LIGHT UNFLAVORED MESONS
($S = C = B = 0$)

NODE=MXXX005

For $I = 1$ (π, b, ρ, a): $u\overline{d}$, $(u\overline{u}-d\overline{d})/\sqrt{2}$, $d\overline{u}$;
for $I = 0$ (η, η', h, h', ω, ϕ, f, f'): $c_1(u\overline{u} + d\overline{d}) + c_2(s\overline{s})$

NODE=MXXX005

NODE=M014

$f_0(500)$

$I^G(J^{PC}) = 0^+(0^{++})$

also known as σ; was $f_0(600)$

See the related review(s):

Scalar Mesons below 1 GeV

$f_0(500)$ T-MATRIX POLE $\sqrt{s}$

NODE=M014PP

Note that $\Gamma \approx 2\ \mathrm{Im}(\sqrt{s_{\mathrm{pole}}})$.

NODE=M014PP

NODE=M014PP

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
(400–550)−*i*(200–350) OUR ESTIMATE (see Fig. 64.3 in the review)				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$(410 \pm 20)-i(240 \pm 15)$	SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma\ (\pi\pi,\ K\overline{K},\ \eta\eta,\ \omega\phi)$
$(512 \pm 15)-i(188 \pm 12)$	[1] ABLIKIM	17	BES3	$J/\psi \to \gamma 3\pi$
$(440 \pm 10)-i(238 \pm 10)$	[2] ALBALADEJO	12	RVUE	Compilation
$(445 \pm 25)-i(278^{+22}_{-18})$	[3,4] GARCIA-MAR...	11	RVUE	Compilation
$(457^{+14}_{-13})-i(279^{+11}_{-7})$	[3,5] GARCIA-MAR...	11	RVUE	Compilation
$(442^{+5}_{-8})-i(274^{+6}_{-5})$	[6] MOUSSALLAM	11	RVUE	Compilation
$(452 \pm 13)-i(259 \pm 16)$	[7] MENNESSIER	10	RVUE	Compilation
$(448 \pm 43)-i(266 \pm 43)$	[8] MENNESSIER	10	RVUE	Compilation
$(455 \pm 6^{+31}_{-13})-i(278 \pm 6^{+34}_{-43})$	[9] CAPRINI	08	RVUE	Compilation
$(463 \pm 6^{+31}_{-17})-i(259 \pm 6^{+33}_{-34})$	[10] CAPRINI	08	RVUE	Compilation
$(552^{+84}_{-106})-i(232^{+81}_{-72})$	[11] ABLIKIM	07A	BES2	$\psi(2S) \to \pi^+\pi^- J/\psi$
$(466 \pm 18)-i(223 \pm 28)$	[12] BONVICINI	07	CLEO	$D^+ \to \pi^-\pi^+\pi^+$
$(472 \pm 30)-i(271 \pm 30)$	[13] BUGG	07A	RVUE	Compilation
$(484 \pm 17)-i(255 \pm 10)$	GARCIA-MAR...	07	RVUE	Compilation
$(430)-i(325)$	[14] ANISOVICH	06	RVUE	Compilation
$(441^{+16}_{-8})-i(272^{+9}_{-12.5})$	[15] CAPRINI	06	RVUE	$\pi\pi \to \pi\pi$
$(470 \pm 50)-i(285 \pm 25)$	[16] ZHOU	05	RVUE	
$(541 \pm 39)-i(252 \pm 42)$	[17] ABLIKIM	04A	BES2	$J/\psi \to \omega\pi^+\pi^-$
$(528 \pm 32)-i(207 \pm 23)$	[18] GALLEGOS	04	RVUE	Compilation
$(533 \pm 25)-i(249 \pm 25)$	[19] BUGG	03	RVUE	
$517 - i240$	BLACK	01	RVUE	$\pi\pi \to \pi\pi$
$(470 \pm 30)-i(295 \pm 20)$	[15] COLANGELO	01	RVUE	$\pi\pi \to \pi\pi$
$(535^{+48}_{-36})-i(155^{+76}_{-53})$	[20] ISHIDA	01		$\Upsilon(3S) \to \Upsilon\pi\pi$
$610 \pm 14 - i(310 \pm 13)$	[21] SUROVTSEV	01	RVUE	$\pi\pi \to \pi\pi,\ K\overline{K}$
$(540^{+36}_{-29})-i(193^{+32}_{-40})$	ISHIDA	00B		$p\overline{p} \to \pi^0\pi^0\pi^0$
$445 - i235$	HANNAH	99	RVUE	π scalar form factor
$(523 \pm 12)-i(259 \pm 7)$	KAMINSKI	99	RVUE	$\pi\pi \to \pi\pi,\ K\overline{K},\ \sigma\sigma$
$442 - i\ 227$	OLLER	99	RVUE	$\pi\pi \to \pi\pi,\ K\overline{K}$
$469 - i203$	OLLER	99B	RVUE	$\pi\pi \to \pi\pi,\ K\overline{K}$
$445 - i221$	OLLER	99C	RVUE	$\pi\pi \to \pi\pi,\ K\overline{K},\ \eta\eta$
$420 - i\ 212$	LOCHER	98	RVUE	$\pi\pi \to \pi\pi\ ,\ K\overline{K}$
$440 - i245$	[22] DOBADO	97	RVUE	Compilation
$(602 \pm 26)-i(196 \pm 27)$	[23] ISHIDA	97		$\pi\pi \to \pi\pi$
$(537 \pm 20)-i(250 \pm 17)$	[24] KAMINSKI	97B	RVUE	$\pi\pi \to \pi\pi,\ K\overline{K},\ 4\pi$
$470 - i250$	[25,26] TORNQVIST	96	RVUE	$\pi\pi \to \pi\pi,\ K\overline{K},\ K\pi,\ \eta\pi$
$387 - i305$	[26,27] JANSSEN	95	RVUE	$\pi\pi \to \pi\pi,\ K\overline{K}$
$420 - i370$	[28] ACHASOV	94	RVUE	$\pi\pi \to \pi\pi$
$(506 \pm 10)-i(247 \pm 3)$	KAMINSKI	94	RVUE	$\pi\pi \to \pi\pi,\ K\overline{K}$

→ UNCHECKED ←

OCCUR=2

OCCUR=2

OCCUR=2

$370-i356$	[29] ZOU	94B	RVUE	$\pi\pi \to \pi\pi, K\overline{K}$	
$408-i342$	[26,29] ZOU	93	RVUE	$\pi\pi \to \pi\pi, K\overline{K}$	
$470-i208$	[30] VANBEVEREN	86	RVUE	$\pi\pi \to \pi\pi, K\overline{K}, \eta\eta, \ldots$	
$(750\pm50)-i(450\pm50)$	[31] ESTABROOKS	79	RVUE	$\pi\pi \to \pi\pi, K\overline{K}$	
$(660\pm100)-i(320\pm70)$	PROTOPOP...	73	HBC	$\pi\pi \to \pi\pi, K\overline{K}$	
$650-i370$	[32] BASDEVANT	72	RVUE	$\pi\pi \to \pi\pi$	

[1] S-matrix pole; 8595 events. NODE=M014PP;LINKAGE=I
[2] Applying the chiral unitary approach at NLO to the K_{e4} data of BATLEY 10 and $\pi N \to \pi\pi N$ data of HYAMS 73, GRAYER 74, and PROTOPOPESCU 73. NODE=M014PP;LINKAGE=AD
[3] Uses the K_{e4} data of BATLEY 10C and the $\pi N \to \pi\pi N$ data of HYAMS 73, GRAYER 74, and PROTOPOPESCU 73. NODE=M014PP;LINKAGE=GM
[4] Analytic continuation using Roy equations. NODE=M014PP;LINKAGE=GR
[5] Analytic continuation using GKPY equations. NODE=M014PP;LINKAGE=GC
[6] Using Roy equations. NODE=M014PP;LINKAGE=MO
[7] Average of three variants of the analytic K-matrix model. Uses the K_{e4} data of BATLEY 08A and the $\pi N \to \pi\pi N$ data of HYAMS 73 and GRAYER 74. NODE=M014PP;LINKAGE=ME
[8] Average of the analyses of three data sets in the K-matrix model. Uses the data of BATLEY 08A, HYAMS 73, and GRAYER 74, partially of COHEN 80 or ETKIN 82B. NODE=M014PP;LINKAGE=MN
[9] From the K_{e4} data of BATLEY 08A and $\pi N \to \pi\pi N$ data of HYAMS 73. NODE=M014PP;LINKAGE=CA
[10] From the K_{e4} data of BATLEY 08A and $\pi N \to \pi\pi N$ data of PROTOPOPESCU 73, GRAYER 74, and ESTABROOKS 74. NODE=M014PP;LINKAGE=AP
[11] From a mean of three different $f_0(500)$ parametrizations. Uses 40k events. NODE=M014PP;LINKAGE=AL
[12] From an isobar model using 2.6k events. NODE=M014PP;LINKAGE=BO
[13] Reanalysis of ABLIKIM 04A, PISLAK 01, and HYAMS 73 data. NODE=M014PP;LINKAGE=BU
[14] Using the N/D method. NODE=M014PP;LINKAGE=AN
[15] From the solution of the Roy equation (ROY 71) for the isoscalar S-wave and using a phase-shift analysis of HYAMS 73 and PROTOPOPESCU 73 data. NODE=M014PP;LINKAGE=CL
[16] Reanalysis of the data from PROTOPOPESCU 73, ESTABROOKS 74, GRAYER 74, ROSSELET 77, PISLAK 03, and AKHMETSHIN 04. NODE=M014PP;LINKAGE=ZH
[17] From a mean of six different analyses and $f_0(500)$ parameterizations. NODE=M014PP;LINKAGE=AB
[18] Using data on $\psi(2S) \to J/\psi\pi\pi$ from BAI 00E and on $\Upsilon(\mathrm{nS}) \to \Upsilon(\mathrm{mS})\pi\pi$ from BUTLER 94B and ALEXANDER 98. NODE=M014PP;LINKAGE=GA
[19] From a combined analysis of HYAMS 73, AUGUSTIN 89, AITALA 01B, and PISLAK 01. NODE=M014PP;LINKAGE=PS
[20] A similar analysis (KOMADA 01) finds $(580^{+79}_{-30})-i(190^{+107}_{-49})$ MeV. NODE=M014PP;LINKAGE=KI
[21] Coupled channel reanalysis of BATON 70, BENSINGER 71, BAILLON 72, HYAMS 73, HYAMS 75, ROSSELET 77, COHEN 80, and ETKIN 82B using the uniformizing variable. NODE=M014PP;LINKAGE=SU
[22] Using the inverse amplitude method and data of ESTABROOKS 73, GRAYER 74, and PROTOPOPESCU 73. NODE=M014PP;LINKAGE=DO
[23] Reanalysis of data from HYAMS 73, GRAYER 74, SRINIVASAN 75, and ROSSELET 77 using the interfering amplitude method. NODE=M014PP;LINKAGE=AA
[24] Average and spread of 4 variants ("up" and "down") of KAMINSKI 97B 3-channel model. NODE=M014PP;LINKAGE=E
[25] Uses data from BEIER 72B, OCHS 73, HYAMS 73, GRAYER 74, ROSSELET 77, CASON 83, ASTON 88, and ARMSTRONG 91B. Coupled channel analysis with flavor symmetry and all light two-pseudoscalars systems. NODE=M014PP;LINKAGE=B
[26] Demonstrates explicitly that $f_0(500)$ and $f_0(1370)$ are two different poles. NODE=M014PP;LINKAGE=G
[27] Analysis of data from FALVARD 88. NODE=M014PP;LINKAGE=C
[28] Analysis of data from OCHS 73, ESTABROOKS 75, ROSSELET 77, and MUKHIN 80. NODE=M014PP;LINKAGE=D
[29] Analysis of data from OCHS 73, GRAYER 74, and ROSSELET 77. NODE=M014PP;LINKAGE=F
[30] Coupled-channel analysis using data from PROTOPOPESCU 73, HYAMS 73, HYAMS 75, GRAYER 74, ESTABROOKS 74, ESTABROOKS 75, FROGGATT 77, CORDEN 79, BISWAS 81. NODE=M014PP;LINKAGE=BV
[31] Analysis of data from APEL 72C, GRAYER 74, CASON 76, PAWLICKI 77. Includes spread and errors of 4 solutions. NODE=M014PP;LINKAGE=A
[32] Analysis of data from BATON 70, BENSINGER 71, COLTON 71, BAILLON 72,PROTOPOPESCU 73, and WALKER 67. NODE=M014PP;LINKAGE=J

$f_0(500)$ BREIT-WIGNER MASS

NODE=M014M

NODE=M014M
→ UNCHECKED ←

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
400 to 800 OUR ESTIMATE				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
513 ± 32	[33] MURAMATSU	02	CLEO	$e^+e^- \approx$ 10 GeV
$478^{+24}_{-23}\pm17$	AITALA	01B	E791	$D^+ \to \pi^-\pi^+\pi^+$
563^{+58}_{-29}	[34] ISHIDA	01		$\Upsilon(3S) \to \Upsilon\pi\pi$
555	[35] ASNER	00	CLE2	$\tau^- \to \pi^-\pi^0\pi^0\nu_\tau$
540 ± 36	ISHIDA	00B		$p\overline{p} \to \pi^0\pi^0\pi^0$
$750\pm\ 4$	ALEKSEEV	99	SPEC	$1.78\ \pi^- p_{\mathrm{polar}} \to \pi^-\pi^+ n$
$744\pm\ 5$	ALEKSEEV	98	SPEC	$1.78\ \pi^- p_{\mathrm{polar}} \to \pi^-\pi^+ n$

759 ± 5	[36] TROYAN	98		5.2 $np \to np\pi^+\pi^-$
780 ± 30	ALDE	97	GAM2	450 $pp \to pp\pi^0\pi^0$
585 ± 20	[37] ISHIDA	97		$\pi\pi \to \pi\pi$
761 ± 12	[38] SVEC	96	RVUE	6–17 $\pi N_{polar} \to \pi^+\pi^- N$
~ 860	[39,40] TORNQVIST	96	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$, $K\pi$, $\eta\pi$
1165 ± 50	[41,42] ANISOVICH	95	RVUE	$\pi^- p \to \pi^0\pi^0 n$, $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\pi^0\eta$, $\pi^0\eta\eta$
414 ± 20	[38] AUGUSTIN	89	DM2	

[33] Statistical uncertainty only. NODE=M014M;LINKAGE=UT

[34] A similar analysis (KOMADA 01) finds 526^{+48}_{-37} MeV. NODE=M014M;LINKAGE=KI

[35] From the best fit of the Dalitz plot. NODE=M014M;LINKAGE=KK

[36] 6σ effect, no PWA. NODE=M014M;LINKAGE=TN

[37] Reanalysis of data from HYAMS 73, GRAYER 74, SRINIVASAN 75, and ROSSELET 77 using the interfering amplitude method. NODE=M014M;LINKAGE=AA

[38] Breit-Wigner fit to S-wave intensity measured in $\pi N \to \pi^-\pi^+ N$ on polarized targets. The fit does not include $f_0(980)$. NODE=M014M;LINKAGE=E

[39] Uses data from ASTON 88, OCHS 73, HYAMS 73, ARMSTRONG 91B, GRAYER 74, CASON 83, ROSSELET 77, and BEIER 72B. Coupled channel analysis with flavor symmetry and all light two-pseudoscalars systems. NODE=M014M;LINKAGE=B

[40] Also observed by ASNER 00 in $\tau^- \to \pi^-\pi^0\pi^0\nu_\tau$ decays. NODE=M014M;LINKAGE=GG

[41] Uses $\pi^0\pi^0$ data from ANISOVICH 94, AMSLER 94D, and ALDE 95B, $\pi^+\pi^-$ data from OCHS 73, GRAYER 74 and ROSSELET 77, and $\eta\eta$ data from ANISOVICH 94. NODE=M014M;LINKAGE=F

[42] The pole is on Sheet III. Demonstrates explicitly that $f_0(500)$ and $f_0(1370)$ are two different poles. NODE=M014M;LINKAGE=G

$f_0(500)$ BREIT-WIGNER WIDTH

NODE=M014W

NODE=M014W

→ UNCHECKED ←

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
100 to 800 OUR ESTIMATE				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
335 ± 67	[43] MURAMATSU	02	CLEO	$e^+e^- \approx$ 10 GeV
$324^{+42}_{-40} \pm 21$	AITALA	01B	E791	$D^+ \to \pi^-\pi^+\pi^+$
372^{+229}_{-95}	[44] ISHIDA	01		$\Upsilon(3S) \to \Upsilon\pi\pi$
540	[45] ASNER	00	CLE2	$\tau^- \to \pi^-\pi^0\pi^0\nu_\tau$
372 ± 80	ISHIDA	00B		$p\overline{p} \to \pi^0\pi^0\pi^0$
119 ± 13	ALEKSEEV	99	SPEC	1.78 $\pi^- p_{polar} \to \pi^-\pi^+ n$
77 ± 22	ALEKSEEV	98	SPEC	1.78 $\pi^- p_{polar} \to \pi^-\pi^+ n$
35 ± 12	[46] TROYAN	98		5.2 $np \to np\pi^+\pi^-$
780 ± 60	ALDE	97	GAM2	450 $pp \to pp\pi^0\pi^0$
385 ± 70	[47] ISHIDA	97		$\pi\pi \to \pi\pi$
290 ± 54	[48] SVEC	96	RVUE	6–17 $\pi N_{polar} \to \pi^+\pi^- N$
~ 880	[49,50] TORNQVIST	96	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$, $K\pi$, $\eta\pi$
460 ± 40	[51,52] ANISOVICH	95	RVUE	$\pi^- p \to \pi^0\pi^0 n$, $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\pi^0\eta$, $\pi^0\eta\eta$
494 ± 58	[48] AUGUSTIN	89	DM2	

[43] Statistical uncertainty only. NODE=M014W;LINKAGE=UT

[44] A similar analysis (KOMADA 01) finds 301^{+145}_{-100} MeV. NODE=M014W;LINKAGE=KI

[45] From the best fit of the Dalitz plot. NODE=M014W;LINKAGE=KK

[46] 6σ effect, no PWA. NODE=M014W;LINKAGE=TN

[47] Reanalysis of data from HYAMS 73, GRAYER 74, SRINIVASAN 75, and ROSSELET 77 using the interfering amplitude method. NODE=M014W;LINKAGE=AA

[48] Breit-Wigner fit to S-wave intensity measured in $\pi N \to \pi^-\pi^+ N$ on polarized targets. The fit does not include $f_0(980)$. NODE=M014W;LINKAGE=E

[49] Uses data from ASTON 88, OCHS 73, HYAMS 73, ARMSTRONG 91B, GRAYER 74, CASON 83, ROSSELET 77, and BEIER 72B. Coupled channel analysis with flavor symmetry and all light two-pseudoscalars systems. NODE=M014W;LINKAGE=B

[50] Also observed by ASNER 00 in $\tau^- \to \pi^-\pi^0\pi^0\nu_\tau$ decays. NODE=M014W;LINKAGE=GG

[51] Uses $\pi^0\pi^0$ data from ANISOVICH 94, AMSLER 94D, and ALDE 95B, $\pi^+\pi^-$ data from OCHS 73, GRAYER 74 and ROSSELET 77, and $\eta\eta$ data from ANISOVICH 94. NODE=M014W;LINKAGE=F

[52] The pole is on Sheet III. Demonstrates explicitly that $f_0(500)$ and $f_0(1370)$ are two different poles. NODE=M014W;LINKAGE=G

$f_0(500)$ DECAY MODES

NODE=M014215;NODE=M014

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\pi\pi$	seen	DESIG=1;OUR EST;→ UNCHECKED ←
Γ_2	$\gamma\gamma$	seen	DESIG=5;OUR EST;→ UNCHECKED ←

$f_0(500)$ PARTIAL WIDTHS

NODE=M014220

$\Gamma(\gamma\gamma)$ Γ_2

NODE=M014W2
NODE=M014W2

• • • We do not use the following data for averages, fits, limits, etc. • • •

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
2.05 ± 0.21	[53] DAI	14A	RVUE	Compilation
$1.7\ \pm0.4$	[54] HOFERICHT...	11	RVUE	Compilation
3.08 ± 0.82	[55] MENNESSIER	11	RVUE	Compilation
$2.08\pm0.2\ ^{+0.07}_{-0.04}$	[56] MOUSSALLAM	11	RVUE	Compilation
2.08	[57] MAO	09	RVUE	Compilation
$1.2\ \pm0.4$	[58] BERNABEU	08	RVUE	
$3.9\ \pm0.6$	[55] MENNESSIER	08	RVUE	$\gamma\gamma\rightarrow\ \pi^+\pi^-,\ \pi^0\pi^0$
$1.8\ \pm0.4$	[59] OLLER	08	RVUE	Compilation
1.68 ± 0.15	[59,60] OLLER	08A	RVUE	Compilation
$3.1\ \pm0.5$	[61,62] PENNINGTON	08	RVUE	Compilation
$2.4\ \pm0.4$	[62,63] PENNINGTON	08	RVUE	Compilation
$4.1\ \pm0.3$	[64] PENNINGTON	06	RVUE	$\gamma\gamma\rightarrow\ \pi^0\pi^0$
$3.8\ \pm1.5$	[65,66] BOGLIONE	99	RVUE	$\gamma\gamma\rightarrow\ \pi^+\pi^-,\ \pi^0\pi^0$
$5.4\ \pm2.3$	[65] MORGAN	90	RVUE	$\gamma\gamma\rightarrow\ \pi^+\pi^-,\ \pi^0\pi^0$
$10\ \ \pm6$	COURAU	86	DM1	$e^+e^-\rightarrow\ \pi^+\pi^-e^+e^-$

OCCUR=2

[53] Using dispersive analysis with phases from GARCIA-MARTIN 11A and BUETTIKER 04 as input. NODE=M014W2;LINKAGE=B

[54] Using Roy-Steiner equations with $\pi\pi$ phase shifts from an update of COLANGELO 01 and from GARCIA-MARTIN 11A. NODE=M014W2;LINKAGE=HO

[55] Using an analytic K-matrix model. NODE=M014W2;LINKAGE=ME

[56] Using dispersion integral with phase input from Roy equations and data from MARSISKE 90, BOYER 90, BEHREND 92, UEHARA 08A, and MORI 07. NODE=M014W2;LINKAGE=MO

[57] Used dispersion theory. The value quoted used the $f_0(500)$ pole position of $457-i276$ MeV. NODE=M014W2;LINKAGE=MA

[58] Using p, n polarizabilities from PDG 06 and fitting to $\pi\pi$ phase motion from GARCIA-MARTIN 07 and σ-poles from GARCIA-MARTIN 07 and CAPRINI 06. NODE=M014W2;LINKAGE=BE

[59] Using twice-subtracted dispersion integrals. NODE=M014W2;LINKAGE=OL

[60] Supersedes OLLER 08. NODE=M014W2;LINKAGE=LL

[61] Solution A (preferred solution based on χ^2-analysis). NODE=M014W2;LINKAGE=P1

[62] Dispersion theory based amplitude analysis of BOYER 90, MARSISKE 90, BEHREND 92, and MORI 07. NODE=M014W2;LINKAGE=P3

[63] Solution B (worse than solution A; still acceptable when systematic uncertainties are included). NODE=M014W2;LINKAGE=P2

[64] Using unitarity and the σ pole position from CAPRINI 06. NODE=M014W2;LINKAGE=PE

[65] This width could equally well be assigned to the $f_0(1370)$. The authors analyse data from BOYER 90 and MARSISKE 90 and report strong correlation with $\gamma\gamma$ width of $f_2(1270)$. NODE=M014W2;LINKAGE=A

[66] Supersedes MORGAN 90. NODE=M014W2;LINKAGE=BL

$f_0(500)$ REFERENCES

NODE=M014

SARANTSEV	21	PL B816 136227	A.V. Sarantsev *et al.*	(BONN, PNPI)	REFID=61091
ABLIKIM	17	PRL 118 012001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57650
DAI	14A	PR D90 036004	L.-Y. Dai, M.R. Pennington	(CEBAF)	REFID=55923
ALBALADEJO	12	PR D86 034003	M. Albaladejo, J.A. Oller	(MURC)	REFID=54277
GARCIA-MAR...	11	PRL 107 072001	R. Garcia-Martin *et al.*	(MADR, CRAC)	REFID=16761
GARCIA-MAR...	11A	PR D83 074004	R. Garcia-Martin *et al.*	(MADR, CRAC)	REFID=54121
HOFERICHT...	11	EPJ C71 1743	M. Hoferichter, D.R. Phillips, C. Schat	(BONN+)	REFID=53966
MENNESSIER	11	PL B696 40	G. Mennessier, S. Narison, X.-G. Wang		REFID=53637
MOUSSALLAM	11	EPJ C71 1814	B. Moussallam		REFID=53975
BATLEY	10	PL B686 101	J.R. Batley *et al.*	(CERN NA48/2 Collab.)	REFID=53285
BATLEY	10C	EPJ C70 635	J.R. Batley *et al.*	(CERN NA48/2 Collab.)	REFID=53567
MENNESSIER	10	PL B688 59	G. Mennessier, S. Narison, X.-G. Wang		REFID=53657
MAO	09	PR D79 116008	Y. Mao *et al.*		REFID=52992
BATLEY	08A	EPJ C54 411	J.R. Batley *et al.*	(CERN NA48/2 Collab.)	REFID=52487
BERNABEU	08	PRL 100 241804	J. Bernabeu, J. Prades	(IFIC, GRAN)	REFID=52271
CAPRINI	08	PR D77 114019	I. Caprini		REFID=52273
MENNESSIER	08	PL B665 205	G. Mennessier, S. Narison, W. Ochs		REFID=52299
OLLER	08	PL B659 201	J.A. Oller, L. Roca, C. Schat	(MURC, UBA)	REFID=53976
OLLER	08A	EPJ A37 15	J.A. Oller, L. Roca	(MURC)	REFID=53977
PENNINGTON	08	EPJ C56 1	M.R. Pennington *et al.*		REFID=52303
UEHARA	08A	PR D78 052004	S. Uehara *et al.*	(BELLE Collab.)	REFID=52309
ABLIKIM	07A	PL B645 19	M. Ablikim *et al.*	(BES Collab.)	REFID=51614
BONVICINI	07	PR D76 012001	G. Bonvicini *et al.*	(CLEO Collab.)	REFID=51721
BUGG	07A	JP G34 151	D.V. Bugg *et al.*		REFID=53252
GARCIA-MAR...	07	PR D76 074034	R. Garcia-Martin, J.R. Pelaez, F.J. Yndurain		REFID=51949

MORI	07	PR D75 051101	T. Mori *et al.*	(BELLE Collab.)	REFID=51652
ANISOVICH	06	IJMP A21 3615	V.V. Anisovich		REFID=51137
CAPRINI	06	PRL 96 132001	I. Caprini, G. Colangelo, H. Leutwyler	(BCIP+)	REFID=51076
PDG	06	JP G33 1	W.-M. Yao *et al.*	(PDG Collab.)	REFID=51004
PENNINGTON	06	PRL 97 011601	M.R. Pennington		REFID=51184
ZHOU	05	JHEP 0502 043	Z.Y. Zhou *et al.*		REFID=50823
ABLIKIM	04A	PL B598 149	M. Ablikim *et al.*	(BES Collab.)	REFID=49740
AKHMETSHIN	04	PL B578 285	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=49609
BUETTIKER	04	EPJ C33 409	P. Buettiker, S. Descotes-Genon, B. Moussallam		REFID=56428;ERROR=1
GALLEGOS	04	PR D69 074033	A. Gallegos *et al.*		REFID=49769
BUGG	03	PL B572 1	D.V. Bugg		REFID=49586
PISLAK	03	PR D67 072004	S. Pislak *et al.*	(BNL E865 Collab.)	REFID=49344
Also		PR D81 119903E	S. Pislak *et al.*	(BNL E865 Collab.)	REFID=53337
MURAMATSU	02	PRL 89 251802	H. Muramatsu *et al.*	(CLEO Collab.)	REFID=49081
Also		PRL 90 059901 (errat.)	H. Muramatsu *et al.*	(CLEO Collab.)	REFID=49385
AITALA	01B	PRL 86 770	E.M. Aitala *et al.*	(FNAL E791 Collab.)	REFID=48005
BLACK	01	PR D64 014031	D. Black *et al.*		REFID=48314
COLANGELO	01	NP B603 125	G. Colangelo, J. Gasser, H. Leytwyler		REFID=49180
ISHIDA	01	PL B518 47	M. Ishida *et al.*		REFID=48354
KOMADA	01	PL B508 31	T. Komada *et al.*		REFID=48541
PISLAK	01	PRL 87 221801	S. Pislak *et al.*	(BNL E865 Collab.)	REFID=48433
Also		PR D67 072004	S. Pislak *et al.*	(BNL E865 Collab.)	REFID=49344
Also		PRL 105 019901E	S. Pislak *et al.*	(BNL E865 Collab.)	REFID=53338
SUROVTSEV	01	PR D63 054024	Y.S. Surovtsev, D. Krupa, M. Nagy		REFID=48310
ASNER	00	PR D61 012002	D.M. Asner *et al.*	(CLEO Collab.)	REFID=47339
BAI	00E	PR D62 032002	J. Bai *et al.*	(BES Collab.)	REFID=47955
ISHIDA	00B	PTP 104 203	M. Ishida *et al.*		REFID=48358
ALEKSEEV	99	NP B541 3	I.G. Alekseev *et al.*		REFID=46614
BOGLIONE	99	EPJ C9 11	M. Boglione, M.R. Pennington		REFID=46931
HANNAH	99	PR D60 017502	T. Hannah		REFID=46935
KAMINSKI	99	EPJ C9 141	R. Kaminski, L. Lesniak, B. Loiseau	(CRAC, PARIN)	REFID=46927
OLLER	99	PR D60 099906 (erratum)	J.A. Oller *et al.*		REFID=46899
OLLER	99B	NP A652 407 (erratum)	J.A. Oller, E. Oset		REFID=46924
OLLER	99C	PR D60 074023	J.A. Oller, E. Oset		REFID=47386
ALEKSEEV	98	PAN 61 174	I.G. Alekseev *et al.*		REFID=46328
ALEXANDER	98	PR D58 052004	J.P. Alexander *et al.*	(CLEO Collab.)	REFID=46329
LOCHER	98	EPJ C4 317	M.P. Locher *et al.*	(PSI)	REFID=46372
TROYAN	98	JINRRC 5-91 33	Yu. Troyan *et al.*		REFID=46615
ALDE	97	PL B397 350	D.M. Alde *et al.*	(GAMS Collab.)	REFID=45392
DOBADO	97	PR D56 3057	A. Dobado, J.R. Pelaez		REFID=53964
ISHIDA	97	PTP 98 1005	S. Ishida *et al.*	(TOKY, MIYA, KEK)	REFID=45998
KAMINSKI	97B	PL B413 130	R. Kaminski, L. Lesniak, B. Loiseau	(CRAC, IPN)	REFID=45778
Also		PTP 95 745	S. Ishida *et al.*	(TOKY, MIYA, KEK)	REFID=45770
SVEC	96	PR D53 2343	M. Svec	(MCGI)	REFID=44509
TORNQVIST	96	PRL 76 1575	N.A. Tornqvist, M. Roos	(HELS)	REFID=44507
ALDE	95B	ZPHY C66 375	D.M. Alde *et al.*	(GAMS Collab.)	REFID=44375
ANISOVICH	95	PL B355 363	V.V. Anisovich *et al.*	(PNPI, SERP)	REFID=44442
JANSSEN	95	PR D52 2690	G. Janssen *et al.*	(STON, ADLD, JULI)	REFID=44508
ACHASOV	94	PR D49 5779	N.N. Achasov, G.N. Shestakov	(NOVM)	REFID=44087
AMSLER	94D	PL B333 277	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=44093
ANISOVICH	94	PL B323 233	V.V. Anisovich *et al.*	(Crystal Barrel Collab.)	REFID=43659
BUTLER	94B	PR D49 40	F. Butler *et al.*	(CLEO Collab.)	REFID=43799
KAMINSKI	94	PR D50 3145	R. Kaminski, L. Lesniak, J.P. Maillet	(CRAC+)	REFID=45771
ZOU	94B	PR D50 591	B.S. Zou, D.V. Bugg	(LOQM)	REFID=44072
ZOU	93	PR D48 3948	B.S. Zou, D.V. Bugg	(LOQM)	REFID=43672
BEHREND	92	ZPHY C56 381	H.J. Behrend	(CELLO Collab.)	REFID=43172
ARMSTRONG	91B	ZPHY C52 389	T.A. Armstrong *et al.*	(ATHU, BARI, BIRM+)	REFID=41862
BOYER	90	PR D42 1350	J. Boyer *et al.*	(Mark II Collab.)	REFID=41362
MARSISKE	90	PR D41 3324	H. Marsiske *et al.*	(Crystal Ball Collab.)	REFID=41351
MORGAN	90	ZPHY C48 623	D. Morgan, M.R. Pennington	(RAL, DURH)	REFID=41583
AUGUSTIN	89	NP B320 1	J.E. Augustin, G. Cosme	(DM2 Collab.)	REFID=41004
ASTON	88	NP B296 493	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)	REFID=40262
FALVARD	88	PR D38 2706	A. Falvard *et al.*	(CLER, FRAS, LALO+)	REFID=40576
COURAU	86	NP B271 1	A. Courau *et al.*	(CLER, LALO)	REFID=44510
VANBEVEREN	86	ZPHY C30 615	E. van Beveren *et al.*	(NIJM, BIEL)	REFID=45769
CASON	83	PR D28 1586	N.M. Cason *et al.*	(NDAM, ANL)	REFID=20752
ETKIN	82B	PR D25 1786	A. Etkin *et al.*	(BNL, CUNY, TUFTS, VAND)	REFID=20390
BISWAS	81	PRL 47 1378	N.N. Biswas *et al.*	(NDAM, ANL)	REFID=21106
COHEN	80	PR D22 2595	D. Cohen *et al.*	(ANL) IJP	REFID=20381
MUKHIN	80	JETPL 32 601 Translated from ZETFP 32 616.	K.N. Mukhin *et al.*	(KIAE)	REFID=44528
CORDEN	79	NP B157 250	M.J. Corden *et al.*	(BIRM, RHEL, TELA+) JP	REFID=20374
ESTABROOKS	79	PR D19 2678	P. Estabrooks	(CARL)	REFID=20375
FROGGATT	77	NP B129 89	C.D. Froggatt, J.L. Petersen	(GLAS, NORD)	REFID=21072
PAWLICKI	77	PR D15 3196	A.J. Pawlicki *et al.*	(ANL) IJ	REFID=20367
ROSSELET	77	PR D15 574	L. Rosselet *et al.*	(GEVA, SACL)	REFID=11004
CASON	76	PRL 36 1485	N.M. Cason *et al.*	(NDAM, ANL) IJ	REFID=21064
ESTABROOKS	75	NP B95 322	P.G. Estabrooks, A.D. Martin	(DURH)	REFID=20642
HYAMS	75	NP B100 205	B.D. Hyams *et al.*	(CERN, MPIM)	REFID=20355
SRINIVASAN	75	PR D12 681	V. Srinivasan *et al.*	(NDAM, ANL)	REFID=21062
ESTABROOKS	74	NP B79 301	P.G. Estabrooks, A.D. Martin	(DURH)	REFID=20111
GRAYER	74	NP B75 189	G. Grayer *et al.*	(CERN, MPIM)	REFID=20113
ESTABROOKS	73	Tallahassee	P.G. Estabrooks *et al.*	(CERN, MPIM)	REFID=20345
HYAMS	73	NP B64 134	B.D. Hyams *et al.*	(CERN, MPIM)	REFID=20107
OCHS	73	Thesis	W. Ochs	(MPIM, MUNI)	REFID=20349
PROTOPOP...	73	PR D7 1279	S.D. Protopopescu *et al.*	(LBL)	REFID=20108
APEL	72C	PL 41B 542	W.D. Apel *et al.*	(KARLK, KARLE, PISA)	REFID=21013
BAILLON	72	PL 38B 555	P.H. Baillon *et al.*	(SLAC)	REFID=20093
BASDEVANT	72	PL 41B 178	J.L. Basdevant, C.D. Froggatt, J.L. Petersen	(CERN)	REFID=20095
BEIER	72B	PRL 29 511	E.W. Beier *et al.*	(PENN)	REFID=44530
BENSINGER	71	PL 36B 134	J.R. Bensinger *et al.*	(WISC)	REFID=21006
COLTON	71	PR D3 2028	E.P. Colton *et al.*	(LBL, FNAL, UCLA+)	REFID=44533
ROY	71	PL 36B 353	S.M. Roy		REFID=51107
BATON	70	PL 33B 528	J.P. Baton, G. Laurens, J. Reignier	(SACL)	REFID=20086
WALKER	67	RMP 39 695	W.D. Walker	(WISC)	REFID=20960

NODE=M009

$\rho(770)$

$I^G(J^{PC}) = 1^+(1^{--})$

NODE=M009

THE $\rho(770)$

Updated September 2019 by S. Eidelman (Novosibirsk) and G. Venanzoni (Pisa).

The determination of the parameters of the $\rho(770)$ is beset with many difficulties because of its large width. In physical region fits, the line shape does not correspond to a relativistic Breit-Wigner function with a P-wave width, but requires some additional shape parameter. This dependence on parameterization was demonstrated long ago [1]. Bose-Einstein correlations are another source of shifts in the $\rho(770)$ line shape, particularly in multiparticle final-state systems [2].

The same model dependence afflicts any other source of resonance parameters, such as the energy dependence of the phase shift δ_1^1, or the pole position. It is, therefore, not surprising that a study of $\rho(770)$ dominance in the decays of the η and η' reveals the need for specific dynamical effects, in addition to the $\rho(770)$ pole [3,4].

The cleanest determination of the $\rho(770)$ mass and width comes from e^+e^- annihilation and τ-lepton decays. Analysis of ALEPH [5] showed that the charged $\rho(770)$ parameters measured from τ-lepton decays are consistent with those of the neutral one determined from e^+e^- data [6]. This conclusion is qualitatively supported by the later studies of CLEO [7] and Belle [8]. However, comparison of the two-pion mass spectrum in τ decays from OPAL [9], CLEO [7], and ALEPH [10,11], and the $e^+e^- \to \pi^+\pi^-$ cross section from CMD-2 [12,13], showed significant discrepancies between the two shapes which can be as high as 10% above the ρ meson [14,15]. This discrepancy remains after measurements of the two-pion cross section in e^+e^- annihilation at KLOE [16,17,18,19], SND [20,21], BaBar [22] and, more recently BESIII [23] The effect is not accounted for by isospin breaking [24,25,26,27], but the accuracy of its calculation may be overestimated [28,29].

This problem seems to be solved after a recent analysis in [30] which showed that after correcting the τ data for the missing $\rho-\gamma$ mixing contribution, besides the other known isospin symmetry violating corrections, the $\pi\pi$ I=1 part of the hadronic vacuum polarization contribution to the muon g$-$2 is fully compatible between τ based and e^+e^- based evaluations.

The global fit of the whole set of the ρ, ω, and ϕ decays, taking into account mixing effects in the hidden local symmetry model, also showed consistency of the data on τ decays to two pions and e^+e^- annihilation [31,32]. However, because of the progress in e^+e^- data, the τ input is now less precise and less reliable due to additional theoretical uncertainties [33] decreasing importance of τ versus e^+e^- comparison for the determination of $\rho(770)$ parameters and other applications, like, e.g., calculations of hadronic vacuum polarization.

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ρ(770) T-MATRIX POLE $\sqrt{s}$

NODE=M009PP

NODE=M009PP

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$(761^{+4}_{-3}) - i(71.7^{+1.9}_{-2.3})$	[1] GARCIA-MAR..11		RVUE	Compilation	
$(763.7^{+1.7}_{-1.5}) - i(73.2^{+1.0}_{-1.1})$	[2] GARCIA-MAR..11		RVUE	Compilation	OCCUR=2
$(754 \pm 18) - i(74 \pm 10)$	[3] PELAEZ	04A	RVUE	$\pi\pi \to \pi\pi$	OCCUR=2

[1] Reanalysis of the K_{e4} data of BATLEY 10C and the $\pi N \to \pi\pi N$ data of HYAMS 73, GRAYER 74, and PROTOPOPESCU 73 using Roy equations. NODE=M009PP;LINKAGE=A

[2] Reanalysis of the K_{e4} data of BATLEY 10C and the $\pi N \to \pi\pi N$ data of HYAMS 73, GRAYER 74, and PROTOPOPESCU 73 using GKPY equations. NODE=M009PP;LINKAGE=C

[3] Reanalysis of data from PROTOPOPESCU 73, ESTABROOKS 74, GRAYER 74, and COHEN 80 in the unitarized ChPT model. NODE=M009PP;LINKAGE=B

ρ(770) MASS

NODE=M009205

We no longer list S-wave Breit-Wigner fits, or data with high combinatorial background.

NODE=M009205

NEUTRAL ONLY, e^+e^-

NODE=M009M0
NODE=M009M0

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*	
775.26±0.23 OUR AVERAGE						
775.3 ±0.5 ±0.6		[1] ACHASOV	21	SND	$e^+e^- \to \pi^+\pi^-$	
775.02±0.35		[2] LEES	12G	BABR	$e^+e^- \to \pi^+\pi^-\gamma$	
775.97±0.46±0.70	900k	[3] AKHMETSHIN	07		$e^+e^- \to \pi^+\pi^-$	
774.6 ±0.4 ±0.5	800k	[4,5] ACHASOV	06	SND	$e^+e^- \to \pi^+\pi^-$	
775.65±0.64±0.50	114k	[6,7] AKHMETSHIN	04	CMD2	$e^+e^- \to \pi^+\pi^-$	
775.9 ±0.5 ±0.5	1.98M	[8] ALOISIO	03	KLOE	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	
775.8 ±0.9 ±2.0	500k	[8] ACHASOV	02	SND	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	
775.9 ±1.1		[9] BARKOV	85	OLYA	$e^+e^- \to \pi^+\pi^-$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
763.49±0.53		[10] BARTOS	17	RVUE	$e^+e^- \to \pi^+\pi^-$	
758.23±0.46		[11] BARTOS	17A	RVUE	$e^+e^- \to \pi^+\pi^-$	
775.8 ±0.5 ±0.3	1.98M	[12] ALOISIO	03	KLOE	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	OCCUR=2
775.9 ±0.6 ±0.5	1.98M	[13] ALOISIO	03	KLOE	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	OCCUR=3
775.0 ±0.6 ±1.1	500k	[14] ACHASOV	02	SND	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	OCCUR=3
775.1 ±0.7 ±5.3		[15] BENAYOUN	98	RVUE	$e^+e^- \to \pi^+\pi^-$, $\mu^+\mu^-$	
770.5 ±1.9 ±5.1		[16] GARDNER	98	RVUE	0.28–0.92 $e^+e^- \to \pi^+\pi^-$	
764.1 ±0.7		[17] O'CONNELL	97	RVUE	$e^+e^- \to \pi^+\pi^-$	
757.5 ±1.5		[18] BERNICHA	94	RVUE	$e^+e^- \to \pi^+\pi^-$	
768 ±1		[19] GESHKEN...	89	RVUE	$e^+e^- \to \pi^+\pi^-$	

[1] From a fit of the cross section in the energy range 0.525 < $\sqrt{s}$ < 0.883 GeV parameterized by the sum of the Breit-Wigner amplitudes for the ρ(770), ω and ρ(1450) resonances. NODE=M009M0;LINKAGE=D

[2] Using the GOUNARIS 68 parametrization with the complex phase of the $\rho-\omega$ interference and leaving the masses and widths of the ρ(1450), ρ(1700), and ρ(2150) resonances as free parameters of the fit. NODE=M009M0;LINKAGE=LE

[3] A combined fit of AKHMETSHIN 07, AULCHENKO 06, and AULCHENKO 05. NODE=M009M0;LINKAGE=AK

[4] Supersedes ACHASOV 05A. NODE=M009M0;LINKAGE=AC

[5] A fit of the SND data from 400 to 1000 MeV using parameters of the ρ(1450) and ρ(1700) from a fit of the data of BARKOV 85, BISELLO 89 and ANDERSON 00A. NODE=M009M0;LINKAGE=SN

[6] Using the GOUNARIS 68 parametrization with the complex phase of the ρ-ω interference. NODE=M009M0;LINKAGE=GS

[7] Update of AKHMETSHIN 02. NODE=M009M0;LINKAGE=PT

[8] Assuming $m_{\rho^+} = m_{\rho^-}$, $\Gamma_{\rho^+} = \Gamma_{\rho^-}$. NODE=M009M0;LINKAGE=CH

[9] From the GOUNARIS 68 parametrization of the pion form factor. NODE=M009M0;LINKAGE=K

[10] Applies the Unitary & Analytic Model of the pion electromagnetic form factor of DUBNICKA 10 to analyze the data of LEES 12G and ABLIKIM 16C. NODE=M009M0;LINKAGE=A

[11] Applies the Unitary & Analytic Model of the pion electromagnetic form factor of DUBNICKA 10 to analyze the data of ACHASOV 06, AKHMETSHIN 07, AUBERT 09AS, and AMBROSINO 11A. NODE=M009M0;LINKAGE=B

[12] Assuming $m_{\rho^+} = m_{\rho^-} = m_{\rho^0}$, $\Gamma_{\rho^+} = \Gamma_{\rho^-} = \Gamma_{\rho^0}$. NODE=M009M0;LINKAGE=DF

[13] Without limitations on masses and widths. NODE=M009M0;LINKAGE=WO

[14] Assuming $m_{\rho^0} = m_{\rho^\pm}$, $g_{\rho^0 \pi\pi} = g_{\rho^\pm \pi\pi}$. NODE=M009M0;LINKAGE=HC

[15] Using the data of BARKOV 85 in the hidden local symmetry model. NODE=M009M0;LINKAGE=K2

[16] From the fit to $e^+ e^- \rightarrow \pi^+ \pi^-$ data from the compilations of HEYN 81 and BARKOV 85, including the GOUNARIS 68 parametrization of the pion form factor. NODE=M009M0;LINKAGE=G8

[17] A fit of BARKOV 85 data assuming the direct $\omega\pi\pi$ coupling. NODE=M009M0;LINKAGE=AB

[18] Applying the S-matrix formalism to the BARKOV 85 data. NODE=M009M0;LINKAGE=AA

[19] Includes BARKOV 85 data. Model-dependent width definition. NODE=M009M0;LINKAGE=F

CHARGED ONLY, τ DECAYS and $e^+ e^-$

NODE=M009M5
NODE=M009M5

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT	
775.11±0.34 OUR AVERAGE							
774.6 ±0.2 ±0.5	5.4M	[1,2] FUJIKAWA	08	BELL	±	$\tau^- \rightarrow \pi^- \pi^0 \nu_\tau$	
775.5 ±0.7		[2,3] SCHAEL	05C	ALEP		$\tau^- \rightarrow \pi^- \pi^0 \nu_\tau$	
775.5 ±0.5 ±0.4	1.98M	[4] ALOISIO	03	KLOE		1.02 $e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$	
775.1 ±1.1 ±0.5	87k	[5,6] ANDERSON	00A	CLE2		$\tau^- \rightarrow \pi^- \pi^0 \nu_\tau$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
761.60±0.95		[7] BARTOS	17A	RVUE		$\tau^- \rightarrow \pi^- \pi^0 \nu_\tau$	
774.8 ±0.6 ±0.4	1.98M	[8] ALOISIO	03	KLOE	−	1.02 $e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$	OCCUR=2
776.3 ±0.6 ±0.7	1.98M	[8] ALOISIO	03	KLOE	+	1.02 $e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$	OCCUR=3
773.9 ±2.0 $^{+0.3}_{-1.0}$		[9] SANZ-CILLERO	03	RVUE		$\tau^- \rightarrow \pi^- \pi^0 \nu_\tau$	
774.5 ±0.7 ±1.5	500k	[4] ACHASOV	02	SND	±	1.02 $e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$	OCCUR=2
775.1 ±0.5		[10] PICH	01	RVUE		$\tau^- \rightarrow \pi^- \pi^0 \nu_\tau$	

[1] $|F_\pi(0)|^2$ fixed to 1. NODE=M009M5;LINKAGE=FU

[2] From the GOUNARIS 68 parametrization of the pion form factor. NODE=M009M5;LINKAGE=GO

[3] The error combines statistical and systematic uncertainties. Supersedes BARATE 97M. NODE=M009M5;LINKAGE=SC

[4] Assuming $m_{\rho^+} = m_{\rho^-}$, $\Gamma_{\rho^+} = \Gamma_{\rho^-}$. NODE=M009M5;LINKAGE=CH

[5] $\rho(1700)$ mass and width fixed at 1700 MeV and 235 MeV respectively. NODE=M009M5;LINKAGE=A6

[6] From the GOUNARIS 68 parametrization of the pion form factor. The second error is a model error taking into account different parametrizations of the pion form factor. NODE=M009M5;LINKAGE=K1

[7] Applies the Unitary & Analytic Model of the pion electromagnetic form factor of DUBNICKA 10 to analyze the data of FUJIKAWA 08. NODE=M009M5;LINKAGE=A

[8] Without limitations on masses and widths. NODE=M009M5;LINKAGE=WO

[9] Using the data of BARATE 97M and the effective chiral Lagrangian. NODE=M009M5;LINKAGE=Z

[10] From a fit of the model-independent parameterization of the pion form factor to the data of BARATE 97M. NODE=M009M5;LINKAGE=PC

MIXED CHARGES, OTHER REACTIONS

NODE=M009M7
NODE=M009M7

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
763.0±0.3±1.2	600k	[1] ABELE	99E	CBAR	0±	0.0 $\overline{p}p \rightarrow \pi^+ \pi^- \pi^0$

[1] Assuming the equality of ρ^+ and ρ^- masses and widths. NODE=M009M7;LINKAGE=LB

CHARGED ONLY, HADROPRODUCED

NODE=M009M2
NODE=M009M2

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT	
766.5±1.1 OUR AVERAGE							
763.7±3.2		ABELE	97	CBAR		$\overline{p}n \rightarrow \pi^- \pi^0 \pi^0$	
768 ±9		AGUILAR-...	91	EHS		400 pp	
767 ±3	2935	[1] CAPRARO	87	SPEC	−	200 π^- Cu $\rightarrow \pi^- \pi^0$ Cu	
761 ±5	967	[1] CAPRARO	87	SPEC	−	200 π^- Pb $\rightarrow \pi^- \pi^0$ Pb	OCCUR=2
771 ±4		HUSTON	86	SPEC	+	202 π^+ A $\rightarrow \pi^+ \pi^0$ A	
766 ±7	6500	[2] BYERLY	73	OSPK	−	5 $\pi^- p$	
766.8±1.5	9650	[3] PISUT	68	RVUE	−	1.7–3.2 $\pi^- p$, t <10	
767 ±6	900	[1] EISNER	67	HBC	−	4.2 $\pi^- p$, t <10	

[1] Mass errors enlarged by us to $\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M009M2;LINKAGE=Z

[2] Phase shift analysis. Systematic errors added corresponding to spread of different fits. NODE=M009M2;LINKAGE=X

[3] From fit of 3-parameter relativistic P-wave Breit-Wigner to total mass distribution. Includes BATON 68, MILLER 67B, ALFF-STEINBERGER 66, HAGOPIAN 66, HAGOPIAN 66B, JACOBS 66B, JAMES 66, WEST 66, BLIEDEN 65 and CARMONY 64. NODE=M009M2;LINKAGE=A

NEUTRAL ONLY, PHOTOPRODUCED

NODE=M009M0P
NODE=M009M0P

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
769.2± 0.9 OUR AVERAGE						
770.8± 1.3$^{+2.3}_{-2.4}$	900k	ANDREEV	20	H1	$e p \rightarrow e \pi^+ \pi^- p$	
771 ± 2 $^{+2}_{-1}$	63.5k	[1] ABRAMOWICZ	12	ZEUS	$e p \rightarrow e \pi^+ \pi^- p$	
770 ± 2 ±1	79k	[2] BREITWEG	98B	ZEUS	50–100 γp	
767.6± 2.7		BARTALUCCI	78	CNTR	$\gamma p \rightarrow e^+ e^- p$	
775 ± 5		GLADDING	73	CNTR	2.9–4.7 γp	
767 ± 4	1930	BALLAM	72	HBC	2.8 γp	
770 ± 4	2430	BALLAM	72	HBC	4.7 γp	OCCUR=2
765 ±10		ALVENSLEB...	70	CNTR	γA, t <0.01	
767.7± 1.9	140k	BIGGS	70	CNTR	<4.1 $\gamma C \rightarrow \pi^+ \pi^- C$	
765 ± 5	4000	ASBURY	67B	CNTR	$\gamma +$ Pb	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
771 ± 2	79k	[3] BREITWEG	98B	ZEUS	50–100 γp	OCCUR=2

[1] Using the KUHN 90 parametrization of the pion form factor, neglecting $\rho-\omega$ interference. NODE=M009M0P;LINKAGE=AB
[2] From the parametrization according to SOEDING 66. NODE=M009M0P;LINKAGE=B5
[3] From the parametrization according to ROSS 66. NODE=M009M0P;LINKAGE=B6

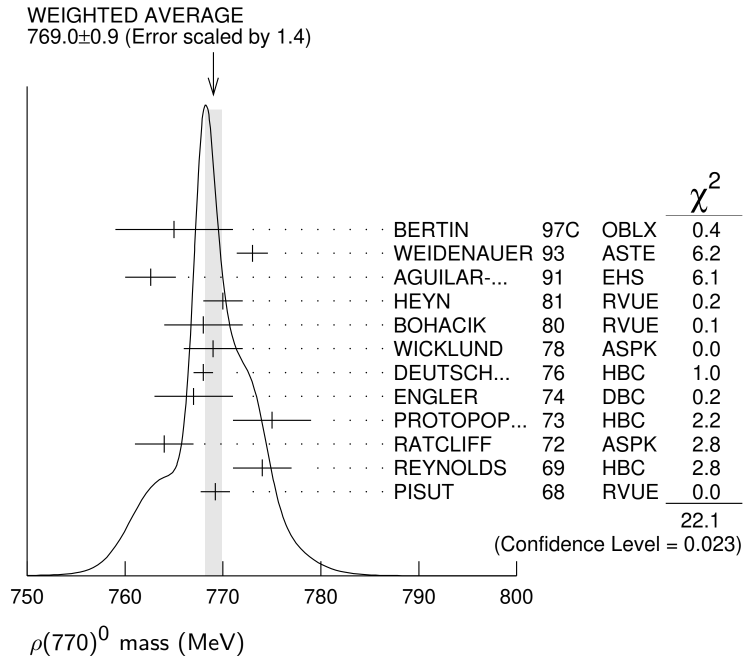
NEUTRAL ONLY, OTHER REACTIONS

NODE=M009M0R
NODE=M009M0R

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
769.0 ±0.9 OUR AVERAGE Error includes scale factor of 1.4. See the ideogram below.						
765 ±6		BERTIN	97C	OBLX	0.0 $\overline{p} p \rightarrow \pi^+ \pi^- \pi^0$	
773 ±1.6		WEIDENAUER	93	ASTE	$\overline{p} p \rightarrow \pi^+ \pi^- \omega$	
762.6 ±2.6		AGUILAR-...	91	EHS	400 $p p$	
770 ±2		[1] HEYN	81	RVUE	Pion form factor	
768 ±4		[2,3] BOHACIK	80	RVUE		
769 ±3		[4] WICKLUND	78	ASPK	3,4,6 $\pi^\pm N$	
768 ±1	76k	DEUTSCH...	76	HBC	16 $\pi^+ p$	
767 ±4	4100	ENGLER	74	DBC	6 $\pi^+ n \rightarrow \pi^+ \pi^- p$	
775 ±4	32k	[2] PROTOPOP...	73	HBC	7.1 $\pi^+ p$, t <0.4	
764 ±3	6.8k	[5] RATCLIFF	72	ASPK	15 $\pi^- p$, t <0.3	
774 ±3	1.7k	REYNOLDS	69	HBC	2.26 $\pi^- p$	
769.2 ±1.5	13.3k	[6] PISUT	68	RVUE	1.7–3.2 $\pi^- p$, t <10	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
774.34±0.18±0.35	970k	[7] ABLIKIM	18C	BES3	$\eta'(958) \rightarrow \gamma \pi^+ \pi^-$	
772.93±0.18±0.34	970k	[8] ABLIKIM	18C	BES3	$\eta'(958) \rightarrow \gamma \pi^+ \pi^-$	OCCUR=2
773.5 ±2.5		[9] COLANGELO	01	RVUE	$\pi \pi \rightarrow \pi \pi$	
762.3 ±0.5 ±1.2	600k	[10] ABELE	99E	CBAR	0.0 $\overline{p} p \rightarrow \pi^+ \pi^- \pi^0$	
777 ±2	4.9k	[11] ADAMS	97	E665	470 $\mu p \rightarrow \mu X B$	
770 ±2		[12] BOGOLYUB...	97	MIRA	32 $\overline{p} p \rightarrow \pi^+ \pi^- X$	
768 ±8		[12] BOGOLYUB...	97	MIRA	32 $p p \rightarrow \pi^+ \pi^- X$	OCCUR=2
761.1 ±2.9		DUBNICKA	89	RVUE	π form factor	
777.4 ±2.0		[13] CHABAUD	83	ASPK	17 $\pi^- p$ polarized	
769.5 ±0.7		[2,3] LANG	79	RVUE		
770 ±9		[3] ESTABROOKS	74	RVUE	17 $\pi^- p \rightarrow \pi^+ \pi^- n$	
773.5 ±1.7	11.2k	[14] JACOBS	72	HBC	2.8 $\pi^- p$	
775 ±3	2.2k	[15] HYAMS	68	OSPK	11.2 $\pi^- p$	

[1] HEYN 81 includes all spacelike and timelike F_π values until 1978. NODE=M009M0R;LINKAGE=B0
[2] From pole extrapolation. NODE=M009M0R;LINKAGE=C0
[3] From phase shift analysis of GRAYER 74 data. NODE=M009M0R;LINKAGE=H
[4] Phase shift analysis. Systematic errors added corresponding to spread of different fits. NODE=M009M0R;LINKAGE=X
[5] Published values contain misprints. Corrected by private communication RATCLIFF 74. NODE=M009M0R;LINKAGE=03
[6] Includes MALAMUD 69, ARMENISE 68, BACON 67, HUWE 67, MILLER 67B, ALFF-STEINBERGER 66, HAGOPIAN 66, HAGOPIAN 66B, JACOBS 66B, JAMES 66, WEST 66, GOLDHABER 64, ABOLINS 63. NODE=M009M0R;LINKAGE=R
[7] From a fit to $\pi^+ \pi^-$ mass using $\rho(770)$ (parametrized with the Gounaris-Sakurai approach), $\omega(782)$, and box anomaly components. NODE=M009M0R;LINKAGE=B
[8] From a fit to $\pi^+ \pi^-$ mass using $\rho(770)$ (parametrized with the Gounaris-Sakurai approach), $\omega(782)$, and $\rho(1450)$ components. NODE=M009M0R;LINKAGE=C
[9] Breit-Wigner mass from a phase-shift analysis of HYAMS 73 and PROTOPOPESCU 73 data. NODE=M009M0R;LINKAGE=CL
[10] Using relativistic Breit-Wigner and taking into account ρ-ω interference. NODE=M009M0R;LINKAGE=BL
[11] Systematic errors not evaluated. NODE=M009M0R;LINKAGE=A1
[12] Systematic effects not studied. NODE=M009M0R;LINKAGE=QQ
[13] From fit of 3-parameter relativistic Breit-Wigner to helicity-zero part of P-wave intensity. CHABAUD 83 includes data of GRAYER 74. NODE=M009M0R;LINKAGE=G

[14] Mass errors enlarged by us to $\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M009M0R;LINKAGE=Z
[15] Of HYAMS 68 six parametrizations, this is theoretically soundest. MR NODE=M009M0R;LINKAGE=02



$m_{\rho(770)^0} - m_{\rho(770)^\pm}$

NODE=M009D

NODE=M009D

VALUE (MeV)			EVTS	DOCUMENT ID		TECN	CHG	COMMENT
−0.7	**±0.8**	**OUR AVERAGE**		Error includes scale factor of 1.5. See the ideogram below.				
−2.4	±0.8			[1] SCHAEL	05C	ALEP		$\tau^- \to \pi^- \pi^0 \nu_\tau$
0.4	±0.7	±0.6	1.98M	[2] ALOISIO	03	KLOE		1.02 $e^+ e^- \to \pi^+ \pi^- \pi^0$
1.3	±1.1	±2.0	500k	[2] ACHASOV	02	SND		1.02 $e^+ e^- \to \pi^+ \pi^- \pi^0$
1.6	±0.6	±1.7	600k	ABELE	99E	CBAR	±0	0.0 $\overline{p} p \to \pi^+ \pi^- \pi^0$
−4	±4		3000	[3] REYNOLDS	69	HBC	−0	2.26 $\pi^- p$
−5	±5		3600	[3] FOSTER	68	HBC	±0	0.0 $\overline{p} p$
2.4	±2.1		22950	[4] PISUT	68	RVUE		$\pi N \to \rho N$
• • • We do not use the following data for averages, fits, limits, etc. • • •								
−3.37	±1.06			[5] BARTOS	17A	RVUE		$e^+ e^- \to \pi^+ \pi^-$, $\tau^- \to \pi^- \pi^0 \nu_\tau$

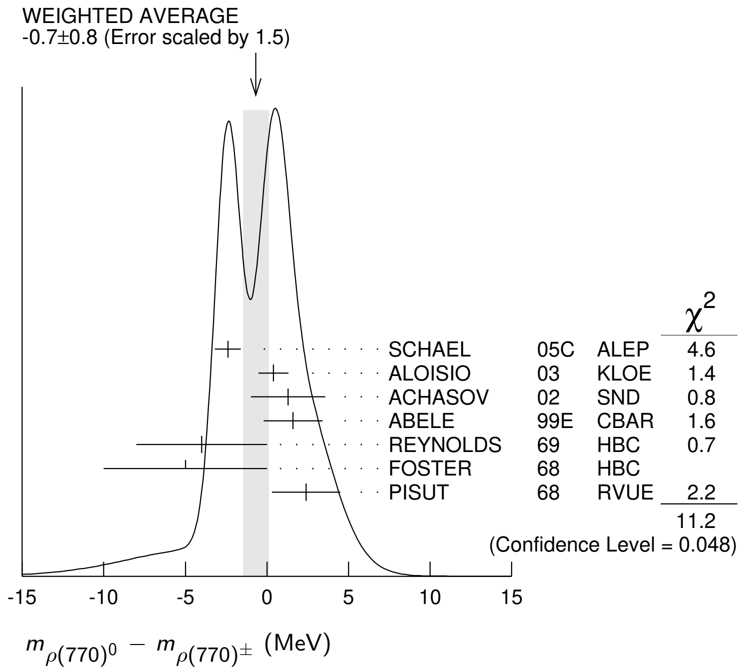
[1] From the combined fit of the τ^- data from ANDERSON 00A and SCHAEL 05C and $e^+ e^-$ data from the compilation of BARKOV 85, AKHMETSHIN 04, and ALOISIO 05. Supersedes BARATE 97M. NODE=M009D;LINKAGE=SC

[2] Assuming $m_{\rho^+} = m_{\rho^-}$, $\Gamma_{\rho^+} = \Gamma_{\rho^-}$. NODE=M009D;LINKAGE=CH

[3] From quoted masses of charged and neutral modes. NODE=M009D;LINKAGE=A

[4] Includes MALAMUD 69, ARMENISE 68, BATON 68, BACON 67, HUWE 67, MILLER 67B, ALFF-STEINBERGER 66, HAGOPIAN 66, HAGOPIAN 66B, JACOBS 66B, JAMES 66, WEST 66, BLIEDEN 65, CARMONY 64, GOLDHABER 64, ABOLINS 63. NODE=M009D;LINKAGE=R

[5] Applies the Unitary & Analytic Model of the pion electromagnetic form factor of DUBNICKA 10 to analyze the data of ACHASOV 06, AKHMETSHIN 07, AUBERT 09AS, AMBROSINO 11A, and FUJIKAWA 08. NODE=M009D;LINKAGE=B



$m_{\rho(770)^+} - m_{\rho(770)^-}$

NODE=M009D1

NODE=M009D1

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.5±0.8±0.7	1.98M	[1] ALOISIO	03	KLOE	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$

[1] Without limitations on masses and widths.

NODE=M009D;LINKAGE=WO

ρ(770) RANGE PARAMETER

NODE=M009R

The range parameter R enters an energy-dependent correction to the width, of the form $(1 + q_r^2 R^2) / (1 + q^2 R^2)$, where q is the momentum of one of the pions in the $\pi\pi$ rest system. At resonance, $q = q_r$.

NODE=M009R

VALUE (GeV^{-1})	DOCUMENT ID		TECN	CHG	COMMENT
$5.3^{+0.9}_{-0.7}$	[1] CHABAUD	83	ASPK	0	17 $\pi^- p$ polarized

NODE=M009R

[1] The old PISUT 68 value, properly corrected, was 3.2 ± 0.6.

NODE=M009R;LINKAGE=01

ρ(770) WIDTH

NODE=M009220

We no longer list S-wave Breit-Wigner fits, or data with high combinatorial background.

NODE=M009220

NEUTRAL ONLY, e^+e^-

NODE=M009W0
NODE=M009W0

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
147.4 ±0.8 OUR AVERAGE		Error includes scale factor of 2.0. See the ideogram below.			
145.6 ±0.6 ±0.8		[1] ACHASOV	21	SND	$e^+e^- \to \pi^+\pi^-$
149.59±0.67		[2] LEES	12G	BABR	$e^+e^- \to \pi^+\pi^-\gamma$
145.98±0.75±0.50	900k	[3] AKHMETSHIN	07		$e^+e^- \to \pi^+\pi^-$
146.1 ±0.8 ±1.5	800k	[4,5] ACHASOV	06	SND	$e^+e^- \to \pi^+\pi^-$
143.85±1.33±0.80	114k	[6,7] AKHMETSHIN	04	CMD2	$e^+e^- \to \pi^+\pi^-$
147.3 ±1.5 ±0.7	1.98M	[8] ALOISIO	03	KLOE	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$
151.1 ±2.6 ±3.0	500k	[8] ACHASOV	02	SND	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$
150.5 ±3.0		[9] BARKOV	85	OLYA	$e^+e^- \to \pi^+\pi^-$

• • • We do not use the following data for averages, fits, limits, etc. • • •

144.06±0.85		[10] BARTOS	17	RVUE	$e^+e^- \to \pi^+\pi^-$	
144.56±0.80		[11] BARTOS	17A	RVUE	$e^+e^- \to \pi^+\pi^-$	
143.9 ±1.3 ±1.1	1.98M	[12] ALOISIO	03	KLOE	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	OCCUR=2
147.4 ±1.5 ±0.7	1.98M	[13] ALOISIO	03	KLOE	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	OCCUR=3
149.8 ±2.2 ±2.0	500k	[14] ACHASOV	02	SND	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	OCCUR=3
147.9 ±1.5 ±7.5		[15] BENAYOUN	98	RVUE	$e^+e^- \to \pi^+\pi^-$, $\mu^+\mu^-$	
153.5 ±1.3 ±4.6		[16] GARDNER	98	RVUE	0.28–0.92 $e^+e^- \to \pi^+\pi^-$	
145.0 ±1.7		[17] O'CONNELL	97	RVUE	$e^+e^- \to \pi^+\pi^-$	
142.5 ±3.5		[18] BERNICHA	94	RVUE	$e^+e^- \to \pi^+\pi^-$	
138 ±1		[19] GESHKEN...	89	RVUE	$e^+e^- \to \pi^+\pi^-$	

[1] From a fit of the cross section in the energy range 0.525 < $\sqrt{s}$ < 0.883 GeV parameterized by the sum of the Breit-Wigner amplitudes for the $\rho(770)$, ω and $\rho(1450)$ resonances. NODE=M009W0;LINKAGE=D

[2] Using the GOUNARIS 68 parametrization with the complex phase of the $\rho-\omega$ interference and leaving the masses and widths of the $\rho(1450)$, $\rho(1700)$, and $\rho(2150)$ resonances as free parameters of the fit. NODE=M009W0;LINKAGE=LE

[3] A combined fit of AKHMETSHIN 07, AULCHENKO 06, and AULCHENKO 05. NODE=M009W;LINKAGE=AK

[4] Supersedes ACHASOV 05A. NODE=M009W0;LINKAGE=AC

[5] A fit of the SND data from 400 to 1000 MeV using parameters of the $\rho(1450)$ and $\rho(1700)$ from a fit of the data of BARKOV 85, BISELLO 89 and ANDERSON 00A. NODE=M009W0;LINKAGE=SN

[6] Using the GOUNARIS 68 parametrization with the complex phase of the ρ-ω interference. NODE=M009W5;LINKAGE=GS

[7] From a fit in the energy range 0.61 to 0.96 GeV. Update of AKHMETSHIN 02. NODE=M009W5;LINKAGE=P2

[8] Assuming $m_{\rho^+} = m_{\rho^-}$, $\Gamma_{\rho^+} = \Gamma_{\rho^-}$. NODE=M009W;LINKAGE=CH

[9] From the GOUNARIS 68 parametrization of the pion form factor. NODE=M009W;LINKAGE=K

[10] Applies the Unitary & Analytic Model of the pion electromagnetic form factor of DUBNICKA 10 to analyze the data of LEES 12G and ABLIKIM 16C. NODE=M009W0;LINKAGE=A

[11] Applies the Unitary & Analytic Model of the pion electromagnetic form factor of DUBNICKA 10 to analyze the data of ACHASOV 06, AKHMETSHIN 07, AUBERT 09AS, and AMBROSINO 11A. NODE=M009W0;LINKAGE=B

[12] Assuming $m_{\rho^+} = m_{\rho^-} = m_{\rho^0}$, $\Gamma_{\rho^+} = \Gamma_{\rho^-} = \Gamma_{\rho^0}$. NODE=M009W;LINKAGE=DF

[13] Without limitations on masses and widths. NODE=M009W;LINKAGE=WO

[14] Assuming $m_{\rho^0} = m_{\rho^\pm}$, $g_{\rho^0\pi\pi} = g_{\rho^\pm\pi\pi}$. NODE=M009W;LINKAGE=HC

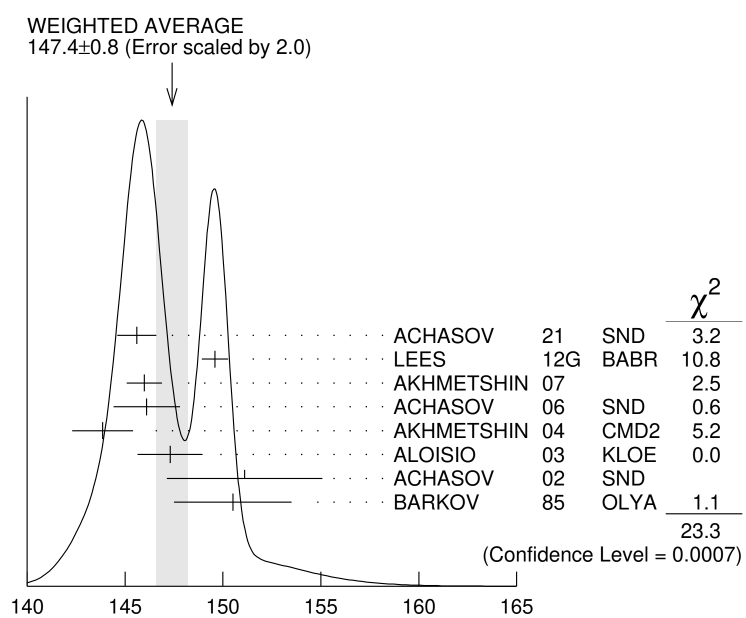
[15] Using the data of BARKOV 85 in the hidden local symmetry model. NODE=M009W;LINKAGE=K2

[16] From the fit to $e^+e^- \to \pi^+\pi^-$ data from the compilations of HEYN 81 and BARKOV 85, including the GOUNARIS 68 parametrization of the pion form factor. NODE=M009W;LINKAGE=G8

[17] A fit of BARKOV 85 data assuming the direct $\omega\pi\pi$ coupling. NODE=M009W;LINKAGE=AB

[18] Applying the S-matrix formalism to the BARKOV 85 data. NODE=M009W;LINKAGE=AA

[19] Includes BARKOV 85 data. Model-dependent width definition. NODE=M009W;LINKAGE=F



Neutral only, e^+e^- (MeV)

CHARGED ONLY, τ DECAYS and e^+e^-

NODE=M009W5
NODE=M009W5

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
149.1 ±0.8 OUR FIT					
149.1 ±0.8 OUR AVERAGE					
148.1 ±0.4 ±1.7	5.4M	[1,2] FUJIKAWA 08	BELL	±	$\tau^- \to \pi^- \pi^0 \nu_\tau$
149.0 ±1.2		[2,3] SCHAEL 05C	ALEP		$\tau^- \to \pi^- \pi^0 \nu_\tau$
149.9 ±2.3 ±2.0	500k	[4] ACHASOV 02	SND	±	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$
150.4 ±1.4 ±1.4	87k	[5,6] ANDERSON 00A	CLE2		$\tau^- \to \pi^- \pi^0 \nu_\tau$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
139.90±0.46		[7] BARTOS 17A	RVUE		$\tau^- \to \pi^- \pi^0 \nu_\tau$
143.7 ±1.3 ±1.2	1.98M	[4] ALOISIO 03	KLOE	±	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$
142.9 ±1.3 ±1.4	1.98M	[8] ALOISIO 03	KLOE	−	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$
144.7 ±1.4 ±1.2	1.98M	[8] ALOISIO 03	KLOE	+	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$
150.2 ±2.0 $^{+0.7}_{-1.6}$		[9] SANZ-CILLERO 03	RVUE		$\tau^- \to \pi^- \pi^0 \nu_\tau$
150.9 ±2.2 ±2.0	500k	[10] ACHASOV 02	SND		1.02 $e^+e^- \to \pi^+\pi^-\pi^0$

OCCUR=2
OCCUR=2
OCCUR=3
OCCUR=4

[1] $|F_\pi(0)|^2$ fixed to 1. NODE=M009W5;LINKAGE=FU
[2] From the GOUNARIS 68 parametrization of the pion form factor. NODE=M009W5;LINKAGE=GO
[3] The error combines statistical and systematic uncertainties. Supersedes BARATE 97M. NODE=M009W5;LINKAGE=SC
[4] Assuming $m_{\rho^+} = m_{\rho^-}$, $\Gamma_{\rho^+} = \Gamma_{\rho^-}$. NODE=M009W5;LINKAGE=CH
[5] $\rho(1700)$ mass and width fixed at 1700 MeV and 235 MeV respectively. NODE=M009W5;LINKAGE=A6
[6] From the GOUNARIS 68 parametrization of the pion form factor. The second error is a model error taking into account different parametrizations of the pion form factor. NODE=M009W5;LINKAGE=K1
[7] Applies the Unitary & Analytic Model of the pion electromagnetic form factor of DUBNICKA 10 to analyze the data of FUJIKAWA 08. NODE=M009W5;LINKAGE=A
[8] Without limitations on masses and widths. NODE=M009W5;LINKAGE=WO
[9] Using the data of BARATE 97M and the effective chiral Lagrangian. NODE=M009W5;LINKAGE=Z
[10] Assuming $m_{\rho^0} = m_{\rho^\pm}$, $g_{\rho^0\pi\pi} = g_{\rho^\pm\pi\pi}$. NODE=M009W5;LINKAGE=HC

MIXED CHARGES, OTHER REACTIONS

NODE=M009W7
NODE=M009W7

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
149.5±1.3	600k	[1] ABELE 99E	CBAR	0±	0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$

[1] Assuming the equality of ρ^+ and ρ^- masses and widths. NODE=M009W;LINKAGE=LB

CHARGED ONLY, HADROPRODUCED

NODE=M009W2
NODE=M009W2

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
150.2± 2.4 OUR FIT					
150.2± 2.4 OUR AVERAGE					
152.8± 4.3		ABELE 97	CBAR		$\overline{p}n \to \pi^-\pi^0\pi^0$
155 ±11	2.9k	[1] CAPRARO 87	SPEC	−	200 π^- Cu $\to \pi^-\pi^0$ Cu
154 ±20	967	[1] CAPRARO 87	SPEC	−	200 π^- Pb $\to \pi^-\pi^0$ Pb
150 ± 5		HUSTON 86	SPEC	+	202 π^+ A $\to \pi^+\pi^0$ A
146 ±12	6.5k	[2] BYERLY 73	OSPK	−	5 $\pi^- p$
148.2± 4.1	9.6k	[3] PISUT 68	RVUE	−	1.7–3.2 $\pi^- p$, $t<10$
146 ±13	900	EISNER 67	HBC	−	4.2 $\pi^- p$, $t<10$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
137.0± 0.4		[4] ABLIKIM 17	BES3		$J/\psi \to \gamma 3\pi$

OCCUR=2

[1] Width errors enlarged by us to $4\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M009W2;LINKAGE=Z
[2] Phase shift analysis. Systematic errors added corresponding to spread of different fits. NODE=M009W2;LINKAGE=X
[3] From fit of 3-parameter relativistic P-wave Breit-Wigner to total mass distribution. Includes BATON 68, MILLER 67B, ALFF-STEINBERGER 66, HAGOPIAN 66, HAGOPIAN 66B, JACOBS 66B, JAMES 66, WEST 66, BLIEDEN 65 and CARMONY 64. NODE=M009W2;LINKAGE=A1
[4] S-matrix pole at a fixed ρ meson mass of 775.49 MeV. NODE=M009W2;LINKAGE=A

NEUTRAL ONLY, PHOTOPRODUCED

NODE=M009W0P
NODE=M009W0P

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
151.5$^{+1.9}_{-2.1}$ OUR AVERAGE				
151.3± 2.2$^{+1.6}_{-2.8}$	900k	ANDREEV 20	H1	$ep \to e\pi^+\pi^- p$
155 ± 5 ± 2	63.5k	[1] ABRAMOWICZ 12	ZEUS	$ep \to e\pi^+\pi^- p$
146 ± 3 ±13	79k	[2] BREITWEG 98B	ZEUS	50–100 γp
150.9± 3.0		BARTALUCCI 78	CNTR	$\gamma p \to e^+e^- p$

• • • We do not use the following data for averages, fits, limits, etc. • • •

138 ± 3	79k	[3] BREITWEG	98B	ZEUS	50–100 γp	OCCUR=2
147 ±11		GLADDING	73	CNTR	2.9–4.7 γp	
155 ±12	2430	BALLAM	72	HBC	4.7 γp	
145 ±13	1930	BALLAM	72	HBC	2.8 γp	OCCUR=2
140 ± 5		ALVENSLEB...	70	CNTR	γA, t <0.01	
146.1± 2.9	140k	BIGGS	70	CNTR	<4.1 $\gamma C \to \pi^+\pi^- C$	
160 ±10		LANZEROTTI	68	CNTR	γp	
130 ± 5	4000	ASBURY	67B	CNTR	γ + Pb	

[1] Using the KUHN 90 parametrization of the pion form factor, neglecting ρ–ω interference. NODE=M009W0P;LINKAGE=AB
[2] From the parametrization according to SOEDING 66. NODE=M009W;LINKAGE=B5
[3] From the parametrization according to ROSS 66. NODE=M009W;LINKAGE=B6

NEUTRAL ONLY, OTHER REACTIONS

NODE=M009W0R
NODE=M009W0R

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
150.9 ± 1.7 OUR AVERAGE		Error includes scale factor of 1.1.			
122 ±20		BERTIN	97C	OBLX	0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$
145.7 ± 5.3		WEIDENAUER	93	ASTE	$\overline{p}p \to \pi^+\pi^-\omega$
144.9 ± 3.7		DUBNICKA	89	RVUE	π form factor
148 ± 6		[1,2] BOHACIK	80	RVUE	
152 ± 9		[3] WICKLUND	78	ASPK	3,4,6 $\pi^\pm pN$
154 ± 2	76k	DEUTSCH...	76	HBC	16 $\pi^+ p$
157 ± 8	6.8k	[4] RATCLIFF	72	ASPK	15 $\pi^- p$, t <0.3
143 ± 8	1.7k	REYNOLDS	69	HBC	2.26 $\pi^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
150.85± 0.55±0.67	970k	[5] ABLIKIM	18C	BES3	$\eta'(958) \to \gamma\pi^+\pi^-$
150.18± 0.55±0.65	970k	[6] ABLIKIM	18C	BES3	$\eta'(958) \to \gamma\pi^+\pi^-$ OCCUR=2
147.0 ± 2.5	600k	[7] ABELE	99E	CBAR	0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$
146 ± 3	4.9k	[8] ADAMS	97	E665	470 $\mu p \to \mu XB$
160.0 $^{+4.1}_{-4.0}$		[9] CHABAUD	83	ASPK	17 $\pi^- p$ polarized
155 ± 1		[10] HEYN	81	RVUE	π form factor
148.0 ± 1.3		[1,2] LANG	79	RVUE	
146 ±14	4.1k	ENGLER	74	DBC	6 $\pi^+ n \to \pi^+\pi^- p$
143 ±13		[2] ESTABROOKS	74	RVUE	17 $\pi^- p \to \pi^+\pi^- n$
160 ±10	32k	[1] PROTOPOP...	73	HBC	7.1 $\pi^+ p$, t <0.4
145 ±12	2.2k	[3,11] HYAMS	68	OSPK	11.2 $\pi^- p$
163 ±15	13.3k	[12] PISUT	68	RVUE	1.7–3.2 $\pi^- p$, t <10

[1] From pole extrapolation. NODE=M009W;LINKAGE=C
[2] From phase shift analysis of GRAYER 74 data. NODE=M009W;LINKAGE=H
[3] Width errors enlarged by us to $4\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M009W;LINKAGE=Z
[4] Published values contain misprints. Corrected by private communication RATCLIFF 74. NODE=M009W;LINKAGE=03
[5] From a fit to $\pi^+\pi^-$ mass using $\rho(770)$ (parametrized with the Gounaris-Sakurai approach), $\omega(782)$, and box anomaly components. NODE=M009W0R;LINKAGE=B
[6] From a fit to $\pi^+\pi^-$ mass using $\rho(770)$ (parametrized with the Gounaris-Sakurai approach), $\omega(782)$, and $\rho(1450)$ components. NODE=M009W0R;LINKAGE=C
[7] Using relativistic Breit-Wigner and taking into account ρ-ω interference. NODE=M009W;LINKAGE=BL
[8] Systematic errors not evaluated. NODE=M009W;LINKAGE=A1
[9] From fit of 3-parameter relativistic Breit-Wigner to helicity-zero part of P-wave intensity. CHABAUD 83 includes data of GRAYER 74. NODE=M009W;LINKAGE=G
[10] HEYN 81 includes all spacelike and timelike F_π values until 1978. NODE=M009W;LINKAGE=B
[11] Of HYAMS 68 six parametrizations this is theoretically soundest. MR NODE=M009W;LINKAGE=02
[12] Includes MALAMUD 69, ARMENISE 68, BACON 67, HUWE 67, MILLER 67B, ALFF-STEINBERGER 66, HAGOPIAN 66, HAGOPIAN 66B, JACOBS 66B, JAMES 66, WEST 66, GOLDHABER 64, ABOLINS 63. NODE=M009W;LINKAGE=R

$\Gamma_{\rho(770)^0} - \Gamma_{\rho(770)^\pm}$

NODE=M009W6
NODE=M009W6

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.3 ±1.3 OUR AVERAGE		Error includes scale factor of 1.4.			
−0.2 ±1.0		[1] SCHAEL	05C	ALEP	$\tau^- \to \pi^-\pi^0\nu_\tau$
3.6 ±1.8 ±1.7	1.98M	[2] ALOISIO	03	KLOE	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
4.66±0.85		[3] BARTOS	17A	RVUE	$e^+e^- \to \pi^+\pi^-$, $\tau^- \to \pi^-\pi^0\nu_\tau$

[1] From the combined fit of the τ^- data from ANDERSON 00A and SCHAEL 05C and e^+e^- data from the compilation of BARKOV 85, AKHMETSHIN 04, and ALOISIO 05. Supersedes BARATE 97M. NODE=M009W6;LINKAGE=SC

[2] Assuming $m_{\rho^+} = m_{\rho^-}$, $\Gamma_{\rho^+} = \Gamma_{\rho^-}$. NODE=M009W6;LINKAGE=CH

[3] Applies the Unitary & Analytic Model of the pion electromagnetic form factor of DUBNICKA 10 to analyze the data of ACHASOV 06, AKHMETSHIN 07, AUBERT 09AS, AMBROSINO 11A, and FUJIKAWA 08. NODE=M009W6;LINKAGE=A

$\Gamma_{\rho(770)^+} - \Gamma_{\rho(770)^-}$

NODE=M009W16
NODE=M009W16

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
1.8±2.0±0.5	1.98M	[1] ALOISIO	03	KLOE	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$

[1] Without limitations on masses and widths. NODE=M009W16;LINKAGE=WO

$\rho(770)$ DECAY MODES

NODE=M009225;NODE=M009

	Mode		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	
Γ_1	$\pi\pi$		$\sim$ 100 %		DESIG=1;OUR EVAL;→ UNCHECKED ←
Γ_2	$K\overline{K}$				DESIG=81
	$\rho(770)^\pm$ decays				NODE=M009;CLUMP=A
Γ_3	$\pi^\pm\pi^0$		$\sim$ 100 %		DESIG=11;OUR EVAL;→ UNCHECKED ←
Γ_4	$\pi^\pm\gamma$		(4.5 ±0.5) $\times 10^{-4}$	S=2.2	DESIG=3
Γ_5	$\pi^\pm\eta$		< 6 $\times 10^{-3}$	CL=84%	DESIG=5
Γ_6	$\pi^\pm\pi^+\pi^-\pi^0$		< 2.0 $\times 10^{-3}$	CL=84%	DESIG=21
	$\rho(770)^0$ decays				NODE=M009;CLUMP=B
Γ_7	$\pi^+\pi^-$		$\sim$ 100 %		DESIG=12;OUR EVAL;→ UNCHECKED ←
Γ_8	$\pi^+\pi^-\gamma$		(9.9 ±1.6) $\times 10^{-3}$		DESIG=60
Γ_9	$\pi^0\gamma$		(4.7 ±0.8) $\times 10^{-4}$	S=1.7	DESIG=40
Γ_{10}	$\eta\gamma$		(3.00±0.21) $\times 10^{-4}$		DESIG=8
Γ_{11}	$\pi^0\pi^0\gamma$		(4.5 ±0.8) $\times 10^{-5}$		DESIG=80
Γ_{12}	$\mu^+\mu^-$	[a]	(4.55±0.28) $\times 10^{-5}$		DESIG=6
Γ_{13}	e^+e^-	[a]	(4.72±0.05) $\times 10^{-5}$		DESIG=4
Γ_{14}	$\pi^+\pi^-\pi^0$		($1.01^{+0.54}_{-0.36}$±0.34) $\times 10^{-4}$		DESIG=7;OUR EVAL;→ UNCHECKED ←
Γ_{15}	$\pi^+\pi^-\pi^+\pi^-$		(1.8 ±0.9) $\times 10^{-5}$		DESIG=22
Γ_{16}	$\pi^+\pi^-\pi^0\pi^0$		(1.6 ±0.8) $\times 10^{-5}$		DESIG=30
Γ_{17}	$\pi^0e^+e^-$		< 1.2 $\times 10^{-5}$	CL=90%	DESIG=9
Γ_{18}	ηe^+e^-				DESIG=10

[a] The $\omega\rho$ interference is then due to $\omega\rho$ mixing only, and is expected to be small. If $e\mu$ universality holds, $\Gamma(\rho^0 \to \mu^+\mu^-) = \Gamma(\rho^0 \to e^+e^-) \times 0.99785$. LINKAGE=MD2

CONSTRAINED FIT INFORMATION

An overall fit to the total width and a partial width uses 10 measurements and one constraint to determine 3 parameters. The overall fit has a $\chi^2 = 10.7$ for 8 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\left\langle\delta p_i\delta p_j\right\rangle/(\delta p_i\cdot\delta p_j)$, in percent, from the fit to parameters p_i, including the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_4	−100	
Γ	15	−15
	x_3	x_4

	Mode	Rate (MeV)	Scale factor	
Γ_3	$\pi^\pm\pi^0$	150.2 ±2.4		DESIG=11
Γ_4	$\pi^\pm\gamma$	0.068±0.007	2.3	DESIG=3

CONSTRAINED FIT INFORMATION

An overall fit to the total width, a partial width, and 7 branching ratios uses 21 measurements and one constraint to determine 9 parameters. The overall fit has a $\chi^2 = 9.5$ for 13 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\left<\delta p_i \delta p_j\right>/(\delta p_i \cdot \delta p_j)$, in percent, from the fit to parameters p_i, including the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

	x_7	x_8	x_9	x_{10}	x_{11}	x_{12}	x_{13}	x_{15}
x_8	−100							
x_9	−5	0						
x_{10}	−1	0	1					
x_{11}	−1	0	0	0				
x_{12}	2	−3	0	0	0			
x_{13}	0	0	−6	−9	0	0		
x_{15}	−1	0	0	0	0	0	0	
Γ	0	0	3	5	0	0	−54	0

	Mode		Rate (MeV)	Scale factor	
Γ_7	$\pi^+\pi^-$		147.5 ±0.9		DESIG=12
Γ_8	$\pi^+\pi^-\gamma$		1.48 ±0.24		DESIG=60
Γ_9	$\pi^0\gamma$		0.070 ±0.012	1.7	DESIG=40
Γ_{10}	$\eta\gamma$		0.0447 ±0.0032		DESIG=8
Γ_{11}	$\pi^0\pi^0\gamma$		0.0066 ±0.0012		DESIG=80
Γ_{12}	$\mu^+\mu^-$	[a]	0.0068 ±0.0004		DESIG=6
Γ_{13}	e^+e^-	[a]	0.00704±0.00006		DESIG=4
Γ_{15}	$\pi^+\pi^-\pi^+\pi^-$		0.0027 ±0.0014		DESIG=22

ρ(770) PARTIAL WIDTHS

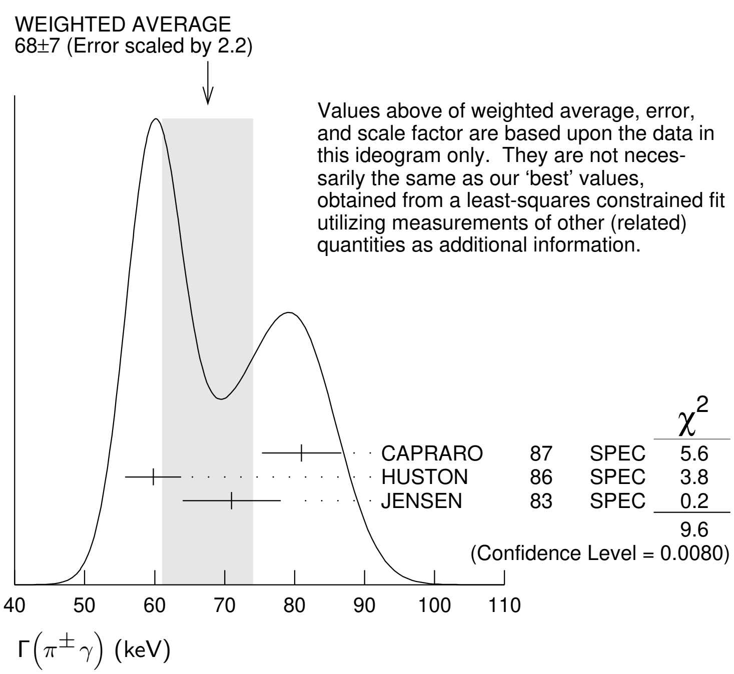
NODE=M009230

Γ(π±γ) Γ4

NODE=M009W3

NODE=M009W3

VALUE (keV)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
68 ±7 OUR FIT Error includes scale factor of 2.3.					
68 ±7 OUR AVERAGE Error includes scale factor of 2.2. See the ideogram below.					
81 ±4 ±4	CAPRARO	87	SPEC	−	200 π^- A → $\pi^-\pi^0$ A
59.8±4.0	HUSTON	86	SPEC	+	202 π^+ A → $\pi^+\pi^0$ A
71 ±7	JENSEN	83	SPEC	−	156–260 π^- A → $\pi^-\pi^0$ A



$\Gamma(\pi^0\gamma)$ — Γ_9

NODE=M009W31
NODE=M009W31

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$77\pm17\pm11$	36500	[1] ACHASOV 03	SND	0.60–0.97 $e^+e^- \to \pi^0\gamma$
121 ± 31		DOLINSKY 89	ND	$e^+e^- \to \pi^0\gamma$

[1] Using Γ_{total}= 147.9 ± 1.3 MeV and B($\rho \to \pi^0\gamma$) from ACHASOV 03.

NODE=M009W31;LINKAGE=AV

$\Gamma(\eta\gamma)$ — Γ_{10}

NODE=M009W32
NODE=M009W32

VALUE (keV)	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
62 ± 17	[1] DOLINSKY 89	ND	$e^+e^- \to \eta\gamma$

[1] Solution corresponding to constructive ω-ρ interference.

NODE=M009W32;LINKAGE=L

$\Gamma(e^+e^-)$ — Γ_{13}

NODE=M009W4
NODE=M009W4

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
7.04 ±0.06 OUR FIT				
7.04 ±0.06 OUR AVERAGE				
$7.048\pm0.057\pm0.050$	900k	[1] AKHMETSHIN 07		$e^+e^- \to \pi^+\pi^-$
$7.06\pm0.11\pm0.05$	114k	[2,3] AKHMETSHIN 04	CMD2	$e^+e^- \to \pi^+\pi^-$
$6.77\pm0.10\pm0.30$		BARKOV 85	OLYA	$e^+e^- \to \pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$7.12\pm0.02\pm0.11$	800k	[4] ACHASOV 06	SND	$e^+e^- \to \pi^+\pi^-$
6.3 ± 0.1		[5] BENAYOUN 98	RVUE	$e^+e^- \to \pi^+\pi^-$, $\mu^+\mu^-$

OCCUR=2

[1] A combined fit of AKHMETSHIN 07, AULCHENKO 06, and AULCHENKO 05.
[2] Using the GOUNARIS 68 parametrization with the complex phase of the ρ-ω interference.
[3] From a fit in the energy range 0.61 to 0.96 GeV. Update of AKHMETSHIN 02.
[4] Supersedes ACHASOV 05A.
[5] Using the data of BARKOV 85 in the hidden local symmetry model.

NODE=M009W4;LINKAGE=AK
NODE=M009W4;LINKAGE=GS
NODE=M009W4;LINKAGE=P2
NODE=M009W4;LINKAGE=AC
NODE=M009W4;LINKAGE=K2

$\Gamma(\pi^+\pi^-\pi^+\pi^-)$ — Γ_{15}

NODE=M009W33
NODE=M009W33

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$2.8\pm1.4\pm0.5$	153	AKHMETSHIN 00	CMD2	0.6–0.97 $e^+e^- \to \pi^+\pi^-\pi^+\pi^-$

$\rho(770)$ $\Gamma(e^+e^-)\Gamma(i)/\Gamma^2(\text{total})$

NODE=M009233

$\Gamma(e^+e^-)/\Gamma_{total} \times \Gamma(\pi^+\pi^-)/\Gamma_{total}$ — $\Gamma_{13}/\Gamma \times \Gamma_7/\Gamma$

NODE=M009G4
NODE=M009G4

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
4.89 ±0.04 OUR AVERAGE				
$4.889\pm0.015\pm0.039$		[1] ACHASOV 21	SND	$e^+e^- \to \pi^+\pi^-$
$4.876\pm0.023\pm0.064$	800k	[2,3] ACHASOV 06	SND	$e^+e^- \to \pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
4.72 ± 0.02		[4] BENAYOUN 10	RVUE	0.4–1.05 e^+e^-

[1] From a fit of the cross section in the energy range 0.525 < $\sqrt{s}$ < 0.883 GeV parameterized by the sum of the Breit-Wigner amplitudes for the $\rho(770)$, ω and $\rho(1450)$ resonances.

NODE=M009G4;LINKAGE=A

[2] Supersedes ACHASOV 05A.

NODE=M009G4;LINKAGE=AC

[3] A fit of the SND data from 400 to 1000 MeV using parameters of the $\rho(1450)$ and $\rho(1700)$ from a fit of the data of BARKOV 85, BISELLO 89 and ANDERSON 00A.

NODE=M009G4;LINKAGE=SN

[4] A simultaneous fit of $e^+e^- \to \pi^+\pi^-$, $\pi^+\pi^-\pi^0$, $\pi^0\gamma$, $\eta\gamma$ data.

NODE=M009G4;LINKAGE=BE

$\Gamma(e^+e^-)/\Gamma_{total} \times \Gamma(\eta\gamma)/\Gamma_{total}$ — $\Gamma_{13}/\Gamma \times \Gamma_{10}/\Gamma$

NODE=M009G1
NODE=M009G1

VALUE (units 10^{-8})	EVTS	DOCUMENT ID	TECN	COMMENT
1.42±0.10 OUR FIT				
1.45±0.12 OUR AVERAGE				
$1.32\pm0.14\pm0.08$	33k	[1] ACHASOV 07B	SND	0.6–1.38 $e^+e^- \to \eta\gamma$
$1.50\pm0.65\pm0.09$	17.4k	[2] AKHMETSHIN 05	CMD2	0.60-1.38 $e^+e^- \to \eta\gamma$
$1.61\pm0.20\pm0.11$	23k	[3,4] AKHMETSHIN 01B	CMD2	$e^+e^- \to \eta\gamma$
1.85 ± 0.49		[5] DOLINSKY 89	ND	$e^+e^- \to \eta\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.05 ± 0.02		[6] BENAYOUN 10	RVUE	0.4–1.05 e^+e^-

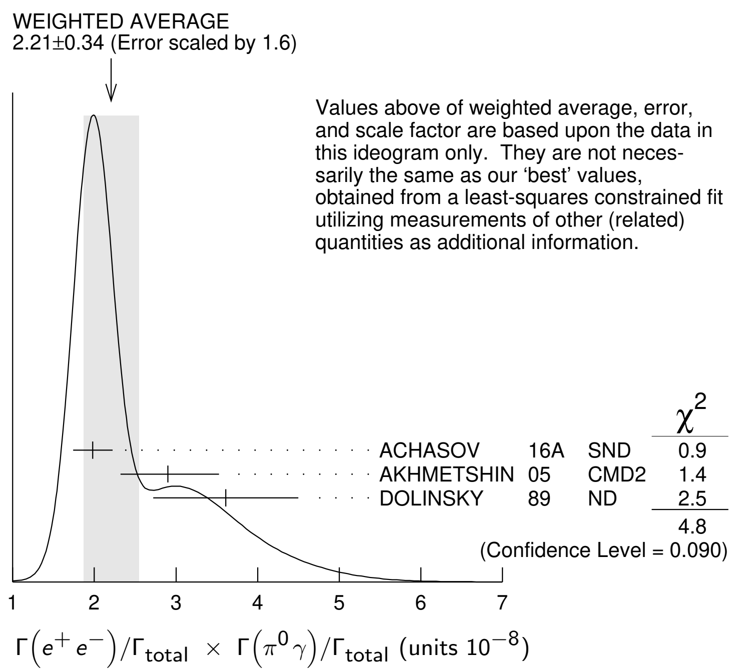
[1] From a combined fit of $\sigma(e^+e^- \to \eta\gamma)$ with $\eta \to 3\pi^0$ and $\eta \to \pi^+\pi^-\pi^0$, and fixing $B(\eta \to 3\pi^0)$ / $B(\eta \to \pi^+\pi^-\pi^0) = 1.44 \pm 0.04$. Recalculated by us from the cross section at the peak. Supersedes ACHASOV 00D and ACHASOV 06A. NODE=M009G1;LINKAGE=AH
[2] From the $\eta \to 2\gamma$ decay and using $B(\eta \to \gamma\gamma)= 39.43 \pm 0.26\%$. NODE=M009G;LINKAGE=AH
[3] From the $\eta \to 3\pi^0$ decay and using $B(\eta \to 3\pi^0)= (32.24 \pm 0.29) \times 10^{-2}$. NODE=M009G;LINKAGE=AK
[4] The combined fit from 600 to 1380 MeV taking into account $\rho(770)$, $\omega(782)$, $\phi(1020)$, and $\rho(1450)$ (mass and width fixed at 1450 MeV and 310 MeV respectively). NODE=M009G;LINKAGE=BQ
[5] Recalculated by us from the cross section in the peak. NODE=M009G;LINKAGE=LP
[6] A simultaneous fit of $e^+e^- \to \pi^+\pi^-$, $\pi^+\pi^-\pi^0$, $\pi^0\gamma$, $\eta\gamma$ data. NODE=M009G1;LINKAGE=BE

$\Gamma(e^+e^-)/\Gamma_{total} \times \Gamma(\pi^0\gamma)/\Gamma_{total}$ — $\Gamma_{13}/\Gamma \times \Gamma_9/\Gamma$

NODE=M009G2
NODE=M009G2

VALUE (units 10^{-8})	EVTS	DOCUMENT ID	TECN	COMMENT
2.2 ±0.4 OUR FIT Error includes scale factor of 1.7.				
2.21 ±0.34 OUR AVERAGE Error includes scale factor of 1.6. See the ideogram below.				
1.98 ±0.22 ±0.10		[1] ACHASOV 16A	SND	0.60-1.38 $e^+e^- \to \pi^0\gamma$
2.90 $^{+0.60}_{-0.55}$ ±0.18	18k	AKHMETSHIN 05	CMD2	0.60-1.38 $e^+e^- \to \pi^0\gamma$
3.61 ±0.74 ±0.49	10k	[2] DOLINSKY 89	ND	$e^+e^- \to \pi^0\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.875±0.026		[3] BENAYOUN 10	RVUE	0.4–1.05 e^+e^-
2.37 ±0.53 ±0.33	36k	[4] ACHASOV 03	SND	0.60–0.97 $e^+e^- \to \pi^0\gamma$

[1] From the VMD model with the prho(770), $\omega(782)$, $\phi(1020)$ resonances, and an additional resonance describing the total contribution of the $\rho(1450)$ and $\omega(1420)$ states. Supersedes ACHASOV 03. NODE=M009G2;LINKAGE=B
[2] Recalculated by us from the cross section in the peak. NODE=M009G2;LINKAGE=LP
[3] A simultaneous fit of $e^+e^- \to \pi^+\pi^-$, $\pi^+\pi^-\pi^0$, $\pi^0\gamma$, $\eta\gamma$ data. NODE=M009G2;LINKAGE=BE
[4] Using $\sigma_{\phi \to \pi^0\gamma}$ from ACHASOV 00 and m_ρ = 775.97 MeV in the model with the energy-independent phase of ρ-ω interferenceequal to $(-10.2 \pm 7.0)^\circ$. NODE=M009G;LINKAGE=SH



$\Gamma(e^+e^-)/\Gamma_{total} \times \Gamma(\pi^+\pi^-\pi^0)/\Gamma_{total}$ — $\Gamma_{13}/\Gamma \times \Gamma_{14}/\Gamma$

NODE=M009G3
NODE=M009G3

VALUE (units 10^{-9})	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.903±0.076		[1] BENAYOUN 10	RVUE	0.4–1.05 e^+e^-
4.58 $^{+2.46}_{-1.64}$ ±1.56	1.2M	[2] ACHASOV 03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$

[1] A simultaneous fit of $e^+e^- \to \pi^+\pi^-$, $\pi^+\pi^-\pi^0$, $\pi^0\gamma$, $\eta\gamma$ data. NODE=M009G3;LINKAGE=BE
[2] Statistical significance is less than 3σ. NODE=M009G3;LINKAGE=AC

$\rho(770)$ BRANCHING RATIOS

NODE=M009235

$\Gamma(\pi^\pm\eta)/\Gamma(\pi\pi)$ — Γ_5/Γ_1

NODE=M009R4
NODE=M009R4

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	CHG	COMMENT
<60	84	FERBEL 66	HBC	±	$\pi^\pm p$ above 2.5

$\Gamma(\pi^{\pm}\pi^{+}\pi^{-}\pi^{0})/\Gamma(\pi\pi)$ — Γ_6/Γ_1

NODE=M009R1
NODE=M009R1

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	CHG	COMMENT
<20	84	FERBEL	66	HBC	$\pm$	$\pi^{\pm} p$ above 2.5
• • • We do not use the following data for averages, fits, limits, etc. • • •						
35±40		JAMES	66	HBC	+	2.1 $\pi^{+} p$

$\Gamma(\pi^{+}\pi^{-}\gamma)/\Gamma_{total}$ — Γ_8/Γ

NODE=M009R12
NODE=M009R12

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
0.0099±0.0016 OUR FIT					
0.0099±0.0016		[1] DOLINSKY	91	ND	$e^{+}e^{-} \rightarrow \pi^{+}\pi^{-}\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.0111±0.0014		[2] VASSERMAN	88	ND	$e^{+}e^{-} \rightarrow \pi^{+}\pi^{-}\gamma$
<0.005	90	[3] VASSERMAN	88	ND	$e^{+}e^{-} \rightarrow \pi^{+}\pi^{-}\gamma$

OCCUR=2

[1] Bremsstrahlung from a decay pion and for photon energy above 50 MeV. NODE=M009R12;LINKAGE=J
[2] Superseded by DOLINSKY 91. NODE=M009R12;LINKAGE=I
[3] Structure radiation due to quark rearrangement in the decay. NODE=M009R12;LINKAGE=N

$\Gamma(\pi^{0}\gamma)/\Gamma_{total}$ — Γ_9/Γ

NODE=M009R9
NODE=M009R9

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
4.20±0.52		[1] ACHASOV	16A	SND	0.60–1.38 $e^{+}e^{-} \rightarrow \pi^{0}\gamma$
$6.21^{+1.28}_{-1.18}\pm0.39$	18k	[2,3] AKHMETSHIN	05	CMD2	0.60-1.38 $e^{+}e^{-} \rightarrow \pi^{0}\gamma$
5.22±1.17±0.75	36k	[3,4] ACHASOV	03	SND	0.60–0.97 $e^{+}e^{-} \rightarrow \pi^{0}\gamma$
6.8 ±1.7		[5] BENAYOUN	96	RVUE	0.54-1.04 $e^{+}e^{-} \rightarrow \pi^{0}\gamma$
7.9 ±2.0		[3] DOLINSKY	89	ND	$e^{+}e^{-} \rightarrow \pi^{0}\gamma$

[1] Using B($\rho \rightarrow e^{+}e^{-}$) from PDG 15. Supersedes ACHASOV 03. NODE=M009R9;LINKAGE=C
[2] Using B($\rho \rightarrow e^{+}e^{-}$) = $(4.67 \pm 0.09) \times 10^{-5}$. NODE=M009R9;LINKAGE=AK
[3] Not independent of the corresponding $\Gamma(e^{+}e^{-}) \times \Gamma(\pi^{0}\gamma)/\Gamma^2_{total}$. NODE=M009R9;LINKAGE=BZ
[4] Using B($\rho \rightarrow e^{+}e^{-}$) = $(4.54 \pm 0.10) \times 10^{-5}$. NODE=M009R9;LINKAGE=AS
[5] Reanalysis of DRUZHININ 84, DOLINSKY 89, and DOLINSKY 91 taking into account a triangle anomaly contribution. NODE=M009R9;LINKAGE=A

$\Gamma(\eta\gamma)/\Gamma_{total}$ — Γ_{10}/Γ

NODE=M009R7
NODE=M009R7

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
3.00±0.21 OUR FIT						
2.90±0.32 OUR AVERAGE						
2.79±0.34±0.03	33k	[1] ACHASOV	07B	SND		0.6–1.38 $e^{+}e^{-} \rightarrow \eta\gamma$
3.6 ±0.9		[2] ANDREWS	77	CNTR	0	6.7–10 γCu
• • • We do not use the following data for averages, fits, limits, etc. • • •						
3.21±1.39±0.20	17.4k	[3,4] AKHMETSHIN	05	CMD2		0.60-1.38 $e^{+}e^{-} \rightarrow \eta\gamma$
3.39±0.42±0.23		[2,5,6] AKHMETSHIN	01B	CMD2		$e^{+}e^{-} \rightarrow \eta\gamma$
$1.9\ ^{+0.6}_{-0.8}$		[7] BENAYOUN	96	RVUE		0.54-1.04 $e^{+}e^{-} \rightarrow \eta\gamma$
4.0 ±1.1		[2,4] DOLINSKY	89	ND		$e^{+}e^{-} \rightarrow \eta\gamma$

[1] ACHASOV 07B reports $[\Gamma(\rho(770) \rightarrow \eta\gamma)/\Gamma_{total}] \times [B(\rho(770) \rightarrow e^{+}e^{-})] = (1.32 \pm 0.14 \pm 0.08) \times 10^{-8}$ which we divide by our best value B($\rho(770) \rightarrow e^{+}e^{-}$) = $(4.72 \pm 0.05) \times 10^{-5}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Supersedes ACHASOV 00D and ACHASOV 06A. NODE=M009R7;LINKAGE=AO
[2] Solution corresponding to constructive ω-ρ interference. NODE=M009R7;LINKAGE=A
[3] Using B($\rho \rightarrow e^{+}e^{-}$) = $(4.67 \pm 0.09) \times 10^{-5}$ and B($\eta \rightarrow \gamma\gamma$) = 39.43 ± 0.26%. NODE=M009R;LINKAGE=AK
[4] Not independent of the corresponding $\Gamma(e^{+}e^{-}) \times \Gamma(\eta\gamma)/\Gamma^2_{total}$. NODE=M009R7;LINKAGE=AZ
[5] The combined fit from 600 to 1380 MeV taking into account $\rho(770)$, $\omega(782)$, $\phi(1020)$, and $\rho(1450)$ (mass and width fixed at 1450 MeV and 310 MeV respectively). NODE=M009R;LINKAGE=BQ
[6] Using B($\rho \rightarrow e^{+}e^{-}$) = $(4.75 \pm 0.10) \times 10^{-5}$ from AKHMETSHIN 02 and B($\eta \rightarrow 3\pi^{0}$) = $(32.24 \pm 0.29) \times 10^{-2}$. NODE=M009R;LINKAGE=BX
[7] Reanalysis of DRUZHININ 84, DOLINSKY 89, and DOLINSKY 91 taking into account a triangle anomaly contribution. Constructive ρ-ω interference solution. NODE=M009R7;LINKAGE=C

$\Gamma(\pi^0\pi^0\gamma)/\Gamma_{total}$ Γ_{11}/Γ

NODE=M009R14
NODE=M009R14

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
4.5±0.8 OUR FIT					
$4.5^{+0.9}_{-0.8}$ OUR AVERAGE					
$5.2^{+1.5}_{-1.3}\pm0.6$	190	[1] AKHMETSHIN	04B	CMD2	0.6–0.97 $e^+e^- \to \pi^0\pi^0\gamma$
$4.1^{+1.0}_{-0.9}\pm0.3$	295	[2] ACHASOV	02F	SND	0.36–0.97 $e^+e^- \to \pi^0\pi^0\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$4.8^{+3.4}_{-1.8}\pm0.5$	63	[3] ACHASOV	00G	SND	$e^+e^- \to \pi^0\pi^0\gamma$

OCCUR=2

[1] This branching ratio includes the conventional VMD mechanism $\rho \to \omega\pi^0$, $\omega \to \pi^0\gamma$, and the new decay mode $\rho \to f_0(500)\gamma$, $f_0(500) \to \pi^0\pi^0$ with a branching ratio $(2.0^{+1.1}_{-0.9} \pm 0.3) \times 10^{-5}$ differing from zero by 2.0 standard deviations. NODE=M009R14;LINKAGE=AH

[2] This branching ratio includes the conventional VMD mechanism $\rho \to \omega\pi^0$, $\omega \to \pi^0\gamma$ and the new decay mode $\rho \to f_0(500)\gamma$, $f_0(500) \to \pi^0\pi^0$ with a branching ratio $(1.9^{+0.9}_{-0.8} \pm 0.4) \times 10^{-5}$ differing from zero by 2.4 standard deviations. Supersedes ACHASOV 00G. NODE=M009R;LINKAGE=FF

[3] Superseded by ACHASOV 02F. NODE=M009R;LINKAGE=GF

$\Gamma(\mu^+\mu^-)/\Gamma(\pi^+\pi^-)$ Γ_{12}/Γ_7

NODE=M009R5
NODE=M009R5

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
4.60±0.28 OUR FIT				
4.6 ±0.2 ±0.2	ANTIPOV	89	SIGM	π^- Cu $\to \mu^+\mu^-\pi^-$ Cu
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$8.2\ ^{+1.6}_{-3.6}$	[1] ROTHWELL	69	CNTR	Photoproduction
5.6 ±1.5	[2] WEHMANN	69	OSPK	12 π^- C, Fe
$9.7\ ^{+3.1}_{-3.3}$	[3,4] HYAMS	67	OSPK	11 π^- Li, H

[1] Possibly large ρ-ω interference leads us to increase the minus error. NODE=M009R5;LINKAGE=R

[2] Result contains 11 ± 11% correction using SU(3) for central value. The error on the correction takes account of possible ρ-ω interference and the upper limit agrees with the upper limit of $\omega \to \mu^+\mu^-$ from this experiment. NODE=M009R5;LINKAGE=W

[3] But he even enlarges his error to take residual ω contamination into account. Since his value is high, seems the other experiments also can't have too many ω's. But maybe Hyams has additional μ's from $\rho \to \pi\pi$, decaying π's. NODE=M009R5;LINKAGE=01

[4] HYAMS 67's mass resolution is 20 MeV. The ω region was excluded. NODE=M009R5;LINKAGE=H

$\Gamma(e^+e^-)/\Gamma(\pi\pi)$ Γ_{13}/Γ_1

NODE=M009R3
NODE=M009R3

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.40±0.05	[1,2] BENAKSAS	72	OSPK	$e^+e^- \to \pi^+\pi^-$

[1] The ρ' contribution is not taken into account. NODE=M009R;LINKAGE=KS

[2] Barkov excludes Auslender and Benaksas for large statistical and systematic errors. NODE=M009R3;LINKAGE=01

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{14}/Γ

NODE=M009R10
NODE=M009R10

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.88±0.23±0.30			[1] LEES	21B	BABR	10.5 $e^+e^- \to \pi^+\pi^-\pi^0\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$1.01^{+0.54}_{-0.36}\pm0.34$		1.2M	[2] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
<1.2	90		VASSERMAN	88B	ND	$e^+e^- \to \pi^+\pi^-\pi^0$

[1] From the cross section for $e^+e^- \to \pi^+\pi^-\pi^0$ with contributions from $\rho(770)$, $\omega(782)$, $\phi(1020)$, $\omega(1420)$, and $\omega(1650)$. Statistical evidence is more than 6 σ. NODE=M009R10;LINKAGE=A

[2] Statistical significance is less than 3σ. NODE=M009R;LINKAGE=NS

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma(\pi\pi)$ Γ_{14}/Γ_1

NODE=M009R6
NODE=M009R6

VALUE	CL%	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
∼ 0.01		BRAMON	86	RVUE	0	$J/\psi \to \omega\pi^0$
<0.01	84	[1] ABRAMS	71	HBC	0	3.7 $\pi^+ p$

[1] Model dependent, assumes I = 1, 2, or 3 for the 3π system. NODE=M009R6;LINKAGE=G

$\Gamma(\pi^+\pi^-\pi^+\pi^-)/\Gamma_{total}$ — Γ_{15}/Γ

NODE=M009R13

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
1.8±0.9 OUR FIT						
1.8±0.9±0.3		153	AKHMETSHIN	00	CMD2	0.6–0.97 $e^+e^- \to \pi^+\pi^-\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<20	90		KURDADZE	88	OLYA	$e^+e^- \to \pi^+\pi^-\pi^+\pi^-$

$\Gamma(\pi^+\pi^-\pi^+\pi^-)/\Gamma(\pi\pi)$ — Γ_{15}/Γ_1

NODE=M009R11

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<15	90	ERBE	69	HBC	0	2.5–5.8 γp
<20		CHUNG	68	HBC	0	3.2,4.2 $\pi^- p$
<20	90	HUSON	68	HLBC	0	16.0 $\pi^- p$
<80		JAMES	66	HBC	0	2.1 $\pi^+ p$

$\Gamma(\pi^+\pi^-\pi^0\pi^0)/\Gamma_{total}$ — Γ_{16}/Γ

NODE=M009R8

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
1.60±0.74±0.18		[1] ACHASOV	09A	SND	$e^+e^- \to \pi^+\pi^-\pi^0\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 4	90	AULCHENKO	87C	ND	$e^+e^- \to \pi^+\pi^-\pi^0\pi^0$
<20	90	KURDADZE	86	OLYA	$e^+e^- \to \pi^+\pi^-\pi^0\pi^0$

[1] Assuming no interference between the ρ and ω contributions.

NODE=M009R8;LINKAGE=AC

$\Gamma(\pi^0 e^+e^-)/\Gamma_{total}$ — Γ_{17}/Γ

NODE=M009R15

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<1.2	90	ACHASOV	08	SND	0.36–0.97 $e^+e^- \to \pi^0 e^+e^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.6		AKHMETSHIN	05A	CMD2	0.72-0.84 e^+e^-

$\Gamma(\eta e^+e^-)/\Gamma_{total}$ — Γ_{18}/Γ

NODE=M009R16

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.7	AKHMETSHIN	05A	CMD2	0.72-0.84 e^+e^-

$\rho(770)$ REFERENCES

NODE=M009

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LEES 21B PR D104 112003 J.P. Lees *et al.* (BABAR Collab.) REFID=61450
ANDREEV 20 EPJ C80 1189 V. Andreev *et al.* (H1 Collab.) REFID=60773
ABLIKIM 18C PRL 120 242003 M. Ablikim *et al.* (BESIII Collab.) REFID=58843
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BARTOS 17 PR D96 113004 E. Bartos *et al.* REFID=58325
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LEES 12G PR D86 032013 J.P. Lees *et al.* (BABAR Collab.) REFID=54299
AMBROSINO 11A PL B700 102 F. Ambrosino *et al.* (KLOE Collab.) REFID=16683
GARCIA-MAR... 11 PRL 107 072001 R. Garcia-Martin *et al.* (MADR, CRAC) REFID=16761
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BENAYOUN 10 EPJ C65 211 M. Benayoun *et al.* REFID=53212
DUBNICKA 10 APS 60 1 S. Dubnicka, A.Z. Dubnickova REFID=58797
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FUJIKAWA 08 PR D78 072006 M. Fujikawa *et al.* (BELLE Collab.) REFID=52536
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AKHMETSHIN	04	PL B578 285	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=49609
AKHMETSHIN	04B	PL B580 119	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=49610
PELAEZ	04A	MPL A19 2879	J.R. Pelaez	(MADU)	REFID=50347
ACHASOV	03	PL B559 171	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=49187
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ALOISIO	03	PL B561 55	A. Aloisio *et al.*	(KLOE Collab.)	REFID=49404
SANZ-CILLERO	03	EPJ C27 587	J.J. Sanz-Cillero, A. Pich		REFID=49399
ACHASOV	02	PR D65 032002	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=48549
ACHASOV	02F	PL B537 201	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=48816
AKHMETSHIN	02	PL B527 161	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=48565
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COLANGELO	01	NP B603 125	G. Colangelo, J. Gasser, H. Leytwyler		REFID=49180
PICH	01	PR D63 093005	A. Pich, J. Portoles		REFID=48313
ACHASOV	00	EPJ C12 25	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=47417
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ACHASOV	00G	JETPL 71 355	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=47929
		Translated from ZETFP 71 519.			
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ANDERSON	00A	PR D61 112002	S. Anderson *et al.*	(CLEO Collab.)	REFID=47468
ABELE	99E	PL B469 270	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=47414
BENAYOUN	98	EPJ C2 269	M. Benayoun *et al.*	(IPNP, NOVO, ADLD+)	REFID=45859
BREITWEG	98B	EPJ C2 247	J. Breitweg *et al.*	(ZEUS Collab.)	REFID=46354
GARDNER	98	PR D57 2716	S. Gardner, H.B. O'Connell		REFID=46366
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ABELE	97	PL B391 191	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=45415
ADAMS	97	ZPHY C74 237	M.R. Adams *et al.*	(E665 Collab.)	REFID=45533
BARATE	97M	ZPHY C76 15	R. Barate *et al.*	(ALEPH Collab.)	REFID=45622
BERTIN	97C	PL B408 476	A. Bertin *et al.*	(OBELIX Collab.)	REFID=45701
BOGOLYUB...	97	PAN 60 46	M.Y. Bogolyubsky *et al.*	(MOSU, SERP)	REFID=45393
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O'CONNELL	97	NP A623 559	H.B. O'Connell *et al.*	(ADLD)	REFID=45860
BENAYOUN	96	ZPHY C72 221	M. Benayoun *et al.*	(IPNP, NOVO)	REFID=45753
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BISELLO	89	PL B220 321	D. Bisello *et al.*	(DM2 Collab.)	REFID=40740
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DUBNICKA	89	JP G15 1349	S. Dubnicka *et al.*	(JINR, SLOV)	REFID=44082
GESHKEN...	89	ZPHY C45 351	B.V. Geshkenbein	(ITEP)	REFID=41017
KURDADZE	88	JETPL 47 512	L.M. Kurdadze *et al.*	(NOVO)	REFID=41121
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VASSERMAN	88	SJNP 47 1035	I.B. Vasserman *et al.*	(NOVO)	REFID=41019
		Translated from YAF 47 1635.			
VASSERMAN	88B	SJNP 48 480	I.B. Vasserman *et al.*	(NOVO)	REFID=41020
		Translated from YAF 48 753.			
AULCHENKO	87C	IYF 87-90 Preprint	V.M. Aulchenko *et al.*	(NOVO)	REFID=41370
CAPRARO	87	NP B288 659	L. Capraro *et al.*	(CLER, FRAS, MILA+)	REFID=40003
BRAMON	86	PL B173 97	A. Bramon, J. Casulleras	(BARC)	REFID=22102
HUSTON	86	PR D33 3199	J. Huston *et al.*	(ROCH, FNAL, MINN)	REFID=20137
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BARKOV	85	NP B256 365	L.M. Barkov *et al.*	(NOVO)	REFID=20134
DRUZHININ	84	PL 144B 136	V.P. Druzhinin *et al.*	(NOVO)	REFID=20561
CHABAUD	83	NP B223 1	V. Chabaud *et al.*	(CERN, CRAC, MPIM)	REFID=20131
JENSEN	83	PR D27 26	T. Jensen *et al.*	(ROCH, FNAL, MINN)	REFID=20132
HEYN	81	ZPHY C7 169	M.F. Heyn, C.B. Lang	(GRAZ)	REFID=20129
BOHACIK	80	PR D21 1342	J. Bohacik, H. Kuhnelt	(SLOV, WIEN)	REFID=20128
COHEN	80	PR D22 2595	D. Cohen *et al.*	(ANL)	REFID=20381
LANG	79	PR D19 956	C.B. Lang, A. Mas-Parareda	(GRAZ)	REFID=20126
BARTALUCCI	78	NC 44A 587	S. Bartalucci *et al.*	(DESY, FRAS)	REFID=20122
WICKLUND	78	PR D17 1197	A.B. Wicklund *et al.*	(ANL)	REFID=20124
ANDREWS	77	PRL 38 198	D.E. Andrews *et al.*	(ROCH)	REFID=20120
DEUTSCH...	76	NP B103 426	M. Deutschmann *et al.*	(AACH3, BERL, BONN+)	REFID=20119
ENGLER	74	PR D10 2070	A. Engler *et al.*	(CMU, CASE)	REFID=20110
ESTABROOKS	74	NP B79 301	P.G. Estabrooks, A.D. Martin	(DURH)	REFID=20111
GRAYER	74	NP B75 189	G. Grayer *et al.*	(CERN, MPIM)	REFID=20113
RATCLIFF	74	Private Comm.			REFID=40128;ERROR=3
BYERLY	73	PR D7 637	W.L. Byerly *et al.*	(MICH)	REFID=20104
GLADDING	73	PR D8 3721	G.E. Gladding *et al.*	(HARV)	REFID=20106
HYAMS	73	NP B64 134	B.D. Hyams *et al.*	(CERN, MPIM)	REFID=20107
PROTOPOP...	73	PR D7 1279	S.D. Protopopescu *et al.*	(LBL)	REFID=20108
BALLAM	72	PR D5 545	J. Ballam *et al.*	(SLAC, LBL, TUFTS)	REFID=20094
BENAKSAS	72	PL 39B 289	D. Benaksas *et al.*	(ORSAY)	REFID=20096
JACOBS	72	PR D6 1291	L.D. Jacobs	(SACL)	REFID=20101
RATCLIFF	72	PL 38B 345	B.N. Ratcliff *et al.*	(SLAC)	REFID=20102
ABRAMS	71	PR D4 653	G.S. Abrams *et al.*	(LBL)	REFID=20090
ALVENSLEB...	70	PRL 24 786	H. Alvensleben *et al.*	(DESY)	REFID=20085
BIGGS	70	PRL 24 1197	P.J. Biggs *et al.*	(DARE)	REFID=20087
ERBE	69	PR 188 2060	R. Erbe *et al.*	(German Bubble Chamber Collab.)	REFID=20074
MALAMUD	69	Argonne Conf. 93	E.I. Malamud, P.E. Schlein	(UCLA)	REFID=20077
REYNOLDS	69	PR 184 1424	B.G. Reynolds *et al.*	(FSU)	REFID=20080
ROTHWELL	69	PRL 23 1521	P.L. Rothwell *et al.*	(NEAS)	REFID=20082
WEHMANN	69	PR 178 2095	A.A. Wehmann *et al.*	(HARV, CASE, SLAC+)	REFID=20084
ARMENISE	68	NC 54A 999	N. Armenise *et al.*	(BARI, BGNA, FIRZ+)	REFID=20054
BATON	68	PR 176 1574	J.P. Baton, G. Laurens	(SACL)	REFID=20056
CHUNG	68	PR 165 1491	S.U. Chung *et al.*	(LRL)	REFID=20059
FOSTER	68	NP B6 107	M. Foster *et al.*	(CERN, CDEF)	REFID=20061
GOUNARIS	68	PRL 21 244	G.J. Gounaris, J.J. Sakurai		REFID=48054
HUSON	68	PL 28B 208	R. Huson *et al.*	(ORSAY, MILA, UCLA)	REFID=20062
HYAMS	68	NP B7 1	B.D. Hyams *et al.*	(CERN, MPIM)	REFID=20063
LANZEROTTI	68	PR 166 1365	L.J. Lanzerotti *et al.*	(HARV)	REFID=20068
PISUT	68	NP B6 325	J. Pisut, M. Roos	(CERN)	REFID=20070
ASBURY	67B	PRL 19 865	J.G. Asbury *et al.*	(DESY, COLU)	REFID=20038
BACON	67	PR 157 1263	T.C. Bacon *et al.*	(BNL)	REFID=20039
EISNER	67	PR 164 1699	R.L. Eisner *et al.*	(PURD)	REFID=20046
HUWE	67	PL 24B 252	D.O. Huwe *et al.*	(COLU)	REFID=20049
HYAMS	67	PL 24B 634	B.D. Hyams *et al.*	(CERN, MPIM)	REFID=20050
MILLER	67B	PR 153 1423	D.H. Miller *et al.*	(PURD)	REFID=20051
ALFF-...	66	PR 145 1072	C. Alff-Steinberger *et al.*	(COLU, RUTG)	REFID=10762
FERBEL	66	PL 21 111	T. Ferbel	(ROCH)	REFID=20028
HAGOPIAN	66	PR 145 1128	V. Hagopian *et al.*	(PENN, SACL)	REFID=20030
HAGOPIAN	66B	PR 152 1183	V. Hagopian, Y.L. Pan	(PENN, LRL)	REFID=20031
JACOBS	66B	UCRL 16877	L.D. Jacobs	(LRL)	REFID=20033
JAMES	66	PR 142 896	F.E. James, H.L. Kraybill	(YALE, BNL)	REFID=10770
ROSS	66	PR 149 1172	M. Ross, L. Stodolsky		REFID=46380
SOEDING	66	PL B19 702	P. Soeding		REFID=46385
WEST	66	PR 149 1089	E. West *et al.*	(WISC)	REFID=20035
BLIEDEN	65	PL 19 444	H.R. Blieden *et al.*	(CERN MMS Collab.)	REFID=20016
CARMONY	64	PRL 12 254	D.D. Carmony *et al.*	(UCB)	REFID=20578
GOLDHABER	64	PRL 12 336	G. Goldhaber *et al.*	(LRL, UCB)	REFID=20013
ABOLINS	63	PRL 11 381	M.A. Abolins *et al.*	(UCSD)	REFID=20006

NODE=M001

$\omega(782)$

$I^G(J^{PC}) = 0^-(1^{--})$

ω(782) MASS

NODE=M001M

NODE=M001M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
782.66±0.13 OUR AVERAGE		Error includes scale factor of 2.0. See the ideogram below.				
$777.9 \pm 2.2 \ ^{+4.3}_{-2.2}$	900k	ANDREEV	20	H1	$e p \to e \pi^+ \pi^- p$	
$783.20 \pm 0.13 \pm 0.16$	18680	AKHMETSHIN	05	CMD2	0.60–1.38 $e^+ e^- \to \pi^0 \gamma$	
$782.68 \pm 0.09 \pm 0.04$	11200	[1] AKHMETSHIN	04	CMD2	$e^+ e^- \to \pi^+ \pi^- \pi^0$	
$782.79 \pm 0.08 \pm 0.09$	1.2M	[2] ACHASOV	03D	RVUE	0.44–2.00 $e^+ e^- \to \pi^+ \pi^- \pi^0$	
$781.96 \pm 0.17 \pm 0.80$	11k	[3] AMSLER	94C	CBAR	0.0 $\overline{p} p \to \omega \eta \pi^0$	
$782.08 \pm 0.36 \pm 0.82$	3463	[4] AMSLER	94C	CBAR	0.0 $\overline{p} p \to \omega \eta \pi^0$	OCCUR=2
$781.96 \pm 0.13 \pm 0.17$	15k	AMSLER	93B	CBAR	0.0 $\overline{p} p \to \omega \pi^0 \pi^0$	
782.4 ± 0.2	270k	WEIDENAUER	93	ASTE	$\overline{p} p \to 2\pi^+ 2\pi^- \pi^0$	
782.4 ± 0.5	7000	[5] KEYNE	76	CNTR	$\pi^- p \to \omega n$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$782.58 \pm 0.03 \pm 0.01$		[6] HOID	20	RVUE	$e^+ e^- \to \pi^0 \gamma$	
$781.68 \pm 0.09 \pm 0.03$		[7] COLANGELO	19	RVUE	$e^+ e^- \to \pi^+ \pi^-$	
$782.63 \pm 0.03 \pm 0.01$		[8] HOFERICHT...	19	RVUE	$e^+ e^- \to \pi^+ \pi^- \pi^0$	
781.91 ± 0.24		[9] LEES	12G	BABR	$e^+ e^- \to \pi^+ \pi^- \gamma$	
$782.7 \pm 0.1 \pm 1.5$	19500	[10] WURZINGER	95	SPEC	1.33 $p d \to {}^3\text{He}\omega$	
781.78 ± 0.10		[10] BARKOV	87	CMD	$e^+ e^- \to \pi^+ \pi^- \pi^0$	
782.2 ± 0.4	1488	[11] KURDADZE	83B	OLYA	$e^+ e^- \to \pi^+ \pi^- \pi^0$	
783.3 ± 0.4	433	CORDIER	80	DM1	$e^+ e^- \to \pi^+ \pi^- \pi^0$	
782.5 ± 0.8	33260	ROOS	80	RVUE	0.0–3.6 $\overline{p} p$	
782.6 ± 0.8	3000	BENKHEIRI	79	OMEG	9–12 $\pi^\pm p$	
781.8 ± 0.6	1430	COOPER	78B	HBC	0.7–0.8 $\overline{p} p \to 5\pi$	
782.7 ± 0.9	535	VANAPEL...	78	HBC	7.2 $\overline{p} p \to \overline{p} p \omega$	
783.5 ± 0.8	2100	GESSAROLI	77	HBC	11 $\pi^- p \to \omega n$	
782.5 ± 0.8	418	AGUILAR-...	72B	HBC	3.9,4.6 $K^- p$	
783.4 ± 1.0	248	BIZZARRI	71	HBC	0.0 $p \overline{p} \to K^+ K^- \omega$	
781.0 ± 0.6	510	BIZZARRI	71	HBC	0.0 $p \overline{p} \to K_1 K_1 \omega$	OCCUR=2
783.7 ± 1.0	3583	[12] COYNE	71	HBC	3.7 $\pi^+ p \to p \pi^+ \pi^+ \pi^- \pi^0$	OCCUR=2
784.1 ± 1.2	750	ABRAMOVI...	70	HBC	3.9 $\pi^- p$	
783.2 ± 1.6		[13] BIGGS	70B	CNTR	<4.1 $\gamma \text{C} \to \pi^+ \pi^- \text{C}$	
782.4 ± 0.5	2400	BIZZARRI	69	HBC	0.0 $\overline{p} p$	

[1] Update of AKHMETSHIN 00C. NODE=M001M;LINKAGE=PT

[2] From the combined fit of ANTONELLI 92, ACHASOV 01E, ACHASOV 02E, and ACHASOV 03D data on the $\pi^+ \pi^- \pi^0$ and ANTONELLI 92 on the $\omega \pi^+ \pi^-$ final states. Supersedes ACHASOV 99E and ACHASOV 02E. NODE=M001M;LINKAGE=VH

[3] From the $\eta \to \gamma\gamma$ decay. NODE=M001M;LINKAGE=S1

[4] From the $\eta \to 3\pi^0$ decay. NODE=M001M;LINKAGE=S2

[5] Observed by threshold-crossing technique. Mass resolution = 4.8 MeV FWHM. NODE=M001M;LINKAGE=B

[6] The values were extracted from a dispersively improved Breit-Wigner parameterization and do not include vacuum polarization. Inclusion of vacuum polarization gives 782.736 ± 0.024 MeV. NODE=M001M;LINKAGE=G

[7] The ω mass was extracted from a dispersively improved Breit-Wigner parameterization, the ω width fixed at 8.49 ± 0.08 MeV. The value does not include vacuum polarization which would shift the mass to $781.81 \pm 0.09 \pm 0.03$ MeV. The mixing parameter is assumed real valued. NODE=M001M;LINKAGE=A

[8] The values were extracted from a dispersively improved Breit-Wigner parameterization and do not include vacuum polarization. NODE=M001M;LINKAGE=H

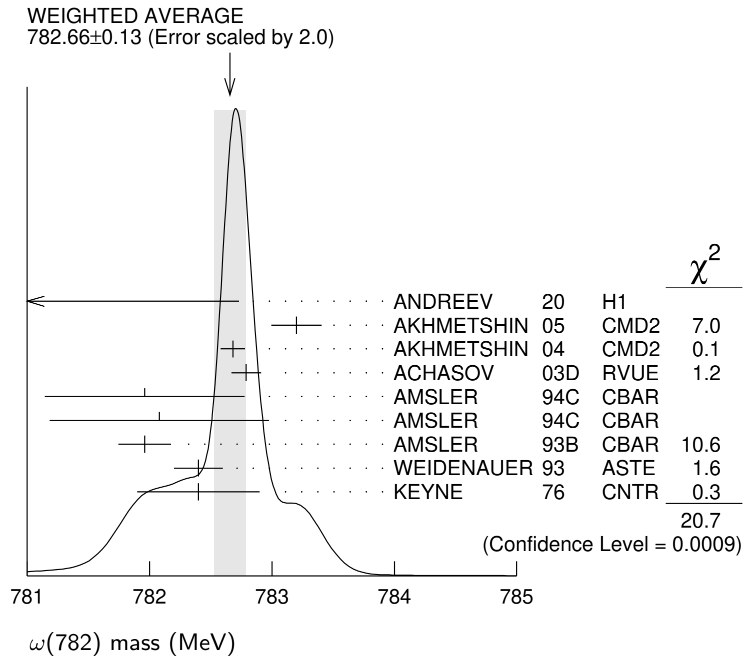
[9] From the $\rho-\omega$ interference in the $\pi^+ \pi^-$ mass spectrum using the Breit-Wigner for the ω and leaving its mass and width as free parameters of the fit. NODE=M001M;LINKAGE=LE

[10] Systematic uncertainties underestimated. NODE=M001M;LINKAGE=KB

[11] Systematic uncertainties not estimated. NODE=M001M;LINKAGE=I

[12] From best-resolution sample of COYNE 71. NODE=M001M;LINKAGE=D

[13] From ω-ρ interference in the $\pi^+ \pi^-$ mass spectrum assuming ω width 12.6 MeV. NODE=M001M;LINKAGE=F



ω(782) WIDTH

NODE=M001W

NODE=M001W

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
8.68±0.13 OUR AVERAGE					
8.68±0.23±0.10	11200	[1] AKHMETSHIN	04	CMD2	$e^+e^- \to \pi^+\pi^-\pi^0$
8.68±0.04±0.15	1.2M	[2] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
8.65±0.06±0.01		[3] HOID	20	RVUE	$e^+e^- \to \pi^0\gamma$
8.71±0.04±0.04		[4] HOFERICHT...	19	RVUE	$e^+e^- \to \pi^+\pi^-\pi^0$
8.13±0.45		[5] LEES	12G	BABR	$e^+e^- \to \pi^+\pi^-\gamma$
8.2 ±0.3	19500	[6] WURZINGER	95	SPEC	1.33 $pd \to {}^3\mathrm{He}\omega$
8.4 ±0.1		[7] AULCHENKO	87	ND	$e^+e^- \to \pi^+\pi^-\pi^0$
8.30±0.40		[6] BARKOV	87	CMD	$e^+e^- \to \pi^+\pi^-\pi^0$
9.8 ±0.9	1488	[8] KURDADZE	83B	OLYA	$e^+e^- \to \pi^+\pi^-\pi^0$
9.0 ±0.8	433	[6] CORDIER	80	DM1	$e^+e^- \to \pi^+\pi^-\pi^0$
12 ±2	1430	COOPER	78B	HBC	0.7–0.8 $\overline{p}p \to 5\pi$
9.4 ±2.5	2100	GESSAROLI	77	HBC	11 $\pi^-p \to \omega n$
10.22±0.43	20000	[9] KEYNE	76	CNTR	$\pi^-p \to \omega n$
13.3 ±2	418	AGUILAR-...	72B	HBC	3.9,4.6 K^-p
9.1 ±0.8	451	[6] BENAKSAS	72B	OSPK	$e^+e^- \to \pi^+\pi^-\pi^0$
10.5 ±1.5		BORENSTEIN	72	HBC	2.18 K^-p
7.70±0.9 ±1.15	940	BROWN	72	MMS	2.5 $\pi^-p \to n\mathrm{MM}$
10.3 ±1.4	510	BIZZARRI	71	HBC	0.0 $p\overline{p} \to K_1K_1\omega$
12.8 ±3.0	248	BIZZARRI	71	HBC	0.0 $p\overline{p} \to K^+K^-\omega$
9.5 ±1.0	3583	COYNE	71	HBC	3.7 $\pi^+p \to p\pi^+\pi^+\pi^-\pi^0$

OCCUR=2

[1] Update of AKHMETSHIN 00C. NODE=M001W;LINKAGE=PT

[2] From the combined fit of ANTONELLI 92, ACHASOV 01E, ACHASOV 02E, and ACHASOV 03D data on the $\pi^+\pi^-\pi^0$ and ANTONELLI 92 on the $\omega\pi^+\pi^-$ final states. Supersedes ACHASOV 99E and ACHASOV 02E. NODE=M001W;LINKAGE=VH

[3] The values were extracted from a dispersively improved Breit-Wigner parameterization and do not include vacuum polarization. Inclusion of vacuum polarization gives 8.63 ± 0.05 MeV. NODE=M001W;LINKAGE=E

[4] The values were extracted from a dispersively improved Breit-Wigner parameterization and do not include vacuum polarization. NODE=M001W;LINKAGE=F

[5] From the $\rho-\omega$ interference in the $\pi^+\pi^-$ mass spectrum using the Breit-Wigner for the ω and leaving its mass and width as free parameters of the fit. NODE=M001W;LINKAGE=LE

[6] Systematic uncertainties underestimated. NODE=M001W;LINKAGE=I

[7] Relativistic Breit-Wigner includes radiative corrections. Systematic uncertainties not estimated. NODE=M001W;LINKAGE=G

[8] Systematic uncertainties not estimated. NODE=M001W;LINKAGE=J

[9] Observed by threshold-crossing technique. Mass resolution = 4.8 MeV FWHM. NODE=M001W;LINKAGE=B

$\omega(782)$ DECAY MODES

NODE=M001215;NODE=M001

	Mode		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	
Γ_1	$\pi^+\pi^-\pi^0$		(89.2 ± 0.7) %		DESIG=1
Γ_2	$\pi^0\gamma$		(8.35 ± 0.27) %	S=2.2	DESIG=3
Γ_3	$\pi^+\pi^-$		$(1.53^{+0.11}_{-0.13})$ %	S=1.2	DESIG=2
Γ_4	neutrals (excluding $\pi^0\gamma$)		$(7\ ^{+8}_{-4}) \times 10^{-3}$	S=1.1	DESIG=13
Γ_5	$\eta\gamma$		$(4.5 \pm 0.4) \times 10^{-4}$	S=1.1	DESIG=6
Γ_6	$\pi^0 e^+ e^-$		$(7.7 \pm 0.6) \times 10^{-4}$		DESIG=14
Γ_7	$\pi^0\mu^+\mu^-$		$(1.34 \pm 0.18) \times 10^{-4}$	S=1.5	DESIG=11
Γ_8	$\eta e^+ e^-$				DESIG=18
Γ_9	$e^+ e^-$		$(7.38 \pm 0.22) \times 10^{-5}$	S=1.9	DESIG=7
Γ_{10}	$\pi^+\pi^-\pi^0\pi^0$		$< 2 \times 10^{-4}$	CL=90%	DESIG=12
Γ_{11}	$\pi^+\pi^-\gamma$		$< 3.6 \times 10^{-3}$	CL=95%	DESIG=4
Γ_{12}	$\pi^+\pi^-\pi^+\pi^-$		$< 1 \times 10^{-3}$	CL=90%	DESIG=15
Γ_{13}	$\pi^0\pi^0\gamma$		$(6.7 \pm 1.1) \times 10^{-5}$		DESIG=5
Γ_{14}	$\eta\pi^0\gamma$		$< 3.3 \times 10^{-5}$	CL=90%	DESIG=17
Γ_{15}	$\mu^+\mu^-$		$(7.4 \pm 1.8) \times 10^{-5}$		DESIG=8
Γ_{16}	3γ		$< 1.9 \times 10^{-4}$	CL=95%	DESIG=10
	Charge conjugation (C) violating modes				NODE=M001;CLUMP=A
Γ_{17}	$\eta\pi^0$	C	$< 2.1 \times 10^{-4}$	CL=90%	DESIG=9
Γ_{18}	$2\pi^0$	C	$< 2.2 \times 10^{-4}$	CL=90%	DESIG=193
Γ_{19}	$3\pi^0$	C	$< 2.3 \times 10^{-4}$	CL=90%	DESIG=16
Γ_{20}	invisible		$< 7 \times 10^{-5}$	CL=90%	DESIG=194

CONSTRAINED FIT INFORMATION

An overall fit to 15 branching ratios uses 48 measurements and one constraint to determine 10 parameters. The overall fit has a $\chi^2 = 48.0$ for 39 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\left\langle\delta x_i \delta x_j\right\rangle/(\delta x_i \cdot \delta x_j)$, in percent, from the fit to the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

	x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_9	x_{13}
x_2	23								
x_3	−18	−4							
x_4	−92	−55	1						
x_5	7	23	−1	−15					
x_6	−1	0	0	0	0				
x_7	0	0	0	0	0	0			
x_9	−24	−73	4	47	−31	0	0		
x_{13}	1	4	0	−2	1	0	0	−3	
x_{15}	0	0	0	0	0	0	0	0	0

$\omega(782)$ PARTIAL WIDTHS

NODE=M001218

$\Gamma(\pi^0\gamma)$ Γ_2

NODE=M001W1
NODE=M001W1

VALUE (keV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
880±50	7815	[1] ACHASOV	13	SND	1.05–2.00 $e^+e^- \to \pi^0\pi^0\gamma$
788±12±27	36500	[2] ACHASOV	03	SND	0.60–0.97 $e^+e^- \to \pi^0\gamma$
764±51	10625	DOLINSKY	89	ND	$e^+e^- \to \pi^0\gamma$

[1] Systematic uncertainty not estimated. NODE=M001W1;LINKAGE=AC

[2] Using $\Gamma_\omega = 8.44 \pm 0.09$ MeV and B($\omega \to \pi^0\gamma$) from ACHASOV 03. NODE=M001W1;LINKAGE=AD

$\Gamma(\eta\gamma)$ Γ_5

NODE=M001W2
NODE=M001W2

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
6.1 ± 2.5	[1] DOLINSKY	89	ND	$e^+e^- \to \eta\gamma$

[1] Using $\Gamma_\omega = 8.4 \pm 0.1$ MeV and B($\omega \to \eta\gamma$) from DOLINSKY 89.

NODE=M001W2;LINKAGE=DA

$\Gamma(e^+e^-)$ Γ_9

NODE=M001W7
NODE=M001W7

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.60 ±0.02 OUR EVALUATION					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.591 ± 0.015	11200	[1,2] AKHMETSHIN	04	CMD2	$e^+e^- \to \pi^+\pi^-\pi^0$
$0.653\pm0.003\pm0.021$	1.2M	[3] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
0.600 ± 0.031	10625	DOLINSKY	89	ND	$e^+e^- \to \pi^0\gamma$

→ UNCHECKED ←

[1] Using B($\omega \to \pi^+\pi^-\pi^0$) = 0.891 ± 0.007 and $\Gamma_{total} = 8.44 \pm 0.09$ MeV.
[2] Update of AKHMETSHIN 00C.
[3] Using ACHASOV 03, ACHASOV 03D and B($\omega \to \pi^+\pi^-$) = (1.70 ± 0.28)%.

NODE=M001W7;LINKAGE=3P
NODE=M001W7;LINKAGE=PT
NODE=M001W;LINKAGE=VF

$\omega(782)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma(total)$

NODE=M001235

$\Gamma(\pi^+\pi^-\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_1\Gamma_9/\Gamma$

NODE=M001R02
NODE=M001R02

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
569.8±3.1±8.2	[1] LEES	21B	BABR	10.5 $e^+e^- \to \pi^+\pi^-\pi^0\gamma$

[1] From the cross section for $e^+e^- \to \pi^+\pi^-\pi^0$ with contributions from $\rho(770)$, $\omega(782)$, $\phi(1020)$, $\omega(1420)$, and $\omega(1650)$.

NODE=M001R02;LINKAGE=A

$\omega(782)$ $\Gamma(e^+e^-)\Gamma(i)/\Gamma^2(total)$

NODE=M001225

$\Gamma(e^+e^-)/\Gamma_{total} \times \Gamma(\pi^+\pi^-\pi^0)/\Gamma_{total}$ $\Gamma_9/\Gamma \times \Gamma_1/\Gamma$

NODE=M001G2
NODE=M001G2

6.59±0.19 OUR FIT Error includes scale factor of 2.1. [$(6.60 \pm 0.16) \times 10^{-5}$ OUR 2021 FIT Scale factor = 1.9]

NEW

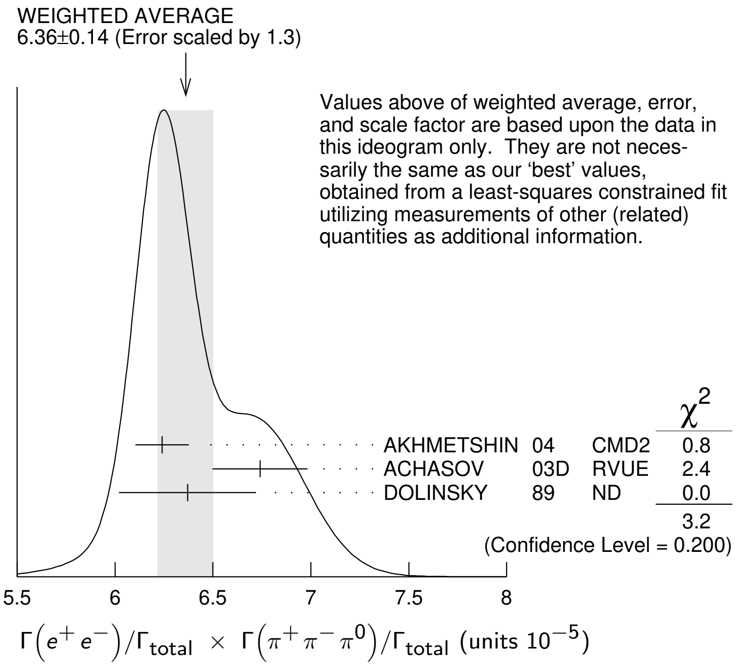
6.36±0.14 OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below. [$(6.41 \pm 0.13) \times 10^{-5}$ OUR 2021 AVERAGE Scale factor = 1.2]

NEW

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$6.24\pm0.11\pm0.08$	11.2k	[1] AKHMETSHIN	04	CMD2	$e^+e^- \to \pi^+\pi^-\pi^0$
$6.74\pm0.04\pm0.24$	1.2M	[2,3] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
6.37 ± 0.35		[2] DOLINSKY	89	ND	$e^+e^- \to \pi^+\pi^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
6.20 ± 0.13		[4] BENAYOUN	10	RVUE	0.4–1.05 e^+e^-
$6.70\pm0.06\pm0.27$		[5] AUBERT,B	04N	BABR	10.6 $e^+e^- \to \pi^+\pi^-\pi^0\gamma$
6.45 ± 0.24		[6] BARKOV	87	CMD	$e^+e^- \to \pi^+\pi^-\pi^0$
5.79 ± 0.42	1488	[7] KURDADZE	83B	OLYA	$e^+e^- \to \pi^+\pi^-\pi^0$
5.89 ± 0.54	433	[6] CORDIER	80	DM1	$e^+e^- \to \pi^+\pi^-\pi^0$
7.54 ± 0.84	451	[6] BENAKSAS	72B	OSPK	$e^+e^- \to \pi^+\pi^-\pi^0$

[1] Update of AKHMETSHIN 00C.
[2] Recalculated by us from the cross section in the peak.
[3] From the combined fit of ANTONELLI 92, ACHASOV 01E, ACHASOV 02E, and ACHASOV 03D data on the $\pi^+\pi^-\pi^0$ and ANTONELLI 92 on the $\omega\pi^+\pi^-$ final states. Supersedes ACHASOV 99E and ACHASOV 02E.
[4] A simultaneous fit of $e^+e^- \to \pi^+\pi^-$, $\pi^+\pi^-\pi^0$, $\pi^0\gamma$, $\eta\gamma$ data.
[5] Superseeded by LEES 21B.
[6] Recalculated by us from the cross section in the peak. Systematic uncertainties underestimated.
[7] Recalculated by us from the cross section in the peak. Systematic uncertainties not estimated.

NODE=M001G;LINKAGE=PT
NODE=M001G;LINKAGE=LP
NODE=M001G;LINKAGE=VH
NODE=M001G2;LINKAGE=BE
NODE=M001G2;LINKAGE=C
NODE=M001G2;LINKAGE=A
NODE=M001G2;LINKAGE=B



$\Gamma(e^+e^-)/\Gamma_{total} \times \Gamma(\pi^0\gamma)/\Gamma_{total}$ $\Gamma_9/\Gamma \times \Gamma_2/\Gamma$

NODE=M001G4
NODE=M001G4

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
6.16 ±0.14 OUR FIT Error includes scale factor of 1.8. [(6.16 ± 0.17) × 10^{-6} OUR 2021 FIT Scale factor = 2.1]				
6.34 ±0.10 OUR AVERAGE				
6.336±0.056±0.089		[1] ACHASOV 16A	SND	0.60–1.38 $e^+e^- \to \pi^0\gamma$
6.47 ±0.14 ±0.39	18k	AKHMETSHIN 05	CMD2	0.60-1.38 $e^+e^- \to \pi^0\gamma$
6.34 ±0.21 ±0.21	10k	[2] DOLINSKY 89	ND	$e^+e^- \to \pi^0\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
6.80 ±0.13		[3] BENAYOUN 10	RVUE	0.4–1.05 e^+e^-
6.50 ±0.11 ±0.20	36k	[4] ACHASOV 03	SND	0.60–0.97 $e^+e^- \to \pi^0\gamma$

NEW

[1] From the VMD model with the interfering $\rho(770)$, $\omega(782)$, $\phi(1020)$, and an additional resonance describing the total contribution of the $\rho(1450)$ and $\omega(1420)$ states. Supersedes ACHASOV 03. NODE=M001G4;LINKAGE=A

[2] Recalculated by us from the cross section in the peak. NODE=M001G4;LINKAGE=LP

[3] A simultaneous fit of $e^+e^- \to \pi^+\pi^-$, $\pi^+\pi^-\pi^0$, $\pi^0\gamma$, $\eta\gamma$ data. NODE=M001G4;LINKAGE=BE

[4] Using $\sigma(\phi \to \pi^0\gamma)$ from ACHASOV 00 and m_ω = 782.57 MeV in the model with the energy-independent phase of ρ-ω interferenceequal to $(-10.2 \pm 7.0)^\circ$. NODE=M001G;LINKAGE=SH

$\Gamma(e^+e^-)/\Gamma_{total} \times \Gamma(\pi^+\pi^-)/\Gamma_{total}$ $\Gamma_9/\Gamma \times \Gamma_3/\Gamma$

NODE=M001G5
NODE=M001G5

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
1.28 ±0.05 OUR AVERAGE				
1.318±0.051±0.021		[1] ACHASOV 21	SND	$e^+e^- \to \pi^+\pi^-$
1.225±0.058±0.041	800k	[2] ACHASOV 06	SND	$e^+e^- \to \pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.166±0.036		[3] BENAYOUN 13	RVUE	0.4–1.05 e^+e^-
1.05 ±0.08		[4] DAVIER 13	RVUE	$e^+e^- \to \pi^+\pi^-(\gamma)$

[1] From a fit of the cross section in the energy range 0.525 < $\sqrt{s}$ < 0.883 GeV parameterized by the sum of the Breit-Wigner amplitudes for the $\rho(770)$, ω and $\rho(1450)$ resonances. The measured phase of the $\rho(770)$—ω interference is $(110.7 \pm 1.5 \pm 1.0)^\circ$. NODE=M001G5;LINKAGE=C

[2] Supersedes ACHASOV 05A. NODE=M001G5;LINKAGE=AC

[3] A simultaneous fit to $e^+e^- \to \pi^+\pi^-$, $\pi^+\pi^-\pi^0$, $\pi^0\gamma$, $\eta\gamma$, $K\overline{K}$, and $\tau^- \to \pi^-\pi^0\nu_\tau$ data. Supersedes BENAYOUN 10. NODE=M001G5;LINKAGE=B

[4] From $e^+e^- \to \pi^+\pi^-(\gamma)$ data of LEES 12G. NODE=M001G5;LINKAGE=A

$\Gamma(e^+e^-)/\Gamma_{total} \times \Gamma(\eta\gamma)/\Gamma_{total}$ $\Gamma_9/\Gamma \times \Gamma_5/\Gamma$

NODE=M001G3
NODE=M001G3

VALUE (units 10^{-8})	EVTS	DOCUMENT ID	TECN	COMMENT
3.32±0.28 OUR FIT Error includes scale factor of 1.1.				
3.18±0.28 OUR AVERAGE				
3.10±0.31±0.11	33k	[1] ACHASOV 07B	SND	0.6–1.38 $e^+e^- \to \eta\gamma$
$3.17^{+1.85}_{-1.31}$±0.21	17.4k	[2] AKHMETSHIN 05	CMD2	0.60-1.38 $e^+e^- \to \eta\gamma$
3.41±0.52±0.21	23k	[3,4] AKHMETSHIN 01B	CMD2	$e^+e^- \to \eta\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
4.50±0.10		[5] BENAYOUN 10	RVUE	0.4–1.05 e^+e^-

[1] From a combined fit of $\sigma(e^+e^- \to \eta\gamma)$ with $\eta \to 3\pi^0$ and $\eta \to \pi^+\pi^-\pi^0$, and fixing B($\eta \to 3\pi^0$) / B($\eta \to \pi^+\pi^-\pi^0$) = 1.44 ± 0.04. Recalculated by us from the cross section at the peak. Supersedes ACHASOV 00D and ACHASOV 06A.
[2] From the $\eta \to 2\gamma$ decay and using B($\eta \to \gamma\gamma$)= 39.43 ± 0.26%.
[3] From the $\eta \to 3\pi^0$ decay and using B($\eta \to 3\pi^0$)= (32.24 ± 0.29) × 10^{-2}.
[4] The combined fit from 600 to 1380 MeV taking into account ρ(770), ω(782), ϕ(1020), and ρ(1450) (mass and width fixed at 1450 MeV and 310 MeV respectively).
[5] A simultaneous fit of $e^+e^- \to \pi^+\pi^-$, $\pi^+\pi^-\pi^0$, $\pi^0\gamma$, $\eta\gamma$ data.

NODE=M001G3;LINKAGE=AH
NODE=M001G;LINKAGE=AH
NODE=M001G;LINKAGE=AK
NODE=M001G;LINKAGE=BQ
NODE=M001G3;LINKAGE=BE

$\Gamma(e^+e^-)/\Gamma_{total} \times \Gamma(\mu^+\mu^-)/\Gamma_{total}$ $\Gamma_9/\Gamma \times \Gamma_{15}/\Gamma$

NODE=M001G01
NODE=M001G01

VALUE (units 10^{-9})	EVTS	DOCUMENT ID		TECN	COMMENT
4.3±1.8±2.2	4.5M	[1] ANASTASI	17	KLOE	$e^+e^- \to \mu^+\mu^-\gamma$

[1] From a fit of the real part of the vacuum polarization by a sum of the leptonic and hadronic contributions, where the hadronic contribution is parametrized as a sum of Breit-Wigner resonances ω(782), ϕ(1020) and using a GOUNARIS 68 parametrization for the ρ(770), and a non-resonant term.

NODE=M001G01;LINKAGE=A

ω(782) BRANCHING RATIOS

NODE=M001220

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_1/Γ

NODE=M001R21
NODE=M001R21

NIECKNIG 12 describes final-state interactions between the three pions in a dispersive framework using data on the $\pi\pi$ *P*-wave scattering phase shift.

NODE=M001R21

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.9024±0.0019		[1] AMBROSINO	08G	KLOE	1.0–1.03 $e^+e^- \to \pi^+\pi^-2\pi^0$, $2\pi^0\gamma$
0.8965±0.0016±0.0048	1.2M	[2,3] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
0.880 ±0.020 ±0.032	11200	[3,4] AKHMETSHIN	00C	CMD2	$e^+e^- \to \pi^+\pi^-\pi^0$
0.8942±0.0062		[3] DOLINSKY	89	ND	$e^+e^- \to \pi^+\pi^-\pi^0$

[1] Not independent of $\Gamma(\pi^0\gamma)$ / $\Gamma(\pi^+\pi^-\pi^0)$ from AMBROSINO 08G.
[2] Using ACHASOV 03, ACHASOV 03D and B($\omega \to \pi^+\pi^-$) = (1.70 ± 0.28)%.
[3] Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\pi^+\pi^-\pi^0)/\Gamma^2_{total}$.
[4] Using $\Gamma(e^+e^-)$=0.60 ± 0.02 keV.

NODE=M001R21;LINKAGE=AM
NODE=M001R;LINKAGE=VF
NODE=M001R;LINKAGE=ZL
NODE=M001R;LINKAGE=KH

$\Gamma(\pi^0\gamma)/\Gamma_{total}$ Γ_2/Γ

NODE=M001R28
NODE=M001R28

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
8.88±0.18		[1] ACHASOV	16A	SND	0.60–1.38 $e^+e^- \to \pi^0\gamma$
8.09±0.14		[2] AMBROSINO	08G	KLOE	$e^+e^- \to \pi^+\pi^-2\pi^0$, $2\pi^0\gamma$
9.06±0.20±0.57	18k	[3,4] AKHMETSHIN	05	CMD2	0.60-1.38 $e^+e^- \to \pi^0\gamma$
9.34±0.15±0.31	36k	[4] ACHASOV	03	SND	0.60–0.97 $e^+e^- \to \pi^0\gamma$
8.65±0.16±0.42	1.2M	[5,6] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
8.39±0.24	9k	[7] BENAYOUN	96	RVUE	$e^+e^- \to \pi^0\gamma$
8.88±0.62	10k	[4] DOLINSKY	89	ND	$e^+e^- \to \pi^0\gamma$

[1] Using B($\omega \to e^+e^-$) from PDG 15. Supersedes ACHASOV 03.
[2] Not independent of $\Gamma(\pi^0\gamma)$ / $\Gamma(\pi^+\pi^-\pi^0)$ from AMBROSINO 08G.
[3] Using B($\omega \to e^+e^-$)= (7.14 ± 0.13) × 10^{-5}.
[4] Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\pi^0\gamma)/\Gamma^2_{total}$.
[5] Using ACHASOV 03, ACHASOV 03D and B($\omega \to \pi^+\pi^-$) = (1.70 ± 0.28)%.
[6] Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\pi^+\pi^-\pi^0)/\Gamma^2_{total}$.
[7] Reanalysis of DRUZHININ 84, DOLINSKY 89, DOLINSKY 91 taking into account the triangle anomaly contributions.

NODE=M001R28;LINKAGE=A
NODE=M001R28;LINKAGE=AM
NODE=M001R;LINKAGE=AH
NODE=M001R;LINKAGE=VL
NODE=M001R28;LINKAGE=VF
NODE=M001R28;LINKAGE=ZL
NODE=M001R28;LINKAGE=A1

$\Gamma(\pi^0\gamma)/\Gamma(\pi^+\pi^-\pi^0)$ Γ_2/Γ_1

NODE=M001R3
NODE=M001R3

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
9.35±0.30 OUR FIT Error includes scale factor of 2.4. [(9.34 ± 0.29) × 10^{-2} OUR 2021 FIT Scale factor = 2.3]				
9.05±0.27 OUR AVERAGE Error includes scale factor of 1.8.				
8.97±0.16	AMBROSINO	08G	KLOE	$e^+e^- \to \pi^+\pi^-2\pi^0$, $2\pi^0\gamma$
9.94±0.36±0.38	[1] AULCHENKO	00A	SND	$e^+e^- \to \pi^+\pi^-2\pi^0$, $2\pi^0\gamma$
8.4 ±1.3	KEYNE	76	CNTR	$\pi^- p \to \omega n$
10.9 ±2.5	BENAKSAS	72C	OSPK	$e^+e^- \to \pi^0\gamma$
8.1 ±2.0	BALDIN	71	HLBC	2.9 $\pi^+ p$
13 ±4	JACQUET	69B	HLBC	2.05 $\pi^+ p \to \pi^+ p\omega$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
9.7 ±0.2 ±0.5	[2,3] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
9.9 ±0.7	[2] DOLINSKY	89	ND	$e^+e^- \to \pi^0\gamma$

NEW

[1] From $\sigma_0^{\omega\pi^0 \to \pi^0\pi^0\gamma}(m_\phi)/\sigma_0^{\omega\pi^0 \to \pi^+\pi^-\pi^0\pi^0}(m_\phi)$ with a phase-space correction factor of 1/1.023. NODE=M001R3;LINKAGE=AL
[2] Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\pi^0\gamma)/\Gamma^2_{total}$. NODE=M001R3;LINKAGE=VL
[3] Using ACHASOV 03. Based on 1.2M events. NODE=M001R3;LINKAGE=VW

$\Gamma(\pi^+\pi^-)/\Gamma_{total}$ Γ_3/Γ

NODE=M001R15

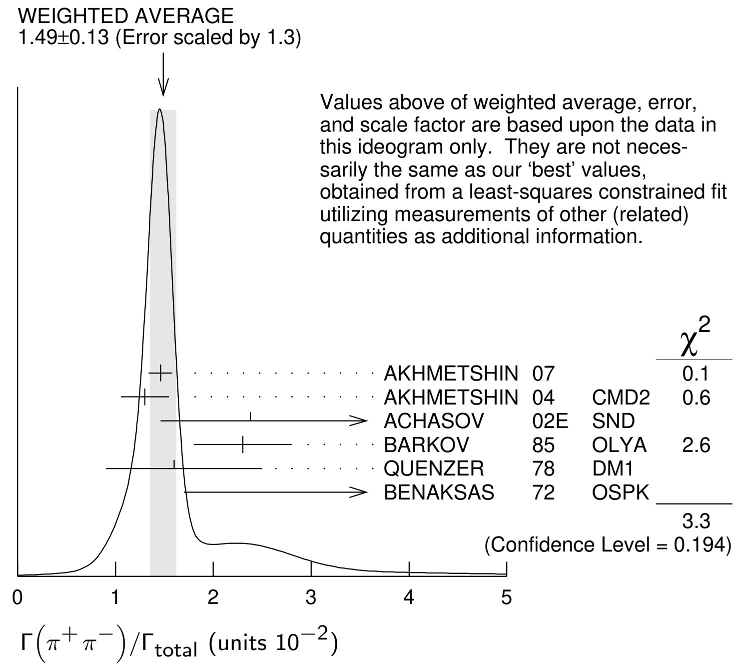
See also $\Gamma(\pi^+\pi^-)/\Gamma(\pi^+\pi^-\pi^0)$.

NODE=M001R15
NODE=M001R15

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
$1.53^{+0.11}_{-0.13}$ OUR FIT	Error includes scale factor of 1.2.				
1.49±0.13 OUR AVERAGE	Error includes scale factor of 1.3. See the ideogram below.				
1.46±0.12±0.02	900k	[1] AKHMETSHIN	07		$e^+e^- \to \pi^+\pi^-$
1.30±0.24±0.05	11.2k	[2] AKHMETSHIN	04	CMD2	$e^+e^- \to \pi^+\pi^-$
$2.38^{+1.77}_{-0.90}$±0.18	5.4k	[3] ACHASOV	02E	SND	1.1–1.38 $e^+e^- \to \pi^+\pi^-\pi^0$
2.3 ±0.5		BARKOV	85	OLYA	$e^+e^- \to \pi^+\pi^-$
1.6 $^{+0.9}_{-0.7}$		QUENZER	78	DM1	$e^+e^- \to \pi^+\pi^-$
3.6 ±1.9		BENAKSAS	72	OSPK	$e^+e^- \to \pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.29±0.22±0.03	970k	[4,5] ABLIKIM	18C	BES3	$\eta'(958) \to \gamma\pi^+\pi^-$
1.28±0.22±0.03	970k	[6,7] ABLIKIM	18C	BES3	$\eta'(958) \to \gamma\pi^+\pi^-$
1.52±0.08		[8] HANHART	18	RVUE	$e^+e^- \to \pi^+\pi^-$
1.75±0.11	4.5M	[9] ACHASOV	05A	SND	$e^+e^- \to \pi^+\pi^-$
2.01±0.29		[10] BENAYOUN	03	RVUE	$e^+e^- \to \pi^+\pi^-$
1.9 ±0.3		[11] GARDNER	99	RVUE	$e^+e^- \to \pi^+\pi^-$
2.3 ±0.4		[12] BENAYOUN	98	RVUE	$e^+e^- \to \pi^+\pi^-$, $\mu^+\mu^-$
1.0 ±0.11		[13] WICKLUND	78	ASPK	3,4,6 $\pi^\pm N$
1.22±0.30		ALVENSLEB...	71C	CNTR	Photoproduction
1.3 $^{+1.2}_{-0.9}$		MOFFEIT	71	HBC	2.8,4.7 γp
$0.80^{+0.28}_{-0.20}$		[14] BIGGS	70B	CNTR	4.2γC $\to \pi^+\pi^-$ C

OCCUR=3
OCCUR=2

[1] A combined fit of AKHMETSHIN 07, AULCHENKO 06, and AULCHENKO 05. NODE=M001R15;LINKAGE=AK
[2] Update of AKHMETSHIN 02. NODE=M001R15;LINKAGE=PT
[3] From the $m_{\pi^+\pi^-}$ spectrum taking into account the interference of the $\rho\pi$ and $\omega\pi$ amplitudes. NODE=M001R;LINKAGE=VE
[4] From a fit to $\pi^+\pi^-$ mass using $\rho(770)$ (parametrized with the Gounaris-Sakurai approach), $\omega(782)$, and box anomaly components. NODE=M001R15;LINKAGE=E
[5] ABLIKIM 18C reports $[\Gamma(\omega(782) \to \pi^+\pi^-)/\Gamma_{total}] \times [B(\eta'(958) \to \omega\gamma)] = (3.25 \pm 0.21 \pm 0.52) \times 10^{-4}$ which we divide by our best value $B(\eta'(958) \to \omega\gamma) = (2.52 \pm 0.07) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M001R15;LINKAGE=H
[6] From a fit to $\pi^+\pi^-$ mass using $\rho(770)$ (parametrized with the Gounaris-Sakurai approach), $\omega(782)$, and $\rho(1450)$ components. NODE=M001R15;LINKAGE=J
[7] ABLIKIM 18C reports $[\Gamma(\omega(782) \to \pi^+\pi^-)/\Gamma_{total}] \times [B(\eta'(958) \to \omega\gamma)] = (3.22 \pm 0.21 \pm 0.52) \times 10^{-4}$ which we divide by our best value $B(\eta'(958) \to \omega\gamma) = (2.52 \pm 0.07) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M001R15;LINKAGE=K
[8] Dispersive analysis. Value extracted from average of data from AUBERT 09AS, AKHMETSHIN 07, ACHASOV 06, AMBROSINO 11A, BABUSCI 13D, ABLIKIM 16B normalised by PDG 16 evaluation for $\Gamma(\omega \to e^+e^-)$. NODE=M001R15;LINKAGE=D
[9] Using $\Gamma(\omega \to e^+e^-)$ from the 2004 Edition of this Review (PDG 04). NODE=M001R;LINKAGE=SN
[10] Using the data of AKHMETSHIN 02 in the hidden local symmetry model. NODE=M001R;LINKAGE=BY
[11] Using the data of BARKOV 85. NODE=M001R15;LINKAGE=H4
[12] Using the data of BARKOV 85 in the hidden local symmetry model. NODE=M001R15;LINKAGE=Q
[13] From a model-dependent analysis assuming complete coherence. NODE=M001R15;LINKAGE=F
[14] Re-evaluated under $\Gamma(\pi^+\pi^-)/\Gamma(\pi^+\pi^-\pi^0)$ by BEHREND 71 using more accurate $\omega \to \rho$ photoproduction cross-section ratio. NODE=M001R15;LINKAGE=B



$\Gamma(\pi^+\pi^-)/\Gamma(\pi^+\pi^-\pi^0)$ Γ_3/Γ_1

NODE=M001R2

See also $\Gamma(\pi^+\pi^-)/\Gamma_{total}$.

NODE=M001R2
NODE=M001R2

VALUE	DOCUMENT ID		TECN	COMMENT
0.0172±0.0014 OUR FIT Error includes scale factor of 1.2.				
0.026 ±0.005 OUR AVERAGE				
0.021 $^{+0.028}_{-0.009}$	[1,2] RATCLIFF	72	ASPK	15 $\pi^- p \to n 2\pi$
0.028 ±0.006	[1] BEHREND	71	ASPK	Photoproduction
0.022 $^{+0.009}_{-0.01}$	[3] ROOS	70	RVUE	

[1] The fitted width of these data is 160 MeV in agreement with present average, thus the ω contribution is overestimated. Assuming ρ width 145 MeV. NODE=M001R2;LINKAGE=A

[2] Significant interference effect observed. NB of $\omega \to 3\pi$ comes from an extrapolation. NODE=M001R2;LINKAGE=S

[3] ROOS 70 combines ABRAMOVICH 70 and BIZZARRI 70. NODE=M001R2;LINKAGE=R

$\Gamma(\pi^+\pi^-)/\Gamma(\pi^0\gamma)$ Γ_3/Γ_2

NODE=M001R33
NODE=M001R33

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.20±0.04	1.98M	[1] ALOISIO	03	KLOE	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$

[1] Using the data of ALOISIO 02D. NODE=M001R;LINKAGE=KL

$\Gamma(\text{neutrals})/\Gamma_{total}$ $(\Gamma_2+\Gamma_4)/\Gamma$

NODE=M001R14
NODE=M001R14

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.091±0.006 OUR FIT					
0.081±0.011 OUR AVERAGE					
0.075±0.025		BIZZARRI	71	HBC	0.0 $p\overline{p}$
0.079±0.019		DEINET	69B	OSPK	1.5 $\pi^- p$
0.084±0.015		BOLLINI	68C	CNTR	2.1 $\pi^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.073±0.018	42	BASILE	72B	CNTR	1.67 $\pi^- p$

$\Gamma(\text{neutrals})/\Gamma(\pi^+\pi^-\pi^0)$ $(\Gamma_2+\Gamma_4)/\Gamma_1$

NODE=M001R1
NODE=M001R1

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.102±0.008 OUR FIT					
0.103$^{+0.011}_{-0.010}$ OUR AVERAGE					
0.15 ±0.04	46	AGUILAR-...	72B	HBC	3.9,4.6 $K^- p$
0.10 ±0.03	19	BARASH	67B	HBC	0.0 $\overline{p}p$
0.134±0.026	850	DIGIUGNO	66B	CNTR	1.4 $\pi^- p$
0.097±0.016	348	FLATTE	66	HBC	1.4 – 1.7 $K^- p \to \Lambda MM$
0.06 $^{+0.05}_{-0.02}$		JAMES	66	HBC	2.1 $\pi^+ p$
0.08 ±0.03	35	KRAEMER	64	DBC	1.2 $\pi^+ d$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.11 ±0.02	20	BUSCHBECK	63	HBC	1.5 $K^- p$

$\Gamma(\pi^0\gamma)/\Gamma(\text{neutrals})$ $\Gamma_2/(\Gamma_2+\Gamma_4)$

NODE=M001R18
NODE=M001R18

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.78±0.07		[1] DAKIN	72	OSPK	1.4 $\pi^- p \to n$MM
>0.81	90	DEINET	69B	OSPK	

[1] Error statistical only. Authors obtain good fit also assuming $\pi^0\gamma$ as the only neutral decay.

NODE=M001R18;LINKAGE=D

$\Gamma(\text{neutrals})/\Gamma(\text{charged particles})$ $(\Gamma_2+\Gamma_4)/(\Gamma_1+\Gamma_3)$

NODE=M001R9
NODE=M001R9

VALUE	DOCUMENT ID		TECN	COMMENT
0.100±0.008 OUR FIT				
0.124±0.021	FELDMAN	67C	OSPK	1.2 $\pi^- p$

$\Gamma(\eta\gamma)/\Gamma_{total}$ Γ_5/Γ

NODE=M001R19
NODE=M001R19

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
4.5 ±0.4 OUR FIT Error includes scale factor of 1.1.					
6.3 ±1.3 OUR AVERAGE Error includes scale factor of 1.2.					
6.6 ±1.7		[1] ABELE	97E	CBAR	0.0 $\overline{p}p \to 5\gamma$
8.3 ±2.1		ALDE	93	GAM2	38$\pi^- p \to \omega n$
3.0 $^{+2.5}_{-1.8}$		[2] ANDREWS	77	CNTR	6.7–10 γCu
• • • We do not use the following data for averages, fits, limits, etc. • • •					
4.2 ±0.4 ±0.1	33k	[3] ACHASOV	07B	SND	0.6–1.38 $e^+e^- \to \eta\gamma$
4.44 $^{+2.59}_{-1.83}$ ±0.28	17.4k	[4,5] AKHMETSHIN	05	CMD2	0.60-1.38 $e^+e^- \to \eta\gamma$
5.10±0.72±0.34	23k	[6] AKHMETSHIN	01B	CMD2	$e^+e^- \to \eta\gamma$
0.7 to 5.5		[7] CASE	00	CBAR	0.0 $p\overline{p} \to \eta\eta\gamma$
6.56 $^{+2.41}_{-2.55}$	3525	[2,8] BENAYOUN	96	RVUE	$e^+e^- \to \eta\gamma$
7.3 ±2.9		[2,4] DOLINSKY	89	ND	$e^+e^- \to \eta\gamma$

[1] No flat $\eta\eta\gamma$ background assumed.
NODE=M001R;LINKAGE=EA

[2] Solution corresponding to constructive ω-ρ interference.
NODE=M001R19;LINKAGE=A

[3] ACHASOV 07B reports $[\Gamma(\omega(782) \to \eta\gamma)/\Gamma_{total}] \times [B(\omega(782) \to e^+e^-)] = (3.10 \pm 0.31 \pm 0.11) \times 10^{-8}$ which we divide by our best value $B(\omega(782) \to e^+e^-) = (7.38 \pm 0.22) \times 10^{-5}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Supersedes ACHASOV 00D and ACHASOV 06A.
NODE=M001R19;LINKAGE=AO

[4] Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\eta\gamma)/\Gamma^2_{total}$.
NODE=M001R13;LINKAGE=WL

[5] Using $B(\omega \to e^+e^-) = (7.14 \pm 0.13) \times 10^{-5}$ and $B(\eta \to \gamma\gamma) = 39.43 \pm 0.26\%$.
NODE=M001R19;LINKAGE=AK

[6] Using $B(\omega \to e^+e^-) = (7.07 \pm 0.19) \times 10^{-5}$ and using $B(\eta \to 3\pi^0) = (32.24 \pm 0.29) \times 10^{-2}$. Solution corresponding to constructive ω-ρ interference. The combined fit from 600 to 1380 MeV taking into account $\rho(770)$, $\omega(782)$, $\phi(1020)$, and $\rho(1450)$ (mass and width fixed at 1450 MeV and 310 MeV respectively). Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\eta\gamma)/\Gamma^2_{total}$.
NODE=M001R19;LINKAGE=TS

[7] Depending on the degree of coherence with the flat $\eta\eta\gamma$ background and using $B(\omega \to \pi^0\gamma) = (8.5 \pm 0.5) \times 10^{-2}$.
NODE=M001R;LINKAGE=CS

[8] Reanalysis of DRUZHININ 84, DOLINSKY 89, DOLINSKY 91 taking into account the triangle anomaly contributions.
NODE=M001R19;LINKAGE=A1

$\Gamma(\eta\gamma)/\Gamma(\pi^0\gamma)$ Γ_5/Γ_2

NODE=M001R11
NODE=M001R11

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.0098±0.0024	[1] ALDE	93	GAM2	38$\pi^- p \to \omega n$
0.0082±0.0033	[2] DOLINSKY	89	ND	$e^+e^- \to \eta\gamma$
0.010 ±0.045	APEL	72B	OSPK	4–8 $\pi^- p \to n3\gamma$

[1] Model independent determination.
NODE=M001R11;LINKAGE=A

[2] Solution corresponding to constructive ω-ρ interference.
NODE=M001R11;LINKAGE=K

$\Gamma(\pi^0 e^+e^-)/\Gamma_{total}$ Γ_6/Γ

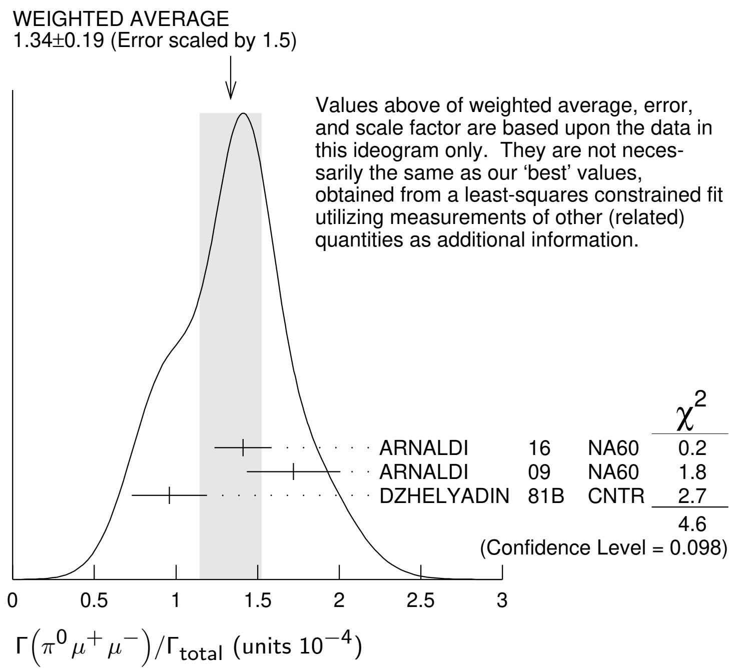
NODE=M001R23
NODE=M001R23

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
7.7 ±0.6 OUR FIT					
7.7 ±0.6 OUR AVERAGE					
7.61±0.53±0.64		ACHASOV	08	SND	0.36–0.97 $e^+e^- \to \pi^0 e^+e^-$
8.19±0.71±0.62		AKHMETSHIN	05A	CMD2	0.72-0.84 e^+e^-
5.9 ±1.9	43	DOLINSKY	88	ND	$e^+e^- \to \pi^0 e^+e^-$

$\Gamma(\pi^0 \mu^+ \mu^-)/\Gamma_{total}$ Γ_7/Γ

NODE=M001R12
NODE=M001R12

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.34±0.18 OUR FIT Error includes scale factor of 1.5.					
1.34±0.19 OUR AVERAGE Error includes scale factor of 1.5. See the ideogram below.					
1.41±0.09±0.15		ARNALDI	16	NA60	400 GeV (p-A) collisions
1.72±0.25±0.14	3k	ARNALDI	09	NA60	158A In−In collisions
0.96±0.23		DZHELYADIN	81B	CNTR	25–33 $\pi^- p \to \omega n$



$\Gamma(\eta e^+ e^-)/\Gamma_{total}$ Γ_8/Γ

NODE=M001R34
NODE=M001R34

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<1.1	AKHMETSHIN	05A	CMD2	0.72-0.84 $e^+ e^-$

$\Gamma(e^+ e^-)/\Gamma_{total}$ Γ_9/Γ

NODE=M001R13
NODE=M001R13

NEW

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.738±0.022 OUR FIT Error includes scale factor of 1.9. [$(0.739 \pm 0.019) \times 10^{-4}$ OUR 2021 FIT Scale factor = 1.7]					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.700±0.016	11200	[1,2] AKHMETSHIN	04	CMD2	$e^+ e^- \to \pi^+ \pi^- \pi^0$
0.752±0.004±0.024	1.2M	[2,3] ACHASOV	03D	RVUE	0.44–2.00 $e^+ e^- \to \pi^+ \pi^- \pi^0$
0.714±0.036		[2] DOLINSKY	89	ND	$e^+ e^- \to \pi^+ \pi^- \pi^0$
0.72 ±0.03		[2] BARKOV	87	CMD	$e^+ e^- \to \pi^+ \pi^- \pi^0$
0.64 ±0.04	1488	[2] KURDADZE	83B	OLYA	$e^+ e^- \to \pi^+ \pi^- \pi^0$
0.675±0.069	433	[2] CORDIER	80	DM1	$e^+ e^- \to \pi^+ \pi^- \pi^0$
0.83 ±0.10	451	[2] BENAKSAS	72B	OSPK	$e^+ e^- \to \pi^+ \pi^- \pi^0$
0.77 ±0.06		[4] AUGUSTIN	69D	OSPK	$e^+ e^- \to \pi^+ \pi^- \pi^0$
0.65 ±0.13	33	[5] ASTVACAT...	68	OSPK	Assume SU(3)+mixing

[1] Using B($\omega \to \pi^+ \pi^- \pi^0$) = 0.891 ± 0.007. Update of AKHMETSHIN 00C. NODE=M001R13;LINKAGE=4P
[2] Not independent of the corresponding $\Gamma(e^+ e^-) \times \Gamma(\pi^+ \pi^- \pi^0)/\Gamma^2_{total}$. NODE=M001R13;LINKAGE=ZL
[3] Using ACHASOV 03, ACHASOV 03D and B($\omega \to \pi^+ \pi^-$) = (1.70 ± 0.28)%. NODE=M001R13;LINKAGE=VF
[4] Rescaled by us to correspond to ω width 8.4 MeV. Systematic errors underestimated. NODE=M001R13;LINKAGE=E
[5] Not resolved from ρ decay. Error statistical only. NODE=M001R13;LINKAGE=A

$\Gamma(\pi^+ \pi^- \pi^0 \pi^0)/\Gamma_{total}$ Γ_{10}/Γ

NODE=M001R5
NODE=M001R5

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 2	90	ACHASOV	09A	SND	$e^+ e^- \to \pi^+ \pi^- \pi^0 \pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<200	90	KURDADZE	86	OLYA	$e^+ e^- \to \pi^+ \pi^- \pi^0 \pi^0$

$\Gamma(\pi^+\pi^-\gamma)/\Gamma_{total}$ — Γ_{11}/Γ

NODE=M001R22
NODE=M001R22

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0036	95	WEIDENAUER	90	ASTE	$p\overline{p} \to \pi^+\pi^-\pi^+\pi^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.004	95	BITYUKOV	88B	SPEC	32 $\pi^- p \to \pi^+\pi^-\gamma X$

$\Gamma(\pi^+\pi^-\gamma)/\Gamma(\pi^+\pi^-\pi^0)$ — Γ_{11}/Γ_1

NODE=M001R4
NODE=M001R4

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.066	90	KALBFLEISCH	75	HBC	2.18 $K^- p \to \Lambda\pi^+\pi^-\gamma$
<0.05	90	FLATTE	66	HBC	1.2 – 1.7 $K^- p \to \Lambda\pi^+\pi^-\gamma$

$\Gamma(\pi^+\pi^-\pi^+\pi^-)/\Gamma_{total}$ — Γ_{12}/Γ

NODE=M001R24
NODE=M001R24

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1 \times 10^{-3}$	90	KURDADZE	88	OLYA	$e^+e^- \to \pi^+\pi^-\pi^+\pi^-$

$\Gamma(\pi^0\pi^0\gamma)/\Gamma_{total}$ — Γ_{13}/Γ

NODE=M001R29
NODE=M001R29

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
6.7±1.1 OUR FIT					
6.5±1.2 OUR AVERAGE					
$6.4^{+2.4}_{-2.0}\pm0.8$	190	[1] AKHMETSHIN	04B	CMD2	0.6–0.97 $e^+e^- \to \pi^0\pi^0\gamma$
$6.6^{+1.4}_{-1.3}\pm0.6$	295	ACHASOV	02F	SND	0.36–0.97 $e^+e^- \to \pi^0\pi^0\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$11.8^{+2.1}_{-1.9}\pm1.4$	190	[2] AKHMETSHIN	04B	CMD2	0.6–0.97 $e^+e^- \to \pi^0\pi^0\gamma$
7.8±2.7±2.0	63	[1,3] ACHASOV	00G	SND	$e^+e^- \to \pi^0\pi^0\gamma$
12.7±2.3±2.5	63	[2,3] ACHASOV	00G	SND	$e^+e^- \to \pi^0\pi^0\gamma$

OCCUR=2
OCCUR=2

[1] In the model assuming the $\rho \to \pi^0\pi^0\gamma$ decay via the $\omega\pi$ and $f_0(500)\gamma$ mechanisms.
[2] In the model assuming the $\rho \to \pi^0\pi^0\gamma$ decay via the $\omega\pi$ mechanism only.
[3] Superseded by ACHASOV 02F.

NODE=M001R29;LINKAGE=A
NODE=M001R29;LINKAGE=B
NODE=M001R;LINKAGE=GF

$\Gamma(\pi^0\pi^0\gamma)/\Gamma(\pi^+\pi^-\pi^0)$ — Γ_{13}/Γ_1

NODE=M001R10
NODE=M001R10

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.00045	90	DOLINSKY	89	ND	$e^+e^- \to \pi^0\pi^0\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.08	95	JACQUET	69B	HLBC	2.05 $\pi^+ p \to \pi^+ p\omega$

$\Gamma(\pi^0\pi^0\gamma)/\Gamma(\pi^0\gamma)$ — Γ_{13}/Γ_2

NODE=M001R7
NODE=M001R7

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
8.0±1.3 OUR FIT						
8.5±2.9		40 ± 14	ALDE	94B	GAM2	38$\pi^- p \to \pi^0\pi^0\gamma n$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 50	90		DOLINSKY	89	ND	$e^+e^- \to \pi^0\pi^0\gamma$
<1800	95		KEYNE	76	CNTR	$\pi^- p \to \omega n$
<1500	90		BENAKSAS	72C	OSPK	e^+e^-
<1400			BALDIN	71	HLBC	2.9 $\pi^+ p$
<1000	90		BARMIN	64	HLBC	1.3–2.8 $\pi^- p$

$\Gamma(\pi^0\pi^0\gamma)/\Gamma(\text{neutrals})$ — $\Gamma_{13}/(\Gamma_2+\Gamma_4)$

NODE=M001R17
NODE=M001R17

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.22±0.07		[1] DAKIN	72	OSPK	1.4 $\pi^- p \to n$ MM
<0.19	90	DEINET	69B	OSPK	

[1] See $\Gamma(\pi^0\gamma)/\Gamma(\text{neutrals})$.

NODE=M001R17;LINKAGE=D

$\Gamma(\eta\pi^0\gamma)/\Gamma_{total}$ — Γ_{14}/Γ

NODE=M001R32
NODE=M001R32

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<3.3	90	AKHMETSHIN	04B	CMD2	0.6–0.97 $e^+e^- \to \eta\pi^0\gamma$

$\Gamma(\mu^+\mu^-)/\Gamma_{total}$ — Γ_{15}/Γ

NODE=M001R30

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
7.4±1.8 OUR FIT					
7.4±1.8 OUR AVERAGE					
6.6±1.4±1.7	4.5M	[1] ANASTASI	17	KLOE	$e^+e^- \to \mu^+\mu^-\gamma$
9.0±2.9±1.1	18	HEISTER	02C	ALEP	$Z \to \mu^+\mu^- + X$

[1] Assuming lepton universality in the decay $\omega \to \ell^+\ell^-$ and correcting for different phase space between electron and muon final states. NODE=M001R30;LINKAGE=A

$\Gamma(\mu^+\mu^-)/\Gamma(\pi^+\pi^-\pi^0)$ — Γ_{15}/Γ_1

NODE=M001R6

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.2	90	WILSON	69	OSPK	12 π^- C → Fe
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.7	74	FLATTE	66	HBC	1.2 – 1.7 $K^- p \to \Lambda\mu^+\mu^-$
<1.2		BARBARO-...	65	HBC	2.7 $K^- p$

$\Gamma(\pi^0\mu^+\mu^-)/\Gamma(\mu^+\mu^-)$ — Γ_7/Γ_{15}

NODE=M001R20

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.2±0.6	30	[1] DZHELYADIN	79	CNTR	25–33 $\pi^- p$

[1] Superseded by DZHELYADIN 81B result above. NODE=M001R20;LINKAGE=S

$\Gamma(3\gamma)/\Gamma_{total}$ — Γ_{16}/Γ

NODE=M001R27

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.9	95	[1] ABELE	97E	CBAR	0.0 $\bar{p}p \to 5\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<2	90	[1] PROKOSHKIN	95	GAM2	38 $\pi^- p \to 3\gamma n$

[1] From direct 3γ decay search. NODE=M001R27;LINKAGE=A

$\Gamma(\eta\pi^0)/\Gamma_{total}$ — Γ_{17}/Γ

NODE=M001R25

Violates C conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.001	90	ALDE	94B	GAM2	$38\pi^- p \to \eta\pi^0 n$

$[\Gamma(\eta\gamma)+\Gamma(\eta\pi^0)]/\Gamma(\pi^+\pi^-\pi^0)$ — $(\Gamma_5+\Gamma_{17})/\Gamma_1$

NODE=M001R8

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.016	90	[1] FLATTE	66	HBC	1.2 – 1.7 $K^- p \to \Lambda\pi^+\pi^-$ MM
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.045	95	JACQUET	69B	HLBC	2.05 $\pi^+ p \to \pi^+ p\omega$

[1] Restated by us using B($\eta \to$ charged modes) = 29.2%. NODE=M001R8;LINKAGE=A

$\Gamma(\eta\pi^0)/\Gamma(\pi^0\gamma)$ — Γ_{17}/Γ_2

NODE=M001R35

Violates C conservation.

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<2.6	90	[1] STAROSTIN	09	CRYM	$\gamma p \to \eta\pi^0 p$

[1] STAROSTIN 09 reports $[\Gamma(\omega(782) \to \eta\pi^0)/\Gamma(\omega(782) \to \pi^0\gamma)] \times [B(\eta \to 2\gamma)] < 1.01 \times 10^{-3}$ which we divide by our best value $B(\eta \to 2\gamma) = 39.36 \times 10^{-2}$. NODE=M001R35;LINKAGE=ST

$\Gamma(2\pi^0)/\Gamma(\pi^0\gamma)$ — Γ_{18}/Γ_2

NODE=M001R36

Violates C conservation and Bose-Einstein statistics.

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<2.59	90	STAROSTIN	09	CRYM	$\gamma p \to 2\pi^0 p$

$\Gamma(3\pi^0)/\Gamma_{total}$ — Γ_{19}/Γ

NODE=M001R26

Violates C conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<3 \times 10^{-4}$	90	PROKOSHKIN	95	GAM2	38 $\pi^- p \to 3\pi^0 n$

$\Gamma(3\pi^0)/\Gamma(\pi^0\gamma)$ — Γ_{19}/Γ_2

NODE=M001R37

Violates *C* conservation.

NODE=M001R37
NODE=M001R37

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<2.72	90	STAROSTIN	09	CRYM	$\gamma p \to 3\pi^0 p$

$\Gamma(3\pi^0)/\Gamma(\pi^+\pi^-\pi^0)$ — Γ_{19}/Γ_1

NODE=M001R31

Violates *C* conservation.

NODE=M001R31
NODE=M001R31

VALUE	CL%	DOCUMENT ID		COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.009	90	BARBERIS	01	450 $pp \to p_f 3\pi^0 p_s$

$\Gamma(\text{invisible})/\Gamma(\pi^+\pi^-\pi^0)$ — Γ_{20}/Γ_1

NODE=M001R01
NODE=M001R01

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<8.1 × 10^{-5}	90	ABLIKIM	18S	BES3	$J/\psi \to \omega\eta \to \omega\pi^+\pi^-\pi^0$

PARAMETER Λ IN $\omega \to \pi^0 \ell^+ \ell^-$ DECAY

NODE=M001230

In the pole approximation the electromagnetic transition form factor for a resonance of mass *M* is given by the expression:

NODE=M001230

$$|F|^2 = (1 - M^2/\Lambda^2)^{-2},$$

where for the parameter Λ vector dominance predicts $\Lambda = M_\rho \approx 0.770$ GeV. The ARNALDI 09 measurement is in obvious conflict with this expectation. Note that for $\eta \to \gamma\mu^+\mu^-$ decay ARNALDI 09 and DZHELYADIN 80 obtain the value of Λ consistent with vector dominance.

PARAMETER Λ IN $\omega \to \pi^0\mu^+\mu^-$ DECAY

NODE=M001LAM
NODE=M001LAM

VALUE (GeV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.670 ±0.006 OUR AVERAGE					
0.6707±0.0039±0.0056		[1] ARNALDI	16	NA60	400 GeV (*p*-*A*) collisions
0.668 ±0.009 ±0.003	3k	[2] ARNALDI	09	NA60	158*A* In−In collisions
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.65 ±0.03		DZHELYADIN	81B	CNTR	25–33 $\pi^- p \to \omega n$

[1] ARNALDI 16 reports $\Lambda^{-2}(\omega) = 2.223 \pm 0.026 \pm 0.037$ GeV^{-2} which we converted to the quoted Λ value.

NODE=M001LAM;LINKAGE=A

[2] ARNALDI 09 reports $\Lambda^{-2}(\omega) = 2.24 \pm 0.06 \pm 0.02$ GeV^{-2} which we converted to the quoted Λ value.

NODE=M001LAM;LINKAGE=B

PARAMETER Λ IN $\omega \to \pi^0 e^+ e^-$ DECAY

NODE=M001A02
NODE=M001A02

VALUE (GeV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.709±0.037	1.1k	[1] ADLARSON	17B	A2MM	$\gamma p \to \omega p$

[1] ADLARSON 17B reports $\Lambda^{-2}(\omega\pi^0) = 1.99 \pm 0.21$ GeV^{-2} that we converted to the quoted Λ value.

NODE=M001A02;LINKAGE=A

ENERGY DEPENDENCE OF $\omega \to \pi^+\pi^-\pi^0$ DALITZ PLOT

NODE=M001A00

The following experiments fit to one or more of the coefficients α, β, γ for $|\text{matrix element}|^2 \propto P\,(1 + 2\alpha\, Z + 2\beta\, Z^{3/2} \sin(3\phi) + 2\gamma Z^2 + O(Z^{5/2}))$ where *P* is the *P*-wave phase-space factor and Z, ϕ are kinematical variables as defined in ADLARSON 17.

NODE=M001A00

NODE=M001A00

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.133 ±0.008 OUR AVERAGE					
0.1321±0.0067±0.0046	260k	[1] ABLIKIM	18AD	BES3	$J/\psi \to \omega\eta$
0.147 ±0.036	44k	ADLARSON	17	WASA	α in $pd \to {}^3\text{He}\,\omega$, $pp \to pp\omega$

[1] Keeping a term linear in Z only. A fit with the terms proportional to Z and $Z^{3/2}$ gives $\alpha = 0.133 \pm 0.041$ and $\beta = 0.037 \pm 0.054$.

NODE=M001A00;LINKAGE=A

$\omega(782)$ REFERENCES

NODE=M001

ACHASOV	21	JHEP 2101 113	M.N. Achasov *et al.*	(SND Collab.)	REFID=61040
LEES	21B	PR D104 112003	J.P. Lees *et al.*	(BABAR Collab.)	REFID=61450
ANDREEV	20	EPJ C80 1189	V. Andreev *et al.*	(H1 Collab.)	REFID=60773
HOID	20	EPJ C80 988	B.-L. Hoid, M. Hoferichter, B. Kubis	(BONN, BERN)	REFID=61048
COLANGELO	19	JHEP 1902 006	G. Colangelo, M. Hoferichter, P. Stoffer	(BERN+)	REFID=59585
HOFERICHT...	19	JHEP 1908 137	M. Hoferichter, B.-L. Hoid, B. Kubis	(WASH, BONN)	REFID=60974
ABLIKIM	18AD	PR D98 112007	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59498
ABLIKIM	18C	PRL 120 242003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58843
ABLIKIM	18S	PR D98 032001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58971
HANHART	18	EPJ C78 450	C. Hanhart *et al.*		REFID=59186
ADLARSON	17	PL B770 418	P. Adlarson *et al.*	(WASA-at-COSY Collab.)	REFID=57907
ADLARSON	17B	PR C95 035208	P. Adlarson *et al.*	(A2 Collab. at MAMI)	REFID=58155
ANASTASI	17	PL B767 485	A. Anastasi *et al.*	(KLOE-2 Collab.)	REFID=57887
ABLIKIM	16B	PL B753 103	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57126
ACHASOV	16A	PR D93 092001	M.N. Achasov *et al.*	(SND Collab.)	REFID=57513
ARNALDI	16	PL B757 437	R. Arnaldi *et al.*	(NA60 Collab.)	REFID=57220
PDG	16	CP C40 100001	C. Patrignani *et al.*	(PDG Collab.)	REFID=57140
PDG	15	RPP 2015 at pdg.lbl.gov		(PDG Collab.)	REFID=56977;ERROR=4
ACHASOV	13	PR D88 054013	M.N. Achasov *et al.*	(SND Collab.)	REFID=55584
BABUSCI	13D	PL B720 336	D. Babusci *et al.*	(CATA, CALB, BARI)	REFID=55337
BENAYOUN	13	EPJ C73 2453	M. Benayoun, P. David, L. DelBuono	(PARIN, BERLIN+)	REFID=55357
DAVIER	13	EPJ C73 2597	M. Davier *et al.*		REFID=55499
LEES	12G	PR D86 032013	J.P. Lees *et al.*	(BABAR Collab.)	REFID=54299
NIECKNIG	12	EPJ C72 2014	F. Niecknig, B. Kubis, S.P. Schneider	(BONN)	REFID=54305
AMBROSINO	11A	PL B700 102	F. Ambrosino *et al.*	(KLOE Collab.)	REFID=16683
BENAYOUN	10	EPJ C65 211	M. Benayoun *et al.*		REFID=53212
ACHASOV	09A	JETP 109 379	M.N. Achasov *et al.*	(SND Collab.)	REFID=53101
		Translated from ZETF 136 442.			
ARNALDI	09	PL B677 260	R. Arnaldi *et al.*	(NA60 Collab.)	REFID=52720
AUBERT	09AS	PRL 103 231801	B. Aubert *et al.*	(BABAR Collab.)	REFID=53136
STAROSTIN	09	PR C79 065201	A. Starostin *et al.*	(Crystal Ball Collab. at MAMI)	REFID=53001
ACHASOV	08	JETP 107 61	M.N. Achasov *et al.*	(SND Collab.)	REFID=52258
		Translated from ZETF 134 80.			
AMBROSINO	08G	PL B669 223	F. Ambrosino *et al.*	(KLOE Collab.)	REFID=52573
ACHASOV	07B	PR D76 077101	M.N. Achasov *et al.*	(SND Collab.)	REFID=51942
AKHMETSHIN	07	PL B648 28	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=51615
ACHASOV	06	JETP 103 380	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=51113
		Translated from ZETF 130 437.			
ACHASOV	06A	PR D74 014016	M.N. Achasov *et al.*	(SND Collab.)	REFID=51133
AULCHENKO	06	JETPL 84 413	V.M. Aulchenko *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=51513
		Translated from ZETFP 84 491.			
ACHASOV	05A	JETP 101 1053	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=51045
		Translated from ZETF 128 1201.			
AKHMETSHIN	05	PL B605 26	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=50330
AKHMETSHIN	05A	PL B613 29	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=50508
AULCHENKO	05	JETPL 82 743	V.M. Aulchenko *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=51060
		Translated from ZETFP 82 841.			
AKHMETSHIN	04	PL B578 285	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=49609
AKHMETSHIN	04B	PL B580 119	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=49610
AUBERT,B	04N	PR D70 072004	B. Aubert *et al.*	(BABAR Collab.)	REFID=50184
PDG	04	PL B592 1	S. Eidelman *et al.*	(PDG Collab.)	REFID=49653
ACHASOV	03	PL B559 171	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=49187
ACHASOV	03D	PR D68 052006	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=49577
ALOISIO	03	PL B561 55	A. Aloisio *et al.*	(KLOE Collab.)	REFID=49404
BENAYOUN	03	EPJ C29 397	M. Benayoun *et al.*		REFID=49477
ACHASOV	02E	PR D66 032001	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=48815
ACHASOV	02F	PL B537 201	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=48816
AKHMETSHIN	02	PL B527 161	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=48565
ALOISIO	02D	PL B537 21	A. Aloisio *et al.*	(KLOE Collab.)	REFID=48824
HEISTER	02C	PL B528 19	A. Heister *et al.*	(ALEPH Collab.)	REFID=48564
ACHASOV	01E	PR D63 072002	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=48311
AKHMETSHIN	01B	PL B509 217	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=48167
BARBERIS	01	PL B507 14	D. Barberis *et al.*		REFID=48324
ACHASOV	00	EPJ C12 25	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=47417
ACHASOV	00D	JETPL 72 282	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=47882
		Translated from ZETFP 72 411.			
ACHASOV	00G	JETPL 71 355	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=47929
		Translated from ZETFP 71 519.			
AKHMETSHIN	00C	PL B476 33	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=47423
AULCHENKO	00A	JETP 90 927	V.M. Aulchenko *et al.*	(Novosibirsk SND Collab.)	REFID=47953
		Translated from ZETF 117 1067.			
CASE	00	PR D61 032002	T. Case *et al.*	(Crystal Barrel Collab.)	REFID=47409
ACHASOV	99E	PL B462 365	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=47391
GARDNER	99	PR D59 076002	S. Gardner, H.B. O'Connell		REFID=46919
BENAYOUN	98	EPJ C2 269	M. Benayoun *et al.*	(IPNP, NOVO, ADLD+)	REFID=45859
ABELE	97E	PL B411 361	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=45755
BENAYOUN	96	ZPHY C72 221	M. Benayoun *et al.*	(IPNP, NOVO)	REFID=45753
PROKOSHKIN	95	PD 40 273	Y.D. Prokoshkin, V.D. Samoilenko	(SERP)	REFID=44616
		Translated from DANS 342 610.			
WURZINGER	95	PR C51 443	R. Wurzinger *et al.*	(BONN, ORSAY, SACL+)	REFID=45209
ALDE	94B	PL B340 122	D.M. Alde *et al.*	(SERP, BELG, LANL, LAPP+)	REFID=44100
AMSLER	94C	PL B327 425	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=44091
ALDE	93	PAN 56 1229	D.M. Alde *et al.*	(SERP, LAPP, LANL, BELG+)	REFID=43603
		Translated from YAF 56 137.			
Also		ZPHY C61 35	D.M. Alde *et al.*	(SERP, LAPP, LANL, BELG+)	REFID=43790
AMSLER	93B	PL B311 362	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=43602
WEIDENAUER	93	ZPHY C59 387	P. Weidenauer *et al.*	(ASTERIX Collab.)	REFID=43585
ANTONELLI	92	ZPHY C56 15	A. Antonelli *et al.*	(DM2 Collab.)	REFID=43168
DOLINSKY	91	PRPL 202 99	S.I. Dolinsky *et al.*	(NOVO)	REFID=41369
WEIDENAUER	90	ZPHY C47 353	P. Weidenauer *et al.*	(ASTERIX Collab.)	REFID=41368
DOLINSKY	89	ZPHY C42 511	S.I. Dolinsky *et al.*	(NOVO)	REFID=41003
BITYUKOV	88B	SJNP 47 800	S.I. Bityukov *et al.*	(SERP)	REFID=41021
		Translated from YAF 47 1258.			
DOLINSKY	88	SJNP 48 277	S.I. Dolinsky *et al.*	(NOVO)	REFID=41022
		Translated from YAF 48 442.			
KURDADZE	88	JETPL 47 512	L.M. Kurdadze *et al.*	(NOVO)	REFID=41121
		Translated from ZETFP 47 432.			
AULCHENKO	87	PL B186 432	V.M. Aulchenko *et al.*	(NOVO)	REFID=40007
BARKOV	87	JETPL 46 164	L.M. Barkov *et al.*	(NOVO)	REFID=40280
		Translated from ZETFP 46 132.			

KURDADZE	86	JETPL 43 643	L.M. Kurdadze *et al.*	(NOVO)	REFID=40287
		Translated from ZETFP 43 497.			
BARKOV	85	NP B256 365	L.M. Barkov *et al.*	(NOVO)	REFID=20134
DRUZHININ	84	PL 144B 136	V.P. Druzhinin *et al.*	(NOVO)	REFID=20561
KURDADZE	83B	JETPL 36 274	A.M. Kurdadze *et al.*	(NOVO)	REFID=20244
		Translated from ZETFP 36 221.			
DZHELYADIN	81B	PL 102B 296	R.I. Dzhelyadin *et al.*	(SERP)	REFID=20242
CORDIER	80	NP B172 13	A. Cordier *et al.*	(LALO)	REFID=20240
DZHELYADIN	80	PL 94B 548	R.I. Dzhelyadin *et al.*	(SERP)	REFID=10831
ROOS	80	LNC 27 321	M. Roos, A. Pellinen	(HELS)	REFID=20241
BENKHEIRI	79	NP B150 268	P. Benkheiri *et al.*	(EPOL, CERN, CDEF+)	REFID=20238
DZHELYADIN	79	PL 84B 143	R.I. Dzhelyadin *et al.*	(SERP)	REFID=20239
COOPER	78B	NP B146 1	A.M. Cooper *et al.*	(TATA, CERN, CDEF+)	REFID=20235
QUENZER	78	PL 76B 512	A. Quenzer *et al.*	(LALO)	REFID=20123
VANAPEL...	78	NP B133 245	G.W. van Apeldoorn *et al.*	(ZEEM)	REFID=20234
WICKLUND	78	PR D17 1197	A.B. Wicklund *et al.*	(ANL)	REFID=20124
ANDREWS	77	PRL 38 198	D.E. Andrews *et al.*	(ROCH)	REFID=20120
GESSAROLI	77	NP B126 382	R. Gessaroli *et al.*	(BGNA, FIRZ, GENO+)	REFID=20230
KEYNE	76	PR D14 28	J. Keyne *et al.*	(LOIC, SHMP)	REFID=20226
Also		PR D8 2789	D.M. Binnie *et al.*	(LOIC, SHMP)	REFID=20216
KALBFLEISCH	75	PR D11 987	G.R. Kalbfleisch, R.C. Strand, J.W. Chapman	(BNL+)	REFID=20223
AGUILAR-...	72B	PR D6 29	M. Aguilar-Benitez *et al.*	(BNL)	REFID=20205
APEL	72B	PL 41B 234	W.D. Apel *et al.*	(KARLK, KARLE, PISA)	REFID=20206
BASILE	72B	Phil. Conf. 153	M. Basile *et al.*	(CERN)	REFID=20207
BENAKSAS	72	PL 39B 289	D. Benaksas *et al.*	(ORSAY)	REFID=20096
BENAKSAS	72B	PL 42B 507	D. Benaksas *et al.*	(ORSAY)	REFID=20209
BENAKSAS	72C	PL 42B 511	D. Benaksas *et al.*	(ORSAY)	REFID=20517
BORENSTEIN	72	PR D5 1559	S.R. Borenstein *et al.*	(BNL, MICH)	REFID=20215
BROWN	72	PL 42B 117	R.M. Brown *et al.*	(ILL, ILLC)	REFID=20211
DAKIN	72	PR D6 2321	J.T. Dakin *et al.*	(PRIN)	REFID=20212
RATCLIFF	72	PL 38B 345	B.N. Ratcliff *et al.*	(SLAC)	REFID=20102
ALVENSLEB...	71C	PRL 27 888	H. Alvensleben *et al.*	(DESY)	REFID=20193
BALDIN	71	SJNP 13 758	A.B. Baldin *et al.*	(ITEP)	REFID=20195
		Translated from YAF 13 1318.			
BEHREND	71	PRL 27 61	H.J. Behrend *et al.*	(ROCH, CORN, FNAL)	REFID=20197
BIZZARRI	71	NP B27 140	R. Bizzarri *et al.*	(CERN, CDEF)	REFID=20198
COYNE	71	NP B32 333	D.G. Coyne *et al.*	(LRL)	REFID=20201
MOFFEIT	71	NP B29 349	K.C. Moffeit *et al.*	(LRL, UCB, SLAC+)	REFID=20204
ABRAMOVI...	70	NP B20 209	M. Abramovich *et al.*	(CERN)	REFID=20180
BIGGS	70B	PRL 24 1201	P.J. Biggs *et al.*	(DARE)	REFID=20184
BIZZARRI	70	PRL 25 1385	R. Bizzarri *et al.*	(ROMA, SYRA)	REFID=20181
ROOS	70	DNPL/R7 173	M. Roos	(CERN)	REFID=20191
Proc. Daresbury Study Weekend No. 1.					
AUGUSTIN	69D	PL 28B 513	J.E. Augustin *et al.*	(ORSAY)	REFID=20169
BIZZARRI	69	NP B14 169	R. Bizzarri *et al.*	(CERN, CDEF)	REFID=20171
DEINET	69B	PL 30B 426	W. Deinet *et al.*	(KARL, CERN)	REFID=20173
JACQUET	69B	NC 63A 743	F. Jacquet *et al.*	(EPOL, BERG)	REFID=20176
WILSON	69	Private Comm.	R. Wilson	(HARV)	REFID=20179
Also		PR 178 2095	A.A. Wehmann *et al.*	(HARV, CASE, SLAC+)	REFID=20084
ASTVACAT...	68	PL 27B 45	R.G. Astvatsaturov *et al.*	(JINR, MOSU)	REFID=20055
BOLLINI	68C	NC 56A 531	D. Bollini *et al.*	(CERN, BGNA, STRB)	REFID=20164
GOUNARIS	68	PRL 21 244	G.J. Gounaris, J.J. Sakurai		REFID=48054
BARASH	67B	PR 156 1399	N. Barash *et al.*	(COLU)	REFID=20160
FELDMAN	67C	PR 159 1219	M. Feldman *et al.*	(PENN)	REFID=20161
DIGIUGNO	66B	NC 44A 1272	G. Di Giugno *et al.*	(NAPL, FRAS, TRST)	REFID=20156
FLATTE	66	PR 145 1050	S.M. Flatte *et al.*	(LRL)	REFID=20157
JAMES	66	PR 142 896	F.E. James, H.L. Kraybill	(YALE, BNL)	REFID=10770
BARBARO-...	65	PRL 14 279	A. Barbaro-Galtieri, R.D. Tripp	(LRL)	REFID=20152
BARMIN	64	JETP 18 1289	V.V. Barmin *et al.*	(ITEP)	REFID=20149
		Translated from ZETF 45 1879.			
KRAEMER	64	PR 136 B496	R.W. Kraemer *et al.*	(JHU, NWES, WOOD)	REFID=10755
BUSCHBECK	63	Siena Conf. 1 166	B. Buschbeck *et al.*	(VIEN, CERN, ANIK)	REFID=20146

NODE=M002

$\eta'(958)$

$I^G(J^{PC}) = 0^+(0^{-+})$

$\eta'(958)$ MASS

NODE=M002M

NODE=M002M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
957.78 ±0.06 OUR AVERAGE					
957.793±0.054±0.036	3.9k	LIBBY	08	CLEO	$J/\psi \to \gamma\eta'$
957.9 ±0.2 ±0.6	4800	WURZINGER	96	SPEC	1.68 $pd \to {}^3\text{He}\eta'$
957.46 ±0.33		DUANE	74	MMS	$\pi^- p \to n$MM
958.2 ±0.5	1414	DANBURG	73	HBC	2.2 $K^- p \to \Lambda\eta'$
958 ±1	400	JACOBS	73	HBC	2.9 $K^- p \to \Lambda\eta'$
956.1 ±1.1	3415	[1] BASILE	71	CNTR	1.6 $\pi^- p \to n\eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
957.5 ±0.2		BAI	04J	BES2	$J/\psi \to \gamma\gamma\pi^+\pi^-$
959 ±1	630	[2] BELADIDZE	92C	VES	36 π^- Be $\to \pi^-\eta'\eta$ Be
958 ±1	340	[2] ARMSTRONG	91B	OMEG	300 $pp \to pp\eta\pi^+\pi^-$
958.2 ±0.4	622	[2] AUGUSTIN	90	DM2	$J/\psi \to \gamma\eta\pi^+\pi^-$
957.8 ±0.2	2420	[2] AUGUSTIN	90	DM2	$J/\psi \to \gamma\gamma\pi^+\pi^-$
956.3 ±1.0	143	[2] GIDAL	87	MRK2	$e^+e^- \to e^+e^-\eta\pi^+\pi^-$
957.4 ±1.4	535	[3] BASILE	71	CNTR	1.6 $\pi^- p \to n\eta'$
957 ±1		RITTENBERG	69	HBC	1.7–2.7 $K^- p$

OCCUR=2

OCCUR=2

[1] Using all η' decays. NODE=M002M;LINKAGE=BS

[2] Systematic uncertainty not estimated. NODE=M002M;LINKAGE=NS

[3] Using η' decays into neutrals. Not independent of the other listed BASILE 71 η' mass measurement. NODE=M002M;LINKAGE=BA

$\eta'(958)$ WIDTH

NODE=M002W

NODE=M002W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
0.188±0.006 OUR FIT						
0.230±0.021 OUR AVERAGE						
0.226±0.017±0.014	2300	CZERWINSKI	10	MMS		$pp \to pp\eta'$
0.40 ±0.22	4800	WURZINGER	96	SPEC		1.68 $pd \to {}^3\text{He}\eta'$
0.28 ±0.10	1000	BINNIE	79	MMS	0	$\pi^- p \to n$MM
• • • We do not use the following data for averages, fits, limits, etc. • • •						
0.20 ±0.04		BAI	04J	BES2		$J/\psi \to \gamma\gamma\pi^+\pi^-$

$\eta'(958)$ DECAY MODES

NODE=M002215;NODE=M002

	Mode	Fraction (Γ_i/Γ)	Confidence level	
Γ_1	$\pi^+\pi^-\eta$	(42.5 ±0.5) %		DESIG=1
Γ_2	$\rho^0\gamma$ (including non-resonant $\pi^+\pi^-\gamma$)	(29.5 ±0.4) %		DESIG=9
Γ_3	$\rho^0\gamma$			DESIG=213
Γ_4	$\pi^0\pi^0\eta$	(22.4 ±0.5) %		DESIG=2
Γ_5	$\omega\gamma$	(2.52 ±0.07) %		DESIG=7
Γ_6	ωe^+e^-	(2.0 ±0.4) $\times 10^{-4}$		DESIG=205
Γ_7	$\gamma\gamma$	(2.307±0.033) %		DESIG=6
Γ_8	$3\pi^0$	(2.50 ±0.17) $\times 10^{-3}$		DESIG=8
Γ_9	$\mu^+\mu^-\gamma$	(1.13 ±0.28) $\times 10^{-4}$		DESIG=20
Γ_{10}	$\pi^+\pi^-\mu^+\mu^-$	(2.0 ±0.4) $\times 10^{-5}$		DESIG=201
Γ_{11}	$\pi^+\pi^-\pi^0$	(3.61 ±0.17) $\times 10^{-3}$		DESIG=121
Γ_{12}	$(\pi^+\pi^-\pi^0)$ S-wave	(3.8 ±0.5) $\times 10^{-3}$		DESIG=211
Γ_{13}	$\pi^\mp\rho^\pm$	(7.4 ±2.3) $\times 10^{-4}$		DESIG=210
Γ_{14}	$\pi^0\rho^0$	< 4 %	90%	DESIG=18
Γ_{15}	$2(\pi^+\pi^-)$	(8.4 ±0.9) $\times 10^{-5}$		DESIG=131
Γ_{16}	$\pi^+\pi^-2\pi^0$	(1.8 ±0.4) $\times 10^{-4}$		DESIG=202

Γ_{17}	$2(\pi^+\pi^-)$ neutrals			< 1	%	95%	DESIG=132
Γ_{18}	$2(\pi^+\pi^-)\pi^0$			< 1.8	$\times 10^{-3}$	90%	DESIG=141
Γ_{19}	$2(\pi^+\pi^-)2\pi^0$			< 1	%	95%	DESIG=15
Γ_{20}	$3(\pi^+\pi^-)$			< 3.1	$\times 10^{-5}$	90%	DESIG=203
Γ_{21}	$K^\pm\pi^\mp$			< 4	$\times 10^{-5}$	90%	DESIG=207
Γ_{22}	$\pi^+\pi^-e^+e^-$			(2.42 ±0.10)	$\times 10^{-3}$		DESIG=10
Γ_{23}	$\pi^+e^-\nu_e$+ c.c.			< 2.1	$\times 10^{-4}$	90%	DESIG=204
Γ_{24}	γe^+e^-			(4.91 ±0.27)	$\times 10^{-4}$		DESIG=28
Γ_{25}	$\pi^0\gamma\gamma$			(3.20 ±0.24)	$\times 10^{-3}$		DESIG=24
Γ_{26}	$\pi^0\gamma\gamma$(non resonant)			(6.2 ±0.9)	$\times 10^{-4}$		DESIG=212
Γ_{27}	$\eta\gamma\gamma$			< 1.33	$\times 10^{-4}$	90%	DESIG=214
Γ_{28}	$4\pi^0$			< 4.94	$\times 10^{-5}$	90%	DESIG=26
Γ_{29}	e^+e^-			< 5.6	$\times 10^{-9}$	90%	DESIG=150
Γ_{30}	invisible			< 6	$\times 10^{-4}$	90%	DESIG=200

Charge conjugation (*C*), Parity (*P*), Lepton family number (*LF*) violating modes

NODE=M002;CLUMP=B

Γ_{31}	$\pi^+\pi^-$	*P,CP*		< 1.8	$\times 10^{-5}$	90%	DESIG=111
Γ_{32}	$\pi^0\pi^0$	*P,CP*		< 4	$\times 10^{-4}$	90%	DESIG=25
Γ_{33}	$\pi^0e^+e^-$	*C*	[a]	< 1.4	$\times 10^{-3}$	90%	DESIG=16
Γ_{34}	ηe^+e^-	*C*	[a]	< 2.4	$\times 10^{-3}$	90%	DESIG=17
Γ_{35}	3γ	*C*		< 1.0	$\times 10^{-4}$	90%	DESIG=23
Γ_{36}	$\mu^+\mu^-\pi^0$	*C*	[a]	< 6.0	$\times 10^{-5}$	90%	DESIG=22
Γ_{37}	$\mu^+\mu^-\eta$	*C*	[a]	< 1.5	$\times 10^{-5}$	90%	DESIG=21
Γ_{38}	$e\mu$	*LF*		< 4.7	$\times 10^{-4}$	90%	DESIG=27

[a] *C* parity forbids this to occur as a single-photon process.

LINKAGE=CS

CONSTRAINED FIT INFORMATION

An overall fit to the total width, a partial width, 2 combinations of partial widths obtained from integrated cross section, and 20 branching ratios uses 52 measurements and one constraint to determine 9 parameters. The overall fit has a χ^2 = 69.5 for 44 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\langle\delta p_i \delta p_j\rangle/(\delta p_i \cdot \delta p_j)$, in percent, from the fit to parameters p_i, including the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{\rm total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

	x_1	x_2	x_4	x_5	x_7	x_8	x_{11}	x_{22}
x_2	−25							
x_4	−75	−43						
x_5	−7	−6	−2					
x_7	−11	−7	9	−1				
x_8	−17	−10	19	0	2			
x_{11}	−1	−1	−1	0	0	0		
x_{22}	−8	30	−14	−2	−2	−3	0	
Γ	11	−10	−1	1	−40	0	0	−3

	Mode	Rate (MeV)	
Γ_1	$\pi^+\pi^-\eta$	0.0799 ±0.0029	DESIG=1
Γ_2	$\rho^0\gamma$(including non-resonant $\pi^+\pi^-\gamma$)	0.0554 ±0.0019	DESIG=9
Γ_4	$\pi^0\pi^0\eta$	0.0421 ±0.0017	DESIG=2
Γ_5	$\omega\gamma$	0.00474±0.00020	DESIG=7
Γ_7	$\gamma\gamma$	0.00434±0.00013	DESIG=6
Γ_8	$3\pi^0$	(4.7 ±0.4) $\times 10^{-4}$	DESIG=8
Γ_{11}	$\pi^+\pi^-\pi^0$	(6.8 ±0.4) $\times 10^{-4}$	DESIG=121
Γ_{22}	$\pi^+\pi^-e^+e^-$	(4.54 ±0.23) $\times 10^{-4}$	DESIG=10

$\eta'(958)$ PARTIAL WIDTHS

NODE=M002220

$\Gamma(\gamma\gamma)$ — Γ_7

NODE=M002W4

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
4.34±0.14 OUR FIT					
4.28±0.19 OUR AVERAGE					
4.17±0.10±0.27	2000	[1] ACCIARRI	98Q	L3	$e^+e^- \to e^+e^-\pi^+\pi^-\gamma$
4.53±0.29±0.51	266	KARCH	92	CBAL	$e^+e^- \to e^+e^-\eta\pi^0\pi^0$
3.61±0.13±0.48		[2] BEHREND	91	CELL	$e^+e^- \to e^+e^-\eta'(958)$
4.6 ±1.1 ±0.6	23	BARU	90	MD1	$e^+e^- \to e^+e^-\pi^+\pi^-\gamma$
4.57±0.25±0.44		BUTLER	90	MRK2	$e^+e^- \to e^+e^-\eta'(958)$
5.08±0.24±0.71	547	[3] ROE	90	ASP	$e^+e^- \to e^+e^-2\gamma$
3.8 ±0.7 ±0.6	34	AIHARA	88C	TPC	$e^+e^- \to e^+e^-\eta\pi^+\pi^-$
4.9 ±0.5 ±0.5	136	[4] WILLIAMS	88	CBAL	$e^+e^- \to e^+e^-2\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
4.7 ±0.6 ±0.9	143	[5] GIDAL	87	MRK2	$e^+e^- \to e^+e^-\eta\pi^+\pi^-$
4.0 ±0.9		[6] BARTEL	85E	JADE	$e^+e^- \to e^+e^-2\gamma$

[1] No non-resonant $\pi^+\pi^-$ contribution found. NODE=M002W4;LINKAGE=AC

[2] Reevaluated by us using B($\eta' \to \rho(770)\gamma$) = (30.2 ± 1.3)%. NODE=M002W4;LINKAGE=K1

[3] Reevaluated by us using B($\eta' \to \gamma\gamma$) = (2.11 ± 0.13)%. NODE=M002W4;LINKAGE=K2

[4] Reevaluated by us using B($\eta' \to \gamma\gamma$) = (2.11 ± 0.13)%. NODE=M002W4;LINKAGE=K3

[5] Superseded by BUTLER 90. NODE=M002W4;LINKAGE=C

[6] Systematic error not evaluated. NODE=M002W4;LINKAGE=A

$\Gamma(e^+e^-)$ — Γ_{29}

NODE=M002W1

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<1.1 × 10^{-3}	90	[1,2] ACHASOV	15	SND	0.958 $e^+e^- \to \pi\pi\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<2.0 × 10^{-3}	90	[2] ACHASOV	15	SND	0.958 $e^+e^- \to \pi\pi\eta$
<2.4 × 10^{-3}	90	[2] AKHMETSHIN	15	CMD3	0.958 $e^+e^- \to \pi^+\pi^-\eta$

OCCUR=2

[1] Combining data of ACHASOV 15 and AKHMETSHIN 15. NODE=M002W1;LINKAGE=A

[2] Using η and η' branching fractions from PDG 14. NODE=M002W1;LINKAGE=B

$\eta'(958)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M002223

This combination of a partial width with the partial width into $\gamma\gamma$ and with the total width is obtained from the integrated cross section into channel(i) in the $\gamma\gamma$ annihilation.

NODE=M002223

$\Gamma(\gamma\gamma) \times \Gamma(\rho^0\gamma(\text{including non-resonant } \pi^+\pi^-\gamma))/\Gamma_{total}$ — $\Gamma_7\Gamma_2/\Gamma$

NODE=M002G1

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
1.28±0.04 OUR FIT					
1.26±0.07 OUR AVERAGE Error includes scale factor of 1.2.					
1.09±0.04±0.13		BEHREND	91	CELL	$e^+e^- \to e^+e^-\rho(770)^0\gamma$
1.35±0.09±0.21		AIHARA	87	TPC	$e^+e^- \to e^+e^-\rho\gamma$
1.13±0.04±0.13	867	ALBRECHT	87B	ARG	$e^+e^- \to e^+e^-\rho\gamma$
1.53±0.09±0.21		ALTHOFF	84E	TASS	$e^+e^- \to e^+e^-\rho\gamma$
1.14±0.08±0.11	243	BERGER	84B	PLUT	$e^+e^- \to e^+e^-\rho\gamma$
1.73±0.34±0.35	95	JENNI	83	MRK2	$e^+e^- \to e^+e^-\rho\gamma$
1.49±0.13±0.027	213	BARTEL	82B	JADE	$e^+e^- \to e^+e^-\rho\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.85±0.31±0.24	43	BEHREND	82C	CELL	$e^+e^- \to e^+e^-\rho\gamma$

$\Gamma(\gamma\gamma) \times \Gamma(\pi^0\pi^0\eta)/\Gamma_{total}$ — $\Gamma_7\Gamma_4/\Gamma$

NODE=M002G2

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
0.97±0.04 OUR FIT Error includes scale factor of 1.1.				
0.92±0.06±0.11	[1] KARCH	92	CBAL	$e^+e^- \to e^+e^-\eta\pi^0\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.95±0.05±0.08	[2] KARCH	90	CBAL	$e^+e^- \to e^+e^-\eta\pi^0\pi^0$
1.00±0.08±0.10	[2,3] ANTREASYAN	87	CBAL	$e^+e^- \to e^+e^-\eta\pi^0\pi^0$

[1] Reevaluated by us using B($\eta \to \gamma\gamma$) = (39.21 ± 0.34)%. Supersedes ANTREASYAN 87 and KARCH 90. NODE=M002G2;LINKAGE=K4

[2] Superseded by KARCH 92. NODE=M002G2;LINKAGE=A

[3] Using BR($\eta \to 2\gamma$)=(38.9 ± 0.5)%. NODE=M002G2;LINKAGE=D

$\eta'(958)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma(\text{total})$

NODE=M002224

$\Gamma(\pi^+\pi^-\eta) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_1\Gamma_{29}/\Gamma$

NODE=M002G01

VALUE (10^{-3} eV)	CL%	DOCUMENT ID	TECN	COMMENT
<1.0	90	[1] AKHMETSHIN 15	CMD3	0.958 $e^+e^- \to \pi^+\pi^-\eta$

[1] AKHMETSHIN 15 reports $[\Gamma(\eta'(958) \to \pi^+\pi^-\eta) \times \Gamma(\eta'(958) \to e^+e^-)/\Gamma_{total}] \times [B(\eta \to 2\gamma)] < 4.1 \times 10^{-4}$ eV which we divide by our best value $B(\eta \to 2\gamma) = 39.36 \times 10^{-2}$.

NODE=M002G01;LINKAGE=A

$\eta'(958)$ BRANCHING RATIOS

NODE=M002230

$\Gamma(\pi^+\pi^-\eta)/\Gamma_{total}$ — Γ_1/Γ

NODE=M002R47

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
42.5 ±0.5 OUR FIT	Error includes scale factor of 1.1.			
41.24±0.08±1.24	312k	ABLIKIM 19T	BES	$J/\psi \to \gamma\eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
42.4 ±1.1 ±0.4	1.2k	[1] PEDLAR 09	CLEO	$J/\psi \to \gamma\eta'$

[1] Not independent of other η' branching fractions and ratios in PEDLAR 09.

NODE=M002R47;LINKAGE=PE

$\Gamma(\pi^+\pi^-\eta(\text{charged decay}))/\Gamma_{total}$ — $0.2804\Gamma_1/\Gamma$

NODE=M002R3

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.1191±0.0015 OUR FIT	Error includes scale factor of 1.1. [0.1185 ± 0.0015 OUR 2021 FIT Scale factor = 1.1]			
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.123 ±0.014	107	RITTENBERG 69	HBC	1.7–2.7 K^-p
0.10 ±0.04	10	LONDON 66	HBC	2.24 $K^-p \to \Lambda 2\pi^+ 2\pi^- \pi^0$
0.07 ±0.04	7	BADIER 65B	HBC	3 K^-p

NEW

$\Gamma(\pi^+\pi^-\eta(\text{neutral decay}))/\Gamma_{total}$ — $0.7196\Gamma_1/\Gamma$

NODE=M002R1

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.306±0.004 OUR FIT	Error includes scale factor of 1.1.			
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.314±0.026	281	RITTENBERG 69	HBC	1.7–2.7 K^-p

$\Gamma(\rho^0\gamma(\text{including non-resonant } \pi^+\pi^-\gamma))/\Gamma_{total}$ — Γ_2/Γ

NODE=M002R6

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
29.5 ± 0.4 OUR FIT	Error includes scale factor of 1.1.			
29.90± 0.03±0.55	913k	ABLIKIM 19T	BES	$J/\psi \to \gamma\eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
28.7 ± 0.7 ±0.4	0.2k	[1] PEDLAR 09	CLEO	$J/\psi \to \gamma\eta'$
32.9 ± 3.3	298	RITTENBERG 69	HBC	1.7–2.7 K^-p
20 ±10	20	LONDON 66	HBC	2.24 $K^-p \to \Lambda\pi^+\pi^-\gamma$
34 ± 9	35	BADIER 65B	HBC	3 K^-p

[1] Not independent of other η' branching fractions and ratios in PEDLAR 09.

NODE=M002R6;LINKAGE=PE

$\Gamma(\rho^0\gamma)/\Gamma_{total}$ — Γ_3/Γ

NODE=M002R66

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
33.34±0.06±1.60	970k	[1] ABLIKIM 18C	BES3	$\eta'(958) \to \gamma\pi^+\pi^-$
34.43±0.52±1.97	970k	[2] ABLIKIM 18C	BES3	$\eta'(958) \to \gamma\pi^+\pi^-$

OCCUR=2

[1] From a fit to $\pi^+\pi^-$ mass using $\rho(770)$, $\omega(782)$, and box anomaly components.

NODE=M002R66;LINKAGE=A

[2] From a fit to $\pi^+\pi^-$ mass using $\rho(770)$, $\omega(782)$, and $\rho(1450)$ components.

NODE=M002R66;LINKAGE=B

$\Gamma(\rho^0\gamma(\text{including non-resonant } \pi^+\pi^-\gamma))/\Gamma(\pi^+\pi^-\eta)$ — Γ_2/Γ_1

NODE=M002R43

VALUE	DOCUMENT ID	TECN	COMMENT
0.694±0.014 OUR FIT	Error includes scale factor of 1.1.		
0.683±0.020 OUR AVERAGE			
0.677±0.024±0.011	PEDLAR 09	CLE3	$J/\psi \to \eta'\gamma$
0.69 ±0.03	ABLIKIM 06E	BES2	$J/\psi \to \eta'\gamma$

$\Gamma(\rho^0\gamma(\text{including non-resonant } \pi^+\pi^-\gamma))/\Gamma(\pi^+\pi^-\eta(\text{neutral decay}))$ — $\Gamma_2/0.714\Gamma_1$

NODE=M002R27

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.972±0.020 OUR FIT Error includes scale factor of 1.1.					
0.97 ±0.09 OUR AVERAGE					
0.70 ±0.22		AMSLER	04B	CBAR	$0\ \bar{p}p \to \pi^+\pi^-\eta$
1.07 ±0.17		BELADIDZE	92C	VES	$36\ \pi^-\text{Be} \to \pi^-\eta'\eta\text{Be}$
0.92 ±0.14	473	DANBURG	73	HBC	$2.2\ K^-p \to \Lambda X^0$
1.11 ±0.18	192	JACOBS	73	HBC	$2.9\ K^-p \to \Lambda X^0$

$\Gamma(\pi^0\pi^0\eta)/\Gamma_{total}$ — Γ_4/Γ

NODE=M002R48

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
22.4 ±0.6 OUR FIT Error includes scale factor of 1.1.					
21.36±0.10±0.92	52k	ABLIKIM	19T	BES	$J/\psi \to \gamma\eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
23.5 ±1.3 ±0.4	3.2k	[1] PEDLAR	09	CLEO	$J/\psi \to \gamma\eta'$

[1] Not independent of other η' branching fractions and ratios in PEDLAR 09.

NODE=M002R48;LINKAGE=PE

$\Gamma(\pi^0\pi^0\eta(3\pi^0\text{ decay}))/\Gamma_{total}$ — $0.321\Gamma_4/\Gamma$

NODE=M002R26

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0718±0.0018 OUR FIT Error includes scale factor of 1.1.					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.11 ±0.06	4	BENSINGER	70	DBC	$2.2\ \pi^+ d$

$\Gamma(\pi^0\pi^0\eta)/\Gamma(\pi^+\pi^-\eta)$ — Γ_4/Γ_1

NODE=M002R45

VALUE	DOCUMENT ID		TECN	COMMENT
0.527±0.019 OUR FIT Error includes scale factor of 1.1.				
0.555±0.043±0.013	PEDLAR	09	CLE3	$J/\psi \to \eta'\gamma$

$\Gamma(\rho^0\gamma(\text{including non-resonant } \pi^+\pi^-\gamma))/\Gamma(\pi\pi\eta)$ — $\Gamma_2/(\Gamma_1+\Gamma_4)$

NODE=M002R7

VALUE	DOCUMENT ID		TECN	COMMENT
0.454±0.009 OUR FIT Error includes scale factor of 1.1.				
0.43 ±0.02 ±0.02	BARBERIS	98C	OMEG	$450\ pp \to p_f\eta' p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.31 ±0.15	DAVIS	68	HBC	$5.5\ K^-p$

$\Gamma(\omega\gamma)/\Gamma_{total}$ — Γ_5/Γ

NODE=M002R49

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
2.52 ±0.07 OUR FIT					
2.50 ±0.07 OUR AVERAGE					
2.489±0.018±0.074	23k	ABLIKIM	19T	BES	$J/\psi \to \gamma\eta'$
2.55 ±0.03 ±0.16	33.2k	[1] ABLIKIM	15AD	BES3	$J/\psi \to \eta'\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.34 ±0.30 ±0.04	70	[2] PEDLAR	09	CLEO	$J/\psi \to \gamma\eta'$

[1] Using $B(J/\psi \to \eta'\gamma) = (5.15 \pm 0.16) \times 10^{-3}$ and $B(\omega \to \pi^+\pi^-\pi^0) = (89.2 \pm 0.7)\%$.

NODE=M002R49;LINKAGE=A

[2] Not independent of other η' branching fractions and ratios in PEDLAR 09.

NODE=M002R49;LINKAGE=PE

$\Gamma(\omega\gamma)/\Gamma(\pi^+\pi^-\eta)$ — Γ_5/Γ_1

NODE=M002R17

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0593±0.0018 OUR FIT Error includes scale factor of 1.1.					
0.055 ±0.007 ±0.001		PEDLAR	09	CLE3	$J/\psi \to \eta'\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.068 ±0.013	68	ZANFINO	77	ASPK	$8.4\ \pi^- p$

$\Gamma(\omega\gamma)/\Gamma(\pi^0\pi^0\eta)$ — Γ_5/Γ_4

NODE=M002R33

VALUE	DOCUMENT ID		TECN	COMMENT
0.113±0.004 OUR FIT				
0.147±0.016	ALDE	87B	GAM2	$38\ \pi^- p \to n4\gamma$

$\Gamma(\omega e^+e^-)/\Gamma(\omega\gamma)$ — Γ_6/Γ_5

NODE=M002R60

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
7.71±1.34±0.54	[1] ABLIKIM	15AD	BES3	$J/\psi \to \eta'\gamma$

[1] Obtained from other ABLIKIM 15AD meausurements with common systematics taken into account.

NODE=M002R60;LINKAGE=A

$\Gamma(\omega e^+ e^-)/\Gamma_{total}$ Γ_6/Γ

NODE=M002R59

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
1.97±0.34±0.17	66	[1] ABLIKIM 15AD	BES3	$J/\psi \to \eta' \gamma$

[1] Using B($J/\psi \to \eta' \gamma$) = $(5.15 \pm 0.16) \times 10^{-3}$ and B($\omega \to \pi^+ \pi^- \pi^0$) = (89.2 ± 0.7)%.

NODE=M002R59;LINKAGE=A

$\Gamma(\rho^0 \gamma(\text{including non-resonant } \pi^+ \pi^- \gamma))/[\Gamma(\pi^+ \pi^- \eta) + \Gamma(\pi^0 \pi^0 \eta) + \Gamma(\omega\gamma)]$ $\Gamma_2/(\Gamma_1+\Gamma_4+\Gamma_5)$

NODE=M002R18

VALUE	DOCUMENT ID	TECN	COMMENT
0.437±0.008 OUR FIT Error includes scale factor of 1.1.			
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.25 ±0.14	DAUBER 64	HBC	1.95 $K^- p$

$[\Gamma(\pi^0 \pi^0 \eta(\text{charged decay})) + \Gamma(\omega(\text{charged decay})\gamma)]/\Gamma_{total}$ $(0.286\Gamma_4+0.89\Gamma_5)/\Gamma$

NODE=M002R4

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.0864±0.0017 OUR FIT Error includes scale factor of 1.1.				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.045 ±0.029	42	RITTENBERG 69	HBC	1.7–2.7 $K^- p$

$\Gamma(\pi^+ \pi^- \text{neutrals})/\Gamma_{total}$ $(0.714\Gamma_1+0.286\Gamma_4+0.89\Gamma_5)/\Gamma$

NODE=M002R2

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.3897±0.0028 OUR FIT Error includes scale factor of 1.1.				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.4 ±0.1	39	LONDON 66	HBC	2.24 $K^- p \to \Lambda \pi^+ \pi^-$ neutrals
0.35 ±0.06	33	BADIER 65B	HBC	3 $K^- p$

$\Gamma(\gamma\gamma)/\Gamma_{total}$ Γ_7/Γ

NODE=M002R19

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
2.307±0.035 OUR FIT Error includes scale factor of 1.1.				
2.31 ±0.06 OUR AVERAGE Error includes scale factor of 1.8.				
2.331±0.012±0.035	71k	ABLIKIM 19T	BES	$J/\psi \to \gamma\eta'$
1.99 $^{+0.31}_{-0.27}$ ±0.07	114	[1] WICHT 08	BELL	$B^\pm \to K^\pm \gamma\gamma$
2.00 ±0.18		[2] STANTON 80	SPEC	8.45 $\pi^- p \to n \pi^+ \pi^- 2\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.25 ±0.16 ±0.03	0.3k	[3] PEDLAR 09	CLEO	$J/\psi \to \gamma\eta'$
1.8 ±0.2	6000	[4] APEL 79	NICE	15–40 $\pi^- p \to n 2\gamma$
2.5 ±0.7		DUANE 74	MMS	$\pi^- p \to n$MM
1.71 ±0.33	68	DALPIAZ 72	CNTR	1.6 $\pi^- p \to n X^0$
2.0 $^{+0.8}_{-0.6}$	31	HARVEY 71	OSPK	3.65 $\pi^- p \to n X^0$

[1] WICHT 08 reports $[\Gamma(\eta'(958) \to \gamma\gamma)/\Gamma_{total}] \times [B(B^+ \to \eta' K^+)] = (1.40^{+0.16}_{-0.15}{}^{+0.15}_{-0.12}) \times 10^{-6}$ which we divide by our best value $B(B^+ \to \eta' K^+) = (7.04 \pm 0.25) \times 10^{-5}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M002R19;LINKAGE=WI

[2] Includes APEL 79 result.

NODE=M002R19;LINKAGE=S

[3] Not independent of other η' branching fractions and ratios in PEDLAR 09.

NODE=M002R19;LINKAGE=PE

[4] Data is included in STANTON 80 evaluation.

NODE=M002R19;LINKAGE=A

$\Gamma(\gamma\gamma)/\Gamma(\pi^+ \pi^- \eta)$ Γ_7/Γ_1

NODE=M002R46

VALUE	DOCUMENT ID	TECN	COMMENT
0.0543±0.0012 OUR FIT Error includes scale factor of 1.1.			
0.053 ±0.004 ±0.001	PEDLAR 09	CLE3	$J/\psi \to \eta' \gamma$

$\Gamma(\gamma\gamma)/\Gamma(\rho^0 \gamma(\text{including non-resonant } \pi^+ \pi^- \gamma))$ Γ_7/Γ_2

NODE=M002R42

VALUE	DOCUMENT ID	TECN	COMMENT
0.0783±0.0016 OUR FIT Error includes scale factor of 1.1.			
0.080 ±0.008	ABLIKIM 06E	BES2	$J/\psi \to \eta' \gamma$

$\Gamma(\gamma\gamma)/\Gamma(\pi^0 \pi^0 \eta)$ Γ_7/Γ_4

NODE=M002R38

VALUE	DOCUMENT ID	TECN	COMMENT
0.1031±0.0028 OUR FIT			
0.105 ±0.010 OUR AVERAGE Error includes scale factor of 1.9.			
0.091 ±0.009	AMSLER 93	CBAR	0.0 $\overline{p} p$
0.112 ±0.002 ±0.006	ALDE 87B	GAM2	38 $\pi^- p \to n 2\gamma$

$\Gamma(\gamma\gamma)/\Gamma(\pi^0\pi^0\eta(\text{neutral decay}))$ $\Gamma_7/0.714\Gamma_4$

NODE=M002R28

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.144±0.004 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.188±0.058	16	APEL	72	OSPK	3.8 $\pi^- p \rightarrow nX^0$

$\Gamma(\text{neutrals})/\Gamma_{total}$ $(0.714\Gamma_4+0.09\Gamma_5+\Gamma_7)/\Gamma$

NODE=M002R5

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.185±0.004 OUR FIT Error includes scale factor of 1.1.					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.185±0.022	535	BASILE	71	CNTR	1.6 $\pi^- p \rightarrow nX^0$
0.189±0.026	123	RITTENBERG	69	HBC	1.7–2.7 $K^- p$

$\Gamma(3\pi^0)/\Gamma_{total}$ Γ_8/Γ

NODE=M002R55

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
2.50 ±0.17 OUR FIT					
3.57 ±0.26 OUR AVERAGE					
3.522±0.082±0.254	2015	ABLIKIM	17	BES3	$J/\psi \rightarrow \gamma(3\pi^0)$
4.79 ±0.59 ±1.14	183	[1] ABLIKIM	15P	BES3	$J/\psi \rightarrow K^+K^- 3\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3.56 ±0.22 ±0.34	309	[2] ABLIKIM	12E	BES3	$J/\psi \rightarrow \gamma(3\pi^0)$

[1] We have added all systematic uncertainties in quadrature to a single value. NODE=M002R55;LINKAGE=A

[2] Superseded by ABLIKIM 17. NODE=M002R55;LINKAGE=B

$\Gamma(3\pi^0)/\Gamma(\pi^0\pi^0\eta)$ Γ_8/Γ_4

NODE=M002R32

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
112± 8 OUR FIT					
78±10 OUR AVERAGE					
86±19	235	BLIK	08	GAMS	32 $\pi^- p \rightarrow \eta' n$
74±15		ALDE	87B	GAM2	38 $\pi^- p \rightarrow n6\gamma$
75±18		BINON	84	GAM2	30–40 $\pi^- p \rightarrow n6\gamma$

$\Gamma(\mu^+\mu^-\gamma)/\Gamma(\gamma\gamma)$ Γ_9/Γ_7

NODE=M002R29

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
4.9±1.2	33	VIKTOROV	80	CNTR	25,33 $\pi^- p \rightarrow 2\mu\gamma$

$\Gamma(\pi^+\pi^-\mu^+\mu^-)/\Gamma_{total}$ Γ_{10}/Γ

NODE=M002R50

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
1.95±0.37±0.03		53	[1] ABLIKIM	21I	BES3	$J/\psi \rightarrow \gamma\eta'(958)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 2.9	90		[2] ABLIKIM	13O	BES3	$J/\psi \rightarrow \gamma\eta'$
<24	90		[3] NAIK	09	CLEO	$J/\psi \rightarrow \gamma\eta'$

[1] ABLIKIM 21I reports $(1.97 \pm 0.33 \pm 0.19) \times 10^{-5}$ from a measurement of $[\Gamma(\eta'(958) \rightarrow \pi^+\pi^-\mu^+\mu^-)/\Gamma_{total}] \times [B(J/\psi(1S) \rightarrow \gamma\eta'(958))]$ assuming $B(J/\psi(1S) \rightarrow \gamma\eta'(958)) = (5.21 \pm 0.17) \times 10^{-3}$, which we rescale to our best value $B(J/\psi(1S) \rightarrow \gamma\eta'(958)) = (5.25 \pm 0.07) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M002R50;LINKAGE=E

[2] Using $\Gamma_2/\Gamma = (29.3 \pm 0.6)\%$ from PDG 12. NODE=M002R50;LINKAGE=A

[3] Not independent of measured value of Γ_{10}/Γ_1 from NAIK 09. NODE=M002R50;LINKAGE=NA

$\Gamma(\pi^+\pi^-\mu^+\mu^-)/\Gamma(\pi^+\pi^-\eta)$ Γ_{10}/Γ_1

NODE=M002R03

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.5	90	[1] NAIK	09	CLEO	$J/\psi \rightarrow \gamma\eta'$

[1] NAIK 09 reports $[\Gamma(\eta'(958) \rightarrow \pi^+\pi^-\mu^+\mu^-)/\Gamma(\eta'(958) \rightarrow \pi^+\pi^-\eta)] / [B(\eta \rightarrow 2\gamma)] < 1.3 \times 10^{-3}$ which we multiply by our best value $B(\eta \rightarrow 2\gamma) = 39.36 \times 10^{-2}$. NODE=M002R03;LINKAGE=NA

$\Gamma(\pi^+\pi^-\mu^+\mu^-)/\Gamma(\rho^0\gamma(\text{including non-resonant } \pi^+\pi^-\gamma))$ Γ_{10}/Γ_2

NODE=M002R57

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.0	90	ABLIKIM	13O	BES3	$J/\psi \rightarrow \gamma\eta'$

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{11}/Γ

NODE=M002R21

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
3.61 ±0.18 OUR FIT					
3.61 ±0.18 OUR AVERAGE					
3.591±0.054±0.174	6067	ABLIKIM	17	BES3	$J/\psi \to \gamma(\pi^+\pi^-\pi^0)$
4.28 ±0.49 ±1.11	78	[1] ABLIKIM	15P	BES3	$J/\psi \to K^+K^- 3\pi$
3.7 $^{+1.1}_{-0.9}$ ±0.4		[2] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3.83 ±0.15 ±0.39	1014	[3] ABLIKIM	12E	BES3	$J/\psi \to \gamma(\pi^+\pi^-\pi^0)$

[1] We have added all systematic uncertainties in quadrature to a single value. NODE=M002R21;LINKAGE=A

[2] Not independent of measured value of Γ_{11}/Γ_1 from NAIK 09. NODE=M002R21;LINKAGE=NA

[3] Superseded by ABLIKIM 17. NODE=M002R21;LINKAGE=B

$\Gamma((\pi^+\pi^-\pi^0)\text{ S-wave})/\Gamma_{total}$ — Γ_{12}/Γ

NODE=M002R63

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
37.63±0.77±5.00	6580	[1] ABLIKIM	17	BES3	$J/\psi \to \gamma(\pi^+\pi^-\pi^0)$

[1] We have added all systematic uncertainties in quadrature . NODE=M002R63;LINKAGE=A

$\Gamma(\pi^\mp\rho^\pm)/\Gamma_{total}$ — Γ_{13}/Γ

NODE=M002R62

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
7.44±0.60±2.23	1231	[1] ABLIKIM	17	BES3	$J/\psi \to \gamma(\pi^\mp\rho^\pm)$

[1] We have added all systematic uncertainties in quadrature . NODE=M002R62;LINKAGE=A

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma(\pi^+\pi^-\eta)$ — Γ_{11}/Γ_1

NODE=M002R01

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
8.5 ±0.4 OUR FIT Error includes scale factor of 1.1.					
8.27$^{+2.49}_{-2.12}$±0.04	20	[1] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$

[1] NAIK 09 reports $[\Gamma(\eta'(958) \to \pi^+\pi^-\pi^0)/\Gamma(\eta'(958) \to \pi^+\pi^-\eta)]$ / $[B(\eta \to 2\gamma)] = (21^{+6}_{-5} \pm 2) \times 10^{-3}$ which we multiply by our best value $B(\eta \to 2\gamma) = (39.36 \pm 0.18) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M002R01;LINKAGE=NA

$\Gamma(\pi^0\rho^0)/\Gamma_{total}$ — Γ_{14}/Γ

NODE=M002R10

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.04	90	RITTENBERG	65	HBC	2.7 K^-p

$\Gamma(2(\pi^+\pi^-))/\Gamma_{total}$ — Γ_{15}/Γ

NODE=M002R24

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
8.4±0.9±0.1		199	[1] ABLIKIM	14M	BES3	$J/\psi \to \gamma\eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 24	90		[2] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$
<1000	90		RITTENBERG	69	HBC	1.7–2.7 K^-p

[1] ABLIKIM 14M reports $[\Gamma(\eta'(958) \to 2(\pi^+\pi^-))/\Gamma_{total}] \times [B(J/\psi(1S) \to \gamma\eta'(958))] = (4.40 \pm 0.35 \pm 0.30) \times 10^{-7}$ which we divide by our best value $B(J/\psi(1S) \to \gamma\eta'(958)) = (5.25 \pm 0.07) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M002R24;LINKAGE=A

[2] Not independent of measured value of Γ_{15}/Γ_1 from NAIK 09. NODE=M002R24;LINKAGE=NA

$\Gamma(2(\pi^+\pi^-))/\Gamma(\pi^+\pi^-\eta)$ — Γ_{15}/Γ_1

NODE=M002R04

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.6	90	[1] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$

[1] NAIK 09 reports $[\Gamma(\eta'(958) \to 2(\pi^+\pi^-))/\Gamma(\eta'(958) \to \pi^+\pi^-\eta)]$ / $[B(\eta \to 2\gamma)] < 1.4 \times 10^{-3}$ which we multiply by our best value $B(\eta \to 2\gamma) = 39.36 \times 10^{-2}$. NODE=M002R04;LINKAGE=NA

$\Gamma(\pi^+\pi^-2\pi^0)/\Gamma_{total}$ — Γ_{16}/Γ

NODE=M002R51

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
1.79±0.38±0.02		84	[1] ABLIKIM	14M	BES3	$J/\psi \to \gamma\eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<27	90		[2] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$

[1] ABLIKIM 14M reports $[\Gamma(\eta'(958) \to \pi^+\pi^-2\pi^0)/\Gamma_{total}] \times [B(J/\psi(1S) \to \gamma\eta'(958))] = (9.38 \pm 1.79 \pm 0.89) \times 10^{-7}$ which we divide by our best value $B(J/\psi(1S) \to \gamma\eta'(958)) = (5.25 \pm 0.07) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M002R51;LINKAGE=A

[2] Not independent of measured value of Γ_{16}/Γ_1 from NAIK 09. NODE=M002R51;LINKAGE=NA

$\Gamma(\pi^+\pi^- 2\pi^0)/\Gamma(\pi^+\pi^-\eta)$ Γ_{16}/Γ_1

NODE=M002R05

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<6	90	[1] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$

[1] NAIK 09 reports $[\Gamma(\eta'(958) \to \pi^+\pi^- 2\pi^0)/\Gamma(\eta'(958) \to \pi^+\pi^-\eta)]$ / $[B(\eta \to 2\gamma)]$ $< 15 \times 10^{-3}$ which we multiply by our best value $B(\eta \to 2\gamma) = 39.36 \times 10^{-2}$.

NODE=M002R05;LINKAGE=NA

$\Gamma(2(\pi^+\pi^-)\text{ neutrals})/\Gamma_{total}$ Γ_{17}/Γ

NODE=M002R22

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.01	95	DANBURG	73	HBC	2.2 $K^- p \to \Lambda X^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.01	90	RITTENBERG	69	HBC	1.7–2.7 $K^- p$

$\Gamma(2(\pi^+\pi^-)\pi^0)/\Gamma_{total}$ Γ_{18}/Γ

NODE=M002R23

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.002	90	[1] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$
<0.01	90	RITTENBERG	69	HBC	1.7–2.7 $K^- p$

[1] Not independent of measured value of Γ_{18}/Γ_1 from NAIK 09.

NODE=M002R23;LINKAGE=NA

$\Gamma(2(\pi^+\pi^-)\pi^0)/\Gamma(\pi^+\pi^-\eta)$ Γ_{18}/Γ_1

NODE=M002R06

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<4	90	[1] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$

[1] NAIK 09 reports $[\Gamma(\eta'(958) \to 2(\pi^+\pi^-)\pi^0)/\Gamma(\eta'(958) \to \pi^+\pi^-\eta)]$ / $[B(\eta \to 2\gamma)]$ $< 11 \times 10^{-3}$ which we multiply by our best value $B(\eta \to 2\gamma) = 39.36 \times 10^{-2}$.

NODE=M002R06;LINKAGE=NA

$\Gamma(2(\pi^+\pi^-)2\pi^0)/\Gamma_{total}$ Γ_{19}/Γ

NODE=M002R16

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.01	95	KALBFLEISCH	64B	HBC	$K^- p \to \Lambda 2(\pi^+\pi^-)$+MM
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.01	90	LONDON	66	HBC	Compilation

$\Gamma(3(\pi^+\pi^-))/\Gamma_{total}$ Γ_{20}/Γ

NODE=M002R07

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
< 3.1	90	[1] ABLIKIM	13U	BES3	$J/\psi \to \gamma 3(\pi^+\pi^-)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 53	90	[2] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$
<500	95	KALBFLEISCH	64B	HBC	$K^- p \to \Lambda 2(\pi^+\pi^-)$

[1] Using $B(J/\psi \to \gamma\eta'(958)) = (5.16 \pm 0.15) \times 10^{-3}$.

NODE=M002R07;LINKAGE=A

[2] Not independent of measured value of Γ_{20}/Γ_1 from NAIK 09.

NODE=M002R07;LINKAGE=NA

$\Gamma(3(\pi^+\pi^-))/\Gamma(\pi^+\pi^-\eta)$ Γ_{20}/Γ_1

NODE=M002R08

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<1.2	90	[1] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$

[1] NAIK 09 reports $[\Gamma(\eta'(958) \to 3(\pi^+\pi^-))/\Gamma(\eta'(958) \to \pi^+\pi^-\eta)]$ / $[B(\eta \to 2\gamma)]$ $< 3.0 \times 10^{-3}$ which we multiply by our best value $B(\eta \to 2\gamma) = 39.36 \times 10^{-2}$.

NODE=M002R08;LINKAGE=NA

$\Gamma(K^\pm\pi^\mp)/\Gamma(\rho^0\gamma(\text{including non-resonant }\pi^+\pi^-\gamma))$ Γ_{21}/Γ_2

NODE=M002R61

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.3 × 10^{-4}	90	ABLIKIM	16M	BES3	$e^+e^- \to J/\psi \to$ hadrons

$\Gamma(\pi^+\pi^- e^+ e^-)/\Gamma_{total}$ Γ_{22}/Γ

NODE=M002R12

NEW

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
2.42±0.10 OUR FIT						
$[(2.4^{+1.3}_{-0.9}) \times 10^{-3}$ OUR 2021 FIT]						
• • • We do not use the following data for averages, fits, limits, etc. • • •						
2.11±0.12±0.14		429	[1] ABLIKIM	13O	BES3	$J/\psi \to \gamma\eta'$
$2.5\ ^{+1.2}_{-0.9} \pm 0.5$			[2] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$
<6	90		RITTENBERG	65	HBC	2.7 $K^- p$

[1] Using $\Gamma_2/\Gamma = (29.3 \pm 0.6)\%$ from PDG 12.

NODE=M002R12;LINKAGE=A

[2] Not independent of measured value of Γ_{22}/Γ_1 from NAIK 09.

NODE=M002R12;LINKAGE=NA

$\Gamma(\pi^+\pi^- e^+ e^-)/\Gamma(\pi^+\pi^-\eta)$ — Γ_{22}/Γ_1

NODE=M002R02

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
5.69±0.25 OUR FIT					
[$(5.5^{+3.0}_{-2.3}) \times 10^{-3}$ OUR 2021 FIT]					
$\mathbf{5.51^{+3.00}_{-2.30}\pm0.03}$	8	[1] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$

NEW

[1] NAIK 09 reports $[\Gamma(\eta'(958) \to \pi^+\pi^- e^+ e^-)/\Gamma(\eta'(958) \to \pi^+\pi^-\eta)]$ / $[B(\eta \to 2\gamma)] = (14^{+7}_{-5} \pm 3) \times 10^{-3}$ which we multiply by our best value $B(\eta \to 2\gamma) = (39.36 \pm 0.18) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M002R02;LINKAGE=NA

$\Gamma(\pi^+\pi^- e^+ e^-)/\Gamma(\rho^0\gamma(\text{including non-resonant }\pi^+\pi^-\gamma))$ — Γ_{22}/Γ_2

NODE=M002R56

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
8.20±0.31 OUR FIT					
8.20±0.31 OUR AVERAGE [$(7.2 \pm 0.6) \times 10^{-3}$ OUR 2021 AVERAGE]					
8.20±0.16±0.27	2584	ABLIKIM	21J	BES3	$J/\psi \to \gamma\eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
7.2 ±0.4 ±0.5	429	[1] ABLIKIM	13O	BES3	$J/\psi \to \gamma\eta'$

NEW

[1] Superseded by ABLIKIM 21J.

NODE=M002R56;LINKAGE=A

$\Gamma(\pi^+ e^- \nu_e + \text{c.c.})/\Gamma(\pi^+\pi^-\eta)$ — Γ_{23}/Γ_1

NODE=M002R54

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<5.0	90	ABLIKIM	13G	BES3	$J/\psi \to \phi\eta'$

$\Gamma(\gamma e^+ e^-)/\Gamma_{total}$ — Γ_{24}/Γ

NODE=M002R40

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.9	90	BRIERE	00	CLEO	10.6 $e^+ e^-$

$\Gamma(\gamma e^+ e^-)/\Gamma(\gamma\gamma)$ — Γ_{24}/Γ_7

NODE=M002R00

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
2.13±0.09±0.07	864	ABLIKIM	15O	BES3	$J/\psi \to \gamma e^+ e^-$

$\Gamma(\pi^0\gamma\gamma)/\Gamma_{total}$ — Γ_{25}/Γ

NODE=M002R64

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
3.20±0.07±0.23	3.4k	ABLIKIM	17T	BES3	$J/\psi \to \gamma\eta'$

$\Gamma(\pi^0\gamma\gamma(\text{non resonant}))/\Gamma_{total}$ — Γ_{26}/Γ

NODE=M002R65

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
6.16±0.64±0.67	655	ABLIKIM	17T	BES3	$J/\psi \to \gamma\eta'$

$\Gamma(\pi^0\gamma\gamma)/\Gamma(\pi^0\pi^0\eta)$ — Γ_{25}/Γ_4

NODE=M002R35

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<37	90	ALDE	87B	GAM2	38 $\pi^- p \to n 4\gamma$

$\Gamma(\eta\gamma\gamma)/\Gamma_{total}$ — Γ_{27}/Γ

NODE=M002R67

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$\mathbf{<1.33 \times 10^{-4}}$	90	ABLIKIM	19AW	BES3	$J/\psi \to \gamma\eta' \to \gamma\gamma\gamma 2\gamma$

$\Gamma(4\pi^0)/\Gamma_{total}$ — Γ_{28}/Γ

NODE=M002R58

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$\mathbf{<4.94 \times 10^{-5}}$	90	ABLIKIM	20E	BES3	$J/\psi \to \eta'\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<3.2 \times 10^{-4}$	90	DONSKOV	14	GAM4	32.5 $\pi^- p \to \eta' n$

$\Gamma(4\pi^0)/\Gamma(\pi^0\pi^0\eta)$ — Γ_{28}/Γ_4

NODE=M002R37

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<23	90	ALDE	87B	GAM2	38 $\pi^- p \to n 8\gamma$

$\Gamma(e^+e^-)/\Gamma_{total}$ Γ_{29}/Γ

NODE=M002R39
NODE=M002R39

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
< 5.6 × 10⁻⁹	90	[1] ACHASOV	15	SND	$0.958\ e^+e^- \to \pi\pi\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<12 \times 10^{-9}$	90	[2] AKHMETSHIN	15	CMD3	$0.958\ e^+e^- \to \pi^+\pi^-\eta$
$< 2.1 \times 10^{-7}$	90	VOROBYEV	88	ND	$e^+e^- \to \pi^+\pi^-\eta$

[1] Combining data of ACHASOV 15 and AKHMETSHIN 15 and using $\Gamma(\eta') = 0.198 \pm 0.009$ MeV.
[2] Using $\Gamma_{\eta'(958)} = 198 \pm 9$ keV, $B(\eta'(958) \to \pi^+\pi^-\eta) = (42.9 \pm 0.7)\%$, and $B(\eta \to \gamma\gamma) = (39.41 \pm 0.20)\%$.

NODE=M002R39;LINKAGE=B
NODE=M002R39;LINKAGE=A

$\Gamma(\text{invisible})/\Gamma_{total}$ Γ_{30}/Γ

NODE=M002R52
NODE=M002R52

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<9.5	90	[1] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$

[1] Not independent of measured value of Γ_{30}/Γ_1 from NAIK 09.

NODE=M002R52;LINKAGE=NA

$\Gamma(\text{invisible})/\Gamma(\gamma\gamma)$ Γ_{30}/Γ_7

NODE=M002R44
NODE=M002R44

VALUE (units 10^{-2})	CL%	DOCUMENT ID		TECN	COMMENT
<2.4	90	ABLIKIM	13	BES3	$J/\psi \to \phi\eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<6.69	90	ABLIKIM	06Q	BES	$J/\psi \to \phi\eta'$

$\Gamma(\text{invisible})/\Gamma(\pi^+\pi^-\eta)$ Γ_{30}/Γ_1

NODE=M002R09
NODE=M002R09

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<2.1	90	[1] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$

[1] NAIK 09 reports $[\Gamma(\eta'(958) \to \text{invisible})/\Gamma(\eta'(958) \to \pi^+\pi^-\eta)]$ / $[B(\eta \to 2\gamma)] < 5.4 \times 10^{-3}$ which we multiply by our best value $B(\eta \to 2\gamma) = 39.36 \times 10^{-2}$.

NODE=M002R09;LINKAGE=NA

$\Gamma(\pi^+\pi^-)/\Gamma_{total}$ Γ_{31}/Γ

NODE=M002R20
NODE=M002R20

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 0.18	90	[1] AAIJ	17D	LHCB	$D^+_{(s)} \to \pi^+\pi^-\pi^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 0.5	90	[2] ABLIKIM	11G	BES3	$J/\psi \to \gamma\pi^+\pi^-$
< 29	90	[3] MORI	07A	BELL	$\gamma\gamma \to \pi^+\pi^-$
< 3.3	90	[4] MORI	07A	BELL	$\gamma\gamma \to \pi^+\pi^-$
<800	95	DANBURG	73	HBC	$2.2\ K^- p \to \Lambda X^0$
<200	90	RITTENBERG	69	HBC	$1.7–2.7\ K^- p$

OCCUR=2

[1] Using branching fractions of $D^+_{(s)}$ decays from PDG 15.
[2] ABLIKIM 11G reports $[\Gamma(\eta'(958) \to \pi^+\pi^-)/\Gamma_{total}] \times [B(J/\psi(1S) \to \gamma\eta'(958))] < 2.84 \times 10^{-7}$ which we divide by our best value $B(J/\psi(1S) \to \gamma\eta'(958)) = 5.25 \times 10^{-3}$.
[3] Taking into account interference with the $\gamma\gamma \to \pi^+\pi^-$ continuum.
[4] Without interference with the $\gamma\gamma \to \pi^+\pi^-$ continuum.

NODE=M002R20;LINKAGE=A
NODE=M002R20;LINKAGE=AL
NODE=M002R20;LINKAGE=MO
NODE=M002R20;LINKAGE=MR

$\Gamma(\pi^0\pi^0)/\Gamma_{total}$ Γ_{32}/Γ

NODE=M002R53
NODE=M002R53

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<4 × 10⁻⁴	90	[1] ABLIKIM	11G	BES3	$J/\psi \to \gamma\pi^0\pi^0$

[1] ABLIKIM 11G reports $[\Gamma(\eta'(958) \to \pi^+\pi^-)/\Gamma_{total}] \times [B(J/\psi(1S) \to \gamma\eta'(958))] < 2.84 \times 10^{-7}$ which we divide by our best value $B(J/\psi(1S) \to \gamma\eta'(958)) = 5.25 \times 10^{-3}$.

NODE=M002R53;LINKAGE=AL

$\Gamma(\pi^0\pi^0)/\Gamma(\pi^0\pi^0\eta)$ Γ_{32}/Γ_4

NODE=M002R36
NODE=M002R36

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<45	90	ALDE	87B	GAM2	$38\ \pi^- p \to n4\gamma$

$\Gamma(\pi^0 e^+e^-)/\Gamma_{total}$ Γ_{33}/Γ

NODE=M002R8
NODE=M002R8

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
< 1.4	90	BRIERE	00	CLEO	$10.6\ e^+e^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<13	90	RITTENBERG	65	HBC	$2.7\ K^- p$

$\Gamma(\eta e^+ e^-)/\Gamma_{total}$ Γ_{34}/Γ

NODE=M002R9

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
< 2.4	90	BRIERE	00	CLEO	10.6 $e^+ e^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<11	90	RITTENBERG	65	HBC	2.7 $K^- p$

$\Gamma(3\gamma)/\Gamma(\pi^0\pi^0\eta)$ Γ_{35}/Γ_4

NODE=M002R34

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<4.6	90	ALDE	87B	GAM2	38 $\pi^- p \to n 3\gamma$

$\Gamma(\mu^+\mu^-\pi^0)/\Gamma_{total}$ Γ_{36}/Γ

NODE=M002R31

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<6.0	90	DZHELYADIN	81	CNTR	30 $\pi^- p \to \eta' n$

$\Gamma(\mu^+\mu^-\eta)/\Gamma_{total}$ Γ_{37}/Γ

NODE=M002R30

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<1.5	90	DZHELYADIN	81	CNTR	30 $\pi^- p \to \eta' n$

$\Gamma(e\mu)/\Gamma_{total}$ Γ_{38}/Γ

NODE=M002R41

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<4.7	90	BRIERE	00	CLEO	10.6 $e^+ e^-$

$\eta'(958) \to \eta\pi\pi$ DECAY PARAMETERS

NODE=M002225

$|\text{MATRIX ELEMENT}|^2 = |1 + \alpha Y|^2 + CX + DX^2$

X and Y are Dalitz variables; α is complex and C, and D are real-valued. Parameters C and D are not necessarily equal to c and d, respectively, in the generalized parameterization following this one. May be different for $\eta'(958) \to \eta\pi^+\pi^-$ and $\eta'(958) \to \eta\pi^0\pi^0$ decays. Because of different initial assumptions and strong correlations of the parameters we do not average the parameters in the section below.

NODE=M002225

$Re(\alpha)$ decay parameter

NODE=M002A0

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$-0.034 \pm 0.002 \pm 0.002$	351k	ABLIKIM	18	BES3	$\eta' \to \eta\pi^+\pi^-$
$-0.054 \pm 0.004 \pm 0.001$	56k	ABLIKIM	18	BES3	$\eta' \to \eta\pi^0\pi^0$
$-0.033 \pm 0.005 \pm 0.003$	44k	[1] ABLIKIM	11	BES3	$J/\psi \to \gamma\eta\pi^+\pi^-$
$-0.072 \pm 0.012 \pm 0.006$	7k	[2] AMELIN	05A	VES	28 $\pi^- A \to \eta\pi^+\pi^-\pi^- A^*$
$-0.021 \pm 0.018 \pm 0.017$	6.7k	[3] BRIERE	00	CLEO	10.6 $e^+ e^- \to \eta\pi^+\pi^- X$
$-0.058 \pm 0.013 \pm 0.003$	5.4k	[4] ALDE	86	GAM2	38 $\pi^- p \to n\eta\pi^0\pi^0$
-0.08 ± 0.03		[4,5] KALBFLEISCH	74	RVUE	$\eta' \to \eta\pi^+\pi^-$

OCCUR=2

[1] See ABLIKIM 11 for the full correlation matrix. NODE=M002A0;LINKAGE=AB
[2] Superseded by DOROFEEV 07, which found this parameterization unacceptable. See below. NODE=M002A0;LINKAGE=AM
[3] Assuming Im(α) = 0, C = 0, and D = 0. NODE=M002A0;LINKAGE=BR
[4] Assuming C = 0. NODE=M002A0;LINKAGE=A
[5] From the data of DAUBER 64, RITTENBERG 69, AGUILAR-BENITEZ 72B, JACOBS 73, and DANBURG 73. NODE=M002A0;LINKAGE=KA

$Im(\alpha)$ decay parameter

NODE=M002IA0

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.000 \pm 0.019 \pm 0.001$	351k	ABLIKIM	18	BES3	$\eta' \to \eta\pi^+\pi^-$
$0.000 \pm 0.038 \pm 0.002$	56k	ABLIKIM	18	BES3	$\eta' \to \eta\pi^0\pi^0$
$0.000 \pm 0.049 \pm 0.001$	44k	[1] ABLIKIM	11	BES3	$J/\psi \to \gamma\eta\pi^+\pi^-$
$0.0 \pm 0.1 \pm 0.0$	7k	[2] AMELIN	05A	VES	28 $\pi^- A \to \eta\pi^+\pi^-\pi^- A^*$
$-0.00 \pm 0.13 \pm 0.00$	5.4k	[3] ALDE	86	GAM2	38 $\pi^- p \to n\eta\pi^0\pi^0$
0.0 ± 0.3		[3,4] KALBFLEISCH	74	RVUE	$\eta' \to \eta\pi^+\pi^-$

OCCUR=2

[1] See ABLIKIM 11 for the full correlation matrix. NODE=M002IA0;LINKAGE=AB
[2] Superseded by DOROFEEV 07, which found this parameterization unacceptable. See below. NODE=M002IA0;LINKAGE=AM
[3] Assuming C = 0. NODE=M002IA0;LINKAGE=A
[4] From the data of DAUBER 64, RITTENBERG 69, AGUILAR-BENITEZ 72B, JACOBS 73, and DANBURG 73. NODE=M002IA0;LINKAGE=KA

C decay parameter

NODE=M002C0
NODE=M002C0

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.0027±0.0024±0.0015	351k	ABLIKIM	18	BES3	$\eta' \to \eta\pi^+\pi^-$
0.018 ±0.009 ±0.003	44k	[1] ABLIKIM	11	BES3	$J/\psi \to \gamma\eta\pi^+\pi^-$
0.020 ±0.018 ±0.004	7k	[2] AMELIN	05A	VES	28 $\pi^- A \to \eta\pi^+\pi^-\pi^- A^*$

[1] See ABLIKIM 11 for the full correlation matrix. NODE=M002C0;LINKAGE=AB
[2] Superseded by DOROFEEV 07, which found this parameterization unacceptable. See below. NODE=M002C0;LINKAGE=AM

D decay parameter

NODE=M002D0
NODE=M002D0

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
−0.053±0.004±0.004	351k	ABLIKIM	18	BES3	$\eta' \to \eta\pi^+\pi^-$
−0.061±0.009±0.005	56k	ABLIKIM	18	BES3	$\eta' \to \eta\pi^0\pi^0$ OCCUR=2
−0.059±0.012±0.004	44k	[1] ABLIKIM	11	BES3	$J/\psi \to \gamma\eta\pi^+\pi^-$
−0.066±0.030±0.015	7k	[2] AMELIN	05A	VES	28 $\pi^- A \to \eta\pi^+\pi^-\pi^- A^*$
0.00 ±0.03 ±0.00	5.4k	[3] ALDE	86	GAM2	38 $\pi^- p \to n\eta\pi^0\pi^0$
0		[3,4] KALBFLEISCH	74	RVUE	$\eta' \to \eta\pi^+\pi^-$

[1] See ABLIKIM 11 for the full correlation matrix. NODE=M002D0;LINKAGE=AB
[2] Superseded by DOROFEEV 07, which found this parameterization unacceptable. See below. NODE=M002D0;LINKAGE=AM
[3] Assuming $C = 0$. NODE=M002D0;LINKAGE=AL
[4] From the data of DAUBER 64, RITTENBERG 69, AGUILAR-BENITEZ 72B, JACOBS 73, and DANBURG 73. NODE=M002D0;LINKAGE=KA

$\eta'(958) \to \eta\pi\pi$ DECAY PARAMETERS

NODE=M002227

$|\text{MATRIX ELEMENT}|^2 \propto 1 + a\,Y + b\,Y^2 + c\,X + d\,X^2$

X and *Y* are Dalitz variables and *a*, *b*, *c*, and *d* are real-valued parameters. May be different for $\eta'(958) \to \eta\pi^+\pi^-$ and $\eta'(958) \to \eta\pi^0\pi^0$ decays. We do not average measurements in the section below because parameter values from each experiment are strongly correlated.

NODE=M002227

a decay parameter

NODE=M002DPA
NODE=M002DPA

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
−0.056±0.004±0.002	351k	ABLIKIM	18	BES3	$\eta' \to \eta\pi^+\pi^-$
−0.087±0.009±0.006	56k	ABLIKIM	18	BES3	$\eta' \to \eta\pi^0\pi^0$ OCCUR=2
−0.074±0.008±0.006	124k	ADLARSON	18A	A2MM	$\eta' \to \eta\pi^0\pi^0$
−0.072±0.007±0.008		[1] GONZALEZ-S...	18A	RVUE	$\eta' \to \eta\pi^0\pi^0$
−0.047±0.011±0.003	44k	[2] ABLIKIM	11	BES3	$J/\psi \to \gamma\eta\pi^+\pi^-$
−0.066±0.016±0.003	15k	[3] BLIK	09	GAM4	32.5 $\pi^- p \to \eta' n$
−0.127±0.016±0.008	20k	[4] DOROFEEV	07	VES	27 $\pi^- p \to \eta' n$, $\pi^- A \to \eta'\pi^- A^*$

[1] Theoretical analysis of ADLARSON 18A using resonance chiral perturbation theory to one loop. NODE=M002DPA;LINKAGE=A
[2] See ABLIKIM 11 for the full correlation matrix. NODE=M002DPA;LINKAGE=AB
[3] From $\eta' \to \eta\pi^0\pi^0$ decay. NODE=M002DPA;LINKAGE=BL
[4] From $\eta' \to \eta\pi^+\pi^-$ decay. NODE=M002DPA;LINKAGE=DO

b decay parameter

NODE=M002DPB
NODE=M002DPB

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
−0.049±0.006±0.006	351k	ABLIKIM	18	BES3	$\eta' \to \eta\pi^+\pi^-$
−0.073±0.014±0.005	56k	ABLIKIM	18	BES3	$\eta' \to \eta\pi^0\pi^0$ OCCUR=2
−0.063±0.014±0.005	124k	ADLARSON	18A	A2MM	$\eta' \to \eta\pi^0\pi^0$
−0.052±0.001±0.002		[1] GONZALEZ-S...	18A	RVUE	$\eta' \to \eta\pi^0\pi^0$
−0.069±0.019±0.009	44k	[2] ABLIKIM	11	BES3	$J/\psi \to \gamma\eta\pi^+\pi^-$
−0.063±0.028±0.004	15k	[3] BLIK	09	GAM4	32.5 $\pi^- p \to \eta' n$
−0.106±0.028±0.014	20k	[4] DOROFEEV	07	VES	27 $\pi^- p \to \eta' n$, $\pi^- A \to \eta'\pi^- A^*$

[1] Theoretical analysis of ADLARSON 18A using resonance chiral perturbation theory to one loop. NODE=M002DPB;LINKAGE=A
[2] See ABLIKIM 11 for the full correlation matrix. NODE=M002DPB;LINKAGE=AB
[3] From $\eta' \to \eta\pi^0\pi^0$ decay. NODE=M002DPB;LINKAGE=BL
[4] From $\eta' \to \eta\pi^+\pi^-$ decay. NODE=M002DPB;LINKAGE=DO

c decay parameter

NODE=M002DPC
NODE=M002DPC

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.0027\pm0.0024\pm0.0018$	351k	ABLIKIM	18	BES3	$\eta' \to \eta\pi^+\pi^-$
$0.019 \pm0.011 \pm0.003$	44k	[1] ABLIKIM	11	BES3	$J/\psi \to \gamma\eta\pi^+\pi^-$
$-0.107 \pm0.096 \pm0.003$	15k	[2] BLIK	09	GAM4	$32.5\ \pi^- p \to \eta' n$
$0.015 \pm0.011 \pm0.014$	20k	[3] DOROFEEV	07	VES	$27\ \pi^- p \to \eta' n$, $\pi^- A \to \eta'\pi^- A^*$

[1] See ABLIKIM 11 for the full correlation matrix. NODE=M002DPC;LINKAGE=AB
[2] From $\eta' \to \eta\pi^0\pi^0$ decay. NODE=M002DPC;LINKAGE=BL
[3] From $\eta' \to \eta\pi^+\pi^-$ decay. NODE=M002DPC;LINKAGE=DO

d decay parameter

NODE=M002DPD
NODE=M002DPD

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$-0.063\pm0.004\pm0.003$	351k	ABLIKIM	18	BES3	$\eta' \to \eta\pi^+\pi^-$
$-0.074\pm0.009\pm0.004$	56k	ABLIKIM	18	BES3	$\eta' \to \eta\pi^0\pi^0$ OCCUR=2
$-0.050\pm0.009\pm0.005$	124k	ADLARSON	18A	A2MM	$\eta' \to \eta\pi^0\pi^0$
$-0.051\pm0.008\pm0.006$		[1] GONZALEZ-S...	18A	RVUE	$\eta' \to \eta\pi^0\pi^0$
$-0.073\pm0.012\pm0.003$	44k	[2] ABLIKIM	11	BES3	$J/\psi \to \gamma\eta\pi^+\pi^-$
$0.018\pm0.078\pm0.006$	15k	[3] BLIK	09	GAM4	$32.5\ \pi^- p \to \eta' n$
$-0.082\pm0.017\pm0.008$	20k	[4] DOROFEEV	07	VES	$27\ \pi^- p \to \eta' n$, $\pi^- A \to \eta'\pi^- A^*$

[1] Theoretical analysis of ADLARSON 18A using resonance chiral perturbation theory to one loop. NODE=M002DPD;LINKAGE=A
[2] See ABLIKIM 11 for the full correlation matrix. NODE=M002DPD;LINKAGE=AB
[3] From $\eta' \to \eta\pi^0\pi^0$ decay. If $c \equiv 0$ from Bose-Einstein symmetry, $d = -0.067 \pm 0.020 \pm 0.003$. NODE=M002DPD;LINKAGE=BL
[4] From $\eta' \to \eta\pi^+\pi^-$ decay. NODE=M002DPD;LINKAGE=DO

$\eta'(958)$ β PARAMETER
$|\text{MATRIX ELEMENT}|^2 = (1 + 2\beta Z)$

NODE=M002226

See the "Note on η Decay Parameters" in our 1994 edition Physical Review **D50** 1173 (1994), p. 1454.

NODE=M002226

β decay parameter

NODE=M002B0
NODE=M002B0

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
-0.61 ± 0.08 OUR AVERAGE		Error includes scale factor of 1.2.			
$-0.640\pm0.046\pm0.047$	1.8k	ABLIKIM	15G	BES3	$J/\psi \to \gamma(\pi^0\pi^0\pi^0)$
-0.59 ± 0.18	235	BLIK	08	GAMS	$32\ \pi^- p \to \eta' n$
-0.1 ± 0.3		ALDE	87B	GAM2	$38\ \pi^- p \to n3\pi^0$

$\eta'(958)$ *C*-NONCONSERVING DECAY PARAMETER

NODE=M002235

See the note on η decay parameters in the Stable Particle Particle Listings for definition of this parameter.

NODE=M002235

DECAY ASYMMETRY PARAMETER FOR $\pi^+\pi^-\gamma$

NODE=M002A
NODE=M002A

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
-0.03 ± 0.04 OUR AVERAGE					
-0.019 ± 0.056		AIHARA	87	TPC	$2\gamma \to \pi^+\pi^-\gamma$
-0.069 ± 0.078	295	GRIGORIAN	75	STRC	$2.1\ \pi^- p$
0.00 ± 0.10	103	KALBFLEISCH	75	HBC	$2.18\ K^- p \to \Lambda\pi^+\pi^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.07 ± 0.08	152	RITTENBERG	65	HBC	$2.1\text{–}2.7\ K^- p$

$\eta'(958) \to \gamma\ell^+\ell^-$ TRANSITION FORM FACTOR SLOPE

NODE=M002FFL

Related to the effective virtual meson mass Λ, via slope $\approx \Lambda^{-2}$. See e.g. LANDSBERG 85, eq. (3.8), for a detailed definition.

NODE=M002FFL

NODE=M002FFL

VALUE (GeV^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
1.62 ± 0.17 OUR AVERAGE					
$1.60\pm0.17\pm0.08$	864	[1] ABLIKIM	15O	BES3	$J/\psi \to \gamma e^+ e^-$
1.7 ± 0.4	33	[1] VIKTOROV	80		$25,33\ \pi^- p \to 2\mu\gamma$

[1] In the single-pole Ansatz where slope $= 1/(\Lambda^2 + \gamma^2)$ with Λ, γ being a Breit-Wigner mass, width for the effective contributing vector meson. NODE=M002FFL;LINKAGE=A

$\eta'(958)$ REFERENCES

NODE=M002

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ABLIKIM 20E PR D101 032001 M. Ablikim *et al.* (BESIII Collab.) REFID=60252
ABLIKIM 19AW PR D100 052015 M. Ablikim *et al.* (BESIII Collab.) REFID=60000
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ABLIKIM 18 PR D97 012003 M. Ablikim *et al.* (BESIII Collab.) REFID=58711
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AAIJ 17D PL B764 233 R. Aaij *et al.* (LHCb Collab.) REFID=57702
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ABLIKIM 16M PR D93 072008 M. Ablikim *et al.* (BESIII Collab.) REFID=57511
ABLIKIM 15AD PR D92 051101 M. Ablikim *et al.* (BESIII Collab.) REFID=56983
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BINON 84 PL 140B 264 F.G. Binon *et al.* (SERP, BELG, LAPP+) REFID=20307
JENNI 83 PR D27 1031 P. Jenni *et al.* (SLAC, LBL) REFID=20304
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DALPIAZ 72 PL 42B 377 P.F. Dalpiaz *et al.* (CERN) REFID=20278
BASILE 71 NC 3A 371 M. Basile *et al.* (CERN, BGNA, STRB) REFID=20270
HARVEY 71 PRL 27 885 E.H. Harvey *et al.* (MINN, MICH) REFID=20272
BENSINGER 70 PL 33B 505 J.R. Bensinger *et al.* (WISC) REFID=20268
RITTENBERG 69 Thesis UCRL 18863 A. Rittenberg (LRL) I REFID=20266
DAVIS 68 PL 27B 532 R. Davis *et al.* (NWES, ANL) REFID=20263
LONDON 66 PR 143 1034 G.W. London *et al.* (BNL, SYRA) IJP REFID=11774
BADIER 65B PL 17 337 J. Badier *et al.* (EPOL, SACL, AMST) REFID=20253
RITTENBERG 65 PRL 15 556 A. Rittenberg, G.R. Kalbfleisch (LRL, BNL) REFID=10761
DAUBER 64 PRL 13 449 P.M. Dauber *et al.* (UCLA) JP REFID=20247
KALBFLEISCH 64B PRL 13 349 G.R. Kalbfleisch, O.I. Dahl, A. Rittenberg (LRL) JP REFID=20252

NODE=M003

$f_0(980)$ $I^G(J^{PC}) = 0^+(0^{++})$

See the related review(s):

Scalar Mesons below 1 GeV

$f_0(980)$ T-MATRIX POLE $\sqrt{s}$

NODE=M003PP

NODE=M003PP
→ UNCHECKED ←

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
(980–1010) − *i* (20–35) OUR ESTIMATE (see Fig. 64.4 in the review)					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$(1014 \pm 8)-i(35 \pm 5)$		SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma\ (\pi\pi, K\overline{K}, \eta\eta, \omega\phi)$
$(992.8 \pm 1.3) - i(30.7 \pm 2.3)$	18.5k	[1] ALBRECHT	20	RVUE	$0.9\ \overline{p}p \to \pi^0\pi^0\eta, \pi^0\eta\eta, \pi^0 K^+ K^-$
$(1003^{+5}_{-27}) - i(21^{+10}_{-8})$		[2] GARCIA-MAR..11		RVUE	Compilation
$(996 \pm 7) - i(25^{+10}_{-6})$		[3] GARCIA-MAR..11		RVUE	Compilation
$(973^{+39}_{-127}) - i(11^{+189}_{-11})$		[4] PELAEZ	04A	RVUE	$\pi\pi \to \pi\pi$

OCCUR=2

[1] 5 poles, 5 channels, including scattering data from HYAMS 75 ($\pi\pi$), LONGACRE 86 ($K\overline{K}$), BINON 83 ($\eta\eta$), and BINON 84C ($\eta\eta'$). Second solution 977.8 ± 1.7 MeV.
NODE=M003PP;LINKAGE=D

[2] Reanalysis of the K_{e4} data of BATLEY 10C and the $\pi N \to \pi\pi N$ data of HYAMS 73, GRAYER 74, and PROTOPOPESCU 73 using Roy equations.
NODE=M003PP;LINKAGE=B

[3] Reanalysis of the K_{e4} data of BATLEY 10C and the $\pi N \to \pi\pi N$ data of HYAMS 73, GRAYER 74, and PROTOPOPESCU 73 using GKPY equations.
NODE=M003PP;LINKAGE=C

[4] Reanalysis of data from PROTOPOPESCU 73, ESTABROOKS 74, GRAYER 74, and COHEN 80 in the unitarized ChPT model.
NODE=M003PP;LINKAGE=A

$f_0(980)$ MASS

NODE=M003M1

NODE=M003M1
→ UNCHECKED ←

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*	
990 ±20 OUR ESTIMATE						
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$992.0^{+8.5}_{-7.5} \pm 8.6$		[1] AAIJ	19H	LHCB	$pp \to D^{\pm} X$	
989.4 ± 1.3	424	ABLIKIM	15P	BES3	$J/\psi \to K^+K^- 3\pi$	
989.9 ± 0.4	706	ABLIKIM	12E	BES3	$J/\psi \to \gamma 3\pi$	
$996\ ^{+4}_{-14}$		[2] MOUSSALLAM	11	RVUE	Compilation	
981 ± 43		[3] MENNESSIER	10	RVUE	Compilation	
$1030\ ^{+30}_{-10}$		[4] ANISOVICH	09	RVUE	$0.0\ \overline{p}p, \pi N$	
$977\ ^{+11}_{-9} \pm 1$	44	[5] ECKLUND	09	CLEO	$4.17\ e^+e^- \to D_s^- D_s^{*+}$ + c.c.	
$982.2 \pm 1.0^{+8.1}_{-8.0}$		[6] UEHARA	08A	BELL	$10.6\ e^+e^- \to e^+e^-\pi^0\pi^0$	
$976.8 \pm 0.3^{+10.1}_{-0.6}$	64k	[7] AMBROSINO	07	KLOE	$1.02\ e^+e^- \to \pi^0\pi^0\gamma$	
$984.7 \pm 0.4^{+2.4}_{-3.7}$	64k	[8] AMBROSINO	07	KLOE	$1.02\ e^+e^- \to \pi^0\pi^0\gamma$	OCCUR=2
973 ± 3	262 ± 30	[9] AUBERT	07AK	BABR	$10.6\ e^+e^- \to \phi\pi^+\pi^-\gamma$	
970 ± 7	54 ± 9	[9] AUBERT	07AK	BABR	$10.6\ e^+e^- \to \phi\pi^0\pi^0\gamma$	OCCUR=2
953 ± 20	2.6k	[10] BONVICINI	07	CLEO	$D^+ \to \pi^-\pi^+\pi^+$	
$985.6^{+1.2}_{-1.5}{}^{+1.1}_{-1.6}$		[11] MORI	07	BELL	$10.6\ e^+e^- \to e^+e^-\pi^+\pi^-$	
$983.0 \pm 0.6^{+4.0}_{-3.0}$		[12] AMBROSINO	06B	KLOE	$1.02\ e^+e^- \to \pi^+\pi^-\gamma$	
$977.3 \pm 0.9^{+3.7}_{-4.3}$		[13] AMBROSINO	06B	KLOE	$1.02\ e^+e^- \to \pi^+\pi^-\gamma$	OCCUR=2
950 ± 9	4286	[14] GARMASH	06	BELL	$B^+ \to K^+\pi^+\pi^-$	
965 ± 10		[15] ABLIKIM	05	BES2	$J/\psi \to \phi\pi^+\pi^-, \phi K^+K^-$	
1031 ± 8		[16] ANISOVICH	03	RVUE		
1037 ± 31		TIKHOMIROV	03	SPEC	$40.0\ \pi^- C \to K_S^0 K_S^0 K_L^0 X$	

973 ± 1	2438	[17] ALOISIO	02D	KLOE	$e^+e^- \to \pi^0\pi^0\gamma$		
977 ± 3 ± 2	848	[18] AITALA	01A	E791	$D_s^+ \to \pi^-\pi^+\pi^+$		
969.8 ± 4.5	419	[19] ACHASOV	00H	SND	$e^+e^- \to \pi^0\pi^0\gamma$		
985 $^{+16}_{-12}$	419	[20,21] ACHASOV	00H	SND	$e^+e^- \to \pi^0\pi^0\gamma$		OCCUR=2
976 ± 5 ± 6		[22] AKHMETSHIN	99B	CMD2	$e^+e^- \to \pi^+\pi^-\gamma$		
977 ± 3 ± 6	268	[22] AKHMETSHIN	99C	CMD2	$e^+e^- \to \pi^0\pi^0\gamma$		
975 ± 4 ± 6		[23] AKHMETSHIN	99C	CMD2	$e^+e^- \to \pi^0\pi^0\gamma$		OCCUR=2
975 ± 4 ± 6		[24] AKHMETSHIN	99C	CMD2	$e^+e^- \to \pi^+\pi^-\gamma$, $\pi^0\pi^0\gamma$		OCCUR=3
985 ±10		BARBERIS	99	OMEG	450 $pp \to p_s p_f K^+K^-$		
982 ± 3		BARBERIS	99B	OMEG	450 $pp \to p_s p_f \pi^+\pi^-$		
982 ± 3		BARBERIS	99C	OMEG	450 $pp \to p_s p_f \pi^0\pi^0$		
987 ± 6 ± 6		[25] BARBERIS	99D	OMEG	450 $pp \to K^+K^-$, $\pi^+\pi^-$		
989 ±15		BELLAZZINI	99	GAM4	450 $pp \to pp\pi^0\pi^0$		
991 ± 3		[26] KAMINSKI	99	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$, $\sigma\sigma$		
∼ 980		[26] OLLER	99	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$		
∼ 993.5		OLLER	99B	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$		
∼ 987		[26] OLLER	99C	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$, $\eta\eta$		
957 ± 6		[27] ACKERSTAFF	98Q	OPAL	$Z \to f_0$ X		
960 ±10		ALDE	98	GAM4			
1015 ±15		[26] ANISOVICH	98B	RVUE	Compilation		
1008		[28] LOCHER	98	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$		
955 ±10		[27] ALDE	97	GAM2	450 $pp \to pp\pi^0\pi^0$		
994 ± 9		[29] BERTIN	97C	OBLX	0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$		
993.2 ± 6.5 ± 6.9		[30] ISHIDA	96	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$		
1006		TORNQVIST	96	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$, $K\pi$, $\eta\pi$		
997 ± 5	3k	[31] ALDE	95B	GAM2	38 $\pi^-p \to \pi^0\pi^0 n$		
960 ±10	10k	[32] ALDE	95B	GAM2	38 $\pi^-p \to \pi^0\pi^0 n$		OCCUR=2
994 ± 5		AMSLER	95B	CBAR	0.0 $\overline{p}p \to 3\pi^0$		
∼ 996		[33] AMSLER	95D	CBAR	0.0 $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$		
987 ± 6		[34] ANISOVICH	95	RVUE			
1015		JANSSEN	95	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$		
983		[35] BUGG	94	RVUE	$\overline{p}p \to \eta 2\pi^0$		
973 ± 2		[36] KAMINSKI	94	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$		
988		[37] ZOU	94B	RVUE			
988 ±10		[38] MORGAN	93	RVUE	$\pi\pi(K\overline{K}) \to \pi\pi(K\overline{K})$, $J/\psi \to \phi\pi\pi(K\overline{K})$, $D_s \to \pi(\pi\pi)$		
971.1 ± 4.0		[27] AGUILAR-...	91	EHS	400 pp		
979 ± 4		[39] ARMSTRONG	91	OMEG	300 $pp \to pp\pi\pi$, $ppK\overline{K}$		
956 ±12		BREAKSTONE	90	SFM	$pp \to pp\pi^+\pi^-$		
959.4 ± 6.5		[27] AUGUSTIN	89	DM2	$J/\psi \to \omega\pi^+\pi^-$		
978 ± 9		[27] ABACHI	86B	HRS	$e^+e^- \to \pi^+\pi^-$ X		
985.0 $^{+\ 9.0}_{-39.0}$		ETKIN	82B	MPS	23 $\pi^-p \to n2K^0_S$		
974 ± 4		[39] GIDAL	81	MRK2	$J/\psi \to \pi^+\pi^-$ X		
975		[40] ACHASOV	80	RVUE			
986 ±10		[39] AGUILAR-...	78	HBC	0.7 $\overline{p}p \to K^0_S K^0_S$		
969 ± 5		[39] LEEPER	77	ASPK	2–2.4 $\pi^-p \to \pi^+\pi^-n$, K^+K^-n		
987 ± 7		[39] BINNIE	73	CNTR	$\pi^-p \to n$MM		
1012 ± 6		[41] GRAYER	73	ASPK	17 $\pi^-p \to \pi^+\pi^-n$		
1007 ±20		[41] HYAMS	73	ASPK	17 $\pi^-p \to \pi^+\pi^-n$		
997 ± 6		[41] PROTOPOP...	73	HBC	7 $\pi^+p \to \pi^+p\pi^+\pi^-$		

[1] From the $D^\pm \to K^\pm K^+K^-$ Dalitz plot fit with the Triple-M amplitude in the multi-meson model of AOUDE 18. NODE=M003M1;LINKAGE=F

[2] Pole position. Used Roy equations. NODE=M003M1;LINKAGE=MU

[3] Average of the analyses of three data sets in the K-matrix model. Uses the data of BATLEY 08A, HYAMS 73, and GRAYER 74, partially of COHEN 80 or ETKIN 82B. NODE=M003M1;LINKAGE=ME

[4] On sheet II in a 2-pole solution. The other pole is found on sheet III at (850−100i) MeV NODE=M003M1;LINKAGE=AO

[5] Using a relativistic Breit-Wigner function and taking into account the finite D_s mass. NODE=M003M1;LINKAGE=EC

[6] Breit-Wigner mass. Using finite width corrections according to FLATTE 76 and ACHASOV 05, and the ratio $g_{f_0 KK}/g_{f_0\pi\pi} = 0$. NODE=M003M1;LINKAGE=UE

[7] In the kaon-loop fit. NODE=M003M1;LINKAGE=AK
[8] In the no-structure fit. NODE=M003M1;LINKAGE=AS
[9] Systematic errors not estimated. NODE=M003M1;LINKAGE=NS
[10] FLATTE 76 parameterization. $g_{f_0 \pi\pi} = 329 \pm 96$ MeV/c^2 assuming $g_{f_0 K\overline{K}}/g_{f_0 \pi\pi}$=2. NODE=M003M1;LINKAGE=BO
[11] Breit-Wigner mass. Using finite width corrections according to FLATTE 76 and ACHASOV 05, and the ratio $g_{f_0 KK}/g_{f_0 \pi\pi} = 4.21 \pm 0.25 \pm 0.21$ from ABLIKIM 05. NODE=M003M1;LINKAGE=MO
[12] In the kaon-loop fit following formalism of ACHASOV 89. NODE=M003M1;LINKAGE=AB
[13] In the no-structure fit assuming a direct coupling of ϕ to $f_0 \gamma$. NODE=M003M1;LINKAGE=AM
[14] FLATTE 76 parameterization. Supersedes GARMASH 05. NODE=M003M1;LINKAGE=GR
[15] FLATTE 76 parameterization, $g_{f_0 K\overline{K}}/g_{f_0 \pi\pi} = 4.21 \pm 0.25 \pm 0.21$. NODE=M003M1;LINKAGE=AL
[16] K-matrix pole from combined analysis of $\pi^- p \to \pi^0\pi^0 n$, $\pi^- p \to K\overline{K} n$, $\pi^+\pi^- \to \pi^+\pi^-$, $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$, $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, $K^0_S K^0_S \pi^0$, $K^+ K^0_S \pi^-$ at rest, $\overline{p}n \to \pi^-\pi^-\pi^+$, $K^0_S K^-\pi^0$, $K^0_S K^0_S \pi^-$ at rest. NODE=M003M;LINKAGE=KM
[17] From the negative interference with the $f_0(500)$ meson of AITALA 01B using the ACHASOV 89 parameterization for the $f_0(980)$, a Breit-Wigner for the $f_0(500)$, and ACHASOV 01F for the $\rho\pi$ contribution. NODE=M003M1;LINKAGE=KD
[18] Coupled-channel Breit-Wigner, couplings g_π=0.09±0.01±0.01, g_K=0.02±0.04±0.03. NODE=M003M;LINKAGE=TL
[19] Supersedes ACHASOV 98I. Using the model of ACHASOV 89. NODE=M003M;LINKAGE=V9
[20] Supersedes ACHASOV 98I. NODE=M003M;LINKAGE=V8
[21] In the "narrow resonance" approximation. NODE=M003M1;LINKAGE=AI
[22] Assuming $\Gamma(f_0)$= 40 MeV. NODE=M003M;LINKAGE=SM
[23] From a narrow pole fit taking into account $f_0(980)$ and $f_0(1200)$ intermediate mechanisms. NODE=M003M;LINKAGE=ST
[24] From the combined fit of the photon spectra in the reactions $e^+e^- \to \pi^+\pi^-\gamma$, $\pi^0\pi^0\gamma$. NODE=M003M;LINKAGE=SL
[25] Supersedes BARBERIS 99 and BARBERIS 99B NODE=M003M1;LINKAGE=BD
[26] T-matrix pole. NODE=M003M1;LINKAGE=AN
[27] From invariant mass fit. NODE=M003M1;LINKAGE=A
[28] On sheet II in a 2 pole solution. The other pole is found on sheet III at (1039−93i) MeV. NODE=M003M1;LINKAGE=LC
[29] On sheet II in a 2 pole solution. The other pole is found on sheet III at (963-29i) MeV. NODE=M003M1;LINKAGE=X
[30] Reanalysis of data from HYAMS 73, GRAYER 74, SRINIVASAN 75, and ROSSELET 77 using the interfering amplitude method. NODE=M003M1;LINKAGE=AA
[31] At high $|t|$. NODE=M003M1;LINKAGE=LA
[32] At low $|t|$. NODE=M003M1;LINKAGE=LB
[33] On sheet II in a 4-pole solution, the other poles are found on sheet III at (953−55i) MeV and on sheet IV at (938−35i) MeV. NODE=M003M1;LINKAGE=KL
[34] Combined fit of ALDE 95B, ANISOVICH 94, AMSLER 94D. NODE=M003M1;LINKAGE=CF
[35] On sheet II in a 2 pole solution. The other pole is found on sheet III at (996−103i) MeV. NODE=M003M1;LINKAGE=C2
[36] From sheet II pole position. NODE=M003M1;LINKAGE=KM
[37] On sheet II in a 2 pole solution. The other pole is found on sheet III at (797−185i) MeV and can be interpreted as a shadow pole. NODE=M003M1;LINKAGE=L
[38] On sheet II in a 2 pole solution. The other pole is found on sheet III at (978−28i) MeV. NODE=M003M1;LINKAGE=K
[39] From coupled channel analysis. NODE=M003M1;LINKAGE=B
[40] Coupled channel analysis with finite width corrections. NODE=M003M;LINKAGE=B
[41] Included in AGUILAR-BENITEZ 78 fit. NODE=M003M;LINKAGE=R

$f_0(980)$ WIDTH

NODE=M003W1

Width determination very model dependent. Peak width in $\pi\pi$ is about 50 MeV, but decay width can be much larger.

NODE=M003W1

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
10 to 100 OUR ESTIMATE					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
15.3± 4.7	424	ABLIKIM	15P	BES3	$J/\psi \to K^+K^-3\pi$
9.5± 1.1	706	ABLIKIM	12E	BES3	$J/\psi \to \gamma 3\pi$
$48\ ^{+22}_{-6}$		[1] MOUSSALLAM	11	RVUE	Compilation
36 ± 22		[2] MENNESSIER	10	RVUE	Compilation
$70\ ^{+20}_{-32}$		[3] ANISOVICH	09	RVUE	0.0 $\overline{p}p$, πN
$91\ ^{+30}_{-22} \pm 3$	44	[4] ECKLUND	09	CLEO	4.17 $e^+e^- \to D^-_s D^{*+}_s$ + c.c.
$66.9 \pm 2.2 ^{+17.6}_{-12.5}$		[5] UEHARA	08A	BELL	10.6 $e^+e^- \to e^+e^-\pi^0\pi^0$
65 ± 13	262 ± 30	[6] AUBERT	07AK	BABR	10.6 $e^+e^- \to \phi\pi^+\pi^-\gamma$

NODE=M003W1
→ UNCHECKED ←

81 ± 21	54 ± 9	[6] AUBERT	07AK	BABR	10.6 $e^+e^- \to \phi\pi^0\pi^0\gamma$	OCCUR=2
$51.3^{+20.8+13.2}_{-17.7-3.8}$		[7] MORI	07	BELL	10.6 $e^+e^- \to e^+e^-\pi^+\pi^-$	
61 ± 9 $^{+14}_{-8}$	2584	[8] GARMASH	05	BELL	$B^+ \to K^+\pi^+\pi^-$	
64 ± 16		[9] ANISOVICH	03	RVUE		
121 ± 23		TIKHOMIROV	03	SPEC	40.0 π^- C $\to K^0_S K^0_S K^0_L$ X	
∼ 70		[10] BRAMON	02	RVUE	1.02 $e^+e^- \to \pi^0\pi^0\gamma$	
44 ± 2 ± 2	848	[11] AITALA	01A	E791	$D^+_s \to \pi^-\pi^+\pi^+$	
201 ± 28	419	[12] ACHASOV	00H	SND	$e^+e^- \to \pi^0\pi^0\gamma$	
122 ± 13	419	[13,14] ACHASOV	00H	SND	$e^+e^- \to \pi^0\pi^0\gamma$	OCCUR=2
56 ± 20		[15] AKHMETSHIN	99C	CMD2	$e^+e^- \to \pi^0\pi^0\gamma$	
65 ± 20		BARBERIS	99	OMEG	450 $pp \to p_s p_f K^+K^-$	
80 ± 10		BARBERIS	99B	OMEG	450 $pp \to p_s p_f \pi^+\pi^-$	
80 ± 10		BARBERIS	99C	OMEG	450 $pp \to p_s p_f \pi^0\pi^0$	
48 ± 12 ± 8		[16] BARBERIS	99D	OMEG	450 $pp \to K^+K^-$, $\pi^+\pi^-$	
65 ± 25		BELLAZZINI	99	GAM4	450 $pp \to pp\pi^0\pi^0$	
71 ± 14		[17] KAMINSKI	99	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$, $\sigma\sigma$	
∼ 28		[17] OLLER	99	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$	
∼ 25		OLLER	99B	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$	
∼ 14		[17] OLLER	99C	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$, $\eta\eta$	
70 ± 20		ALDE	98	GAM4		
86 ± 16		[17] ANISOVICH	98B	RVUE	Compilation	
54		[18] LOCHER	98	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$	
69 ± 15		[19] ALDE	97	GAM2	450 $pp \to pp\pi^0\pi^0$	
38 ± 20		[20] BERTIN	97C	OBLX	0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$	
∼ 100		[21] ISHIDA	96	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$	
34		TORNQVIST	96	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$, $K\pi$, $\eta\pi$	
48 ± 10	3k	[22] ALDE	95B	GAM2	38 $\pi^-p \to \pi^0\pi^0 n$	
95 ± 20	10k	[23] ALDE	95B	GAM2	38 $\pi^-p \to \pi^0\pi^0 n$	OCCUR=2
26 ± 10		AMSLER	95B	CBAR	0.0 $\overline{p}p \to 3\pi^0$	
∼ 112		[24] AMSLER	95D	CBAR	0.0 $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$	
80 ± 12		[25] ANISOVICH	95	RVUE		
30		JANSSEN	95	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$	
74		[26] BUGG	94	RVUE	$\overline{p}p \to \eta 2\pi^0$	
29 ± 2		[27] KAMINSKI	94	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$	
46		[28] ZOU	94B	RVUE		
48 ± 12		[29] MORGAN	93	RVUE	$\pi\pi(K\overline{K}) \to \pi\pi(K\overline{K})$, $J/\psi \to \phi\pi\pi(K\overline{K})$, $D_s \to \pi(\pi\pi)$	
37.4 ± 10.6		[19] AGUILAR-...	91	EHS	400 pp	
72 ± 8		[30] ARMSTRONG	91	OMEG	300 $pp \to pp\pi\pi$, $ppK\overline{K}$	
110 ± 30		BREAKSTONE	90	SFM	$pp \to pp\pi^+\pi^-$	
29 ± 13		[19] ABACHI	86B	HRS	$e^+e^- \to \pi^+\pi^-$ X	
120 ± 281 ± 20		ETKIN	82B	MPS	23 $\pi^-p \to n 2K^0_S$	
28 ± 10		[30] GIDAL	81	MRK2	$J/\psi \to \pi^+\pi^-$ X	
70 to 300		[31] ACHASOV	80	RVUE		
100 ± 80		[32] AGUILAR-...	78	HBC	0.7 $\overline{p}p \to K^0_S K^0_S$	
30 ± 8		[30] LEEPER	77	ASPK	2–2.4 $\pi^-p \to \pi^+\pi^-n$, K^+K^-n	
48 ± 14		[30] BINNIE	73	CNTR	$\pi^-p \to n$MM	
32 ± 10		[33] GRAYER	73	ASPK	17 $\pi^-p \to \pi^+\pi^-n$	
30 ± 10		[33] HYAMS	73	ASPK	17 $\pi^-p \to \pi^+\pi^-n$	
54 ± 16		[33] PROTOPOP...	73	HBC	7 $\pi^+p \to \pi^+p\pi^+\pi^-$	

[1] Pole position. Used Roy equations.
[2] Average of the analyses of three data sets in the K-matrix model. Uses the data of BATLEY 08A, HYAMS 73, and GRAYER 74, partially of COHEN 80 or ETKIN 82B.
[3] On sheet II in a 2-pole solution. The other pole is found on sheet III at (850−100*i*) MeV
[4] Using a relativistic Breit-Wigner function and taking into account the finite D_s mass.
[5] Breit-Wigner $\pi\pi$ width. Using finite width corrections according to FLATTE 76 and ACHASOV 05, and the ratio $g_{f_0 K K}/g_{f_0 \pi\pi} = 0$.
[6] Systematic errors not estimated.
[7] Breit-Wigner $\pi\pi$ width. Using finite width corrections according to FLATTE 76 and ACHASOV 05, and the ratio $g_{f_0 K K}/g_{f_0 \pi\pi} = 4.21 \pm 0.25 \pm 0.21$ from ABLIKIM 05.
[8] Breit-Wigner, solution 1, PWA ambiguous.
[9] K-matrix pole from combined analysis of $\pi^- p \to \pi^0\pi^0 n$, $\pi^- p \to K\overline{K} n$, $\pi^+\pi^- \to \pi^+\pi^-$, $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$, $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, $K^0_S K^0_S \pi^0$, $K^+ K^0_S \pi^-$ at rest, $\overline{p}n \to \pi^-\pi^-\pi^+$, $K^0_S K^-\pi^0$, $K^0_S K^0_S \pi^-$ at rest.
[10] Using the data of AKHMETSHIN 99C, ACHASOV 00H, and ALOISIO 02D.
[11] Breit-Wigner width.
[12] Supersedes ACHASOV 98I. Using the model of ACHASOV 89.
[13] Supersedes ACHASOV 98I.
[14] In the "narrow resonance" approximation.
[15] From the combined fit of the photon spectra in the reactions $e^+e^- \to \pi^+\pi^-\gamma$, $\pi^0\pi^0\gamma$.
[16] Supersedes BARBERIS 99 and BARBERIS 99B
[17] T-matrix pole.
[18] On sheet II in a 2 pole solution. The other pole is found on sheet III at (1039−93*i*) MeV.
[19] From invariant mass fit.
[20] On sheet II in a 2 pole solution. The other pole is found on sheet III at (963-29i) MeV.
[21] Reanalysis of data from HYAMS 73, GRAYER 74, SRINIVASAN 75, and ROSSELET 77 using the interfering amplitude method.
[22] At high $|t|$.
[23] At low $|t|$.
[24] On sheet II in a 4-pole solution, the other poles are found on sheet III at (953−55*i*) MeV and on sheet IV at (938−35*i*) MeV.
[25] Combined fit of ALDE 95B, ANISOVICH 94,
[26] On sheet II in a 2 pole solution. The other pole is found on sheet III at (996−103*i*) MeV.
[27] From sheet II pole position.
[28] On sheet II in a 2 pole solution. The other pole is found on sheet III at (797−185*i*) MeV and can be interpreted as a shadow pole.
[29] On sheet II in a 2 pole solution. The other pole is found on sheet III at (978−28*i*) MeV.
[30] From coupled channel analysis.
[31] Coupled channel analysis with finite width corrections.
[32] From coupled channel fit to the HYAMS 73 and PROTOPOPESCU 73 data. With a simultaneous fit to the $\pi\pi$ phase-shifts, inelasticity and to the $K^0_S K^0_S$ invariant mass.
[33] Included in AGUILAR-BENITEZ 78 fit.

$f_0(980)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$\pi\pi$	seen
Γ_2	$K\overline{K}$	seen
Γ_3	$\gamma\gamma$	seen
Γ_4	e^+e^-	

$f_0(980)$ PARTIAL WIDTHS

$\Gamma(\gamma\gamma)$ Γ_3

VALUE (keV)	*DOCUMENT ID*		*TECN*	*COMMENT*
$0.29^{+0.11}_{-0.06}$ OUR AVERAGE				
$0.286 \pm 0.017^{+0.211}_{-0.070}$	[1] UEHARA	08A	BELL	10.6 $e^+e^- \to e^+e^-\pi^0\pi^0$
$0.205^{+0.095}_{-0.083}{}^{+0.147}_{-0.117}$	[2] MORI	07	BELL	10.6 $e^+e^- \to e^+e^-\pi^+\pi^-$
$0.42 \pm 0.06 \pm 0.18$	[3] OEST	90	JADE	$e^+e^- \to e^+e^-\pi^0\pi^0$

NODE=M003W1;LINKAGE=MU
NODE=M003W1;LINKAGE=ME
NODE=M003W1;LINKAGE=AO
NODE=M003W1;LINKAGE=EC
NODE=M003W1;LINKAGE=UE
NODE=M003W1;LINKAGE=NS
NODE=M003W1;LINKAGE=MO
NODE=M003W1;LINKAGE=GA
NODE=M003W;LINKAGE=KM
NODE=M003W;LINKAGE=BR
NODE=M003W;LINKAGE=TL
NODE=M003W;LINKAGE=V9
NODE=M003W;LINKAGE=V8
NODE=M003W1;LINKAGE=AI
NODE=M003W;LINKAGE=SL
NODE=M003W1;LINKAGE=BD
NODE=M003W1;LINKAGE=AN
NODE=M003W1;LINKAGE=LO
NODE=M003W1;LINKAGE=A
NODE=M003W1;LINKAGE=X
NODE=M003W1;LINKAGE=AA
NODE=M003W1;LINKAGE=LA
NODE=M003W1;LINKAGE=LB
NODE=M003W1;LINKAGE=KL
NODE=M003W1;LINKAGE=CF
NODE=M003W1;LINKAGE=C2
NODE=M003W1;LINKAGE=KM
NODE=M003W1;LINKAGE=L
NODE=M003W1;LINKAGE=K
NODE=M003W1;LINKAGE=B
NODE=M003W;LINKAGE=B
NODE=M003W;LINKAGE=C
NODE=M003W;LINKAGE=R
NODE=M003215;NODE=M003
DESIG=2;OUR EVAL;→ UNCHECKED ←
DESIG=1;OUR EVAL;→ UNCHECKED ←
DESIG=5;OUR EVAL;→ UNCHECKED ←
DESIG=4
NODE=M003220
NODE=M003W4
NODE=M003W4

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.32 ±0.05	[4] DAI	14A	RVUE	Compilation
0.16 ±0.01	[5] MENNESSIER	11	RVUE	
0.29 ±0.21 $^{+0.02}_{-0.07}$	[6] MOUSSALLAM	11	RVUE	Compilation
0.42	[7,8] PENNINGTON	08	RVUE	Compilation
0.10	[8,9] PENNINGTON	08	RVUE	Compilation
0.28 $^{+0.09}_{-0.13}$	[10] BOGLIONE	99	RVUE	$\gamma\gamma \to \pi^+\pi^-$, $\pi^0\pi^0$
0.29 ±0.07 ±0.12	[11,12] BOYER	90	MRK2	$e^+e^- \to e^+e^-\pi^+\pi^-$
0.31 ±0.14 ±0.09	[11,12] MARSISKE	90	CBAL	$e^+e^- \to e^+e^-\pi^0\pi^0$
0.63 ±0.14	[13] MORGAN	90	RVUE	$\gamma\gamma \to \pi^+\pi^-$, $\pi^0\pi^0$

OCCUR=2

[1] Using finite width corrections according to FLATTE 76 and ACHASOV 05, and the ratio $g_{f_0 K K}/g_{f_0 \pi\pi} = 0$. NODE=M003W4;LINKAGE=UE

[2] Using finite width corrections according to FLATTE 76 and ACHASOV 05, and the ratio $g_{f_0 K K}/g_{f_0 \pi\pi} = 4.21 \pm 0.25 \pm 0.21$ from ABLIKIM 05. NODE=M003W4;LINKAGE=MO

[3] OEST 90 quote systematic errors $^{+0.08}_{-0.18}$. We use ±0.18. Observed 60 events. NODE=M003W4;LINKAGE=H

[4] Using dispersive analysis with phases from GARCIA-MARTIN 11A and BUETTIKER 04 as input. NODE=M003W4;LINKAGE=D

[5] Uses an analytic K-matrix model. Compilation. NODE=M003W4;LINKAGE=ME

[6] Using dispersion integral with phase input from Roy equations and data from MARSISKE 90, BOYER 90, BEHREND 92, UEHARA 08A, and MORI 07. NODE=M003W4;LINKAGE=MU

[7] Solution A (preferred solution based on χ^2-analysis). NODE=M003W4;LINKAGE=P1

[8] Dispersion theory based amplitude analysis of BOYER 90, MARSISKE 90, BEHREND 92, and MORI 07. NODE=M003W4;LINKAGE=P3

[9] Solution B (worse than solution A; still acceptable when systematic uncertainties are included). NODE=M003W4;LINKAGE=P2

[10] Supersedes MORGAN 90. NODE=M003W4;LINKAGE=BL

[11] From analysis allowing arbitrary background unconstrained by unitarity. NODE=M003W4;LINKAGE=B

[12] Data included in MORGAN 90, BOGLIONE 99 analyses. NODE=M003W4;LINKAGE=C

[13] From amplitude analysis of BOYER 90 and MARSISKE 90, data corresponds to resonance parameters m = 989 MeV, Γ = 61 MeV. NODE=M003W4;LINKAGE=A

$\Gamma(e^+e^-)$ Γ_4

NODE=M003W3
NODE=M003W3

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<8.4	90	VOROBYEV	88	ND	$e^+e^- \to \pi^0\pi^0$

f_0(980) BRANCHING RATIOS

NODE=M003225

$\Gamma(\pi\pi)/[\Gamma(\pi\pi)+\Gamma(K\overline{K})]$ $\Gamma_1/(\Gamma_1+\Gamma_2)$

NODE=M003R1
NODE=M003R1

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.52±0.12	9.9k	[1] AUBERT	06O	BABR	$B^\pm \to K^\pm\pi^\pm\pi^\mp$
0.75$^{+0.11}_{-0.13}$		[2] ABLIKIM	05Q	BES2	$\chi_{c0} \to 2\pi^+2\pi^-$, $\pi^+\pi^-K^+K^-$
0.84±0.02		[3] ANISOVICH	02D	SPEC	Combined fit
∼ 0.68		OLLER	99B	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$
0.67±0.09		[4] LOVERRE	80	HBC	4 $\pi^-p \to n2K^0_S$
0.81$^{+0.09}_{-0.04}$		[4] CASON	78	STRC	7 $\pi^-p \to n2K^0_S$
0.78±0.03		[4] WETZEL	76	OSPK	8.9 $\pi^-p \to n2K^0_S$

[1] Recalculated by us using $\Gamma(K^+K^-)$ / $\Gamma(\pi^+\pi^-)$ = 0.69 ± 0.32 from AUBERT 06O and isospin relations. NODE=M003R1;LINKAGE=AU

[2] Using data from ABLIKIM 04G. NODE=M003R1;LINKAGE=AB

[3] From a combined K-matrix analysis of Crystal Barrel ($p\overline{p} \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$), GAMS ($\pi p \to \pi^0\pi^0 n$, $\eta\eta n$, $\eta\eta' n$), and BNL ($\pi p \to K\overline{K} n$) data. NODE=M003R;LINKAGE=CH

[4] Measure $\pi\pi$ elasticity assuming two resonances coupled to the $\pi\pi$ and $K\overline{K}$ channels only. NODE=M003R1;LINKAGE=B

$f_0(980)$ REFERENCES

NODE=M003

SARANTSEV	21	PL B816 136227	A.V. Sarantsev *et al.*	(BONN, PNPI)	REFID=61091
ALBRECHT	20	EPJ C80 453	M. Albrecht *et al.*	(Crystal Barrel Collab.)	REFID=60439
AAIJ	19H	JHEP 1904 063	R. Aaij *et al.*	(LHCb Collab.)	REFID=59670
AOUDE	18	PR D98 056021	R.T. Aoude *et al.*		REFID=59987
ABLIKIM	15P	PR D92 012007	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56781
DAI	14A	PR D90 036004	L.-Y. Dai, M.R. Pennington	(CEBAF)	REFID=55923
ABLIKIM	12E	PRL 108 182001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54270
GARCIA-MAR...	11	PRL 107 072001	R. Garcia-Martin *et al.*	(MADR, CRAC)	REFID=16761
GARCIA-MAR...	11A	PR D83 074004	R. Garcia-Martin *et al.*	(MADR, CRAC)	REFID=54121
MENNESSIER	11	PL B696 40	G. Mennessier, S. Narison, X.-G. Wang		REFID=53637
MOUSSALLAM	11	EPJ C71 1814	B. Moussallam		REFID=53975
BATLEY	10C	EPJ C70 635	J.R. Batley *et al.*	(CERN NA48/2 Collab.)	REFID=53567
MENNESSIER	10	PL B688 59	G. Mennessier, S. Narison, X.-G. Wang		REFID=53657
ANISOVICH	09	IJMP A24 2481	V.V. Anisovich, A.V. Sarantsev		REFID=52719
ECKLUND	09	PR D80 052009	K.M. Ecklund *et al.*	(CLEO Collab.)	REFID=53041
BATLEY	08A	EPJ C54 411	J.R. Batley *et al.*	(CERN NA48/2 Collab.)	REFID=52487
PENNINGTON	08	EPJ C56 1	M.R. Pennington *et al.*		REFID=52303
UEHARA	08A	PR D78 052004	S. Uehara *et al.*	(BELLE Collab.)	REFID=52309
AMBROSINO	07	EPJ C49 473	F. Ambrosino *et al.*	(KLOE Collab.)	REFID=51616
AUBERT	07AK	PR D76 012008	B. Aubert *et al.*	(BABAR Collab.)	REFID=51908
BONVICINI	07	PR D76 012001	G. Bonvicini *et al.*	(CLEO Collab.)	REFID=51721
MORI	07	PR D75 051101	T. Mori *et al.*	(BELLE Collab.)	REFID=51652
AMBROSINO	06B	PL B634 148	F. Ambrosino *et al.*	(KLOE Collab.)	REFID=51043
AUBERT	06O	PR D74 032003	B. Aubert *et al.*	(BABAR Collab.)	REFID=51141
GARMASH	06	PRL 96 251803	A. Garmash *et al.*	(BELLE Collab.)	REFID=51162
ABLIKIM	05	PL B607 243	M. Ablikim *et al.*	(BES Collab.)	REFID=50450
ABLIKIM	05Q	PR D72 092002	M. Ablikim *et al.*	(BES Collab.)	REFID=50958
ACHASOV	05	PR D72 013006	N.N. Achasov, G.N. Shestakov		REFID=50762
GARMASH	05	PR D71 092003	A. Garmash *et al.*	(BELLE Collab.)	REFID=50641
ABLIKIM	04G	PR D70 092002	M. Ablikim *et al.*	(BES Collab.)	REFID=50187
BUETTIKER	04	EPJ C33 409	P. Buettiker, S. Descotes-Genon, B. Moussallam		REFID=56428;ERROR=6
PELAEZ	04A	MPL A19 2879	J.R. Pelaez	(MADU)	REFID=50347
ANISOVICH	03	EPJ A16 229	V.V. Anisovich *et al.*		REFID=49401
TIKHOMIROV	03	PAN 66 828	G.D. Tikhomirov *et al.*		REFID=49423
		Translated from YAF 66 860.			
ALOISIO	02D	PL B537 21	A. Aloisio *et al.*	(KLOE Collab.)	REFID=48824
ANISOVICH	02D	PAN 65 1545	V.V. Anisovich *et al.*		REFID=48831
		Translated from YAF 65 1583.			
BRAMON	02	EPJ C26 253	A. Bramon *et al.*		REFID=49178
ACHASOV	01F	PR D63 094007	N.N. Achasov, V.V. Gubin	(Novosibirsk SND Collab.)	REFID=48312
AITALA	01A	PRL 86 765	E.M. Aitala *et al.*	(FNAL E791 Collab.)	REFID=48004
AITALA	01B	PRL 86 770	E.M. Aitala *et al.*	(FNAL E791 Collab.)	REFID=48005
ACHASOV	00H	PL B485 349	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=47930
AKHMETSHIN	99B	PL B462 371	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=47392
AKHMETSHIN	99C	PL B462 380	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=47393
BARBERIS	99	PL B453 305	D. Barberis *et al.*	(Omega Expt.)	REFID=46921
BARBERIS	99B	PL B453 316	D. Barberis *et al.*	(Omega Expt.)	REFID=46922
BARBERIS	99C	PL B453 325	D. Barberis *et al.*	(Omega Expt.)	REFID=46923
BARBERIS	99D	PL B462 462	D. Barberis *et al.*	(Omega Expt.)	REFID=47395
BELLAZZINI	99	PL B467 296	R. Bellazzini *et al.*		REFID=47400
BOGLIONE	99	EPJ C9 11	M. Boglione, M.R. Pennington		REFID=46931
KAMINSKI	99	EPJ C9 141	R. Kaminski, L. Lesniak, B. Loiseau	(CRAC, PARIN)	REFID=46927
OLLER	99	PR D60 099906 (erratum)	J.A. Oller *et al.*		REFID=46899
OLLER	99B	NP A652 407 (erratum)	J.A. Oller, E. Oset		REFID=46924
OLLER	99C	PR D60 074023	J.A. Oller, E. Oset		REFID=47386
ACHASOV	98I	PL B440 442	M.N. Achasov *et al.*		REFID=46600
ACKERSTAFF	98Q	EPJ C4 19	K. Ackerstaff *et al.*	(OPAL Collab.)	REFID=46145
ALDE	98	EPJ A3 361	D. Alde *et al.*	(GAM4 Collab.)	REFID=46605
Also		PAN 62 405	D. Alde *et al.*	(GAMS Collab.)	REFID=46914
		Translated from YAF 62 446.			
ANISOVICH	98B	SPU 41 419	V.V. Anisovich *et al.*		REFID=46331
		Translated from UFN 168 481.			
LOCHER	98	EPJ C4 317	M.P. Locher *et al.*	(PSI)	REFID=46372
ALDE	97	PL B397 350	D.M. Alde *et al.*	(GAMS Collab.)	REFID=45392
BERTIN	97C	PL B408 476	A. Bertin *et al.*	(OBELIX Collab.)	REFID=45701
ISHIDA	96	PTP 95 745	S. Ishida *et al.*	(TOKY, MIYA, KEK)	REFID=45770
TORNQVIST	96	PRL 76 1575	N.A. Tornqvist, M. Roos	(HELS)	REFID=44507
ALDE	95B	ZPHY C66 375	D.M. Alde *et al.*	(GAMS Collab.)	REFID=44375
AMSLER	95B	PL B342 433	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=44377
AMSLER	95D	PL B355 425	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=44441
ANISOVICH	95	PL B355 363	V.V. Anisovich *et al.*	(PNPI, SERP)	REFID=44442
JANSSEN	95	PR D52 2690	G. Janssen *et al.*	(STON, ADLD, JULI)	REFID=44508
AMSLER	94D	PL B333 277	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=44093
ANISOVICH	94	PL B323 233	V.V. Anisovich *et al.*	(Crystal Barrel Collab.)	REFID=43659
BUGG	94	PR D50 4412	D.V. Bugg *et al.*	(LOQM)	REFID=44078
KAMINSKI	94	PR D50 3145	R. Kaminski, L. Lesniak, J.P. Maillet	(CRAC+)	REFID=45771
ZOU	94B	PR D50 591	B.S. Zou, D.V. Bugg	(LOQM)	REFID=44072
MORGAN	93	PR D48 1185	D. Morgan, M.R. Pennington	(RAL, DURH)	REFID=43614
BEHREND	92	ZPHY C56 381	H.J. Behrend	(CELLO Collab.)	REFID=43172
AGUILAR-...	91	ZPHY C50 405	M. Aguilar-Benitez *et al.*	(LEBC-EHS Collab.)	REFID=41637
ARMSTRONG	91	ZPHY C51 351	T.A. Armstrong *et al.*	(ATHU, BARI, BIRM+)	REFID=41744
BOYER	90	PR D42 1350	J. Boyer *et al.*	(Mark II Collab.)	REFID=41362
BREAKSTONE	90	ZPHY C48 569	A.M. Breakstone *et al.*	(ISU, BGNA, CERN+)	REFID=41376
MARSISKE	90	PR D41 3324	H. Marsiske *et al.*	(Crystal Ball Collab.)	REFID=41351
MORGAN	90	ZPHY C48 623	D. Morgan, M.R. Pennington	(RAL, DURH)	REFID=41583
OEST	90	ZPHY C47 343	T. Oest *et al.*	(JADE Collab.)	REFID=41358
ACHASOV	89	NP B315 465	N.N. Achasov, V.N. Ivanchenko		REFID=48021
AUGUSTIN	89	NP B320 1	J.E. Augustin, G. Cosme	(DM2 Collab.)	REFID=41004
VOROBYEV	88	SJNP 48 273	P.V. Vorobiev *et al.*	(NOVO)	REFID=41023
		Translated from YAF 48 436.			
ABACHI	86B	PRL 57 1990	S. Abachi *et al.*	(PURD, ANL, IND, MICH+)	REFID=20394
LONGACRE	86	PL B177 223	R.S. Longacre *et al.*	(BNL, BRAN, CUNY+)	REFID=20768
BINON	84C	NC 80A 363	F.G. Binon *et al.*	(BELG, LAPP, SERP+)	REFID=21418
BINON	83	NC 78A 313	F.G. Binon *et al.*	(BELG, LAPP, SERP+)	REFID=20750
ETKIN	82B	PR D25 1786	A. Etkin *et al.*	(BNL, CUNY, TUFTS, VAND)	REFID=20390
GIDAL	81	PL 107B 153	G. Gidal *et al.*	(SLAC, LBL)	REFID=20386
ACHASOV	80	SJNP 32 566	N.N. Achasov, S.A. Devyanin, G.N. Shestakov	(NOVM)	REFID=20458
		Translated from YAF 32 1098.			
COHEN	80	PR D22 2595	D. Cohen *et al.*	(ANL) IJP	REFID=20381
LOVERRE	80	ZPHY C6 187	P.F. Loverre *et al.*	(CERN, CDEF, MADR+) IJP	REFID=20382
AGUILAR-...	78	NP B140 73	M. Aguilar-Benitez *et al.*	(MADR, BOMB+)	REFID=20368
CASON	78	PRL 41 271	N.M. Cason *et al.*	(NDAM, ANL)	REFID=20370
LEEPER	77	PR D16 2054	R.J. Leeper *et al.*	(ISU)	REFID=20365
ROSSELET	77	PR D15 574	L. Rosselet *et al.*	(GEVA, SACL)	REFID=11004
FLATTE	76	PL 63B 224	S.M. Flatte	(CERN)	REFID=20446
WETZEL	76	NP B115 208	W. Wetzel *et al.*	(ETH, CERN, LOIC)	REFID=20362
HYAMS	75	NP B100 205	B.D. Hyams *et al.*	(CERN, MPIM)	REFID=20355
SRINIVASAN	75	PR D12 681	V. Srinivasan *et al.*	(NDAM, ANL)	REFID=21062
ESTABROOKS	74	NP B79 301	P.G. Estabrooks, A.D. Martin	(DURH)	REFID=20111
GRAYER	74	NP B75 189	G. Grayer *et al.*	(CERN, MPIM)	REFID=20113
BINNIE	73	PRL 31 1534	D.M. Binnie *et al.*	(LOIC, SHMP)	REFID=20343
GRAYER	73	Tallahassee	G. Grayer *et al.*	(CERN, MPIM)	REFID=20347
HYAMS	73	NP B64 134	B.D. Hyams *et al.*	(CERN, MPIM)	REFID=20107
PROTOPOP...	73	PR D7 1279	S.D. Protopopescu *et al.*	(LBL)	REFID=20108

NODE=M036

$a_0(980)$

$I^G(J^{PC}) = 1^-(0^{++})$

See the related review(s):
Scalar Mesons below 1 GeV

$a_0(980)$ T-MATRIX POLE $\sqrt{s}$

NODE=M036PP

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
(960–1030) − *i* (20–70) OUR ESTIMATE	(see Fig. 64.2 in the review)		
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$(1117^{+24}_{-320}) - i(12^{+43}_{-12})$	[1] PELAEZ 04A	RVUE	$\pi\pi \to \pi\pi$, $\pi K \to \pi K$

NODE=M036PP → UNCHECKED ←

[1] Reanalysis of data from LINGLIN 73, ESTABROOKS 78, and ASTON 88 in the unitarized ChPT model.

NODE=M036PP;LINKAGE=A

$a_0(980)$ MASS

NODE=M036205

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
980 ±20 OUR ESTIMATE	Mass determination very model dependent		
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$1000.7^{+12.9}_{-0.7}$	[1] LU 20	RVUE	$\gamma\gamma \to \pi^0\eta$, $K^0_S K^0_S$

NODE=M036MX → UNCHECKED ←

[1] T-matrix pole on sheet II.

NODE=M036MX;LINKAGE=A

$\eta\pi$ FINAL STATE ONLY

NODE=M036M1

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1004.1 ± 1.5 ±6.5		[1] ALBRECHT 20	CBAR		$0.9\ \overline{p}p \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0K^+K^-$
982.5 ± 1.6 ±1.1	16.9k	[2] AMBROSINO 09F	KLOE		$1.02\ e^+e^- \to \eta\pi^0\gamma$
986 ± 4		ANISOVICH 09	RVUE		$0.0\ \overline{p}p$, πN
$982.3^{+0.6}_{-0.7}{}^{+3.1}_{-4.7}$		[3] UEHARA 09A	BELL		$\gamma\gamma \to \pi^0\eta$
987.4 ± 1.0 ±3.0		[4,5] BUGG 08A	RVUE	0	$\overline{p}p \to \pi^0\pi^0\eta$
989.1 ± 1.0 ±3.0		[5,6] BUGG 08A	RVUE	0	$\overline{p}p \to \pi^0\pi^0\eta$
985 ± 4 ±6	318	ACHARD 02B	L3		183–209 $e^+e^- \to e^+e^-\eta\pi^+\pi^-$
995^{+52}_{-10}	36	[7] ACHASOV 00F	SND		$e^+e^- \to \eta\pi^0\gamma$
994^{+33}_{-8}	36	[8] ACHASOV 00F	SND		$e^+e^- \to \eta\pi^0\gamma$
975 ± 7		BARBERIS 00H			$450\ pp \to p_f\eta\pi^0p_s$
988 ± 8		BARBERIS 00H			$450\ pp \to \Delta^{++}_f\eta\pi^-p_s$
∼ 1055		[9] OLLER 99	RVUE		$\eta\pi$, $K\overline{K}$
∼ 1009.2		[9] OLLER 99B	RVUE		$\pi\pi \to \pi\pi$, $K\overline{K}$
993.1 ± 2.1		[10] TEIGE 99	B852		$18.3\ \pi^-p \to \eta\pi^+\pi^-n$
988 ± 6		[9] ANISOVICH 98B	RVUE		Compilation
987		TORNQVIST 96	RVUE		$\pi\pi \to \pi\pi$, $K\overline{K}$, $K\pi$, $\eta\pi$
991		JANSSEN 95	RVUE		$\eta\pi \to \eta\pi$, $K\overline{K}$, $K\pi$, $\eta\pi$
984.45± 1.23±0.34		AMSLER 94C	CBAR		$0.0\ \overline{p}p \to \omega\eta\pi^0$
982 ± 2		[11] AMSLER 92	CBAR		$0.0\ \overline{p}p \to \eta\eta\pi^0$
984 ± 4	1040	[11] ARMSTRONG 91B	OMEG	±	$300\ pp \to pp\eta\pi^+\pi^-$
976 ± 6		ATKINSON 84E	OMEG	±	25–55 $\gamma p \to \eta\pi n$
986 ± 3	500	[12] EVANGELIS... 81	OMEG	±	$12\ \pi^-p \to \eta\pi^+\pi^-\pi^-p$
990 ± 7	145	[12] GURTU 79	HBC	±	$4.2\ K^-p \to \Lambda\eta2\pi$
980 ±11	47	CONFORTO 78	OSPK	−	$4.5\ \pi^-p \to pX^-$
978 ±16	50	CORDEN 78	OMEG	±	12–15 $\pi^-p \to n\eta2\pi$
977 ± 7		GRASSLER 77	HBC	−	$16\ \pi^{\mp}p \to p\eta3\pi$
989 ± 4	70	WELLS 75	HBC	−	3.1–6 $K^-p \to \Lambda\eta2\pi$
972 ±10	150	DEFOIX 72	HBC	±	$0.7\ \overline{p}p \to 7\pi$
970 ±15	20	BARNES 69C	HBC	−	4–5 $K^-p \to \Lambda\eta2\pi$
980 ±10		CAMPBELL 69	DBC	±	$2.7\ \pi^+d$
980 ±10	15	MILLER 69B	HBC	−	$4.5\ K^-N \to \eta\pi\Lambda$
980 ±10	30	AMMAR 68	HBC	±	$5.5\ K^-p \to \Lambda\eta2\pi$

NODE=M036M1

OCCUR=2

OCCUR=2

OCCUR=2

OCCUR=2

[1] T-matrix pole with 2 poles, 2 channels, pole mass on adjacent sheet 1002.4 ± 1.4 ± 6.6 MeV. NODE=M036M1;LINKAGE=D
[2] Using the model of ACHASOV 89 and ACHASOV 03B. NODE=M036M1;LINKAGE=AM
[3] From a fit with the S-wave amplitude including two interfering Breit-Wigners plus a background term. NODE=M036M1;LINKAGE=UE
[4] Parameterizes couplings to $\overline{K}K$, $\pi\eta$, and $\pi\eta'$. NODE=M036M1;LINKAGE=BP
[5] Using AMSLER 94D and ABELE 98. NODE=M036M1;LINKAGE=BU
[6] From the T-matrix pole on sheet II. NODE=M036M1;LINKAGE=BT
[7] Using the model of ACHASOV 89. Supersedes ACHASOV 98B. NODE=M036M1;LINKAGE=V1
[8] Using the model of JAFFE 77. Supersedes ACHASOV 98B. NODE=M036M1;LINKAGE=M2
[9] T-matrix pole. NODE=M036M1;LINKAGE=AN
[10] Breit-Wigner fit, average between $a_0^\pm$ and a_0^0. The fit favors a slightly heavier $a_0^\pm$. NODE=M036M1;LINKAGE=BF
[11] From a single Breit-Wigner fit. NODE=M036M1;LINKAGE=A
[12] From $f_1(1285)$ decay. NODE=M036M1;LINKAGE=R

$K\overline{K}$ ONLY

NODE=M036M2
NODE=M036M2

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$947.7^{+5.5}_{-5.0}\pm6.6$		[1] AAIJ	19H	LHCB	$pp \to D^\pm X$
925 ± 5 ± 8	190k	[2] AAIJ	16N	LHCB	$D^0 \to K^0_S K^\pm \pi^\mp$
~ 1053		[3] OLLER	99C	RVUE	$\pi\pi \to \pi\pi, K\overline{K}$
982 ± 3		[4] ABELE	98	CBAR	0.0 $\overline{p}p \to K^0_L K^\pm \pi^\mp$
975 ± 15		BERTIN	98B	OBLX	0.0 $\overline{p}p \to K^\pm K_s \pi^\mp$
970 ± 10	316	DEBILLY	80	HBC	1.2–2 $\overline{p}p \to f_1(1285)\omega$
1016 ± 10	100	[5] ASTIER	67	HBC	0.0 $\overline{p}p$
1003.3 ± 7.0	143	[6,7] ROSENFELD	65	RVUE	

[1] From the $D^\pm \to K^\pm K^+ K^-$ Dalitz plot fit with the Triple-M amplitude in the multi-meson model of AOUDE 18. NODE=M036M2;LINKAGE=C
[2] Using a two-channel resonance parametrization with couplings fixed to ABELE 98. NODE=M036M2;LINKAGE=B
[3] T-matrix pole. NODE=M036M2;LINKAGE=AN
[4] T-matrix pole on sheet II, the pole on sheet III is at 1006-i49 MeV. NODE=M036M2;LINKAGE=Q
[5] ASTIER 67 includes data of BARLOW 67, CONFORTO 67, ARMENTEROS 65. NODE=M036M2;LINKAGE=A
[6] Note on J^P. Main argument for 0^+ is small Q value. Isotropy of decay distribution in $\overline{p}p$ at rest proves nothing. See discussion by Rosenfeld (Oxford) and Butterworth (Heidelberg). NODE=M036M2;LINKAGE=01
[7] Plus systematic errors. NODE=M036M2;LINKAGE=S

$a_0(980)$ WIDTH

NODE=M036210

NODE=M036W1

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
50 to 100 OUR ESTIMATE Width determination very model dependent. Peak width in $\eta\pi$ is about 60 MeV, but decay width can be much larger.						
• • • We do not use the following data for averages, fits, limits, etc. • • •						
97.2 ± 1.9 ± 5.7		[1] ALBRECHT	20	CBAR		0.9 $\overline{p}p \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0 K^+K^-$
$73.2^{+25.4}_{-5.2}$		[2] LU	20	RVUE		$\gamma\gamma \to \pi^0\eta$, $K^0_S K^0_S$
$75.6\pm1.6^{+17.4}_{-10.0}$		[3] UEHARA	09A	BELL		$\gamma\gamma \to \pi^0\eta$
80.2 ± 3.8 ± 5.4		[4] BUGG	08A	RVUE	0	$\overline{p}p \to \pi^0\pi^0\eta$
50 ± 13 ± 4	318	ACHARD	02B	L3		183–209 $e^+e^- \to e^+e^-\eta\pi^+\pi^-$
72 ± 16		BARBERIS	00H			450 $pp \to p_f\eta\pi^0 p_s$
61 ± 19		BARBERIS	00H			450 $pp \to \Delta^{++}_f \eta\pi^- p_s$
~ 42		[5] OLLER	99	RVUE		$\eta\pi$, $K\overline{K}$
~ 112		[5] OLLER	99B	RVUE		$\pi\pi \to \eta\pi$, $K\overline{K}$
71 ± 7		TEIGE	99	B852		18.3 $\pi^- p \to \eta\pi^+\pi^- n$
92 ± 20		[5] ANISOVICH	98B	RVUE		Compilation
65 ± 10		[6] BERTIN	98B	OBLX	±	0.0 $\overline{p}p \to K^\pm K_s \pi^\mp$
~ 100		TORNQVIST	96	RVUE		$\pi\pi \to \pi\pi$, $K\overline{K}$, $K\pi$, $\eta\pi$
202		JANSSEN	95	RVUE		$\eta\pi \to \eta\pi$, $K\overline{K}$, $K\pi$, $\eta\pi$
54.12 ± 0.34 ± 0.12		AMSLER	94C	CBAR		0.0 $\overline{p}p \to \omega\eta\pi^0$

→ UNCHECKED ←

OCCUR=2

54	±10		[7] AMSLER	92	CBAR		0.0 $\bar{p}p \to \eta\eta\pi^0$
95	±14	1040	[7] ARMSTRONG	91B	OMEG	±	300 $pp \to pp\eta\pi^+\pi^-$
62	±15	500	[8] EVANGELIS...	81	OMEG	±	12 $\pi^- p \to \eta\pi^+\pi^-\pi^- p$
60	±20	145	[8] GURTU	79	HBC	±	4.2 $K^- p \to \Lambda\eta 2\pi$
60	$^{+50}_{-30}$	47	CONFORTO	78	OSPK	−	4.5 $\pi^- p \to pX^-$
86.0	$^{+60.0}_{-50.0}$	50	CORDEN	78	OMEG	±	12–15 $\pi^- p \to n\eta 2\pi$
44	±22		GRASSLER	77	HBC	−	16 $\pi^\mp p \to p\eta 3\pi$
80	to 300		[9] FLATTE	76	RVUE	−	4.2 $K^- p \to \Lambda\eta 2\pi$
16.0	$^{+25.0}_{-16.0}$	70	[10] WELLS	75	HBC	−	3.1–6 $K^- p \to \Lambda\eta 2\pi$
30	± 5	150	[11] DEFOIX	72	HBC	±	0.7 $\bar{p}p \to 7\pi$
40	±15		CAMPBELL	69	DBC	±	2.7 $\pi^+ d$
60	±30	15	MILLER	69B	HBC	−	4.5 $K^- N \to \eta\pi\Lambda$
80	±30	30	AMMAR	68	HBC	±	5.5 $K^- p \to \Lambda\eta 2\pi$

[1] T-matrix pole with 2 poles, 2 channels, pole width on adjacent sheet 127.0 ± 2.3 ± 6.7 MeV. NODE=M036W1;LINKAGE=C
[2] T-matrix pole on sheet II. NODE=M036W1;LINKAGE=D
[3] From a fit with the S-wave amplitude including two interfering Breit-Wigners plus a background term. NODE=M036W1;LINKAGE=UE
[4] From the T-matrix pole on sheet II, using AMSLER 94D and ABELE 98. NODE=M036W1;LINKAGE=BU
[5] T-matrix pole. NODE=M036W1;LINKAGE=AN
[6] The $\eta\pi$ width. NODE=M036W1;LINKAGE=BE
[7] From a single Breit-Wigner fit. NODE=M036W1;LINKAGE=A
[8] From f_1(1285) decay. NODE=M036W1;LINKAGE=R
[9] Using a two-channel resonance parametrization of GAY 76B data. NODE=M036W1;LINKAGE=F
[10] Weak evidence only for $a_0(980)^+$ production. NODE=M036W1;LINKAGE=W
[11] This number has very little meaning. Error is much too small. Vlada NODE=M036W1;LINKAGE=01

$K\overline{K}$ ONLY

NODE=M036W2
NODE=M036W2

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
92± 8		[1] ABELE	98	CBAR		0.0 $\bar{p}p \to K^0_L K^\pm\pi^\mp$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
∼ 48		[2] OLLER	99C	RVUE		$\pi\pi \to \pi\pi, K\overline{K}$
∼ 25	100	[3] ASTIER	67	HBC	±	
57±13	143	[4] ROSENFELD	65	RVUE	±	

[1] T-matrix pole on sheet II, the pole on sheet III is at 1006-i49 MeV. NODE=M036W2;LINKAGE=Q
[2] T-matrix pole. NODE=M036W2;LINKAGE=AN
[3] ASTIER 67 includes data of BARLOW 67, CONFORTO 67, ARMENTEROS 65. NODE=M036W2;LINKAGE=A
[4] Plus systematic errors. NODE=M036W2;LINKAGE=S

a_0(980) DECAY MODES

NODE=M036215;NODE=M036

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\eta\pi$	seen	DESIG=1;OUR EST;→ UNCHECKED ←
Γ_2	$K\overline{K}$	seen	DESIG=3;OUR EST;→ UNCHECKED ←
Γ_3	$\eta'\pi$	seen	DESIG=8
Γ_4	$\rho\pi$	not seen	DESIG=2;OUR EST;→ UNCHECKED ←
Γ_5	$\gamma\gamma$	seen	DESIG=5;OUR EST;→ UNCHECKED ←
Γ_6	e^+e^-		DESIG=6

a_0(980) PARTIAL WIDTHS

NODE=M036217

$\Gamma(\gamma\gamma)$ Γ_5

NODE=M036W4
NODE=M036W4

VALUE (keV)	*DOCUMENT ID*		*TECN*
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.30±0.10	[1] AMSLER	98	RVUE

[1] Using $\Gamma_{\gamma\gamma}$B(a0(980) → $\eta\pi$) =0.24 ± 0.08 keV. NODE=M036W4;LINKAGE=A

$a_0(980)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M036220

$\Gamma(\eta\pi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_1\Gamma_5/\Gamma$

NODE=M036G1

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
$0.21^{+0.08}_{-0.04}$ OUR AVERAGE					
$0.128^{+0.003}_{-0.002}{}^{+0.502}_{-0.043}$		[1] UEHARA	09A	BELL	$\gamma\gamma \to \pi^0\eta$
$0.28 \pm 0.04 \pm 0.10$	44	OEST	90	JADE	$e^+e^- \to e^+e^-\pi^0\eta$
$0.19 \pm 0.07\ ^{+0.10}_{-0.07}$		ANTREASYAN	86	CBAL	$e^+e^- \to e^+e^-\pi^0\eta$

[1] From a fit with the S-wave amplitude including two interfering Breit-Wigners plus a background term.

NODE=M036G1;LINKAGE=UE

$\Gamma(\eta\pi) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_1\Gamma_6/\Gamma$

NODE=M036G2

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<1.5	90	VOROBYEV	88	ND	$e^+e^- \to \pi^0\eta$

$a_0(980)$ BRANCHING RATIOS

NODE=M036225

$\Gamma(K\overline{K})/\Gamma(\eta\pi)$ — Γ_2/Γ_1

NODE=M036R2

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.177±0.024 OUR AVERAGE Error includes scale factor of 1.2.					
0.23 ± 0.05	[1] ABELE	98	CBAR		$0.0\ \overline{p}p \to K^0_L K^\pm \pi^\mp$
$0.166 \pm 0.01 \pm 0.02$	[2] BARBERIS	98C	OMEG		$450\ pp \to p_f f_1(1285) p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.138 \pm 0.001 \pm 0.035$	[3] ALBRECHT	20	CBAR		$0.9\ \overline{p}p \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0 K^+K^-$
1.20 ± 0.15	[4] ANISOVICH	09	RVUE		$0.0\ \overline{p}p$, πN
$1.05 \pm 0.07 \pm 0.05$	[5] BUGG	08A	RVUE	0	$\overline{p}p \to \pi^0\pi^0\eta$
0.57 ± 0.16	[6] BARGIOTTI	03	OBLX		$\overline{p}p$
~ 0.60	OLLER	99B	RVUE		$\pi\pi \to \eta\pi$, $K\overline{K}$
0.7 ± 0.3	[2] CORDEN	78	OMEG		12–15 $\pi^- p \to n\eta 2\pi$
0.25 ± 0.08	[2] DEFOIX	72	HBC	±	$0.7\ \overline{p} \to 7\pi$

[1] Using $\pi^0\pi^0\eta$ from AMSLER 94D.
[2] From the decay of $f_1(1285)$.
[3] Residues from T-matrix pole with 2 poles, 2 channels. Solution on adjacent sheet $0.149 \pm 0.001 \pm 0.039$.
[4] This is a ratio of couplings.
[5] A ratio of couplings, using AMSLER 94D and ABELE 98. Supersedes BUGG 94.
[6] Coupled channel analysis of $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, and $K^\pm K^0_S\pi^\mp$.

NODE=M036R2;LINKAGE=Q
NODE=M036R2;LINKAGE=L
NODE=M036R2;LINKAGE=A
NODE=M036R2;LINKAGE=AN
NODE=M036R2;LINKAGE=BU
NODE=M036R;LINKAGE=BG

$\Gamma(\eta'\pi)/\Gamma_{total}$ — Γ_3/Γ

NODE=M036R00

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	116k	[1] CHEN	20A	BELL	$D^0 \to K^-\pi^+\eta$

[1] From an amplitude analysis of the $D^0 \to K^-\pi^+\eta$ decay in a three-channel Flatte model with a 10.1 σ significance. Earlier observed by ABLIKIM 17K in the $\chi_{c1} \to \eta\pi^+\pi^-$ decay with a 8.9 σ significance.

NODE=M036R00;LINKAGE=A

$\Gamma(\rho\pi)/\Gamma(\eta\pi)$ — Γ_4/Γ_1

NODE=M036R1

$\rho\pi$ forbidden.

VALUE	CL%	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.25	70	[1] AMMAR	70	HBC	±	4.1,5.5 $K^- p \to \Lambda\eta 2\pi$

[1] Not clear if they really observed the $a_0(980)$ 3 standard deviations.

NODE=M036R1;LINKAGE=01

$a_0(980)$ REFERENCES

NODE=M036

ALBRECHT	20	EPJ C80 453	M. Albrecht *et al.*	(Crystal Barrel Collab.)	REFID=60439
CHEN	20A	PR D102 012002	Y.Q. Chen *et al.*	(BELLE Collab.)	REFID=60333
LU	20	EPJ C80 436	J. Lu, B. Moussallam		REFID=60436
AAIJ	19H	JHEP 1904 063	R. Aaij *et al.*	(LHCb Collab.)	REFID=59670
AOUDE	18	PR D98 056021	R.T. Aoude *et al.*		REFID=59987
ABLIKIM	17K	PR D95 032002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57953
AAIJ	16N	PR D93 052018	R. Aaij *et al.*	(LHCb Collab.)	REFID=57273
AMBROSINO	09F	PL B681 5	F. Ambrosino *et al.*	(KLOE Collab.)	REFID=53105
ANISOVICH	09	IJMP A24 2481	V.V. Anisovich, A.V. Sarantsev		REFID=52719
UEHARA	09A	PR D80 032001	S. Uehara *et al.*	(BELLE Collab.)	REFID=53002
BUGG	08A	PR D78 074023	D.V. Bugg	(LOQM)	REFID=52578
PELAEZ	04A	MPL A19 2879	J.R. Pelaez	(MADU)	REFID=50347
ACHASOV	03B	PR D68 014006	N.N. Achsaov, A.V. Kiselev		REFID=49476
BARGIOTTI	03	EPJ C26 371	M. Bargiotti *et al.*	(OBELIX Collab.)	REFID=49217

ACHARD	02B	PL B526 269	P. Achard *et al.*	(L3 Collab.)	REFID=48574
ACHASOV	00F	PL B479 53	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=47928
BARBERIS	00H	PL B488 225	D. Barberis *et al.*	(WA 102 Collab.)	REFID=47964
OLLER	99	PR D60 099906 (erratum)	J.A. Oller *et al.*		REFID=46899
OLLER	99B	NP A652 407 (erratum)	J.A. Oller, E. Oset		REFID=46924
OLLER	99C	PR D60 074023	J.A. Oller, E. Oset		REFID=47386
TEIGE	99	PR D59 012001	S. Teige *et al.*	(BNL E852 Collab.)	REFID=46613
ABELE	98	PR D57 3860	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=45863
ACHASOV	98B	PL B438 441	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=46317
AMSLER	98	RMP 70 1293	C. Amsler		REFID=46601
ANISOVICH	98B	SPU 41 419	V.V. Anisovich *et al.*		REFID=46331
		Translated from UFN 168 481.			
BARBERIS	98C	PL B440 225	D. Barberis *et al.*	(WA 102 Collab.)	REFID=46346
BERTIN	98B	PL B434 180	A. Bertin *et al.*	(OBELIX Collab.)	REFID=46351
TORNQVIST	96	PRL 76 1575	N.A. Tornqvist, M. Roos	(HELS)	REFID=44507
JANSSEN	95	PR D52 2690	G. Janssen *et al.*	(STON, ADLD, JULI)	REFID=44508
AMSLER	94C	PL B327 425	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=44091
AMSLER	94D	PL B333 277	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=44093
BUGG	94	PR D50 4412	D.V. Bugg *et al.*	(LOQM)	REFID=44078
AMSLER	92	PL B291 347	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=43169
ARMSTRONG	91B	ZPHY C52 389	T.A. Armstrong *et al.*	(ATHU, BARI, BIRM+)	REFID=41862
OEST	90	ZPHY C47 343	T. Oest *et al.*	(JADE Collab.)	REFID=41358
ACHASOV	89	NP B315 465	N.N. Achasov, V.N. Ivanchenko		REFID=48021
ASTON	88	NP B296 493	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)	REFID=40262
VOROBYEV	88	SJNP 48 273	P.V. Vorobiev *et al.*	(NOVO)	REFID=41023
		Translated from YAF 48 436.			
ANTREASYAN	86	PR D33 1847	D. Antreasyan *et al.*	(Crystal Ball Collab.)	REFID=20469
ATKINSON	84E	PL 138B 459	M. Atkinson *et al.*	(BONN, CERN, GLAS+)	REFID=20624
EVANGELIS...	81	NP B178 197	C. Evangelista *et al.*	(BARI, BONN, CERN+)	REFID=20462
DEBILLY	80	NP B176 1	L. de Billy *et al.*	(CURIN, LAUS, NEUC+)	REFID=20461
GURTU	79	NP B151 181	A. Gurtu *et al.*	(CERN, ZEEM, NIJM, OXF)	REFID=20456
CONFORTO	78	LNC 23 419	B. Conforto *et al.*	(RHEL, TNTO, CHIC+)	REFID=20451
CORDEN	78	NP B144 253	M.J. Corden *et al.*	(BIRM, RHEL, TELA+)	REFID=20452
ESTABROOKS	78	NP B133 490	P.G. Estabrooks *et al.*	(MCGI, CARL, DURH+)	REFID=22443
GRASSLER	77	NP B121 189	H. Grassler *et al.*	(AACH3, BERL, BONN+)	REFID=20447
JAFFE	77	PR D15 267,281	R. Jaffe	(MIT)	REFID=43673
FLATTE	76	PL 63B 224	S.M. Flatte	(CERN)	REFID=20446
GAY	76B	PL 63B 220	J.B. Gay *et al.*	(CERN, AMST, NIJM) JP	REFID=20445
WELLS	75	NP B101 333	J. Wells *et al.*	(OXF)	REFID=20444
LINGLIN	73	NP B55 408	D. Linglin	(CERN)	REFID=22428
DEFOIX	72	NP B44 125	C. Defoix *et al.*	(CDEF, CERN)	REFID=20435
AMMAR	70	PR D2 430	R. Ammar *et al.*	(KANS, NWES, ANL, WISC)	REFID=20428
BARNES	69C	PRL 23 610	V.E. Barnes *et al.*	(BNL, SYRA)	REFID=20418
CAMPBELL	69	PRL 22 1204	J.H. Campbell *et al.*	(PURD)	REFID=20419
MILLER	69B	PL 29B 255	D.H. Miller *et al.*	(PURD)	REFID=20424
Also		PR 188 2011	W.L. Yen *et al.*	(PURD)	REFID=20425
AMMAR	68	PRL 21 1832	R. Ammar *et al.*	(NWES, ANL)	REFID=20412
ASTIER	67	PL 25B 294	A. Astier *et al.*	(CDEF, CERN, IRAD)	REFID=20405
Includes data of BARLOW 67, CONFORTO 67, and ARMENTEROS 65.					
BARLOW	67	NC 50A 701	J. Barlow *et al.*	(CERN, CDEF, IRAD, LIVP)	REFID=20041
CONFORTO	67	NP B3 469	G. Conforto *et al.*	(CERN, CDEF, IPNP+)	REFID=20411
ARMENTEROS	65	PL 17 344	R. Armenteros *et al.*	(CERN, CDEF)	REFID=20396
ROSENFELD	65	Oxford Conf. 58	A.H. Rosenfeld	(LRL)	REFID=20399

NODE=M004

$\phi(1020)$

$I^G(J^{PC}) = 0^-(1^{--})$

$\phi(1020)$ MASS

NODE=M004M

NODE=M004M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
1019.461±0.016 OUR AVERAGE						
1019.463±0.061	2.3M	[1] KOZYREV	18	CMD3	$e^+e^- \to K^+K^-$, $K^0_S K^0_L$	OCCUR=2
1019.462±0.042±0.056	28k	[2] LEES	14H	BABR	$e^+e^- \to K^0_S K^0_L \gamma$	
1019.51 ±0.02 ±0.05		[3] LEES	13Q	BABR	$e^+e^- \to K^+K^-\gamma$	
1019.30 ±0.02 ±0.10	105k	AKHMETSHIN	06	CMD2	0.98–1.06 $e^+e^- \to \pi^+\pi^-\pi^0$	
1019.52 ±0.05 ±0.05	17.4k	AKHMETSHIN	05	CMD2	0.60-1.38 $e^+e^- \to \eta\gamma$	
1019.483±0.011±0.025	272k	[4] AKHMETSHIN	04	CMD2	$e^+e^- \to K^0_L K^0_S$	
1019.42 ±0.05	1900k	[5] ACHASOV	01E	SND	$e^+e^- \to K^+K^-$, $K_S K_L$, $\pi^+\pi^-\pi^0$	
1019.40 ±0.04 ±0.05	23k	AKHMETSHIN	01B	CMD2	$e^+e^- \to \eta\gamma$	
1019.36 ±0.12		[6] ACHASOV	00B	SND	$e^+e^- \to \eta\gamma$	
1019.38 ±0.07 ±0.08	2200	[7] AKHMETSHIN	99F	CMD2	$e^+e^- \to \pi^+\pi^- \geq 2\gamma$	
1019.51 ±0.07 ±0.10	11169	AKHMETSHIN	98	CMD2	$e^+e^- \to \pi^+\pi^-\pi^0$	
1019.5 ±0.4		BARBERIS	98	OMEG	450 $pp \to pp2K^+2K^-$	
1019.42 ±0.06	55600	AKHMETSHIN	95	CMD2	$e^+e^- \to$ hadrons	
1019.7 ±0.3	2012	DAVENPORT	86	MPSF	400 pA $\to 4KX$	
1019.7 ±0.1 ±0.1	5079	ALBRECHT	85D	ARG	10 $e^+e^- \to K^+K^-X$	
1019.3 ±0.1	1500	ARENTON	82	AEMS	11.8 polar. $pp \to KK$	
1019.67 ±0.17	25080	[8] PELLINEN	82	RVUE		
1019.52 ±0.13	3681	BUKIN	78C	OLYA	$e^+e^- \to$ hadrons	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1018.4 ±0.5 ±0.1		[9] ALBRECHT	20	CBAR	0.9 $\overline{p}p \to K^+K^-\pi^0$	
1019.21 ±0.04 ±0.03		[10] HOID	20	RVUE	$e^+e^- \to \pi^0\gamma$	
1019.54 ±0.10 ±0.51		[11] AAIJ	19H	LHCB	$pp \to D^\pm X$	OCCUR=2
1019.20 ±0.02 ±0.01		[12] HOFERICHT...	19	RVUE	$e^+e^- \to \pi^+\pi^-\pi^0$	
1019.469±0.061	1.7M	KOZYREV	18	CMD3	$e^+e^- \to K^+K^-$	
1019.457±0.061	610k	KOZYREV	16	CMD3	$e^+e^- \to K^0_S K^0_L$	
1019.48 ±0.01		LEES	13F	BABR	$D^+ \to K^+K^-\pi^+$	
1019.441±0.008±0.080	542k	[13] AKHMETSHIN	08	CMD2	1.02 $e^+e^- \to K^+K^-$	
1019.63 ±0.07	12540	[14] AUBERT,B	05J	BABR	$D^0 \to \overline{K}^0 K^+K^-$	
1019.8 ±0.7		ARMSTRONG	86	OMEG	85 $\pi^+/pp \to \pi^+/p4Kp$	
1020.1 ±0.11	5526	[14] ATKINSON	86	OMEG	20–70 γp	
1019.7 ±1.0		BEBEK	86	CLEO	$e^+e^- \to \Upsilon(4S)$	
1019.411±0.008	642k	[15] DIJKSTRA	86	SPEC	100–200 $\pi^\pm$, $\overline{p}$, p, $K^\pm$, on Be	
1020.9 ±0.2		[14] FRAME	86	OMEG	13 $K^+p \to \phi K^+p$	
1021.0 ±0.2		[14] ARMSTRONG	83B	OMEG	18.5 $K^-p \to K^-K^+\Lambda$	
1020.0 ±0.5		[14] ARMSTRONG	83B	OMEG	18.5 $K^-p \to K^-K^+\Lambda$	OCCUR=2
1019.7 ±0.3		[14] BARATE	83	GOLI	190 π^-Be $\to 2\mu$X	
1019.8 ±0.2 ±0.5	766	IVANOV	81	OLYA	1–1.4 $e^+e^- \to K^+K^-$	
1019.4 ±0.5	337	COOPER	78B	HBC	0.7–0.8 $\overline{p}p \to K^0_S K^0_L \pi^+\pi^-$	
1020 ±1	383	[14] BALDI	77	CNTR	10 $\pi^-p \to \pi^-\phi p$	OCCUR=2
1018.9 ±0.6	800	COHEN	77	ASPK	6 $\pi^\pm N \to K^+K^-N$	
1019.7 ±0.5	454	KALBFLEISCH	76	HBC	2.18 $K^-p \to \Lambda K\overline{K}$	
1019.4 ±0.8	984	BESCH	74	CNTR	2 $\gamma p \to pK^+K^-$	
1020.3 ±0.4	100	BALLAM	73	HBC	2.8–9.3 γp	
1019.4 ±0.7		BINNIE	73B	CNTR	$\pi^-p \to \phi n$	
1019.6 ±0.5	120	[16] AGUILAR-...	72B	HBC	3.9,4.6 $K^-p \to \Lambda K^+K^-$	

1019.9	±0.5	100	[16] AGUILAR-...	72B	HBC	3.9,4.6 $K^- p \to K^- p K^+ K^-$	OCCUR=2
1020.4	±0.5	131	COLLEY	72	HBC	10 $K^+ p \to K^+ p \phi$	
1019.9	±0.3	410	STOTTLE...	71	HBC	2.9 $K^- p \to \Sigma/\Lambda K \overline{K}$	

[1] Average of KOZYREV 16 and KOZYREV 18 values taking into account the correlated uncertainties. Supersedes individual KOZYREV 16 and KOZYREV 18 results. NODE=M004M;LINKAGE=G
[2] Using a vector meson dominance model with contribution from $\phi(1020)$ and higher mass excitations of $\rho(770)$, $\omega(782)$, and $\phi(1020)$. NODE=M004M;LINKAGE=E
[3] Using a phenomenological model based on KUHN 90 with a sum of Breit-Wigner resonances for $\rho(770)$, $\omega(782)$, $\phi(1020)$ and their higher mass excitations. NODE=M004M;LINKAGE=C
[4] Update of AKHMETSHIN 99D NODE=M004M;LINKAGE=GS
[5] From the combined fit assuming that the total $\phi(1020)$ production cross section is saturated by those of $K^+ K^-$, $K_S K_L$, $\pi^+ \pi^- \pi^0$, and $\eta\gamma$ decays modes and using ACHASOV 00B for the $\eta\gamma$ decay mode. NODE=M004M;LINKAGE=AE
[6] Using a total width of 4.43 ± 0.05 MeV. Systematic uncertainty included. NODE=M004M;LINKAGE=G2
[7] Using a total width of 4.43 ± 0.05 MeV. NODE=M004M;LINKAGE=F2
[8] PELLINEN 82 review includes AKERLOF 77, DAUM 81, BALDI 77, AYRES 74, DEGROOT 74. NODE=M004M;LINKAGE=R
[9] Width fixed at 4.2 MeV. NODE=M004M;LINKAGE=J
[10] The values were extracted from a dispersively improved Breit-Wigner parameterization and do not include vacuum polarization. Inclusion of vacuum polarization gives 1019.457 ± 0.020 MeV. NODE=M004M;LINKAGE=M
[11] From the $D^\pm \to K^\pm K^+ K^-$ Dalitz plot fit with the Triple-M amplitude in the multimeson model of AOUDE 18. NODE=M004M;LINKAGE=I
[12] The values were extracted from a dispersively improved Breit-Wigner parameterization and do not include vacuum polarization. NODE=M004M;LINKAGE=N
[13] Strongly correlated with AKHMETSHIN 04. NODE=M004M;LINKAGE=AH
[14] Systematic errors not evaluated. NODE=M004M;LINKAGE=A
[15] Weighted and scaled average of 12 measurements of DIJKSTRA 86. NODE=M004M;LINKAGE=B
[16] Mass errors enlarged by us to $\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M004M;LINKAGE=D

ϕ(1020) WIDTH

NODE=M004W

NODE=M004W

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*	
4.249±0.013 OUR AVERAGE		Error includes scale factor of 1.1.				
4.245±0.013	2.3M	[1] KOZYREV	18	CMD3	$e^+ e^- \to K^+ K^-$, $K^0_S K^0_L$	OCCUR=2
4.205±0.103±0.067	28k	[2] LEES	14H	BABR	$e^+ e^- \to K^0_S K^0_L \gamma$	
4.29 ±0.04 ±0.07		[3] LEES	13Q	BABR	$e^+ e^- \to K^+ K^- \gamma$	
4.30 ±0.06 ±0.17	105k	AKHMETSHIN	06	CMD2	0.98–1.06 $e^+ e^- \to \pi^+ \pi^- \pi^0$	
4.280±0.033±0.025	272k	[4] AKHMETSHIN	04	CMD2	$e^+ e^- \to K^0_L K^0_S$	
4.21 ±0.04	1900k	[5] ACHASOV	01E	SND	$e^+ e^- \to K^+ K^-$, $K_S K_L$, $\pi^+ \pi^- \pi^0$	
4.44 ±0.09	55600	AKHMETSHIN	95	CMD2	$e^+ e^- \to$ hadrons	
4.5 ±0.7	1500	ARENTON	82	AEMS	11.8 polar. $p p \to K K$	
4.2 ±0.6	766	[6] IVANOV	81	OLYA	1–1.4 $e^+ e^- \to K^+ K^-$	
4.3 ±0.6		[6] CORDIER	80	DM1	$e^+ e^- \to \pi^+ \pi^- \pi^0$	
4.36 ±0.29	3681	[6] BUKIN	78C	OLYA	$e^+ e^- \to$ hadrons	
4.4 ±0.6	984	[6] BESCH	74	CNTR	2 $\gamma p \to p K^+ K^-$	
4.67 ±0.72	681	[6] BALAKIN	71	OSPK	$e^+ e^- \to$ hadrons	
4.09 ±0.29		BIZOT	70	OSPK	$e^+ e^- \to$ hadrons	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
4.07 ±0.13 ±0.01		[7] HOID	20	RVUE	$e^+ e^- \to \pi^0 \gamma$	
4.23 ±0.04 ±0.02		[8] HOFERICHT...	19	RVUE	$e^+ e^- \to \pi^+ \pi^- \pi^0$	
4.249±0.015	1.7M	KOZYREV	18	CMD3	$e^+ e^- \to K^+ K^-$	
4.240±0.017	610k	KOZYREV	16	CMD3	$e^+ e^- \to K^0_S K^0_L$	
4.37 ±0.02		LEES	13F	BABR	$D^+ \to K^+ K^- \pi^+$	
4.24 ±0.02 ±0.03	542k	[9] AKHMETSHIN	08	CMD2	1.02 $e^+ e^- \to K^+ K^-$	
4.28 ±0.13	12540	[10] AUBERT,B	05J	BABR	$D^0 \to \overline{K}^0 K^+ K^-$	
4.45 ±0.06	271k	DIJKSTRA	86	SPEC	100 π^- Be	
3.6 ±0.8	337	[6] COOPER	78B	HBC	0.7–0.8 $\overline{p} p \to K^0_S K^0_L \pi^+ \pi^-$	
4.5 ±0.50	1300	[6,10] AKERLOF	77	SPEC	400 pA $\to K^+ K^-$ X	
4.5 ±0.8	500	[6,10] AYRES	74	ASPK	3–6 $\pi^- p \to K^+ K^- n$, $K^- p \to K^+ K^- \Lambda/\Sigma^0$	
3.81 ±0.37		COSME	74B	OSPK	$e^+ e^- \to K^0_L K^0_S$	
3.8 ±0.7	454	[6] BORENSTEIN	72	HBC	2.18 $K^- p \to K \overline{K} n$	

[1] Average of KOZYREV 16 and KOZYREV 18 values taking into account the correlated uncertainties. Supersedes individual KOZYREV 16 and KOZYREV 18 results. NODE=M004W;LINKAGE=G

[2] Using a vector meson dominance model with contribution from $\phi(1020)$ and higher mass excitations of $\rho(770)$, $\omega(782)$, and $\phi(1020)$. NODE=M004W;LINKAGE=E

[3] Using a phenomenological model based on KUHN 90 with a sum of Breit-Wigner resonances for $\rho(770)$, $\omega(782)$, $\phi(1020)$ and their higher mass excitations. NODE=M004W;LINKAGE=C

[4] Update of AKHMETSHIN 99D NODE=M004W;LINKAGE=GS

[5] From the combined fit assuming that the total $\phi(1020)$ production cross section is saturated by those of K^+K^-, $K_S K_L$, $\pi^+\pi^-\pi^0$, and $\eta\gamma$ decays modes and using ACHASOV 00B for the $\eta\gamma$ decay mode. NODE=M004W;LINKAGE=AE

[6] Width errors enlarged by us to $4\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M004W;LINKAGE=D

[7] The values were extracted from a dispersively improved Breit-Wigner parameterization. NODE=M004W;LINKAGE=I

[8] The values were extracted from a dispersively improved Breit-Wigner parameterization and do not include vacuum polarization. NODE=M004W;LINKAGE=K

[9] Strongly correlated with AKHMETSHIN 04. NODE=M004W;LINKAGE=AH

[10] Systematic errors not evaluated. NODE=M004W;LINKAGE=A

$\phi(1020)$ DECAY MODES

NODE=M004215;NODE=M004

	Mode		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	
Γ_1	K^+K^-		(49.1 ± 0.5) %	S=1.3	DESIG=1
Γ_2	$K^0_L K^0_S$		(33.9 ± 0.4) %	S=1.2	DESIG=2
Γ_3	$\rho\pi + \pi^+\pi^-\pi^0$		(15.4 ± 0.4) %	S=1.2	DESIG=24
Γ_4	$\rho\pi$				DESIG=16
Γ_5	$\pi^+\pi^-\pi^0$				DESIG=3
Γ_6	$\eta\gamma$		(1.301 ± 0.025) %	S=1.2	DESIG=4
Γ_7	$\pi^0\gamma$		$(1.32 \pm 0.05) \times 10^{-3}$		DESIG=7
Γ_8	$\ell^+\ell^-$		—		DESIG=256;OUR EVAL;→ UNCHECKED ←
Γ_9	e^+e^-		$(2.979 \pm 0.033) \times 10^{-4}$	S=1.3	DESIG=5
Γ_{10}	$\mu^+\mu^-$		$(2.85 \pm 0.19) \times 10^{-4}$		DESIG=6
Γ_{11}	ηe^+e^-		$(1.08 \pm 0.04) \times 10^{-4}$		DESIG=17
Γ_{12}	$\pi^+\pi^-$		$(7.3 \pm 1.3) \times 10^{-5}$		DESIG=8
Γ_{13}	$\omega\pi^0$		$(4.7 \pm 0.5) \times 10^{-5}$		DESIG=25
Γ_{14}	$\omega\gamma$		< 5 %	CL=84%	DESIG=10
Γ_{15}	$\rho\gamma$		$< 1.2 \times 10^{-5}$	CL=90%	DESIG=12
Γ_{16}	$\pi^+\pi^-\gamma$		$(4.1 \pm 1.3) \times 10^{-5}$		DESIG=9
Γ_{17}	$f_0(980)\gamma$		$(3.22 \pm 0.19) \times 10^{-4}$	S=1.1	DESIG=20
Γ_{18}	$\pi^0\pi^0\gamma$		$(1.12 \pm 0.06) \times 10^{-4}$		DESIG=19
Γ_{19}	$\pi^+\pi^-\pi^+\pi^-$		$(3.9 {}^{+2.8}_{-2.2}) \times 10^{-6}$		DESIG=15
Γ_{20}	$\pi^+\pi^+\pi^-\pi^-\pi^0$		$< 4.6 \times 10^{-6}$	CL=90%	DESIG=14
Γ_{21}	$\pi^0 e^+e^-$		$(1.33 {}^{+0.07}_{-0.10}) \times 10^{-5}$		DESIG=21
Γ_{22}	$\pi^0\eta\gamma$		$(7.27 \pm 0.30) \times 10^{-5}$	S=1.5	DESIG=22
Γ_{23}	$a_0(980)\gamma$		$(7.6 \pm 0.6) \times 10^{-5}$		DESIG=23
Γ_{24}	$K^0\overline{K}^0\gamma$		$< 1.9 \times 10^{-8}$	CL=90%	DESIG=257
Γ_{25}	$\eta'(958)\gamma$		$(6.21 \pm 0.21) \times 10^{-5}$		DESIG=194
Γ_{26}	$\eta\pi^0\pi^0\gamma$		$< 2 \times 10^{-5}$	CL=90%	DESIG=195
Γ_{27}	$\mu^+\mu^-\gamma$		$(1.4 \pm 0.5) \times 10^{-5}$		DESIG=196
Γ_{28}	$\rho\gamma\gamma$		$< 1.2 \times 10^{-4}$	CL=90%	DESIG=250
Γ_{29}	$\eta\pi^+\pi^-$		$< 1.8 \times 10^{-5}$	CL=90%	DESIG=255
Γ_{30}	$\eta\mu^+\mu^-$		$< 9.4 \times 10^{-6}$	CL=90%	DESIG=26
Γ_{31}	$\eta U \to \eta e^+e^-$		$< 1 \times 10^{-6}$	CL=90%	DESIG=259
Γ_{32}	invisible		$< 1.7 \times 10^{-4}$	CL=90%	DESIG=260
	Lepton Family number (LF) violating modes				NODE=M004;CLUMP=A
Γ_{33}	$e^\pm\mu^\mp$	LF	$< 2 \times 10^{-6}$	CL=90%	DESIG=258

CONSTRAINED FIT INFORMATION

An overall fit to 30 branching ratios uses 80 measurements and one constraint to determine 14 parameters. The overall fit has a $\chi^2 = 61.8$ for 67 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\langle\delta x_i \delta x_j\rangle/(\delta x_i \cdot \delta x_j)$, in percent, from the fit to the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

	x_1	x_2	x_3	x_6	x_7	x_9	x_{10}	x_{12}	x_{13}	x_{17}
x_2	−73									
x_3	−60	−10								
x_6	−21	18	2							
x_7	−11	11	2	8						
x_9	48	−51	−8	−37	−22					
x_{10}	−6	6	1	4	3	−12				
x_{12}	−3	3	0	2	1	−6	1			
x_{13}	−4	4	1	3	2	−8	1	0		
x_{17}	0	0	0	0	0	0	0	0	0	
x_{18}	−10	10	1	18	4	−19	2	1	2	0
x_{19}	−1	1	0	1	0	−2	0	0	0	0
x_{23}	0	0	0	0	0	0	0	0	0	0
x_{25}	−7	6	1	33	3	−12	1	1	1	0

	x_{18}	x_{19}	x_{23}
x_{19}	0		
x_{23}	0	0	
x_{25}	6	0	0

$\phi(1020)$ PARTIAL WIDTHS

NODE=M004218

$\Gamma(\eta\gamma)$ Γ_6

NODE=M004W6
NODE=M004W6

VALUE (keV)	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
58.9±0.5±2.4	ACHASOV	00	SND	$e^+ e^- \to \eta\gamma$

$\Gamma(\pi^0\gamma)$ Γ_7

NODE=M004W7
NODE=M004W7

VALUE (keV)	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$5.40\pm0.16^{+0.43}_{-0.40}$	ACHASOV	00	SND	$e^+ e^- \to \pi^0\gamma$

$\Gamma(\ell^+\ell^-)$ Γ_8

NODE=M004W5
NODE=M004W5

VALUE (keV)	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.320±0.017±0.015	[1] AMBROSINO	05	KLOE	1.02 $e^+ e^- \to \mu^+\mu^-$

[1] Weighted average of Γ_{ee} and $\sqrt{\Gamma_{ee}\Gamma_{\mu\mu}}$ from AMBROSINO 05 assuming lepton universality.

NODE=M004W5;LINKAGE=AM

$\Gamma(e^+e^-)$ Γ_9

NODE=M004W8
NODE=M004W8

VALUE (keV)	*DOCUMENT ID*		*TECN*	*COMMENT*
1.27 ±0.04 OUR EVALUATION				
1.251±0.021 OUR AVERAGE Error includes scale factor of 1.1.				
1.235±0.006±0.022	[1] AKHMETSHIN	11	CMD2	1.02 $e^+ e^- \to \phi$
1.32 ±0.05 ±0.03	[2] AMBROSINO	05	KLOE	1.02 $e^+ e^- \to e^+ e^-$
1.28 ±0.05	AKHMETSHIN	95	CMD2	1.02 $e^+ e^- \to \phi$

→ UNCHECKED ←

[1] Combined analysis of the CMD-2 data on $\phi \to K^+K^-$, $K^0_S K^0_L$, $\pi^+\pi^-\pi^0$, $\eta\gamma$ assuming that the sum of their branching fractions is 0.99741 ± 0.00007.

NODE=M004W8;LINKAGE=AK

[2] From forward-backward asymmetry and using Γ_{total} = 4.26 ± 0.05 MeV from the 2004 edition of this Review.

NODE=M004W8;LINKAGE=AM

$\left(\Gamma(e^+e^-) \times \Gamma(\mu^+\mu^-)\right)^{1/2}$ $(\Gamma_9\Gamma_{10})^{1/2}$

NODE=M004W9
NODE=M004W9

VALUE (keV)	DOCUMENT ID	TECN	COMMENT
1.320±0.018±0.017	AMBROSINO 05	KLOE	1.02 $e^+e^- \to \mu^+\mu^-$

ϕ(1020) Γ(i)Γ(e^+e^-)/Γ(total)

NODE=M004223

$\Gamma(K^+K^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_1\Gamma_9/\Gamma$

NODE=M004G01
NODE=M004G01

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
0.6340±0.0070±0.0039		[1] LEES 13Q	BABR	$e^+e^- \to K^+K^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.669 ±0.001 ±0.023	1.7M	KOZYREV 18	CMD3	$e^+e^- \to K^+K^-$

[1] Using a phenomenological model based on KUHN 90 with a sum of Breit-Wigner resonances for $\rho(770)$, $\omega(782)$, $\phi(1020)$ and their higher mass excitations. The first error combines statistical and systematic uncertainties. The second one is due to the parametrization of the charged kaon form factor and mass calibration.

NODE=M004G01;LINKAGE=A

$\Gamma(K^0_L K^0_S) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_2\Gamma_9/\Gamma$

NODE=M004GXX
NODE=M004GXX

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
0.4200±0.0033±0.0123	28k	[1] LEES 14H	BABR	$e^+e^- \to K^0_S K^0_L \gamma$

[1] Using a vector meson dominance model with contribution from $\phi(1020)$ and higher mass excitations of $\rho(770)$, $\omega(782)$, and $\phi(1020)$.

NODE=M004GXX;LINKAGE=A

$\left[\Gamma(\rho\pi) + \Gamma(\pi^+\pi^-\pi^0)\right] \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_3\Gamma_9/\Gamma$

NODE=M004R03
NODE=M004R03

VALUE (eV)	DOCUMENT ID	TECN	COMMENT
184.1±2.1±8.0	[1] LEES 21B	BABR	10.5 $e^+e^- \to \pi^+\pi^-\pi^0\gamma$

[1] From the cross section for $e^+e^- \to \pi^+\pi^-\pi^0$ with contributions from $\rho(770)$, $\omega(782)$, $\phi(1020)$, $\omega(1420)$, and $\omega(1650)$.

NODE=M004R03;LINKAGE=A

ϕ(1020) Γ(i)Γ(e^+e^-)/Γ^2(total)

NODE=M004224

$\Gamma(K^+K^-)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_1/\Gamma \times \Gamma_9/\Gamma$

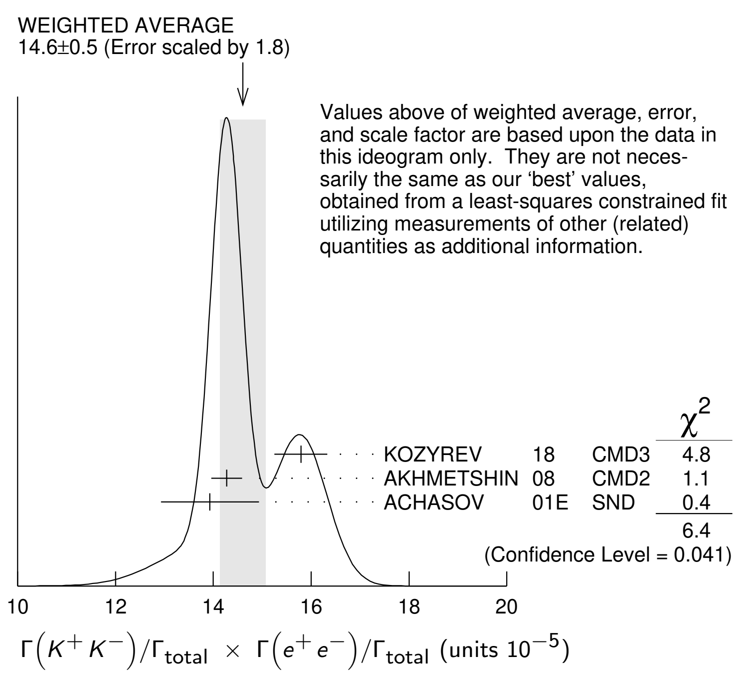
NODE=M004G10
NODE=M004G10

NEW

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
14.64 ±0.28 OUR FIT Error includes scale factor of 1.4. [$(14.64 \pm 0.29) \times 10^{-5}$ OUR 2021 FIT Scale factor = 1.5]				
14.6 ±0.5 OUR AVERAGE Error includes scale factor of 1.8. See the ideogram below.				
15.789±0.541	1.7M	KOZYREV 18	CMD3	$e^+e^- \to K^+K^-$
14.27 ±0.05 ±0.31	542k	AKHMETSHIN 08	CMD2	1.02 $e^+e^- \to K^+K^-$
13.93 ±0.14 ±0.99	1000k	[1] ACHASOV 01E	SND	$e^+e^- \to K^+K^-$, $K_S K_L$, $\pi^+\pi^-\pi^0$

[1] From the combined fit assuming that the total $\phi(1020)$ production cross section is saturated by those of K^+K^-, $K_S K_L$, $\pi^+\pi^-\pi^0$, and $\eta\gamma$ decays modes and using ACHASOV 00B for the $\eta\gamma$ decay mode.

NODE=M004G10;LINKAGE=AE



$\Gamma(K^0_L K^0_S)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_2/\Gamma \times \Gamma_9/\Gamma$

NODE=M004G6
NODE=M004G6

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
10.11 ±0.12 OUR FIT					
[(10.10 ± 0.12) × 10^{-5} OUR 2021 FIT Scale factor = 1.1]					
10.07 ±0.13 OUR AVERAGE					
10.078±0.223	610k	[1] KOZYREV	16	CMD3	$e^+e^- \to K^0_S K^0_L$
10.01 ±0.04 ±0.17	272k	[2] AKHMETSHIN	04	CMD2	$e^+e^- \to K^0_L K^0_S$
10.27 ±0.07 ±0.34	500k	[3] ACHASOV	01E	SND	$e^+e^- \to K^+K^-$, $K_S K_L$, $\pi^+\pi^-\pi^0$

NEW

[1] KOZYREV 16 also reports $\Gamma(e^+e^-)$ B($\phi \to K^0_S K^0_L$) = (0.428 ± 0.001 ± 0.009) keV. NODE=M004G6;LINKAGE=A

[2] Update of AKHMETSHIN 99D NODE=M004G;LINKAGE=GS

[3] From the combined fit assuming that the total $\phi(1020)$ production cross section is saturated by those of K^+K^-, $K_S K_L$, $\pi^+\pi^-\pi^0$, and $\eta\gamma$ decays modes and using ACHASOV 00B for the $\eta\gamma$ decay mode. NODE=M004G6;LINKAGE=AE

$[\Gamma(\rho\pi)+\Gamma(\pi^+\pi^-\pi^0)]/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_3/\Gamma \times \Gamma_9/\Gamma$

NODE=M004G7
NODE=M004G7

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
4.58 ±0.11 OUR FIT Error includes scale factor of 1.1. [(4.53 ± 0.10) × 10^{-5} OUR 2021 FIT Scale factor = 1.1]					
4.51 ±0.14 OUR AVERAGE					
[(4.46 ± 0.12) × 10^{-5} OUR 2021 AVERAGE]					
4.51 ±0.16 ±0.11	105k	AKHMETSHIN	06	CMD2	0.98–1.06 $e^+e^- \to \pi^+\pi^-\pi^0$
4.665±0.042±0.261	400k	[1] ACHASOV	01E	SND	$e^+e^- \to K^+K^-$, $K_S K_L$, $\pi^+\pi^-\pi^0$
4.35 ±0.27 ±0.08	11169	[2] AKHMETSHIN	98	CMD2	$e^+e^- \to \pi^+\pi^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
4.38 ±0.12		BENAYOUN	10	RVUE	0.4–1.05 e^+e^-
4.30 ±0.08 ±0.21		[3] AUBERT,B	04N	BABR	10.6 $e^+e^- \to \pi^+\pi^-\pi^0\gamma$

NEW
NEW

[1] From the combined fit assuming that the total $\phi(1020)$ production cross section is saturated by those of K^+K^-, $K_S K_L$, $\pi^+\pi^-\pi^0$, and $\eta\gamma$ decays modes and using ACHASOV 00B for the $\eta\gamma$ decay mode. NODE=M004G7;LINKAGE=AE

[2] Recalculated by us from the cross section in the peak. NODE=M004G;LINKAGE=B

[3] Superseeded by LEES 21B. NODE=M004G7;LINKAGE=A

$\Gamma(\eta\gamma)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_6/\Gamma \times \Gamma_9/\Gamma$

NODE=M004G2
NODE=M004G2

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
3.88 ±0.07 OUR FIT Error includes scale factor of 1.2. [(3.87 ± 0.07) × 10^{-6} OUR 2021 FIT Scale factor = 1.2]					
3.93 ±0.09 OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below.					
4.050±0.067±0.118	33k	[1] ACHASOV	07B	SND	0.6–1.38 $e^+e^- \to \eta\gamma$
$4.093^{+0.040}_{-0.043}$±0.247	17.4k	[2] AKHMETSHIN	05	CMD2	0.60-1.38 $e^+e^- \to \eta\gamma$
3.850±0.041±0.159	23k	[3,4] AKHMETSHIN	01B	CMD2	$e^+e^- \to \eta\gamma$
4.00 ±0.04 ±0.11		[5] ACHASOV	00	SND	$e^+e^- \to \eta\gamma$
3.53 ±0.08 ±0.17	2200	[6,7] AKHMETSHIN	99F	CMD2	$e^+e^- \to \eta\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
4.19 ±0.06		[8] BENAYOUN	10	RVUE	0.4–1.05 e^+e^-

NEW

[1] From a combined fit of $\sigma(e^+e^- \to \eta\gamma)$ with $\eta \to 3\pi^0$ and $\eta \to \pi^+\pi^-\pi^0$, and fixing B($\eta \to 3\pi^0$) / B($\eta \to \pi^+\pi^-\pi^0$) = 1.44 ± 0.04. Recalculated by us from the cross section at the peak. Supersedes ACHASOV 00D and ACHASOV 06A. NODE=M004G2;LINKAGE=AH

[2] From the $\eta \to 2\gamma$ decay and using B($\eta \to \gamma\gamma$) = 39.43 ± 0.26%. NODE=M004G2;LINKAGE=AK

[3] From the $\eta \to 3\pi^0$ decay and using B($\eta \to 3\pi^0$)= (32.24 ± 0.29) × 10^{-2}. NODE=M004G;LINKAGE=AK

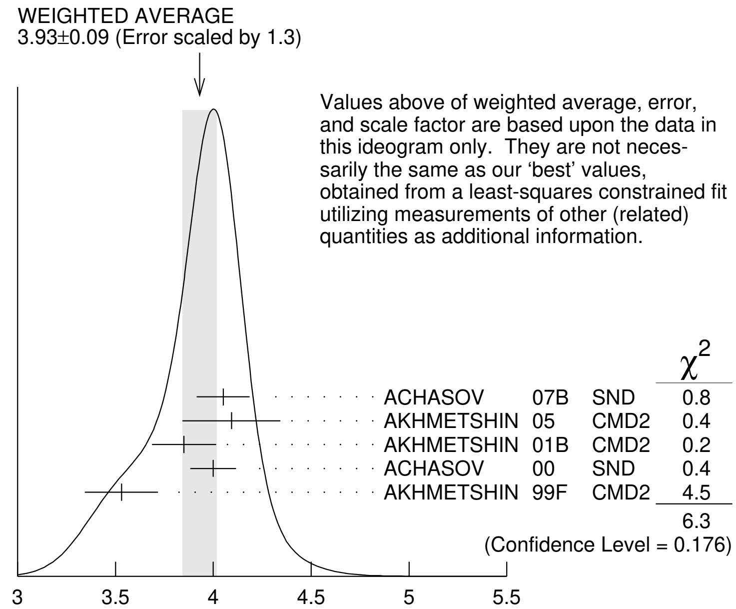
[4] The combined fit from 600 to 1380 MeV taking into account $\rho(770)$, $\omega(782)$, $\phi(1020)$, and $\rho(1450)$ (mass and width fixed at 1450 MeV and 310 MeV respectively). NODE=M004G;LINKAGE=BQ

[5] From the $\eta \to 2\gamma$ decay and using B($\eta \to 2\gamma$) =(39.21 ± 0.34) × 10^{-2}. NODE=M004G2;LINKAGE=A

[6] Recalculated by the authors from the cross section in the peak. NODE=M004G;LINKAGE=A

[7] From the $\eta \to \pi^+\pi^-\pi^0$ decay and using B($\eta \to \pi^+\pi^-\pi^0$) =(23.1 ± 0.5) × 10^{-2}. NODE=M004G2;LINKAGE=C

[8] A simultaneous fit of $e^+e^- \to \pi^+\pi^-$, $\pi^+\pi^-\pi^0$, $\pi^0\gamma$, $\eta\gamma$ data. NODE=M004G7;LINKAGE=BE



$\Gamma(\eta\gamma)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_6/\Gamma \times \Gamma_9/\Gamma$

$\Gamma(\pi^0\gamma)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_7/\Gamma \times \Gamma_9/\Gamma$

NODE=M004G3
NODE=M004G3

VALUE (units 10^{-7})	EVTS	DOCUMENT ID	TECN	COMMENT
3.94±0.16 OUR FIT				
3.95±0.17 OUR AVERAGE				
4.04±0.09±0.19		[1] ACHASOV 16A	SND	0.60–1.38 $e^+e^- \to \pi^0\gamma$
3.75±0.11±0.29	18k	AKHMETSHIN 05	CMD2	0.60-1.38 $e^+e^- \to \pi^0\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
4.29±0.11		[2] BENAYOUN 10	RVUE	0.4–1.05 e^+e^-
$3.67\pm0.10^{+0.27}_{-0.25}$		[3] ACHASOV 00	SND	$e^+e^- \to \pi^0\gamma$

[1] From the VMD model with the interfering $\rho(770)$, $\omega(782)$, $\phi(1020)$ resonances, and an additional resonance describing the total contribution of the $\rho(1450)$ and $\omega(1420)$ states. Supersedes ACHASOV 00. NODE=M004G3;LINKAGE=B

[2] A simultaneous fit of $e^+e^- \to \pi^+\pi^-$, $\pi^+\pi^-\pi^0$, $\pi^0\gamma$, $\eta\gamma$ data. NODE=M004G3;LINKAGE=BE

[3] From the $\pi^0 \to 2\gamma$ decay and using B($\pi^0 \to 2\gamma$) = (98.798 ± 0.032) × 10^{-2}. NODE=M004G3;LINKAGE=A

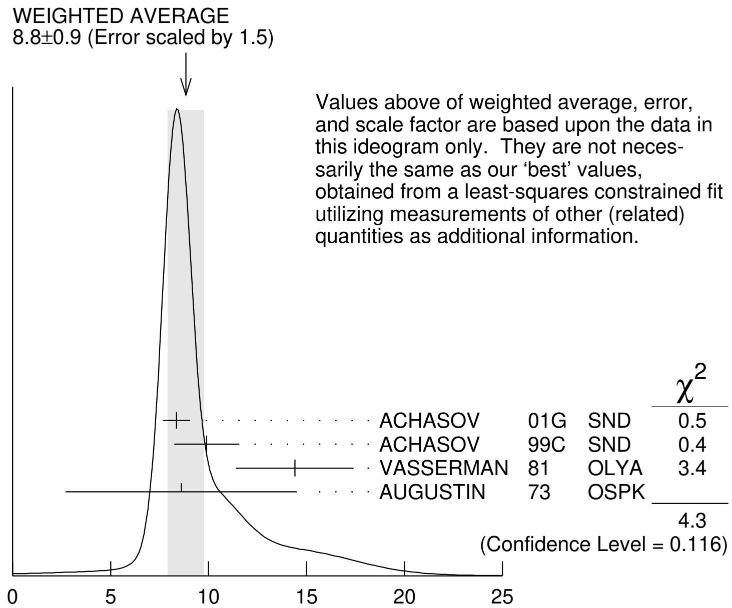
$\Gamma(\mu^+\mu^-)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{10}/\Gamma \times \Gamma_9/\Gamma$

NODE=M004G5
NODE=M004G5

VALUE (units 10^{-8})	DOCUMENT ID	TECN	COMMENT
8.5 ±0.6 OUR FIT			
8.8 ±0.9 OUR AVERAGE Error includes scale factor of 1.5. See the ideogram below.			
8.36±0.59±0.37	ACHASOV 01G	SND	$e^+e^- \to \mu^+\mu^-$
9.9 ±1.4 ±0.9	[1] ACHASOV 99C	SND	$e^+e^- \to \mu^+\mu^-$
14.4 ±3.0	[2] VASSERMAN 81	OLYA	$e^+e^- \to \mu^+\mu^-$
8.6 ±5.9	[2] AUGUSTIN 73	OSPK	$e^+e^- \to \mu^+\mu^-$

[1] Recalculated by the authors from the cross section in the peak. NODE=M004G5;LINKAGE=A

[2] Recalculated by us from the cross section in the peak. NODE=M004G5;LINKAGE=B



$\Gamma(\mu^+\mu^-)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{10}/\Gamma \times \Gamma_9/\Gamma$

$\Gamma(\pi^+\pi^-)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{12}/\Gamma \times \Gamma_9/\Gamma$

NODE=M004G4
NODE=M004G4

VALUE (units 10^{-8})	DOCUMENT ID		TECN	COMMENT
2.2 ±0.4 OUR FIT				
2.2 ±0.4 OUR AVERAGE				
2.1 ±0.3 ±0.3	[1] ACHASOV	00C	SND	$e^+e^- \to \pi^+\pi^-$
$1.95^{+1.15}_{-0.87}$	[2] GOLUBEV	86	ND	$e^+e^- \to \pi^+\pi^-$
$6.01^{+3.19}_{-2.51}$	[2] VASSERMAN	81	OLYA	$e^+e^- \to \pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
3.31±0.99	[3] BENAYOUN	13	RVUE	0.4–1.05 e^+e^-

[1] Recalculated by the authors from the cross section in the peak. NODE=M004G4;LINKAGE=AC

[2] Recalculated by us from the cross section in the peak. NODE=M004G4;LINKAGE=B

[3] A simultaneous fit to $e^+e^- \to \pi^+\pi^-$, $\pi^+\pi^-\pi^0$, $\pi^0\gamma$, $\eta\gamma$, $K\overline{K}$, and $\tau^- \to \pi^-\pi^0\nu_\tau$ data. NODE=M004G4;LINKAGE=A

$\Gamma(\omega\pi^0)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{13}/\Gamma \times \Gamma_9/\Gamma$

NODE=M004G11
NODE=M004G11

VALUE (units 10^{-8})	DOCUMENT ID		TECN	COMMENT
1.40±0.15 OUR FIT				
1.37±0.17±0.01	[1,2] AMBROSINO	08G	KLOE	$e^+e^- \to \pi^+\pi^-2\pi^0$, $2\pi^0\gamma$

[1] Recalculated by the authors from the cross section at the peak. NODE=M004G11;LINKAGE=AB

[2] AMBROSINO 08G reports $[\Gamma(\phi(1020) \to \omega\pi^0)/\Gamma_{total} \times \Gamma(\phi(1020) \to e^+e^-)/\Gamma_{total}] \times [B(\omega(782) \to \pi^+\pi^-\pi^0)] = (1.22 \pm 0.13 \pm 0.08) \times 10^{-8}$ which we divide by our best value $B(\omega(782) \to \pi^+\pi^-\pi^0) = (89.2 \pm 0.7) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M004G11;LINKAGE=AM

$\Gamma(\pi^0\pi^0\gamma)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{18}/\Gamma \times \Gamma_9/\Gamma$

NODE=M004G9
NODE=M004G9

VALUE (units 10^{-8})	DOCUMENT ID		TECN	COMMENT
3.34±0.17 OUR FIT				
$\mathbf{3.33^{+0.04}_{-0.09}{}^{+0.19}_{-0.20}}$	[1] AMBROSINO	07	KLOE	$e^+e^- \to \pi^0\pi^0\gamma$

[1] Calculated by the authors from the cross section at the peak. NODE=M004G9;LINKAGE=AM

$\Gamma(\pi^+\pi^-\pi^+\pi^-)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{19}/\Gamma \times \Gamma_9/\Gamma$

NODE=M004G8
NODE=M004G8

VALUE (units 10^{-9})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{1.2^{+0.8}_{-0.7}}$ **OUR FIT**					
1.17±0.52±0.64	3285	[1] AKHMETSHIN	00E	CMD2	$e^+e^- \to \pi^+\pi^-\pi^+\pi^-$

[1] Recalculated by the authors from the cross section in the peak. NODE=M004G8;LINKAGE=A

$\phi(1020)$ BRANCHING RATIOS

NODE=M004220

$\Gamma(K^+K^-)/\Gamma_{total}$ — Γ_1/Γ

NODE=M004R1
NODE=M004R1

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.491±0.005 OUR FIT Error includes scale factor of 1.3. [0.492 ± 0.005 OUR 2021 FIT Scale factor = 1.3]				
0.493±0.010 OUR AVERAGE				
0.492±0.012	2913	AKHMETSHIN 95	CMD2	$e^+e^- \to K^+K^-$
0.44 ±0.05	321	KALBFLEISCH 76	HBC	2.18 $K^-p \to \Lambda K^+K^-$
0.49 ±0.06	270	DEGROOT 74	HBC	4.2 $K^-p \to \Lambda\phi$
0.540±0.034	565	BALAKIN 71	OSPK	$e^+e^- \to K^+K^-$
0.48 ±0.04	252	LINDSEY 66	HBC	2.1–2.7 $K^-p \to \Lambda K^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.493±0.003±0.007		[1] AKHMETSHIN 11	CMD2	1.02 $e^+e^- \to K^+K^-$
0.476±0.017	1000k	[2] ACHASOV 01E	SND	$e^+e^- \to K^+K^-$, $K_S K_L$, $\pi^+\pi^-\pi^0$

NEW

[1] Combined analysis of the CMD-2 data on $\phi \to K^+K^-$, $K^0_S K^0_L$, $\pi^+\pi^-\pi^0$, $\eta\gamma$ assuming that the sum of their branching fractions is 0.99741 ± 0.00007.

NODE=M004R1;LINKAGE=AK

[2] Using B($\phi \to e^+e^-$)= (2.93 ± 0.14) × 10^{-4}.

NODE=M004R1;LINKAGE=B2

$\Gamma(K^0_L K^0_S)/\Gamma_{total}$ — Γ_2/Γ

NODE=M004R2
NODE=M004R2

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.339±0.004 OUR FIT Error includes scale factor of 1.2. [0.340 ± 0.004 OUR 2021 FIT Scale factor = 1.3]				
0.331±0.009 OUR AVERAGE				
0.335±0.010	40644	AKHMETSHIN 95	CMD2	$e^+e^- \to K^0_L K^0_S$
0.326±0.035		DOLINSKY 91	ND	$e^+e^- \to K^0_L K^0_S$
0.310±0.024		DRUZHININ 84	ND	$e^+e^- \to K^0_L K^0_S$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.336±0.002±0.006		[1] AKHMETSHIN 11	CMD2	1.02 $e^+e^- \to K^0_S K^0_L$
0.351±0.013	500k	[2] ACHASOV 01E	SND	$e^+e^- \to K^+K^-$, $K_S K_L$, $\pi^+\pi^-\pi^0$
0.27 ±0.03	133	KALBFLEISCH 76	HBC	2.18 $K^-p \to \Lambda K^0_L K^0_S$
0.257±0.030	95	[3] BALAKIN 71	OSPK	$e^+e^- \to K^0_L K^0_S$
0.40 ±0.04	167	LINDSEY 66	HBC	2.1–2.7 $K^-p \to \Lambda K^0_L K^0_S$

NEW

[1] Combined analysis of the CMD-2 data on $\phi \to K^+K^-$, $K^0_S K^0_L$, $\pi^+\pi^-\pi^0$, $\eta\gamma$ assuming that the sum of their branching fractions is 0.99741 ± 0.00007.

NODE=M004R2;LINKAGE=AK

[2] Using B($\phi \to e^+e^-$)= (2.93 ± 0.14) × 10^{-4}.

NODE=M004R2;LINKAGE=B2

[3] Balakin error increased by Paul.

NODE=M004R2;LINKAGE=01

$\Gamma(K^0_L K^0_S)/\Gamma(K^+K^-)$ — Γ_2/Γ_1

NODE=M004R19
NODE=M004R19

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.690±0.015 OUR FIT Error includes scale factor of 1.3. [0.690 ± 0.015 OUR 2021 FIT Scale factor = 1.3]				
0.740±0.031 OUR AVERAGE				
0.70 ±0.06	2732	BUKIN 78C	OLYA	$e^+e^- \to K^0_L K^0_S$
0.82 ±0.08		LOSTY 78	HBC	4.2 $K^-p \to \phi$hyperon
0.71 ±0.05		LAVEN 77	HBC	10 $K^-p \to K^+K^-\Lambda$
0.71 ±0.08		LYONS 77	HBC	3–4 $K^-p \to \Lambda\phi$
0.89 ±0.10	144	AGUILAR-... 72B	HBC	3.9,4.6 K^-p
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.638±0.022	2.3M	[1] KOZYREV 18	CMD3	$e^+e^- \to K^0_L K^0_S$, K^+K^-
0.68 ±0.03		[2] AKHMETSHIN 95	CMD2	$e^+e^- \to K^0_L K^0_S$, K^+K^-

NEW

[1] The prediction taking into account phase-space difference, radiative corrections, isospin breaking, and the Sommerfeld-Gamow-Sakharov factor gives 0.630.

NODE=M004R19;LINKAGE=A

[2] Theoretical analysis of BRAMON 00 taking into account phase-space difference, electromagnetic radiative corrections, as well as isospin breaking, predicts 0.62. FLOREZ-BAEZ 08 predicts 0.63 considering also structure-dependent radiative corrections. FISCHBACH 02 calculates additional corrections caused by the close threshold and predicts 0.68. See also BENAYOUN 01 and DUBYNSKIY 07. BENAYOUN 12 obtains 0.71 ± 0.01 in the HLS model.

NODE=M004R19;LINKAGE=KH

$\Gamma(K^0_L K^0_S)/\Gamma(K\overline{K})$ — $\Gamma_2/(\Gamma_1+\Gamma_2)$

NODE=M004R5

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.408±0.005 OUR FIT Error includes scale factor of 1.3. [0.408 ± 0.005 OUR 2021 FIT Scale factor = 1.3]					
0.45 ±0.04 OUR AVERAGE					
0.44 ±0.07		[1] LONDON	66	HBC	2.24 $K^- p \rightarrow \Lambda K \overline{K}$
0.48 ±0.07	52	BADIER	65B	HBC	3 $K^- p$
0.40 ±0.10	34	SCHLEIN	63	HBC	1.95 $K^- p \rightarrow \Lambda K \overline{K}$

NEW

[1] This is probably not affected by their controversial background subtraction; the value is from their numbers of $K_1 K_2$ vs $K^+ K^-$ events. NODE=M004R5;LINKAGE=01

$\left[\Gamma(\rho\pi) + \Gamma(\pi^+\pi^-\pi^0)\right]/\Gamma_{total}$ — Γ_3/Γ

NODE=M004R3

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.154±0.004 OUR FIT Error includes scale factor of 1.2. [0.1524 ± 0.0033 OUR 2021 FIT Scale factor = 1.2]					
0.151±0.009 OUR AVERAGE Error includes scale factor of 1.7.					
0.161±0.008	11761	AKHMETSHIN	95	CMD2	$e^+ e^- \rightarrow \pi^+\pi^-\pi^0$
0.143±0.007		DOLINSKY	91	ND	$e^+ e^- \rightarrow \pi^+\pi^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.155±0.002±0.005		[1] AKHMETSHIN	11	CMD2	1.02 $e^+ e^- \rightarrow \pi^+\pi^-\pi^0$
0.159±0.008	400k	[2] ACHASOV	01E	SND	$e^+ e^- \rightarrow K^+ K^-$, $K_S K_L$, $\pi^+\pi^-\pi^0$
0.145±0.009±0.003	11169	[3] AKHMETSHIN	98	CMD2	$e^+ e^- \rightarrow \pi^+\pi^-\pi^0$
0.139±0.007		[4] PARROUR	76B	OSPK	$e^+ e^-$

NEW

[1] Combined analysis of the CMD-2 data on $\phi \rightarrow K^+ K^-$, $K^0_S K^0_L$, $\pi^+\pi^-\pi^0$, $\eta\gamma$ assuming that the sum of their branching fractions is 0.99741 ± 0.00007. NODE=M004R3;LINKAGE=AK

[2] Using B($\phi \rightarrow e^+ e^-$)= (2.93 ± 0.14) × 10^{-4}. NODE=M004R3;LINKAGE=B2

[3] Using B($\phi \rightarrow e^+ e^-$)=(2.99 ± 0.08) × 10^{-4}. NODE=M004R;LINKAGE=8D

[4] Using $\Gamma(\phi)$= 4.1 MeV. If interference between the $\rho\pi$ and 3π modes is neglected, the fraction of the $\rho\pi$ is more than 80% at the 90% confidence level. NODE=M004R3;LINKAGE=E

$\left[\Gamma(\rho\pi) + \Gamma(\pi^+\pi^-\pi^0)\right]/\Gamma(K^+K^-)$ — Γ_3/Γ_1

NODE=M004R20

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.313±0.010 OUR FIT Error includes scale factor of 1.2. [0.310 ± 0.009 OUR 2021 FIT Scale factor = 1.2]					
0.28 ±0.09	34	AGUILAR-...	72B	HBC	3.9,4.6 $K^- p$

NEW

$\left[\Gamma(\rho\pi) + \Gamma(\pi^+\pi^-\pi^0)\right]/\Gamma(K\overline{K})$ — $\Gamma_3/(\Gamma_1+\Gamma_2)$

NODE=M004R6

VALUE	DOCUMENT ID		TECN	COMMENT
0.185±0.005 OUR FIT Error includes scale factor of 1.2. [0.183 ± 0.005 OUR 2021 FIT Scale factor = 1.2]				
0.24 ±0.04 OUR AVERAGE				
0.237±0.039	CERRADA	77B	HBC	4.2 $K^- p \rightarrow \Lambda 3\pi$
0.30 ±0.15	LONDON	66	HBC	2.24 $K^- p \rightarrow \Lambda \pi^+\pi^-\pi^0$

NEW

$\left[\Gamma(\rho\pi) + \Gamma(\pi^+\pi^-\pi^0)\right]/\Gamma(K^0_L K^0_S)$ — Γ_3/Γ_2

NODE=M004R7

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.453±0.012 OUR FIT Error includes scale factor of 1.1. [0.448 ± 0.011 OUR 2021 FIT Scale factor = 1.1]					
0.51 ±0.05 OUR AVERAGE					
0.56 ±0.07	3681	BUKIN	78C	OLYA	$e^+ e^- \rightarrow K^0_L K^0_S$, $\pi^+\pi^-\pi^0$
0.47 ±0.06	516	COSME	74	OSPK	$e^+ e^- \rightarrow \pi^+\pi^-\pi^0$

NEW

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_5/Γ

NODE=M004R46

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
≃ 0.0087		1.98M	[1,2] ALOISIO	03	KLOE	1.02 $e^+ e^- \rightarrow \pi^+\pi^-\pi^0$
<0.0006	90		[3] ACHASOV	02	SND	1.02 $e^+ e^- \rightarrow \pi^+\pi^-\pi^0$
<0.23	90		[3] CORDIER	80	DM1	$e^+ e^- \rightarrow \pi^+\pi^-\pi^0$
<0.20	90		[3] PARROUR	76B	OSPK	$e^+ e^- \rightarrow \pi^+\pi^-\pi^0$

[1] From a fit without limitations on charged and neutral ρ masses and widths. NODE=M004R;LINKAGE=L1

[2] Adding the direct and $\omega\pi$ contributions and considering the interference between the $\rho\pi$ and $\pi^+\pi^-\pi^0$. NODE=M004R;LINKAGE=L2

[3] Neglecting the interference between the $\rho\pi$ and $\pi^+\pi^-\pi^0$. NODE=M004R;LINKAGE=46

$\Gamma(\eta\gamma)/\Gamma_{total}$ Γ_6/Γ

NODE=M004R11
NODE=M004R11

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
1.301±0.025 OUR FIT Error includes scale factor of 1.2. [$(1.303 \pm 0.025) \times 10^{-2}$ OUR 2021 FIT Scale factor = 1.2]				
1.26 ±0.04 OUR AVERAGE				
1.246±0.025±0.057	10k	[1] ACHASOV 98F	SND	$e^+e^- \to 7\gamma$
1.18 ±0.11	279	[2] AKHMETSHIN 95	CMD2	$e^+e^- \to \pi^+\pi^- 3\gamma$
1.30 ±0.06		[3] DRUZHININ 84	ND	$e^+e^- \to 3\gamma$
1.4 ±0.2		[4] DRUZHININ 84	ND	$e^+e^- \to 6\gamma$
0.88 ±0.20	290	KURDADZE 83C	OLYA	$e^+e^- \to 3\gamma$
1.35 ±0.29		ANDREWS 77	CNTR	6.7–10 γCu
1.5 ±0.4	54	[3] COSME 76	OSPK	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.38 ±0.02 ±0.02		[5] AKHMETSHIN 11	CMD2	1.02 $e^+e^- \to \eta\gamma$
1.36 ±0.05 ±0.02	33k	[6] ACHASOV 07B	SND	0.6–1.38 $e^+e^- \to \eta\gamma$
1.373±0.014±0.085	17.4k	[7,8] AKHMETSHIN 05	CMD2	0.60-1.38 $e^+e^- \to \eta\gamma$
1.287±0.013±0.063		[9,10] AKHMETSHIN 01B	CMD2	$e^+e^- \to \eta\gamma$
1.338±0.012±0.052		[11] ACHASOV 00	SND	$e^+e^- \to \eta\gamma$
1.18 ±0.03 ±0.06	2200	[12] AKHMETSHIN 99F	CMD2	$e^+e^- \to \eta\gamma$
1.21 ±0.07		[13] BENAYOUN 96	RVUE	0.54-1.04 $e^+e^- \to \eta\gamma$

NEW

OCCUR=2

[1] Using $B(\phi \to e^+e^-) = (2.99 \pm 0.08) \times 10^{-4}$ and $B(\eta \to 3\pi^0) = (32.2 \pm 0.4) \times 10^{-2}$.
[2] From $\pi^+\pi^-\pi^0$ decay mode of η.
[3] From 2γ decay mode of η.
[4] From $3\pi^0$ decay mode of η.
[5] Combined analysis of the CMD-2 data on $\phi \to K^+K^-$, $K^0_S K^0_L$, $\pi^+\pi^-\pi^0$, $\eta\gamma$ assuming that the sum of their branching fractions is 0.99741 ± 0.00007.
[6] ACHASOV 07B reports $[\Gamma(\phi(1020) \to \eta\gamma)/\Gamma_{total}] \times [B(\phi(1020) \to e^+e^-)] = (4.050 \pm 0.067 \pm 0.118) \times 10^{-6}$ which we divide by our best value $B(\phi(1020) \to e^+e^-) = (2.979 \pm 0.033) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Supersedes ACHASOV 00D and ACHASOV 06A.
[7] Using $B(\phi \to e^+e^-) = (2.98 \pm 0.04) \times 10^{-4}$ and $B(\eta \to \gamma\gamma) = 39.43 \pm 0.26\%$.
[8] Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\eta\gamma)/\Gamma^2_{total}$.
[9] Using $B(\phi \to e^+e^-) = (2.99 \pm 0.08) \times 10^{-4}$ and $B(\eta \to 3\pi^0) = (32.24 \pm 0.29) \times 10^{-2}$.
[10] The combined fit from 600 to 1380 MeV taking into account $\rho(770)$, $\omega(782)$, $\phi(1020)$, and $\rho(1450)$ (mass and width fixed at 1450 MeV and 310 MeV respectively).
[11] From the $\eta \to 2\gamma$ decay and using $B(\phi \to e^+e^-) = (2.99 \pm 0.08) \times 10^{-4}$.
[12] From $\pi^+\pi^-\pi^0$ decay mode of η and using $B(\phi \to e^+e^-) = (2.99 \pm 0.08) \times 10^{-4}$.
[13] Reanalysis of DRUZHININ 84, DOLINSKY 89, and DOLINSKY 91 taking into account a triangle anomaly contribution.

NODE=M004R11;LINKAGE=AC
NODE=M004R11;LINKAGE=Z3
NODE=M004R11;LINKAGE=A
NODE=M004R11;LINKAGE=C
NODE=M004R11;LINKAGE=AN
NODE=M004R11;LINKAGE=AO
NODE=M004R11;LINKAGE=AH
NODE=M004R11;LINKAGE=AK
NODE=M004R;LINKAGE=AK
NODE=M004R;LINKAGE=BQ
NODE=M004R;LINKAGE=GA
NODE=M004R;LINKAGE=FF
NODE=M004R;LINKAGE=TS

$\Gamma(\pi^0\gamma)/\Gamma_{total}$ Γ_7/Γ

NODE=M004R17
NODE=M004R17

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
1.32 ±0.05 OUR FIT [$(1.32 \pm 0.06) \times 10^{-3}$ OUR 2021 FIT]				
1.31 ±0.13 OUR AVERAGE				
1.30 ±0.13		DRUZHININ 84	ND	$e^+e^- \to 3\gamma$
1.4 ±0.5	32	COSME 76	OSPK	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.367±0.072		[1] ACHASOV 16A	SND	0.60–1.38 $e^+e^- \to \pi^0\gamma$
1.258±0.037±0.077	18k	[2,3] AKHMETSHIN 05	CMD2	0.60-1.38 $e^+e^- \to \pi^0\gamma$
$1.226 \pm 0.036^{+0.096}_{-0.089}$		[4] ACHASOV 00	SND	$e^+e^- \to \pi^0\gamma$
1.26 ±0.17		[5] BENAYOUN 96	RVUE	0.54-1.04 $e^+e^- \to \pi^0\gamma$

NEW

OCCUR=3

[1] Using $B(\phi \to e^+e^-)$ from PDG 15. Supersedes ACHASOV 00.
[2] Using $B(\phi \to e^+e^-) = (2.98 \pm 0.04) \times 10^{-4}$.
[3] Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\pi^0\gamma)/\Gamma^2_{total}$.
[4] From the $\pi^0 \to 2\gamma$ decay and using $B(\phi \to e^+e^-) = (2.99 \pm 0.08) \times 10^{-4}$.
[5] Reanalysis of DRUZHININ 84, DOLINSKY 89, and DOLINSKY 91 taking into account a triangle anomaly contribution.

NODE=M004R17;LINKAGE=D
NODE=M004R17;LINKAGE=AH
NODE=M004R17;LINKAGE=AK
NODE=M004R;LINKAGE=3G
NODE=M004R17;LINKAGE=TS

$\Gamma(\eta\gamma)/\Gamma(\pi^0\gamma)$ Γ_6/Γ_7

NODE=M004R42
NODE=M004R42

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$10.9 \pm 0.3^{+0.7}_{-0.8}$	ACHASOV 00	SND	$e^+e^- \to \eta\gamma, \pi^0\gamma$

$\Gamma(e^+e^-)/\Gamma_{total}$ Γ_9/Γ

NODE=M004R16

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.979±0.033 OUR FIT Error includes scale factor of 1.3. [$(2.974 \pm 0.034) \times 10^{-4}$ OUR 2021 FIT Scale factor = 1.3]					
2.98 ±0.07 OUR AVERAGE Error includes scale factor of 1.1.					
2.93 ±0.14	1900k	[1] ACHASOV	01E	SND	$e^+e^- \to K^+K^-$, $K_S K_L$, $\pi^+\pi^-\pi^0$
2.88 ±0.09	55600	AKHMETSHIN	95	CMD2	$e^+e^- \to$ hadrons
3.00 ±0.21	3681	BUKIN	78C	OLYA	$e^+e^- \to$ hadrons
3.10 ±0.14		[2] PARROUR	76	OSPK	e^+e^-
3.3 ±0.3		COSME	74	OSPK	$e^+e^- \to$ hadrons
2.81 ±0.25	681	BALAKIN	71	OSPK	$e^+e^- \to$ hadrons
3.50 ±0.27		CHATELUS	71	OSPK	e^+e^-

NEW

[1] From the combined fit assuming that the total $\phi(1020)$ production cross section is saturated by those of K^+K^-, $K_S K_L$, $\pi^+\pi^-\pi^0$, and $\eta\gamma$ decays modes and using ACHASOV 00B for the $\eta\gamma$ decay mode. NODE=M004R16;LINKAGE=AE

[2] Using total width 4.2 MeV. They detect 3π mode and observe significant interference with ω tail. This is accounted for in the result quoted above. NODE=M004R16;LINKAGE=E

$\Gamma(\mu^+\mu^-)/\Gamma_{total}$ Γ_{10}/Γ

NODE=M004R10

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
2.85±0.19 OUR FIT				
[$(2.86 \pm 0.19) \times 10^{-4}$ OUR 2021 FIT]				
2.5 ±0.4 OUR AVERAGE				
2.69±0.46	[1] HAYES	71	CNTR	8.3,9.8 $\gamma C \to \mu^+\mu^- X$
2.17±0.60	[1] EARLES	70	CNTR	6.0 $\gamma C \to \mu^+\mu^- X$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.87±0.20±0.14	[2] ACHASOV	01G	SND	$e^+e^- \to \mu^+\mu^-$
3.30±0.45±0.32	[3] ACHASOV	99C	SND	$e^+e^- \to \mu^+\mu^-$
4.83±1.02	[4] VASSERMAN	81	OLYA	$e^+e^- \to \mu^+\mu^-$
2.87±1.98	[4] AUGUSTIN	73	OSPK	$e^+e^- \to \mu^+\mu^-$

NEW

[1] Neglecting interference between resonance and continuum. NODE=M004R10;LINKAGE=A

[2] Using $B(\phi \to e^+e^-) = (2.91 \pm 0.07) \times 10^{-4}$. NODE=M004R;LINKAGE=GZ

[3] Using $B(\phi \to e^+e^-)=(2.99 \pm 0.08) \times 10^{-4}$. NODE=M004R10;LINKAGE=8D

[4] Recalculated by us using $B(\phi \to e^+e^-)= (2.99 \pm 0.08) \times 10^{-4}$. NODE=M004R;LINKAGE=VA

$\Gamma(\eta e^+e^-)/\Gamma_{total}$ Γ_{11}/Γ

NODE=M004R24

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT	
1.08 ±0.04 OUR AVERAGE						
1.075±0.007±0.038	30k	[1] BABUSCI	15	KLOE	1.02 $e^+e^- \to \eta e^+e^-$	
1.19 ±0.19 ±0.12	213	[2] ACHASOV	01B	SND	$e^+e^- \to \eta e^+e^-$	
1.14 ±0.10 ±0.06	355	[3] AKHMETSHIN	01	CMD2	$e^+e^- \to \eta e^+e^-$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1.13 ±0.14 ±0.07	183	[4] AKHMETSHIN	01	CMD2	$e^+e^- \to \eta e^+e^-$	OCCUR=2
1.21 ±0.14 ±0.09	130	[5] AKHMETSHIN	01	CMD2	$e^+e^- \to \eta e^+e^-$	OCCUR=3
1.04 ±0.20 ±0.08	42	[6] AKHMETSHIN	01	CMD2	$e^+e^- \to \eta e^+e^-$	OCCUR=4
1.3 $^{+0.8}_{-0.6}$	7	GOLUBEV	85	ND	$e^+e^- \to \eta e^+e^-$	

[1] Using $B(\eta \to 3\pi^0) = (32.57 \pm 0.23)\%$ from PDG 12. NODE=M004R24;LINKAGE=A

[2] Using $B(\eta \to \gamma\gamma) = (39.25 \pm 0.32)\%$, $B(\phi \to \eta\gamma) = (1.26 \pm 0.06)\%$, and $B(\phi \to e^+e^-) = (3.00 \pm 0.06) \times 10^{-4}$. NODE=M004R;LINKAGE=VM

[3] The average of the branching ratios separately obtained from the $\eta \to \gamma\gamma$, $3\pi^0$, $\pi^+\pi^-\pi^0$ decays. NODE=M004R;LINKAGE=H1

[4] From $\eta \to \gamma\gamma$ decays and using $B(\eta \to \gamma\gamma) = (39.33 \pm 0.25) \times 10^{-2}$, $B(\eta \to \pi^+\pi^-\gamma) = (4.75 \pm 11) \times 10^{-2}$, and $B(\phi \to \eta\gamma) = (1.297 \pm 0.033) \times 10^{-2}$. NODE=M004R;LINKAGE=H2

[5] From $\eta \to 3\pi^0$ decays and using $B(\pi^0 \to \gamma\gamma) = (98.798 \pm 0.033) \times 10^{-2}$, $B(\eta \to 3\pi^0) = (32.24 \pm 0.29) \times 10^{-2}$, $B(\eta \to \pi^+\pi^-\gamma) = (4.75 \pm 0.11) \times 10^{-2}$, and $B(\phi \to \eta\gamma) = (1.297 \pm 0.033) \times 10^{-2}$. NODE=M004R;LINKAGE=H3

[6] From $\eta \to \pi^+\pi^-\pi^0$ decays and using $B(\pi^0 \to \gamma\gamma) = (98.798 \pm 0.033) \times 10^{-2}$, $B(\pi^0 \to e^+e^-\gamma) = (1.198 \pm 0.032) \times 10^{-2}$, $B(\eta \to \pi^+\pi^-\pi^0) = (23.0 \pm 0.4) \times 10^{-2}$, $B(\phi \to \pi^+\pi^-\pi^0) = (15.5 \pm 0.6) \times 10^{-2}$, and $B(\phi \to \eta\gamma) = (1.297 \pm 0.033) \times 10^{-2}$. NODE=M004R;LINKAGE=H4

$\Gamma(\pi^+\pi^-)/\Gamma_{total}$ — Γ_{12}/Γ

NODE=M004R18
NODE=M004R18

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.71\pm0.11\pm0.09$		[1] ACHASOV	00C	SND	$e^+e^-\to\pi^+\pi^-$
$0.65^{+0.38}_{-0.29}$		[1] GOLUBEV	86	ND	$e^+e^-\to\pi^+\pi^-$
$2.01^{+1.07}_{-0.84}$		[1] VASSERMAN	81	OLYA	$e^+e^-\to\pi^+\pi^-$
<6.6	95	BUKIN	78B	OLYA	$e^+e^-\to\pi^+\pi^-$
<2.7	95	ALVENSLEB...	72	CNTR	6.7 γC $\to$ C$\pi^+\pi^-$

[1] Using B($\phi\to e^+e^-$)=(2.99 ± 0.08) × 10^{-4}. NODE=M004R18;LINKAGE=8D

$\Gamma(\omega\pi^0)/\Gamma_{total}$ — Γ_{13}/Γ

NODE=M004R28
NODE=M004R28

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
4.7±0.5 OUR FIT				
$\mathbf{5.2^{+1.3}_{-1.1}}$	[1,2] AULCHENKO	00A	SND	$e^+e^-\to\pi^+\pi^-\pi^0\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
4.4 ± 0.6	[3] AMBROSINO	08G	KLOE	$e^+e^-\to\pi^+\pi^-2\pi^0$, $2\pi^0\gamma$
~5.4	[4] ACHASOV	00E	SND	$e^+e^-\to\pi^0\pi^0\gamma$
$5.5^{+1.6}_{-1.4}\pm0.3$	[2,5] AULCHENKO	00A	SND	$e^+e^-\to\pi^+\pi^-\pi^0\pi^0$
$4.8^{+1.9}_{-1.7}\pm0.8$	[4] ACHASOV	99	SND	$e^+e^-\to\pi^+\pi^-\pi^0\pi^0$

OCCUR=2

[1] Using the 1996 and 1998 data. NODE=M004R28;LINKAGE=K2
[2] (2.3 ± 0.3)% correction for other decay modes of the ω(782) applied. NODE=M004R28;LINKAGE=K3
[3] Not independent of the corresponding $\Gamma(\omega\pi^0)\times\Gamma(e^+e^-)$ / Γ^2(total). NODE=M004R28;LINKAGE=AM
[4] Using the 1996 data. NODE=M004R28;LINKAGE=VS
[5] Using the 1998 data. NODE=M004R28;LINKAGE=K1

$\Gamma(\omega\gamma)/\Gamma_{total}$ — Γ_{14}/Γ

NODE=M004R14
NODE=M004R14

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.05	84	LINDSEY	66	HBC	2.1–2.7 $K^-p\to\Lambda\pi^+\pi^-$ neutrals

$\Gamma(\rho\gamma)/\Gamma_{total}$ — Γ_{15}/Γ

NODE=M004R15
NODE=M004R15

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 0.12	90	[1] AKHMETSHIN	99B	CMD2	$e^+e^-\to\pi^+\pi^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<7	90	AKHMETSHIN	97C	CMD2	$e^+e^-\to\pi^+\pi^-\gamma$
<200	84	LINDSEY	66	HBC	2.1–2.7 $K^-p\to\Lambda\pi^+\pi^-$ neutrals

[1] Supersedes AKHMETSHIN 97C. NODE=M004R;LINKAGE=1N

$\Gamma(\pi^+\pi^-\gamma)/\Gamma_{total}$ — Γ_{16}/Γ

NODE=M004R12
NODE=M004R12

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.41±0.12±0.04		30175	[1] AKHMETSHIN	99B	CMD2	$e^+e^-\to\pi^+\pi^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.3	90		[2] AKHMETSHIN	97C	CMD2	$e^+e^-\to\pi^+\pi^-\gamma$
<600	90		KALBFLEISCH	75	HBC	2.18 $K^-p\to\Lambda\pi^+\pi^-\gamma$
<70	90		COSME	74	OSPK	$e^+e^-\to\pi^+\pi^-\gamma$
<400	90		LINDSEY	65	HBC	2.1–2.7 $K^-p\to\Lambda\pi^+\pi^-$ neutrals

[1] For $E_\gamma>20$ MeV and assuming that B(ϕ(1020) $\to f_0(980)\gamma$) is negligible. Supersedes AKHMETSHIN 97C. NODE=M004R;LINKAGE=2N
[2] For $E_\gamma>20$ MeV and assuming that B(ϕ(1020) $\to f_0(980)\gamma$) is negligible. NODE=M004R12;LINKAGE=Z3

$\Gamma(f_0(980)\gamma)/\Gamma_{total}$ — Γ_{17}/Γ

NODE=M004R30
NODE=M004R30

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
3.22±0.19 OUR FIT Error includes scale factor of 1.1.						
3.21±0.19 OUR AVERAGE						
$3.21^{+0.03}_{-0.09}\pm0.18$			[1] AMBROSINO	07	KLOE	$e^+e^-\to\pi^0\pi^0\gamma$
$2.90\pm0.21\pm1.54$			[2] AKHMETSHIN	99C	CMD2	$e^+e^-\to\pi^+\pi^-\gamma$, $\pi^0\pi^0\gamma$

OCCUR=3

• • • We do not use the following data for averages, fits, limits, etc. • • •

4.47±0.21		2438	[3] ALOISIO	02D	KLOE	$e^+e^- \to \pi^0\pi^0\gamma$	
3.5 ±0.3 $^{+1.3}_{-0.5}$		419	[4,5] ACHASOV	00H	SND	$e^+e^- \to \pi^0\pi^0\gamma$	
1.93±0.46±0.50		27188	[6] AKHMETSHIN	99B	CMD2	$e^+e^- \to \pi^+\pi^-\gamma$	
3.05±0.25±0.72		268	[7] AKHMETSHIN	99C	CMD2	$e^+e^- \to \pi^0\pi^0\gamma$	
1.5 ±0.5		268	[8] AKHMETSHIN	99C	CMD2	$e^+e^- \to \pi^0\pi^0\gamma$	OCCUR=2
3.42±0.30±0.36		164	[4] ACHASOV	98I	SND	$e^+e^- \to 5\gamma$	
< 1	90		[9] AKHMETSHIN	97C	CMD2	$e^+e^- \to \pi^+\pi^-\gamma$	
< 7	90		[10] AKHMETSHIN	97C	CMD2	$e^+e^- \to \pi^+\pi^-\gamma$	OCCUR=2
< 20	90		DRUZHININ	87	ND	$e^+e^- \to \pi^0\pi^0\gamma$	

[1] Obtained by the authors taking into account the $\pi^+\pi^-$ decay mode. Includes a component due to $\pi\pi$ production via the $f_0(500)$ meson. Supersedes ALOISIO 02D. NODE=M004R30;LINKAGE=MB
[2] From the combined fit of the photon spectra in the reactions $e^+e^- \to \pi^+\pi^-\gamma$, $\pi^0\pi^0\gamma$. NODE=M004R;LINKAGE=SL
[3] From the negative interference with the $f_0(500)$ meson of AITALA 01B using the ACHASOV 89 parameterization for the $f_0(980)$, a Breit-Wigner for the $f_0(500)$, and ACHASOV 01F for the $\rho\pi$ contribution. Superseded by AMBROSINO 07. NODE=M004R;LINKAGE=KD
[4] Assuming that the $\pi^0\pi^0\gamma$ final state is completely determined by the $f_0\gamma$ mechanism, neglecting the decay B($\phi \to K\overline{K}\gamma$) and using B($f_0 \to \pi^+\pi^-$)= 2B($f_0 \to \pi^0\pi^0$). NODE=M004R;LINKAGE=AI
[5] Using the value B($\phi \to \eta\gamma$)=(1.338 ± 0.053) × 10^{-2}. NODE=M004R;LINKAGE=U8
[6] For $E_\gamma > 20$ MeV. Supersedes AKHMETSHIN 97C. NODE=M004R;LINKAGE=3N
[7] Neglecting other intermediate mechanisms ($\rho\pi$, $\sigma\gamma$). NODE=M004R;LINKAGE=SM
[8] A narrow pole fit taking into account $f_0(980)$ and $f_0(1200)$ intermediate mechanisms. NODE=M004R;LINKAGE=ST
[9] For destructive interference with the Bremsstrahlung process NODE=M004R30;LINKAGE=A
[10] For constructive interference with the Bremsstrahlung process NODE=M004R30;LINKAGE=B

$\Gamma(f_0(980)\gamma)/\Gamma(\eta\gamma)$ Γ_{17}/Γ_6

NODE=M004R44
NODE=M004R44

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
2.48±0.15 OUR FIT Error includes scale factor of 1.1. [($2.47^{+0.15}_{-0.16}$)×10^{-2} OUR 2021 FIT Scale factor = 1.1] NEW					
2.6 ±0.2 $^{+0.8}_{-0.3}$	419	[1] ACHASOV	00H	SND	$e^+e^- \to \pi^0\pi^0\gamma$

[1] Assuming that the $\pi^0\pi^0\gamma$ final state is completely determined by the $f_0\gamma$ mechanism, neglecting the decay B($\phi \to K\overline{K}\gamma$) and using B($f_0 \to \pi^+\pi^-$)= 2B($f_0 \to \pi^0\pi^0$). NODE=M004R44;LINKAGE=AI

$\Gamma(\pi^0\pi^0\gamma)/\Gamma_{total}$ Γ_{18}/Γ

NODE=M004R26
NODE=M004R26

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
1.07 ±0.06 OUR AVERAGE						
1.07 $^{+0.01}_{-0.03}$ $^{+0.06}_{-0.06}$			[1] AMBROSINO	07	KLOE	$e^+e^- \to \pi^0\pi^0\gamma$
1.08 ±0.17 ±0.09		268	AKHMETSHIN	99C	CMD2	$e^+e^- \to \pi^0\pi^0\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1.09 ±0.03 ±0.05		2438	ALOISIO	02D	KLOE	$e^+e^- \to \pi^0\pi^0\gamma$
1.158±0.093±0.052		419	[2,3] ACHASOV	00H	SND	$e^+e^- \to \pi^0\pi^0\gamma$
<10	90		DRUZHININ	87	ND	$e^+e^- \to 5\gamma$

[1] Supersedes ALOISIO 02D. NODE=M004R26;LINKAGE=MB
[2] Using the value B($\phi \to \eta\gamma$)=(1.338 ± 0.053) × 10^{-2}. NODE=M004R26;LINKAGE=U8
[3] Supersedes ACHASOV 98I. Excluding $\omega\pi^0$. NODE=M004R26;LINKAGE=V8

$\Gamma(\pi^0\pi^0\gamma)/\Gamma(\eta\gamma)$ Γ_{18}/Γ_6

NODE=M004R39
NODE=M004R39

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
0.86 ±0.04 OUR FIT					
0.865±0.070±0.017	419	[1] ACHASOV	00H	SND	$e^+e^- \to \pi^0\pi^0\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.90 ±0.08 ±0.07	164	ACHASOV	98I	SND	$e^+e^- \to 5\gamma$

[1] Supersedes ACHASOV 98I. Excluding $\omega\pi^0$. NODE=M004R39;LINKAGE=V8

$\Gamma(\pi^+\pi^-\pi^+\pi^-)/\Gamma_{total}$ Γ_{19}/Γ

NODE=M004R22
NODE=M004R22

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
6.5 ±2.7 ±1.6		6.8k	[1] AKHMETSHIN	17	CMD3	$e^+e^- \to \pi^+\pi^-\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
3.93±1.74±2.14		3.3k	AKHMETSHIN	00E	CMD2	$e^+e^- \to \pi^+\pi^-\pi^+\pi^-$
< 870	90		CORDIER	79	WIRE	$e^+e^- \to \pi^+\pi^-\pi^+\pi^-$

[1] Using the cross section at the ϕ meson peak $\sigma(\phi) = 4172 \pm 42$ nb, the nonresonant cross section $\sigma(0) = 1.263 \pm 0.027$ nb and Re(Z) = 0.146 ± 0.030, Im(Z) = −0.002 ± 0.024 for the complex amplitude of the $\phi \to \pi^+\pi^-\pi^+\pi^-$ transition. NODE=M004R22;LINKAGE=A

$\Gamma(\pi^+\pi^+\pi^-\pi^-\pi^0)/\Gamma_{total}$ Γ_{20}/Γ

NODE=M004R27
NODE=M004R27

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
< 4.6	90	AKHMETSHIN	00E	CMD2	$e^+e^- \to \pi^+\pi^-\pi^+\pi^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<150	95	BARKOV	88	CMD	$e^+e^- \to \pi^+\pi^-\pi^+\pi^-\pi^0$

$\Gamma(\pi^0 e^+ e^-)/\Gamma_{total}$ Γ_{21}/Γ

NODE=M004R31
NODE=M004R31

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$1.33^{+0.07}_{-0.10}$ OUR AVERAGE						
$1.35\pm0.05^{+0.05}_{-0.10}$		9.5k	[1] ANASTASI	16B	KLOE	$e^+e^- \to \pi^0 e^+ e^-$
$1.01\pm0.28\pm0.29$		52	[2] ACHASOV	02D	SND	$e^+e^- \to \pi^0 e^+ e^-$
$1.22\pm0.34\pm0.21$		46	[3] AKHMETSHIN	01C	CMD2	$e^+e^- \to \pi^0 e^+ e^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<12	90		DOLINSKY	88	ND	$e^+e^- \to \pi^0 e^+ e^-$

[1] Using B($\pi^0 \to \gamma\gamma$) from the 2014 Edition of this Review (PDG 14). NODE=M004R31;LINKAGE=A

[2] Using various branching ratios from the 2000 Edition of this Review (PDG 00). NODE=M004R;LINKAGE=DS

[3] Using B($\pi^0 \to \gamma\gamma$) = 0.98798 ± 0.00032, B($\phi \to \eta\gamma$) = $(1.297 \pm 0.033) \times 10^{-2}$, and B($\eta \to \pi^+\pi^-\gamma$) = $(4.75 \pm 0.11) \times 10^{-2}$. NODE=M004R;LINKAGE=5H

$\Gamma(\pi^0\eta\gamma)/\Gamma_{total}$ Γ_{22}/Γ

NODE=M004R32
NODE=M004R32

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
7.27 ± 0.30 OUR AVERAGE Error includes scale factor of 1.5. See the ideogram below.						
7.06 ± 0.22		16.9k	[1] AMBROSINO	09F	KLOE	1.02 $e^+e^- \to \eta\pi^0\gamma$
$8.51\pm0.51\pm0.57$		607	[2] ALOISIO	02C	KLOE	$e^+e^- \to \eta\pi^0\gamma$
$7.96\pm0.60\pm0.40$		197	[3] ALOISIO	02C	KLOE	$e^+e^- \to \eta\pi^0\gamma$ (OCCUR=2)
$8.8\ \pm1.4\ \pm0.9$		36	[4] ACHASOV	00F	SND	$e^+e^- \to \eta\pi^0\gamma$
$9.0\ \pm2.4\ \pm1.0$		80	AKHMETSHIN	99C	CMD2	$e^+e^- \to \eta\pi^0\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$7.01\pm0.10\pm0.20$		13.3k	[2,5] AMBROSINO	09F	KLOE	1.02 $e^+e^- \to \eta\pi^0\gamma$ (OCCUR=2)
$7.12\pm0.13\pm0.22$		3.6k	[3,6] AMBROSINO	09F	KLOE	1.02 $e^+e^- \to \eta\pi^0\gamma$ (OCCUR=3)
$8.3\ \pm2.3\ \pm1.2$		20	ACHASOV	98B	SND	$e^+e^- \to 5\gamma$
<250	90		DOLINSKY	91	ND	$e^+e^- \to \pi^0\eta\gamma$

[1] Combined results of $\eta \to \gamma\gamma$ and $\eta \to \pi^+\pi^-\pi^0$ decay modes measurements. NODE=M004R32;LINKAGE=AM

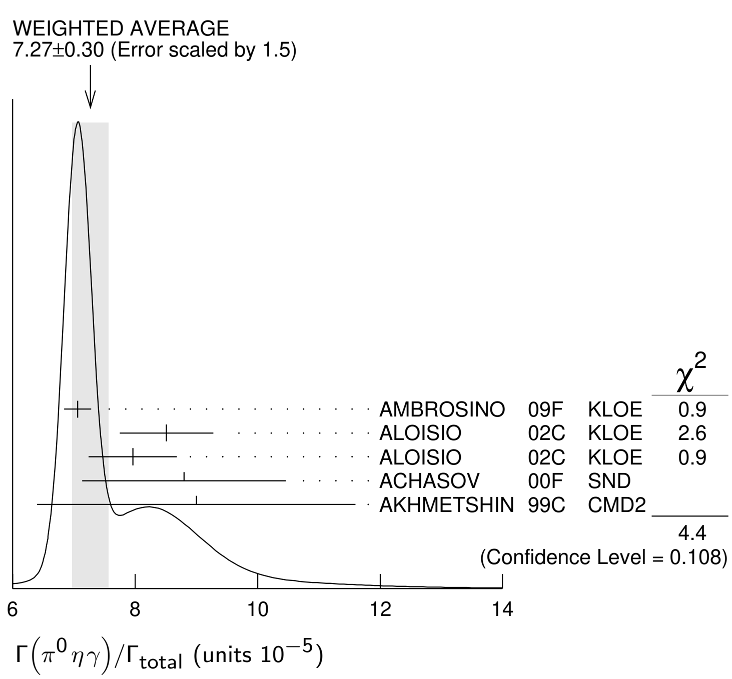
[2] From the decay mode $\eta \to \gamma\gamma$. NODE=M004R;LINKAGE=C1

[3] From the decay mode $\eta \to \pi^+\pi^-\pi^0$. NODE=M004R;LINKAGE=C2

[4] Supersedes ACHASOV 98B. NODE=M004R32;LINKAGE=AF

[5] Using B($\phi \to \eta\gamma$) = (1.304 ± 0.025)%, B($\eta \to 3\pi^0$) = (32.56 ± 0.23)%, and B($\eta \to \gamma\gamma$) = (39.31 ± 0.20)%. NODE=M004R32;LINKAGE=AB

[6] Using B($\phi \to \eta\gamma$) = (1.304 ± 0.025)%, B($\eta \to 3\pi^0$) = (32.56 ± 0.23)%, and B($\eta \to \pi^+\pi^-\pi^0$) = (22.73 ± 0.28)%. NODE=M004R32;LINKAGE=AR



$\Gamma(a_0(980)\gamma)/\Gamma_{total}$ — Γ_{23}/Γ

NODE=M004R33
NODE=M004R33

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
7.6±0.6 OUR FIT						
7.6±0.6 OUR AVERAGE						
7.4±0.7			[1] ALOISIO	02C	KLOE	$e^+e^- \to \eta\pi^0\gamma$
8.8±1.7		36	[2] ACHASOV	00F	SND	$e^+e^- \to \eta\pi^0\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
11 ±2			[3] GOKALP	02	RVUE	$e^+e^- \to \eta\pi^0\gamma$
<500	90		DOLINSKY	91	ND	$e^+e^- \to \pi^0\eta\gamma$

[1] Using $M_{a_0(980)}$=984.8 MeV and assuming $a_0(980)\gamma$ dominance. NODE=M004R;LINKAGE=C3

[2] Assuming $a_0(980)\gamma$ dominance in the $\eta\pi^0\gamma$ final state. NODE=M004R33;LINKAGE=AF

[3] Using data of ACHASOV 00F. NODE=M004R;LINKAGE=GK

$\Gamma(f_0(980)\gamma)/\Gamma(a_0(980)\gamma)$ — Γ_{17}/Γ_{23}

NODE=M004R47
NODE=M004R47

VALUE	DOCUMENT ID		TECN	COMMENT
6.1±0.6	[1] ALOISIO	02C	KLOE	$e^+e^- \to \eta\pi^0\gamma$

[1] Using results of ALOISIO 02D and assuming that $f_0(980)$ decays into $\pi\pi$ only and $a_0(980)$ into $\eta\pi$ only. NODE=M004R;LINKAGE=C4

$\Gamma(K^0\overline{K}^0\gamma)/\Gamma_{total}$ — Γ_{24}/Γ

NODE=M004R48
NODE=M004R48

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.9\times10^{-8}$	90	AMBROSINO	09C	KLOE	$e^+e^- \to K^0_S K^0_S\gamma$

$\Gamma(\eta'(958)\gamma)/\Gamma_{total}$ — Γ_{25}/Γ

NODE=M004R25
NODE=M004R25

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
6.21±0.21 OUR FIT						
[$(6.22 \pm 0.21)\times10^{-5}$ OUR 2021 FIT]						
6.21±0.30 OUR AVERAGE						
[$(6.22 \pm 0.30)\times10^{-5}$ OUR 2021 AVERAGE]						
6.21±0.27±0.12		3407	[1] AMBROSINO	07A	KLOE	1.02 $e^+e^- \to \pi^+\pi^-7\gamma$
$6.7\ ^{+2.8}_{-2.4}$ ±0.8		12	[2] AULCHENKO	03B	SND	$e^+e^- \to \eta'\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$6.7\ ^{+5.0}_{-4.2}$ ±1.5		7	AULCHENKO	03B	SND	$e^+e^- \to 7\gamma$
6.10±0.61±0.43		120	[3] ALOISIO	02E	KLOE	1.02 $e^+e^- \to \pi^+\pi^-3\gamma$
$8.2\ ^{+2.1}_{-1.9}$ ±1.1		21	[4] AKHMETSHIN	00B	CMD2	$e^+e^- \to \pi^+\pi^-3\gamma$
$4.9\ ^{+2.2}_{-1.8}$ ±0.6		9	[5] AKHMETSHIN	00F	CMD2	$e^+e^- \to \pi^+\pi^-\pi^+\pi^- \geq 2\gamma$
6.4 ±1.6		30	[6] AKHMETSHIN	00F	CMD2	$e^+e^- \to \eta'(958)\gamma$
$6.7\ ^{+3.4}_{-2.9}$ ±1.0		5	[7] AULCHENKO	99	SND	$e^+e^- \to \pi^+\pi^-3\gamma$
<11	90		AULCHENKO	98	SND	$e^+e^- \to 7\gamma$
$12\ ^{+7}_{-5}$ ±2		6	[4] AKHMETSHIN	97B	CMD2	$e^+e^- \to \pi^+\pi^- 3\gamma$
<41	90		DRUZHININ	87	ND	$e^+e^- \to \gamma\eta\pi^+\pi^-$

NEW
NEW
OCCUR=2
OCCUR=2

[1] AMBROSINO 07A reports $[\Gamma(\phi(1020) \to \eta'(958)\gamma)/\Gamma_{total}]$ / $[B(\phi(1020) \to \eta\gamma)]$ = $(4.77 \pm 0.09 \pm 0.19)\times10^{-3}$ which we multiply by our best value $B(\phi(1020) \to \eta\gamma)$ = $(1.301 \pm 0.025)\times10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M004R25;LINKAGE=AM

[2] Averaging AULCHENKO 03B with AULCHENKO 99. NODE=M004R25;LINKAGE=BK

[3] Using $B(\phi \to \eta\gamma)$= (1.297 ± 0.033)%. NODE=M004R;LINKAGE=E2

[4] Using the value $B(\phi \to \eta\gamma) = (1.26 \pm 0.06)\times10^{-2}$. NODE=M004R25;LINKAGE=Q

[5] Using $B(\phi \to K^0_L K^0_S)$ = (33.8 ± 0.6)%. NODE=M004R;LINKAGE=T2

[6] Averaging AKHMETSHIN 00B with AKHMETSHIN 00F. NODE=M004R;LINKAGE=T3

[7] Using the value $B(\eta' \to \eta\pi^+\pi^-)$= $(43.7 \pm 1.5)\times10^{-2}$ and $B(\eta \to \gamma\gamma)$= $(39.25 \pm 0.31)\times10^{-2}$. NODE=M004R25;LINKAGE=AU

$\Gamma(\eta'(958)\gamma)/\Gamma(K^0_L K^0_S)$ — Γ_{25}/Γ_2

NODE=M004R43
NODE=M004R43

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.83±0.06 OUR FIT					
$1.46^{+0.64}_{-0.54}$±0.18	9	[1] AKHMETSHIN	00F	CMD2	$e^+e^- \to \pi^+\pi^-\pi^+\pi^- \geq 2\gamma$

[1] Using various branching ratios of K^0_S, K^0_L, η, η' from the 2000 edition (The European Physical Journal **C15** 1 (2000)) of this Review. NODE=M004R;LINKAGE=T1

$\Gamma(\eta'(958)\gamma)/\Gamma(\eta\gamma)$ — Γ_{25}/Γ_6

NODE=M004R34

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
4.77±0.15 OUR FIT				
4.78±0.20 OUR AVERAGE				
4.77±0.09±0.19	3407	AMBROSINO 07A	KLOE	1.02 $e^+e^- \to \pi^+\pi^-7\gamma$
4.70±0.47±0.31	120	[1] ALOISIO 02E	KLOE	1.02 $e^+e^- \to \pi^+\pi^-3\gamma$
$6.5\ ^{+1.7}_{-1.5}\ \pm0.8$	21	AKHMETSHIN 00B	CMD2	$e^+e^- \to \pi^+\pi^-3\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$9.5\ ^{+5.2}_{-4.0}\ \pm1.4$	6	[2] AKHMETSHIN 97B	CMD2	$e^+e^- \to \pi^+\pi^-3\gamma$

[1] From the decay mode $\eta' \to \eta\pi^+\pi^-$, $\eta \to \gamma\gamma$. NODE=M004R;LINKAGE=E1

[2] Superseded by AKHMETSHIN 00B. NODE=M004R;LINKAGE=KS

$\Gamma(\eta\pi^0\pi^0\gamma)/\Gamma_{total}$ — Γ_{26}/Γ

NODE=M004R36

VALUE (units 10^{-5})	CL%	DOCUMENT ID	TECN	COMMENT
<2	90	AULCHENKO 98	SND	$e^+e^- \to 7\gamma$

$\Gamma(\mu^+\mu^-\gamma)/\Gamma_{total}$ — Γ_{27}/Γ

NODE=M004R35

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
1.43±0.45±0.14	27188	[1] AKHMETSHIN 99B	CMD2	$e^+e^- \to \mu^+\mu^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.3 ±1.0	824 ± 33	[2] AKHMETSHIN 97C	CMD2	$e^+e^- \to \mu^+\mu^-\gamma$

[1] For $E_\gamma > 20$ MeV. Supersedes AKHMETSHIN 97C. NODE=M004R35;LINKAGE=3N

[2] For $E_\gamma > 20$ MeV. NODE=M004R35;LINKAGE=A

$\Gamma(\rho\gamma\gamma)/\Gamma_{total}$ — Γ_{28}/Γ

NODE=M004R37

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT
<1.2	90	AULCHENKO 08	CMD2	$\phi \to \pi^+\pi^-\gamma\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<5	90	AKHMETSHIN 98	CMD2	$e^+e^- \to \pi^+\pi^-\gamma\gamma$

$\Gamma(\eta\pi^+\pi^-)/\Gamma_{total}$ — Γ_{29}/Γ

NODE=M004R38

VALUE (units 10^{-5})	CL%	DOCUMENT ID	TECN	COMMENT
< 1.8	90	AKHMETSHIN 00E	CMD2	$e^+e^- \to \pi^+\pi^-\pi^+\pi^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
< 6.1	90	AULCHENKO 08	CMD2	$\phi \to \eta\pi^+\pi^-$
<30	90	AKHMETSHIN 98	CMD2	$e^+e^- \to \pi^+\pi^-\gamma\gamma$

$\Gamma(\eta\mu^+\mu^-)/\Gamma_{total}$ — Γ_{30}/Γ

NODE=M004R45

VALUE (units 10^{-6})	CL%	DOCUMENT ID	TECN	COMMENT
<9.4	90	AKHMETSHIN 01	CMD2	$e^+e^- \to \eta e^+e^-$

$\Gamma(\eta U \to \eta e^+e^-)/\Gamma_{total}$ — Γ_{31}/Γ

NODE=M004R01

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<1 \times 10^{-6}$	90	[1] BABUSCI 13B	KLOE	1.02 $e^+e^- \to \eta e^+e^-$

[1] For a narrow vector U with mass between 5 and 470 MeV, from the combined analysis of $\eta \to \pi^+\pi^-\pi^0$ and $\eta \to \pi^0\pi^0\pi^0$ from ARCHILLI 12. Measured 90% CL limits as a function of m_U range from 2.2×10^{-8} to 10^{-6}. NODE=M004R01;LINKAGE=A

$\Gamma(\text{invisible})/\Gamma(K^+K^-)$ — Γ_{32}/Γ_1

NODE=M004R02

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<3.4 \times 10^{-4}$	90	ABLIKIM 18S	BES3	$J/\psi \to \phi\eta \to \phi\pi^+\pi^-\pi^0$

Lepton Family number (LF) violating modes

NODE=M00422A

$\Gamma(e^\pm\mu^\mp)/\Gamma_{total}$ — Γ_{33}/Γ

NODE=M004R29

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<2 \times 10^{-6}$	90	ACHASOV 10A	SND	$e^+e^- \to e^\pm\mu^\mp$

$\pi^+\pi^-\pi^0$ / $\rho\pi$ AMPLITUDE RATIO a_1 IN DECAY OF $\phi \to \pi^+\pi^-\pi^0$

NODE=M004D1

NIECKNIG 12 describes final-state interactions between the three pions in a dispersive framework using data on the $\pi\pi$ P-wave scattering phase shift. NODE=M004D1

NODE=M004D1

VALUE (units 10^{-2})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
9.1±1.2 OUR AVERAGE						
10.1±4.4±1.7		80k	[1] AKHMETSHIN	06	CMD2	1.017–1.021 $e^+e^- \to \pi^+\pi^-\pi^0$
9.0±1.1±0.6		1.98M	[2,3] ALOISIO	03	KLOE	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$-6 < a_1 < 6$		500k	[3] ACHASOV	02	SND	$e^+e^- \to \pi^+\pi^-\pi^0$
$-16 < a_1 < 11$	90	9.8k	[1,4] AKHMETSHIN	98	CMD2	$e^+e^- \to \pi^+\pi^-\gamma\gamma$

[1] Dalitz plot analysis taking into account interference between the contact and $\rho\pi$ amplitudes. NODE=M004D1;LINKAGE=AK
[2] From a fit without limitations on charged and neutral ρ masses and widths. NODE=M004D;LINKAGE=L1
[3] Recalculated by us to match the notations of AKHMETSHIN 98. NODE=M004D;LINKAGE=L3
[4] Assuming zero phase for the contact term. NODE=M004D1;LINKAGE=KL

PARAMETER β IN $\phi \to P e^+ e^-$ DECAYS

NODE=M004230

NODE=M004230

In the one-pole approximation the electromagnetic transition form factor for $\phi \to P e^+ e^-$ ($P = \pi,\eta$) is given as a function of the $e^+ e^-$ invariant mass squared, q^2, by the expression:

$$\left|F(q^2)\right|^2 = (1 - q^2/\Lambda^2)^{-2},$$

where vector meson dominance predicts parameter $\Lambda \approx 0.770$ GeV ($\Lambda^{-2} \approx$ 1.687 GeV^{-2}). The slope of this form factor, $\beta = dF/dq^2(q^2{=}0)$, equals Λ^{-2} in this approximation.

The measurements below obtain β in the one-pole approximation.

PARAMETER β IN $\phi \to \pi^0 e^+ e^-$ DECAY

NODE=M004A00
NODE=M004A00

VALUE (GeV^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
2.02±0.11	9.5k	[1] ANASTASI	16B	KLOE	1.02 $e^+e^- \to \pi^0 e^+e^-$

[1] The error combines statistical and systematic uncertainties. NODE=M004A00;LINKAGE=A

PARAMETER β IN $\phi \to \eta e^+ e^-$ DECAY

NODE=M004BFP
NODE=M004BFP

VALUE (GeV^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
1.29±0.13 OUR AVERAGE					
$1.28 \pm 0.10^{+0.09}_{-0.08}$	30k	BABUSCI	15	KLOE	1.02 $e^+e^- \to \eta e^+e^-$
3.8 ±1.8	213	[1] ACHASOV	01B	SND	1.02 $e^+e^- \to \eta e^+e^-$

[1] The uncertainty is statistical only. The systematic one is negligible, in comparison. NODE=M004BFP;LINKAGE=A

ϕ(1020) REFERENCES

NODE=M004

LEES	21B	PR D104 112003	J.P. Lees *et al.*	(BABAR Collab.)	REFID=61450
ALBRECHT	20	EPJ C80 453	M. Albrecht *et al.*	(Crystal Barrel Collab.)	REFID=60439
HOID	20	EPJ C80 988	B.-L. Hoid, M. Hoferichter, B. Kubis	(BONN, BERN)	REFID=61048
AAIJ	19H	JHEP 1904 063	R. Aaij *et al.*	(LHCb Collab.)	REFID=59670
HOFERICHT...	19	JHEP 1908 137	M. Hoferichter, B.-L. Hoid, B. Kubis	(WASH, BONN)	REFID=60974
ABLIKIM	18S	PR D98 032001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58971
AOUDE	18	PR D98 056021	R.T. Aoude *et al.*		REFID=59987
KOZYREV	18	PL B779 64	E.A. Kozyrev *et al.*	(CMD-3 Collab.)	REFID=58794
AKHMETSHIN	17	PL B768 345	R.R. Akhmetshin *et al.*	(CMD-3 Collab.)	REFID=57893
ACHASOV	16A	PR D93 092001	M.N. Achasov *et al.*	(SND Collab.)	REFID=57513
ANASTASI	16B	PL B757 362	A. Anastasi *et al.*	(KLOE-2 Collab.)	REFID=57399
KOZYREV	16	PL B760 314	E.A. Kozyrev *et al.*	(CMD-3 Collab.)	REFID=57514
BABUSCI	15	PL B742 1	D. Babusci *et al.*	(KLOE-2 Collab.)	REFID=56374
PDG	15	RPP 2015 at pdg.lbl.gov		(PDG Collab.)	REFID=56977;ERROR=7
LEES	14H	PR D89 092002	J.P. Lees *et al.*	(BABAR Collab.)	REFID=55940
PDG	14	CP C38 070001	K. Olive *et al.*	(PDG Collab.)	REFID=55687
BABUSCI	13B	PL B720 111	D. Babusci *et al.*	(KLOE-2 Collab.)	REFID=55068
BENAYOUN	13	EPJ C73 2453	M. Benayoun, P. David, L. DelBuono	(PARIN, BERLIN+)	REFID=55357
LEES	13F	PR D87 052010	J.P. Lees *et al.*	(BABAR Collab.)	REFID=55127
LEES	13Q	PR D88 032013	J.P. Lees *et al.*	(BABAR Collab.)	REFID=55404
ARCHILLI	12	PL B706 251	F. Archilli *et al.*	(KLOE-2 Collab.)	REFID=53951
BENAYOUN	12	EPJ C72 1848	M. Benayoun *et al.*		REFID=54281
NIECKNIG	12	EPJ C72 2014	F. Niecknig, B. Kubis, S.P. Schneider	(BONN)	REFID=54305
PDG	12	PR D86 010001	J. Beringer *et al.*	(PDG Collab.)	REFID=54066
AKHMETSHIN	11	PL B695 412	R.R. Akhmetshin *et al.*	(CMD-2 Collab.)	REFID=53645
ACHASOV	10A	PR D81 057102	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=53352
BENAYOUN	10	EPJ C65 211	M. Benayoun *et al.*		REFID=53212
AMBROSINO	09C	PL B679 10	F. Ambrosino *et al.*	(KLOE Collab.)	REFID=52969
AMBROSINO	09F	PL B681 5	F. Ambrosino *et al.*	(KLOE Collab.)	REFID=53105
AKHMETSHIN	08	PL B669 217	R.R. Akhmetshin *et al.*	(CMD-2 Collab.)	REFID=52572
AMBROSINO	08G	PL B669 223	F. Ambrosino *et al.*	(KLOE Collab.)	REFID=52573
AULCHENKO	08	JETPL 88 85 (Translated from ZETFP 88 93.)	V. Aulchenko *et al.*	(CMD-2 Collab.)	REFID=52268

FLOREZ-BAEZ 08 PR D78 077301 F.V. Florez-Baez, G. Lopez Castro REFID=52584
ACHASOV 07B PR D76 077101 M.N. Achasov *et al.* (SND Collab.) REFID=51942
AMBROSINO 07 EPJ C49 473 F. Ambrosino *et al.* (KLOE Collab.) REFID=51616
AMBROSINO 07A PL B648 267 F. Ambrosino *et al.* (KLOE Collab.) REFID=51646
DUBYNSKIY 07 PR D75 113001 S. Dubynskiy *et al.* REFID=51719
ACHASOV 06A PR D74 014016 M.N. Achasov *et al.* (SND Collab.) REFID=51133
AKHMETSHIN 06 PL B642 203 R.R. Akhmetshin *et al.* (CMD-2 Collab.) REFID=51465
AKHMETSHIN 05 PL B605 26 R.R. Akhmetshin *et al.* (Novosibirsk CMD-2 Collab.) REFID=50330
AMBROSINO 05 PL B608 199 F. Ambrosino *et al.* (KLOE Collab.) REFID=50453
AUBERT,B 05J PR D72 052008 B. Aubert *et al.* (BABAR Collab.) REFID=50824
AKHMETSHIN 04 PL B578 285 R.R. Akhmetshin *et al.* (Novosibirsk CMD-2 Collab.) REFID=49609
AUBERT,B 04N PR D70 072004 B. Aubert *et al.* (BABAR Collab.) REFID=50184
ALOISIO 03 PL B561 55 A. Aloisio *et al.* (KLOE Collab.) REFID=49404
AULCHENKO 03B JETP 97 24 V.M. Aulchenko *et al.* (Novosibirsk SND Collab.) REFID=49613
Translated from ZETF 124 28.
ACHASOV 02 PR D65 032002 M.N. Achasov *et al.* (Novosibirsk SND Collab.) REFID=48549
ACHASOV 02D JETPL 75 449 M.N. Achasov *et al.* (Novosibirsk SND Collab.) REFID=48814
Translated from ZETFP 75 539.
ALOISIO 02C PL B536 209 A. Aloisio *et al.* (KLOE Collab.) REFID=48823
ALOISIO 02D PL B537 21 A. Aloisio *et al.* (KLOE Collab.) REFID=48824
ALOISIO 02E PL B541 45 A. Aloisio *et al.* (KLOE Collab.) REFID=48825
FISCHBACH 02 PL B526 355 E. Fischbach, A.W. Overhauser, B. Woodahl REFID=48575
GOKALP 02 JP G28 2783 A. Gokalp *et al.* REFID=49167
ACHASOV 01B PL B504 275 M.N. Achasov *et al.* (Novosibirsk SND Collab.) REFID=48111
ACHASOV 01E PR D63 072002 M.N. Achasov *et al.* (Novosibirsk SND Collab.) REFID=48311
ACHASOV 01F PR D63 094007 N.N. Achasov, V.V. Gubin (Novosibirsk SND Collab.) REFID=48312
ACHASOV 01G PRL 86 1698 M.N. Achasov *et al.* (Novosibirsk SND Collab.) REFID=48315
AITALA 01B PRL 86 770 E.M. Aitala *et al.* (FNAL E791 Collab.) REFID=48005
AKHMETSHIN 01 PL B501 191 R.R. Akhmetshin *et al.* (Novosibirsk CMD-2 Collab.) REFID=48110
AKHMETSHIN 01B PL B509 217 R.R. Akhmetshin *et al.* (Novosibirsk CMD-2 Collab.) REFID=48167
AKHMETSHIN 01C PL B503 237 R.R. Akhmetshin *et al.* (Novosibirsk CMD-2 Collab.) REFID=48323
BENAYOUN 01 EPJ C22 503 M. Benayoun, H.B. O'Connell REFID=48570
ACHASOV 00 EPJ C12 25 M.N. Achasov *et al.* (Novosibirsk SND Collab.) REFID=47417
ACHASOV 00B JETP 90 17 M.N. Achasov *et al.* (Novosibirsk SND Collab.) REFID=47425
Translated from ZETF 117 22.
ACHASOV 00C PL B474 188 M.N. Achasov *et al.* (Novosibirsk SND Collab.) REFID=47431
ACHASOV 00D JETPL 72 282 M.N. Achasov *et al.* (Novosibirsk SND Collab.) REFID=47882
Translated from ZETFP 72 411.
ACHASOV 00E NP B569 158 M.N. Achasov *et al.* (Novosibirsk SND Collab.) REFID=47927
ACHASOV 00F PL B479 53 M.N. Achasov *et al.* (Novosibirsk SND Collab.) REFID=47928
ACHASOV 00H PL B485 349 M.N. Achasov *et al.* (Novosibirsk SND Collab.) REFID=47930
AKHMETSHIN 00B PL B473 337 R.R. Akhmetshin *et al.* (Novosibirsk CMD-2 Collab.) REFID=47422
AKHMETSHIN 00E PL B491 81 R.R. Akhmetshin *et al.* (Novosibirsk CMD-2 Collab.) REFID=47936
AKHMETSHIN 00F PL B494 26 R.R. Akhmetshin *et al.* (Novosibirsk CMD-2 Collab.) REFID=47937
AULCHENKO 00A JETP 90 927 V.M. Aulchenko *et al.* (Novosibirsk SND Collab.) REFID=47953
Translated from ZETF 117 1067.
BRAMON 00 PL B486 406 A. Bramon *et al.* REFID=47969
PDG 00 EPJ C15 1 D.E. Groom *et al.* (PDG Collab.) REFID=47469
ACHASOV 99 PL B449 122 M.N. Achasov *et al.* REFID=46896
ACHASOV 99C PL B456 304 M.N. Achasov *et al.* REFID=46939
AKHMETSHIN 99B PL B462 371 R.R. Akhmetshin *et al.* (Novosibirsk CMD-2 Collab.) REFID=47392
AKHMETSHIN 99C PL B462 380 R.R. Akhmetshin *et al.* (Novosibirsk CMD-2 Collab.) REFID=47393
AKHMETSHIN 99D PL B466 385 R.R. Akhmetshin *et al.* REFID=47397
Also PL B508 217 (errat.) R.R. Akhmetshin *et al.* (Novosibirsk CMD-2 Collab.) REFID=48328
AKHMETSHIN 99F PL B460 242 R.R. Akhmetshin *et al.* (Novosibirsk CMD-2 Collab.) REFID=47473
AULCHENKO 99 JETPL 69 97 V.M. Aulchenko *et al.* REFID=46920
Translated from ZETFP 69 87.
ACHASOV 98B PL B438 441 M.N. Achasov *et al.* (Novosibirsk SND Collab.) REFID=46317
ACHASOV 98F JETPL 68 573 M.N. Achasov *et al.* (Novosibirsk SND Collab.) REFID=46321
ACHASOV 98I PL B440 442 M.N. Achasov *et al.* REFID=46600
AKHMETSHIN 98 PL B434 426 R.R. Akhmetshin *et al.* (CMD-2 Collab.) REFID=46325
AULCHENKO 98 PL B436 199 V.M. Aulchenko *et al.* (Novosibirsk SND Collab.) REFID=46336
BARBERIS 98 PL B432 436 D. Barberis *et al.* (Omega Expt.) REFID=46344
AKHMETSHIN 97B PL B415 445 R.R. Akhmetshin *et al.* (NOVO, BOST, PITT+) REFID=45801
AKHMETSHIN 97C PL B415 452 R.R. Akhmetshin *et al.* (Novosibirsk CMD-2 Collab.) REFID=45802
BENAYOUN 96 ZPHY C72 221 M. Benayoun *et al.* (IPNP, NOVO) REFID=45753
AKHMETSHIN 95 PL B364 199 R.R. Akhmetshin *et al.* (Novosibirsk CMD-2 Collab.) REFID=44617
DOLINSKY 91 PRPL 202 99 S.I. Dolinsky *et al.* (NOVO) REFID=41369
KUHN 90 ZPHY C48 445 J.H. Kuhn *et al.* (MPIM) REFID=45862
ACHASOV 89 NP B315 465 N.N. Achasov, V.N. Ivanchenko REFID=48021
DOLINSKY 89 ZPHY C42 511 S.I. Dolinsky *et al.* (NOVO) REFID=41003
BARKOV 88 SJNP 47 248 L.M. Barkov *et al.* (NOVO) REFID=41024
Translated from YAF 47 393.
DOLINSKY 88 SJNP 48 277 S.I. Dolinsky *et al.* (NOVO) REFID=41022
Translated from YAF 48 442.
DRUZHININ 87 ZPHY C37 1 V.P. Druzhinin *et al.* (NOVO) REFID=40448
ARMSTRONG 86 PL 166B 245 T.A. Armstrong *et al.* (ATHU, BARI, BIRM+) REFID=20563
ATKINSON 86 ZPHY C30 521 M. Atkinson *et al.* (BONN, CERN, GLAS+) REFID=20564
BEBEK 86 PRL 56 1893 C. Bebek *et al.* (CLEO Collab.) REFID=11540
DAVENPORT 86 PR D33 2519 T.F. Davenport (TUFTS, ARIZ, FNAL, FSU, NDAM+) REFID=20567
DIJKSTRA 86 ZPHY C31 375 H. Dijkstra *et al.* (ANIK, BRIS, CERN+) REFID=20568
FRAME 86 NP B276 667 D. Frame *et al.* (GLAS) REFID=20569
GOLUBEV 86 SJNP 44 409 V.B. Golubev *et al.* (NOVO) REFID=40449
Translated from YAF 44 633.
ALBRECHT 85D PL 153B 343 H. Albrecht *et al.* (ARGUS Collab.) REFID=20562
GOLUBEV 85 SJNP 41 756 V.B. Golubev *et al.* (NOVO) REFID=40450
Translated from YAF 41 1183.
DRUZHININ 84 PL 144B 136 V.P. Druzhinin *et al.* (NOVO) REFID=20561
ARMSTRONG 83B NP B224 193 T.A. Armstrong *et al.* (BARI, BIRM, CERN+) REFID=20558
BARATE 83 PL 121B 449 R. Barate *et al.* (SACL, LOIC, SHMP, IND) REFID=12177
KURDADZE 83C JETPL 38 366 L.M. Kurdadze *et al.* (NOVO) REFID=20560
Translated from ZETFP 38 306.
ARENTON 82 PR D25 2241 M.W. Arenton *et al.* (ANL, ILL) REFID=20556
PELLINEN 82 PS 25 599 A. Pellinen, M. Roos (HELS) REFID=20557
DAUM 81 PL 100B 439 C. Daum *et al.* (AMST, BRIS, CERN, CRAC+) REFID=20552
IVANOV 81 PL 107B 297 P.M. Ivanov *et al.* (NOVO) REFID=20553
Also Private Comm. S.I. Eidelman (NOVO) REFID=20554
VASSERMAN 81 PL 99B 62 I.B. Vasserman *et al.* (NOVO) REFID=20555
Also SJNP 35 240 L.M. Kurdadze *et al.* REFID=47475
Translated from YAF 35 352.

CORDIER	80	NP B172 13	A. Cordier *et al.*	(LALO)	REFID=20240
CORDIER	79	PL 81B 389	A. Cordier *et al.*	(LALO)	REFID=20549
BUKIN	78B	SJNP 27 521	A.D. Bukin *et al.*	(NOVO)	REFID=20545
		Translated from YAF 27 985.			
BUKIN	78C	SJNP 27 516	A.D. Bukin *et al.*	(NOVO)	REFID=20544
		Translated from YAF 27 976.			
COOPER	78B	NP B146 1	A.M. Cooper *et al.*	(TATA, CERN, CDEF+)	REFID=20235
LOSTY	78	NP B133 38	M.J. Losty *et al.*	(CERN, AMST, NIJM+)	REFID=20547
AKERLOF	77	PRL 39 861	C.W. Akerlof *et al.*	(FNAL, MICH, PURD)	REFID=20534
ANDREWS	77	PRL 38 198	D.E. Andrews *et al.*	(ROCH)	REFID=20120
BALDI	77	PL 68B 381	R. Baldi *et al.*	(GEVA)	REFID=20536
CERRADA	77B	NP B126 241	M. Cerrada *et al.*	(AMST, CERN, NIJM+)	REFID=20537
COHEN	77	PRL 38 269	D. Cohen *et al.*	(ANL)	REFID=20538
LAVEN	77	NP B127 43	H. Laven *et al.*	(AACH3, BERL, CERN, LOIC+)	REFID=20541
LYONS	77	NP B125 207	L. Lyons, A.M. Cooper, A.G. Clark	(OXF)	REFID=20232
COSME	76	PL 63B 352	G. Cosme *et al.*	(ORSAY)	REFID=20529
KALBFLEISCH	76	PR D13 22	G.R. Kalbfleisch, R.C. Strand, J.W. Chapman	(BNL+)	REFID=20531
PARROUR	76	PL 63B 357	G. Parrour *et al.*	(ORSAY)	REFID=20532
PARROUR	76B	PL 63B 362	G. Parrour *et al.*	(ORSAY)	REFID=20533
KALBFLEISCH	75	PR D11 987	G.R. Kalbfleisch, R.C. Strand, J.W. Chapman	(BNL+)	REFID=20223
AYRES	74	PRL 32 1463	D.S. Ayres *et al.*	(ANL)	REFID=20522
BESCH	74	NP B70 257	H.J. Besch *et al.*	(BONN)	REFID=20523
COSME	74	PL 48B 155	G. Cosme *et al.*	(ORSAY)	REFID=20525
COSME	74B	PL 48B 159	G. Cosme *et al.*	(ORSAY)	REFID=20526
DEGROOT	74	NP B74 77	A.J. de Groot *et al.*	(AMST, NIJM)	REFID=20527
AUGUSTIN	73	PRL 30 462	J.E. Augustin *et al.*	(ORSAY)	REFID=47515
BALLAM	73	PR D7 3150	J. Ballam *et al.*	(SLAC, LBL)	REFID=20520
BINNIE	73B	PR D8 2789	D.M. Binnie *et al.*	(LOIC, SHMP)	REFID=20216
AGUILAR-...	72B	PR D6 29	M. Aguilar-Benitez *et al.*	(BNL)	REFID=20205
ALVENSLEB...	72	PRL 28 66	H. Alvensleben *et al.*	(MIT, DESY)	REFID=20514
BORENSTEIN	72	PR D5 1559	S.R. Borenstein *et al.*	(BNL, MICH)	REFID=20215
COLLEY	72	NP B50 1	D.C. Colley *et al.*	(BIRM, GLAS)	REFID=20519
BALAKIN	71	PL 34B 328	V.E. Balakin *et al.*	(NOVO)	REFID=20507
CHATELUS	71	Thesis LAL 1247	Y. Chatelus	(STRB)	REFID=20508
Also		PL 32B 416	J.C. Bizot *et al.*	(ORSAY)	REFID=20501
HAYES	71	PR D4 899	S. Hayes *et al.*	(CORN)	REFID=20511
STOTTLE...	71	Thesis ORO 2504 170	A.R. Stottlemyer	(UMD)	REFID=20512
BIZOT	70	PL 32B 416	J.C. Bizot *et al.*	(ORSAY)	REFID=20501
Also		Liverpool Sym. 69	J.P. Perez-y-Jorba		REFID=20502
EARLES	70	PRL 25 1312	D.R. Earles *et al.*	(NEAS)	REFID=20504
LINDSEY	66	PR 147 913	J.S. Lindsey, G. Smith	(LRL)	REFID=20481
LONDON	66	PR 143 1034	G.W. London *et al.*	(BNL, SYRA) IGJPC	REFID=11774
BADIER	65B	PL 17 337	J. Badier *et al.*	(EPOL, SACL, AMST)	REFID=20253
LINDSEY	65	PRL 15 221	J.S. Lindsey, G.A. Smith	(LRL)	REFID=20478
LINDSEY 65 data included in LINDSEY 66.					
SCHLEIN	63	PRL 10 368	P.E. Schlein *et al.*	(UCLA) IGJP	REFID=20474

NODE=M030

$h_1(1170)$

$I^G(J^{PC}) = 0^-(1^{+-})$

$h_1(1170)$ MASS

NODE=M030M

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
1166± 5±3	[1] ANDO	92	SPEC		$8\ \pi^- p \to \pi^+\pi^-\pi^0 n$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1168± 4	ANDO	92	SPEC		$8\ \pi^- p \to \pi^+\pi^-\pi^0 n$
1190±60	[2] DANKOWY...	81	SPEC	0	$8\ \pi p \to 3\pi n$

NODE=M030M OCCUR=2

[1] Average and spread of values using 2 variants of the model of BOWLER 75. NODE=M030M;LINKAGE=B
[2] Uses the model of BOWLER 75. NODE=M030M;LINKAGE=C

$h_1(1170)$ WIDTH

NODE=M030W

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
375± 6±34	[3] ANDO	92	SPEC		$8\ \pi^- p \to \pi^+\pi^-\pi^0 n$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
345± 6	ANDO	92	SPEC		$8\ \pi^- p \to \pi^+\pi^-\pi^0 n$
320±50	[4] DANKOWY...	81	SPEC	0	$8\ \pi p \to 3\pi n$

NODE=M030W OCCUR=2

[3] Average and spread of values using 2 variants of the model of BOWLER 75. NODE=M030W;LINKAGE=B
[4] Uses the model of BOWLER 75. NODE=M030W;LINKAGE=C

$h_1(1170)$ DECAY MODES

NODE=M030215;NODE=M030

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\rho\pi$	seen	DESIG=1;OUR EST;→ UNCHECKED ←

$h_1(1170)$ BRANCHING RATIOS

NODE=M030220

$\Gamma(\rho\pi)/\Gamma_{total}$ Γ_1/Γ

NODE=M030R1
NODE=M030R1

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	ANDO	92	SPEC	$8\ \pi^- p \rightarrow \pi^+\pi^-\pi^0 n$
seen	ATKINSON	84	OMEG	20–70 $\gamma p \rightarrow \pi^+\pi^-\pi^0 p$
seen	DANKOWY...	81	SPEC	$8\ \pi p \rightarrow 3\pi n$

$h_1(1170)$ REFERENCES

NODE=M030

ANDO	92	PL B291 496	A. Ando *et al.*	(KEK, KYOT, NIRS, SAGA+)
ATKINSON	84	NP B231 15	M. Atkinson *et al.*	(BONN, CERN, GLAS+)
DANKOWY...	81	PRL 46 580	J.A. Dankowych *et al.*	(TNTO, BNL, CARL+)
BOWLER	75	NP B97 227	M.G. Bowler *et al.*	(OXFTP, DARE)

REFID=43171
REFID=20574
REFID=20572
REFID=20571

NODE=M011

$b_1(1235)$

$I^G(J^{PC}) = 1^+(1^{+-})$

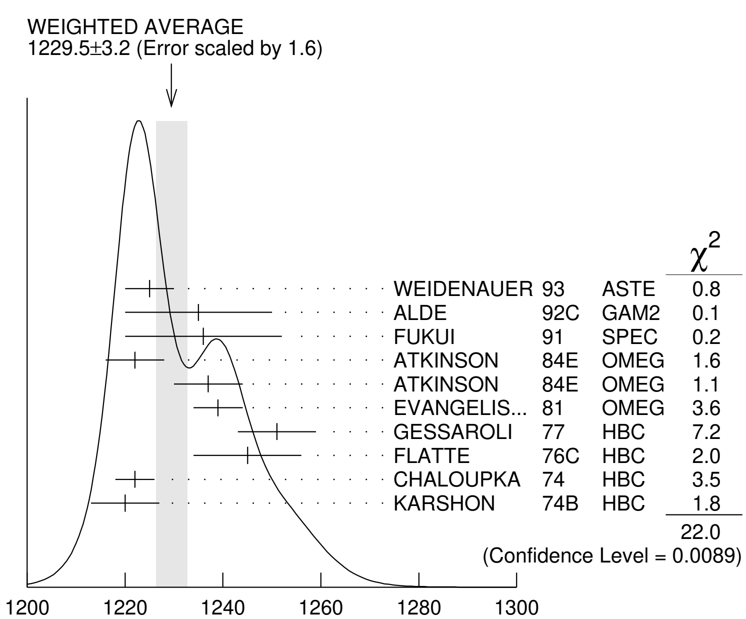
$b_1(1235)$ MASS

NODE=M011M

NODE=M011M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1229.5± 3.2 OUR AVERAGE		Error includes scale factor of 1.6. See the ideogram below.				
1225 ± 5		WEIDENAUER	93	ASTE		$\overline{p}p \rightarrow 2\pi^+ 2\pi^- \pi^0$
1235 ±15		ALDE	92C	GAM2		38,100 $\pi^- p \rightarrow \omega\pi^0 n$
1236 ±16		FUKUI	91	SPEC		8.95 $\pi^- p \rightarrow \omega\pi^0 n$
1222 ± 6		ATKINSON	84E	OMEG	±	25–55 $\gamma p \rightarrow \omega\pi X$
1237 ± 7		ATKINSON	84E	OMEG	0	25–55 $\gamma p \rightarrow \omega\pi X$
1239 ± 5		EVANGELIS...	81	OMEG	−	12 $\pi^- p \rightarrow \omega\pi p$
1251 ± 8	450	GESSAROLI	77	HBC	−	11 $\pi^- p \rightarrow \pi^- \omega p$
1245 ±11	890	FLATTE	76C	HBC	−	4.2 $K^- p \rightarrow \pi^- \omega \Sigma^+$
1222 ± 4	1400	CHALOUPKA	74	HBC	−	3.9 $\pi^- p$
1220 ± 7	600	KARSHON	74B	HBC	+	4.9 $\pi^+ p$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1190 ±10		AUGUSTIN	89	DM2	±	$e^+e^- \rightarrow 5\pi$
1213 ± 5		ATKINSON	84C	OMEG	0	20–70 γp
1271 ±11		COLLICK	84	SPEC	+	200 $\pi^+ Z \rightarrow Z\pi\omega$

OCCUR=2



$b_1(1235)$ mass (MeV)

$b_1(1235)$ WIDTH

NODE=M011W

NODE=M011W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
142± 9 OUR AVERAGE		Error includes scale factor of 1.2.				
113±12		WEIDENAUER	93	ASTE		$\overline{p}p \to 2\pi^+ 2\pi^- \pi^0$
160±30		ALDE	92C	GAM2		38,100 $\pi^- p \to \omega\pi^0 n$
151±31		FUKUI	91	SPEC		8.95 $\pi^- p \to \omega\pi^0 n$
170±15		EVANGELIS...	81	OMEG	−	12 $\pi^- p \to \omega\pi p$
170±50	225	BALTAY	78B	HBC	+	15 $\pi^+ p \to p 4\pi$
155±32	450	GESSAROLI	77	HBC	−	11 $\pi^- p \to \pi^- \omega p$
182±45	890	FLATTE	76C	HBC	−	4.2 $K^- p \to \pi^- \omega \Sigma^+$
135±20	1400	CHALOUPKA	74	HBC	−	3.9 $\pi^- p$
156±22	600	KARSHON	74B	HBC	+	4.9 $\pi^+ p$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
210±19		AUGUSTIN	89	DM2	±	$e^+ e^- \to 5\pi$
231±14		ATKINSON	84C	OMEG	0	20–70 γp
232±29		COLLICK	84	SPEC	+	200 $\pi^+ Z \to Z\pi\omega$

$b_1(1235)$ DECAY MODES

NODE=M011215;NODE=M011

	Mode	Fraction (Γ_i/Γ)	Confidence level	
Γ_1	$\omega\pi$	seen		DESIG=1;OUR EST;→ UNCHECKED ←
	[D/S amplitude ratio = 0.277 ± 0.027]			
Γ_2	$\pi^\pm \gamma$	$(1.6\pm0.4)\times 10^{-3}$		DESIG=9
Γ_3	$\eta\rho$	seen		DESIG=8;OUR EST;→ UNCHECKED ←
Γ_4	$\pi^+\pi^+\pi^-\pi^0$	< 50 %	84%	DESIG=2;OUR EST;→ UNCHECKED ←
Γ_5	$K^*(892)^\pm K^\mp$	seen		DESIG=74
Γ_6	$(K\overline{K})^\pm \pi^0$	< 8 %	90%	DESIG=71;OUR EST;→ UNCHECKED ←
Γ_7	$K^0_S K^0_L \pi^\pm$	< 6 %	90%	DESIG=73;OUR EST;→ UNCHECKED ←
Γ_8	$K^0_S K^0_S \pi^\pm$	< 2 %	90%	DESIG=72;OUR EST;→ UNCHECKED ←
Γ_9	$\phi\pi$	< 1.5 %	84%	DESIG=5;OUR EST;→ UNCHECKED ←

$b_1(1235)$ PARTIAL WIDTHS

NODE=M011220

$\Gamma(\pi^\pm\gamma)$ Γ_2

NODE=M011W3
NODE=M011W3

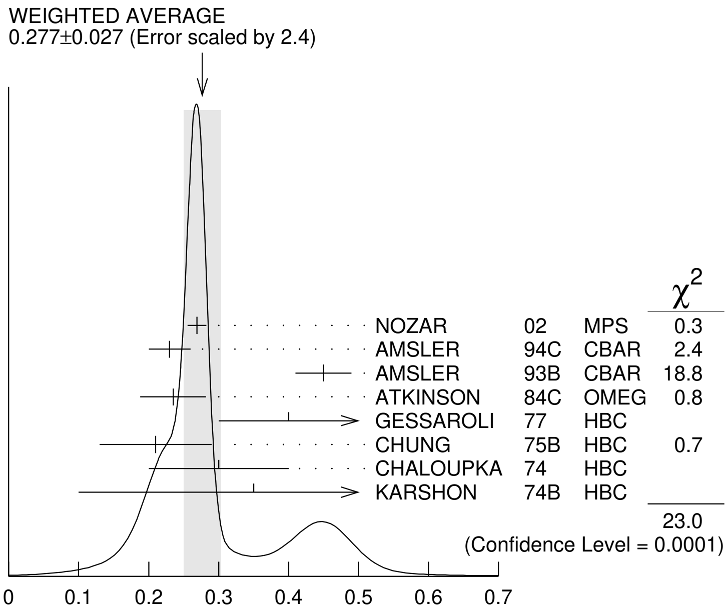
VALUE (keV)	DOCUMENT ID		TECN	CHG	COMMENT
230±60	COLLICK	84	SPEC	+	200 $\pi^+ Z \to Z\pi\omega$

$b_1(1235)$ D-wave/S-wave AMPLITUDE RATIO IN DECAY OF $b_1(1235) \to \omega\pi$

NODE=M011DS

NODE=M011DS

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
0.277±0.027 OUR AVERAGE		Error includes scale factor of 2.4. See the ideogram below.				
0.269±0.009±0.010		NOZAR	02	MPS	−	18 $\pi^- p \to \omega\pi^- p$
0.23 ±0.03		AMSLER	94C	CBAR		0.0 $\overline{p}p \to \omega\eta\pi^0$
0.45 ±0.04		AMSLER	93B	CBAR		0.0 $\overline{p}p \to \omega\pi^0\pi^0$
0.235±0.047		ATKINSON	84C	OMEG		20–70 γp
0.4 $^{+0.1}_{-0.1}$		GESSAROLI	77	HBC	−	11 $\pi^- p \to \pi^- \omega p$
0.21 ±0.08		CHUNG	75B	HBC	+	7.1 $\pi^+ p$
0.3 ±0.1		CHALOUPKA	74	HBC	−	3.9–7.5 $\pi^- p$
0.35 ±0.25	600	KARSHON	74B	HBC	+	4.9 $\pi^+ p$



$b_1(1235)$ D-wave/S-wave amplitude ratio in decay of $b_1(1235) \to \omega\pi$

$b_1(1235)$ D-wave/S-wave AMPLITUDE PHASE DIFFERENCE IN DECAY OF $b_1(1235) \to \omega\pi$

NODE=M011PH

VALUE (°)	DOCUMENT ID		TECN	CHG	COMMENT
10.5±2.4±3.9	NOZAR	02	MPS	–	18 $\pi^- p \to \omega\pi^- p$

NODE=M011PH

$b_1(1235)$ BRANCHING RATIOS

NODE=M011230

$\Gamma(\eta\rho)/\Gamma(\omega\pi)$ — Γ_3/Γ_1

NODE=M011R9
NODE=M011R9

VALUE	DOCUMENT ID		TECN	COMMENT
<0.10	ATKINSON	84D	OMEG	20–70 γp

$\Gamma(\pi^+\pi^+\pi^-\pi^0)/\Gamma(\omega\pi)$ — Γ_4/Γ_1

NODE=M011R1
NODE=M011R1

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
<0.5	ABOLINS	63	HBC	+	3.5 $\pi^+ p$

$\Gamma(K^*(892)^\pm K^\mp)/\Gamma_{total}$ — Γ_5/Γ

NODE=M011R10
NODE=M011R10

VALUE	DOCUMENT ID		TECN	COMMENT
seen	[1] ABLIKIM	10E	BES2	$J/\psi \to K^\pm K^0_S \pi^\mp \pi^0$

[1] From a fit including ten additional resonances and energy-independent Breit-Wigner width.

NODE=M011R10;LINKAGE=AB

$\Gamma((K\overline{K})^\pm\pi^0)/\Gamma(\omega\pi)$ — Γ_6/Γ_1

NODE=M011R6
NODE=M011R6

VALUE	CL%	DOCUMENT ID		TECN	CHG	COMMENT
<0.08	90	BALTAY	67	HBC	±	0.0 $\overline{p}p$

$\Gamma(K^0_S K^0_L \pi^\pm)/\Gamma(\omega\pi)$ — Γ_7/Γ_1

NODE=M011R8
NODE=M011R8

VALUE	CL%	DOCUMENT ID		TECN	CHG	COMMENT
<0.06	90	BALTAY	67	HBC	±	0.0 $\overline{p}p$

$\Gamma(K^0_S K^0_S \pi^\pm)/\Gamma(\omega\pi)$ — Γ_8/Γ_1

NODE=M011R7
NODE=M011R7

VALUE	CL%	DOCUMENT ID		TECN	CHG	COMMENT
<0.02	90	BALTAY	67	HBC	±	0.0 $\overline{p}p$

$\Gamma(\phi\pi)/\Gamma(\omega\pi)$ — Γ_9/Γ_1

NODE=M011R4
NODE=M011R4

VALUE	CL%	DOCUMENT ID		TECN	CHG	COMMENT
<0.004	95	VIKTOROV	96	SPEC	0	32.5 $\pi^- p \to K^+ K^- \pi^0 n$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.04	95	BIZZARRI	69	HBC	±	0.0 $\overline{p}p$
<0.015		DAHL	67	HBC		1.6–4.2 $\pi^- p$

b_1(1235) REFERENCES

NODE=M011

ABLIKIM	10E	PL B693 88	M. Ablikim *et al.*	(BES II Collab.)	REFID=53361
NOZAR	02	PL B541 35	M. Nozar *et al.*		REFID=48850
VIKTOROV	96	PAN 59 1184	V.A. Viktorov *et al.*	(SERP)	REFID=45203
		Translated from YAF 59 1239.			
AMSLER	94C	PL B327 425	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=44091
AMSLER	93B	PL B311 362	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=43602
WEIDENAUER	93	ZPHY C59 387	P. Weidenauer *et al.*	(ASTERIX Collab.)	REFID=43585
ALDE	92C	ZPHY C54 553	D.M. Alde *et al.*	(BELG, SERP, KEK, LANL+)	REFID=41859
FUKUI	91	PL B257 241	S. Fukui *et al.*	(SUGI, NAGO, KEK, KYOT+)	REFID=41581
AUGUSTIN	89	NP B320 1	J.E. Augustin, G. Cosme	(DM2 Collab.)	REFID=41004
ATKINSON	84C	NP B243 1	M. Atkinson *et al.*	(BONN, CERN, GLAS+) JP	REFID=20625
ATKINSON	84D	NP B242 269	M. Atkinson *et al.*	(BONN, CERN, GLAS+)	REFID=20623
ATKINSON	84E	PL 138B 459	M. Atkinson *et al.*	(BONN, CERN, GLAS+)	REFID=20624
COLLICK	84	PRL 53 2374	B. Collick *et al.*	(MINN, ROCH, FNAL)	REFID=20626
EVANGELIS...	81	NP B178 197	C. Evangelista *et al.*	(BARI, BONN, CERN+)	REFID=20462
BALTAY	78B	PR D17 62	C. Baltay *et al.*	(COLU, BING)	REFID=21265
GESSAROLI	77	NP B126 382	R. Gessaroli *et al.*	(BGNA, FIRZ, GENO+) JP	REFID=20230
FLATTE	76C	PL 64B 325	S.M. Flatte *et al.*	(CERN, AMST, NIJM+) JP	REFID=20615
CHUNG	75B	PR D11 2426	S.U. Chung *et al.*	(BNL, LBL, UCSC) JP	REFID=20613
CHALOUPKA	74	PL 51B 407	V. Chaloupka *et al.*	(CERN) JP	REFID=20611
KARSHON	74B	PR D10 3608	U. Karshon *et al.*	(REHO) JP	REFID=20612
BIZZARRI	69	NP B14 169	R. Bizzarri *et al.*	(CERN, CDEF)	REFID=20171
BALTAY	67	PRL 18 93	C. Baltay *et al.*	(COLU)	REFID=20159
DAHL	67	PR 163 1377	O.I. Dahl *et al.*	(LRL)	REFID=20321
ABOLINS	63	PRL 11 381	M.A. Abolins *et al.*	(UCSD)	REFID=20006

NODE=M010

a_1(1260)

$I^G(J^{PC}) = 1^-(1^{++})$

See also our review under the a_1(1260) in PDG 06, Journal of Physics **G33** 1 (2006).

NODE=M010

a_1(1260) MASS

NODE=M010M

VALUE (MeV)			*EVTS*		*DOCUMENT ID*		*TECN*	*COMMENT*	
									NODE=M010M
1230	**±40**	**OUR ESTIMATE**							→ UNCHECKED ←
1299	$^{+12}_{-28}$		46M	[1]	AGHASYAN	18B	COMP	$190\ \pi^- p \to \pi^-\pi^+\pi^- p$	
• • • We do not use the following data for averages, fits, limits, etc. • • •									
1195.05	± 1.05	± 6.33	894k		AAIJ	18AI	LHCB	$D^0 \to K^\mp\pi^\pm\pi^\pm\pi^\mp$	
1209	± 4	$^{+12}_{-9}$		[2]	MIKHASENKO	18	RVUE	$\tau^- \to \pi^-\pi^+\pi^-\nu_\tau$	
1225	± 9	±20	7k	[3]	DARGENT	17	RVUE	$D^0 \to \pi^-\pi^+\pi^-\pi^+$	
1255	± 6	$^{+7}_{-17}$	420k	[4]	ALEKSEEV	10	COMP	$190\ \pi^- Pb \to \pi^-\pi^-\pi^+ Pb'$	
1243	±12	±20		[5]	AUBERT	07AU	BABR	$10.6\ e^+e^- \to \rho^0\rho^\pm\pi^\mp\gamma$	
1230–1270			6360	[6]	LINK	07A	FOCS	$D^0 \to \pi^-\pi^+\pi^-\pi^+$	
1203	± 3			[7]	GOMEZ-DUM...	04	RVUE	$\tau^+ \to \pi^+\pi^+\pi^-\nu_\tau$	
1330	±24		90k		SALVINI	04	OBLX	$\overline{p}p \to 2\pi^+2\pi^-$	
1331	±10	± 3	37k	[8]	ASNER	00	CLE2	$10.6\ e^+e^- \to \tau^+\tau^-$, $\tau^- \to \pi^-\pi^0\pi^0\nu_\tau$	
1255	± 7	± 6	5904	[9]	ABREU	98G	DLPH	e^+e^-	
1207	± 5	± 8	5904	[10]	ABREU	98G	DLPH	e^+e^-	OCCUR=2
1196	± 4	± 5	5904	[11,12]	ABREU	98G	DLPH	e^+e^-	OCCUR=3
1240	±10				BARBERIS	98B		$450\ pp \to p_f\pi^+\pi^-\pi^0 p_s$	
1262	± 9	± 7		[9,13]	ACKERSTAFF	97R	OPAL	E^{ee}_{cm}= 88–94, $\tau \to 3\pi\nu$	
1210	± 7	± 2		[10,13]	ACKERSTAFF	97R	OPAL	E^{ee}_{cm}= 88–94, $\tau \to 3\pi\nu$	OCCUR=2
1211	± 7	$^{+50}_{-0}$		[10]	ALBRECHT	93C	ARG	$\tau^+ \to \pi^+\pi^+\pi^-\nu$	
1121	± 8			[14]	ANDO	92	SPEC	$8\ \pi^- p \to \pi^+\pi^-\pi^0 n$	
1242	±37			[15]	IVANOV	91	RVUE	$\tau \to \pi^+\pi^+\pi^-\nu$	
1260	±14			[16]	IVANOV	91	RVUE	$\tau \to \pi^+\pi^+\pi^-\nu$	OCCUR=2
1250	± 9			[17]	IVANOV	91	RVUE	$\tau \to \pi^+\pi^+\pi^-\nu$	OCCUR=3
1208	±15				ARMSTRONG	90	OMEG	$300.0 pp \to pp\pi^+\pi^-\pi^0$	
1220	±15			[18]	ISGUR	89	RVUE	$\tau^+ \to \pi^+\pi^+\pi^-\nu$	
1260	±25			[19]	BOWLER	88	RVUE		
1166	±18	±11			BAND	87	MAC	$\tau^+ \to \pi^+\pi^+\pi^-\nu$	

1164	±41	±23		BAND	87	MAC	$\tau^+ \to \pi^+ \pi^0 \pi^0 \nu$	OCCUR=2
1250	±40			[18] TORNQVIST	87	RVUE	
1046	±11			ALBRECHT	86B	ARG	$\tau^+ \to \pi^+ \pi^+ \pi^- \nu$
1056	±20	±15		RUCKSTUHL	86	DLCO	$\tau^+ \to \pi^+ \pi^+ \pi^- \nu$
1194	±14	±10		SCHMIDKE	86	MRK2	$\tau^+ \to \pi^+ \pi^+ \pi^- \nu$
1255	±23			BELLINI	85	SPEC	$40\ \pi^- A \to \pi^- \pi^+ \pi^- A$
1240	±80			[20] DANKOWY...	81	SPEC	$8.45\ \pi^- p \to n 3\pi$
1280	±30			[20] DAUM	81B	CNTR	$63,94\ \pi^- p \to p 3\pi$
1041	±13			[21] GAVILLET	77	HBC	$4.2\ K^- p \to \Sigma 3\pi$

[1] Statistical error negligible. NODE=M010M;LINKAGE=Q
[2] From the pole position. Using an amplitude analysis based on approximate three-body unitary of τ data from SCHAEL 05C. NODE=M010M;LINKAGE=S
[3] Reanalysis of CLEO data using Breit-Wigner parameterization. NODE=M010M;LINKAGE=V
[4] Superseded by AGHASYAN 2018B. NODE=M010M;LINKAGE=R
[5] The $\rho^\pm \pi^\mp$ state can be also due to the $\pi(1300)$. NODE=M010M;LINKAGE=AU
[6] Using the Breit-Wigner parameterization; strong correlation between mass and width. NODE=M010M;LINKAGE=LI
[7] Using the data of BARATE 98R. NODE=M010M;LINKAGE=GO
[8] From a fit to the 3π mass spectrum including the $K \overline{K}^*(892)$ threshold. NODE=M010M;LINKAGE=B6
[9] Uses the model of KUHN 90. NODE=M010M;LINKAGE=KS
[10] Uses the model of ISGUR 89. NODE=M010M;LINKAGE=IM
[11] Includes the effect of a possible a_1' state. NODE=M010M;LINKAGE=A1
[12] Uses the model of FEINDT 90. NODE=M010M;LINKAGE=F1
[13] Supersedes AKERS 95P. NODE=M010M;LINKAGE=X
[14] Average and spread of values using 2 variants of the model of BOWLER 75. NODE=M010M;LINKAGE=P
[15] Reanalysis of RUCKSTUHL 86. NODE=M010M;LINKAGE=I
[16] Reanalysis of SCHMIDKE 86. NODE=M010M;LINKAGE=L
[17] Reanalysis of ALBRECHT 86B. NODE=M010M;LINKAGE=M
[18] From a combined reanalysis of ALBRECHT 86B, SCHMIDKE 86, and RUCKSTUHL 86. NODE=M010M;LINKAGE=K
[19] From a combined reanalysis of ALBRECHT 86B and DAUM 81B. NODE=M010M;LINKAGE=G
[20] Uses the model of BOWLER 75. NODE=M010M;LINKAGE=D
[21] Produced in K^- backward scattering. NODE=M010M;LINKAGE=F

$a_1(1260)$ WIDTH

NODE=M010W

NODE=M010W

→ UNCHECKED ←

VALUE (MeV)			EVTS	DOCUMENT ID		TECN	COMMENT
250 to 600 OUR ESTIMATE							
420	**± 35**	**OUR AVERAGE**					
380	± 80		46M	[1] AGHASYAN	18B	COMP	$190\ \pi^- p \to \pi^- \pi^+ \pi^- p$
430	± 24	± 31		DARGENT	17	RVUE	$D^0 \to \pi^- \pi^+ \pi^- \pi^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •							
422.01	± 2.10	± 12.72	894k	AAIJ	18AI	LHCB	$D^0 \to K^\mp \pi^\pm \pi^\pm \pi^\mp$
576	± 11	$^{+89}_{-20}$		[2] MIKHASENKO	18	RVUE	$\tau^- \to \pi^- \pi^+ \pi^- \nu_\tau$
367	± 9	$^{+28}_{-25}$	420k	[3] ALEKSEEV	10	COMP	$190\ \pi^- Pb \to \pi^- \pi^- \pi^+ Pb'$
410	± 31	± 30		[4] AUBERT	07AU	BABR	$10.6\ e^+ e^- \to \rho^0 \rho^\pm \pi^\mp \gamma$
520–680			6360	[5] LINK	07A	FOCS	$D^0 \to \pi^- \pi^+ \pi^- \pi^+$
480	± 20			[6] GOMEZ-DUM...	04	RVUE	$\tau^+ \to \pi^+ \pi^+ \pi^- \nu_\tau$
580	± 41		90k	SALVINI	04	OBLX	$\overline{p} p \to 2\pi^+ 2\pi^-$
460	± 85		205	[7] DRUTSKOY	02	BELL	$B \to D^{(*)} K^- K^{*0}$
814	± 36	± 13	37k	[8] ASNER	00	CLE2	$10.6\ e^+ e^- \to \tau^+ \tau^-,\ \tau^- \to \pi^- \pi^0 \pi^0 \nu_\tau$
450	± 50		22k	[9] AKHMETSHIN	99E	CMD2	$1.05–1.38\ e^+ e^- \to \pi^+ \pi^- \pi^0 \pi^0$
570	± 10			[10] BONDAR	99	RVUE	$e^+ e^- \to 4\pi,\ \tau \to 3\pi \nu_\tau$
587	± 27	± 21	5904	[11] ABREU	98G	DLPH	$e^+ e^-$
478	± 3	± 15	5904	[12] ABREU	98G	DLPH	$e^+ e^-$
425	± 14	± 8	5904	[13,14] ABREU	98G	DLPH	$e^+ e^-$
400	± 35			BARBERIS	98B		$450\ p p \to p_f \pi^+ \pi^- \pi^0 p_s$
621	± 32	± 58		[11,15] ACKERSTAFF	97R	OPAL	$E^{ee}_{cm} = 88–94,\ \tau \to 3\pi \nu$

OCCUR=2 (478 ABREU)
OCCUR=3 (425 ABREU)

457	± 15	± 17	[12,15] ACKERSTAFF	97R	OPAL	E^{ee}_{cm}= 88–94, $\tau \to 3\pi\nu$		OCCUR=2
446	± 21	$^{+140}_{-\ \ 0}$	[12] ALBRECHT	93C	ARG	$\tau^+ \to \pi^+\pi^+\pi^-\nu$		
239	± 11		ANDO	92	SPEC	$8\ \pi^- p \to \pi^+\pi^-\pi^0 n$		
266	± 13	± 4	[16] ANDO	92	SPEC	$8\ \pi^- p \to \pi^+\pi^-\pi^0 n$		OCCUR=3
465	$^{+228}_{-143}$		[17] IVANOV	91	RVUE	$\tau \to \pi^+\pi^+\pi^-\nu$		
298	$^{+\ 40}_{-\ 34}$		[18] IVANOV	91	RVUE	$\tau \to \pi^+\pi^+\pi^-\nu$		OCCUR=2
488	± 32		[19] IVANOV	91	RVUE	$\tau \to \pi^+\pi^+\pi^-\nu$		OCCUR=3
430	± 50		ARMSTRONG	90	OMEG	$300.0 pp \to pp\pi^+\pi^-\pi^0$		
420	± 40		[20] ISGUR	89	RVUE	$\tau^+ \to \pi^+\pi^+\pi^-\nu$		
396	± 43		[21] BOWLER	88	RVUE			
405	± 75	± 25	BAND	87	MAC	$\tau^+ \to \pi^+\pi^+\pi^-\nu$		
419	±108	± 57	BAND	87	MAC	$\tau^+ \to \pi^+\pi^0\pi^0\nu$		OCCUR=2
521	± 27		ALBRECHT	86B	ARG	$\tau^+ \to \pi^+\pi^+\pi^-\nu$		
476	$^{+132}_{-120}$	± 54	RUCKSTUHL	86	DLCO	$\tau^+ \to \pi^+\pi^+\pi^-\nu$		
462	± 56	± 30	SCHMIDKE	86	MRK2	$\tau^+ \to \pi^+\pi^+\pi^-\nu$		
292	± 40		BELLINI	85	SPEC	$40\ \pi^- A \to \pi^-\pi^+\pi^- A$		
380	±100		[22] DANKOWY...	81	SPEC	$8.45\ \pi^- p \to n 3\pi$		
300	± 50		[22] DAUM	81B	CNTR	$63,94\ \pi^- p \to p 3\pi$		
230	± 50		[23] GAVILLET	77	HBC	$4.2\ K^- p \to \Sigma 3\pi$		

[1] Statistical error negligible. NODE=M010W;LINKAGE=Q
[2] From the pole position. Using an amplitude analysis based on approximate three-body unitary of τ data from SCHAEL 05C. NODE=M010W;LINKAGE=S
[3] Superseded by AGHASYAN 2018B. NODE=M010W;LINKAGE=R
[4] The $\rho^{\pm}\pi^{\mp}$ state can be also due to the $\pi(1300)$. NODE=M010W;LINKAGE=AU
[5] Using the Breit-Wigner parameterization; strong correlation between mass and width. NODE=M010W;LINKAGE=LI
[6] Using the data of BARATE 98R. NODE=M010W;LINKAGE=GO
[7] From a fit of the $K^- K^{*0}$ distribution assuming m_{a_1}= 1230 MeV and purely resonant production of the $K^- K^{*0}$ system. NODE=M010W;LINKAGE=DR
[8] From a fit to the 3π mass spectrum including the $K\overline{K}^*(892)$ threshold. NODE=M010W;LINKAGE=B6
[9] Using the $a_1(1260)$ mass of 1230 MeV. NODE=M010W;LINKAGE=WE
[10] From AKHMETSHIN 99E and ASNER 00 data using the $a_1(1260)$ mass of 1230 MeV. NODE=M010W;LINKAGE=WB
[11] Uses the model of KUHN 90. NODE=M010W;LINKAGE=KS
[12] Uses the model of ISGUR 89. NODE=M010W;LINKAGE=IM
[13] Includes the effect of a possible a_1' state. NODE=M010W;LINKAGE=A1
[14] Uses the model of FEINDT 90. NODE=M010W;LINKAGE=F1
[15] Supersedes AKERS 95P. NODE=M010W;LINKAGE=X
[16] Average and spread of values using 2 variants of the model of BOWLER 75. NODE=M010W;LINKAGE=P
[17] Reanalysis of RUCKSTUHL 86. NODE=M010W;LINKAGE=I
[18] Reanalysis of SCHMIDKE 86. NODE=M010W;LINKAGE=L
[19] Reanalysis of ALBRECHT 86B. NODE=M010W;LINKAGE=M
[20] From a combined reanalysis of ALBRECHT 86B, SCHMIDKE 86, and RUCKSTUHL 86. NODE=M010W;LINKAGE=K
[21] From a combined reanalysis of ALBRECHT 86B and DAUM 81B. NODE=M010W;LINKAGE=G
[22] Uses the model of BOWLER 75. NODE=M010W;LINKAGE=D
[23] Produced in K^- backward scattering. NODE=M010W;LINKAGE=F

$a_1(1260)$ DECAY MODES

NODE=M010215;NODE=M010

	Mode	Fraction (Γ_i/Γ)	
Γ_1	3π	seen	DESIG=17;OUR EST;→ UNCHECKED ←
Γ_2	$(\rho\pi)_{S-\text{wave}},\ \rho \to \pi\pi$	seen	DESIG=7;OUR EST;→ UNCHECKED ←
Γ_3	$(\rho\pi)_{D-\text{wave}},\ \rho \to \pi\pi$	seen	DESIG=8;OUR EST;→ UNCHECKED ←
Γ_4	$(\rho(1450)\pi)_{S-\text{wave}},\ \rho \to \pi\pi$	seen	DESIG=9;OUR EST;→ UNCHECKED ←
Γ_5	$(\rho(1450)\pi)_{D-\text{wave}},\ \rho \to \pi\pi$	seen	DESIG=10;OUR EST;→ UNCHECKED ←
Γ_6	$f_0(500)\pi,\ f_0 \to \pi\pi$	seen	DESIG=16;OUR EST;→ UNCHECKED ←
Γ_7	$f_0(980)\pi,\ f_0 \to \pi\pi$	not seen	DESIG=11;OUR EST;→ UNCHECKED ←
Γ_8	$f_0(1370)\pi,\ f_0 \to \pi\pi$	seen	DESIG=12;OUR EST;→ UNCHECKED ←
Γ_9	$f_2(1270)\pi,\ f_2 \to \pi\pi$	seen	DESIG=13;OUR EST;→ UNCHECKED ←
Γ_{10}	$\pi^+\pi^-\pi^0$	seen	DESIG=22
Γ_{11}	$\pi^0\pi^0\pi^0$	not seen	DESIG=23;OUR EST;→ UNCHECKED ←
Γ_{12}	$KK\pi$	seen	DESIG=18;OUR EST;→ UNCHECKED ←
Γ_{13}	$K^*(892)K$	seen	DESIG=14;OUR EST;→ UNCHECKED ←
Γ_{14}	$\pi\gamma$	seen	DESIG=4;OUR EST;→ UNCHECKED ←

$a_1(1260)$ PARTIAL WIDTHS

NODE=M010220

$\Gamma(\pi\gamma)$ Γ_{14}

NODE=M010W4
NODE=M010W4

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
640±246	ZIELINSKI	84C	SPEC	$200\ \pi^+ Z \rightarrow Z 3\pi$

D-wave/*S*-wave AMPLITUDE RATIO IN DECAY OF $a_1(1260) \rightarrow \rho\pi$

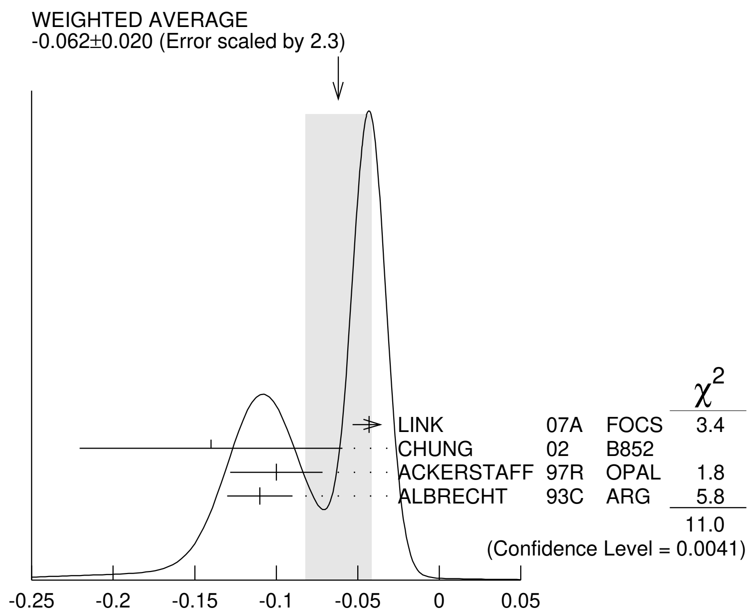
NODE=M010DS

NODE=M010DS

VALUE	DOCUMENT ID		TECN	COMMENT
−0.062±0.020 OUR AVERAGE Error includes scale factor of 2.3. See the ideogram below.				
−0.043±0.009±0.005	LINK	07A	FOCS	$D^0 \rightarrow \pi^-\pi^+\pi^-\pi^+$
−0.14 ±0.04 ±0.07	[1] CHUNG	02	B852	$18.3\ \pi^- p \rightarrow \pi^+\pi^-\pi^- p$
−0.10 ±0.02 ±0.02	[2,3] ACKERSTAFF	97R	OPAL	E^{ee}_{cm}= 88–94, $\tau \rightarrow 3\pi\nu$
−0.11 ±0.02	[2] ALBRECHT	93C	ARG	$\tau^+ \rightarrow \pi^+\pi^+\pi^-\nu$

[1] Deck-type background not subtracted.
[2] Uses the model of ISGUR 89.
[3] Supersedes AKERS 95P.

NODE=M010DS;LINKAGE=C
NODE=M010DS;LINKAGE=IM
NODE=M010DS;LINKAGE=X



D-wave/*S*-wave AMPLITUDE RATIO IN DECAY OF $a_1(1260) \rightarrow \rho\pi$

$a_1(1260)$ BRANCHING RATIOS

NODE=M010225

$\Gamma((\rho\pi)_{S-wave}, \rho \rightarrow \pi\pi)/\Gamma_{total}$ Γ_2/Γ

NODE=M010R5
NODE=M010R5

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
60.19	37k	[1] ASNER	00	CLE2	$10.6\ e^+e^- \rightarrow \tau^+\tau^-$, $\tau^- \rightarrow \pi^-\pi^0\pi^0\nu_\tau$

$\Gamma((\rho\pi)_{D-wave}, \rho \rightarrow \pi\pi)/\Gamma_{total}$ Γ_3/Γ

NODE=M010R6
NODE=M010R6

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.30±0.60±0.22	37k	[1] ASNER	00	CLE2	$10.6\ e^+e^- \rightarrow \tau^+\tau^-$, $\tau^- \rightarrow \pi^-\pi^0\pi^0\nu_\tau$

$\Gamma((\rho(1450)\pi)_{S-wave}, \rho \rightarrow \pi\pi)/\Gamma_{total}$ Γ_4/Γ

NODE=M010R7
NODE=M010R7

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.56±0.84±0.32	37k	[1,2] ASNER	00	CLE2	$10.6\ e^+e^- \rightarrow \tau^+\tau^-$, $\tau^- \rightarrow \pi^-\pi^0\pi^0\nu_\tau$

$\Gamma\big((\rho(1450)\pi)_{D-wave},\ \rho\to\pi\pi\big)/\Gamma_{total}$ — Γ_5/Γ

NODE=M010R8
NODE=M010R8

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$2.04\pm1.20\pm0.28$	37k	[1,2] ASNER	00	CLE2	$10.6\ e^+e^-\to\tau^+\tau^-$, $\tau^-\to\pi^-\pi^0\pi^0\nu_\tau$

$\Gamma\big(f_0(500)\pi,\ f_0\to\pi\pi\big)/\Gamma_{total}$ — Γ_6/Γ

NODE=M010R9
NODE=M010R9

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen		CHUNG	02	B852	$18.3\ \pi^-p\to\pi^+\pi^-\pi^-p$
$18.76\pm4.29\pm1.48$	37k	[1,3] ASNER	00	CLE2	$10.6\ e^+e^-\to\tau^+\tau^-$, $\tau^-\to\pi^-\pi^0\pi^0\nu_\tau$

$\Gamma\big(f_0(500)\pi,\ f_0\to\pi\pi\big)/\Gamma\big((\rho\pi)_{S-wave},\ \rho\to\pi\pi\big)$ — Γ_6/Γ_2

NODE=M010R4
NODE=M010R4

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.06\ \pm0.05$	90k	SALVINI	04	OBLX	$\overline{p}p\to 2\pi^+2\pi^-$
~0.3	28k	AKHMETSHIN	99E	CMD2	1.05–$1.38\ e^+e^-\to\pi^+\pi^-\pi^+\pi^-$
0.003 ± 0.003		[4] LONGACRE	82	RVUE	

$\Gamma\big(f_0(980)\pi,\ f_0\to\pi\pi\big)/\Gamma_{total}$ — Γ_7/Γ

NODE=M010R10
NODE=M010R10

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
not seen	37k	ASNER	00	CLE2	$10.6\ e^+e^-\to\tau^+\tau^-$, $\tau^-\to\pi^-\pi^0\pi^0\nu_\tau$

$\Gamma\big(f_0(1370)\pi,\ f_0\to\pi\pi\big)/\Gamma_{total}$ — Γ_8/Γ

NODE=M010R11
NODE=M010R11

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$7.40\pm2.71\pm1.26$	37k	[1,5] ASNER	00	CLE2	$10.6\ e^+e^-\to\tau^+\tau^-$, $\tau^-\to\pi^-\pi^0\pi^0\nu_\tau$

$\Gamma\big(f_2(1270)\pi,\ f_2\to\pi\pi\big)/\Gamma_{total}$ — Γ_9/Γ

NODE=M010R12
NODE=M010R12

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1.19\pm0.49\pm0.17$	37k	[1,6] ASNER	00	CLE2	$10.6\ e^+e^-\to\tau^+\tau^-$, $\tau^-\to\pi^-\pi^0\pi^0\nu_\tau$

$\Gamma\big(\pi^+\pi^-\pi^0\big)/\Gamma_{total}$ — Γ_{10}/Γ

NODE=M010R00
NODE=M010R00

VALUE	DOCUMENT ID		COMMENT
seen	BARBERIS	98B	$450\ pp\to p_f\pi^+\pi^-\pi^0p_s$

$\Gamma\big(\pi^0\pi^0\pi^0\big)/\Gamma\big(\pi^+\pi^-\pi^0\big)$ — Γ_{11}/Γ_{10}

NODE=M010R15
NODE=M010R15

VALUE	CL%	DOCUMENT ID		COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.008	90	[7] BARBERIS	01	$450\ pp\to p_f3\pi^0p_s$

$\Gamma\big(K^*(892)K\big)/\Gamma_{total}$ — Γ_{13}/Γ

NODE=M010R13
NODE=M010R13

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.2 ± 0.5	2255	[8] COAN	04	CLEO	$\tau^-\to K^-\pi^-K^+\nu_\tau$
8 to 15	205	[9] DRUTSKOY	02	BELL	$B\to D^{(*)}K^-K^{*0}$
$3.3\pm0.5\pm0.1$	37k	[10] ASNER	00	CLE2	$10.6\ e^+e^-\to\tau^+\tau^-$, $\tau^-\to\pi^-\pi^0\pi^0\nu_\tau$
2.6 ± 0.3		[11] BARATE	99R	ALEP	$\tau\to K\overline{K}\pi\nu_\tau$

[1] From a fit to the Dalitz plot. NODE=M010R;LINKAGE=B1
[2] Assuming for $\rho(1450)$ mass and width of 1370 and 386 MeV respectively. NODE=M010R;LINKAGE=B2
[3] Assuming for $f_0(500)$ (σ) mass and width of 860 and 880 MeV respectively. NODE=M010R;LINKAGE=B3
[4] Uses multichannel Aitchison-Bowler model (BOWLER 75). Uses data from GAVILLET 77, DAUM 80, and DANKOWYCH 81. NODE=M010R4;LINKAGE=E
[5] Assuming for $f_0(1370)$ mass and width of 1186 and 350 MeV respectively. NODE=M010R;LINKAGE=B4
[6] Assuming for $f_2(1270)$ mass and width of 1275 and 185 MeV respectively. NODE=M010R;LINKAGE=B5
[7] Inconsistent with observations of $\sigma\pi$, $f_0(1370)\pi$, and $f_2(1270)\pi$ decay modes. NODE=M010R;LINKAGE=RB
[8] Using structure functions from KUHN 92 and DECKER 93A and B($\tau^- \rightarrow K^-\pi^-K^+\nu_\tau$) = (0.155 ± 0.006 ± 0.009)% from BRIERE 03. NODE=M010R13;LINKAGE=CO
[9] From a comparison to ALAM 94 assuming purely resonant production of the K^-K^{*0} system. NODE=M010R;LINKAGE=DR
[10] From a fit to the 3π mass spectrum including the $K\overline{K}^*(892)$ threshold. NODE=M010R;LINKAGE=B6
[11] Assuming $a_1(1260)$ dominance and taking B($\tau \rightarrow a_1(1260)\nu_\tau$) from BUSKULIC 96. NODE=M010R13;LINKAGE=BA

$a_1(1260)$ REFERENCES

NODE=M010

AAIJ	18AI	EPJ C78 443	R. Aaij *et al.*	(LHCb Collab.)	REFID=59187
AGHASYAN	18B	PR D98 092003	M. Aghasyan *et al.*	(COMPASS Collab.)	REFID=59471
MIKHASENKO	18	PR D98 096021	M. Mikhasenko *et al.*	(JPAC Collab.)	REFID=59487
DARGENT	17	JHEP 1705 143	P. dArgent *et al.*	(HEID, BRIS)	REFID=58121
ALEKSEEV	10	PRL 104 241803	M.G. Alekseev *et al.*	(COMPASS Collab.)	REFID=53356
AUBERT	07AU	PR D76 092005	B. Aubert *et al.*	(BABAR Collab.)	REFID=52049
LINK	07A	PR D75 052003	J.M. Link *et al.*	(FNAL FOCUS Collab.)	REFID=51713
PDG	06	JP G33 1	W.-M. Yao *et al.*	(PDG Collab.)	REFID=51004
SCHAEL	05C	PRPL 421 191	S. Schael *et al.*	(ALEPH Collab.)	REFID=50845
COAN	04	PRL 92 232001	T.E. Coan *et al.*	(CLEO Collab.)	REFID=49945
GOMEZ-DUM...	04	PR D69 073002	D. Gomez Dumm, A. Pich, J. Portoles		REFID=49771
SALVINI	04	EPJ C35 21	P. Salvini *et al.*	(OBELIX Collab.)	REFID=53226
BRIERE	03	PRL 90 181802	R. A. Briere *et al.*	(CLEO Collab.)	REFID=49360
CHUNG	02	PR D65 072001	S.U. Chung *et al.*	(BNL E852 Collab.)	REFID=48837
DRUTSKOY	02	PL B542 171	A. Drutskoy *et al.*	(BELLE Collab.)	REFID=48780
BARBERIS	01	PL B507 14	D. Barberis *et al.*		REFID=48324
ASNER	00	PR D61 012002	D.M. Asner *et al.*	(CLEO Collab.)	REFID=47339
AKHMETSHIN	99E	PL B466 392	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=47411
BARATE	99R	EPJ C11 599	R. Barate *et al.*	(ALEPH Collab.)	REFID=47366
BONDAR	99	PL B466 403	A.E. Bondar *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=47358
ABREU	98G	PL B426 411	P. Abreu *et al.*	(DELPHI Collab.)	REFID=45909
BARATE	98R	EPJ C4 409	R. Barate *et al.*	(ALEPH Collab.)	REFID=46147
BARBERIS	98B	PL B422 399	D. Barberis *et al.*	(WA 102 Collab.)	REFID=46345
ACKERSTAFF	97R	ZPHY C75 593	K. Ackerstaff *et al.*	(OPAL Collab.)	REFID=45616
BUSKULIC	96	ZPHY C70 579	D. Buskulic *et al.*	(ALEPH Collab.)	REFID=44588
AKERS	95P	ZPHY C67 45	R. Akers *et al.*	(OPAL Collab.)	REFID=44366
ALAM	94	PR D50 43	M.S. Alam *et al.*	(CLEO Collab.)	REFID=43738
ALBRECHT	93C	ZPHY C58 61	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=43310
DECKER	93A	ZPHY C58 445	R. Decker *et al.*		REFID=51577
ANDO	92	PL B291 496	A. Ando *et al.*	(KEK, KYOT, NIRS, SAGA+)	REFID=43171
KUHN	92	ZPHY C56 661	J.H. Kuhn, E. Mirkes		REFID=51576
IVANOV	91	ZPHY C49 563	Y.P. Ivanov, A.A. Osipov, M.K. Volkov	(JINR)	REFID=41750
ARMSTRONG	90	ZPHY C48 213	T.A. Armstrong, M. Benayoun, W. Beusch	(WA76 Coll.)	REFID=41375
FEINDT	90	ZPHY C48 681	M. Feindt	(HAMB)	REFID=45912
KUHN	90	ZPHY C48 445	J.H. Kuhn *et al.*	(MPIM)	REFID=45862
ISGUR	89	PR D39 1357	N. Isgur, C. Morningstar, C. Reader	(TNTO)	REFID=40730
BOWLER	88	PL B209 99	M.G. Bowler	(OXF)	REFID=40578
BAND	87	PL B198 297	H.R. Band *et al.*	(MAC Collab.)	REFID=40263
TORNQVIST	87	ZPHY C36 695	N.A. Tornqvist	(HELS)	REFID=40030
ALBRECHT	86B	ZPHY C33 7	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=20884
RUCKSTUHL	86	PRL 56 2132	W. Ruckstuhl *et al.*	(DELCO Collab.)	REFID=10349
SCHMIDKE	86	PRL 57 527	W.B. Schmidke *et al.*	(Mark II Collab.)	REFID=10350
BELLINI	85	SJNP 41 781	D. Bellini *et al.*		REFID=47490
		Translated from YAF 41 1223.			
ZIELINSKI	84C	PRL 52 1195	M. Zielinski *et al.*	(ROCH, MINN, FNAL)	REFID=20882
LONGACRE	82	PR D26 82	R.S. Longacre	(BNL)	REFID=20878
DANKOWY...	81	PRL 46 580	J.A. Dankowych *et al.*	(TNTO, BNL, CARL+)	REFID=20572
DAUM	81B	NP B182 269	C. Daum *et al.*	(AMST, CERN, CRAC, MPIM+)	REFID=20872
DAUM	80	PL 89B 281	C. Daum *et al.*	(AMST, CERN, CRAC, MPIM+) JP	REFID=20868
GAVILLET	77	PL 69B 119	P. Gavillet *et al.*	(AMST, CERN, NIJM+) JP	REFID=20852
BOWLER	75	NP B97 227	M.G. Bowler *et al.*	(OXFTP, DARE)	REFID=20571

NODE=M005

$f_2(1270)$

$I^G(J^{PC}) = 0^+(2^{++})$

$f_2(1270)$ MASS

NODE=M005M

NODE=M005M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
1275.5± 0.8 OUR AVERAGE						
1275.8± 1.0±0.4		[1] BOGOLYUB...	13	SPEC	$7\pi^+(K^+,p)A \to n\gamma + X$	
1262 $^{+1}_{-2}$ ±8		[2] ABLIKIM	06V	BES2	$e^+e^- \to J/\psi \to \gamma\pi^+\pi^-$	
1275 ±15		ABLIKIM	05	BES2	$J/\psi \to \phi\pi^+\pi^-$	
1283 ± 5		ALDE	98	GAM4	$100\ \pi^- p \to \pi^0\pi^0 n$	
1278 ± 5		[3] BERTIN	97C	OBLX	$0.0\ \overline{p}p \to \pi^+\pi^-\pi^0$	
1272 ± 8	200k	PROKOSHKIN	94	GAM2	$38\ \pi^- p \to \pi^0\pi^0 n$	
1269.7± 5.2	5730	AUGUSTIN	89	DM2	$e^+e^- \to 5\pi$	
1283 ± 8	400	[4] ALDE	87	GAM4	$100\ \pi^- p \to 4\pi^0 n$	
1274 ± 5		[4] AUGUSTIN	87	DM2	$J/\psi \to \gamma\pi^+\pi^-$	
1283 ± 6		[5] LONGACRE	86	MPS	$22\ \pi^- p \to n 2K^0_S$	
1276 ± 7		COURAU	84	DLCO	$e^+e^- \to e^+e^-\pi^+\pi^-$	
1273.3± 2.3		[6] CHABAUD	83	ASPK	$17\ \pi^- p$ polarized	
1280 ± 4		[7] CASON	82	STRC	$8\ \pi^+ p \to \Delta^{++}\pi^0\pi^0$	
1281 ± 7	11600	GIDAL	81	MRK2	J/ψ decay	
1282 ± 5		[8] CORDEN	79	OMEG	12–15 $\pi^- p \to n 2\pi$	
1269 ± 4	10k	APEL	75	NICE	$40\ \pi^- p \to n 2\pi^0$	
1272 ± 4	4600	ENGLER	74	DBC	$6\ \pi^+ n \to \pi^+\pi^- p$	
1277 ± 4	5300	FLATTE	71	HBC	$7.0\ \pi^+ p$	
1273 ± 8		[4] STUNTEBECK	70	HBC	$8\ \pi^- p$, $5.4\ \pi^+ d$	
1265 ± 8		BOESEBECK	68	HBC	$8\ \pi^+ p$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1268 ± 8		[9] RODAS	22	RVUE	$J/\psi(1S) \to \gamma\ (\pi\pi,\ K\overline{K})$	
1263 ±12		CARVER	21	CLAS	$\gamma p \to \pi^0\pi^0 p$	
1263.3± 0.2±1.5		[10] ALBRECHT	20	RVUE	$0.9\ \overline{p}p \to \pi^0\pi^0\eta,\ \pi^0\eta\eta,\ \pi^0 K^+K^-$	
1259 ± 4 ±4	1.7k	[11,12] DOBBS	15		$J/\psi \to \gamma\pi^+\pi^-$	
1267 ± 4 ±3	1.5k	[11,12] DOBBS	15		$\psi(2S) \to \gamma\pi^+\pi^-$	OCCUR=2
1270 ± 8		[13] ANISOVICH	09	RVUE	$0.0\ \overline{p}p$, πN	
1277 ± 6	870	[14] SCHEGELSKY	06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$	
1251 ±10		TIKHOMIROV	03	SPEC	$40.0\ \pi^- C \to K^0_S K^0_S K^0_L X$	
1260 ±10		[15] ALDE	97	GAM2	$450\ pp \to pp\pi^0\pi^0$	
1278 ± 6		[15] GRYGOREV	96	SPEC	$40\ \pi^- N \to K^0_S K^0_S X$	
1262 ±11		AGUILAR-...	91	EHS	$400\ pp$	
1275 ±10		AKER	91	CBAR	$0.0\ \overline{p}p \to 3\pi^0$	
1220 ±10		BREAKSTONE	90	SFM	$pp \to pp\pi^+\pi^-$	
1288 ±12		ABACHI	86B	HRS	$e^+e^- \to \pi^+\pi^- X$	
1284 ±30	3k	BINON	83	GAM2	$38\ \pi^- p \to n 2\eta$	
1280 ±20	3k	APEL	82	CNTR	$25\ \pi^- p \to n 2\pi^0$	
1284 ±10	16000	DEUTSCH...	76	HBC	$16\ \pi^+ p$	
1258 ±10	600	TAKAHASHI	72	HBC	$8\ \pi^- p \to n 2\pi$	
1275 ±13		ARMENISE	70	HBC	$9\ \pi^+ n \to p\pi^+\pi^-$	OCCUR=2
1261 ± 5	1960	[4] ARMENISE	68	DBC	$5.1\ \pi^+ n \to p\pi^+ MM^-$	
1270 ±10	360	[4] ARMENISE	68	DBC	$5.1\ \pi^+ n \to p\pi^0 MM$	OCCUR=2
1268 ± 6		[16] JOHNSON	68	HBC	$3.7–4.2\ \pi^- p$	

[1] Averaged over six nuclear targets, no statistically significant dependence on target nucleus observed. NODE=M005M;LINKAGE=B

[2] Breit-Wigner mass. NODE=M005M;LINKAGE=K

[3] T-matrix pole. NODE=M005M;LINKAGE=A

[4] Mass errors enlarged by us to $\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M005M;LINKAGE=T

[5] From a partial-wave analysis of data using a K-matrix formalism with 5 poles. NODE=M005M;LINKAGE=L

[6] From an energy-independent partial-wave analysis. NODE=M005M;LINKAGE=O

[7] From an amplitude analysis of the reaction $\pi^+\pi^- \to 2\pi^0$. NODE=M005M;LINKAGE=P

[8] From an amplitude analysis of $\pi^+\pi^- \to \pi^+\pi^-$ scattering data. NODE=M005M;LINKAGE=S

[9] T-matrix pole from coupled channel K-matrix fit to data on $J/\psi \to \gamma\pi^0\pi^0$ (ABLIKIM 15AE) and $J/\psi \to \gamma K^0_S K^0_S$ (ABLIKIM 18AA). NODE=M005M;LINKAGE=N

[10] T-matrix pole, 5 poles, 5 channels, including scattering data from HYAMS 75 ($\pi\pi$), LONGACRE 86 ($K\overline{K}$), BINON 83 ($\eta\eta$). NODE=M005M;LINKAGE=M

[11] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M005M;LINKAGE=C
[12] From a fit to a Breit-Wigner line shape with fixed Γ = 185 MeV. NODE=M005M;LINKAGE=D
[13] 4-poles, 5-channel K matrix fit. NODE=M005M;LINKAGE=AN
[14] From analysis of L3 data at 91 and 183–209 GeV. NODE=M005M;LINKAGE=SC
[15] Systematic uncertainties not estimated. NODE=M005M;LINKAGE=QQ
[16] JOHNSON 68 includes BONDAR 63, LEE 64, DERADO 65, EISNER 67. NODE=M005M;LINKAGE=J

$f_2(1270)$ WIDTH

NODE=M005W

NODE=M005W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
$186.7^{+2.2}_{-2.5}$ OUR FIT		Error includes scale factor of 1.4.				
$185.9^{+2.8}_{-2.1}$ OUR AVERAGE		Error includes scale factor of 1.6. See the ideogram below.				
$190.3\pm 1.9\pm 1.8$		[1] BOGOLYUB...	13	SPEC	$7\pi^+(K^+,p)A \to n\gamma + X$	
$175\ ^{+6}_{-4}\ \pm10$		[2] ABLIKIM	06V	BES2	$e^+e^- \to J/\psi \to \gamma\pi^+\pi^-$	
190 ± 20		ABLIKIM	05	BES2	$J/\psi \to \phi\pi^+\pi^-$	
171 ± 10		ALDE	98	GAM4	$100\ \pi^- p \to \pi^0\pi^0 n$	
204 ± 20		[3] BERTIN	97C	OBLX	$0.0\ \overline{p}p \to \pi^+\pi^-\pi^0$	
192 ± 5	200k	PROKOSHKIN	94	GAM2	$38\ \pi^- p \to \pi^0\pi^0 n$	
180 ± 24		AGUILAR-...	91	EHS	$400\ pp$	
169 ± 9	5730	[4] AUGUSTIN	89	DM2	$e^+e^- \to 5\pi$	
150 ± 30	400	[4] ALDE	87	GAM4	$100\ \pi^- p \to 4\pi^0 n$	
$186\ ^{+9}_{-2}$		[5] LONGACRE	86	MPS	$22\ \pi^- p \to n2K^0_S$	
$179.2^{+6.9}_{-6.6}$		[6] CHABAUD	83	ASPK	$17\ \pi^- p$ polarized	
160 ± 11		DENNEY	83	LASS	$10\ \pi^+ N$	
196 ± 10	3k	APEL	82	CNTR	$25\ \pi^- p \to n2\pi^0$	
152 ± 9		[7] CASON	82	STRC	$8\ \pi^+ p \to \Delta^{++}\pi^0\pi^0$	
186 ± 27	11600	GIDAL	81	MRK2	J/ψ decay	
216 ± 13		[8] CORDEN	79	OMEG	12–15 $\pi^- p \to n2\pi$	
190 ± 10	10k	APEL	75	NICE	$40\ \pi^- p \to n2\pi^0$	
192 ± 16	4600	ENGLER	74	DBC	$6\ \pi^+ n \to \pi^+\pi^- p$	
183 ± 15	5300	FLATTE	71	HBC	$7\ \pi^+ p \to \Delta^{++} f_2$	
196 ± 30		[4] STUNTEBECK	70	HBC	$8\ \pi^- p$, $5.4\ \pi^+ d$	
216 ± 20	1960	[4] ARMENISE	68	DBC	$5.1\ \pi^+ n \to p\pi^+ MM^-$	OCCUR=2
128 ± 27		[4] BOESEBECK	68	HBC	$8\ \pi^+ p$	
176 ± 21		[4,9] JOHNSON	68	HBC	3.7–4.2 $\pi^- p$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
201 ± 11		[10] RODAS	22	RVUE	$J/\psi(1S) \to \gamma\ (\pi\pi,\ K\overline{K})$	
183 ± 2		CARVER	21	CLAS	$\gamma p \to \pi^0\pi^0 p$	
$193.7\pm 0.4\pm 1.6$		[11] ALBRECHT	20	RVUE	$0.9\ \overline{p}p \to \pi^0\pi^0\eta,\ \pi^0\eta\eta,\ \pi^0K^+K^-$	
194 ± 36		[12] ANISOVICH	09	RVUE	$0.0\ \overline{p}p,\ \pi N$	
195 ± 15	870	[13] SCHEGELSKY	06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$	
121 ± 26		TIKHOMIROV	03	SPEC	$40.0\ \pi^- C \to K^0_S K^0_S K^0_L X$	
187 ± 20		[14] ALDE	97	GAM2	$450\ pp \to pp\pi^0\pi^0$	
184 ± 10		[14] GRYGOREV	96	SPEC	$40\ \pi^- N \to K^0_S K^0_S X$	
200 ± 10		AKER	91	CBAR	$0.0\ \overline{p}p \to 3\pi^0$	
240 ± 40	3k	BINON	83	GAM2	$38\ \pi^- p \to n2\eta$	
187 ± 30	650	[4] ANTIPOV	77	CIBS	$25\ \pi^- p \to p3\pi$	
225 ± 38	16000	DEUTSCH...	76	HBC	$16\ \pi^+ p$	
166 ± 28	600	[4] TAKAHASHI	72	HBC	$8\ \pi^- p \to n2\pi$	
173 ± 53		[4] ARMENISE	70	HBC	$9\ \pi^+ n \to p\pi^+\pi^-$	OCCUR=2

[1] Averaged over six nuclear targets, no statistically significant dependence on target nucleus observed. NODE=M005W;LINKAGE=C
[2] Breit-Wigner width NODE=M005W;LINKAGE=D
[3] T-matrix pole. NODE=M005W;LINKAGE=QA
[4] Width errors enlarged by us to $4\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M005W;LINKAGE=T
[5] From a partial-wave analysis of data using a K-matrix formalism with 5 poles. NODE=M005W;LINKAGE=L
[6] From an energy-independent partial-wave analysis. NODE=M005W;LINKAGE=R
[7] From an amplitude analysis of the reaction $\pi^+\pi^- \to 2\pi^0$. NODE=M005W;LINKAGE=Q
[8] From an amplitude analysis of $\pi^+\pi^- \to \pi^+\pi^-$ scattering data. NODE=M005W;LINKAGE=U
[9] JOHNSON 68 includes BONDAR 63, LEE 64, DERADO 65, EISNER 67. NODE=M005W;LINKAGE=J

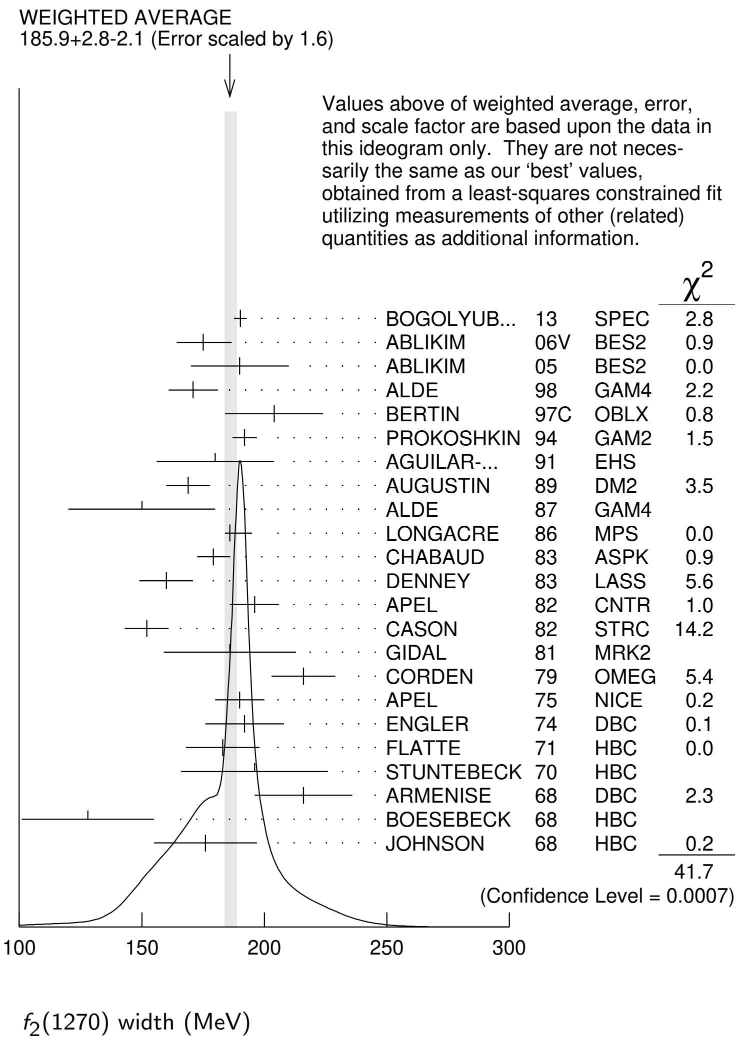
[10] T-matrix pole from coupled channel K-matrix fit to data on $J/\psi \rightarrow \gamma \pi^0 \pi^0$ (ABLIKIM 15AE) and $J/\psi \rightarrow \gamma K^0_S K^0_S$ (ABLIKIM 18AA). NODE=M005W;LINKAGE=K

[11] T-matrix pole, 4 poles, 4 channels, including scattering data from HYAMS 75 ($\pi\pi$), LONGACRE 86 ($K\overline{K}$), BINON 83 ($\eta\eta$). NODE=M005W;LINKAGE=F

[12] 4-poles, 5-channel K matrix fit. NODE=M005W;LINKAGE=AN

[13] From analysis of L3 data at 91 and 183–209 GeV. NODE=M005W;LINKAGE=SC

[14] Systematic uncertainties not estimated. NODE=M005W;LINKAGE=QQ



$f_2(1270)$ DECAY MODES

NODE=M005215;NODE=M005

	Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	
Γ_1	$\pi\pi$	$(84.2 {}^{+2.9}_{-0.9})$ %	S=1.1	DESIG=1
Γ_2	$\pi^+\pi^- 2\pi^0$	$(7.7 {}^{+1.1}_{-3.2})$ %	S=1.2	DESIG=3
Γ_3	$K\overline{K}$	$(4.6 {}^{+0.5}_{-0.4})$ %	S=2.7	DESIG=4
Γ_4	$2\pi^+ 2\pi^-$	(2.8 ± 0.4) %	S=1.2	DESIG=2
Γ_5	$\eta\eta$	$(4.0 \pm 0.8) \times 10^{-3}$	S=2.1	DESIG=7
Γ_6	$4\pi^0$	$(3.0 \pm 1.0) \times 10^{-3}$		DESIG=9
Γ_7	$\gamma\gamma$	$(1.42 \pm 0.24) \times 10^{-5}$	S=1.4	DESIG=8
Γ_8	$\eta\pi\pi$	$< 8 \times 10^{-3}$	CL=95%	DESIG=6
Γ_9	$K^0 K^- \pi^+ +$ c.c.	$< 3.4 \times 10^{-3}$	CL=95%	DESIG=5
Γ_{10}	$e^+ e^-$	$< 6 \times 10^{-10}$	CL=90%	DESIG=10

CONSTRAINED FIT INFORMATION

An overall fit to the total width, 4 partial widths, a combination of partial widths obtained from integrated cross sections, and 6 branching ratios uses 45 measurements and one constraint to determine 8 parameters. The overall fit has a χ^2 = 83.0 for 38 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\left\langle\delta p_i \delta p_j\right\rangle/(\delta p_i \cdot \delta p_j)$, in percent, from the fit to parameters p_i, including the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_2	−90						
x_3	10	−39					
x_4	10	−38	1				
x_5	1	−6	0	0			
x_6	0	−7	0	0	0		
x_7	3	1	−15	0	0	0	
Γ	−71	65	−10	−7	−1	0	−6
	x_1	x_2	x_3	x_4	x_5	x_6	x_7

	Mode	Rate (MeV)	Scale factor	
Γ_1	$\pi\pi$	$157.2^{+4.0}_{-1.1}$		DESIG=1
Γ_2	$\pi^+\pi^-2\pi^0$	$14.4^{+2.1}_{-6.0}$	1.2	DESIG=3
Γ_3	$K\overline{K}$	8.5 ±0.8	2.8	DESIG=4
Γ_4	$2\pi^+2\pi^-$	5.2 ±0.7	1.2	DESIG=2
Γ_5	$\eta\eta$	0.75 ±0.14	2.1	DESIG=7
Γ_6	$4\pi^0$	0.56 ±0.19		DESIG=9
Γ_7	$\gamma\gamma$	0.0026±0.0005	1.4	DESIG=8

f_2(1270) PARTIAL WIDTHS

NODE=M005220

$\Gamma(\pi\pi)$ — Γ_1

NODE=M005W1
NODE=M005W1

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
$157.2^{+4.0}_{-1.1}$ OUR FIT				
$157.0^{+6.0}_{-1.0}$		[1] LONGACRE 86	MPS	22 $\pi^- p \to n 2K^0_S$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
152 ±8	870	[2] SCHEGELSKY 06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$

[1] From a partial-wave analysis of data using a K-matrix formalism with 5 poles.
[2] From analysis of L3 data at 91 and 183–209 GeV and using SU(3) relations.

NODE=M005W1;LINKAGE=L
NODE=M005W1;LINKAGE=SC

$\Gamma(K\overline{K})$ — Γ_3

NODE=M005W4
NODE=M005W4

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
8.5±0.8 OUR FIT Error includes scale factor of 2.8.				
$9.0^{+0.7}_{-0.3}$		[1] LONGACRE 86	MPS	22 $\pi^- p \to n 2K^0_S$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
7.5±2.0	870	[2] SCHEGELSKY 06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$

[1] From a partial-wave analysis of data using a K-matrix formalism with 5 poles.
[2] From analysis of L3 data at 91 and 183–209 GeV and using SU(3) relations.

NODE=M005W4;LINKAGE=L
NODE=M005W4;LINKAGE=SC

$\Gamma(\eta\eta)$ — Γ_5

NODE=M005W7
NODE=M005W7

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
0.75±0.14 OUR FIT Error includes scale factor of 2.1.				
1.0 ±0.1		[1] LONGACRE 86	MPS	22 $\pi^- p \to n 2K^0_S$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.8 ±0.4	870	[2] SCHEGELSKY 06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$

[1] From a partial-wave analysis of data using a K-matrix formalism with 5 poles.
[2] From analysis of L3 data at 91 and 183–209 GeV and using SU(3) relations.

NODE=M005W7;LINKAGE=L
NODE=M005W7;LINKAGE=SC

$\Gamma(\gamma\gamma)$ Γ_7

NODE=M005W8

The value of this width depends on the theoretical model used. Unitary approaches with scalars typically (with exception of PENNINGTON 08) give values clustering around 2.6 keV; without an *S*-wave contribution, values are systematically higher (typically around 3 keV).

NODE=M005W8

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT	
2.6 ±0.5 OUR FIT	Error includes scale factor of 1.4.					NODE=M005W8
2.93±0.40		[1] DAI	14A	RVUE	Compilation	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
3.14±0.20		[2,3] PENNINGTON	08	RVUE	Compilation	OCCUR=2
3.82±0.30		[3,4] PENNINGTON	08	RVUE	Compilation	OCCUR=3
2.55±0.15	870	[5] SCHEGELSKY	06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$	
2.84±0.35		BOGLIONE	99	RVUE	$\gamma\gamma \to \pi^+\pi^-$, $\pi^0\pi^0$	
2.93±0.23±0.32		[6] YABUKI	95	VNS		
$2.58\pm0.13^{+0.36}_{-0.27}$		[7] BEHREND	92	CELL	$e^+e^- \to e^+e^-\pi^+\pi^-$	
3.10±0.35±0.35		[8] BLINOV	92	MD1	$e^+e^- \to e^+e^-\pi^+\pi^-$	
2.27±0.47±0.11		ADACHI	90D	TOPZ	$e^+e^- \to e^+e^-\pi^+\pi^-$	
3.15±0.04±0.39		BOYER	90	MRK2	$e^+e^- \to e^+e^-\pi^+\pi^-$	
$3.19\pm0.16^{+0.29}_{-0.28}$		MARSISKE	90	CBAL	$e^+e^- \to e^+e^-\pi^0\pi^0$	
2.35±0.65		[9] MORGAN	90	RVUE	$\gamma\gamma \to \pi^+\pi^-$, $\pi^0\pi^0$	
$3.19\pm0.09^{+0.22}_{-0.38}$	2177	OEST	90	JADE	$e^+e^- \to e^+e^-\pi^0\pi^0$	
3.2 ±0.1 ±0.4		[10] AIHARA	86B	TPC	$e^+e^- \to e^+e^-\pi^+\pi^-$	
2.5 ±0.1 ±0.5		BEHREND	84B	CELL	$e^+e^- \to e^+e^-\pi^+\pi^-$	
2.85±0.25±0.5		[11] BERGER	84	PLUT	$e^+e^- \to e^+e^-2\pi$	
2.70±0.05±0.20		COURAU	84	DLCO	$e^+e^- \to e^+e^-\pi^+\pi^-$	
2.52±0.13±0.38		[12] SMITH	84C	MRK2	$e^+e^- \to e^+e^-\pi^+\pi^-$	
2.7 ±0.2 ±0.6		EDWARDS	82F	CBAL	$e^+e^- \to e^+e^-2\pi^0$	
$2.9\ ^{+0.6}_{-0.4}\ \pm0.6$		[13] EDWARDS	82F	CBAL	$e^+e^- \to e^+e^-2\pi^0$	OCCUR=2
3.2 ±0.2 ±0.6		BRANDELIK	81B	TASS	$e^+e^- \to e^+e^-\pi^+\pi^-$	
3.6 ±0.3 ±0.5		ROUSSARIE	81	MRK2	$e^+e^- \to e^+e^-\pi^+\pi^-$	
2.3 ±0.8		[14] BERGER	80B	PLUT	e^+e^-	

[1] Based on a *K*-matrix analysis of BELLE data from MORI 07, UEHARA 08A, UEHARA 09 and UEHARA 13. The width is derived for the pole on the third sheet which is closest to the physical axis. Supersedes PENNINGTON 08. NODE=M005W8;LINKAGE=A

[2] Solution A (preferred solution based on χ^2-analysis). NODE=M005W8;LINKAGE=P1

[3] Dispersion theory based amplitude analysis of BOYER 90, MARSISKE 90, BEHREND 92, and MORI 07. NODE=M005W8;LINKAGE=P3

[4] Solution B (worse than solution A; still acceptable when systematic uncertainties are included). NODE=M005W8;LINKAGE=P2

[5] From analysis of L3 data at 91 and 183–209 GeV and using SU(3) relations. NODE=M005W8;LINKAGE=SC

[6] With a narrow scalar state around 1220 MeV. NODE=M005W8;LINKAGE=YA

[7] Using a unitarized model with a 300 - 500 keV wide scalar at 1100 MeV. NODE=M005W;LINKAGE=B

[8] Using the unitarized model of LYTH 85. NODE=M005W;LINKAGE=A

[9] Error includes spread of different solutions. Data of MARK2 and CRYSTAL BALL used in the analysis. Authors report strong correlations with $\gamma\gamma$ width of $f_0(1370)$: $\Gamma(f_2)$ + 1/4 $\Gamma(f^0)$ = 3.6 ± 0.3 KeV. NODE=M005PW;LINKAGE=C

[10] Radiative corrections modify the partial widths; for instance the COURAU 84 value becomes 2.66 ± 0.21 in the calculation of LANDRO 86. NODE=M005PW;LINKAGE=B

[11] Using the MENNESSIER 83 model. NODE=M005PW;LINKAGE=X

[12] Superseded by BOYER 90. NODE=M005PW;LINKAGE=V

[13] If helicity = 2 assumption is not made. NODE=M005PW;LINKAGE=H

[14] Using mass, width and B($f_2(1270) \to 2\pi$) from PDG 78. NODE=M005PW;LINKAGE=A

$\Gamma(e^+e^-)$ Γ_{10}

NODE=M005W9

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<0.11	90	ACHASOV	00K	SND	$e^+e^- \to \pi^0\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.7	90	VOROBYEV	88	ND	$e^+e^- \to \pi^0\pi^0$

NODE=M005W9

$f_2(1270)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M005223

$\Gamma(K\overline{K}) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_3\Gamma_7/\Gamma$

NODE=M005G1
NODE=M005G1

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
0.121±0.020 OUR FIT Error includes scale factor of 1.3.				
0.091±0.007±0.027	[1] ALBRECHT	90G	ARG	$e^+e^- \rightarrow e^+e^-K^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.104±0.007±0.072	[2] ALBRECHT	90G	ARG	$e^+e^- \rightarrow e^+e^-K^+K^-$

OCCUR=2

[1] Using an incoherent background.
[2] Using a coherent background.

NODE=M005G1;LINKAGE=A
NODE=M005G1;LINKAGE=K

$\Gamma(\eta\eta) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_5\Gamma_7/\Gamma$

NODE=M005G02
NODE=M005G02

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
$\mathbf{11.5^{+1.8}_{-2.0}{}^{+4.5}_{-3.7}}$	[1] UEHARA	10A	BELL	10.6 $e^+e^- \rightarrow e^+e^-\eta\eta$

[1] Including interference with the $f'_2(1525)$ (parameters fixed to the values from the 2008 edition of this review, PDG 08) and f_0(Y).

NODE=M005G02;LINKAGE=UE

Helicity-0/Helicity-2 RATIO IN $\gamma\gamma \rightarrow f_2(1270) \rightarrow \pi\pi$

NODE=M005HR0
NODE=M005HR0

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
$\mathbf{3.7\pm0.3^{+15.9}_{-\ 2.9}}$	UEHARA	08A	BELL	10.6 $e^+e^- \rightarrow e^+e^-\pi^0\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
9.5±1.8	[1] DAI	14A	RVUE	Compilation
13	[2,3] PENNINGTON	08	RVUE	Compilation
26	[3,4] PENNINGTON	08	RVUE	Compilation

OCCUR=2
OCCUR=3

[1] Based on a K-matrix analysis of BELLE data from MORI 07, UEHARA 08A, UEHARA 09 and UEHARA 13. The width is derived for the pole on the third sheet which is closest to the physical axis.

NODE=M005HR0;LINKAGE=A

[2] Solution A (preferred solution based on χ^2-analysis).

NODE=M005HR0;LINKAGE=P1

[3] Dispersion theory based amplitude analysis of BOYER 90, MARSISKE 90, BEHREND 92, and MORI 07.

NODE=M005HR0;LINKAGE=P3

[4] Solution B (worse than solution A; still acceptable when systematic uncertainties are included).

NODE=M005HR0;LINKAGE=P2

$f_2(1270)$ BRANCHING RATIOS

NODE=M005225

$\Gamma(\pi\pi)/\Gamma_{total}$ Γ_1/Γ

NODE=M005R10
NODE=M005R10

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.842^{+0.029}_{-0.009}}$ **OUR FIT** Error includes scale factor of 1.1.					
0.837±0.020 OUR AVERAGE					
0.849±0.025		CHABAUD	83	ASPK	17 π^-p polarized
0.85 ±0.05	250	BEAUPRE	71	HBC	8 $\pi^+p \rightarrow \Delta^{++}f_2$
0.8 ±0.04	600	OH	70	HBC	1.26 $\pi^-p \rightarrow \pi^+\pi^-n$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.856±0.001±0.05		[1] ALBRECHT	20	RVUE	0.9 $\overline{p}p \rightarrow \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0K^+K^-$

[1] Residue from T-matrix pole, 4 poles, 4 channels, including scattering data from HYAMS 75 ($\pi\pi$), LONGACRE 86 ($K\overline{K}$), BINON 83 ($\eta\eta$).

NODE=M005R10;LINKAGE=A

$\Gamma(\pi^+\pi^-2\pi^0)/\Gamma(\pi\pi)$ Γ_2/Γ_1

NODE=M005R2

Should be twice $\Gamma(2\pi^+2\pi^-)/\Gamma(\pi\pi)$ if decay is $\rho\rho$. (See ASCOLI 68D.)

NODE=M005R2
NODE=M005R2

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.091^{+0.014}_{-0.040}}$ **OUR FIT** Error includes scale factor of 1.2.					
0.15 ±0.06	600	EISENBERG	74	HBC	4.9 $\pi^+p \rightarrow \Delta^{++}f_2$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.07		EMMS	75D	DBC	4 $\pi^+n \rightarrow pf_2$

$\Gamma(K\overline{K})/\Gamma_{total}$ Γ_3/Γ

NODE=M005R00
NODE=M005R00

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.033±0.001±0.005	[1] ALBRECHT	20	RVUE	0.9 $\overline{p}p \rightarrow \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0K^+K^-$

[1] Residue from T-matrix pole, 4 poles, 4 channels, including scattering data from HYAMS 75 ($\pi\pi$), LONGACRE 86 ($K\overline{K}$), BINON 83 ($\eta\eta$).

NODE=M005R00;LINKAGE=A

$\Gamma(K\overline{K})/\Gamma(\pi\pi)$ Γ_3/Γ_1

NODE=M005R3

We average only experiments which either take into account $f_2(1270)$-$a_2(1320)$ interference explicitly or demonstrate that $a_2(1320)$ production is negligible.

NODE=M005R3

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
$0.054^{+0.005}_{-0.006}$ OUR FIT	Error includes scale factor of 2.7.			
$0.041^{+0.004}_{-0.005}$ OUR AVERAGE				
0.045 ± 0.01		[1] BARGIOTTI 03	OBLX	$\overline{p}p$
$0.037^{+0.008}_{-0.021}$		ETKIN 82B	MPS	$23\ \pi^- p \to n 2K^0_S$
0.045 ± 0.009		CHABAUD 81	ASPK	$17\ \pi^- p$ polarized
0.039 ± 0.008		LOVERRE 80	HBC	$4\ \pi^- p \to K\overline{K}N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.052 ± 0.025		ABLIKIM 04E	BES2	$J/\psi \to \omega K^+ K^-$
0.036 ± 0.005		[2] COSTA 80	OMEG	1–2.2 $\pi^- p \to K^+ K^- n$
0.030 ± 0.005		[3] MARTIN 79	RVUE	
0.027 ± 0.009		[4] POLYCHRO... 79	STRC	$7\ \pi^- p \to n 2K^0_S$
0.025 ± 0.015		EMMS 75D	DBC	$4\ \pi^+ n \to p f_2$
0.031 ± 0.012	20	ADERHOLZ 69	HBC	$8\ \pi^+ p \to K^+ K^- \pi^+ p$

NODE=M005R3

[1] Coupled channel analysis of $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, and $K^\pm K^0_S \pi^\mp$. NODE=M005R;LINKAGE=BG

[2] Re-evaluated by CHABAUD 83. NODE=M005R3;LINKAGE=D

[3] Includes PAWLICKI 77 data. NODE=M005R3;LINKAGE=F

[4] Takes into account the $f_2(1270)$-$f'_2(1525)$ interference. NODE=M005R3;LINKAGE=M

$\Gamma(2\pi^+2\pi^-)/\Gamma(\pi\pi)$ Γ_4/Γ_1

NODE=M005R1
NODE=M005R1

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.033 ± 0.005 OUR FIT	Error includes scale factor of 1.2.			
0.033 ± 0.004 OUR AVERAGE	Error includes scale factor of 1.1.			
0.024 ± 0.006	160	EMMS 75D	DBC	$4\ \pi^+ n \to p f_2$
0.051 ± 0.025	70	EISENBERG 74	HBC	$4.9\ \pi^+ p \to \Delta^{++} f_2$
$0.043^{+0.007}_{-0.011}$	285	[1] LOUIE 74	HBC	$3.9\ \pi^- p \to n f_2$
0.037 ± 0.007	154	ANDERSON 73	DBC	$6\ \pi^+ n \to p f_2$
0.047 ± 0.013		OH 70	HBC	$1.26\ \pi^- p \to \pi^+\pi^- n$

[1] LOUIE 74 was quoted as 0.065 in PDG 74. Factor 2/3 to go from $\pi^+\pi^- \to \pi\pi$ forgotten. Mike L. NODE=M005R1;LINKAGE=02

$\Gamma(\eta\eta)/\Gamma_{total}$ Γ_5/Γ

NODE=M005R7
NODE=M005R7

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
4.0 ± 0.8 OUR FIT	Error includes scale factor of 2.1.		
2.9 ± 0.5 OUR AVERAGE			
2.7 ± 0.7	BINON 05	GAMS	$33\ \pi^- p \to \eta\eta n$
2.8 ± 0.7	ALDE 86D	GAM4	$100\ \pi^- p \to 2\eta n$
5.2 ± 1.7	BINON 83	GAM2	$38\ \pi^- p \to 2\eta n$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$4.0\pm1.0\pm2.0$	[1] ALBRECHT 20	RVUE	$0.9\ \overline{p}p \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0 K^+ K^-$

[1] Residue from T-matrix pole, 4 poles, 4 channels, including scattering data from HYAMS 75 ($\pi\pi$), LONGACRE 86 ($K\overline{K}$), BINON 83 ($\eta\eta$). NODE=M005R7;LINKAGE=A

$\Gamma(\eta\eta)/\Gamma(\pi\pi)$ Γ_5/Γ_1

NODE=M005R6
NODE=M005R6

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
0.003 ± 0.001		BARBERIS 00E		$450\ pp \to p_f \eta\eta p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.05	95	EDWARDS 82F	CBAL	$e^+e^- \to e^+e^- 2\eta$
<0.016	95	EMMS 75D	DBC	$4\ \pi^+ n \to p f_2$
<0.09	95	EISENBERG 74	HBC	$4.9\ \pi^+ p \to \Delta^{++} f_2$

$\Gamma(4\pi^0)/\Gamma_{total}$ Γ_6/Γ

NODE=M005R11
NODE=M005R11

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.0030 ± 0.0010 OUR FIT				
$0.003\ \pm0.001$	400 ± 50	ALDE 87	GAM4	$100\ \pi^- p \to 4\pi^0 n$

$\Gamma(\gamma\gamma)/\Gamma_{total}$ Γ_7/Γ

NODE=M005R13
NODE=M005R13

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$1.57\pm0.01^{+1.39}_{-0.14}$	UEHARA	08A	BELL	10.6 $e^+e^- \rightarrow e^+e^-\pi^0\pi^0$

$\Gamma(\eta\pi\pi)/\Gamma(\pi\pi)$ Γ_8/Γ_1

NODE=M005R5
NODE=M005R5

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.010	95	EMMS	75D	DBC	$4\,\pi^+ n \rightarrow p f_2$

$\Gamma(K^0 K^- \pi^+ + c.c.)/\Gamma(\pi\pi)$ Γ_9/Γ_1

NODE=M005R4
NODE=M005R4

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.004	95	EMMS	75D	DBC	$4\,\pi^+ n \rightarrow p f_2$

$\Gamma(e^+e^-)/\Gamma_{total}$ Γ_{10}/Γ

NODE=M005R12
NODE=M005R12

VALUE (units 10^{-10})	CL%	DOCUMENT ID		TECN	COMMENT
<6	90	ACHASOV	00K	SND	$e^+e^- \rightarrow \pi^0\pi^0$

$f_2(1270)$ REFERENCES

NODE=M005

RODAS 22 EPJ C82 80 A. Rodas et al. (JPAC Collab.) REFID=61610
CARVER 21 PRL 126 082002 M. Carver et al. (CLAS Collab.) REFID=61097
ALBRECHT 20 EPJ C80 453 M. Albrecht et al. (Crystal Barrel Collab.) REFID=60439
ABLIKIM 18AA PR D98 072003 M. Ablikim et al. (BESIII Collab.) REFID=59455
ABLIKIM 15AE PR D92 052003 M. Ablikim et al. (BESIII Collab.) REFID=56984
DOBBS 15 PR D91 052006 S. Dobbs et al. (NWES) REFID=56805
DAI 14A PR D90 036004 L.-Y. Dai, M.R. Pennington (CEBAF) REFID=55923
BOGOLYUB... 13 PAN 76 1324 M.Yu. Bogolyubsky et al. (HYPERON-M Collab.) REFID=55585
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UEHARA 13 PTEP 2013 123C01 S. Uehara et al. (BELLE Collab.) REFID=55592
UEHARA 10A PR D82 114031 S. Uehara et al. (BELLE Collab.) REFID=53641
ANISOVICH 09 IJMP A24 2481 V.V. Anisovich, A.V. Sarantsev REFID=52719
UEHARA 09 PR D79 052009 S. Uehara et al. (BELLE Collab.) REFID=52761
PDG 08 PL B667 1 C. Amsler et al. (PDG Collab.) REFID=52166
PENNINGTON 08 EPJ C56 1 M.R. Pennington et al. REFID=52303
UEHARA 08A PR D78 052004 S. Uehara et al. (BELLE Collab.) REFID=52309
MORI 07 PR D75 051101 T. Mori et al. (BELLE Collab.) REFID=51652
ABLIKIM 06V PL B642 441 M. Ablikim et al. (BES Collab.) REFID=51507
SCHEGELSKY 06A EPJ A27 207 V.A. Schegelsky et al. REFID=51185
ABLIKIM 05 PL B607 243 M. Ablikim et al. (BES Collab.) REFID=50450
BINON 05 PAN 68 960 F. Binon et al. REFID=50780
Translated from YAF 68 998.
ABLIKIM 04E PL B603 138 M. Ablikim et al. (BES Collab.) REFID=50174
BARGIOTTI 03 EPJ C26 371 M. Bargiotti et al. (OBELIX Collab.) REFID=49217
TIKHOMIROV 03 PAN 66 828 G.D. Tikhomirov et al. REFID=49423
Translated from YAF 66 860.
ACHASOV 00K PL B492 8 M.N. Achasov et al. (Novosibirsk SND Collab.) REFID=47933
BARBERIS 00E PL B479 59 D. Barberis et al. (WA 102 Collab.) REFID=47961
BOGLIONE 99 EPJ C9 11 M. Boglione, M.R. Pennington REFID=46931
ALDE 98 EPJ A3 361 D. Alde et al. (GAM4 Collab.) REFID=46605
Also PAN 62 405 D. Alde et al. (GAMS Collab.) REFID=46914
Translated from YAF 62 446.
ALDE 97 PL B397 350 D.M. Alde et al. (GAMS Collab.) REFID=45392
BERTIN 97C PL B408 476 A. Bertin et al. (OBELIX Collab.) REFID=45701
GRYGOREV 96 PAN 59 2105 V.K. Grigoriev, O.N. Baloshin, B.P. Barkov (ITEP) REFID=45566
Translated from YAF 59 2187.
YABUKI 95 JPSJ 64 435 F. Yabuki et al. (VENUS Collab.) REFID=46384
PROKOSHKIN 94 PD 39 420 Y.D. Prokoshkin, A.A. Kondashov (SERP) REFID=44094
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BEHREND 92 ZPHY C56 381 H.J. Behrend (CELLO Collab.) REFID=43172
BLINOV 92 ZPHY C53 33 A.E. Blinov et al. (NOVO) REFID=41858
AGUILAR-... 91 ZPHY C50 405 M. Aguilar-Benitez et al. (LEBC-EHS Collab.) REFID=41637
AKER 91 PL B260 249 E. Aker et al. (Crystal Barrel Collab.) REFID=41587
ADACHI 90D PL B234 185 I. Adachi et al. (TOPAZ Collab.) REFID=41345
ALBRECHT 90G ZPHY C48 183 H. Albrecht et al. (ARGUS Collab.) REFID=41374
BOYER 90 PR D42 1350 J. Boyer et al. (Mark II Collab.) REFID=41362
BREAKSTONE 90 ZPHY C48 569 A.M. Breakstone et al. (ISU, BGNA, CERN+) REFID=41376
MARSISKE 90 PR D41 3324 H. Marsiske et al. (Crystal Ball Collab.) REFID=41351
MORGAN 90 ZPHY C48 623 D. Morgan, M.R. Pennington (RAL, DURH) REFID=41583
OEST 90 ZPHY C47 343 T. Oest et al. (JADE Collab.) REFID=41358
AUGUSTIN 89 NP B320 1 J.E. Augustin, G. Cosme (DM2 Collab.) REFID=41004
VOROBYEV 88 SJNP 48 273 P.V. Vorobiev et al. (NOVO) REFID=41023
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ALDE 87 PL B198 286 D.M. Alde et al. (LANL, BRUX, SERP, LAPP) REFID=40221
AUGUSTIN 87 ZPHY C36 369 J.E. Augustin et al. (LALO, CLER, FRAS+) REFID=40268
ABACHI 86B PRL 57 1990 S. Abachi et al. (PURD, ANL, IND, MICH+) REFID=20394
AIHARA 86B PRL 57 404 H. Aihara et al. (TPC-2γ Collab.) REFID=20764
ALDE 86D NP B269 485 D.M. Alde et al. (BELG, LAPP, SERP, CERN+) REFID=20765
LANDRO 86 PL B172 445 M. Landro, K.J. Mork, H.A. Olsen (UTRO) REFID=20767
LONGACRE 86 PL B177 223 R.S. Longacre et al. (BNL, BRAN, CUNY+) REFID=20768
LYTH 85 JP G11 459 D.H. Lyth REFID=42169
BEHREND 84B ZPHY C23 223 H.J. Behrend et al. (CELLO Collab.) REFID=20757
BERGER 84 ZPHY C26 199 C. Berger et al. (PLUTO Collab.) REFID=20760
COURAU 84 PL 147B 227 A. Courau et al. (CIT, SLAC) REFID=20758
SMITH 84C PR D30 851 J.R. Smith et al. (SLAC, LBL, HARV) REFID=20759
BINON 83 NC 78A 313 F.G. Binon et al. (BELG, LAPP, SERP+) REFID=20750
Also SJNP 38 561 F.G. Binon et al. (BELG, LAPP, SERP+) REFID=20751
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CHABAUD	83	NP B223 1	V. Chabaud *et al.*	(CERN, CRAC, MPIM)	REFID=20131
DENNEY	83	PR D28 2726	D.L. Denney *et al.*	(IOWA, MICH)	REFID=20754
MENNESSIER	83	ZPHY C16 241	G. Mennessier	(MONP)	REFID=20393
APEL	82	NP B201 197	W.D. Apel *et al.*	(KARLK, KARLE, PISA, SERP+)	REFID=20745
CASON	82	PRL 48 1316	N.M. Cason *et al.*	(NDAM, ANL)	REFID=20746
EDWARDS	82F	PL 110B 82	C. Edwards *et al.*	(CIT, HARV, PRIN+)	REFID=20747
ETKIN	82B	PR D25 1786	A. Etkin *et al.*	(BNL, CUNY, TUFTS, VAND)	REFID=20390
BRANDELIK	81B	ZPHY C10 117	R. Brandelik *et al.*	(TASSO Collab.)	REFID=20741
CHABAUD	81	APP B12 575	V. Chabaud *et al.*	(CERN, CRAC, MPIM)	REFID=20742
GIDAL	81	PL 107B 153	G. Gidal *et al.*	(SLAC, LBL)	REFID=20386
ROUSSARIE	81	PL 105B 304	A. Roussarie *et al.*	(SLAC, LBL)	REFID=20388
BERGER	80B	PL 94B 254	C. Berger *et al.*	(PLUTO Collab.)	REFID=20736
COSTA	80	NP B175 402	G. Costa *et al.*	(BARI, BONN, CERN, GLAS+)	REFID=20737
LOVERRE	80	ZPHY C6 187	P.F. Loverre *et al.*	(CERN, CDEF, MADR+)	REFID=20382
CORDEN	79	NP B157 250	M.J. Corden *et al.*	(BIRM, RHEL, TELA+)	REFID=20374
MARTIN	79	NP B158 520	A.D. Martin, E.N. Ozmutlu	(DURH)	REFID=20377
POLYCHRO...	79	PR D19 1317	V.A. Polychronakos *et al.*	(NDAM, ANL)	REFID=20378
PDG	78	PL 75B 1	C. Bricman *et al.*		REFID=40124
ANTIPOV	77	NP B119 45	Y.M. Antipov *et al.*	(SERP, GEVA)	REFID=20728
PAWLICKI	77	PR D15 3196	A.J. Pawlicki *et al.*	(ANL)	REFID=20367
DEUTSCH...	76	NP B103 426	M. Deutschmann *et al.*	(AACH3, BERL, BONN+)	REFID=20119
APEL	75	PL 57B 398	W.D. Apel *et al.*	(KARLK, KARLE, PISA, SERP+)	REFID=20720
EMMS	75D	NP B96 155	M.J. Emms *et al.*	(BIRM, DURH, RHEL)	REFID=20721
HYAMS	75	NP B100 205	B.D. Hyams *et al.*	(CERN, MPIM)	REFID=20355
EISENBERG	74	PL 52B 239	Y. Eisenberg *et al.*	(REHO)	REFID=20715
ENGLER	74	PR D10 2070	A. Engler *et al.*	(CMU, CASE)	REFID=20110
LOUIE	74	PL 48B 385	J. Louie *et al.*	(SACL, CERN)	REFID=20719
PDG	74	PL 50B 1	V. Chaloupka *et al.*		REFID=40125
ANDERSON	73	PRL 31 562	J.C. Anderson *et al.*	(CMU, CASE)	REFID=20710
TAKAHASHI	72	PR D6 1266	K. Takahashi *et al.*	(TOHOK, PENN, NDAM+)	REFID=20103
BEAUPRE	71	NP B28 77	J.V. Beaupre *et al.*	(AACH, BERL, CERN)	REFID=20698
FLATTE	71	PL 34B 551	S.M. Flatte *et al.*	(LBL)	REFID=20700
ARMENISE	70	LNC 4 199	N. Armenise *et al.*	(BARI, BGNA, FIRZ)	REFID=20693
OH	70	PR D1 2494	B.Y. Oh *et al.*	(WISC, TNTO) JP	REFID=20335
STUNTEBECK	70	PL 32B 391	P.H. Stuntebeck *et al.*	(NDAM)	REFID=20696
ADERHOLZ	69	NP B11 259	M. Aderholz *et al.*	(AACH3, BERL, CERN+)	REFID=20687
ARMENISE	68	NC 54A 999	N. Armenise *et al.*	(BARI, BGNA, FIRZ+)	REFID=20054
ASCOLI	68D	PRL 21 1712	G. Ascoli *et al.*	(ILL)	REFID=20681
BOESEBECK	68	NP B4 501	K. Boesebeck *et al.*	(AACH, BERL, CERN)	REFID=20585
JOHNSON	68	PR 176 1651	P.B. Johnson *et al.*	(NDAM, PURD, SLAC)	REFID=20065
EISNER	67	PR 164 1699	R.L. Eisner *et al.*	(PURD)	REFID=20046
DERADO	65	PRL 14 872	I. Derado *et al.*	(NDAM)	REFID=20668
LEE	64	PRL 12 342	Y.Y. Lee *et al.*	(MICH)	REFID=20663
BONDAR	63	PL 5 153	L. Bondar *et al.*	(AACH, BIRM, BONN, DESY+)	REFID=20657

NODE=M008

$f_1(1285)$

$I^G(J^{PC}) = 0^+(1^{++})$

$f_1(1285)$ MASS

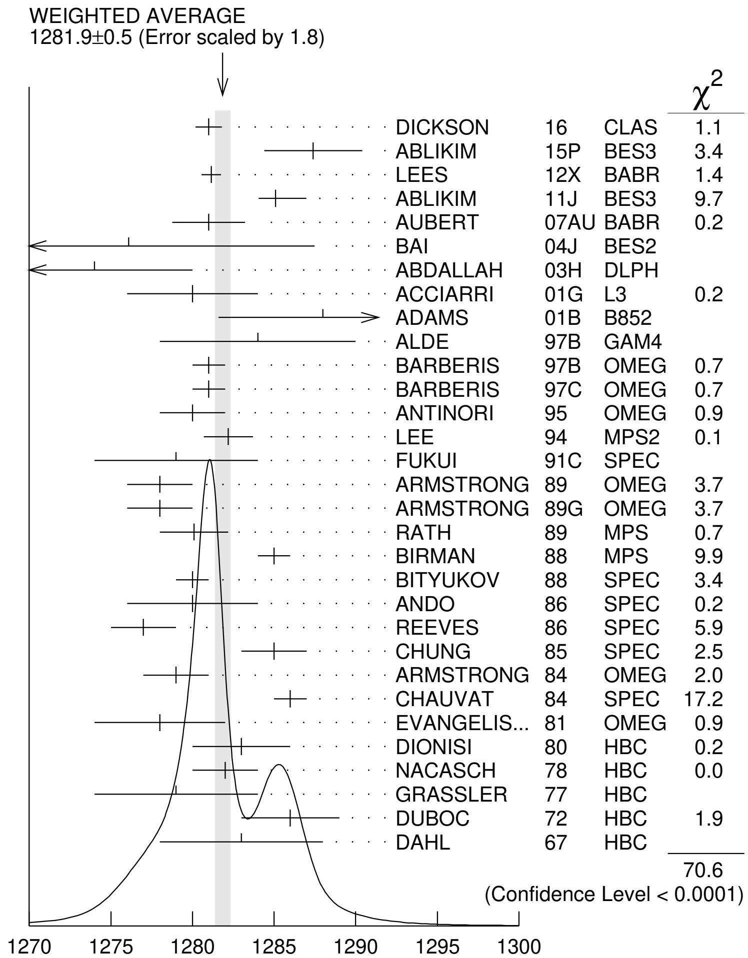
NODE=M008M

NODE=M008M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
1281.9 ± 0.5 OUR AVERAGE		Error includes scale factor of 1.8. See the ideogram below.		
1281.0 ± 0.8		DICKSON 16	CLAS	2.55 $\gamma p \to \eta \pi^+ \pi^- p$
1287.4 ± 3.0	87	ABLIKIM 15P	BES3	$J/\psi \to K^+ K^- 3\pi$
1281.16 ± 0.39 ± 0.45		[1] LEES 12X	BABR	$\tau^- \to \pi^- f_1(1285) \nu_\tau$
1285.1 ± 1.0 $^{+1.6}_{-0.3}$		[2] ABLIKIM 11J	BES3	$J/\psi \to \omega(\eta \pi^+ \pi^-)$
1281 ± 2 ± 1		AUBERT 07AU	BABR	10.6 $e^+ e^- \to f_1(1285) \pi^+ \pi^- \gamma$
1276.1 ± 8.1 ± 8.0	203	BAI 04J	BES2	$J/\psi \to \gamma \gamma \pi^+ \pi^-$
1274 ± 6	237	ABDALLAH 03H	DLPH	91.2 $e^+ e^- \to K^0_S K^\pm \pi^\mp + X$
1280 ± 4		ACCIARRI 01G	L3	
1288 ± 4 ± 5	20k	ADAMS 01B	B852	18 GeV $\pi^- p \to K^+ K^- \pi^0 n$
1284 ± 6	1400	ALDE 97B	GAM4	100 $\pi^- p \to \eta \pi^0 \pi^0 n$
1281 ± 1		BARBERIS 97B	OMEG	450 $p p \to p p 2(\pi^+ \pi^-)$
1281 ± 1		BARBERIS 97C	OMEG	450 $p p \to p p K^0_S K^\pm \pi^\mp$
1280 ± 2		[3] ANTINORI 95	OMEG	300,450 $p p \to p p 2(\pi^+ \pi^-)$
1282.2 ± 1.5		LEE 94	MPS2	18 $\pi^- p \to K^+ \overline{K}^0 2\pi^- p$
1279 ± 5		FUKUI 91C	SPEC	8.95 $\pi^- p \to \eta \pi^+ \pi^- n$
1278 ± 2	140	ARMSTRONG 89	OMEG	300 $p p \to K \overline{K} \pi p p$
1278 ± 2		ARMSTRONG 89G	OMEG	85 $\pi^+ p \to 4\pi \pi p$, $p p \to 4\pi p p$

1280.1	± 2.1		60	RATH	89	MPS	$21.4\ \pi^- p \to K^0_S K^0_S \pi^0 n$	
1285	± 1		4750	[4] BIRMAN	88	MPS	$8\ \pi^- p \to K^+ \overline{K}^0 \pi^- n$	
1280	± 1		504	BITYUKOV	88	SPEC	$32.5\ \pi^- p \to K^+ K^- \pi^0 n$	
1280	± 4			ANDO	86	SPEC	$8\ \pi^- p \to \eta \pi^+ \pi^- n$	
1277	± 2		420	REEVES	86	SPEC	$6.6\ p\overline{p} \to K K \pi X$	
1285	± 2			CHUNG	85	SPEC	$8\ \pi^- p \to N K \overline{K} \pi$	
1279	± 2		604	ARMSTRONG	84	OMEG	$85\ \pi^+ p \to K \overline{K} \pi \pi p$, $p p \to K \overline{K} \pi p p$	
1286	± 1			CHAUVAT	84	SPEC	ISR 31.5 $p p$	
1278	± 4			EVANGELIS...	81	OMEG	$12\ \pi^- p \to \eta \pi^+ \pi^- \pi^- p$	
1283	± 3		103	DIONISI	80	HBC	$4\ \pi^- p \to K \overline{K} \pi n$	
1282	± 2		320	NACASCH	78	HBC	$0.7,0.76\ \overline{p} p \to K \overline{K} 3\pi$	
1279	± 5		210	GRASSLER	77	HBC	$16\ \pi^\mp p$	
1286	± 3		180	DUBOC	72	HBC	$1.2\ \overline{p} p \to 2K 4\pi$	
1283	± 5			DAHL	67	HBC	$1.6–4.2\ \pi^- p$	
• • • We do not use the following data for averages, fits, limits, etc. • • •								
1289.3	± 2.8		234	ABLIKIM	19BA	BES3	$e^+ e^- \to \psi(2S)$	
1284.2	± 2.2			[5] AAIJ	14Y	LHCB	$\overline{B}^0_{(s)} \to J/\psi 2(\pi^+ \pi^-)$	
1281.9	± 0.5			[5] SOSA	99	SPEC	$p p \to p_{slow} (K^0_S K^+ \pi^-) p_{fast}$	
1282.8	± 0.6			[5] SOSA	99	SPEC	$p p \to p_{slow} (K^0_S K^- \pi^+) p_{fast}$	OCCUR=2
1270	±10			AMELIN	95	VES	$37\ \pi^- N \to \pi^- \pi^+ \pi^- \gamma N$	
1280	± 2			ABATZIS	94	OMEG	$450\ p p \to p p 2(\pi^+ \pi^-)$	
1282	± 4			ARMSTRONG	93C	E760	$\overline{p} p \to \pi^0 \eta \eta \to 6\gamma$	
1270	± 6	±10		ARMSTRONG	92C	OMEG	$300\ p p \to p p \pi^+ \pi^- \gamma$	
1281	± 1			ARMSTRONG	89E	OMEG	$300\ p p \to p p 2(\pi^+ \pi^-)$	
1279	± 6	±10	16	BECKER	87	MRK3	$e^+ e^- \to \phi K \overline{K} \pi$	
1286	± 9			GIDAL	87	MRK2	$e^+ e^- \to e^+ e^- \eta \pi^+ \pi^-$	
1287	± 5		353	BITYUKOV	84B	SPEC	$32\ \pi^- p \to K^+ K^- \pi^0 n$	
∼ 1279				[6] TORNQVIST	82B	RVUE		
1275	± 6		31	BROMBERG	80	SPEC	$100\ \pi^- p \to K \overline{K} \pi X$	
1288	± 9		200	GURTU	79	HBC	$4.2\ K^- p \to n \eta 2\pi$	
∼ 1275.0			46	[7] STANTON	79	CNTR	$8.5\ \pi^- p \to n 2\gamma 2\pi$	
1271	±10		34	CORDEN	78	OMEG	$12–15\ \pi^- p \to K^+ K^- \pi n$	
1295	±12		85	CORDEN	78	OMEG	$12–15\ \pi^- p \to n 5\pi$	OCCUR=2
1292	±10		150	DEFOIX	72	HBC	$0.7\ \overline{p} p \to 7\pi$	
1280	± 3		500	[8] THUN	72	MMS	$13.4\ \pi^- p$	
1303	± 8			BARDADIN-...	71	HBC	$8\ \pi^+ p \to p 6\pi$	
1283	± 6			BOESEBECK	71	HBC	$16.0\ \pi p \to p 5\pi$	
1270	±10			CAMPBELL	69	DBC	$2.7\ \pi^+ d$	
1285	± 7			LORSTAD	69	HBC	$0.7\ \overline{p} p$, 4,5-body	
1290	± 7			D'ANDLAU	68	HBC	$1.2\ \overline{p} p$, 5–6 body	

[1] Using the $2\pi^+ 2\pi^-$ and $\pi^+ \pi^- \eta$ modes of $f_1(1285)$ decay. NODE=M008M;LINKAGE=LE
[2] The selected process is $J/\psi \to \omega a_0(980) \pi$. NODE=M008M;LINKAGE=BL
[3] Supersedes ABATZIS 94, ARMSTRONG 89E. NODE=M008M;LINKAGE=B
[4] From partial wave analysis of $K^+ \overline{K}^0 \pi^-$ system. NODE=M008M;LINKAGE=A
[5] No systematic error given. NODE=M008M;LINKAGE=N1
[6] From a unitarized quark-model calculation. NODE=M008M;LINKAGE=T
[7] From phase shift analysis of $\eta \pi^+ \pi^-$ system. NODE=M008M;LINKAGE=P
[8] Seen in the missing mass spectrum. NODE=M008M;LINKAGE=S



$f_1(1285)$ mass (MeV)

$f_1(1285)$ WIDTH

NODE=M008W

Only experiments giving width error less than 20 MeV are kept for averaging.

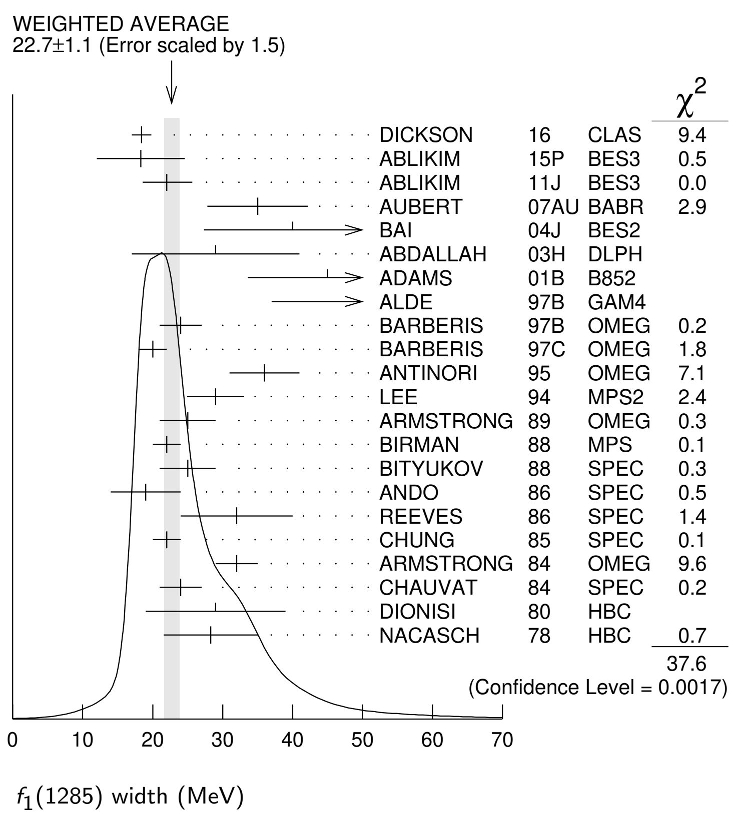
NODE=M008W

NODE=M008W

VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
22.7± 1.1 OUR AVERAGE		Error includes scale factor of 1.5. See the ideogram below.		
18.4± 1.4		DICKSON 16	CLAS	2.55 $\gamma p \to \eta \pi^+ \pi^- p$
18.3± 6.3	87	ABLIKIM 15P	BES3	$J/\psi \to K^+ K^- 3\pi$
22.0± 3.1 $^{+\ 2.0}_{-\ 1.5}$		[1] ABLIKIM 11J	BES3	$J/\psi \to \omega(\eta \pi^+ \pi^-)$
35 ± 6 ± 4		AUBERT 07AU	BABR	10.6 $e^+ e^- \to f_1(1285) \pi^+ \pi^- \gamma$
40.0± 8.6± 9.3	203	BAI 04J	BES2	$J/\psi \to \gamma \gamma \pi^+ \pi^-$
29 ±12	237	ABDALLAH 03H	DLPH	91.2 $e^+ e^- \to K^0_S K^\pm \pi^\mp + X$
45 ± 9 ± 7	20k	ADAMS 01B	B852	18 GeV $\pi^- p \to K^+ K^- \pi^0 n$
55 ±18	1400	ALDE 97B	GAM4	100 $\pi^- p \to \eta \pi^0 \pi^0 n$
24 ± 3		BARBERIS 97B	OMEG	450 $p p \to p p 2(\pi^+ \pi^-)$
20 ± 2		BARBERIS 97C	OMEG	450 $p p \to p p K^0_S K^\pm \pi^\mp$
36 ± 5		[2] ANTINORI 95	OMEG	300,450 $p p \to p p 2(\pi^+ \pi^-)$
29.0± 4.1		LEE 94	MPS2	18 $\pi^- p \to K^+ \overline{K}^0 2\pi^- p$
25 ± 4	140	ARMSTRONG 89	OMEG	300 $p p \to K \overline{K} \pi p p$
22 ± 2	4750	[3] BIRMAN 88	MPS	8 $\pi^- p \to K^+ \overline{K}^0 \pi^- n$
25 ± 4	504	BITYUKOV 88	SPEC	32.5 $\pi^- p \to K^+ K^- \pi^0 n$
19 ± 5		ANDO 86	SPEC	8 $\pi^- p \to \eta \pi^+ \pi^- n$
32 ± 8	420	REEVES 86	SPEC	6.6 $p \overline{p} \to K K \pi X$

22 ± 2		CHUNG	85	SPEC	8 $\pi^- p \to N K \overline{K} \pi$	
32 ± 3	604	ARMSTRONG	84	OMEG	85 $\pi^+ p \to K \overline{K} \pi \pi p$, $p p \to K \overline{K} \pi p p$	
24 ± 3		CHAUVAT	84	SPEC	ISR 31.5 $p p$	
29 ±10	103	DIONISI	80	HBC	4 $\pi^- p \to K \overline{K} \pi n$	
28.3± 6.7	320	NACASCH	78	HBC	0.7,0.76 $\overline{p} p \to K \overline{K} 3\pi$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
17.1± 3.4	234	ABLIKIM	19BA	BES3	$e^+ e^- \to \psi(2S)$	
32.4± 5.8		[4] AAIJ	14Y	LHCB	$\overline{B}^0_{(s)} \to J/\psi 2(\pi^+ \pi^-)$	
18.2± 1.2		[4] SOSA	99	SPEC	$p p \to p_{slow} (K^0_S K^+ \pi^-) p_{fast}$	
19.4± 1.5		[4] SOSA	99	SPEC	$p p \to p_{slow} (K^0_S K^- \pi^+) p_{fast}$	OCCUR=2
40 ± 5		ABATZIS	94	OMEG	450 $p p \to p p 2(\pi^+ \pi^-)$	
31 ± 5		ARMSTRONG	89E	OMEG	300 $p p \to p p 2(\pi^+ \pi^-)$	
41 ±12		ARMSTRONG	89G	OMEG	85 $\pi^+ p \to 4\pi \pi p$, $p p \to 4\pi p p$	
17.9±10.9	60	RATH	89	MPS	21.4 $\pi^- p \to K^0_S K^0_S \pi^0 n$	
14 $^{+20}_{-14}$ ±10	16	BECKER	87	MRK3	$e^+ e^- \to \phi K \overline{K} \pi$	
26 ±12		EVANGELIS...	81	OMEG	12 $\pi^- p \to \eta \pi^+ \pi^- \pi^- p$	
25 ±15	200	GURTU	79	HBC	4.2 $K^- p \to n \eta 2\pi$	
∼ 10		[5] STANTON	79	CNTR	8.5 $\pi^- p \to n 2\gamma 2\pi$	
24 ±18	210	GRASSLER	77	HBC	16 $\pi^\mp p$	
28 ± 5	150	[6] DEFOIX	72	HBC	0.7 $\overline{p} p \to 7\pi$	
46 ± 9	180	[6] DUBOC	72	HBC	1.2 $\overline{p} p \to 2K 4\pi$	
37 ± 5	500	[7] THUN	72	MMS	13.4 $\pi^- p$	
10 ±10		BOESEBECK	71	HBC	16.0 $\pi p \to p 5\pi$	
30 ±15		CAMPBELL	69	DBC	2.7 $\pi^+ d$	
60 ±15		[6] LORSTAD	69	HBC	0.7 $\overline{p} p$, 4,5-body	
35 ±10		[6] DAHL	67	HBC	1.6–4.2 $\pi^- p$	

[1] The selected process is $J/\psi \to \omega a_0(980) \pi$. NODE=M008W;LINKAGE=BL
[2] Supersedes ABATZIS 94, ARMSTRONG 89E. NODE=M008W;LINKAGE=B
[3] From partial wave analysis of $K^+ \overline{K}^0 \pi^-$ system. NODE=M008W;LINKAGE=A
[4] No systematic error given. NODE=M008W;LINKAGE=N1
[5] From phase shift analysis of $\eta \pi^+ \pi^-$ system. NODE=M008W;LINKAGE=P
[6] Resolution is not unfolded. NODE=M008W;LINKAGE=R
[7] Seen in the missing mass spectrum. NODE=M008W;LINKAGE=S



$f_1(1285)$ DECAY MODES

NODE=M008215;NODE=M008

	Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	
Γ_1	4π	(32.7± 1.9) %	S=1.2	DESIG=21
Γ_2	$\pi^0\pi^0\pi^+\pi^-$	(21.8± 1.3) %	S=1.2	DESIG=22
Γ_3	$2\pi^+2\pi^-$	(10.9± 0.6) %	S=1.2	DESIG=20
Γ_4	$\rho^0\pi^+\pi^-$	(10.9± 0.6) %	S=1.2	DESIG=191
Γ_5	$\rho^0\rho^0$	seen		DESIG=23
Γ_6	$4\pi^0$	$< 7 \times 10^{-4}$	CL=90%	DESIG=7
Γ_7	$\eta\pi^+\pi^-$	(35 ±15) %		DESIG=198
Γ_8	$\eta\pi\pi$	(52.2± 2.0) %	S=1.2	DESIG=3
Γ_9	$a_0(980)\pi$ [ignoring $a_0(980) \to K\overline{K}$]	(38 ± 4) %		DESIG=4
Γ_{10}	$\eta\pi\pi$ [excluding $a_0(980)\pi$]	(14 ± 4) %		DESIG=5
Γ_{11}	$K\overline{K}\pi$	(9.0± 0.4) %	S=1.1	DESIG=1
Γ_{12}	$K\overline{K}^*(892)$	not seen		DESIG=6
Γ_{13}	$\pi^+\pi^-\pi^0$	$(3.0\pm 0.9) \times 10^{-3}$		DESIG=197
Γ_{14}	$\rho^\pm\pi^\mp$	$< 3.1 \times 10^{-3}$	CL=95%	DESIG=199
Γ_{15}	$\gamma\rho^0$	(6.1± 1.0) %	S=1.7	DESIG=13
Γ_{16}	$\phi\gamma$	$(7.4\pm 2.6) \times 10^{-4}$		DESIG=10
Γ_{17}	e^+e^-	$< 9.4 \times 10^{-9}$	CL=90%	DESIG=200
Γ_{18}	$\gamma\gamma^*$			DESIG=9
Γ_{19}	$\gamma\gamma$			DESIG=8

CONSTRAINED FIT INFORMATION

An overall fit to 6 branching ratios uses 18 measurements and one constraint to determine 5 parameters. The overall fit has a $\chi^2 =$ 24.0 for 14 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\langle\delta x_i \delta x_j\rangle/(\delta x_i \cdot \delta x_j)$, in percent, from the fit to the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_9	−30			
x_{10}	−12	−88		
x_{11}	22	−10	−4	
x_{15}	−25	−7	−3	−27
	x_1	x_9	x_{10}	x_{11}

$f_1(1285)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M008217

$\Gamma(\eta\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_8\Gamma_{19}/\Gamma = (\Gamma_9+\Gamma_{10})\Gamma_{19}/\Gamma$

NODE=M008G2
NODE=M008G2

VALUE (keV)	CL%	DOCUMENT ID		TECN	COMMENT
<0.62	95	GIDAL	87	MRK2	$e^+e^- \to e^+e^-\eta\pi^+\pi^-$

$\Gamma(\eta\pi\pi) \times \Gamma(\gamma\gamma^*)/\Gamma_{total}$ — $\Gamma_8\Gamma_{18}/\Gamma = (\Gamma_9+\Gamma_{10})\Gamma_{18}/\Gamma$

NODE=M008G3
NODE=M008G3

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
1.4 ±0.4 OUR AVERAGE		Error includes scale factor of 1.4.			
1.18±0.25±0.20	26	[1,2] AIHARA	88B	TPC	$e^+e^- \to e^+e^-\eta\pi^+\pi^-$
2.30±0.61±0.42		[1,3] GIDAL	87	MRK2	$e^+e^- \to e^+e^-\eta\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.8 ±0.3 ±0.3	420	[4] ACHARD	02B	L3	183–209 $e^+e^- \to e^+e^-\eta\pi^+\pi^-$

[1] Assuming a ρ-pole form factor. NODE=M008G3;LINKAGE=A

[2] Published value multiplied by $\eta\pi\pi$ branching ratio 0.49. NODE=M008G3;LINKAGE=F

[3] Published value divided by 2 and multiplied by the $\eta\pi\pi$ branching ratio 0.49. NODE=M008G3;LINKAGE=B

[4] Published value multiplied by the $\eta\pi\pi$ branching ratio 0.52. NODE=M008G3;LINKAGE=AC

$f_1(1285)$ BRANCHING RATIOS

NODE=M008220

$\Gamma(K\overline{K}\pi)/\Gamma(4\pi)$ — Γ_{11}/Γ_1

NODE=M008R1

VALUE	DOCUMENT ID		TECN	COMMENT
0.274±0.017 OUR FIT Error includes scale factor of 1.4.				
0.271±0.016 OUR AVERAGE Error includes scale factor of 1.2.				
0.265±0.014	[1] BARBERIS	97C	OMEG	450 $pp \to ppK^0_S K^\pm \pi^\mp$
0.28 ±0.05	[2] ARMSTRONG	89E	OMEG	300 $pp \to ppf_1(1285)$
0.37 ±0.03 ±0.05	[3] ARMSTRONG	89G	OMEG	85 $\pi p \to 4\pi X$

[1] Using $2(\pi^+\pi^-)$ data from BARBERIS 97B. NODE=M008R1;LINKAGE=B

[2] Assuming $\rho\pi\pi$ and $a_0(980)\pi$ intermediate states. NODE=M008R1;LINKAGE=M

[3] 4π consistent with being entirely $\rho\pi\pi$. NODE=M008R1;LINKAGE=A

$\Gamma(\pi^0\pi^0\pi^+\pi^-)/\Gamma_{total}$ — $\Gamma_2/\Gamma = \frac{2}{3}\Gamma_1/\Gamma$

NODE=M008R18

VALUE	DOCUMENT ID
0.218±0.013 OUR FIT Error includes scale factor of 1.2.	

$\Gamma(2\pi^+2\pi^-)/\Gamma_{total}$ — $\Gamma_3/\Gamma = \frac{1}{3}\Gamma_1/\Gamma$

NODE=M008R17

VALUE	DOCUMENT ID
0.109±0.006 OUR FIT Error includes scale factor of 1.2.	

$\Gamma(\rho^0\pi^+\pi^-)/\Gamma_{total}$ — $\Gamma_4/\Gamma = \frac{1}{3}\Gamma_1/\Gamma$

NODE=M008R19

VALUE	DOCUMENT ID
0.109±0.006 OUR FIT Error includes scale factor of 1.2.	

$\Gamma(\rho^0\pi^+\pi^-)/\Gamma(2\pi^+2\pi^-)$ — Γ_4/Γ_3

NODE=M008R6

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.0±0.4	GRASSLER	77	HBC	16 GeV $\pi^\pm p$

$\Gamma(\rho^0\rho^0)/\Gamma_{total}$ — Γ_5/Γ

NODE=M008R21

VALUE	DOCUMENT ID		COMMENT
seen	BARBERIS	00C	450 $pp \to p_f 4\pi p_s$

$\Gamma(4\pi^0)/\Gamma_{total}$ — Γ_6/Γ

NODE=M008R8

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<7	90	ALDE	87	GAM4	100 $\pi^- p \to 4\pi^0 n$

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma(\eta\pi^+\pi^-)$ — Γ_{13}/Γ_7

NODE=M008R02

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.86±0.16±0.20	2.3k	[1] DOROFEEV	11	VES	$\pi^- N \to \pi^- f_1(1285) N$

[1] Value obtained selecting the region corresponding to $f_0(980)$ in the $\pi^+\pi^-$ mass spectrum. NODE=M008R02;LINKAGE=DO

$\Gamma(\eta\pi\pi)/\Gamma_{total}$ — $\Gamma_8/\Gamma = (\Gamma_9+\Gamma_{10})/\Gamma$

NODE=M008R22

VALUE	DOCUMENT ID
0.522±0.020 OUR FIT Error includes scale factor of 1.2.	

$\Gamma(4\pi)/\Gamma(\eta\pi\pi)$ — $\Gamma_1/\Gamma_8 = \Gamma_1/(\Gamma_9+\Gamma_{10})$

NODE=M008R4

VALUE	DOCUMENT ID		TECN	COMMENT
0.63±0.06 OUR FIT Error includes scale factor of 1.3.				
0.41±0.14 OUR AVERAGE				
0.37±0.11±0.11	BOLTON	92	MRK3	$J/\psi \to \gamma f_1(1285)$
0.64±0.40	GURTU	79	HBC	4.2 $K^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.93±0.30	[1] GRASSLER	77	HBC	16 $\pi^\mp p$

[1] Assuming $\rho\pi\pi$ and $a_0(980)\pi$ intermediate states. NODE=M008R4;LINKAGE=M

$\Gamma(2\pi^+2\pi^-)/\Gamma(\eta\pi\pi)$ — Γ_3/Γ_8

NODE=M008R04

VALUE	DOCUMENT ID		TECN	COMMENT
0.28±0.02±0.02	[1] LEES	12X	BABR	$\tau^- \to \pi^- f_1(1285)\nu_\tau$

[1] Assuming B($f_1(1285) \to \pi\pi\eta$) = 3/2 B($f_1(1285) \to \pi^+\pi^-\eta$). NODE=M008R04;LINKAGE=LE

$\Gamma(a_0(980)\pi$ [ignoring $a_0(980) \to K\overline{K}$]$)/\Gamma(\eta\pi\pi)$ — $\Gamma_9/\Gamma_8 = \Gamma_9/(\Gamma_9+\Gamma_{10})$

NODE=M008R3
NODE=M008R3

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
0.72±0.08 OUR FIT					
0.72±0.07 OUR AVERAGE					
0.74±0.02±0.09		DICKSON	16	CLAS	$\gamma p \to f_1(1285) p$
0.72±0.15		GURTU	79	HBC	4.2 $K^- p$
0.6 $^{+0.3}_{-0.2}$		CORDEN	78	OMEG	12–15 $\pi^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
>0.69	95	ACHARD	02B	L3	183–209 $e^+ e^- \to e^+ e^- \eta \pi^+ \pi^-$
0.28±0.07		ALDE	97B	GAM4	100 $\pi^- p \to \eta \pi^0 \pi^0 n$
1.0 ±0.3		GRASSLER	77	HBC	16 $\pi^\mp p$

$\Gamma(K\overline{K}\pi)/\Gamma(\eta\pi\pi)$ — $\Gamma_{11}/\Gamma_8 = \Gamma_{11}/(\Gamma_9+\Gamma_{10})$

NODE=M008R2
NODE=M008R2

VALUE	DOCUMENT ID		TECN	COMMENT
0.172±0.012 OUR FIT Error includes scale factor of 1.1.				
0.176±0.012 OUR AVERAGE				
0.216±0.010±0.031	DICKSON	16	CLAS	$\gamma p \to f_1(1285) p$
0.166±0.01 ±0.008	BARBERIS	98C	OMEG	450 $pp \to p_f f_1(1285) p_s$
0.42 ±0.15	GURTU	79	HBC	4.2 $K^- p$
0.5 ±0.2	[1] CORDEN	78	OMEG	12–15 $\pi^- p$
0.20 ±0.08	[2] DEFOIX	72	HBC	0.7 $\overline{p}p \to 7\pi$
0.16 ±0.08	CAMPBELL	69	DBC	2.7 $\pi^+ d$

OCCUR=2

[1] CORDEN 78 assumes low-mass $\eta\pi\pi$ region is dominantly 1^{++}. See BARBERIS 98C and MANAK 00A for discussion.

NODE=M008R2;LINKAGE=CD

[2] $K\overline{K}$ system characterized by the $I = 1$ threshold enhancement. (See under $a_0(980)$).

NODE=M008R2;LINKAGE=K

$\Gamma(K\overline{K}^*(892))/\Gamma_{total}$ — Γ_{12}/Γ

NODE=M008R5
NODE=M008R5

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	NACASCH	78	HBC	0.7,0.76 $\overline{p}p \to K\overline{K}3\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	[1] ACHARD	07	L3	183–209 $e^+ e^- \to e^+ e^- K^0_S K^\pm \pi^\mp$

[1] A clear signal of 19.8 ± 4.4 events observed at high Q^2.

NODE=M008R5;LINKAGE=CH

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{13}/Γ

NODE=M008R01
NODE=M008R01

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.30±0.055±0.074	2.3k	[1] DOROFEEV	11	VES	$\pi^- N \to \pi^- f_1(1285) N$

[1] Value obtained selecting the region corresponding to $f_0(980)$ in the $\pi^+\pi^-$ mass spectrum. The sytematic error includes the uncertainty on the partial width $f_1 \to \eta\pi\pi$ obtained from PDG 10 data.

NODE=M008R01;LINKAGE=DO

$\Gamma(\rho^\pm\pi^\mp)/\Gamma_{total}$ — Γ_{14}/Γ

NODE=M008R03
NODE=M008R03

VALUE (%)	CL%	DOCUMENT ID		TECN	COMMENT
<0.31	95	DOROFEEV	11	VES	$\pi^- N \to \pi^- f_1(1285) N$

$\Gamma(\gamma\rho^0)/\Gamma_{total}$ — Γ_{15}/Γ

NODE=M008R15
NODE=M008R15

VALUE (units 10^{-2})	CL%	DOCUMENT ID		TECN	COMMENT
6.1±1.0 OUR FIT Error includes scale factor of 1.7.					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.8±0.7±0.6		[1] AMELIN	95	VES	37 $\pi^- N \to \pi^-\pi^+\pi^-\gamma N$
<5	95	BITYUKOV	91B	SPEC	32 $\pi^- p \to \pi^+\pi^-\gamma n$

[1] Not an independent measurement.

NODE=M008R15;LINKAGE=A

$\Gamma(\gamma\rho^0)/\Gamma(2\pi^+2\pi^-)$ — $\Gamma_{15}/\Gamma_3 = \Gamma_{15}/\frac{1}{3}\Gamma_1$

NODE=M008R13
NODE=M008R13

VALUE	DOCUMENT ID		TECN	COMMENT
0.55±0.10 OUR FIT Error includes scale factor of 1.5.				
0.45±0.18	[1] COFFMAN	90	MRK3	$J/\psi \to \gamma\gamma\pi^+\pi^-$

[1] Using B($J/\psi \to \gamma f_1(1285) \to \gamma\gamma\rho^0$)=0.25 × 10^{-4} and B($J/\psi \to \gamma f_1(1285) \to \gamma 2\pi^+ 2\pi^-$)=0.55 × 10^{-4} given by MIR 88.

NODE=M008R13;LINKAGE=E

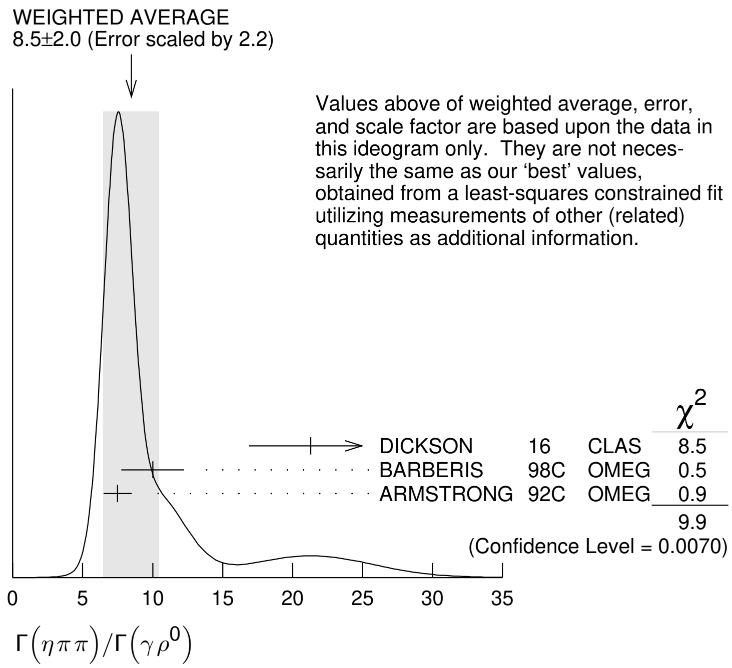
$\Gamma(\eta\pi\pi)/\Gamma(\gamma\rho^0)$ — $\Gamma_8/\Gamma_{15} = (\Gamma_9+\Gamma_{10})/\Gamma_{15}$

NODE=M008R16
NODE=M008R16

VALUE	DOCUMENT ID	TECN	COMMENT
8.6±1.6 OUR FIT Error includes scale factor of 1.9.			
8.5±2.0 OUR AVERAGE Error includes scale factor of 2.2. See the ideogram below.			
21.3±4.4	DICKSON 16	CLAS	$\gamma p \to f_1(1285) p$
10.0±1.0±2.0	BARBERIS 98C	OMEG	450 $pp \to p_f f_1(1285) p_s$
7.5±1.0	[1] ARMSTRONG 92C	OMEG	300 $pp \to pp\pi^+\pi^-\gamma,\ pp\eta\pi^+\pi^-$

[1] Published value multiplied by 1.5.

NODE=M008R16;LINKAGE=B



$\Gamma(\gamma\rho^0)/\Gamma(K\overline{K}\pi)$ — Γ_{15}/Γ_{11}

NODE=M008R12
NODE=M008R12

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
>0.035	90	[1] COFFMAN 90	MRK3	$J/\psi \to \gamma\gamma\pi^+\pi^-$

[1] Using B($J/\psi \to \gamma f_1(1285) \to \gamma\gamma\rho^0$)=0.25 × 10^{-4} and B($J/\psi \to \gamma f_1(1285) \to \gamma K\overline{K}\pi$)=< 0.72 × 10^{-3}.

NODE=M008R12;LINKAGE=F

$\Gamma(\phi\gamma)/\Gamma(K\overline{K}\pi)$ — Γ_{16}/Γ_{11}

NODE=M008R9
NODE=M008R9

VALUE (units 10^{-2})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
0.82±0.21±0.20		19	BITYUKOV 88	SPEC	32.5 $\pi^- p \to K^+K^-\pi^0 n$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.50	95		BARBERIS 98C	OMEG	450 $pp \to p_f f_1(1285) p_s$
<0.93	95		AMELIN 95	VES	37 $\pi^- N \to \pi^-\pi^+\pi^-\gamma N$

$\Gamma(e^+e^-)/\Gamma_{total}$ — Γ_{17}/Γ

NODE=M008R00
NODE=M008R00

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<9.4 × 10^{-9}	90	[1] ACHASOV 20	SND	$e^+e^- \to \eta\pi^0\pi^0$

OCCUR=2

[1] ACHASOV 20 reports two candidate events corresponding to a significance of 2.5 σ and the branching fraction of $(5.1^{+3.7}_{-2.7}) \times 10^{-9}$.

NODE=M008R00;LINKAGE=B

$f_1(1285)$ REFERENCES

NODE=M008

ACHASOV	20	PL B800 135074	M.N. Achasov *et al.*	(SND Collab.)	REFID=60144
ABLIKIM	19BA	PR D100 092003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60024
DICKSON	16	PR C93 065202	R. Dickson *et al.*	(JLab CLAS Collab.)	REFID=57487
ABLIKIM	15P	PR D92 012007	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56781
AAIJ	14Y	PRL 112 091802	R. Aaij *et al.*	(LHCb Collab.)	REFID=55837
LEES	12X	PR D86 092010	J.P. Lees *et al.*	(BABAR Collab.)	REFID=54714
ABLIKIM	11J	PRL 107 182001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=53931
DOROFEEV	11	EPJ A47 68	V. Dorofeev *et al.*	(SERP, MIPT)	REFID=16755
PDG	10	JP G37 075021	K. Nakamura *et al.*	(PDG Collab.)	REFID=53229
ACHARD	07	JHEP 0703 018	P. Achard *et al.*	(L3 Collab.)	REFID=51698
AUBERT	07AU	PR D76 092005	B. Aubert *et al.*	(BABAR Collab.)	REFID=52049
BAI	04J	PL B594 47	J.Z. Bai *et al.*	(BES Collab.)	REFID=50167

ABDALLAH	03H	PL B569 129	J. Abdallah *et al.*	(DELPHI Collab.)	REFID=49548
ACHARD	02B	PL B526 269	P. Achard *et al.*	(L3 Collab.)	REFID=48574
ACCIARRI	01G	PL B501 1	M. Acciarri *et al.*	(L3 Collab.)	REFID=48319
ADAMS	01B	PL B516 264	G.S. Adams *et al.*	(BNL E852 Collab.)	REFID=49649
BARBERIS	00C	PL B471 440	D. Barberis *et al.*	(WA 102 Collab.)	REFID=47959
MANAK	00A	PR D62 012003	J.J. Manak *et al.*	(BNL E852 Collab.)	REFID=47989
SOSA	99	PRL 83 913	M. Sosa *et al.*		REFID=46937
BARBERIS	98C	PL B440 225	D. Barberis *et al.*	(WA 102 Collab.)	REFID=46346
ALDE	97B	PAN 60 386	D. Alde *et al.*	(GAMS Collab.)	REFID=45396
		Translated from YAF 60 458.			
BARBERIS	97B	PL B413 217	D. Barberis *et al.*	(WA 102 Collab.)	REFID=45758
BARBERIS	97C	PL B413 225	D. Barberis *et al.*	(WA 102 Collab.)	REFID=45759
AMELIN	95	ZPHY C66 71	D.V. Amelin *et al.*	(VES Collab.)	REFID=44376
ANTINORI	95	PL B353 589	F. Antinori *et al.*	(ATHU, BARI, BIRM+)	REFID=44437
ABATZIS	94	PL B324 509	S. Abatzis *et al.*	(ATHU, BARI, BIRM+)	REFID=44090
LEE	94	PL B323 227	J.H. Lee *et al.*	(BNL, IND, KYUN, MASD+)	REFID=44092
ARMSTRONG	93C	PL B307 394	T.A. Armstrong *et al.*	(FNAL, FERR, GENO+)	REFID=43587
ARMSTRONG	92C	ZPHY C54 371	T.A. Armstrong *et al.*	(ATHU, BARI, BIRM+)	REFID=42097
BOLTON	92	PL B278 495	T. Bolton *et al.*	(Mark III Collab.)	REFID=42175
BITYUKOV	91B	SJNP 54 318	S.I. Bityukov *et al.*	(SERP)	REFID=41864
		Translated from YAF 54 529.			
FUKUI	91C	PL B267 293	S. Fukui *et al.*	(SUGI, NAGO, KEK, KYOT+)	REFID=41748
COFFMAN	90	PR D41 1410	D.M. Coffman *et al.*	(Mark III Collab.)	REFID=41350
ARMSTRONG	89	PL B221 216	T.A. Armstrong *et al.*	(CERN, CDEF, BIRM+) JPC	REFID=40729
ARMSTRONG	89E	PL B228 536	T.A. Armstrong, M. Benayoun	(ATHU, BARI, BIRM+)	REFID=41011
ARMSTRONG	89G	ZPHY C43 55	T.A. Armstrong *et al.*	(CERN, BIRM, BARI+)	REFID=40930
RATH	89	PR D40 693	M.G. Rath *et al.*	(NDAM, BRAN, BNL, CUNY+)	REFID=40924
AIHARA	88B	PL B209 107	H. Aihara *et al.*	(TPC-2γ Collab.)	REFID=40572
BIRMAN	88	PRL 61 1557	A. Birman *et al.*	(BNL, FSU, IND, MASD) JP	REFID=40568
BITYUKOV	88	PL B203 327	S.I. Bityukov *et al.*	(SERP)	REFID=40569
MIR	88	Photon-Photon 88, 126	R. Mir	(Mark III Collab.)	REFID=41574
Conference					
ALDE	87	PL B198 286	D.M. Alde *et al.*	(LANL, BRUX, SERP, LAPP)	REFID=40221
BECKER	87	PRL 59 186	J.J. Becker *et al.*	(Mark III Collab.)	REFID=40015
GIDAL	87	PRL 59 2012	G. Gidal *et al.*	(LBL, SLAC, HARV)	REFID=40223
ANDO	86	PRL 57 1296	A. Ando *et al.*	(KEK, KYOT, NIRS, SAGA+) IJP	REFID=20891
REEVES	86	PR D34 1960	D.F. Reeves *et al.*	(FLOR, BNL, IND+) JP	REFID=20936
CHUNG	85	PRL 55 779	S.U. Chung *et al.*	(BNL, FLOR, IND+) JP	REFID=20934
ARMSTRONG	84	PL 146B 273	T.A. Armstrong *et al.*	(ATHU, BARI, BIRM+) JP	REFID=20929
BITYUKOV	84B	PL 144B 133	S.I. Bityukov *et al.*	(SERP)	REFID=20468
CHAUVAT	84	PL 148B 382	P. Chauvat *et al.*	(CERN, CLER, UCLA+)	REFID=20932
TORNQVIST	82B	NP B203 268	N.A. Tornqvist	(HELS)	REFID=20573
EVANGELIS...	81	NP B178 197	C. Evangelista *et al.*	(BARI, BONN, CERN+)	REFID=20462
BROMBERG	80	PR D22 1513	C.M. Bromberg *et al.*	(CIT, FNAL, ILLC+)	REFID=20922
DIONISI	80	NP B169 1	C. Dionisi *et al.*	(CERN, MADR, CDEF+)	REFID=20924
GURTU	79	NP B151 181	A. Gurtu *et al.*	(CERN, ZEEM, NIJM, OXF)	REFID=20456
STANTON	79	PRL 42 346	N.R. Stanton *et al.*	(OSU, CARL, MCGI+) JP	REFID=20887
CORDEN	78	NP B144 253	M.J. Corden *et al.*	(BIRM, RHEL, TELA+) JP	REFID=20452
NACASCH	78	NP B135 203	R. Nacasch *et al.*	(PARIS, MADR, CERN)	REFID=20919
GRASSLER	77	NP B121 189	H. Grassler *et al.*	(AACH3, BERL, BONN+)	REFID=20447
DEFOIX	72	NP B44 125	C. Defoix *et al.*	(CDEF, CERN)	REFID=20435
DUBOC	72	NP B46 429	J. Duboc *et al.*	(PARIS, LIVP)	REFID=20339
THUN	72	PRL 28 1733	R. Thun *et al.*	(STON, NEAS)	REFID=20911
BARDADIN-...	71	PR D4 2711	M. Bardadin-Otwinowska *et al.*	(WARS)	REFID=20196
BOESEBECK	71	PL 34B 659	K. Boesebeck	(AACH, BERL, BONN, CERN, CRAC+)	REFID=20905
CAMPBELL	69	PRL 22 1204	J.H. Campbell *et al.*	(PURD)	REFID=20419
LORSTAD	69	NP B14 63	B. Lorstad *et al.*	(CDEF, CERN) JP	REFID=20901
D'ANDLAU	68	NP B5 693	C. d'Andlau *et al.*	(CDEF, CERN, IRAD+) IJP	REFID=20897
DAHL	67	PR 163 1377	O.I. Dahl *et al.*	(LRL) IJP	REFID=20321

NODE=M037

$\eta(1295)$

$I^G(J^{PC}) = 0^+(0^{-+})$

See the review on "Spectroscopy of Light Meson Resonances."

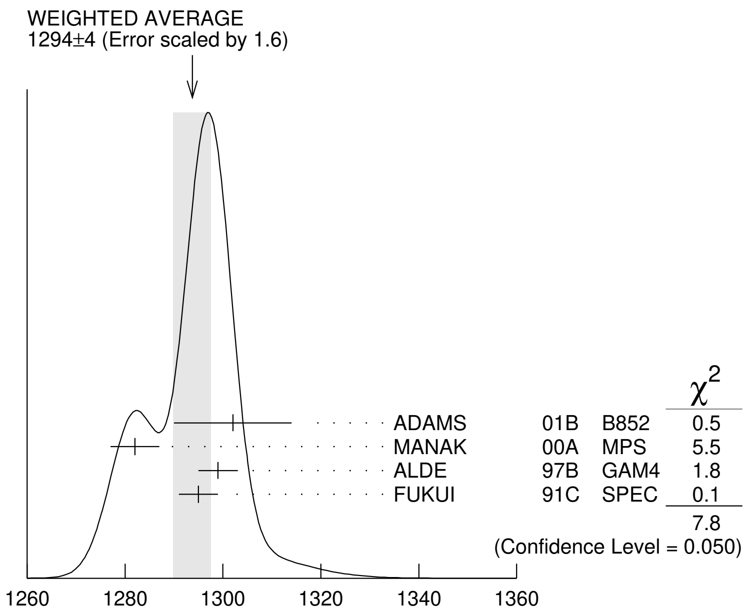
NODE=M037

$\eta(1295)$ MASS

NODE=M037M

NODE=M037M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1294±4 OUR AVERAGE	Error includes scale factor of 1.6. See the ideogram below.				
1302±9±8	20k	ADAMS	01B	B852	18 GeV $\pi^- p \to K^+ K^- \pi^0 n$
1282±5	9082	MANAK	00A	MPS	18 $\pi^- p \to \eta\pi^+\pi^- n$
1299±4	2100	ALDE	97B	GAM4	100 $\pi^- p \to \eta\pi^0\pi^0 n$
1295±4		FUKUI	91C	SPEC	8.95 $\pi^- p \to \eta\pi^+\pi^- n$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1264±8		[1] AUGUSTIN	90	DM2	$J/\psi \to \gamma\eta\pi^+\pi^-$
~ 1275		STANTON	79	CNTR	8.4 $\pi^- p \to n\eta 2\pi$



$\eta(1295)$ mass (MeV)

[1] PWA analysis of AUGUSTIN 92 assigns 0^{-+} quantum numbers to this state rather than 1^{++} as before.

NODE=M037M;LINKAGE=AG

$\eta(1295)$ WIDTH

NODE=M037W

NODE=M037W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
55± 5 OUR AVERAGE					
57±23±21	20k	ADAMS	01B	B852	18 GeV $\pi^- p \to K^+ K^- \pi^0 n$
66±13	9082	MANAK	00A	MPS	18 $\pi^- p \to \eta\pi^+\pi^- n$
53± 6		FUKUI	91C	SPEC	8.95 $\pi^- p \to \eta\pi^+\pi^- n$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<40	2100	ALDE	97B	GAM4	100 $\pi^- p \to \eta\pi^0\pi^0 n$
44±20		[2] AUGUSTIN	90	DM2	$J/\psi \to \gamma\eta\pi^+\pi^-$
~ 70		STANTON	79	CNTR	8.4 $\pi^- p \to n\eta 2\pi$

[2] PWA analysis of AUGUSTIN 92 assigns 0^{-+} quantum numbers to this state rather than 1^{++} as before.

NODE=M037W;LINKAGE=AG

$\eta(1295)$ DECAY MODES

NODE=M037215;NODE=M037

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\eta\pi^+\pi^-$	seen	DESIG=2;OUR EST;→ UNCHECKED ←
Γ_2	$a_0(980)\pi$	seen	DESIG=1;OUR EST;→ UNCHECKED ←
Γ_3	$\gamma\gamma$		DESIG=3
Γ_4	$\eta\pi^0\pi^0$	seen	DESIG=4;OUR EST;→ UNCHECKED ←
Γ_5	$\eta(\pi\pi)_{S\text{-wave}}$	seen	DESIG=5;OUR EST;→ UNCHECKED ←
Γ_6	$\sigma\eta$		DESIG=6
Γ_7	$K\overline{K}\pi$		DESIG=7

$\eta(1295)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M037220

$\Gamma(\eta\pi^+\pi^-) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_1\Gamma_3/\Gamma$

NODE=M037G2
NODE=M037G2

VALUE (keV)	CL%	DOCUMENT ID		TECN	COMMENT
<0.066	95	ACCIARRI	01G	L3	183–202 $e^+e^- \to e^+e^-\eta\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.6	90	AIHARA	88C	TPC	$e^+e^- \to e^+e^-\eta\pi^+\pi^-$
<0.3		ANTREASYAN	87	CBAL	$e^+e^- \to e^+e^-\eta\pi\pi$

$\Gamma(K\overline{K}\pi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_7\Gamma_3/\Gamma$

NODE=M037G3
NODE=M037G3

VALUE (keV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.014	90	[3,4] AHOHE	05	CLE2	10.6 $e^+e^- \to e^+e^- K^0_S K^\pm\pi^\mp$

[3] Using $\eta(1295)$ mass and width 1294 MeV and 55 MeV, respectively. NODE=M037G3;LINKAGE=AH

[4] Assuming three-body phase-space decay to $K^0_S K^\pm\pi^\mp$. NODE=M037G3;LINKAGE=B3

$\eta(1295)$ BRANCHING RATIOS

NODE=M037225

$\Gamma(a_0(980)\pi)/\Gamma_{total}$ — Γ_2/Γ

NODE=M037R1
NODE=M037R1

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	BERTIN	97	OBLX	0.0 $\overline{p}p \to K^\pm(K^0)\pi^\mp\pi^+\pi^-$
seen	BIRMAN	88	MPS	8 $\pi^-p \to K^+\overline{K}^0\pi^-n$
large	ANDO	86	SPEC	8 $\pi^-p \to \eta\pi^+\pi^-n$
large	STANTON	79	CNTR	8.4 $\pi^-p \to n\eta2\pi$

$\Gamma(a_0(980)\pi)/\Gamma(\eta\pi^0\pi^0)$ — Γ_2/Γ_4

NODE=M037R2
NODE=M037R2

VALUE	DOCUMENT ID		TECN	COMMENT
0.65±0.10	[5] ALDE	97B	GAM4	100 $\pi^-p \to \eta\pi^0\pi^0 n$

[5] Assuming that $a_0(980)$ decays only to $\eta\pi$. NODE=M037R2;LINKAGE=A

$\Gamma(\eta(\pi\pi)_{S\text{-wave}})/\Gamma(\eta\pi^0\pi^0)$ — Γ_5/Γ_4

NODE=M037R4
NODE=M037R4

VALUE	DOCUMENT ID		TECN	COMMENT
0.35±0.10	ALDE	97B	GAM4	100 $\pi^-p \to \eta\pi^0\pi^0 n$

$\Gamma(a_0(980)\pi)/\Gamma(\sigma\eta)$ — Γ_2/Γ_6

NODE=M037R5
NODE=M037R5

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.48±0.22	9082	MANAK	00A	MPS	18 $\pi^-p \to \eta\pi^+\pi^-n$

$\eta(1295)$ REFERENCES

NODE=M037

AHOHE	05	PR D71 072001	R. Ahohe *et al.*	(CLEO Collab.)	REFID=50764
ACCIARRI	01G	PL B501 1	M. Acciarri *et al.*	(L3 Collab.)	REFID=48319
ADAMS	01B	PL B516 264	G.S. Adams *et al.*	(BNL E852 Collab.)	REFID=49649
MANAK	00A	PR D62 012003	J.J. Manak *et al.*	(BNL E852 Collab.)	REFID=47989
ALDE	97B	PAN 60 386 Translated from YAF 60 458.	D. Alde *et al.*	(GAMS Collab.)	REFID=45396
BERTIN	97	PL B400 226	A. Bertin *et al.*	(OBELIX Collab.)	REFID=45417
AUGUSTIN	92	PR D46 1951	J.E. Augustin, G. Cosme	(DM2 Collab.)	REFID=41584
FUKUI	91C	PL B267 293	S. Fukui *et al.*	(SUGI, NAGO, KEK, KYOT+)	REFID=41748
AUGUSTIN	90	PR D42 10	J.E. Augustin *et al.*	(DM2 Collab.)	REFID=41352
AIHARA	88C	PR D38 1	H. Aihara *et al.*	(TPC-2γ Collab.)	REFID=40564
BIRMAN	88	PRL 61 1557	A. Birman *et al.*	(BNL, FSU, IND, MASD) JP	REFID=40568
ANTREASYAN	87	PR D36 2633	D. Antreasyan *et al.*	(Crystal Ball Collab.)	REFID=40008
ANDO	86	PRL 57 1296	A. Ando *et al.*	(KEK, KYOT, NIRS, SAGA+) IJP	REFID=20891
STANTON	79	PRL 42 346	N.R. Stanton *et al.*	(OSU, CARL, MCGI+) JP	REFID=20887

NODE=M058

$\pi(1300)$

$I^G(J^{PC}) = 1^-(0^{-+})$

$\pi(1300)$ MASS

NODE=M058M

NODE=M058M → UNCHECKED ←

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1300±100 OUR ESTIMATE					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1128± 26±70		DARGENT	17	RVUE	$D^0 \to \pi^-\pi^+\pi^-\pi^+$
1345± 8±10	18k	[1] SCHEGELSKY	06	RVUE	$\gamma\gamma \to \pi^+\pi^-\pi^0$
1200± 40	90k	SALVINI	04	OBLX	$\overline{p}p \to 2\pi^+2\pi^-$
1343± 15±24		CHUNG	02	B852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$
1375± 40		ABELE	01	CBAR	0.0 $\overline{p}d \to \pi^- 4\pi^0 p$
1275± 15		BERTIN	97D	OBLX	0.05 $\overline{p}p \to 2\pi^+2\pi^-$
~ 1114		ABELE	96	CBAR	0.0 $\overline{p}p \to 5\pi^0$
1190± 30		ZIELINSKI	84	SPEC	200 $\pi^+ Z \to Z 3\pi$
1240± 30		BELLINI	82	SPEC	40 $\pi^- A \to A 3\pi$
1273± 50		[2] AARON	81	RVUE	
1342± 20		BONESINI	81	OMEG	12 $\pi^- p \to p 3\pi$
~ 1400		DAUM	81B	SPEC	63,94 $\pi^- p$

[1] From analysis of L3 data at 183–209 GeV. NODE=M058M;LINKAGE=SC

[2] Uses multichannel Aitchison-Bowler model (BOWLER 75). Uses data from DAUM 80 and DANKOWYCH 81. NODE=M058M;LINKAGE=E

$\pi(1300)$ WIDTH

NODE=M058W

NODE=M058W → UNCHECKED ←

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
200 to 600 OUR ESTIMATE					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
314± 39±66		DARGENT	17	RVUE	$D^0 \to \pi^-\pi^+\pi^-\pi^+$
260± 20±30	18k	[3] SCHEGELSKY	06	RVUE	$\gamma\gamma \to \pi^+\pi^-\pi^0$
470±120	90k	SALVINI	04	OBLX	$\overline{p}p \to 2\pi^+2\pi^-$
449± 39±47		CHUNG	02	B852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$
268± 50		ABELE	01	CBAR	0.0 $\overline{p}d \to \pi^- 4\pi^0 p$
218±100		BERTIN	97D	OBLX	0.05 $\overline{p}p \to 2\pi^+2\pi^-$
~ 340		ABELE	96	CBAR	0.0 $\overline{p}p \to 5\pi^0$
440± 80		ZIELINSKI	84	SPEC	200 $\pi^+ Z \to Z 3\pi$
360±120		BELLINI	82	SPEC	40 $\pi^- A \to A 3\pi$
580±100		[4] AARON	81	RVUE	
220± 70		BONESINI	81	OMEG	12 $\pi^- p \to p 3\pi$
~ 600		DAUM	81B	SPEC	63,94 $\pi^- p$

[3] From analysis of L3 data at 183–209 GeV. NODE=M058W;LINKAGE=SC

[4] Uses multichannel Aitchison-Bowler model (BOWLER 75). Uses data from DAUM 80 and DANKOWYCH 81. NODE=M058W;LINKAGE=E

$\pi(1300)$ DECAY MODES

NODE=M058215;NODE=M058

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\rho\pi$	seen	DESIG=1;OUR EST;→ UNCHECKED ←
Γ_2	$\pi(\pi\pi)_{S\text{-wave}}$	seen	DESIG=3;OUR EST;→ UNCHECKED ←
Γ_3	$\gamma\gamma$		DESIG=4

$\pi(1300)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M058218

$\Gamma(\rho\pi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_1\Gamma_3/\Gamma$

NODE=M058G1
NODE=M058G1

VALUE (keV)	CL%	DOCUMENT ID		TECN	COMMENT
<0.085	90	ACCIARRI	97T	L3	$e^+e^- \to e^+e^-\pi^+\pi^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.8	95	[5] SCHEGELSKY	06	RVUE	$\gamma\gamma \to \pi^+\pi^-\pi^0$
<0.54	90	ALBRECHT	97B	ARG	$e^+e^- \to e^+e^-\pi^+\pi^-\pi^0$

[5] From analysis of L3 data at 183–209 GeV. NODE=M058G1;LINKAGE=SC

$\pi(1300)$ BRANCHING RATIOS

NODE=M058220

$\Gamma(\pi(\pi\pi)_{S\text{-wave}})/\Gamma(\rho\pi)$ Γ_2/Γ_1

NODE=M058R1

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
2.2 ±0.4		90k	SALVINI	04	OBLX	$\overline{p}p \to 2\pi^+ 2\pi^-$
seen			CHUNG	02	B852	18.3 $\pi^- p \to \pi^+ 2\pi^- p$
<0.15	90		ABELE	01	CBAR	0.0 $\overline{p}d \to \pi^- 4\pi^0 p$
2.12			[6] AARON	81	RVUE	

[6] Uses multichannel Aitchison-Bowler model (BOWLER 75). Uses data from DAUM 80 and DANKOWYCH 81.

NODE=M058R1;LINKAGE=E

$\pi(1300)$ REFERENCES

NODE=M058

DARGENT	17	JHEP 1705 143	P. dArgent *et al.*	(HEID, BRIS)
SCHEGELSKY	06	EPJ A27 199	V.A. Schegelsky *et al.*	
SALVINI	04	EPJ C35 21	P. Salvini *et al.*	(OBELIX Collab.)
CHUNG	02	PR D65 072001	S.U. Chung *et al.*	(BNL E852 Collab.)
ABELE	01	EPJ C19 667	A. Abele *et al.*	(Crystal Barrel Collab.)
ACCIARRI	97T	PL B413 147	M. Acciarri *et al.*	(L3 Collab.)
ALBRECHT	97B	ZPHY C74 469	H. Albrecht *et al.*	(ARGUS Collab.)
BERTIN	97D	PL B414 220	A. Bertin *et al.*	(OBELIX Collab.)
ABELE	96	PL B380 453	A. Abele *et al.*	(Crystal Barrel Collab.)
ZIELINSKI	84	PR D30 1855	M. Zielinski *et al.*	(ROCH, MINN, FNAL)
BELLINI	82	PRL 48 1697	G. Bellini *et al.*	(MILA, BGNA, JINR)
AARON	81	PR D24 1207	R.A. Aaron, R.S. Longacre	(NEAS, BNL)
BONESINI	81	PL 103B 75	M. Bonesini *et al.*	(MILA, LIVP, DARE+)
DANKOWY...	81	PRL 46 580	J.A. Dankowych *et al.*	(TNTO, BNL, CARL+)
DAUM	81B	NP B182 269	C. Daum *et al.*	(AMST, CERN, CRAC, MPIM+)
DAUM	80	PL 89B 281	C. Daum *et al.*	(AMST, CERN, CRAC, MPIM+)
BOWLER	75	NP B97 227	M.G. Bowler *et al.*	(OXFTP, DARE)

REFID=58121
REFID=51186
REFID=53226
REFID=48837
REFID=48334
REFID=45761
REFID=45418
REFID=45763
REFID=45011
REFID=20881
REFID=21134
REFID=20870
REFID=21130
REFID=20572
REFID=20872
REFID=20868
REFID=20571

NODE=M012

$a_2(1320)$

$I^G(J^{PC}) = 1^-(2^{++})$

$a_2(1320)$ MASS

NODE=M012M0

VALUE (MeV)	DOCUMENT ID
1318.2±0.6 OUR AVERAGE Includes data from the 4 datablocks that follow this one. Error includes scale factor of 1.2.	

NODE=M012M0

3π MODE

NODE=M012M1

The data in this block is included in the average printed for a previous datablock.

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1318.6± 1.3 OUR AVERAGE		Error includes scale factor of 1.4. See the ideogram below.				
$1314.5^{+4.0}_{-3.3}$	46M	[1] AGHASYAN	18B	COMP		190 $\pi^- p \to \pi^-\pi^+\pi^- p$
1326 ± 2 ±2		CHUNG	02	B852		18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$
1317 ± 3		BARBERIS	98B			450 $pp \to p_f \pi^+\pi^-\pi^0 p_s$
1323 ± 4 ±3		ACCIARRI	97T	L3		$e^+e^- \to e^+e^-\pi^+\pi^-\pi^0$
1320 ± 7		ALBRECHT	97B	ARG		$e^+e^- \to e^+e^-\pi^+\pi^-\pi^0$
1311.3± 1.6±3.0	72.4k	AMELIN	96	VES		36 $\pi^- p \to \pi^+\pi^-\pi^0 n$
1310 ± 5		ARMSTRONG	90	OMEG	0	300.0$pp \to pp\pi^+\pi^-\pi^0$
1323.8± 2.3	4022	AUGUSTIN	89	DM2	±	$J/\psi \to \rho^\pm a_2^\mp$
1320.6± 3.1	3562	AUGUSTIN	89	DM2	0	$J/\psi \to \rho^0 a_2^0$
1317 ± 2	25k	[2] DAUM	80C	SPEC	−	63,94 $\pi^- p \to 3\pi p$
1320 ±10	1097	[2] BALTAY	78B	HBC	+0	15 $\pi^+ p \to p 4\pi$
1306 ± 8		FERRERSORIA	78	OMEG	−	9 $\pi^- p \to p 3\pi$
1318 ± 7	1.6k	[2] EMMS	75	DBC	0	4 $\pi^+ n \to p(3\pi)^0$
1315 ± 5		[2] ANTIPOV	73C	CNTR	−	25,40 $\pi^- p \to p\eta\pi^-$
1306 ± 9	1580	CHALOUPKA	73	HBC	−	3.9 $\pi^- p$

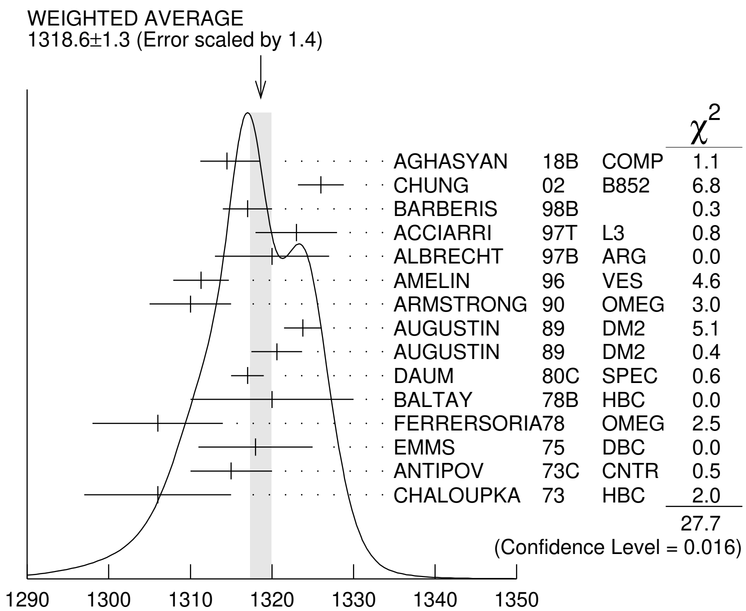
NODE=M012M1

OCCUR=2

• • • We do not use the following data for averages, fits, limits, etc. • • •

1321 ± 1 $^{+0}_{-7}$	420k	[3] ALEKSEEV	10	COMP		190 $\pi^- Pb \to \pi^-\pi^-\pi^+ Pb'$	
1300 ± 2 ±4	18k	[4] SCHEGELSKY	06	RVUE	0	$\gamma\gamma \to \pi^+\pi^-\pi^0$	
1305 ±14		CONDO	93	SHF		$\gamma p \to n\pi^+\pi^+\pi^-$	
1310 ± 2		[2] EVANGELIS...	81	OMEG	−	12 $\pi^- p \to 3\pi p$	
1343 ±11	490	BALTAY	78B	HBC	0	15 $\pi^+ p \to \Delta 3\pi$	OCCUR=2
1309 ± 5	5k	BINNIE	71	MMS	−	$\pi^- p$ near a_2 threshold	OCCUR=2
1299 ± 6	28k	BOWEN	71	MMS	−	5 $\pi^- p$	
1300 ± 6	24k	BOWEN	71	MMS	+	5 $\pi^+ p$	OCCUR=2
1309 ± 4	17k	BOWEN	71	MMS	−	7 $\pi^- p$	OCCUR=3
1306 ± 4	941	ALSTON-...	70	HBC	+	7.0 $\pi^+ p \to 3\pi p$	

[1] Statistical error negligible. NODE=M012M1;LINKAGE=D
[2] From a fit to $J^P = 2^+$ $\rho\pi$ partial wave. NODE=M012M1;LINKAGE=P
[3] Superseded by AGHASYAN 2018B. NODE=M012M1;LINKAGE=C
[4] From analysis of L3 data at 183–209 GeV. NODE=M012M1;LINKAGE=SC



a_2(1320) mass, 3π mode (MeV)

$K\overline{K}$ MODE

NODE=M012M2

The data in this block is included in the average printed for a previous datablock.

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT	
1318.1± 0.7 OUR AVERAGE							NODE=M012M2
1319 ± 5	4700	[1,2] CLELAND	82B	SPEC	+	50 $\pi^+ p \to K^0_S K^+ p$	OCCUR=2
1324 ± 6	5200	[1,2] CLELAND	82B	SPEC	−	50 $\pi^- p \to K^0_S K^- p$	OCCUR=3
1320 ± 2	4000	CHABAUD	80	SPEC	−	17 $\pi^- A \to K^0_S K^- A$	
1312 ± 4	11000	CHABAUD	78	SPEC	−	9.8 $\pi^- p \to K^- K^0_S p$	
1316 ± 2	4730	CHABAUD	78	SPEC	−	18.8 $\pi^- p \to K^- K^0_S p$	OCCUR=2
1318 ± 1		[1,3] MARTIN	78D	SPEC	−	10 $\pi^- p \to K^0_S K^- p$	
1320 ± 2	2724	MARGULIE	76	SPEC	−	23 $\pi^- p \to K^- K^0_S p$	
1313 ± 4	730	FOLEY	72	CNTR	−	20.3 $\pi^- p \to K^- K^0_S p$	
1319 ± 3	1500	[3] GRAYER	71	ASPK	−	17.2 $\pi^- p \to K^- K^0_S p$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
1304 ±10	870	[4] SCHEGELSKY	06A	RVUE	0	$\gamma\gamma \to K^0_S K^0_S$	
1330 ±11	1000	[1,2] CLELAND	82B	SPEC	+	30 $\pi^+ p \to K^0_S K^+ p$	
1324 ± 5	350	HYAMS	78	ASPK	+	12.7 $\pi^+ p \to K^+ K^0_S p$	

[1] From a fit to $J^P = 2^+$ partial wave. NODE=M012M2;LINKAGE=P
[2] Number of events evaluated by us. NODE=M012M2;LINKAGE=W
[3] Systematic error in mass scale subtracted. NODE=M012M2;LINKAGE=S
[4] From analysis of L3 data at 91 and 183–209 GeV. NODE=M012M2;LINKAGE=SC

$\eta\pi$ MODE

NODE=M012M3

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT

The data in this block is included in the average printed for a previous datablock.

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1317.7± 1.4 OUR AVERAGE						
1308 ± 9		BARBERIS	00H			450 $pp \to p_f \eta\pi^0 p_s$
1316 ± 9		BARBERIS	00H			450 $pp \to \Delta_f^{++} \eta\pi^- p_s$
1317 ± 1 ±2		THOMPSON	97	MPS		18 $\pi^- p \to \eta\pi^- p$
1315 ± 5 ±2		[1] AMSLER	94D	CBAR		0.0 $\overline{p}p \to \pi^0\pi^0\eta$
1325.1± 5.1		AOYAGI	93	BKEI		$\pi^- p \to \eta\pi^- p$
1317.7± 1.4±2.0		BELADIDZE	93	VES		$37\pi^- N \to \eta\pi^- N$
1323 ± 8	1000	[2] KEY	73	OSPK	−	6 $\pi^- p \to p\pi^-\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1318.7± $1.9^{+1.3}_{-1.3}$		[3] KOPF	21	RVUE		0.9 $p\overline{p} \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0 K^+ K^-$ and 191 $\pi^- p \to \pi^-\pi^-\pi^+ p$
1312.5± 0.7±2.6		[4] ALBRECHT	20	RVUE		0.9 $\overline{p}p \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0 K^+ K^-$
1306.0± 0.8±1.3		[5] RODAS	19	JPAC		191 $\pi^- p \to \eta^{(\prime)}\pi^- p$
1307 ± 1 ±6		[6] JACKURA	18	JPAC		$\pi^- p \to \eta\pi^- p$
1315 ±12		[7] ADOLPH	15	COMP		191 $\pi^- p \to \eta^{(\prime)}\pi^- p$
1309 ± 4		ANISOVICH	09	RVUE		$\overline{p}p$, πN
1324 ± 5		ARMSTRONG	93C	E760	0	$\overline{p}p \to \pi^0\eta\eta \to 6\gamma$
1336.2± 1.7	2561	DELFOSSE	81	SPEC	+	$\pi^\pm p \to p\pi^\pm\eta$
1330.7± 2.4	1653	DELFOSSE	81	SPEC	−	$\pi^\pm p \to p\pi^\pm\eta$
1324 ± 8	6200	[2,8] CONFORTO	73	OSPK	−	6 $\pi^- p \to p\mathrm{MM}^-$

OCCUR=2 (BARBERIS 00H); OCCUR=2 (DELFOSSE 81)

[1] The systematic error of 2 MeV corresponds to the spread of solutions.
[2] Error includes 5 MeV systematic mass-scale error.
[3] From T-matrix pole based on combined fit of Crystal Barrel and $\pi\pi$ scattering data (ALBRECHT 20), and COMPASS data (ADOLPH 15), using a coupled-channel model of $\eta\pi$, $\eta'\pi$ and $K\overline{K}$ systems.
[4] T-matrix pole with 2 poles, 2 channels ($\pi^0\eta$ and $K\overline{K}$).
[5] The coupled-channel analysis of both the $\eta\pi$ and $\eta'\pi$ systems using ADOLPH 15 data. The mass is extracted from the T-matrix pole.
[6] Superseded by RODAS 19.
[7] ADOLPH 15 value is derived from a Breit-Wigner fit with mass-dependent width taking the $\eta\pi$ and $\rho\pi$ channels into account.
[8] Missing mass with enriched MMS = $\eta\pi^-$, $\eta = 2\gamma$.

NODE=M012M3;LINKAGE=DD
NODE=M012M3;LINKAGE=E
NODE=M012M3;LINKAGE=F
NODE=M012M3;LINKAGE=D
NODE=M012M3;LINKAGE=C
NODE=M012M3;LINKAGE=B
NODE=M012M3;LINKAGE=A
NODE=M012M3;LINKAGE=M

$\eta'\pi$ MODE

NODE=M012M4

The data in this block is included in the average printed for a previous datablock.

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1322 ± 7 OUR AVERAGE				
1318 ± 8 $^{+3}_{-5}$	IVANOV	01	B852	18 $\pi^- p \to \eta'\pi^- p$
1327.0±10.7	BELADIDZE	93	VES	$37\pi^- N \to \eta'\pi^- N$

$a_2(1320)$ WIDTH

NODE=M012210

3π MODE

NODE=M012W1

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
$105.0^{+1.7}_{-1.9}$ OUR AVERAGE						
$106.6^{+3.4}_{-7.0}$	46M	[1] AGHASYAN	18B	COMP		190 $\pi^- p \to \pi^-\pi^+\pi^- p$
108 ± 3 ±15		CHUNG	02	B852		18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$
120 ±10		BARBERIS	98B			450 $pp \to p_f \pi^+\pi^-\pi^0 p_s$
105 ±10 ±11		ACCIARRI	97T	L3		$e^+e^- \to e^+e^-\pi^+\pi^-\pi^0$
120 ±10		ALBRECHT	97B	ARG		$e^+e^- \to e^+e^-\pi^+\pi^-\pi^0$
103.0± 6.0± 3.3	72.4k	AMELIN	96	VES		36 $\pi^- p \to \pi^+\pi^-\pi^0 n$
120 ±10		ARMSTRONG	90	OMEG	0	300.0$pp \to pp\pi^+\pi^-\pi^0$

107.0± 9.7	4022	AUGUSTIN	89	DM2	±	$J/\psi \to \rho^{\pm} a_2^{\mp}$	
118.5±12.5	3562	AUGUSTIN	89	DM2	0	$J/\psi \to \rho^0 a_2^0$	OCCUR=2
97 ± 5		[2] EVANGELIS...	81	OMEG	−	$12\ \pi^- p \to 3\pi p$	
96 ± 9	25k	[2] DAUM	80C	SPEC	−	$63,94\ \pi^- p \to 3\pi p$	
110 ±15	1097	[2] BALTAY	78B	HBC	+0	$15\ \pi^+ p \to p 4\pi$	
112 ±18	1.6k	[2] EMMS	75	DBC	0	$4\ \pi^+ n \to p(3\pi)^0$	
122 ±14	1.2k	[2,3] WAGNER	75	HBC	0	$7\ \pi^+ p \to \Delta^{++}(3\pi)^0$	
115 ±15		[2] ANTIPOV	73C	CNTR	−	$25,40\ \pi^- p \to p\eta\pi^-$	
99 ±15	1580	CHALOUPKA	73	HBC	−	$3.9\ \pi^- p$	
105 ± 5	28k	BOWEN	71	MMS	−	$5\ \pi^- p$	
99 ± 5	24k	BOWEN	71	MMS	+	$5\ \pi^+ p$	OCCUR=2
103 ± 5	17k	BOWEN	71	MMS	−	$7\ \pi^- p$	OCCUR=3
• • • We do not use the following data for averages, fits, limits, etc. • • •							
110 ± 2 $^{+2}_{-15}$	420k	[4] ALEKSEEV	10	COMP		$190\ \pi^- Pb \to \pi^-\pi^-\pi^+ Pb'$	
117 ± 6 ±20	18k	[5] SCHEGELSKY	06	RVUE	0	$\gamma\gamma \to \pi^+\pi^-\pi^0$	
120 ±40		CONDO	93	SHF		$\gamma p \to n\pi^+\pi^+\pi^-$	
115 ±14	490	BALTAY	78B	HBC	0	$15\ \pi^+ p \to \Delta 3\pi$	OCCUR=2
72 ±16	5k	BINNIE	71	MMS	−	$\pi^- p$ near a_2 threshold	OCCUR=2
79 ±12	941	ALSTON-...	70	HBC	+	$7.0\ \pi^+ p \to 3\pi p$	

[1] Statistical error negligible. NODE=M012W1;LINKAGE=C
[2] From a fit to $J^P = 2^+$ $\rho\pi$ partial wave. NODE=M012W1;LINKAGE=P
[3] Width errors enlarged by us to $4\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M012W1;LINKAGE=S
[4] Superseded by AGHASYAN 2018B. NODE=M012W1;LINKAGE=E
[5] From analysis of L3 data at 183–209 GeV. NODE=M012W1;LINKAGE=SC

$K\overline{K}$ AND $\eta\pi$ MODES

NODE=M012W0
NODE=M012W0

VALUE (MeV)	DOCUMENT ID
107 ±5 OUR ESTIMATE	
110.4±1.7 OUR AVERAGE	Includes data from the 2 datablocks that follow this one.

→ UNCHECKED ←

$K\overline{K}$ MODE

NODE=M012W2
NODE=M012W2

The data in this block is included in the average printed for a previous datablock.

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT	
109.8± 2.4 OUR AVERAGE							
112 ±20	4700	[1,2] CLELAND	82B	SPEC	+	$50\ \pi^+ p \to K_S^0 K^+ p$	OCCUR=2
120 ±25	5200	[1,2] CLELAND	82B	SPEC	−	$50\ \pi^- p \to K_S^0 K^- p$	OCCUR=3
106 ± 4	4000	CHABAUD	80	SPEC	−	$17\ \pi^- A \to K_S^0 K^- A$	
126 ±11	11000	CHABAUD	78	SPEC	−	$9.8\ \pi^- p \to K^- K_S^0 p$	
101 ± 8	4730	CHABAUD	78	SPEC	−	$18.8\ \pi^- p \to K^- K_S^0 p$	OCCUR=2
113 ± 4		[1,3] MARTIN	78D	SPEC	−	$10\ \pi^- p \to K_S^0 K^- p$	
105 ± 8	2724	[3] MARGULIE	76	SPEC	−	$23\ \pi^- p \to K^- K_S^0 p$	
113 ±19	730	FOLEY	72	CNTR	−	$20.3\ \pi^- p \to K^- K_S^0 p$	
123 ±13	1500	[3] GRAYER	71	ASPK	−	$17.2\ \pi^- p \to K^- K_S^0 p$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
120 ±15	870	[4] SCHEGELSKY	06A	RVUE	0	$\gamma\gamma \to K_S^0 K_S^0$	
121 ±51	1000	[1,2] CLELAND	82B	SPEC	+	$30\ \pi^+ p \to K_S^0 K^+ p$	
110 ±18	350	HYAMS	78	ASPK	+	$12.7\ \pi^+ p \to K^+ K_S^0 p$	

[1] From a fit to $J^P = 2^+$ partial wave. NODE=M012W2;LINKAGE=P
[2] Number of events evaluated by us. NODE=M012W2;LINKAGE=W
[3] Width errors enlarged by us to $4\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M012W2;LINKAGE=S
[4] From analysis of L3 data at 91 and 183–209 GeV. NODE=M012W2;LINKAGE=SC

$\eta\pi$ MODE

NODE=M012W3
NODE=M012W3

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT	
The data in this block is included in the average printed for a previous datablock.							
111.1± 2.4 OUR AVERAGE							
115 ±20		BARBERIS	00H			450 $p p \to p_f \eta \pi^0 p_s$	
112 ±14		BARBERIS	00H			450 $p p \to \Delta_f^{++} \eta \pi^- p_s$	OCCUR=2
112 ± 3 ±2		[1] AMSLER	94D	CBAR		0.0 $\overline{p} p \to \pi^0 \pi^0 \eta$	
103 ± 6 ±3		BELADIDZE	93	VES		$37 \pi^- N \to \eta \pi^- N$	
112.2± 5.7	2561	DELFOSSE	81	SPEC	+	$\pi^\pm p \to p \pi^\pm \eta$	
116.6± 7.7	1653	DELFOSSE	81	SPEC	−	$\pi^\pm p \to p \pi^\pm \eta$	OCCUR=2
108 ± 9	1000	KEY	73	OSPK	−	6 $\pi^- p \to p \pi^- \eta$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
$107.5 \pm 4.6^{+3.3}_{-1.8}$		[2] KOPF	21	RVUE		0.9 $p \overline{p} \to \pi^0 \pi^0 \eta$, $\pi^0 \eta \eta$, $\pi^0 K^+ K^-$ and 191 $\pi^- p \to \pi^- \pi^- \pi^+ p$	
106.9± 1.2±3.7		[3] ALBRECHT	20	RVUE		0.9 $\overline{p} p \to \pi^0 \pi^0 \eta$, $\pi^0 \eta \eta$, $\pi^0 K^+ K^-$	
114.4± 1.6±0.0		[4] RODAS	19	JPAC		191 $\pi^- p \to \eta^{(\prime)} \pi^- p$	
112 ± 1 ±8		[5] JACKURA	18	JPAC		$\pi^- p \to \eta \pi^- p$	
119 ±14		[6] ADOLPH	15	COMP		191 $\pi^- p \to \eta^{(\prime)} \pi^- p$	
110 ± 4		ANISOVICH	09	RVUE		$\overline{p} p$, πN	
127 ± 2 ±2		[7] THOMPSON	97	MPS		18 $\pi^- p \to \eta \pi^- p$	
118 ±10		ARMSTRONG	93C	E760	0	$\overline{p} p \to \pi^0 \eta \eta \to 6\gamma$	
104 ± 9	6200	[8] CONFORTO	73	OSPK	−	6 $\pi^- p \to p MM^-$	

[1] The systematic error of 2 MeV corresponds to the spread of solutions. NODE=M012W3;LINKAGE=DD

[2] From T-matrix pole based on combined fit of Crystal Barrel and $\pi\pi$ scattering data (ALBRECHT 20), and COMPASS data (ADOLPH 15), using a coupled-channel model of $\eta\pi$, $\eta'\pi$ and $K\overline{K}$ systems. NODE=M012W3;LINKAGE=G

[3] T-matrix pole with 2 poles, 2 channels ($\pi^0\eta$ and $K\overline{K}$). NODE=M012W3;LINKAGE=F

[4] The coupled-channel analysis of both the $\eta\pi$ and $\eta'\pi$ systems using ADOLPH 15 data. The width is extracted from the T-matrix pole. NODE=M012W3;LINKAGE=E

[5] Superseded by RODAS 19. NODE=M012W3;LINKAGE=C

[6] ADOLPH 15 value is derived from a Breit-Wigner fit with mass-dependent width taking the $\eta\pi$ and $\rho\pi$ channels into account. NODE=M012W3;LINKAGE=B

[7] Resolution is not unfolded. NODE=M012W3;LINKAGE=A

[8] Missing mass with enriched MMS = $\eta\pi^-$, $\eta = 2\gamma$. NODE=M012W3;LINKAGE=M

$\eta'\pi$ MODE

NODE=M012W4
NODE=M012W4

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
119±25 OUR AVERAGE				
140±35±20	IVANOV	01	B852	18 $\pi^- p \to \eta' \pi^- p$
106±32	BELADIDZE	93	VES	$37\pi^- N \to \eta' \pi^- N$

$a_2(1320)$ DECAY MODES

NODE=M012215;NODE=M012

	Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	
Γ_1	3π	(70.1 ±2.7) %	S=1.2	DESIG=1
Γ_2	$\rho(770)\pi$			DESIG=11
Γ_3	$f_2(1270)\pi$			DESIG=12
Γ_4	$\rho(1450)\pi$			DESIG=13
Γ_5	$\eta\pi$	(14.5 ±1.2) %		DESIG=3
Γ_6	$\omega\pi\pi$	(10.6 ±3.2) %	S=1.3	DESIG=4
Γ_7	$K\overline{K}$	(4.9 ±0.8) %		DESIG=2
Γ_8	$\eta'(958)\pi$	(5.5 ±0.9) $\times 10^{-3}$		DESIG=8
Γ_9	$\pi^\pm\gamma$	(2.91±0.27) $\times 10^{-3}$		DESIG=7
Γ_{10}	$\gamma\gamma$	(9.4 ±0.7) $\times 10^{-6}$		DESIG=9
Γ_{11}	e^+e^-	< 5 $\times 10^{-9}$	CL=90%	DESIG=10

CONSTRAINED FIT INFORMATION

An overall fit to 5 branching ratios uses 18 measurements and one constraint to determine 4 parameters. The overall fit has a $\chi^2 =$ 9.3 for 15 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\left<\delta x_i \delta x_j\right>/(\delta x_i \cdot \delta x_j)$, in percent, from the fit to the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_5	10		
x_6	−89	−46	
x_7	−1	−2	−24
	x_1	x_5	x_6

$a_2(1320)$ PARTIAL WIDTHS

NODE=M012220

$\Gamma(\eta\pi)$ Γ_5

NODE=M012W6
NODE=M012W6

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
18.5±3.0	870	[1] SCHEGELSKY	06A	RVUE	0	$\gamma\gamma \to K^0_S K^0_S$

[1] From analysis of L3 data at 91 and 183–209 GeV, using $\Gamma(a_2(1320) \to \gamma\gamma) = 0.91$ keV and SU(3) relations.

NODE=M012W6;LINKAGE=SC

$\Gamma(K\overline{K})$ Γ_7

NODE=M012W5
NODE=M012W5

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$7.0^{+2.0}_{-1.5}$	870	[1] SCHEGELSKY	06A	RVUE	0	$\gamma\gamma \to K^0_S K^0_S$

[1] From analysis of L3 data at 91 and 183–209 GeV, using $\Gamma(a_2(1320) \to \gamma\gamma) = 0.91$ keV and SU(3) relations.

NODE=M012W5;LINKAGE=SC

$\Gamma(\pi^\pm\gamma)$ Γ_9

NODE=M012W7
NODE=M012W7

VALUE (keV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
311± 25 OUR AVERAGE						
358± 6±42		[1] ADOLPH	14	COMP	−	190 π^- Pb $\to \pi^+\pi^-\pi^-$ Pb$'$
284± 25±25	7.1k	MOLCHANOV	01	SELX		600 $\pi^- A \to \pi^+\pi^-\pi^- A$
295± 60		CIHANGIR	82	SPEC	+	200 π^+ A
• • • We do not use the following data for averages, fits, limits, etc. • • •						
461±110		[2] MAY	77	SPEC	±	9.7 γA

[1] Primakoff reaction using $a_2(1320) \to 3\pi$ branching ratio of 70.1%.
[2] Assuming one-pion exchange.

NODE=M012W7;LINKAGE=AD
NODE=M012W;LINKAGE=M2

$\Gamma(\gamma\gamma)$ Γ_{10}

NODE=M012W9
NODE=M012W9

VALUE (keV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1.00±0.06 OUR AVERAGE						
0.98±0.05±0.09		ACCIARRI	97T	L3		$e^+e^- \to e^+e^-\pi^+\pi^-\pi^0$
0.96±0.03±0.13		ALBRECHT	97B	ARG		$e^+e^- \to e^+e^-\pi^+\pi^-\pi^0$
1.26±0.26±0.18	36	BARU	90	MD1		$e^+e^- \to e^+e^-\pi^+\pi^-\pi^0$
1.00±0.07±0.15	415	BEHREND	90C	CELL	0	$e^+e^- \to e^+e^-\pi^+\pi^-\pi^0$
1.03±0.13±0.21		BUTLER	90	MRK2		$e^+e^- \to e^+e^-\pi^+\pi^-\pi^0$
1.01±0.14±0.22	85	OEST	90	JADE		$e^+e^- \to e^+e^-\pi^0\eta$
0.90±0.27±0.15	56	[1] ALTHOFF	86	TASS	0	$e^+e^- \to e^+e^- 3\pi$
1.14±0.20±0.26		[2] ANTREASYAN	86	CBAL	0	$e^+e^- \to e^+e^-\pi^0\eta$
1.06±0.18±0.19		BERGER	84C	PLUT	0	$e^+e^- \to e^+e^- 3\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$0.81\pm0.19^{+0.42}_{-0.11}$	35	[1] BEHREND	82C	CELL	0	$e^+e^- \to e^+e^- 3\pi$
0.77±0.18±0.27	22	[2] EDWARDS	82F	CBAL	0	$e^+e^- \to e^+e^-\pi^0\eta$

[1] From $\rho\pi$ decay mode.
[2] From $\eta\pi^0$ decay mode.

NODE=M012W;LINKAGE=F
NODE=M012W;LINKAGE=G

$\Gamma(e^+e^-)$ Γ_{11}

NODE=M012W10
NODE=M012W10

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
< 0.56	90	ACHASOV	00K	SND	$e^+e^- \to \pi^0\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<25	90	VOROBYEV	88	ND	$e^+e^- \to \pi^0\eta$

$a_2(1320)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M012223

$\Gamma(3\pi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_1\Gamma_{10}/\Gamma$

NODE=M012G2
NODE=M012G2

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.65\pm0.02\pm0.02$	18k	[1] SCHEGELSKY	06	RVUE	$\gamma\gamma \to \pi^+\pi^-\pi^0$

[1] From analysis of L3 data at 183–209 GeV.

NODE=M012G2;LINKAGE=SC

$\Gamma(\eta\pi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_5\Gamma_{10}/\Gamma$

NODE=M012G01
NODE=M012G01

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.145^{+0.097}_{-0.034}$	[1] UEHARA	09A	BELL	$e^+e^- \to e^+e^-\eta\pi^0$

[1] From the D_2-wave. The fraction of the D_0-wave is $3.4^{+2.3}_{-1.1}$%.

NODE=M012G01;LINKAGE=UE

$\Gamma(K\overline{K}) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_7\Gamma_{10}/\Gamma$

NODE=M012G1
NODE=M012G1

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
$0.126\pm0.007\pm0.028$	[1] ALBRECHT	90G	ARG	$e^+e^- \to e^+e^-K^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.081\pm0.006\pm0.027$	[2] ALBRECHT	90G	ARG	$e^+e^- \to e^+e^-K^+K^-$

OCCUR=2

[1] Using an incoherent background.
[2] Using a coherent background.

NODE=M012G1;LINKAGE=A
NODE=M012G1;LINKAGE=B

$a_2(1320)$ BRANCHING RATIOS

NODE=M012225

$\left[\Gamma(f_2(1270)\pi) + \Gamma(\rho(1450)\pi)\right]/\Gamma(\rho(770)\pi)$ $(\Gamma_3+\Gamma_4)/\Gamma_2$

NODE=M012R9
NODE=M012R9

VALUE	CL%	DOCUMENT ID		TECN	CHG	COMMENT
<0.12	90	ABRAMOVI...	70B	HBC	−	3.93 π^-p

$\Gamma(\rho(770)\pi)/\Gamma(f_2(1270)\pi)$ Γ_2/Γ_3

NODE=M012R00
NODE=M012R00

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$16.5^{+1.2}_{-2.4}$	46M	[1] AGHASYAN	18B	COMP	190 $\pi^-p \to \pi^-\pi^+\pi^-p$

[1] Statistical error negligible.

NODE=M012R00;LINKAGE=A

$\Gamma(\eta\pi)/\Gamma(3\pi)$ Γ_5/Γ_1

NODE=M012R3
NODE=M012R3

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
0.207±0.018 OUR FIT						
0.213±0.020 OUR AVERAGE						
0.18 ±0.05		FORINO	76	HBC		11 π^-p
0.22 ±0.05	52	ANTIPOV	73	CNTR	−	40 π^-p
0.211±0.044	149	CHALOUPKA	73	HBC	−	3.9 π^-p
0.246±0.042	167	ALSTON-...	71	HBC	+	7.0 π^+p
0.25 ±0.09	15	BOECKMANN	70	HBC	+	5.0 π^+p
0.23 ±0.08	22	ASCOLI	68	HBC	−	5 π^-p
0.12 ±0.08		CHUNG	68	HBC	−	3.2 π^-p
0.22 ±0.09		CONTE	67	HBC	−	11.0 π^-p

$\Gamma(\omega\pi\pi)/\Gamma(3\pi)$ Γ_6/Γ_1

NODE=M012R12
NODE=M012R12

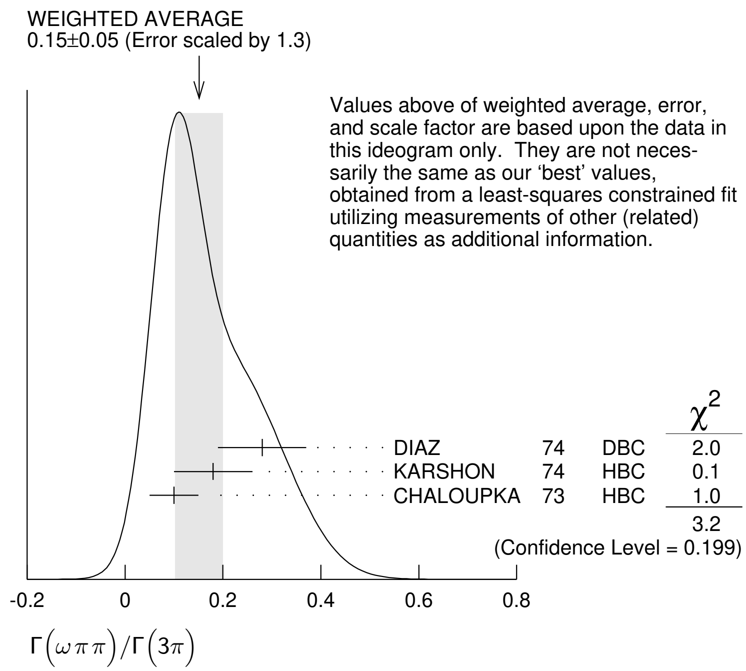
VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
0.15±0.05 OUR FIT Error includes scale factor of 1.3.						
0.15±0.05 OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below.						
0.28±0.09	60	DIAZ	74	DBC	0	6 π^+n
0.18±0.08		[1] KARSHON	74	HBC		Avg. of above two
0.10±0.05	279	[2] CHALOUPKA	73	HBC	−	3.9 π^-p
• • • We do not use the following data for averages, fits, limits, etc. • • •						
0.29±0.08	140	[1] KARSHON	74	HBC	0	4.9 π^+p
0.10±0.04	60	[1] KARSHON	74	HBC	+	4.9 π^+p
0.19±0.08		DEFOIX	73	HBC	0	0.7 $\overline{p}p$

OCCUR=3

OCCUR=2

[1] KARSHON 74 suggest an additional $I = 0$ state strongly coupled to $\omega\pi\pi$ which could explain discrepancies in branching ratios and masses. We use a central value and a systematic spread. NODE=M012R12;LINKAGE=K

[2] Decays to $b_1(1040)\pi$, $b_1 \to \omega\pi$. Error increased to account for possible systematic errors of complicated analysis. NODE=M012R12;LINKAGE=01



$\Gamma(K\overline{K})/\Gamma(3\pi)$ — Γ_7/Γ_1

NODE=M012R1

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
0.070±0.012 OUR FIT						
0.078±0.017		CHABAUD	78	RVUE		
• • • We do not use the following data for averages, fits, limits, etc. • • •						
0.011±0.003		[1] BERTIN	98B	OBLX		0.0 $\overline{p}p \to K^{\pm}K_S\pi^{\mp}$
0.056±0.014	50	[2] CHALOUPKA	73	HBC	−	3.9 $\pi^- p$
0.097±0.018	113	[2] ALSTON-...	71	HBC	+	7.0 $\pi^+ p$
0.06 ±0.03		[2] ABRAMOVI...	70B	HBC	−	3.93 $\pi^- p$
0.054±0.022		[2] CHUNG	68	HBC	−	3.2 $\pi^- p$

[1] Using 4π data from BERTIN 97D. NODE=M012R1;LINKAGE=BE

[2] Included in CHABAUD 78 review. NODE=M012R1;LINKAGE=C

$\Gamma(K\overline{K})/\Gamma(\eta\pi)$ — Γ_7/Γ_5

NODE=M012R14

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.31 ±0.22 $^{+0.09}_{-0.11}$	[1] KOPF	21	RVUE	0.9 $p\overline{p} \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0K^+K^-$ and 191 $\pi^- p \to \pi^-\pi^-\pi^+ p$
0.352±0.011±0.175	[2] ALBRECHT	20	RVUE	0.9 $\overline{p}p \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0K^+K^-$
0.08 ±0.02	[3] BERTIN	98B	OBLX	0.0 $\overline{p}p \to K^{\pm}K_S\pi^{\mp}$

[1] From T-matrix pole based on combined fit of Crystal Barrel and $\pi\pi$ scattering data (ALBRECHT 20), and COMPASS data (ADOLPH 15), using a coupled-channel model of $\eta\pi$, $\eta'\pi$ and $K\overline{K}$ systems. NODE=M012R14;LINKAGE=B

[2] Residues from T-matrix pole with 2 poles, 2 channels ($\pi^0\eta$ and $K\overline{K}$). NODE=M012R14;LINKAGE=A

[3] Using $\eta\pi\pi$ data from AMSLER 94D. NODE=M012R14;LINKAGE=BE

$\Gamma(\eta\pi)/[\Gamma(3\pi)+\Gamma(\eta\pi)+\Gamma(K\overline{K})]$ — $\Gamma_5/(\Gamma_1+\Gamma_5+\Gamma_7)$

NODE=M012R2

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
0.162±0.012 OUR FIT						
0.140±0.028 OUR AVERAGE						
0.13 ±0.04		ESPIGAT	72	HBC	±	0.0 $\overline{p}p$
0.15 ±0.04	34	BARNHAM	71	HBC	+	3.7 $\pi^+ p$

$\Gamma(K\overline{K})/[\Gamma(3\pi)+\Gamma(\eta\pi)+\Gamma(K\overline{K})]$ $\Gamma_7/(\Gamma_1+\Gamma_5+\Gamma_7)$

NODE=M012R8

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT	
0.054±0.009 OUR FIT							
0.048±0.012 OUR AVERAGE							
0.05 ±0.02		TOET	73	HBC	+	5 $\pi^+ p$	
0.09 ±0.04		TOET	73	HBC	0	5 $\pi^+ p$	OCCUR=2
0.03 ±0.02	8	[1] DAMERI	72	HBC	−	11 $\pi^- p$	
0.06 ±0.03	17	BARNHAM	71	HBC	+	3.7 $\pi^+ p$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
0.020±0.004		[2] ESPIGAT	72	HBC	±	0.0 $\overline{p}p$	

[1] Montanet agrees. Vlada. NODE=M012R8;LINKAGE=01

[2] Not averaged because of discrepancy between masses from $K\overline{K}$ and $\rho\pi$ modes. NODE=M012R8;LINKAGE=A

$\Gamma(\eta'(958)\pi)/\Gamma_{total}$ Γ_8/Γ

NODE=M012R4

VALUE	CL%	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.006	95	ALDE	92B	GAM2		38,100 $\pi^- p \to \eta' \pi^0 n$
<0.02	97	BARNHAM	71	HBC	+	3.7 $\pi^+ p$
0.004±0.004		[1] BOESEBECK	68	HBC	+	8 $\pi^+ p$

[1] No longer valid since $\Gamma(K\overline{K})/\Gamma(3\pi)$ value has changed (MORRISON 71). NODE=M012R4;LINKAGE=B

$\Gamma(\eta'(958)\pi)/\Gamma(3\pi)$ Γ_8/Γ_1

NODE=M012R5

VALUE	CL%	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.011	90	EISENSTEIN	73	HBC	−	5 $\pi^- p$
<0.04		ALSTON-...	71	HBC	+	7.0 $\pi^+ p$
$0.04\ ^{+0.03}_{-0.04}$		BOECKMANN	70	HBC	0	5.0 $\pi^+ p$

$\Gamma(\eta'(958)\pi)/\Gamma(\eta\pi)$ Γ_8/Γ_5

NODE=M012R13

VALUE	DOCUMENT ID		TECN	COMMENT	
0.038±0.005 OUR AVERAGE					
0.05 ±0.02	ADOLPH	15	COMP	191 $\pi^- p \to \eta^{(\prime)} \pi^- p$	
0.032±0.009	ABELE	97C	CBAR	0.0 $\overline{p}p \to \pi^0 \pi^0 \eta'$	
0.047±0.010±0.004	[1] BELADIDZE	93	VES	$37\pi^- N \to a_2^- N$	
0.034±0.008±0.005	BELADIDZE	92	VES	$36\pi^- C \to a_2^- C$	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.046\pm0.015\ ^{+0.07}_{-0.006}$	[2] KOPF	21	RVUE	0.9 $p\overline{p} \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0 K^+ K^-$ and 191 $\pi^- p \to \pi^-\pi^-\pi^+ p$	OCCUR=2

[1] Using B($\eta' \to \pi^+\pi^-\eta$) = 0.441, B($\eta \to \gamma\gamma$) = 0.389 and B($\eta \to \pi^+\pi^-\pi^0$) = 0.236. NODE=M012R13;LINKAGE=A

[2] From T-matrix pole based on combined fit of Crystal Barrel and $\pi\pi$ scattering data (ALBRECHT 20), and COMPASS data (ADOLPH 15), using a coupled-channel model of $\eta\pi$, $\eta'\pi$ and $K\overline{K}$ systems. NODE=M012R13;LINKAGE=C

$\Gamma(\pi^\pm\gamma)/\Gamma_{total}$ Γ_9/Γ

NODE=M012R11

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.005\ ^{+0.005}_{-0.003}$	[1] EISENBERG	72	HBC	4.3,5.25,7.5 γp

[1] Pion-exchange model used in this estimation. NODE=M012R11;LINKAGE=R

$\Gamma(e^+e^-)/\Gamma_{total}$ Γ_{11}/Γ

NODE=M012R15

VALUE (units 10^{-9})	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<6	90	ACHASOV	00K	SND	$e^+e^- \to \pi^0\pi^0$

$a_2(1320)$ REFERENCES

NODE=M012

KOPF	21	EPJ C81 1056	B. Kopf *et al.*	(BOCH)	REFID=61470
ALBRECHT	20	EPJ C80 453	M. Albrecht *et al.*	(Crystal Barrel Collab.)	REFID=60439
RODAS	19	PRL 122 042002	A. Rodas *et al.*	(JPAC Collab.)	REFID=59554
AGHASYAN	18B	PR D98 092003	M. Aghasyan *et al.*	(COMPASS Collab.)	REFID=59471
JACKURA	18	PL B779 464	A. Jackura *et al.*	(JPAC and COMPASS Collab.)	REFID=59003
ADOLPH	15	PL B740 303	M. Adolph *et al.*	(COMPASS Collab.)	REFID=56385
ADOLPH	14	EPJ A50 79	C. Adolph *et al.*	(COMPASS Collab.)	REFID=55911
ALEKSEEV	10	PRL 104 241803	M.G. Alekseev *et al.*	(COMPASS Collab.)	REFID=53356
ANISOVICH	09	IJMP A24 2481	V.V. Anisovich, A.V. Sarantsev		REFID=52719
UEHARA	09A	PR D80 032001	S. Uehara *et al.*	(BELLE Collab.)	REFID=53002
SCHEGELSKY	06	EPJ A27 199	V.A. Schegelsky *et al.*		REFID=51186
SCHEGELSKY	06A	EPJ A27 207	V.A. Schegelsky *et al.*		REFID=51185
CHUNG	02	PR D65 072001	S.U. Chung *et al.*	(BNL E852 Collab.)	REFID=48837
IVANOV	01	PRL 86 3977	E.I. Ivanov *et al.*	(BNL E852 Collab.)	REFID=48317
MOLCHANOV	01	PL B521 171	V.V. Molchanov *et al.*	(FNAL SELEX Collab.)	REFID=48559
ACHASOV	00K	PL B492 8	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=47933
BARBERIS	00H	PL B488 225	D. Barberis *et al.*	(WA 102 Collab.)	REFID=47964
BARBERIS	98B	PL B422 399	D. Barberis *et al.*	(WA 102 Collab.)	REFID=46345
BERTIN	98B	PL B434 180	A. Bertin *et al.*	(OBELIX Collab.)	REFID=46351
ABELE	97C	PL B404 179	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=45531
ACCIARRI	97T	PL B413 147	M. Acciarri *et al.*	(L3 Collab.)	REFID=45761
ALBRECHT	97B	ZPHY C74 469	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=45418
THOMPSON	97	PRL 79 1630	D.R. Thompson *et al.*	(BNL E852 Collab.)	REFID=45584
AMELIN	96	ZPHY C70 71	D.V. Amelin *et al.*	(SERP, TBIL)	REFID=44649
AMSLER	94D	PL B333 277	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=44093
AOYAGI	93	PL B314 246	H. Aoyagi *et al.*	(BKEI Collab.)	REFID=43599
ARMSTRONG	93C	PL B307 394	T.A. Armstrong *et al.*	(FNAL, FERR, GENO+)	REFID=43587
BELADIDZE	93	PL B313 276	G.M. Beladidze *et al.*	(VES Collab.)	REFID=43598
CONDO	93	PR D48 3045	G.T. Condo *et al.*	(SLAC Hybrid Collab.)	REFID=43600
ALDE	92B	ZPHY C54 549	D.M. Alde *et al.*	(SERP, BELG, LANL, LAPP+)	REFID=41852
BELADIDZE	92	ZPHY C54 235	G.M. Beladidze *et al.*	(VES Collab.)	REFID=42171
ALBRECHT	90G	ZPHY C48 183	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=41374
ARMSTRONG	90	ZPHY C48 213	T.A. Armstrong, M. Benayoun, W. Beusch	(WA76 Coll.)	REFID=41375
BARU	90	ZPHY C48 581	S.E. Baru *et al.*	(MD-1 Collab.)	REFID=41366
BEHREND	90C	ZPHY C46 583	H.J. Behrend *et al.*	(CELLO Collab.)	REFID=41356
BUTLER	90	PR D42 1368	F. Butler *et al.*	(Mark II Collab.)	REFID=41363
OEST	90	ZPHY C47 343	T. Oest *et al.*	(JADE Collab.)	REFID=41358
AUGUSTIN	89	NP B320 1	J.E. Augustin, G. Cosme	(DM2 Collab.)	REFID=41004
VOROBYEV	88	SJNP 48 273	P.V. Vorobiev *et al.*	(NOVO)	REFID=41023
		Translated from YAF 48 436.			
ALTHOFF	86	ZPHY C31 537	M. Althoff *et al.*	(TASSO Collab.)	REFID=21287
ANTREASYAN	86	PR D33 1847	D. Antreasyan *et al.*	(Crystal Ball Collab.)	REFID=20469
BERGER	84C	PL 149B 427	C. Berger *et al.*	(PLUTO Collab.)	REFID=21286
BEHREND	82C	PL 114B 378	H.J. Behrend *et al.*	(CELLO Collab.)	REFID=20303
Also		PL 125B 518 (erratum)	H.J. Behrend *et al.*	(CELLO Collab.)	REFID=20302
CIHANGIR	82	PL 117B 123	S. Cihangir *et al.*	(FNAL, MINN, ROCH)	REFID=21280
CLELAND	82B	NP B208 228	W.E. Cleland *et al.*	(DURH, GEVA, LAUS+)	REFID=21281
EDWARDS	82F	PL 110B 82	C. Edwards *et al.*	(CIT, HARV, PRIN+)	REFID=20747
DELFOSSE	81	NP B183 349	A. Delfosse *et al.*	(GEVA, LAUS)	REFID=21277
EVANGELIS...	81	NP B178 197	C. Evangelista *et al.*	(BARI, BONN, CERN+)	REFID=20462
CHABAUD	80	NP B175 189	V. Chabaud *et al.*	(CERN, MPIM, AMST)	REFID=21274
DAUM	80C	PL 89B 276	C. Daum *et al.*	(AMST, CERN, CRAC, MPIM+) JP	REFID=21275
BALTAY	78B	PR D17 62	C. Baltay *et al.*	(COLU, BING)	REFID=21265
CHABAUD	78	NP B145 349	V. Chabaud *et al.*	(CERN, MPIM)	REFID=21267
FERRERSORIA	78	PL 74B 287	A. Ferrer Soria *et al.*	(ORSAY, CERN, CDEF+)	REFID=21270
HYAMS	78	NP B146 303	B.D. Hyams *et al.*	(CERN, MPIM, ATEN)	REFID=21271
MARTIN	78D	PL 74B 417	A.D. Martin *et al.*	(DURH, GEVA) JP	REFID=21272
MAY	77	PR D16 1983	E.N. May *et al.*	(ROCH, CORN)	REFID=20450
FORINO	76	NC 35A 465	A. Forino *et al.*	(BGNA, FIRZ, GENO, MILA+)	REFID=21259
MARGULIE	76	PR D14 667	M. Margulies *et al.*	(BNL, CUNY)	REFID=21261
EMMS	75	PL 58B 117	M.J. Emms *et al.*	(BIRM, DURH, RHEL) JP	REFID=21254
WAGNER	75	PL 58B 201	F. Wagner, M. Tabak, D.M. Chew	(LBL) JP	REFID=20843
DIAZ	74	PRL 32 260	J. Diaz *et al.*	(CASE, CMU)	REFID=21248
KARSHON	74	PRL 32 852	U. Karshon *et al.*	(REHO)	REFID=21249
ANTIPOV	73	NP B63 175	Y.M. Antipov *et al.*	(CERN, SERP) JP	REFID=21238
ANTIPOV	73C	NP B63 153	Y.M. Antipov *et al.*	(CERN, SERP) JP	REFID=20817
CHALOUPKA	73	PL 44B 211	V. Chaloupka *et al.*	(CERN)	REFID=21242
CONFORTO	73	PL 45B 154	G. Conforto *et al.*	(EFI, FNAL, TNTO+)	REFID=21243
DEFOIX	73	PL 43B 141	C. Defoix *et al.*	(CDEF)	REFID=21244
EISENSTEIN	73	PR D7 278	L. Eisenstein *et al.*	(ILL)	REFID=21245
KEY	73	PRL 30 503	A.W. Key *et al.*	(TNTO, EFI, FNAL, WISC)	REFID=21246
TOET	73	NP B63 248	D.Z. Toet *et al.*	(NIJM, BONN, DURH, TORI)	REFID=20714
DAMERI	72	NC 9A 1	M. Dameri *et al.*	(GENO, MILA, SACL)	REFID=20338
EISENBERG	72	PR D5 15	Y. Eisenberg *et al.*	(REHO, SLAC, TELA)	REFID=20098
ESPIGAT	72	NP B36 93	P. Espigat *et al.*	(CERN, CDEF)	REFID=21232
FOLEY	72	PR D6 747	K.J. Foley *et al.*	(BNL, CUNY)	REFID=21233
ALSTON-...	71	PL 34B 156	M. Alston-Garnjost *et al.*	(LRL)	REFID=21214
BARNHAM	71	PRL 26 1494	K.W.J. Barnham *et al.*	(LBL)	REFID=21215
BINNIE	71	PL 36B 257	D.M. Binnie *et al.*	(LOIC, SHMP)	REFID=21217
BOWEN	71	PRL 26 1663	D.R. Bowen *et al.*	(NEAS, STON)	REFID=21219
GRAYER	71	PL 34B 333	G. Grayer *et al.*	(CERN, MPIM)	REFID=21223
ABRAMOVI...	70B	NP B23 466	M. Abramovich *et al.*	(CERN) JP	REFID=21195
ALSTON-...	70	PL 33B 607	M. Alston-Garnjost *et al.*	(LRL)	REFID=21196
BOECKMANN	70	NP B16 221	K. Boeckmann *et al.*	(BONN, DURH, NIJM+)	REFID=21202
ASCOLI	68	PRL 20 1321	G. Ascoli *et al.*	(ILL) JP	REFID=21171
BOESEBECK	68	NP B4 501	K. Boesebeck *et al.*	(AACH, BERL, CERN)	REFID=20585
CHUNG	68	PR 165 1491	S.U. Chung *et al.*	(LRL)	REFID=20059
CONTE	67	NC 51A 175	F. Conte *et al.*	(GENO, HAMB, MILA, SACL)	REFID=21166

NODE=M147

$f_0(1370)$

$I^G(J^{PC}) = 0^+(0^{++})$

NODE=M147

See the review on "Spectroscopy of Light Meson Resonances" and a note on "Non-$q\overline{q}$ Candidates" in PDG 06, Journal of Physics **G33** 1 (2006).

$f_0(1370)$ T-MATRIX POLE POSITION

NODE=M147PP

Note that $\Gamma \approx 2\ \mathrm{Im}(\sqrt{s_{\mathrm{pole}}})$.

NODE=M147PP

NODE=M147PP

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*	
(1200–1500)−*i*(150–250) OUR ESTIMATE					→ UNCHECKED ←
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$(1370 \pm 40) - i(195 \pm 20)$	SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma\ (\pi\pi,\ K\overline{K},\ \eta\eta,\ \omega\phi)$	
$(1280.6 \pm 1.6 \pm 47.4) - i(205.2 \pm 1.7 \pm 20.7)$	[1] ALBRECHT	20	RVUE	$0.9\ \overline{p}p \to \pi^0\pi^0\eta,\ \pi^0\eta\eta,\ \pi^0 K^+K^-$	OCCUR=2
$(1290 \pm 50) - i(170^{+20}_{-40})$	[2] ANISOVICH	09	RVUE	$0.0\ \overline{p}p,\ \pi N$	
$(1373 \pm 15) - i(137 \pm 10)$	[3] BARGIOTTI	03	OBLX	$\overline{p}p$	
$(1302 \pm 17) - i(166 \pm 18)$	[4] BARBERIS	00C		$450\ pp \to p_f 4\pi p_s$	
$(1312 \pm 25 \pm 10) - i(109 \pm 22 \pm 15)$	BARBERIS	99D	OMEG	$450\ pp \to K^+K^-,\ \pi^+\pi^-$	
$(1406 \pm 19) - i(80 \pm 6)$	[5] KAMINSKI	99	RVUE	$\pi\pi \to \pi\pi,\ K\overline{K},\ \sigma\sigma$	OCCUR=2
$(1300 \pm 20) - i(120 \pm 20)$	ANISOVICH	98B	RVUE	Compilation	
$(1290 \pm 15) - i(145 \pm 15)$	BARBERIS	97B	OMEG	$450\ pp \to pp2(\pi^+\pi^-)$	
$(1548 \pm 40) - i(560 \pm 40)$	BERTIN	97C	OBLX	$0.0\ \overline{p}p \to \pi^+\pi^-\pi^0$	
$(1380 \pm 40) - i(180 \pm 25)$	ABELE	96B	CBAR	$0.0\ \overline{p}p \to \pi^0 K^0_L K^0_L$	
$(1300 \pm 15) - i(115 \pm 8)$	BUGG	96	RVUE		
$(1330 \pm 50) - i(150 \pm 40)$	[6] AMSLER	95B	CBAR	$\overline{p}p \to 3\pi^0$	
$(1360 \pm 35) - i(150\text{–}300)$	[6] AMSLER	95C	CBAR	$\overline{p}p \to \pi^0\eta\eta$	
$(1390 \pm 30) - i(190 \pm 40)$	[7] AMSLER	95D	CBAR	$\overline{p}p \to 3\pi^0,\ \pi^0\eta\eta,\ \pi^0\pi^0\eta$	OCCUR=2
$1346 - i249$	[8,9] JANSSEN	95	RVUE	$\pi\pi \to \pi\pi,\ K\overline{K}$	OCCUR=2
$1214 - i168$	[9,10] TORNQVIST	95	RVUE	$\pi\pi \to \pi\pi,\ K\overline{K},\ K\pi,\ \eta\pi$	
$1364 - i139$	AMSLER	94D	CBAR	$\overline{p}p \to \pi^0\pi^0\eta$	
$(1365^{+20}_{-55}) - i(134 \pm 35)$	ANISOVICH	94	CBAR	$\overline{p}p \to 3\pi^0,\pi^0\eta\eta$	
$(1340 \pm 40) - i(127^{+30}_{-20})$	[11] BUGG	94	RVUE	$\overline{p}p \to 3\pi^0,\ \eta\eta\pi^0,\ \eta\pi^0\pi^0$	OCCUR=2
$(1430 \pm 5) - i(73 \pm 13)$	[12] KAMINSKI	94	RVUE	$\pi\pi \to \pi\pi,\ K\overline{K}$	
$1420 - i220$	[13] AU	87	RVUE	$\pi\pi \to \pi\pi,\ K\overline{K}$	

[1] T-matrix pole, 5 poles, 5 channels, including scattering data from HYAMS 75 ($\pi\pi$), LONGACRE 86 ($K\overline{K}$), BINON 83 ($\eta\eta$), and BINON 84C ($\eta\eta'$). NODE=M147PP;LINKAGE=E

[2] Another pole is found at $(1510 \pm 130) - i\,(800^{+100}_{-150})$ MeV. NODE=M147PP;LINKAGE=AO

[3] Coupled channel analysis of $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, and $K^\pm K^0_S\pi^\mp$. NODE=M147PP;LINKAGE=BG

[4] Average between $\pi^+\pi^-2\pi^0$ and $2(\pi^+\pi^-)$. NODE=M147PP;LINKAGE=PC

[5] T-matrix pole on sheet $---$. NODE=M147PP;LINKAGE=TK

[6] Supersedes ANISOVICH 94. NODE=M147PP;LINKAGE=K

[7] Coupled-channel analysis of $\overline{p}p \to 3\pi^0$, $\pi^0\eta\eta$, and $\pi^0\pi^0\eta$ on sheet IV. Demonstrates explicitly that $f_0(500)$ and $f_0(1370)$ are two different poles. NODE=M147PP;LINKAGE=A

[8] Analysis of data from FALVARD 88. NODE=M147PP;LINKAGE=C

[9] The pole is on Sheet III. Demonstrates explicitly that $f_0(500)$ and $f_0(1370)$ are two different poles. NODE=M147PP;LINKAGE=DD

[10] Uses data from BEIER 72B, OCHS 73, HYAMS 73, GRAYER 74, ROSSELET 77, CASON 83, ASTON 88, and ARMSTRONG 91B. Coupled channel analysis with flavor symmetry and all light two-pseudoscalars systems. NODE=M147PP;LINKAGE=BB

[11] Reanalysis of ANISOVICH 94 data. NODE=M147PP;LINKAGE=C1

[12] T-matrix pole on sheet III. NODE=M147PP;LINKAGE=KM

[13] Analysis of data from OCHS 73,GRAYER 74, BECKER 79, and CASON 83. NODE=M147PP;LINKAGE=H

$f_0(1370)$ BREIT-WIGNER MASS

NODE=M147205

NODE=M147M

VALUE (MeV)	*DOCUMENT ID*	
1200 to 1500 OUR ESTIMATE		→ UNCHECKED ←

$\pi\pi$ MODE

NODE=M147M1

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1400 ± 40		[1] AUBERT	09L	BABR	$B^\pm \to \pi^\pm\pi^\pm\pi^\mp$
$1470^{+\ 6+\ 72}_{-\ 7-255}$		[2] UEHARA	08A	BELL	$10.6\ e^+e^- \to e^+e^-\pi^0\pi^0$
1259 ± 55	2.6k	BONVICINI	07	CLEO	$D^+ \to \pi^-\pi^+\pi^+$
$1309\pm\ 1\pm\ 15$		[3] BUGG	07A	RVUE	$0.0\ p\overline{p} \to 3\pi^0$
1449 ± 13	4.3k	[4] GARMASH	06	BELL	$B^+ \to K^+\pi^+\pi^-$
1350 ± 50		ABLIKIM	05	BES2	$J/\psi \to \phi\pi^+\pi^-$
$1265\pm30^{+\ 20}_{-\ 35}$		ABLIKIM	05Q	BES2	$\psi(2S) \to \gamma\pi^+\pi^-K^+K^-$
$1434\pm18\pm\ 9$	848	AITALA	01A	E791	$D_s^+ \to \pi^-\pi^+\pi^+$
1308 ± 10		BARBERIS	99B	OMEG	$450\ pp \to p_s p_f \pi^+\pi^-$
1315 ± 50		BELLAZZINI	99	GAM4	$450\ pp \to pp\pi^0\pi^0$
1315 ± 30		ALDE	98	GAM4	$100\ \pi^-p \to \pi^0\pi^0 n$
1280 ± 55		BERTIN	98	OBLX	$0.05–0.405\ \overline{n}p \to \pi^+\pi^+\pi^-$
1186		[5,6] TORNQVIST	95	RVUE	$\pi\pi \to \pi\pi, K\overline{K}, K\pi, \eta\pi$
1472 ± 12		ARMSTRONG	91	OMEG	$300\ pp \to pp\pi\pi,\ ppK\overline{K}$
1275 ± 20		BREAKSTONE	90	SFM	$62\ pp \to pp\pi^+\pi^-$
1420 ± 20		AKESSON	86	SPEC	$63\ pp \to pp\pi^+\pi^-$
1256		FROGGATT	77	RVUE	$\pi^+\pi^-$ channel

[1] Breit-Wigner mass. NODE=M147M1;LINKAGE=BW

[2] Breit-Wigner mass. May also be the $f_0(1500)$. NODE=M147M1;LINKAGE=UE

[3] Reanalysis of ABELE 96C data. NODE=M147M1;LINKAGE=BU

[4] Also observed by GARMASH 07 in $B^0 \to K_S^0\pi^+\pi^-$ decays. Supersedes GARMASH 05. NODE=M147M1;LINKAGE=GR

[5] Uses data from BEIER 72B, OCHS 73, HYAMS 73, GRAYER 74, ROSSELET 77, CASON 83, ASTON 88, and ARMSTRONG 91B. Coupled channel analysis with flavor symmetry and all light two-pseudoscalars systems. NODE=M147M1;LINKAGE=BB

[6] Also observed by ASNER 00 in $\tau^- \to \pi^-\pi^0\pi^0\nu_\tau$ decays NODE=M147M1;LINKAGE=FF

$K\overline{K}$ MODE

NODE=M147M2

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$1422\pm15\pm28$		[1] AAIJ	19H	LHCB	$pp \to D^\pm X$	OCCUR=4
$1360\pm31\pm28$	430	[2,3] DOBBS	15		$J/\psi \to \gamma K^+K^-$	
$1350\pm48\pm15$	168	[2,3] DOBBS	15		$\psi(2S) \to \gamma K^+K^-$	OCCUR=2
$1440\pm\ 6$		VLADIMIRSK...	06	SPEC	$40\ \pi^-p \to K_S^0K_S^0n$	
1391 ± 10		TIKHOMIROV	03	SPEC	$40.0\ \pi^-\mathrm{C} \to K_S^0K_S^0K_L^0\mathrm{X}$	
1440 ± 50		BOLONKIN	88	SPEC	$40\ \pi^-p \to K_S^0K_S^0n$	
$1463\pm\ 9$		ETKIN	82B	MPS	$23\ \pi^-p \to n2K_S^0$	
1425 ± 15		WICKLUND	80	SPEC	$6\ \pi N \to K^+K^-N$	
~ 1300		POLYCHRO...	79	STRC	$7\ \pi^-p \to n2K_S^0$	

[1] From the $D^\pm \to K^\pm K^+K^-$ Dalitz plot fit with the isobar model A. NODE=M147M2;LINKAGE=F

[2] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M147M2;LINKAGE=A

[3] From a fit to a Breit-Wigner line shape with fixed $\Gamma = 346$ MeV. NODE=M147M2;LINKAGE=B

4π MODE $2(\pi\pi)_S+\rho\rho$

NODE=M147M3

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1395 ± 40		ABELE	01	CBAR	$0.0\ \overline{p}d \to \pi^-4\pi^0p$
1374 ± 38		AMSLER	94	CBAR	$0.0\ \overline{p}p \to \pi^+\pi^-3\pi^0$
1345 ± 12		ADAMO	93	OBLX	$\overline{n}p \to 3\pi^+2\pi^-$
1386 ± 30		GASPERO	93	DBC	$0.0\ \overline{p}n \to 2\pi^+3\pi^-$
~ 1410	5751	[1] BETTINI	66	DBC	$0.0\ \overline{p}n \to 2\pi^+3\pi^-$

[1] $\rho\rho$ dominant. NODE=M147M3;LINKAGE=BE

$\eta\eta$ MODE

NODE=M147M4

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$1262^{+51+\ 82}_{-78-103}$	[1] UEHARA	10A	BELL	$10.6\ e^+e^- \to e^+e^-\eta\eta$
1430	AMSLER	92	CBAR	$0.0\ \overline{p}p \to \pi^0\eta\eta$
1220 ± 40	ALDE	86D	GAM4	$100\ \pi^-p \to n2\eta$

[1] Breit-Wigner mass. May also be the $f_0(1500)$. NODE=M147M4;LINKAGE=UE

COUPLED CHANNEL MODE

NODE=M147M5

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$1330.2^{+5.9}_{-6.5}\pm5.1$	[1] AAIJ 19H	LHCB	$pp \to D^{\pm}X$
1306 ± 20	[2] ANISOVICH 03	RVUE	

[1] From the $D^{\pm} \to K^{\pm}K^{+}K^{-}$ Dalitz plot fit with the Triple-M amplitude in the multi-meson model of AOUDE 18. NODE=M147M5;LINKAGE=A

[2] K-matrix pole from combined analysis of $\pi^- p \to \pi^0\pi^0 n$, $\pi^- p \to K\overline{K}n$, $\pi^+\pi^- \to \pi^+\pi^-$, $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$, $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, $K^0_S K^0_S\pi^0$, $K^+K^0_S\pi^-$ at rest, $\overline{p}n \to \pi^-\pi^-\pi^+$, $K^0_S K^-\pi^0$, $K^0_S K^0_S\pi^-$ at rest. NODE=M147M;LINKAGE=KM

$f_0(1370)$ BREIT-WIGNER WIDTH

NODE=M147210

VALUE (MeV)	DOCUMENT ID
200 to 500 OUR ESTIMATE	

NODE=M147W
→ UNCHECKED ←

$\pi\pi$ MODE

NODE=M147W1

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
300 ± 80		[1] AUBERT 09L	BABR	$B^{\pm} \to \pi^{\pm}\pi^{\pm}\pi^{\mp}$
$90^{+2}_{-1}{}^{+50}_{-22}$		[2] UEHARA 08A	BELL	$10.6\ e^+e^- \to e^+e^-\pi^0\pi^0$
298 ± 21	2.6k	BONVICINI 07	CLEO	$D^+ \to \pi^-\pi^+\pi^+$
126 ± 25	4286	[3] GARMASH 06	BELL	$B^+ \to K^+\pi^+\pi^-$
265 ± 40		ABLIKIM 05	BES2	$J/\psi \to \phi\pi^+\pi^-$
$350\pm100^{+105}_{-60}$		ABLIKIM 05Q	BES2	$\psi(2S) \to \gamma\pi^+\pi^-K^+K^-$
$173\pm32\pm6$	848	AITALA 01A	E791	$D^+_s \to \pi^-\pi^+\pi^+$
222 ± 20		BARBERIS 99B	OMEG	$450\ pp \to p_s p_f \pi^+\pi^-$
255 ± 60		BELLAZZINI 99	GAM4	$450\ pp \to pp\pi^0\pi^0$
190 ± 50		ALDE 98	GAM4	$100\ \pi^- p \to \pi^0\pi^0 n$
323 ± 13		BERTIN 98	OBLX	$0.05–0.405\ \overline{n}p \to \pi^+\pi^+\pi^-$
350		[4,5] TORNQVIST 95	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$, $K\pi$, $\eta\pi$
195 ± 33		ARMSTRONG 91	OMEG	$300\ pp \to pp\pi\pi$, $ppK\overline{K}$
285 ± 60		BREAKSTONE 90	SFM	$62\ pp \to pp\pi^+\pi^-$
460 ± 50		AKESSON 86	SPEC	$63\ pp \to pp\pi^+\pi^-$
~ 400		[6] FROGGATT 77	RVUE	$\pi^+\pi^-$ channel

[1] The systematic errors are not reported. NODE=M147W1;LINKAGE=NS

[2] Breit-Wigner width. May also be the $f_0(1500)$. NODE=M147W1;LINKAGE=UE

[3] Also observed by GARMASH 07 in $B^0 \to K^0_S\pi^+\pi^-$ decays. Supersedes GARMASH 05. NODE=M147W1;LINKAGE=GR

[4] Uses data from BEIER 72B, OCHS 73, HYAMS 73, GRAYER 74, ROSSELET 77, CASON 83, ASTON 88, and ARMSTRONG 91B. Coupled channel analysis with flavor symmetry and all light two-pseudoscalars systems. NODE=M147W1;LINKAGE=BB

[5] Also observed by ASNER 00 in $\tau^- \to \pi^-\pi^0\pi^0\nu_\tau$ decays NODE=M147W1;LINKAGE=FF

[6] Width defined as distance between 45 and 135° phase shift. NODE=M147W1;LINKAGE=E

$K\overline{K}$ MODE

NODE=M147W2

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$324\pm38\pm42$	[1] AAIJ 19H	LHCB	$pp \to D^{\pm}X$
121 ± 15	VLADIMIRSK... 06	SPEC	$40\ \pi^- p \to K^0_S K^0_S n$
55 ± 26	TIKHOMIROV 03	SPEC	$40.0\ \pi^- C \to K^0_S K^0_S K^0_L X$
250 ± 80	BOLONKIN 88	SPEC	$40\ \pi^- p \to K^0_S K^0_S n$
118^{+138}_{-16}	ETKIN 82B	MPS	$23\ \pi^- p \to n2K^0_S$
160 ± 30	WICKLUND 80	SPEC	$6\ \pi N \to K^+K^-N$
~ 150	POLYCHRO... 79	STRC	$7\ \pi^- p \to n2K^0_S$

OCCUR=3

[1] From the $D^{\pm} \to K^{\pm}K^{+}K^{-}$ Dalitz plot fit with the isobar model A. NODE=M147W2;LINKAGE=C

4π MODE $2(\pi\pi)_S+\rho\rho$

NODE=M147W3
NODE=M147W3

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
275 ± 55		ABELE	01	CBAR	0.0 $\overline{p}d \to \pi^- 4\pi^0 p$
375 ± 61		AMSLER	94	CBAR	0.0 $\overline{p}p \to \pi^+\pi^- 3\pi^0$
398 ± 26		ADAMO	93	OBLX	$\overline{n}p \to 3\pi^+ 2\pi^-$
310 ± 50		GASPERO	93	DBC	0.0 $\overline{p}n \to 2\pi^+ 3\pi^-$
$\sim$ 90	5751	[1] BETTINI	66	DBC	0.0 $\overline{p}n \to 2\pi^+ 3\pi^-$

[1] $\rho\rho$ dominant.

NODE=M147W3;LINKAGE=BE

$\eta\eta$ MODE

NODE=M147W4
NODE=M147W4

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$484^{+246}_{-170}{}^{+246}_{-263}$	[1] UEHARA	10A	BELL	10.6 $e^+e^- \to e^+e^-\eta\eta$
250	AMSLER	92	CBAR	0.0 $\overline{p}p \to \pi^0\eta\eta$
$320\pm$ 40	ALDE	86D	GAM4	100 $\pi^- p \to n2\eta$

[1] Breit-Wigner width. May also be the $f_0(1500)$.

NODE=M147W4;LINKAGE=UE

COUPLED CHANNEL MODE

NODE=M147W5
NODE=M147W5

VALUE (MeV)	DOCUMENT ID		TECN
• • • We do not use the following data for averages, fits, limits, etc. • • •			
147^{+30}_{-50}	[1] ANISOVICH	03	RVUE

[1] K-matrix pole from combined analysis of $\pi^- p \to \pi^0\pi^0 n$, $\pi^- p \to K\overline{K}n$, $\pi^+\pi^- \to \pi^+\pi^-$, $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$, $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, $K^0_S K^0_S \pi^0$, $K^+K^0_S\pi^-$ at rest, $\overline{p}n \to \pi^-\pi^-\pi^+$, $K^0_S K^-\pi^0$, $K^0_S K^0_S \pi^-$ at rest.

NODE=M147W;LINKAGE=KM

$f_0(1370)$ DECAY MODES

NODE=M147215;NODE=M147

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\pi\pi$	seen	DESIG=1;OUR EST;→ UNCHECKED ←
Γ_2	4π	seen	DESIG=10;OUR EST;→ UNCHECKED ←
Γ_3	$4\pi^0$	seen	DESIG=4;OUR EST;→ UNCHECKED ←
Γ_4	$2\pi^+2\pi^-$	seen	DESIG=5;OUR EST;→ UNCHECKED ←
Γ_5	$\pi^+\pi^-2\pi^0$	seen	DESIG=6;OUR EST;→ UNCHECKED ←
Γ_6	$\rho\rho$	seen	DESIG=14;OUR EST;→ UNCHECKED ←
Γ_7	$2(\pi\pi)_{S\text{-wave}}$	seen	DESIG=15;OUR EST;→ UNCHECKED ←
Γ_8	$\pi(1300)\pi$	seen	DESIG=16;OUR EVAL;→ UNCHECKED ←
Γ_9	$a_1(1260)\pi$	seen	DESIG=17;OUR EVAL;→ UNCHECKED ←
Γ_{10}	$\eta\eta$	seen	DESIG=2;OUR EST;→ UNCHECKED ←
Γ_{11}	$K\overline{K}$	seen	DESIG=11;OUR EST;→ UNCHECKED ←
Γ_{12}	$K\overline{K}n\pi$	not seen	DESIG=18;OUR EVAL;→ UNCHECKED ←
Γ_{13}	6π	not seen	DESIG=19;OUR EVAL;→ UNCHECKED ←
Γ_{14}	$\omega\omega$	not seen	DESIG=20;OUR EVAL;→ UNCHECKED ←
Γ_{15}	$\gamma\gamma$	seen	DESIG=12;OUR EST;→ UNCHECKED ←
Γ_{16}	e^+e^-	not seen	DESIG=13;OUR EST;→ UNCHECKED ←

$f_0(1370)$ PARTIAL WIDTHS

NODE=M147217

$\Gamma(\gamma\gamma)$ Γ_{15}

NODE=M147W11
NODE=M147W11
NODE=M147W11

See $\gamma\gamma$ widths under $f_0(500)$ and MORGAN 90.

$\Gamma(e^+e^-)$ Γ_{16}

NODE=M147W12
NODE=M147W12

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<20	90	VOROBYEV	88	ND	$e^+e^- \to \pi^0\pi^0$

$f_0(1370)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M147225

$\Gamma(\eta\eta) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_{10}\Gamma_{15}/\Gamma$

NODE=M147G01
NODE=M147G01

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$121^{+133}_{-\ 53}{}^{+169}_{-106}$	[1] UEHARA	10A	BELL	10.6 $e^+e^- \rightarrow e^+e^-\eta\eta$

[1] Including interference with the $f'_2(1525)$ (parameters fixed to the values from the 2008 edition of this review, PDG 08) and $f_2(1270)$. May also be the $f_0(1500)$.

NODE=M147G01;LINKAGE=UE

$f_0(1370)$ BRANCHING RATIOS

NODE=M147220

$\Gamma(\pi\pi)/\Gamma_{\text{total}}$ — Γ_1/Γ

NODE=M147R3
NODE=M147R3

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.10	95	OCHS	13	RVUE	
0.26±0.09		BUGG	96	RVUE	
<0.15		[1] AMSLER	94	CBAR	$\overline{p}p \rightarrow \pi^+\pi^-3\pi^0$
<0.06		GASPERO	93	DBC	0.0 $\overline{p}n \rightarrow$ hadrons

[1] Using AMSLER 95B ($3\pi^0$).

NODE=M147R3;LINKAGE=B

$\Gamma(4\pi)/\Gamma_{\text{total}}$ — $\Gamma_2/\Gamma = (\Gamma_3+\Gamma_4+\Gamma_5)/\Gamma$

NODE=M147R4
NODE=M147R4

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
>0.72	GASPERO	93	DBC	0.0 $\overline{p}n \rightarrow$ hadrons

$\Gamma(4\pi^0)/\Gamma(4\pi)$ — Γ_3/Γ_2

NODE=M147R12
NODE=M147R12

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	ABELE	96	CBAR	0.0 $\overline{p}p \rightarrow 5\pi^0$
0.068±0.005	[1] GASPERO	93	DBC	0.0 $\overline{p}n \rightarrow$ hadrons

[1] Model-dependent evaluation.

NODE=M147R12;LINKAGE=GA

$\Gamma(2\pi^+2\pi^-)/\Gamma(4\pi)$ — $\Gamma_4/\Gamma_2 = \Gamma_4/(\Gamma_3+\Gamma_4+\Gamma_5)$

NODE=M147R5
NODE=M147R5

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.420±0.014	[1] GASPERO	93	DBC	0.0 $\overline{p}n \rightarrow 2\pi^+3\pi^-$

[1] Model-dependent evaluation.

NODE=M147R5;LINKAGE=A

$\Gamma(\pi^+\pi^-2\pi^0)/\Gamma(4\pi)$ — $\Gamma_5/\Gamma_2 = \Gamma_5/(\Gamma_3+\Gamma_4+\Gamma_5)$

NODE=M147R6
NODE=M147R6

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.512±0.019	[1] GASPERO	93	DBC	0.0 $\overline{p}n \rightarrow$ hadrons

[1] Model-dependent evaluation.

NODE=M147R6;LINKAGE=A

$\Gamma(\rho\rho)/\Gamma(4\pi)$ — Γ_6/Γ_2

NODE=M147R17
NODE=M147R17

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.26±0.07	ABELE	01B	CBAR	0.0 $\overline{p}d \rightarrow 5\pi p$

$\Gamma(2(\pi\pi)_{S\text{-wave}})/\Gamma(\pi\pi)$ — Γ_7/Γ_1

NODE=M147R15
NODE=M147R15

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
5.6±2.6	[1] ABELE	01	CBAR	0.0 $\overline{p}d \rightarrow \pi^-4\pi^0 p$

[1] From the combined data of ABELE 96 and ABELE 96C.

NODE=M147R;LINKAGE=KZ

$\Gamma(2(\pi\pi)_{S\text{-wave}})/\Gamma(4\pi)$ — Γ_7/Γ_2

NODE=M147R16
NODE=M147R16

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.51±0.09	ABELE	01B	CBAR	0.0 $\overline{p}d \rightarrow 5\pi p$

$\Gamma(\rho\rho)/\Gamma(2(\pi\pi)_{S\text{-wave}})$ Γ_6/Γ_7

NODE=M147R10
NODE=M147R10

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
large	BARBERIS	00C		450 $pp \to p_f 4\pi p_s$
1.6 ±0.2	AMSLER	94	CBAR	$\overline{p}p \to \pi^+\pi^- 3\pi^0$
∼ 0.65	GASPERO	93	DBC	0.0 $\overline{p}n \to$ hadrons

OCCUR=2

$\Gamma(\pi(1300)\pi)/\Gamma(4\pi)$ Γ_8/Γ_2

NODE=M147R18
NODE=M147R18

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.17±0.06	ABELE	01B	CBAR	0.0 $\overline{p}d \to 5\pi p$

$\Gamma(a_1(1260)\pi)/\Gamma(4\pi)$ Γ_9/Γ_2

NODE=M147R19
NODE=M147R19

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.06±0.02	ABELE	01B	CBAR	0.0 $\overline{p}d \to 5\pi p$

$\Gamma(\eta\eta)/\Gamma(4\pi)$ $\Gamma_{10}/\Gamma_2 = \Gamma_{10}/(\Gamma_3+\Gamma_4+\Gamma_5)$

NODE=M147R14
NODE=M147R14

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$(28 \pm 11) \times 10^{-3}$	[1] ANISOVICH	02D	SPEC	Combined fit
$(4.7 \pm 2.0) \times 10^{-3}$	BARBERIS	00E		450 $pp \to p_f \eta\eta p_s$

[1] From a combined K-matrix analysis of Crystal Barrel (0. $p\overline{p} \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$), GAMS ($\pi p \to \pi^0\pi^0 n$, $\eta\eta n$, $\eta\eta' n$), and BNL ($\pi p \to K\overline{K} n$) data.

NODE=M147R14;LINKAGE=CH

$\Gamma(K\overline{K})/\Gamma_{total}$ Γ_{11}/Γ

NODE=M147R11
NODE=M147R11

VALUE	DOCUMENT ID		TECN
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.35±0.13	BUGG	96	RVUE

$\Gamma(K\overline{K})/\Gamma(\pi\pi)$ Γ_{11}/Γ_1

NODE=M147R13
NODE=M147R13

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.08±0.08	ABLIKIM	05	BES2	$J/\psi \to \phi\pi^+\pi^-$, $\phi K^+ K^-$
0.91±0.20	[1] BARGIOTTI	03	OBLX	$\overline{p}p$
0.12±0.06	[2] ANISOVICH	02D	SPEC	Combined fit
0.46±0.15±0.11	BARBERIS	99D	OMEG	450 $pp \to K^+K^-$, $\pi^+\pi^-$

[1] Coupled channel analysis of $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, and $K^\pm K^0_S \pi^\mp$.

NODE=M147R;LINKAGE=BG

[2] From a combined K-matrix analysis of Crystal Barrel (0. $p\overline{p} \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$), GAMS ($\pi p \to \pi^0\pi^0 n$, $\eta\eta n$, $\eta\eta' n$), and BNL ($\pi p \to K\overline{K} n$) data.

NODE=M147R;LINKAGE=CH

$\Gamma(K\overline{K}n\pi)/\Gamma_{total}$ Γ_{12}/Γ

NODE=M147R20
NODE=M147R20

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.03	GASPERO	93	DBC	0.0 $\overline{p}n \to$ hadrons

$\Gamma(6\pi)/\Gamma_{total}$ Γ_{13}/Γ

NODE=M147R21
NODE=M147R21

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.22	GASPERO	93	DBC	0.0 $\overline{p}n \to$ hadrons

$\Gamma(\omega\omega)/\Gamma_{total}$ Γ_{14}/Γ

NODE=M147R22
NODE=M147R22

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.13	GASPERO	93	DBC	0.0 $\overline{p}n \to$ hadrons

$f_0(1370)$ REFERENCES

NODE=M147

SARANTSEV	21	PL B816 136227	A.V. Sarantsev *et al.*	(BONN, PNPI)	REFID=61091
ALBRECHT	20	EPJ C80 453	M. Albrecht *et al.*	(Crystal Barrel Collab.)	REFID=60439
AAIJ	19H	JHEP 1904 063	R. Aaij *et al.*	(LHCb Collab.)	REFID=59670
AOUDE	18	PR D98 056021	R.T. Aoude *et al.*		REFID=59987
DOBBS	15	PR D91 052006	S. Dobbs *et al.*	(NWES)	REFID=56805
OCHS	13	JP G40 043001	W. Ochs		REFID=55367
UEHARA	10A	PR D82 114031	S. Uehara *et al.*	(BELLE Collab.)	REFID=53641
ANISOVICH	09	IJMP A24 2481	V.V. Anisovich, A.V. Sarantsev		REFID=52719
AUBERT	09L	PR D79 072006	B. Aubert *et al.*	(BABAR Collab.)	REFID=52723
PDG	08	PL B667 1	C. Amsler *et al.*	(PDG Collab.)	REFID=52166
UEHARA	08A	PR D78 052004	S. Uehara *et al.*	(BELLE Collab.)	REFID=52309
BONVICINI	07	PR D76 012001	G. Bonvicini *et al.*	(CLEO Collab.)	REFID=51721
BUGG	07A	JP G34 151	D.V. Bugg *et al.*		REFID=53252
GARMASH	07	PR D75 012006	A. Garmash *et al.*	(BELLE Collab.)	REFID=51594
GARMASH	06	PRL 96 251803	A. Garmash *et al.*	(BELLE Collab.)	REFID=51162
PDG	06	JP G33 1	W.-M. Yao *et al.*	(PDG Collab.)	REFID=51004
VLADIMIRSK...	06	PAN 69 493	V.V. Vladimirsky *et al.*	(ITEP, Moscow)	REFID=51191
		Translated from YAF 69 515.			
ABLIKIM	05	PL B607 243	M. Ablikim *et al.*	(BES Collab.)	REFID=50450
ABLIKIM	05Q	PR D72 092002	M. Ablikim *et al.*	(BES Collab.)	REFID=50958
GARMASH	05	PR D71 092003	A. Garmash *et al.*	(BELLE Collab.)	REFID=50641
ANISOVICH	03	EPJ A16 229	V.V. Anisovich *et al.*		REFID=49401
BARGIOTTI	03	EPJ C26 371	M. Bargiotti *et al.*	(OBELIX Collab.)	REFID=49217
TIKHOMIROV	03	PAN 66 828	G.D. Tikhomirov *et al.*		REFID=49423
		Translated from YAF 66 860.			
ANISOVICH	02D	PAN 65 1545	V.V. Anisovich *et al.*		REFID=48831
		Translated from YAF 65 1583.			
ABELE	01	EPJ C19 667	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=48334
ABELE	01B	EPJ C21 261	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=48356
AITALA	01A	PRL 86 765	E.M. Aitala *et al.*	(FNAL E791 Collab.)	REFID=48004
ASNER	00	PR D61 012002	D.M. Asner *et al.*	(CLEO Collab.)	REFID=47339
BARBERIS	00C	PL B471 440	D. Barberis *et al.*	(WA 102 Collab.)	REFID=47959
BARBERIS	00E	PL B479 59	D. Barberis *et al.*	(WA 102 Collab.)	REFID=47961
BARBERIS	99B	PL B453 316	D. Barberis *et al.*	(Omega Expt.)	REFID=46922
BARBERIS	99D	PL B462 462	D. Barberis *et al.*	(Omega Expt.)	REFID=47395
BELLAZZINI	99	PL B467 296	R. Bellazzini *et al.*		REFID=47400
KAMINSKI	99	EPJ C9 141	R. Kaminski, L. Lesniak, B. Loiseau	(CRAC, PARIN)	REFID=46927
ALDE	98	EPJ A3 361	D. Alde *et al.*	(GAM4 Collab.)	REFID=46605
Also		PAN 62 405	D. Alde *et al.*	(GAMS Collab.)	REFID=46914
		Translated from YAF 62 446.			
ANISOVICH	98B	SPU 41 419	V.V. Anisovich *et al.*		REFID=46331
		Translated from UFN 168 481.			
BERTIN	98	PR D57 55	A. Bertin *et al.*	(OBELIX Collab.)	REFID=45782
BARBERIS	97B	PL B413 217	D. Barberis *et al.*	(WA 102 Collab.)	REFID=45758
BERTIN	97C	PL B408 476	A. Bertin *et al.*	(OBELIX Collab.)	REFID=45701
ABELE	96	PL B380 453	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=45011
ABELE	96B	PL B385 425	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=45038
ABELE	96C	NP A609 562	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=45076
BUGG	96	NP B471 59	D.V. Bugg, A.V. Sarantsev, B.S. Zou	(LOQM, PNPI)	REFID=45094
AMSLER	95B	PL B342 433	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=44377
AMSLER	95C	PL B353 571	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=44440
AMSLER	95D	PL B355 425	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=44441
JANSSEN	95	PR D52 2690	G. Janssen *et al.*	(STON, ADLD, JULI)	REFID=44508
TORNQVIST	95	ZPHY C68 647	N.A. Tornqvist	(HELS)	REFID=44529
AMSLER	94	PL B322 431	C. Amsler *et al.*	(Crystal Barrel Collab.) JPC	REFID=43660
AMSLER	94D	PL B333 277	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=44093
ANISOVICH	94	PL B323 233	V.V. Anisovich *et al.*	(Crystal Barrel Collab.) JPC	REFID=43659
BUGG	94	PR D50 4412	D.V. Bugg *et al.*	(LOQM)	REFID=44078
KAMINSKI	94	PR D50 3145	R. Kaminski, L. Lesniak, J.P. Maillet	(CRAC+)	REFID=45771
ADAMO	93	NP A558 13C	A. Adamo *et al.*	(OBELIX Collab.) JPC	REFID=43657
GASPERO	93	NP A562 407	M. Gaspero	(ROMAI) JPC	REFID=43658
AMSLER	92	PL B291 347	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=43169
ARMSTRONG	91	ZPHY C51 351	T.A. Armstrong *et al.*	(ATHU, BARI, BIRM+)	REFID=41744
ARMSTRONG	91B	ZPHY C52 389	T.A. Armstrong *et al.*	(ATHU, BARI, BIRM+)	REFID=41862
BREAKSTONE	90	ZPHY C48 569	A.M. Breakstone *et al.*	(ISU, BGNA, CERN+)	REFID=41376
MORGAN	90	ZPHY C48 623	D. Morgan, M.R. Pennington	(RAL, DURH)	REFID=41583
ASTON	88	NP B296 493	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)	REFID=40262
BOLONKIN	88	NP B309 426	B.V. Bolonkin *et al.*	(ITEP, SERP)	REFID=40580
FALVARD	88	PR D38 2706	A. Falvard *et al.*	(CLER, FRAS, LALO+)	REFID=40576
VOROBYEV	88	SJNP 48 273	P.V. Vorobiev *et al.*	(NOVO)	REFID=41023
		Translated from YAF 48 436.			
AU	87	PR D35 1633	K.L. Au, D. Morgan, M.R. Pennington	(DURH, RAL)	REFID=40064
AKESSON	86	NP B264 154	T. Akesson *et al.*	(Axial Field Spec. Collab.)	REFID=21123
ALDE	86D	NP B269 485	D.M. Alde *et al.*	(BELG, LAPP, SERP, CERN+)	REFID=20765
LONGACRE	86	PL B177 223	R.S. Longacre *et al.*	(BNL, BRAN, CUNY+)	REFID=20768
BINON	84C	NC 80A 363	F.G. Binon *et al.*	(BELG, LAPP, SERP+)	REFID=21418
BINON	83	NC 78A 313	F.G. Binon *et al.*	(BELG, LAPP, SERP+)	REFID=20750
CASON	83	PR D28 1586	N.M. Cason *et al.*	(NDAM, ANL)	REFID=20752
ETKIN	82B	PR D25 1786	A. Etkin *et al.*	(BNL, CUNY, TUFTS, VAND)	REFID=20390
WICKLUND	80	PRL 45 1469	A.B. Wicklund *et al.*	(ANL)	REFID=20383
BECKER	79	NP B151 46	H. Becker *et al.*	(MPIM, CERN, ZEEM, CRAC)	REFID=21084
POLYCHRO...	79	PR D19 1317	V.A. Polychronakos *et al.*	(NDAM, ANL)	REFID=20378
FROGGATT	77	NP B129 89	C.D. Froggatt, J.L. Petersen	(GLAS, NORD)	REFID=21072
ROSSELET	77	PR D15 574	L. Rosselet *et al.*	(GEVA, SACL)	REFID=11004
HYAMS	75	NP B100 205	B.D. Hyams *et al.*	(CERN, MPIM)	REFID=20355
GRAYER	74	NP B75 189	G. Grayer *et al.*	(CERN, MPIM)	REFID=20113
HYAMS	73	NP B64 134	B.D. Hyams *et al.*	(CERN, MPIM)	REFID=20107
OCHS	73	Thesis	W. Ochs	(MPIM, MUNI)	REFID=20349
BEIER	72B	PRL 29 511	E.W. Beier *et al.*	(PENN)	REFID=44530
BETTINI	66	NC 42A 695	A. Bettini *et al.*	(PADO, PISA)	REFID=21361

NODE=M111

$\pi_1(1400)$

$I^G(J^{PC}) = 1^-(1^{-+})$

See the review on "Non-$q\overline{q}$ Mesons" and a note in PDG 06, Journal of Physics **G33** 1 (2006).

NODE=M111

$\pi_1(1400)$ MASS

NODE=M111M

NODE=M111M

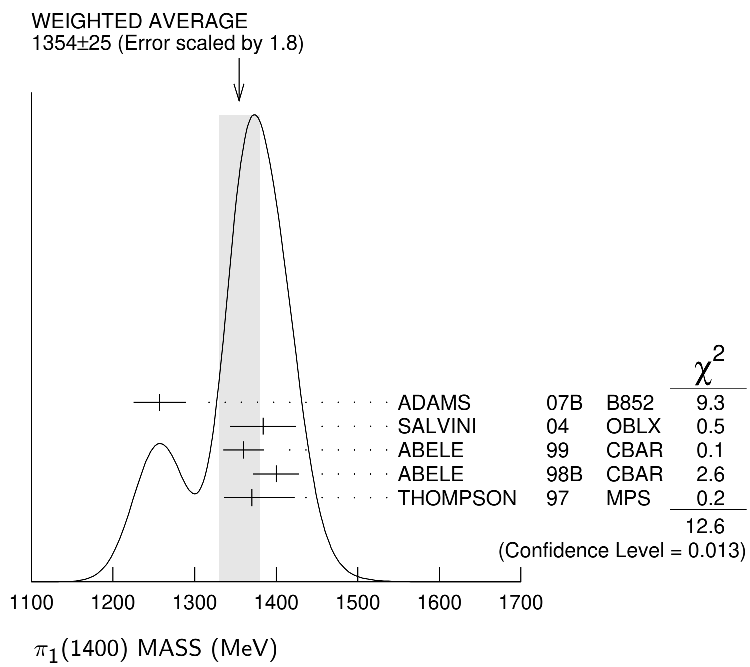
VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
1354 ±25 OUR AVERAGE		Error includes scale factor of 1.8. See the ideogram below.				
1257 ±20 ±25	23.5k	ADAMS	07B	B852		$18\ \pi^- p \to \eta\pi^0 n$
1384 ±20 ±35	90k	SALVINI	04	OBLX		$\overline{p}p \to 2\pi^+ 2\pi^-$
1360 ±25		ABELE	99	CBAR		$0.0\ \overline{p}p \to \pi^0\pi^0\eta$
1400 ±20 ±20		ABELE	98B	CBAR		$0.0\ \overline{p}n \to \pi^-\pi^0\eta$
1370 ±16 $^{+50}_{-30}$		[1] THOMPSON	97	MPS		$18\ \pi^- p \to \eta\pi^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1404.7± 3.5$^{+15.1}_{-17.7}$		[2] ALBRECHT	20	RVUE		$0.9\ \overline{p}p \to \pi^0\pi^0\eta$
1323.1± 4.6		[3] AOYAGI	93	BKEI		$\pi^- p \to \eta\pi^- p$
1406 ±20		[4] ALDE	88B	GAM4	0	$100\ \pi^- p \to \eta\pi^0 n$

[1] Natural parity exchange, questioned by DZIERBA 03. NODE=M111M;LINKAGE=B

[2] T-matrix pole, 1 pole, 2 channels ($\pi\eta$, $\pi\eta'$ for unitarity). NODE=M111M;LINKAGE=E

[3] Unnatural parity exchange. NODE=M111M;LINKAGE=C

[4] Seen in the P_0-wave intensity of the $\eta\pi^0$ system, unnatural parity exchange. NODE=M111M;LINKAGE=A



$\pi_1(1400)$ WIDTH

NODE=M111W

NODE=M111W

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
330 ±35 OUR AVERAGE						
354 ±64 ± 58	23.5k	ADAMS	07B	B852		$18\ \pi^- p \to \eta\pi^0 n$
378 ±50 ± 50	90k	SALVINI	04	OBLX		$\overline{p}p \to 2\pi^+ 2\pi^-$
220 ±90		ABELE	99	CBAR		$0.0\ \overline{p}p \to \pi^0\pi^0\eta$
310 ±50 $^{+\ 50}_{-\ 30}$		ABELE	98B	CBAR		$0.0\ \overline{p}n \to \pi^-\pi^0\eta$
385 ±40 $^{+\ 65}_{-105}$		[1] THOMPSON	97	MPS		$18\ \pi^- p \to \eta\pi^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
628.3±27.1$^{+\ 35.8}_{-138.2}$		[2] ALBRECHT	20	RVUE		$0.9\ \overline{p}p \to \pi^0\pi^0\eta$
143.2±12.5		[3] AOYAGI	93	BKEI		$\pi^- p \to \eta\pi^- p$
180 ±20		[4] ALDE	88B	GAM4	0	$100\ \pi^- p \to \eta\pi^0 n$

[1] Resolution is not unfolded, natural parity exchange, questioned by DZIERBA 03. NODE=M111W;LINKAGE=QQ
[2] T-matrix pole, 1 pole, 2 channels ($\pi\eta$, $\pi\eta'$ for unitarity). NODE=M111W;LINKAGE=B
[3] Unnatural parity exchange. NODE=M111W;LINKAGE=C
[4] Seen in the P_0-wave intensity of the $\eta\pi^0$ system, unnatural parity exchange. NODE=M111W;LINKAGE=A

π_1(1400) DECAY MODES

NODE=M111215;NODE=M111

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\eta\pi^0$	seen	DESIG=1;OUR EST;→ UNCHECKED ←
Γ_2	$\eta\pi^-$	seen	DESIG=4;OUR EST;→ UNCHECKED ←
Γ_3	$\eta'\pi$		DESIG=3
Γ_4	$\rho(770)\pi$	not seen	DESIG=5

π_1(1400) BRANCHING RATIOS

NODE=M111220

$\Gamma(\eta\pi^0)/\Gamma_{total}$ Γ_1/Γ

NODE=M111R1
NODE=M111R1

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
not seen	PROKOSHKIN	95B	GAM4		100 $\pi^- p \to \eta\pi^0 n$
not seen	[1] BUGG	94	RVUE		$\overline{p}p \to \eta 2\pi^0$
not seen	[2] APEL	81	NICE	0	40 $\pi^- p \to \eta\pi^0 n$

[1] Using Crystal Barrel data. NODE=M111R1;LINKAGE=C
[2] A general fit allowing S, D, and P waves (including m=0) is not done because of limited statistics. NODE=M111R1;LINKAGE=B

$\Gamma(\eta\pi^-)/\Gamma_{total}$ Γ_2/Γ

NODE=M111R4
NODE=M111R4

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
possibly seen	BELADIDZE	93	VES	$37\pi^- N \to \eta\pi^- N$

$\Gamma(\eta'\pi)/\Gamma(\eta\pi^0)$ Γ_3/Γ_1

NODE=M111R3
NODE=M111R3

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.80	95	BOUTEMEUR	90	GAM4	100 $\pi^- p \to 4\gamma n$

$\Gamma(\rho(770)\pi)/\Gamma_{total}$ Γ_4/Γ

NODE=M111R00
NODE=M111R00

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	AGHASYAN	18B	COMP	190 $\pi^- p \to \pi^-\pi^+\pi^- p$

π_1(1400) REFERENCES

NODE=M111

ALBRECHT	20	EPJ C80 453	M. Albrecht *et al.*	(Crystal Barrel Collab.)	REFID=60439
AGHASYAN	18B	PR D98 092003	M. Aghasyan *et al.*	(COMPASS Collab.)	REFID=59471
ADAMS	07B	PL B657 27	G.S. Adams *et al.*	(BNL E852 Collab.)	REFID=52048
PDG	06	JP G33 1	W.-M. Yao *et al.*	(PDG Collab.)	REFID=51004
SALVINI	04	EPJ C35 21	P. Salvini *et al.*	(OBELIX Collab.)	REFID=53226
DZIERBA	03	PR D67 094015	A.R. Dzierba *et al.*		REFID=49412
ABELE	99	PL B446 349	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=46602
ABELE	98B	PL B423 175	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=45864
THOMPSON	97	PRL 79 1630	D.R. Thompson *et al.*	(BNL E852 Collab.)	REFID=45584
PROKOSHKIN	95B	PAN 58 606 Translated from YAF 58 662.	Y.D. Prokoshkin, S.A. Sadovsky	(SERP)	REFID=44619
BUGG	94	PR D50 4412	D.V. Bugg *et al.*	(LOQM)	REFID=44078
AOYAGI	93	PL B314 246	H. Aoyagi *et al.*	(BKEI Collab.)	REFID=43599
BELADIDZE	93	PL B313 276	G.M. Beladidze *et al.*	(VES Collab.)	REFID=43598
BOUTEMEUR	90	Hadron 89 Conf. p 119	M. Boutemeur, M. Poulet	(SERP, BELG, LANL+)	REFID=41751
ALDE	88B	PL B205 397	D.M. Alde *et al.*	(SERP, BELG, LANL, LAPP) IGJPC	REFID=40558
APEL	81	NP B193 269	W.D. Apel *et al.*	(SERP, CERN)	REFID=22913

NODE=M027

$\eta(1405)$ $\quad I^G(J^{PC}) = 0^+(0^{-+})$

See also the $\eta(1475)$.

NODE=M027

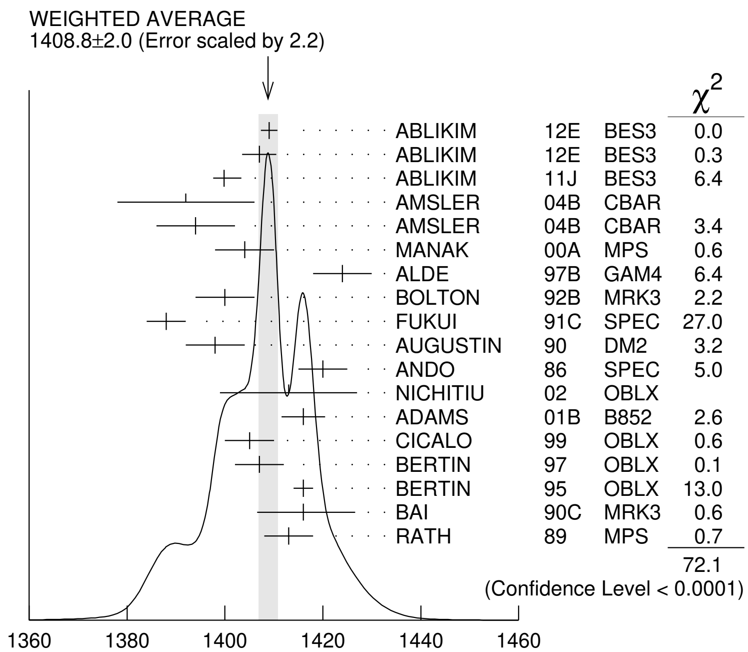
$\eta(1405)$ MASS

NODE=M027205

VALUE (MeV) *DOCUMENT ID*

NODE=M027MX

1408.8±2.0 OUR AVERAGE Includes data from the 2 datablocks that follow this one. Error includes scale factor of 2.2. See the ideogram below.



$\eta(1405)$ mass (MeV)

$\eta\pi\pi$ MODE

NODE=M027M1

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
The data in this block is included in the average printed for a previous datablock.					
1405.8± 2.6 OUR AVERAGE		Error includes scale factor of 2.3. See the ideogram below.			
1409.0± 1.7	743	ABLIKIM	12E	BES3	$J/\psi \to \gamma(\pi^+\pi^-\pi^0)$
1407.0± 3.5	198	ABLIKIM	12E	BES3	$J/\psi \to \gamma(\pi^0\pi^0\pi^0)$
1399.8± $2.2^{+2.8}_{-0.1}$		[1] ABLIKIM	11J	BES3	$J/\psi \to \omega(\eta\pi^+\pi^-)$
1392 ±14	900 ± 375	AMSLER	04B	CBAR	$0\ \overline{p}p \to \pi^+\pi^-\pi^+\pi^-\eta$
1394 ± 8	6.6 ± 2.0k	AMSLER	04B	CBAR	$0\ \overline{p}p \to \pi^+\pi^-\pi^0\pi^0\eta$
1404 ± 6	9082	MANAK	00A	MPS	$18\ \pi^- p \to \eta\pi^+\pi^- n$
1424 ± 6	2200	ALDE	97B	GAM4	$100\ \pi^- p \to \eta\pi^0\pi^0 n$
1400 ± 6		[2] BOLTON	92B	MRK3	$J/\psi \to \gamma\eta\pi^+\pi^-$
1388 ± 4		FUKUI	91C	SPEC	$8.95\ \pi^- p \to \eta\pi^+\pi^- n$
1398 ± 6	261	[3] AUGUSTIN	90	DM2	$J/\psi \to \gamma\eta\pi^+\pi^-$
1420 ± 5		ANDO	86	SPEC	$8\ \pi^- p \to \eta\pi^+\pi^- n$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1404.0±11.0	195	ABLIKIM	19BA	BES3	$e^+e^- \to \psi(2S)$
1385 ± 7		BAI	99	BES	$J/\psi \to \gamma\eta\pi^+\pi^-$
1409 ± 3		[4] AMSLER	95F	CBAR	$0\ \overline{p}p \to \pi^+\pi^-\pi^0\pi^0\eta$

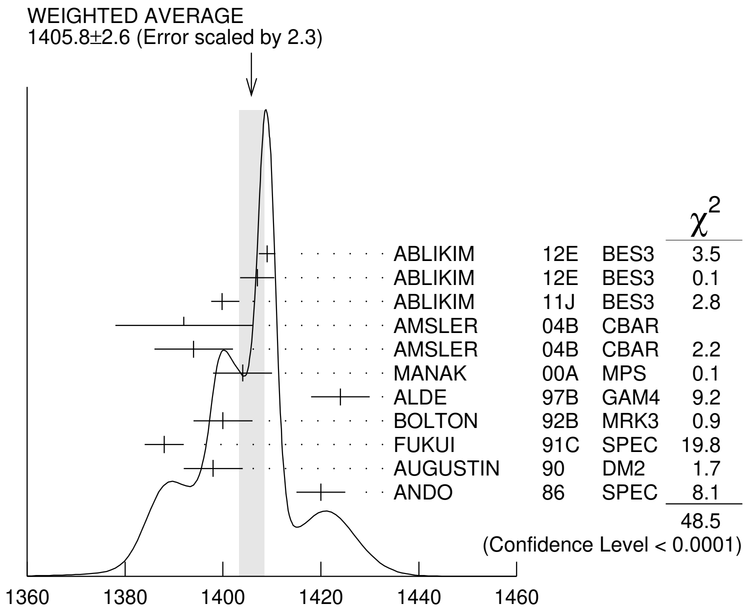
NODE=M027M1

OCCUR=2

OCCUR=2

[1] The selected process is $J/\psi \to \omega a_0(980)\pi$.
[2] From fit to the $a_0(980)\pi$ 0^{-+} partial wave.
[3] Best fit with a single Breit Wigner.
[4] Superseded by AMSLER 04B.

NODE=M027M1;LINKAGE=BL
NODE=M027M1;LINKAGE=J1
NODE=M027M1;LINKAGE=A1
NODE=M027M1;LINKAGE=A



$\eta(1405)$ mass, $\eta\pi\pi$ mode (MeV)

$K\overline{K}\pi$ MODE ($a_0(980)\pi$ or direct $K\overline{K}\pi$)

NODE=M027M4
NODE=M027M4

VALUE (MeV)		EVTS	DOCUMENT ID		TECN	COMMENT
The data in this block is included in the average printed for a previous datablock.						
1413.9± 1.7 OUR AVERAGE			Error includes scale factor of 1.1.			
1413 ±14		3651	[1] NICHITIU	02	OBLX	$0\ \overline{p}p \rightarrow K^+K^-\pi^+\pi^-\pi^0$
1416 ± 4	±2	20k	ADAMS	01B	B852	18 GeV $\pi^- p \rightarrow K^+K^-\pi^0 n$
1405 ± 5			[2] CICALO	99	OBLX	$0\ \overline{p}p \rightarrow K^\pm K^0_S \pi^\mp\pi^+\pi^-$
1407 ± 5			[2] BERTIN	97	OBLX	$0\ \overline{p}p \rightarrow K^\pm(K^0)\pi^\mp\pi^+\pi^-$
1416 ± 2			[2] BERTIN	95	OBLX	$0\ \overline{p}p \rightarrow K\overline{K}\pi\pi\pi$
1416 ± 8	$^{+7}_{-5}$	700	[3] BAI	90C	MRK3	$J/\psi \rightarrow \gamma K^0_S K^\pm\pi^\mp$
1413 ± 5			[3] RATH	89	MPS	$21.4\ \pi^- p \rightarrow n K^0_S K^0_S \pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1459 ± 5			[4] AUGUSTIN	92	DM2	$J/\psi \rightarrow \gamma K\overline{K}\pi$

OCCUR=2
OCCUR=3

[1] Decaying dominantly directly to $K^+K^-\pi^0$. NODE=M027M;LINKAGE=NC
[2] Decaying into $(K\overline{K})_S\pi$, $(K\pi)_S\overline{K}$, and $a_0(980)\pi$. NODE=M027M4;LINKAGE=FX
[3] From fit to the $a_0(980)\pi$ 0^{-+} partial wave. Cannot rule out a $a_0(980)\pi$ 1^{++} partial wave. NODE=M027M4;LINKAGE=C2
[4] Excluded from averaging because averaging would be meaningless. NODE=M027M4;LINKAGE=AA

$\pi\pi\gamma$ MODE

NODE=M027M2
NODE=M027M2

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1403±17 OUR AVERAGE	Error includes scale factor of 1.8.				
1390±12	235 ± 91	AMSLER	04B	CBAR	$0\ \overline{p}p \rightarrow \pi^+\pi^-\pi^+\pi^-\eta$
1424±10±11	547	BAI	04J	BES2	$J/\psi \rightarrow \gamma\gamma\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1401±18		[1,2] AUGUSTIN	90	DM2	$J/\psi \rightarrow \pi^+\pi^-\gamma\gamma$
1432± 8		[2] COFFMAN	90	MRK3	$J/\psi \rightarrow \pi^+\pi^- 2\gamma$

OCCUR=4

[1] Best fit with a single Breit Wigner. NODE=M027M2;LINKAGE=E
[2] This peak in the $\gamma\rho$ channel may not be related to the $\eta(1405)$. NODE=M027M2;LINKAGE=X

4π MODE

NODE=M027M3
NODE=M027M3

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1420±20		BUGG	95	MRK3	$J/\psi \rightarrow \gamma\pi^+\pi^-\pi^+\pi^-$
1489±12	3270	[1] BISELLO	89B	DM2	$J/\psi \rightarrow 4\pi\gamma$

[1] Estimated by us from various fits. NODE=M027M3;LINKAGE=E

$K\overline{K}\pi$ MODE (unresolved)

NODE=M027M6
NODE=M027M6

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1452.7± 3.3	191	[1,2] ABLIKIM	13M	BES3	$\psi(2S) \to \omega K K \pi$	
1437.6± 3.2	249 ± 35	[1,2] ABLIKIM	08E	BES2	$J/\psi \to \omega K^0_S K^+ \pi^-$ + c.c.	
1445.9± 5.7	62 ± 18	[1,2] ABLIKIM	08E	BES2	$J/\psi \to \omega K^+ K^- \pi^0$	OCCUR=2
1442 ±10	410	[1] BAI	98C	BES	$J/\psi \to \gamma K^+ K^- \pi^0$	
1445 ± 8	693	[1] AUGUSTIN	90	DM2	$J/\psi \to \gamma K^0_S K^\pm \pi^\mp$	
1433 ± 8	296	[1] AUGUSTIN	90	DM2	$J/\psi \to \gamma K^+ K^- \pi^0$	OCCUR=2
1413 ± 8	500	[1] DUCH	89	ASTE	$\overline{p}p \to \pi^+\pi^- K^\pm \pi^\mp K^0$	
1453 ± 7	170	[1] RATH	89	MPS	21.4 $\pi^- p \to K^0_S K^0_S \pi^0 n$	OCCUR=2
1419 ± 1	8800	[1] BIRMAN	88	MPS	8 $\pi^- p \to K^+ \overline{K}^0 \pi^- n$	
1424 ± 3	620	[1] REEVES	86	SPEC	6.6 $p\overline{p} \to K\overline{K}\pi X$	
1421 ± 2		[1] CHUNG	85	SPEC	8 $\pi^- p \to K\overline{K}\pi n$	
1440 $^{+20}_{-15}$	174	[1] EDWARDS	82E	CBAL	$J/\psi \to \gamma K^+ K^- \pi^0$	
1440 $^{+10}_{-15}$		[1] SCHARRE	80	MRK2	$J/\psi \to \gamma K^0_S K^\pm \pi^\mp$	
1425 ± 7	800	[1,3] BAILLON	67	HBC	0 $\overline{p}p \to K\overline{K}\pi\pi\pi$	

[1] These experiments identify only one pseudoscalar in the 1400–1500 range. Data could also refer to $\eta(1475)$. NODE=M027M;LINKAGE=NP

[2] Systematic uncertainty not evaluated. NODE=M027M;LINKAGE=NS

[3] From best fit of 0^{-+} partial wave , 50% $K^*(892)K$, 50% $a_0(980)\pi$. NODE=M027M6;LINKAGE=H

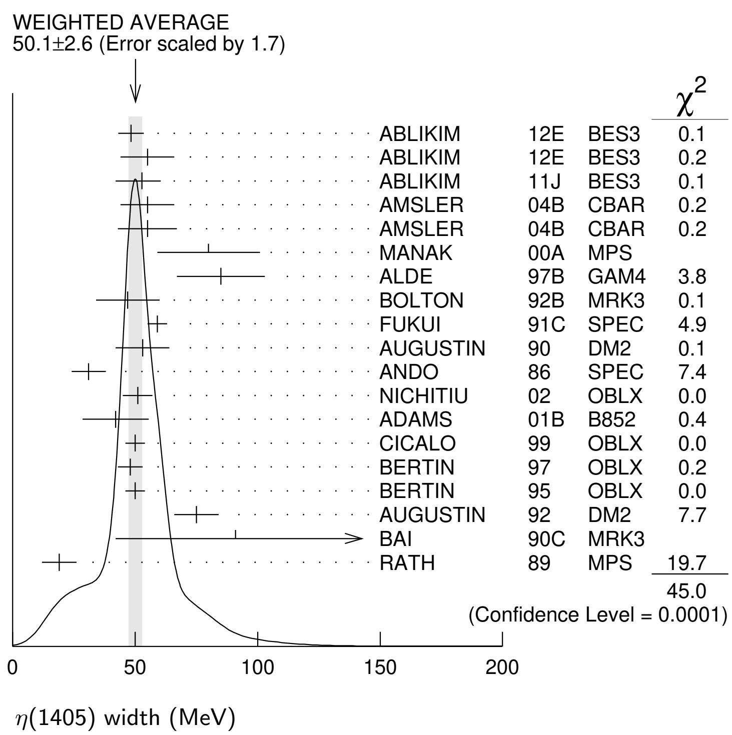
$\eta(1405)$ WIDTH

NODE=M027210

NODE=M027WX

VALUE (MeV)	DOCUMENT ID

50.1±2.6 OUR AVERAGE Includes data from the 2 datablocks that follow this one. Error includes scale factor of 1.7. See the ideogram below.



$\eta\pi\pi$ MODE

NODE=M027W1
NODE=M027W1

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
The data in this block is included in the average printed for a previous datablock.						
52.6± 3.2 OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below.						
48.3± 5.2	743	ABLIKIM	12E	BES3	$J/\psi \to \gamma(\pi^+\pi^-\pi^0)$	
55.0±11.0	198	ABLIKIM	12E	BES3	$J/\psi \to \gamma(\pi^0\pi^0\pi^0)$	OCCUR=2
52.8± 7.6$^{+0.1}_{-7.6}$		[1] ABLIKIM	11J	BES3	$J/\psi \to \omega(\eta\pi^+\pi^-)$	
55 ±11	900	AMSLER	04B	CBAR	0 $\overline{p}p \to \pi^+\pi^-\pi^+\pi^-\eta$	

55 ±12	6.6k	AMSLER	04B	CBAR	$0\ \overline{p}p \to \pi^+\pi^-\pi^0\pi^0\gamma$	OCCUR=2
80 ±21	9.0k	MANAK	00A	MPS	$18\ \pi^- p \to \eta\pi^+\pi^- n$	
85 ±18	2.2k	ALDE	97B	GAM4	$100\ \pi^- p \to \eta\pi^0\pi^0 n$	
47 ±13		[2] BOLTON	92B	MRK3	$J/\psi \to \gamma\eta\pi^+\pi^-$	
59 ± 4		FUKUI	91C	SPEC	$8.95\ \pi^- p \to \eta\pi^+\pi^- n$	
53 ±11		[3] AUGUSTIN	90	DM2	$J/\psi \to \gamma\eta\pi^+\pi^-$	
31 ± 7		ANDO	86	SPEC	$8\ \pi^- p \to \eta\pi^+\pi^- n$	

• • • We do not use the following data for averages, fits, limits, etc. • • •

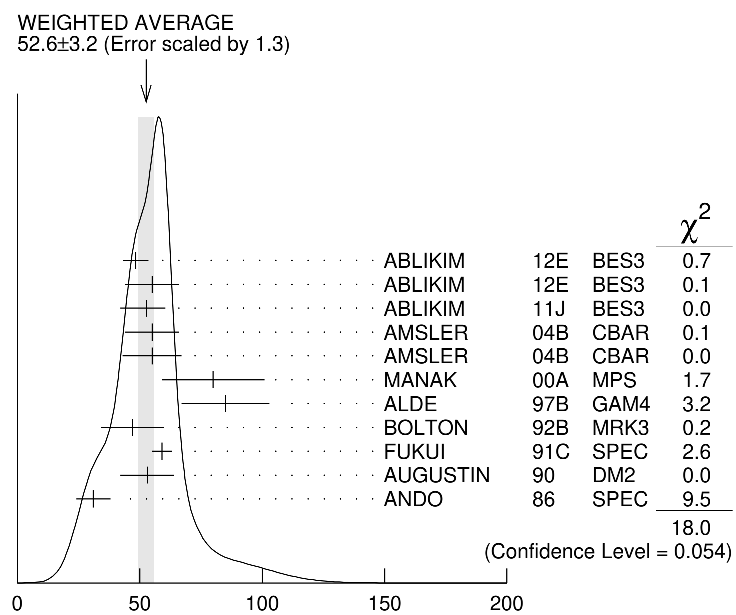
79.0±16.0	195	ABLIKIM	19BA	BES3	$e^+e^- \to \psi(2S)$
86 ±10		[4] AMSLER	95F	CBAR	$0\ \overline{p}p \to \pi^+\pi^-\pi^0\pi^0\eta$

[1] The selected process is $J/\psi \to \omega a_0(980)\pi$. NODE=M027W1;LINKAGE=BL

[2] From fit to the $a_0(980)\pi\ 0^{-+}$ partial wave. NODE=M027W1;LINKAGE=A1

[3] From $\eta\pi^+\pi^-$ mass distribution - mainly $a_0(980)\pi$ - no spin–parity determination available. NODE=M027W1;LINKAGE=D1

[4] Superseded by AMSLER 04B. NODE=M027W1;LINKAGE=A



$\eta(1405)$ width $\eta\pi\pi$ mode (MeV)

$K\overline{K}\pi$ MODE ($a_0(980)\pi$ or direct $K\overline{K}\pi$)

NODE=M027W4
NODE=M027W4

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*	

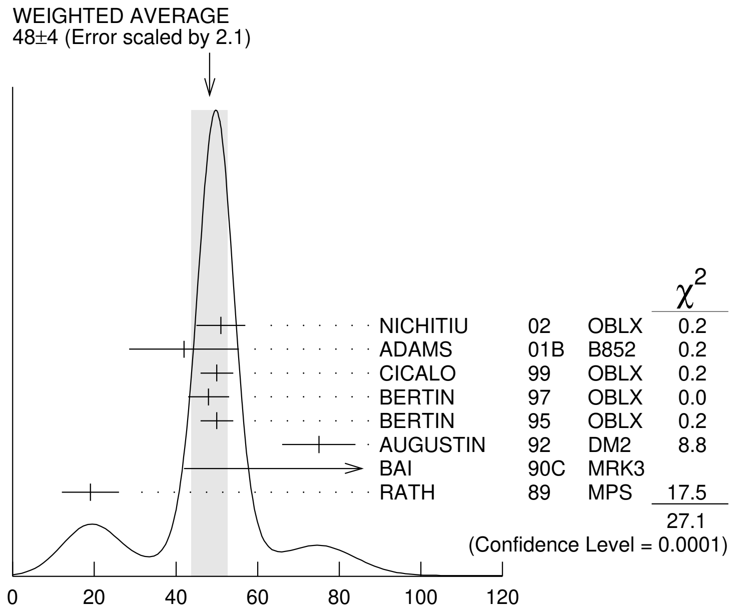
The data in this block is included in the average printed for a previous datablock.

48± 4 OUR AVERAGE		Error includes scale factor of 2.1. See the ideogram below.				
51± 6	3651	[1] NICHITIU	02	OBLX	$0\ \overline{p}p \to K^+K^-\pi^+\pi^-\pi^0$	
42±10± 9	20k	ADAMS	01B	B852	$18\ \text{GeV}\ \pi^- p \to K^+K^-\pi^0 n$	
50± 4		CICALO	99	OBLX	$0\ \overline{p}p \to K^\pm K^0_S\pi^\mp\pi^+\pi^-$	
48± 5		[2] BERTIN	97	OBLX	$0.0\ \overline{p}p \to K^\pm(K^0)\pi^\mp\pi^+\pi^-$	
50± 4		[2] BERTIN	95	OBLX	$0\ \overline{p}p \to K\overline{K}\pi\pi\pi$	
75± 9		AUGUSTIN	92	DM2	$J/\psi \to \gamma K\overline{K}\pi$	
$91^{+67}_{-31}{}^{+15}_{-38}$		[3] BAI	90C	MRK3	$J/\psi \to \gamma K^0_S K^\pm\pi^\mp$	OCCUR=2
19± 7		[3] RATH	89	MPS	$21.4\ \pi^- p \to n K^0_S K^0_S\pi^0$	OCCUR=3

[1] Decaying dominantly directly to $K^+K^-\pi^0$. NODE=M027W;LINKAGE=NC

[2] Decaying into $(K\overline{K})_S\pi$, $(K\pi)_S\overline{K}$, and $a_0(980)\pi$. NODE=M027W4;LINKAGE=FX

[3] From fit to the $a_0(980)\pi\ 0^{-+}$ partial wave , but $a_0(980)\pi\ 1^{++}$ cannot be excluded. NODE=M027W4;LINKAGE=C



$\eta(1405)$ width $K\overline{K}\pi$ mode ($a_0(980)\ \pi$ dominant) (MeV)

$\pi\pi\gamma$ MODE

NODE=M027W2
NODE=M027W2

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
89 ±17 OUR AVERAGE	Error includes scale factor of 1.7.			
64 ±18	235 ± 91	AMSLER 04B	CBAR	$0\ \overline{p}p \to \pi^+\pi^-\pi^+\pi^-\gamma$
101.0± 8.8±8.8	547	BAI 04J	BES2	$J/\psi \to \gamma\gamma\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
174 ±44		AUGUSTIN 90	DM2	$J/\psi \to \pi^+\pi^-\gamma\gamma$
90 ±26		[1] COFFMAN 90	MRK3	$J/\psi \to \pi^+\pi^- 2\gamma$

OCCUR=2

[1] This peak in the $\gamma\rho$ channel may not be related to the $\eta(1405)$.

NODE=M027W2;LINKAGE=X

4π MODE

NODE=M027W3
NODE=M027W3

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
160±30		BUGG 95	MRK3	$J/\psi \to \gamma\pi^+\pi^-\pi^+\pi^-$
144±13	3270	[1] BISELLO 89B	DM2	$J/\psi \to 4\pi\gamma$

[1] Estimated by us from various fits.

NODE=M027W3;LINKAGE=F2

$K\overline{K}\pi$ MODE (unresolved)

NODE=M027W6
NODE=M027W6

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
45.9± 8.2	191	[1,2] ABLIKIM 13M	BES3	$\psi(2S) \to \omega K K \pi$
48.9± 9.0	249 ± 35	[1,2] ABLIKIM 08E	BES2	$J/\psi \to \omega K^0_S K^+\pi^-$ + c.c.
34.2±18.5	62 ± 18	[1,2] ABLIKIM 08E	BES2	$J/\psi \to \omega K^+ K^- \pi^0$
93 ±14	296	[1] AUGUSTIN 90	DM2	$J/\psi \to \gamma K^+ K^- \pi^0$
105 ±10	693	[1] AUGUSTIN 90	DM2	$J/\psi \to \gamma K^0_S K^\pm \pi^\mp$
62 ±16	500	[1] DUCH 89	ASTE	$\overline{p}p \to K\overline{K}\pi\pi\pi$
100 ±11	170	[1] RATH 89	MPS	$21.4\ \pi^- p \to K^0_S K^0_S \pi^0 n$
66 ± 2	8800	[1] BIRMAN 88	MPS	$8\ \pi^- p \to K^+ \overline{K}^0 \pi^- n$
60 ±10	620	[1] REEVES 86	SPEC	$6.6\ p\overline{p} \to K K \pi X$
60 ±10		[1] CHUNG 85	SPEC	$8\ \pi^- p \to K\overline{K}\pi n$
55 $^{+20}_{-30}$	174	[1] EDWARDS 82E	CBAL	$J/\psi \to \gamma K^+ K^- \pi^0$
50 $^{+30}_{-20}$		[1] SCHARRE 80	MRK2	$J/\psi \to \gamma K^0_S K^\pm \pi^\mp$
80 ±10	800	[1,3] BAILLON 67	HBC	$0.0\ \overline{p}p \to K\overline{K}\pi\pi\pi$

OCCUR=2
OCCUR=2
OCCUR=3
OCCUR=2

[1] These experiments identify only one pseudoscalar in the 1400–1500 range. Data could also refer to $\eta(1475)$.

NODE=M027W;LINKAGE=NP

[2] Systematic uncertainty not evaluated.

NODE=M027W;LINKAGE=NS

[3] From best fit to 0^{-+} partial wave , 50% $K^*(892)K$, 50% $a_0(980)\pi$.

NODE=M027W6;LINKAGE=H1

$\eta(1405)$ DECAY MODES

NODE=M027215;NODE=M027

	Mode	Fraction (Γ_i/Γ)	Confidence level	
Γ_1	$K\overline{K}\pi$	seen		DESIG=2;OUR EST;→ UNCHECKED ←
Γ_2	$\eta\pi\pi$	seen		DESIG=5;OUR EST;→ UNCHECKED ←
Γ_3	$a_0(980)\pi$	seen		DESIG=4;OUR EST;→ UNCHECKED ←
Γ_4	$\eta(\pi\pi)_{S\text{-wave}}$	seen		DESIG=9;OUR EST;→ UNCHECKED ←
Γ_5	$f_0(980)\pi^0 \to \pi^+\pi^-\pi^0$	not seen		DESIG=15
Γ_6	$f_0(980)\eta$	seen		DESIG=10;OUR EST;→ UNCHECKED ←
Γ_7	4π	seen		DESIG=6;OUR EST;→ UNCHECKED ←
Γ_8	$\rho\rho$	<58 %	99.85%	DESIG=12
Γ_9	$\gamma\gamma$			DESIG=7
Γ_{10}	$\rho^0\gamma$	seen		DESIG=8;OUR EST;→ UNCHECKED ←
Γ_{11}	$\phi\gamma$			DESIG=13
Γ_{12}	$K^*(892)K$	seen		DESIG=11;OUR EST;→ UNCHECKED ←

$\eta(1405)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M027220

$\Gamma(K\overline{K}\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_1\Gamma_9/\Gamma$

NODE=M027G3
NODE=M027G3

VALUE (keV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.035	90	[1,2] AHOHE	05	CLE2	10.6 $e^+e^- \to e^+e^- K^0_S K^\pm \pi^\mp$

[1] Using $\eta(1405)$ mass and width 1410 MeV and 51 MeV, respectively. NODE=M027G3;LINKAGE=AH

[2] Assuming three-body phase-space decay to $K^0_S K^\pm \pi^\mp$. NODE=M027G3;LINKAGE=B3

$\Gamma(\eta\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_2\Gamma_9/\Gamma$

NODE=M027G5
NODE=M027G5

VALUE (keV)	CL%	DOCUMENT ID		TECN	COMMENT
<0.095	95	ACCIARRI	01G	L3	183–202 $e^+e^- \to e^+e^-\eta\pi^+\pi^-$

$\Gamma(\rho^0\gamma) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_{10}\Gamma_9/\Gamma$

NODE=M027G8
NODE=M027G8

VALUE (keV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.5	95	ALTHOFF	84E	TASS	$e^+e^- \to e^+e^-\pi^+\pi^-\gamma$

$\eta(1405)$ BRANCHING RATIOS

NODE=M027225

$\Gamma(\eta\pi\pi)/\Gamma(K\overline{K}\pi)$ — Γ_2/Γ_1

NODE=M027R3
NODE=M027R3

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
1.09±0.48		[1] AMSLER	04B	CBAR	0 $\overline{p}p \to \pi^+\pi^-\pi^+\pi^-\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.5	90	EDWARDS	83B	CBAL	$J/\psi \to \eta\pi\pi\gamma$
<1.1	90	SCHARRE	80	MRK2	$J/\psi \to \eta\pi\pi\gamma$
<1.5	95	FOSTER	68B	HBC	0.0 $\overline{p}p$

[1] Using the data of BAILLON 67 on $\overline{p}p \to K\overline{K}\pi$. NODE=M027R3;LINKAGE=AM

$\Gamma(\rho^0\gamma)/\Gamma(\eta\pi\pi)$ — Γ_{10}/Γ_2

NODE=M027R12
NODE=M027R12

VALUE	DOCUMENT ID		TECN	COMMENT
0.111±0.064	AMSLER	04B	CBAR	0 $\overline{p}p$

$\Gamma(a_0(980)\pi)/\Gamma(K\overline{K}\pi)$ — Γ_3/Γ_1

NODE=M027R4
NODE=M027R4

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
~ 0.15		[1] BERTIN	95	OBLX	0 $\overline{p}p \to K\overline{K}\pi\pi\pi$
~ 0.8	500	[1] DUCH	89	ASTE	$\overline{p}p \to \pi^+\pi^-K^\pm\pi^\mp K^0$
~ 0.75		[1] REEVES	86	SPEC	6.6 $p\overline{p} \to KK\pi X$

[1] Assuming that the $a_0(980)$ decays only into $K\overline{K}$. NODE=M027R4;LINKAGE=C

$\Gamma(a_0(980)\pi)/\Gamma(\eta\pi\pi)$ — Γ_3/Γ_2

NODE=M027R2
NODE=M027R2

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.29±0.10		ABELE	98E	CBAR	0 $p\overline{p} \to \eta\pi^0\pi^0\pi^0$
0.19±0.04	2200	[1] ALDE	97B	GAM4	100 $\pi^-p \to \eta\pi^0\pi^0 n$
0.56±0.04±0.03		[1] AMSLER	95F	CBAR	0 $\overline{p}p \to \pi^+\pi^-\pi^0\pi^0\eta$

[1] Assuming that the $a_0(980)$ decays only into $\eta\pi$. NODE=M027R2;LINKAGE=A

$\Gamma(a_0(980)\pi)/\Gamma(\eta(\pi\pi)_{S\text{-wave}})$ — Γ_3/Γ_4

NODE=M027R9

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.91±0.12		ANISOVICH	01	SPEC	0.0 $\overline{p}p \to \eta\pi^+\pi^-\pi^+\pi^-$
0.15±0.04	9082	[1] MANAK	00A	MPS	18 $\pi^- p \to \eta\pi^+\pi^- n$
0.70±0.12±0.20		[2] BAI	99	BES	$J/\psi \to \gamma\eta\pi^+\pi^-$

[1] Statistical error only.
[2] Assuming that the $a_0(980)$ decays only into $\eta\pi$.

NODE=M027R;LINKAGE=K3
NODE=M027R9;LINKAGE=BK

$\Gamma(\rho^0\gamma)/\Gamma(K\overline{K}\pi)$ — Γ_{10}/Γ_1

NODE=M027R7

VALUE	DOCUMENT ID		TECN	COMMENT
0.0152±0.0038	[1] COFFMAN	90	MRK3	$J/\psi \to \gamma\gamma\pi^+\pi^-$

[1] Using B($J/\psi \to \gamma\eta(1405) \to \gamma K\overline{K}\pi$)=$4.2 \times 10^{-3}$ and B($J/\psi \to \gamma\eta(1405) \to \gamma\gamma\rho^0$)=$6.4 \times 10^{-5}$.

NODE=M027R7;LINKAGE=D

$\Gamma(\gamma\gamma)/\Gamma(K\overline{K}\pi)$ — Γ_9/Γ_1

NODE=M027R02

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.78 × 10^{-3}	90	[1] ABLIKIM	18O	BES3	$\psi(2S) \to \pi^+\pi^-\gamma\gamma\gamma$

[1] Using results from BAI 00D.

NODE=M027R02;LINKAGE=A

$\Gamma(\eta(\pi\pi)_{S\text{-wave}})/\Gamma(\eta\pi\pi)$ — Γ_4/Γ_2

NODE=M027R8

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.81±0.04	2200	ALDE	97B	GAM4	100 $\pi^- p \to \eta\pi^0\pi^0 n$

$\Gamma(f_0(980)\eta)/\Gamma(\eta\pi\pi)$ — Γ_6/Γ_2

NODE=M027R10

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.32±0.07	[1] ANISOVICH	00	SPEC	0.9–1.2 $\overline{p}p \to \eta 3\pi^0$

[1] Using preliminary Crystal Barrel data.

NODE=M027R10;LINKAGE=D

$\Gamma(f_0(980)\pi^0 \to \pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_5/Γ

NODE=M027R00

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	[1] ABLIKIM	17AJ	BES3	$\psi(2S) \to \gamma\pi^+\pi^-\pi^0$

[1] ABLIKIM 17AJ reports B($\psi(2S) \to \gamma\eta(1405) \to \gamma f_0(980)\pi^0 \to \gamma\pi^+\pi^-\pi^0$) < 5.0×10^{-7}.

NODE=M027R00;LINKAGE=A

$\Gamma(\rho\rho)/\Gamma_{total}$ — Γ_8/Γ

NODE=M027R13

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.58	99.85	[1,2] AMSLER	04B	CBAR	0 $\overline{p}p$

[1] Assuming that the $\eta(1405)$ decays are saturated by the $\pi\pi\eta$, $K\overline{K}\pi$ and $\rho\rho$ modes.
[2] Using the data of BAILLON 67 on $\overline{p}p \to K\overline{K}\pi$.

NODE=M027R13;LINKAGE=AM
NODE=M027R13;LINKAGE=AS

$\Gamma(K^*(892)K)/\Gamma(a_0(980)\pi)$ — Γ_{12}/Γ_3

NODE=M027R11

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.084±0.024	[1] ADAMS	01B	B852	18 GeV $\pi^- p \to K^+K^-\pi^0 n$

[1] Statistical error only.

NODE=M027R11;LINKAGE=K3

$\Gamma(\phi\gamma)/\Gamma(\rho^0\gamma)$ — Γ_{11}/Γ_{10}

NODE=M027R14

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.09±0.03		[1] ABLIKIM	18I	BES3	$J/\psi \to \gamma\gamma\phi(1020)$
0.13±0.04		[2] ABLIKIM	18I	BES3	$J/\psi \to \gamma\gamma\phi(1020)$
<0.77	95	[3] BAI	04J	BES2	$J/\psi \to \gamma\gamma K^+K^-$

OCCUR=2

[1] Constructive interference between $X(1835)$ and $\eta(1405)/\eta(1475)$ decays to $\gamma\phi$ is assumed. Also see $\eta(1475)$. ABLIKIM 18I reports the inverse as 11.10 ± 3.5.
[2] Destructive interference between $X(1835)$ and $\eta(1405)/\eta(1475)$ decays to $\gamma\phi$ is assumed. Also see $\eta(1475)$. ABLIKIM 18I reports the inverse as 7.53 ± 2.49.
[3] Calculated by us from B($J/\psi \to \eta(1405)\gamma \to \phi\gamma\gamma$) < 0.82×10^{-4} and B($J/\psi \to \eta(1405)\gamma \to \rho^0\gamma\gamma$) = $(1.07 \pm 0.17 \pm 0.11) \times 10^{-4}$.

NODE=M027R14;LINKAGE=A
NODE=M027R14;LINKAGE=B
NODE=M027R14;LINKAGE=BA

η(1405) REFERENCES

NODE=M027

ABLIKIM	19BA	PR D100 092003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60024
ABLIKIM	18I	PR D97 051101	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58893
ABLIKIM	18O	PR D97 072014	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58925
ABLIKIM	17AJ	PR D96 112008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58322
ABLIKIM	13M	PR D87 092006	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55386
ABLIKIM	12E	PRL 108 182001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54270
ABLIKIM	11J	PRL 107 182001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=53931
ABLIKIM	08E	PR D77 032005	M. Ablikim *et al.*	(BES Collab.)	REFID=52143
AHOHE	05	PR D71 072001	R. Ahohe *et al.*	(CLEO Collab.)	REFID=50764
AMSLER	04B	EPJ C33 23	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=51079
BAI	04J	PL B594 47	J.Z. Bai *et al.*	(BES Collab.)	REFID=50167
NICHITIU	02	PL B545 261	F. Nichitiu *et al.*	(OBELIX Collab.)	REFID=48848
ACCIARRI	01G	PL B501 1	M. Acciarri *et al.*	(L3 Collab.)	REFID=48319
ADAMS	01B	PL B516 264	G.S. Adams *et al.*	(BNL E852 Collab.)	REFID=49649
ANISOVICH	01	NP A690 567	A.V. Anisovich *et al.*		REFID=48308
ANISOVICH	00	PL B472 168	A.V. Anisovich *et al.*		REFID=47429
BAI	00D	PL B476 25	J.Z. Bai *et al.*	(BES Collab.)	REFID=47954
MANAK	00A	PR D62 012003	J.J. Manak *et al.*	(BNL E852 Collab.)	REFID=47989
BAI	99	PL B446 356	J.Z. Bai *et al.*	(BES Collab.)	REFID=46606
CICALO	99	PL B462 453	C. Cicalo *et al.*	(OBELIX Collab.)	REFID=47394
ABELE	98E	NP B514 45	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=46314
BAI	98C	PL B440 217	J.Z. Bai *et al.*	(BES Collab.)	REFID=46337
ALDE	97B	PAN 60 386	D. Alde *et al.*	(GAMS Collab.)	REFID=45396
		Translated from YAF 60 458.			
BERTIN	97	PL B400 226	A. Bertin *et al.*	(OBELIX Collab.)	REFID=45417
AMSLER	95F	PL B358 389	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=44613
BERTIN	95	PL B361 187	A. Bertin *et al.*	(OBELIX Collab.)	REFID=44614
BUGG	95	PL B353 378	D.V. Bugg *et al.*	(LOQM, PNPI, WASH)	REFID=44438
AUGUSTIN	92	PR D46 1951	J.E. Augustin, G. Cosme	(DM2 Collab.)	REFID=41584
BOLTON	92B	PRL 69 1328	T. Bolton *et al.*	(Mark III Collab.)	REFID=42176
FUKUI	91C	PL B267 293	S. Fukui *et al.*	(SUGI, NAGO, KEK, KYOT+)	REFID=41748
AUGUSTIN	90	PR D42 10	J.E. Augustin *et al.*	(DM2 Collab.)	REFID=41352
BAI	90C	PRL 65 2507	Z. Bai *et al.*	(Mark III Collab.)	REFID=41578
COFFMAN	90	PR D41 1410	D.M. Coffman *et al.*	(Mark III Collab.)	REFID=41350
BISELLO	89B	PR D39 701	G. Busetto *et al.*	(DM2 Collab.)	REFID=40575
DUCH	89	ZPHY C45 223	K.D. Duch *et al.*	(ASTERIX Collab.) JP	REFID=41016
RATH	89	PR D40 693	M.G. Rath *et al.*	(NDAM, BRAN, BNL, CUNY+)	REFID=40924
BIRMAN	88	PRL 61 1557	A. Birman *et al.*	(BNL, FSU, IND, MASD) JP	REFID=40568
ANDO	86	PRL 57 1296	A. Ando *et al.*	(KEK, KYOT, NIRS, SAGA+) IJP	REFID=20891
REEVES	86	PR D34 1960	D.F. Reeves *et al.*	(FLOR, BNL, IND+) JP	REFID=20936
CHUNG	85	PRL 55 779	S.U. Chung *et al.*	(BNL, FLOR, IND+) JP	REFID=20934
ALTHOFF	84E	PL 147B 487	M. Althoff *et al.*	(TASSO Collab.)	REFID=20305
EDWARDS	83B	PRL 51 859	C. Edwards *et al.*	(CIT, HARV, PRIN+)	REFID=21318
EDWARDS	82E	PRL 49 259	C. Edwards *et al.*	(CIT, HARV, PRIN+)	REFID=21314
Also		PRL 50 219	C. Edwards *et al.*	(CIT, HARV, PRIN+)	REFID=21315
SCHARRE	80	PL 97B 329	D.L. Scharre *et al.*	(SLAC, LBL)	REFID=21329
FOSTER	68B	NP B8 174	M. Foster *et al.*	(CERN, CDEF)	REFID=21179
BAILLON	67	NC 50A 393	P.H. Baillon *et al.*	(CERN, CDEF, IRAD)	REFID=20407

NODE=M109

$h_1(1415)$

$I^G(J^{PC}) = 0^-(1^{+-})$

was $h_1(1380)$

$h_1(1415)$ MASS

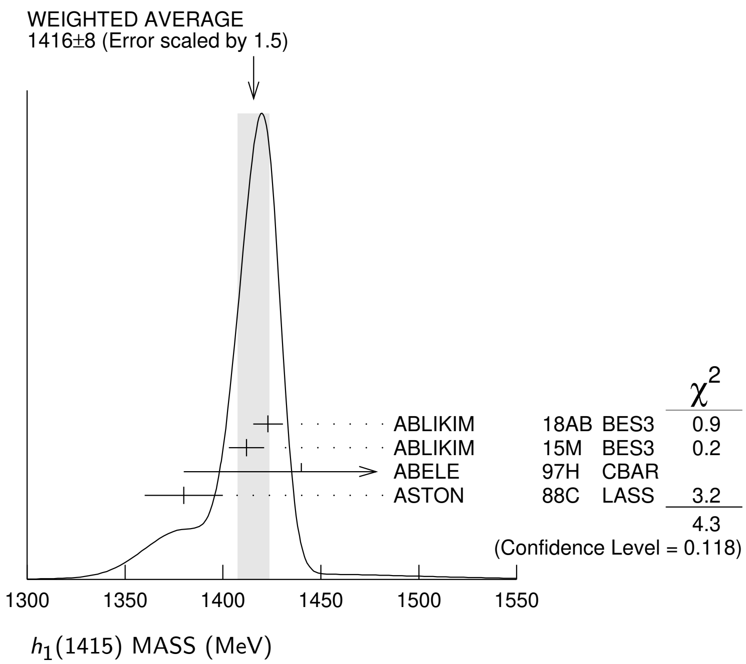
NODE=M109M

NODE=M109M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1416± 8 OUR AVERAGE		Error includes scale factor of 1.5. See the ideogram below.			
1423± 2.1±7.3	2.2k	[1] ABLIKIM	18AB	BES3	$J/\psi \to \eta' h_1 \to \eta' K^* \overline{K}$
1412± 4 ±8		[1] ABLIKIM	15M	BES3	$\psi(2S) \to \gamma \chi_{c1,2} \to \gamma \phi (h_1 \to K^* \overline{K})$
1440±60		ABELE	97H	CBAR	$\overline{p} p \to K^0_L K^0_S \pi^0 \pi^0$
1380±20		ASTON	88C	LASS	$11\ K^- p \to K^0_S K^\pm \pi^\mp \Lambda$

[1] Final states $K^+ K^- \pi^0$ and $K^0_S K^\pm \pi^\mp$.

NODE=M109M;LINKAGE=A



$h_1(1415)$ WIDTH

NODE=M109W

NODE=M109W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
90 ±15 OUR AVERAGE					
90.3± 9.8±17.5	2.2k	[1] ABLIKIM	18AB	BES3	$J/\psi \to \eta' h_1 \to \eta' K^* \overline{K}$
84 ±12 ±40		[1] ABLIKIM	15M	BES3	$\psi(2S) \to \gamma \chi_{c1,2} \to \gamma \phi (h_1 \to K^* \overline{K})$
170 ±80		ABELE	97H	CBAR	$\overline{p} p \to K^0_L K^0_S \pi^0 \pi^0$
80 ±30		ASTON	88C	LASS	$11\ K^- p \to K^0_S K^\pm \pi^\mp \Lambda$

[1] Final states $K^+ K^- \pi^0$ and $K^0_S K^\pm \pi^\mp$.

NODE=M109W;LINKAGE=A

$h_1(1415)$ DECAY MODES

NODE=M109215;NODE=M109

	Mode
Γ_1	$K \overline{K}^*(892) +$ c.c.

DESIG=1

$h_1(1415)$ REFERENCES

NODE=M109

ABLIKIM	18AB	PR D98 072005	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59456
ABLIKIM	15M	PR D91 112008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56778
ABELE	97H	PL B415 280	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=45765
ASTON	88C	PL B201 573	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)	REFID=40282

NODE=M006

$f_1(1420)$

$I^G(J^{PC}) = 0^+(1^{++})$

See the review on "Spectroscopy of Light Meson Resonances."

NODE=M006

$f_1(1420)$ MASS

NODE=M006M2

NODE=M006M2

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1426.3± 0.9 OUR AVERAGE		Error includes scale factor of 1.1.			
1434 ± 5 ± 5	133	[1] ACHARD	07	L3	183–209 $e^+e^- \to e^+e^- K^0_S K^\pm \pi^\mp$
1426 ± 6	711	ABDALLAH	03H	DLPH	91.2 $e^+e^- \to K^0_S K^\pm \pi^\mp + X$
1420 ±14	3651	NICHITIU	02	OBLX	0 $\overline{p}p \to K^+K^-\pi^+\pi^-\pi^0$
1428 ± 4 ± 2	20k	ADAMS	01B	B852	18 GeV $\pi^- p \to K^+K^-\pi^0 n$
1426 ± 1		BARBERIS	97C	OMEG	450 $pp \to pp K^0_S K^\pm \pi^\mp$
1425 ± 8		BERTIN	97	OBLX	0.0 $\overline{p}p \to K^\pm(K^0)\pi^\mp\pi^+\pi^-$
1430 ± 4		[2] ARMSTRONG	92E	OMEG	85,300 $\pi^+ p$, $pp \to \pi^+ p$, $pp(K\overline{K}\pi)$
1462 ±20		[3] AUGUSTIN	92	DM2	$J/\psi \to \gamma K\overline{K}\pi$
1443 $^{+7}_{-6}$ $^{+3}_{-2}$	1100	BAI	90C	MRK3	$J/\psi \to \gamma K^0_S K^\pm \pi^\mp$
1425 ±10	17	BEHREND	89	CELL	$\gamma\gamma \to K^0_S K^\pm \pi^\mp$
1442 ± 5 $^{+10}_{-17}$	111	BECKER	87	MRK3	e^+e^-, $\omega K\overline{K}\pi$
1423 ± 4		GIDAL	87B	MRK2	$e^+e^- \to e^+e^- K\overline{K}\pi$
1417 ±13	13	AIHARA	86C	TPC	$e^+e^- \to e^+e^- K\overline{K}\pi$
1422 ± 3		CHAUVAT	84	SPEC	ISR 31.5 pp
1440 ±10		[4] BROMBERG	80	SPEC	100 $\pi^- p \to K\overline{K}\pi X$
1426 ± 6	221	DIONISI	80	HBC	4 $\pi^- p \to K\overline{K}\pi n$
1420 ±20		DAHL	67	HBC	1.6–4.2 $\pi^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1430.8± 0.9		[5] SOSA	99	SPEC	$pp \to p_{slow}(K^0_S K^+\pi^-) p_{fast}$
1433.4± 0.8		[5] SOSA	99	SPEC	$pp \to p_{slow}(K^0_S K^-\pi^+) p_{fast}$
1435 ± 9		PROKOSHKIN	97B	GAM4	100 $\pi^- p \to \eta\pi^0\pi^0 n$
1429 ± 3	389	ARMSTRONG	89	OMEG	300 $pp \to K\overline{K}\pi pp$
1425 ± 2	1520	ARMSTRONG	84	OMEG	85 $\pi^+ p$, $pp \to (\pi^+, p)(K\overline{K}\pi)p$
~ 1420		BITYUKOV	84	SPEC	32 $K^- p \to K^+K^-\pi^0 Y$

OCCUR=2

[1] From a fit with a width fixed at 55 MeV. NODE=M006M2;LINKAGE=CH

[2] This result supersedes ARMSTRONG 84, ARMSTRONG 89. NODE=M006M2;LINKAGE=C

[3] From fit to the $K^*(892)K$ 1^{++} partial wave. NODE=M006M2;LINKAGE=B

[4] Mass error increased to account for $a_0(980)$ mass cut uncertainties. NODE=M006M2;LINKAGE=A

[5] No systematic error given. NODE=M006M2;LINKAGE=N1

$f_1(1420)$ WIDTH

NODE=M006W

NODE=M006W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
54.5± 2.6 OUR AVERAGE					
51 ±14	711	ABDALLAH	03H	DLPH	91.2 $e^+e^- \to K^0_S K^\pm \pi^\mp + X$
61 ± 8	3651	NICHITIU	02	OBLX	0 $\overline{p}p \to K^+K^-\pi^+\pi^-\pi^0$
38 ± 9 ±6	20k	ADAMS	01B	B852	18 GeV $\pi^- p \to K^+K^-\pi^0 n$
58 ± 4		BARBERIS	97C	OMEG	450 $pp \to pp K^0_S K^\pm \pi^\mp$
45 ±10		BERTIN	97	OBLX	0.0 $\overline{p}p \to K^\pm(K^0)\pi^\mp\pi^+\pi^-$
58 ±10		[6] ARMSTRONG	92E	OMEG	85,300 $\pi^+ p$, $pp \to \pi^+ p$, $pp(K\overline{K}\pi)$

129	± 41		[7] AUGUSTIN	92	DM2	$J/\psi \to \gamma K \overline{K} \pi$	
68	$^{+29}_{-18}$ $^{+8}_{-9}$	1100	BAI	90C	MRK3	$J/\psi \to \gamma K^0_S K^\pm \pi^\mp$	
42	± 22	17	BEHREND	89	CELL	$\gamma\gamma \to K^0_S K^\pm \pi^\mp$	
40	$^{+17}_{-13}$ ± 5	111	BECKER	87	MRK3	$e^+ e^- \to \omega K \overline{K} \pi$	
35	$^{+47}_{-20}$	13	AIHARA	86C	TPC	$e^+ e^- \to e^+ e^- K \overline{K} \pi$	
47	± 10		CHAUVAT	84	SPEC	ISR 31.5 $p p$	
62	± 14		BROMBERG	80	SPEC	100 $\pi^- p \to K \overline{K} \pi X$	
40	± 15	221	DIONISI	80	HBC	4 $\pi^- p \to K \overline{K} \pi n$	
60	± 20		DAHL	67	HBC	1.6–4.2 $\pi^- p$	

• • • We do not use the following data for averages, fits, limits, etc. • • •

68.7	$\pm$ 2.9		[8] SOSA	99	SPEC	$p p \to p_{slow} (K^0_S K^+ \pi^-) p_{fast}$	
58.8	$\pm$ 3.3		[8] SOSA	99	SPEC	$p p \to p_{slow} (K^0_S K^- \pi^+) p_{fast}$	OCCUR=2
90	± 25		PROKOSHKIN	97B	GAM4	100 $\pi^- p \to \eta \pi^0 \pi^0 n$	
58	$\pm$ 8	389	ARMSTRONG	89	OMEG	300 $p p \to K \overline{K} \pi p p$	
62	$\pm$ 5	1520	ARMSTRONG	84	OMEG	85 $\pi^+ p$, $p p \to (\pi^+, p)(K \overline{K} \pi) p$	
$\sim$ 50			BITYUKOV	84	SPEC	32 $K^- p \to K^+ K^- \pi^0 Y$	

[6] This result supersedes ARMSTRONG 84, ARMSTRONG 89. NODE=M006W;LINKAGE=C
[7] From fit to the $K^*(892) K$ 1^{++} partial wave. NODE=M006W;LINKAGE=B
[8] No systematic error given. NODE=M006W;LINKAGE=N1

$f_1(1420)$ DECAY MODES

NODE=M006215;NODE=M006

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$K \overline{K} \pi$	seen	DESIG=2;OUR EST;→ UNCHECKED ←
Γ_2	$K \overline{K}^*(892)+$ c.c.	seen	DESIG=1;OUR EST;→ UNCHECKED ←
Γ_3	$\eta \pi \pi$	possibly seen	DESIG=5;OUR EST;→ UNCHECKED ←
Γ_4	$a_0(980) \pi$		DESIG=4
Γ_5	$\pi \pi \rho$		DESIG=3
Γ_6	4π		DESIG=6
Γ_7	$\rho^0 \gamma$		DESIG=8
Γ_8	$\phi \gamma$	seen	DESIG=9;OUR EST;→ UNCHECKED ←

$f_1(1420)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M006220

$\Gamma(K \overline{K} \pi) \times \Gamma(\gamma\gamma^*)/\Gamma_{total}$

NODE=M006G2
NODE=M006G2

VALUE (keV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
1.9±0.4 OUR AVERAGE						
3.2±0.6±0.7		133	[9,10] ACHARD	07	L3	183–209 $e^+ e^- \to e^+ e^- K^0_S K^\pm \pi^\mp$
3.0±0.9±0.7			[11,12] BEHREND	89	CELL	$e^+ e^- \to e^+ e^- K^0_S K \pi$
$2.3^{+1.0}_{-0.9}$±0.8			HILL	89	JADE	$e^+ e^- \to e^+ e^- K^\pm K^0_S \pi^\mp$
1.3±0.5±0.3			AIHARA	88B	TPC	$e^+ e^- \to e^+ e^- K^\pm K^0_S \pi^\mp$
1.6±0.7±0.3			[11,13] GIDAL	87B	MRK2	$e^+ e^- \to e^+ e^- K \overline{K} \pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<8.0	95		JENNI	83	MRK2	$e^+ e^- \to e^+ e^- K \overline{K} \pi$

[9] From a fit with a width fixed at 55 MeV. NODE=M006G2;LINKAGE=CH
[10] The form factor parameter from the fit is 926 ± 78 MeV. NODE=M006G2;LINKAGE=CR
[11] Assume a ρ-pole form factor. NODE=M006G2;LINKAGE=A
[12] A ϕ - pole form factor gives considerably smaller widths. NODE=M006G2;LINKAGE=D
[13] Published value divided by 2. NODE=M006G2;LINKAGE=B

$f_1(1420)$ BRANCHING RATIOS

NODE=M006225

$\Gamma(K\overline{K}^*(892)+\text{c.c.})/\Gamma(K\overline{K}\pi)$ — Γ_2/Γ_1

NODE=M006R1
NODE=M006R1

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.76 ± 0.06	BROMBERG	80	SPEC	$100\ \pi^- p \to K\overline{K}\pi X$
0.86 ± 0.12	DIONISI	80	HBC	$4\ \pi^- p \to K\overline{K}\pi n$

$\Gamma(\pi\pi\rho)/\Gamma(K\overline{K}\pi)$ — Γ_5/Γ_1

NODE=M006R2
NODE=M006R2

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.3	95	CORDEN	78	OMEG	12–15 $\pi^- p$
<2.0		DAHL	67	HBC	1.6–4.2 $\pi^- p$

$\Gamma(\eta\pi\pi)/\Gamma(K\overline{K}\pi)$ — Γ_3/Γ_1

NODE=M006R3
NODE=M006R3

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.1	95	ARMSTRONG	91B	OMEG	$300\ pp \to pp\eta\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.35 ± 0.75		KOPKE	89	MRK3	$J/\psi \to \omega\eta\pi\pi(K\overline{K}\pi)$
<0.6	90	GIDAL	87	MRK2	$e^+e^- \to e^+e^-\eta\pi^+\pi^-$
<0.5	95	CORDEN	78	OMEG	12–15 $\pi^- p$
$1.5\ \pm0.8$		DEFOIX	72	HBC	$0.7\ \overline{p}p$

$\Gamma(a_0(980)\pi)/\Gamma(\eta\pi\pi)$ — Γ_4/Γ_3

NODE=M006R4
NODE=M006R4

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
>0.1	90	PROKOSHKIN	97B	GAM4	$100\ \pi^- p \to \eta\pi^0\pi^0 n$
not seen in either mode		ANDO	86	SPEC	$8\ \pi^- p$
not seen in either mode		CORDEN	78	OMEG	12–15 $\pi^- p$
0.4 ± 0.2		DEFOIX	72	HBC	$0.7\ \overline{p}p \to 7\pi$

$\Gamma(4\pi)/\Gamma(K\overline{K}^*(892)+\text{c.c.})$ — Γ_6/Γ_2

NODE=M006R5
NODE=M006R5

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.90	95	DIONISI	80	HBC	$4\ \pi^- p$

$\Gamma(K\overline{K}\pi)/[\Gamma(K\overline{K}^*(892)+\text{c.c.})+\Gamma(a_0(980)\pi)]$ — $\Gamma_1/(\Gamma_2+\Gamma_4)$

NODE=M006R6
NODE=M006R6

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.65 ± 0.27	[14] DIONISI	80	HBC	$4\ \pi^- p$

[14] Calculated using $\Gamma(K\overline{K})/\Gamma(\eta\pi) = 0.24 \pm 0.07$ for $a_0(980)$ fractions.

NODE=M006R6;LINKAGE=C

$\Gamma(a_0(980)\pi)/\Gamma(K\overline{K}^*(892)+\text{c.c.})$ — Γ_4/Γ_2

NODE=M006R7
NODE=M006R7
NEW

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
0.042±0.014 OUR AVERAGE					
[0.04 ± 0.014 OUR 2021 AVERAGE]					
$0.44\ \pm0.19$		ABLIKIM	21U	BES3	$D_s^+ \to f_1(1420)\pi^+$
$0.04\ \pm0.01\ \pm0.01$		BARBERIS	98C	OMEG	$450\ pp \to p_f f_1(1420) p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.04	68	ARMSTRONG	84	OMEG	$85\ \pi^+ p$

$\Gamma(4\pi)/\Gamma(K\overline{K}\pi)$ — Γ_6/Γ_1

NODE=M006R8
NODE=M006R8

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.62	95	ARMSTRONG	89G	OMEG	$85\ \pi p \to 4\pi X$

$\Gamma(\rho^0\gamma)/\Gamma_{\text{total}}$ — Γ_7/Γ

NODE=M006R9
NODE=M006R9

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.08	95	[15] ARMSTRONG	92C	SPEC	$300\ pp \to pp\pi^+\pi^-\gamma$

[15] Using the data on the $\overline{K}K\pi$ mode from ARMSTRONG 89.

NODE=M006R9;LINKAGE=A

$\Gamma(\rho^0\gamma)/\Gamma(K\overline{K}\pi)$ — Γ_7/Γ_1

NODE=M006R10
NODE=M006R10

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.02	95	BARBERIS	98C	OMEG	$450\ pp \to p_f f_1(1420) p_s$

$\Gamma(\phi\gamma)/\Gamma(K\overline{K}\pi)$ Γ_8/Γ_1

NODE=M006R11
NODE=M006R11

VALUE	DOCUMENT ID		TECN	COMMENT
0.003±0.001±0.001	BARBERIS	98C	OMEG	450 $pp \to p_f f_1(1420) p_s$

f_1(1420) REFERENCES

NODE=M006

ABLIKIM	21U	PR D104 032011	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61155
ACHARD	07	JHEP 0703 018	P. Achard *et al.*	(L3 Collab.)	REFID=51698
ABDALLAH	03H	PL B569 129	J. Abdallah *et al.*	(DELPHI Collab.)	REFID=49548
NICHITIU	02	PL B545 261	F. Nichitiu *et al.*	(OBELIX Collab.)	REFID=48848
ADAMS	01B	PL B516 264	G.S. Adams *et al.*	(BNL E852 Collab.)	REFID=49649
SOSA	99	PRL 83 913	M. Sosa *et al.*		REFID=46937
BARBERIS	98C	PL B440 225	D. Barberis *et al.*	(WA 102 Collab.)	REFID=46346
BARBERIS	97C	PL B413 225	D. Barberis *et al.*	(WA 102 Collab.)	REFID=45759
BERTIN	97	PL B400 226	A. Bertin *et al.*	(OBELIX Collab.)	REFID=45417
PROKOSHKIN	97B	PD 42 298	Yu.D. Prokoshkin, S.A. Sadovsky		REFID=45549
		Translated from DANS 354 751.			
ARMSTRONG	92C	ZPHY C54 371	T.A. Armstrong *et al.*	(ATHU, BARI, BIRM+)	REFID=42097
ARMSTRONG	92E	ZPHY C56 29	T.A. Armstrong *et al.*	(ATHU, BARI, BIRM+) JPC	REFID=43173
AUGUSTIN	92	PR D46 1951	J.E. Augustin, G. Cosme	(DM2 Collab.)	REFID=41584
ARMSTRONG	91B	ZPHY C52 389	T.A. Armstrong *et al.*	(ATHU, BARI, BIRM+)	REFID=41862
BAI	90C	PRL 65 2507	Z. Bai *et al.*	(Mark III Collab.)	REFID=41578
ARMSTRONG	89	PL B221 216	T.A. Armstrong *et al.*	(CERN, CDEF, BIRM+) JPC	REFID=40729
ARMSTRONG	89G	ZPHY C43 55	T.A. Armstrong *et al.*	(CERN, BIRM, BARI+)	REFID=40930
BEHREND	89	ZPHY C42 367	H.J. Behrend *et al.*	(CELLO Collab.)	REFID=40732
HILL	89	ZPHY C42 355	P. Hill *et al.*	(JADE Collab.) JP	REFID=40741
KOPKE	89	PRPL 174 67	L. Kopke *et al.*	(CERN)	REFID=41863
AIHARA	88B	PL B209 107	H. Aihara *et al.*	(TPC-2γ Collab.)	REFID=40572
BECKER	87	PRL 59 186	J.J. Becker *et al.*	(Mark III Collab.) JP	REFID=40015
GIDAL	87	PRL 59 2012	G. Gidal *et al.*	(LBL, SLAC, HARV)	REFID=40223
GIDAL	87B	PRL 59 2016	G. Gidal *et al.*	(LBL, SLAC, HARV)	REFID=40224
AIHARA	86C	PRL 57 2500	H. Aihara *et al.*	(TPC-2γ Collab.) JP	REFID=21326
ANDO	86	PRL 57 1296	A. Ando *et al.*	(KEK, KYOT, NIRS, SAGA+)	REFID=20891
ARMSTRONG	84	PL 146B 273	T.A. Armstrong *et al.*	(ATHU, BARI, BIRM+) JP	REFID=20929
BITYUKOV	84	SJNP 39 735	S. Bityukov *et al.*	(SERP)	REFID=45856
		Translated from YAF 39 1165.			
CHAUVAT	84	PL 148B 382	P. Chauvat *et al.*	(CERN, CLER, UCLA+)	REFID=20932
JENNI	83	PR D27 1031	P. Jenni *et al.*	(SLAC, LBL)	REFID=20304
BROMBERG	80	PR D22 1513	C.M. Bromberg *et al.*	(CIT, FNAL, ILLC+)	REFID=20922
DIONISI	80	NP B169 1	C. Dionisi *et al.*	(CERN, MADR, CDEF+) IJP	REFID=20924
CORDEN	78	NP B144 253	M.J. Corden *et al.*	(BIRM, RHEL, TELA+)	REFID=20452
DEFOIX	72	NP B44 125	C. Defoix *et al.*	(CDEF, CERN)	REFID=20435
DAHL	67	PR 163 1377	O.I. Dahl *et al.*	(LRL) IJP	REFID=20321
Also		PRL 14 1074	D.H. Miller *et al.*	(LRL, UCB)	REFID=21291

NODE=M125

$\omega(1420)$

$I^G(J^{PC}) = 0^-(1^{--})$

See also the $\omega(1650)$ particle listing.

NODE=M125

ω(1420) MASS

NODE=M125M

NODE=M125M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
1410± 60 OUR ESTIMATE						→ UNCHECKED ←
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1418± 30± 10	824	[1] AKHMETSHIN	17A	CMD3	1.4–2.0 $e^+e^- \to \omega\eta$	
1470± 50	13.1k	[2] AULCHENKO	15A	SND	1.05–1.80 $e^+e^- \to \pi^+\pi^-\pi^0$	
1382± 23± 70		AUBERT	07AU	BABR	10.6 $e^+e^- \to \omega\pi^+\pi^-\gamma$	
1350± 20± 20		AUBERT,B	04N	BABR	10.6 $e^+e^- \to \pi^+\pi^-\pi^0\gamma$	
1400± 50±130	1.2M	[3] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$	
1450± 10		[4] HENNER	02	RVUE	1.2–2.0 $e^+e^- \to \rho\pi, \omega\pi\pi$	
1373± 70	177	[5] AKHMETSHIN	00D	CMD2	1.2–1.38 $e^+e^- \to \omega\pi^+\pi^-$	
1370± 25	5095	ANISOVICH	00H	SPEC	0.0 $p\overline{p} \to \omega\pi^0\pi^0\pi^0$	
1400^{+100}_{-200}		[6] ACHASOV	98H	RVUE	$e^+e^- \to \pi^+\pi^-\pi^0$	
∼ 1400		[7] ACHASOV	98H	RVUE	$e^+e^- \to \omega\pi^+\pi^-$	OCCUR=2
∼ 1460		[8] ACHASOV	98H	RVUE	$e^+e^- \to K^+K^-$	OCCUR=3
1440± 70		[9] CLEGG	94	RVUE		
1419± 31	315	[10] ANTONELLI	92	DM2	1.34–2.4 $e^+e^- \to \rho\pi$	

[1] From a fit of the interfering $\omega(1420)$ and $\omega(1650)$ with a relative phase of π and other parameters floating. NODE=M125M;LINKAGE=F
[2] From a fit with contributions from $\omega(782)$, $\phi(1020)$, $\omega(1420)$, and $\omega(1650)$. See ACHASOV 20A for a further analysis of the $\pi^+\pi^-\pi^0$ data. NODE=M125M;LINKAGE=E
[3] From the combined fit of ANTONELLI 92, ACHASOV 01E, ACHASOV 02E, and ACHASOV 03D data on the $\pi^+\pi^-\pi^0$ and ANTONELLI 92 on the $\omega\pi^+\pi^-$ final states. Supersedes ACHASOV 99E and ACHASOV 02E. NODE=M125M;LINKAGE=VH
[4] Using results of CORDIER 81 and preliminary data of DOLINSKY 91 and ANTONELLI 92. NODE=M125M;LINKAGE=AB
[5] Using the data of AKHMETSHIN 00D and ANTONELLI 92. The $\rho\pi$ dominance for the energy dependence of the $\omega(1420)$ and $\omega(1650)$ width assumed. NODE=M125M;LINKAGE=KL
[6] Using data from BARKOV 87, DOLINSKY 91, and ANTONELLI 92. NODE=M125M;LINKAGE=L1
[7] Using the data from ANTONELLI 92. NODE=M125M;LINKAGE=L2
[8] Using the data from IVANOV 81 and BISELLO 88B. NODE=M125M;LINKAGE=L3
[9] From a fit to two Breit-Wigner functions and using the data of DOLINSKY 91 and ANTONELLI 92. NODE=M125M;LINKAGE=AD
[10] From a fit to two Breit-Wigner functions interfering between them and with the ω,ϕ tails with fixed (+,−,+) phases. NODE=M125M;LINKAGE=B

$\omega(1420)$ WIDTH

NODE=M125W

NODE=M125W

→ UNCHECKED ←

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
290±190 OUR ESTIMATE					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
440±125	267	[1] ACHASOV	20B	SND	$e^+e^- \to \omega\eta \to \eta\pi^0\gamma$
104± 35± 10	824	[2] AKHMETSHIN	17A	CMD3	1.4–2.0 $e^+e^- \to \omega\eta$
880±170	13.1k	[3] AULCHENKO	15A	SND	1.05–1.80 $e^+e^- \to \pi^+\pi^-\pi^0$
480±180		[4] ACHASOV	10D	SND	1.075–2.0 $e^+e^- \to \pi^0\gamma$
130± 50±100		AUBERT	07AU	BABR	10.6 $e^+e^- \to \omega\pi^+\pi^-\gamma$
450± 70± 70		AUBERT,B	04N	BABR	10.6 $e^+e^- \to \pi^+\pi^-\pi^0\gamma$
870^{+500}_{-300}±450	1.2M	[5] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
199± 15		[6] HENNER	02	RVUE	1.2–2.0 $e^+e^- \to \rho\pi, \omega\pi\pi$
188± 45	177	[7] AKHMETSHIN	00D	CMD2	1.2–1.38 $e^+e^- \to \omega\pi^+\pi^-$
360^{+100}_{-60}	5095	ANISOVICH	00H	SPEC	0.0 $p\bar{p} \to \omega\pi^0\pi^0\pi^0$
240± 70		[8] CLEGG	94	RVUE	
174± 59	315	[9] ANTONELLI	92	DM2	1.34–2.4$e^+e^- \to \rho\pi$

[1] From a fit with contributions from $\omega(1420)$, $\omega(1650)$, and $\phi(1680)$. The mass of $\omega(1420)$ is fixed to the PDG 18 value of 1420 MeV. NODE=M125W;LINKAGE=H
[2] From a fit of the interfering $\omega(1420)$ and $\omega(1650)$ with a relative phase of π and other parameters floating. NODE=M125W;LINKAGE=F
[3] From a fit with contributions from $\omega(782)$, $\phi(1020)$, $\omega(1420)$, and $\omega(1650)$. See ACHASOV 20A for a further analysis of the $\pi^+\pi^-\pi^0$ data. NODE=M125W;LINKAGE=E
[4] From a fit of a VMD model with two effective resonances with masses of 1450 MeV and 1700 MeV to describe the excited vector states $\omega(1420)$, $\rho(1450)$, $\omega(1650)$, and $\rho(1700)$. Systematic errors not evaluated. NODE=M125W;LINKAGE=G
[5] From the combined fit of ANTONELLI 92, ACHASOV 01E, ACHASOV 02E, and ACHASOV 03D data on the $\pi^+\pi^-\pi^0$ and ANTONELLI 92 on the $\omega\pi^+\pi^-$ final states. Supersedes ACHASOV 99E and ACHASOV 02E. NODE=M125W;LINKAGE=VH
[6] Using results of CORDIER 81 and preliminary data of DOLINSKY 91 and ANTONELLI 92. NODE=M125W;LINKAGE=AB
[7] Using the data of AKHMETSHIN 00D and ANTONELLI 92. The $\rho\pi$ dominance for the energy dependence of the $\omega(1420)$ and $\omega(1650)$ width assumed. NODE=M125W;LINKAGE=KL
[8] From a fit to two Breit-Wigner functions and using the data of DOLINSKY 91 and ANTONELLI 92. NODE=M125W;LINKAGE=AD
[9] From a fit to two Breit-Wigner functions interfering between them and with the ω,ϕ tails with fixed (+,−,+) phases. NODE=M125W;LINKAGE=B

$\omega(1420)$ DECAY MODES

NODE=M125215;NODE=M125

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\rho\pi$	seen	DESIG=1;OUR EST;→ UNCHECKED ←
Γ_2	$\omega\pi\pi$	seen	DESIG=4;OUR EST;→ UNCHECKED ←
Γ_3	$\omega\eta$		DESIG=7
Γ_4	$b_1(1235)\pi$	seen	DESIG=5;OUR EST;→ UNCHECKED ←
Γ_5	e^+e^-	seen	DESIG=3;OUR EST;→ UNCHECKED ←
Γ_6	$\pi^0\gamma$		DESIG=6

$\omega(1420)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma^2(\text{total})$

NODE=M125230

$\Gamma(\rho\pi)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_1/\Gamma \times \Gamma_5/\Gamma$

NODE=M125G3
NODE=M125G3

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.73 ± 0.08	13.1k	[1] AULCHENKO	15A	SND	1.05–1.80 $e^+e^- \to \pi^+\pi^-\pi^0$
$0.82 \pm 0.05 \pm 0.06$		AUBERT,B	04N	BABR	10.6 $e^+e^- \to \pi^+\pi^-\pi^0\gamma$
$0.65 \pm 0.13 \pm 0.21$	1.2M	[2,3] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
0.625 ± 0.160		[4,5] CLEGG	94	RVUE	
0.466 ± 0.178		[6,7] ANTONELLI	92	DM2	1.34–2.4 $e^+e^- \to \rho\pi$

[1] From a fit with contributions from $\omega(782)$, $\phi(1020)$, $\omega(1420)$, and $\omega(1650)$. See ACHASOV 20A for a further analysis of the $\pi^+\pi^-\pi^0$ data. NODE=M125G3;LINKAGE=A

[2] Calculated by us from the cross section at the peak. NODE=M125G;LINKAGE=AW

[3] From the combined fit of ANTONELLI 92, ACHASOV 01E, ACHASOV 02E, and ACHASOV 03D data on the $\pi^+\pi^-\pi^0$ and ANTONELLI 92 on the $\omega\pi^+\pi^-$ final states. Supersedes ACHASOV 99E and ACHASOV 02E. NODE=M125G;LINKAGE=VH

[4] From a fit to two Breit-Wigner functions and using the data of DOLINSKY 91 and ANTONELLI 92. NODE=M125G;LINKAGE=AD

[5] From the partial and leptonic width given by the authors. NODE=M125G;LINKAGE=SE

[6] From a fit to two Breit-Wigner functions interfering between them and with the ω,ϕ tails with fixed (+,−,+) phases. NODE=M125G;LINKAGE=A

[7] From the product of the leptonic width and partial branching ratio given by the authors. NODE=M125G;LINKAGE=ES

$\Gamma(\omega\pi\pi)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_2/\Gamma \times \Gamma_5/\Gamma$

NODE=M125G4
NODE=M125G4

VALUE (units 10^{-8})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
19.7 ± 5.7	AUBERT	07AU	BABR	10.6 $e^+e^- \to \omega\pi^+\pi^-\gamma$
1.9 ± 1.9	[1] AKHMETSHIN	00D	CMD2	1.2–2.4 $e^+e^- \to \omega\pi^+\pi^-$

[1] Using the data of AKHMETSHIN 00D and ANTONELLI 92. The $\rho\pi$ dominance for the energy dependence of the $\omega(1420)$ and $\omega(1650)$ width assumed. NODE=M125G;LINKAGE=KL

$\Gamma(\omega\eta)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_3/\Gamma \times \Gamma_5/\Gamma$

NODE=M125G6
NODE=M125G6

VALUE (units 10^{-8})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.5 ± 0.6	267	[1] ACHASOV	20B	SND	$e^+e^- \to \omega\eta \to \eta\pi^0\gamma$
$2.1^{+1.0}_{-0.8}$		ACHASOV	19	SND	$e^+e^- \to \pi^+\pi^-\pi^0\eta$
$5.0 \pm 2.6 \pm 0.3$	824	[2] AKHMETSHIN	17A	CMD3	1.4–2.0 $e^+e^- \to \omega\eta$
$1.6^{+0.9}_{-0.7}$	898	[3] ACHASOV	16B	SND	1.34–2.00 $e^+e^- \to \omega\eta$

[1] From a fit with contributions from $\omega(1420)$, $\omega(1650)$, and $\phi(1680)$. The mass of $\omega(1420)$ is fixed to the PDG 18 value of 1420 MeV. Fixing also the width of $\omega(1420)$ to the PDG 18 value of 220 MeV results in $(3.0 \pm 1.6) \times 10^{-8}$ measurement. NODE=M125G6;LINKAGE=C

[2] From a fit of the interfering $\omega(1420)$ and $\omega(1650)$ with a relative phase of π and other parameters floating. From an alternative fit $\Gamma(\omega(1420) \to \omega\eta)/\Gamma_{total} \times \Gamma(\omega(1420) \to e^+e^-) = 5.3 \pm 1.6$ eV. NODE=M125G6;LINKAGE=B

[3] From a fit with contributions from $\omega(1420)$, $\omega(1650)$, and $\phi(1680)$. The mass and the width of $\omega(1420)$ are fixed to the 2014 edition (PDG 14) of this review. NODE=M125G6;LINKAGE=A

$\Gamma(\pi^0\gamma)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_6/\Gamma \times \Gamma_5/\Gamma$

NODE=M125G5
NODE=M125G5

VALUE (units 10^{-8})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.23 ± 0.14	[1] ACHASOV	10D	SND	1.075–2.0 $e^+e^- \to \pi^0\gamma$
$2.03^{+0.70}_{-0.75}$	[2] AKHMETSHIN	05	CMD2	0.60–1.38 $e^+e^- \to \pi^0\gamma$

[1] From a fit of a VMD model with two effective resonances with masses of 1450 MeV and 1700 MeV to describe the excited vector states $\omega(1420)$, $\rho(1450)$, $\omega(1650)$, and $\rho(1700)$. Systematic errors not evaluated. NODE=M125G5;LINKAGE=A

[2] Using 1420 MeV and 220 MeV for the $\omega(1420)$ mass and width. NODE=M125G5;LINKAGE=AK

$\omega(1420)$ BRANCHING RATIOS

NODE=M125225

$\Gamma(\omega\pi\pi)/\Gamma_{total}$ — Γ_2/Γ

NODE=M125R2

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.301 ± 0.029	[1] HENNER 02	RVUE	1.2–2.0 $e^+e^- \rightarrow \rho\pi, \omega\pi\pi$
possibly seen	AKHMETSHIN 00D	CMD2	$e^+e^- \rightarrow \omega\pi^+\pi^-$

$\Gamma(\omega\pi\pi)/\Gamma(b_1(1235)\pi)$ — Γ_2/Γ_4

NODE=M125R1

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.60 ± 0.16	5095	ANISOVICH 00H	SPEC	0.0 $p\overline{p} \rightarrow \omega\pi^0\pi^0\pi^0$

$\Gamma(\rho\pi)/\Gamma_{total}$ — Γ_1/Γ

NODE=M125R3

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
seen	ACHASOV 20A	SND	1.15–2.00 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$
0.699 ± 0.029	[1] HENNER 02	RVUE	1.2–2.0 $e^+e^- \rightarrow \rho\pi, \omega\pi\pi$

$\Gamma(e^+e^-)/\Gamma_{total}$ — Γ_5/Γ

NODE=M125R4

VALUE (units 10^{-7})	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$\sim$ 6.6	1.2M	[2,3] ACHASOV 03D	RVUE	0.44–2.00 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$
23 ±1		[1] HENNER 02	RVUE	1.2–2.0 $e^+e^- \rightarrow \rho\pi, \omega\pi\pi$

[1] Assuming that the $\omega(1420)$ decays into $\rho\pi$ and $\omega\pi\pi$ only. NODE=M125R;LINKAGE=AC

[2] Calculated by us from the cross section at the peak. NODE=M125R;LINKAGE=AW

[3] Assuming that the $\omega(1420)$ decays into $\rho\pi$ only. NODE=M125R;LINKAGE=GS

$\omega(1420)$ REFERENCES

NODE=M125

ACHASOV	20A	EPJ C80 993	M.N. Achasov *et al.*	(SND Collab.)	REFID=60923
ACHASOV	20B	EPJ C80 1008	M.N. Achasov *et al.*	(SND Collab.)	REFID=60924
ACHASOV	19	PR D99 112004	M.N. Achasov *et al.*	(SND Collab.)	REFID=59887
PDG	18	PR D98 030001	M. Tanabashi *et al.*	(PDG Collab.)	REFID=59304
AKHMETSHIN	17A	PL B773 150	R.R. Akhmetshin *et al.*	(CMD-3 Collab.)	REFID=58239
ACHASOV	16B	PR D94 092002	M.N. Achasov *et al.*	(SND Collab.)	REFID=57537
AULCHENKO	15A	JETP 121 27 (Translated from ZETF 148 34.)	V.M. Aulchenko *et al.*	(SND Collab.)	REFID=56843
PDG	14	CP C38 070001	K. Olive *et al.*	(PDG Collab.)	REFID=55687
ACHASOV	10D	PR D98 112001	M.N. Achasov *et al.*	(SND Collab.)	REFID=59494
AUBERT	07AU	PR D76 092005	B. Aubert *et al.*	(BABAR Collab.)	REFID=52049
AKHMETSHIN	05	PL B605 26	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=50330
AUBERT,B	04N	PR D70 072004	B. Aubert *et al.*	(BABAR Collab.)	REFID=50184
ACHASOV	03D	PR D68 052006	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=49577
ACHASOV	02E	PR D66 032001	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=48815
HENNER	02	EPJ C26 3	V.K. Henner *et al.*		REFID=49177
ACHASOV	01E	PR D63 072002	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=48311
AKHMETSHIN	00D	PL B489 125	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=47935
ANISOVICH	00H	PL B485 341	A.V. Anisovich *et al.*		REFID=47948
ACHASOV	99E	PL B462 365	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=47391
ACHASOV	98H	PR D57 4334	N.N. Achasov, A.A. Kozhevnikov		REFID=46323
CLEGG	94	ZPHY C62 455	A.B. Clegg, A. Donnachie	(LANC, MCHS)	REFID=44081
ANTONELLI	92	ZPHY C56 15	A. Antonelli *et al.*	(DM2 Collab.)	REFID=43168
DOLINSKY	91	PRPL 202 99	S.I. Dolinsky *et al.*	(NOVO)	REFID=41369
BISELLO	88B	ZPHY C39 13	D. Bisello *et al.*	(PADO, CLER, FRAS+)	REFID=40581
BARKOV	87	JETPL 46 164 (Translated from ZETFP 46 132.)	L.M. Barkov *et al.*	(NOVO)	REFID=40280
CORDIER	81	PL 106B 155	A. Cordier *et al.*	(ORSAY)	REFID=21586
IVANOV	81	PL 107B 297	P.M. Ivanov *et al.*	(NOVO)	REFID=20553

NODE=M066

$f_2(1430)$

$I^G(J^{PC}) = 0^+(2^{++})$

OMITTED FROM SUMMARY TABLE

This entry lists nearby peaks observed in the D wave of the $K\overline{K}$ and $\pi^+\pi^-$ systems. Needs confirmation.

NODE=M066

$f_2(1430)$ MASS

NODE=M066M1

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
≈ 1430 OUR ESTIMATE				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1440±11±3	LEES	21A	BABR	$\gamma\gamma \to \eta_c(1S) \to \eta'\pi^+\pi^-$
1453± 4	[1] VLADIMIRSK...	01	SPEC	$40\ \pi^- p \to K^0_S K^0_S n$
1421± 5	AUGUSTIN	87	DM2	$J/\psi \to \gamma\pi^+\pi^-$
1480±50	AKESSON	86	SPEC	$pp \to pp\pi^+\pi^-$
1436^{+26}_{-16}	DAUM	84	CNTR	17–18 $\pi^- p \to K^+K^- n$
1412± 3	DAUM	84	CNTR	$63\ \pi^- p \to K^0_S K^0_S n$, $K^+K^- n$
1439^{+5}_{-6}	[2] BEUSCH	67	OSPK	5,7,12 $\pi^- p \to K^0_S K^0_S n$

NODE=M066M1 → UNCHECKED ←

OCCUR=2

[1] $J^{PC} = 0^{++}$ or 2^{++}.
[2] Not seen by WETZEL 76.

NODE=M066M;LINKAGE=AC
NODE=M066M;LINKAGE=C

$f_2(1430)$ WIDTH

NODE=M066W1

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
46±15±5	LEES	21A	BABR	$\gamma\gamma \to \eta_c(1S) \to \eta'\pi^+\pi^-$
13± 5	[3] VLADIMIRSK...	01	SPEC	$40\ \pi^- p \to K^0_S K^0_S n$
30± 9	AUGUSTIN	87	DM2	$J/\psi \to \gamma\pi^+\pi^-$
150±50	AKESSON	86	SPEC	$pp \to pp\pi^+\pi^-$
81^{+56}_{-29}	DAUM	84	CNTR	17–18 $\pi^- p \to K^+K^- n$
14± 6	DAUM	84	CNTR	$63\ \pi^- p \to K^0_S K^0_S n$, $K^+K^- n$
43^{+17}_{-18}	[4] BEUSCH	67	OSPK	5,7,12 $\pi^- p \to K^0_S K^0_S n$

NODE=M066W1

OCCUR=2

[3] $J^{PC} = 0^{++}$ or 2^{++}.
[4] Not seen by WETZEL 76.

NODE=M066W;LINKAGE=AC
NODE=M066W;LINKAGE=C

$f_2(1430)$ DECAY MODES

NODE=M066215;NODE=M066

	Mode
Γ_1	$K\overline{K}$
Γ_2	$\pi\pi$

DESIG=1
DESIG=2

$f_2(1430)$ REFERENCES

NODE=M066

LEES	21A	PR D104 072002	J.P. Lees *et al.*	(BABAR Collab.)
VLADIMIRSK...	01	PAN 64 1895	V.V. Vladmirsky *et al.*	
		Translated from YAF 64 1979.		
AUGUSTIN	87	ZPHY C36 369	J.E. Augustin *et al.*	(LALO, CLER, FRAS+)
AKESSON	86	NP B264 154	T. Akesson *et al.*	(Axial Field Spec. Collab.)
DAUM	84	ZPHY C23 339	C. Daum *et al.*	(AMST, CERN, CRAC, MPIM+) JP
WETZEL	76	NP B115 208	W. Wetzel *et al.*	(ETH, CERN, LOIC)
BEUSCH	67	PL 25B 357	W. Beusch *et al.*	(ETH, CERN)

REFID=61442
REFID=48571
REFID=40268
REFID=21123
REFID=21372
REFID=20362
REFID=20320

NODE=M149

$a_0(1450)$

$I^G(J^{PC}) = 1^-(0^{++})$

See the review on "Spectroscopy of Light Meson Resonances."

NODE=M149

$a_0(1450)$ MASS

NODE=M149M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1474 ±19 OUR AVERAGE					
1480 ±30		ABELE	98	CBAR	0.0 $\overline{p}p \to K^0_L K^\pm \pi^\mp$
1470 ±25		[1] AMSLER	95D	CBAR	0.0 $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1302.1± 1.1± 3.9		[2] ALBRECHT	20	RVUE	0.9 $\overline{p}p \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0 K^+ K^-$
1458 ±14 ±15	190k	[3] AAIJ	16N	LHCB	$D^0 \to K^0_S K^\pm \pi^\mp$
1515 ±30		[4] ANISOVICH	09	RVUE	0.0 $\overline{p}p$, πN
$1316.8^{+0.7+24.7}_{-1.0-4.6}$		[5] UEHARA	09A	BELL	$\gamma\gamma \to \pi^0\eta$
1432 ±13 ±25		[6] BUGG	08A	RVUE	$\overline{p}p$
1477 ±10	80k	[7] UMAN	06	E835	5.2 $\overline{p}p \to \eta\eta\pi^0$
1441^{+40}_{-15}	35k	[4] BAKER	03	SPEC	$\overline{p}p \to \omega\pi^+\pi^-\pi^0$
1303 ±16		[8] BARGIOTTI	03	OBLX	$\overline{p}p$
1296 ±10		[9] AMSLER	02	CBAR	0.9 $\overline{p}p \to \pi^0\pi^0\eta$
1565 ±30		[9] ANISOVICH	98B	RVUE	Compilation
1290 ±10		[10] BERTIN	98B	OBLX	0.0 $\overline{p}p \to K^\pm K_s \pi^\mp$
1450 ±40		AMSLER	94D	CBAR	0.0 $\overline{p}p \to \pi^0\pi^0\eta$
1410 ±25		ETKIN	82C	MPS	23 $\pi^- p \to n 2K^0_S$
~ 1300		MARTIN	78	SPEC	10 $K^\pm p \to K^0_S \pi p$
1255 ± 5		[11] CASON	76		

NODE=M149M

[1] Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D. NODE=M149M;LINKAGE=AB
[2] T-matrix pole, 2 poles, 2 channels ($\pi\eta$, $K\overline{K}$). NODE=M149M;LINKAGE=C
[3] Using a model with Gaussian constraints to the PDG averaged values . NODE=M149M;LINKAGE=A
[4] From the pole position. NODE=M149M;LINKAGE=PP
[5] May be a different state. NODE=M149M;LINKAGE=UE
[6] Using data from AMSLER 94D, ABELE 98, and BAKER 03. Supersedes BUGG 94. NODE=M149M;LINKAGE=BU
[7] Statistical error only. NODE=M149M;LINKAGE=ST
[8] Coupled channel analysis of $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, and $K^\pm K^0_S \pi^\mp$. NODE=M149M;LINKAGE=BG
[9] T-matrix pole. NODE=M149M;LINKAGE=B
[10] Not confirmed by BUGG 08A. NODE=M149M;LINKAGE=BE
[11] Isospin 0 not excluded. NODE=M149M;LINKAGE=CC

$a_0(1450)$ WIDTH

NODE=M149W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
265 ±13 OUR AVERAGE					
265 ±15		ABELE	98	CBAR	0.0 $\overline{p}p \to K^0_L K^\pm \pi^\mp$
265 ±30		[1] AMSLER	95D	CBAR	0.0 $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
112.4± 1.4± 3.4		[2] ALBRECHT	20	RVUE	0.9 $\overline{p}p \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0 K^+ K^-$
282 ±12 ±13	190k	[3] AAIJ	16N	LHCB	$D^0 \to K^0_S K^\pm \pi^\mp$
230 ±36		[4] ANISOVICH	09	RVUE	0.0 $\overline{p}p$, πN
$65.0^{+2.1+99.1}_{-5.4-32.6}$		[5] UEHARA	09A	BELL	$\gamma\gamma \to \pi^0\eta$
196 ±10 ±10		[6] BUGG	08A	RVUE	$\overline{p}p$
267 ±11	80k	[7] UMAN	06	E835	5.2 $\overline{p}p \to \eta\eta\pi^0$
110 ±14	35k	[4] BAKER	03	SPEC	$\overline{p}p \to \omega\pi^+\pi^-\pi^0$
92 ±16		[8] BARGIOTTI	03	OBLX	$\overline{p}p$
81 ±21		[9] AMSLER	02	CBAR	0.9 $\overline{p}p \to \pi^0\pi^0\eta$
292 ±40		[9] ANISOVICH	98B	RVUE	Compilation
80 ± 5		[10] BERTIN	98B	OBLX	0.0 $\overline{p}p \to K^\pm K_s \pi^\mp$
270 ±40		AMSLER	94D	CBAR	0.0 $\overline{p}p \to \pi^0\pi^0\eta$
230 ±30		ETKIN	82C	MPS	23 $\pi^- p \to n 2K^0_S$
~ 250		MARTIN	78	SPEC	10 $K^\pm p \to K^0_S \pi p$
79 ±10		[11] CASON	76		

NODE=M149W

[1] Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D. NODE=M149W;LINKAGE=AB
[2] T-matrix pole, 2 poles, 2 channels ($\pi\eta$, $K\overline{K}$). NODE=M149W;LINKAGE=C
[3] Using a model with Gaussian constraints to the PDG averaged values . NODE=M149W;LINKAGE=A
[4] From the pole position. NODE=M149W;LINKAGE=PP
[5] May be a different state. NODE=M149W;LINKAGE=UE
[6] Using data from AMSLER 94D, ABELE 98, and BAKER 03. Supersedes BUGG 94. NODE=M149W;LINKAGE=BU
[7] Statistical error only. NODE=M149W;LINKAGE=ST
[8] Coupled channel analysis of $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, and $K^\pm K^0_S\pi^\mp$. NODE=M149W;LINKAGE=BG
[9] T-matrix pole. NODE=M149W;LINKAGE=B
[10] Not confirmed by BUGG 08A. NODE=M149W;LINKAGE=BE
[11] Isospin 0 not excluded. NODE=M149W;LINKAGE=CC

$a_0(1450)$ DECAY MODES

NODE=M149215;NODE=M149

Branching fractions are given relative to the one **DEFINED AS 1**. NODE=M149

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\pi\eta$	0.093 ± 0.020	DESIG=1
Γ_2	$\pi\eta'(958)$	0.033 ± 0.017	DESIG=2
Γ_3	$K\overline{K}$	0.082 ± 0.028	DESIG=3
Γ_4	$\omega\pi\pi$	**DEFINED AS 1**	DESIG=4
Γ_5	$a_0(980)\pi\pi$	seen	DESIG=5
Γ_6	$\gamma\gamma$	seen	DESIG=6

$a_0(1450)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M149225

$\Gamma(\pi\eta)\times\Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_1\Gamma_6/\Gamma$

NODE=M149G01
NODE=M149G01

VALUE (eV)	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$432\pm6^{+1073}_{-256}$	[1] UEHARA	09A	BELL	$\gamma\gamma\to\pi^0\eta$

[1] May be a different state. NODE=M149G01;LINKAGE=UE

$a_0(1450)$ BRANCHING RATIOS

NODE=M149220

$\Gamma(\pi\eta'(958))/\Gamma(\pi\eta)$ — Γ_2/Γ_1

NODE=M149R1
NODE=M149R1

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
0.35±0.16	[1] ABELE	98	CBAR	$0.0\ \overline{p}p\to K^0_L K^\pm\pi^\mp$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.43 ± 0.19	ABELE	97C	CBAR	$0.0\ \overline{p}p\to\pi^0\pi^0\eta'$

[1] Using $\pi^0\eta$ from AMSLER 94D. NODE=M149R1;LINKAGE=A

$\Gamma(K\overline{K})/\Gamma(\pi\eta)$ — Γ_3/Γ_1

NODE=M149R2
NODE=M149R2

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
0.88 ±0.23	[1] ABELE	98	CBAR	$0.0\ \overline{p}p\to K^0_L K^\pm\pi^\mp$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$1.887\pm0.041\pm0.97$	[2] ALBRECHT	20	RVUE	$0.9\ \overline{p}p\to\pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0K^+K^-$

[1] Using $\pi^0\eta$ from AMSLER 94D. NODE=M149R2;LINKAGE=A
[2] Residues from T-matrix pole, 2 poles, 2 channels ($\pi\eta$, $K\overline{K}$). NODE=M149R2;LINKAGE=B

$\Gamma(\omega\pi\pi)/\Gamma(\pi\eta)$ — Γ_4/Γ_1

NODE=M149R3
NODE=M149R3

VALUE	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
10.7±2.3	35280	[1] BAKER	03	SPEC	$\overline{p}p\to\omega\pi^+\pi^-\pi^0$

[1] Using results on $\overline{p}p\to a_0(1450)^0\pi^0$, $a_0(1450)\to\eta\pi^0$ from ABELE 96C and assuming the $\omega\rho$ mechanism for the $\omega\pi\pi$ state. NODE=M149R;LINKAGE=PP

$\Gamma(a_0(980)\pi\pi)/\Gamma_{total}$ — Γ_5/Γ

NODE=M149R01
NODE=M149R01

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
seen	BUGG	08A	RVUE	$\overline{p}p$

$\Gamma(a_0(980)\pi\pi)/\Gamma(\pi\eta)$ — Γ_5/Γ_1

NODE=M149R02
NODE=M149R02

VALUE	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
≤ 4.3	ANISOVICH	01	RVUE	0	$\overline{p}p\to\eta 2\pi^+2\pi^-$

NODE=M149R03
NODE=M149R03

$\Gamma(\gamma\gamma)/\Gamma_{total}$ **Γ_6/Γ**

VALUE	DOCUMENT ID	TECN	COMMENT
seen	[1] UEHARA 09A	BELL	$\gamma\gamma \to \pi^0 \eta$

[1] May be a different state.

NODE=M149R03;LINKAGE=UE

a_0(1450) REFERENCES

NODE=M149

ALBRECHT	20	EPJ C80 453	M. Albrecht *et al.*	(Crystal Barrel Collab.)	REFID=60439
AAIJ	16N	PR D93 052018	R. Aaij *et al.*	(LHCb Collab.)	REFID=57273
ANISOVICH	09	IJMP A24 2481	V.V. Anisovich, A.V. Sarantsev		REFID=52719
UEHARA	09A	PR D80 032001	S. Uehara *et al.*	(BELLE Collab.)	REFID=53002
BUGG	08A	PR D78 074023	D.V. Bugg	(LOQM)	REFID=52578
UMAN	06	PR D73 052009	I. Uman *et al.*	(FNAL E835)	REFID=51063
BAKER	03	PL B563 140	C.A. Baker *et al.*		REFID=49414
BARGIOTTI	03	EPJ C26 371	M. Bargiotti *et al.*	(OBELIX Collab.)	REFID=49217
AMSLER	02	EPJ C23 29	C. Amsler *et al.*		REFID=48580
ANISOVICH	01	NP A690 567	A.V. Anisovich *et al.*		REFID=48308
ABELE	98	PR D57 3860	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=45863
ANISOVICH	98B	SPU 41 419	V.V. Anisovich *et al.*		REFID=46331
		Translated from UFN 168 481.			
BERTIN	98B	PL B434 180	A. Bertin *et al.*	(OBELIX Collab.)	REFID=46351
ABELE	97C	PL B404 179	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=45531
ABELE	96C	NP A609 562	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=45076
AMSLER	95B	PL B342 433	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=44377
AMSLER	95C	PL B353 571	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=44440
AMSLER	95D	PL B355 425	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=44441
AMSLER	94D	PL B333 277	C. Amsler *et al.*	(Crystal Barrel Collab.) IGJPC	REFID=44093
BUGG	94	PR D50 4412	D.V. Bugg *et al.*	(LOQM)	REFID=44078
ETKIN	82C	PR D25 2446	A. Etkin *et al.*	(BNL, CUNY, TUFTS, VAND)	REFID=20391
MARTIN	78	NP B134 392	A.D. Martin *et al.*	(DURH, GEVA)	REFID=22446
CASON	76	PRL 36 1485	N.M. Cason *et al.*	(NDAM, ANL)	REFID=21064

NODE=M105

$\rho(1450)$

$I^G(J^{PC}) = 1^+(1^{--})$

NODE=M105

THE $\rho(1450)$ AND THE $\rho(1700)$

Updated September 2019 by S. Eidelman (Novosibirsk), C. Hanhart (Juelich) and G. Venanzoni (Pisa).

In our 1988 edition, we replaced the $\rho(1600)$ entry with two new ones, the $\rho(1450)$ and the $\rho(1700)$, because there was emerging evidence that the 1600-MeV region actually contains two ρ-like resonances. Erkal [1] had pointed out this possibility with a theoretical analysis on the consistency of 2π and 4π electromagnetic form factors and the $\pi\pi$ scattering length. Donnachie [2], with a full analysis of data on the 2π and 4π final states in e^+e^- annihilation and photoproduction reactions, had also argued that in order to obtain a consistent picture, two resonances were necessary. The existence of $\rho(1450)$ was supported by the analysis of $\eta\rho^0$ mass spectra obtained in photoproduction and e^+e^- annihilation [3], as well as that of $e^+e^- \to \omega\pi$ [4].

The analysis of [2] was further extended by [5,6] to include new data on 4π-systems produced in e^+e^- annihilation, and in τ-decays (τ decays to 4π, and e^+e^- annihilation to 4π can be related by the Conserved Vector Current assumption). These systems were successfully analyzed using interfering contributions from two ρ-like states, and from the tail of the $\rho(770)$ decaying into two-body states. While specific conclusions on

$\rho(1450) \rightarrow 4\pi$ were obtained, little could be said about the $\rho(1700)$.

Independent evidence for two 1^- states is provided by [7] in 4π electroproduction at $\langle Q^2 \rangle = 1$ $(\text{GeV}/c)^2$, and by [8] in a high-statistics sample of the $\eta\pi\pi$ system in $\pi^- p$ charge exchange.

This scenario with two overlapping resonances is supported by other data. Bisello [9] measured the pion form factor in the interval 1.35–2.4 GeV, and observed a deep minimum around 1.6 GeV. The best fit was obtained with the hypothesis of ρ-like resonances at 1420 and 1770 MeV, with widths of about 250 MeV. Antonelli [10] found that the $e^+e^- \rightarrow \eta\,\pi^+\,\pi^-$ cross section is better fitted with two fully interfering Breit-Wigners, with parameters in fair agreement with those of [2] and [9]. These results can be considered as a confirmation of the $\rho(1450)$.

Decisive evidence for the $\pi\pi$ decay mode of both $\rho(1450)$ and $\rho(1700)$ comes from $\overline{p}p$ annihilation at rest [11]. It has been shown that these resonances also possess a $K\overline{K}$ decay mode [12–14]. . High-statistics studies of the decays $\tau \rightarrow \pi\pi\nu_\tau$ [15,16], and $\tau \rightarrow 4\pi\nu_\tau$ [17] also require the $\rho(1450)$, but are not sensitive to the $\rho(1700)$, because it is too close to the τ mass. A recent very-high-statistics study of the $\tau \rightarrow \pi\pi\nu_\tau$ decay performed at Belle [18] reports the first observation of both $\rho(1450)$ and $\rho(1700)$ in τ decays. A clear picture of the two $\pi^+\pi^-$ resonances interfering with the $\rho(770)$ in e^+e^- annihilation was also reported by BaBar using the ISR method [19].

The structure of these ρ states is not yet completely clear. Barnes [20] and Close [21] claim that $\rho(1450)$ has a mass consistent with radial $2S$, but its decays show characteristics of hybrids, and suggest that this state may be a $2S$-hybrid mixture. Donnachie [22] argues that hybrid states could have a 4π decay mode dominated by the $a_1\pi$. Such behavior has been observed by [23] in $e^+e^- \rightarrow 4\pi$ in the energy range 1.05–1.38 GeV, and by [17] in $\tau \rightarrow 4\pi$ decays. CLEO [24] and Belle [25] observe the $\rho(1450) \rightarrow \omega\pi$ decay mode in B-meson decays, however, do not find $\rho(1700) \rightarrow \omega\pi^0$. A similar conclusion is made by [26,27], who studied the process $e^+e^- \rightarrow \omega\pi^0$ and do not observe a statistically significant signal of the $\rho(1700)$. Various decay modes of the $\rho(1450)$ and $\rho(1700)$ are observed in $\overline{p}n$ and $\overline{p}p$ annihilation [28,29], but no definite conclusions can be drawn. More data should be collected to clarify the nature of the ρ states, particularly in the energy range above 1.6 GeV.

We now list under a separate entry the $\rho(1570)$, the $\phi\pi$ state with $J^{PC} = 1^{--}$ earlier observed by [30] (referred to as $C(1480)$) and recently confirmed by [31]. While [32] shows that it may be a threshold effect, [5] and [33] suggest two independent vector states with this decay mode. The $C(1480)$ has not been seen in the $\overline{p}p$ [34] and e^+e^- [35,36] experiments. However, the sensitivity of the two latter is an order of magnitude lower than that of [31]. Note that [31] can not exclude that their observation is due to an OZI-suppressed decay mode of the $\rho(1700)$.

Several observations on the $\omega\pi$ system in the 1200-MeV region [37–43] mmay be interpreted in terms of either $J^P = 1^-$ $\rho(770) \to \omega\pi$ production [44], or $J^P = 1^+$ $b_1(1235)$ production [42,43]. We argue that no special entry for a $\rho(1250)$ is needed. The LASS amplitude analysis [45] showing evidence for $\rho(1270)$ is preliminary and needs confirmation. For completeness, the relevant observations are listed under the $\rho(1450)$.

Recently [46] reported a very broad 1^{--} resonance-like K^+K^- state in $J/\psi \to K^+K^-\pi^0$ decays. Its pole position corresponds to mass of 1576 MeV and width of 818 MeV. [47–49] ssuggest its exotic structure (molecular or multiquark), while [50] and [51] explain it by the interference between the $\rho(1450)$ and $\rho(1700)$. The latter statement is qualitatively supported by BaBar [52] and SND [53]. We quote [46] as $X(1575)$ in the section "Further States."

Evidence for ρ-like mesons decaying into 6π states was first noted by [54] in the analysis of 6π mass spectra from e^+e^- annihilation [55,56] and diffractive photoproduction [57]. Clegg [54] argued that two states at about 2.1 and 1.8 GeV exist: while the former is a candidate for the $\rho(2150)$, the latter could be a manifestation of the $\rho(1700)$ distorted by threshold effects. BaBar reported observations of the new decay modes of the $\rho(2150)$ in the channels $\eta'(958)\pi^+\pi^-$ and $f_1(1285)\pi^+\pi^-$ [58]. The relativistic quark model [59] predicts the 2^3D_1 state with $J^{PC} = 1^{--}$ at 2.15 GeV which can be identified with the $\rho(2150)$.

We no longer list under a separate particle $\rho(1900)$ various observations of irregular behavior of the cross sections near the $N\bar{N}$ threshold. Dips of various width around 1.9 GeV were reported by the E687 Collaboration (a narrow one in the $3\pi^+3\pi^-$ diffractive photoproduction [60,61]) , by the FENICE experiment (a narrow structure in the R value [62])

, by BaBar in ISR (a narrow structure in $e^+e^- \to \phi\pi$ final state [63], but much broader in $e^+e^- \to 3\pi^+3\pi^-$ and $e^+e^- \to 2(\pi^+\pi^-\pi^0)$ [64]) , by CMD-3 (also a rather broad dip in $e^+e^- \to 3\pi^+3\pi^-$ [65]) . A dedicated scan of the $N\bar{N}$-threshold region by CMD-3 confirms this effect in the $e^+e^- \to 3\pi^+3\pi^-$ and $e^+e^- \to K^+K^-\pi^+\pi^-$ final states, but does not see it in the cross section of $e^+e^- \to 2\pi^+2\pi^-$ [66]. Most probably, these structures emerge as a threshold effect due to the opening of the $N\bar{N}$ channel [67,68,69].

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$\rho(1450)$ MASS

NODE=M105205

$\rho(1450)$ MASS

NODE=M105M0
NODE=M105M0

VALUE (MeV)	DOCUMENT ID
1465±25 OUR ESTIMATE This is only an educated guess; the error given is larger than the error on the average of the published values.	

→ UNCHECKED ←

$\eta\rho^0$ MODE

NODE=M105M1
NODE=M105M1

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1506±11	13.4k	[1] GRIBANOV	20	CMD3	1.1–2.0 $e^+e^- \to \eta\pi^+\pi^-$
1500±10	7.4k	[2] ACHASOV	18	SND	1.22–2.00 $e^+e^- \to \eta\pi^+\pi^-$
1497±14		[3] AKHMETSHIN	01B	CMD2	$e^+e^- \to \eta\gamma$
1421±15		[4] AKHMETSHIN	00D	CMD2	$e^+e^- \to \eta\pi^+\pi^-$
1470±20		ANTONELLI	88	DM2	$e^+e^- \to \eta\pi^+\pi^-$
1446±10		FUKUI	88	SPEC	8.95 $\pi^- p \to \eta\pi^+\pi^- n$

[1] Mass and width of the $\rho(770)$ fixed at 775 and 149 MeV, respectively; solution 2 of model 2, $\eta \to \gamma\gamma$ decays used. NODE=M105M1;LINKAGE=B

[2] From the combined fit of AULCHENKO 15 and ACHASOV 18 in the model with the interfering $\rho(1450)$, $\rho(1700)$ and $\rho(2150)$ with the parameters of the $\rho(1450)$ and $\rho(1700)$ floating and the mass and width of the $\rho(2150)$ fixed at 2155 MeV and 320 MeV, respectively. The phases of the resonances are π, 0 and π, respectively. NODE=M105M1;LINKAGE=A

[3] Using the data of AKHMETSHIN 01B on $e^+e^- \to \eta\gamma$, AKHMETSHIN 00D and ANTONELLI 88 on $e^+e^- \to \eta\pi^+\pi^-$. NODE=M105M;LINKAGE=SW

[4] Using the data of ANTONELLI 88, DOLINSKY 91, and AKHMETSHIN 00D. The energy-independent width of the $\rho(1450)$ and $\rho(1700)$ mesons assumed. NODE=M105M1;LINKAGE=KL

$\omega\pi$ MODE

NODE=M105M3
NODE=M105M3

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1510± 7	10.2k	[1] ACHASOV	16D	SND	1.05–2.00 $e^+e^- \to \pi^0\pi^0\gamma$
$1544\pm22^{+11}_{-46}$	821	[2] MATVIENKO	15	BELL	$\overline{B}^0 \to D^{*+}\omega\pi^-$
1491±19	7815	[3] ACHASOV	13	SND	1.05–2.00 $e^+e^- \to \pi^0\pi^0\gamma$
1582±17±25	2382	[4] AKHMETSHIN	03B	CMD2	$e^+e \to \pi^0\pi^0\gamma$
$1349\pm25^{+10}_{-5}$	341	[5] ALEXANDER	01B	CLE2	$B \to D^{(*)}\omega\pi^-$
1523±10		[6] EDWARDS	00A	CLE2	$\tau^- \to \omega\pi^-\nu_\tau$
1463±25		[7] CLEGG	94	RVUE	
1250		[8] ASTON	80C	OMEG	20–70 $\gamma p \to \omega\pi^0 p$
1290±40		[8] BARBER	80C	SPEC	3–5 $\gamma p \to \omega\pi^0 p$

OCCUR=2

[1] From a phenomenological model based on vector meson dominance with interfering $\rho(770)$, $\rho(1450)$, and $\rho(1700)$. The $\rho(1700)$ mass and width are fixed at 1720 MeV and 250 MeV, respectively. Systematic uncertainties not estimated. Supersedes ACHASOV 13. NODE=M105M3;LINKAGE=D

[2] Using Breit-Wigner parameterization of the $\rho(1450)$ and assuming equal probabilities of the $\rho(1450) \to \pi\pi$ and $\rho(1450) \to \omega\pi$ decays. NODE=M105M3;LINKAGE=C

[3] From a phenomenological model based on vector meson dominance with the interfering $\rho(1450)$ and $\rho(1700)$ and their widths fixed at 400 and 250 MeV, respectively. Systematic uncertainty not estimated. NODE=M105M3;LINKAGE=AC

[4] Using the data of AKHMETSHIN 03B and BISELLO 91B assuming the $\omega\pi^0$ and $\pi^+\pi^-$ mass dependence of the total width. $\rho(1700)$ mass and width fixed at 1700 MeV and 240 MeV, respectively. NODE=M105M3;LINKAGE=HK

[5] Using Breit-Wigner parameterization of the $\rho(1450)$ and assuming the $\omega\pi^-$ mass dependence for the total width. NODE=M105M3;LINKAGE=3Z

[6] Mass-independent width parameterization. $\rho(1700)$ mass and width fixed at 1700 MeV and 235 MeV respectively. NODE=M105M;LINKAGE=E1

[7] Using data from BISELLO 91B, DOLINSKY 86 and ALBRECHT 87L. NODE=M105M3;LINKAGE=B

[8] Not separated from $b_1(1235)$, not pure $J^P = 1^-$ effect. NODE=M105M3;LINKAGE=A

4π MODE

NODE=M105M6
NODE=M105M6

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1435±40	ABELE	01B	CBAR	0.0 $\overline{p}n \to 2\pi^- 2\pi^0 \pi^+$
1350±50	ACHASOV	97	RVUE	$e^+e^- \to 2(\pi^+\pi^-)$
1449± 4	[1] ARMSTRONG	89E	OMEG	300 $pp \to pp2(\pi^+\pi^-)$

[1] Not clear whether this observation has I=1 or 0. NODE=M105M6;LINKAGE=A

$\pi\pi$ MODE

NODE=M105M5
NODE=M105M5

VALUE (MeV)			EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •							
1326.35	± 3.46			[1] BARTOS	17	RVUE	$e^+e^- \to \pi^+\pi^-$
1342.31	±46.62			[2] BARTOS	17A	RVUE	$e^+e^- \to \pi^+\pi^-$
1373.83	±11.37			[3] BARTOS	17A	RVUE	$\tau^- \to \pi^-\pi^0\nu_\tau$
1429	±41		20k	[4] LEES	17C	BABR	$J/\psi \to \pi^+\pi^-\pi^0$
1350	±20	$^{+20}_{-30}$	63.5k	[5] ABRAMOWICZ	12	ZEUS	$ep \to e\pi^+\pi^- p$
1493	±15			[6] LEES	12G	BABR	$e^+e^- \to \pi^+\pi^-\gamma$
1446	± 7	±28	5.4M	[7,8] FUJIKAWA	08	BELL	$\tau^- \to \pi^-\pi^0\nu_\tau$
1328	±15			[9] SCHAEL	05C	ALEP	$\tau^- \to \pi^-\pi^0\nu_\tau$
1406	±15		87k	[7,10] ANDERSON	00A	CLE2	$\tau^- \to \pi^-\pi^0\nu_\tau$
∼ 1368				[11] ABELE	99C	CBAR	0.0 $\overline{p}d \to \pi^+\pi^-\pi^- p$
1348	±33			BERTIN	98	OBLX	0.05–0.405 $\overline{n}p \to 2\pi^+\pi^-$
1411	±14			[12] ABELE	97	CBAR	$\overline{p}n \to \pi^-\pi^0\pi^0$
1370	$^{+90}_{-70}$			ACHASOV	97	RVUE	$e^+e^- \to \pi^+\pi^-$
1359	±40			[10] BERTIN	97C	OBLX	0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$
1282	±37			BERTIN	97D	OBLX	0.05 $\overline{p}p \to 2\pi^+2\pi^-$
1424	±25			BISELLO	89	DM2	$e^+e^- \to \pi^+\pi^-$
1265.5	±75.3			DUBNICKA	89	RVUE	$e^+e^- \to \pi^+\pi^-$
1292	±17			[13] KURDADZE	83	OLYA	0.64–1.4 $e^+e^- \to \pi^+\pi^-$

OCCUR=2
OCCUR=2

[1] Applies the Unitary & Analytic Model of the pion electromagnetic form factor of DUBNICKA 10 to analyze the data of LEES 12G and ABLIKIM 16C. NODE=M105M5;LINKAGE=D

[2] Applies the Unitary & Analytic Model of the pion electromagnetic form factor of DUBNICKA 10 to analyze the data of ACHASOV 06, AKHMETSHIN 07, AUBERT 09AS, and AMBROSINO 11A. NODE=M105M5;LINKAGE=E

[3] Applies the Unitary & Analytic Model of the pion electromagnetic form factor of DUBNICKA 10 to analyze the data of FUJIKAWA 08. NODE=M105M5;LINKAGE=F

[4] From a Dalitz plot analysis in an isobar model with $\rho(1450)$ and $\rho(1700)$ masses and widths floating. NODE=M105M5;LINKAGE=B

[5] Using the KUHN 90 parametrization of the pion form factor, neglecting $\rho-\omega$ interference. NODE=M105M5;LINKAGE=AB

[6] Using the GOUNARIS 68 parametrization of the pion form factor leaving the masses and widths of the $\rho(1450)$, $\rho(1700)$, and $\rho(2150)$ resonances as free parameters of the fit. NODE=M105M5;LINKAGE=LE

[7] From the GOUNARIS 68 parametrization of the pion form factor. NODE=M105M;LINKAGE=1K

[8] $|F_\pi(0)|^2$ fixed to 1. NODE=M105M5;LINKAGE=FU

[9] From the combined fit of the τ^- data from ANDERSON 00A and SCHAEL 05C and e^+e^- data from the compilation of BARKOV 85, AKHMETSHIN 04, and ALOISIO 05. $\rho(1700)$ mass and width fixed at 1713 MeV and 235 MeV, respectively. Supersedes BARATE 97M. NODE=M105M5;LINKAGE=SC

[10] $\rho(1700)$ mass and width fixed at 1700 MeV and 235 MeV, respectively. NODE=M105M5;LINKAGE=A

[11] $\rho(1700)$ mass and width fixed at 1780 MeV and 275 MeV respectively. NODE=M105M5;LINKAGE=C5

[12] T-matrix pole. NODE=M105M5;LINKAGE=QQ

[13] Using for $\rho(1700)$ mass and width 1600 ± 20 and 300 ± 10 MeV respectively. NODE=M105M5;LINKAGE=KD

$K\overline{K}$ MODE

NODE=M105M7
NODE=M105M7

VALUE (MeV)			EVTS	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •								
1208	±8	±9	190k	[1] AAIJ	16N	LHCB		$D^0 \to K^0_S K^\pm\pi^\mp$
1422.8	±6.5		27k	[2] ABELE	99D	CBAR	±	0.0 $\overline{p}p \to K^+K^-\pi^0$

[1] Using the GOUNARIS 68 parameterization with fixed width. NODE=M105M7;LINKAGE=A

[2] K-matrix pole. Isospin not determined, could be $\omega(1420)$. NODE=M105M7;LINKAGE=AN

$K\overline{K}^*(892)$ + c.c. MODE

NODE=M105M8
NODE=M105M8

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1505±19±7	AUBERT	08S	BABR	10.6 $e^+e^- \to K\overline{K}^*(892)\gamma$

$m_{\rho(1450)^0} - m_{\rho(1450)^\pm}$

NODE=M105DM
NODE=M105DM

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
−31.53±47.99	[1] BARTOS	17A	RVUE	$e^+e^- \to \pi^+\pi^-$, $\tau^- \to \pi^-\pi^0\nu_\tau$

[1] Applies the Unitary & Analytic Model of the pion electromagnetic form factor of DUBNICKA 10 to analyze the data of ACHASOV 06, AKHMETSHIN 07, AUBERT 09AS, AMBROSINO 11A, and FUJIKAWA 08. NODE=M105DM;LINKAGE=A

$\rho(1450)$ WIDTH

NODE=M105210

$\rho(1450)$ WIDTH

NODE=M105W0
NODE=M105W0

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
400± 60 OUR ESTIMATE This is only an educated guess; the error given is larger than the error on the average of the published values.				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
480±180	[1] ACHASOV	10D	SND	1.075–2.0 $e^+e^- \to \pi^0\gamma$

→ UNCHECKED ←

[1] From a fit of a VMD model with two effective resonances with masses of 1450 MeV and 1700 MeV to describe the excited vector states $\omega(1420)$, $\rho(1450)$, $\omega(1650)$, and $\rho(1700)$. Systematic errors not evaluated.

NODE=M105W0;LINKAGE=A

$\eta\rho^0$ MODE

NODE=M105W1
NODE=M105W1

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
321±27	13.4k	[1] GRIBANOV	20	CMD3	1.1–2.0 $e^+e^- \to \eta\pi^+\pi^-$
280±20	7.4k	[2] ACHASOV	18	SND	1.22–2.00 $e^+e^- \to \eta\pi^+\pi^-$
226±44		[3] AKHMETSHIN	01B	CMD2	$e^+e^- \to \eta\gamma$
211±31		[4] AKHMETSHIN	00D	CMD2	$e^+e^- \to \eta\pi^+\pi^-$
230±30		ANTONELLI	88	DM2	$e^+e^- \to \eta\pi^+\pi^-$
60±15		FUKUI	88	SPEC	8.95 $\pi^- p \to \eta\pi^+\pi^- n$

[1] Mass and width of the $\rho(770)$ fixed at 775 and 149 MeV, respectively; solution 2 of model 2, $\eta \to \gamma\gamma$ decays used.

NODE=M105W1;LINKAGE=B

[2] From the combined fit of AULCHENKO 15 and ACHASOV 18 in the model with the interfering $\rho(1450)$, $\rho(1700)$ and $\rho(2150)$ with the parameters of the $\rho(1450)$ and $\rho(1700)$ floating and the mass and width of the $\rho(2150)$ fixed at 2155 MeV and 320 MeV, respectively. The phases of the resonances are π, 0 and π, respectively.

NODE=M105W1;LINKAGE=A

[3] Using the data of AKHMETSHIN 01B on $e^+e^- \to \eta\gamma$, AKHMETSHIN 00D and ANTONELLI 88 on $e^+e^- \to \eta\pi^+\pi^-$.

NODE=M105W;LINKAGE=SW

[4] Using the data of ANTONELLI 88, DOLINSKY 91, and AKHMETSHIN 00D. The energy-independent width of the $\rho(1450)$ and $\rho(1700)$ mesons assumed.

NODE=M105W1;LINKAGE=KL

$\omega\pi$ MODE

NODE=M105W3
NODE=M105W3

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
440± 40	10.2k	[1] ACHASOV	16D	SND	1.05–2.00 $e^+e^- \to \pi^0\pi^0\gamma$
$303^{+31}_{-52}{}^{+69}_{-7}$	821	[2] MATVIENKO	15	BELL	$\overline{B}^0 \to D^{*+}\omega\pi^-$
429± 42±10	2382	[3] AKHMETSHIN	03B	CMD2	$e^+e \to \pi^0\pi^0\gamma$
$547\pm 86^{+46}_{-45}$	341	[4] ALEXANDER	01B	CLE2	$B \to D^{(*)}\omega\pi^-$
400± 35		[5] EDWARDS	00A	CLE2	$\tau^- \to \omega\pi^-\nu_\tau$
311± 62		[6] CLEGG	94	RVUE	
300		[7] ASTON	80C	OMEG	20–70 $\gamma p \to \omega\pi^0 p$
320±100		[7] BARBER	80C	SPEC	3–5 $\gamma p \to \omega\pi^0 p$

OCCUR=3

[1] From a phenomenological model based on vector meson dominance with interfering $\rho(770)$, $\rho(1450)$, and $\rho(1700)$. The $\rho(1700)$ mass and width are fixed at 1720 MeV and 250 MeV, respectively. Systematic uncertainties not estimated. Supersedes ACHASOV 13.

NODE=M105W3;LINKAGE=D

[2] Using Breit-Wigner parameterization of the $\rho(1450)$ and assuming equal probabilities of the $\rho(1450) \to \pi\pi$ and $\rho(1450) \to \omega\pi$ decays.

NODE=M105W3;LINKAGE=C

[3] Using the data of AKHMETSHIN 03B and BISELLO 91B assuming the $\omega\pi^0$ and $\pi^+\pi^-$ mass dependence of the total width. $\rho(1700)$ mass and width fixed at 1700 MeV and 240 MeV, respectively.

NODE=M105W3;LINKAGE=HK

[4] Using Breit-Wigner parameterization of the $\rho(1450)$ and assuming the $\omega\pi^-$ mass dependence for the total width.

NODE=M105W3;LINKAGE=3Z

[5] Mass-independent width parameterization. $\rho(1700)$ mass and width fixed at 1700 MeV and 235 MeV respectively.

NODE=M105W;LINKAGE=E1

[6] Using data from BISELLO 91B, DOLINSKY 86 and ALBRECHT 87L.

NODE=M105W3;LINKAGE=B

[7] Not separated from $b_1(1235)$, not pure $J^P = 1^-$ effect.

NODE=M105W3;LINKAGE=A

4π MODE

NODE=M105W66
NODE=M105W66

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
325±100	ABELE	01B	CBAR	0.0 $\overline{p}n \to 2\pi^- 2\pi^0\pi^+$

$\pi\pi$ MODE

NODE=M105W5

VALUE (MeV)		EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
324.13±12.01			[1] BARTOS	17	RVUE	$e^+e^- \to \pi^+\pi^-$
492.17±138.38			[2] BARTOS	17A	RVUE	$e^+e^- \to \pi^+\pi^-$
340.87±23.84			[3] BARTOS	17A	RVUE	$\tau^- \to \pi^-\pi^0\nu_\tau$
576 ±29		20k	[4] LEES	17C	BABR	$J/\psi \to \pi^+\pi^-\pi^0$
460 ±30	$^{+40}_{-45}$	63.5k	[5] ABRAMOWICZ	12	ZEUS	$e p \to e\pi^+\pi^- p$
427 ±31			[6] LEES	12G	BABR	$e^+e^- \to \pi^+\pi^-\gamma$
434 ±16	±60	5.4M	[7,8] FUJIKAWA	08	BELL	$\tau^- \to \pi^-\pi^0\nu_\tau$
468 ±41			[9] SCHAEL	05C	ALEP	$\tau^- \to \pi^-\pi^0\nu_\tau$
455 ±41		87k	[7,10] ANDERSON	00A	CLE2	$\tau^- \to \pi^-\pi^0\nu_\tau$
∼ 374			[11] ABELE	99C	CBAR	0.0 $\overline{p}d \to \pi^+\pi^-\pi^- p$
275 ±10			BERTIN	98	OBLX	0.05–0.405 $\overline{n}p \to \pi^+\pi^+\pi^-$
343 ±20			[12] ABELE	97	CBAR	$\overline{p}n \to \pi^-\pi^0\pi^0$
310 ±40			[10] BERTIN	97C	OBLX	0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$
236 ±36			BERTIN	97D	OBLX	0.05 $\overline{p}p \to 2\pi^+2\pi^-$
269 ±31			BISELLO	89	DM2	$e^+e^- \to \pi^+\pi^-$
391 ±70			DUBNICKA	89	RVUE	$e^+e^- \to \pi^+\pi^-$
218 ±46			[13] KURDADZE	83	OLYA	0.64–1.4 $e^+e^- \to \pi^+\pi^-$

OCCUR=2

[1] Applies the Unitary & Analytic Model of the pion electromagnetic form factor of DUBNICKA 10 to analyze the data of LEES 12G and ABLIKIM 16C. NODE=M105W5;LINKAGE=C

[2] Applies the Unitary & Analytic Model of the pion electromagnetic form factor of DUBNICKA 10 to analyze the data of ACHASOV 06, AKHMETSHIN 07, AUBERT 09AS, and AMBROSINO 11A. NODE=M105W5;LINKAGE=D

[3] Applies the Unitary & Analytic Model of the pion electromagnetic form factor of DUBNICKA 10 to analyze the data of FUJIKAWA 08. NODE=M105W5;LINKAGE=E

[4] From a Dalitz plot analysis in an isobar model with ρ(1450) and ρ(1700) masses and widths floating. NODE=M105W5;LINKAGE=B

[5] Using the KUHN 90 parametrization of the pion form factor, neglecting $\rho-\omega$ interference. NODE=M105W5;LINKAGE=AB

[6] Using the GOUNARIS 68 parametrization of the pion form factor leaving the masses and widths of the ρ(1450), ρ(1700), and ρ(2150) resonances as free parameters of the fit. NODE=M105W5;LINKAGE=LE

[7] From the GOUNARIS 68 parametrization of the pion form factor. NODE=M105W;LINKAGE=1K

[8] $|F_\pi(0)|^2$ fixed to 1. NODE=M105W5;LINKAGE=FU

[9] From the combined fit of the τ^- data from ANDERSON 00A and SCHAEL 05C and e^+e^- data from the compilation of BARKOV 85, AKHMETSHIN 04, and ALOISIO 05. ρ(1700) mass and width fixed at 1713 MeV and 235 MeV, respectively. Supersedes BARATE 97M. NODE=M105W5;LINKAGE=SC

[10] ρ(1700) mass and width fixed at 1700 MeV and 235 MeV, respectively. NODE=M105W5;LINKAGE=A

[11] ρ(1700) mass and width fixed at 1780 MeV and 275 MeV respectively. NODE=M105W5;LINKAGE=C5

[12] T-matrix pole. NODE=M105W5;LINKAGE=QQ

[13] Using for ρ(1700) mass and width 1600 ± 20 and 300 ± 10 MeV respectively. NODE=M105W5;LINKAGE=KD

$K\overline{K}$ MODE

NODE=M105W7

VALUE (MeV)			EVTS	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •								
410	±19	±35	190k	[1] AAIJ	16N	LHCB		$D^0 \to K^0_S K^\pm\pi^\mp$
146.5±10.5			27k	[2] ABELE	99D	CBAR	±	0.0 $\overline{p}p \to K^+K^-\pi^0$

[1] Using the GOUNARIS 68 parameterization with fixed mass. NODE=M105W7;LINKAGE=A

[2] K-matrix pole. Isospin not determined, could be ω(1420). NODE=M105W7;LINKAGE=AN

$K\overline{K}^*(892)$ + c.c. MODE

NODE=M105W8

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
418±25±4	AUBERT	08S	BABR	10.6 $e^+e^- \to K\overline{K}^*(892)\gamma$

$\Gamma_{\rho(1450)^0} - \Gamma_{\rho(1450)^\pm}$

NODE=M105DW

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
151.30±140.42	[1] BARTOS	17A	RVUE	$e^+e^- \to \pi^+\pi^-$, $\tau^- \to \pi^-\pi^0\nu_\tau$

[1] Applies the Unitary & Analytic Model of the pion electromagnetic form factor of DUBNICKA 10 to analyze the data of ACHASOV 06, AKHMETSHIN 07, AUBERT 09AS, AMBROSINO 11A, and FUJIKAWA 08. NODE=M105DW;LINKAGE=A

$\rho(1450)$ DECAY MODES

NODE=M105215;NODE=M105

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\pi\pi$	seen	DESIG=1;OUR EST;→ UNCHECKED ←
Γ_2	$\pi^+\pi^-$	seen	DESIG=20;OUR EVAL;→ UNCHECKED ←
Γ_3	4π	seen	DESIG=2;OUR EST;→ UNCHECKED ←
Γ_4	$\omega\pi$		DESIG=6
Γ_5	$a_1(1260)\pi$		DESIG=10
Γ_6	$h_1(1170)\pi$		DESIG=11
Γ_7	$\pi(1300)\pi$		DESIG=12
Γ_8	$\rho\rho$		DESIG=13
Γ_9	$\rho(\pi\pi)_{S\text{-wave}}$		DESIG=14
Γ_{10}	e^+e^-	seen	DESIG=4;OUR EST;→ UNCHECKED ←
Γ_{11}	$\eta\rho$	seen	DESIG=3
Γ_{12}	$a_2(1320)\pi$	not seen	DESIG=8;OUR EST;→ UNCHECKED ←
Γ_{13}	$K\overline{K}$	seen	DESIG=7;OUR EVAL;→ UNCHECKED ←
Γ_{14}	K^+K^-	seen	DESIG=21;OUR EVAL;→ UNCHECKED ←
Γ_{15}	$K\overline{K}^*(892)+$ c.c.	possibly seen	DESIG=15;OUR EST;→ UNCHECKED ←
Γ_{16}	$\pi^0\gamma$		DESIG=23
Γ_{17}	$\eta\gamma$	seen	DESIG=9
Γ_{18}	$f_0(500)\gamma$	not seen	DESIG=16;OUR EST;→ UNCHECKED ←
Γ_{19}	$f_0(980)\gamma$	not seen	DESIG=17;OUR EST;→ UNCHECKED ←
Γ_{20}	$f_0(1370)\gamma$	not seen	DESIG=18;OUR EST;→ UNCHECKED ←
Γ_{21}	$f_2(1270)\gamma$	not seen	DESIG=19;OUR EST;→ UNCHECKED ←

$\rho(1450)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma(\text{total})$

NODE=M105220

$\Gamma(\pi\pi) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_1\Gamma_{10}/\Gamma$

NODE=M105G3
NODE=M105G3

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.12	[1] DIEKMAN	88	RVUE	$e^+e^- \to \pi^+\pi^-$
$0.027^{+0.015}_{-0.010}$	[2] KURDADZE	83	OLYA	0.64–1.4 $e^+e^- \to \pi^+\pi^-$

[1] Using total width = 235 MeV. NODE=M105G3;LINKAGE=B
[2] Using for $\rho(1700)$ mass and width 1600 ± 20 and 300 ± 10 MeV respectively. NODE=M105G3;LINKAGE=KD

$\Gamma(\eta\rho) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_{11}\Gamma_{10}/\Gamma$

NODE=M105G4
NODE=M105G4

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
335±27±20	13.4k	[1] GRIBANOV	20	CMD3	1.1–2.0 $e^+e^- \to \eta\pi^+\pi^-$
210±24±10		[2] LEES	18	BABR	$e^+e^- \to \eta\pi^+\pi^-$
74±20		[3] AKHMETSHIN	00D	CMD2	$e^+e^- \to \eta\pi^+\pi^-$
91±19		ANTONELLI	88	DM2	$e^+e^- \to \eta\pi^+\pi^-$

[1] Mass and width of the $\rho(770)$ fixed at 775 and 149 MeV, respectively; solution 2 of model 2, $\eta \to \gamma\gamma$ decays used. NODE=M105G4;LINKAGE=B
[2] Includes non-resonant contribution. The selected fit model includes three ρ excited states. Model uncertainty is 20%. NODE=M105G4;LINKAGE=A
[3] Using the data of ANTONELLI 88, DOLINSKY 91, and AKHMETSHIN 00D. The energy-independent width of the $\rho(1450)$ and $\rho(1700)$ mesons assumed. NODE=M105G4;LINKAGE=KL

$\Gamma(\eta\gamma) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_{17}\Gamma_{10}/\Gamma$

NODE=M105G6
NODE=M105G6

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<16.4	[1] AKHMETSHIN	05	CMD2	0.60-1.38 $e^+e^- \to \eta\gamma$
2.2±0.5±0.3	[2] AKHMETSHIN	01B	CMD2	$e^+e^- \to \eta\gamma$

[1] From 2γ decay mode of η using 1465 MeV and 310 MeV for the $\rho(1450)$ mass and width. Recalculated by us. NODE=M105G6;LINKAGE=AK
[2] Using the data of AKHMETSHIN 01B on $e^+e^- \to \eta\gamma$, AKHMETSHIN 00D and ANTONELLI 88 on $e^+e^- \to \eta\pi^+\pi^-$. Recalculated by us using width of 226 MeV. NODE=M105G;LINKAGE=SW

$\Gamma(K\overline{K}^*(892)+\text{c.c.}) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{15}\Gamma_{10}/\Gamma$

NODE=M105G8
NODE=M105G8

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
127±15±6	AUBERT	08S	BABR	10.6 $e^+e^- \to K\overline{K}^*(892)\gamma$

$\rho(1450)$ $\Gamma(i)/\Gamma(\text{total}) \times \Gamma(e^+e^-)/\Gamma(\text{total})$

NODE=M105230

$\Gamma(\omega\pi)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_4/\Gamma \times \Gamma_{10}/\Gamma$

NODE=M105R05
NODE=M105R05

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.1±0.4	10.2k	[1] ACHASOV	16D	SND	1.05–2.00 $e^+e^- \to \pi^0\pi^0\gamma$
5.3±0.4	7815	[2] ACHASOV	13	SND	1.05–2.00 $e^+e^- \to \pi^0\pi^0\gamma$

OCCUR=3

[1] From a phenomenological model based on vector meson dominance with interfering $\rho(770)$, $\rho(1450)$, and $\rho(1700)$. The $\rho(1700)$ mass and width are fixed at 1720 MeV and 250 MeV, respectively. Systematic uncertainties not estimated. Supersedes ACHASOV 13.

NODE=M105R05;LINKAGE=A

[2] From a phenomenological model based on vector meson dominance with the interfering $\rho(1450)$ and $\rho(1700)$ and their widths fixed at 400 and 250 MeV, respectively. Systematic uncertainty not estimated.

NODE=M105R05;LINKAGE=AC

$\Gamma(\eta\rho)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{11}/\Gamma \times \Gamma_{10}/\Gamma$

NODE=M105R00
NODE=M105R00

VALUE (units 10^{-7})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
7.3±0.3	7.4k	[1] ACHASOV	18	SND	1.22–2.00 $e^+e^- \to \eta\pi^+\pi^-$
$4.3^{+1.1}_{-0.9}\pm0.2$	4.9k	[2] AULCHENKO	15	SND	1.22–2.00 $e^+e^- \to \eta\pi^+\pi^-$

[1] From the combined fit of AULCHENKO 15 and ACHASOV 18 in the model with the interfering $\rho(1450)$, $\rho(1700)$ and $\rho(2150)$ with the parameters of the $\rho(1450)$ and $\rho(1700)$ floating and the mass and width of the $\rho(2150)$ fixed at 2155 MeV and 320 MeV, respectively. The phases of the resonances are π, 0 and π, respectively.

NODE=M105R00;LINKAGE=B

[2] From a fit to the $e^+e^- \to \eta\pi^+\pi^-$ cross section with vector meson dominance model including $\rho(770)$, $\rho(1450)$, and $\rho(1700)$ decaying exclusively via $\eta\rho(770)$. Masses and widths of vector states are fixed to PDG 14. Coupling constants are assumed to be real.

NODE=M105R00;LINKAGE=A

$\Gamma(f_0(500)\gamma)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{18}/\Gamma \times \Gamma_{10}/\Gamma$

NODE=M105R01
NODE=M105R01

VALUE (units 10^{-9})	CL%	DOCUMENT ID		TECN	COMMENT
<4.0	90	ACHASOV	11	SND	$e^+e^- \to \pi^0\pi^0\gamma$

$\Gamma(\pi^0\gamma)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{16}/\Gamma \times \Gamma_{10}/\Gamma$

NODE=M105R17
NODE=M105R17

VALUE (units 10^{-9})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.3±1.4	[1] ACHASOV	10D	SND	1.075–2.0 $e^+e^- \to \pi^0\gamma$

[1] From a fit of a VMD model with two effective resonances with masses of 1450 MeV and 1700 MeV to describe the excited vector states $\omega(1420)$, $\rho(1450)$, $\omega(1650)$, and $\rho(1700)$. Systematic errors not evaluated.

NODE=M105R17;LINKAGE=A

$\Gamma(f_0(980)\gamma)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{19}/\Gamma \times \Gamma_{10}/\Gamma$

NODE=M105R02
NODE=M105R02

VALUE (units 10^{-9})	CL%	DOCUMENT ID		TECN	COMMENT
<2.6	90	ACHASOV	11	SND	$e^+e^- \to \pi^0\pi^0\gamma$

$\Gamma(f_0(1370)\gamma)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{20}/\Gamma \times \Gamma_{10}/\Gamma$

NODE=M105R03
NODE=M105R03

VALUE (units 10^{-9})	CL%	DOCUMENT ID		TECN	COMMENT
<3.5	90	ACHASOV	11	SND	$e^+e^- \to \pi^0\pi^0\gamma$

$\Gamma(f_2(1270)\gamma)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{21}/\Gamma \times \Gamma_{10}/\Gamma$

NODE=M105R04
NODE=M105R04

VALUE (units 10^{-9})	CL%	DOCUMENT ID		TECN	COMMENT
<0.8	90	[1] ACHASOV	11	SND	$e^+e^- \to \pi^0\pi^0\gamma$

[1] Using Breit-Wigner parametrization of the $\rho(1450)$ with mass and width of 1465 MeV and 400 MeV, respectively.

NODE=M105R01;LINKAGE=AC

$\rho(1450)$ BRANCHING RATIOS

NODE=M105225

$\Gamma(\pi\pi)/\Gamma(4\pi)$ — Γ_1/Γ_3

NODE=M105R15

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.37 ± 0.10	[1,2] ABELE	01B	CBAR	0.0 $\overline{p}n \rightarrow 5\pi$

[1] $\omega\pi$ not included.
[2] Using ABELE 97.

NODE=M105R;LINKAGE=BL
NODE=M105R;LINKAGE=LK

$\Gamma(K^+K^-)/\Gamma(\pi^+\pi^-)$ — Γ_{14}/Γ_2

NODE=M105R08

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
30.7±8.4±8.2	20k	[1] LEES	17C	BABR	$J/\psi \rightarrow h^+h^-\pi^0$

[1] From Dalitz plot analyses in isobar models.

NODE=M105R08;LINKAGE=A

$\Gamma(\omega\pi)/\Gamma_{total}$ — Γ_4/Γ

NODE=M105R5

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	821	[1] MATVIENKO	15	BELL	$\overline{B}^0 \rightarrow D^{*+}\omega\pi^-$
seen	1.6k	ACHASOV	12	SND	$e^+e^- \rightarrow \pi^0\pi^0\gamma$
~ 0.21		CLEGG	94	RVUE	

[1] Using Breit-Wigner parameterization of the $\rho(1450)$ and assuming equal probabilities of the $\rho(1450) \rightarrow \pi\pi$ and $\rho(1450) \rightarrow \omega\pi$ decays.

NODE=M105R5;LINKAGE=A

$\Gamma(\pi\pi)/\Gamma(\omega\pi)$ — Γ_1/Γ_4

NODE=M105R6

VALUE	DOCUMENT ID		TECN
• • • We do not use the following data for averages, fits, limits, etc. • • •			
~ 0.32	CLEGG	94	RVUE

$\Gamma(\omega\pi)/\Gamma(4\pi)$ — Γ_4/Γ_3

NODE=M105R3

VALUE	DOCUMENT ID		TECN
• • • We do not use the following data for averages, fits, limits, etc. • • •			
<0.14	CLEGG	88	RVUE

$\Gamma(a_1(1260)\pi)/\Gamma(4\pi)$ — Γ_5/Γ_3

NODE=M105R10

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.27 ± 0.08	[1] ABELE	01B	CBAR	0.0 $\overline{p}n \rightarrow 5\pi$

[1] $\omega\pi$ not included.

NODE=M105R10;LINKAGE=BL

$\Gamma(h_1(1170)\pi)/\Gamma(4\pi)$ — Γ_6/Γ_3

NODE=M105R11

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.08 ± 0.04	[1] ABELE	01B	CBAR	0.0 $\overline{p}n \rightarrow 5\pi$

[1] $\omega\pi$ not included.

NODE=M105R11;LINKAGE=BL

$\Gamma(\pi(1300)\pi)/\Gamma(4\pi)$ — Γ_7/Γ_3

NODE=M105R12

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.37 ± 0.13	[1] ABELE	01B	CBAR	0.0 $\overline{p}n \rightarrow 5\pi$

[1] $\omega\pi$ not included.

NODE=M105R12;LINKAGE=BL

$\Gamma(\rho\rho)/\Gamma(4\pi)$ — Γ_8/Γ_3

NODE=M105R13

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.11 ± 0.05	[1] ABELE	01B	CBAR	0.0 $\overline{p}n \rightarrow 5\pi$

[1] $\omega\pi$ not included.

NODE=M105R13;LINKAGE=BL

$\Gamma(\rho(\pi\pi)_{S\text{-wave}})/\Gamma(4\pi)$ — Γ_9/Γ_3

NODE=M105R14

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.17 ± 0.09	[1] ABELE	01B	CBAR	0.0 $\overline{p}n \rightarrow 5\pi$

[1] $\omega\pi$ not included.

NODE=M105R14;LINKAGE=BL

$\Gamma(\eta\rho)/\Gamma_{total}$ Γ_{11}/Γ

NODE=M105R2
NODE=M105R2

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	35	[1] ACHASOV	14	SND	1.15–2.00 $e^+e^- \to \eta\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.04		DONNACHIE	87B	RVUE	

[1] From a phenomenological model based on vector meson dominance with $\rho(1450)$ and $\phi(1680)$ masses and widths from the PDG 12.

NODE=M105R2;LINKAGE=A

$\Gamma(\eta\rho)/\Gamma(\omega\pi)$ Γ_{11}/Γ_4

NODE=M105R4
NODE=M105R4

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.081±0.020	[1,2] AULCHENKO	15	SND	1.22–2.00 $e^+e^- \to \eta\pi^+\pi^-$
~ 0.24	[3] DONNACHIE	91	RVUE	
>2	FUKUI	91	SPEC	8.95 $\pi^- p \to \omega\pi^0 n$

[1] From a fit to the $e^+e^- \to \eta\pi^+\pi^-$ cross section with vector meson dominance model including $\rho(770)$, $\rho(1450)$, and $\rho(1700)$ decaying exclusively via $\eta\rho(770)$. Masses and widths of vector states are fixed to PDG 14. Coupling constants are assumed to be real.

NODE=M105R4;LINKAGE=A

[2] Reports the inverse of the quoted value as 12.3 ± 3.1.

NODE=M105R4;LINKAGE=B

[3] Using data from BISELLO 91B, DOLINSKY 86 and ALBRECHT 87L.

NODE=M105R;LINKAGE=A

$\Gamma(\pi\pi)/\Gamma(\eta\rho)$ Γ_1/Γ_{11}

NODE=M105R07
NODE=M105R07

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.3±0.4	[1] AULCHENKO	15	SND	1.22–2.00 $e^+e^- \to \eta\pi^+\pi^-$

[1] From a fit to the $e^+e^- \to \eta\pi^+\pi^-$ cross section with vector meson dominance model including $\rho(770)$, $\rho(1450)$, and $\rho(1700)$ decaying exclusively via $\eta\rho(770)$. Masses and widths of vector states are fixed to PDG 14. Coupling constants are assumed to be real.

NODE=M105R07;LINKAGE=A

$\Gamma(a_2(1320)\pi)/\Gamma_{total}$ Γ_{12}/Γ

NODE=M105R9
NODE=M105R9

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	AMELIN	00	VES	37 $\pi^- p \to \eta\pi^+\pi^- n$

$\Gamma(K\overline{K})/\Gamma(\omega\pi)$ Γ_{13}/Γ_4

NODE=M105R8
NODE=M105R8

VALUE	DOCUMENT ID		TECN
• • • We do not use the following data for averages, fits, limits, etc. • • •			
<0.08	[1] DONNACHIE	91	RVUE

[1] Using data from BISELLO 91B, DOLINSKY 86 and ALBRECHT 87L.

NODE=M105R8;LINKAGE=A

$\Gamma(K\overline{K}^*(892)+c.c.)/\Gamma_{total}$ Γ_{15}/Γ

NODE=M105R16
NODE=M105R16

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
possibly seen	COAN	04	CLEO	$\tau^- \to K^-\pi^-K^+\nu_\tau$

$\Gamma(\eta\gamma)/\Gamma_{total}$ Γ_{17}/Γ

NODE=M105R06
NODE=M105R06

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	35	[1] ACHASOV	14	SND	1.15–2.00 $e^+e^- \to \eta\gamma$

[1] From a phenomenological model based on vector meson dominance with $\rho(1450)$ and $\phi(1680)$ masses and widths from the PDG 12.

NODE=M105R06;LINKAGE=A

$\rho(1450)$ REFERENCES

NODE=M105

GRIBANOV	20	JHEP 2001 112	S.S. Gribanov *et al.*	(CMD-3 Collab.)	REFID=60620
ACHASOV	18	PR D97 012008	M.N. Achasov *et al.*	(SND Collab.)	REFID=58785
LEES	18	PR D97 052007	J.P. Lees *et al.*	(BABAR Collab.)	REFID=58900
BARTOS	17	PR D96 113004	E. Bartos *et al.*		REFID=58325
BARTOS	17A	IJMP A32 1750154	E. Bartos *et al.*		REFID=58367
LEES	17C	PR D95 072007	J.P. Lees *et al.*	(BABAR Collab.)	REFID=57981
AAIJ	16N	PR D93 052018	R. Aaij *et al.*	(LHCb Collab.)	REFID=57273
ABLIKIM	16C	PL B753 629	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57138
ACHASOV	16D	PR D94 112001	M.N. Achasov *et al.*	(SND Collab.)	REFID=57618
AULCHENKO	15	PR D91 052013	V.M. Aulchenko *et al.*	(SND Collab.)	REFID=56793
MATVIENKO	15	PR D92 012013	D. Matvienko *et al.*	(BELLE Collab.)	REFID=56601
ACHASOV	14	PR D90 032002	M.N. Achasov *et al.*	(SND Collab.)	REFID=55912
PDG	14	CP C38 070001	K. Olive *et al.*	(PDG Collab.)	REFID=55687
ACHASOV	13	PR D88 054013	M.N. Achasov *et al.*	(SND Collab.)	REFID=55584
ABRAMOWICZ	12	EPJ C72 1869	H. Abramowicz *et al.*	(ZEUS Collab.)	REFID=54274
ACHASOV	12	JETPL 94 734	M.N. Achasov *et al.*		REFID=54275
		Translated from ZETFP 94 796.			

LEES	12G	PR D86 032013	J.P. Lees *et al.*	(BABAR Collab.)	REFID=54299
PDG	12	PR D86 010001	J. Beringer *et al.*	(PDG Collab.)	REFID=54066
ACHASOV	11	JETP 113 75	M.N. Achasov *et al.*	(SND Collab.)	REFID=16721
		Translated from ZETF 140 87.			
AMBROSINO	11A	PL B700 102	F. Ambrosino *et al.*	(KLOE Collab.)	REFID=16683
ACHASOV	10D	PR D98 112001	M.N. Achasov *et al.*	(SND Collab.)	REFID=59494
DUBNICKA	10	APS 60 1	S. Dubnicka, A.Z. Dubnickova		REFID=58797
AUBERT	09AS	PRL 103 231801	B. Aubert *et al.*	(BABAR Collab.)	REFID=53136
AUBERT	08S	PR D77 092002	B. Aubert *et al.*	(BABAR Collab.)	REFID=52242
FUJIKAWA	08	PR D78 072006	M. Fujikawa *et al.*	(BELLE Collab.)	REFID=52536
AKHMETSHIN	07	PL B648 28	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=51615
ACHASOV	06	JETP 103 380	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=51113
		Translated from ZETF 130 437.			
AKHMETSHIN	05	PL B605 26	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=50330
ALOISIO	05	PL B606 12	A. Aloisio *et al.*	(KLOE Collab.)	REFID=51112
SCHAEL	05C	PRPL 421 191	S. Schael *et al.*	(ALEPH Collab.)	REFID=50845
AKHMETSHIN	04	PL B578 285	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=49609
COAN	04	PRL 92 232001	T.E. Coan *et al.*	(CLEO Collab.)	REFID=49945
AKHMETSHIN	03B	PL B562 173	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=49406
ABELE	01B	EPJ C21 261	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=48356
AKHMETSHIN	01B	PL B509 217	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=48167
ALEXANDER	01B	PR D64 092001	J.P. Alexander *et al.*	(CLEO Collab.)	REFID=48391
AKHMETSHIN	00D	PL B489 125	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=47935
AMELIN	00	NP A668 83	D. Amelin *et al.*	(VES Collab.)	REFID=47432
ANDERSON	00A	PR D61 112002	S. Anderson *et al.*	(CLEO Collab.)	REFID=47468
EDWARDS	00A	PR D61 072003	K.W. Edwards *et al.*	(CLEO Collab.)	REFID=47465
ABELE	99C	PL B450 275	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=46916
ABELE	99D	PL B468 178	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=47401
BERTIN	98	PR D57 55	A. Bertin *et al.*	(OBELIX Collab.)	REFID=45782
ABELE	97	PL B391 191	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=45415
ACHASOV	97	PR D55 2663	N.N. Achasov *et al.*	(NOVM)	REFID=45382
BARATE	97M	ZPHY C76 15	R. Barate *et al.*	(ALEPH Collab.)	REFID=45622
BERTIN	97C	PL B408 476	A. Bertin *et al.*	(OBELIX Collab.)	REFID=45701
BERTIN	97D	PL B414 220	A. Bertin *et al.*	(OBELIX Collab.)	REFID=45763
CLEGG	94	ZPHY C62 455	A.B. Clegg, A. Donnachie	(LANC, MCHS)	REFID=44081
BISELLO	91B	NPBPS B21 111	D. Bisello	(DM2 Collab.)	REFID=41752
DOLINSKY	91	PRPL 202 99	S.I. Dolinsky *et al.*	(NOVO)	REFID=41369
DONNACHIE	91	ZPHY C51 689	A. Donnachie, A.B. Clegg	(MCHS, LANC)	REFID=41632
FUKUI	91	PL B257 241	S. Fukui *et al.*	(SUGI, NAGO, KEK, KYOT+)	REFID=41581
KUHN	90	ZPHY C48 445	J.H. Kuhn *et al.*	(MPIM)	REFID=45862
ARMSTRONG	89E	PL B228 536	T.A. Armstrong, M. Benayoun	(ATHU, BARI, BIRM+)	REFID=41011
BISELLO	89	PL B220 321	D. Bisello *et al.*	(DM2 Collab.)	REFID=40740
DUBNICKA	89	JP G15 1349	S. Dubnicka *et al.*	(JINR, SLOV)	REFID=44082
ANTONELLI	88	PL B212 133	A. Antonelli *et al.*	(DM2 Collab.)	REFID=40583
CLEGG	88	ZPHY C40 313	A.B. Clegg, A. Donnachie	(MCHS, LANC)	REFID=40922
DIEKMAN	88	PRPL 159 99	B. Diekmann	(BONN)	REFID=40272
FUKUI	88	PL B202 441	S. Fukui *et al.*	(SUGI, NAGO, KEK, KYOT+)	REFID=40273
ALBRECHT	87L	PL B185 223	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=40418
DONNACHIE	87B	ZPHY C34 257	A. Donnachie, A.B. Clegg	(MCHS, LANC)	REFID=40920
DOLINSKY	86	PL B174 453	S.I. Dolinsky *et al.*	(NOVO)	REFID=20246
BARKOV	85	NP B256 365	L.M. Barkov *et al.*	(NOVO)	REFID=20134
KURDADZE	83	JETPL 37 733	L.M. Kurdadze *et al.*	(NOVO)	REFID=20133
		Translated from ZETFP 37 613.			
ASTON	80C	PL 92B 211	D. Aston	(BONN, CERN, EPOL, GLAS, LANC+)	REFID=20652
BARBER	80C	ZPHY C4 169	D.P. Barber *et al.*	(DARE, LANC, SHEF)	REFID=20653
GOUNARIS	68	PRL 21 244	G.J. Gounaris, J.J. Sakurai		REFID=48054

NODE=M175

$\eta(1475)$

$I^G(J^{PC}) = 0^+(0^{-+})$

See the $\eta(1405)$ and the related review on "Spectroscopy of Light Meson Resonances."

NODE=M175

$\eta(1475)$ MASS

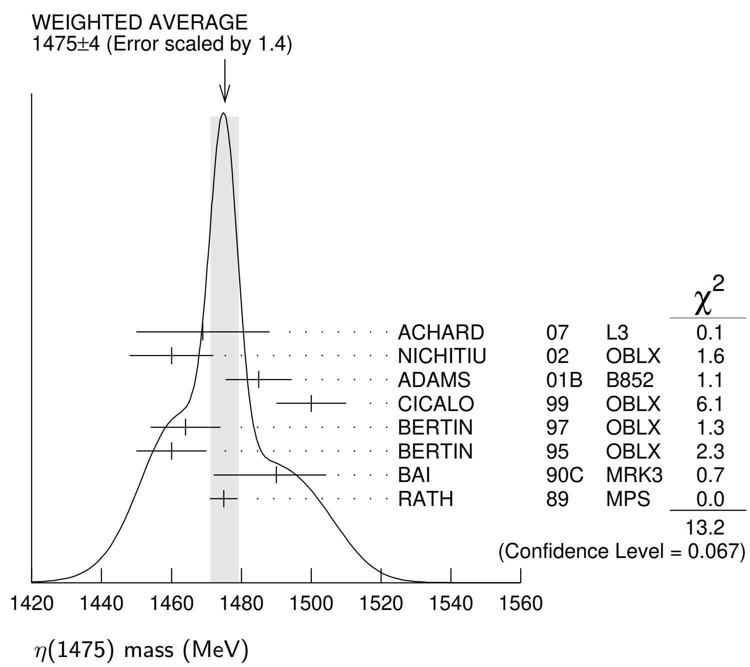
NODE=M175M5

NODE=M175M5

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
1475± 4 OUR AVERAGE		Error includes scale factor of 1.4. See the ideogram below.				
1469±14±13	74	ACHARD	07	L3	183–209 $e^+e^- \rightarrow e^+e^- K^0_S K^\pm \pi^\mp$	
1460±12	3651	NICHITIU	02	OBLX	0 $\overline{p}p \rightarrow K^+K^-\pi^+\pi^-\pi^0$	
1485± 8± 5	20k	ADAMS	01B	B852	18 GeV $\pi^- p \rightarrow K^+K^-\pi^0 n$	
1500±10		CICALO	99	OBLX	0 $\overline{p}p \rightarrow K^\pm K^0_S \pi^\mp\pi^+\pi^-$	
1464±10		BERTIN	97	OBLX	0 $\overline{p}p \rightarrow K^\pm(K^0)\pi^\mp\pi^+\pi^-$	OCCUR=2
1460±10		BERTIN	95	OBLX	0 $\overline{p}p \rightarrow K\overline{K}\pi\pi\pi$	OCCUR=2
$1490^{+14}_{-8}{}^{+3}_{-16}$	1100	BAI	90C	MRK3	$J/\psi \rightarrow \gamma K^0_S K^\pm\pi^\mp$	
1475± 4		RATH	89	MPS	21.4 $\pi^- p \rightarrow n K^0_S K^0_S \pi^0$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1477± 7±13		[1] ABLIKIM	18I	BES3	$J/\psi \rightarrow \gamma\gamma\phi(1020)$	
$1565\pm 8^{+0}_{-63}$		[2] ABLIKIM	15T	BES3	$J/\psi \rightarrow \gamma K^0_S K^0_S \eta$	
1421±14		AUGUSTIN	92	DM2	$J/\psi \rightarrow \gamma K\overline{K}\pi$	OCCUR=2

[1] From a fit to $\gamma\phi$ invariant mass. Angular analysis consistent with $J^{PC} = 0^{-+}$. Other J^{PC} not excluded. NODE=M175M5;LINKAGE=B

[2] Could also be the $\eta(1405)$. NODE=M175M5;LINKAGE=A



$\eta(1475)$ WIDTH

NODE=M175W5

NODE=M175W5

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
90± 9 OUR AVERAGE		Error includes scale factor of 1.6. See the ideogram below.				
67±18± 7	74	ACHARD	07	L3	183–209 $e^+e^- \rightarrow e^+e^- K^0_S K^\pm \pi^\mp$	
120±15	3651	NICHITIU	02	OBLX	0 $\overline{p}p \rightarrow K^+K^-\pi^+\pi^-\pi^0$	
98±18± 3	20k	ADAMS	01B	B852	18 GeV $\pi^- p \rightarrow K^+K^-\pi^0 n$	
100±20		CICALO	99	OBLX	0 $\overline{p}p \rightarrow K^\pm K^0_S \pi^\mp\pi^+\pi^-$	
105±15		BERTIN	97	OBLX	0.0 $\overline{p}p \rightarrow K^\pm(K^0)\pi^\mp\pi^+\pi^-$	OCCUR=2
105±15		BERTIN	95	OBLX	0 $\overline{p}p \rightarrow K\overline{K}\pi\pi\pi$	OCCUR=2
$54^{+37}_{-21}{}^{+13}_{-24}$		BAI	90C	MRK3	$J/\psi \rightarrow \gamma K^0_S K^\pm\pi^\mp$	
51±13		RATH	89	MPS	21.4 $\pi^- p \rightarrow n K^0_S K^0_S \pi^0$	

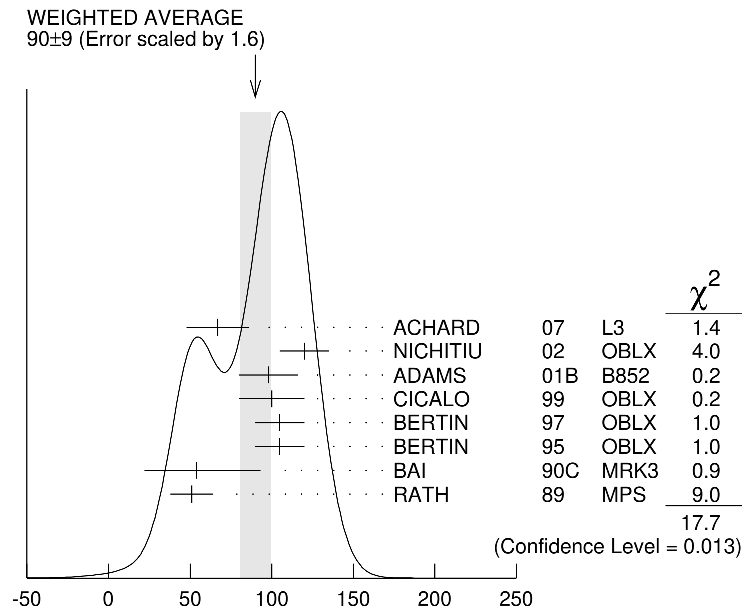
• • • We do not use the following data for averages, fits, limits, etc. • • •

$118 \pm 22 \pm 17$	[1] ABLIKIM	18I	BES3	$J/\psi \to \gamma\gamma\phi(1020)$
45^{+14+21}_{-13-28}	[2] ABLIKIM	15T	BES3	$J/\psi \to \gamma K^0_S K^0_S \eta$
63 ± 18	AUGUSTIN	92	DM2	$J/\psi \to \gamma K \overline{K} \pi$

OCCUR=2

[1] From a fit to $\gamma\phi$ invariant mass. Angular analysis consistent with $J^{PC} = 0^{-+}$. Other J^{PC} not excluded. NODE=M175W5;LINKAGE=B

[2] Could also be the $\eta(1405)$. NODE=M175W5;LINKAGE=A



$\eta(1475)$ width (MeV)

$\eta(1475)$ DECAY MODES

NODE=M175215;NODE=M175

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$K \overline{K} \pi$	seen	DESIG=2;OUR EST;→ UNCHECKED ←
Γ_2	$K \overline{K}^*(892) +$ c.c.	seen	DESIG=1;OUR EST;→ UNCHECKED ←
Γ_3	$a_0(980)\pi$	seen	DESIG=4;OUR EST;→ UNCHECKED ←
Γ_4	$\gamma\gamma$	seen	DESIG=7;OUR EST;→ UNCHECKED ←
Γ_5	$K^0_S K^0_S \eta$	possibly seen	DESIG=8;OUR EVAL;→ UNCHECKED ←
Γ_6	$\gamma\phi(1020)$	possibly seen	DESIG=9

$\eta(1475)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M175220

$\Gamma(K\overline{K}\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_1\Gamma_4/\Gamma$

NODE=M175G2
NODE=M175G2

VALUE (keV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.23±0.05±0.05		74	[1] ACHARD	07	L3	183–209 $e^+e^- \to e^+e^- K^0_S K^\pm \pi^\mp$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 0.089	90		[2,3] AHOHE	05	CLE2	10.6 $e^+e^- \to e^+e^- K^0_S K^\pm \pi^\mp$

[1] Supersedes ACCIARRI 01G. Using B($K^0_S \to \pi^+\pi^-$)= 0.6895. NODE=M175G2;LINKAGE=CH

[2] Using $\eta(1475)$ mass of 1481 MeV and width of 48 MeV. The upper limit increases to 0.140 keV if the world average value, 87 MeV, of the width is used. NODE=M175G2;LINKAGE=AH

[3] Assuming three-body phase-space decay to $K^0_S K^\pm \pi^\mp$. NODE=M175G2;LINKAGE=B3

$\eta(1475)$ BRANCHING RATIOS

NODE=M175225

$\Gamma(K\overline{K}^*(892)+\text{c.c.})/\Gamma(K\overline{K}\pi)$ — Γ_2/Γ_1

NODE=M175R1
NODE=M175R1

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.50 ± 0.10	[1] BAILLON	67	HBC	0.0 $\overline{p}p \to K\overline{K}\pi\pi\pi$

[1] Data could also refer to $\eta(1405)$. NODE=M175R;LINKAGE=BL

$\Gamma(K\overline{K}^*(892)+c.c.)/[\Gamma(K\overline{K}^*(892)+c.c.)+\Gamma(a_0(980)\pi)]$ $\Gamma_2/(\Gamma_2+\Gamma_3)$

NODE=M175R6

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.25	90	EDWARDS	82E	CBAL	$J/\psi \to K^+K^-\pi^0\gamma$

$\Gamma(\gamma\gamma)/\Gamma(K\overline{K}\pi)$ Γ_4/Γ_1

NODE=M175R01

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.27 × 10^{-3}	90	[1] ABLIKIM	18O	BES3	$\psi(2S) \to \pi^+\pi^-\gamma\gamma\gamma$

[1] Using results from BAI 00D.

NODE=M175R01;LINKAGE=A

$\Gamma(\gamma\phi(1020))/\Gamma_{total}$ Γ_6/Γ

NODE=M175R00

VALUE	DOCUMENT ID		TECN	COMMENT
possibly seen	[1] ABLIKIM	18I	BES3	$J/\psi \to \gamma\gamma\phi(1020)$

[1] Seen as a peak in $\gamma\phi$ invariant mass. Angular analysis consistent with $J^{PC} = 0^{-+}$. Other J^{PC} not excluded. Also see $\eta(1405)$.

NODE=M175R00;LINKAGE=A

η(1475) REFERENCES

NODE=M175

ABLIKIM	18I	PR D97 051101	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58893
ABLIKIM	18O	PR D97 072014	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58925
ABLIKIM	15T	PRL 115 091803	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56785
ACHARD	07	JHEP 0703 018	P. Achard *et al.*	(L3 Collab.)	REFID=51698
AHOHE	05	PR D71 072001	R. Ahohe *et al.*	(CLEO Collab.)	REFID=50764
NICHITIU	02	PL B545 261	F. Nichitiu *et al.*	(OBELIX Collab.)	REFID=48848
ACCIARRI	01G	PL B501 1	M. Acciarri *et al.*	(L3 Collab.)	REFID=48319
ADAMS	01B	PL B516 264	G.S. Adams *et al.*	(BNL E852 Collab.)	REFID=49649
BAI	00D	PL B476 25	J.Z. Bai *et al.*	(BES Collab.)	REFID=47954
CICALO	99	PL B462 453	C. Cicalo *et al.*	(OBELIX Collab.)	REFID=47394
BERTIN	97	PL B400 226	A. Bertin *et al.*	(OBELIX Collab.)	REFID=45417
BERTIN	95	PL B361 187	A. Bertin *et al.*	(OBELIX Collab.)	REFID=44614
AUGUSTIN	92	PR D46 1951	J.E. Augustin, G. Cosme	(DM2 Collab.)	REFID=41584
BAI	90C	PRL 65 2507	Z. Bai *et al.*	(Mark III Collab.)	REFID=41578
RATH	89	PR D40 693	M.G. Rath *et al.*	(NDAM, BRAN, BNL, CUNY+)	REFID=40924
EDWARDS	82E	PRL 49 259	C. Edwards *et al.*	(CIT, HARV, PRIN+)	REFID=21314
BAILLON	67	NC 50A 393	P.H. Baillon *et al.*	(CERN, CDEF, IRAD)	REFID=20407

NODE=M152

$f_0(1500)$

$I^G(J^{PC}) = 0^+(0^{++})$

See the reviews on "Scalar Mesons below 1 GeV" and on "Non-$q\overline{q}$ Mesons".

NODE=M152

f_0(1500) MASS

NODE=M152M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1506 ± 6 OUR AVERAGE		Error includes scale factor of 1.4. See the ideogram below.			
1515 ±12		[1] BARBERIS	00A		450 $pp \to p_f\eta\eta p_s$
1511 ± 9		[1,2] BARBERIS	00C		450 $pp \to p_f 4\pi p_s$
1510 ± 8		[1] BARBERIS	00E		450 $pp \to p_f\eta\eta p_s$
1522 ±25		[1] BERTIN	98	OBLX	0.05–0.405 $\overline{n}p \to \pi^+\pi^+\pi^-$
1449 ±20		[1] BERTIN	97C	OBLX	0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$
1500 ±10		[3] AMSLER	95D	CBAR	0.0 $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1450 ±10		[4] RODAS	22	RVUE	$J/\psi(1S) \to \gamma(\pi\pi, K\overline{K})$
1483 ±15		[1] SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma(\pi\pi, K\overline{K}, \eta\eta, \omega\phi)$
1496 ± 1.2$^{+4.4}_{-26.4}$		[5] ALBRECHT	20	RVUE	0.9 $\overline{p}p \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0K^+K^-$
1465 ±18		[6] ROPERTZ	18	RVUE	$\overline{B}^0_s \to J/\psi(\pi^+\pi^-/K^+K^-)$
1447 ±16 ± 13	163	[7,8] DOBBS	15		$J/\psi \to \gamma\pi^+\pi^-$

OCCUR=2

1442 ± 9 ± 4	261	[7,8] DOBBS	15		$\psi(2S) \rightarrow \gamma\pi^+\pi^-$	OCCUR=2
1460.9± 2.9		[9] AAIJ	14BR	LHCB	$\overline{B}^0_s \rightarrow J/\psi\pi^+\pi^-$	
1468 $^{+14}_{-15}$ $^{+23}_{-74}$	5.5k	[10] ABLIKIM	13N	BES3	$e^+e^- \rightarrow J/\psi \rightarrow \gamma\eta\eta$	
1486 ±10		[1] ANISOVICH	09	RVUE	0.0 $\overline{p}p$, πN	
1470 ±60	568	[11] KLEMPT	08	E791	$D^+_s \rightarrow \pi^-\pi^+\pi^+$	
1470 $^{+6}_{-7}$ $^{+72}_{-255}$		[12] UEHARA	08A	BELL	10.6 $e^+e^- \rightarrow e^+e^-\pi^0\pi^0$	
1466 ± 6 ± 20		[13] ABLIKIM	06V	BES2	$e^+e^- \rightarrow J/\psi \rightarrow \gamma\pi^+\pi^-$	
1495 ± 4		AMSLER	06	CBAR	0.9 $\overline{p}p \rightarrow K^+K^-\pi^0$	
1539 ±20	9.9k	AUBERT	06O	BABR	$B^+ \rightarrow K^+K^+K^-$	
1473 ± 5	80k	[13,14] UMAN	06	E835	5.2 $\overline{p}p \rightarrow \eta\eta\pi^0$	
1478 ± 6		VLADIMIRSK...	06	SPEC	40 $\pi^-p \rightarrow K^0_S K^0_S n$	
1493 ± 7		[13] BINON	05	GAMS	33 $\pi^-p \rightarrow \eta\eta n$	
1524 ±14	1400	[15] GARMASH	05	BELL	$B^+ \rightarrow K^+K^+K^-$	
1489 $^{+8}_{-4}$		[16] ANISOVICH	03	RVUE		
1490 ±30		[13] ABELE	01	CBAR	0.0 $\overline{p}d \rightarrow \pi^- 4\pi^0 p$	
1497 ±10		[13] BARBERIS	99	OMEG	450 $pp \rightarrow p_s p_f K^+K^-$	
1502 ±10		[13] BARBERIS	99B	OMEG	450 $pp \rightarrow p_s p_f \pi^+\pi^-$	
1502 ±12 ± 10		[17] BARBERIS	99D	OMEG	450 $pp \rightarrow K^+K^-$, $\pi^+\pi^-$	
1530 ±45		[13] BELLAZZINI	99	GAM4	450 $pp \rightarrow pp\pi^0\pi^0$	
1505 ±18		[13] FRENCH	99		300 $pp \rightarrow p_f(K^+K^-)p_s$	
1447 ±27		[18] KAMINSKI	99	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$, $\sigma\sigma$	
1580 ±80		[13] ALDE	98	GAM4	100 $\pi^-p \rightarrow \pi^0\pi^0 n$	
1499 ± 8		[1] ANISOVICH	98B	RVUE	Compilation	
∼ 1520		REYES	98	SPEC	800 $pp \rightarrow p_s p_f K^0_S K^0_S$	
1510 ±20		[1] BARBERIS	97B	OMEG	450 $pp \rightarrow pp2(\pi^+\pi^-)$	
∼ 1475		FRABETTI	97D	E687	$D^\pm_s \rightarrow \pi^\mp\pi^\pm\pi^\pm$	
∼ 1505		ABELE	96	CBAR	0.0 $\overline{p}p \rightarrow 5\pi^0$	
1515 ±20		ABELE	96B	CBAR	0.0 $\overline{p}p \rightarrow \pi^0 K^0_L K^0_L$	
1500 ± 8		[1] ABELE	96C	RVUE	Compilation	
1460 ±20	120	[13] AMELIN	96B	VES	37 $\pi^-A \rightarrow \eta\eta\pi^-A$	
1500 ± 8		BUGG	96	RVUE		
1500 ±15		[19] AMSLER	95B	CBAR	0.0 $\overline{p}p \rightarrow 3\pi^0$	
1505 ±15		[20] AMSLER	95C	CBAR	0.0 $\overline{p}p \rightarrow \eta\eta\pi^0$	OCCUR=2
1445 ± 5		[21] ANTINORI	95	OMEG	300,450 $pp \rightarrow pp2(\pi^+\pi^-)$	
1497 ±30		[13] ANTINORI	95	OMEG	300,450 $pp \rightarrow pp\pi^+\pi^-$	OCCUR=2
∼ 1505		BUGG	95	MRK3	$J/\psi \rightarrow \gamma\pi^+\pi^-\pi^+\pi^-$	
1446 ± 5		[13] ABATZIS	94	OMEG	450 $pp \rightarrow pp2(\pi^+\pi^-)$	
1545 ±25		[13] AMSLER	94E	CBAR	0.0 $\overline{p}p \rightarrow \pi^0\eta\eta'$	
1520 ±25		[1,22] ANISOVICH	94	CBAR	0.0 $\overline{p}p \rightarrow 3\pi^0, \pi^0\eta\eta$	
1505 ±20		[1,23] BUGG	94	RVUE	$\overline{p}p \rightarrow 3\pi^0$, $\eta\eta\pi^0$, $\eta\pi^0\pi^0$	
1560 ±25		[13] AMSLER	92	CBAR	0.0 $\overline{p}p \rightarrow \pi^0\eta\eta$	
1550 ±45 ± 30		[13] BELADIDZE	92C	VES	36 π^-Be $\rightarrow \pi^-\eta'\eta$Be	
1449 ± 4		[13] ARMSTRONG	89E	OMEG	300 $pp \rightarrow pp2(\pi^+\pi^-)$	
1610 ±20		[13] ALDE	88	GAM4	300 $\pi^-N \rightarrow \pi^-N2\eta$	
∼ 1525		ASTON	88D	LASS	11 $K^-p \rightarrow K^0_S K^0_S \Lambda$	
1570 ±20	600	[13] ALDE	87	GAM4	100 $\pi^-p \rightarrow 4\pi^0 n$	
1575 ±45		[24] ALDE	86D	GAM4	100 $\pi^-p \rightarrow 2\eta n$	
1568 ±33		[13] BINON	84C	GAM2	38 $\pi^-p \rightarrow \eta\eta' n$	
1592 ±25		[13] BINON	83	GAM2	38 $\pi^-p \rightarrow 2\eta n$	
1525 ± 5		[13] GRAY	83	DBC	0.0 $\overline{p}N \rightarrow 3\pi$	

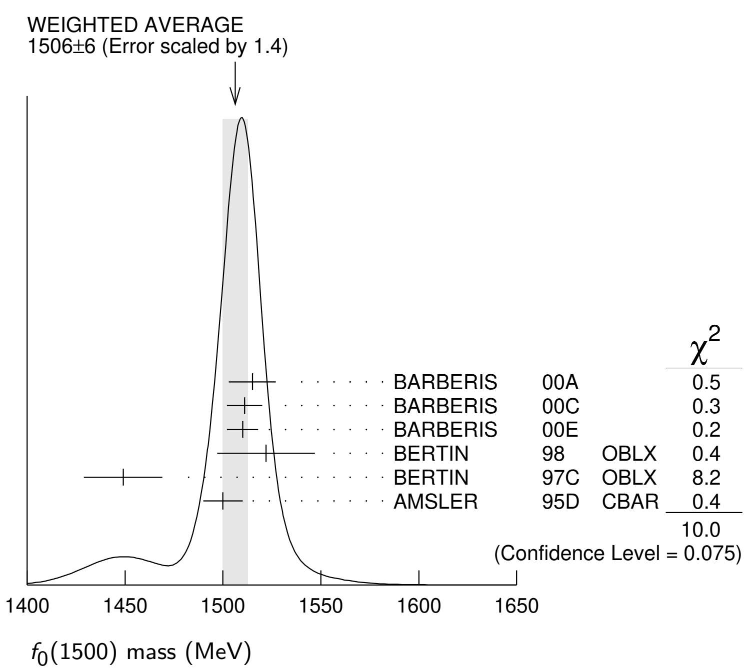
[1] T-matrix pole. NODE=M152M;LINKAGE=PP

[2] Average between $\pi^+\pi^-2\pi^0$ and $2(\pi^+\pi^-)$. NODE=M152M;LINKAGE=PC

[3] T-matrix pole. Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D. NODE=M152M;LINKAGE=AB

[4] T-matrix pole from coupled channel K-matrix fit to data on $J/\psi \rightarrow \gamma\pi^0\pi^0$ (ABLIKIM 15AE) and $J/\psi \rightarrow \gamma K^0_S K^0_S$ (ABLIKIM 18AA). NODE=M152M;LINKAGE=L

[5] T-matrix pole, 5 poles, 5 channels, including scattering data from HYAMS 75 ($\pi\pi$), LONGACRE 86 ($K\overline{K}$), BINON 83 ($\eta\eta$), and BINON 84C ($\eta\eta'$). NODE=M152M;LINKAGE=J
[6] T-matrix pole of 3 channel unitary model fit to data from AAIJ 14BR and AAIJ 17V extracted using Pade approximants. NODE=M152M;LINKAGE=H
[7] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M152M;LINKAGE=F
[8] From a fit to a Breit-Wigner line shape with fixed $\Gamma = 109$ MeV. NODE=M152M;LINKAGE=G
[9] Solution I, statistical error only. NODE=M152M;LINKAGE=I
[10] From partial wave analysis including all possible combinations of 0^{++}, 2^{++}, and 4^{++} resonances. NODE=M152M;LINKAGE=C
[11] Reanalysis of AITALA 01A data. This state could also be $f_0(1370)$. NODE=M152M;LINKAGE=KL
[12] Breit-Wigner mass. May also be the $f_0(1370)$. NODE=M152M;LINKAGE=UE
[13] Breit-Wigner mass. NODE=M152M;LINKAGE=E
[14] Statistical error only. NODE=M152M;LINKAGE=ST
[15] Breit-Wigner, solution 1, PWA ambiguous. NODE=M152M;LINKAGE=GA
[16] K-matrix pole from combined analysis of $\pi^- p \to \pi^0\pi^0 n$, $\pi^- p \to K\overline{K} n$, $\pi^+\pi^- \to \pi^+\pi^-$, $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$, $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, $K^0_S K^0_S \pi^0$, $K^+ K^0_S \pi^-$ at rest, $\overline{p}n \to \pi^-\pi^-\pi^+$, $K^0_S K^-\pi^0$, $K^0_S K^0_S \pi^-$ at rest. NODE=M152M;LINKAGE=KM
[17] Supersedes BARBERIS 99 and BARBERIS 99B. NODE=M152M;LINKAGE=BD
[18] T-matrix pole on sheet $--+$. NODE=M152M;LINKAGE=TK
[19] T-matrix pole, supersedes ANISOVICH 94. NODE=M152M;LINKAGE=D
[20] T-matrix pole, supersedes ANISOVICH 94 and AMSLER 92. NODE=M152M;LINKAGE=D1
[21] Supersedes ABATZIS 94, ARMSTRONG 89E. Breit-Wigner mass. NODE=M152M;LINKAGE=B
[22] From a simultaneous analysis of the annihilations $\overline{p}p \to 3\pi^0, \pi^0\eta\eta$. NODE=M152M;LINKAGE=A
[23] Reanalysis of ANISOVICH 94 data. NODE=M152M;LINKAGE=C1
[24] From central value and spread of two solutions. Breit-Wigner mass. NODE=M152M;LINKAGE=AZ



$f_0(1500)$ WIDTH

NODE=M152W

NODE=M152W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
112 ± 9	**OUR AVERAGE**				
110 ± 24		[1] BARBERIS	00A		450 $pp \to p_f \eta\eta p_s$
102 ± 18		[1,2] BARBERIS	00C		450 $pp \to p_f 4\pi p_s$
110 ± 16		[1] BARBERIS	00E		450 $pp \to p_f \eta\eta p_s$
108 ± 33		[1] BERTIN	98	OBLX	0.05–0.405 $\overline{n}p \to \pi^+\pi^+\pi^-$
114 ± 30		[1] BERTIN	97C	OBLX	0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$
154 ± 30		[3] AMSLER	95D	CBAR	0.0 $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$

• • • We do not use the following data for averages, fits, limits, etc. • • •

106 ± 16		[4] RODAS	22	RVUE	$J/\psi(1S) \to \gamma (\pi\pi, K\overline{K})$	
116 ± 12		[1] SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma (\pi\pi, K\overline{K}, \eta\eta, \omega\phi)$	
$80.8 \pm 0.6 {}^{+20.0}_{-5.0}$		[5] ALBRECHT	20	RVUE	$0.9\ \overline{p}p \to \pi^0\pi^0\eta, \pi^0\eta\eta, \pi^0 K^+K^-$	
100 ± 18		[6] ROPERTZ	18	RVUE	$\overline{B}^0_s \to J/\psi(\pi^+\pi^- / K^+K^-)$	
124 ± 7		[7] AAIJ	14BR	LHCB	$\overline{B}^0_s \to J/\psi\pi^+\pi^-$	
$136 {}^{+41}_{-26} {}^{+28}_{-100}$	5.5k	[8] ABLIKIM	13N	BES3	$e^+e^- \to J/\psi \to \gamma\eta\eta$	
114 ± 10		[1] ANISOVICH	09	RVUE	$0.0\ \overline{p}p, \pi N$	
$90 {}^{+2}_{-1} {}^{+50}_{-22}$		[9] UEHARA	08A	BELL	$10.6\ e^+e^- \to e^+e^-\pi^0\pi^0$	
$108 {}^{+14}_{-11} \pm 25$		[10] ABLIKIM	06V	BES2	$e^+e^- \to J/\psi \to \gamma\pi^+\pi^-$	
121 ± 8		AMSLER	06	CBAR	$0.9\ \overline{p}p \to K^+K^-\pi^0$	
257 ± 33	9.9k	AUBERT	06O	BABR	$B^+ \to K^+K^+K^-$	
108 ± 9	80k	[10,11] UMAN	06	E835	$5.2\ \overline{p}p \to \eta\eta\pi^0$	
119 ± 10		VLADIMIRSK...	06	SPEC	$40\ \pi^-p \to K^0_S K^0_S n$	
90 ± 15		[10] BINON	05	GAMS	$33\ \pi^-p \to \eta\eta n$	
136 ± 23	1400	[12] GARMASH	05	BELL	$B^+ \to K^+K^+K^-$	
102 ± 10		[13] ANISOVICH	03	RVUE		
140 ± 40		[10] ABELE	01	CBAR	$0.0\ \overline{p}d \to \pi^- 4\pi^0 p$	
104 ± 25		[10] BARBERIS	99	OMEG	$450\ pp \to p_s p_f K^+K^-$	
131 ± 15		[10] BARBERIS	99B	OMEG	$450\ pp \to p_s p_f \pi^+\pi^-$	
98 ± 18 ± 16		[14] BARBERIS	99D	OMEG	$450\ pp \to K^+K^-, \pi^+\pi^-$	
160 ± 50		[10] BELLAZZINI	99	GAM4	$450\ pp \to pp\pi^0\pi^0$	
100 ± 33		[10] FRENCH	99		$300\ pp \to p_f(K^+K^-)p_s$	
108 ± 46		[15] KAMINSKI	99	RVUE	$\pi\pi \to \pi\pi, K\overline{K}, \sigma\sigma$	
280 ± 100		[10] ALDE	98	GAM4	$100\ \pi^-p \to \pi^0\pi^0 n$	
130 ± 20		[1] ANISOVICH	98B	RVUE	Compilation	
120 ± 35		[1] BARBERIS	97B	OMEG	$450\ pp \to pp2(\pi^+\pi^-)$	
~ 100		FRABETTI	97D	E687	$D^\pm_s \to \pi^\mp\pi^\pm\pi^\pm$	
~ 169		ABELE	96	CBAR	$0.0\ \overline{p}p \to 5\pi^0$	
105 ± 15		ABELE	96B	CBAR	$0.0\ \overline{p}p \to \pi^0 K^0_L K^0_L$	
100 ± 30	120	[10] AMELIN	96B	VES	$37\ \pi^-A \to \eta\eta\pi^-A$	
132 ± 15		BUGG	96	RVUE		
120 ± 25		[16] AMSLER	95B	CBAR	$0.0\ \overline{p}p \to 3\pi^0$	
120 ± 30		[17] AMSLER	95C	CBAR	$0.0\ \overline{p}p \to \eta\eta\pi^0$	OCCUR=2
65 ± 10		[18] ANTINORI	95	OMEG	$300,450\ pp \to pp2(\pi^+\pi^-)$	
199 ± 30		[10] ANTINORI	95	OMEG	$300,450\ pp \to pp\pi^+\pi^-$	OCCUR=2
56 ± 12		[10] ABATZIS	94	OMEG	$450\ pp \to pp2(\pi^+\pi^-)$	
100 ± 40		[10] AMSLER	94E	CBAR	$0.0\ \overline{p}p \to \pi^0\eta\eta'$	
$148 {}^{+20}_{-25}$		[1,19] ANISOVICH	94	CBAR	$0.0\ \overline{p}p \to 3\pi^0, \pi^0\eta\eta$	
150 ± 20		[1,20] BUGG	94	RVUE	$\overline{p}p \to 3\pi^0, \eta\eta\pi^0, \eta\pi^0\pi^0$	
245 ± 50		[10] AMSLER	92	CBAR	$0.0\ \overline{p}p \to \pi^0\eta\eta$	
153 ± 67 ± 50		[10] BELADIDZE	92C	VES	$36\ \pi^-\mathrm{Be} \to \pi^-\eta'\eta\mathrm{Be}$	
78 ± 18		[10] ARMSTRONG	89E	OMEG	$300\ pp \to pp2(\pi^+\pi^-)$	
170 ± 40		[10] ALDE	88	GAM4	$300\ \pi^-N \to \pi^-N2\eta$	
150 ± 20	600	[10] ALDE	87	GAM4	$100\ \pi^-p \to 4\pi^0 n$	
265 ± 65		[21] ALDE	86D	GAM4	$100\ \pi^-p \to 2\eta n$	
260 ± 60		[10] BINON	84C	GAM2	$38\ \pi^-p \to \eta\eta' n$	
210 ± 40		[10] BINON	83	GAM2	$38\ \pi^-p \to 2\eta n$	
101 ± 13		[10] GRAY	83	DBC	$0.0\ \overline{p}N \to 3\pi$	

[1] T-matrix pole. NODE=M152W;LINKAGE=PP

[2] Average between $\pi^+\pi^-2\pi^0$ and $2(\pi^+\pi^-)$. NODE=M152W;LINKAGE=PC

[3] T-matrix pole. Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D. NODE=M152W;LINKAGE=AB

[4] T-matrix pole from coupled channel K-matrix fit to data on $J/\psi \to \gamma \pi^0 \pi^0$ (ABLIKIM 15AE) and $J/\psi \to \gamma K^0_S K^0_S$ (ABLIKIM 18AA). NODE=M152W;LINKAGE=I

[5] T-matrix pole, 5 poles, 5 channels, including scattering data from HYAMS 75 ($\pi\pi$), LONGACRE 86 ($K\overline{K}$), BINON 83 ($\eta\eta$), and BINON 84C ($\eta\eta'$). NODE=M152W;LINKAGE=H

[6] T-matrix pole of 3 channel unitary model fit to data from AAIJ 14BR and AAIJ 17V extracted using Pade approximants. NODE=M152W;LINKAGE=F

[7] Solution I, statistical error only. NODE=M152W;LINKAGE=G

[8] From partial wave analysis including all possible combinations of 0^{++}, 2^{++}, and 4^{++} resonances. NODE=M152W;LINKAGE=C

[9] Breit-Wigner width. May also be the $f_0(1370)$. NODE=M152W;LINKAGE=UE

[10] Breit-Wigner width. NODE=M152W;LINKAGE=E

[11] Statistical error only. NODE=M152W;LINKAGE=ST

[12] Breit-Wigner, solution 1, PWA ambiguous. NODE=M152W;LINKAGE=GA

[13] K-matrix pole from combined analysis of $\pi^- p \to \pi^0 \pi^0 n$, $\pi^- p \to K\overline{K} n$, $\pi^+\pi^- \to \pi^+\pi^-$, $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$, $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, $K^0_S K^0_S \pi^0$, $K^+ K^0_S \pi^-$ at rest, $\overline{p}n \to \pi^-\pi^-\pi^+$, $K^0_S K^- \pi^0$, $K^0_S K^0_S \pi^-$ at rest. NODE=M152W;LINKAGE=KM

[14] Supersedes BARBERIS 99 and BARBERIS 99B. NODE=M152W;LINKAGE=BD

[15] T-matrix pole on sheet $--+$. NODE=M152W;LINKAGE=TK

[16] T-matrix pole, supersedes ANISOVICH 94. NODE=M152W;LINKAGE=D

[17] T-matrix pole, supersedes ANISOVICH 94 and AMSLER 92. NODE=M152W;LINKAGE=D1

[18] Supersedes ABATZIS 94, ARMSTRONG 89E. Breit-Wigner mass. NODE=M152W;LINKAGE=B

[19] From a simultaneous analysis of the annihilations $\overline{p}p \to 3\pi^0, \pi^0\eta\eta$. NODE=M152W;LINKAGE=A

[20] Reanalysis of ANISOVICH 94 data. NODE=M152W;LINKAGE=C1

[21] From central value and spread of two solutions. Breit-Wigner mass. NODE=M152W;LINKAGE=AZ

$f_0(1500)$ DECAY MODES

NODE=M152215;NODE=M152

	Mode	Fraction (Γ_i/Γ)	Scale factor	
Γ_1	$\pi\pi$	(34.5 ± 2.2) %	1.2	DESIG=8
Γ_2	$\pi^+\pi^-$	seen		DESIG=9
Γ_3	$2\pi^0$	seen		DESIG=3;OUR EST;→ UNCHECKED ←
Γ_4	4π	(48.9 ± 3.3) %	1.2	DESIG=7
Γ_5	$4\pi^0$	seen		DESIG=5;OUR EST;→ UNCHECKED ←
Γ_6	$2\pi^+2\pi^-$	seen		DESIG=6;OUR EST;→ UNCHECKED ←
Γ_7	$2(\pi\pi)_{S\text{-wave}}$	seen		DESIG=11;OUR EST;→ UNCHECKED ←
Γ_8	$\rho\rho$	seen		DESIG=12;OUR EST;→ UNCHECKED ←
Γ_9	$\pi(1300)\pi$	seen		DESIG=13;OUR EST;→ UNCHECKED ←
Γ_{10}	$a_1(1260)\pi$	seen		DESIG=14;OUR EST;→ UNCHECKED ←
Γ_{11}	$\eta\eta$	$(\ 6.0\pm0.9)$ %	1.1	DESIG=1
Γ_{12}	$\eta\eta'(958)$	$(\ 2.2\pm0.8)$ %	1.4	DESIG=2
Γ_{13}	$K\overline{K}$	$(\ 8.5\pm1.0)$ %	1.1	DESIG=4
Γ_{14}	$\gamma\gamma$	not seen		DESIG=10;OUR EST;→ UNCHECKED ←

CONSTRAINED FIT INFORMATION

An overall fit to 6 branching ratios uses 10 measurements and one constraint to determine 5 parameters. The overall fit has a $\chi^2 =$ 5.6 for 6 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\left\langle\delta x_i \delta x_j\right\rangle/(\delta x_i \cdot \delta x_j)$, in percent, from the fit to the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_4	−88			
x_{11}	27	−56		
x_{12}	3	−32	26	
x_{13}	43	−64	20	2
	x_1	x_4	x_{11}	x_{12}

$f_0(1500)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M152217

$\Gamma(\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_1\Gamma_{14}/\Gamma$

NODE=M152G1
NODE=M152G1

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$33^{+12}_{-6}{}^{+1809}_{-21}$		[1] UEHARA	08A	BELL	10.6 $e^+e^- \to e^+e^-\pi^0\pi^0$
not seen		ACCIARRI	01H	L3	$\gamma\gamma \to K^0_S K^0_S$, E^{ee}_{cm}= 91, 183–209 GeV
<460	95	BARATE	00E	ALEP	$\gamma\gamma \to \pi^+\pi^-$

[1] May also be the $f_0(1370)$. Multiplied by us by 3 to obtain the $\pi\pi$ value.

NODE=M152G1;LINKAGE=UE

$f_0(1500)$ BRANCHING RATIOS

NODE=M152220

$\Gamma(\pi\pi)/\Gamma_{total}$ — Γ_1/Γ

NODE=M152R8
NODE=M152R8

VALUE	DOCUMENT ID		TECN
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.454±0.104	BUGG	96	RVUE

$\Gamma(\pi^+\pi^-)/\Gamma_{total}$ — Γ_2/Γ

NODE=M152R10
NODE=M152R10

VALUE	DOCUMENT ID		TECN	COMMENT
seen	BERTIN	98	OBLX	0.05–0.405 $\overline{n}p \to \pi^+\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
possibly seen	FRABETTI	97D	E687	$D^\pm_s \to \pi^\mp\pi^\pm\pi^\pm$

$\Gamma(4\pi)/\Gamma(\pi\pi)$ — Γ_4/Γ_1

NODE=M152R6
NODE=M152R6

VALUE	DOCUMENT ID		TECN	COMMENT
1.42±0.18 OUR FIT Error includes scale factor of 1.2.				
1.42±0.18 OUR AVERAGE Error includes scale factor of 1.2.				
1.37±0.16	BARBERIS	00D		450 $pp \to p_f 4\pi p_s$
2.1 ±0.6	[1] AMSLER	98	RVUE	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.1 ±0.2	[2] ANISOVICH	02D	SPEC	Combined fit
3.4 ±0.8	[1] ABELE	96	CBAR	0.0 $\overline{p}p \to 5\pi^0$

[1] Excluding $\rho\rho$ contribution to 4π.

NODE=M152R6;LINKAGE=C

[2] From a combined K-matrix analysis of Crystal Barrel (0. $p\overline{p} \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$), GAMS ($\pi p \to \pi^0\pi^0 n$, $\eta\eta n$, $\eta\eta' n$), and BNL ($\pi p \to K\overline{K}n$) data.

NODE=M152R6;LINKAGE=CH

$\Gamma(2(\pi\pi)_{S\text{-wave}})/\Gamma(\pi\pi)$ — Γ_7/Γ_1

NODE=M152R14
NODE=M152R14

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.42±0.26	[1] ABELE	01	CBAR	0.0 $\overline{p}d \to \pi^- 4\pi^0 p$

[1] From the combined data of ABELE 96 and ABELE 96C.

NODE=M152R;LINKAGE=KZ

$\Gamma(2(\pi\pi)_{S\text{-wave}})/\Gamma(4\pi)$ — Γ_7/Γ_4

NODE=M152R15
NODE=M152R15

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.26±0.07	ABELE	01B	CBAR	0.0 $\overline{p}d \to 5\pi p$

$\Gamma(\rho\rho)/\Gamma(4\pi)$ — Γ_8/Γ_4

NODE=M152R16
NODE=M152R16

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.13±0.08	ABELE	01B	CBAR	0.0 $\overline{p}d \to 5\pi p$

$\Gamma(\rho\rho)/\Gamma(2(\pi\pi)_{S\text{-wave}})$ — Γ_8/Γ_7

NODE=M152R11
NODE=M152R11

VALUE	DOCUMENT ID		COMMENT
2.87±0.34 OUR AVERAGE Error includes scale factor of 1.1.			
3.3 ±0.5	BARBERIS	00C	450 $pp \to p_f \pi^+\pi^- 2\pi^0 p_s$
2.6 ±0.4	BARBERIS	00C	450 $pp \to p_f 2(\pi^+\pi^-) p_s$

OCCUR=2

$\Gamma(\pi(1300)\pi)/\Gamma(4\pi)$ — Γ_9/Γ_4

NODE=M152R17
NODE=M152R17

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.50±0.25	ABELE	01B	CBAR	0.0 $\overline{p}d \to 5\pi p$

$\Gamma(a_1(1260)\pi)/\Gamma(4\pi)$ — Γ_{10}/Γ_4

NODE=M152R18

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.12 ± 0.05	ABELE	01B	CBAR	$0.0\ \overline{p}d \to 5\pi p$

$\Gamma(\eta\eta)/\Gamma_{total}$ — Γ_{11}/Γ

NODE=M152R1

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
large	ALDE	88	GAM4	$300\ \pi^- N \to \eta\eta\pi^- N$
large	BINON	83	GAM2	$38\ \pi^- p \to 2\eta n$

$\Gamma(\eta\eta)/\Gamma(\pi\pi)$ — Γ_{11}/Γ_1

NODE=M152R13

VALUE	DOCUMENT ID		TECN	COMMENT
0.173±0.024 OUR FIT Error includes scale factor of 1.1.				
0.175±0.027 OUR AVERAGE				
$0.18\ \pm0.03$	BARBERIS	00E		$450\ pp \to p_f\eta\eta p_s$
0.157 ± 0.060	[1] AMSLER	95D	CBAR	$0.0\ \overline{p}p \to \pi^0\pi^0\pi^0,\ \pi^0\eta\eta,\ \pi^0\pi^0\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.080 ± 0.033	AMSLER	02	CBAR	$0.9\ \overline{p}p \to \pi^0\eta\eta,\ \pi^0\pi^0\pi^0$
$0.11\ \pm0.03$	[2] ANISOVICH	02D	SPEC	Combined fit
0.078 ± 0.013	[3] ABELE	96C	RVUE	Compilation
0.230 ± 0.097	[4] AMSLER	95C	CBAR	$0.0\ \overline{p}p \to \eta\eta\pi^0$

[1] Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D. NODE=M152R3;LINKAGE=AB

[2] From a combined K-matrix analysis of Crystal Barrel ($0.\ p\overline{p} \to \pi^0\pi^0\pi^0,\ \pi^0\eta\eta,\ \pi^0\pi^0\eta$), GAMS ($\pi p \to \pi^0\pi^0 n,\ \eta\eta n,\ \eta\eta' n$), and BNL ($\pi p \to K\overline{K} n$) data. NODE=M152R;LINKAGE=CH

[3] 2π width determined to be 60 ± 12 MeV. NODE=M152R3;LINKAGE=CM

[4] Using AMSLER 95B ($3\pi^0$). NODE=M152R3;LINKAGE=A

$\Gamma(4\pi^0)/\Gamma(\eta\eta)$ — Γ_5/Γ_{11}

NODE=M152R5

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.8 ± 0.3	ALDE	87	GAM4	$100\ \pi^- p \to 4\pi^0 n$

$\Gamma(\eta\eta'(958))/\Gamma(\pi\pi)$ — Γ_{12}/Γ_1

NODE=M152R12

VALUE	DOCUMENT ID		TECN	COMMENT
0.064±0.022 OUR FIT Error includes scale factor of 1.4.				
0.095±0.026	BARBERIS	00A		$450\ pp \to p_f\eta\eta p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.005 ± 0.003	[1] ANISOVICH	02D	SPEC	Combined fit

[1] From a combined K-matrix analysis of Crystal Barrel ($0.\ p\overline{p} \to \pi^0\pi^0\pi^0,\ \pi^0\eta\eta,\ \pi^0\pi^0\eta$), GAMS ($\pi p \to \pi^0\pi^0 n,\ \eta\eta n,\ \eta\eta' n$), and BNL ($\pi p \to K\overline{K} n$) data. NODE=M152R12;LINKAGE=CH

$\Gamma(\eta\eta'(958))/\Gamma(\eta\eta)$ — Γ_{12}/Γ_{11}

NODE=M152R2

VALUE	DOCUMENT ID		TECN	COMMENT
0.37±0.13 OUR FIT Error includes scale factor of 1.5.				
0.29±0.10	[1] AMSLER	95C	CBAR	$0.0\ \overline{p}p \to \eta\eta\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.05 ± 0.03	[2] ANISOVICH	02D	SPEC	Combined fit
0.84 ± 0.23	ABELE	96C	RVUE	Compilation
$2.7\ \pm0.8$	BINON	84C	GAM2	$38\ \pi^- p \to \eta\eta' n$

[1] Using AMSLER 94E ($\eta\eta'\pi^0$). NODE=M152R2;LINKAGE=A

[2] From a combined K-matrix analysis of Crystal Barrel ($0.\ p\overline{p} \to \pi^0\pi^0\pi^0,\ \pi^0\eta\eta,\ \pi^0\pi^0\eta$), GAMS ($\pi p \to \pi^0\pi^0 n,\ \eta\eta n,\ \eta\eta' n$), and BNL ($\pi p \to K\overline{K} n$) data. NODE=M152R2;LINKAGE=CH

$\Gamma(K\overline{K})/\Gamma_{total}$ — Γ_{13}/Γ

NODE=M152R9

VALUE	DOCUMENT ID		TECN
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.044 ± 0.021	BUGG	96	RVUE

$\Gamma(K\overline{K})/\Gamma(\pi\pi)$ — Γ_{13}/Γ_1

NODE=M152R7

VALUE	DOCUMENT ID	TECN	COMMENT
0.246±0.025 OUR FIT			
0.236±0.026 OUR AVERAGE			
0.25 ±0.03	[1] BARGIOTTI 03	OBLX	$\overline{p}p$
0.19 ±0.07	[2] ABELE 98	CBAR	0.0 $\overline{p}p \rightarrow K^0_L K^\pm \pi^\mp$
0.20 ±0.08	[3] ABELE 96B	CBAR	0.0 $\overline{p}p \rightarrow \pi^0 K^0_L K^0_L$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.16 ±0.05	[4] ANISOVICH 02D	SPEC	Combined fit
0.33 ±0.03 ±0.07	BARBERIS 99D	OMEG	450 $pp \rightarrow K^+K^-, \pi^+\pi^-$

[1] Coupled channel analysis of $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, and $K^\pm K^0_S \pi^\mp$. NODE=M152R;LINKAGE=BG

[2] Using $\pi^0\pi^0$ from AMSLER 95B. NODE=M152R7;LINKAGE=A

[3] Using AMSLER 95B ($3\pi^0$), AMSLER 94C ($2\pi^0\eta$) and SU(3). NODE=M152R7;LINKAGE=D

[4] From a combined K-matrix analysis of Crystal Barrel (0. $p\overline{p} \rightarrow \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$), GAMS ($\pi p \rightarrow \pi^0\pi^0 n$, $\eta\eta n$, $\eta\eta' n$), and BNL ($\pi p \rightarrow K\overline{K} n$) data. NODE=M152R7;LINKAGE=CH

$\Gamma(K\overline{K})/\Gamma(\eta\eta)$ — Γ_{13}/Γ_{11}

NODE=M152R4

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
1.43±0.24 OUR FIT	Error includes scale factor of 1.1.			
1.85±0.41		BARBERIS 00E		450 $pp \rightarrow p_f \eta\eta p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.5 ±0.6		[1] ANISOVICH 02D	SPEC	Combined fit
<0.4	90	[2] PROKOSHKIN 91	GAM4	300 $\pi^- p \rightarrow \pi^- p\eta\eta$
<0.6		[3] BINON 83	GAM2	38 $\pi^- p \rightarrow 2\eta n$

[1] From a combined K-matrix analysis of Crystal Barrel (0. $p\overline{p} \rightarrow \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$), GAMS ($\pi p \rightarrow \pi^0\pi^0 n$, $\eta\eta n$, $\eta\eta' n$), and BNL ($\pi p \rightarrow K\overline{K} n$) data. NODE=M152R4;LINKAGE=CH

[2] Combining results of GAM4 with those of WA76 on $K\overline{K}$ central production. NODE=M152R4;LINKAGE=BZ

[3] Using ETKIN 82B and COHEN 80. NODE=M152R4;LINKAGE=A

f_0(1500) REFERENCES

NODE=M152

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SARANTSEV 21 PL B816 136227 A.V. Sarantsev et al. (BONN, PNPI) REFID=61091
ALBRECHT 20 EPJ C80 453 M. Albrecht et al. (Crystal Barrel Collab.) REFID=60439
ABLIKIM 18AA PR D98 072003 M. Ablikim et al. (BESIII Collab.) REFID=59455
ROPERTZ 18 EPJ C78 1000 S. Ropertz, C. Hanhart, B. Kubis (BONN, JULI) REFID=59332
AAIJ 17V JHEP 1708 037 R. Aaij et al. (LHCb Collab.) REFID=57828
ABLIKIM 15AE PR D92 052003 M. Ablikim et al. (BESIII Collab.) REFID=56984
DOBBS 15 PR D91 052006 S. Dobbs et al. (NWES) REFID=56805
AAIJ 14BR PR D89 092006 R. Aaij et al. (LHCb Collab.) REFID=56035
ABLIKIM 13N PR D87 092009 M. Ablikim et al. (BESIII Collab.) REFID=55387
ANISOVICH 09 IJMP A24 2481 V.V. Anisovich, A.V. Sarantsev REFID=52719
KLEMPT 08 EPJ C55 39 E. Klempt, M. Matveev, A.V. Sarantsev (BONN+) REFID=52286
UEHARA 08A PR D78 052004 S. Uehara et al. (BELLE Collab.) REFID=52309
ABLIKIM 06V PL B642 441 M. Ablikim et al. (BES Collab.) REFID=51507
AMSLER 06 PL B639 165 C. Amsler et al. (Crystal Barrel Collab.) REFID=51136
AUBERT 06O PR D74 032003 B. Aubert et al. (BABAR Collab.) REFID=51141
UMAN 06 PR D73 052009 I. Uman et al. (FNAL E835) REFID=51063
VLADIMIRSK... 06 PAN 69 493 V.V. Vladimirsky et al. (ITEP, Moscow) REFID=51191
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BINON 05 PAN 68 960 F. Binon et al. REFID=50780
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GARMASH 05 PR D71 092003 A. Garmash et al. (BELLE Collab.) REFID=50641
ANISOVICH 03 EPJ A16 229 V.V. Anisovich et al. REFID=49401
BARGIOTTI 03 EPJ C26 371 M. Bargiotti et al. (OBELIX Collab.) REFID=49217
AMSLER 02 EPJ C23 29 C. Amsler et al. REFID=48580
ANISOVICH 02D PAN 65 1545 V.V. Anisovich et al. REFID=48831
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ABELE 01 EPJ C19 667 A. Abele et al. (Crystal Barrel Collab.) REFID=48334
ABELE 01B EPJ C21 261 A. Abele et al. (Crystal Barrel Collab.) REFID=48356
ACCIARRI 01H PL B501 173 M. Acciarri et al. (L3 Collab.) REFID=48321
AITALA 01A PRL 86 765 E.M. Aitala et al. (FNAL E791 Collab.) REFID=48004
BARATE 00E PL B472 189 R. Barate et al. (ALEPH Collab.) REFID=47428
BARBERIS 00A PL B471 429 D. Barberis et al. (WA 102 Collab.) REFID=47957
BARBERIS 00C PL B471 440 D. Barberis et al. (WA 102 Collab.) REFID=47959
BARBERIS 00D PL B474 423 D. Barberis et al. (WA 102 Collab.) REFID=47960
BARBERIS 00E PL B479 59 D. Barberis et al. (WA 102 Collab.) REFID=47961
BARBERIS 99 PL B453 305 D. Barberis et al. (Omega Expt.) REFID=46921
BARBERIS 99B PL B453 316 D. Barberis et al. (Omega Expt.) REFID=46922
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BELLAZZINI 99 PL B467 296 R. Bellazzini et al. REFID=47400
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KAMINSKI 99 EPJ C9 141 R. Kaminski, L. Lesniak, B. Loiseau (CRAC, PARIN) REFID=46927
ABELE 98 PR D57 3860 A. Abele et al. (Crystal Barrel Collab.) REFID=45863
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AMSLER 98 RMP 70 1293 C. Amsler REFID=46601
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BERTIN	98	PR D57 55	A. Bertin *et al.*	(OBELIX Collab.)	REFID=45782
REYES	98	PRL 81 4079	M.A. Reyes *et al.*		REFID=46378
BARBERIS	97B	PL B413 217	D. Barberis *et al.*	(WA 102 Collab.)	REFID=45758
BERTIN	97C	PL B408 476	A. Bertin *et al.*	(OBELIX Collab.)	REFID=45701
FRABETTI	97D	PL B407 79	P.L. Frabetti *et al.*	(FNAL E687 Collab.)	REFID=45554
ABELE	96	PL B380 453	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=45011
ABELE	96B	PL B385 425	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=45038
ABELE	96C	NP A609 562	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=45076
AMELIN	96B	PAN 59 976	D.V. Amelin *et al.*	(SERP, TBIL)	REFID=44725
		Translated from YAF 59 1021.			
BUGG	96	NP B471 59	D.V. Bugg, A.V. Sarantsev, B.S. Zou	(LOQM, PNPI)	REFID=45094
AMSLER	95B	PL B342 433	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=44377
AMSLER	95C	PL B353 571	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=44440
AMSLER	95D	PL B355 425	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=44441
ANTINORI	95	PL B353 589	F. Antinori *et al.*	(ATHU, BARI, BIRM+)	REFID=44437
BUGG	95	PL B353 378	D.V. Bugg *et al.*	(LOQM, PNPI, WASH)	REFID=44438
ABATZIS	94	PL B324 509	S. Abatzis *et al.*	(ATHU, BARI, BIRM+)	REFID=44090
AMSLER	94C	PL B327 425	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=44091
AMSLER	94D	PL B333 277	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=44093
AMSLER	94E	PL B340 259	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=44080
ANISOVICH	94	PL B323 233	V.V. Anisovich *et al.*	(Crystal Barrel Collab.)	REFID=43659
BUGG	94	PR D50 4412	D.V. Bugg *et al.*	(LOQM)	REFID=44078
AMSLER	92	PL B291 347	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=43169
BELADIDZE	92C	SJNP 55 1535	G.M. Beladidze, S.I. Bityukov, G.V. Borisov	(SERP+)	REFID=43175
		Translated from YAF 55 2748.			
PROKOSHKIN	91	SPD 36 155	Y.D. Prokoshkin	(GAM2 and GAM4 Collab.)	REFID=41719
		Translated from DANS 316 900.			
ARMSTRONG	89E	PL B228 536	T.A. Armstrong, M. Benayoun	(ATHU, BARI, BIRM+)	REFID=41011
ALDE	88	PL B201 160	D.M. Alde *et al.*	(SERP, BELG, LANL, LAPP+)	REFID=40283
ASTON	88D	NP B301 525	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)	REFID=40330
ALDE	87	PL B198 286	D.M. Alde *et al.*	(LANL, BRUX, SERP, LAPP)	REFID=40221
ALDE	86D	NP B269 485	D.M. Alde *et al.*	(BELG, LAPP, SERP, CERN+)	REFID=20765
LONGACRE	86	PL B177 223	R.S. Longacre *et al.*	(BNL, BRAN, CUNY+)	REFID=20768
BINON	84C	NC 80A 363	F.G. Binon *et al.*	(BELG, LAPP, SERP+)	REFID=21418
BINON	83	NC 78A 313	F.G. Binon *et al.*	(BELG, LAPP, SERP+)	REFID=20750
Also		SJNP 38 561	F.G. Binon *et al.*	(BELG, LAPP, SERP+)	REFID=20751
		Translated from YAF 38 934.			
GRAY	83	PR D27 307	L. Gray *et al.*	(SYRA)	REFID=21370
ETKIN	82B	PR D25 1786	A. Etkin *et al.*	(BNL, CUNY, TUFTS, VAND)	REFID=20390
COHEN	80	PR D22 2595	D. Cohen *et al.*	(ANL)	REFID=20381
HYAMS	75	NP B100 205	B.D. Hyams *et al.*	(CERN, MPIM)	REFID=20355

NODE=M084

$f_1(1510)$ $I^G(J^{PC}) = 0^+(1^{++})$

OMITTED FROM SUMMARY TABLE

See the review on "Spectroscopy of Light Meson Resonances."

NODE=M084

$f_1(1510)$ MASS

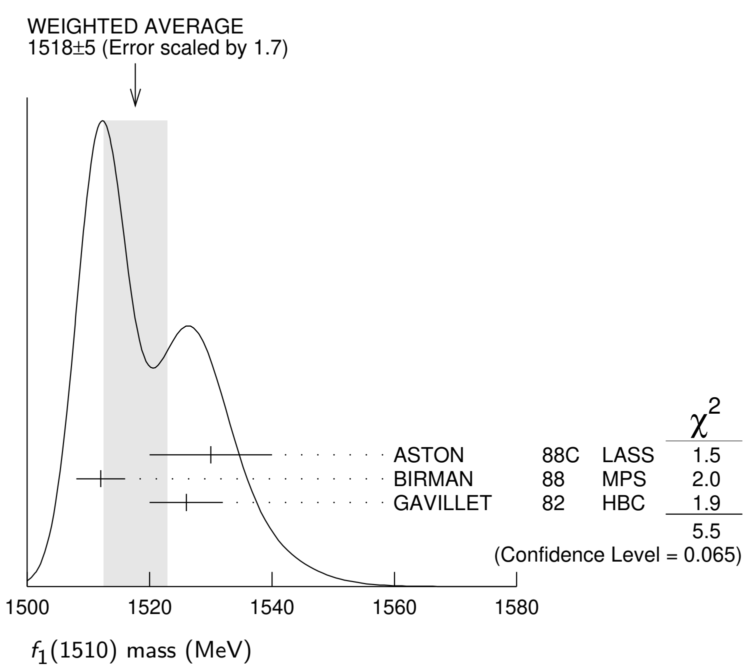
NODE=M084M

NODE=M084M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1518± 5 OUR AVERAGE	Error includes scale factor of 1.7. See the ideogram below.				
1530±10		ASTON	88C	LASS	11 $K^- p \rightarrow K^0_S K^\pm \pi^\mp \Lambda$
1512± 4	600	[1] BIRMAN	88	MPS	8 $\pi^- p \rightarrow K^+ \overline{K}^0 \pi^- n$
1526± 6	271	GAVILLET	82	HBC	4.2 $K^- p \rightarrow \Lambda K K \pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
∼ 1525		[2] BAUER	93B		$\gamma\gamma^* \rightarrow \pi^+\pi^-\pi^0\pi^0$

[1] From partial wave analysis of $K^+ \overline{K}^0 \pi^-$ state. NODE=M084M;LINKAGE=A

[2] Not seen by AIHARA 88C in the $K^0_S K^\pm \pi^\mp$ final state. NODE=M084M;LINKAGE=C



$f_1(1510)$ WIDTH

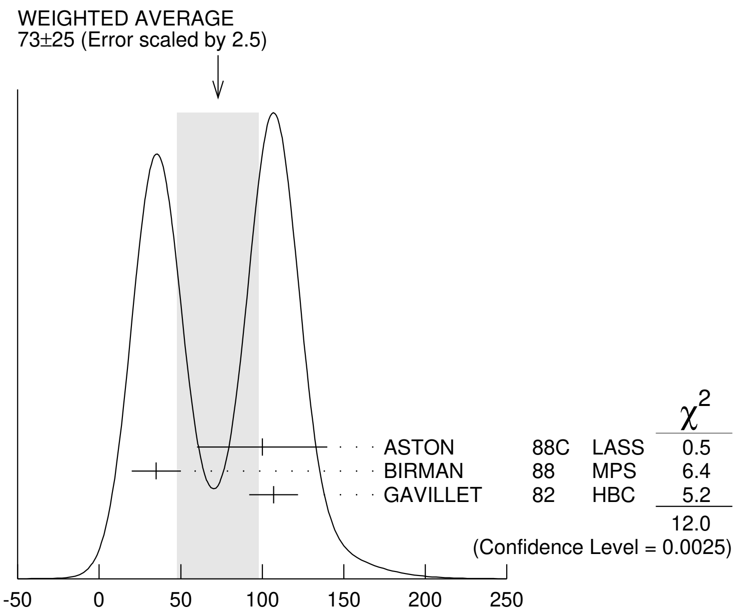
NODE=M084W

NODE=M084W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
73±25 OUR AVERAGE		Error includes scale factor of 2.5. See the ideogram below.			
100±40		ASTON	88C	LASS	11 $K^- p \to K^0_S K^\pm \pi^\mp \Lambda$
35±15	600	[3] BIRMAN	88	MPS	8 $\pi^- p \to K^+ \overline{K}^0 \pi^- n$
107±15	271	GAVILLET	82	HBC	4.2 $K^- p \to \Lambda K K \pi$

[3] From partial wave analysis of $K^+ \overline{K}^0 \pi^-$ state.

NODE=M084W;LINKAGE=A



$f_1(1510)$ width (MeV)

$f_1(1510)$ DECAY MODES

NODE=M084215;NODE=M084

	Mode	Fraction (Γ_i/Γ)
Γ_1	$K \overline{K}^*(892) +$ c.c.	seen
Γ_2	$\pi^+ \pi^- \eta'$	seen

DESIG=1;OUR EST;→ UNCHECKED ←
DESIG=2

$f_1(1510)$ BRANCHING RATIOS

NODE=M084225

$\Gamma(\pi^+ \pi^- \eta')/\Gamma_{total}$ **Γ_2/Γ**

NODE=M084R01
NODE=M084R01

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	230	ABLIKIM	11C	BES3	$J/\psi \to \gamma \pi^+ \pi^- \eta'$

$f_1(1510)$ REFERENCES

NODE=M084

ABLIKIM	11C	PRL 106 072002	M. Ablikim *et al.*	(BESIII Collab.)
BAUER	93B	PR D48 3976	D.A. Bauer *et al.*	(SLAC)
AIHARA	88C	PR D38 1	H. Aihara *et al.*	(TPC-2γ Collab.)
ASTON	88C	PL B201 573	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS) JP
BIRMAN	88	PRL 61 1557	A. Birman *et al.*	(BNL, FSU, IND, MASD) JP
GAVILLET	82	ZPHY C16 119	P. Gavillet *et al.*	(CERN, CDEF, PADO+)

REFID=53684
REFID=43678
REFID=40564
REFID=40282
REFID=40568
REFID=20877

NODE=M013

$f'_2(1525)$

$I^G(J^{PC}) = 0^+(2^{++})$

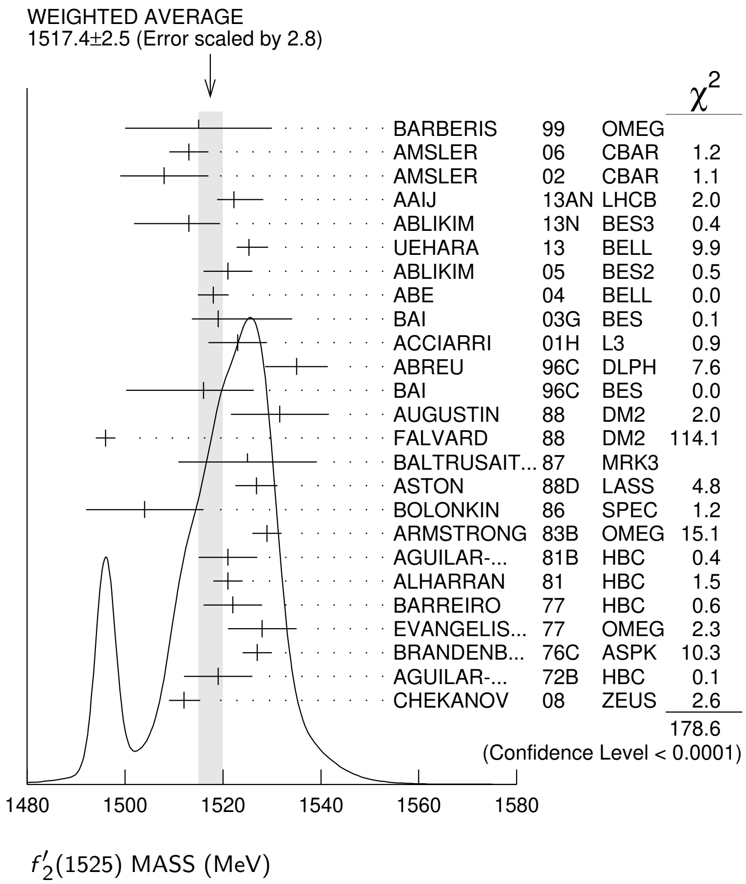
$f'_2(1525)$ MASS

NODE=M013MX

NODE=M013MX

VALUE (MeV) *DOCUMENT ID*

1517.4±2.5 OUR AVERAGE Includes data from the 6 datablocks that follow this one. Error includes scale factor of 2.8. See the ideogram below.



PRODUCED BY PION BEAM

NODE=M013M1

NODE=M013M1

The data in this block is included in the average printed for a previous datablock.

• • • We do not use the following data for averages, fits, limits, etc. • • •

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1521 ± 13		TIKHOMIROV	03	SPEC	$40.0\ \pi^- C \rightarrow K^0_S K^0_S K^0_L X$
1547^{+10}_{-2}		[1] LONGACRE	86	MPS	$22\ \pi^- p \rightarrow K^0_S K^0_S n$
1496^{+9}_{-8}		[2] CHABAUD	81	ASPK	$6\ \pi^- p \rightarrow K^+ K^- n$
1497^{+8}_{-9}		CHABAUD	81	ASPK	$18.4\ \pi^- p \rightarrow K^+ K^- n$
1492 ± 29		GORLICH	80	ASPK	$17\ \pi^- p$ polarized $\rightarrow K^+ K^- n$
1502 ± 25		[3] CORDEN	79	OMEG	12–15 $\pi^- p \rightarrow \pi^+ \pi^- n$
1480	14	CRENNELL	66	HBC	$6.0\ \pi^- p \rightarrow K^0_S K^0_S n$

OCCUR=2

[1] From a partial-wave analysis of data using a K-matrix formalism with 5 poles. NODE=M013M;LINKAGE=L

[2] CHABAUD 81 is a reanalysis of PAWLICKI 77 data. NODE=M013M;LINKAGE=D

[3] From an amplitude analysis where the $f'_2(1525)$ width and elasticity are in complete disagreement with the values obtained from $K\overline{K}$ channel, making the solution dubious. NODE=M013M;LINKAGE=N

PRODUCED BY $K^{\pm}$ BEAM

NODE=M013M2
NODE=M013M2

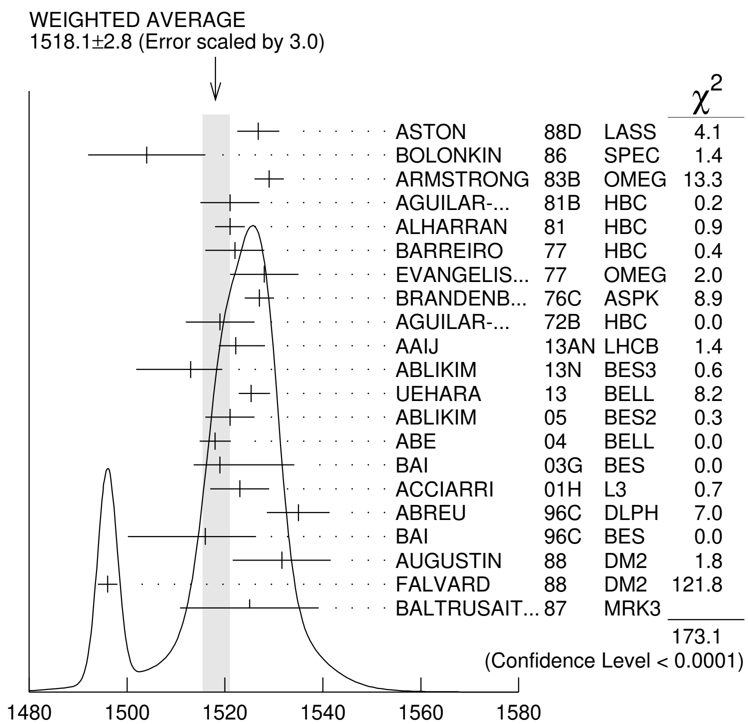
The data in this block is included in the average printed for a previous datablock.

1518.1± 2.8 OUR AVERAGE Includes data from the datablock that follows this one. Error includes scale factor of 3.0. See the ideogram below.

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1526.8± 4.3		ASTON	88D	LASS	11 $K^- p \to K^0_S K^0_S \Lambda$
1504 ±12		BOLONKIN	86	SPEC	40 $K^- p \to K^0_S K^0_S Y$
1529 ± 3		ARMSTRONG	83B	OMEG	18.5 $K^- p \to K^- K^+ \Lambda$
1521 ± 6	650	AGUILAR-...	81B	HBC	4.2 $K^- p \to \Lambda K^+ K^-$
1521 ± 3	572	ALHARRAN	81	HBC	8.25 $K^- p \to \Lambda K \overline{K}$
1522 ± 6	123	BARREIRO	77	HBC	4.15 $K^- p \to \Lambda K^0_S K^0_S$
1528 ± 7	166	EVANGELIS...	77	OMEG	10 $K^- p \to K^+ K^- (\Lambda, \Sigma)$
1527 ± 3	120	BRANDENB...	76C	ASPK	13 $K^- p \to K^+ K^- (\Lambda, \Sigma)$
1519 ± 7	100	AGUILAR-...	72B	HBC	3.9,4.6 $K^- p \to K \overline{K} (\Lambda, \Sigma)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1514 ± 8	61	BINON	07	GAMS	32.5 $K^- p \to \eta\eta(\Lambda/\Sigma^0)$
1513 ±10		[1] BARKOV	99	SPEC	40 $K^- p \to K^0_S K^0_S y$

[1] Systematic errors not estimated.

NODE=M013M2;LINKAGE=SK



PRODUCED BY $K^{\pm}$ BEAM (MeV)

PRODUCED IN e^+e^- ANNIHILATION AND PARTICLE DECAYS

NODE=M013M3
NODE=M013M3

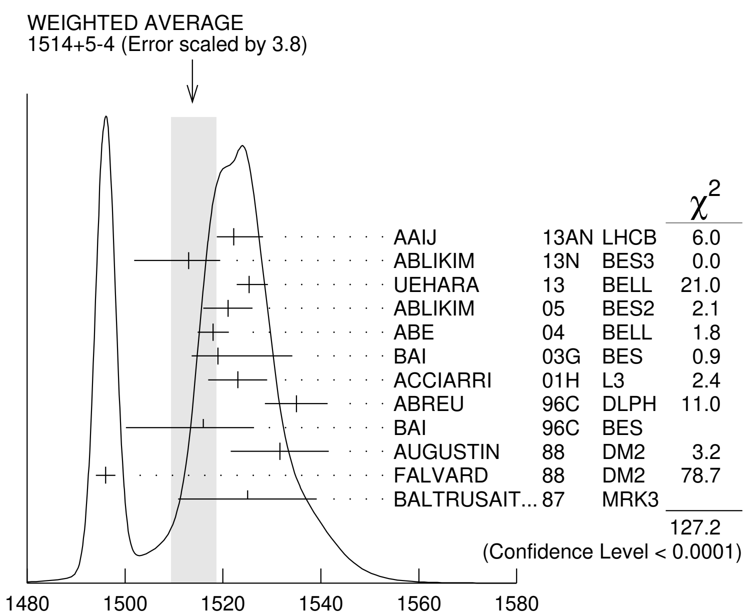
The data in this block is included in the average printed for a previous datablock.

1514 $^{+5}_{-4}$ OUR AVERAGE Error includes scale factor of 3.8. See the ideogram below.

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1522.2± 2.8 $^{+5.3}_{-2.0}$		AAIJ	13AN	LHCB	$\overline{B}^0_s \to J/\psi K^+ K^-$
1513 ± 5 $^{+4}_{-10}$	5.5k	[1] ABLIKIM	13N	BES3	$e^+e^- \to J/\psi \to \gamma\eta\eta$
1525.3 $^{+1.2}_{-1.4}$ $^{+3.7}_{-2.1}$		UEHARA	13	BELL	$\gamma\gamma \to K^0_S K^0_S$
1521 ± 5		ABLIKIM	05	BES2	$J/\psi \to \phi K^+ K^-$
1518 ± 1 ± 3		ABE	04	BELL	10.6 $e^+e^- \to e^+e^- K^+ K^-$
1519 ± 2 $^{+15}_{-5}$		BAI	03G	BES	$J/\psi \to \gamma K \overline{K}$
1523 ± 6	331	[2] ACCIARRI	01H	L3	91, 183–209 $e^+e^- \to e^+e^- K^0_S K^0_S$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT	
1535 ± 5 ± 4		ABREU	96C	DLPH	$Z^0 \to K^+ K^- + X$	
1516 ± 5 $^{+9}_{-15}$		BAI	96C	BES	$J/\psi \to \gamma K^+ K^-$	
1531.6±10.0		AUGUSTIN	88	DM2	$J/\psi \to \gamma K^+ K^-$	
1496 ± 2		[3] FALVARD	88	DM2	$J/\psi \to \phi K^+ K^-$	OCCUR=2
1525 ±10 ±10		BALTRUSAIT...87		MRK3	$J/\psi \to \gamma K^+ K^-$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1503 ±11		[4] RODAS	22	RVUE	$J/\psi(1S) \to \gamma\,(\pi\pi,\ K\overline{K})$	
1532 ± 3 ± 6	644	[5,6] DOBBS	15		$J/\psi \to \gamma K^+ K^-$	
1557 ± 9 ± 3	113	[5,6] DOBBS	15		$\psi(2S) \to \gamma K^+ K^-$	OCCUR=2
1526 ± 7	29	[7] LEES	14H	BABR	$e^+ e^- \to K^0_S K^0_S K^+ K^- \gamma$	
1523 ± 5	870	[8] SCHEGELSKY	06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$	
1515 ± 5		[9] FALVARD	88	DM2	$J/\psi \to \phi K^+ K^-$	

[1] From partial wave analysis including all possible combinations of 0^{++}, 2^{++}, and 4^{++} resonances. NODE=M013M3;LINKAGE=A
[2] Supersedes ACCIARRI 95J. NODE=M013M;LINKAGE=HA
[3] From an analysis including interference with $f_0(1710)$. NODE=M013M;LINKAGE=F2
[4] T-matrix pole from coupled channel K-matrix fit to data on $J/\psi \to \gamma\pi^0\pi^0$ (ABLIKIM 15AE) and $J/\psi \to \gamma K^0_S K^0_S$ (ABLIKIM 18AA). NODE=M013M3;LINKAGE=E
[5] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M013M3;LINKAGE=B
[6] From a fit to a Breit-Wigner line shape with fixed $\Gamma = 73$ MeV. NODE=M013M3;LINKAGE=C
[7] From a fit to a Breit-Wigner line shape plus a second-order polynomial function. Systematic errors not evaluated. NODE=M013M3;LINKAGE=D
[8] From analysis of L3 data at 91 and 183–209 GeV. NODE=M013M3;LINKAGE=SC
[9] From an analysis ignoring interference with $f_0(1710)$. NODE=M013M;LINKAGE=F1



$f'_2(1525)$ mass, $e^+ e^-$ annihilation and particle decays (MeV)

PRODUCED IN $\overline{p}p$ ANNIHILATION

NODE=M013M9
NODE=M013M9

The data in this block is included in the average printed for a previous datablock.

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
1512 ± 4 OUR AVERAGE				
1513 ± 4	AMSLER	06	CBAR	0.9 $\overline{p}p \to K^+ K^- \pi^0$
1508 ± 9	[1] AMSLER	02	CBAR	0.9 $\overline{p}p \to \pi^0\eta\eta$, $\pi^0\pi^0\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1495.0± 1.1±8.1	[2] ALBRECHT	20	RVUE	0.9 $\overline{p}p \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0 K^+ K^-$
1530 ±12	[3] ANISOVICH	09	RVUE	0.0 $\overline{p}p$, πN

[1] T-matrix pole. NODE=M013M;LINKAGE=TT
[2] T-matrix pole, 4 poles, 4 channels, including scattering data from HYAMS 75 ($\pi\pi$), LONGACRE 86 ($K\overline{K}$), BINON 83 ($\eta\eta$). NODE=M013M9;LINKAGE=A
[3] 4-poles, 5-channel K matrix fit. NODE=M013M9;LINKAGE=AN

CENTRAL PRODUCTION

NODE=M013M4

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
The data in this block is included in the average printed for a previous datablock.				
1515±15	BARBERIS	99	OMEG	450 $p p \to p_s p_f K^+ K^-$

PRODUCED IN *ep* COLLISIONS

NODE=M013M10

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
The data in this block is included in the average printed for a previous datablock.					
$\mathbf{1512 \pm 3^{+1.4}_{-0.5}}$		[1] CHEKANOV	08	ZEUS	$e p \to K^0_S K^0_S X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1537^{+9}_{-8}	84	[2] CHEKANOV	04	ZEUS	$e p \to K^0_S K^0_S X$

[1] In the SU(3) based model with a specific interference pattern of the $f_2(1270)$, $a^0_2(1320)$, and $f'_2(1525)$ mesons incoherently added to the $f_0(1710)$ and non-resonant background. NODE=M013M10;LINKAGE=HE

[2] Systematic errors not estimated. NODE=M013M10;LINKAGE=CH

$f'_2(1525)$ WIDTH

NODE=M013WX

VALUE (MeV)	DOCUMENT ID		COMMENT
86 ±5 OUR FIT Error includes scale factor of 2.2.			
$\mathbf{86.9^{+2.3}_{-2.1}}$	PDG	18	Average of width measurements

NODE=M013WX

PRODUCED BY PION BEAM

NODE=M013W1

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
$\mathbf{86.9^{+2.3}_{-2.1}}$ **OUR AVERAGE** Includes data from the 5 datablocks that follow this one. Error includes scale factor of 1.4. See the ideogram below.				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
102 ±42	TIKHOMIROV	03	SPEC	40.0 $\pi^- C \to K^0_S K^0_S K^0_L X$
$108 ^{+5}_{-2}$	[1] LONGACRE	86	MPS	22 $\pi^- p \to K^0_S K^0_S n$
$69 ^{+22}_{-16}$	[2] CHABAUD	81	ASPK	6 $\pi^- p \to K^+ K^- n$
$137 ^{+23}_{-21}$	CHABAUD	81	ASPK	18.4 $\pi^- p \to K^+ K^- n$
$150 ^{+83}_{-50}$	GORLICH	80	ASPK	17 $\pi^- p$ polarized $\to K^+ K^- n$
165 ±42	[3] CORDEN	79	OMEG	12–15 $\pi^- p \to \pi^+ \pi^- n$
$92 ^{+39}_{-22}$	[4] POLYCHRO...	79	STRC	7 $\pi^- p \to n K^0_S K^0_S$

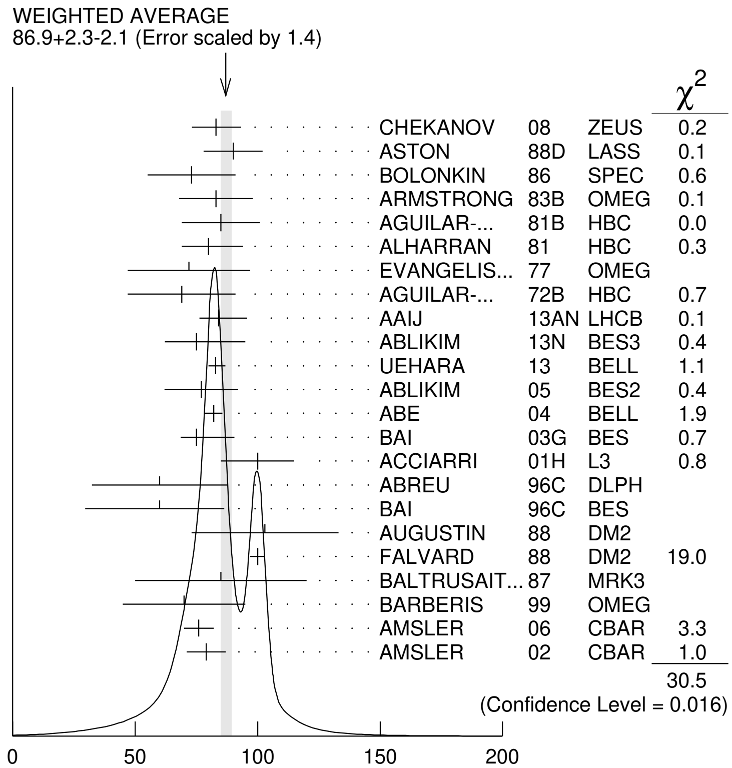
OCCUR=2

[1] From a partial-wave analysis of data using a K-matrix formalism with 5 poles. NODE=M013W;LINKAGE=L

[2] CHABAUD 81 is a reanalysis of PAWLICKI 77 data. NODE=M013W;LINKAGE=D

[3] From an amplitude analysis where the $f'_2(1525)$ width and elasticity are in complete disagreement with the values obtained from $K\overline{K}$ channel, making the solution dubious. NODE=M013W;LINKAGE=N

[4] From a fit to the D with $f_2(1270)$-$f'_2(1525)$ interference. Mass fixed at 1516 MeV. NODE=M013W;LINKAGE=M



$f_2'(1525)$ WIDTH (MeV)

PRODUCED BY $K^{\pm}$ BEAM

NODE=M013W2

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT

The data in this block is included in the average printed for a previous datablock.

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
82± 6 OUR AVERAGE					
90±12		ASTON	88D	LASS	11 $K^- p \to K^0_S K^0_S \Lambda$
73±18		BOLONKIN	86	SPEC	40 $K^- p \to K^0_S K^0_S Y$
83±15		ARMSTRONG	83B	OMEG	18.5 $K^- p \to K^- K^+ \Lambda$
85±16	650	AGUILAR-...	81B	HBC	4.2 $K^- p \to \Lambda K^+ K^-$
80^{+14}_{-11}	572	ALHARRAN	81	HBC	8.25 $K^- p \to \Lambda K \overline{K}$
72±25	166	EVANGELIS...	77	OMEG	10 $K^- p \to K^+ K^- (\Lambda, \Sigma)$
69±22	100	AGUILAR-...	72B	HBC	3.9,4.6 $K^- p \to K \overline{K} (\Lambda, \Sigma)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
92^{+25}_{-16}	61	BINON	07	GAMS	32.5 $K^- p \to \eta\eta(\Lambda/\Sigma^0)$
75±20		BARKOV [1]	99	SPEC	40 $K^- p \to K^0_S K^0_S y$
62^{+19}_{-14}	123	BARREIRO	77	HBC	4.15 $K^- p \to \Lambda K^0_S K^0_S$
61± 8	120	BRANDENB...	76C	ASPK	13 $K^- p \to K^+ K^- (\Lambda, \Sigma)$

[1] Systematic errors not estimated.

NODE=M013W2;LINKAGE=SK

PRODUCED IN $e^+ e^-$ ANNIHILATION AND PARTICLE DECAYS

NODE=M013W3

The data in this block is included in the average printed for a previous datablock.

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$89.2^{+3.4}_{-3.0}$ OUR AVERAGE Error includes scale factor of 1.8. See the ideogram below.					
$84 \pm 6 ^{+10}_{-5}$		AAIJ	13AN	LHCB	$\overline{B}^0_s \to J/\psi K^+ K^-$
$75 ^{+12}_{-10} {}^{+16}_{-8}$	5.5k	ABLIKIM [1]	13N	BES3	$e^+ e^- \to J/\psi \to \gamma\eta\eta$
$82.9^{+2.1}_{-2.2}{}^{+3.3}_{-2.0}$		UEHARA	13	BELL	$\gamma\gamma \to K^0_S K^0_S$
77 ±15		ABLIKIM	05	BES2	$J/\psi \to \phi K^+ K^-$
82 ± 2 ± 3		ABE	04	BELL	10.6 $e^+ e^- \to e^+ e^- K^+ K^-$
$75 \pm 4 ^{+15}_{-5}$		BAI	03G	BES	$J/\psi \to \gamma K \overline{K}$

100	±15		331	[2] ACCIARRI	01H	L3	91, 183–209 $e^+e^- \to e^+e^- K^0_S K^0_S$
60	±20	±19		ABREU	96C	DLPH	$Z^0 \to K^+K^- + X$
60	±23	$^{+13}_{-20}$		BAI	96C	BES	$J/\psi \to \gamma K^+K^-$
103	±30			AUGUSTIN	88	DM2	$J/\psi \to \gamma K^+K^-$
100	± 3			[3] FALVARD	88	DM2	$J/\psi \to \phi K^+K^-$
85	±35			BALTRUSAIT...	87	MRK3	$J/\psi \to \gamma K^+K^-$

OCCUR=2

• • • We do not use the following data for averages, fits, limits, etc. • • •

84	±15		[4] RODAS	22	RVUE	$J/\psi(1S) \to \gamma (\pi\pi, K\overline{K})$
37	±12	29	[5] LEES	14H	BABR	$e^+e^- \to K^0_S K^0_S K^+K^-\gamma$
104	±10	870	[6] SCHEGELSKY	06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$
62	±10		[7] FALVARD	88	DM2	$J/\psi \to \phi K^+K^-$

[1] From partial wave analysis including all possible combinations of 0^{++}, 2^{++}, and 4^{++} resonances. NODE=M013W3;LINKAGE=A

[2] Supersedes ACCIARRI 95J. NODE=M013W;LINKAGE=HA

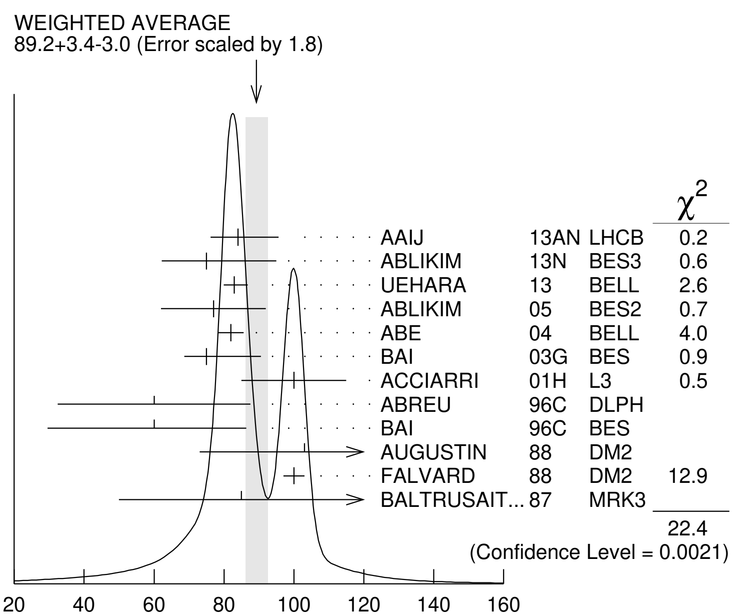
[3] From an analysis including interference with $f_0(1710)$. NODE=M013W;LINKAGE=F2

[4] T-matrix pole from coupled channel K-matrix fit to data on $J/\psi \to \gamma\pi^0\pi^0$ (ABLIKIM 15AE) and $J/\psi \to \gamma K^0_S K^0_S$ (ABLIKIM 18AA). NODE=M013W3;LINKAGE=C

[5] From a fit to a Breit-Wigner line shape plus a second-order polynomial function. Systematic errors not evaluated. NODE=M013W3;LINKAGE=B

[6] From analysis of L3 data at 91 and 183–209 GeV. NODE=M013W3;LINKAGE=SC

[7] From an analysis ignoring interference with $f_0(1710)$. NODE=M013W;LINKAGE=F1



$f'_2(1525)$ width, e^+e^- annihilation and particle decays (MeV)

PRODUCED IN $\overline{p}p$ ANNIHILATION

NODE=M013W9
NODE=M013W9

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
The data in this block is included in the average printed for a previous datablock.				
77 ± 5 OUR AVERAGE				
76 ± 6	AMSLER	06	CBAR	0.9 $\overline{p}p \to K^+K^-\pi^0$
79 ± 8	[1] AMSLER	02	CBAR	0.9 $\overline{p}p \to \pi^0\eta\eta$, $\pi^0\pi^0\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
104.8± 0.9±9.8	[2] ALBRECHT	20	RVUE	0.9 $\overline{p}p \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0K^+K^-$
128 ±20	[3] ANISOVICH	09	RVUE	0.0 $\overline{p}p$, πN

[1] T-matrix pole. NODE=M013W9;LINKAGE=TT

[2] T-matrix pole, 4 poles, 4 channels, including scattering data from HYAMS 75 ($\pi\pi$), LONGACRE 86 ($K\overline{K}$), BINON 83 ($\eta\eta$). NODE=M013W9;LINKAGE=A

[3] K-matrix, 4-poles, 5-channel fit. NODE=M013W9;LINKAGE=AN

CENTRAL PRODUCTION

NODE=M013W4

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT

The data in this block is included in the average printed for a previous datablock.

70±25	BARBERIS	99	OMEG	450 $pp \to p_s p_f K^+ K^-$

PRODUCED IN *ep* COLLISIONS

NODE=M013W10

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
The data in this block is included in the average printed for a previous datablock.					
$83 \pm 9^{+5}_{-4}$		[1] CHEKANOV	08	ZEUS	$ep \to K^0_S K^0_S X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
50^{+34}_{-22}	84	[2] CHEKANOV	04	ZEUS	$ep \to K^0_S K^0_S X$

[1] In the SU(3) based model with a specific interference pattern of the $f_2(1270)$, $a^0_2(1320)$, and $f'_2(1525)$ mesons incoherently added to the $f_0(1710)$ and non-resonant background. NODE=M013W10;LINKAGE=HE

[2] Systematic errors not estimated. NODE=M013W10;LINKAGE=CH

$f'_2(1525)$ DECAY MODES

NODE=M013215;NODE=M013

	Mode	Fraction (Γ_i/Γ)	Scale factor	
Γ_1	$K\overline{K}$	(87.6±2.2) %	1.1	DESIG=2
Γ_2	$\eta\eta$	(11.6±2.2) %	1.1	DESIG=4
Γ_3	$\pi\pi$	(8.3±1.6) $\times 10^{-3}$		DESIG=1
Γ_4	$K\overline{K}^*(892)+$ c.c.			DESIG=3
Γ_5	$\pi K\overline{K}$			DESIG=6
Γ_6	$\pi\pi\eta$			DESIG=5
Γ_7	$\pi^+\pi^+\pi^-\pi^-$			DESIG=7
Γ_8	$\gamma\gamma$	(9.5±1.1) $\times 10^{-7}$	1.1	DESIG=8

CONSTRAINED FIT INFORMATION

An overall fit to the total width, 2 partial widths, a combination of partial widths obtained from integrated cross sections, and 3 branching ratios uses 17 measurements and one constraint to determine 5 parameters. The overall fit has a $\chi^2 = 18.2$ for 13 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\langle\delta p_i \delta p_j\rangle/(\delta p_i \cdot \delta p_j)$, in percent, from the fit to parameters p_i, including the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_2	−100			
x_3	−6	−1		
x_8	−19	19	1	
Γ	−4	4	0	−44
	x_1	x_2	x_3	x_8

	Mode	Rate (MeV)	Scale factor	
Γ_1	$K\overline{K}$	75 ±4	1.8	DESIG=2
Γ_2	$\eta\eta$	9.9 ±1.9	1.1	DESIG=4
Γ_3	$\pi\pi$	0.71±0.14	1.1	DESIG=1
Γ_8	$\gamma\gamma$	(8.2 ±0.9) $\times 10^{-5}$		DESIG=8

$f'_2(1525)$ PARTIAL WIDTHS

NODE=M013220

$\Gamma(K\overline{K})$ Γ_1

NODE=M013W6

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
75±4 OUR FIT Error includes scale factor of 1.8.				
63^{+6}_{-5}	[1] LONGACRE	86	MPS	22 $\pi^- p \to K^0_S K^0_S n$

[1] From a partial-wave analysis of data using a K-matrix formalism with 5 poles. NODE=M013PW;LINKAGE=L

$\Gamma(\eta\eta)$ Γ_2

NODE=M013W7
NODE=M013W7

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
9.9±1.9 OUR FIT Error includes scale factor of 1.1.					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
5.0 ± 0.8	870	[1] SCHEGELSKY	06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$
$24\ {}^{+3}_{-1}$		[2] LONGACRE	86	MPS	$22\ \pi^- p \to K^0_S K^0_S n$

[1] From analysis of L3 data at 91 and 183–209 GeV, using $\Gamma(f'_2(1525) \to K\overline{K}) = 68$ MeV and SU(3) relations.

NODE=M013W7;LINKAGE=SC

[2] From a partial-wave analysis of data using a K-matrix formalism with 5 poles.

NODE=M013PW7;LINKAGE=L

$\Gamma(\pi\pi)$ Γ_3

NODE=M013W5
NODE=M013W5

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.71±0.14 OUR FIT Error includes scale factor of 1.1.					
$\mathbf{1.4\ {}^{+1.0}_{-0.5}}$		[1] LONGACRE	86	MPS	$22\ \pi^- p \to K^0_S K^0_S n$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.2\ {}^{+1.0}_{-0.2}$	870	[2] SCHEGELSKY	06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$

[1] From a partial-wave analysis of data using a K-matrix formalism with 5 poles.

NODE=M013PW5;LINKAGE=L

[2] From analysis of L3 data at 91 and 183–209 GeV, using $\Gamma(f'_2(1525) \to K\overline{K}) = 68$ MeV and SU(3) relations.

NODE=M013W5;LINKAGE=SC

$\Gamma(\gamma\gamma)$ Γ_8

NODE=M013W8
NODE=M013W8

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.082±0.009 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.13\ \pm0.03$	870	[1] SCHEGELSKY	06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$

[1] From analysis of L3 data at 91 and 183–209 GeV, using $\Gamma(f'_2(1525) \to K\overline{K}) = 68$ MeV and SU(3) relations.

NODE=M013W8;LINKAGE=SC

$\Gamma(K\overline{K})/\Gamma_{total}$ Γ_1/Γ

NODE=M013R00
NODE=M013R00

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.746\pm0.002{}^{+0.166}_{-0.162}$	[1] ALBRECHT	20	RVUE	$0.9\ \overline{p}p \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0 K^+ K^-$

[1] Residue from T-matrix pole, 4 poles, 4 channels, including scattering data from HYAMS 75 ($\pi\pi$), LONGACRE 86 ($K\overline{K}$), BINON 83 ($\eta\eta$).

NODE=M013R00;LINKAGE=A

$f'_2(1525)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(total)$

NODE=M013223

$\Gamma(K\overline{K}) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_1\Gamma_8/\Gamma$

NODE=M013G1
NODE=M013G1

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.072 ±0.007 OUR FIT					
0.072 ±0.007 OUR AVERAGE					
$0.048\ {}^{+0.067}_{-0.008}\ {}^{+0.108}_{-0.012}$		UEHARA	13	BELL	$\gamma\gamma \to K^0_S K^0_S$
$0.0564\pm0.0048\pm0.0116$		ABE	04	BELL	$10.6\ e^+e^- \to e^+e^- K^+K^-$
$0.076\ \pm0.006\ \pm0.011$	331	[1] ACCIARRI	01H	L3	$e^+e^- \to e^+e^- K^0_S K^0_S$
$0.067\ \pm0.008\ \pm0.015$		[2] ALBRECHT	90G	ARG	$e^+e^- \to e^+e^- K^+K^-$
$0.11\ {}^{+0.03}_{-0.02}\ \pm0.02$		BEHREND	89C	CELL	$e^+e^- \to e^+e^- K^0_S K^0_S$
$0.10\ {}^{+0.04}_{-0.03}\ {}^{+0.03}_{-0.02}$		BERGER	88	PLUT	$e^+e^- \to e^+e^- K^0_S K^0_S$
$0.12\ \pm0.07\ \pm0.04$		[2] AIHARA	86B	TPC	$e^+e^- \to e^+e^- K^+K^-$
$0.11\ \pm0.02\ \pm0.04$		[2] ALTHOFF	83	TASS	$e^+e^- \to e^+e^- K\overline{K}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.0314\pm0.0050\pm0.0077$		[3] ALBRECHT	90G	ARG	$e^+e^- \to e^+e^- K^+K^-$

OCCUR=2

[1] Supersedes ACCIARRI 95J. From analysis of L3 data at 91 and 183–209 GeV,

NODE=M013G;LINKAGE=HA

[2] Using an incoherent background.

NODE=M013G1;LINKAGE=A

[3] Using a coherent background.

NODE=M013G1;LINKAGE=B

$f'_2(1525)$ BRANCHING RATIOS

NODE=M013225

$\Gamma(\eta\eta)/\Gamma_{total}$ — Γ_2/Γ

NODE=M013R8

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.059\pm0.003\pm0.026$	[1] ALBRECHT	20	RVUE	0.9 $\bar{p}p \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0K^+K^-$
seen	UEHARA	10A	BELL	10.6 $e^+e^- \to e^+e^-\eta\eta$
$0.10\ \pm0.03$	[2] PROKOSHKIN	91	GAM4	300 $\pi^-p \to \pi^-p\eta\eta$

[1] Residue from T-matrix pole, 4 poles, 4 channels, including scattering data from HYAMS 75 ($\pi\pi$), LONGACRE 86 ($K\overline{K}$), BINON 83 ($\eta\eta$). NODE=M013R8;LINKAGE=A

[2] Combining results of GAM4 with those of WA76 on $K\overline{K}$ central production and results of CBAL, MRK3 and DM2 on $J/\psi \to \gamma\eta\eta$. NODE=M013R8;LINKAGE=B

$\Gamma(\eta\eta)/\Gamma(K\overline{K})$ — Γ_2/Γ_1

NODE=M013R3

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.132 ± 0.028 OUR FIT						
0.115 ± 0.028 OUR AVERAGE						
$0.119\pm0.015\pm0.036$		61	[1] BINON	07	GAMS	32.5 $K^-p \to \eta\eta(\Lambda/\Sigma^0)$
$0.11\ \pm0.04$			[2] PROKOSHKIN	91	GAM4	300 $\pi^-p \to \pi^-p\eta\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.14	90		BARBERIS	00E		450 $pp \to p_f\eta\eta p_s$
<0.50			BARNES	67	HBC	4.6,5.0 K^-p

[1] Using the compilation of the cross sections for $f'_2(1525)$ production in K^-p collisions from ASTON 88D. NODE=M013R3;LINKAGE=BI

[2] Combining results of GAM4 with those of WA76 on $K\overline{K}$ central production and results of CBAL, MRK3 and DM2 on $J/\psi \to \gamma\eta\eta$. NODE=M013R3;LINKAGE=B

$\Gamma(\pi\pi)/\Gamma_{total}$ — Γ_3/Γ

NODE=M013R1

VALUE (units 10^{-2})	CL%	DOCUMENT ID		TECN	COMMENT
0.83 ± 0.16 OUR FIT					
0.75 ± 0.16 OUR AVERAGE					
$0.7\ \pm0.2$		COSTA	80	OMEG	10 $\pi^-p \to K^+K^-n$
$2.7\ ^{+7.1}_{-1.3}$		[1] GORLICH	80	ASPK	17,18 π^-p
0.75 ± 0.25		[1,2] MARTIN	79	RVUE	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$3.4\ \pm1.5\ \pm1.0$		[3] ALBRECHT	20	RVUE	0.9 $\bar{p}p \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0K^+K^-$
<6	95	AGUILAR-...	81B	HBC	4.2 $K^-p \to \Lambda K^+K^-$
$19\ \ \pm3$		CORDEN	79	OMEG	12–15 $\pi^-p \to \pi^+\pi^-n$
<4.5	95	BARREIRO	77	HBC	4.15 $K^-p \to \Lambda K^0_S K^0_S$
$1.2\ \pm0.4$		[1] PAWLICKI	77	SPEC	6 $\pi N \to K^+K^-N$
<6.3	90	BRANDENB...	76C	ASPK	13 $K^-p \to K^+K^-(\Lambda,\Sigma)$
<0.86		[1] BEUSCH	75B	OSPK	8.9 $\pi^-p \to K^0\overline{K}^0n$

[1] Assuming that the $f'_2(1525)$ is produced by an one-pion exchange production mechanism. NODE=M013R1;LINKAGE=C

[2] MARTIN 79 uses the PAWLICKI 77 data with different input value of the $f'_2(1525) \to K\overline{K}$ branching ratio. NODE=M013R1;LINKAGE=D

[3] Residue from T-matrix pole, 4 poles, 4 channels, including scattering data from HYAMS 75 ($\pi\pi$), LONGACRE 86 ($K\overline{K}$), BINON 83 ($\eta\eta$). NODE=M013R1;LINKAGE=A

$\Gamma(\pi\pi)/\Gamma(K\overline{K})$ — Γ_3/Γ_1

NODE=M013R7

VALUE	DOCUMENT ID		TECN	COMMENT
0.0094 ± 0.0018 OUR FIT				
$0.075\ \pm0.035$	AUGUSTIN	87	DM2	$J/\psi \to \gamma\pi^+\pi^-$

$[\Gamma(K\overline{K}^*(892)+\text{c.c.})+\Gamma(\pi K\overline{K})]/\Gamma(K\overline{K})$ — $(\Gamma_4+\Gamma_5)/\Gamma_1$

NODE=M013R5

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.35	95	AGUILAR-...	72B	HBC	3.9,4.6 K^-p
<0.4	67	AMMAR	67	HBC	

$\Gamma(\pi\pi\eta)/\Gamma(K\overline{K})$ Γ_6/Γ_1

NODE=M013R4
NODE=M013R4

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.41	95	AGUILAR-...	72B	HBC	3.9,4.6 $K^- p$
<0.3	67	AMMAR	67	HBC	

$\Gamma(\pi^+\pi^+\pi^-\pi^-)/\Gamma(K\overline{K})$ Γ_7/Γ_1

NODE=M013R6
NODE=M013R6

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.32	95	AGUILAR-...	72B	HBC	3.9,4.6 $K^- p$

$f'_2(1525)$ REFERENCES

NODE=M013

RODAS	22	EPJ C82 80	A. Rodas *et al.*	(JPAC Collab.)	REFID=61610
ALBRECHT	20	EPJ C80 453	M. Albrecht *et al.*	(Crystal Barrel Collab.)	REFID=60439
ABLIKIM	18AA	PR D98 072003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59455
PDG	18	PR D98 030001	M. Tanabashi *et al.*	(PDG Collab.)	REFID=59304
ABLIKIM	15AE	PR D92 052003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56984
DOBBS	15	PR D91 052006	S. Dobbs *et al.*	(NWES)	REFID=56805
LEES	14H	PR D89 092002	J.P. Lees *et al.*	(BABAR Collab.)	REFID=55940
AAIJ	13AN	PR D87 072004	R. Aaij *et al.*	(LHCb Collab.)	REFID=55137
ABLIKIM	13N	PR D87 092009	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55387
UEHARA	13	PTEP 2013 123C01	S. Uehara *et al.*	(BELLE Collab.)	REFID=55592
UEHARA	10A	PR D82 114031	S. Uehara *et al.*	(BELLE Collab.)	REFID=53641
ANISOVICH	09	IJMP A24 2481	V.V. Anisovich, A.V. Sarantsev		REFID=52719
CHEKANOV	08	PRL 101 112003	S. Chekanov *et al.*	(ZEUS Collab.)	REFID=52275
BINON	07	PAN 70 1713 Translated from YAF 70 1758.	F. Binon *et al.*	(GAMS Collab.)	REFID=52057
AMSLER	06	PL B639 165	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=51136
SCHEGELSKY	06A	EPJ A27 207	V.A. Schegelsky *et al.*		REFID=51185
ABLIKIM	05	PL B607 243	M. Ablikim *et al.*	(BES Collab.)	REFID=50450
ABE	04	EPJ C32 323	K. Abe *et al.*	(BELLE Collab.)	REFID=49650
CHEKANOV	04	PL B578 33	S. Chekanov *et al.*	(ZEUS Collab.)	REFID=49672
BAI	03G	PR D68 052003	J.Z. Bai *et al.*	(BES Collab.)	REFID=49580
TIKHOMIROV	03	PAN 66 828 Translated from YAF 66 860.	G.D. Tikhomirov *et al.*		REFID=49423
AMSLER	02	EPJ C23 29	C. Amsler *et al.*		REFID=48580
ACCIARRI	01H	PL B501 173	M. Acciarri *et al.*	(L3 Collab.)	REFID=48321
BARBERIS	00E	PL B479 59	D. Barberis *et al.*	(WA 102 Collab.)	REFID=47961
BARBERIS	99	PL B453 305	D. Barberis *et al.*	(Omega Expt.)	REFID=46921
BARKOV	99	JETPL 70 248 Translated from ZETFP 70 242.	B.P. Barkov *et al.*		REFID=47379
ABREU	96C	PL B379 309	P. Abreu *et al.*	(DELPHI Collab.)	REFID=44671
BAI	96C	PRL 77 3959	J.Z. Bai *et al.*	(BES Collab.)	REFID=45169
ACCIARRI	95J	PL B363 118	M. Acciarri *et al.*	(L3 Collab.)	REFID=44615
PROKOSHKIN	91	SPD 36 155 Translated from DANS 316 900.	Y.D. Prokoshkin	(GAM2 and GAM4 Collab.)	REFID=41719
ALBRECHT	90G	ZPHY C48 183	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=41374
BEHREND	89C	ZPHY C43 91	H.J. Behrend *et al.*	(CELLO Collab.)	REFID=40915
ASTON	88D	NP B301 525	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)	REFID=40330
AUGUSTIN	88	PRL 60 2238	J.E. Augustin *et al.*	(DM2 Collab.)	REFID=40574
BERGER	88	ZPHY C37 329	C. Berger *et al.*	(PLUTO Collab.)	REFID=40566
FALVARD	88	PR D38 2706	A. Falvard *et al.*	(CLER, FRAS, LALO+)	REFID=40576
AUGUSTIN	87	ZPHY C36 369	J.E. Augustin *et al.*	(LALO, CLER, FRAS+)	REFID=40268
BALTRUSAIT...	87	PR D35 2077	R.M. Baltrusaitis *et al.*	(Mark III Collab.)	REFID=40010
AIHARA	86B	PRL 57 404	H. Aihara *et al.*	(TPC-2γ Collab.)	REFID=20764
BOLONKIN	86	SJNP 43 776 Translated from YAF 43 1211.	B.V. Bolonkin *et al.*	(ITEP) JP	REFID=44646
LONGACRE	86	PL B177 223	R.S. Longacre *et al.*	(BNL, BRAN, CUNY+)	REFID=20768
ALTHOFF	83	PL 121B 216	M. Althoff *et al.*	(TASSO Collab.)	REFID=21408
ARMSTRONG	83B	NP B224 193	T.A. Armstrong *et al.*	(BARI, BIRM, CERN+)	REFID=20558
BINON	83	NC 78A 313	F.G. Binon *et al.*	(BELG, LAPP, SERP+)	REFID=20750
AGUILAR-...	81B	ZPHY C8 313	M. Aguilar-Benitez *et al.*	(CERN, CDEF+)	REFID=21104
ALHARRAN	81	NP B191 26	S. Al-Harran *et al.*	(BIRM, CERN, GLAS+)	REFID=21403
CHABAUD	81	APP B12 575	V. Chabaud *et al.*	(CERN, CRAC, MPIM)	REFID=20742
COSTA	80	NP B175 402	G. Costa *et al.*	(BARI, BONN, CERN, GLAS+)	REFID=20737
GORLICH	80	NP B174 16	L. Gorlich *et al.*	(CRAC, MPIM, CERN+)	REFID=20738
CORDEN	79	NP B157 250	M.J. Corden *et al.*	(BIRM, RHEL, TELA+) JP	REFID=20374
MARTIN	79	NP B158 520	A.D. Martin, E.N. Ozmutlu	(DURH)	REFID=20377
POLYCHRO...	79	PR D19 1317	V.A. Polychronakos *et al.*	(NDAM, ANL)	REFID=20378
BARREIRO	77	NP B121 237	F. Barreiro *et al.*	(CERN, AMST, NIJM+)	REFID=21392
EVANGELIS...	77	NP B127 384	C. Evangelista *et al.*	(BARI, BONN, CERN+)	REFID=20540
PAWLICKI	77	PR D15 3196	A.J. Pawlicki *et al.*	(ANL) IJP	REFID=20367
BRANDENB...	76C	NP B104 413	G.W. Brandenburg *et al.*	(SLAC)	REFID=20225
BEUSCH	75B	PL 60B 101	W. Beusch *et al.*	(CERN, ETH)	REFID=21390
HYAMS	75	NP B100 205	B.D. Hyams *et al.*	(CERN, MPIM)	REFID=20355
AGUILAR-...	72B	PR D6 29	M. Aguilar-Benitez *et al.*	(BNL)	REFID=20205
AMMAR	67	PRL 19 1071	R. Ammar *et al.*	(NWES, ANL) JP	REFID=21382
BARNES	67	PRL 19 964	V.E. Barnes *et al.*	(BNL, SYRA) IJPC	REFID=21383
CRENNELL	66	PRL 16 1025	D.J. Crennell *et al.*	(BNL) I	REFID=20317

NODE=M123

$f_2(1565)$

$I^G(J^{PC}) = 0^+(2^{++})$

OMITTED FROM SUMMARY TABLE

Seen mostly in antinucleon-nucleon annihilation. Needs confirmation in other channels. See the review on "Spectroscopy of Light Meson Resonances."

NODE=M123

$f_2(1565)$ MASS

NODE=M123M

NODE=M123M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1542±19 OUR AVERAGE	Error includes scale factor of 2.2. See the ideogram below.			
1552±13	[1] AMSLER	02	CBAR	0.9 $\overline{p}p \to \pi^0\eta\eta$, $\pi^0\pi^0\pi^0$
1575±18	[1] BERTIN	98	OBLX	0.05–0.405 $\overline{n}p \to \pi^+\pi^+\pi^-$
1507±15	[1] BERTIN	97C	OBLX	0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1560±15	[2] ANISOVICH	09	RVUE	0.0 $\overline{p}p$, πN
1590±10	[3,4] AMELIN	06	VES	36 $\pi^- p \to \omega\omega n$
1550±10±20	[4] AMELIN	00	VES	37 $\pi^- p \to \eta\pi^+\pi^- n$
1598±11± 9	BAKER	99B	SPEC	0 $\overline{p}p \to \omega\omega\pi^0$
1534±20	[5] ABELE	96C	RVUE	Compilation
~ 1552	[6] AMSLER	95D	CBAR	0.0 $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$
1598±72	BALOSHIN	95	SPEC	40 π^- C $\to K^0_S K^0_S X$
1566^{+80}_{-50}	[7] ANISOVICH	94	CBAR	0.0 $\overline{p}p \to 3\pi^0, \eta\eta\pi^0$
1502± 9	ADAMO	93	OBLX	$\overline{n}p \to \pi^+\pi^+\pi^-$
1488±10	[8] ARMSTRONG	93C	E760	$\overline{p}p \to \pi^0\eta\eta \to 6\gamma$
1508±10	[8] ARMSTRONG	93D	E760	$\overline{p}p \to 3\pi^0 \to 6\gamma$
1525±10	[8] ARMSTRONG	93D	E760	$\overline{p}p \to \eta\pi^0\pi^0 \to 6\gamma$
~ 1504	[9] WEIDENAUER	93	ASTE	0.0 $\overline{p}N \to 3\pi^- 2\pi^+$
1540±15	[8] ADAMO	92	OBLX	$\overline{n}p \to \pi^+\pi^+\pi^-$
1515±10	[10] AKER	91	CBAR	0.0 $\overline{p}p \to 3\pi^0$
1565±20	MAY	90	ASTE	0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$
1477± 5	BRIDGES	86C	DBC	0.0 $\overline{p}N \to 3\pi^- 2\pi^+$

OCCUR=2

[1] T-matrix pole. NODE=M123M;LINKAGE=G

[2] On sheet II in a two-pole solution. NODE=M123M;LINKAGE=AN

[3] Supersedes the $\omega\omega$ state of BELADIDZE 92B earlier assigned to the $f_2(1640)$. NODE=M123M;LINKAGE=AM

[4] Breit-Wigner width. NODE=M123M;LINKAGE=D

[5] T-matrix pole, large coupling to $\rho\rho$ and $\omega\omega$, could be $f_2(1640)$. NODE=M123M;LINKAGE=AA

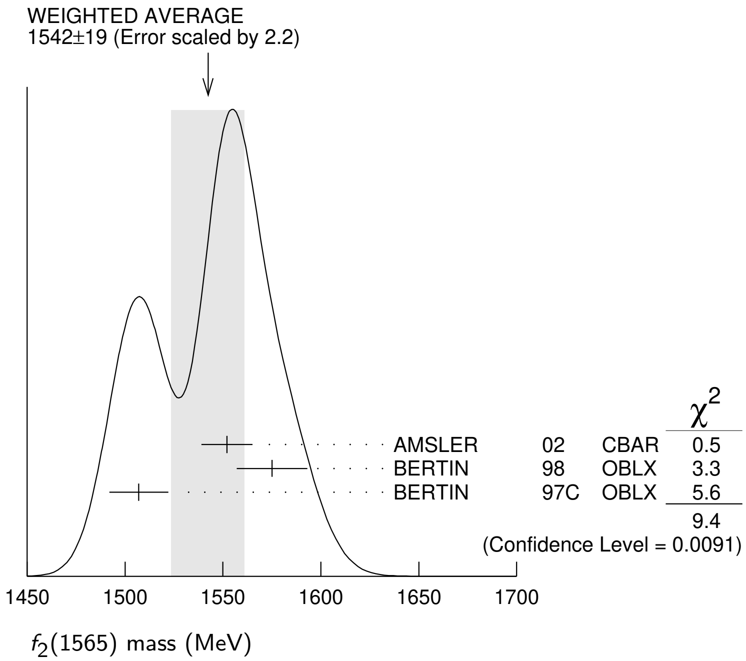
[6] Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D. NODE=M123M;LINKAGE=AB

[7] From a simultaneous analysis of the annihilations $\overline{p}p \to 3\pi^0, \pi^0\eta\eta$ including AKER 91 data. NODE=M123M;LINKAGE=C

[8] J^P not determined, could be partly $f_0(1500)$. NODE=M123M;LINKAGE=E

[9] J^P not determined. NODE=M123M;LINKAGE=F

[10] Superseded by AMSLER 95B. NODE=M123M;LINKAGE=BA



$f_2(1565)$ WIDTH

NODE=M123W

NODE=M123W

VALUE (MeV)		DOCUMENT ID		TECN	COMMENT
122± 13 OUR AVERAGE					
113± 23	[11]	AMSLER	02	CBAR	0.9 $\overline{p}p \to \pi^0\eta\eta$, $\pi^0\pi^0\pi^0$
119± 24	[11]	BERTIN	98	OBLX	0.05–0.405 $\overline{n}p \to \pi^+\pi^+\pi^-$
130± 20	[11]	BERTIN	97C	OBLX	0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
280± 40	[12]	ANISOVICH	09	RVUE	0.0 $\overline{p}p$, πN
140± 11	[13,14]	AMELIN	06	VES	36 $\pi^- p \to \omega\omega n$
130± 20±40	[14]	AMELIN	00	VES	37 $\pi^- p \to \eta\pi^+\pi^- n$
180± 60	[15]	ABELE	96C	RVUE	Compilation
∼ 142	[16]	AMSLER	95D	CBAR	0.0 $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$
263±101		BALOSHIN	95	SPEC	40 π^- C $\to K^0_S K^0_S$ X
166^{+80}_{-20}	[17]	ANISOVICH	94	CBAR	0.0 $\overline{p}p \to 3\pi^0, \eta\eta\pi^0$
130± 10	[18]	ADAMO	93	OBLX	$\overline{n}p \to \pi^+\pi^+\pi^-$
148± 27	[19]	ARMSTRONG	93C	E760	$\overline{p}p \to \pi^0\eta\eta \to 6\gamma$
103± 15	[19]	ARMSTRONG	93D	E760	$\overline{p}p \to 3\pi^0 \to 6\gamma$
111± 10	[19]	ARMSTRONG	93D	E760	$\overline{p}p \to \eta\pi^0\pi^0 \to 6\gamma$
∼ 206	[20]	WEIDENAUER	93	ASTE	0.0 $\overline{p}N \to 3\pi^- 2\pi^+$
132± 37	[19]	ADAMO	92	OBLX	$\overline{n}p \to \pi^+\pi^+\pi^-$
120± 10	[21]	AKER	91	CBAR	0.0 $\overline{p}p \to 3\pi^0$
170± 40		MAY	90	ASTE	0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$
116± 9		BRIDGES	86C	DBC	0.0 $\overline{p}N \to 3\pi^- 2\pi^+$

OCCUR=2

[11] T-matrix pole.
[12] On sheet II in a two-pole solution.
[13] Supersedes the $\omega\omega$ state of BELADIDZE 92B earlier assigned to the $f_2(1640)$.
[14] Breit-Wigner width.
[15] T-matrix pole, large coupling to $\rho\rho$ and $\omega\omega$, could be $f_2(1640)$.
[16] Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D.
[17] From a simultaneous analysis of the annihilations $\overline{p}p \to 3\pi^0, \pi^0\eta\eta$ including AKER 91 data.
[18] Supersedes ADAMO 92.
[19] J^P not determined, could be partly $f_0(1500)$.
[20] J^P not determined.
[21] Superseded by AMSLER 95B.

NODE=M123W;LINKAGE=G
NODE=M123W;LINKAGE=AN
NODE=M123W;LINKAGE=AM
NODE=M123W;LINKAGE=H
NODE=M123W;LINKAGE=CC
NODE=M123W;LINKAGE=AB
NODE=M123W;LINKAGE=D
NODE=M123W;LINKAGE=C
NODE=M123W;LINKAGE=E
NODE=M123W;LINKAGE=F
NODE=M123W;LINKAGE=BA

$f_2(1565)$ DECAY MODES

NODE=M123215;NODE=M123

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\pi\pi$	seen	DESIG=6;OUR EST;→ UNCHECKED ←
Γ_2	$\pi^+\pi^-$	seen	DESIG=1;OUR EST;→ UNCHECKED ←
Γ_3	$\pi^0\pi^0$	seen	DESIG=3;OUR EST;→ UNCHECKED ←
Γ_4	$\rho^0\rho^0$	seen	DESIG=2;OUR EST;→ UNCHECKED ←
Γ_5	$2\pi^+2\pi^-$	seen	DESIG=5;OUR EST;→ UNCHECKED ←
Γ_6	$\eta\eta$	seen	DESIG=4;OUR EST;→ UNCHECKED ←
Γ_7	$\omega\omega$	seen	DESIG=7;OUR EST;→ UNCHECKED ←
Γ_8	$K\overline{K}$	seen	DESIG=9;OUR EST;→ UNCHECKED ←
Γ_9	$\gamma\gamma$	seen	DESIG=10;OUR EST;→ UNCHECKED ←

$f_2(1565)$ PARTIAL WIDTHS

NODE=M123225

$\Gamma(\eta\eta)$ Γ_6

NODE=M123W3
NODE=M123W3

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.2 ± 0.3	870	[22] SCHEGELSKY 06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$

$\Gamma(K\overline{K})$ Γ_8

NODE=M123W1
NODE=M123W1

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.0 ± 1.0	870	[22] SCHEGELSKY 06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$

$\Gamma(\gamma\gamma)$ Γ_9

NODE=M123W2
NODE=M123W2

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.70 ± 0.14	870	[22] SCHEGELSKY 06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$

[22] From analysis of L3 data at 91 and 183–209 GeV, using $f_2(1565)$ mass of 1570 MeV, width of 160 MeV, $\Gamma(\pi\pi)$ = 25 MeV, and SU(3) relations.

NODE=M123W1;LINKAGE=SC

$f_2(1565)$ BRANCHING RATIOS

NODE=M123220

$\Gamma(\pi\pi)/\Gamma_{total}$ Γ_1/Γ

NODE=M123R5
NODE=M123R5

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
seen	BAKER 99B	SPEC	$0\ \overline{p}p \to \omega\omega\pi^0$

$\Gamma(\pi^+\pi^-)/\Gamma_{total}$ Γ_2/Γ

NODE=M123R1
NODE=M123R1

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
seen	BERTIN 98	OBLX	0.05–0.405 $\overline{n}p \to \pi^+\pi^+\pi^-$
not seen	[23] ANISOVICH 94B	RVUE	$\overline{p}p \to \pi^+\pi^-\pi^0$
seen	MAY 89	ASTE	$\overline{p}p \to \pi^+\pi^-\pi^0$

[23] ANISOVICH 94B is from a reanalysis of MAY 90.

NODE=M123R1;LINKAGE=A

$\Gamma(\pi^0\pi^0)/\Gamma_{total}$ Γ_3/Γ

NODE=M123R3
NODE=M123R3

VALUE	DOCUMENT ID	TECN	COMMENT
seen	AMSLER 95B	CBAR	0.0 $\overline{p}p \to 3\pi^0$

$\Gamma(\pi^+\pi^-)/\Gamma(\rho^0\rho^0)$ Γ_2/Γ_4

NODE=M123R2
NODE=M123R2

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.042 ± 0.013	BRIDGES 86B	DBC	$\overline{p}N \to 3\pi^-2\pi^+$

$\Gamma(\eta\eta)/\Gamma(\pi^0\pi^0)$ Γ_6/Γ_3

NODE=M123R4
NODE=M123R4

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.024\pm0.005\pm0.012$	[24] ARMSTRONG 93C	E760	$\overline{p}p \to \pi^0\eta\eta \to 6\gamma$

[24] J^P not determined, could be partly $f_0(1500)$.

NODE=M123R4;LINKAGE=E

$\Gamma(\omega\omega)/\Gamma_{total}$ — Γ_7/Γ

NODE=M123R6

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
seen	BAKER 99B	SPEC	0 $\overline{p}p \to \omega\omega\pi^0$

NODE=M123R6

f_2(1565) REFERENCES

NODE=M123

ANISOVICH	09	IJMP A24 2481	V.V. Anisovich, A.V. Sarantsev		REFID=52719
AMELIN	06	PAN 69 690	D.V. Amelin *et al.*	(VES Collab.)	REFID=51574
		Translated from YAF 69 715.			
SCHEGELSKY	06A	EPJ A27 207	V.A. Schegelsky *et al.*		REFID=51185
AMSLER	02	EPJ C23 29	C. Amsler *et al.*		REFID=48580
AMELIN	00	NP A668 83	D. Amelin *et al.*	(VES Collab.)	REFID=47432
BAKER	99B	PL B467 147	C.A. Baker *et al.*		REFID=47398
BERTIN	98	PR D57 55	A. Bertin *et al.*	(OBELIX Collab.)	REFID=45782
BERTIN	97C	PL B408 476	A. Bertin *et al.*	(OBELIX Collab.)	REFID=45701
ABELE	96C	NP A609 562	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=45076
AMSLER	95B	PL B342 433	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=44377
AMSLER	95C	PL B353 571	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=44440
AMSLER	95D	PL B355 425	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=44441
BALOSHIN	95	PAN 58 46	O.N. Baloshin *et al.*	(ITEP)	REFID=44621
		Translated from YAF 58 50.			
AMSLER	94D	PL B333 277	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=44093
ANISOVICH	94	PL B323 233	V.V. Anisovich *et al.*	(Crystal Barrel Collab.)	REFID=43659
ANISOVICH	94B	PR D50 1972	V.V. Anisovich *et al.*	(LOQM)	REFID=44071
ADAMO	93	NP A558 13C	A. Adamo *et al.*	(OBELIX Collab.)	REFID=43657
ARMSTRONG	93C	PL B307 394	T.A. Armstrong *et al.*	(FNAL, FERR, GENO+)	REFID=43587
ARMSTRONG	93D	PL B307 399	T.A. Armstrong *et al.*	(FNAL, FERR, GENO+)	REFID=43596
WEIDENAUER	93	ZPHY C59 387	P. Weidenauer *et al.*	(ASTERIX Collab.)	REFID=43585
ADAMO	92	PL B287 368	A. Adamo *et al.*	(OBELIX Collab.)	REFID=42177
BELADIDZE	92B	ZPHY C54 367	G.M. Beladidze *et al.*	(VES Collab.)	REFID=42172
AKER	91	PL B260 249	E. Aker *et al.*	(Crystal Barrel Collab.)	REFID=41587
MAY	90	ZPHY C46 203	B. May *et al.*	(ASTERIX Collab.)	REFID=41365
MAY	89	PL B225 450	B. May *et al.*	(ASTERIX Collab.) IJP	REFID=40921
BRIDGES	86B	PRL 56 215	D.L. Bridges *et al.*	(SYRA, CASE)	REFID=21376
BRIDGES	86C	PRL 57 1534	D.L. Bridges *et al.*	(SYRA)	REFID=21377

NODE=M188

$\rho(1570)$

$I^G(J^{PC}) = 1^+(1^{--})$

OMITTED FROM SUMMARY TABLE

May be an OZI-violating decay mode of $\rho(1700)$. See the review on "Spectroscopy of Light Meson Resonances."

NODE=M188

$\rho(1570)$ MASS

NODE=M188M

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
1570±36±62	54	[1] AUBERT 08S	BABR	10.6 $e^+e^- \to \phi\pi^0\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1585±15		[2] ACHASOV 20C	SND	1.3–2.0 $e^+e^- \to K^+K^-\pi^0$
1480±40		[3] BITYUKOV 87	SPEC	32.5 $\pi^-p \to \phi\pi^0 n$

NODE=M188M

[1] From the fit with two resonances. NODE=M188M;LINKAGE=AU

[2] From a fit using a two resonance model in which the mass and width of the other resonance are fixed at the $\rho(1700)$ values from PDG 20. NODE=M188M;LINKAGE=A

[3] Systematic errors not estimated. NODE=M188M;LINKAGE=BI

$\rho(1570)$ WIDTH

NODE=M188W

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
144±75±43	54	[4] AUBERT 08S	BABR	10.6 $e^+e^- \to \phi\pi^0\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
75±30		[5] ACHASOV 20C	SND	1.3–2.0 $e^+e^- \to K^+K^-\pi^0$
130±60		[6] BITYUKOV 87	SPEC	32.5 $\pi^-p \to \phi\pi^0 n$

NODE=M188W

[4] From the fit with two resonances. NODE=M188W;LINKAGE=AU

[5] From a fit using a two resonance model in which the mass and width of the other resonance are fixed at the $\rho(1700)$ values from PDG 20. NODE=M188W;LINKAGE=A

[6] Systematic errors not estimated. NODE=M188W;LINKAGE=BI

$\rho(1570)$ DECAY MODES

NODE=M188215;NODE=M188

	Mode	Fraction (Γ_i/Γ)	
Γ_1	e^+e^-		DESIG=1
Γ_2	$\phi\pi$	not seen	DESIG=2
Γ_3	$\omega\pi$		DESIG=3

$\rho(1570)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma(\text{total})$

NODE=M188225

$\Gamma(\phi\pi) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_2\Gamma_1/\Gamma$

NODE=M188G01

VALUE (eV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
3.5±0.9±0.3		54	[7] AUBERT	08S	BABR	10.6 $e^+e^- \to \phi\pi^0\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<70	90		[8] AULCHENKO	87B	ND	$e^+e^- \to K^0_S K^0_L \pi^0$

[7] From the fit with two resonances.
[8] Using mass and width of BITYUKOV 87.

NODE=M188G01;LINKAGE=AU
NODE=M188G01;LINKAGE=AL

$\rho(1570)$ BRANCHING RATIOS

NODE=M188220

$\Gamma(\phi\pi)/\Gamma_{\text{total}}$ — Γ_2/Γ

NODE=M188R01

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	ABELE	97H	CBAR	$\overline{p}p \to K^0_L K^0_S \pi^0\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.01	[9] DONNACHIE	91	RVUE	

[9] Using data from BISELLO 91B, DOLINSKY 86, and ALBRECHT 87L.

NODE=M188R01;LINKAGE=DO

$\Gamma(\phi\pi)/\Gamma(\omega\pi)$ — Γ_2/Γ_3

NODE=M188R02

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
>0.5	95	BITYUKOV	87	SPEC	32.5 $\pi^- p \to \phi\pi^0 n$

$\rho(1570)$ REFERENCES

NODE=M188

ACHASOV	20C	EPJ C80 1139	M.N. Achasov *et al.*	(SND Collab.)
PDG	20	PTEP 2020 083C01	P.A. Zyla *et al.*	(PDG Collab.)
AUBERT	08S	PR D77 092002	B. Aubert *et al.*	(BABAR Collab.)
ABELE	97H	PL B415 280	A. Abele *et al.*	(Crystal Barrel Collab.)
BISELLO	91B	NPBPS B21 111	D. Bisello	(DM2 Collab.)
DONNACHIE	91	ZPHY C51 689	A. Donnachie, A.B. Clegg	(MCHS, LANC)
ALBRECHT	87L	PL B185 223	H. Albrecht *et al.*	(ARGUS Collab.)
AULCHENKO	87B	JETPL 45 145	V.M. Aulchenko *et al.*	(NOVO)
		Translated from ZETFP 45 118.		
BITYUKOV	87	PL B188 383	S.I. Bityukov *et al.*	(SERP)
DOLINSKY	86	PL B174 453	S.I. Dolinsky *et al.*	(NOVO)

REFID=60935
REFID=60676
REFID=52242
REFID=45765
REFID=41752
REFID=41632
REFID=40418
REFID=41373
REFID=40011
REFID=20246

NODE=M166

$h_1(1595)$

$I^G(J^{PC}) = 0^-(1^{+-})$

OMITTED FROM SUMMARY TABLE

Seen in a partial-wave analysis of the $\omega\eta$ system produced in the reaction $\pi^- p \to \omega\eta n$ at 18 GeV/c.

NODE=M166

$h_1(1595)$ MASS

NODE=M166M

NODE=M166M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
$\mathbf{1594 \pm 15^{+10}_{-60}}$	EUGENIO	01	SPEC	18 $\pi^- p \to \omega\eta n$

$h_1(1595)$ WIDTH

NODE=M166W

NODE=M166W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
$\mathbf{384 \pm 60^{+\ 70}_{-100}}$	EUGENIO	01	SPEC	18 $\pi^- p \to \omega\eta n$

$h_1(1595)$ DECAY MODES

NODE=M166215;NODE=M166

	Mode	Fraction (Γ_i/Γ)
Γ_1	$\omega\eta$	seen

DESIG=1;OUR EST;→ UNCHECKED ←

$h_1(1595)$ REFERENCES

NODE=M166

EUGENIO	01	PL B497 190	P. Eugenio *et al.*

REFID=48010

NODE=M164

$\pi_1(1600)$

$I^G(J^{PC}) = 1^-(1^{-+})$

See the review on "Spectroscopy of Light Meson Resonances" and a note in PDG 06, Journal of Physics **G33** 1 (2006).

NODE=M164

$\pi_1(1600)$ T-Matrix Pole $\sqrt{s}$

NODE=M164TMP

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$(1623 \pm 47^{+24}_{-75}) - i\,(228 \pm 44^{+72}_{-88})$	[1] KOPF	21	RVUE	0.9 $p\overline{p} \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0 K^+ K^-$ and 191 $\pi^- p \to \pi^-\pi^-\pi^+ p$
$(1564 \pm 24 \pm 86) - i\,(246 \pm 27 \pm 51)$	[2] RODAS	19	JPAC	191 $\pi^- p \to \eta^{(\prime)}\pi^- p$

NODE=M164TMP

[1] From T-matrix pole based on combined fit of Crystal Barrel and $\pi\pi$ scattering data (ALBRECHT 20), and COMPASS data (ADOLPH 15), using a coupled-channel model of $\eta\pi$, $\eta'\pi$ and $K\overline{K}$ systems. NODE=M164TMP;LINKAGE=B

[2] The coupled-channel analysis of both the $\eta\pi$ and $\eta'\pi$ systems using ADOLPH 15 data. NODE=M164TMP;LINKAGE=A

$\pi_1(1600)$ MASS

NODE=M164M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1661^{+15}_{-11} OUR AVERAGE	Error includes scale factor of 1.2.				
1600^{+110}_{-60}	46M	[1] AGHASYAN	18B	COMP	190 $\pi^- p \to \pi^-\pi^+\pi^- p$
$1664 \pm 8 \pm 10$	145k	[2] LU	05	B852	18 $\pi^- p \to \omega\pi^-\pi^0 p$
$1709 \pm 24 \pm 41$	69k	[3] KUHN	04	B852	18 $\pi^- p \to \eta\pi^+\pi^-\pi^- p$
$1597 \pm 10^{+45}_{-10}$		[3] IVANOV	01	B852	18 $\pi^- p \to \eta'\pi^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1660 \pm 10^{+0}_{-64}$	420k	[4] ALEKSEEV	10	COMP	190 $\pi^- Pb \to \pi^-\pi^-\pi^+ Pb'$
$1593 \pm 8^{+29}_{-47}$		[3,5] ADAMS	98B	B852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$

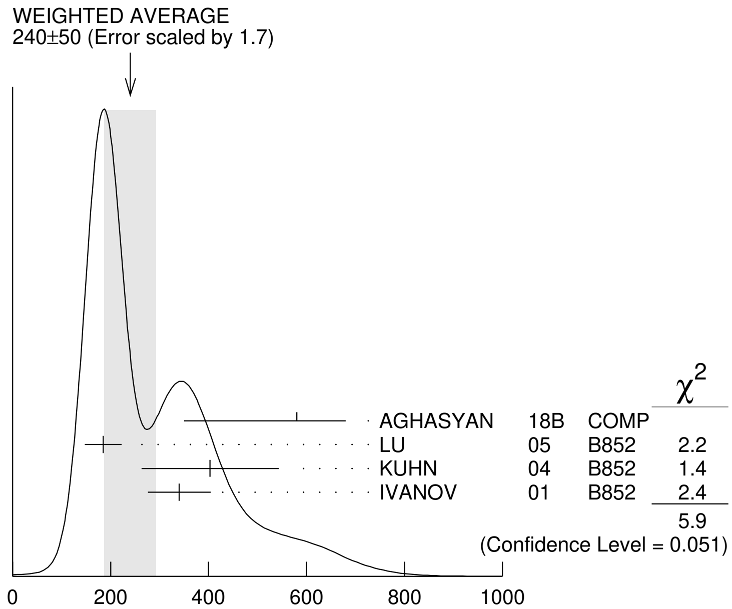
[1] Statistical error negligible. See also the review ALEXEEV 22. NODE=M164M;LINKAGE=B
[2] May be a different state: natural and unnatural parity exchanges. NODE=M164M;LINKAGE=LU
[3] Natural parity exchange. NODE=M164M;LINKAGE=A
[4] Superseded by AGHASYAN 2018B. NODE=M164M;LINKAGE=C
[5] Superseded by DZIERBA 06 excluding this state in a more refined PWA analysis, with 2.6 M events of $\pi^- p \to \pi^-\pi^-\pi^+ p$ and 3 M events of $\pi^- p \to \pi^-\pi^0\pi^0 p$ of E852 data. NODE=M164M;LINKAGE=DZ

$\pi_1(1600)$ WIDTH

NODE=M164W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
240± 50 OUR AVERAGE	Error includes scale factor of 1.7. See the ideogram below.				
580^{+100}_{-230}	46M	[1] AGHASYAN	18B	COMP	190 $\pi^- p \to \pi^-\pi^+\pi^- p$
$185 \pm 25 \pm 28$	145k	[2] LU	05	B852	18 $\pi^- p \to \omega\pi^-\pi^0 p$
$403 \pm 80 \pm 115$	69k	[3] KUHN	04	B852	18 $\pi^- p \to \eta\pi^+\pi^-\pi^- p$
$340 \pm 40 \pm 50$		[3] IVANOV	01	B852	18 $\pi^- p \to \eta'\pi^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$269 \pm 21^{+42}_{-64}$	420k	[4] ALEKSEEV	10	COMP	190 $\pi^- Pb \to \pi^-\pi^-\pi^+ Pb'$
$168 \pm 20^{+150}_{-12}$		[3,5] ADAMS	98B	B852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$

[1] Statistical error negligible. See also the review ALEXEEV 22. NODE=M164W;LINKAGE=B
[2] May be a different state: natural and unnatural parity exchanges. NODE=M164W;LINKAGE=LU
[3] Natural parity exchange. NODE=M164W;LINKAGE=A
[4] Superseded by AGHASYAN 2018B. NODE=M164W;LINKAGE=C
[5] Superseded by DZIERBA 06 excluding this state in a more refined PWA analysis, with 2.6 M events of $\pi^- p \to \pi^-\pi^-\pi^+ p$ and 3 M events of $\pi^- p \to \pi^-\pi^0\pi^0 p$ of E852 data. NODE=M164W;LINKAGE=DZ



$\pi_1(1600)$ width (MeV)

$\pi_1(1600)$ DECAY MODES

NODE=M164215;NODE=M164

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\pi\pi\pi$	seen	DESIG=1;OUR EST;→ UNCHECKED ←
Γ_2	$\rho^0\pi^-$	seen	DESIG=2
Γ_3	$f_2(1270)\pi^-$	not seen	DESIG=4
Γ_4	$b_1(1235)\pi$	seen	DESIG=5
Γ_5	$\eta'(958)\pi^-$	seen	DESIG=3
Γ_6	$\eta\pi$		DESIG=7
Γ_7	$f_1(1285)\pi$	seen	DESIG=6;OUR EST;→ UNCHECKED ←

$\pi_1(1600)$ BRANCHING RATIOS

NODE=M164220

$\Gamma(\rho^0\pi^-)/\Gamma_{total}$ Γ_2/Γ

NODE=M164R1
NODE=M164R1

VALUE	DOCUMENT ID		TECN	COMMENT
seen	ALEKSEEV	10	COMP	190 $\pi^- Pb \to \pi^-\pi^-\pi^+ Pb'$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	NOZAR	09	CLAS	$\gamma p \to 2\pi^+\pi^- n$
not seen	[1] DZIERBA	06	B852	18 $\pi^- p$

[1] From the PWA analysis of 2.6 M $\pi^- p \to \pi^-\pi^-\pi^+ p$ and 3 M events of $\pi^- p \to \pi^-\pi^0\pi^0 p$ of E852 data. Supersedes ADAMS 98B.

NODE=M164R1;LINKAGE=DZ

$\Gamma(f_2(1270)\pi^-)/\Gamma_{total}$ Γ_3/Γ

NODE=M164R3
NODE=M164R3

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	[1] DZIERBA	06	B852	18 $\pi^- p$

[1] From the PWA analysis of 2.6 M $\pi^- p \to \pi^-\pi^-\pi^+ p$ and 3 M events of $\pi^- p \to \pi^-\pi^0\pi^0 p$ of E852 data. Supersedes CHUNG 02.

NODE=M164R3;LINKAGE=DZ

$\Gamma(b_1(1235)\pi)/\Gamma_{total}$ Γ_4/Γ

NODE=M164R4
NODE=M164R4

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	35280	[1] BAKER	03	SPEC	$\overline{p}p \to \omega\pi^+\pi^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	145k	LU	05	B852	18 $\pi^- p \to \omega\pi^-\pi^0 p$

[1] $B((b_1\pi)_{D-wave})/B((b_1\pi)_{S\text{-wave}})=0.3 \pm 0.1$.

NODE=M164R;LINKAGE=RB

$\Gamma(\eta'(958)\pi^-)/\Gamma_{total}$ Γ_5/Γ

NODE=M164R2
NODE=M164R2

VALUE	DOCUMENT ID		TECN	COMMENT
seen	IVANOV	01	B852	18 $\pi^- p \to \eta'\pi^- p$

$\Gamma(\eta'(958)\pi^-)/\Gamma(\eta\pi)$ Γ_5/Γ_6

NODE=M164R00

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$5.54\pm1.1^{+1.8}_{-0.27}$	[1] KOPF	21	RVUE	0.9 $p\overline{p} \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0 K^+ K^-$ and 191 $\pi^- p \to \pi^-\pi^-\pi^+ p$

[1] From T-matrix pole based on combined fit of Crystal Barrel and $\pi\pi$ scattering data (ALBRECHT 20), and COMPASS data (ADOLPH 15), using a coupled-channel model of $\eta\pi$, $\eta'\pi$ and $K\overline{K}$ systems.

NODE=M164R00;LINKAGE=A

$\Gamma(f_1(1285)\pi)/\Gamma(\eta'(958)\pi^-)$ Γ_7/Γ_5

NODE=M164R5

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
3.80±0.78	69k	[1] KUHN	04	B852	18 $\pi^- p \to \eta\pi^+\pi^-\pi^- p$

[1] Using $\eta'(958)\pi$ data from IVANOV 01.

NODE=M164R;LINKAGE=KU

$\pi_1(1600)$ REFERENCES

NODE=M164

ALEXEEV	22	PR D105 012005	G.D. Alexeev *et al.*	(COMPASS Collab.)
KOPF	21	EPJ C81 1056	B. Kopf *et al.*	(BOCH)
ALBRECHT	20	EPJ C80 453	M. Albrecht *et al.*	(Crystal Barrel Collab.)
RODAS	19	PRL 122 042002	A. Rodas *et al.*	(JPAC Collab.)
AGHASYAN	18B	PR D98 092003	M. Aghasyan *et al.*	(COMPASS Collab.)
ADOLPH	15	PL B740 303	M. Adolph *et al.*	(COMPASS Collab.)
ALEKSEEV	10	PRL 104 241803	M.G. Alekseev *et al.*	(COMPASS Collab.)
NOZAR	09	PRL 102 102002	M. Nozar *et al.*	(JLab CLAS Collab.)
DZIERBA	06	PR D73 072001	A.R. Dzierba *et al.*	(BNL E852 Collab.)
PDG	06	JP G33 1	W.-M. Yao *et al.*	(PDG Collab.)
LU	05	PRL 94 032002	M. Lu *et al.*	(BNL E852 Collab.)
KUHN	04	PL B595 109	J. Kuhn *et al.*	(BNL E852 Collab.)
BAKER	03	PL B563 140	C.A. Baker *et al.*	
CHUNG	02	PR D65 072001	S.U. Chung *et al.*	(BNL E852 Collab.)
IVANOV	01	PRL 86 3977	E.I. Ivanov *et al.*	(BNL E852 Collab.)
ADAMS	98B	PRL 81 5760	G.S. Adams *et al.*	(BNL E852 Collab.)

REFID=61491
REFID=61470
REFID=60439
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REFID=52758
REFID=51077
REFID=51004
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REFID=46610

NODE=M161

$a_1(1640)$

$I^G(J^{PC}) = 1^-(1^{++})$

Possibly seen in the study of the hadronic structure in decay $\tau \to 3\pi\nu_\tau$ (ABREU 98G and ASNER 00).

NODE=M161

$a_1(1640)$ MASS

NODE=M161M

NODE=M161M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1655± 16 OUR AVERAGE	Error includes scale factor of 1.2.				
1700^{+35}_{-130}	46M	[1] AGHASYAN	18B	COMP	190 $\pi^- p \to \pi^-\pi^+\pi^- p$
1691± 18±30		DARGENT	17	RVUE	$D^0 \to \pi^-\pi^+\pi^-\pi^+$
1630± 20	35k	[2] BAKER	03	SPEC	$\overline{p}p \to \omega\pi^+\pi^-\pi^0$
1714± 9±36		CHUNG	02	B852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$
1640± 12±30		BAKER	99	SPEC	1.94 $\overline{p}p \to 4\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1670± 90		BELLINI	85	SPEC	40 $\pi^- A \to \pi^-\pi^+\pi^- A$

[1] Statistical error negligible.

NODE=M161M;LINKAGE=A

[2] Using the $a_1(1260)$ mass and width results of BOWLER 88.

NODE=M161M;LINKAGE=KB

$a_1(1640)$ WIDTH

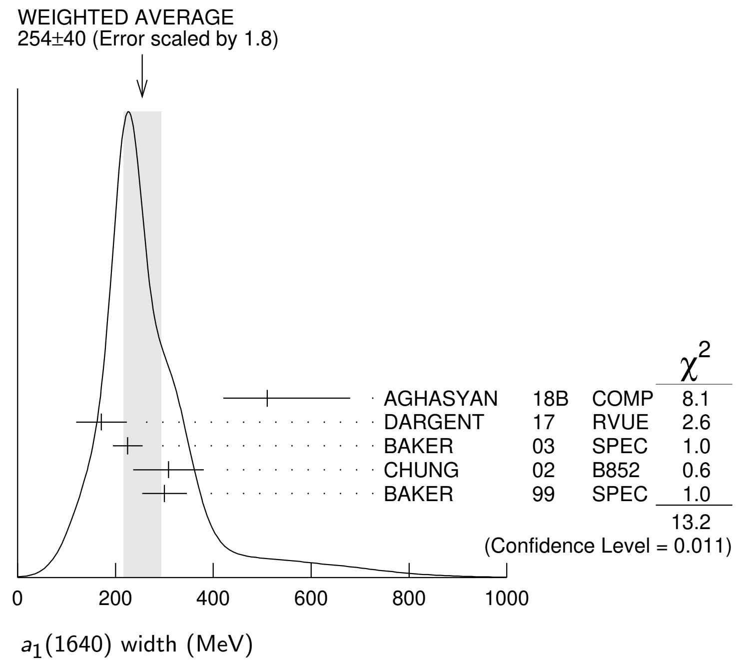
NODE=M161W

NODE=M161W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
254± 40 OUR AVERAGE	Error includes scale factor of 1.8. See the ideogram below.				
510^{+170}_{-90}	46M	[1] AGHASYAN	18B	COMP	190 $\pi^- p \to \pi^-\pi^+\pi^- p$
171± 33±40		DARGENT	17	RVUE	$D^0 \to \pi^-\pi^+\pi^-\pi^+$
225± 30	35k	[2] BAKER	03	SPEC	$\overline{p}p \to \omega\pi^+\pi^-\pi^0$
308± 37±62		CHUNG	02	B852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$
300± 22±40		BAKER	99	SPEC	1.94 $\overline{p}p \to 4\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
300±100		BELLINI	85	SPEC	40 $\pi^- A \to \pi^-\pi^+\pi^- A$

[1] Statistical error negligible.
[2] Using the $a_1(1260)$ mass and width results of BOWLER 88.

NODE=M161W;LINKAGE=A
NODE=M161W;LINKAGE=KB



$a_1(1640)$ DECAY MODES

NODE=M161215;NODE=M161

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\pi\pi\pi$	seen	DESIG=3;OUR EST;→ UNCHECKED ←
Γ_2	$f_2(1270)\pi$	seen	DESIG=1;OUR EST;→ UNCHECKED ←
Γ_3	$\sigma\pi$	seen	DESIG=2;OUR EST;→ UNCHECKED ←
Γ_4	$\rho\pi_{S-wave}$	seen	DESIG=7;OUR EST;→ UNCHECKED ←
Γ_5	$\rho\pi_{D-wave}$	seen	DESIG=4;OUR EST;→ UNCHECKED ←
Γ_6	$\omega\pi\pi$	seen	DESIG=5;OUR EST;→ UNCHECKED ←
Γ_7	$f_1(1285)\pi$	seen	DESIG=6;OUR EST;→ UNCHECKED ←
Γ_8	$a_1(1260)\eta$	not seen	DESIG=8

$a_1(1640)$ BRANCHING RATIOS

NODE=M161220

$\Gamma(f_2(1270)\pi)/\Gamma(\sigma\pi)$ — Γ_2/Γ_3

NODE=M161R1
NODE=M161R1

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
0.24±0.07	BAKER	99	SPEC	1.94 $\overline{p}p \to 4\pi^0$

$\Gamma(\rho\pi_{D-wave})/\Gamma_{total}$ — Γ_5/Γ

NODE=M161R2
NODE=M161R2

• • • We do not use the following data for averages, fits, limits, etc. • • •

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
seen	CHUNG	02	B852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$
seen	AMELIN	95B	VES	36 $\pi^- A \to \pi^+\pi^-\pi^- A$

$\Gamma(\omega\pi\pi)/\Gamma_{total}$ — Γ_6/Γ

NODE=M161R3
NODE=M161R3

• • • We do not use the following data for averages, fits, limits, etc. • • •

VALUE	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
seen	35280	[1] BAKER	03	SPEC	$\overline{p}p \to \omega\pi^+\pi^-\pi^0$

[1] Assuming the $\omega\rho$ mechanism for the $\omega\pi\pi$ state.

NODE=M161R;LINKAGE=KB

$\Gamma(f_1(1285)\pi)/\Gamma_{total}$ — Γ_7/Γ

NODE=M161R4
NODE=M161R4

• • • We do not use the following data for averages, fits, limits, etc. • • •

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
not seen	KUHN	04	B852	18 $\pi^- p \to \eta\pi^+\pi^-\pi^- p$
seen	LEE	94	MPS2	18 $\pi^- p \to K^+\overline{K}^0\pi^-\pi^- p$

$\Gamma(a_1(1260)\eta)/\Gamma_{total}$ — Γ_8/Γ

NODE=M161R5

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	KUHN	04	B852	18 $\pi^- p \to \eta\pi^+\pi^-\pi^- p$

a_1(1640) REFERENCES

NODE=M161

AGHASYAN	18B	PR D98 092003	M. Aghasyan *et al.*	(COMPASS Collab.)	REFID=59471
DARGENT	17	JHEP 1705 143	P. dArgent *et al.*	(HEID, BRIS)	REFID=58121
KUHN	04	PL B595 109	J. Kuhn *et al.*	(BNL E852 Collab.)	REFID=49773
BAKER	03	PL B563 140	C.A. Baker *et al.*		REFID=49414
CHUNG	02	PR D65 072001	S.U. Chung *et al.*	(BNL E852 Collab.)	REFID=48837
ASNER	00	PR D61 012002	D.M. Asner *et al.*	(CLEO Collab.)	REFID=47339
BAKER	99	PL B449 114	C.A. Baker *et al.*		REFID=46888
ABREU	98G	PL B426 411	P. Abreu *et al.*	(DELPHI Collab.)	REFID=45909
AMELIN	95B	PL B356 595	D.V. Amelin *et al.*	(SERP, TBIL)	REFID=44433
LEE	94	PL B323 227	J.H. Lee *et al.*	(BNL, IND, KYUN, MASD+)	REFID=44092
BOWLER	88	PL B209 99	M.G. Bowler	(OXF)	REFID=40578
BELLINI	85	SJNP 41 781	D. Bellini *et al.*		REFID=47490
		Translated from YAF 41 1223.			

NODE=M117

$f_2(1640)$

$I^G(J^{PC}) = 0^+(2^{++})$

OMITTED FROM SUMMARY TABLE

f_2(1640) MASS

NODE=M117M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1639± 6 OUR AVERAGE	Error includes scale factor of 1.2.			
1620±16	BUGG	95	MRK3	$J/\psi \to \gamma\pi^+\pi^-\pi^+\pi^-$
1647± 7	ADAMO	92	OBLX	$\overline{n}p \to 3\pi^+ 2\pi^-$
1635± 7	ALDE	90	GAM2	38 $\pi^- p \to \omega\omega n$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1640± 5	AMSLER	06	CBAR	0.9 $\overline{p}p \to K^+K^-\pi^0$
1659± 6	VLADIMIRSK...	06	SPEC	40 $\pi^- p \to K^0_S K^0_S n$
1643± 7	[1] ALDE	89B	GAM2	38 $\pi^- p \to \omega\omega n$

[1] Superseded by ALDE 90.

NODE=M117M;LINKAGE=BB

f_2(1640) WIDTH

NODE=M117W

VALUE (MeV)	CL%	DOCUMENT ID		TECN	COMMENT
99^{+60}_{-40} OUR AVERAGE		Error includes scale factor of 2.9.			
140^{+60}_{-20}		BUGG	95	MRK3	$J/\psi \to \gamma\pi^+\pi^-\pi^+\pi^-$
58±20		ADAMO	92	OBLX	$\overline{n}p \to 3\pi^+ 2\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
44± 9		AMSLER	06	CBAR	0.9 $\overline{p}p \to K^+K^-\pi^0$
152±18		VLADIMIRSK...	06	SPEC	40 $\pi^- p \to K^0_S K^0_S n$
< 70	90	ALDE	90	GAM2	38 $\pi^- p \to \omega\omega n$

f_2(1640) DECAY MODES

NODE=M117215;NODE=M117

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\omega\omega$	seen	DESIG=1;OUR EST;→ UNCHECKED ←
Γ_2	4π	seen	DESIG=2;OUR EST;→ UNCHECKED ←
Γ_3	$K\overline{K}$	seen	DESIG=3

f_2(1640) BRANCHING RATIOS

NODE=M117220

$\Gamma(K\overline{K})/\Gamma_{total}$ — Γ_3/Γ

NODE=M117R2

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AMSLER	06	CBAR	0.9 $\overline{p}p \to K^+K^-\pi^0$

f_2(1640) REFERENCES

NODE=M117

AMSLER	06	PL B639 165	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=51136
VLADIMIRSK...	06	PAN 69 493	V.V. Vladimirsky *et al.*	(ITEP, Moscow)	REFID=51191
		Translated from YAF 69 515.			
BUGG	95	PL B353 378	D.V. Bugg *et al.*	(LOQM, PNPI, WASH) JP	REFID=44438
ADAMO	92	PL B287 368	A. Adamo *et al.*	(OBELIX Collab.)	REFID=42177
ALDE	90	PL B241 600	D.M. Alde *et al.*	(SERP, BELG, LANL, LAPP+)	REFID=40935
ALDE	89B	PL B216 451	D.M. Alde *et al.*	(SERP, BELG, LANL, LAPP+) IGJPC	REFID=40735

NODE=M154

$\eta_2(1645)$

$I^G(J^{PC}) = 0^+(2^{-+})$

$\eta_2(1645)$ MASS

NODE=M154M

NODE=M154M

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
1617± 5 OUR AVERAGE					
1613± 8	BARBERIS	00B			450 $pp \to p_f \eta \pi^+ \pi^- p_s$
1617± 8	BARBERIS	00C			450 $pp \to p_f 4\pi p_s$
1620±20	BARBERIS	97B	OMEG		450 $pp \to pp2(\pi^+\pi^-)$
1645±14±15	ADOMEIT	96	CBAR	0	1.94 $\overline{p}p \to \eta 3\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1645± 6±20	ANISOVICH	00E	SPEC		0.9–1.94 $\overline{p}p \to \eta 3\pi^0$

$\eta_2(1645)$ WIDTH

NODE=M154W

NODE=M154W

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
181±11 OUR AVERAGE					
185±17	BARBERIS	00B			450 $pp \to p_f \eta \pi^+ \pi^- p_s$
177±18	BARBERIS	00C			450 $pp \to p_f 4\pi p_s$
180±25	BARBERIS	97B	OMEG		450 $pp \to pp2(\pi^+\pi^-)$
$180^{+40}_{-21}\pm25$	ADOMEIT	96	CBAR	0	1.94 $\overline{p}p \to \eta 3\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
200±25	ANISOVICH	00E	SPEC		0.9–1.94 $\overline{p}p \to \eta 3\pi^0$

$\eta_2(1645)$ DECAY MODES

NODE=M154215;NODE=M154

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$a_2(1320)\pi$	seen	DESIG=1;OUR EST;→ UNCHECKED ←
Γ_2	$K\overline{K}\pi$	seen	DESIG=2;OUR EST;→ UNCHECKED ←
Γ_3	$K^*\overline{K}$	seen	DESIG=3;OUR EST;→ UNCHECKED ←
Γ_4	$\eta\pi^+\pi^-$	seen	DESIG=4;OUR EST;→ UNCHECKED ←
Γ_5	$a_0(980)\pi$	seen	DESIG=5;OUR EST;→ UNCHECKED ←
Γ_6	$f_2(1270)\eta$	not seen	DESIG=6;OUR EST;→ UNCHECKED ←

$\eta_2(1645)$ BRANCHING RATIOS

NODE=M154220

$\Gamma(K\overline{K}\pi)/\Gamma(a_2(1320)\pi)$ — Γ_2/Γ_1

NODE=M154R1

NODE=M154R1

VALUE	DOCUMENT ID		TECN	COMMENT
0.07±0.03	[1] BARBERIS	97C	OMEG	450 $pp \to ppK\overline{K}\pi$

[1] Using $2(\pi^+\pi^-)$ data from BARBERIS 97B.

NODE=M154R1;LINKAGE=A

$\Gamma(a_2(1320)\pi)/\Gamma(a_0(980)\pi)$ — Γ_1/Γ_5

NODE=M154R3

NODE=M154R3

VALUE	DOCUMENT ID		TECN	COMMENT
13.1±2.3 OUR AVERAGE				
13.5±4.6	[2] ANISOVICH	11	SPEC	0.9–1.94 $p\overline{p}$
13.0±2.7	BARBERIS	00B		450 $pp \to p_f \eta \pi^+ \pi^- p_s$

[2] Reanalysis of ADOMEIT 96 and ANISOVICH 00E.

NODE=M154R3;LINKAGE=AN

$\Gamma(f_2(1270)\eta)/\Gamma_{total}$ — Γ_6/Γ

NODE=M154R4

NODE=M154R4

VALUE	DOCUMENT ID		COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
not seen	BARBERIS	00B	450 $pp \to p_f \eta \pi^+ \pi^- p_s$

$\eta_2(1645)$ REFERENCES

NODE=M154

ANISOVICH	11	EPJ C71 1511	A.V. Anisovich *et al.*	(LOQM, RAL, PNPI)	REFID=53631
ANISOVICH	00E	PL B477 19	A.V. Anisovich *et al.*		REFID=47945
BARBERIS	00B	PL B471 435	D. Barberis *et al.*	(WA 102 Collab.)	REFID=47958
BARBERIS	00C	PL B471 440	D. Barberis *et al.*	(WA 102 Collab.)	REFID=47959
BARBERIS	97B	PL B413 217	D. Barberis *et al.*	(WA 102 Collab.)	REFID=45758
BARBERIS	97C	PL B413 225	D. Barberis *et al.*	(WA 102 Collab.)	REFID=45759
ADOMEIT	96	ZPHY C71 227	J. Adomeit *et al.*	(Crystal Barrel Collab.)	REFID=45202

NODE=M126

$\omega(1650)$ $I^G(J^{PC}) = 0^-(1^{--})$

See also the $\omega(1420)$ particle listing.

NODE=M126

ω(1650) MASS

NODE=M126M

NODE=M126M

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT	
1670± 30 OUR ESTIMATE					→ UNCHECKED ←
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1698± 10	267	[1] ACHASOV 20B	SND	$e^+e^- \to \omega\eta \to \eta\pi^0\gamma$	
$1651\pm 3^{+16}_{-6}$	183k	[2] ABLIKIM 19AQ	BES	$J/\psi \to K^+K^-\pi^0$	
1673^{+6}_{-7}		ACHASOV 19	SND	$e^+e^- \to \pi^+\pi^-\pi^0\eta$	
1671± 6±10	824	[3] AKHMETSHIN 17A	CMD3	1.4–2.0 $e^+e^- \to \omega\eta$	
1660± 10	898	[4] ACHASOV 16B	SND	1.34–2.00 $e^+e^- \to \omega\eta$	
1680± 10	13.1k	[5] AULCHENKO 15A	SND	1.05–1.80 $e^+e^- \to \pi^+\pi^-\pi^0$	
1667± 13± 6		AUBERT 07AU	BABR	10.6 $e^+e^- \to \omega\pi^+\pi^-\gamma$	
1645± 8	13	AUBERT 06D	BABR	10.6 $e^+e^- \to \omega\eta\gamma$	
1660± 10± 2		AUBERT,B 04N	BABR	10.6 $e^+e^- \to \pi^+\pi^-\pi^0\gamma$	
1770± 50±60	1.2M	[6] ACHASOV 03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$	
1619± 5		[7] HENNER 02	RVUE	1.2–2.0 $e^+e^- \to \rho\pi$, $\omega\pi\pi$	
1700± 20		EUGENIO 01	SPEC	18 $\pi^-p \to \omega\eta n$	
1705± 26	612	[8] AKHMETSHIN 00D	CMD2	$e^+e^- \to \omega\pi^+\pi^-$	OCCUR=2
1820^{+190}_{-150}		[9] ACHASOV 98H	RVUE	$e^+e^- \to \pi^+\pi^-\pi^0$	
1840^{+100}_{-70}		[10] ACHASOV 98H	RVUE	$e^+e^- \to \omega\pi^+\pi^-$	OCCUR=2
1780^{+170}_{-300}		[11] ACHASOV 98H	RVUE	$e^+e^- \to K^+K^-$	OCCUR=3
~ 2100		[12] ACHASOV 98H	RVUE	$e^+e^- \to K^0_S K^\pm\pi^\mp$	OCCUR=4
1606± 9		[13] CLEGG 94	RVUE		OCCUR=5
1662± 13	750	[14] ANTONELLI 92	DM2	1.34–2.4$e^+e^- \to \rho\pi$, $\omega\pi\pi$	OCCUR=4
1670± 20		ATKINSON 83B	OMEG	20–70 $\gamma p \to 3\pi X$	
1657± 13		CORDIER 81	DM1	$e^+e^- \to \omega 2\pi$	
1679± 34	21	ESPOSITO 80	FRAM	$e^+e^- \to 3\pi$	
1652± 17		COSME 79	OSPK	$e^+e^- \to 3\pi$	

[1] From a fit with contributions from $\omega(1420)$, $\omega(1650)$, and $\phi(1680)$. The mass of $\omega(1420)$ is fixed to the PDG 18 value of 1420 MeV. Fixing also the width of $\omega(1420)$ to the PDG 18 value of 220 MeV results in 1694 ± 9 MeV measurement. NODE=M126M;LINKAGE=H

[2] Could also be $\rho(1700)$. Branching ratio $J/\psi \to X\pi^0 \to K^+K^-\pi^0 = (5.3\pm0.3^{+0.6}_{-0.5})\times 10^{-5}$. NODE=M126M;LINKAGE=G

[3] From a fit of the interfering $\omega(1420)$ and $\omega(1650)$ with a relative phase of π and other parameters floating. NODE=M126M;LINKAGE=F

[4] From a fit with contributions from $\omega(1420)$, $\omega(1650)$, and $\phi(1680)$. NODE=M126M;LINKAGE=E

[5] From a fit with contributions from $\omega(782)$, $\phi(1020)$, $\omega(1420)$, and $\omega(1650)$. See ACHASOV 20A for a further analysis of the $\pi^+\pi^-\pi^0$ data. NODE=M126M;LINKAGE=A

[6] From the combined fit of ANTONELLI 92, ACHASOV 01E, ACHASOV 02E, and ACHASOV 03D data on the $\pi^+\pi^-\pi^0$ and ANTONELLI 92 on the $\omega\pi^+\pi^-$ final states. Supersedes ACHASOV 99E and ACHASOV 02E. NODE=M126M;LINKAGE=VH

[7] Using results of CORDIER 81 and preliminary data of DOLINSKY 91 and ANTONELLI 92. NODE=M126M;LINKAGE=AB

[8] Using the data of AKHMETSHIN 00D and ANTONELLI 92. The $\rho\pi$ dominance for the energy dependence of the $\omega(1420)$ and $\omega(1650)$ width assumed. NODE=M126M;LINKAGE=KI

[9] Using data from BARKOV 87, DOLINSKY 91, and ANTONELLI 92. NODE=M126M;LINKAGE=L1

[10] Using the data from ANTONELLI 92. NODE=M126M;LINKAGE=L2

[11] Using the data from IVANOV 81 and BISELLO 88B. NODE=M126M;LINKAGE=L3

[12] Using the data from BISELLO 91C. NODE=M126M;LINKAGE=L4

[13] From a fit to two Breit-Wigner functions and using the data of DOLINSKY 91 and ANTONELLI 92. NODE=M126M;LINKAGE=AD

[14] From the combined fit of the $\rho\pi$ and $\omega\pi\pi$ final states. NODE=M126M;LINKAGE=AE

ω(1650) WIDTH

NODE=M126W

NODE=M126W
→ UNCHECKED ←

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
315± 35 OUR ESTIMATE				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
110± 16	267	[1] ACHASOV 20B	SND	$e^+e^- \to \omega\eta \to \eta\pi^0\gamma$
$194\pm 8^{+15}_{-7}$	183k	[2] ABLIKIM 19AQ	BES	$J/\psi \to K^+K^-\pi^0$
95± 11		ACHASOV 19	SND	$e^+e^- \to \pi^+\pi^-\pi^0\eta$
113± 9± 10	824	[3] AKHMETSHIN 17A	CMD3	1.4–2.0 $e^+e^- \to \omega\eta$
110± 20	898	[4] ACHASOV 16B	SND	1.34–2.00 $e^+e^- \to \omega\eta$
310± 30	13.1k	[5] AULCHENKO 15A	SND	1.05–1.80 $e^+e^- \to \pi^+\pi^-\pi^0$
222± 25± 20		AUBERT 07AU	BABR	10.6 $e^+e^- \to \omega\pi^+\pi^-\gamma$
114± 14	13	AUBERT 06D	BABR	10.6 $e^+e^- \to \omega\eta\gamma$
230± 30± 20		AUBERT,B 04N	BABR	10.6 $e^+e^- \to \pi^+\pi^-\pi^0\gamma$
$490^{+200}_{-150}\pm 130$	1.2M	[6] ACHASOV 03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
250± 14		[7] HENNER 02	RVUE	1.2–2.0 $e^+e^- \to \rho\pi, \omega\pi\pi$
250± 50		EUGENIO 01	SPEC	18 $\pi^- p \to \omega\eta n$
370± 25	612	[8] AKHMETSHIN 00D	CMD2	$e^+e^- \to \omega\pi^+\pi^-$
113± 20		[9] CLEGG 94	RVUE	
280± 24	750	[10] ANTONELLI 92	DM2	1.34–2.4 $e^+e^- \to \rho\pi, \omega\pi\pi$
160± 20		ATKINSON 83B	OMEG	20–70 $\gamma p \to 3\pi X$
136± 46		CORDIER 81	DM1	$e^+e^- \to \omega 2\pi$
99± 49	21	ESPOSITO 80	FRAM	$e^+e^- \to 3\pi$
42± 17		COSME 79	OSPK	$e^+e^- \to 3\pi$

OCCUR=2
OCCUR=5
OCCUR=4

[1] From a fit with contributions from $\omega(1420)$, $\omega(1650)$, and $\phi(1680)$. The mass of $\omega(1420)$ is fixed to the PDG 18 value of 1420 MeV. Fixing also the width of $\omega(1420)$ to the PDG 18 value of 220 MeV results in 94 ± 13 MeV measurement. NODE=M126W;LINKAGE=H

[2] Could also be $\rho(1700)$. Branching ratio $J/\psi \to X\pi^0 \to K^+K^-\pi^0 = (5.3\pm0.3^{+0.6}_{-0.5})\times 10^{-5}$. NODE=M126W;LINKAGE=G

[3] From a fit of the interfering $\omega(1420)$ and $\omega(1650)$ with a relative phase of π and other parameters floating. NODE=M126W;LINKAGE=F

[4] From a fit with contributions from $\omega(1420)$, $\omega(1650)$, and $\phi(1680)$. NODE=M126W;LINKAGE=E

[5] From a fit with contributions from $\omega(782)$, $\phi(1020)$, $\omega(1420)$, and $\omega(1650)$. See ACHASOV 20A for a further analysis of the $\pi^+\pi^-\pi^0$ data. NODE=M126W;LINKAGE=A

[6] From the combined fit of ANTONELLI 92, ACHASOV 01E, ACHASOV 02E, and ACHASOV 03D data on the $\pi^+\pi^-\pi^0$ and ANTONELLI 92 on the $\omega\pi^+\pi^-$ final states. Supersedes ACHASOV 99E and ACHASOV 02E. NODE=M126W;LINKAGE=VH

[7] Using results of CORDIER 81 and preliminary data of DOLINSKY 91 and ANTONELLI 92. NODE=M126W;LINKAGE=AB

[8] Using the data of AKHMETSHIN 00D and ANTONELLI 92. The $\rho\pi$ dominance for the energy dependence of the $\omega(1420)$ and $\omega(1650)$ width assumed. NODE=M126W;LINKAGE=KI

[9] From a fit to two Breit-Wigner functions and using the data of DOLINSKY 91 and ANTONELLI 92. NODE=M126W;LINKAGE=AD

[10] From the combined fit of the $\rho\pi$ and $\omega\pi\pi$ final states. NODE=M126W;LINKAGE=AE

$\omega(1650)$ DECAY MODES

NODE=M126215;NODE=M126

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\rho\pi$	seen	DESIG=1;OUR EST;→ UNCHECKED ←
Γ_2	$\rho(1450)\pi$	seen	DESIG=6
Γ_3	$\omega\pi\pi$	seen	DESIG=2;OUR EST;→ UNCHECKED ←
Γ_4	$\omega\eta$	seen	DESIG=4;OUR EST;→ UNCHECKED ←
Γ_5	e^+e^-	seen	DESIG=3;OUR EST;→ UNCHECKED ←
Γ_6	$\pi^0\gamma$	not seen	DESIG=5

$\omega(1650)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma^2(\text{total})$

NODE=M126230

$\Gamma(\rho\pi)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_1/\Gamma \times \Gamma_5/\Gamma$

NODE=M126G3
NODE=M126G3

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.56 ±0.23	13.1k	[1] AULCHENKO 15A	SND	1.05–1.80 $e^+e^- \to \pi^+\pi^-\pi^0$
1.3 ±0.1 ±0.1		AUBERT,B 04N	BABR	10.6 $e^+e^- \to \pi^+\pi^-\pi^0\gamma$
$1.2\ ^{+0.4}_{-0.1}\ \pm 0.8$	1.2M	[2,3] ACHASOV 03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
0.921±0.230		[4,5] CLEGG 94	RVUE	
0.479±0.050	750	[6,7] ANTONELLI 92	DM2	1.34–2.4 $e^+e^- \to \rho\pi, \omega\pi\pi$

[1] From a fit with contributions from $\omega(782)$, $\phi(1020)$, $\omega(1420)$, and $\omega(1650)$. See ACHASOV 20A for a further analysis of the $\pi^+\pi^-\pi^0$ data. NODE=M126G3;LINKAGE=A
[2] Calculated by us from the cross section at the peak. NODE=M126G;LINKAGE=AW
[3] From the combined fit of ANTONELLI 92, ACHASOV 01E, ACHASOV 02E, and ACHASOV 03D data on the $\pi^+\pi^-\pi^0$ and ANTONELLI 92 on the $\omega\pi^+\pi^-$ final states. Supersedes ACHASOV 99E and ACHASOV 02E. NODE=M126G;LINKAGE=VH
[4] From a fit to two Breit-Wigner functions and using the data of DOLINSKY 91 and ANTONELLI 92. NODE=M126G;LINKAGE=AD
[5] From the partial and leptonic width given by the authors. NODE=M126G;LINKAGE=SE
[6] From the combined fit of the $\rho\pi$ and $\omega\pi\pi$ final states. NODE=M126G;LINKAGE=AE
[7] From the product of the leptonic width and partial branching ratio given by the authors. NODE=M126G;LINKAGE=ES

$\Gamma(\omega\pi\pi)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_3/\Gamma \times \Gamma_5/\Gamma$

NODE=M126G4
NODE=M126G4

VALUE (units 10^{-7})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
7.0 ± 0.5		AUBERT	07AU	BABR	10.6 $e^+e^- \to \omega\pi^+\pi^-\gamma$
$4.1 \pm 0.9 \pm 1.3$	1.2M	[1,2] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
5.40 ± 0.95		[3] AKHMETSHIN	00D	CMD2	1.2–1.38 $e^+e^- \to \omega\pi^+\pi^-$
3.18 ± 0.80		[4,5] CLEGG	94	RVUE	
6.07 ± 0.61	750	[6,7] ANTONELLI	92	DM2	1.34–2.4 $e^+e^- \to \rho\pi, \omega\pi\pi$

[1] Calculated by us from the cross section at the peak. NODE=M126G4;LINKAGE=AW
[2] From the combined fit of ANTONELLI 92, ACHASOV 01E, ACHASOV 02E, and ACHASOV 03D data on the $\pi^+\pi^-\pi^0$ and ANTONELLI 92 on the $\omega\pi^+\pi^-$ final states. Supersedes ACHASOV 99E and ACHASOV 02E. NODE=M126G4;LINKAGE=VH
[3] Using the data of AKHMETSHIN 00D and ANTONELLI 92. The $\rho\pi$ dominance for the energy dependence of the $\omega(1420)$ and $\omega(1650)$ width assumed. NODE=M126G4;LINKAGE=KL
[4] From a fit to two Breit-Wigner functions and using the data of DOLINSKY 91 and ANTONELLI 92. NODE=M126G4;LINKAGE=AD
[5] From the partial and leptonic width given by the authors. NODE=M126G4;LINKAGE=SE
[6] From the combined fit of the $\rho\pi$ and $\omega\pi\pi$ final states. NODE=M126G4;LINKAGE=AE
[7] From the product of the leptonic width and partial branching ratio given by the authors. NODE=M126G4;LINKAGE=ES

$\Gamma(\omega\eta)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_4/\Gamma \times \Gamma_5/\Gamma$

NODE=M126G5
NODE=M126G5

VALUE (units 10^{-7})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
6.4 ± 0.9	267	[1] ACHASOV	20B	SND	$e^+e^- \to \omega\eta \to \eta\pi^0\gamma$
$5.62^{+0.45}_{-0.42}$		ACHASOV	19	SND	$e^+e^- \to \pi^+\pi^-\pi^0\eta$
$4.5 \pm 0.3 \pm 0.3$	824	[2] AKHMETSHIN	17A	CMD3	1.4–2.0 $e^+e^- \to \omega\eta$
4.4 ± 0.5	898	[3] ACHASOV	16B	SND	1.34–2.00 $e^+e^- \to \omega\eta$
5.7 ± 0.6	13	AUBERT	06D	BABR	10.6 $e^+e^- \to \omega\eta\gamma$
< 60 at 90% CL		[4] AKHMETSHIN	03B	CMD2	$e^+e \to \eta\pi^0\gamma$

[1] From a fit with contributions from $\omega(1420)$, $\omega(1650)$, and $\phi(1680)$. The mass of $\omega(1420)$ is fixed to the PDG 18 value of 1420 MeV. Fixing also the width of $\omega(1420)$ to the PDG 18 value of 220 MeV results in $(5.4 \pm 0.6) \times 10^{-7}$ measurement. NODE=M126G5;LINKAGE=C
[2] From a fit of the interfering $\omega(1420)$ and $\omega(1650)$ with a relative phase of π and other parameters floating. From an alternative fit $\Gamma(\omega(1650) \to \omega\eta)/\Gamma_{total} \times \Gamma(\omega(1650) \to e^+e^-) = 51 \pm 3$ eV. NODE=M126G5;LINKAGE=B
[3] From a fit with contributions from $\omega(1420)$, $\omega(1650)$, and $\phi(1680)$. NODE=M126G5;LINKAGE=A
[4] $\omega(1650)$ mass and width fixed at 1700 MeV and 250 MeV, respectively. NODE=M126G5;LINKAGE=KH

$\omega(1650)$ BRANCHING RATIOS

NODE=M126225

$\Gamma(\rho\pi)/\Gamma_{total}$ — Γ_1/Γ

NODE=M126R3
NODE=M126R3

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
~ 0.65	1.2M	[1] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
0.380 ± 0.014		[2] HENNER	02	RVUE	1.2–2.0 $e^+e^- \to \rho\pi, \omega\pi\pi$

[1] From the combined fit of ANTONELLI 92, ACHASOV 01E, ACHASOV 02E, and ACHASOV 03D data on the $\pi^+\pi^-\pi^0$ and ANTONELLI 92 on the $\omega\pi^+\pi^-$ final states. Supersedes ACHASOV 99E and ACHASOV 02E. NODE=M126R;LINKAGE=VH
[2] Assuming that the $\omega(1650)$ decays into $\rho\pi$ and $\omega\pi\pi$ only. NODE=M126R;LINKAGE=AC

$\Gamma(\rho(1450)\pi)/\Gamma_{total}$ — Γ_2/Γ

NODE=M126R02
NODE=M126R02

VALUE	DOCUMENT ID		TECN	COMMENT
seen	ACHASOV	20A	SND	1.15–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$

$\Gamma(\omega\pi\pi)/\Gamma_{total}$ Γ_3/Γ

NODE=M126R2
NODE=M126R2

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
~ 0.35	1.2M	[1] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
0.620 ± 0.014		[2] HENNER	02	RVUE	1.2–2.0 $e^+e^- \to \rho\pi, \omega\pi\pi$

[1] From the combined fit of ANTONELLI 92, ACHASOV 01E, ACHASOV 02E, and ACHASOV 03D data on the $\pi^+\pi^-\pi^0$ and ANTONELLI 92 on the $\omega\pi^+\pi^-$ final states. Supersedes ACHASOV 99E and ACHASOV 02E.
NODE=M126R2;LINKAGE=VH

[2] Assuming that the $\omega(1650)$ decays into $\rho\pi$ and $\omega\pi\pi$ only.
NODE=M126R2;LINKAGE=AC

$\Gamma(e^+e^-)/\Gamma_{total}$ Γ_5/Γ

NODE=M126R4
NODE=M126R4

VALUE (units 10^{-7})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
~ 18	1.2M	[1,2] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
32 ± 1		[2] HENNER	02	RVUE	1.2–2.0 $e^+e^- \to \rho\pi, \omega\pi\pi$

[1] Calculated by us from the cross section at the peak.
NODE=M126R;LINKAGE=AW

[2] Assuming that the $\omega(1650)$ decays into $\rho\pi$ and $\omega\pi\pi$ only.
NODE=M126R4;LINKAGE=AC

$\Gamma(\pi^0\gamma)/\Gamma_{total}$ Γ_6/Γ

NODE=M126R00
NODE=M126R00

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	[1] ACHASOV	10D	SND	1.075–2.0 $e^+e^- \to \pi^0\gamma$

[1] From a fit of a VMD model with two effective resonances with masses of 1450 MeV and 1700 MeV to describe the excited vector states $\omega(1420)$, $\rho(1450)$, $\omega(1650)$, and $\rho(1700)$. The width of the highest mass effective resonance is fixed at 315 MeV.
NODE=M126R00;LINKAGE=A

$\omega(1650)$ REFERENCES

NODE=M126

ACHASOV	20A	EPJ C80 993	M.N. Achasov *et al.*	(SND Collab.)	REFID=60923
ACHASOV	20B	EPJ C80 1008	M.N. Achasov *et al.*	(SND Collab.)	REFID=60924
ABLIKIM	19AQ	PR D100 032004	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59909
ACHASOV	19	PR D99 112004	M.N. Achasov *et al.*	(SND Collab.)	REFID=59887
PDG	18	PR D98 030001	M. Tanabashi *et al.*	(PDG Collab.)	REFID=59304
AKHMETSHIN	17A	PL B773 150	R.R. Akhmetshin *et al.*	(CMD-3 Collab.)	REFID=58239
ACHASOV	16B	PR D94 092002	M.N. Achasov *et al.*	(SND Collab.)	REFID=57537
AULCHENKO	15A	JETP 121 27	V.M. Aulchenko *et al.*	(SND Collab.)	REFID=56843
		Translated from ZETF 148 34.			
ACHASOV	10D	PR D98 112001	M.N. Achasov *et al.*	(SND Collab.)	REFID=59494
AUBERT	07AU	PR D76 092005	B. Aubert *et al.*	(BABAR Collab.)	REFID=52049
AUBERT	06D	PR D73 052003	B. Aubert *et al.*	(BABAR Collab.)	REFID=51047
AUBERT,B	04N	PR D70 072004	B. Aubert *et al.*	(BABAR Collab.)	REFID=50184
ACHASOV	03D	PR D68 052006	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=49577
AKHMETSHIN	03B	PL B562 173	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=49406
ACHASOV	02E	PR D66 032001	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=48815
HENNER	02	EPJ C26 3	V.K. Henner *et al.*		REFID=49177
ACHASOV	01E	PR D63 072002	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=48311
EUGENIO	01	PL B497 190	P. Eugenio *et al.*		REFID=48010
AKHMETSHIN	00D	PL B489 125	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=47935
ACHASOV	99E	PL B462 365	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=47391
ACHASOV	98H	PR D57 4334	N.N. Achasov, A.A. Kozhevnikov		REFID=46323
CLEGG	94	ZPHY C62 455	A.B. Clegg, A. Donnachie	(LANC, MCHS)	REFID=44081
ANTONELLI	92	ZPHY C56 15	A. Antonelli *et al.*	(DM2 Collab.)	REFID=43168
BISELLO	91C	ZPHY C52 227	D. Bisello *et al.*	(DM2 Collab.)	REFID=41867
DOLINSKY	91	PRPL 202 99	S.I. Dolinsky *et al.*	(NOVO)	REFID=41369
BISELLO	88B	ZPHY C39 13	D. Bisello *et al.*	(PADO, CLER, FRAS+)	REFID=40581
BARKOV	87	JETPL 46 164	L.M. Barkov *et al.*	(NOVO)	REFID=40280
		Translated from ZETFP 46 132.			
ATKINSON	83B	PL 127B 132	M. Atkinson *et al.*	(BONN, CERN, GLAS+)	REFID=21502
CORDIER	81	PL 106B 155	A. Cordier *et al.*	(ORSAY)	REFID=21586
IVANOV	81	PL 107B 297	P.M. Ivanov *et al.*	(NOVO)	REFID=20553
ESPOSITO	80	LNC 28 195	B. Esposito *et al.*	(FRAS, NAPL, PADO+)	REFID=21584
COSME	79	NP B152 215	G. Cosme *et al.*	(IPN)	REFID=21475

NODE=M045

$\omega_3(1670)$

$I^G(J^{PC}) = 0^-(3^{--})$

$\omega_3(1670)$ MASS

NODE=M045M

NODE=M045M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1667 ± 4 OUR AVERAGE					
1665.3± 5.2±4.5	23400	AMELIN	96	VES	36 $\pi^- p \to \pi^+\pi^-\pi^0 n$
1685 ±20	60	BAUBILLIER	79	HBC	8.2 $K^- p$ backward
1673 ±12	430	[1,2] BALTAY	78E	HBC	15 $\pi^+ p \to \Delta 3\pi$
1650 ±12		CORDEN	78B	OMEG	8–12 $\pi^- p \to N 3\pi$
1669 ±11	600	[2] WAGNER	75	HBC	7 $\pi^+ p \to \Delta^{++} 3\pi$
1678 ±14	500	DIAZ	74	DBC	6 $\pi^+ n \to p 3\pi^0$
1660 ±13	200	DIAZ	74	DBC	6 $\pi^+ n \to p\omega\pi^0\pi^0$
1679 ±17	200	MATTHEWS	71D	DBC	7.0 $\pi^+ n \to p 3\pi^0$
1670 ±20		KENYON	69	DBC	8 $\pi^+ n \to p 3\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
~ 1700	110	[1] CERRADA	77B	HBC	4.2 $K^- p \to \Lambda 3\pi$
1695 ±20		BARNES	69B	HBC	4.6 $K^- p \to \omega 2\pi X$
1636 ±20		ARMENISE	68B	DBC	5.1 $\pi^+ n \to p 3\pi^0$

OCCUR=2

[1] Phase rotation seen for $J^P = 3^-$ $\rho\pi$ wave.

[2] From a fit to $I(J^P) = 0(3^-)$ $\rho\pi$ partial wave.

NODE=M045M;LINKAGE=E

NODE=M045M;LINKAGE=P

$\omega_3(1670)$ WIDTH

NODE=M045W

NODE=M045W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
168±10 OUR AVERAGE					
149±19±7	23400	AMELIN	96	VES	36 $\pi^- p \to \pi^+\pi^-\pi^0 n$
160±80	60	[3] BAUBILLIER	79	HBC	8.2 $K^- p$ backward
173±16	430	[4,5] BALTAY	78E	HBC	15 $\pi^+ p \to \Delta 3\pi$
253±39		CORDEN	78B	OMEG	8–12 $\pi^- p \to N 3\pi$
173±28	600	[3,5] WAGNER	75	HBC	7 $\pi^+ p \to \Delta^{++} 3\pi$
167±40	500	DIAZ	74	DBC	6 $\pi^+ n \to p 3\pi^0$
122±39	200	DIAZ	74	DBC	6 $\pi^+ n \to p\omega\pi^0\pi^0$
155±40	200	[3] MATTHEWS	71D	DBC	7.0 $\pi^+ n \to p 3\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
90±20		BARNES	69B	HBC	4.6 $K^- p \to \omega 2\pi$
100±40		KENYON	69	DBC	8 $\pi^+ n \to p 3\pi^0$
112±60		ARMENISE	68B	DBC	5.1 $\pi^+ n \to p 3\pi^0$

OCCUR=2

[3] Width errors enlarged by us to $4\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass.

[4] Phase rotation seen for $J^P = 3^-$ $\rho\pi$ wave.

[5] From a fit to $I(J^P) = 0(3^-)$ $\rho\pi$ partial wave.

NODE=M045W;LINKAGE=S

NODE=M045W;LINKAGE=E

NODE=M045W;LINKAGE=P

$\omega_3(1670)$ DECAY MODES

NODE=M045215;NODE=M045

	Mode	Fraction (Γ_i/Γ)
Γ_1	$\rho\pi$	seen
Γ_2	$\omega\pi\pi$	seen
Γ_3	$b_1(1235)\pi$	possibly seen

DESIG=1;OUR EST;→ UNCHECKED ←

DESIG=2;OUR EST;→ UNCHECKED ←

DESIG=3;OUR EST;→ UNCHECKED ←

$\omega_3(1670)$ BRANCHING RATIOS

NODE=M045220

$\Gamma(\omega\pi\pi)/\Gamma(\rho\pi)$ Γ_2/Γ_1

NODE=M045R3

NODE=M045R3

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.71±0.27	100	DIAZ	74	DBC	6 $\pi^+ n \to p 5\pi^0$

$\Gamma(b_1(1235)\pi)/\Gamma(\rho\pi)$ Γ_3/Γ_1

NODE=M045R4

NODE=M045R4

VALUE	DOCUMENT ID		TECN	COMMENT
possibly seen	DIAZ	74	DBC	6 $\pi^+ n \to p 5\pi^0$

$\Gamma(b_1(1235)\pi)/\Gamma(\omega\pi\pi)$ Γ_3/Γ_2

NODE=M045R5
NODE=M045R5

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
>0.75	68	BAUBILLIER 79	HBC	8.2 $K^- p$ backward

ω_3(1670) REFERENCES

NODE=M045

AMELIN	96	ZPHY C70 71	D.V. Amelin *et al.*	(SERP, TBIL)	REFID=44649
BAUBILLIER	79	PL 89B 131	M. Baubillier *et al.*	(BIRM, CERN, GLAS+)	REFID=21522
BALTAY	78E	PRL 40 87	C. Baltay, C.V. Cautis, M. Kalelkar	(COLU) JP	REFID=21520
CORDEN	78B	NP B138 235	M.J. Corden *et al.*	(BIRM, RHEL, TELA+)	REFID=21269
CERRADA	77B	NP B126 241	M. Cerrada *et al.*	(AMST, CERN, NIJM+) JP	REFID=20537
WAGNER	75	PL 58B 201	F. Wagner, M. Tabak, D.M. Chew	(LBL) JP	REFID=20843
DIAZ	74	PRL 32 260	J. Diaz *et al.*	(CASE, CMU)	REFID=21248
MATTHEWS	71D	PR D3 2561	J.A.J. Matthews *et al.*	(TNTO, WISC)	REFID=21515
BARNES	69B	PRL 23 142	V.E. Barnes *et al.*	(BNL)	REFID=21512
KENYON	69	PRL 23 146	I.R. Kenyon *et al.*	(BNL, UCND, ORNL)	REFID=20800
ARMENISE	68B	PL 26B 336	N. Armenise *et al.*	(BARI, BGNA, FIRZ+)	REFID=20783

NODE=M034

$\pi_2(1670)$

$I^G(J^{PC}) = 1^-(2^{-+})$

$\pi_2(1670)$ MASS

NODE=M034M

NODE=M034M

$1670.6^{+2.9}_{-1.2}$ OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below.

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT	
$1642\ ^{+12}_{-\ 1}$	46M	[1] AGHASYAN 18B	COMP		190 $\pi^- p \to \pi^-\pi^+\pi^- p$	
1749 ±10 ±100	145k	LU 05	B852		18 $\pi^- p \to \omega\pi^-\pi^0 p$	
1676 ± 3 ± 8		[2] CHUNG 02	B852		18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$	
1685 ±10 ± 30		BARBERIS 01			450 $pp \to p_f 3\pi^0 p_s$	
1687 ± 9 ± 15		AMELIN 99	VES		37 $\pi^- A \to \omega\pi^-\pi^0 A^*$	
1669 ± 4		BARBERIS 98B			450 $pp \to p_f \rho\pi p_s$	
1670 ± 4		BARBERIS 98B			450 $pp \to p_f f_2(1270)\pi p_s$	OCCUR=2
1690 ±14		[3] BERDNIKOV 94	VES		37 $\pi^- A \to K^+K^-\pi^- A$	
1710 ±20	700	ANTIPOV 87	SIGM	−	50 π^- Cu $\to \mu^+\mu^-\pi^-$ Cu	
1676 ± 6		[3] EVANGELIS... 81	OMEG	−	12 $\pi^- p \to 3\pi p$	
1657 ±14		[3,4] DAUM 80D	SPEC	−	63–94 $\pi p \to 3\pi X$	
1662 ±10	2000	[3] BALTAY 77	HBC	+	15 $\pi^+ p \to p 3\pi$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$1658 \pm 3\ ^{+24}_{-\ 8}$	420k	[5] ALEKSEEV 10	COMP		190 $\pi^- Pb \to \pi^-\pi^-\pi^+ Pb'$	
1730 ±20		[6] AMELIN 95B	VES		36 $\pi^- A \to \pi^+\pi^-\pi^- A$	
1742 ±31 ± 49		ANTREASYAN 90	CBAL		$e^+e^- \to e^+e^-\pi^0\pi^0\pi^0$	
1624 ±21		[2] BELLINI 85	SPEC		40 $\pi^- A \to \pi^-\pi^+\pi^- A$	
1622 ±35		[7] BELLINI 85	SPEC		40 $\pi^- A \to \pi^-\pi^+\pi^- A$	OCCUR=2
1693 ±28		[8] BELLINI 85	SPEC		40 $\pi^- A \to \pi^-\pi^+\pi^- A$	OCCUR=3
1710 ±20		[9] DAUM 81B	SPEC	−	63,94 $\pi^- p$	
1660 ±10		[3] ASCOLI 73	HBC	−	5–25 $\pi^- p \to p\pi_2$	

[1] Statistical error negligible. NODE=M034M;LINKAGE=A

[2] From $f_2(1270)\pi$ decay. NODE=M034M;LINKAGE=F2

[3] From a fit to $J^P = 2^-$ S-wave $f_2(1270)\pi$ partial wave. NODE=M034M;LINKAGE=P

[4] Clear phase rotation seen in $2^- S$, $2^- P$, $2^- D$ waves. We quote central value and spread of single-resonance fits to three channels. NODE=M034M;LINKAGE=D

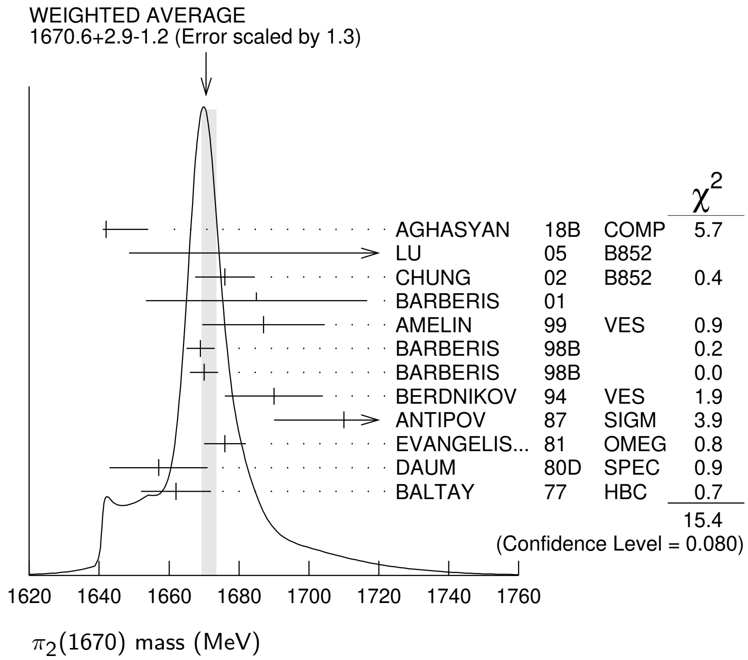
[5] Superseded by AGHASYAN 2018B. NODE=M034M;LINKAGE=B

[6] J^{PC} ambiguous. NODE=M034M;LINKAGE=AX

[7] From $\rho\pi$ decay. NODE=M034M;LINKAGE=R2

[8] From $\sigma\pi$ decay. NODE=M034M;LINKAGE=S2

[9] From a two-resonance fit to four $2^{-}0^{+}$ waves. This should not be averaged with all the single resonance fits. NODE=M034M;LINKAGE=L



$\pi_2(1670)$ WIDTH

NODE=M034W

NODE=M034W

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
258^{+8}_{-9} OUR AVERAGE		Error includes scale factor of 1.2.			
311^{+12}_{-23}	46M	[10] AGHASYAN	18B	COMP		$190\ \pi^- p \to \pi^-\pi^+\pi^- p$
$408\pm 60\pm 250$	145k	LU	05	B852		$18\ \pi^- p \to \omega\pi^-\pi^0 p$
$254\pm 3\pm 31$		[11] CHUNG	02	B852		$18.3\ \pi^- p \to \pi^+\pi^-\pi^- p$
$265\pm 30\pm 40$		BARBERIS	01			$450\ pp \to p_f 3\pi^0 p_s$
$168\pm 43\pm 53$		AMELIN	99	VES		$37\ \pi^- A \to \omega\pi^-\pi^0 A^*$
268 ± 15		BARBERIS	98B			$450\ pp \to p_f \rho\pi p_s$
256 ± 15		BARBERIS	98B			$450\ pp \to p_f f_2(1270)\pi p_s$ OCCUR=2
190 ± 50		[12] BERDNIKOV	94	VES		$37\ \pi^- A \to K^+K^-\pi^- A$
170 ± 80	700	ANTIPOV	87	SIGM	−	$50\ \pi^-$ Cu $\to \mu^+\mu^-\pi^-$ Cu
260 ± 20		[12] EVANGELIS...	81	OMEG	−	$12\ \pi^- p \to 3\pi p$
219 ± 20		[12,13] DAUM	80D	SPEC	−	63–94 $\pi p \to 3\pi X$
285 ± 60	2000	[12] BALTAY	77	HBC	+	$15\ \pi^+ p \to p 3\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$271\pm 9^{+22}_{-24}$	420k	[14] ALEKSEEV	10	COMP		$190\ \pi^- Pb \to \pi^-\pi^-\pi^+ Pb'$
310 ± 20		[15] AMELIN	95B	VES		$36\ \pi^- A \to \pi^+\pi^-\pi^- A$
$236\pm 49\pm 36$		ANTREASYAN	90	CBAL		$e^+e^- \to e^+e^-\pi^0\pi^0\pi^0$
304 ± 22		[11] BELLINI	85	SPEC		$40\ \pi^- A \to \pi^-\pi^+\pi^- A$
404 ± 108		[16] BELLINI	85	SPEC		$40\ \pi^- A \to \pi^-\pi^+\pi^- A$ OCCUR=2
330 ± 90		[17] BELLINI	85	SPEC		$40\ \pi^- A \to \pi^-\pi^+\pi^- A$ OCCUR=3
312 ± 50		[18] DAUM	81B	SPEC	−	63,94 $\pi^- p$
270 ± 60		[12] ASCOLI	73	HBC	−	5–25 $\pi^- p \to p\pi_2$

[10] Statistical error negligible. NODE=M034W;LINKAGE=A
[11] From $f_2(1270)\pi$ decay. NODE=M034W;LINKAGE=F2
[12] From a fit to $J^P = 2^-$ $f_2(1270)\pi$ partial wave. NODE=M034W;LINKAGE=P
[13] Clear phase rotation seen in $2^- S$, $2^- P$, $2^- D$ waves. We quote central value and spread of single-resonance fits to three channels. NODE=M034W;LINKAGE=D
[14] Superseded by AGHASYAN 2018B. NODE=M034W;LINKAGE=B
[15] J^{PC} ambiguous. NODE=M034W;LINKAGE=AX
[16] From $\rho\pi$ decay. NODE=M034W;LINKAGE=R2
[17] From $\sigma\pi$ decay. NODE=M034W;LINKAGE=S2
[18] From a two-resonance fit to four $2^- 0^+$ waves. This should not be averaged with all the single resonance fits. NODE=M034W;LINKAGE=L

$\pi_2(1670)$ DECAY MODES

NODE=M034215;NODE=M034

	Mode	Fraction (Γ_i/Γ)	Confidence level	
Γ_1	3π	(95.8 ± 1.4) %		DESIG=20
Γ_2	$\pi^+\pi^-\pi^0$			DESIG=22
Γ_3	$\pi^0\pi^0\pi^0$			DESIG=23
Γ_4	$f_2(1270)\pi$	(56.3 ± 3.2) %		DESIG=8
Γ_5	$\rho\pi$	$(31\ \pm4\ )$ %		DESIG=2
Γ_6	$\sigma\pi$	$(10\ \pm4\ )$ %		DESIG=13
Γ_7	$\pi(\pi\pi)_{S\text{-wave}}$	$(\ 8.7\pm3.4)$ %		DESIG=11
Γ_8	$\pi^\pm\pi^+\pi^-$	$(53\ \pm4\ )$ %		DESIG=10
Γ_9	$K\overline{K}^*(892)+$ c.c.	$(\ 4.2\pm1.4)$ %		DESIG=5
Γ_{10}	$\omega\rho$	$(\ 2.7\pm1.1)$ %		DESIG=14
Γ_{11}	$\pi^\pm\gamma$	$(\ 7.0\pm1.2)\times10^{-4}$		DESIG=27
Γ_{12}	$\gamma\gamma$	$< 2.8 \times10^{-7}$	90%	DESIG=12
Γ_{13}	$\eta\pi$	< 5 %		DESIG=3
Γ_{14}	$\pi^\pm 2\pi^+ 2\pi^-$	< 5 %		DESIG=4
Γ_{15}	$\rho(1450)\pi$	$< 3.6 \times10^{-3}$	97.7%	DESIG=15
Γ_{16}	$b_1(1235)\pi$	$< 1.9 \times10^{-3}$	97.7%	DESIG=16
Γ_{17}	$\eta 3\pi$			DESIG=24
Γ_{18}	$f_1(1285)\pi$	possibly seen		DESIG=25
Γ_{19}	$a_2(1320)\pi$	not seen		DESIG=26

CONSTRAINED FIT INFORMATION

An overall fit to 4 branching ratios uses 6 measurements and one constraint to determine 4 parameters. The overall fit has a $\chi^2 =$ 1.9 for 3 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\left\langle\delta x_i\delta x_j\right\rangle/(\delta x_i\cdot\delta x_j)$, in percent, from the fit to the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_5	−53		
x_7	−29	−59	
x_9	−8	−21	−9
	x_4	x_5	x_7

$\pi_2(1670)$ PARTIAL WIDTHS

NODE=M034217

$\Gamma(\pi^\pm\gamma)$ Γ_{11}

NODE=M034W2
NODE=M034W2

VALUE (keV)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
181±11±27	[19] ADOLPH	14	COMP	−	190 π^- Pb $\rightarrow$ $\pi^+\pi^-\pi^-$ Pb$'$

[19] Primakoff reaction. Assumes incoherent $f_2(1270)\pi$ contribution to 3π final state and uses B($\pi_2(1670) \rightarrow f_2\pi$) = 56%. NODE=M034W2;LINKAGE=AD

$\Gamma(\gamma\gamma)$ Γ_{12}

NODE=M034W1
NODE=M034W1

VALUE (keV)	CL%	DOCUMENT ID		TECN	CHG	COMMENT
<0.072	90	[20] ACCIARRI	97T	L3		$e^+e^- \to e^+e^-\pi^+\pi^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.19	90	[20] ALBRECHT	97B	ARG		$e^+e^- \to e^+e^-\pi^+\pi^-\pi^0$
1.41 ±0.23±0.28		ANTREASYAN	90	CBAL	0	$e^+e^- \to e^+e^-\pi^0\pi^0\pi^0$
0.8 ±0.3 ±0.12		[21] BEHREND	90C	CELL	0	$e^+e^- \to e^+e^-\pi^+\pi^-\pi^0$
1.3 ±0.3 ±0.2		[22] BEHREND	90C	CELL	0	$e^+e^- \to e^+e^-\pi^+\pi^-\pi^0$

OCCUR=2

[20] Decaying into $f_2(1270)\pi$ and $\rho\pi$.
[21] Constructive interference between $f_2(1270)\pi$,$\rho\pi$ and background.
[22] Incoherent Ansatz.

NODE=M034W1;LINKAGE=QQ
NODE=M034W1;LINKAGE=C
NODE=M034W1;LINKAGE=G

$\pi_2(1670)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M034230

$\Gamma(\pi^+\pi^-\pi^0) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_2\Gamma_{12}/\Gamma$

NODE=M034G01
NODE=M034G01

VALUE (keV)	CL%	DOCUMENT ID		TECN	COMMENT
<0.1	95	[23] SCHEGELSKY	06	RVUE	$\gamma\gamma \to \pi^+\pi^-\pi^0$

[23] From analysis of L3 data at 183–209 GeV.

NODE=M034G01;LINKAGE=SC

$\pi_2(1670)$ BRANCHING RATIOS

NODE=M034220

$\Gamma(3\pi)/\Gamma_{total}$ $\Gamma_1/\Gamma = (\Gamma_4+\Gamma_5+\Gamma_7)/\Gamma$

NODE=M034R20
NODE=M034R20

VALUE	DOCUMENT ID
0.958±0.014 OUR FIT	

$\Gamma(\pi^0\pi^0\pi^0)/\Gamma(\pi^+\pi^-\pi^0)$ Γ_3/Γ_2

NODE=M034R21
NODE=M034R21

VALUE	DOCUMENT ID		COMMENT
0.29±0.03±0.05	BARBERIS	01	450 $pp \to p_f 3\pi^0 p_s$

$\Gamma(\rho\pi)/0.565\Gamma(f_2(1270)\pi)$ $\Gamma_5/0.565\Gamma_4$

NODE=M034R16

(With $f_2(1270) \to \pi^+\pi^-$.)

NODE=M034R16
NODE=M034R16

VALUE	DOCUMENT ID		TECN	COMMENT
0.97±0.09 OUR AVERAGE	Error includes scale factor of 1.9.			
0.76±0.07±0.10	CHUNG	02	B852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$
1.01±0.05	BARBERIS	98B		450 $pp \to p_f \pi^+\pi^-\pi^0 p_s$

$\Gamma(\sigma\pi)/\Gamma(f_2(1270)\pi)$ Γ_6/Γ_4

NODE=M034R15
NODE=M034R15

VALUE	DOCUMENT ID		TECN	COMMENT
0.17±0.02±0.07	CHUNG	02	B852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.24±0.10	[24,25] BAKER	99	SPEC	1.94 $\overline{p}p \to 4\pi^0$

$\frac{1}{2}\Gamma(\rho\pi)/\Gamma(\pi^\pm\pi^+\pi^-)$ $\frac{1}{2}\Gamma_5/\Gamma_8 = \frac{1}{2}\Gamma_5/(0.565\Gamma_4+\frac{1}{2}\Gamma_5+0.624\Gamma_7)$

NODE=M034R2
NODE=M034R2

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.29±0.04 OUR FIT					
0.29±0.05	[26] DAUM	81B	SPEC		63,94 $\pi^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.3	BARTSCH	68	HBC	+	8 $\pi^+ p \to 3\pi p$

$0.565\Gamma(f_2(1270)\pi)/\Gamma(\pi^\pm\pi^+\pi^-)$ $0.565\Gamma_4/\Gamma_8 = 0.565\Gamma_4/(0.565\Gamma_4+\frac{1}{2}\Gamma_5+0.624\Gamma_7)$

NODE=M034R3

(With $f_2(1270) \to \pi^+\pi^-$.)

NODE=M034R3
NODE=M034R3

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.604±0.035 OUR FIT					
0.60 ±0.05 OUR AVERAGE	Error includes scale factor of 1.3.				
0.61 ±0.04	[26] DAUM	81B	SPEC		63,94 $\pi^- p$
0.76 $^{+0.24}_{-0.34}$	ARMENISE	69	DBC	+	5.1 $\pi^+ d \to d 3\pi$
0.35 ±0.20	BALTAY	68	HBC	+	7–8.5 $\pi^+ p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.59	BARTSCH	68	HBC	+	8 $\pi^+ p \to 3\pi p$

$0.624\Gamma(\pi(\pi\pi)_{S\text{-wave}})/\Gamma(\pi^\pm\pi^+\pi^-)$ $\quad 0.624\Gamma_7/\Gamma_8 = 0.624\Gamma_7/(0.565\Gamma_4+\frac{1}{2}\Gamma_5+0.624\Gamma_7)$

NODE=M034R11

(With $(\pi\pi)_{S\text{-wave}} \to \pi^+\pi^-$.)

NODE=M034R11
NODE=M034R11

VALUE	DOCUMENT ID		TECN	COMMENT
0.10±0.04 OUR FIT				
0.10±0.05	[26] DAUM	81B	SPEC	63,94 $\pi^- p$

$\Gamma(K\overline{K}^*(892)+\text{c.c.})/\Gamma(f_2(1270)\pi)$ $\quad \Gamma_9/\Gamma_4$

NODE=M034R13
NODE=M034R13

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.075±0.025 OUR FIT					
0.075±0.025	[27] ARMSTRONG	82B	OMEG	−	16 $\pi^- p \to K^+ K^- \pi^- p$

$\Gamma(\omega\rho)/\Gamma_{total}$ $\quad \Gamma_{10}/\Gamma$

NODE=M034R17
NODE=M034R17

VALUE	DOCUMENT ID		TECN	COMMENT
0.027±0.004±0.010	[28] AMELIN	99	VES	37 $\pi^- A \to \omega\pi^-\pi^0 A^*$

$\Gamma(\eta\pi)/\Gamma(\pi^\pm\pi^+\pi^-)$ $\quad \Gamma_{13}/\Gamma_8 = \Gamma_{13}/(0.565\Gamma_4+\frac{1}{2}\Gamma_5+0.624\Gamma_7)$

NODE=M034R5

(All η decays.)

NODE=M034R5
NODE=M034R5

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
<0.09	BALTAY	68	HBC	+	7–8.5 $\pi^+ p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.10	CRENNELL	70	HBC	−	6 $\pi^- p \to f_2\pi^- N$

$\Gamma(\pi^\pm 2\pi^+ 2\pi^-)/\Gamma(\pi^\pm\pi^+\pi^-)$ $\quad \Gamma_{14}/\Gamma_8 = \Gamma_{14}/(0.565\Gamma_4+\frac{1}{2}\Gamma_5+0.624\Gamma_7)$

NODE=M034R6
NODE=M034R6

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
<0.10	CRENNELL	70	HBC	−	6 $\pi^- p \to f_2\pi^- N$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.1	BALTAY	68	HBC	+	7,8.5 $\pi^+ p$

$\Gamma(\rho(1450)\pi)/\Gamma_{total}$ $\quad \Gamma_{15}/\Gamma$

NODE=M034R18
NODE=M034R18

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0036	97.7	AMELIN	99	VES	37 $\pi^- A \to \omega\pi^-\pi^0 A^*$

$\Gamma(b_1(1235)\pi)/\Gamma_{total}$ $\quad \Gamma_{16}/\Gamma$

NODE=M034R19
NODE=M034R19

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0019	97.7	AMELIN	99	VES	37 $\pi^- A \to \omega\pi^-\pi^0 A^*$

$\Gamma(f_1(1285)\pi)/\Gamma_{total}$ $\quad \Gamma_{18}/\Gamma$

NODE=M034R23
NODE=M034R23

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
possibly seen	69k	KUHN	04	B852	18 $\pi^- p \to \eta\pi^+\pi^-\pi^- p$

$\Gamma(a_2(1320)\pi)/\Gamma_{total}$ $\quad \Gamma_{19}/\Gamma$

NODE=M034R24
NODE=M034R24

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
not seen	69k	KUHN	04	B852	18 $\pi^- p \to \eta\pi^+\pi^-\pi^- p$

D-wave/*S*-wave RATIO FOR $\pi_2(1670) \to f_2(1270)\pi$

NODE=M034R14
NODE=M034R14

VALUE	DOCUMENT ID		TECN	COMMENT
−0.18±0.06	[24] BAKER	99	SPEC	1.94 $\overline{p}p \to 4\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.22±0.10	[26] DAUM	81B	SPEC	63,94 $\pi^- p$

F-wave/*P*-wave RATIO FOR $\pi_2(1670) \to \rho\pi$

NODE=M034R22
NODE=M034R22

VALUE	DOCUMENT ID		TECN	COMMENT
−0.72±0.07±0.14	CHUNG	02	B852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$

[24] Using preliminary CBAR data. NODE=M034R;LINKAGE=BK
[25] With the $\sigma\pi$ in L=2 and the $f_2(1270)\pi$ in L=0. NODE=M034R15;LINKAGE=A
[26] From a two-resonance fit to four 2^-0^+ waves. NODE=M034R;LINKAGE=L
[27] From a partial-wave analysis of $K^+K^-\pi^-$ system. NODE=M034R13;LINKAGE=M
[28] Normalized to the B($\pi_2(1670) \to f_2\pi$). NODE=M034R;LINKAGE=DM

$\pi_2(1670)$ REFERENCES

NODE=M034

AGHASYAN	18B	PR D98 092003	M. Aghasyan *et al.*	(COMPASS Collab.)	REFID=59471
ADOLPH	14	EPJ A50 79	C. Adolph *et al.*	(COMPASS Collab.)	REFID=55911
ALEKSEEV	10	PRL 104 241803	M.G. Alekseev *et al.*	(COMPASS Collab.)	REFID=53356
SCHEGELSKY	06	EPJ A27 199	V.A. Schegelsky *et al.*		REFID=51186
LU	05	PRL 94 032002	M. Lu *et al.*	(BNL E852 Collab.)	REFID=50459
KUHN	04	PL B595 109	J. Kuhn *et al.*	(BNL E852 Collab.)	REFID=49773
CHUNG	02	PR D65 072001	S.U. Chung *et al.*	(BNL E852 Collab.)	REFID=48837
BARBERIS	01	PL B507 14	D. Barberis *et al.*		REFID=48324
AMELIN	99	PAN 62 445	D.V. Amelin *et al.*	(VES Collab.)	REFID=46910
		Translated from YAF 62 487.			
BAKER	99	PL B449 114	C.A. Baker *et al.*		REFID=46888
BARBERIS	98B	PL B422 399	D. Barberis *et al.*	(WA 102 Collab.)	REFID=46345
ACCIARRI	97T	PL B413 147	M. Acciarri *et al.*	(L3 Collab.)	REFID=45761
ALBRECHT	97B	ZPHY C74 469	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=45418
AMELIN	95B	PL B356 595	D.V. Amelin *et al.*	(SERP, TBIL)	REFID=44433
BERDNIKOV	94	PL B337 219	E.B. Berdnikov *et al.*	(SERP, TBIL)	REFID=44073
ANTREASYAN	90	ZPHY C48 561	D. Antreasyan *et al.*	(Crystal Ball Collab.)	REFID=41372
BEHREND	90C	ZPHY C46 583	H.J. Behrend *et al.*	(CELLO Collab.)	REFID=41356
ANTIPOV	87	EPL 4 403	Y.M. Antipov *et al.*	(SERP, JINR, INRM+)	REFID=40004
BELLINI	85	SJNP 41 781	D. Bellini *et al.*		REFID=47490
		Translated from YAF 41 1223.			
ARMSTRONG	82B	NP B202 1	T.A. Armstrong, B. Baccari	(AACH3, BARI, BONN+)	REFID=20874
DAUM	81B	NP B182 269	C. Daum *et al.*	(AMST, CERN, CRAC, MPIM+)	REFID=20872
EVANGELIS...	81	NP B178 197	C. Evangelista *et al.*	(BARI, BONN, CERN+)	REFID=20462
Also		NP B186 594	C. Evangelista		REFID=21576
DAUM	80D	PL 89B 285	C. Daum *et al.*	(AMST, CERN, CRAC, MPIM+) JP	REFID=21573
BALTAY	77	PRL 39 591	C. Baltay, C.V. Cautis, M. Kalelkar	(COLU) JP	REFID=20847
ASCOLI	73	PR D7 669	G. Ascoli	(ILL, TNTO, GENO, HAMB, MILA+) JP	REFID=21553
CRENNELL	70	PRL 24 781	D.J. Crennell *et al.*	(BNL)	REFID=20805
ARMENISE	69	LNC 2 501	N. Armenise *et al.*	(BARI, BGNA, FIRZ)	REFID=20689
BALTAY	68	PRL 20 887	C. Baltay *et al.*	(COLU, ROCH, RUTG, YALE) I	REFID=21531
BARTSCH	68	NP B7 345	J. Bartsch *et al.*	(AACH, BERL, CERN) JP	REFID=21532

NODE=M067

$\phi(1680)$

$I^G(J^{PC}) = 0^-(1^{--})$

$\phi(1680)$ MASS

NODE=M067205

e^+e^- PRODUCTION

NODE=M067M1

NODE=M067M1

VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
1680±20 OUR ESTIMATE				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$1680^{+12}_{-13}\pm21$	1.8k	[1] ABLIKIM	20F	BES3	$\psi(2S) \to K^+K^-\eta$
1662 ± 20		[2] ACHASOV	20C	SND	1.3–2.0 $e^+e^- \to K^+K^-\pi^0$
1641^{+24}_{-18}		ACHASOV	19	SND	$e^+e^- \to \pi^+\pi^-\pi^0\eta$
$1667\pm\ 5\pm11$	3k	[3] IVANOV	19A	CMD3	1.59–2.007 $e^+e^- \to K^+K^-\eta$
1700 ± 23	2k	[4] ACHASOV	18A	SND	1.3–2.0 $e^+e^- \to K^0_S K^0_L \pi^0$
$1674\pm12\pm\ 6$	6.2k	[5] LEES	14H	BABR	$e^+e^- \to K^0_S K^0_L \gamma$
$1733\pm10\pm10$		[6] LEES	12F	BABR	10.6 $e^+e^- \to \phi\pi^+\pi^-\gamma$
$1689\pm\ 7\pm10$	4.8k	[7] SHEN	09	BELL	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\gamma$
$1709\pm20\pm43$		[8] AUBERT	08S	BABR	10.6 $e^+e^- \to$ hadrons
1623 ± 20	948	[9] AKHMETSHIN	03	CMD2	1.05–1.38 $e^+e^- \to K^0_L K^0_S$
~ 1500		[10] ACHASOV	98H	RVUE	$e^+e^- \to \pi^+\pi^-\pi^0$, $\omega\pi^+\pi^-$, K^+K^-
~ 1900		[11] ACHASOV	98H	RVUE	$e^+e^- \to K^0_S K^\pm\pi^\mp$
1700 ± 20		[12] CLEGG	94	RVUE	$e^+e^- \to K^+K^-$, $K^0_S K\pi$
1657 ± 27	367	BISELLO	91C	DM2	$e^+e^- \to K^0_S K^\pm\pi^\mp$
1655 ± 17		[13] BISELLO	88B	DM2	$e^+e^- \to K^+K^-$
1680 ± 10		[14] BUON	82	DM1	$e^+e^- \to$ hadrons
1677 ± 12		[15] MANE	82	DM1	$e^+e^- \to K^0_S K\pi$

→ UNCHECKED ←

OCCUR=4

[1] Seen in $\psi(2S)$ decay with branching ratio $\psi(2S) \to X\eta \to K^+K^-\eta = (12.0 \pm 1.3^{+6.5}_{-6.9}) \times 10^{-6}$. NODE=M067M1;LINKAGE=E

[2] From a fit using a vector meson dominance model with contribution from $\rho(770)$, $\omega(782)$, $\phi(1020)$, $\omega(1420)$, $\rho(1450)$. NODE=M067M1;LINKAGE=F

[3] From a fit with coherent interference of the $\phi(1680)$ with a non-resonant contribution. NODE=M067M1;LINKAGE=D

[4] Assuming the $K\overline{K}^*(892)+$ c.c. dynamics. Systematic uncertainties not estimated. NODE=M067M1;LINKAGE=C

[5] Using a vector meson dominance model with contribution from $\phi(1020)$, $\phi(1680)$, and higher mass excitations of $\rho(770)$ and $\omega(782)$. NODE=M067M1;LINKAGE=B

[6] Using events with $\pi\pi$ invariant mass less than 0.85 GeV. NODE=M067M1;LINKAGE=A

[7] From a fit with two incoherent Breit-Wigners. NODE=M067M1;LINKAGE=SH

[8] From the simultaneous fit to the $K\overline{K}^*(892)+$ c.c. and $\phi\eta$ data from AUBERT 08S using the results of AUBERT 07AK. NODE=M067M1;LINKAGE=AU

[9] From the combined fit of AKHMETSHIN 03 and MANE 81 also including ρ, ω, and ϕ. Neither isospin nor flavor structure known. NODE=M067M;LINKAGE=HK
[10] Using data from IVANOV 81, BARKOV 87, BISELLO 88B, DOLINSKY 91, and ANTONELLI 92. NODE=M067M1;LINKAGE=L1
[11] Using the data from BISELLO 91C. NODE=M067M1;LINKAGE=L4
[12] Using BISELLO 88B and MANE 82 data. NODE=M067M;LINKAGE=A
[13] From global fit including ρ, ω, ϕ and $\rho(1700)$ assume mass 1570 MeV and width 510 MeV for ρ radial excitation. NODE=M067M;LINKAGE=E
[14] From global fit of ρ, ω, ϕ and their radial excitations to channels $\omega\pi^+\pi^-$, K^+K^-, $K^0_S K^0_L$, $K^0_S K^\pm\pi^\mp$. Assume mass 1570 MeV and width 510 MeV for ρ radial excitations, mass 1570 and width 500 MeV for ω radial excitation. NODE=M067M;LINKAGE=C
[15] Fit to one channel only, neglecting interference with ω, $\rho(1700)$. NODE=M067M;LINKAGE=D

$p\overline{p}$ ANNIHILATION

NODE=M067M3
NODE=M067M3

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1700 ± 8	[1] AMSLER	06	CBAR	0.9 $\overline{p}p \to K^+K^-\pi^0$

[1] Could also be $\rho(1700)$. NODE=M067M3;LINKAGE=AM

ϕ(1680) WIDTH

NODE=M067210

e^+e^- PRODUCTION

NODE=M067W1
NODE=M067W1

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
150±50 OUR ESTIMATE This is only an educated guess; the error given is larger than the error on the average of the published values.					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$185^{+30}_{-26}{}^{+25}_{-47}$	1.8k	[1] ABLIKIM	20F	BES3	$\psi(2S) \to K^+K^-\eta$
159 ± 32		[2] ACHASOV	20C	SND	1.3–2.0 $e^+e^- \to K^+K^-\pi^0$
103^{+26}_{-24}		ACHASOV	19	SND	$e^+e^- \to \pi^+\pi^-\pi^0\eta$
$176\pm23\pm38$	3k	[3] IVANOV	19A	CMD3	1.59–2.007 $e^+e^- \to K^+K^-\eta$
300 ± 50	2k	[4] ACHASOV	18A	SND	1.3–2.0 $e^+e^- \to K^0_S K^0_L\pi^0$
$165\pm38\pm70$	6.2k	[5] LEES	14H	BABR	$e^+e^- \to K^0_S K^0_L\gamma$
$300\pm15\pm37$		[6] LEES	12F	BABR	10.6 $e^+e^- \to \phi\pi^+\pi^-\gamma$
$211\pm14\pm19$	4.8k	[7] SHEN	09	BELL	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\gamma$
$322\pm77\pm160$		[8] AUBERT	08S	BABR	10.6 $e^+e^- \to$ hadrons
139 ± 60	948	[9] AKHMETSHIN	03	CMD2	1.05–1.38 $e^+e^- \to K^0_L K^0_S$
300 ± 60		[10] CLEGG	94	RVUE	$e^+e^- \to K^+K^-$, $K^0_S K\pi$
146 ± 55	367	BISELLO	91C	DM2	$e^+e^- \to K^0_S K^\pm\pi^\mp$
207 ± 45		[11] BISELLO	88B	DM2	$e^+e^- \to K^+K^-$
185 ± 22		[12] BUON	82	DM1	$e^+e^- \to$ hadrons
102 ± 36		[13] MANE	82	DM1	$e^+e^- \to K^0_S K\pi$

→ UNCHECKED ←

[1] Seen in $\psi(2S)$ decay with branching ratio $\psi(2S) \to X\eta \to K^+K^-\eta = (12.0 \pm 1.3^{+6.5}_{-6.9}) \times 10^{-6}$. NODE=M067W1;LINKAGE=E
[2] From a fit using a vector meson dominance model with contribution from $\rho(770)$, $\omega(782)$, $\phi(1020)$, $\omega(1420)$, $\rho(1450)$. NODE=M067W1;LINKAGE=F
[3] From a fit with coherent interference of the $\phi(1680)$ with a non-resonant contribution. NODE=M067W1;LINKAGE=D
[4] Assuming the $K\overline{K}^*(892)+$ c.c. dynamics. Systematic uncertainties not estimated. NODE=M067W1;LINKAGE=C
[5] Using a vector meson dominance model with contribution from $\phi(1020)$, $\phi(1680)$, and higher mass excitations of $\rho(770)$ and $\omega(782)$. NODE=M067W1;LINKAGE=B
[6] Using events with $\pi\pi$ invariant mass less than 0.85 GeV. NODE=M067W1;LINKAGE=A
[7] From a fit with two incoherent Breit-Wigners. NODE=M067W1;LINKAGE=SH
[8] From the simultaneous fit to the $K\overline{K}^*(892)+$ c.c. and $\phi\eta$ data from AUBERT 08S using the results of AUBERT 07AK. NODE=M067W1;LINKAGE=AU
[9] From the combined fit of AKHMETSHIN 03 and MANE 81 also including ρ, ω, and ϕ. Neither isospin nor flavor structure known. NODE=M067W;LINKAGE=HK
[10] Using BISELLO 88B and MANE 82 data. NODE=M067W;LINKAGE=A
[11] From global fit including ρ, ω, ϕ and $\rho(1700)$ NODE=M067W;LINKAGE=E
[12] From global fit of ρ, ω, ϕ and their radial excitations to channels $\omega\pi^+\pi^-$, K^+K^-, $K^0_S K^0_L$, $K^0_S K^\pm\pi^\mp$. Assume mass 1570 MeV and width 510 MeV for ρ radial excitations, mass 1570 and width 500 MeV for ω radial excitation. NODE=M067W;LINKAGE=C
[13] Fit to one channel only, neglecting interference with ω, $\rho(1700)$. NODE=M067W;LINKAGE=D

$p\overline{p}$ ANNIHILATION

NODE=M067W3
NODE=M067W3

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
143±24	[1] AMSLER	06	CBAR	0.9 $\overline{p}p \rightarrow K^+K^-\pi^0$

[1] Could also be $\rho(1700)$.

NODE=M067W3;LINKAGE=AM

ϕ(1680) DECAY MODES

NODE=M067215;NODE=M067

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$K\overline{K}^*(892)$+ c.c.	seen	DESIG=4;OUR EST;→ UNCHECKED ←
Γ_2	$K^0_S K\pi$	seen	DESIG=5;OUR EST;→ UNCHECKED ←
Γ_3	$K\overline{K}$	seen	DESIG=3;OUR EST;→ UNCHECKED ←
Γ_4	$K^0_L K^0_S$		DESIG=9
Γ_5	e^+e^-	seen	DESIG=6;OUR EST;→ UNCHECKED ←
Γ_6	$\omega\pi\pi$	not seen	DESIG=1;OUR EST;→ UNCHECKED ←
Γ_7	$\phi\pi\pi$		DESIG=11
Γ_8	$K^+K^-\pi^+\pi^-$	seen	DESIG=12;OUR EVAL;→ UNCHECKED ←
Γ_9	$\eta\phi$	seen	DESIG=10
Γ_{10}	$K^+K^-\eta$		DESIG=14
Γ_{11}	$\eta\gamma$	seen	DESIG=13
Γ_{12}	$K^+K^-\pi^0$		DESIG=2

ϕ(1680) $\Gamma(i)\Gamma(e^+e^-)/\Gamma(\text{total})$

NODE=M067220

This combination of a partial width with the partial width into e^+e^- and with the total width is obtained from the integrated cross section into channel (I) in e^+e^- annihilation. We list only data that have not been used to determine the partial width Γ(I) or the branching ratio Γ(I)/total.

NODE=M067220

$\Gamma(K^0_L K^0_S) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_4\Gamma_5/\Gamma$

NODE=M067A00
NODE=M067A00

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
14.3±2.4±6.2	6.2k	[1] LEES	14H	BABR	$e^+e^- \rightarrow K^0_S K^0_L \gamma$

[1] Using a vector meson dominance model with contribution from $\phi(1020)$, $\phi(1680)$, and higher mass excitations of $\rho(770)$ and $\omega(782)$.

NODE=M067A00;LINKAGE=A

$\Gamma(\phi\pi\pi) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_7\Gamma_5/\Gamma$

NODE=M067G02
NODE=M067G02

VALUE (10^{-2} keV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
4.2±0.2±0.3	LEES	12F	BABR	10.6 $e^+e^- \rightarrow \phi\pi^+\pi^-\gamma$

$\Gamma(\eta\phi) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_9\Gamma_5/\Gamma$

NODE=M067R00
NODE=M067R00

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
94±13±15	3k	[1] IVANOV	19A	CMD3	1.59–2.007 $e^+e^- \rightarrow K^+K^-\eta$

[1] From a fit with coherent interference of the $\phi(1680)$ with a non-resonant contribution.

NODE=M067R00;LINKAGE=A

ϕ(1680) $\Gamma(i)\Gamma(e^+e^-)/\Gamma^2(\text{total})$

NODE=M067223

This combination of a branching ratio into channel (i) and branching ratio into e^+e^- is directly measured and obtained from the cross section at the peak. We list only data that have not been used to determine the branching ratio into (i) or e^+e^-.

NODE=M067223

$\Gamma(K^0_L K^0_S)/\Gamma_{\text{total}} \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_4/\Gamma \times \Gamma_5/\Gamma$

NODE=M067G5
NODE=M067G5

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.131±0.059	948	[1] AKHMETSHIN	03	CMD2	1.05–1.38 $e^+e^- \rightarrow K^0_L K^0_S$

[1] From the combined fit of AKHMETSHIN 03 and MANE 81 also including ρ, ω, and ϕ. Neither isospin nor flavor structure known. Recalculated by us.

NODE=M067G;LINKAGE=GK

$\Gamma(K\overline{K}^*(892)+\text{c.c.})/\Gamma_{\text{total}} \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_1/\Gamma \times \Gamma_5/\Gamma$

NODE=M067G6

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1.15 \pm 0.16 \pm 0.01$		[1] AUBERT	08S	BABR	10.6 $e^+e^- \rightarrow K\overline{K}^*(892)\gamma$ + c.c.
3.29 ± 1.57	367	[2] BISELLO	91C	DM2	1.35–2.40 $e^+e^- \rightarrow K^0_S K^\pm \pi^\mp$

[1] From the simultaneous fit to the $K\overline{K}^*(892)+$ c.c. and $\phi\eta$ data from AUBERT 08S using the results of AUBERT 07AK.
[2] Recalculated by us with the published value of B($K\overline{K}^*(892)$ + c.c.) $\times$ $\Gamma(e^+e^-)$.

NODE=M067G6;LINKAGE=AU
NODE=M067G;LINKAGE=GL

$\Gamma(\phi\pi\pi)/\Gamma_{\text{total}} \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_7/\Gamma \times \Gamma_5/\Gamma$

NODE=M067G01

VALUE (units 10^{-7})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1.86 \pm 0.14 \pm 0.21$	4.8k	[1] SHEN	09	BELL	10.6 $e^+e^- \rightarrow K^+K^-\pi^+\pi^-\gamma$

[1] Multiplied by 3/2 to take into account the $\phi\pi^0\pi^0$ mode. Using B($\phi \rightarrow K^+K^-$) = $(49.2 \pm 0.6)\%$.

NODE=M067G01;LINKAGE=SH

$\Gamma(\eta\phi)/\Gamma_{\text{total}} \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_9/\Gamma \times \Gamma_5/\Gamma$

NODE=M067G7

VALUE (units 10^{-7})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$5.64^{+1.74}_{-1.80}$		ACHASOV	19	SND	$e^+e^- \rightarrow \pi^+\pi^-\pi^0\eta$
$5.3 \pm 0.6 \pm 0.9$	3k	[1] IVANOV	19A	CMD3	1.59–2.007 $e^+e^- \rightarrow K^+K^-\eta$
$4.3 \pm 1.0 \pm 0.9$		[2] AUBERT	08S	BABR	10.6 $e^+e^- \rightarrow \phi\eta\gamma$

[1] From a fit with coherent interference of the $\phi(1680)$ with a non-resonant contribution.
[2] From the simultaneous fit to the $K\overline{K}^*(892)+$ c.c. and $\phi\eta$ data from AUBERT 08S using the results of AUBERT 07AK.

NODE=M067G7;LINKAGE=A
NODE=M067G7;LINKAGE=AU

$\phi(1680)$ BRANCHING RATIOS

NODE=M067225

$\Gamma(K\overline{K}^*(892)+\text{c.c.})/\Gamma(K^0_S K\pi)$ — Γ_1/Γ_2

NODE=M067R3

VALUE	DOCUMENT ID		TECN	COMMENT
dominant	MANE	82	DM1	$e^+e^- \rightarrow K^0_S K^\pm\pi^\mp$

$\Gamma(K\overline{K})/\Gamma(K\overline{K}^*(892)+\text{c.c.})$ — Γ_3/Γ_1

NODE=M067R2

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.07 ± 0.01	BUON	82	DM1	e^+e^-

$\Gamma(\omega\pi\pi)/\Gamma(K\overline{K}^*(892)+\text{c.c.})$ — Γ_6/Γ_1

NODE=M067R1

VALUE	DOCUMENT ID		TECN	COMMENT
<0.10	BUON	82	DM1	e^+e^-

$\Gamma(\eta\phi)/\Gamma_{\text{total}}$ — Γ_9/Γ

NODE=M067R01

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	35	[1] ACHASOV	14	SND	1.15–2.00 $e^+e^- \rightarrow \eta\gamma$

[1] From a phenomenological model based on vector meson dominance with $\rho(1450)$ and $\phi(1680)$ masses and widths from the PDG 12.

NODE=M067R01;LINKAGE=A

$\Gamma(\eta\phi)/\Gamma(K\overline{K}^*(892)+\text{c.c.})$ — Γ_9/Γ_1

NODE=M067R5

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
≈ 0.37	[1] AUBERT	08S	BABR	10.6 $e^+e^- \rightarrow$ hadrons

[1] From the fit including data from AUBERT 07AK.

NODE=M067R5;LINKAGE=AU

$\Gamma(\eta\gamma)/\Gamma_{\text{total}}$ — Γ_{11}/Γ

NODE=M067R02

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	35	[1] ACHASOV	14	SND	1.15–2.00 $e^+e^- \rightarrow \eta\gamma$

[1] From a phenomenological model based on vector meson dominance with $\rho(1450)$ and $\phi(1680)$ masses and widths from the PDG 12.

NODE=M067R02;LINKAGE=A

$\phi(1680)$ REFERENCES

NODE=M067

ABLIKIM	20F	PR D101 032008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60256
ACHASOV	20C	EPJ C80 1139	M.N. Achasov *et al.*	(SND Collab.)	REFID=60935
ACHASOV	19	PR D99 112004	M.N. Achasov *et al.*	(SND Collab.)	REFID=59887
IVANOV	19A	PL B798 134946	V.L. Ivanov *et al.*	(CMD-3 Collab.)	REFID=60133
ACHASOV	18A	PR D97 032011	M.N. Achasov *et al.*	(SND Collab.)	REFID=58883
ACHASOV	14	PR D90 032002	M.N. Achasov *et al.*	(SND Collab.)	REFID=55912
LEES	14H	PR D89 092002	J.P. Lees *et al.*	(BABAR Collab.)	REFID=55940
LEES	12F	PR D86 012008	J.P. Lees *et al.*	(BABAR Collab.)	REFID=54298
PDG	12	PR D86 010001	J. Beringer *et al.*	(PDG Collab.)	REFID=54066
SHEN	09	PR D80 031101	C.P. Shen *et al.*	(BELLE Collab.)	REFID=53000
AUBERT	08S	PR D77 092002	B. Aubert *et al.*	(BABAR Collab.)	REFID=52242
AUBERT	07AK	PR D76 012008	B. Aubert *et al.*	(BABAR Collab.)	REFID=51908
AMSLER	06	PL B639 165	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=51136
AKHMETSHIN	03	PL B551 27	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=49172
Also		PAN 65 1222	E.V. Anashkin, V.M. Aulchenko, R.R. Akhmetshin		REFID=48827
		Translated from YAF 65 1255.			
ACHASOV	98H	PR D57 4334	N.N. Achasov, A.A. Kozhevnikov		REFID=46323
CLEGG	94	ZPHY C62 455	A.B. Clegg, A. Donnachie	(LANC, MCHS)	REFID=44081
ANTONELLI	92	ZPHY C56 15	A. Antonelli *et al.*	(DM2 Collab.)	REFID=43168
BISELLO	91C	ZPHY C52 227	D. Bisello *et al.*	(DM2 Collab.)	REFID=41867
DOLINSKY	91	PRPL 202 99	S.I. Dolinsky *et al.*	(NOVO)	REFID=41369
BISELLO	88B	ZPHY C39 13	D. Bisello *et al.*	(PADO, CLER, FRAS+)	REFID=40581
BARKOV	87	JETPL 46 164	L.M. Barkov *et al.*	(NOVO)	REFID=40280
		Translated from ZETFP 46 132.			
BUON	82	PL 118B 221	J. Buon *et al.*	(LALO, MONP)	REFID=21494
MANE	82	PL 112B 178	F. Mane *et al.*	(LALO)	REFID=21590
IVANOV	81	PL 107B 297	P.M. Ivanov *et al.*	(NOVO)	REFID=20553
MANE	81	PL 99B 261	F. Mane *et al.*	(ORSAY)	REFID=21588

NODE=M015

$\rho_3(1690)$

$I^G(J^{PC}) = 1^+(3^{--})$

$\rho_3(1690)$ MASS

NODE=M015205

NODE=M015M

VALUE (MeV)	*DOCUMENT ID*
1688.8±2.1 OUR AVERAGE	Includes data from the 5 datablocks that follow this one.

2π MODE

NODE=M015M1
NODE=M015M1

The data in this block is included in the average printed for a previous datablock.

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
1686± 4 OUR AVERAGE						
1677±14		EVANGELIS...	81	OMEG	−	12 $\pi^- p \to 2\pi p$
1679±11	476	BALTAY	78B	HBC	0	15 $\pi^+ p \to \pi^+\pi^- n$
1678±12	175	[1] ANTIPOV	77	CIBS	0	25 $\pi^- p \to p 3\pi$
1690± 7	600	[1] ENGLER	74	DBC	0	6 $\pi^+ n \to \pi^+\pi^- p$
1693± 8		[2] GRAYER	74	ASPK	0	17 $\pi^- p \to \pi^+\pi^- n$
1678±12		MATTHEWS	71C	DBC	0	7 $\pi^+ N$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1734±10		[3] CORDEN	79	OMEG		12–15 $\pi^- p \to n 2\pi$
1692±12		[2,4] ESTABROOKS	75	RVUE		17 $\pi^- p \to \pi^+\pi^- n$
1737±23		ARMENISE	70	DBC	0	9 $\pi^+ N$
1650±35	122	BARTSCH	70B	HBC	+	8 $\pi^+ p \to N 2\pi$
1687±21		STUNTEBECK	70	HDBC	0	8 $\pi^- p$, 5.4 $\pi^+ d$
1683±13		ARMENISE	68	DBC	0	5.1 $\pi^+ d$
1670±30		GOLDBERG	65	HBC	0	6 $\pi^+ d$, 8 $\pi^- p$

[1] Mass errors enlarged by us to $\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M015M1;LINKAGE=E

[2] Uses same data as HYAMS 75. NODE=M015M1;LINKAGE=G

[3] From a phase shift solution containing a $f_2'(1525)$ width two times larger than the $K\overline{K}$ result. NODE=M015M1;LINKAGE=M

[4] From phase-shift analysis. Error takes account of spread of different phase-shift solutions. NODE=M015M1;LINKAGE=I

$K\overline{K}$ AND $K\overline{K}\pi$ MODES

NODE=M015M2
NODE=M015M2

The data in this block is included in the average printed for a previous datablock.

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
1696± 4 OUR AVERAGE						
1699± 5		ALPER	80	CNTR	0	62 $\pi^- p \to K^+ K^- n$
1698±12	6k	[5,6] MARTIN	78D	SPEC		10 $\pi p \to K^0_S K^- p$
1692± 6		BLUM	75	ASPK	0	18.4 $\pi^- p \to n K^+ K^-$
1690±16		ADERHOLZ	69	HBC	+	8 $\pi^+ p \to K\overline{K}\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1694± 8		[7] COSTA	80	OMEG		10 $\pi^- p \to K^+ K^- n$

[5] From a fit to $J^P = 3^-$ partial wave. NODE=M015M2;LINKAGE=P

[6] Systematic error on mass scale subtracted. NODE=M015M2;LINKAGE=S

[7] They cannot distinguish between $\rho_3(1690)$ and $\omega_3(1670)$. NODE=M015M2;LINKAGE=L

$(4\pi)^{\pm}$ MODE

NODE=M015M3

The data in this block is included in the average printed for a previous datablock.

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT	
1686± 5 OUR AVERAGE		Error includes scale factor of 1.1.					
1694± 6		[8] EVANGELIS...	81	OMEG	−	12 $\pi^- p \rightarrow p 4\pi$	
1665±15	177	BALTAY	78B	HBC	+	15 $\pi^+ p \rightarrow p 4\pi$	
1670±10		THOMPSON	74	HBC	+	13 $\pi^+ p$	
1687±20		CASON	73	HBC	−	8,18.5 $\pi^- p$	
1685±14		[9] CASON	73	HBC	−	8,18.5 $\pi^- p$	OCCUR=2
1680±40	144	BARTSCH	70B	HBC	+	8 $\pi^+ p \rightarrow N 4\pi$	
1689±20	102	[9] BARTSCH	70B	HBC	+	8 $\pi^+ p \rightarrow N 2\rho$	OCCUR=3
1705±21		CASO	70	HBC	−	11.2 $\pi^- p \rightarrow n \rho 2\pi$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
1718±10		[10] EVANGELIS...	81	OMEG	−	12 $\pi^- p \rightarrow p 4\pi$	OCCUR=2
1673± 9		[11] EVANGELIS...	81	OMEG	−	12 $\pi^- p \rightarrow p 4\pi$	OCCUR=3
1733± 9	66	[9] KLIGER	74	HBC	−	4.5 $\pi^- p \rightarrow p 4\pi$	
1630±15		HOLMES	72	HBC	+	10–12 $K^+ p$	
1720±15		BALTAY	68	HBC	+	7, 8.5 $\pi^+ p$	

[8] From $\rho^- \rho^0$ mode, not independent of the other two EVANGELISTA 81 entries. NODE=M015M3;LINKAGE=A

[9] From $\rho^{\pm} \rho^0$ mode. NODE=M015M3;LINKAGE=F

[10] From $a_2(1320)^- \pi^0$ mode, not independent of the other two EVANGELISTA 81 entries. NODE=M015M3;LINKAGE=B

[11] From $a_2(1320)^0 \pi^-$ mode, not independent of the other two EVANGELISTA 81 entries. NODE=M015M3;LINKAGE=C

$\omega\pi$ MODE

NODE=M015M5

The data in this block is included in the average printed for a previous datablock.

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
1681± 7 OUR AVERAGE					
1670±25	[12] ALDE	95	GAM2		38 $\pi^- p \rightarrow \omega \pi^0 n$
1690±15	EVANGELIS...	81	OMEG	−	12 $\pi^- p \rightarrow \omega \pi p$
1666±14	GESSAROLI	77	HBC		11 $\pi^- p \rightarrow \omega \pi p$
1686± 9	THOMPSON	74	HBC	+	13 $\pi^+ p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1654±24	BARNHAM	70	HBC	+	10 $K^+ p \rightarrow \omega \pi X$

[12] Supersedes ALDE 92C. NODE=M015M5;LINKAGE=A

$\eta\pi^+\pi^-$ MODE

NODE=M015M6

(For difficulties with MMS experiments, see the $a_2(1320)$ mini-review in the 1973 edition.)

The data in this block is included in the average printed for a previous datablock.

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT	
1682±12 OUR AVERAGE						
1685±10±20	AMELIN	00	VES		37 $\pi^- p \rightarrow \eta \pi^+ \pi^- n$	
1680±15	FUKUI	88	SPEC	0	8.95 $\pi^- p \rightarrow \eta \pi^+ \pi^- n$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1700±47	[13] ANDERSON	69	MMS	−	16 $\pi^- p$ backward	
1632±15	[13,14] FOCACCI	66	MMS	−	7–12 $\pi^- p \rightarrow p$MM	
1700±15	[13,14] FOCACCI	66	MMS	−	7–12 $\pi^- p \rightarrow p$MM	OCCUR=2
1748±15	[13,14] FOCACCI	66	MMS	−	7–12 $\pi^- p \rightarrow p$MM	OCCUR=3

[13] Seen in 2.5–3 GeV/c $\overline{p}p$. $2\pi^+ 2\pi^-$, with 0, 1, 2 $\pi^+\pi^-$ pairs in ρ band not seen by OREN 74 (2.3 GeV/c $\overline{p}p$) with more statistics. (Jan. 1976) NODE=M015M6;LINKAGE=R

[14] Not seen by BOWEN 72. NODE=M015M6;LINKAGE=N

$\rho_3(1690)$ WIDTH

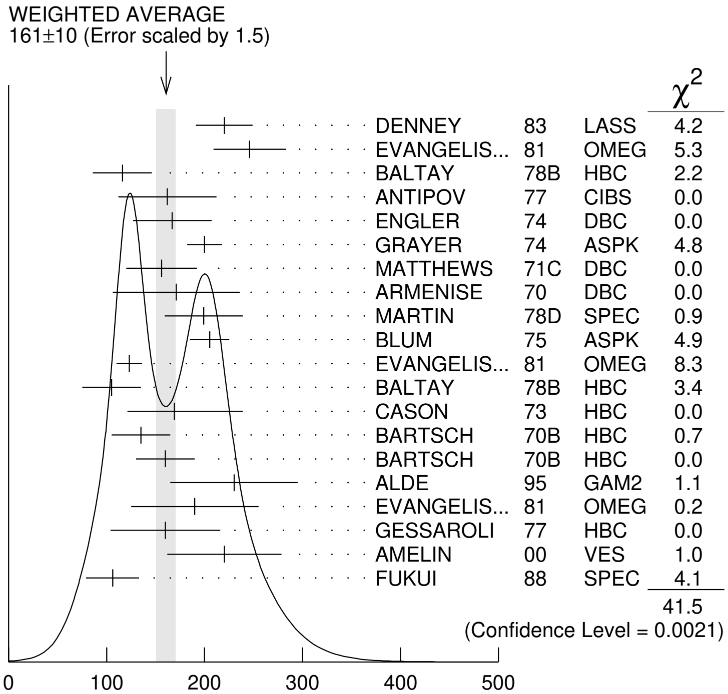
NODE=M015210

2π, $K\overline{K}$, AND $K\overline{K}\pi$ MODES

NODE=M015W

VALUE (MeV)	DOCUMENT ID

161±10 OUR AVERAGE Includes data from the 5 datablocks that follow this one. Error includes scale factor of 1.5. See the ideogram below.



$\rho_3(1690)$ width, 2π, $K\overline{K}$, and $K\overline{K}\pi$ modes (MeV)

2π MODE

NODE=M015W1

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT

NODE=M015W1

The data in this block is included in the average printed for a previous datablock.

186±14 OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below.

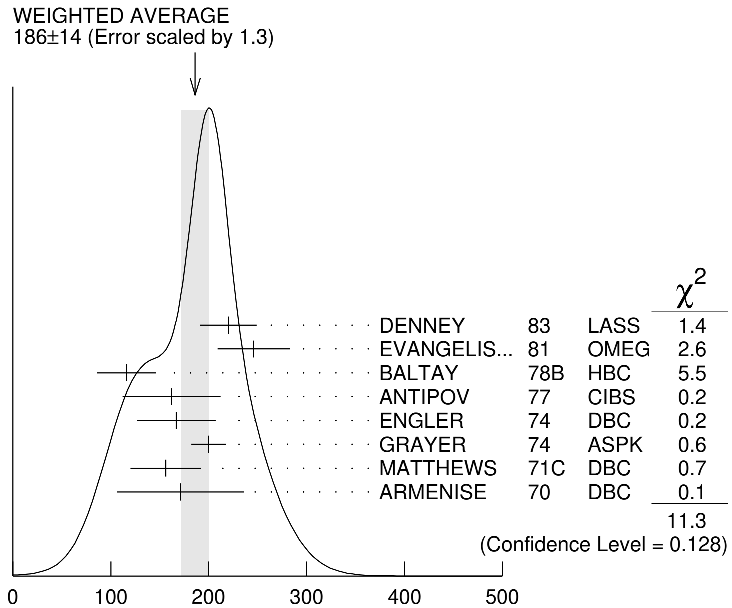
VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
220±29		DENNEY	83	LASS		10 $\pi^+ N$
246±37		EVANGELIS...	81	OMEG	−	12 $\pi^- p \to 2\pi p$
116±30	476	BALTAY	78B	HBC	0	15 $\pi^+ p \to \pi^+\pi^- n$
162±50	175	[15] ANTIPOV	77	CIBS	0	25 $\pi^- p \to p 3\pi$
167±40	600	ENGLER	74	DBC	0	6 $\pi^+ n \to \pi^+\pi^- p$
200±18		[16] GRAYER	74	ASPK	0	17 $\pi^- p \to \pi^+\pi^- n$
156±36		MATTHEWS	71C	DBC	0	7 $\pi^+ N$
171±65		ARMENISE	70	DBC	0	9 $\pi^+ d$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
322±35		[17] CORDEN	79	OMEG		12–15 $\pi^- p \to n 2\pi$
240±30		[16,18] ESTABROOKS	75	RVUE		17 $\pi^- p \to \pi^+\pi^- n$
180±30	122	BARTSCH	70B	HBC	+	8 $\pi^+ p \to N 2\pi$
267^{+72}_{-46}		STUNTEBECK	70	HDBC	0	8 $\pi^- p$, 5.4 $\pi^+ d$
188±49		ARMENISE	68	DBC	0	5.1 $\pi^+ d$
180±40		GOLDBERG	65	HBC	0	6 $\pi^+ d$, 8 $\pi^- p$

[15] Width errors enlarged by us to $4\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M015W1;LINKAGE=T

[16] Uses same data as HYAMS 75 and BECKER 79. NODE=M015W1;LINKAGE=G

[17] From a phase shift solution containing a $f'_2(1525)$ width two times larger than the $K\overline{K}$ result. NODE=M015W1;LINKAGE=M

[18] From phase-shift analysis. Error takes account of spread of different phase-shift solutions. NODE=M015W1;LINKAGE=I



$\rho_3(1690)$ width, 2π mode (MeV)

$K\overline{K}$ AND $K\overline{K}\pi$ MODES

NODE=M015W2
NODE=M015W2

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*

The data in this block is included in the average printed for a previous datablock.

204±18 OUR AVERAGE						
199±40	6000	[19] MARTIN	78D	SPEC		10 $\pi p \rightarrow K^0_S K^- p$
205±20		BLUM	75	ASPK	0	18.4 $\pi^- p \rightarrow n K^+ K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
219± 4		ALPER	80	CNTR	0	62 $\pi^- p \rightarrow K^+ K^- n$
186±11		[20] COSTA	80	OMEG		10 $\pi^- p \rightarrow K^+ K^- n$
112±60		ADERHOLZ	69	HBC	+	8 $\pi^+ p \rightarrow K\overline{K}\pi$

[19] From a fit to $J^P = 3^-$ partial wave. NODE=M015W2;LINKAGE=P
[20] They cannot distinguish between $\rho_3(1690)$ and $\omega_3(1670)$. NODE=M015W2;LINKAGE=L

$(4\pi)^\pm$ MODE

NODE=M015W3
NODE=M015W3

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*

The data in this block is included in the average printed for a previous datablock.

129±10 OUR AVERAGE							
123±13		[21] EVANGELIS...	81	OMEG	−	12 $\pi^- p \rightarrow p 4\pi$	
105±30	177	BALTAY	78B	HBC	+	15 $\pi^+ p \rightarrow p 4\pi$	
169^{+70}_{-48}		CASON	73	HBC	−	8,18.5 $\pi^- p$	
135±30	144	BARTSCH	70B	HBC	+	8 $\pi^+ p \rightarrow N 4\pi$	
160±30	102	BARTSCH	70B	HBC	+	8 $\pi^+ p \rightarrow N 2\rho$	OCCUR=3
• • • We do not use the following data for averages, fits, limits, etc. • • •							
230±28		[22] EVANGELIS...	81	OMEG	−	12 $\pi^- p \rightarrow p 4\pi$	OCCUR=2
184±33		[23] EVANGELIS...	81	OMEG	−	12 $\pi^- p \rightarrow p 4\pi$	OCCUR=3
150	66	[24] KLIGER	74	HBC	−	4.5 $\pi^- p \rightarrow p 4\pi$	
106±25		THOMPSON	74	HBC	+	13 $\pi^+ p$	
125^{+83}_{-35}		[24] CASON	73	HBC	−	8,18.5 $\pi^- p$	OCCUR=2
130±30		HOLMES	72	HBC	+	10–12 $K^+ p$	
180±30	90	[24] BARTSCH	70B	HBC	+	8 $\pi^+ p \rightarrow N a_2 \pi$	OCCUR=2
100±35		BALTAY	68	HBC	+	7, 8.5 $\pi^+ p$	

[21] From $\rho^- \rho^0$ mode, not independent of the other two EVANGELISTA 81 entries. NODE=M015W3;LINKAGE=A
[22] From $a_2(1320)^- \pi^0$ mode, not independent of the other two EVANGELISTA 81 entries. NODE=M015W3;LINKAGE=B
[23] From $a_2(1320)^0 \pi^-$ mode, not independent of the other two EVANGELISTA 81 entries. NODE=M015W3;LINKAGE=C
[24] From $\rho^\pm \rho^0$ mode. NODE=M015W3;LINKAGE=F

$\omega\pi$ MODE

NODE=M015W5
NODE=M015W5

VALUE (MeV)		DOCUMENT ID		TECN	CHG	COMMENT
The data in this block is included in the average printed for a previous datablock.						
190±40 OUR AVERAGE						
230±65	[25]	ALDE	95	GAM2		38 $\pi^- p \to \omega\pi^0 n$
190±65		EVANGELIS...	81	OMEG	−	12 $\pi^- p \to \omega\pi p$
160±56		GESSAROLI	77	HBC		11 $\pi^- p \to \omega\pi p$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
89±25		THOMPSON	74	HBC	+	13 $\pi^+ p$
130^{+73}_{-43}		BARNHAM	70	HBC	+	10 $K^+ p \to \omega\pi X$

[25] Supersedes ALDE 92C.

NODE=M015W5;LINKAGE=A

$\eta\pi^+\pi^-$ MODE

NODE=M015W6

(For difficulties with MMS experiments, see the $a_2(1320)$ mini-review in the 1973 edition.)

NODE=M015W6

NODE=M015W6

VALUE (MeV)		DOCUMENT ID		TECN	CHG	COMMENT
The data in this block is included in the average printed for a previous datablock.						
126±40 OUR AVERAGE Error includes scale factor of 1.8.						
220±30±50		AMELIN	00	VES		37 $\pi^- p \to \eta\pi^+\pi^- n$
106±27		FUKUI	88	SPEC	0	8.95 $\pi^- p \to \eta\pi^+\pi^- n$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
195	[26]	ANDERSON	69	MMS	−	16 $\pi^- p$ backward
< 21	[26,27]	FOCACCI	66	MMS	−	7–12 $\pi^- p \to p$MM
< 30	[26,27]	FOCACCI	66	MMS	−	7–12 $\pi^- p \to p$MM
< 38	[26,27]	FOCACCI	66	MMS	−	7–12 $\pi^- p \to p$MM

OCCUR=2
OCCUR=3

[26] Seen in 2.5–3 GeV/c $\overline{p}p$. $2\pi^+ 2\pi^-$, with 0, 1, 2 $\pi^+\pi^-$ pairs in ρ^0 band not seen by OREN 74 (2.3 GeV/c $\overline{p}p$) with more statistics. (Jan. 1979)

NODE=M015W6;LINKAGE=R

[27] Not seen by BOWEN 72.

NODE=M015W6;LINKAGE=N

$\rho_3(1690)$ DECAY MODES

NODE=M015215;NODE=M015

	Mode	Fraction (Γ_i/Γ)	Scale factor	
Γ_1	4π	(71.1 ± 1.9) %		DESIG=2
Γ_2	$\pi^\pm\pi^+\pi^-\pi^0$	(67 ±22) %		DESIG=11
Γ_3	$\omega\pi$	(16 ± 6) %		DESIG=7
Γ_4	$\pi\pi$	(23.6 ± 1.3) %		DESIG=1
Γ_5	$K\overline{K}\pi$	(3.8 ± 1.2) %		DESIG=3
Γ_6	$K\overline{K}$	(1.58± 0.26) %	1.2	DESIG=4
Γ_7	$\eta\pi^+\pi^-$	seen		DESIG=13
Γ_8	$\rho(770)\eta$	seen		DESIG=14;OUR EST;→ UNCHECKED ←
Γ_9	$\pi\pi\rho$	seen		DESIG=5;OUR EST;→ UNCHECKED ←
Γ_{10}	$a_2(1320)\pi$	seen		DESIG=6;OUR EST;→ UNCHECKED ←
Γ_{11}	$\rho\rho$	seen		DESIG=8;OUR EST;→ UNCHECKED ←
Γ_{12}	$\phi\pi$			DESIG=9
Γ_{13}	$\eta\pi$			DESIG=10
Γ_{14}	$\pi^\pm 2\pi^+ 2\pi^- \pi^0$			DESIG=12

CONSTRAINED FIT INFORMATION

An overall fit to 5 branching ratios uses 10 measurements and one constraint to determine 4 parameters. The overall fit has a $\chi^2 =$ 14.7 for 7 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\left\langle\delta x_i \delta x_j\right\rangle/(\delta x_i \cdot \delta x_j)$, in percent, from the fit to the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_4	−77		
x_5	−74	17	
x_6	−15	2	0
	x_1	x_4	x_5

$\rho_3(1690)$ BRANCHING RATIOS

NODE=M015220

$\Gamma(\pi\pi)/\Gamma_{total}$ — Γ_4/Γ

NODE=M015R1

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.236±0.013 OUR FIT					
0.243±0.013 OUR AVERAGE					
$0.259^{+0.018}_{-0.019}$	BECKER	79	ASPK	0	17 $\pi^- p$ polarized
0.23 ±0.02	CORDEN	79	OMEG		12–15 $\pi^- p \to n 2\pi$
0.22 ±0.04	[28] MATTHEWS	71C	HDBC	0	7 $\pi^+ n \to \pi^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.245±0.006	[29] ESTABROOKS	75	RVUE		17 $\pi^- p \to \pi^+\pi^- n$

[28] One-pion-exchange model used in this estimation.
[29] From phase-shift analysis of HYAMS 75 data.

NODE=M015R1;LINKAGE=P
NODE=M015R1;LINKAGE=G

$\Gamma(\pi\pi)/\Gamma(\pi^\pm\pi^+\pi^-\pi^0)$ — Γ_4/Γ_2

NODE=M015R2

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.35±0.11	CASON	73	HBC	−	8,18.5 $\pi^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.2	HOLMES	72	HBC	+	10–12 $K^+ p$
<0.12	BALLAM	71B	HBC	−	16 $\pi^- p$

$\Gamma(\pi\pi)/\Gamma(4\pi)$ — Γ_4/Γ_1

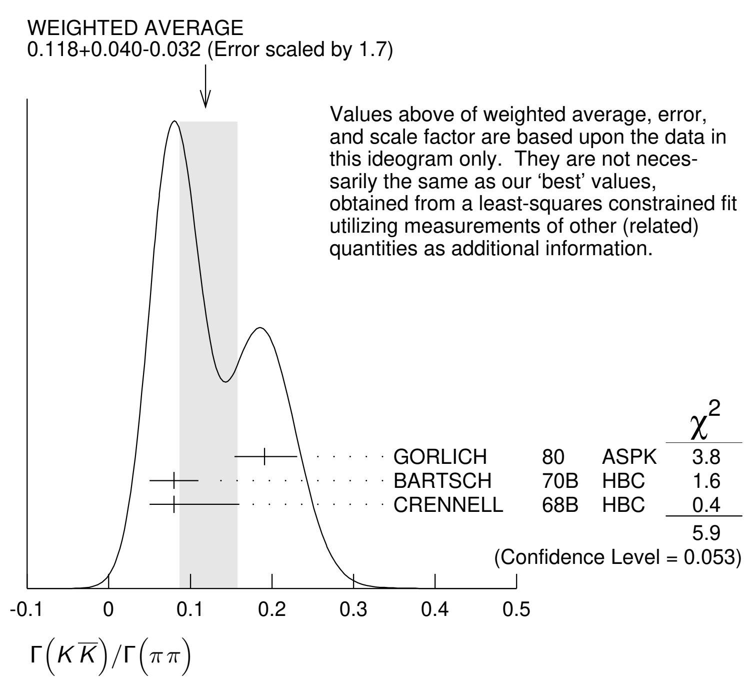
NODE=M015R3

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.332±0.026 OUR FIT Error includes scale factor of 1.1.					
0.30 ±0.10	BALTAY	78B	HBC	0	15 $\pi^+ p \to p 4\pi$

$\Gamma(K\overline{K})/\Gamma(\pi\pi)$ — Γ_6/Γ_4

NODE=M015R4

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.067±0.011 OUR FIT Error includes scale factor of 1.2.					
$\mathbf{0.118^{+0.040}_{-0.032}}$ **OUR AVERAGE** Error includes scale factor of 1.7. See the ideogram below.					
$0.191^{+0.040}_{-0.037}$	GORLICH	80	ASPK	0	17,18 $\pi^- p$ polarized
0.08 ±0.03	BARTSCH	70B	HBC	+	8 $\pi^+ p$
$0.08\ ^{+0.08}_{-0.03}$	CRENNELL	68B	HBC		6.0 $\pi^- p$



$\Gamma(K\overline{K}\pi)/\Gamma(\pi\pi)$ — Γ_5/Γ_4

NODE=M015R5

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.16±0.05 OUR FIT					
0.16±0.05	[30] BARTSCH	70B	HBC	+	8 $\pi^+ p$

[30] Increased by us to correspond to B($\rho_3(1690) \to \pi\pi$)=0.24.

NODE=M015R5;LINKAGE=A

$\left[\Gamma(\pi\pi\rho)+\Gamma(a_2(1320)\pi)+\Gamma(\rho\rho)\right]/\Gamma(\pi^\pm\pi^+\pi^-\pi^0)$ $(\Gamma_9+\Gamma_{10}+\Gamma_{11})/\Gamma_2$

NODE=M015R6
NODE=M015R6

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.94±0.09 OUR AVERAGE					
0.96±0.21	BALTAY	78B	HBC	+	15 $\pi^+ p \to p 4\pi$
0.88±0.15	BALLAM	71B	HBC	−	16 $\pi^- p$
1 ±0.15	BARTSCH	70B	HBC	+	8 $\pi^+ p$
consistent with 1	CASO	68	HBC	−	11 $\pi^- p$

$\Gamma(\rho\rho)/\Gamma(\pi^\pm\pi^+\pi^-\pi^0)$ Γ_{11}/Γ_2

NODE=M015R7
NODE=M015R7

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
0.12±0.11		BALTAY	78B	HBC	+	15 $\pi^+ p \to p 4\pi$
0.56	66	KLIGER	74	HBC	−	4.5 $\pi^- p \to p 4\pi$
0.13±0.09		[31] THOMPSON	74	HBC	+	13 $\pi^+ p$
0.7 ±0.15		BARTSCH	70B	HBC	+	8 $\pi^+ p$

[31] $\rho\rho$ and $a_2(1320)\pi$ modes are indistinguishable.

NODE=M015R7;LINKAGE=T

$\Gamma(\rho\rho)/\left[\Gamma(\pi\pi\rho)+\Gamma(a_2(1320)\pi)+\Gamma(\rho\rho)\right]$ $\Gamma_{11}/(\Gamma_9+\Gamma_{10}+\Gamma_{11})$

NODE=M015R8
NODE=M015R8

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.48±0.16	CASO	68	HBC	−	11 $\pi^- p$

$\Gamma(a_2(1320)\pi)/\Gamma(\pi^\pm\pi^+\pi^-\pi^0)$ Γ_{10}/Γ_2

NODE=M015R9
NODE=M015R9

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.66±0.08	BALTAY	78B	HBC	+	15 $\pi^+ p \to p 4\pi$
0.36±0.14	[32] THOMPSON	74	HBC	+	13 $\pi^+ p$
not seen	CASON	73	HBC	−	8,18.5 $\pi^- p$
0.6 ±0.15	BARTSCH	70B	HBC	+	8 $\pi^+ p$
0.6	BALTAY	68	HBC	+	7,8.5 $\pi^+ p$

[32] $\rho\rho$ and $a_2(1320)\pi$ modes are indistinguishable.

NODE=M015R9;LINKAGE=T

$\Gamma(\omega\pi)/\Gamma(\pi^\pm\pi^+\pi^-\pi^0)$ Γ_3/Γ_2

NODE=M015R10
NODE=M015R10

VALUE	CL%	DOCUMENT ID		TECN	CHG	COMMENT
0.23±0.05 OUR AVERAGE		Error includes scale factor of 1.2.				
0.33±0.07		THOMPSON	74	HBC	+	13 $\pi^+ p$
0.12±0.07		BALLAM	71B	HBC	−	16 $\pi^- p$
0.25±0.10		BALTAY	68	HBC	+	7,8.5 $\pi^+ p$
0.25±0.10		JOHNSTON	68	HBC	−	7.0 $\pi^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.11	95	BALTAY	78B	HBC	+	15 $\pi^+ p \to p 4\pi$
<0.09		KLIGER	74	HBC	−	4.5 $\pi^- p \to p 4\pi$

$\Gamma(\phi\pi)/\Gamma(\pi^\pm\pi^+\pi^-\pi^0)$ Γ_{12}/Γ_2

NODE=M015R11
NODE=M015R11

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.11	BALTAY	68	HBC	+	7,8.5 $\pi^+ p$

$\Gamma(\pi^\pm 2\pi^+ 2\pi^- \pi^0)/\Gamma(\pi^\pm\pi^+\pi^-\pi^0)$ Γ_{14}/Γ_2

NODE=M015R12
NODE=M015R12

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.15	BALTAY	68	HBC	+	7,8.5 $\pi^+ p$

$\Gamma(\eta\pi)/\Gamma(\pi^\pm\pi^+\pi^-\pi^0)$ Γ_{13}/Γ_2

NODE=M015R13
NODE=M015R13

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.02	THOMPSON	74	HBC	+	13 $\pi^+ p$

$\Gamma(K\overline{K})/\Gamma_{total}$ Γ_6/Γ

NODE=M015R14
NODE=M015R14

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.0158±0.0026 OUR FIT	Error includes scale factor of 1.2.				
0.0130±0.0024 OUR AVERAGE					
0.013 ±0.003	COSTA	80	OMEG	0	10 $\pi^- p \to K^+ K^- n$
0.013 ±0.004	[33] MARTIN	78B	SPEC	−	10 $\pi p \to K^0_S K^- p$

[33] From $(\Gamma_4\Gamma_6)^{1/2} = 0.056 \pm 0.034$ assuming $B(\rho_3(1690) \to \pi\pi) = 0.24$.

NODE=M015R14;LINKAGE=B

$\Gamma(\omega\pi)/[\Gamma(\omega\pi)+\Gamma(\rho\rho)]$ $\Gamma_3/(\Gamma_3+\Gamma_{11})$

NODE=M015R16

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.22 ± 0.08	CASON	73	HBC	−	8,18.5 $\pi^- p$

$\Gamma(\eta\pi^+\pi^-)/\Gamma_{total}$ Γ_7/Γ

NODE=M015R17

VALUE	DOCUMENT ID		TECN	COMMENT
seen	FUKUI	88	SPEC	8.95 $\pi^- p \to \eta\pi^+\pi^- n$

$\Gamma(a_2(1320)\pi)/\Gamma(\rho(770)\eta)$ Γ_{10}/Γ_8

NODE=M015R18

VALUE	DOCUMENT ID		TECN	COMMENT
5.5 ± 2.0	AMELIN	00	VES	37 $\pi^- p \to \eta\pi^+\pi^- n$

$\rho_3(1690)$ REFERENCES

NODE=M015

AMELIN	00	NP A668 83	D. Amelin *et al.*	(VES Collab.)	REFID=47432
ALDE	95	ZPHY C66 379	D.M. Alde *et al.*	(GAMS Collab.) JP	REFID=44371
ALDE	92C	ZPHY C54 553	D.M. Alde *et al.*	(BELG, SERP, KEK, LANL+)	REFID=41859
FUKUI	88	PL B202 441	S. Fukui *et al.*	(SUGI, NAGO, KEK, KYOT+)	REFID=40273
DENNEY	83	PR D28 2726	D.L. Denney *et al.*	(IOWA, MICH)	REFID=20754
EVANGELIS...	81	NP B178 197	C. Evangelista *et al.*	(BARI, BONN, CERN+)	REFID=20462
ALPER	80	PL 94B 422	B. Alper *et al.*	(AMST, CERN, CRAC, MPIM+)	REFID=21665
COSTA	80	NP B175 402	G. Costa *et al.*	(BARI, BONN, CERN, GLAS+)	REFID=20737
GORLICH	80	NP B174 16	L. Gorlich *et al.*	(CRAC, MPIM, CERN+)	REFID=20738
BECKER	79	NP B151 46	H. Becker *et al.*	(MPIM, CERN, ZEEM, CRAC)	REFID=21084
CORDEN	79	NP B157 250	M.J. Corden *et al.*	(BIRM, RHEL, TELA+) JP	REFID=20374
BALTAY	78B	PR D17 62	C. Baltay *et al.*	(COLU, BING)	REFID=21265
MARTIN	78B	NP B140 158	A.D. Martin *et al.*	(DURH, GEVA)	REFID=21273
MARTIN	78D	PL 74B 417	A.D. Martin *et al.*	(DURH, GEVA)	REFID=21272
ANTIPOV	77	NP B119 45	Y.M. Antipov *et al.*	(SERP, GEVA)	REFID=20728
GESSAROLI	77	NP B126 382	R. Gessaroli *et al.*	(BGNA, FIRZ, GENO+)	REFID=20230
BLUM	75	PL 57B 403	W. Blum *et al.*	(CERN, MPIM) JP	REFID=21651
ESTABROOKS	75	NP B95 322	P.G. Estabrooks, A.D. Martin	(DURH)	REFID=20642
HYAMS	75	NP B100 205	B.D. Hyams *et al.*	(CERN, MPIM)	REFID=20355
ENGLER	74	PR D10 2070	A. Engler *et al.*	(CMU, CASE)	REFID=20110
GRAYER	74	NP B75 189	G. Grayer *et al.*	(CERN, MPIM)	REFID=20113
KLIGER	74	SJNP 19 428	G.K. Kliger *et al.*	(ITEP)	REFID=21648
		Translated from YAF 19 839.			
OREN	74	NP B71 189	Y. Oren *et al.*	(ANL, OXF)	REFID=20221
THOMPSON	74	NP B69 220	G. Thompson *et al.*	(PURD)	REFID=21650
CASON	73	PR D7 1971	N.M. Cason *et al.*	(NDAM)	REFID=20606
BOWEN	72	PRL 29 890	D.R. Bowen *et al.*	(NEAS, STON)	REFID=21711
HOLMES	72	PR D6 3336	R. Holmes *et al.*	(ROCH)	REFID=21639
BALLAM	71B	PR D3 2606	J. Ballam *et al.*	(SLAC)	REFID=21630
MATTHEWS	71C	NP B33 1	J.A.J. Matthews *et al.*	(TNTO, WISC) JP	REFID=21633
ARMENISE	70	LNC 4 199	N. Armenise *et al.*	(BARI, BGNA, FIRZ)	REFID=20693
BARNHAM	70	PRL 24 1083	K.W.J. Barnham *et al.*	(BIRM)	REFID=21624
BARTSCH	70B	NP B22 109	J. Bartsch *et al.*	(AACH, BERL, CERN)	REFID=21625
CASO	70	LNC 3 707	C. Caso *et al.*	(GENO, HAMB, MILA, SACL)	REFID=20590
STUNTEBECK	70	PL 32B 391	P.H. Stuntebeck *et al.*	(NDAM)	REFID=20696
ADERHOLZ	69	NP B11 259	M. Aderholz *et al.*	(AACH3, BERL, CERN+)	REFID=20687
ANDERSON	69	PRL 22 1390	E.W. Anderson *et al.*	(BNL, CMU)	REFID=20795
ARMENISE	68	NC 54A 999	N. Armenise *et al.*	(BARI, BGNA, FIRZ+) I	REFID=20054
BALTAY	68	PRL 20 887	C. Baltay *et al.*	(COLU, ROCH, RUTG, YALE) I	REFID=21531
CASO	68	NC 54A 983	C. Caso *et al.*	(GENO, HAMB, MILA, SACL)	REFID=20586
CRENNELL	68B	PL 28B 136	D.J. Crennell *et al.*	(BNL)	REFID=21616
JOHNSTON	68	PRL 20 1414	T.F. Johnston *et al.*	(TNTO, WISC) IJP	REFID=21617
FOCACCI	66	PRL 17 890	M.N. Focacci *et al.*	(CERN)	REFID=20402
GOLDBERG	65	PL 17 354	M. Goldberg *et al.*	(CERN, EPOL, ORSAY+)	REFID=21601

NODE=M065

$\rho(1700)$

$I^G(J^{PC}) = 1^+(1^{--})$

NODE=M065

THE $\rho(1450)$ AND THE $\rho(1700)$

Updated September 2019 by S. Eidelman (Novosibirsk), C. Hanhart (Juelich) and G. Venanzoni (Pisa).

In our 1988 edition, we replaced the $\rho(1600)$ entry with two new ones, the $\rho(1450)$ and the $\rho(1700)$, because there was emerging evidence that the 1600-MeV region actually contains two ρ-like resonances. Erkal [1] had pointed out this possibility with a theoretical analysis on the consistency of 2π and 4π electromagnetic form factors and the $\pi\pi$ scattering length. Donnachie [2], with a full analysis of data on the 2π and 4π final states in e^+e^- annihilation and photoproduction reactions, had also argued that in order to obtain a consistent picture, two resonances were necessary. The existence of $\rho(1450)$ was supported by the analysis of $\eta\rho^0$ mass spectra obtained in photoproduction and e^+e^- annihilation [3], as well as that of $e^+e^- \to \omega\pi$ [4].

The analysis of [2] was further extended by [5,6] to include new data on 4π-systems produced in e^+e^- annihilation, and in τ-decays (τ decays to 4π, and e^+e^- annihilation to 4π can be related by the Conserved Vector Current assumption). These systems were successfully analyzed using interfering contributions from two ρ-like states, and from the tail of the $\rho(770)$ decaying into two-body states. While specific conclusions on $\rho(1450) \to 4\pi$ were obtained, little could be said about the $\rho(1700)$.

Independent evidence for two 1^- states is provided by [7] in 4π electroproduction at $\langle Q^2\rangle = 1$ $(\mathrm{GeV}/c)^2$, and by [8] in a high-statistics sample of the $\eta\pi\pi$ system in π^-p charge exchange.

This scenario with two overlapping resonances is supported by other data. Bisello [9] measured the pion form factor in the interval 1.35–2.4 GeV, and observed a deep minimum around 1.6 GeV. The best fit was obtained with the hypothesis of ρ-like resonances at 1420 and 1770 MeV, with widths of about 250 MeV. Antonelli [10] found that the $e^+e^- \to \eta\pi^+\pi^-$ cross section is better fitted with two fully interfering Breit-Wigners, with parameters in fair agreement with those of [2] and [9]. These results can be considered as a confirmation of the $\rho(1450)$.

Decisive evidence for the $\pi\pi$ decay mode of both $\rho(1450)$ and $\rho(1700)$ comes from $\overline{p}p$ annihilation at rest [11]. It has been shown that these resonances also possess a $K\overline{K}$ decay mode [12–14]. . High-statistics studies of the decays $\tau \to \pi\pi\nu_\tau$ [15,16], and $\tau \to 4\pi\nu_\tau$ [17] also require the $\rho(1450)$, but are not sensitive to the $\rho(1700)$, because it is too close to the τ mass. A recent very-high-statistics study of the $\tau \to \pi\pi\nu_\tau$ decay performed at Belle [18] reports the first observation of both $\rho(1450)$ and $\rho(1700)$ in τ decays. A clear picture of the two $\pi^+\pi^-$ resonances interfering with the $\rho(770)$ in e^+e^- annihilation was also reported by BaBar using the ISR method [19].

The structure of these ρ states is not yet completely clear. Barnes [20] and Close [21] claim that $\rho(1450)$ has a mass consistent with radial $2S$, but its decays show characteristics of hybrids, and suggest that this state may be a $2S$-hybrid mixture. Donnachie [22] argues that hybrid states could have a 4π decay mode dominated by the $a_1\pi$. Such behavior has been observed by [23] in $e^+e^- \to 4\pi$ in the energy range 1.05–1.38 GeV, and by [17] in $\tau \to 4\pi$ decays. CLEO [24] and Belle [25] observe the $\rho(1450) \to \omega\pi$ decay mode in B-meson decays, however, do not find $\rho(1700) \to \omega\pi^0$. A similar conclusion is made by [26,27], who studied the process $e^+e^- \to \omega\pi^0$ and do not observe a statistically significant signal of the $\rho(1700)$. Various decay modes of the $\rho(1450)$ and $\rho(1700)$ are observed in $\overline{p}n$ and $\overline{p}p$ annihilation [28,29], but no definite conclusions can be drawn. More data should be collected to clarify the nature of the ρ states, particularly in the energy range above 1.6 GeV.

We now list under a separate entry the $\rho(1570)$, the $\phi\pi$ state with $J^{PC} = 1^{--}$ earlier observed by [30] (referred to as $C(1480)$) and recently confirmed by [31]. While [32] shows that it may be a threshold effect, [5] and [33] suggest two independent vector states with this decay mode. The $C(1480)$ has not been seen in the $\overline{p}p$ [34] and e^+e^- [35,36] experiments. However, the sensitivity of the two latter is an order of magnitude lower than that of [31]. Note that [31] can not exclude that their observation is due to an OZI-suppressed decay mode of the $\rho(1700)$.

Several observations on the $\omega\pi$ system in the 1200-MeV region [37–43] mmay be interpreted in terms of either $J^P = 1^-$ $\rho(770) \to \omega\pi$ production [44], or $J^P = 1^+$ $b_1(1235)$ production [42,43]. We argue that no special entry for a $\rho(1250)$ is needed. The LASS amplitude analysis [45] showing evidence for $\rho(1270)$ is preliminary and needs confirmation.

For completeness, the relevant observations are listed under the $\rho(1450)$.

Recently [46] reported a very broad 1^{--} resonance-like K^+K^- state in $J/\psi \to K^+K^-\pi^0$ decays. Its pole position corresponds to mass of 1576 MeV and width of 818 MeV. [47–49] ssuggest its exotic structure (molecular or multiquark), while [50] and [51] explain it by the interference between the $\rho(1450)$ and $\rho(1700)$. The latter statement is qualitatively supported by BaBar [52] and SND [53]. We quote [46] as $X(1575)$ in the section "Further States."

Evidence for ρ-like mesons decaying into 6π states was first noted by [54] in the analysis of 6π mass spectra from e^+e^- annihilation [55,56] and diffractive photoproduction [57]. Clegg [54] argued that two states at about 2.1 and 1.8 GeV exist: while the former is a candidate for the $\rho(2150)$, the latter could be a manifestation of the $\rho(1700)$ distorted by threshold effects. BaBar reported observations of the new decay modes of the $\rho(2150)$ in the channels $\eta'(958)\pi^+\pi^-$ and $f_1(1285)\pi^+\pi^-$ [58]. The relativistic quark model [59] predicts the 2^3D_1 state with $J^{PC} = 1^{--}$ at 2.15 GeV which can be identified with the $\rho(2150)$.

We no longer list under a separate particle $\rho(1900)$ various observations of irregular behavior of the cross sections near the $N\bar{N}$ threshold. Dips of various width around 1.9 GeV were reported by the E687 Collaboration (a narrow one in the $3\pi^+3\pi^-$ diffractive photoproduction [60,61]) , by the FENICE experiment (a narrow structure in the R value [62]) , by BaBar in ISR (a narrow structure in $e^+e^- \to \phi\pi$ final state [63], but much broader in $e^+e^- \to 3\pi^+3\pi^-$ and $e^+e^- \to 2(\pi^+\pi^-\pi^0)$ [64]) , by CMD-3 (also a rather broad dip in $e^+e^- \to 3\pi^+3\pi^-$ [65]) . A dedicated scan of the $N\bar{N}$-threshold region by CMD-3 confirms this effect in the $e^+e^- \to 3\pi^+3\pi^-$ and $e^+e^- \to K^+K^-\pi^+\pi^-$ final states, but does not see it in the cross section of $e^+e^- \to 2\pi^+2\pi^-$ [66]. Most probably, these structures emerge as a threshold effect due to the opening of the $N\bar{N}$ channel [67,68,69].

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$\rho(1700)$ MASS

NODE=M065205

$\eta\rho^0$ AND $\pi^+\pi^-$ MODES

NODE=M065M0
NODE=M065M0

VALUE (MeV)	*DOCUMENT ID*
1720±20 OUR ESTIMATE	

→ UNCHECKED ←

$\eta\rho^0$ MODE

NODE=M065M6
NODE=M065M6

The data in this block is included in the average printed for a previous datablock.

• • • We do not use the following data for averages, fits, limits, etc. • • •

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1834±12	13.4k	[1] GRIBANOV	20	CMD3	1.1–2.0 $e^+e^- \to \eta\pi^+\pi^-$
1840±10	7.4k	[2] ACHASOV	18	SND	1.22–2.00 $e^+e^- \to \eta\pi^+\pi^-$
1740±20		ANTONELLI	88	DM2	$e^+e^- \to \eta\pi^+\pi^-$
1701±15		[3] FUKUI	88	SPEC	8.95 $\pi^- p \to \eta\pi^+\pi^- n$

[1] Mass and width of the $\rho(770)$ fixed at 775 and 149 MeV, respectively; solution 2 of model 2, $\eta \to \gamma\gamma$ decays used. NODE=M065M6;LINKAGE=B

[2] From the combined fit of AULCHENKO 15 and ACHASOV 18 in the model with the interfering $\rho(1450)$, $\rho(1700)$ and $\rho(2150)$ with the parameters of the $\rho(1450)$ and $\rho(1700)$ floating and the mass and width of the $\rho(2150)$ fixed at 2155 MeV and 320 MeV, respectively. The phases of the resonances are π, 0 and π, respectively. NODE=M065M6;LINKAGE=A

[3] Assuming $\rho^+ f_0(1370)$ decay mode interferes with $a_1(1260)^+\pi$ background. From a two Breit-Wigner fit. NODE=M065M;LINKAGE=B

$\pi\pi$ MODE

NODE=M065M1

VALUE (MeV)		EVTS	DOCUMENT ID		TECN	COMMENT

The data in this block is included in the average printed for a previous datablock.

• • • We do not use the following data for averages, fits, limits, etc. • • •

VALUE (MeV)		EVTS	DOCUMENT ID		TECN	COMMENT
1770.54± 5.49			[1] BARTOS	17	RVUE	$e^+e^- \rightarrow \pi^+\pi^-$
1718.50±65.44			[2] BARTOS	17A	RVUE	$e^+e^- \rightarrow \pi^+\pi^-$
1766.80±52.36			[3] BARTOS	17A	RVUE	$\tau^- \rightarrow \pi^-\pi^0\nu_\tau$
1644 ±36		20k	[4] LEES	17C	BABR	$J/\psi \rightarrow \pi^+\pi^-\pi^0$
1780 ±20	$^{+15}_{-20}$	63.5k	[5] ABRAMOWICZ	12	ZEUS	$ep \rightarrow e\pi^+\pi^- p$
1861 ±17			[6] LEES	12G	BABR	$e^+e^- \rightarrow \pi^+\pi^-\gamma$
1728 ±17	±89	5.4M	[7,8] FUJIKAWA	08	BELL	$\tau^- \rightarrow \pi^-\pi^0\nu_\tau$
1780 $^{+37}_{-29}$			[9] ABELE	97	CBAR	$\overline{p}n \rightarrow \pi^-\pi^0\pi^0$
1719 ±15			[9] BERTIN	97C	OBLX	0.0 $\overline{p}p \rightarrow \pi^+\pi^-\pi^0$
1730 ±30			CLEGG	94	RVUE	$e^+e^- \rightarrow \pi^+\pi^-$
1768 ±21			BISELLO	89	DM2	$e^+e^- \rightarrow \pi^+\pi^-$
1745.7 ±91.9			DUBNICKA	89	RVUE	$e^+e^- \rightarrow \pi^+\pi^-$
1546 ±26			GESHKEN...	89	RVUE	
1650			[10] ERKAL	85	RVUE	20–70 $\gamma p \rightarrow \gamma\pi$
1550 ±70			ABE	84B	HYBR	20 $\gamma p \rightarrow \pi^+\pi^- p$
1590 ±20			[11] ASTON	80	OMEG	20–70 $\gamma p \rightarrow p2\pi$
1600 ±10			[12] ATIYA	79B	SPEC	50 $\gamma C \rightarrow C2\pi$
1598 $^{+24}_{-22}$			BECKER	79	ASPK	17 $\pi^- p$ polarized
1659 ±25			[10] LANG	79	RVUE	
1575			[10] MARTIN	78C	RVUE	17 $\pi^- p \rightarrow \pi^+\pi^- n$
1610 ±30			[10] FROGGATT	77	RVUE	17 $\pi^- p \rightarrow \pi^+\pi^- n$
1590 ±20			[13] HYAMS	73	ASPK	17 $\pi^- p \rightarrow \pi^+\pi^- n$

OCCUR=2

[1] Applies the Unitary & Analytic Model of the pion electromagnetic form factor of DUBNICKA 10 to analyze the data of LEES 12G and ABLIKIM 16C. NODE=M065M1;LINKAGE=C

[2] Applies the Unitary & Analytic Model of the pion electromagnetic form factor of DUBNICKA 10 to analyze the data of ACHASOV 06, AKHMETSHIN 07, AUBERT 09AS, and AMBROSINO 11A. NODE=M065M1;LINKAGE=D

[3] Applies the Unitary & Analytic Model of the pion electromagnetic form factor of DUBNICKA 10 to analyze the data of FUJIKAWA 08. NODE=M065M1;LINKAGE=E

[4] From a Dalitz plot analysis in an isobar model with $\rho(1450)$ and $\rho(1700)$ masses and widths floating. NODE=M065M1;LINKAGE=A

[5] Using the KUHN 90 parametrization of the pion form factor, neglecting $\rho-\omega$ interference. NODE=M065M1;LINKAGE=AB

[6] Using the GOUNARIS 68 parametrization of the pion form factor leaving the masses and widths of the $\rho(1450)$, $\rho(1700)$, and $\rho(2150)$ resonances as free parameters of the fit. NODE=M065M1;LINKAGE=LE

[7] $|F_\pi(0)|^2$ fixed to 1. NODE=M065M1;LINKAGE=FU

[8] From the GOUNARIS 68 parametrization of the pion form factor. NODE=M065M1;LINKAGE=GO

[9] T-matrix pole. NODE=M065M;LINKAGE=QQ

[10] From phase shift analysis of HYAMS 73 data. NODE=M065M;LINKAGE=P

[11] Simple relativistic Breit-Wigner fit with constant width. NODE=M065M;LINKAGE=M

[12] An additional 40 MeV uncertainty in both the mass and width is present due to the choice of the background shape. NODE=M065M;LINKAGE=R

[13] Included in BECKER 79 analysis. NODE=M065M;LINKAGE=H

$\pi\omega$ MODE

NODE=M065M8

• • • We do not use the following data for averages, fits, limits, etc. • • •

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1708±41	7815	[1] ACHASOV	13	SND	1.05–2.00 $e^+e^- \rightarrow \pi^0\pi^0\gamma$
1550 to 1620		[2] ACHASOV	00I	SND	$e^+e^- \rightarrow \pi^0\pi^0\gamma$
1580 to 1710		[3] ACHASOV	00I	SND	$e^+e^- \rightarrow \pi^0\pi^0\gamma$
1710±90		ACHASOV	97	RVUE	$e^+e^- \rightarrow \omega\pi^0$

OCCUR=2

[1] From a phenomenological model based on vector meson dominance with the interfering $\rho(1450)$ and $\rho(1700)$ and their widths fixed at 400 and 250 MeV, respectively. Systematic uncertainty not estimated. NODE=M065M8;LINKAGE=AC

[2] Taking into account both $\rho(1450)$ and $\rho(1700)$ contributions. Using the data of ACHASOV 00I on $e^+e^- \rightarrow \omega\pi^0$ and of EDWARDS 00A on $\tau^- \rightarrow \omega\pi^-\nu_\tau$. $\rho(1450)$ mass and width fixed at 1400 MeV and 500 MeV respectively. NODE=M065M;LINKAGE=I1

[3] Taking into account the $\rho(1700)$ contribution only. Using the data of ACHASOV 00I on $e^+e^- \rightarrow \omega\pi^0$ and of EDWARDS 00A on $\tau^- \rightarrow \omega\pi^-\nu_\tau$. NODE=M065M;LINKAGE=I2

$K\overline{K}$ MODE

NODE=M065M2
NODE=M065M2

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$1688.7\pm 3.1^{+141.1}_{-\ \ 1.3}$		[1] ALBRECHT	20	RVUE		0.9 $\overline{p}p \rightarrow K^+K^-\pi^0$
$1541 \pm12 \pm 33$	190k	[2] AAIJ	16N	LHCB		$D^0 \rightarrow K^0_S K^\pm \pi^\mp$
1740.8 ± 22.2	27k	[3] ABELE	99D	CBAR	$\pm$	0.0 $\overline{p}p \rightarrow K^+K^-\pi^0$
1582 ± 36	1600	CLELAND	82B	SPEC	$\pm$	50 $\pi p \rightarrow K^0_S K^\pm p$

[1] T-matrix pole, 2 poles, 3 channels, including $\pi\pi$ scattering data from HYAMS 75. NODE=M065M2;LINKAGE=D

[2] Using the GOUNARIS 68 parameterization with a fixed width. Value is average using different $K\pi$ S-wave parametrizations in fit. NODE=M065M2;LINKAGE=A

[3] K-matrix pole. Isospin not determined, could be $\omega(1650)$ or $\phi(1680)$. NODE=M065M2;LINKAGE=AN

2 $(\pi^+\pi^-)$ MODE

NODE=M065M4
NODE=M065M4

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1851^{+\ 27}_{-\ 24}$		ACHASOV	97	RVUE	$e^+e^- \rightarrow 2(\pi^+\pi^-)$
1570 ± 20		[1] CORDIER	82	DM1	$e^+e^- \rightarrow 2(\pi^+\pi^-)$
1520 ± 30		[2] ASTON	81E	OMEG	20–70 $\gamma p \rightarrow p4\pi$
1654 ± 25		[3] DIBIANCA	81	DBC	$\pi^+ d \rightarrow pp2(\pi^+\pi^-)$
1666 ± 39		[1] BACCI	80	FRAG	$e^+e^- \rightarrow 2(\pi^+\pi^-)$
1780	34	KILLIAN	80	SPEC	11 $e^-p \rightarrow 2(\pi^+\pi^-)$
1500		[4] ATIYA	79B	SPEC	50 γC $\rightarrow$ C$4\pi^\pm$
1570 ± 60	65	[5] ALEXANDER	75	HBC	7.5 $\gamma p \rightarrow p4\pi$
1550 ± 60		[2] CONVERSI	74	OSPK	$e^+e^- \rightarrow 2(\pi^+\pi^-)$
1550 ± 50	160	SCHACHT	74	STRC	5.5–9 $\gamma p \rightarrow p4\pi$
1450 ± 100	340	SCHACHT	74	STRC	9–18 $\gamma p \rightarrow p4\pi$ OCCUR=2
1430 ± 50	400	BINGHAM	72B	HBC	9.3 $\gamma p \rightarrow p4\pi$

[1] Simple relativistic Breit-Wigner fit with model dependent width. NODE=M065M;LINKAGE=A

[2] Simple relativistic Breit-Wigner fit with constant width. NODE=M065M4;LINKAGE=M

[3] One peak fit result. NODE=M065M;LINKAGE=O

[4] Parameters roughly estimated, not from a fit. NODE=M065M;LINKAGE=C

[5] Skew mass distribution compensated by Ross-Stodolsky factor. NODE=M065M;LINKAGE=D

$\pi^+\pi^-\pi^0\pi^0$ MODE

NODE=M065M5
NODE=M065M5

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1660 ± 30	ATKINSON	85B	OMEG	20–70 γp

$3(\pi^+\pi^-)$ AND $2(\pi^+\pi^-\pi^0)$ MODES

NODE=M065M7
NODE=M065M7

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1730 ± 34	[1] FRABETTI	04	E687	$\gamma p \rightarrow 3\pi^+3\pi^- p$
1783 ± 15	CLEGG	90	RVUE	$e^+e^- \rightarrow 3(\pi^+\pi^-)2(\pi^+\pi^-\pi^0)$

[1] From a fit with two resonances with the JACOB 72 continuum. NODE=M065M;LINKAGE=PI

$m_{\rho(1700)^0} - m_{\rho(1700)^\pm}$

NODE=M065DM

NODE=M065DM

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
-48.30 ± 83.81	[1] BARTOS	17A	RVUE	$e^+e^- \rightarrow \pi^+\pi^-$, $\tau^- \rightarrow \pi^-\pi^0\nu_\tau$

[1] Applies the Unitary & Analytic Model of the pion electromagnetic form factor of DUBNICKA 10 to analyze the data of ACHASOV 06, AKHMETSHIN 07, AUBERT 09AS, AMBROSINO 11A, and FUJIKAWA 08. NODE=M065DM;LINKAGE=A

$\rho(1700)$ WIDTH

NODE=M065210

$\eta\rho^0$ AND $\pi^+\pi^-$ MODES

NODE=M065W0
NODE=M065W0

VALUE (MeV)	DOCUMENT ID
250±100 OUR ESTIMATE	

→ UNCHECKED ←

$\eta\rho^0$ MODE

NODE=M065W6

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
The data in this block is included in the average printed for a previous datablock.				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
47±19	13.4k	[1] GRIBANOV 20	CMD3	1.1–2.0 $e^+e^- \to \eta\pi^+\pi^-$
132±40	7.4k	[2] ACHASOV 18	SND	1.22–2.00 $e^+e^- \to \eta\pi^+\pi^-$
150±30		ANTONELLI 88	DM2	$e^+e^- \to \eta\pi^+\pi^-$
282±44		[3] FUKUI 88	SPEC	8.95 $\pi^- p \to \eta\pi^+\pi^- n$

[1] Mass and width of the $\rho(770)$ fixed at 775 and 149 MeV, respectively; solution 2 of model 2, $\eta \to \gamma\gamma$ decays used. NODE=M065W6;LINKAGE=B

[2] From the combined fit of AULCHENKO 15 and ACHASOV 18 in the model with the interfering $\rho(1450)$, $\rho(1700)$ and $\rho(2150)$ with the parameters of the $\rho(1450)$ and $\rho(1700)$ floating and the mass and width of the $\rho(2150)$ fixed at 2155 MeV and 320 MeV, respectively. The phases of the resonances are π, 0 and π, respectively. NODE=M065W6;LINKAGE=A

[3] Assuming $\rho^+ f_0(1370)$ decay mode interferes with $a_1(1260)^+\pi$ background. From a two Breit-Wigner fit. NODE=M065W;LINKAGE=B

$\pi\pi$ MODE

NODE=M065W1

VALUE (MeV)		EVTS	DOCUMENT ID	TECN	COMMENT
The data in this block is included in the average printed for a previous datablock.					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
268.98± 11.40			[1] BARTOS 17	RVUE	$e^+e^- \to \pi^+\pi^-$
489.58± 16.95			[2] BARTOS 17A	RVUE	$e^+e^- \to \pi^+\pi^-$
414.71±119.48			[3] BARTOS 17A	RVUE	$\tau^- \to \pi^-\pi^0\nu_\tau$ (OCCUR=2)
109 ± 19		20k	[4] LEES 17C	BABR	$J/\psi \to \pi^+\pi^-\pi^0$
310 ± 30	$^{+25}_{-35}$	63.5k	[5] ABRAMOWICZ 12	ZEUS	$e p \to e\pi^+\pi^- p$
316 ± 26			[6] LEES 12G	BABR	$e^+e^- \to \pi^+\pi^-\gamma$
164 ± 21	$^{+89}_{-26}$	5.4M	[7,8] FUJIKAWA 08	BELL	$\tau^- \to \pi^-\pi^0\nu_\tau$
275 ± 45			[9] ABELE 97	CBAR	$\overline{p}n \to \pi^-\pi^0\pi^0$
310 ± 40			[9] BERTIN 97C	OBLX	0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$
400 ±100			CLEGG 94	RVUE	$e^+e^- \to \pi^+\pi^-$
224 ± 22			BISELLO 89	DM2	$e^+e^- \to \pi^+\pi^-$
242.5 ±163.0			DUBNICKA 89	RVUE	$e^+e^- \to \pi^+\pi^-$
620 ± 60			GESHKEN... 89	RVUE	
<315			[10] ERKAL 85	RVUE	20–70 $\gamma p \to \gamma\pi$
280 $^{+30}_{-80}$			ABE 84B	HYBR	20 $\gamma p \to \pi^+\pi^- p$
230 ± 80			[11] ASTON 80	OMEG	20–70 $\gamma p \to p 2\pi$
283 ± 14			[12] ATIYA 79B	SPEC	50 $\gamma C \to C 2\pi$
175 $^{+98}_{-53}$			BECKER 79	ASPK	17 $\pi^- p$ polarized
232 ± 34			[10] LANG 79	RVUE	
340			[10] MARTIN 78C	RVUE	17 $\pi^- p \to \pi^+\pi^- n$
300 ±100			[10] FROGGATT 77	RVUE	17 $\pi^- p \to \pi^+\pi^- n$
180 ± 50			[13] HYAMS 73	ASPK	17 $\pi^- p \to \pi^+\pi^- n$

[1] Applies the Unitary & Analytic Model of the pion electromagnetic form factor of DUBNICKA 10 to analyze the data of LEES 12G and ABLIKIM 16C. NODE=M065W1;LINKAGE=C

[2] Applies the Unitary & Analytic Model of the pion electromagnetic form factor of DUBNICKA 10 to analyze the data of ACHASOV 06, AKHMETSHIN 07, AUBERT 09AS, and AMBROSINO 11A. NODE=M065W1;LINKAGE=D

[3] Applies the Unitary & Analytic Model of the pion electromagnetic form factor of DUBNICKA 10 to analyze the data of FUJIKAWA 08. NODE=M065W1;LINKAGE=E

[4] From a Dalitz plot analysis in an isobar model with $\rho(1450)$ and $\rho(1700)$ masses and widths floating. NODE=M065W1;LINKAGE=A

[5] Using the KUHN 90 parametrization of the pion form factor, neglecting $\rho-\omega$ interference. NODE=M065W1;LINKAGE=AB

[6] Using the GOUNARIS 68 parametrization of the pion form factor leaving the masses and widths of the $\rho(1450)$, $\rho(1700)$, and $\rho(2150)$ resonances as free parameters of the fit. NODE=M065W1;LINKAGE=LE

[7] $|F_\pi(0)|^2$ fixed to 1. NODE=M065W1;LINKAGE=FU

[8] From the GOUNARIS 68 parametrization of the pion form factor. NODE=M065W1;LINKAGE=GO

[9] T-matrix pole. NODE=M065W;LINKAGE=QQ

[10] From phase shift analysis of HYAMS 73 data. NODE=M065W;LINKAGE=P

[11] Simple relativistic Breit-Wigner fit with constant width. NODE=M065W;LINKAGE=M

[12] An additional 40 MeV uncertainty in both the mass and width is present due to the choice of the background shape. NODE=M065W;LINKAGE=R

[13] Included in BECKER 79 analysis. NODE=M065W;LINKAGE=H

$K\overline{K}$ MODE

NODE=M065W2

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$150.9\pm\ 2.5^{+60}_{-10.6}$		[1] ALBRECHT	20	RVUE		$0.9\ \overline{p}p \to K^+K^-\pi^0$
$187.2\pm\ 26.7$	27k	[2] ABELE	99D	CBAR	$\pm$	$0.0\ \overline{p}p \to K^+K^-\pi^0$
$265\ \pm120$	1600	CLELAND	82B	SPEC	$\pm$	$50\ \pi p \to K^0_S K^\pm p$

[1] T-matrix pole, 2 poles, 3 channels, including $\pi\pi$ scattering data from HYAMS 75. NODE=M065W2;LINKAGE=A

[2] K-matrix pole. Isospin not determined, could be $\omega(1650)$ or $\phi(1680)$. NODE=M065W2;LINKAGE=AN

2 $(\pi^+\pi^-)$ MODE

NODE=M065W4

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$510\pm\ 40$		[1] CORDIER	82	DM1	$e^+e^- \to 2(\pi^+\pi^-)$
$400\pm\ 50$		[2] ASTON	81E	OMEG	20–70 $\gamma p \to p4\pi$
400 ± 146		[3] DIBIANCA	81	DBC	$\pi^+ d \to pp2(\pi^+\pi^-)$
700 ± 160		[1] BACCI	80	FRAG	$e^+e^- \to 2(\pi^+\pi^-)$
100	34	KILLIAN	80	SPEC	11 $e^-p \to 2(\pi^+\pi^-)$
600		[4] ATIYA	79B	SPEC	50 γC $\to$ C$4\pi^\pm$
340 ± 160	65	[5] ALEXANDER	75	HBC	7.5 $\gamma p \to p4\pi$
360 ± 100		[2] CONVERSI	74	OSPK	$e^+e^- \to 2(\pi^+\pi^-)$
400 ± 120	160	[6] SCHACHT	74	STRC	5.5–9 $\gamma p \to p4\pi$
850 ± 200	340	[6] SCHACHT	74	STRC	9–18 $\gamma p \to p4\pi$ OCCUR=2
650 ± 100	400	BINGHAM	72B	HBC	9.3 $\gamma p \to p4\pi$

[1] Simple relativistic Breit-Wigner fit with model-dependent width. NODE=M065W;LINKAGE=A

[2] Simple relativistic Breit-Wigner fit with constant width. NODE=M065W4;LINKAGE=M

[3] One peak fit result. NODE=M065W;LINKAGE=O

[4] Parameters roughly estimated, not from a fit. NODE=M065W;LINKAGE=C

[5] Skew mass distribution compensated by Ross-Stodolsky factor. NODE=M065W;LINKAGE=D

[6] Width errors enlarged by us to $4\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M065W;LINKAGE=E

$\pi^+\pi^-\pi^0\pi^0$ MODE

NODE=M065W5

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
300 ± 50	ATKINSON	85B	OMEG	20–70 γp

$\omega\pi^0$ MODE

NODE=M065W9

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
350 to 580	[1] ACHASOV	00I	SND	$e^+e^- \to \pi^0\pi^0\gamma$
490 to 1040	[2] ACHASOV	00I	SND	$e^+e^- \to \pi^0\pi^0\gamma$ OCCUR=2

[1] Taking into account both $\rho(1450)$ and $\rho(1700)$ contributions. Using the data of ACHASOV 00I on $e^+e^- \to \omega\pi^0$ and of EDWARDS 00A on $\tau^- \to \omega\pi^-\nu_\tau$. $\rho(1450)$ mass and width fixed at 1400 MeV and 500 MeV respectively. NODE=M065W;LINKAGE=I1

[2] Taking into account the $\rho(1700)$ contribution only. Using the data of ACHASOV 00I on $e^+e^- \to \omega\pi^0$ and of EDWARDS 00A on $\tau^- \to \omega\pi^-\nu_\tau$. NODE=M065W;LINKAGE=I2

$3(\pi^+\pi^-)$ AND $2(\pi^+\pi^-\pi^0)$ MODES

NODE=M065W7

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
315 ± 100	[1] FRABETTI	04	E687	$\gamma p \to 3\pi^+3\pi^- p$
$285\pm\ 20$	CLEGG	90	RVUE	$e^+e^- \to 3(\pi^+\pi^-)2(\pi^+\pi^-\pi^0)$

[1] From a fit with two resonances with the JACOB 72 continuum. NODE=M065W;LINKAGE=PI

$\Gamma_{\rho(1700)^0} - \Gamma_{\rho(1700)^\pm}$

NODE=M065DW

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
74.87 ± 120.67	[1] BARTOS	17A	RVUE	$e^+e^- \to \pi^+\pi^-, \tau^- \to \pi^-\pi^0\nu_\tau$

[1] Applies the Unitary & Analytic Model of the pion electromagnetic form factor of DUBNICKA 10 to analyze the data of ACHASOV 06, AKHMETSHIN 07, AUBERT 09AS, AMBROSINO 11A, and FUJIKAWA 08. NODE=M065DW;LINKAGE=A

$\rho(1700)$ DECAY MODES

NODE=M065215;NODE=M065

	Mode	Fraction (Γ_i/Γ)	
Γ_1	4π		DESIG=20
Γ_2	$2(\pi^+\pi^-)$	seen	DESIG=2;OUR EST;→ UNCHECKED ←
Γ_3	$\rho\pi\pi$	seen	DESIG=12;OUR EST;→ UNCHECKED ←
Γ_4	$\rho^0\pi^+\pi^-$	seen	DESIG=1;OUR EST;→ UNCHECKED ←
Γ_5	$\rho^0\pi^0\pi^0$		DESIG=7
Γ_6	$\rho^\pm\pi^\mp\pi^0$	seen	DESIG=9;OUR EST;→ UNCHECKED ←
Γ_7	$a_1(1260)\pi$	seen	DESIG=15;OUR EST;→ UNCHECKED ←
Γ_8	$h_1(1170)\pi$	seen	DESIG=16;OUR EST;→ UNCHECKED ←
Γ_9	$\pi(1300)\pi$	seen	DESIG=17;OUR EST;→ UNCHECKED ←
Γ_{10}	$\rho\rho$	seen	DESIG=18;OUR EST;→ UNCHECKED ←
Γ_{11}	$\pi^+\pi^-$	seen	DESIG=4;OUR EST;→ UNCHECKED ←
Γ_{12}	$\pi\pi$	seen	DESIG=13;OUR EST;→ UNCHECKED ←
Γ_{13}	$K\overline{K}^*(892)+$ c.c.	seen	DESIG=10;OUR EST;→ UNCHECKED ←
Γ_{14}	$\eta\rho$	seen	DESIG=11;OUR EST;→ UNCHECKED ←
Γ_{15}	$a_2(1320)\pi$	not seen	DESIG=14;OUR EST;→ UNCHECKED ←
Γ_{16}	$K\overline{K}$	seen	DESIG=5;OUR EST;→ UNCHECKED ←
Γ_{17}	e^+e^-	seen	DESIG=8;OUR EST;→ UNCHECKED ←
Γ_{18}	$\pi^0\omega$	seen	DESIG=6;OUR EST;→ UNCHECKED ←
Γ_{19}	$\pi^0\gamma$	not seen	DESIG=194

$\rho(1700)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma(\text{total})$

NODE=M065225

This combination of a partial width with the partial width into e^+e^- and with the total width is obtained from the cross-section into channel$_I$ in e^+e^- annihilation.

NODE=M065225

$\Gamma(2(\pi^+\pi^-)) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_2\Gamma_{17}/\Gamma$

NODE=M065G2
NODE=M065G2

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.6 ±0.2	DELCOURT	81B	DM1	$e^+e^- \to 2(\pi^+\pi^-)$
2.83±0.42	BACCI	80	FRAG	$e^+e^- \to 2(\pi^+\pi^-)$

$\Gamma(\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{11}\Gamma_{17}/\Gamma$

NODE=M065G4
NODE=M065G4

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.13	[1] DIEKMAN	88	RVUE	$e^+e^- \to \pi^+\pi^-$
$0.029^{+0.016}_{-0.012}$	KURDADZE	83	OLYA	0.64–1.4 $e^+e^- \to \pi^+\pi^-$

[1] Using total width = 220 MeV.

NODE=M065G4;LINKAGE=B

$\Gamma(K\overline{K}^*(892)+\text{c.c.}) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{13}\Gamma_{17}/\Gamma$

NODE=M065G10
NODE=M065G10

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.305±0.071	[1] BIZOT	80	DM1	e^+e^-

[1] Model dependent.

NODE=M065G;LINKAGE=M

$\Gamma(\eta\rho) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{14}\Gamma_{17}/\Gamma$

NODE=M065G11
NODE=M065G11

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.35± 0.53±0.08	13.4k	[1] GRIBANOV	20	CMD3	1.1–2.0 $e^+e^- \to \eta\pi^+\pi^-$
84 ±26 ±4		[2] LEES	18	BABR	$e^+e^- \to \eta\pi^+\pi^-$
7 ± 3		ANTONELLI	88	DM2	$e^+e^- \to \eta\pi^+\pi^-$

[1] Mass and width of the $\rho(770)$ fixed at 775 and 149 MeV, respectively; solution 2 of model 2, $\eta \to \gamma\gamma$ decays used.

NODE=M065G11;LINKAGE=B

[2] Includes non-resonant contribution. The selected fit model includes three ρ excited states. Model uncertainty is 80%.

NODE=M065G11;LINKAGE=A

$\Gamma(K\overline{K}) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{16}\Gamma_{17}/\Gamma$

NODE=M065G5

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.035 ± 0.029	[1] BIZOT	80	DM1	e^+e^-

[1] Model dependent.

NODE=M065G5;LINKAGE=M

$\Gamma(\rho\pi\pi) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_3\Gamma_{17}/\Gamma$

NODE=M065G12

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
3.510 ± 0.090	[1] BIZOT	80	DM1	e^+e^-

[1] Model dependent.

NODE=M065G12;LINKAGE=M

$\rho(1700)$ $\Gamma(i)/\Gamma(total) \times \Gamma(e^+e^-)/\Gamma(total)$

NODE=M065240

$\Gamma(\pi^0\omega)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{18}/\Gamma \times \Gamma_{17}/\Gamma$

NODE=M065R01

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.09 ± 0.05	10.2k	[1] ACHASOV	16D	SND	1.05–2.00 $e^+e^- \rightarrow \pi^0\pi^0\gamma$
1.7 ± 0.4	7815	[2] ACHASOV	13	SND	1.05–2.00 $e^+e^- \rightarrow \pi^0\pi^0\gamma$

OCCUR=4

[1] From a phenomenological model based on vector meson dominance with interfering $\rho(700)$, $\rho(1450)$, and $\rho(1700)$. The $\rho(1700)$ mass and width are fixed at 1720 MeV and 250 MeV, respectively. Systematic uncertainty not estimated. Supersedes ACHASOV 13.

NODE=M065R01;LINKAGE=B

[2] From a phenomenological model based on vector meson dominance with the interfering $\rho(1450)$ and $\rho(1700)$ and their widths fixed at 400 and 250 MeV, respectively. Systematic uncertainty not estimated.

NODE=M065R01;LINKAGE=AC

$\Gamma(\eta\rho)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{14}/\Gamma \times \Gamma_{17}/\Gamma$

NODE=M065R00

VALUE (units 10^{-8})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$8.3^{+3.8}_{-3.1}$	7.4k	[1] ACHASOV	18	SND	1.22–2.00 $e^+e^- \rightarrow \eta\pi^+\pi^-$

[1] From the combined fit of AULCHENKO 15 and ACHASOV 18 in the model with the interfering $\rho(1450)$, $\rho(1700)$ and $\rho(2150)$ with the parameters of the $\rho(1450)$ and $\rho(1700)$ floating and the mass and width of the $\rho(2150)$ fixed at 2155 MeV and 320 MeV, respectively. The phases of the resonances are π, 0 and π, respectively.

NODE=M065R00;LINKAGE=A

$\rho(1700)$ BRANCHING RATIOS

NODE=M065230

$\Gamma(\rho\pi\pi)/\Gamma(4\pi)$ Γ_3/Γ_1

NODE=M065R19

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.28 ± 0.06	[1] ABELE	01B	CBAR	0.0 $\overline{p}n \rightarrow 5\pi$

[1] $\omega\pi$ not included.

NODE=M065R;LINKAGE=BL

$\Gamma(\rho^0\pi^+\pi^-)/\Gamma(2(\pi^+\pi^-))$ Γ_4/Γ_2

NODE=M065R1

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
~ 1.0		DELCOURT	81B	DM1	$e^+e^- \rightarrow 2(\pi^+\pi^-)$
0.7 ± 0.1	500	SCHACHT	74	STRC	5.5–18 $\gamma p \rightarrow p4\pi$
0.80		[1] BINGHAM	72B	HBC	9.3 $\gamma p \rightarrow p4\pi$

[1] The $\pi\pi$ system is in *S*-wave.

NODE=M065R1;LINKAGE=S

$\Gamma(\rho^0\pi^0\pi^0)/\Gamma(\rho^\pm\pi^\mp\pi^0)$ Γ_5/Γ_6

NODE=M065R6

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.10	ATKINSON	85B	OMEG		20–70 γp
<0.15	ATKINSON	82	OMEG	0	20–70 $\gamma p \rightarrow p4\pi$

$\Gamma(a_1(1260)\pi)/\Gamma(4\pi)$ Γ_7/Γ_1

NODE=M065R15

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.16 ± 0.05	[1] ABELE	01B	CBAR	0.0 $\overline{p}n \rightarrow 5\pi$

[1] $\omega\pi$ not included.

NODE=M065R15;LINKAGE=BL

$\Gamma(h_1(1170)\pi)/\Gamma(4\pi)$ — Γ_8/Γ_1

NODE=M065R16

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.17 ± 0.06	[1] ABELE	01B	CBAR	0.0 $\overline{p}n \to 5\pi$

[1] $\omega\pi$ not included. NODE=M065R16;LINKAGE=BL

$\Gamma(\pi(1300)\pi)/\Gamma(4\pi)$ — Γ_9/Γ_1

NODE=M065R17

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.30 ± 0.10	[1] ABELE	01B	CBAR	0.0 $\overline{p}n \to 5\pi$

[1] $\omega\pi$ not included. NODE=M065R17;LINKAGE=BL

$\Gamma(\rho\rho)/\Gamma(4\pi)$ — Γ_{10}/Γ_1

NODE=M065R18

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.09 ± 0.03	[1] ABELE	01B	CBAR	0.0 $\overline{p}n \to 5\pi$

[1] $\omega\pi$ not included. NODE=M065R18;LINKAGE=BL

$\Gamma(\pi^+\pi^-)/\Gamma_{total}$ — Γ_{11}/Γ

NODE=M065R5

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.108\pm0.017^{+0.162}_{-0.004}$	[1] ALBRECHT	20	RVUE	0.9 $\overline{p}p \to K^+K^-\pi^0$
$0.287^{+0.043}_{-0.042}$	BECKER	79	ASPK	17 π^-p polarized
0.15 to 0.30	[2] MARTIN	78C	RVUE	17 $\pi^-p \to \pi^+\pi^-n$
<0.20	[3] COSTA...	77B	RVUE	$e^+e^- \to 2\pi, 4\pi$
0.30 ± 0.05	[2] FROGGATT	77	RVUE	17 $\pi^-p \to \pi^+\pi^-n$
<0.15	[4] EISENBERG	73	HBC	5 $\pi^+p \to \Delta^{++}2\pi$
0.25 ± 0.05	[5] HYAMS	73	ASPK	17 $\pi^-p \to \pi^+\pi^-n$

[1] Residue from T-matrix pole, 2 poles, 3 channels, Chew-Mandelstam functions and simplified analytic continuation for the 4π channel. Includes scattering data from HYAMS 75 and model-independent calculation of GARCIA-MARTIN 11A. NODE=M065R5;LINKAGE=A

[2] From phase shift analysis of HYAMS 73 data. NODE=M065R5;LINKAGE=P

[3] Estimate using unitarity, time reversal invariance, Breit-Wigner. NODE=M065R5;LINKAGE=C

[4] Estimated using one-pion-exchange model. NODE=M065R5;LINKAGE=E

[5] Included in BECKER 79 analysis. NODE=M065R5;LINKAGE=H

$\Gamma(K\overline{K})/\Gamma_{total}$ — Γ_{16}/Γ

NODE=M065R03

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.007\pm0.006^{+0.041}_{-0.002}$	[1] ALBRECHT	20	RVUE	0.9 $\overline{p}p \to K^+K^-\pi^0$

[1] Residue from T-matrix pole, 2 poles, 3 channels, Chew-Mandelstam functions and simplified analytic continuation for the 4π channel. Includes scattering data from HYAMS 75 and model-independent calculation of GARCIA-MARTIN 11A. NODE=M065R03;LINKAGE=A

$\Gamma(\pi^+\pi^-)/\Gamma(2(\pi^+\pi^-))$ — Γ_{11}/Γ_2

NODE=M065R3

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.13 ± 0.05	ASTON	80	OMEG	20–70 $\gamma p \to p2\pi$
<0.14	[1] DAVIER	73	STRC	6–18 $\gamma p \to p4\pi$
<0.2	[2] BINGHAM	72B	HBC	9.3 $\gamma p \to p2\pi$

[1] Upper limit is estimate. NODE=M065R3;LINKAGE=E

[2] 2σ upper limit. NODE=M065R3;LINKAGE=S

$\Gamma(\pi\pi)/\Gamma(4\pi)$ — Γ_{12}/Γ_1

NODE=M065R20

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.16 ± 0.04	[1,2] ABELE	01B	CBAR	0.0 $\overline{p}n \to 5\pi$

[1] Using ABELE 97. NODE=M065R;LINKAGE=LK

[2] $\omega\pi$ not included. NODE=M065R20;LINKAGE=BL

$\Gamma(K\overline{K}^*(892)+c.c.)/\Gamma_{total}$ — Γ_{13}/Γ

NODE=M065R21

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
possibly seen	COAN	04	CLEO	$\tau^- \to K^-\pi^-K^+\nu_\tau$

$\Gamma(K\overline{K}^*(892)+\text{c.c.})/\Gamma(2(\pi^+\pi^-))$ — Γ_{13}/Γ_2

NODE=M065R9

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.15 ± 0.03	[1] DELCOURT	81B	DM1	$e^+e^- \to \overline{K}K\pi$

[1] Assuming $\rho(1700)$ and ω radial excitations to be degenerate in mass.

NODE=M065R9;LINKAGE=D

$\Gamma(\eta\rho)/\Gamma_{\text{total}}$ — Γ_{14}/Γ

NODE=M065R12

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
possibly seen		AKHMETSHIN	00D	CMD2	$e^+e^- \to \eta\pi^+\pi^-$
<0.04		DONNACHIE	87B	RVUE	
<0.02	58	ATKINSON	86B	OMEG	20–70 γp

$\Gamma(\eta\rho)/\Gamma(2(\pi^+\pi^-))$ — Γ_{14}/Γ_2

NODE=M065R8

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.123 ± 0.027	DELCOURT	82	DM1	$e^+e^- \to \pi^+\pi^-$ MM
~ 0.1	ASTON	80	OMEG	20–70 γp

$\Gamma(\pi^+\pi^-\text{ neutrals})/\Gamma(2(\pi^+\pi^-))$ — $(\Gamma_5+\Gamma_6+0.714\Gamma_{14})/\Gamma_2$

NODE=M065R7

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.6 ± 0.4	[1] BALLAM	74	HBC	9.3 γp

[1] Upper limit. Background not subtracted.

NODE=M065R7;LINKAGE=U

$\Gamma(a_2(1320)\pi)/\Gamma_{\text{total}}$ — Γ_{15}/Γ

NODE=M065R14

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	AMELIN	00	VES	37 $\pi^- p \to \eta\pi^+\pi^- n$

$\Gamma(K\overline{K})/\Gamma(2(\pi^+\pi^-))$ — Γ_{16}/Γ_2

NODE=M065R4

VALUE	CL%	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
0.015 ± 0.010		[1] DELCOURT	81B	DM1		$e^+e^- \to \overline{K}K$
<0.04	95	BINGHAM	72B	HBC	0	9.3 γp

[1] Assuming $\rho(1700)$ and ω radial excitations to be degenerate in mass.

NODE=M065R4;LINKAGE=D

$\Gamma(K\overline{K})/\Gamma(K\overline{K}^*(892)+\text{c.c.})$ — Γ_{16}/Γ_{13}

NODE=M065R10

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.052 ± 0.026	BUON	82	DM1	$e^+e^- \to$ hadrons

$\Gamma(\pi^0\omega)/\Gamma_{\text{total}}$ — Γ_{18}/Γ

NODE=M065R13

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
not seen		MATVIENKO	15	BELL	$\overline{B}^0 \to D^{*+}\omega\pi^-$
seen	1.6k	ACHASOV	12	SND	$e^+e^- \to \pi^0\pi^0\gamma$
not seen	2382	AKHMETSHIN	03B	CMD2	$e^+e \to \pi^0\pi^0\gamma$
seen		ACHASOV	97	RVUE	$e^+e^- \to \omega\pi^0$

$\Gamma(\pi^0\gamma)/\Gamma_{\text{total}}$ — Γ_{19}/Γ

NODE=M065R02

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	[1] ACHASOV	10D	SND	1.075–2.0 $e^+e^- \to \pi^0\gamma$

[1] From a fit of a VMD model with two effective resonances with masses of 1450 MeV and 1700 MeV to describe the excited vector states $\omega(1420)$, $\rho(1450)$, $\omega(1650)$, and $\rho(1700)$. The width of the highest mass effective resonance is fixed at 315 MeV.

NODE=M065R02;LINKAGE=A

$\rho(1700)$ REFERENCES

NODE=M065

ALBRECHT 20 EPJ C80 453 M. Albrecht *et al.* (Crystal Barrel Collab.) REFID=60439
GRIBANOV 20 JHEP 2001 112 S.S. Gribanov *et al.* (CMD-3 Collab.) REFID=60620
ACHASOV 18 PR D97 012008 M.N. Achasov *et al.* (SND Collab.) REFID=58785
LEES 18 PR D97 052007 J.P. Lees *et al.* (BABAR Collab.) REFID=58900
BARTOS 17 PR D96 113004 E. Bartos *et al.* REFID=58325
BARTOS 17A IJMP A32 1750154 E. Bartos *et al.* REFID=58367
LEES 17C PR D95 072007 J.P. Lees *et al.* (BABAR Collab.) REFID=57981
AAIJ 16N PR D93 052018 R. Aaij *et al.* (LHCb Collab.) REFID=57273
ABLIKIM 16C PL B753 629 M. Ablikim *et al.* (BESIII Collab.) REFID=57138
ACHASOV 16D PR D94 112001 M.N. Achasov *et al.* (SND Collab.) REFID=57618
AULCHENKO 15 PR D91 052013 V.M. Aulchenko *et al.* (SND Collab.) REFID=56793
MATVIENKO 15 PR D92 012013 D. Matvienko *et al.* (BELLE Collab.) REFID=56601
ACHASOV 13 PR D88 054013 M.N. Achasov *et al.* (SND Collab.) REFID=55584
ABRAMOWICZ 12 EPJ C72 1869 H. Abramowicz *et al.* (ZEUS Collab.) REFID=54274
ACHASOV 12 JETPL 94 734 M.N. Achasov *et al.* REFID=54275
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LEES 12G PR D86 032013 J.P. Lees *et al.* (BABAR Collab.) REFID=54299
AMBROSINO 11A PL B700 102 F. Ambrosino *et al.* (KLOE Collab.) REFID=16683
GARCIA-MAR... 11A PR D83 074004 R. Garcia-Martin *et al.* (MADR, CRAC) REFID=54121
ACHASOV 10D PR D98 112001 M.N. Achasov *et al.* (SND Collab.) REFID=59494
DUBNICKA 10 APS 60 1 S. Dubnicka, A.Z. Dubnickova REFID=58797
AUBERT 09AS PRL 103 231801 B. Aubert *et al.* (BABAR Collab.) REFID=53136
FUJIKAWA 08 PR D78 072006 M. Fujikawa *et al.* (BELLE Collab.) REFID=52536
AKHMETSHIN 07 PL B648 28 R.R. Akhmetshin *et al.* (Novosibirsk CMD-2 Collab.) REFID=51615
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COAN 04 PRL 92 232001 T.E. Coan *et al.* (CLEO Collab.) REFID=49945
FRABETTI 04 PL B578 290 P.L. Frabetti *et al.* (FNAL E687 Collab.) REFID=49614
AKHMETSHIN 03B PL B562 173 R.R. Akhmetshin *et al.* (Novosibirsk CMD-2 Collab.) REFID=49406
ABELE 01B EPJ C21 261 A. Abele *et al.* (Crystal Barrel Collab.) REFID=48356
ACHASOV 00I PL B486 29 M.N. Achasov *et al.* (Novosibirsk SND Collab.) REFID=47931
AKHMETSHIN 00D PL B489 125 R.R. Akhmetshin *et al.* (Novosibirsk CMD-2 Collab.) REFID=47935
AMELIN 00 NP A668 83 D. Amelin *et al.* (VES Collab.) REFID=47432
EDWARDS 00A PR D61 072003 K.W. Edwards *et al.* (CLEO Collab.) REFID=47465
ABELE 99D PL B468 178 A. Abele *et al.* (Crystal Barrel Collab.) REFID=47401
ABELE 97 PL B391 191 A. Abele *et al.* (Crystal Barrel Collab.) REFID=45415
ACHASOV 97 PR D55 2663 N.N. Achasov *et al.* (NOVM) REFID=45382
BERTIN 97C PL B408 476 A. Bertin *et al.* (OBELIX Collab.) REFID=45701
CLEGG 94 ZPHY C62 455 A.B. Clegg, A. Donnachie (LANC, MCHS) REFID=44081
CLEGG 90 ZPHY C45 677 A.B. Clegg, A. Donnachie (LANC, MCHS) REFID=41355
KUHN 90 ZPHY C48 445 J.H. Kuhn *et al.* (MPIM) REFID=45862
BISELLO 89 PL B220 321 D. Bisello *et al.* (DM2 Collab.) REFID=40740
DUBNICKA 89 JP G15 1349 S. Dubnicka *et al.* (JINR, SLOV) REFID=44082
GESHKEN... 89 ZPHY C45 351 B.V. Geshkenbein (ITEP) REFID=41017
ANTONELLI 88 PL B212 133 A. Antonelli *et al.* (DM2 Collab.) REFID=40583
DIEKMAN 88 PRPL 159 99 B. Diekmann (BONN) REFID=40272
FUKUI 88 PL B202 441 S. Fukui *et al.* (SUGI, NAGO, KEK, KYOT+) REFID=40273
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ATKINSON 85B ZPHY C26 499 M. Atkinson *et al.* (BONN, CERN, GLAS+) REFID=21506
ERKAL 85 ZPHY C29 485 C. Erkal, M.G. Olsson (WISC) REFID=20136
ABE 84B PRL 53 751 K. Abe *et al.* (SLAC HFP Collab.) REFID=21503
KURDADZE 83 JETPL 37 733 L.M. Kurdadze *et al.* (NOVO) REFID=20133
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CLELAND 82B NP B208 228 W.E. Cleland *et al.* (DURH, GEVA, LAUS+) REFID=21281
CORDIER 82 PL 109B 129 A. Cordier *et al.* (LALO) REFID=21495
DELCOURT 82 PL 113B 93 B. Delcourt *et al.* (LALO) REFID=21496
ASTON 81E NP B189 15 D. Aston (BONN, CERN, EPOL, GLAS, LANC+) REFID=21487
DELCOURT 81B Bonn Conf. 205 B. Delcourt (ORSAY) REFID=21490
Also PL 109B 129 A. Cordier *et al.* (LALO) REFID=21495
DIBIANCA 81 PR D23 595 F.A. di Bianca *et al.* (CASE, CMU) REFID=21492
ASTON 80 PL 92B 215 D. Aston (BONN, CERN, EPOL, GLAS, LANC+) REFID=21478
BACCI 80 PL 95B 139 C. Bacci *et al.* (ROMA, FRAS) REFID=21481
BIZOT 80 Madison Conf. 546 J.C. Bizot *et al.* (LALO, MONP) REFID=21482
KILLIAN 80 PR D21 3005 T.J. Killian *et al.* (CORN) REFID=21484
ATIYA 79B PRL 43 1691 M.S. Atiya *et al.* (COLU, ILL, FNAL) REFID=21470
BECKER 79 NP B151 46 H. Becker *et al.* (MPIM, CERN, ZEEM, CRAC) REFID=21084
LANG 79 PR D19 956 C.B. Lang, A. Mas-Parareda (GRAZ) REFID=20126
MARTIN 78C ANP 114 1 A.D. Martin, M.R. Pennington (CERN) REFID=21661
COSTA... 77B PL 71B 345 B. Costa de Beauregard, B. Pire, T.N. Truong (EPOL) REFID=21465
FROGGATT 77 NP B129 89 C.D. Froggatt, J.L. Petersen (GLAS, NORD) REFID=21072
ALEXANDER 75 PL 57B 487 G. Alexander *et al.* (TELA) REFID=21450
HYAMS 75 NP B100 205 B.D. Hyams *et al.* (CERN, MPIM) REFID=20355
BALLAM 74 NP B76 375 J. Ballam *et al.* (SLAC, LBL, MPIM) REFID=20610
CONVERSI 74 PL 52B 493 M. Conversi *et al.* (ROMA, FRAS) REFID=20637
SCHACHT 74 NP B81 205 P. Schacht *et al.* (MPIM) REFID=21449
DAVIER 73 NP B58 31 M. Davier *et al.* (SLAC) REFID=21434
EISENBERG 73 PL 43B 149 Y. Eisenberg *et al.* (REHO) REFID=21435
HYAMS 73 NP B64 134 B.D. Hyams *et al.* (CERN, MPIM) REFID=20107
BINGHAM 72B PL 41B 635 H.H. Bingham *et al.* (LBL, UCB, SLAC) IGJP REFID=21426
JACOB 72 PR D5 1847 M. Jacob, R. Slansky REFID=49668
GOUNARIS 68 PRL 21 244 G.J. Gounaris, J.J. Sakurai REFID=48054

NODE=M162

$a_2(1700)$

$I^G(J^{PC}) = 1^-(2^{++})$

$a_2(1700)$ MASS

NODE=M162M

NODE=M162M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1698 ±44		[1] AMSLER	02	CBAR	0.9 $\overline{p}p \to \pi^0\eta\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1686 ±22 $^{+19}_{-7}$		[2] KOPF	21	RVUE	0.9 $p\overline{p} \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0K^+K^-$ and 191 $\pi^-p \to \pi^-\pi^-\pi^+p$
1638.9± 2.3$^{+57.4}_{-0.1}$		[3] ALBRECHT	20	RVUE	0.9 $\overline{p}p \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0K^+K^-$
1722 ±15 ±67		[4] RODAS	19	JPAC	191 $\pi^-p \to \eta^{(\prime)}\pi^-p$
1681 $^{+22}_{-35}$	46M	[5,6] AGHASYAN	18B	COMP	190 $\pi^-p \to \pi^-\pi^+\pi^-p$
1720 ±10 ±60		[7] JACKURA	18	JPAC	$\pi^-p \to \eta\pi^-p$
1726 ±12 ±25		[6] ABLIKIM	17K	BES3	$\psi(2S) \to \gamma\eta\pi^+\pi^-$
1675 ±25		ANISOVICH	09	RVUE	0.0 $\overline{p}p$, πN
1722 ± 9 ±15	18k	[8] SCHEGELSKY	06	RVUE	$\gamma\gamma \to \pi^+\pi^-\pi^0$
1702 ± 7	80k	[9] UMAN	06	E835	5.2 $\overline{p}p \to \eta\eta\pi^0$
1721 ±13 ±44	145k	LU	05	B852	18 $\pi^-p \to \omega\pi^-\pi^0p$
1737 ± 5 ± 7		ABE	04	BELL	10.6 $e^+e^- \to e^+e^-K^+K^-$
1767 ±14	221	[10] ACCIARRI	01H	L3	$\gamma\gamma \to K^0_SK^0_S$, E^{ee}_{cm}= 91, 183–209 GeV
1660 ±40		[6] ABELE	99B	CBAR	1.94 $\overline{p}p \to \pi^0\eta\eta$
~ 1775		[11] GRYGOREV	99	SPEC	40 $\pi^-p \to K^0_SK^0_Sn$
1752 ±21 ± 4		ACCIARRI	97T	L3	$\gamma\gamma \to \pi^+\pi^-\pi^0$

[1] T-matrix pole. NODE=M162M;LINKAGE=TT

[2] From T-matrix pole based on combined fit of Crystal Barrel and $\pi\pi$ scattering data (ALBRECHT 20), and COMPASS data (ADOLPH 15), using a coupled-channel model of $\eta\pi$, $\eta'\pi$ and $K\overline{K}$ systems. NODE=M162M;LINKAGE=H

[3] T-matrix pole, 2 poles, 2 channels ($\pi\eta$, $K\overline{K}$). NODE=M162M;LINKAGE=G

[4] The coupled-channel analysis of both the $\eta\pi$ and $\eta'\pi$ systems using ADOLPH 15 data. The mass is extracted from the T-matrix pole. NODE=M162M;LINKAGE=C

[5] Statistical error negligible. NODE=M162M;LINKAGE=B

[6] Breit-Wigner mass. NODE=M162M;LINKAGE=E

[7] Superseded by RODAS 19. NODE=M162M;LINKAGE=D

[8] From analysis of L3 data at 183–209 GeV. NODE=M162M;LINKAGE=SC

[9] Statistical error only. NODE=M162M;LINKAGE=ST

[10] Spin 2 dominant, isospin not determined, could also be I=1. NODE=M162M;LINKAGE=HA

[11] Possibly two $J^P = 2^+$ resonances with isospins 0 and 1. NODE=M162M;LINKAGE=GR

$a_2(1700)$ WIDTH

NODE=M162W

NODE=M162W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
265 ± 55		[1] AMSLER	02	CBAR	0.9 $\overline{p}p \to \pi^0\eta\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
421 ± 75 $^{+64}_{-57}$		[2] KOPF	21	RVUE	0.9 $p\overline{p} \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0K^+K^-$ and 191 $\pi^-p \to \pi^-\pi^-\pi^+p$
224.0± 2.5$^{+1.8}_{-48.3}$		[3] ALBRECHT	20	RVUE	0.9 $\overline{p}p \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0K^+K^-$
247 ± 17 ±63		[4] RODAS	19	JPAC	191 $\pi^-p \to \eta^{(\prime)}\pi^-p$
436 $^{+20}_{-16}$	46M	[5,6] AGHASYAN	18B	COMP	190 $\pi^-p \to \pi^-\pi^+\pi^-p$
280 ± 10 ±70		[7] JACKURA	18	JPAC	$\pi^-p \to \eta\pi^-p$
190 ± 18 ±30		[6] ABLIKIM	17K	BES3	$\psi(2S) \to \gamma\eta\pi^+\pi^-$
270 $^{+50}_{-20}$		ANISOVICH	09	RVUE	0.0 $\overline{p}p$, πN

336 ± 20 ±20	18k	[8] SCHEGELSKY	06	RVUE	$\gamma\gamma \to \pi^+\pi^-\pi^0$	
417 ± 19	80k	[9] UMAN	06	E835	5.2 $\overline{p}p \to \eta\eta\pi^0$	
279 ± 49 ±66	145k	LU	05	B852	18 $\pi^- p \to \omega\pi^-\pi^0 p$	
151 ± 22 ±24		ABE	04	BELL	10.6 $e^+e^- \to e^+e^- K^+K^-$	
187 ± 60	221	[10] ACCIARRI	01H	L3	$\gamma\gamma \to K^0_S K^0_S$, E^{ee}_{cm}= 91, 183–209 GeV	
280 ± 70		[6] ABELE	99B	CBAR	1.94 $\overline{p}p \to \pi^0\eta\eta$	
150 ±110 ±34		ACCIARRI	97T	L3	$\gamma\gamma \to \pi^+\pi^-\pi^0$	

[1] T-matrix pole. NODE=M162W;LINKAGE=TT

[2] From T-matrix pole based on combined fit of Crystal Barrel and $\pi\pi$ scattering data (ALBRECHT 20), and COMPASS data (ADOLPH 15), using a coupled-channel model of $\eta\pi$, $\eta'\pi$ and $K\overline{K}$ systems. NODE=M162W;LINKAGE=H

[3] T-matrix pole, 2 poles, 2 channels ($\pi\eta$, $K\overline{K}$). NODE=M162W;LINKAGE=G

[4] The coupled-channel analysis of both the $\eta\pi$ and $\eta'\pi$ systems using ADOLPH 15 data. The width is extracted from the T-matrix pole. NODE=M162W;LINKAGE=C

[5] Statistical error negligible. NODE=M162W;LINKAGE=B

[6] Breit-Wigner width. NODE=M162W;LINKAGE=E

[7] Superseded by RODAS 19. NODE=M162W;LINKAGE=D

[8] From analysis of L3 data at 183–209 GeV. NODE=M162W;LINKAGE=SC

[9] Statistical error only. NODE=M162W;LINKAGE=ST

[10] Spin 2 dominant, isospin not determined, could also be I=1. NODE=M162W;LINKAGE=HA

a_2(1700) DECAY MODES

NODE=M162215;NODE=M162

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\eta\pi$	(3.6 ±1.1) %	DESIG=4
Γ_2	$\eta'\pi$		DESIG=8
Γ_3	$\gamma\gamma$	(1.13±0.30) × 10^{-6}	DESIG=1
Γ_4	$\rho\pi$	seen	DESIG=2;OUR EVAL;→ UNCHECKED ←
Γ_5	$f_2(1270)\pi$	seen	DESIG=3;OUR EVAL;→ UNCHECKED ←
Γ_6	$K\overline{K}$	(1.9 ±1.2) %	DESIG=5
Γ_7	$\omega\pi^-\pi^0$	seen	DESIG=6;OUR EVAL;→ UNCHECKED ←
Γ_8	$\omega\rho$	seen	DESIG=7;OUR EVAL;→ UNCHECKED ←

a_2(1700) PARTIAL WIDTHS

NODE=M162220

$\Gamma(\eta\pi)$ — Γ_1

NODE=M162W3
NODE=M162W3

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
9.5±2.0	870	[1] SCHEGELSKY	06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$

[1] From analysis of L3 data at 91 and 183–209 GeV, using a_2(1700) mass of 1730 MeV and width of 340 MeV, and SU(3) relations. NODE=M162W3;LINKAGE=SC

$\Gamma(\gamma\gamma)$ — Γ_3

NODE=M162W2
NODE=M162W2

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.30±0.05	870	[1] SCHEGELSKY	06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$

[1] From analysis of L3 data at 91 and 183–209 GeV, using a_2(1700) mass of 1730 MeV and width of 340 MeV, and SU(3) relations. NODE=M162W2;LINKAGE=SC

$\Gamma(K\overline{K})$ — Γ_6

NODE=M162W1
NODE=M162W1

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
5.0±3.0	870	[1] SCHEGELSKY	06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$

[1] From analysis of L3 data at 91 and 183–209 GeV, using a_2(1700) mass of 1730 MeV and width of 340 MeV, and SU(3) relations. NODE=M162W1;LINKAGE=SC

a_2(1700) $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M162225

$[\Gamma(\rho\pi)+\Gamma(f_2(1270)\pi)] \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $(\Gamma_4+\Gamma_5)\Gamma_3/\Gamma$

NODE=M162G1
NODE=M162G1

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.29±0.04±0.02		ACCIARRI	97T	L3	$\gamma\gamma \to \pi^+\pi^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.37^{+0.12}_{-0.08}$±0.10	18k	[1] SCHEGELSKY	06	RVUE	$\gamma\gamma \to \pi^+\pi^-\pi^0$

[1] From analysis of L3 data at 183–209 GeV. NODE=M162G1;LINKAGE=SC

$\Gamma(K\overline{K}) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_6\Gamma_3/\Gamma$

NODE=M162G2

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$20.6\pm 4.2\pm 4.6$	[1] ABE	04	BELL	$10.6\ e^+e^- \to e^+e^-K^+K^-$
$49\ \pm11\ \pm13$	[2] ACCIARRI	01H	L3	$\gamma\gamma \to K^0_S K^0_S$, $E^{ee}_{cm}=91$, 183–209 GeV

[1] Assuming spin 2. NODE=M162G2;LINKAGE=AB

[2] Spin 2 dominant, isospin not determined, could also be I=1. NODE=M162G;LINKAGE=HA

$a_2(1700)$ BRANCHING RATIOS

NODE=M162235

$\Gamma(\rho\pi)/\Gamma(f_2(1270)\pi)$ — Γ_4/Γ_5

NODE=M162R01

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$3.4\pm0.4\pm0.1$	18k	[1] SCHEGELSKY	06	RVUE	$\gamma\gamma \to \pi^+\pi^-\pi^0$

[1] From analysis of L3 data at 183–209 GeV. NODE=M162R01;LINKAGE=SC

$\Gamma(K\overline{K})/\Gamma(\eta\pi)$ — Γ_6/Γ_1

NODE=M162R00

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.029\pm0.04\ ^{+0.011}_{-0.012}$	[1] KOPF	21	RVUE	$0.9\ p\overline{p} \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0K^+K^-$ and $191\ \pi^-p \to \pi^-\pi^-\pi^+p$
$4.134\pm0.106\ ^{+4.909}_{-2.988}$	[2] ALBRECHT	20	RVUE	$0.9\ \overline{p}p \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0K^+K^-$

[1] From T-matrix pole based on combined fit of Crystal Barrel and $\pi\pi$ scattering data (ALBRECHT 20), and COMPASS data (ADOLPH 15), using a coupled-channel model of $\eta\pi$, $\eta'\pi$ and $K\overline{K}$ systems. NODE=M162R00;LINKAGE=B

[2] Residues from T-matrix pole, 2 poles, 2 channels ($\pi\eta$, $K\overline{K}$). NODE=M162R00;LINKAGE=A

$\Gamma(\eta'\pi)/\Gamma(\eta\pi)$ — Γ_2/Γ_1

NODE=M162R02

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.035\pm0.044\ ^{+0.069}_{-0.012}$	[1] KOPF	21	RVUE	$0.9\ p\overline{p} \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0K^+K^-$ and $191\ \pi^-p \to \pi^-\pi^-\pi^+p$

[1] From T-matrix pole based on combined fit of Crystal Barrel and $\pi\pi$ scattering data (ALBRECHT 20), and COMPASS data (ADOLPH 15), using a coupled-channel model of $\eta\pi$, $\eta'\pi$ and $K\overline{K}$ systems. NODE=M162R02;LINKAGE=A

$a_2(1700)$ REFERENCES

NODE=M162

KOPF	21	EPJ C81 1056	B. Kopf *et al.*	(BOCH)	REFID=61470
ALBRECHT	20	EPJ C80 453	M. Albrecht *et al.*	(Crystal Barrel Collab.)	REFID=60439
RODAS	19	PRL 122 042002	A. Rodas *et al.*	(JPAC Collab.)	REFID=59554
AGHASYAN	18B	PR D98 092003	M. Aghasyan *et al.*	(COMPASS Collab.)	REFID=59471
JACKURA	18	PL B779 464	A. Jackura *et al.*	(JPAC and COMPASS Collab.)	REFID=59003
ABLIKIM	17K	PR D95 032002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57953
ADOLPH	15	PL B740 303	M. Adolph *et al.*	(COMPASS Collab.)	REFID=56385
ANISOVICH	09	IJMP A24 2481	V.V. Anisovich, A.V. Sarantsev		REFID=52719
SCHEGELSKY	06	EPJ A27 199	V.A. Schegelsky *et al.*		REFID=51186
SCHEGELSKY	06A	EPJ A27 207	V.A. Schegelsky *et al.*		REFID=51185
UMAN	06	PR D73 052009	I. Uman *et al.*	(FNAL E835)	REFID=51063
LU	05	PRL 94 032002	M. Lu *et al.*	(BNL E852 Collab.)	REFID=50459
ABE	04	EPJ C32 323	K. Abe *et al.*	(BELLE Collab.)	REFID=49650
AMSLER	02	EPJ C23 29	C. Amsler *et al.*		REFID=48580
ACCIARRI	01H	PL B501 173	M. Acciarri *et al.*	(L3 Collab.)	REFID=48321
ABELE	99B	EPJ C8 67	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=46904
GRYGOREV	99	PAN 62 470	V.K. Grygorev *et al.*		REFID=46909
		Translated from YAF 62 513.			
ACCIARRI	97T	PL B413 147	M. Acciarri *et al.*	(L3 Collab.)	REFID=45761

NODE=M068

$f_0(1710)$ $I^G(J^{PC}) = 0^+(0^{++})$

See the review on "Spectroscopy of Light Meson Resonances."

NODE=M068

$f_0(1710)$ MASS

NODE=M068M

OUR EVALUATION below is based on T-matrix poles from BARBERIS 00E and BARBERIS 99D.

NODE=M068M

NODE=M068M

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
1704±12 OUR EVALUATION				
1733^{+8}_{-7} OUR AVERAGE Error includes scale factor of 1.5. See the ideogram below.				
[1732^{+9}_{-7} MeV OUR 2021 AVERAGE Scale factor = 1.6]				
1757±24 ± 9		[1] LEES 21A	BABR	$\eta_c(1S) \to \eta' K^+ K^-$
$1759\pm 6 ^{+14}_{-25}$	5.5k	[2] ABLIKIM 13N	BES3	$e^+e^- \to J/\psi \to \gamma\eta\eta$
$1750^{+6}_{-7}{}^{+29}_{-18}$		[3] UEHARA 13	BELL	$\gamma\gamma \to K^0_S K^0_S$
$1701\pm 5 ^{+9}_{-2}$	4k	[4] CHEKANOV 08	ZEUS	$ep \to K^0_S K^0_S X$
$1765^{+4}_{-3}\pm 13$		[1] ABLIKIM 06V	BES2	$e^+e^- \to J/\psi \to \gamma\pi^+\pi^-$
1738±30		ABLIKIM 04E	BES2	$J/\psi \to \omega K^+ K^-$
$1740\pm 4 ^{+10}_{-25}$		BAI 03G	BES	$J/\psi \to \gamma K \overline{K}$
1740^{+30}_{-25}		BAI 00A	BES	$J/\psi \to \gamma(\pi^+\pi^-\pi^+\pi^-)$
1710±25		[5] FRENCH 99		300 $pp \to p_f (K^+K^-) p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1769± 8		[6] RODAS 22	RVUE	$J/\psi(1S) \to \gamma\,(\pi\pi,\ K\overline{K})$
1814±31	7.2k	[7] KHOLODENK..21	VES	29 $\pi^- p \to n\omega\phi$
1700±18		[8,9] SARANTSEV 21	RVUE	$J/\psi(1S) \to \gamma\,(\pi\pi,\ K\overline{K},\ \eta\eta,\ \omega\phi)$
$1803\pm 3.5^{+45.5}_{-10.4}$		[10] ALBRECHT 20	RVUE	0.9 $\overline{p}p \to \pi^0\pi^0\eta,\ \pi^0\eta\eta,\ \pi^0 K^+K^-$
1744± 7 ± 5	381	[11,12] DOBBS 15		$J/\psi \to \gamma\pi^+\pi^-$
1705±11 ± 5	237	[11,12] DOBBS 15		$\psi(2S) \to \gamma\pi^+\pi^-$
1706± 4 ± 5	1.0k	[11,12] DOBBS 15		$J/\psi \to \gamma K^+K^-$
1690± 8 ± 3	349	[11,12] DOBBS 15		$\psi(2S) \to \gamma K^+K^-$
$1795\pm 7 ^{+23}_{-20}$		ABLIKIM 13J	BES3	$J/\psi \to \gamma\omega\phi$
$1812^{+19}_{-26}\pm 18$		[13] ABLIKIM 06J	BES2	$J/\psi \to \gamma\omega\phi$
1750±13		AMSLER 06	CBAR	1.64 $\overline{p}p \to K^+K^-\pi^0$
1747± 5	80k	[1,14] UMAN 06	E835	5.2 $\overline{p}p \to \eta\eta\pi^0$
1776±15		VLADIMIRSK...06	SPEC	40 $\pi^- p \to K^0_S K^0_S n$
1790^{+40}_{-30}		[15] ABLIKIM 05	BES2	$J/\psi \to \phi\pi^+\pi^-$
$1760\pm 15 ^{+15}_{-10}$		[15] ABLIKIM 05Q	BES2	$\psi(2S) \to \gamma\pi^+\pi^- K^+K^-$
1670±20		[1] BINON 05	GAMS	33 $\pi^- p \to \eta\eta n$
1732+15		[16] ANISOVICH 03	RVUE	
1682±16		TIKHOMIROV 03	SPEC	40.0 π^- C $\to K^0_S K^0_S K^0_L X$
1670±26	3.6k	[17] NICHITIU 02	OBLX	0 $\overline{p}p \to K^+K^-\pi^+\pi^-\pi^0$
1698±18		[8] BARBERIS 00E		450 $pp \to p_f \eta\eta p_s$
1770±12		[18] ANISOVICH 99B	SPEC	0.6–1.2 $p\overline{p} \to \eta\eta\pi^0$
1730±15		BARBERIS 99	OMEG	450 $pp \to p_s p_f K^+K^-$
1750±20		BARBERIS 99B	OMEG	450 $pp \to p_s p_f \pi^+\pi^-$
1710±12 ±11		[19] BARBERIS 99D	OMEG	450 $pp \to K^+K^-,\ \pi^+\pi^-$
1750±30		[20] ANISOVICH 98B	RVUE	Compilation
1720±39		BAI 98H	BES	$J/\psi \to \gamma\pi^0\pi^0$
1775± 1.5	57	[21] BARKOV 98		$\pi^- p \to K^0_S K^0_S n$
1690±11		[22] ABREU 96C	DLPH	$Z^0 \to K^+K^- + X$
$1696\pm 5 ^{+9}_{-34}$		[23] BAI 96C	BES	$J/\psi \to \gamma K^+K^-$
$1781\pm 8 ^{+10}_{-31}$		BAI 96C	BES	$J/\psi \to \gamma K^+K^-$
1768±14		BALOSHIN 95	SPEC	40 π^- C $\to K^0_S K^0_S X$
1750±15		[24] BUGG 95	MRK3	$J/\psi \to \gamma\pi^+\pi^-\pi^+\pi^-$

NODE=M068M
→ UNCHECKED ←

NEW

OCCUR=3

OCCUR=2
OCCUR=3
OCCUR=4

OCCUR=2

1620 ± 16		[23] BUGG	95	MRK3	$J/\psi \to \gamma \pi^+ \pi^- \pi^+ \pi^-$	OCCUR=2
1748 ± 10		[25] ARMSTRONG	93C	E760	$\overline{p} p \to \pi^0 \eta \eta \to 6\gamma$	
~ 1750		BREAKSTONE	93	SFM	$p p \to p p \pi^+ \pi^- \pi^+ \pi^-$	
1744 ± 15		[26] ALDE	92D	GAM2	$38\ \pi^- p \to \eta \eta n$	
1713 ± 10		[27] ARMSTRONG	89D	OMEG	$300\ p p \to p p K^+ K^-$	
1706 ± 10		[27] ARMSTRONG	89D	OMEG	$300\ p p \to p p K^0_S K^0_S$	OCCUR=2
1707 ± 10		[25] AUGUSTIN	88	DM2	$J/\psi \to \gamma K^+ K^-$, $K^0_S K^0_S$	
1700 ± 15		[23] BOLONKIN	88	SPEC	$40\ \pi^- p \to K^0_S K^0_S n$	
1720 ± 60		BOLONKIN	88	SPEC	$40\ \pi^- p \to K^0_S K^0_S n$	OCCUR=2
1638 ± 10		[28] FALVARD	88	DM2	$J/\psi \to \phi K^+ K^-$, $K^0_S K^0_S$	
1690 ± 4		[29] FALVARD	88	DM2	$J/\psi \to \phi K^+ K^-$, $K^0_S K^0_S$	OCCUR=2
1698 ± 15		[25] AUGUSTIN	87	DM2	$J/\psi \to \gamma \pi^+ \pi^-$	
1720 ± 10	± 10	[23] BALTRUSAIT...	87	MRK3	$J/\psi \to \gamma K^+ K^-$	
1755 ± 8		[30] ALDE	86C	GAM2	$38\ \pi^- p \to n 2\eta$	
$1730^{+\ 2}_{-10}$		[31] LONGACRE	86	RVUE	$22\ \pi^- p \to n 2K^0_S$	
1742 ± 15		[25] WILLIAMS	84	MPSF	$200\ \pi^- N \to 2K^0_S X$	
1670 ± 50		BLOOM	83	CBAL	$J/\psi \to \gamma 2\eta$	
1650 ± 50		BURKE	82	MRK2	$J/\psi \to \gamma 2\rho$	
1640 ± 50		[32,33] EDWARDS	82D	CBAL	$J/\psi \to \gamma 2\eta$	
1730 ± 10	± 20	[34] ETKIN	82C	MPS	$23\ \pi^- p \to n 2K^0_S$	

[1] Breit-Wigner mass. NODE=M068M;LINKAGE=BW

[2] From partial wave analysis including all possible combinations of 0^{++}, 2^{++}, and 4^{++} resonances. NODE=M068M;LINKAGE=D

[3] Spin 0 favored over spin 2. NODE=M068M;LINKAGE=H

[4] In the SU(3) based model with a specific interference pattern of the $f_2(1270)$, $a^0_2(1320)$, and $f'_2(1525)$ mesons incoherently added to the $f_0(1710)$ and non-resonant background. NODE=M068M;LINKAGE=HE

[5] $J^P = 0^+$, supersedes by ARMSTRONG 89D. NODE=M068M;LINKAGE=C3

[6] T-matrix pole from coupled channel K-matrix fit to data on $J/\psi \to \gamma \pi^0 \pi^0$ (ABLIKIM 15AE) and $J/\psi \to \gamma K^0_S K^0_S$ (ABLIKIM 18AA). NODE=M068M;LINKAGE=O

[7] From partial wave analysis of $\omega\phi$ invariant mass including 0^{++}, 2^{++}, and 0^{-+} resonances. NODE=M068M;LINKAGE=M

[8] T-matrix pole. NODE=M068M;LINKAGE=J

[9] Close-by state with mass 1765 ± 15 MeV and width 180 ± 20 MeV. NODE=M068M;LINKAGE=N

[10] T-matrix pole, 5 poles, 5 channels, including scattering data from HYAMS 75 ($\pi\pi$), LONGACRE 86 ($K\overline{K}$), BINON 83 ($\eta\eta$), and BINON 84C ($\eta\eta'$). NODE=M068M;LINKAGE=TP

[11] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M068M;LINKAGE=F

[12] From a fit to a Breit-Wigner line shape with fixed $\Gamma = 135$ MeV. NODE=M068M;LINKAGE=G

[13] Not seen by LIU 09 in $B^\pm \to K^\pm \omega\phi$. NODE=M068M;LINKAGE=L

[14] Systematic errors not estimated. NODE=M068M;LINKAGE=CH

[15] This state may be different from $f_0(1710)$, see CLOSE 05. NODE=M068M;LINKAGE=AB

[16] K-matrix pole, assuming $J^P = 0^+$, from combined analysis of $\pi^- p \to \pi^0 \pi^0 n$, $\pi^- p \to K\overline{K} n$, $\pi^+ \pi^- \to \pi^+ \pi^-$, $\overline{p} p \to \pi^0 \pi^0 \pi^0$, $\pi^0 \eta \eta$, $\pi^0 \pi^0 \eta$, $\pi^+ \pi^- \pi^0$, $K^+ K^- \pi^0$, $K^0_S K^0_S \pi^0$, $K^+ K^0_S \pi^-$ at rest, $\overline{p} n \to \pi^- \pi^- \pi^+$, $K^0_S K^- \pi^0$, $K^0_S K^0_S \pi^-$ at rest. NODE=M068M;LINKAGE=KM

[17] Decaying to $f_0(1370)\pi\pi$. NODE=M068M;LINKAGE=NC

[18] Not seen by AMSLER 02. NODE=M068M;LINKAGE=NS

[19] Supersedes BARBERIS 99 and BARBERIS 99B. NODE=M068M;LINKAGE=BD

[20] T-matrix pole, assuming $J^P = 0^+$ NODE=M068M;LINKAGE=AN

[21] No J^{PC} determination. NODE=M068M;LINKAGE=4A

[22] No J^{PC} determination, width not determined. NODE=M068M;LINKAGE=A4

[23] $J^P = 2^+$. NODE=M068M;LINKAGE=A3

[24] From a fit to the 0^+ partial wave. NODE=M068M;LINKAGE=Q0

[25] No J^{PC} determination. NODE=M068M;LINKAGE=A1

[26] ALDE 92D combines all the GAMS-2000 data. NODE=M068M;LINKAGE=AA

[27] $J^P = 2^+$, superseded by FRENCH 99. NODE=M068M;LINKAGE=C

[28] From an analysis ignoring interference with $f'_2(1525)$. NODE=M068M;LINKAGE=A

[29] From an analysis including interference with $f'_2(1525)$. NODE=M068M;LINKAGE=B

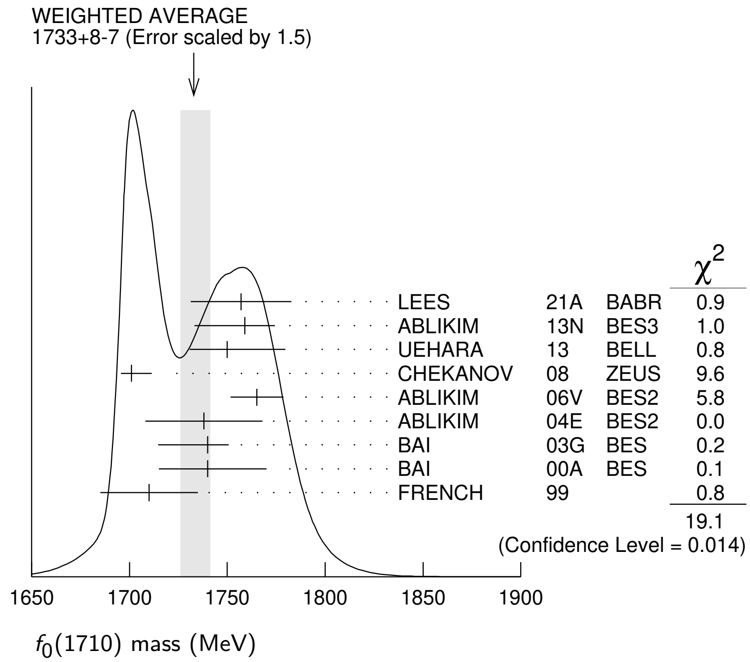
[30] Superseded by ALDE 92D. NODE=M068M;LINKAGE=BB

[31] Uses MRK3 data. From a partial-wave analysis of data using a K-matrix formalism with 5 poles, but assuming spin 2. Fit with constrained inelasticity. NODE=M068M;LINKAGE=A9

[32] $J^P = 2^+$ preferred. NODE=M068M;LINKAGE=B2

[33] From fit neglecting nearby $f'_2(1525)$. Replaced by BLOOM 83. NODE=M068M;LINKAGE=E

[34] Superseded by LONGACRE 86. NODE=M068M;LINKAGE=B1



$f_0(1710)$ WIDTH

NODE=M068W

OUR EVALUATION below is based on T-matrix poles from BARBERIS 00E and BARBERIS 99D.

NODE=M068W

NODE=M068W

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
123 ± 18		**OUR EVALUATION**		
150 $^{+12}_{-10}$		**OUR AVERAGE** Error includes scale factor of 1.3. See the ideogram below. [147 $^{+12}_{-10}$ MeV OUR 2021 AVERAGE Scale factor = 1.2]		
175 ± 23 ± 4		[1] LEES 21A	BABR	$\eta_c(1S) \to \eta' K^+ K^-$
172 ± 10 $^{+32}_{-16}$	5.5k	[2] ABLIKIM 13N	BES3	$e^+ e^- \to J/\psi \to \gamma\eta\eta$
139 $^{+11}_{-12}$ $^{+96}_{-50}$		[3] UEHARA 13	BELL	$\gamma\gamma \to K^0_S K^0_S$
100 ± 24 $^{+7}_{-22}$	4k	[4] CHEKANOV 08	ZEUS	$e p \to K^0_S K^0_S X$
145 ± 8 ±69		[1] ABLIKIM 06V	BES2	$e^+ e^- \to J/\psi \to \gamma\pi^+\pi^-$
125 ± 20		ABLIKIM 04E	BES2	$J/\psi \to \omega K^+ K^-$
166 $^{+5}_{-8}$ $^{+15}_{-10}$		BAI 03G	BES	$J/\psi \to \gamma K \overline{K}$
120 $^{+50}_{-40}$		BAI 00A	BES	$J/\psi \to \gamma(\pi^+\pi^-\pi^+\pi^-)$
105 ± 34		[5] FRENCH 99		$300\ p p \to p_f (K^+ K^-) p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
156 ± 12		[6] RODAS 22	RVUE	$J/\psi(1S) \to \gamma\ (\pi\pi,\ K\overline{K})$
182 ± 19	7.2k	[7] KHOLODENK..21	VES	$29\ \pi^- p \to n\omega\phi$
255 ± 25		[8,9] SARANTSEV 21	RVUE	$J/\psi(1S) \to \gamma\ (\pi\pi,\ K\overline{K},\ \eta\eta,\ \omega\phi)$
289.7± 5.0 $^{+32.6}_{-19.3}$		[10] ALBRECHT 20	RVUE	$0.9\ \overline{p}p \to \pi^0\pi^0\eta,\ \pi^0\eta\eta,\ \pi^0 K^+ K^-$
95 ± 10 $^{+78}_{-82}$		ABLIKIM 13J	BES3	$J/\psi \to \gamma\omega\phi$
105 ± 20 ±28		[11] ABLIKIM 06J	BES2	$J/\psi \to \gamma\omega\phi$
148 $^{+40}_{-30}$		AMSLER 06	CBAR	$1.64\ \overline{p}p \to K^+ K^- \pi^0$
188 ± 13	80k	[1,12] UMAN 06	E835	$5.2\ \overline{p}p \to \eta\eta\pi^0$
250 ± 30		VLADIMIRSK...06	SPEC	$40\ \pi^- p \to K^0_S K^0_S n$
270 $^{+60}_{-30}$		[13] ABLIKIM 05	BES2	$J/\psi \to \phi\pi^+\pi^-$
125 ± 25 $^{+10}_{-15}$		[1] ABLIKIM 05Q	BES2	$\psi(2S) \to \gamma\pi^+\pi^- K^+ K^-$
260 ± 50		[1] BINON 05	GAMS	$33\ \pi^- p \to \eta\eta n$
144 ± 30		[14,15] ANISOVICH 03	RVUE	

→ UNCHECKED ←

NEW

$320\ {}^{+50}_{-20}$		[15,16] ANISOVICH	03	RVUE		OCCUR=2
102 ± 26		TIKHOMIROV	03	SPEC	$40.0\ \pi^- C \rightarrow K^0_S K^0_S K^0_L X$	
267 ± 44	3651	[17] NICHITIU	02	OBLX	$0\ \overline{p}p \rightarrow K^+ K^- \pi^+ \pi^- \pi^0$	
120 ± 26		[9] BARBERIS	00E		$450\ pp \rightarrow p_f \eta\eta p_s$	
220 ± 40		[18,19] ANISOVICH	99B	SPEC	$0.6–1.2\ p\overline{p} \rightarrow \eta\eta\pi^0$	
100 ± 25		BARBERIS	99	OMEG	$450\ pp \rightarrow p_s p_f K^+ K^-$	
160 ± 30		BARBERIS	99B	OMEG	$450\ pp \rightarrow p_s p_f \pi^+ \pi^-$	
$126 \pm 16 \pm 18$		[9,20] BARBERIS	99D	OMEG	$450\ pp \rightarrow K^+ K^-, \pi^+ \pi^-$	
250 ± 140		[21] ANISOVICH	98B	RVUE	Compilation	
30 ± 7	57	[22] BARKOV	98		$\pi^- p \rightarrow K^0_S K^0_S n$	
$103 \pm 18\ {}^{+30}_{-11}$		[23] BAI	96C	BES	$J/\psi \rightarrow \gamma K^+ K^-$	
$85 \pm 24\ {}^{+22}_{-19}$		BAI	96C	BES	$J/\psi \rightarrow \gamma K^+ K^-$	OCCUR=2
56 ± 19		BALOSHIN	95	SPEC	$40\ \pi^- C \rightarrow K^0_S K^0_S X$	
160 ± 40		[24] BUGG	95	MRK3	$J/\psi \rightarrow \gamma \pi^+ \pi^- \pi^+ \pi^-$	
$160\ {}^{+60}_{-20}$		[23] BUGG	95	MRK3	$J/\psi \rightarrow \gamma \pi^+ \pi^- \pi^+ \pi^-$	OCCUR=2
264 ± 25		[25] ARMSTRONG	93C	E760	$\overline{p}p \rightarrow \pi^0 \eta\eta \rightarrow 6\gamma$	
200 to 300		BREAKSTONE	93	SFM	$pp \rightarrow pp \pi^+ \pi^- \pi^+ \pi^-$	
< 80 90% CL		[26] ALDE	92D	GAM2	$38\ \pi^- p \rightarrow \eta\eta N^*$	
181 ± 30		[27] ARMSTRONG	89D	OMEG	$300\ pp \rightarrow pp K^+ K^-$	
104 ± 30		[27] ARMSTRONG	89D	OMEG	$300\ pp \rightarrow pp K^0_S K^0_S$	OCCUR=2
166.4 ± 33.2		[25] AUGUSTIN	88	DM2	$J/\psi \rightarrow \gamma K^+ K^-, K^0_S K^0_S$	
30 ± 20		[23] BOLONKIN	88	SPEC	$40\ \pi^- p \rightarrow K^0_S K^0_S n$	
350 ± 150		BOLONKIN	88	SPEC	$40\ \pi^- p \rightarrow K^0_S K^0_S n$	OCCUR=2
148 ± 17		[28] FALVARD	88	DM2	$J/\psi \rightarrow \phi K^+ K^-, K^0_S K^0_S$	
184 ± 6		[29] FALVARD	88	DM2	$J/\psi \rightarrow \phi K^+ K^-, K^0_S K^0_S$	OCCUR=2
136 ± 28		[25] AUGUSTIN	87	DM2	$J/\psi \rightarrow \gamma \pi^+ \pi^-$	
130 ± 20		[23] BALTRUSAIT...	87	MRK3	$J/\psi \rightarrow \gamma K^+ K^-$	
$122\ {}^{+74}_{-15}$		[30] LONGACRE	86	RVUE	$22\ \pi^- p \rightarrow n 2K^0_S$	
57 ± 38		[31] WILLIAMS	84	MPSF	$200\ \pi^- N \rightarrow 2K^0_S X$	
160 ± 80		BLOOM	83	CBAL	$J/\psi \rightarrow \gamma 2\eta$	
200 ± 100		BURKE	82	MRK2	$J/\psi \rightarrow \gamma 2\rho$	
$220\ {}^{+100}_{-70}$		[32,33] EDWARDS	82D	CBAL	$J/\psi \rightarrow \gamma 2\eta$	
$200\ {}^{+156}_{-9}$		[34] ETKIN	82B	MPS	$23\ \pi^- p \rightarrow n 2K^0_S$	

[1] Breit-Wigner width. NODE=M068W;LINKAGE=BW

[2] From partial wave analysis including all possible combinations of 0^{++}, 2^{++}, and 4^{++} resonances. NODE=M068W;LINKAGE=F

[3] Spin 0 favored over spin 2. NODE=M068W;LINKAGE=G

[4] In the SU(3) based model with a specific interference pattern of the $f_2(1270)$, $a^0_2(1320)$, and $f'_2(1525)$ mesons incoherently added to the $f_0(1710)$ and non-resonant background. NODE=M068W;LINKAGE=HE

[5] $J^P = 0^+$, supersedes by ARMSTRONG 89D. NODE=M068W;LINKAGE=C3

[6] T-matrix pole from coupled channel K-matrix fit to data on $J/\psi \rightarrow \gamma \pi^0 \pi^0$ (ABLIKIM 15AE) and $J/\psi \rightarrow \gamma K^0_S K^0_S$ (ABLIKIM 18AA). NODE=M068W;LINKAGE=L

[7] From partial wave analysis of $\omega\phi$ invariant mass including 0^{++}, 2^{++}, and 0^{-+} resonances. NODE=M068W;LINKAGE=J

[8] Close-by state with mass 1765 ± 15 MeV and width 180 ± 20 MeV. NODE=M068W;LINKAGE=K

[9] T-matrix pole. NODE=M068W;LINKAGE=TP

[10] T-matrix pole, 5 poles, 5 channels, including scattering data from HYAMS 75 ($\pi\pi$), LONGACRE 86 ($K\overline{K}$), BINON 83 ($\eta\eta$), and BINON 84C ($\eta\eta'$). NODE=M068W;LINKAGE=H

[11] Not seen by LIU 09 in $B^\pm \rightarrow K^\pm \omega\phi$. NODE=M068W;LINKAGE=I

[12] Systematic errors not estimated. NODE=M068W;LINKAGE=CH

[13] This state may be different from $f_0(1710)$, see CLOSE 05. NODE=M068W;LINKAGE=AB

[14] (Solution I) NODE=M068W;LINKAGE=K1

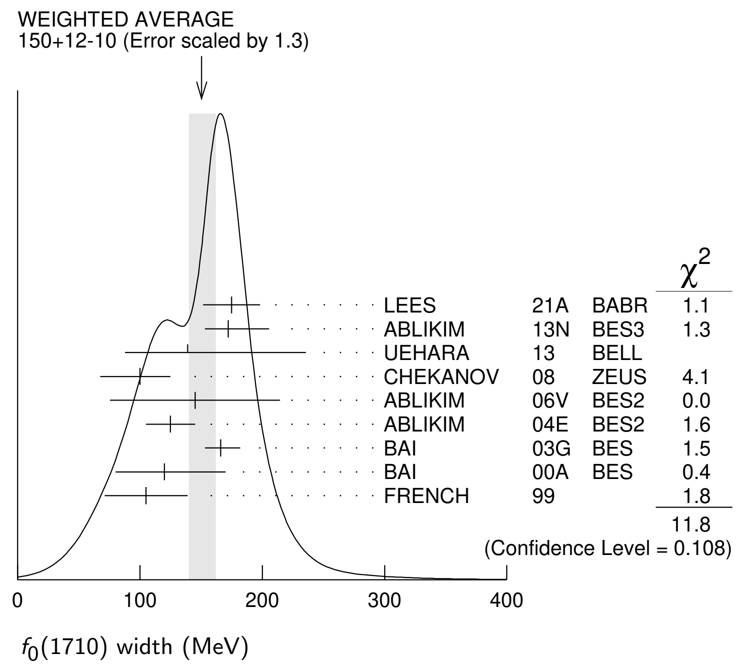
[15] K-matrix pole, assuming $J^P = 0^+$, from combined analysis of $\pi^- p \rightarrow \pi^0 \pi^0 n$, $\pi^- p \rightarrow K\overline{K} n$, $\pi^+ \pi^- \rightarrow \pi^+ \pi^-$, $\overline{p}p \rightarrow \pi^0 \pi^0 \pi^0$, $\pi^0 \eta\eta$, $\pi^0 \pi^0 \eta$, $\pi^+ \pi^- \pi^0$, $K^+ K^- \pi^0$, $K^0_S K^0_S \pi^0$, $K^+ K^0_S \pi^-$ at rest, $\overline{p}n \rightarrow \pi^- \pi^- \pi^+$, $K^0_S K^- \pi^0$, $K^0_S K^0_S \pi^-$ at rest. NODE=M068W;LINKAGE=KM

[16] Solution I. NODE=M068W;LINKAGE=K2

[17] Decaying to $f_0(1370)\pi\pi$. NODE=M068W;LINKAGE=NC

[18] $J^P = 0^+$. NODE=M068W;LINKAGE=AV

[19] Not seen by AMSLER 02. NODE=M068W;LINKAGE=NS
[20] Supersedes BARBERIS 99 and BARBERIS 99B. NODE=M068W;LINKAGE=BD
[21] T-matrix pole, assuming $J^P = 0^+$ NODE=M068W;LINKAGE=AN
[22] No J^{PC} determination. NODE=M068W;LINKAGE=4A
[23] $J^P = 2^+$. NODE=M068W;LINKAGE=A3
[24] From a fit to the 0^+ partial wave. NODE=M068W;LINKAGE=Q0
[25] No J^{PC} determination. NODE=M068W;LINKAGE=A1
[26] ALDE 92D combines all the GAMS-2000 data. NODE=M068W;LINKAGE=AA
[27] $J^P = 2^+$, (0^+ excluded). NODE=M068W;LINKAGE=B
[28] From an analysis ignoring interference with $f'_2(1525)$. NODE=M068W;LINKAGE=C
[29] From an analysis including interference with $f'_2(1525)$. NODE=M068W;LINKAGE=D
[30] Uses MRK3 data. From a partial-wave analysis of data using a K-matrix formalism with 5 poles, but assuming spin 2. Fit with constrained inelasticity. NODE=M068W;LINKAGE=A9
[31] No J^{PC} determination. NODE=M068M;LINKAGE=WI
[32] $J^P = 2^+$ preferred. NODE=M068W;LINKAGE=B2
[33] From fit neglecting nearby $f'_2(1525)$. Replaced by BLOOM 83. NODE=M068W;LINKAGE=E
[34] From an amplitude analysis of the $K^0_S K^0_S$ system, superseded by LONGACRE 86. NODE=M068W;LINKAGE=A



$f_0(1710)$ DECAY MODES

NODE=M068215;NODE=M068

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$K\overline{K}$	seen	DESIG=2;OUR EST;→ UNCHECKED ←
Γ_2	$\eta\eta$	seen	DESIG=1;OUR EST;→ UNCHECKED ←
Γ_3	$\pi\pi$	seen	DESIG=5;OUR EST;→ UNCHECKED ←
Γ_4	$\gamma\gamma$	seen	DESIG=6;OUR EST;→ UNCHECKED ←
Γ_5	$\omega\omega$	seen	DESIG=4

$f_0(1710)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M068220

$\Gamma(K\overline{K}) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_1\Gamma_4/\Gamma$

NODE=M068G2
NODE=M068G2

VALUE (eV)	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
$\mathbf{12^{+3}_{-2}{}^{+227}_{-8}}$		UEHARA	13	BELL	$\gamma\gamma \to K^0_S K^0_S$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<480	95	ALBRECHT	90G	ARG	$\gamma\gamma \to K^+ K^-$
<110	95	[1] BEHREND	89C	CELL	$\gamma\gamma \to K^0_S K^0_S$
<280	95	[1] ALTHOFF	85B	TASS	$\gamma\gamma \to K\overline{K}\pi$

[1] Assuming helicity 2. NODE=M068G2;LINKAGE=F

$\Gamma(\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_3\Gamma_4/\Gamma$

NODE=M068G3
NODE=M068G3

VALUE (keV)	CL%	DOCUMENT ID		TECN	COMMENT
<0.82	95	[1] BARATE	00E	ALEP	$\gamma\gamma \to \pi^+\pi^-$

[1] Assuming spin 0.

NODE=M068G;LINKAGE=Z

$f_0(1710)$ BRANCHING RATIOS

NODE=M068225

$\Gamma(K\overline{K})/\Gamma_{total}$ — Γ_1/Γ

NODE=M068R2
NODE=M068R2

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	1004	[1] DOBBS	15		$J/\psi \to \gamma K^+K^-$
seen	349	[1] DOBBS	15		$\psi(2S) \to \gamma K^+K^-$
0.36 ± 0.12		ALBALADEJO	08	RVUE	
$0.38^{+0.09}_{-0.19}$		[2] LONGACRE	86	MPS	$22\ \pi^- p \to n 2K^0_S$

OCCUR=2

[1] Using CLEO-c data but not authored by the CLEO Collaboration.
[2] From a partial-wave analysis of data using a K-matrix formalism with 5 poles, but assuming spin 2. Fit with constrained inelasticity.

NODE=M068R2;LINKAGE=A
NODE=M068R;LINKAGE=L

$\Gamma(\eta\eta)/\Gamma_{total}$ — Γ_2/Γ

NODE=M068R1
NODE=M068R1

VALUE	DOCUMENT ID		TECN
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.22 ± 0.12	ALBALADEJO	08	RVUE
$0.18^{+0.03}_{-0.13}$	[1] LONGACRE	86	RVUE

[1] From a partial-wave analysis of data using a K-matrix formalism with 5 poles, but assuming spin 2. Fit with constrained inelasticity.

NODE=M068R1;LINKAGE=L

$\Gamma(\pi\pi)/\Gamma_{total}$ — Γ_3/Γ

NODE=M068R5
NODE=M068R5

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	381	[1] DOBBS	15		$J/\psi \to \gamma\pi^+\pi^-$
seen	237	[1] DOBBS	15		$\psi(2S) \to \gamma\pi^+\pi^-$
not seen		AMSLER	02	CBAR	$0.9\ \overline{p}p \to \pi^0\eta\eta,\ \pi^0\pi^0\pi^0$
$0.039^{+0.002}_{-0.024}$		[2] LONGACRE	86	RVUE	

OCCUR=2

[1] Using CLEO-c data but not authored by the CLEO Collaboration.
[2] From a partial-wave analysis of data using a K-matrix formalism with 5 poles, but assuming spin 2. Fit with constrained inelasticity.

NODE=M068R5;LINKAGE=A
NODE=M068R5;LINKAGE=L

$\Gamma(\pi\pi)/\Gamma(K\overline{K})$ — Γ_3/Γ_1

NODE=M068R6
NODE=M068R6

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
0.23±0.05 OUR AVERAGE		Error includes scale factor of 1.2.			
$0.64\pm0.27\ \pm0.18$		LEES	18A	BABR	$\Upsilon(1S) \to \gamma\pi^+\pi^-,\ \gamma K^+K^-$
$0.41^{+0.11}_{-0.17}$		ABLIKIM	06V	BES2	$e^+e^- \to J/\psi \to \gamma\pi^+\pi^-$
$0.2\ \pm0.024\pm0.036$		BARBERIS	99D	OMEG	$450\ pp \to K^+K^-,\ \pi^+\pi^-$
0.39 ± 0.14		ARMSTRONG	91	OMEG	$300\ pp \to pp\pi\pi,\ ppK\overline{K}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.32 ± 0.14		ALBALADEJO	08	RVUE	
<0.11	95	[1] ABLIKIM	04E	BES2	$J/\psi \to \omega K^+K^-$
$5.8\ ^{+9.1}_{-5.5}$		[2] ANISOVICH	02D	SPEC	Combined fit

[1] Using data from ABLIKIM 04A.
[2] From a combined K-matrix analysis of Crystal Barrel (0. $p\overline{p} \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$), GAMS ($\pi p \to \pi^0\pi^0 n$, $\eta\eta n$, $\eta\eta' n$), and BNL ($\pi p \to K\overline{K} n$) data.

NODE=M068R;LINKAGE=AB
NODE=M068R;LINKAGE=CH

$\Gamma(\eta\eta)/\Gamma(K\overline{K})$ — Γ_2/Γ_1

NODE=M068R7
NODE=M068R7

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
0.48±0.15		BARBERIS	00E		$450\ pp \to p_f\eta\eta p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.46^{+0.70}_{-0.38}$		[1] ANISOVICH	02D	SPEC	Combined fit
<0.02	90	[2] PROKOSHKIN	91	GA24	$300\ \pi^- p \to \pi^- p\eta\eta$

[1] From a combined K-matrix analysis of Crystal Barrel (0. $p\overline{p} \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$), GAMS ($\pi p \to \pi^0\pi^0 n$, $\eta\eta n$, $\eta\eta' n$), and BNL ($\pi p \to K\overline{K} n$) data.
[2] Combining results of GAM4 with those of ARMSTRONG 89D.

NODE=M068R7;LINKAGE=CH
NODE=M068R;LINKAGE=A

$\Gamma(\omega\omega)/\Gamma_{total}$ Γ_5/Γ

NODE=M068R3

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	180	ABLIKIM	06H	BES	$J/\psi \to \gamma\omega\omega$

f_0(1710) REFERENCES

NODE=M068

RODAS 22 EPJ C82 80 A. Rodas *et al.* (JPAC Collab.) REFID=61610
KHOLODENK... 21 PAN 83 1602 M.S. Kholodenko (VES Collab.) REFID=61410
LEES 21A PR D104 072002 J.P. Lees *et al.* (BABAR Collab.) REFID=61442
SARANTSEV 21 PL B816 136227 A.V. Sarantsev *et al.* (BONN, PNPI) REFID=61091
ALBRECHT 20 EPJ C80 453 M. Albrecht *et al.* (Crystal Barrel Collab.) REFID=60439
ABLIKIM 18AA PR D98 072003 M. Ablikim *et al.* (BESIII Collab.) REFID=59455
LEES 18A PR D97 112006 J.P. Lees *et al.* (BABAR Collab.) REFID=58950
ABLIKIM 15AE PR D92 052003 M. Ablikim *et al.* (BESIII Collab.) REFID=56984
DOBBS 15 PR D91 052006 S. Dobbs *et al.* (NWES) REFID=56805
ABLIKIM 13J PR D87 032008 M. Ablikim *et al.* (BESIII Collab.) REFID=54955
ABLIKIM 13N PR D87 092009 M. Ablikim *et al.* (BESIII Collab.) REFID=55387
UEHARA 13 PTEP 2013 123C01 S. Uehara *et al.* (BELLE Collab.) REFID=55592
LIU 09 PR D79 071102 C. Liu *et al.* (BELLE Collab.) REFID=52752
ALBALADEJO 08 PRL 101 252002 M. Albaladejo, J.A. Oller REFID=52656
CHEKANOV 08 PRL 101 112003 S. Chekanov *et al.* (ZEUS Collab.) REFID=52275
ABLIKIM 06H PR D73 112007 M. Ablikim *et al.* (BES Collab.) REFID=51125
ABLIKIM 06J PRL 96 162002 M. Ablikim *et al.* (BES Collab.) REFID=51127
ABLIKIM 06V PL B642 441 M. Ablikim *et al.* (BES Collab.) REFID=51507
AMSLER 06 PL B639 165 C. Amsler *et al.* (Crystal Barrel Collab.) REFID=51136
UMAN 06 PR D73 052009 I. Uman *et al.* (FNAL E835) REFID=51063
VLADIMIRSK... 06 PAN 69 493 V.V. Vladimirsky *et al.* (ITEP, Moscow) REFID=51191
Translated from YAF 69 515.
ABLIKIM 05 PL B607 243 M. Ablikim *et al.* (BES Collab.) REFID=50450
ABLIKIM 05Q PR D72 092002 M. Ablikim *et al.* (BES Collab.) REFID=50958
BINON 05 PAN 68 960 F. Binon *et al.* REFID=50780
Translated from YAF 68 998.
CLOSE 05 PR D71 094022 F.E. Close, Q. Zhao REFID=50788
ABLIKIM 04A PL B598 149 M. Ablikim *et al.* (BES Collab.) REFID=49740
ABLIKIM 04E PL B603 138 M. Ablikim *et al.* (BES Collab.) REFID=50174
ANISOVICH 03 EPJ A16 229 V.V. Anisovich *et al.* REFID=49401
BAI 03G PR D68 052003 J.Z. Bai *et al.* (BES Collab.) REFID=49580
TIKHOMIROV 03 PAN 66 828 G.D. Tikhomirov *et al.* REFID=49423
Translated from YAF 66 860.
AMSLER 02 EPJ C23 29 C. Amsler *et al.* REFID=48580
ANISOVICH 02D PAN 65 1545 V.V. Anisovich *et al.* REFID=48831
Translated from YAF 65 1583.
NICHITIU 02 PL B545 261 F. Nichitiu *et al.* (OBELIX Collab.) REFID=48848
BAI 00A PL B472 207 J.Z. Bai *et al.* (BES Collab.) REFID=47426
BARATE 00E PL B472 189 R. Barate *et al.* (ALEPH Collab.) REFID=47428
BARBERIS 00E PL B479 59 D. Barberis *et al.* (WA 102 Collab.) REFID=47961
ANISOVICH 99B PL B449 154 A.V. Anisovich *et al.* REFID=46886
BARBERIS 99 PL B453 305 D. Barberis *et al.* (Omega Expt.) REFID=46921
BARBERIS 99B PL B453 316 D. Barberis *et al.* (Omega Expt.) REFID=46922
BARBERIS 99D PL B462 462 D. Barberis *et al.* (Omega Expt.) REFID=47395
FRENCH 99 PL B460 213 B. French *et al.* (WA76 Collab.) REFID=47491
ANISOVICH 98B SPU 41 419 V.V. Anisovich *et al.* REFID=46331
Translated from UFN 168 481.
BAI 98H PRL 81 1179 J.Z. Bai *et al.* (BES Collab.) REFID=46342
BARKOV 98 JETPL 68 764 B.P. Barkov *et al.* REFID=46616
ABREU 96C PL B379 309 P. Abreu *et al.* (DELPHI Collab.) REFID=44671
BAI 96C PRL 77 3959 J.Z. Bai *et al.* (BES Collab.) REFID=45169
BALOSHIN 95 PAN 58 46 O.N. Baloshin *et al.* (ITEP) REFID=44621
Translated from YAF 58 50.
BUGG 95 PL B353 378 D.V. Bugg *et al.* (LOQM, PNPI, WASH) REFID=44438
ARMSTRONG 93C PL B307 394 T.A. Armstrong *et al.* (FNAL, FERR, GENO+) REFID=43587
BREAKSTONE 93 ZPHY C58 251 A.M. Breakstone *et al.* (IOWA, CERN, DORT+) REFID=43312
ALDE 92D PL B284 457 D.M. Alde *et al.* (GAM2 Collab.) REFID=41591
Also SJNP 54 451 D.M. Alde *et al.* (GAM2 Collab.) REFID=44696
Translated from YAF 54 745.
ARMSTRONG 91 ZPHY C51 351 T.A. Armstrong *et al.* (ATHU, BARI, BIRM+) REFID=41744
PROKOSHKIN 91 SPD 36 155 Y.D. Prokoshkin (GAM2 and GAM4 Collab.) REFID=41719
Translated from DANS 316 900.
ALBRECHT 90G ZPHY C48 183 H. Albrecht *et al.* (ARGUS Collab.) REFID=41374
ARMSTRONG 89D PL B227 186 T.A. Armstrong, M. Benayoun (ATHU, BARI, BIRM+) REFID=41010
BEHREND 89C ZPHY C43 91 H.J. Behrend *et al.* (CELLO Collab.) REFID=40915
AUGUSTIN 88 PRL 60 2238 J.E. Augustin *et al.* (DM2 Collab.) REFID=40574
BOLONKIN 88 NP B309 426 B.V. Bolonkin *et al.* (ITEP, SERP) REFID=40580
FALVARD 88 PR D38 2706 A. Falvard *et al.* (CLER, FRAS, LALO+) REFID=40576
AUGUSTIN 87 ZPHY C36 369 J.E. Augustin *et al.* (LALO, CLER, FRAS+) REFID=40268
BALTRUSAIT... 87 PR D35 2077 R.M. Baltrusaitis *et al.* (Mark III Collab.) REFID=40010
ALDE 86C PL B182 105 D.M. Alde *et al.* (SERP, BELG, LANL, LAPP) REFID=21694
LONGACRE 86 PL B177 223 R.S. Longacre *et al.* (BNL, BRAN, CUNY+) REFID=20768
ALTHOFF 85B ZPHY C29 189 M. Althoff *et al.* (TASSO Collab.) REFID=21349
BINON 84C NC 80A 363 F.G. Binon *et al.* (BELG, LAPP, SERP+) REFID=21418
WILLIAMS 84 PR D30 877 E.G.H. Williams *et al.* (VAND, NDAM, TUFTS+) REFID=21693
BINON 83 NC 78A 313 F.G. Binon *et al.* (BELG, LAPP, SERP+) REFID=20750
BLOOM 83 ARNS 33 143 E.D. Bloom, C. Peck (SLAC, CIT) REFID=21682
BURKE 82 PRL 49 632 D.L. Burke *et al.* (LBL, SLAC) REFID=21676
EDWARDS 82D PRL 48 458 C. Edwards *et al.* (CIT, HARV, PRIN+) REFID=21677
ETKIN 82B PR D25 1786 A. Etkin *et al.* (BNL, CUNY, TUFTS, VAND) REFID=20390
ETKIN 82C PR D25 2446 A. Etkin *et al.* (BNL, CUNY, TUFTS, VAND) REFID=20391
HYAMS 75 NP B100 205 B.D. Hyams *et al.* (CERN, MPIM) REFID=20355

NODE=M255

X(1750)

$I^G(J^{PC}) = ?^-(1^{--})$

OMITTED FROM SUMMARY TABLE

The $X(1750)$ was separated from the $\phi(1680)$ in the 2022 listings due to its incompatible mass and incompatible pattern of $\overline{K}K$ and $\overline{K}^*(892)K$ branching fractions.

NODE=M255

X(1750) MASS

NODE=M255M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1753.8± 2.7 OUR AVERAGE				
$1784 \pm 12 {}^{+0}_{-27}$	ABLIKIM	20F	BES3	$\psi(2S) \rightarrow K^+K^-\eta$
1753.5± 1.5± 2.3	LINK	02K	FOCS	20–160 $\gamma p \rightarrow K^+K^-p$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1726 ±22	BUSENITZ	89	TPS	$\gamma p \rightarrow K^+K^-X$
1760 ±20	ATKINSON	85C	OMEG	20–70 $\gamma p \rightarrow K\overline{K}X$
1690 ±10	ASTON	81F	OMEG	25–70 $\gamma p \rightarrow K^+K^-X$

NODE=M255M

X(1750) WIDTH

NODE=M255W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
120 ±10 OUR AVERAGE				
$106 {}^{+22}_{-19} {}^{+8}_{-36}$	ABLIKIM	20F	BES3	$\psi(2S) \rightarrow K^+K^-\eta$
122.2± 6.2± 8.0	LINK	02K	FOCS	20–160 $\gamma p \rightarrow K^+K^-p$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
121 ±47	BUSENITZ	89	TPS	$\gamma p \rightarrow K^+K^-X$
80 ±40	ATKINSON	85C	OMEG	20–70 $\gamma p \rightarrow K\overline{K}X$
100 ±40	ASTON	81F	OMEG	25–70 $\gamma p \rightarrow K^+K^-X$

NODE=M255W

X(1750) DECAY MODES

NODE=M255215;NODE=M255

	Mode	Fraction (Γ_i/Γ)
Γ_1	K^+K^-	seen
Γ_2	$\overline{K}^*(892)^0 K^0_S$	not seen
Γ_3	$K^*(892)^{\pm} K^{\mp}$	not seen

DESIG=1;OUR EVAL;→ UNCHECKED ←
DESIG=2;OUR EVAL;→ UNCHECKED ←
DESIG=3;OUR EVAL;→ UNCHECKED ←

$\Gamma(\overline{K}^*(892)^0 K^0_S)/\Gamma(K^+K^-)$ Γ_2/Γ_1

NODE=M255R01
NODE=M255R01

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.065	90	LINK	02K	FOCS	$\gamma p \rightarrow K^+K^-p$

$\Gamma(K^*(892)^{\pm} K^{\mp})/\Gamma(K^+K^-)$ Γ_3/Γ_1

NODE=M255R02
NODE=M255R02

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.183	90	LINK	02K	FOCS	$\gamma p \rightarrow K^+K^-p$

X(1750) REFERENCES

NODE=M255

ABLIKIM	20F	PR D101 032008	M. Ablikim *et al.*	(BESIII Collab.)
LINK	02K	PL B545 50	J.M. Link *et al.*	(FNAL FOCUS Collab.)
BUSENITZ	89	PR D40 1	J.K. Busenitz *et al.*	(ILL, FNAL)
ATKINSON	85C	ZPHY C27 233	M. Atkinson *et al.*	(BONN, CERN, GLAS+)
ASTON	81F	PL 104B 231	D. Aston	(BONN, CERN, EPOL, GLAS, LANC+)

REFID=60256
REFID=48845
REFID=40927
REFID=21596
REFID=21585

NODE=M114

$\eta(1760)$

$I^G(J^{PC}) = 0^+(0^{-+})$

OMITTED FROM SUMMARY TABLE

Seen by DM2 in the $\rho\rho$ system (BISELLO 89B). Structure in this region has been reported before in the same system (BALTRUSAITIS 86B) and in the $\omega\omega$ system (BALTRUSAITIS 85C, BISELLO 87).

NODE=M114

$\eta(1760)$ MASS

NODE=M114M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1751±15 OUR AVERAGE					
$1768^{+24}_{-25}\pm10$	465	[1] ZHANG	12A	BELL	$e^+e^- \to e^+e^-\eta'\pi^+\pi^-$
$1744\pm10\pm15$	1045	[2] ABLIKIM	06H	BES	$J/\psi \to \gamma\omega\omega$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1703^{+12}_{-11}\pm\ 2$		[3] ZHANG	12A	BELL	$e^+e^- \to e^+e^-\eta'\pi^+\pi^-$
1760 ± 11	320	[4] BISELLO	89B	DM2	$J/\psi \to 4\pi\gamma$

NODE=M114M

OCCUR=2

[1] From a single-resonance fit.
[2] From a partial wave analysis including $\eta(1760)$, $f_0(1710)$, $f_2(1640)$, and $f_2(1910)$.
[3] From a two-resonance fit.
[4] Estimated by us from various fits. Systematic uncertainties not estimated.

NODE=M114M;LINKAGE=ZA
NODE=M114M;LINKAGE=MA
NODE=M114M;LINKAGE=ZH
NODE=M114M;LINKAGE=A

$\eta(1760)$ WIDTH

NODE=M114W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
240±30 OUR AVERAGE					
$224^{+62}_{-56}\pm25$	465	[5] ZHANG	12A	BELL	$e^+e^- \to e^+e^-\eta'\pi^+\pi^-$
$244^{+24}_{-21}\pm25$	1045	[6] ABLIKIM	06H	BES	$J/\psi \to \gamma\omega\omega$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$42^{+36}_{-22}\pm15$		[7] ZHANG	12A	BELL	$e^+e^- \to e^+e^-\eta'\pi^+\pi^-$
60 ± 16	320	[8] BISELLO	89B	DM2	$J/\psi \to 4\pi\gamma$

NODE=M114W

OCCUR=2

[5] From a single-resonance fit.
[6] From a partial wave analysis including $\eta(1760)$, $f_0(1710)$, $f_2(1640)$, and $f_2(1910)$.
[7] From a two-resonance fit.
[8] Estimated by us from various fits. Systematic uncertainties not estimated.

NODE=M114W;LINKAGE=ZA
NODE=M114W;LINKAGE=MA
NODE=M114W;LINKAGE=ZH
NODE=M114W;LINKAGE=B

$\eta(1760)$ DECAY MODES

NODE=M114215;NODE=M114

	Mode	Fraction (Γ_i/Γ)	
Γ_1	4π		DESIG=1
Γ_2	$2\pi^+2\pi^-$	seen	DESIG=2
Γ_3	$\pi^+\pi^-2\pi^0$	seen	DESIG=3
Γ_4	$\rho^0\rho^0$	seen	DESIG=4
Γ_5	$\rho^+\rho^-$	seen	DESIG=5
Γ_6	$\omega\omega$	seen	DESIG=7
Γ_7	$\eta'\pi^+\pi^-$	seen	DESIG=8;OUR EVAL;→ UNCHECKED ←
Γ_8	$\gamma\gamma$	seen	DESIG=9;OUR EVAL;→ UNCHECKED ←

$\eta(1760)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M114225

$\Gamma(\eta'\pi^+\pi^-) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_7\Gamma_8/\Gamma$

NODE=M114G01
NODE=M114G01

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{28.2^{+\ 7.9}_{-\ 7.5}\pm3.7}$	465	[9] ZHANG	12A	BELL	$e^+e^- \to e^+e^-\eta'\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$3.0^{+\ 2.0}_{-\ 1.2}\pm0.8$	52	[10] ZHANG	12A	BELL	$e^+e^- \to e^+e^-\eta'\pi^+\pi^-$
$18\ ^{+13}_{-10}\ \pm5$	315	[11] ZHANG	12A	BELL	$e^+e^- \to e^+e^-\eta'\pi^+\pi^-$

OCCUR=2

OCCUR=3

[9] From a single-resonance fit.
[10] From a two-resonance fit. For constructive interference with the $X(1835)$.
[11] From a two-resonance fit. For destructive interference with the $X(1835)$.

NODE=M114G01;LINKAGE=ZH
NODE=M114G01;LINKAGE=ZA
NODE=M114G01;LINKAGE=ZN

$\eta(1760)$ BRANCHING RATIOS

NODE=M114210

$\Gamma(2\pi^+ 2\pi^-)/\Gamma_{total}$ — Γ_2/Γ

NODE=M114R01

VALUE	DOCUMENT ID		TECN	COMMENT
seen	BISELLO	89B	DM2	$J/\psi \to \gamma 2\pi^+ 2\pi^-$

$\Gamma(\pi^+ \pi^- 2\pi^0)/\Gamma_{total}$ — Γ_3/Γ

NODE=M114R02

VALUE	DOCUMENT ID		TECN	COMMENT
seen	BISELLO	89B	DM2	$J/\psi \to \gamma \pi^+ \pi^- 2\pi^0$

$\Gamma(\rho^0 \rho^0)/\Gamma_{total}$ — Γ_4/Γ

NODE=M114R03

VALUE	DOCUMENT ID		TECN	COMMENT
seen	BISELLO	89B	DM2	$J/\psi \to \gamma \rho^0 \rho^0$
seen	BALTRUSAIT...	86	MRK3	$J/\psi \to \gamma \rho^0 \rho^0$

$\Gamma(\rho^+ \rho^-)/\Gamma_{total}$ — Γ_5/Γ

NODE=M114R04

VALUE	DOCUMENT ID		TECN	COMMENT
seen	BISELLO	89B	DM2	$J/\psi \to \gamma \rho^+ \rho^-$
seen	BALTRUSAIT...	86	MRK3	$J/\psi \to \gamma \rho^+ \rho^-$

$\Gamma(\omega\omega)/\Gamma_{total}$ — Γ_6/Γ

NODE=M114R06

VALUE	DOCUMENT ID		TECN	COMMENT
seen	BISELLO	87	DM2	$J/\psi \to \omega\omega$
seen	BALTRUSAIT...	85C	MRK3	$J/\psi \to \gamma\omega\omega$

$\Gamma(\gamma\gamma)/\Gamma(\omega\omega)$ — Γ_8/Γ_6

NODE=M114R08

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.48 \times 10^{-3}$	90	[12] ABLIKIM	18O	BES3	$\psi(2S) \to \pi^+ \pi^- \gamma\gamma\gamma$

[12] Using results from ABLIKIM 06H.

NODE=M114R08;LINKAGE=A

$\eta(1760)$ REFERENCES

NODE=M114

ABLIKIM	18O	PR D97 072014	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58925
ZHANG	12A	PR D86 052002	C.C. Zhang *et al.*	(BELLE Collab.)	REFID=54763
ABLIKIM	06H	PR D73 112007	M. Ablikim *et al.*	(BES Collab.)	REFID=51125
BISELLO	89B	PR D39 701	G. Busetto *et al.*	(DM2 Collab.)	REFID=40575
BISELLO	87	PL B192 239	D. Bisello *et al.*	(PADO, CLER, FRAS+)	REFID=40012
BALTRUSAIT...	86	PR D33 629	R.M. Baltrusaitis *et al.*	(Mark III Collab.)	REFID=22009
BALTRUSAIT...	86B	PR D33 1222	R.M. Baltrusaitis *et al.*	(Mark III Collab.)	REFID=22100
BALTRUSAIT...	85C	PRL 55 1723	R.M. Baltrusaitis *et al.*	(CIT, UCSC+)	REFID=22095

NODE=M075

$\pi(1800)$

$I^G(J^{PC}) = 1^-(0^{-+})$

See the review on "Non-$q\overline{q}$ Mesons."

NODE=M075

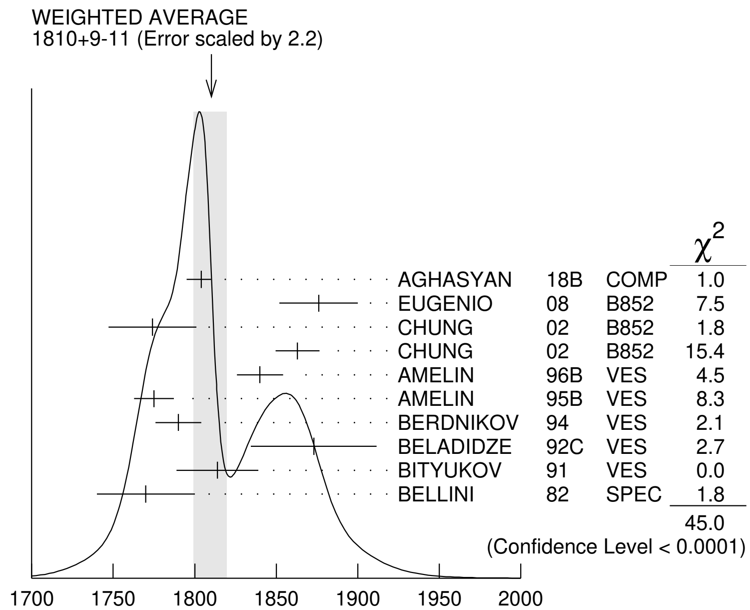
$\pi(1800)$ MASS

NODE=M075M

NODE=M075M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1810^{+9}_{-11} OUR AVERAGE		Error includes scale factor of 2.2. See the ideogram below.				
1804^{+6}_{-9}	46M	[1] AGHASYAN	18B	COMP		$190\ \pi^- p \to \pi^- \pi^+ \pi^- p$
$1876 \pm 18 \pm 16$	4k	[2] EUGENIO	08	B852	−	$18\ \pi^- p \to \eta\eta\pi^- p$
$1774 \pm 18 \pm 20$		[3] CHUNG	02	B852		$18.3\ \pi^- p \to \pi^+ \pi^- \pi^- p$
$1863 \pm 9 \pm 10$		[4] CHUNG	02	B852		$18.3\ \pi^- p \to \pi^+ \pi^- \pi^- p$ OCCUR=2
$1840 \pm 10 \pm 10$	1.2k	AMELIN	96B	VES	−	$37\ \pi^- A \to \eta\eta\pi^- A$
$1775 \pm 7 \pm 10$		[5] AMELIN	95B	VES	−	$36\ \pi^- A \to \pi^+ \pi^- \pi^- A$
1790 ± 14		[6] BERDNIKOV	94	VES	−	$37\ \pi^- A \to K^+ K^- \pi^- A$
$1873 \pm 33 \pm 20$		BELADIDZE	92C	VES	−	$36\ \pi^- \text{Be} \to \pi^- \eta' \eta \text{Be}$
$1814 \pm 10 \pm 23$	426	BITYUKOV	91	VES	−	$36\ \pi^- \text{C} \to \pi^- \eta\eta \text{C}$
1770 ± 30	1.1k	BELLINI	82	SPEC	−	$40\ \pi^- \text{A} \to 3\pi \text{A}$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$1785 \pm 9^{+12}_{-6}$	420k	[7] ALEKSEEV	10	COMP		$190\ \pi^- Pb \to \pi^- \pi^- \pi^+ Pb'$
$1737 \pm 5 \pm 15$		AMELIN	99	VES		$37\ \pi^- A \to \omega \pi^- \pi^0 A^*$

[1] Statistical error negligible. NODE=M075M;LINKAGE=B
[2] From a single-pole fit. NODE=M075M;LINKAGE=SP
[3] In the $f_0(980)\pi$ wave. NODE=M075M;LINKAGE=C1
[4] In the $f_0(500)\pi$ wave. NODE=M075M;LINKAGE=C2
[5] From a fit to $J^{PC} = 0^{-+}$ $f_0(980)\pi$, $f_0(1370)\pi$ waves. NODE=M075M;LINKAGE=AX
[6] From a fit to $J^{PC} = 0^{-+}$ $K_0^*(1430)K^-$ and $f_0(980)\pi^-$ waves. NODE=M075M;LINKAGE=A
[7] Superseded by AGHASYAN 2018B. NODE=M075M;LINKAGE=C



$\pi(1800)$ mass (MeV)

$\pi(1800)$ WIDTH

NODE=M075W

NODE=M075W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
215^{+7}_{-8} OUR AVERAGE						
220^{+8}_{-11}	46M	[8] AGHASYAN	18B	COMP		190 $\pi^- p \to \pi^-\pi^+\pi^- p$
$221\pm26\pm38$	4k	[9] EUGENIO	08	B852	−	18 $\pi^- p \to \eta\eta\pi^- p$
$223\pm48\pm50$		[10] CHUNG	02	B852		18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$
$191\pm21\pm20$		[11] CHUNG	02	B852		18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$ (OCCUR=2)
$210\pm30\pm30$	1.2k	AMELIN	96B	VES	−	37 $\pi^- A \to \eta\eta\pi^- A$
$190\pm15\pm15$		[12] AMELIN	95B	VES	−	36 $\pi^- A \to \pi^+\pi^-\pi^- A$
210 ± 70		[13] BERDNIKOV	94	VES	−	37 $\pi^- A \to K^+K^-\pi^- A$
$225\pm35\pm20$		BELADIDZE	92C	VES	−	36 π^- Be $\to \pi^-\eta'\eta$ Be
$205\pm18\pm32$	426	BITYUKOV	91	VES	−	36 π^- C $\to \pi^-\eta\eta$ C
310 ± 50	1.1k	BELLINI	82	SPEC	−	40 π^- A $\to 3\pi$ A
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$208\pm22^{+21}_{-37}$	420k	[14] ALEKSEEV	10	COMP		190 $\pi^- Pb \to \pi^-\pi^-\pi^+ Pb'$
$259\pm19\pm6$		AMELIN	99	VES		37 $\pi^- A \to \omega\pi^-\pi^0 A^*$

[8] Statistical error negligible. NODE=M075W;LINKAGE=B
[9] From a single-pole fit. NODE=M075W;LINKAGE=SP
[10] In the $f_0(980)\pi$ wave. NODE=M075W;LINKAGE=C1
[11] In the $f_0(500)\pi$ wave. NODE=M075W;LINKAGE=C2
[12] From a fit to $J^{PC} = 0^{-+}$ $f_0(980)\pi$, $f_0(1370)\pi$ waves. NODE=M075W;LINKAGE=AX
[13] From a fit to $J^{PC} = 0^{-+}$ $K_0^*(1430)K^-$ and $f_0(980)\pi^-$ waves. NODE=M075W;LINKAGE=A
[14] Superseded by AGHASYAN 2018B. NODE=M075W;LINKAGE=C

π(1800) DECAY MODES

NODE=M075215;NODE=M075

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\pi^+\pi^-\pi^-$	seen	DESIG=10;OUR EST;→ UNCHECKED ←
Γ_2	$f_0(500)\pi^-$	seen	DESIG=11;OUR EST;→ UNCHECKED ←
Γ_3	$f_0(980)\pi^-$	seen	DESIG=3;OUR EST;→ UNCHECKED ←
Γ_4	$f_0(1370)\pi^-$	seen	DESIG=1
Γ_5	$f_0(1500)\pi^-$	not seen	DESIG=12
Γ_6	$\rho\pi^-$	not seen	DESIG=2
Γ_7	$\eta\eta\pi^-$	seen	DESIG=7;OUR EST;→ UNCHECKED ←
Γ_8	$a_0(980)\eta$	seen	DESIG=5;OUR EST;→ UNCHECKED ←
Γ_9	$a_2(1320)\eta$	not seen	DESIG=13
Γ_{10}	$f_2(1270)\pi$	not seen	DESIG=14
Γ_{11}	$f_0(1370)\pi^-$	not seen	DESIG=15
Γ_{12}	$f_0(1500)\pi^-$	seen	DESIG=6;OUR EST;→ UNCHECKED ←
Γ_{13}	$\eta\eta'(958)\pi^-$	seen	DESIG=8;OUR EST;→ UNCHECKED ←
Γ_{14}	$K_0^*(1430)K^-$	seen	DESIG=4
Γ_{15}	$K^*(892)K^-$	not seen	DESIG=9

π(1800) BRANCHING RATIOS

NODE=M075220

$\Gamma(f_0(980)\pi^-)/\Gamma(f_0(500)\pi^-)$ Γ_3/Γ_2

NODE=M075R11
NODE=M075R11

VALUE	DOCUMENT ID		TECN	COMMENT
0.44±0.08±0.38	[15] CHUNG	02	B852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$

$\Gamma(f_0(980)\pi^-)/\Gamma(f_0(1370)\pi^-)$ Γ_3/Γ_4

NODE=M075R5
NODE=M075R5

• • • We do not use the following data for averages, fits, limits, etc. • • •

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
1.7±1.3	[16] AMELIN	95B	VES	−	36 $\pi^- A \to \pi^+\pi^-\pi^- A$

$\Gamma(f_0(1370)\pi^-)/\Gamma_{total}$ Γ_4/Γ

NODE=M075R1
NODE=M075R1

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
seen	BELLINI	82	SPEC	−	40 π^- A → 3π A

$\Gamma(f_0(1500)\pi^-)/\Gamma_{total}$ Γ_5/Γ

NODE=M075R12
NODE=M075R12

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	CHUNG	02	B852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$

$\Gamma(\rho\pi^-)/\Gamma_{total}$ Γ_6/Γ

NODE=M075R2
NODE=M075R2

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
not seen	BELLINI	82	SPEC	−	40 π^- A → 3π A

$\Gamma(\rho\pi^-)/\Gamma(f_0(980)\pi^-)$ Γ_6/Γ_3

NODE=M075R6
NODE=M075R6

• • • We do not use the following data for averages, fits, limits, etc. • • •

VALUE	CL%	DOCUMENT ID		TECN	CHG	COMMENT
<0.25		CHUNG	02	B852		18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$
<0.14	90	AMELIN	95B	VES	−	36 $\pi^- A \to \pi^+\pi^-\pi^- A$

$\Gamma(\eta\eta\pi^-)/\Gamma(\pi^+\pi^-\pi^-)$ Γ_7/Γ_1

NODE=M075R8
NODE=M075R8

• • • We do not use the following data for averages, fits, limits, etc. • • •

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
0.5±0.1	1200	[16] AMELIN	96B	VES	−	37 $\pi^- A \to \eta\eta\pi^- A$

$\Gamma(a_2(1320)\eta)/\Gamma_{total}$ Γ_9/Γ

NODE=M075R13
NODE=M075R13

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	EUGENIO	08	B852	18 $\pi^- p \to \eta\eta\pi^- p$

$\Gamma(f_2(1270)\pi)/\Gamma_{total}$ Γ_{10}/Γ

NODE=M075R14
NODE=M075R14

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	EUGENIO	08	B852	18 $\pi^- p \to \eta\eta\pi^- p$

$\Gamma(f_0(1370)\pi^-)/\Gamma_{total}$ Γ_{11}/Γ

NODE=M075R15
NODE=M075R15

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	EUGENIO	08	B852	18 $\pi^- p \to \eta\eta\pi^- p$

$\Gamma(f_0(1500)\pi^-)/\Gamma(a_0(980)\eta)$ — Γ_{12}/Γ_8

NODE=M075R7

VALUE	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.48 ± 0.17	4k	[16,17] EUGENIO 08	B852	−	18 $\pi^- p \to \eta\eta\pi^- p$
$0.030^{+0.014}_{-0.011}$		[16] ANISOVICH 01B	SPEC	0	0.6–1.94 $p\overline{p} \to \eta\eta\pi^0\pi^0$
0.08 ± 0.03	1200	[16,18] AMELIN 96B	VES	−	37 $\pi^- A \to \eta\eta\pi^- A$

$\Gamma(\eta\eta'(958)\pi^-)/\Gamma(\eta\eta\pi^-)$ — Γ_{13}/Γ_7

NODE=M075R10

VALUE	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.29 ± 0.07		[16] BELADIDZE 92C	VES	−	36 π^- Be $\to \pi^- \eta' \eta$ Be
0.3 ± 0.1	426 ± 57	[16] BITYUKOV 91	VES	−	36 π^- C $\to \pi^- \eta\eta$ C

$\Gamma(K_0^*(1430)K^-)/\Gamma_{total}$ — Γ_{14}/Γ

NODE=M075R4

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
seen	BERDNIKOV 94	VES	−	37 $\pi^- A \to K^+ K^- \pi^- A$

$\Gamma(K^*(892)K^-)/\Gamma_{total}$ — Γ_{15}/Γ

NODE=M075R9

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
not seen	BERDNIKOV 94	VES	−	37 $\pi^- A \to K^+ K^- \pi^- A$

[15] Assuming that $f_0(980)$ decays only to $\pi\pi$. NODE=M075R;LINKAGE=CK

[16] Systematic errors not estimated. NODE=M075R5;LINKAGE=NS

[17] From a single-pole fit. NODE=M075R7;LINKAGE=SP

[18] Assuming that $f_0(1500)$ decays only to $\eta\eta$ and $a_0(980)$ decays only to $\eta\pi$. NODE=M075R7;LINKAGE=A

$\pi(1800)$ REFERENCES

NODE=M075

AGHASYAN	18B	PR D98 092003	M. Aghasyan *et al.*	(COMPASS Collab.)	REFID=59471
ALEKSEEV	10	PRL 104 241803	M.G. Alekseev *et al.*	(COMPASS Collab.)	REFID=53356
EUGENIO	08	PL B660 466	P. Eugenio *et al.*	(BNL E852 Collab.)	REFID=52160
CHUNG	02	PR D65 072001	S.U. Chung *et al.*	(BNL E852 Collab.)	REFID=48837
ANISOVICH	01B	PL B500 222	A.V. Anisovich *et al.*		REFID=48318
AMELIN	99	PAN 62 445 (Translated from YAF 62 487.)	D.V. Amelin *et al.*	(VES Collab.)	REFID=46910
AMELIN	96B	PAN 59 976 (Translated from YAF 59 1021.)	D.V. Amelin *et al.*	(SERP, TBIL) IGJPC	REFID=44725
AMELIN	95B	PL B356 595	D.V. Amelin *et al.*	(SERP, TBIL)	REFID=44433
BERDNIKOV	94	PL B337 219	E.B. Berdnikov *et al.*	(SERP, TBIL)	REFID=44073
BELADIDZE	92C	SJNP 55 1535 (Translated from YAF 55 2748.)	G.M. Beladidze, S.I. Bityukov, G.V. Borisov	(SERP+)	REFID=43175
BITYUKOV	91	PL B268 137	S.I. Bityukov *et al.*	(SERP, TBIL)	REFID=41749
BELLINI	82	PRL 48 1697	G. Bellini *et al.*	(MILA, BGNA, JINR)	REFID=21134

NODE=M038

$f_2(1810)$

$I^G(J^{PC}) = 0^+(2^{++})$

OMITTED FROM SUMMARY TABLE
Needs confirmation.

NODE=M038

$f_2(1810)$ MASS

NODE=M038M

NODE=M038M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1815 ±12 OUR AVERAGE		Error includes scale factor of 1.4. See the ideogram below.			
$1822\,^{+29}_{-24}\,^{+\ 66}_{-\ 57}$	5.5k	[1] ABLIKIM	13N	BES3	$e^+e^- \to J/\psi \to \gamma\eta\eta$
$1737 \pm 9\,^{+198}_{-\ 65}$		[2] UEHARA	10A	BELL	$10.6\ e^+e^- \to e^+e^-\eta\eta$
1800 ± 30	40	ALDE	88D	GAM4	$300\ \pi^- p \to \pi^- p 4\pi^0$
1806 ± 10	1600	ALDE	87	GAM4	$100\ \pi^- p \to 4\pi^0 n$
1870 ± 40		[3] ALDE	86D	GAM4	$100\ \pi^- p \to \eta\eta n$
$1857\,^{+35}_{-24}$		[4] COSTA	80	OMEG	$10\ \pi^- p \to K^+K^- n$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1845.0 \pm 2.2\,^{+\ 1.6}_{-\ 7.2}$		[5] ALBRECHT	20	RVUE	$0.9\ \overline{p}p \to \pi^0\pi^0\eta,\ \pi^0\eta\eta,\ \pi^0 K^+K^-$
$1858\,^{+18}_{-71}$		[6] LONGACRE	86	RVUE	Compilation
1799 ± 15		[7] CASON	82	STRC	$8\ \pi^+ p \to \Delta^{++}\pi^0\pi^0$

[1] From partial wave analysis including all possible combinations of 0^{++}, 2^{++}, and 4^{++} resonances. NODE=M038M;LINKAGE=B

[2] Breit-Wigner mass. Could also be the $f_2(1910)$. NODE=M038M;LINKAGE=UE

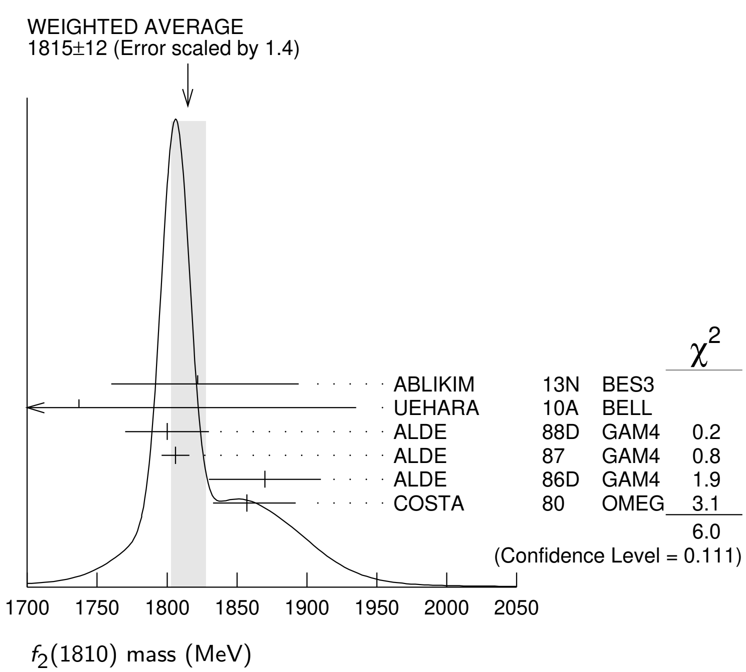
[3] Seen in only one solution. NODE=M038M;LINKAGE=F

[4] Error increased by spread of two solutions. Included in LONGACRE 86 global analysis. NODE=M038M;LINKAGE=A

[5] T-matrix pole, 4 poles, 4 channels, including scattering data from HYAMS 75 ($\pi\pi$), LONGACRE 86 ($K\overline{K}$), BINON 83 ($\eta\eta$). NODE=M038M;LINKAGE=C

[6] From a partial-wave analysis of data using a K-matrix formalism with 5 poles. Includes compilation of several other experiments. NODE=M038M;LINKAGE=L

[7] From an amplitude analysis of the reaction $\pi^+\pi^- \to 2\pi^0$. The resonance in the $2\pi^0$ final state is not confirmed by PROKOSHKIN 97. NODE=M038M;LINKAGE=P1



$f_2(1810)$ WIDTH

NODE=M038W

NODE=M038W

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
197 ± 22 OUR AVERAGE		Error includes scale factor of 1.5. See the ideogram below.		
$229\ {}^{+\ 52}_{-\ 42}\ {}^{+\ 88}_{-155}$	5.5k	[1] ABLIKIM 13N	BES3	$e^+e^- \rightarrow J/\psi \rightarrow \gamma\eta\eta$
$228\ {}^{+\ 21}_{-\ 20}\ {}^{+234}_{-153}$		[2] UEHARA 10A	BELL	$10.6\ e^+e^- \rightarrow e^+e^-\eta\eta$
160 ± 30	40	ALDE 88D	GAM4	$300\ \pi^- p \rightarrow \pi^- p 4\pi^0$
190 ± 20	1600	ALDE 87	GAM4	$100\ \pi^- p \rightarrow 4\pi^0 n$
250 ± 30		[3] ALDE 86D	GAM4	$100\ \pi^- p \rightarrow \eta\eta n$
$185\ {}^{+102}_{-139}$		[4] COSTA 80	OMEG	$10\ \pi^- p \rightarrow K^+K^- n$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$260.9 \pm\ 3.9\ {}^{+199.9}_{-\ 38.2}$		[5] ALBRECHT 20	RVUE	$0.9\ \overline{p}p \rightarrow \pi^0\pi^0\eta,\ \pi^0\eta\eta,\ \pi^0 K^+K^-$
$388\ {}^{+\ 15}_{-\ 21}$		[6] LONGACRE 86	RVUE	Compilation
$280\ {}^{+\ 42}_{-\ 35}$		[7] CASON 82	STRC	$8\ \pi^+ p \rightarrow \Delta^{++}\pi^0\pi^0$

[1] From partial wave analysis including all possible combinations of 0^{++}, 2^{++}, and 4^{++} resonances. NODE=M038W;LINKAGE=B

[2] Breit-Wigner width. Could also be the $f_2(1910)$. NODE=M038W;LINKAGE=UE

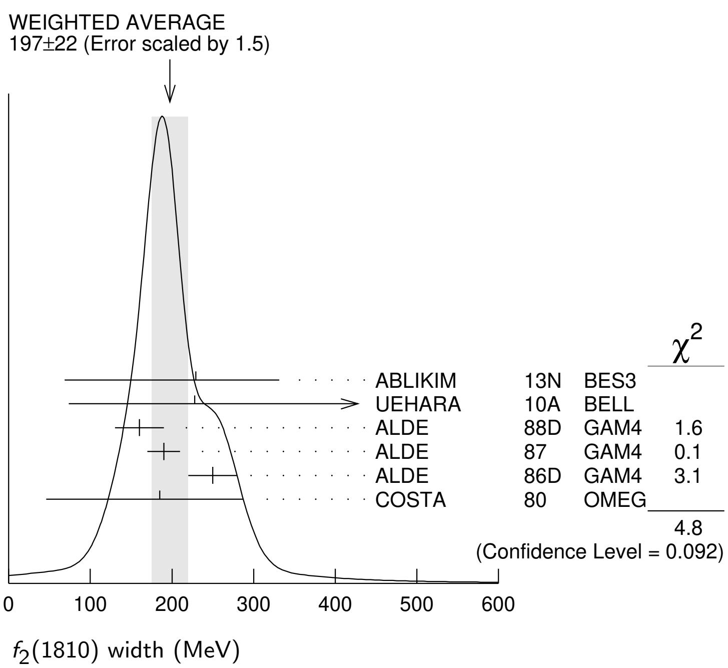
[3] Seen in only one solution. NODE=M038W;LINKAGE=F

[4] Error increased by spread of two solutions. Included in LONGACRE 86 global analysis. NODE=M038W;LINKAGE=A

[5] T-matrix pole, 4 poles, 4 channels, including scattering data from HYAMS 75 ($\pi\pi$), LONGACRE 86 ($K\overline{K}$), BINON 83 ($\eta\eta$). NODE=M038W;LINKAGE=C

[6] From a partial-wave analysis of data using a K-matrix formalism with 5 poles. Includes compilation of several other experiments. NODE=M038W;LINKAGE=L

[7] From an amplitude analysis of the reaction $\pi^+\pi^- \rightarrow 2\pi^0$. The resonance in the $2\pi^0$ final state is not confirmed by PROKOSHKIN 97. NODE=M038W;LINKAGE=P1



$f_2(1810)$ DECAY MODES

NODE=M038215;NODE=M038

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\pi\pi$		DESIG=2
Γ_2	$\eta\eta$	seen	DESIG=3
Γ_3	$4\pi^0$	seen	DESIG=4;OUR EST;→ UNCHECKED ←
Γ_4	K^+K^-		DESIG=1
Γ_5	$\gamma\gamma$	seen	DESIG=5;OUR EST;→ UNCHECKED ←

$f_2(1810)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M038225

$\Gamma(\eta\eta) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_2\Gamma_5/\Gamma$

NODE=M038G01
NODE=M038G01

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
$\mathbf{5.2^{+0.9+37.3}_{-0.8-\ \ 4.5}}$	[1] UEHARA	10A	BELL	$10.6\ e^+e^- \to e^+e^-\eta\eta$

[1] Including interference with the $f_2'(1525)$ (parameters fixed to the values from the 2008 edition of this review, PDG 08) and $f_2(1270)$. May also be the $f_0(1500)$.

NODE=M038G01;LINKAGE=UE

$f_2(1810)$ BRANCHING RATIOS

NODE=M038220

$\Gamma(\pi\pi)/\Gamma_{\text{total}}$ — Γ_1/Γ

NODE=M038R2
NODE=M038R2

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	AMSLER	02	CBAR	$0.9\ \overline{p}p \to \pi^0\eta\eta,\ \pi^0\pi^0\pi^0$
not seen	PROKOSHKIN	97	GAM2	$38\ \pi^- p \to \pi^0\pi^0 n$
$0.21^{+0.02}_{-0.03}$	[1] LONGACRE	86	RVUE	Compilation
0.44 ± 0.03	[2] CASON	82	STRC	$8\ \pi^+ p \to \Delta^{++}\pi^0\pi^0$

[1] From a partial-wave analysis of data using a K-matrix formalism with 5 poles. Includes compilation of several other experiments.

NODE=M038R2;LINKAGE=L

[2] Included in LONGACRE 86 global analysis.

NODE=M038R;LINKAGE=C

$\Gamma(\eta\eta)/\Gamma_{\text{total}}$ — Γ_2/Γ

NODE=M038R3
NODE=M038R3

VALUE	DOCUMENT ID		TECN	COMMENT
seen	ABLIKIM	13N	BES3	PWA of $J/\psi \to \gamma\eta\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.008^{+0.028}_{-0.003}$	[1] LONGACRE	86	RVUE	Compilation

[1] From a partial-wave analysis of data using a K-matrix formalism with 5 poles. Includes compilation of several other experiments.

NODE=M038R3;LINKAGE=L

$\Gamma(\pi\pi)/\Gamma(4\pi^0)$ — Γ_1/Γ_3

NODE=M038R4
NODE=M038R4

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.75	ALDE	87	GAM4	$100\ \pi^- p \to 4\pi^0 n$

$\Gamma(4\pi^0)/\Gamma(\eta\eta)$ — Γ_3/Γ_2

NODE=M038R5
NODE=M038R5

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.8 ± 0.3	ALDE	87	GAM4	$100\ \pi^- p \to 4\pi^0 n$

$\Gamma(K^+K^-)/\Gamma_{\text{total}}$ — Γ_4/Γ

NODE=M038R1
NODE=M038R1

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.003^{+0.019}_{-0.002}$	[1] LONGACRE	86	RVUE	Compilation
seen	COSTA	80	OMEG	$10\ \pi^- p \to K^+K^- n$

[1] From a partial-wave analysis of data using a K-matrix formalism with 5 poles. Includes compilation of several other experiments.

NODE=M038R1;LINKAGE=L

$f_2(1810)$ REFERENCES

NODE=M038

ALBRECHT	20	EPJ C80 453	M. Albrecht *et al.*	(Crystal Barrel Collab.)	REFID=60439
ABLIKIM	13N	PR D87 092009	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55387
UEHARA	10A	PR D82 114031	S. Uehara *et al.*	(BELLE Collab.)	REFID=53641
PDG	08	PL B667 1	C. Amsler *et al.*	(PDG Collab.)	REFID=52166
AMSLER	02	EPJ C23 29	C. Amsler *et al.*		REFID=48580
PROKOSHKIN	97	PD 42 117	Y.D. Prokoshkin *et al.*	(SERP)	REFID=45386
		Translated from DANS 353 323.			
ALDE	88D	SJNP 47 810	D.M. Alde *et al.*	(SERP, BELG, LANL, LAPP+)	REFID=44652
		Translated from YAF 47 1273.			
ALDE	87	PL B198 286	D.M. Alde *et al.*	(LANL, BRUX, SERP, LAPP)	REFID=40221
ALDE	86D	NP B269 485	D.M. Alde *et al.*	(BELG, LAPP, SERP, CERN+)	REFID=20765
LONGACRE	86	PL B177 223	R.S. Longacre *et al.*	(BNL, BRAN, CUNY+)	REFID=20768
BINON	83	NC 78A 313	F.G. Binon *et al.*	(BELG, LAPP, SERP+)	REFID=20750
CASON	82	PRL 48 1316	N.M. Cason *et al.*	(NDAM, ANL)	REFID=20746
COSTA	80	NP B175 402	G. Costa *et al.*	(BARI, BONN, CERN, GLAS+)	REFID=20737
HYAMS	75	NP B100 205	B.D. Hyams *et al.*	(CERN, MPIM)	REFID=20355

NODE=M085

X(1835)

$I^G(J^{PC}) = ?^?(0^{-+})$

OMITTED FROM SUMMARY TABLE

Could be a superposition of two states, one with small width appearing as threshold enhancement in $p\overline{p}$, the other one with a larger width. For the former ABLIKIM 12D determine $J^{PC} = 0^{-+}$.

NODE=M085

X(1835) MASS

NODE=M085M

NODE=M085M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$1826.5^{+13.0}_{-3.4}$ OUR AVERAGE					
$1825.3 \pm 2.4^{+17.3}_{-2.4}$		[1] ABLIKIM	16J	BES3	$J/\psi \to \gamma\pi^+\pi^-\eta'$
$1844 \pm 9\ ^{+16}_{-25}$		ABLIKIM	15T	BES3	$J/\psi \to \gamma K^0_S K^0_S \eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1839 \pm 26 \pm 26$		[2] ABLIKIM	18I	BES3	$J/\psi \to \gamma\gamma\phi(1020)$
$1909.5 \pm 15.9^{+9.4}_{-27.5}$		[3] ABLIKIM	16J	BES3	$J/\psi \to \gamma\pi^+\pi^-\eta'$
$1842.2 \pm 4.2^{+7.1}_{-2.6}$	0.6k	ABLIKIM	13U	BES3	$J/\psi \to \gamma 3(\pi^+\pi^-)$
$1832\ ^{+19}_{-5} \pm 26$		[4] ABLIKIM	12D	BES3	$J/\psi \to \gamma p\overline{p}$
$1836.5 \pm 3.0^{+5.6}_{-2.1}$	4265	[5] ABLIKIM	11C	BES3	$J/\psi \to \gamma\pi^+\pi^-\eta'$
$1877.3 \pm 6.3^{+3.4}_{-7.4}$		[6] ABLIKIM	11J	BES3	$J/\psi \to \omega(\eta\pi^+\pi^-)$
$1837\ ^{+10}_{-12}\ ^{+9}_{-7}$	231	[7,8] ALEXANDER	10	CLEO	$J/\psi \to \gamma p\overline{p}$
$1833.7 \pm 6.1 \pm 2.7$	264	ABLIKIM	05R	BES2	$J/\psi \to \gamma\pi^+\pi^-\eta'$
1831 ± 7		[8,9] ABLIKIM	05R	BES2	$J/\psi \to \gamma p\overline{p}$
$1859\ ^{+3}_{-10}\ ^{+5}_{-25}$		[8] BAI	03F	BES2	$J/\psi \to \gamma p\overline{p}$

OCCUR=2

OCCUR=2

[1] From a fit of the measured $\pi^+\pi^-\eta'$ lineshape that accounts for the abrupt distortion observed at the $p\overline{p}$ threshold through interference with a second previously unseen narrow resonance near 1870 MeV. The fit uses Breit-Wigner functions for the signal shapes and includes known backgrounds and contributors. NODE=M085M;LINKAGE=B

[2] From a fit to $\gamma\phi$ invariant mass. Angular analysis consistent with $J^{PC} = 0^{-+}$. Other J^{PC} not excluded. NODE=M085M;LINKAGE=C

[3] Pole mass from a fit of the measured $\pi^+\pi^-\eta'$ lineshape to a Flatte formula that accounts for the abrupt distortion observed at the $p\overline{p}$ threshold; the fit also includes known backgrounds and contributors, as well as an *ad hoc* Breit-Wigner function (M $\approx$ 1919 MeV; $\Gamma \approx$ 51 MeV) that is required for a good fit. NODE=M085M;LINKAGE=A

[4] From the fit including final state interaction effects in isospin 0 *S*-wave according to SIBIRTSEV 05A. Supersedes ABLIKIM 10G. NODE=M085M;LINKAGE=AK

[5] From a fit of the $\pi^+\pi^-\eta'$ mass distribution to a combination of $\gamma f_1(1510)$, $\gamma X(1835)$, and two states $\gamma X(2120)$ and $\gamma X(2370)$, for $M(\pi^+\pi^-\eta') < 2.8$ GeV,and accounting for backgrounds from non-η' events and $J/\psi \to \pi^0\pi^+\pi^-\eta'$. NODE=M085M;LINKAGE=AI

[6] The selected process is $J/\psi \to \omega a_0(980)\pi$. This state may be due also to $\eta_2(1870)$ or to a combination of $X(1835)$ and $\eta_2(1870)$. NODE=M085M;LINKAGE=BL

[7] From a fit of the $p\overline{p}$ mass distribution to a combination of $\gamma X(1835)$, γR with $M(R)$ = 2100 MeV and $\Gamma(R)$ = 160 MeV, and $\gamma p\overline{p}$ phase space, for $M(p\overline{p}) < 2.85$ GeV. NODE=M085M;LINKAGE=AE

[8] Evidence for a threshold enhancement in the $p\overline{p}$ mass spectrum was also reported by ABE 02K, AUBERT,B 05L, and WANG 05A in $B^+ \to p\overline{p}K^+$, WANG 05A in $B^0 \to p\overline{p}K^0_S$, ABE 02W in $\overline{B}^0 \to p\overline{p}D^0$, DEL-AMO-SANCHEZ 12 in $B \to D(D^*)p\overline{p}(\pi)$, and WEI 08 in $B^+ \to p\overline{p}\pi^+$ decays. Not seen by ATHAR 06 in $\Upsilon(1S) \to p\overline{p}\gamma$. NODE=M085M;LINKAGE=HF

[9] From the fit including final state interaction effects in isospin 0 *S*-wave according to SIBIRTSEV 05A. Systematic errors not estimated. NODE=M085M;LINKAGE=AB

X(1835) WIDTH

NODE=M085W

NODE=M085W

VALUE (MeV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$242\ ^{+14}_{-15}$ OUR AVERAGE						
$245.2 \pm 13.1^{+4.6}_{-9.6}$			[1] ABLIKIM	16J	BES3	$J/\psi \to \gamma\pi^+\pi^-\eta'$
$192\ ^{+20}_{-17}\ ^{+62}_{-43}$			ABLIKIM	15T	BES3	$J/\psi \to \gamma K^0_S K^0_S \eta$

OCCUR=2

• • • We do not use the following data for averages, fits, limits, etc. • • •

175 ±57 ±25			[2] ABLIKIM	18I	BES3	$J/\psi \to \gamma\gamma\phi(1020)$	
$273.5\pm21.4^{+\ 6.1}_{-64.0}$			[3] ABLIKIM	16J	BES3	$J/\psi \to \gamma\pi^+\pi^-\eta'$	
83 ±14 ±11		0.6k	ABLIKIM	13U	BES3	$J/\psi \to \gamma 3(\pi^+\pi^-)$	
< 76	90		[4] ABLIKIM	12D	BES3	$J/\psi \to \gamma p\overline{p}$	
$190\ \pm\ 9\ ^{+38}_{-36}$		4265	[5] ABLIKIM	11C	BES3	$J/\psi \to \gamma\pi^+\pi^-\eta'$	
$57\ \pm12\ ^{+19}_{-\ 4}$			[6] ABLIKIM	11J	BES3	$J/\psi \to \omega(\eta\pi^+\pi^-)$	
$0\ ^{+44}_{-\ 0}$		231	[7,8] ALEXANDER	10	CLEO	$J/\psi \to \gamma p\overline{p}$	
67.7±20.3± 7.7		264	ABLIKIM	05R	BES2	$J/\psi \to \gamma\pi^+\pi^-\eta'$	
< 153	90		[8,9] ABLIKIM	05R	BES2	$J/\psi \to \gamma p\overline{p}$	OCCUR=2
< 30			[8] BAI	03F	BES2	$J/\psi \to \gamma p\overline{p}$	

[1] From a fit of the measured $\pi^+\pi^-\eta'$ lineshape that accounts for the abrupt distortion observed at the $p\overline{p}$ threshold through interference with a second previously unseen narrow resonance near 1870 MeV. The fit uses Breit-Wigner functions for the signal shapes and includes known backgrounds and contributors. NODE=M085W;LINKAGE=B

[2] From a fit to $\gamma\phi$ invariant mass. Angular analysis consistent with $J^{PC} = 0^{-+}$. Other J^{PC} not excluded. NODE=M085W;LINKAGE=C

[3] Pole width from a fit of the measured $\pi^+\pi^-\eta'$ lineshape to a Flatte formula that accounts for the abrupt distortion observed at the $p\overline{p}$ threshold; the fit also includes known backgrounds and contributors, as well as an *ad hoc* Breit-Wigner function (M ≈ 1919 MeV; Γ ≈ 51 MeV) that is required for a good fit. NODE=M085W;LINKAGE=A

[4] From the fit including final state interaction effects in isospin 0 *S*-wave according to SIBIRTSEV 05A. Supersedes ABLIKIM 10G. NODE=M085W;LINKAGE=AK

[5] From a fit of the $\pi^+\pi^-\eta'$ mass distribution to a combination of $\gamma f_1(1510)$, $\gamma X(1835)$, and two states $\gamma X(2120)$ and $\gamma X(2370)$, for $M(\pi^+\pi^-\eta') < 2.8$ GeV,and accounting for backgrounds from non-η' events and $J/\psi \to \pi^0\pi^+\pi^-\eta'$. NODE=M085W;LINKAGE=AI

[6] The selected process is $J/\psi \to \omega a_0(980)\pi$. This state may be due also to $\eta_2(1870)$ or to a combination of $X(1835)$ and $\eta_2(1870)$. NODE=M085W;LINKAGE=BL

[7] From a fit of the $p\overline{p}$ mass distribution to a combination of $\gamma X(1835)$, γR with $M(R)$ = 2100 MeV and $\Gamma(R)$ = 160 MeV, and $\gamma p\overline{p}$ phase space, for $M(p\overline{p}) < 2.85$ GeV. NODE=M085W;LINKAGE=AE

[8] Evidence for a threshold enhancement in the $p\overline{p}$ mass spectrum was also reported by ABE 02K, AUBERT,B 05L, and WANG 05A in $B^+ \to p\overline{p}K^+$, WANG 05A in $B^0 \to p\overline{p}K^0_S$, ABE 02W in $\overline{B}^0 \to p\overline{p}D^0$, DEL-AMO-SANCHEZ 12 in $B \to D(D^*)p\overline{p}(\pi)$, and WEI 08 in $B^+ \to p\overline{p}\pi^+$ decays. Not seen by ATHAR 06 in $\Upsilon(1S) \to p\overline{p}\gamma$. NODE=M085W;LINKAGE=HF

[9] From the fit including final state interaction effects in isospin 0 *S*-wave according to SIBIRTSEV 05A. Systematic errors not estimated. NODE=M085W;LINKAGE=AB

X(1835) DECAY MODES

NODE=M085215;NODE=M085

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$p\overline{p}$	seen	DESIG=1;OUR EVAL;→ UNCHECKED ←
Γ_2	$\eta'\pi^+\pi^-$	seen	DESIG=2
Γ_3	$\gamma\gamma$		DESIG=4
Γ_4	$K^0_S K^0_S \eta$	seen	DESIG=5;OUR EVAL;→ UNCHECKED ←
Γ_5	$\gamma\phi(1020)$	possibly seen	DESIG=6
Γ_6	$3(\pi^+\pi^-)$	seen	DESIG=7

X(1835) Γ(i)Γ(γγ)/Γ(total)

NODE=M085225

$\Gamma(\eta'\pi^+\pi^-) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_2\Gamma_3/\Gamma$

NODE=M085G01
NODE=M085G01

VALUE (eV)	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<35.6	90	[1] ZHANG	12A	BELL	$e^+e^- \to e^+e^-\eta'\pi^+\pi^-$	
<83	90	[2] ZHANG	12A	BELL	$e^+e^- \to e^+e^-\eta'\pi^+\pi^-$	OCCUR=2

[1] From a two-resonance fit and constructive interference of the $\eta(1760)$ and $X(1835)$, a significance of 2.8 σ. NODE=M085G01;LINKAGE=ZH

[2] From a two-resonance fit and destructive interference of the $\eta(1760)$ and $X(1835)$, a significance of 2.8 σ. NODE=M085G01;LINKAGE=ZA

$X(1835)$ BRANCHING RATIOS

NODE=M085220

$\Gamma(p\overline{p})/\Gamma(\eta'\pi^+\pi^-)$ Γ_1/Γ_2

NODE=M085R01

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.333	ABLIKIM	05R	BES2	$J/\psi \to \gamma\pi^+\pi^-\eta'$

$\Gamma(\eta'\pi^+\pi^-)/\Gamma(K^0_S K^0_S\eta)$ Γ_2/Γ_4

NODE=M085R00

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
6.7 ± 1.8	[1] ABLIKIM	15T	BES3	$J/\psi \to \gamma K^0_S K^0_S\eta$

[1] Using resutls from ABLIKIM 05R.

NODE=M085R00;LINKAGE=A

$\Gamma(\eta'\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_2/Γ

NODE=M085R03

VALUE	DOCUMENT ID		TECN	COMMENT
seen	[1] ABLIKIM	16J	BES3	$J/\psi \to \gamma\pi^+\pi^-\eta'$

[1] ABLIKIM 16J quotes B($J/\psi \to \gamma X(1835)$) × B($X(1835) \to \pi^+\pi^-\eta'$) = $(3.93 \pm 0.38^{+0.31}_{-0.84}) \times 10^{-4}$ from a fit of the measured $\pi^+\pi^-\eta'$ lineshape that accounts for the abrupt distortion observed at the $p\overline{p}$ threshold with a Flatte formula in addition to known backgrounds and contributors, as well as an *ad hoc* Breit-Wigner (M ≈ 1919 MeV; Γ ≈ 51 MeV) that is required for a good fit. Another explanation for the distortion provided by ABLIKIM 16J is that a second resonance near 1870 MeV interferes with the $X(1835)$; fits to this possibility yield product branching fraction values compatible with that shown within the respective systematic uncertainties.

NODE=M085R03;LINKAGE=A

$\Gamma(\gamma\phi(1020))/\Gamma_{\text{total}}$ Γ_5/Γ

NODE=M085R04

VALUE	DOCUMENT ID		TECN	COMMENT
possibly seen	[1] ABLIKIM	18I	BES3	$J/\psi \to \gamma\gamma\phi(1020)$

[1] Seen as a peak in $\gamma\phi$ invariant mass. Angular analysis consistent with $J^{PC} = 0^{-+}$. Other J^{PC} not excluded.

NODE=M085R04;LINKAGE=A

$\Gamma(\gamma\gamma)/\Gamma(\eta'\pi^+\pi^-)$ Γ_3/Γ_2

NODE=M085R05

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<9.80 \times 10^{-3}$	90	[1] ABLIKIM	18O	BES3	$\psi(2S) \to \pi^+\pi^-\gamma\gamma\gamma$

[1] Using results from ABLIKIM 16J.

NODE=M085R05;LINKAGE=A

$\Gamma(3(\pi^+\pi^-))/\Gamma_{\text{total}}$ Γ_6/Γ

NODE=M085R06

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	0.6k	ABLIKIM	13U	BES3	$J/\psi \to \gamma 3(\pi^+\pi^-)$

$X(1835)$ REFERENCES

NODE=M085

ABLIKIM 18I PR D97 051101 M. Ablikim *et al.* (BESIII Collab.) REFID=58893
ABLIKIM 18O PR D97 072014 M. Ablikim *et al.* (BESIII Collab.) REFID=58925
ABLIKIM 16J PRL 117 042002 M. Ablikim *et al.* (BESIII Collab.) REFID=57454
ABLIKIM 15T PRL 115 091803 M. Ablikim *et al.* (BESIII Collab.) REFID=56785
ABLIKIM 13U PR D88 091502 M. Ablikim *et al.* (BESIII Collab.) REFID=55582
ABLIKIM 12D PRL 108 112003 M. Ablikim *et al.* (BESIII Collab.) JPC REFID=54269
DEL-AMO-SA... 12 PR D85 092017 P. del Amo Sanchez *et al.* (BABAR Collab.) REFID=54286
ZHANG 12A PR D86 052002 C.C. Zhang *et al.* (BELLE Collab.) REFID=54763
ABLIKIM 11C PRL 106 072002 M. Ablikim *et al.* (BESIII Collab.) REFID=53684
ABLIKIM 11J PRL 107 182001 M. Ablikim *et al.* (BESIII Collab.) REFID=53931
ABLIKIM 10G CP C34 421 M. Ablikim *et al.* (BESIII Collab.) REFID=55685
ALEXANDER 10 PR D82 092002 J.P. Alexander *et al.* (CLEO Collab.) REFID=53525
WEI 08 PL B659 80 J.-T. Wei *et al.* (BELLE Collab.) REFID=52086
ATHAR 06 PR D73 032001 S.B. Athar *et al.* (CLEO Collab.) REFID=50993
ABLIKIM 05R PRL 95 262001 M. Ablikim *et al.* (BES Collab.) REFID=50985
AUBERT,B 05L PR D72 051101 B. Aubert *et al.* (BABAR Collab.) REFID=50827
SIBIRTSEV 05A PR D71 054010 A. Sibirtsev, J. Haidenbauer REFID=51038
WANG 05A PL B617 141 M.-Z. Wang *et al.* (BELLE Collab.) REFID=50651
BAI 03F PRL 91 022001 J.Z. Bai *et al.* (BES II Collab.) REFID=49473
ABE 02K PRL 88 181803 K. Abe *et al.* (BELLE Collab.) REFID=48690
ABE 02W PRL 89 151802 K. Abe *et al.* (BELLE Collab.) REFID=48980

NODE=M054

$\phi_3(1850)$ $\quad I^G(J^{PC}) = 0^-(3^{--})$

$\phi_3(1850)$ MASS

NODE=M054M

NODE=M054M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1854± 7 OUR AVERAGE					
1855±10		ASTON	88E	LASS	11 $K^- p \to K^- K^+ \Lambda$, $K^0_S K^\pm \pi^\mp \Lambda$
1870^{+30}_{-20}	430	ARMSTRONG	82	OMEG	18.5 $K^- p \to K^- K^+ \Lambda$
1850±10	123	ALHARRAN	81B	HBC	8.25 $K^- p \to K \overline{K} \Lambda$

$\phi_3(1850)$ WIDTH

NODE=M054W

NODE=M054W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
87^{+28}_{-23} OUR AVERAGE Error includes scale factor of 1.2.					
64±31		ASTON	88E	LASS	11 $K^- p \to K^- K^+ \Lambda$, $K^0_S K^\pm \pi^\mp \Lambda$
160^{+90}_{-50}	430	ARMSTRONG	82	OMEG	18.5 $K^- p \to K^- K^+ \Lambda$
80^{+40}_{-30}	123	ALHARRAN	81B	HBC	8.25 $K^- p \to K \overline{K} \Lambda$

$\phi_3(1850)$ DECAY MODES

NODE=M054215;NODE=M054

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$K \overline{K}$	seen	DESIG=1;OUR EST;→ UNCHECKED ←
Γ_2	$K \overline{K}^*(892)$+ c.c.	seen	DESIG=2;OUR EST;→ UNCHECKED ←

$\phi_3(1850)$ BRANCHING RATIOS

NODE=M054220

$\Gamma(K \overline{K}^*(892)+\text{c.c.})/\Gamma(K \overline{K})$ $\quad \Gamma_2/\Gamma_1$

NODE=M054R1
NODE=M054R1

VALUE	DOCUMENT ID		TECN	COMMENT
$0.55^{+0.85}_{-0.45}$	ASTON	88E	LASS	11 $K^- p \to K^- K^+ \Lambda$, $K^0_S K^\pm \pi^\mp \Lambda$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.8 ±0.4	ALHARRAN	81B	HBC	8.25 $K^- p \to K \overline{K} \pi \Lambda$

$\phi_3(1850)$ REFERENCES

NODE=M054

ASTON	88E	PL B208 324	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS) IGJPC
ARMSTRONG	82	PL 110B 77	T.A. Armstrong *et al.*	(BARI, BIRM, CERN+) JP
ALHARRAN	81B	PL 101B 357	S. Al-Harran *et al.*	(BIRM, CERN, GLAS+)

REFID=40577
REFID=21405
REFID=21702

NODE=M101

$\eta_2(1870)$ $I^G(J^{PC}) = 0^+(2^{-+})$

$\eta_2(1870)$ MASS

NODE=M101M

NODE=M101M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1842± 8 OUR AVERAGE					
1835±12		BARBERIS	00B		450 $pp \to p_f \eta \pi^+ \pi^- p_s$
1844±13		BARBERIS	00C		450 $pp \to p_f 4\pi p_s$
1840±25		BARBERIS	97B	OMEG	450 $pp \to pp2(\pi^+\pi^-)$
1875±20±35		ADOMEIT	96	CBAR	1.94 $\overline{p}p \to \eta 3\pi^0$
1881±32±40	26	KARCH	92	CBAL	$e^+e^- \to e^+e^- \eta \pi^0 \pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1860± 5±15		ANISOVICH	00E	SPEC	0.9–1.94 $\overline{p}p \to \eta 3\pi^0$
1840±15		BAI	99	BES	$J/\psi \to \gamma \eta \pi^+ \pi^-$

$\eta_2(1870)$ WIDTH

NODE=M101W

NODE=M101W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
225±14 OUR AVERAGE					
235±22		BARBERIS	00B		450 $pp \to p_f \eta \pi^+ \pi^- p_s$
228±23		BARBERIS	00C		450 $pp \to p_f 4\pi p_s$
200±40		BARBERIS	97B	OMEG	450 $pp \to pp2(\pi^+\pi^-)$
200±25±45		ADOMEIT	96	CBAR	1.94 $\overline{p}p \to \eta 3\pi^0$
221±92±44	26	KARCH	92	CBAL	$e^+e^- \to e^+e^- \eta \pi^0 \pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$250\pm25^{+50}_{-35}$		ANISOVICH	00E	SPEC	0.9–1.94 $\overline{p}p \to \eta 3\pi^0$
170±40		BAI	99	BES	$J/\psi \to \gamma \eta \pi^+ \pi^-$

$\eta_2(1870)$ DECAY MODES

NODE=M101225;NODE=M101

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\eta\pi\pi$		DESIG=1
Γ_2	$a_2(1320)\pi$		DESIG=4
Γ_3	$f_2(1270)\eta$		DESIG=8
Γ_4	$a_0(980)\pi$		DESIG=2
Γ_5	$\gamma\gamma$	seen	DESIG=9

$\eta_2(1870)$ BRANCHING RATIOS

NODE=M101230

$\Gamma(a_2(1320)\pi)/\Gamma(f_2(1270)\eta)$ Γ_2/Γ_3

NODE=M101R2
NODE=M101R2

VALUE	DOCUMENT ID		TECN	COMMENT
1.7 ±0.4 OUR AVERAGE				
1.60±0.40	[1] ANISOVICH	11	SPEC	0.9–1.94 $p\overline{p}$
20.4 ±6.6	BARBERIS	00B		450 $pp \to p_f \eta \pi^+ \pi^- p_s$
4.1 ±2.3	ADOMEIT	96	CBAR	1.94 $\overline{p}p \to \eta 3\pi^0$

[1] Reanalysis of ADOMEIT 96 and ANISOVICH 00E.

NODE=M101R2;LINKAGE=AN

$\Gamma(a_2(1320)\pi)/\Gamma(a_0(980)\pi)$ Γ_2/Γ_4

NODE=M101R4
NODE=M101R4

VALUE	DOCUMENT ID		COMMENT
32.6±12.6	BARBERIS	00B	450 $pp \to p_f \eta \pi^+ \pi^- p_s$

$\Gamma(a_0(980)\pi)/\Gamma(f_2(1270)\eta)$ Γ_4/Γ_3

NODE=M101R01
NODE=M101R01

VALUE	DOCUMENT ID		TECN	COMMENT
0.48±0.45	[1] ANISOVICH	11	SPEC	0.9–1.94 $p\overline{p}$

[1] Reanalysis of ADOMEIT 96 and ANISOVICH 00E.

NODE=M101R01;LINKAGE=AN

$\Gamma(\gamma\gamma)/\Gamma_{total}$ Γ_5/Γ

NODE=M101R02
NODE=M101R02

VALUE	DOCUMENT ID		TECN	COMMENT
seen	KARCH	92	CBAL	$e^+e^- \to e^+e^- \eta \pi^0 \pi^0$

$\eta_2(1870)$ REFERENCES

NODE=M101

ANISOVICH	11	EPJ C71 1511	A.V. Anisovich *et al.*	(LOQM, RAL, PNPI)	REFID=53631
ANISOVICH	00E	PL B477 19	A.V. Anisovich *et al.*		REFID=47945
BARBERIS	00B	PL B471 435	D. Barberis *et al.*	(WA 102 Collab.)	REFID=47958
BARBERIS	00C	PL B471 440	D. Barberis *et al.*	(WA 102 Collab.)	REFID=47959
BAI	99	PL B446 356	J.Z. Bai *et al.*	(BES Collab.)	REFID=46606
BARBERIS	97B	PL B413 217	D. Barberis *et al.*	(WA 102 Collab.)	REFID=45758
ADOMEIT	96	ZPHY C71 227	J. Adomeit *et al.*	(Crystal Barrel Collab.)	REFID=45202
KARCH	92	ZPHY C54 33	K. Karch *et al.*	(Crystal Ball Collab.)	REFID=42170

NODE=M185

$\pi_2(1880)$

$I^G(J^{PC}) = 1^-(2^{-+})$

$\pi_2(1880)$ MASS

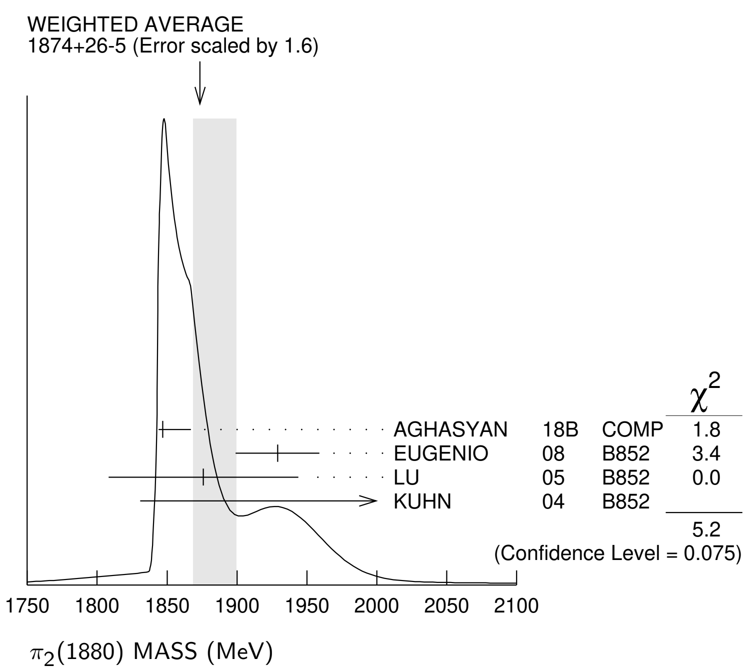
NODE=M185M

NODE=M185M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
1874^{+26}_{-5} OUR AVERAGE		Error includes scale factor of 1.6. See the ideogram below.				
1847^{+20}_{-3}	46M	[1] AGHASYAN	18B	COMP		$190\ \pi^- p \to \pi^-\pi^+\pi^- p$
$1929\pm24\pm18$	4k	EUGENIO	08	B852	$-$	$18\ \pi^- p \to \eta\eta\pi^- p$
$1876\pm11\pm67$	145k	LU	05	B852	$-$	$18\ \pi^- p \to \omega\pi^-\pi^0 p$
$2003\pm88\pm148$	69k	KUHN	04	B852	$-$	$18\ \pi^- p \to \eta\pi^+\pi^-\pi^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1880 ± 20		ANISOVICH	01B	SPEC	0	$0.6–1.94\ \bar{p}p \to \eta\eta\pi^0\pi^0$

[1] Statistical error negligible.

NODE=M185M;LINKAGE=A



$\pi_2(1880)$ WIDTH

NODE=M185W

NODE=M185W

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
237^{+33}_{-30} OUR AVERAGE		Error includes scale factor of 1.2.				
246^{+33}_{-28}	46M	[2] AGHASYAN	18B	COMP		$190\ \pi^- p \to \pi^-\pi^+\pi^- p$
$323\pm87\pm43$	4k	EUGENIO	08	B852	$-$	$18\ \pi^- p \to \eta\eta\pi^- p$
$146\pm17\pm62$	145k	LU	05	B852	$-$	$18\ \pi^- p \to \omega\pi^-\pi^0 p$
$306\pm132\pm121$	69k	KUHN	04	B852	$-$	$18\ \pi^- p \to \eta\pi^+\pi^-\pi^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
255 ± 45		ANISOVICH	01B	SPEC	0	$0.6–1.94\ \bar{p}p \to \eta\eta\pi^0\pi^0$

[2] Statistical error negligible.

NODE=M185W;LINKAGE=A

$\pi_2(1880)$ DECAY MODES

NODE=M185215;NODE=M185

	Mode	
Γ_1	$\eta\eta\pi^-$	DESIG=1
Γ_2	$a_0(980)\eta$	DESIG=2
Γ_3	$a_2(1320)\eta$	DESIG=3
Γ_4	$f_0(1500)\pi$	DESIG=4
Γ_5	$f_1(1285)\pi$	DESIG=5
Γ_6	$\omega\pi^-\pi^0$	DESIG=6

$\Gamma(a_2(1320)\eta)/\Gamma(f_1(1285)\pi)$ Γ_3/Γ_5

NODE=M185R01
NODE=M185R01

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
22.7±7.3	69k	KUHN	04	B852	−	18 $\pi^- p \to \eta\pi^+\pi^-\pi^- p$

$\Gamma(f_0(1500)\pi)/\Gamma(a_0(980)\eta)$ Γ_4/Γ_2

NODE=M185R02
NODE=M185R02

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.28^{+0.20}_{-0.15}$	[3] ANISOVICH	01B	SPEC	0	0.6–1.94 $\overline{p}p \to \eta\eta\pi^0\pi^0$

[3] Systematic errors not estimated.

NODE=M185R02;LINKAGE=NS

$\pi_2(1880)$ REFERENCES

NODE=M185

AGHASYAN	18B	PR D98 092003	M. Aghasyan *et al.*	(COMPASS Collab.)	REFID=59471
EUGENIO	08	PL B660 466	P. Eugenio *et al.*	(BNL E852 Collab.)	REFID=52160
LU	05	PRL 94 032002	M. Lu *et al.*	(BNL E852 Collab.)	REFID=50459
KUHN	04	PL B595 109	J. Kuhn *et al.*	(BNL E852 Collab.)	REFID=49773
ANISOVICH	01B	PL B500 222	A.V. Anisovich *et al.*		REFID=48318

NODE=M170

$\rho(1900)$

$I^G(J^{PC}) = 1^+(1^{--})$

OMITTED FROM SUMMARY TABLE

See the review on "Spectroscopy of Light Meson Resonances."

NODE=M170

$\rho(1900)$ MASS

NODE=M170M

NODE=M170M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1909±17±25	54	[1] AUBERT	08S	BABR	10.6 $e^+e^- \to \phi\pi^0\gamma$	
1880±30		AUBERT	06D	BABR	10.6 $e^+e^- \to 3\pi^+3\pi^-\gamma$	
1860±20		AUBERT	06D	BABR	10.6 $e^+e^- \to 2(\pi^+\pi^-\pi^0)\gamma$	OCCUR=2
1910±10		[2,3] FRABETTI	04	E687	$\gamma p \to 3\pi^+3\pi^- p$	
1870±10		ANTONELLI	96	SPEC	$e^+e^- \to$ hadrons	

[1] From the fit with two resonances. NODE=M170M;LINKAGE=AU
[2] From a fit with two resonances with the JACOB 72 continuum. NODE=M170M;LINKAGE=PI
[3] Supersedes FRABETTI 01. NODE=M170M;LINKAGE=RS

$\rho(1900)$ WIDTH

NODE=M170W

NODE=M170W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
48±17±2	54	[4] AUBERT	08S	BABR	10.6 $e^+e^- \to \phi\pi^0\gamma$	
130±30		AUBERT	06D	BABR	10.6 $e^+e^- \to 3\pi^+3\pi^-\gamma$	
160±20		AUBERT	06D	BABR	10.6 $e^+e^- \to 2(\pi^+\pi^-\pi^0)\gamma$	OCCUR=2
37±13		[5,6] FRABETTI	04	E687	$\gamma p \to 3\pi^+3\pi^- p$	
10± 5		ANTONELLI	96	SPEC	$e^+e^- \to$ hadrons	

[4] From the fit with two resonances. NODE=M170W;LINKAGE=AU
[5] From a fit with two resonances with the JACOB 72 continuum. NODE=M170W;LINKAGE=PI
[6] Supersedes FRABETTI 01. NODE=M170W;LINKAGE=RS

$\rho(1900)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma^2(\text{total})$

NODE=M170215

$\Gamma(\phi\pi)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_4/\Gamma \times \Gamma_6/\Gamma$

NODE=M170B01

VALUE (units 10^{-8})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$4.2\pm1.2\pm0.8$	54	[7] AUBERT	08S	BABR	10.6 $e^+e^- \to \phi\pi^0\gamma$

[7] From the fit with two resonances.

NODE=M170B01;LINKAGE=AU

$\rho(1900)$ DECAY MODES

NODE=M170225;NODE=M170

	Mode	Fraction (Γ_i/Γ)	
Γ_1	6π	seen	DESIG=5;OUR EST;→ UNCHECKED ←
Γ_2	$3\pi^+3\pi^-$	seen	DESIG=1;OUR EST;→ UNCHECKED ←
Γ_3	$2\pi^+2\pi^-2\pi^0$		DESIG=6
Γ_4	$\phi\pi$		DESIG=7
Γ_5	hadrons	seen	DESIG=2;OUR EST;→ UNCHECKED ←
Γ_6	e^+e^-	seen	DESIG=3;OUR EST;→ UNCHECKED ←
Γ_7	$\overline{N}N$	not seen	DESIG=4;OUR EST;→ UNCHECKED ←

$\rho(1900)$ BRANCHING RATIOS

NODE=M170230

$\Gamma(6\pi)/\Gamma_{total}$ — Γ_1/Γ

NODE=M170R1

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	8k	AKHMETSHIN	13	CMD3	$e^+e^- \to 3\pi^+3\pi^-$
not seen		AGNELLO	02	OBLX	$\overline{n}p \to 3\pi^+2\pi^-\pi^0$
seen		FRABETTI	01	E687	$\gamma p \to 3\pi^+3\pi^- p$
seen		ANTONELLI	96	SPEC	$e^+e^- \to$ hadrons

$\rho(1900)$ REFERENCES

NODE=M170

AKHMETSHIN	13	PL B723 82	R.R. Akhmetshin *et al.*	(CMD-3 Collab.)	REFID=55370
AUBERT	08S	PR D77 092002	B. Aubert *et al.*	(BABAR Collab.)	REFID=52242
AUBERT	06D	PR D73 052003	B. Aubert *et al.*	(BABAR Collab.)	REFID=51047
FRABETTI	04	PL B578 290	P.L. Frabetti *et al.*	(FNAL E687 Collab.)	REFID=49614
AGNELLO	02	PL B527 39	M. Agnello *et al.*	(OBELIX Collab.)	REFID=48576
FRABETTI	01	PL B514 240	P.L. Frabetti *et al.*	(FNAL E687 Collab.)	REFID=48350
ANTONELLI	96	PL B365 427	A. Antonelli *et al.*	(FENICE Collab.)	REFID=44633
JACOB	72	PR D5 1847	M. Jacob, R. Slansky		REFID=49668

NODE=M142

$f_2(1910)$

$I^G(J^{PC}) = 0^+(2^{++})$

OMITTED FROM SUMMARY TABLE

We list here three different peaks with close masses and widths seen in the mass distributions of $\omega\omega$, $\eta\eta'$, and K^+K^- final states. ALDE 91B argues that they are of different nature.

NODE=M142

$f_2(1910)$ MASS

NODE=M142205

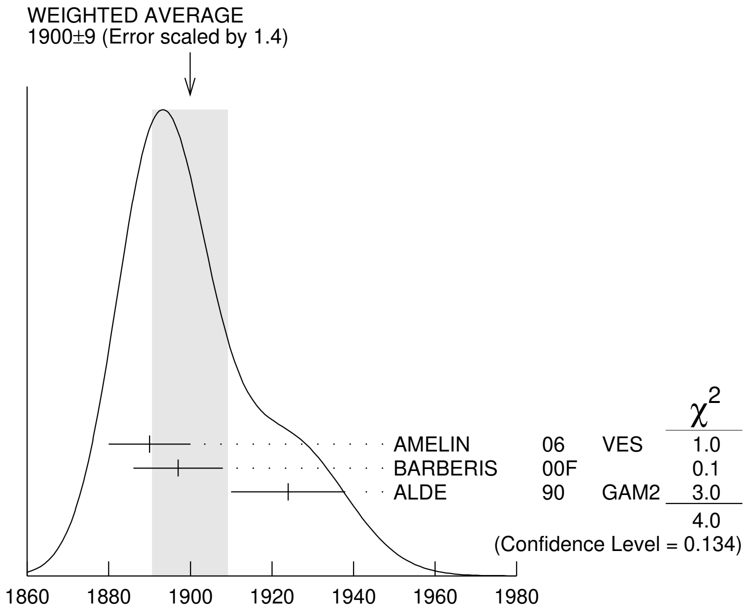
NODE=M142MX

$f_2(1910)$ $\omega\omega$ MODE

NODE=M142M2

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1900± 9 OUR AVERAGE	Error includes scale factor of 1.4. See the ideogram below.			
1890 ± 10	[1] AMELIN	06	VES	36 $\pi^- p \to \omega\omega n$
1897 ± 11	BARBERIS	00F		450 $pp \to p_f\omega\omega p_s$
1924 ± 14	ALDE	90	GAM2	38 $\pi^- p \to \omega\omega n$

[1] Supersedes BELADIDZE 92B. NODE=M142M2;LINKAGE=AM



$f_2(1910)$ $\omega\omega$ MODE MASS (MeV)

$f_2(1910)$ $\eta\eta'$ MODE

NODE=M142M3
NODE=M142M3

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1934±16	[1] BARBERIS	00A		450 $pp \rightarrow p_f \eta\eta' p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1934±20	[2] ANISOVICH	00J	SPEC	
1911±10	ALDE	91B	GAM2	38 $\pi^- p \rightarrow \eta\eta' n$

[1] Also compatible with $J^{PC}=1^{-+}$. NODE=M142M3;LINKAGE=KS

[2] Combined fit with $\eta\eta$, $\pi\pi$, and $\eta\pi\pi$. NODE=M142M3;LINKAGE=AN

$f_2(1910)$ K^+K^- MODE

NODE=M142M4
NODE=M142M4

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1941±18	[1] AMSLER	06	CBAR	1.64 $\overline{p}p \rightarrow K^+K^-\pi^0$

[1] Tentative, could be $f_2(1950)$. NODE=M142M4;LINKAGE=A

$f_2(1910)$ WIDTH

NODE=M142210

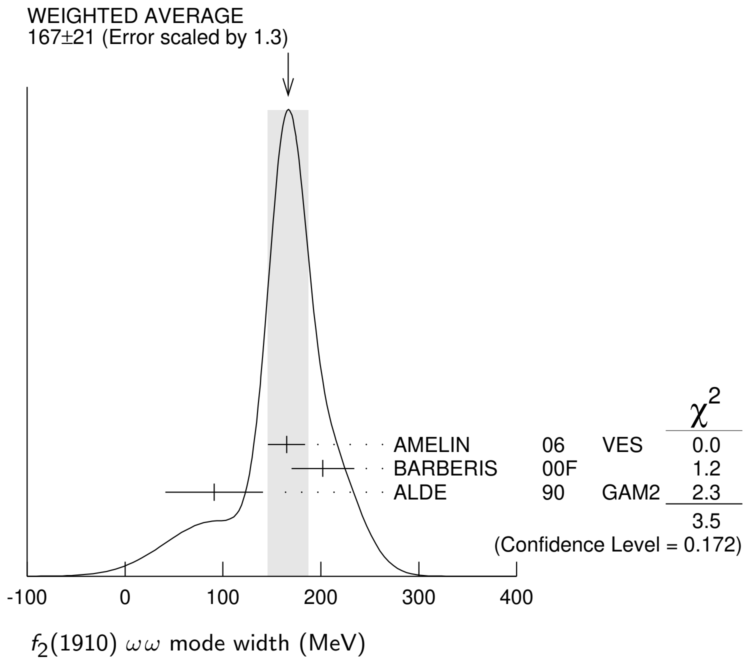
NODE=M142WX

$f_2(1910)$ $\omega\omega$ MODE

NODE=M142W2
NODE=M142W2

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
167±21 OUR AVERAGE	Error includes scale factor of 1.3. See the ideogram below.			
165±19	[1] AMELIN	06	VES	36 $\pi^- p \rightarrow \omega\omega n$
202±32	BARBERIS	00F		450 $pp \rightarrow p_f \omega\omega p_s$
91±50	ALDE	90	GAM2	38 $\pi^- p \rightarrow \omega\omega n$

[1] Supersedes BELADIDZE 92B. NODE=M142W2;LINKAGE=AM



$f_2(1910)$ $\eta\eta'$ MODE

NODE=M142W3

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
141±41	[1] BARBERIS	00A		450 $pp \to p_f \eta\eta' p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
271±25	[2] ANISOVICH	00J	SPEC	
90±35	ALDE	91B	GAM2	38 $\pi^- p \to \eta\eta' n$

[1] Also compatible with $J^{PC}=1-+$.
[2] Combined fit with $\eta\eta$, $\pi\pi$, and $\eta\pi\pi$.

NODE=M142W3;LINKAGE=KS
NODE=M142W3;LINKAGE=AN

$f_2(1910)$ K^+K^- MODE

NODE=M142W4

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
120±40	AMSLER	06	CBAR	1.64 $\overline{p}p \to K^+K^-\pi^0$

$f_2(1910)$ DECAY MODES

NODE=M142215;NODE=M142

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\pi^0\pi^0$		DESIG=6
Γ_2	K^+K^-	seen	DESIG=11
Γ_3	$K^0_S K^0_S$		DESIG=8
Γ_4	$\eta\eta$	seen	DESIG=3;OUR EST;→ UNCHECKED ←
Γ_5	$\omega\omega$	seen	DESIG=4;OUR EST;→ UNCHECKED ←
Γ_6	$\eta\eta'$	seen	DESIG=5;OUR EST;→ UNCHECKED ←
Γ_7	$\eta'\eta'$		DESIG=9
Γ_8	$\rho\rho$	seen	DESIG=10;OUR EST;→ UNCHECKED ←
Γ_9	$a_2(1320)\pi$	seen	DESIG=12;OUR EST;→ UNCHECKED ←
Γ_{10}	$f_2(1270)\eta$	seen	DESIG=13;OUR EST;→ UNCHECKED ←

$f_2(1910)$ BRANCHING RATIOS

NODE=M142225

$\Gamma(K^+K^-)/\Gamma_{total}$ — Γ_2/Γ

NODE=M142R11

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
seen	[1] AMSLER	06	CBAR	1.64 $\overline{p}p \to K^+K^-\pi^0$

[1] Tentative, could be $f_2(1950)$.

NODE=M142R11;LINKAGE=A

$\Gamma(\pi^0\pi^0)/\Gamma(\eta\eta')$ — Γ_1/Γ_6

NODE=M142R4

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.1	ALDE	89	GAM2	$38\pi^- p \to \eta\eta' n$

$\Gamma(K^0_S K^0_S)/\Gamma(\eta\eta')$ — Γ_3/Γ_6

NODE=M142R7

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.066	90	BALOSHIN	86	SPEC	$40 \pi p \rightarrow K^0_S K^0_S n$

$\Gamma(\eta\eta)/\Gamma(\eta\eta')$ — Γ_4/Γ_6

NODE=M142R6

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.05	90	ALDE	91B	GAM2	$38\ \pi^- p \rightarrow \eta\eta' n$

$\Gamma(\omega\omega)/\Gamma(\eta\eta')$ — Γ_5/Γ_6

NODE=M142R10

VALUE	DOCUMENT ID		COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
2.6 ± 0.6	BARBERIS	00F	$450\ pp \rightarrow p_f \omega\omega p_s$

$\Gamma(\eta'\eta')/\Gamma_{\rm total}$ — Γ_7/Γ

NODE=M142R8

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
probably not seen	BARBERIS	00A		$450\ pp \rightarrow p_f \eta'\eta' p_s$
possibly seen	BELADIDZE	92D	VES	$37\ \pi^- p \rightarrow \eta'\eta' n$

$\Gamma(\rho\rho)/\Gamma(\omega\omega)$ — Γ_8/Γ_5

NODE=M142R9

VALUE	DOCUMENT ID		COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
2.6 ± 0.4	BARBERIS	00F	$450\ pp \rightarrow p_f \omega\omega p_s$

$\Gamma(f_2(1270)\eta)/\Gamma(a_2(1320)\pi)$ — Γ_{10}/Γ_9

NODE=M142R12

VALUE	DOCUMENT ID		TECN	COMMENT
0.09±0.05	[1] ANISOVICH	11	SPEC	0.9–1.94 $p\overline{p}$

[1] Reanalysis of ADOMEIT 96 and ANISOVICH 00E.

NODE=M142R12;LINKAGE=AN

f_2(1910) REFERENCES

NODE=M142

ANISOVICH	11	EPJ C71 1511	A.V. Anisovich *et al.*	(LOQM, RAL, PNPI)	REFID=53631
AMELIN	06	PAN 69 690	D.V. Amelin *et al.*	(VES Collab.)	REFID=51574
		Translated from YAF 69 715.			
AMSLER	06	PL B639 165	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=51136
ANISOVICH	00E	PL B477 19	A.V. Anisovich *et al.*		REFID=47945
ANISOVICH	00J	PL B491 47	A.V. Anisovich *et al.*	(RAL, LOQM, PNPI+)	REFID=47950
BARBERIS	00A	PL B471 429	D. Barberis *et al.*	(WA 102 Collab.)	REFID=47957
BARBERIS	00F	PL B484 198	D. Barberis *et al.*	(WA 102 Collab.)	REFID=47962
ADOMEIT	96	ZPHY C71 227	J. Adomeit *et al.*	(Crystal Barrel Collab.)	REFID=45202
BELADIDZE	92B	ZPHY C54 367	G.M. Beladidze *et al.*	(VES Collab.)	REFID=42172
BELADIDZE	92D	ZPHY C57 13	G.M. Beladidze *et al.*	(VES Collab.)	REFID=43309
ALDE	91B	SJNP 54 455	D.M. Alde *et al.*	(SERP, BELG, LANL, LAPP+)	REFID=41844
		Translated from YAF 54 751.			
Also		PL B276 375	D.M. Alde *et al.*	(BELG, SERP, KEK, LANL+)	REFID=41911
ALDE	90	PL B241 600	D.M. Alde *et al.*	(SERP, BELG, LANL, LAPP+)	REFID=40935
ALDE	89	PL B216 447	D.M. Alde *et al.*	(SERP, BELG, LANL, LAPP)	REFID=40727
Also		SJNP 48 1035	D.M. Alde *et al.*	(BELG, SERP, LANL, LAPP)	REFID=44697
		Translated from YAF 48 1724.			
BALOSHIN	86	SJNP 43 959	O.N. Baloshin *et al.*	(ITEP)	REFID=40734
		Translated from YAF 43 1487.			

NODE=M227

$a_0(1950)$ $I^G(J^{PC}) = 1^-(0^{++})$

OMITTED FROM SUMMARY TABLE

Needs confirmation. Seen in $\gamma\gamma \rightarrow \eta_c(1S) \rightarrow K\overline{K}\pi$ by LEES 16A with significance 2.5 σ in $K^0_S K^\pm \pi^\mp$ and 4.2 σ in $K^+ K^- \pi^0$.

NODE=M227

$a_0(1950)$ MASS

NODE=M227M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1931±14±22	12k	[1,2] LEES	16A	BABR	$\gamma\gamma \rightarrow \eta_c(1S) \rightarrow K\overline{K}\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1949±32±76	8k	[1] LEES	16A	BABR	$\gamma\gamma \rightarrow \eta_c(1S) \rightarrow K^0_S K^\pm \pi^\mp$
1927±15±23	4k	[1] LEES	16A	BABR	$\gamma\gamma \rightarrow \eta_c(1S) \rightarrow K^+ K^- \pi^0$

NODE=M227M OCCUR=3 OCCUR=2

[1] From a model-independent partial wave analysis fit to a relativistic Breit-Wigner function with a floating width.

NODE=M227M;LINKAGE=A

[2] Weighted average of the $K^0_S K^\pm$ and $K^+ K^-$ decay modes.

NODE=M227M;LINKAGE=B

$a_0(1950)$ WIDTH

NODE=M227W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
271±22± 29	12k	[1,2] LEES	16A	BABR	$\gamma\gamma \rightarrow \eta_c(1S) \rightarrow K\overline{K}\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
265±36±110	8k	[1] LEES	16A	BABR	$\gamma\gamma \rightarrow \eta_c(1S) \rightarrow K^0_S K^\pm \pi^\mp$
274±28± 30	4k	[1] LEES	16A	BABR	$\gamma\gamma \rightarrow \eta_c(1S) \rightarrow K^+ K^- \pi^0$

NODE=M227W OCCUR=3 OCCUR=2

[1] From a model-independent partial wave analysis fit to a relativistic Breit-Wigner function with a floating mass.

NODE=M227W;LINKAGE=A

[2] Weighted average of the $K^0_S K^\pm$ and $K^+ K^-$ decay modes.

NODE=M227W;LINKAGE=B

$a_0(1950)$ DECAY MODES

NODE=M227215;NODE=M227

	Mode	Fraction (Γ_i/Γ)
Γ_1	$K\overline{K}$	seen

DESIG=1

$a_0(1950)$ BRANCHING RATIOS

NODE=M227225

$\Gamma(K\overline{K})/\Gamma_{total}$ Γ_1/Γ

NODE=M227R01
NODE=M227R01

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	12k	[1] LEES	16A	BABR	$\gamma\gamma \rightarrow \eta_c(1S) \rightarrow K\overline{K}\pi$

[1] From a model-independent partial wave analysis.

NODE=M227R01;LINKAGE=A

$a_0(1950)$ REFERENCES

NODE=M227

LEES 16A PR D93 012005 J.P. Lees *et al.* (BABAR Collab.)

REFID=57125

NODE=M135

$f_2(1950)$ $I^G(J^{PC}) = 0^+(2^{++})$

$f_2(1950)$ MASS

NODE=M135M

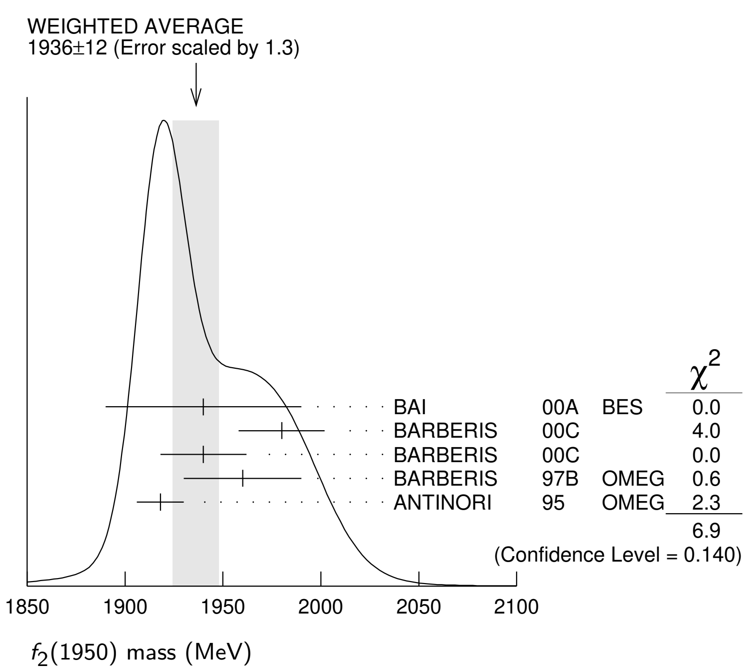
NODE=M135M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1936 ±12 OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below.				
1940 ±50	BAI	00A	BES	$J/\psi \to \gamma(\pi^+\pi^-\pi^+\pi^-)$
1980 ±22	[1] BARBERIS	00C		450 $pp \to pp4\pi$
1940 ±22	[2] BARBERIS	00C		450 $pp \to pp2\pi 2\pi^0$
1960 ±30	BARBERIS	97B	OMEG	450 $pp \to pp2(\pi^+\pi^-)$
1918 ±12	ANTINORI	95	OMEG	300,450 $pp \to pp2(\pi^+\pi^-)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1955 ±75	[3] RODAS	22	RVUE	$J/\psi(1S) \to \gamma\,(\pi\pi,\ K\overline{K})$
$1978.2 \pm 1.8^{+28.4}_{-16.9}$	[4] ALBRECHT	20	RVUE	0.9 $\overline{p}p \to \pi^0\pi^0\eta,\ \pi^0\eta\eta,\ \pi^0K^+K^-$
$2038\ ^{+13}_{-11}\ ^{+12}_{-73}$	[5] UEHARA	09	BELL	10.6 $e^+e^- \to e^+e^-\pi^0\pi^0$
1930 ±25	[6] BINON	05	GAMS	33 $\pi^-p \to \eta\eta n$
1980 ± 2 ±14	ABE	04	BELL	10.6 $e^+e^- \to e^+e^-K^+K^-$
1867 ±46	[7] AMSLER	02	CBAR	0.9 $\overline{p}p \to \pi^0\eta\eta,\ \pi^0\pi^0\pi^0$
2010 ±25	ANISOVICH	00J	SPEC	
1980 ±50	ANISOVICH	99B	SPEC	1.35–1.94 $p\overline{p} \to \eta\eta\pi^0$
~ 1990	[8] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \to \pi\pi$
1950 ±15	[9] ASTON	91	LASS	11 $K^-p \to \Lambda K\overline{K}\pi\pi$

OCCUR=2

[1] Decaying into $\pi^+\pi^-2\pi^0$.
[2] Decaying into $2(\pi^+\pi^-)$.
[3] T-matrix pole from coupled channel K-matrix fit to data on $J/\psi \to \gamma\pi^0\pi^0$ (ABLIKIM 15AE) and $J/\psi \to \gamma K^0_S K^0_S$ (ABLIKIM 18AA).
[4] T-matrix pole, 4 poles, 4 channels, including scattering data from HYAMS 75 ($\pi\pi$), LONGACRE 86 ($K\overline{K}$), BINON 83 ($\eta\eta$).
[5] Taking into account $f_4(2050)$.
[6] First solution, PWA is ambiguous.
[7] T-matrix pole.
[8] From solution B of amplitude analysis of data on $\overline{p}p \to \pi\pi$. See however KLOET 96 who fit $\pi^+\pi^-$ only and find waves only up to $J = 3$ to be important but not significantly resonant.
[9] Cannot determine spin to be 2.

NODE=M135M;LINKAGE=A4
NODE=M135M;LINKAGE=B4
NODE=M135M;LINKAGE=F
NODE=M135M;LINKAGE=B
NODE=M135M;LINKAGE=UE
NODE=M135M;LINKAGE=BI
NODE=M135M;LINKAGE=E
NODE=M135M;LINKAGE=BB
NODE=M135M;LINKAGE=A



$f_2(1950)$ WIDTH

NODE=M135W

NODE=M135W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
464 ± 24 OUR AVERAGE				
380^{+120}_{-90}	BAI	00A	BES	$J/\psi \to \gamma(\pi^+\pi^-\pi^+\pi^-)$
520 ± 50	[1] BARBERIS	00C		450 $pp \to pp4\pi$
485 ± 55	[2] BARBERIS	00C		450 $pp \to pp4\pi$
460 ± 40	BARBERIS	97B	OMEG	450 $pp \to pp2(\pi^+\pi^-)$
390 ± 60	ANTINORI	95	OMEG	300,450 $pp \to pp2(\pi^+\pi^-)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
350 ±113	[3] RODAS	22	RVUE	$J/\psi(1S) \to \gamma\ (\pi\pi,\ K\overline{K})$
$237.6 \pm 1.6^{+41.6}_{-15.5}$	[4] ALBRECHT	20	RVUE	0.9 $\overline{p}p \to \pi^0\pi^0\eta,\ \pi^0\eta\eta,\ \pi^0K^+K^-$
$441^{+27}_{-25}{}^{+28}_{-192}$	[5] UEHARA	09	BELL	10.6 $e^+e^- \to e^+e^-\pi^0\pi^0$
450 ± 50	[6] BINON	05	GAMS	33 $\pi^-p \to \eta\eta n$
297 ± 12 ± 6	ABE	04	BELL	10.6 $e^+e^- \to e^+e^-K^+K^-$
385 ± 58	[7] AMSLER	02	CBAR	0.9 $\overline{p}p \to \pi^0\eta\eta,\ \pi^0\pi^0\pi^0$
495 ± 35	ANISOVICH	00J	SPEC	
500 ±100	ANISOVICH	99B	SPEC	1.35–1.94 $p\overline{p} \to \eta\eta\pi^0$
~ 100	[8] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \to \pi\pi$
250 ± 50	[9] ASTON	91	LASS	11 $K^-p \to \Lambda K\overline{K}\pi\pi$

OCCUR=2

[1] Decaying into $\pi^+\pi^-2\pi^0$. NODE=M135W;LINKAGE=A4

[2] Decaying into $2(\pi^+\pi^-)$. NODE=M135W;LINKAGE=B4

[3] T-matrix pole from coupled channel K-matrix fit to data on $J/\psi \to \gamma\pi^0\pi^0$ (ABLIKIM 15AE) and $J/\psi \to \gamma K^0_S K^0_S$ (ABLIKIM 18AA). NODE=M135W;LINKAGE=D

[4] T-matrix pole, 4 poles, 4 channels, including scattering data from HYAMS 75 ($\pi\pi$), LONGACRE 86 ($K\overline{K}$), BINON 83 ($\eta\eta$). NODE=M135W;LINKAGE=B

[5] Taking into account $f_4(2050)$. NODE=M135W;LINKAGE=UE

[6] First solution, PWA is ambiguous. NODE=M135W;LINKAGE=BI

[7] T-matrix pole. NODE=M135W;LINKAGE=TT

[8] From solution B of amplitude analysis of data on $\overline{p}p \to \pi\pi$. See however KLOET 96 who fit $\pi^+\pi^-$ only and find waves only up to $J = 3$ to be important but not significantly resonant. NODE=M135W;LINKAGE=BB

[9] Cannot determine spin to be 2. NODE=M135W;LINKAGE=A

$f_2(1950)$ DECAY MODES

NODE=M135215;NODE=M135

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$K^*(892)\overline{K}^*(892)$	seen	DESIG=1
Γ_2	$\pi\pi$		DESIG=11
Γ_3	$\pi^+\pi^-$	seen	DESIG=2;OUR EST;→ UNCHECKED ←
Γ_4	$\pi^0\pi^0$	seen	DESIG=10;OUR EST;→ UNCHECKED ←
Γ_5	4π	seen	DESIG=7;OUR EST;→ UNCHECKED ←
Γ_6	$\pi^+\pi^-\pi^+\pi^-$		DESIG=3
Γ_7	$a_2(1320)\pi$		DESIG=4
Γ_8	$f_2(1270)\pi\pi$		DESIG=5
Γ_9	$\eta\eta$	seen	DESIG=6;OUR EST;→ UNCHECKED ←
Γ_{10}	$K\overline{K}$	seen	DESIG=8;OUR EST;→ UNCHECKED ←
Γ_{11}	$\gamma\gamma$	seen	DESIG=9;OUR EST;→ UNCHECKED ←
Γ_{12}	$p\overline{p}$	seen	DESIG=12

$f_2(1950)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M135225

$\Gamma(K\overline{K}) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_{10}\Gamma_{11}/\Gamma$

NODE=M135G1
NODE=M135G1

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
122±4±26	[1] ABE	04	BELL	10.6 $e^+e^- \to e^+e^-K^+K^-$

[1] Assuming spin 2. NODE=M135G1;LINKAGE=AB

$\Gamma(\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_2\Gamma_{11}/\Gamma$

NODE=M135G2

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$162^{+69}_{-42}{}^{+1137}_{-\ 204}$	[1] UEHARA	09	BELL	10.6 $e^+e^- \to e^+e^-\pi^0\pi^0$

[1] Taking into account $f_4(2050)$.

NODE=M135G2;LINKAGE=UE

$f_2(1950)$ BRANCHING RATIOS

NODE=M135220

$\Gamma(K^*(892)\overline{K}^*(892))/\Gamma_{\text{total}}$ — Γ_1/Γ

NODE=M135R1

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
seen	ASTON	91	LASS	0	11 $K^- p \to \Lambda K \overline{K} \pi\pi$

$\Gamma(a_2(1320)\pi)/\Gamma_{\text{total}}$ — Γ_7/Γ

NODE=M135R3

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	BARBERIS	00B		450 $pp \to p_f \eta\pi^+\pi^- p_s$
not seen	BARBERIS	00C		450 $pp \to p_f 4\pi p_s$
possibly seen	BARBERIS	97B	OMEG	450 $pp \to pp2(\pi^+\pi^-)$

$\Gamma(\eta\eta)/\Gamma(4\pi)$ — Γ_9/Γ_5

NODE=M135R5

VALUE	CL%	DOCUMENT ID		COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$<5.0 \times 10^{-3}$	90	BARBERIS	00E	450 $pp \to p_f \eta\eta p_s$

$\Gamma(\eta\eta)/\Gamma(\pi^+\pi^-)$ — Γ_9/Γ_3

NODE=M135R6

VALUE	DOCUMENT ID		TECN	COMMENT
0.14±0.05	AMSLER	02	CBAR	0.9 $\overline{p}p \to \pi^0\eta\eta$, $\pi^0\pi^0\pi^0$

$\Gamma(p\overline{p})/\Gamma_{\text{total}}$ — Γ_{12}/Γ

NODE=M135R07

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	111	ALEXANDER	10	CLEO	$\psi(2S) \to \gamma p\overline{p}$

$f_2(1950)$ REFERENCES

NODE=M135

RODAS	22	EPJ C82 80	A. Rodas *et al.*	(JPAC Collab.)	REFID=61610
ALBRECHT	20	EPJ C80 453	M. Albrecht *et al.*	(Crystal Barrel Collab.)	REFID=60439
ABLIKIM	18AA	PR D98 072003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59455
ABLIKIM	15AE	PR D92 052003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56984
ALEXANDER	10	PR D82 092002	J.P. Alexander *et al.*	(CLEO Collab.)	REFID=53525
UEHARA	09	PR D79 052009	S. Uehara *et al.*	(BELLE Collab.)	REFID=52761
BINON	05	PAN 68 960	F. Binon *et al.*		REFID=50780
		Translated from YAF 68 998.			
ABE	04	EPJ C32 323	K. Abe *et al.*	(BELLE Collab.)	REFID=49650
AMSLER	02	EPJ C23 29	C. Amsler *et al.*		REFID=48580
ANISOVICH	00J	PL B491 47	A.V. Anisovich *et al.*	(RAL, LOQM, PNPI+)	REFID=47950
BAI	00A	PL B472 207	J.Z. Bai *et al.*	(BES Collab.)	REFID=47426
BARBERIS	00B	PL B471 435	D. Barberis *et al.*	(WA 102 Collab.)	REFID=47958
BARBERIS	00C	PL B471 440	D. Barberis *et al.*	(WA 102 Collab.)	REFID=47959
BARBERIS	00E	PL B479 59	D. Barberis *et al.*	(WA 102 Collab.)	REFID=47961
ANISOVICH	99B	PL B449 154	A.V. Anisovich *et al.*		REFID=46886
BARBERIS	97B	PL B413 217	D. Barberis *et al.*	(WA 102 Collab.)	REFID=45758
KLOET	96	PR D53 6120	W.M. Kloet, F. Myhrer	(RUTG, NORD)	REFID=45212
ANTINORI	95	PL B353 589	F. Antinori *et al.*	(ATHU, BARI, BIRM+) JP	REFID=44437
OAKDEN	94	NP A574 731	M.N. Oakden, M.R. Pennington	(DURH)	REFID=45210
ASTON	91	NPBPS B21 5	D. Aston *et al.*	(LASS Collab.)	REFID=41746
LONGACRE	86	PL B177 223	R.S. Longacre *et al.*	(BNL, BRAN, CUNY+)	REFID=20768
BINON	83	NC 78A 313	F.G. Binon *et al.*	(BELG, LAPP, SERP+)	REFID=20750
HYAMS	75	NP B100 205	B.D. Hyams *et al.*	(CERN, MPIM)	REFID=20355

NODE=M017

$a_4(1970)$

$I^G(J^{PC}) = 1^-(4^{++})$

was $a_4(2040)$

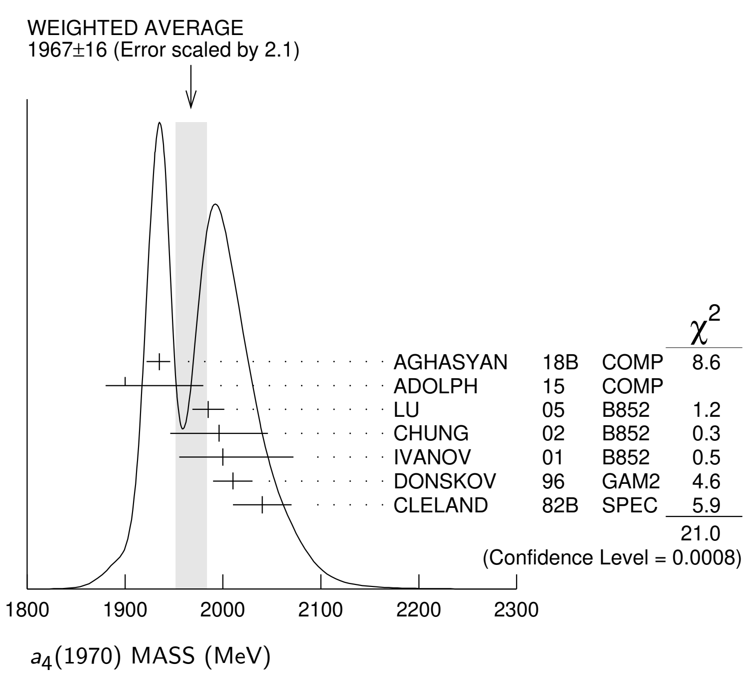
a_4(1970) MASS

NODE=M017M

NODE=M017M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1967±16 OUR AVERAGE		Error includes scale factor of 2.1. See the ideogram below.				
1935^{+11}_{-13}	46M	[1] AGHASYAN	18B	COMP		$190\ \pi^- p \to \pi^- \pi^+ \pi^- p$
1900^{+80}_{-20}		ADOLPH	15	COMP		$191\ \pi^- p \to \eta^{(\prime)} \pi^- p$
$1985 \pm 10 \pm 13$	145k	LU	05	B852		$18\ \pi^- p \to \omega \pi^- \pi^0 p$
$1996 \pm 25 \pm 43$		CHUNG	02	B852		$18.3\ \pi^- p \to 3\pi p$
$2000 \pm 40^{+60}_{-20}$		IVANOV	01	B852		$18\ \pi^- p \to \eta' \pi^- p$
2010 ± 20		[2] DONSKOV	96	GAM2	0	$38\ \pi^- p \to \eta \pi^0 n$
2040 ± 30		[3] CLELAND	82B	SPEC	±	$50\ \pi p \to K^0_S K^\pm p$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$1885 \pm 13^{+50}_{-2}$	420k	[4] ALEKSEEV	10	COMP		$190\ \pi^- Pb \to \pi^- \pi^- \pi^+ Pb'$
2004 ± 6	80k	[5] UMAN	06	E835		$5.2\ \bar{p}p \to \eta\eta\pi^0$
2005^{+25}_{-45}		[6] ANISOVICH	01F	SPEC		$2.0\ \bar{p}p \to 3\pi^0, \pi^0\eta, \pi^0\eta'$
$1944 \pm 8 \pm 50$		[7] AMELIN	99	VES		$37\ \pi^- A \to \omega \pi^- \pi^0 A^*$
1903 ± 10		[8] BALDI	78	SPEC	−	$10\ \pi^- p \to p K^0_S K^-$
2030 ± 50		[9] CORDEN	78C	OMEG	0	$15\ \pi^- p \to 3\pi n$

[1] Statistical error negligible. NODE=M017M;LINKAGE=B
[2] From a simultaneous fit to the G_+ and G_0 wave intensities. NODE=M017M;LINKAGE=A
[3] From an amplitude analysis. NODE=M017M;LINKAGE=C
[4] Superseded by AGHASYAN 2018B. NODE=M017M;LINKAGE=D
[5] Statistical error only. NODE=M017M;LINKAGE=ST
[6] From the combined analysis of ANISOVICH 99C, ANISOVICH 99E, and ANISOVICH 01F. NODE=M017M;LINKAGE=AN
[7] May be a different state. NODE=M017M;LINKAGE=DM
[8] From a fit to the Y^0_8 moment. Limited by phase space. NODE=M017M;LINKAGE=Y
[9] $J^P = 4^+$ is favored, though $J^P = 2^+$ cannot be excluded. NODE=M017M;LINKAGE=M



a_4(1970) WIDTH

NODE=M017W

NODE=M017W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
324^{+15}_{-18} OUR AVERAGE						
333^{+16}_{-21}	46M	[1] AGHASYAN	18B	COMP		$190\ \pi^- p \to \pi^-\pi^+\pi^- p$
300^{+80}_{-100}		ADOLPH	15	COMP		$191\ \pi^- p \to \eta^{(\prime)}\pi^- p$
$231\pm 30\pm 46$	145k	LU	05	B852		$18\ \pi^- p \to \omega\pi^-\pi^0 p$
$298\pm 81\pm 85$		CHUNG	02	B852		$18.3\ \pi^- p \to 3\pi p$
$350\pm 100^{+70}_{-50}$		IVANOV	01	B852		$18\ \pi^- p \to \eta'\pi^- p$
370 ± 80		[2] DONSKOV	96	GAM2	0	$38\ \pi^- p \to \eta\pi^0 n$
380 ± 150		[3] CLELAND	82B	SPEC	$\pm$	$50\ \pi p \to K^0_S K^\pm p$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$294\pm 25^{+46}_{-19}$	420k	[4] ALEKSEEV	10	COMP		$190\ \pi^- Pb \to \pi^-\pi^-\pi^+ Pb'$
401 ± 16	80k	[5] UMAN	06	E835		$5.2\ \overline{p}p \to \eta\eta\pi^0$
180 ± 30		[6] ANISOVICH	01F	SPEC		$2.0\ \overline{p}p \to 3\pi^0$, $\pi^0\eta$, $\pi^0\eta'$
$324\pm 26\pm 75$		[7] AMELIN	99	VES		$37\ \pi^- A \to \omega\pi^-\pi^0 A^*$
166 ± 43		[8] BALDI	78	SPEC	$-$	$10\ \pi^- p \to p K^0_S K^-$
510 ± 200		[9] CORDEN	78C	OMEG	0	$15\ \pi^- p \to 3\pi n$

[1] Statistical error negligible. NODE=M017W;LINKAGE=B
[2] From a simultaneous fit to the G_+ and G_0 wave intensities. NODE=M017W;LINKAGE=A
[3] From an amplitude analysis. NODE=M017W;LINKAGE=C
[4] Superseded by AGHASYAN 2018B. NODE=M017W;LINKAGE=D
[5] Statistical error only. NODE=M017W;LINKAGE=ST
[6] From the combined analysis of ANISOVICH 99C, ANISOVICH 99E, and ANISOVICH 01F. NODE=M017W;LINKAGE=AN
[7] May be a different state. NODE=M017W;LINKAGE=DM
[8] From a fit to the Y^0_8 moment. Limited by phase space. NODE=M017W;LINKAGE=Y
[9] $J^P = 4^+$ is favored, though $J^P = 2^+$ cannot be excluded. NODE=M017W;LINKAGE=M

$a_4(1970)$ DECAY MODES

NODE=M017215;NODE=M017

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$K\overline{K}$	seen	DESIG=1
Γ_2	$\pi^+\pi^-\pi^0$	seen	DESIG=2
Γ_3	$\rho\pi$	seen	DESIG=5;OUR EST;→ UNCHECKED ←
Γ_4	$f_2(1270)\pi$	seen	DESIG=6;OUR EST;→ UNCHECKED ←
Γ_5	$\omega\pi^-\pi^0$	seen	DESIG=7;OUR EST;→ UNCHECKED ←
Γ_6	$\omega\rho$	seen	DESIG=8
Γ_7	$\eta\pi$	seen	DESIG=3
Γ_8	$\eta'(958)\pi$	seen	DESIG=4;OUR EST;→ UNCHECKED ←

$a_4(1970)$ BRANCHING RATIOS

NODE=M017220

$\Gamma(K\overline{K})/\Gamma_{total}$ Γ_1/Γ

NODE=M017R1
NODE=M017R1

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
seen	BALDI	78	SPEC	$\pm$	$10\ \pi^- p \to K^0_S K^- p$

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_2/Γ

NODE=M017R2
NODE=M017R2

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
seen	CORDEN	78C	OMEG	0	$15\ \pi^- p \to 3\pi n$

$\Gamma(\rho\pi)/\Gamma(f_2(1270)\pi)$ Γ_3/Γ_4

NODE=M017R4
NODE=M017R4

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$1.7^{+0.9}_{-0.8}$ OUR AVERAGE Error includes scale factor of 3.7.					
$2.9^{+0.6}_{-0.4}$	46M	[1] AGHASYAN	18B	COMP	$190\ \pi^- p \to \pi^-\pi^+\pi^- p$
$1.1\pm 0.2\pm 0.2$		CHUNG	02	B852	$18.3\ \pi^- p \to 3\pi p$

[1] Statistical error negligible. NODE=M017R4;LINKAGE=A

$\Gamma(\eta\pi)/\Gamma_{total}$ — Γ_7/Γ

NODE=M017R3
NODE=M017R3

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
seen	DONSKOV	96	GAM2	0	38 $\pi^- p \to \eta\pi^0 n$

$\Gamma(\eta'(958)\pi)/\Gamma(\eta\pi)$ — Γ_8/Γ_7

NODE=M017R01
NODE=M017R01

VALUE	DOCUMENT ID		TECN	COMMENT
0.23±0.07	ADOLPH	15	COMP	191 $\pi^- p \to \eta^{(\prime)} \pi^- p$

$\Gamma(\omega\rho)/\Gamma_{total}$ — Γ_6/Γ

NODE=M017R5
NODE=M017R5

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	145k	LU	05	B852	18 $\pi^- p \to \omega\pi^-\pi^0 p$

a_4(1970) REFERENCES

NODE=M017

AGHASYAN	18B	PR D98 092003	M. Aghasyan *et al.*	(COMPASS Collab.)	REFID=59471
ADOLPH	15	PL B740 303	M. Adolph *et al.*	(COMPASS Collab.)	REFID=56385
ALEKSEEV	10	PRL 104 241803	M.G. Alekseev *et al.*	(COMPASS Collab.)	REFID=53356
UMAN	06	PR D73 052009	I. Uman *et al.*	(FNAL E835)	REFID=51063
LU	05	PRL 94 032002	M. Lu *et al.*	(BNL E852 Collab.)	REFID=50459
CHUNG	02	PR D65 072001	S.U. Chung *et al.*	(BNL E852 Collab.)	REFID=48837
ANISOVICH	01F	PL B517 261	A.V. Anisovich *et al.*		REFID=48352
IVANOV	01	PRL 86 3977	E.I. Ivanov *et al.*	(BNL E852 Collab.)	REFID=48317
AMELIN	99	PAN 62 445	D.V. Amelin *et al.*	(VES Collab.)	REFID=46910
		Translated from YAF 62 487.			
ANISOVICH	99C	PL B452 173	A.V. Anisovich *et al.*		REFID=46903
ANISOVICH	99E	PL B452 187	A.V. Anisovich *et al.*		REFID=46902
DONSKOV	96	PAN 59 982	S.V. Donskov *et al.*	(GAMS Collab.) IGJPC	REFID=45207
		Translated from YAF 59 1027.			
CLELAND	82B	NP B208 228	W.E. Cleland *et al.*	(DURH, GEVA, LAUS+)	REFID=21281
BALDI	78	PL 74B 413	R. Baldi *et al.*	(GEVA) JP	REFID=21783
CORDEN	78C	NP B136 77	M.J. Corden *et al.*	(BIRM, RHEL, TELA+) JP	REFID=20859

NODE=M167

$\rho_3(1990)$

$I^G(J^{PC}) = 1^+(3^{--})$

OMITTED FROM SUMMARY TABLE

ρ_3(1990) MASS

NODE=M167M

NODE=M167M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1982±14	[1] ANISOVICH	02	SPEC	0.6–1.9 $p\bar{p} \to \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$
~ 2007	HASAN	94	RVUE	$\bar{p}p \to \pi\pi$

[1] From the combined analysis of ANISOVICH 00J, ANISOVICH 01D, ANISOVICH 01E, and ANISOVICH 02.

NODE=M167M;LINKAGE=AY

ρ_3(1990) WIDTH

NODE=M167W

NODE=M167W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
188±24	[2] ANISOVICH	02	SPEC	0.6–1.9 $p\bar{p} \to \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$
~ 287	HASAN	94	RVUE	$\bar{p}p \to \pi\pi$

[2] From the combined analysis of ANISOVICH 00J, ANISOVICH 01D, ANISOVICH 01E, and ANISOVICH 02.

NODE=M167W;LINKAGE=AY

ρ_3(1990) REFERENCES

NODE=M167

ANISOVICH	02	PL B542 8	A.V. Anisovich *et al.*		REFID=48828
ANISOVICH	01D	PL B508 6	A.V. Anisovich *et al.*		REFID=48327
ANISOVICH	01E	PL B513 281	A.V. Anisovich *et al.*		REFID=48349
ANISOVICH	00J	PL B491 47	A.V. Anisovich *et al.*	(RAL, LOQM, PNPI+)	REFID=47950
HASAN	94	PL B334 215	A. Hasan, D.V. Bugg	(LOQM)	REFID=44103

NODE=M239

$\pi_2(2005)$

$I^G(J^{PC}) = 1^-(2^{-+})$

OMITTED FROM SUMMARY TABLE

$\pi_2(2005)$ MASS

NODE=M239M

NODE=M239M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1963^{+17}_{-27} OUR AVERAGE					
1962^{+17}_{-29}	46M	[1] AGHASYAN	18B	COMP	190 $\pi^- p \to \pi^-\pi^+\pi^- p$
$1974\pm14\pm83$	145k	LU	05	B852	18 $\pi^- p \to \omega\pi^-\pi^0 p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2005 ± 15		ANISOVICH	01F	SPEC	2.0 $\overline{p}p \to 3\pi^0, \pi^0\eta, \pi^0\eta'$

[1] Statistical uncertainty negligible.

NODE=M239M;LINKAGE=A

$\pi_2(2005)$ WIDTH

NODE=M239W

NODE=M239W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
370^{+16}_{-90} OUR AVERAGE					
371^{+16}_{-120}	46M	[1] AGHASYAN	18B	COMP	190 $\pi^- p \to \pi^-\pi^+\pi^- p$
$341\pm61\pm139$	145k	LU	05	B852	18 $\pi^- p \to \omega\pi^-\pi^0 p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
200 ± 40		ANISOVICH	01F	SPEC	2.0 $\overline{p}p \to 3\pi^0, \pi^0\eta, \pi^0\eta'$

[1] Statistical uncertainty negligible.

NODE=M239W;LINKAGE=A

$\pi_2(2005)$ DECAY MODES

NODE=M239215;NODE=M239

	Mode	Fraction (Γ_i/Γ)
Γ_1	$\pi^-\pi^+\pi^-$	seen
Γ_2	$\omega\pi^0\pi^-$	seen

DESIG=1
DESIG=2

$\pi_2(2005)$ BRANCHING RATIOS

NODE=M239220

$\Gamma(\pi^-\pi^+\pi^-)/\Gamma_{total}$ — Γ_1/Γ

NODE=M239R00
NODE=M239R00

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AGHASYAN	18B	COMP	190 $\pi^- p \to \pi^-\pi^+\pi^- p$

$\Gamma(\omega\pi^0\pi^-)/\Gamma_{total}$ — Γ_2/Γ

NODE=M239R01
NODE=M239R01

VALUE	DOCUMENT ID		TECN	COMMENT
seen	LU	05	B852	18 $\pi^- p \to \omega\pi^-\pi^0 p$

$\pi_2(2005)$ REFERENCES

NODE=M239

AGHASYAN	18B	PR D98 092003	M. Aghasyan *et al.*	(COMPASS Collab.)	REFID=59471
LU	05	PRL 94 032002	M. Lu *et al.*	(BNL E852 Collab.)	REFID=50459
ANISOVICH	01F	PL B517 261	A.V. Anisovich *et al.*		REFID=48352

NODE=M106

$f_2(2010)$

$I^G(J^{PC}) = 0^+(2^{++})$

$f_2(2010)$ MASS

NODE=M106M

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
2011^{+62}_{-76}	[1] ETKIN 88	MPS	$22\ \pi^- p \to \phi\phi n$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
2005 ± 12	VLADIMIRSK...06	SPEC	$40\ \pi^- p \to K^0_S K^0_S n$
1980 ± 20	[2] BOLONKIN 88	SPEC	$40\ \pi^- p \to K^0_S K^0_S n$
2050^{+90}_{-50}	ETKIN 85	MPS	$22\ \pi^- p \to 2\phi n$
2120^{+20}_{-120}	LINDENBAUM 84	RVUE	
2160 ± 50	ETKIN 82	MPS	$22\ \pi^- p \to 2\phi n$

[1] Includes data of ETKIN 85. The percentage of the resonance going into $\phi\phi$ 2^{++} S_2, D_2, and D_0 is 98^{+1}_{-3}, 0^{+1}_{-0}, and 2^{+2}_{-1}, respectively.

[2] Statistically very weak, only 1.4 s.d.

NODE=M106M;LINKAGE=C

NODE=M106M;LINKAGE=E

$f_2(2010)$ WIDTH

NODE=M106W

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
202^{+67}_{-62}	[3] ETKIN 88	MPS	$22\ \pi^- p \to \phi\phi n$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
209 ± 32	VLADIMIRSK...06	SPEC	$40\ \pi^- p \to K^0_S K^0_S n$
145 ± 50	[4] BOLONKIN 88	SPEC	$40\ \pi^- p \to K^0_S K^0_S n$
200^{+160}_{-50}	ETKIN 85	MPS	$22\ \pi^- p \to 2\phi n$
300^{+150}_{-50}	LINDENBAUM 84	RVUE	
310 ± 70	ETKIN 82	MPS	$22\ \pi^- p \to 2\phi n$

[3] Includes data of ETKIN 85.

[4] Statistically very weak, only 1.4 s.d.

NODE=M106W;LINKAGE=C

NODE=M106W;LINKAGE=E

$f_2(2010)$ DECAY MODES

NODE=M106215;NODE=M106

	Mode	Fraction (Γ_i/Γ)
Γ_1	$\phi\phi$	seen
Γ_2	$K\overline{K}$	seen

DESIG=1;OUR EST;→ UNCHECKED ←

DESIG=2

$f_2(2010)$ BRANCHING RATIOS

NODE=M106230

$\Gamma(K\overline{K})/\Gamma_{total}$ — Γ_2/Γ

NODE=M106R01

VALUE	DOCUMENT ID	TECN	COMMENT
seen	VLADIMIRSK...06	SPEC	$40\ \pi^- p \to K^0_S K^0_S n$

$f_2(2010)$ REFERENCES

NODE=M106

VLADIMIRSK...	06	PAN 69 493	V.V. Vladimirsky *et al.*	(ITEP, Moscow)	REFID=51191
		Translated from YAF 69 515.			
BOLONKIN	88	NP B309 426	B.V. Bolonkin *et al.*	(ITEP, SERP)	REFID=40580
ETKIN	88	PL B201 568	A. Etkin *et al.*	(BNL, CUNY)	REFID=40285
ETKIN	85	PL 165B 217	A. Etkin *et al.*	(BNL, CUNY)	REFID=21871
LINDENBAUM	84	CNPP 13 285	S.J. Lindenbaum	(CUNY)	REFID=21869
ETKIN	82	PRL 49 1620	A. Etkin *et al.*	(BNL, CUNY)	REFID=21866
Also		Brighton Conf. 351	S.J. Lindenbaum	(BNL, CUNY)	REFID=21867

NODE=M156

$f_0(2020)$

$I^G(J^{PC}) = 0^+(0^{++})$

OMITTED FROM SUMMARY TABLE

Needs confirmation.

NODE=M156

f_0(2020) MASS

NODE=M156M

NODE=M156M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1992±16		[1,2] BARBERIS	00C		450 $pp \to p_f 4\pi p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2038±48		[3] RODAS	22	RVUE	$J/\psi(1S) \to \gamma(\pi\pi, K\overline{K})$
1925±25		SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma(\pi\pi, K\overline{K}, \eta\eta, \omega\phi)$
1910±50		[4] ROPERTZ	18	RVUE	$\overline{B}^0_s \to J/\psi(\pi^+\pi^- / K^+K^-)$
2037± 8	80k	[5] UMAN	06	E835	5.2 $\overline{p}p \to \eta\eta\pi^0$
2040±38		ANISOVICH	00J	SPEC	
2010±60		ALDE	98	GAM4	100 $\pi^- p \to \pi^0\pi^0 n$
2020±35		BARBERIS	97B	OMEG	450 $pp \to pp2(\pi^+\pi^-)$

[1] Average between $\pi^+\pi^-2\pi^0$ and $2(\pi^+\pi^-)$.
[2] T-matrix pole.
[3] T-matrix pole from coupled channel K-matrix fit to data on $J/\psi \to \gamma\pi^0\pi^0$ (ABLIKIM 15AE) and $J/\psi \to \gamma K^0_S K^0_S$ (ABLIKIM 18AA).
[4] T-matrix pole of 3 channel unitary model fit to data from AAIJ 14BR and AAIJ 17V extracted using Pade approximants.
[5] Statistical error only.

NODE=M156M;LINKAGE=PC
NODE=M156M;LINKAGE=PP
NODE=M156M;LINKAGE=B
NODE=M156M;LINKAGE=A
NODE=M156M;LINKAGE=ST

f_0(2020) WIDTH

NODE=M156W

NODE=M156W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
442± 60		[1,2] BARBERIS	00C		450 $pp \to p_f 4\pi p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
312± 82		[3] RODAS	22	RVUE	$J/\psi(1S) \to \gamma(\pi\pi, K\overline{K})$
320± 35		SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma(\pi\pi, K\overline{K}, \eta\eta, \omega\phi)$
400± 80		[4] ROPERTZ	18	RVUE	$\overline{B}^0_s \to J/\psi(\pi^+\pi^- / K^+K^-)$
296± 17	80k	[5] UMAN	06	E835	5.2 $\overline{p}p \to \eta\eta\pi^0$
405± 40		ANISOVICH	00J	SPEC	
240±100		ALDE	98	GAM4	100 $\pi^- p \to \pi^0\pi^0 n$
410± 50		BARBERIS	97B	OMEG	450 $pp \to pp2(\pi^+\pi^-)$

[1] Average between $\pi^+\pi^-2\pi^0$ and $2(\pi^+\pi^-)$.
[2] T-matrix pole.
[3] T-matrix pole from coupled channel K-matrix fit to data on $J/\psi \to \gamma\pi^0\pi^0$ (ABLIKIM 15AE) and $J/\psi \to \gamma K^0_S K^0_S$ (ABLIKIM 18AA).
[4] T-matrix pole of 3 channel unitary model fit to data from AAIJ 14BR and AAIJ 17V extracted using Pade approximants.
[5] Statistical error only.

NODE=M156W;LINKAGE=PC
NODE=M156W;LINKAGE=PP
NODE=M156W;LINKAGE=B
NODE=M156W;LINKAGE=A
NODE=M156W;LINKAGE=ST

f_0(2020) DECAY MODES

NODE=M156215;NODE=M156

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\rho\pi\pi$	seen	DESIG=1;OUR EST;→ UNCHECKED ←
Γ_2	$\pi^0\pi^0$	seen	DESIG=2;OUR EST;→ UNCHECKED ←
Γ_3	$\rho\rho$	seen	DESIG=3;OUR EST;→ UNCHECKED ←
Γ_4	$\omega\omega$	seen	DESIG=4;OUR EST;→ UNCHECKED ←
Γ_5	$\eta\eta$	seen	DESIG=5

f_0(2020) BRANCHING RATIOS

NODE=M156220

$\Gamma(\rho\rho)/\Gamma(\omega\omega)$ Γ_3/Γ_4

NODE=M156R1
NODE=M156R1

VALUE	DOCUMENT ID		COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
∼ 3	BARBERIS	00F	450 $pp \to p_f \omega\omega p_s$

$\Gamma(\eta\eta)/\Gamma_{total}$ Γ_5/Γ

NODE=M156R01

VALUE	DOCUMENT ID		TECN	COMMENT
seen	UMAN	06	E835	5.2 $\overline{p}p \to \eta\eta\pi^0$

f_0(2020) REFERENCES

NODE=M156

RODAS	22	EPJ C82 80	A. Rodas *et al.*	(JPAC Collab.)	REFID=61610
SARANTSEV	21	PL B816 136227	A.V. Sarantsev *et al.*	(BONN, PNPI)	REFID=61091
ABLIKIM	18AA	PR D98 072003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59455
ROPERTZ	18	EPJ C78 1000	S. Ropertz, C. Hanhart, B. Kubis	(BONN, JULI)	REFID=59332
AAIJ	17V	JHEP 1708 037	R. Aaij *et al.*	(LHCb Collab.)	REFID=57828
ABLIKIM	15AE	PR D92 052003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56984
AAIJ	14BR	PR D89 092006	R. Aaij *et al.*	(LHCb Collab.)	REFID=56035
UMAN	06	PR D73 052009	I. Uman *et al.*	(FNAL E835)	REFID=51063
ANISOVICH	00J	PL B491 47	A.V. Anisovich *et al.*	(RAL, LOQM, PNPI+)	REFID=47950
BARBERIS	00C	PL B471 440	D. Barberis *et al.*	(WA 102 Collab.)	REFID=47959
BARBERIS	00F	PL B484 198	D. Barberis *et al.*	(WA 102 Collab.)	REFID=47962
ALDE	98	EPJ A3 361	D. Alde *et al.*	(GAM4 Collab.)	REFID=46605
Also		PAN 62 405	D. Alde *et al.*	(GAMS Collab.)	REFID=46914
		Translated from YAF 62 446.			
BARBERIS	97B	PL B413 217	D. Barberis *et al.*	(WA 102 Collab.)	REFID=45758

NODE=M016

$f_4(2050)$

$I^G(J^{PC}) = 0^+(4^{++})$

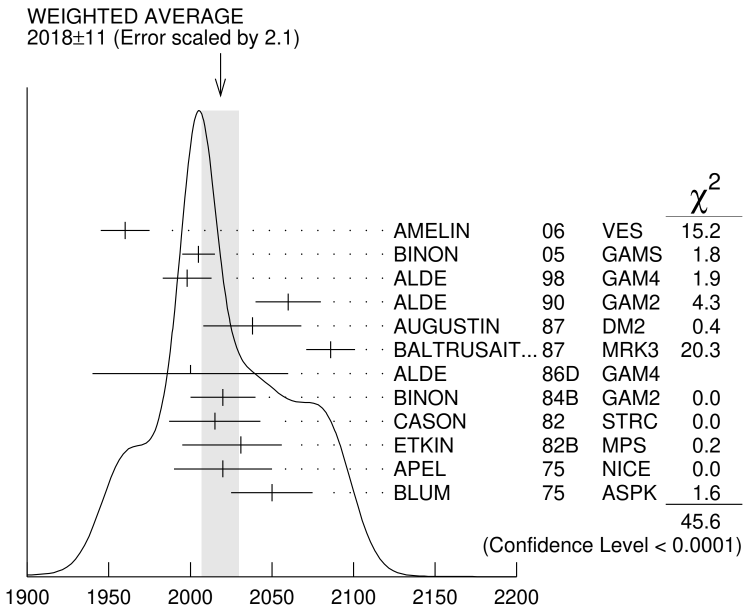
f_4(2050) MASS

NODE=M016M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2018±11 OUR AVERAGE		Error includes scale factor of 2.1. See the ideogram below.			
1960±15		AMELIN	06	VES	36 $\pi^- p \to \omega\omega n$
2005±10		[1] BINON	05	GAMS	33 $\pi^- p \to \eta\eta n$
1998±15		ALDE	98	GAM4	100 $\pi^- p \to \pi^0\pi^0 n$
2060±20		ALDE	90	GAM2	38 $\pi^- p \to \omega\omega n$
2038±30		AUGUSTIN	87	DM2	$J/\psi \to \gamma\pi^+\pi^-$
2086±15		BALTRUSAIT...	87	MRK3	$J/\psi \to \gamma\pi^+\pi^-$
2000±60		ALDE	86D	GAM4	100 $\pi^- p \to n2\eta$
2020±20	40k	[2] BINON	84B	GAM2	38 $\pi^- p \to n2\pi^0$
2015±28		[3] CASON	82	STRC	8 $\pi^+ p \to \Delta^{++}\pi^0\pi^0$
2031^{+25}_{-36}		ETKIN	82B	MPS	23 $\pi^- p \to n2K^0_S$
2020±30	700	APEL	75	NICE	40 $\pi^- p \to n2\pi^0$
2050±25		BLUM	75	ASPK	18.4 $\pi^- p \to nK^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1966±25		[4] ANISOVICH	09	RVUE	0.0 $\overline{p}p$, πN
$1885^{+14}_{-13}{}^{+218}_{-25}$		[5] UEHARA	09	BELL	10.6 $e^+e^- \to e^+e^-\pi^0\pi^0$
2018± 6		ANISOVICH	00J	SPEC	2.0 $\overline{p}p \to \eta\pi^0\pi^0$, $\pi^0\pi^0$, $\eta\eta$, $\eta\eta'$, $\pi\pi$
∼ 2000		[6] MARTIN	98	RVUE	$N\overline{N} \to \pi\pi$
∼ 2010		[7] MARTIN	97	RVUE	$\overline{N}N \to \pi\pi$
∼ 2040		[8] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \to \pi\pi$
∼ 1990		[9] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \to \pi\pi$ OCCUR=2
1978± 5		[10] ALPER	80	CNTR	62 $\pi^- p \to K^+K^- n$
2040±10		[10] ROZANSKA	80	SPRK	18 $\pi^- p \to p\overline{p}n$
1935±13		[10] CORDEN	79	OMEG	12–15 $\pi^- p \to n2\pi$
1988± 7		EVANGELIS...	79B	OMEG	10 $\pi^- p \to K^+K^- n$
1922±14		[11] ANTIPOV	77	CIBS	25 $\pi^- p \to p3\pi$

[1] From the first PWA solution. NODE=M016M;LINKAGE=BI
[2] From a partial-wave analysis of the data. NODE=M016M;LINKAGE=N
[3] From an amplitude analysis of the reaction $\pi^+\pi^- \to 2\pi^0$. NODE=M016M;LINKAGE=NN
[4] K matrix pole. NODE=M016M;LINKAGE=KM
[5] Taking into account the f_2(1950). Helicity-2 production favored. NODE=M016M;LINKAGE=UE
[6] Energy-dependent analysis. NODE=M016M;LINKAGE=RB
[7] Single energy analysis. NODE=M016M;LINKAGE=BR
[8] From solution A of amplitude analysis of data on $\overline{p}p \to \pi\pi$. See however KLOET 96 who fit $\pi^+\pi^-$ only and find waves only up to $J = 3$ to be important but not significantly resonant. NODE=M016M;LINKAGE=B
[9] From solution B of amplitude analysis of data on $\overline{p}p \to \pi\pi$. See however KLOET 96 who fit $\pi^+\pi^-$ only and find waves only up to $J = 3$ to be important but not significantly resonant. NODE=M016M;LINKAGE=BB
[10] $I(J^P) = 0(4^+)$ from amplitude analysis assuming one-pion exchange. NODE=M016M;LINKAGE=M

[11] Width errors enlarged by us to $4\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M016M;LINKAGE=T



$f_4(2050)$ WIDTH

NODE=M016W

NODE=M016W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
237± 18 OUR AVERAGE		Error includes scale factor of 1.9. See the ideogram below.			
290± 20		AMELIN	06	VES	36 $\pi^- p \to \omega\omega n$
340± 80		[12] BINON	05	GAMS	33 $\pi^- p \to \eta\eta n$
395± 40		ALDE	98	GAM4	100 $\pi^- p \to \pi^0\pi^0 n$
170± 60		ALDE	90	GAM2	38 $\pi^- p \to \omega\omega n$
304± 60		AUGUSTIN	87	DM2	$J/\psi \to \gamma\pi^+\pi^-$
210± 63		BALTRUSAIT...	87	MRK3	$J/\psi \to \gamma\pi^+\pi^-$
400±100		ALDE	86D	GAM4	100 $\pi^- p \to n2\eta$
240± 40	40k	[13] BINON	84B	GAM2	38 $\pi^- p \to n2\pi^0$
190± 14		DENNEY	83	LASS	10 $\pi^+ n/\pi^+ p$
186^{+103}_{-58}		[14] CASON	82	STRC	8 $\pi^+ p \to \Delta^{++}\pi^0\pi^0$
305^{+36}_{-119}		ETKIN	82B	MPS	23 $\pi^- p \to n2K^0_S$
180± 60	700	APEL	75	NICE	40 $\pi^- p \to n2\pi^0$
225^{+120}_{-70}		BLUM	75	ASPK	18.4 $\pi^- p \to nK^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
260± 40		[15] ANISOVICH	09	RVUE	0.0 $\overline{p}p$, πN
$453\pm 20^{+31}_{-129}$		[16] UEHARA	09	BELL	10.6 $e^+e^- \to e^+e^-\pi^0\pi^0$
182± 7		ANISOVICH	00J	SPEC	2.0 $\overline{p}p \to \eta\pi^0\pi^0$, $\pi^0\pi^0$, $\eta\eta$, $\eta\eta'$, $\pi\pi$
~ 170		[17] MARTIN	98	RVUE	$N\overline{N} \to \pi\pi$
~ 200		[18] MARTIN	97	RVUE	$\overline{N}N \to \pi\pi$
~ 60		[19] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \to \pi\pi$
~ 80		[20] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \to \pi\pi$
243± 16		[21] ALPER	80	CNTR	62 $\pi^- p \to K^+K^- n$
140± 15		[21] ROZANSKA	80	SPRK	18 $\pi^- p \to p\overline{p}n$
263± 57		[21] CORDEN	79	OMEG	12–15 $\pi^- p \to n2\pi$
100± 28		EVANGELIS...	79B	OMEG	10 $\pi^- p \to K^+K^- n$
107± 56		[22] ANTIPOV	77	CIBS	25 $\pi^- p \to p3\pi$

OCCUR=2

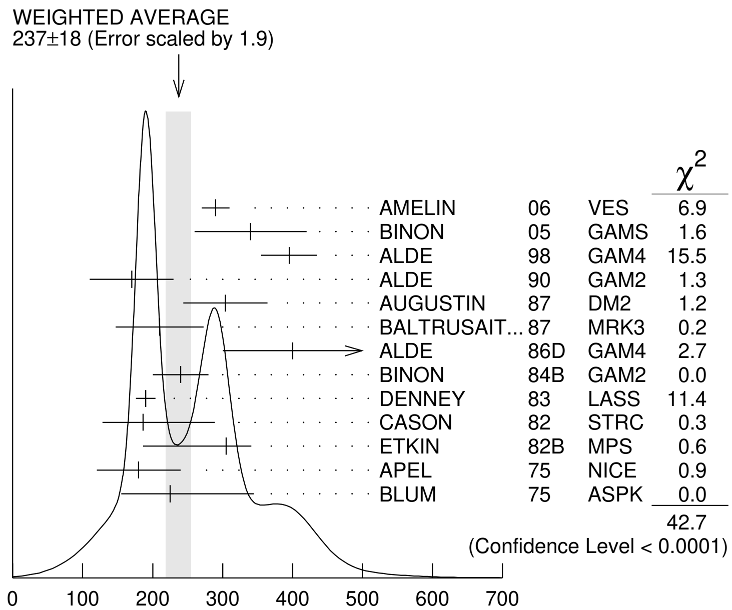
[12] From the first PWA solution. NODE=M016W;LINKAGE=BI
[13] From a partial-wave analysis of the data. NODE=M016W;LINKAGE=N
[14] From an amplitude analysis of the reaction $\pi^+\pi^- \to 2\pi^0$. NODE=M016W;LINKAGE=NN
[15] K matrix pole. NODE=M016W;LINKAGE=KM
[16] Taking into account the $f_2(1950)$. Helicity-2 production favored. NODE=M016W;LINKAGE=UE
[17] Energy-dependent analysis. NODE=M016W;LINKAGE=RB
[18] Single energy analysis. NODE=M016W;LINKAGE=BR

[19] From solution A of amplitude analysis of data on $\overline{p}p \to \pi\pi$. See however KLOET 96 who fit $\pi^+\pi^-$ only and find waves only up to $J=3$ to be important but not significantly resonant. NODE=M016W;LINKAGE=BW

[20] From solution B of amplitude analysis of data on $\overline{p}p \to \pi\pi$. See however KLOET 96 who fit $\pi^+\pi^-$ only and find waves only up to $J=3$ to be important but not significantly resonant. NODE=M016W;LINKAGE=BB

[21] $I(J^P) = 0(4^+)$ from amplitude analysis assuming one-pion exchange. NODE=M016W;LINKAGE=M

[22] Width errors enlarged by us to $4\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M016W;LINKAGE=T



$f_4(2050)$ width (MeV)

$f_4(2050)$ DECAY MODES

NODE=M016215;NODE=M016

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\omega\omega$	seen	DESIG=6
Γ_2	$\pi\pi$	(17.0 ± 1.5) %	DESIG=1
Γ_3	$K\overline{K}$	$(6.8^{+3.4}_{-1.8}) \times 10^{-3}$	DESIG=2
Γ_4	$\eta\eta$	$(2.1\pm0.8) \times 10^{-3}$	DESIG=3
Γ_5	$4\pi^0$	$<$ 1.2 %	DESIG=5
Γ_6	$\gamma\gamma$		DESIG=4
Γ_7	$a_2(1320)\pi$	seen	DESIG=7

$f_4(2050)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M016220

$\Gamma(K\overline{K}) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_3\Gamma_6/\Gamma$

NODE=M016G2
NODE=M016G2

VALUE (keV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.29	95	ALTHOFF	85B	TASS	$\gamma\gamma \to K\overline{K}\pi$

$\Gamma(\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_2\Gamma_6/\Gamma$

NODE=M016G3
NODE=M016G3

VALUE (eV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$23.1^{+3.6}_{-3.3}{}^{+70.5}_{-15.6}$			[23] UEHARA	09	BELL	10.6 $e^+e^- \to e^+e^-\pi^0\pi^0$
<1100	95	13 ± 4	OEST	90	JADE	$e^+e^- \to e^+e^-\pi^0\pi^0$

[23] Taking into account the $f_2(1950)$. Helicity-2 production favored. NODE=M016G3;LINKAGE=UE

$f_4(2050)$ BRANCHING RATIOS

NODE=M016225

$\Gamma(\omega\omega)/\Gamma_{\text{total}}$ — Γ_1/Γ

NODE=M016R7
NODE=M016R7

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AMELIN	06	VES	36 $\pi^-p \to \omega\omega n$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	BARBERIS	00F		450 $pp \to p_f\omega\omega p_s$

$\Gamma(\omega\omega)/\Gamma(\pi\pi)$ — Γ_1/Γ_2

NODE=M016R5

VALUE	DOCUMENT ID		TECN	COMMENT
1.5±0.3	ALDE	90	GAM2	$38\ \pi^- p \to \omega\omega n$

$\Gamma(\pi\pi)/\Gamma_{total}$ — Γ_2/Γ

NODE=M016R1

VALUE	DOCUMENT ID		TECN	COMMENT
0.170±0.015 OUR AVERAGE				
0.18 ±0.03	[24] BINON	83C	GAM2	$38\ \pi^- p \to n 4\gamma$
0.16 ±0.03	[24] CASON	82	STRC	$8\ \pi^+ p \to \Delta^{++}\pi^0\pi^0$
0.17 ±0.02	[24] CORDEN	79	OMEG	$12–15\ \pi^- p \to n 2\pi$

[24] Assuming one pion exchange.

NODE=M016R1;LINKAGE=A

$\Gamma(K\overline{K})/\Gamma(\pi\pi)$ — Γ_3/Γ_2

NODE=M016R2

VALUE	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.04^{+0.02}_{-0.01}}$	ETKIN	82B	MPS	$23\ \pi^- p \to n 2K^0_S$

$\Gamma(\eta\eta)/\Gamma_{total}$ — Γ_4/Γ

NODE=M016R3

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
2.1±0.8	ALDE	86D	GAM4	$100\ \pi^- p \to n 4\gamma$

$\Gamma(4\pi^0)/\Gamma_{total}$ — Γ_5/Γ

NODE=M016R4

VALUE	DOCUMENT ID		TECN	COMMENT
<0.012	ALDE	87	GAM4	$100\ \pi^- p \to 4\pi^0 n$

$\Gamma(a_2(1320)\pi)/\Gamma_{total}$ — Γ_7/Γ

NODE=M016R6

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AMELIN	00	VES	$37\ \pi^- p \to \eta\pi^+\pi^- n$

$f_4(2050)$ REFERENCES

NODE=M016

ANISOVICH	09	IJMP A24 2481	V.V. Anisovich, A.V. Sarantsev		REFID=52719
UEHARA	09	PR D79 052009	S. Uehara *et al.*	(BELLE Collab.)	REFID=52761
AMELIN	06	PAN 69 690	D.V. Amelin *et al.*	(VES Collab.)	REFID=51574
		Translated from YAF 69 715.			
BINON	05	PAN 68 960	F. Binon *et al.*		REFID=50780
		Translated from YAF 68 998.			
AMELIN	00	NP A668 83	D. Amelin *et al.*	(VES Collab.)	REFID=47432
ANISOVICH	00J	PL B491 47	A.V. Anisovich *et al.*	(RAL, LOQM, PNPI+)	REFID=47950
BARBERIS	00F	PL B484 198	D. Barberis *et al.*	(WA 102 Collab.)	REFID=47962
ALDE	98	EPJ A3 361	D. Alde *et al.*	(GAM4 Collab.)	REFID=46605
Also		PAN 62 405	D. Alde *et al.*	(GAMS Collab.)	REFID=46914
		Translated from YAF 62 446.			
MARTIN	98	PR C57 3492	B.R. Martin *et al.*		REFID=46373
MARTIN	97	PR C56 1114	B.R. Martin, G.C. Oades	(LOUC, AARH)	REFID=45685
KLOET	96	PR D53 6120	W.M. Kloet, F. Myhrer	(RUTG, NORD)	REFID=45212
OAKDEN	94	NP A574 731	M.N. Oakden, M.R. Pennington	(DURH)	REFID=45210
ALDE	90	PL B241 600	D.M. Alde *et al.*	(SERP, BELG, LANL, LAPP+)	REFID=40935
OEST	90	ZPHY C47 343	T. Oest *et al.*	(JADE Collab.)	REFID=41358
ALDE	87	PL B198 286	D.M. Alde *et al.*	(LANL, BRUX, SERP, LAPP)	REFID=40221
AUGUSTIN	87	ZPHY C36 369	J.E. Augustin *et al.*	(LALO, CLER, FRAS+)	REFID=40268
BALTRUSAIT...	87	PR D35 2077	R.M. Baltrusaitis *et al.*	(Mark III Collab.)	REFID=40010
ALDE	86D	NP B269 485	D.M. Alde *et al.*	(BELG, LAPP, SERP, CERN+)	REFID=20765
ALTHOFF	85B	ZPHY C29 189	M. Althoff *et al.*	(TASSO Collab.)	REFID=21349
BINON	84B	LNC 39 41	F.G. Binon *et al.*	(SERP, BELG, LAPP)	REFID=21780
BINON	83C	SJNP 38 723	F.G. Binon *et al.*	(SERP, BRUX+)	REFID=40288
		Translated from YAF 38 1199.			
DENNEY	83	PR D28 2726	D.L. Denney *et al.*	(IOWA, MICH)	REFID=20754
CASON	82	PRL 48 1316	N.M. Cason *et al.*	(NDAM, ANL)	REFID=20746
ETKIN	82B	PR D25 1786	A. Etkin *et al.*	(BNL, CUNY, TUFTS, VAND)	REFID=20390
ALPER	80	PL 94B 422	B. Alper *et al.*	(AMST, CERN, CRAC, MPIM+)	REFID=21665
ROZANSKA	80	NP B162 505	M. Rozanska *et al.*	(MPIM, CERN)	REFID=21774
CORDEN	79	NP B157 250	M.J. Corden *et al.*	(BIRM, RHEL, TELA+) JP	REFID=20374
EVANGELIS...	79B	NP B154 381	C. Evangelista *et al.*	(BARI, BONN, CERN+)	REFID=21967
ANTIPOV	77	NP B119 45	Y.M. Antipov *et al.*	(SERP, GEVA)	REFID=20728
APEL	75	PL 57B 398	W.D. Apel *et al.*	(KARLK, KARLE, PISA, SERP+) JP	REFID=20720
BLUM	75	PL 57B 403	W. Blum *et al.*	(CERN, MPIM) JP	REFID=21651

NODE=M020

$\pi_2(2100)$

$I^G(J^{PC}) = 1^-(2^{-+})$

OMITTED FROM SUMMARY TABLE
Needs confirmation.

NODE=M020

$\pi_2(2100)$ MASS

NODE=M020M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
2090± 29 OUR AVERAGE				
2090± 30	[1] AMELIN	95B	VES	36 $\pi^- A \rightarrow \pi^+\pi^-\pi^- A$
2100±150	[2] DAUM	81B	CNTR	63,94 $\pi^- p \rightarrow 3\pi X$

NODE=M020M

[1] From a fit to $J^{PC} = 2^{-+}$ $f_2(1270)\pi$, $(\pi\pi)_S\pi$ waves.
[2] From a two-resonance fit to four 2^-0^+ waves.

NODE=M020M;LINKAGE=AX
NODE=M020M;LINKAGE=L

$\pi_2(2100)$ WIDTH

NODE=M020W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
625± 50 OUR AVERAGE Error includes scale factor of 1.2.				
520±100	[3] AMELIN	95B	VES	36 $\pi^- A \rightarrow \pi^+\pi^-\pi^- A$
651± 50	[4] DAUM	81B	CNTR	63,94 $\pi^- p \rightarrow 3\pi X$

NODE=M020W

[3] From a fit to $J^{PC} = 2^{-+}$ $f_2(1270)\pi$, $(\pi\pi)_S\pi$ waves.
[4] From a two-resonance fit to four 2^-0^+ waves.

NODE=M020W;LINKAGE=AX
NODE=M020W;LINKAGE=L

$\pi_2(2100)$ DECAY MODES

NODE=M020215;NODE=M020

	Mode	Fraction (Γ_i/Γ)
Γ_1	3π	seen
Γ_2	$\rho\pi$	seen
Γ_3	$f_2(1270)\pi$	seen
Γ_4	$(\pi\pi)_S\pi$	seen

DESIG=1;OUR EST;→ UNCHECKED ←
DESIG=2;OUR EST;→ UNCHECKED ←
DESIG=3;OUR EST;→ UNCHECKED ←
DESIG=4;OUR EST;→ UNCHECKED ←

$\pi_2(2100)$ BRANCHING RATIOS

NODE=M020220

$\Gamma(\rho\pi)/\Gamma(3\pi)$ Γ_2/Γ_1

NODE=M020R1
NODE=M020R1

VALUE	DOCUMENT ID		TECN	COMMENT
0.19±0.05	[5] DAUM	81B	CNTR	63,94 $\pi^- p$

$\Gamma(f_2(1270)\pi)/\Gamma(3\pi)$ Γ_3/Γ_1

NODE=M020R2
NODE=M020R2

VALUE	DOCUMENT ID		TECN	COMMENT
0.36±0.09	[5] DAUM	81B	CNTR	63,94 $\pi^- p$

$\Gamma((\pi\pi)_S\pi)/\Gamma(3\pi)$ Γ_4/Γ_1

NODE=M020R3
NODE=M020R3

VALUE	DOCUMENT ID		TECN	COMMENT
0.45±0.07	[5] DAUM	81B	CNTR	63,94 $\pi^- p$

D-wave/S-wave RATIO FOR $\pi_2(2100) \rightarrow f_2(1270)\pi$

NODE=M020R4
NODE=M020R4

VALUE	DOCUMENT ID		TECN	COMMENT
0.39±0.23	[5] DAUM	81B	CNTR	63,94 $\pi^- p$

[5] From a two-resonance fit to four 2^-0^+ waves.

NODE=M020R;LINKAGE=L

$\pi_2(2100)$ REFERENCES

NODE=M020

AMELIN 95B PL B356 595 D.V. Amelin *et al.* (SERP, TBIL)
DAUM 81B NP B182 269 C. Daum *et al.* (AMST, CERN, CRAC, MPIM+)

REFID=44433
REFID=20872

NODE=M168

$f_0(2100)$

$I^G(J^{PC}) = 0^+(0^{++})$

OMITTED FROM SUMMARY TABLE
Needs confirmation.

NODE=M168

$f_0(2100)$ MASS

NODE=M168M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2095^{+17}_{-19} OUR AVERAGE					
[2086^{+20}_{-24} MeV OUR 2021 AVERAGE]					
$2116\pm27\pm17$		LEES	21A	BABR	$\gamma\gamma \to \eta_c(1S) \to \eta'\pi^+\pi^-$
$2081\pm13^{+24}_{-36}$	5.5k	[1] ABLIKIM	13N	BES3	$e^+e^- \to J/\psi \to \gamma\eta\eta$
2090 ± 30		BAI	00A	BES	$J/\psi \to \gamma(\pi^+\pi^-\pi^+\pi^-)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2075 ± 20		SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma\ (\pi\pi,\ K\overline{K},\ \eta\eta,\ \omega\phi)$
$2090\pm10\pm\ 6$	529	[2,3] DOBBS	15		$J/\psi \to \gamma\pi^+\pi^-$
$2099\pm17\pm\ 8$	283	[2,3] DOBBS	15		$\psi(2S) \to \gamma\pi^+\pi^-$
$2105\pm\ 8$	80k	[4] UMAN	06	E835	$5.2\ \overline{p}p \to \eta\eta\pi^0$
2102 ± 13		[5] ANISOVICH	00J	SPEC	$2.0\ \overline{p}p \to \eta\pi^0\pi^0,\ \pi^0\pi^0,\ \eta\eta,\ \eta\eta',\ \pi^+\pi^-$
2105 ± 10		ANISOVICH	99K	SPEC	$0.6–1.94\ \overline{p}p \to \eta\eta,\ \eta\eta'$
~ 2104		BUGG	95		$J/\psi \to \gamma\pi^+\pi^-\pi^+\pi^-$
~ 2122		HASAN	94	RVUE	$\overline{p}p \to \pi\pi$

NODE=M168M; NEW; OCCUR=2

[1] From partial wave analysis including all possible combinations of 0^{++}, 2^{++}, and 4^{++} resonances. NODE=M168M;LINKAGE=A
[2] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M168M;LINKAGE=B
[3] From a fit to a Breit-Wigner line shape with fixed $\Gamma = 209$ MeV. NODE=M168M;LINKAGE=C
[4] Statistical error only. NODE=M168M;LINKAGE=ST
[5] Includes the data of ANISOVICH 00B indicating to exotic decay pattern. NODE=M168M;LINKAGE=AN

$f_0(2100)$ WIDTH

NODE=M168W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$287^{+\ 32}_{-\ 24}$ OUR AVERAGE					
[284^{+60}_{-32} MeV OUR 2021 AVERAGE]					
$289\pm\ 34\pm15$		LEES	21A	BABR	$\gamma\gamma \to \eta_c(1S) \to \eta'\pi^+\pi^-$
$273^{+\ 27+70}_{-\ 24-23}$	5.5k	[1] ABLIKIM	13N	BES3	$e^+e^- \to J/\psi \to \gamma\eta\eta$
330 ± 100		BAI	00A	BES	$J/\psi \to \gamma(\pi^+\pi^-\pi^+\pi^-)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$260\pm\ 25$		SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma\ (\pi\pi,\ K\overline{K},\ \eta\eta,\ \omega\phi)$
$236\pm\ 14$	80k	[2] UMAN	06	E835	$5.2\ \overline{p}p \to \eta\eta\pi^0$
$211\pm\ 29$		[3] ANISOVICH	00J	SPEC	$2.0\ \overline{p}p \to \eta\pi^0\pi^0,\ \pi^0\pi^0,\ \eta\eta,\ \eta\eta',\ \pi^+\pi^-$
$200\pm\ 25$		ANISOVICH	99K	SPEC	$0.6–1.94\ \overline{p}p \to \eta\eta,\ \eta\eta'$
~ 203		BUGG	95		$J/\psi \to \gamma\pi^+\pi^-\pi^+\pi^-$
~ 273		HASAN	94	RVUE	$\overline{p}p \to \pi\pi$

NODE=M168W; NEW

[1] From partial wave analysis including all possible combinations of 0^{++}, 2^{++}, and 4^{++} resonances. NODE=M168W;LINKAGE=A
[2] Statistical error only. NODE=M168W;LINKAGE=ST
[3] Includes the data of ANISOVICH 00B indicating to exotic decay pattern. NODE=M168W;LINKAGE=AN

$f_0(2100)$ REFERENCES

NODE=M168

LEES	21A	PR D104 072002	J.P. Lees *et al.*	(BABAR Collab.)	REFID=61442
SARANTSEV	21	PL B816 136227	A.V. Sarantsev *et al.*	(BONN, PNPI)	REFID=61091
DOBBS	15	PR D91 052006	S. Dobbs *et al.*	(NWES)	REFID=56805
ABLIKIM	13N	PR D87 092009	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55387
UMAN	06	PR D73 052009	I. Uman *et al.*	(FNAL E835)	REFID=51063
ANISOVICH	00B	NP A662 319	A.V. Anisovich *et al.*		REFID=47942
ANISOVICH	00J	PL B491 47	A.V. Anisovich *et al.*	(RAL, LOQM, PNPI+)	REFID=47950
BAI	00A	PL B472 207	J.Z. Bai *et al.*	(BES Collab.)	REFID=47426
ANISOVICH	99K	PL B468 309	A.V. Anisovich *et al.*		REFID=47472
BUGG	95	PL B353 378	D.V. Bugg *et al.*	(LOQM, PNPI, WASH)	REFID=44438
HASAN	94	PL B334 215	A. Hasan, D.V. Bugg	(LOQM)	REFID=44103

NODE=M042

$f_2(2150)$

$I^G(J^{PC}) = 0^+(2^{++})$

OMITTED FROM SUMMARY TABLE

This entry was previously called T_0. NODE=M042

$f_2(2150)$ MASS

NODE=M042205

$f_2(2150)$ MASS, COMBINED MODES (MeV)

NODE=M042M
NODE=M042M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2157±12 OUR AVERAGE Includes data from the datablock that follows this one.					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2170± 6	80k	[1] UMAN	06	E835	5.2 $\overline{p}p \to \eta\eta\pi^0$

[1] Statistical error only. NODE=M042M;LINKAGE=ST

$\eta\eta$ MODE

NODE=M042M3
NODE=M042M3

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
The data in this block is included in the average printed for a previous datablock.				
2157±12 OUR AVERAGE				
2151±16	BARBERIS	00E		450 $pp \to p_f \eta\eta p_s$
2175±20	PROKOSHKIN	95D	GAM4	300 $\pi^- N \to \pi^- N 2\eta$, 450 $pp \to pp2\eta$
2130±35	SINGOVSKI	94	GAM4	450 $pp \to pp2\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2140±30	[2] ABELE	99B	CBAR	1.94 $\overline{p}p \to \pi^0\eta\eta$
2104±20	[3] ARMSTRONG	93C	E760	$\overline{p}p \to \pi^0\eta\eta \to 6\gamma$

[2] Spin not determined. NODE=M042M3;LINKAGE=K3

[3] No J^{PC} determination. NODE=M042M3;LINKAGE=A

$\eta\pi\pi$ MODE

NODE=M042M4
NODE=M042M4

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2135±20±45	[4] ADOMEIT	96	CBAR	0	1.94 $\overline{p}p \to \eta 3\pi^0$

[4] ANISOVICH 00E recommends to withdraw ADOMEIT 96 that assumed a single $J^P = 2^+$ resonance. NODE=M042M4;LINKAGE=AD

$\overline{p}p \to \pi\pi$

NODE=M042M1
NODE=M042M1

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
∼ 2090	[5] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \to \pi\pi$
∼ 2120	[6] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \to \pi\pi$ OCCUR=2
∼ 2170	[7] MARTIN	80B	RVUE	
∼ 2150	[7] MARTIN	80C	RVUE	
∼ 2150	[8] DULUDE	78B	OSPK	1–2 $\overline{p}p \to \pi^0\pi^0$

[5] OAKDEN 94 makes an amplitude analysis of LEAR data on $\overline{p}p \to \pi\pi$ using a method based on Barrelet zeros. This is solution A. The amplitude analysis of HASAN 94 includes earlier data as well, and assume that the data can be parametrized in terms of towers of nearly degenerate resonances on the leading Regge trajectory. See also KLOET 96 and MARTIN 97 who make related analyses. NODE=M042M1;LINKAGE=B

[6] From solution B of amplitude analysis of data on $\overline{p}p \to \pi\pi$. NODE=M042M1;LINKAGE=BB

[7] $I(J^P) = 0(2^+)$ from simultaneous analysis of $p\overline{p} \to \pi^-\pi^+$ and $\pi^0\pi^0$. NODE=M042M1;LINKAGE=P

[8] $I^G(J^P) = 0^+(2^+)$ from partial-wave amplitude analysis. NODE=M042M1;LINKAGE=L

S-CHANNEL $\overline{p}p$, $\overline{N}N$ or $\overline{K}K$

NODE=M042M2
NODE=M042M2

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2139^{+8}_{-9}	[9] EVANGELIS...	97	SPEC		0.6-2.4 $\overline{p}p \to K^0_S K^0_S$
∼ 2190	[9] CUTTS	78B	CNTR		0.97–3 $\overline{p}p \to \overline{N}N$
2155±15	[9,10] COUPLAND	77	CNTR	0	0.7–2.4 $\overline{p}p \to \overline{p}p$
2193± 2	[9,11] ALSPECTOR	73	CNTR		$\overline{p}p$ S channel

[9] Isospins 0 and 1 not separated. NODE=M042M2;LINKAGE=I

[10] From a fit to the total elastic cross section. NODE=M042M2;LINKAGE=E

[11] Referred to as T or T region by ALSPECTOR 73. NODE=M042M2;LINKAGE=M

$K\overline{K}$ MODE

NODE=M042M5

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2200±13	VLADIMIRSK...	06	SPEC	40 $\pi^- p \rightarrow K^0_S K^0_S n$
2150±20	ABLIKIM	04E	BES2	$J/\psi \rightarrow \omega K^+ K^-$
2130±35	BARBERIS	99	OMEG	450 $p p \rightarrow p_s p_f K^+ K^-$

$f_2(2150)$ WIDTH

NODE=M042210

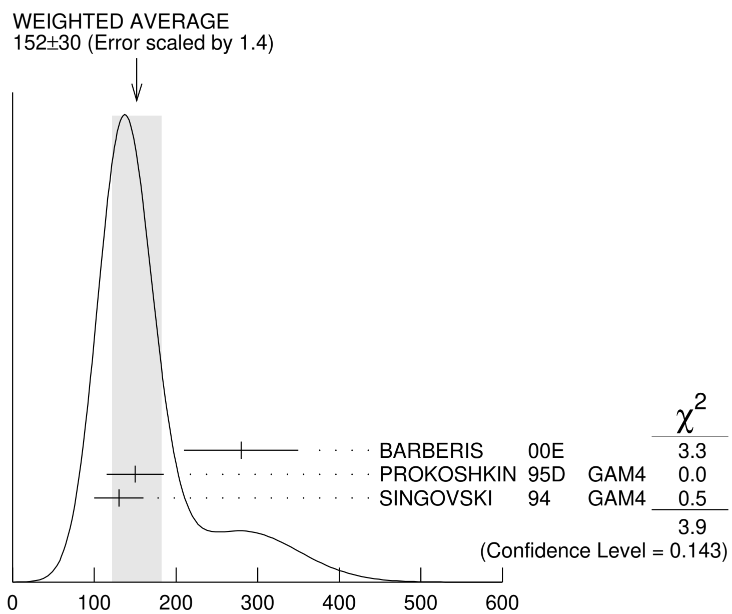
$f_2(2150)$ WIDTH, COMBINED MODES (MeV)

NODE=M042W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
152±30 OUR AVERAGE Includes data from the datablock that follows this one. Error includes scale factor of 1.4. See the ideogram below.					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
182±11	80k	[12] UMAN	06	E835	5.2 $\overline{p} p \rightarrow \eta\eta\pi^0$

[12] Statistical error only.

NODE=M042W;LINKAGE=ST



$f_2(2150)$ width, comibined modes (MeV)

$\eta\eta$ MODE

NODE=M042W3

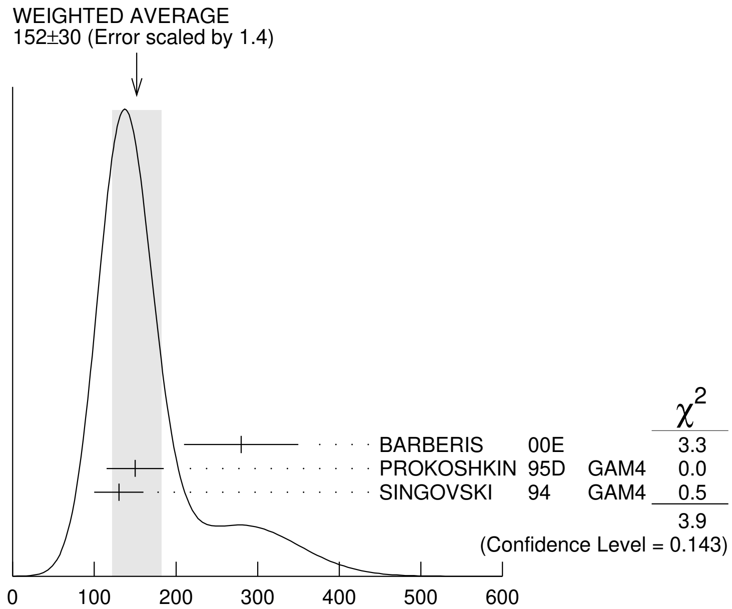
VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
The data in this block is included in the average printed for a previous datablock.				
152±30 OUR AVERAGE Error includes scale factor of 1.4. See the ideogram below.				
280±70	BARBERIS	00E		450 $p p \rightarrow p_f \eta\eta p_s$
150±35	PROKOSHKIN	95D	GAM4	300 $\pi^- N \rightarrow \pi^- N 2\eta$, 450 $p p \rightarrow p p 2\eta$
130±30	SINGOVSKI	94	GAM4	450 $p p \rightarrow p p 2\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
310±50	[13] ABELE	99B	CBAR	1.94 $\overline{p} p \rightarrow \pi^0 \eta\eta$
203±10	[14] ARMSTRONG	93C	E760	$\overline{p} p \rightarrow \pi^0 \eta\eta \rightarrow 6\gamma$

[13] Spin not determined.

NODE=M042W3;LINKAGE=K3

[14] No J^{PC} determination.

NODE=M042W3;LINKAGE=A



f_2(2150) width, $\eta\eta$ mode (MeV)

$\eta\pi\pi$ MODE

NODE=M042W4

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$250\pm25\pm45$	[15] ADOMEIT	96	CBAR	0	1.94 $\overline{p}p \to \eta 3\pi^0$

[15] ANISOVICH 00E recommends to withdraw ADOMEIT 96 that assumed a single $J^P = 2^+$ resonance. NODE=M042W4;LINKAGE=AD

$\overline{p}p \to \pi\pi$

NODE=M042W1

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
250 OUR ESTIMATE				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$\sim$ 70	[16] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \to \pi\pi$
$\sim$ 250	[17] MARTIN	80B	RVUE	
$\sim$ 250	[17] MARTIN	80C	RVUE	
$\sim$ 250	[18] DULUDE	78B	OSPK	1–2 $\overline{p}p \to \pi^0\pi^0$

→ UNCHECKED ←

[16] See however KLOET 96 who fit $\pi^+\pi^-$ only and find waves only up to $J = 3$ to be important but not significantly resonant. NODE=M042W1;LINKAGE=CC

[17] $I(J^P) = 0(2^+)$ from simultaneous analysis of $p\overline{p} \to \pi^-\pi^+$ and $\pi^0\pi^0$. NODE=M042W1;LINKAGE=P

[18] $I^G(J^P) = 0^+(2^+)$ from partial-wave amplitude analysis. NODE=M042W1;LINKAGE=L

S-CHANNEL $\overline{p}p$, $\overline{N}N$ or $\overline{K}K$

NODE=M042W2

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
56^{+31}_{-16}	[19] EVANGELIS...	97	SPEC		0.6-2.4 $\overline{p}p \to K^0_S K^0_S$
135 ± 75	[20,21] COUPLAND	77	CNTR	0	0.7–2.4 $\overline{p}p \to \overline{p}p$
$98\pm\ 8$	[21] ALSPECTOR	73	CNTR		$\overline{p}p$ S channel

[19] Isospin 0 and 2 not separated. NODE=M042W2;LINKAGE=F

[20] From a fit to the total elastic cross section. NODE=M042W2;LINKAGE=E

[21] Isospins 0 and 1 not separated. NODE=M042W2;LINKAGE=I

$K\overline{K}$ MODE

NODE=M042W5

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
91 ± 62	VLADIMIRSK...	06	SPEC	40 $\pi^- p \to K^0_S K^0_S n$
150 ± 30	ABLIKIM	04E	BES2	$J/\psi \to \omega K^+ K^-$
270 ± 50	BARBERIS	99	OMEG	450 $pp \to p_s p_f K^+ K^-$

$f_2(2150)$ DECAY MODES

NODE=M042215;NODE=M042

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\pi\pi$		DESIG=1
Γ_2	$\eta\eta$	seen	DESIG=2;OUR EST;→ UNCHECKED ←
Γ_3	$K\overline{K}$	seen	DESIG=3;OUR EST;→ UNCHECKED ←
Γ_4	$f_2(1270)\eta$	seen	DESIG=4;OUR EST;→ UNCHECKED ←
Γ_5	$a_2(1320)\pi$	seen	DESIG=5;OUR EST;→ UNCHECKED ←
Γ_6	$p\overline{p}$	seen	DESIG=6

$f_2(2150)$ BRANCHING RATIOS

NODE=M042220

$\Gamma(K\overline{K})/\Gamma(\eta\eta)$ Γ_3/Γ_2

NODE=M042R1
NODE=M042R1

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
1.28±0.23		BARBERIS	00E		450 $pp \to p_f \eta\eta p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.1	95	[22] PROKOSHKIN	95D	GAM4	300 $\pi^- N \to \pi^- N 2\eta$, 450 $pp \to pp2\eta$

[22] Using data from ARMSTRONG 89D.

NODE=M042R1;LINKAGE=A

$\Gamma(\pi\pi)/\Gamma(\eta\eta)$ Γ_1/Γ_2

NODE=M042R2
NODE=M042R2

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.33	95	[23] PROKOSHKIN	95D	GAM4	300 $\pi^- N \to \pi^- N 2\eta$, 450 $pp \to pp2\eta$

[23] Derived from a $\pi^0\pi^0/\eta\eta$ limit.

NODE=M042R2;LINKAGE=A

$\Gamma(f_2(1270)\eta)/\Gamma(a_2(1320)\pi)$ Γ_4/Γ_5

NODE=M042R3
NODE=M042R3

VALUE	DOCUMENT ID		TECN	COMMENT
0.79±0.11	[24] ADOMEIT	96	CBAR	1.94 $\overline{p}p \to \eta 3\pi^0$

[24] Using B($a_2(1320) \to \eta\pi$) = 0.145

NODE=M042R3;LINKAGE=A

$\Gamma(p\overline{p})/\Gamma_{total}$ Γ_6/Γ

NODE=M042R04
NODE=M042R04

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	73	ALEXANDER	10	CLEO	$\psi(2S) \to \gamma p\overline{p}$

$f_2(2150)$ REFERENCES

NODE=M042

ALEXANDER	10	PR D82 092002	J.P. Alexander *et al.*	(CLEO Collab.)	REFID=53525
UMAN	06	PR D73 052009	I. Uman *et al.*	(FNAL E835)	REFID=51063
VLADIMIRSK...	06	PAN 69 493	V.V. Vladimirsky *et al.*	(ITEP, Moscow)	REFID=51191
		Translated from YAF 69 515.			
ABLIKIM	04E	PL B603 138	M. Ablikim *et al.*	(BES Collab.)	REFID=50174
ANISOVICH	00E	PL B477 19	A.V. Anisovich *et al.*		REFID=47945
BARBERIS	00E	PL B479 59	D. Barberis *et al.*	(WA 102 Collab.)	REFID=47961
ABELE	99B	EPJ C8 67	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=46904
BARBERIS	99	PL B453 305	D. Barberis *et al.*	(Omega Expt.)	REFID=46921
EVANGELIS...	97	PR D56 3803	C. Evangelista *et al.*	(LEAR Collab.)	REFID=45687
MARTIN	97	PR C56 1114	B.R. Martin, G.C. Oades	(LOUC, AARH)	REFID=45685
ADOMEIT	96	ZPHY C71 227	J. Adomeit *et al.*	(Crystal Barrel Collab.)	REFID=45202
KLOET	96	PR D53 6120	W.M. Kloet, F. Myhrer	(RUTG, NORD)	REFID=45212
PROKOSHKIN	95D	PD 40 495	Y.D. Prokoshkin	(SERP) IGJPC	REFID=44647
		Translated from DANS 344 469.			
HASAN	94	PL B334 215	A. Hasan, D.V. Bugg	(LOQM)	REFID=44103
OAKDEN	94	NP A574 731	M.N. Oakden, M.R. Pennington	(DURH)	REFID=45210
SINGOVSKI	94	NC A107 1911	A.V. Singovsky	(SERP)	REFID=44648
ARMSTRONG	93C	PL B307 394	T.A. Armstrong *et al.*	(FNAL, FERR, GENO+)	REFID=43587
ARMSTRONG	89D	PL B227 186	T.A. Armstrong, M. Benayoun	(ATHU, BARI, BIRM+)	REFID=41010
MARTIN	80B	NP B176 355	B.R. Martin, D. Morgan	(LOUC, RHEL) JP	REFID=21838
MARTIN	80C	NP B169 216	A.D. Martin, M.R. Pennington	(DURH) JP	REFID=21837
CUTTS	78B	PR D17 16	D. Cutts *et al.*	(STON, WISC)	REFID=21733
DULUDE	78B	PL 79B 335	R.S. Dulude *et al.*	(BROW, MIT, BARI) JP	REFID=21850
COUPLAND	77	PL 71B 460	M. Coupland *et al.*	(LOQM, RHEL)	REFID=21830
ALSPECTOR	73	PRL 30 511	J. Alspector *et al.*	(RUTG, UPNJ)	REFID=21813

NODE=M032

$\rho(2150)$ $I^G(J^{PC}) = 1^+(1^{--})$

OMITTED FROM SUMMARY TABLE

This entry was previously called $T_1(2190)$. See the review on "Spectroscopy of Light Meson Resonances." NODE=M032

ρ(2150) MASS

NODE=M032205

e^+e^- PRODUCED

NODE=M032M3

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2034 ±13 $\pm$ 9		[1] ABLIKIM	21A	BES3	$e^+e^- \to \omega\pi^0$
2111 ±43 ±25		[2] ABLIKIM	21X	BES3	$e^+e^- \to \eta'\pi^+\pi^-$
2255 $^{+17}_{-18}$ $^{+50}_{-41}$	1.8k	[3] ABLIKIM	20F	BES3	$\psi(2S) \to K^+K^-\eta$
2201 ±19		[4] LEES	20	BABR	$e^+e^- \to K^+K^-\gamma$
2227 $\pm$ 9 $\pm$ 9		[5] LEES	20	RVUE	$e^+e^- \to K^+K^-$ OCCUR=2
2039 $\pm$ 8 $^{+36}_{-18}$		[6] ABLIKIM	19AQ	BES	$J/\psi \to K^+K^-\pi^0$
2239.2$\pm$ 7.1$\pm$11.3		[7] ABLIKIM	19L	BES3	$e^+e^- \to K^+K^-$
2254 ±22		[8] LEES	12G	BABR	$e^+e^- \to \pi^+\pi^-\gamma$
2150 ±40 ±50		AUBERT	07AU	BABR	10.6 $e^+e^- \to f_1(1285)\pi^+\pi^-\gamma$
1990 ±80		AUBERT	07AU	BABR	10.6 $e^+e^- \to \eta'\pi^+\pi^-\gamma$ OCCUR=2
2153 ±37		BIAGINI	91	RVUE	$e^+e^- \to \pi^+\pi^-$, K^+K^-
2110 ±50		[9] CLEGG	90	RVUE	$e^+e^- \to 3(\pi^+\pi^-)$, $2(\pi^+\pi^-\pi^0)$

[1] From a fit to the cross section between 2.00 and 3.08 GeV with a coherent sum of Breit-Wigner amplitudes, including contributions from $\rho(770)$, $\rho(1450)$ and $\rho(1700)$. Could be another state. NODE=M032M3;LINKAGE=G

[2] From a Breit-Wigner fit to the Born cross section, including an s-dependent continuum amplitude. NODE=M032M3;LINKAGE=H

[3] Seen in $\psi(2S)$ decay with branching ratio $\psi(2S) \to X\eta \to K^+K^-\eta = (21.7 \pm 1.9^{+7.7}_{-8.3}) \times 10^{-6}$. NODE=M032M3;LINKAGE=F

[4] From the fit to the BABAR data of LEES 13Q assuming a coherent sum of a single Breit-Wigner resonance and a nonresonant contribution. The resonance significance is 3.5 σ. NODE=M032M3;LINKAGE=C

[5] From the fit to the BABAR data of LEES 13Q and BESIII data of ABLIKIM 19L assuming a coherent sum of a single Breit-Wigner resonance and a nonresonant contribution. NODE=M032M3;LINKAGE=D

[6] Could also be another state. Seen in J/ψ decay with branching ratio $J/\psi \to X\pi^0 \to K^+K^-\pi^0 = (6.7 \pm 1.1^{+2.2}_{-1.8}) \times 10^{-6}$. NODE=M032M3;LINKAGE=B

[7] The observed structure can be due to both the $\phi(2170)$ and $\rho(2150)$. NODE=M032M3;LINKAGE=E

[8] Using the GOUNARIS 68 parametrization of the pion form factor leaving the masses and widths of the $\rho(1450)$, $\rho(1700)$, and $\rho(2150)$ resonances as free parameters of the fit. NODE=M032M3;LINKAGE=LE

[9] Includes ATKINSON 85. NODE=M032M3;LINKAGE=A

$\overline{p}p \to \pi\pi$

NODE=M032M1

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$\sim$ 2191	HASAN	94	RVUE	$\overline{p}p \to \pi\pi$
$\sim$ 2070	[1] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \to \pi\pi$
$\sim$ 2170	[2] MARTIN	80B	RVUE	
$\sim$ 2100	[2] MARTIN	80C	RVUE	

[1] See however KLOET 96 who fit $\pi^+\pi^-$ only and find waves only up to $J = 3$ to be important but not significantly resonant. NODE=M032M1;LINKAGE=CC

[2] $I(J^P) = 1(1^-)$ from simultaneous analysis of $p\overline{p} \to \pi^-\pi^+$ and $\pi^0\pi^0$. NODE=M032M;LINKAGE=P

S-CHANNEL $\overline{N}N$

NODE=M032M2

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2110$\pm$35	[1] ANISOVICH	02	SPEC	0.6–1.9 $p\overline{p} \to \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$
$\sim$ 2190	[2] CUTTS	78B	CNTR	0.97–3 $\overline{p}p \to \overline{N}N$
2155$\pm$15	[2,3] COUPLAND	77	CNTR	0.7–2.4 $\overline{p}p \to \overline{p}p$
2193$\pm$ 2	[2,4] ALSPECTOR	73	CNTR	$\overline{p}p$ S channel
2190$\pm$10	[5] ABRAMS	70	CNTR	S channel $\overline{p}N$

[1] From the combined analysis of ANISOVICH 00J, ANISOVICH 01D, ANISOVICH 01E, and ANISOVICH 02. NODE=M032M;LINKAGE=AY
[2] Isospins 0 and 1 not separated. NODE=M032M;LINKAGE=I
[3] From a fit to the total elastic cross section. NODE=M032M;LINKAGE=E
[4] Referred to as T or T region by ALSPECTOR 73. NODE=M032M;LINKAGE=M
[5] Seen as bump in $I = 1$ state. See also COOPER 68. PEASLEE 75 confirm $\overline{p}p$ results of ABRAMS 70, no narrow structure. NODE=M032M;LINKAGE=B

$\pi^- p \rightarrow \omega\pi^0 n$

NODE=M032M4
NODE=M032M4

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2140±30	ALDE	95	GAM2	38 $\pi^- p \rightarrow \omega\pi^0 n$
2170±30	ALDE	92C	GAM4	100 $\pi^- p \rightarrow \omega\pi^0 n$

ρ(2150) WIDTH

NODE=M032210

$e^+ e^-$ PRODUCED

NODE=M032W3
NODE=M032W3

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
234 ± 30 ± 25		[1] ABLIKIM	21A	BES3	$e^+ e^- \rightarrow \omega\pi^0$
135 ± 34 ± 30		[2] ABLIKIM	21X	BES3	$e^+ e^- \rightarrow \eta' \pi^+ \pi^-$
$460 ^{+54}_{-48} {}^{+160}_{-90}$	1.8k	[3] ABLIKIM	20F	BES3	$\psi(2S) \rightarrow K^+ K^- \eta$
70 ± 38		[4] LEES	20	BABR	$e^+ e^- \rightarrow K^+ K^- \gamma$
127 ± 14 ± 4		[5] LEES	20	RVUE	$e^+ e^- \rightarrow K^+ K^-$ (OCCUR=2)
$196 \pm 23 ^{+25}_{-27}$		[6] ABLIKIM	19AQ	BES	$J/\psi \rightarrow K^+ K^- \pi^0$
139.8± 12.3± 20.6		[7] ABLIKIM	19L	BES3	$e^+ e^- \rightarrow K^+ K^-$
109 ± 76		[8] LEES	12G	BABR	$e^+ e^- \rightarrow \pi^+ \pi^- \gamma$
350 ± 40 ± 50		AUBERT	07AU	BABR	10.6 $e^+ e^- \rightarrow f_1(1285) \pi^+ \pi^- \gamma$
310 ±140		AUBERT	07AU	BABR	10.6 $e^+ e^- \rightarrow \eta' \pi^+ \pi^- \gamma$ (OCCUR=2)
389 ± 79		BIAGINI	91	RVUE	$e^+ e^- \rightarrow \pi^+ \pi^-$, $K^+ K^-$
410 ±100		[9] CLEGG	90	RVUE	$e^+ e^- \rightarrow 3(\pi^+ \pi^-)$, $2(\pi^+ \pi^- \pi^0)$

[1] From a fit to the cross section between 2.00 and 3.08 GeV with a coherent sum of Breit-Wigner amplitudes, including contributions from $\rho(770)$, $\rho(1450)$ and $\rho(1700)$. Could be another state. NODE=M032W3;LINKAGE=G
[2] From a Breit-Wigner fit to the Born cross section, including an s-dependent continuum amplitude. NODE=M032W3;LINKAGE=H
[3] Seen in $\psi(2S)$ decay with branching ratio $\psi(2S) \rightarrow X\eta \rightarrow K^+ K^- \eta = (21.7 \pm 1.9^{+7.7}_{-8.3}) \times 10^{-6}$. NODE=M032W3;LINKAGE=F
[4] From the fit to the BABAR data of LEES 13Q assuming a coherent sum of a single Breit-Wigner resonance and a nonresonant contribution. The resonance significance is 3.5 σ. NODE=M032W3;LINKAGE=C
[5] From the fit to the BABAR data of LEES 13Q and BESIII data of ABLIKIM 19L assuming a coherent sum of a single Breit-Wigner resonance and a nonresonant contribution. NODE=M032W3;LINKAGE=D
[6] Could also be another state. Seen in J/ψ decay with branching ratio $J/\psi \rightarrow X\pi^0 \rightarrow K^+ K^- \pi^0 = (6.7 \pm 1.1^{+2.2}_{-1.8}) \times 10^{-6}$. NODE=M032W3;LINKAGE=B
[7] The observed structure can be due to both the $\phi(2170)$ and $\rho(2150)$. NODE=M032W3;LINKAGE=E
[8] Using the GOUNARIS 68 parametrization of the pion form factor leaving the masses and widths of the $\rho(1450)$, $\rho(1700)$, and $\rho(2150)$ resonances as free parameters of the fit. NODE=M032W3;LINKAGE=LE
[9] Includes ATKINSON 85. NODE=M032W3;LINKAGE=A

$\overline{p}p \rightarrow \pi\pi$

NODE=M032W1
NODE=M032W1

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
∼ 296	HASAN	94	RVUE	$\overline{p}p \rightarrow \pi\pi$
∼ 40	[1] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \rightarrow \pi\pi$
∼ 250	[2] MARTIN	80B	RVUE	
∼ 200	[2] MARTIN	80C	RVUE	

[1] See however KLOET 96 who fit $\pi^+ \pi^-$ only and find waves only up to $J = 3$ to be important but not significantly resonant. NODE=M032W1;LINKAGE=CC
[2] $I(J^P) = 1(1^-)$ from simultaneous analysis of $p\overline{p} \rightarrow \pi^- \pi^+$ and $\pi^0 \pi^0$. NODE=M032W;LINKAGE=P

S-CHANNEL $\overline{N}N$ NODE=M032W2

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
230±50	[1] ANISOVICH	02	SPEC	0.6–1.9 $p\overline{p} \to \omega\pi^0, \omega\eta\pi^0, \pi^+\pi^-$
135±75	[2,3] COUPLAND	77	CNTR	0.7–2.4 $\overline{p}p \to \overline{p}p$
98± 8	[3] ALSPECTOR	73	CNTR	$\overline{p}p$ S channel
∼ 85	[4] ABRAMS	70	CNTR	S channel $\overline{p}N$

[1] From the combined analysis of ANISOVICH 00J, ANISOVICH 01D, ANISOVICH 01E, and ANISOVICH 02. NODE=M032W;LINKAGE=AY
[2] From a fit to the total elastic cross section. NODE=M032W;LINKAGE=E
[3] Isospins 0 and 1 not separated. NODE=M032W;LINKAGE=I
[4] Seen as bump in $I = 1$ state. See also COOPER 68. PEASLEE 75 confirm $\overline{p}p$ results of ABRAMS 70, no narrow structure. NODE=M032W;LINKAGE=B

$\pi^- p \to \omega\pi^0 n$ NODE=M032W4

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
320±70	ALDE	95	GAM2	38 $\pi^- p \to \omega\pi^0 n$
∼ 300	ALDE	92C	GAM4	100 $\pi^- p \to \omega\pi^0 n$

ρ(2150) DECAY MODES NODE=M032215;NODE=M032

	Mode	Fraction (Γ_i/Γ)	
Γ_1	e^+e^-		DESIG=1
Γ_2	$\pi^+\pi^-$	seen	DESIG=2;OUR EVAL;→ UNCHECKED ←
Γ_3	K^+K^-	seen	DESIG=3;OUR EVAL;→ UNCHECKED ←
Γ_4	$3(\pi^+\pi^-)$	seen	DESIG=4;OUR EVAL;→ UNCHECKED ←
Γ_5	$2(\pi^+\pi^-\pi^0)$	seen	DESIG=5;OUR EVAL;→ UNCHECKED ←
Γ_6	$\eta'\pi^+\pi^-$	seen	DESIG=6;OUR EVAL;→ UNCHECKED ←
Γ_7	$f_1(1285)\pi^+\pi^-$	seen	DESIG=7;OUR EVAL;→ UNCHECKED ←
Γ_8	$\omega\pi^0$	seen	DESIG=8;OUR EVAL;→ UNCHECKED ←
Γ_9	$\omega\pi^0\eta$	seen	DESIG=9;OUR EVAL;→ UNCHECKED ←
Γ_{10}	$p\overline{p}$		DESIG=10

ρ(2150) $\Gamma(i)\Gamma(e^+e^-)/\Gamma(\text{total})$ NODE=M032220

$\Gamma(\omega\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_8\Gamma_1/\Gamma$ NODE=M032R00

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
34±11±16	ABLIKIM	21A	BES3	$e^+e^- \to \omega\pi^0$

$\Gamma(\eta'\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_6\Gamma_1/\Gamma$ NODE=M032R02

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
23.3±5.3±3.3	[1] ABLIKIM	21X	BES3	$e^+e^- \to \eta'\pi^+\pi^-$

[1] From a Breit-Wigner fit to the Born cross section interfering constructively with the continuum. For destructive interference the value is 0.64 ± 0.49 ± 0.42 eV. NODE=M032R02;LINKAGE=A

ρ(2150) $\Gamma(i)\Gamma(e^+e^-)/\Gamma^2(\text{total})$ NODE=M032230

$\Gamma(f_1(1285)\pi^+\pi^-)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_7/\Gamma \times \Gamma_1/\Gamma$ NODE=M032G01

VALUE (units 10^{-7})	DOCUMENT ID		TECN	COMMENT
3.1±0.6±0.5	[1] AUBERT	07AU	BABR	10.6 $e^+e^- \to f_1(1285)\pi^+\pi^-\gamma$

[1] Calculated by us from the reported value of cross section at the peak. NODE=M032G01;LINKAGE=AU

$\Gamma(\eta'\pi^+\pi^-)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_6/\Gamma \times \Gamma_1/\Gamma$ NODE=M032G02

VALUE (units 10^{-8})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
4.9±1.9	[1] AUBERT	07AU	BABR	10.6 $e^+e^- \to \eta'\pi^+\pi^-\gamma$

[1] Calculated by us from the reported value of cross section at the peak. NODE=M032G02;LINKAGE=AU

ρ(2150) REFERENCES

NODE=M032

ABLIKIM	21A	PL B813 136059	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61028
ABLIKIM	21X	PR D103 072007	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61231
ABLIKIM	20F	PR D101 032008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60256
LEES	20	PR D101 012011	J.P. Lees *et al.*	(BESIII Collab.)	REFID=60211
ABLIKIM	19AQ	PR D100 032004	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59909
ABLIKIM	19L	PR D99 032001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59612
LEES	13Q	PR D88 032013	J.P. Lees *et al.*	(BABAR Collab.)	REFID=55404
LEES	12G	PR D86 032013	J.P. Lees *et al.*	(BABAR Collab.)	REFID=54299
AUBERT	07AU	PR D76 092005	B. Aubert *et al.*	(BABAR Collab.)	REFID=52049
ANISOVICH	02	PL B542 8	A.V. Anisovich *et al.*		REFID=48828
ANISOVICH	01D	PL B508 6	A.V. Anisovich *et al.*		REFID=48327
ANISOVICH	01E	PL B513 281	A.V. Anisovich *et al.*		REFID=48349
ANISOVICH	00J	PL B491 47	A.V. Anisovich *et al.*	(RAL, LOQM, PNPI+)	REFID=47950
KLOET	96	PR D53 6120	W.M. Kloet, F. Myhrer	(RUTG, NORD)	REFID=45212
ALDE	95	ZPHY C66 379	D.M. Alde *et al.*	(GAMS Collab.) JP	REFID=44371
HASAN	94	PL B334 215	A. Hasan, D.V. Bugg	(LOQM)	REFID=44103
OAKDEN	94	NP A574 731	M.N. Oakden, M.R. Pennington	(DURH)	REFID=45210
ALDE	92C	ZPHY C54 553	D.M. Alde *et al.*	(BELG, SERP, KEK, LANL+)	REFID=41859
BIAGINI	91	NC 104A 363	M.E. Biagini *et al.*	(FRAS, PRAG)	REFID=41894
CLEGG	90	ZPHY C45 677	A.B. Clegg, A. Donnachie	(LANC, MCHS)	REFID=41355
ATKINSON	85	ZPHY C29 333	M. Atkinson *et al.*	(BONN, CERN, GLAS+)	REFID=22000
MARTIN	80B	NP B176 355	B.R. Martin, D. Morgan	(LOUC, RHEL) JP	REFID=21838
MARTIN	80C	NP B169 216	A.D. Martin, M.R. Pennington	(DURH) JP	REFID=21837
CUTTS	78B	PR D17 16	D. Cutts *et al.*	(STON, WISC)	REFID=21733
COUPLAND	77	PL 71B 460	M. Coupland *et al.*	(LOQM, RHEL)	REFID=21830
PEASLEE	75	PL 57B 189	D.C. Peaslee *et al.*	(CANB, BARI, BROW+)	REFID=21824
ALSPECTOR	73	PRL 30 511	J. Alspector *et al.*	(RUTG, UPNJ)	REFID=21813
ABRAMS	70	PR D1 1917	R.J. Abrams *et al.*	(BNL)	REFID=21807
COOPER	68	PRL 20 1059	W.A. Cooper *et al.*	(ANL)	REFID=21805
GOUNARIS	68	PRL 21 244	G.J. Gounaris, J.J. Sakurai		REFID=48054

NODE=M103

φ(2170)

$I^G(J^{PC}) = 0^-(1^{--})$

See the review on "Spectroscopy of Light Meson Resonances."

NODE=M103

φ(2170) MASS

NODE=M103M

NODE=M103M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2162 ± 7 OUR AVERAGE Error includes scale factor of 1.1. [2159 ± 17 MeV OUR 2021 AVERAGE Scale factor = 1.4] (NEW)					
2176 ±24 ± 3		[1] ABLIKIM	21A	BES3	$e^+e^- \rightarrow \omega\eta$
2163.5± 6.2± 3.0		[2] ABLIKIM	21T	BES3	$e^+e^- \rightarrow \phi\eta$
2177.5± 4.8±19.5		[3] ABLIKIM	20M	BES3	$e^+e^- \rightarrow \eta'\phi$
2126.5±16.8±12.4		[4] ABLIKIM	20S	BES3	$e^+e^- \rightarrow K^+K^-\pi^0\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2273.7± 5.7±19.3		[5] ABLIKIM	21AP	BES3	$e^+e^- \rightarrow K^0_S K^0_L$
2135 ± 8 ± 9	95	ABLIKIM	19I	BES3	$e^+e^- \rightarrow \eta\phi f_0(980)$
2239.2± 7.1±11.3		[6] ABLIKIM	19L	BES3	$e^+e^- \rightarrow K^+K^-$
2200 ± 6 ± 5	471	ABLIKIM	15H	BES3	$J/\psi \rightarrow \eta\phi\pi^+\pi^-$
2180 ± 8 ± 8		[7,8] LEES	12F	BABR	10.6 $e^+e^- \rightarrow \phi\pi^+\pi^-\gamma$
2079 ±13 $^{+79}_{-28}$	4.8k	[9] SHEN	09	BELL	10.6 $e^+e^- \rightarrow K^+K^-\pi^+\pi^-\gamma$
2186 ±10 ± 6	52	ABLIKIM	08F	BES	$J/\psi \rightarrow \eta\phi f_0(980)$
2125 ±22 ±10	483	AUBERT	08S	BABR	10.6 $e^+e^- \rightarrow \phi\eta\gamma$
2192 ±14	116	[10] AUBERT	07AK	BABR	10.6 $e^+e^- \rightarrow K^+K^-\pi^+\pi^-\gamma$
2169 ±20	149	[10] AUBERT	07AK	BABR	10.6 $e^+e^- \rightarrow K^+K^-\pi^0\pi^0\gamma$ (OCCUR=2)
2175 ±10 ±15	201	[8,11] AUBERT,BE	06D	BABR	10.6 $e^+e^- \rightarrow K^+K^-\pi\pi\gamma$

[1] From a fit to the cross section between 2.00 and 3.08 GeV with a coherent sum of Breit-Wigner amplitudes, including contributions from ω(1420) and ω(1650)/φ(1680). NODE=M103M;LINKAGE=F

[2] From a fit to the cross section below 3.5 GeV measured by BaBar and BESIII with a coherent sum of two modified Breit-Wigner amplitudes (φ(1680) and φ(2170)) and a nonresonant term. NODE=M103M;LINKAGE=G

[3] From a fit using a coherent sum of a phase-space modified Breit-Wigner function and a phase-space term. NODE=M103M;LINKAGE=D

[4] By a simultaneous fit of the intermediate channels in a partial-wave analysis, assuming the same structure, modelled with a coherent sum of a nonresonant component and a resonant component by a Breit-Wigner function. NODE=M103M;LINKAGE=E

[5] From a fit to the cross section between 2.00 and 3.08 GeV with a sum of Breit-Wigner amplitude and a nonresonant contribution. The observed structure can be also due to ρ(2150). NODE=M103M;LINKAGE=H

[6] The observed structure can be due to both the φ(2170) and ρ(2150). NODE=M103M;LINKAGE=C

[7] Fit includes interference with the $\phi(1680)$. NODE=M103M;LINKAGE=A
[8] From the $\phi f_0(980)$ component. NODE=M103M;LINKAGE=AB
[9] From a fit with two incoherent Breit-Wigners. NODE=M103M;LINKAGE=SH
[10] From the $K^+ K^- f_0(980)$ component. NODE=M103M;LINKAGE=AU
[11] Superseded by LEES 12F. NODE=M103M;LINKAGE=B

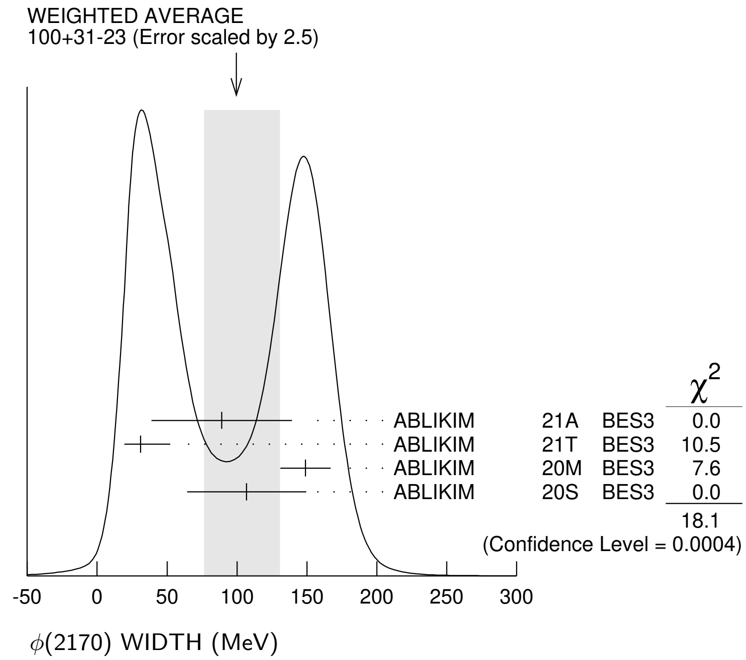
ϕ(2170) WIDTH

NODE=M103W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
100 $^{+31}_{-23}$ OUR AVERAGE					Error includes scale factor of 2.5. See the ideogram below.
[137 ± 16 MeV OUR 2021 AVERAGE]					
89 ±50 ± 5		[1] ABLIKIM	21A	BES3	$e^+ e^- \rightarrow \omega\eta$
31.1 $^{+21.1}_{-11.6}$ ± 1.1		[2] ABLIKIM	21T	BES3	$e^+ e^- \rightarrow \phi\eta$
149.0±15.6± 8.9		[3] ABLIKIM	20M	BES3	$e^+ e^- \rightarrow \eta' \phi$
106.9±32.1±28.1		[4] ABLIKIM	20S	BES3	$e^+ e^- \rightarrow K^+ K^- \pi^0 \pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
86 ±44 ±51		[5] ABLIKIM	21AP	BES3	$e^+ e^- \rightarrow K^0_S K^0_L$
104 ±24 ±12	95	ABLIKIM	19I	BES3	$e^+ e^- \rightarrow \eta\phi f_0(980)$
139.8±12.3±20.6		[6] ABLIKIM	19L	BES3	$e^+ e^- \rightarrow K^+ K^-$
104 ±15 ±15	471	ABLIKIM	15H	BES3	$J/\psi \rightarrow \eta\phi\pi^+\pi^-$
77 ±15 ±10		[7,8] LEES	12F	BABR	10.6 $e^+ e^- \rightarrow \phi\pi^+\pi^-\gamma$
192 ±23 $^{+25}_{-61}$	4.8k	[9] SHEN	09	BELL	10.6 $e^+ e^- \rightarrow K^+ K^- \pi^+ \pi^- \gamma$
65 ±23 ±17	52	ABLIKIM	08F	BES	$J/\psi \rightarrow \eta\phi f_0(980)$
61 ±50 ±13	483	AUBERT	08S	BABR	10.6 $e^+ e^- \rightarrow \phi\eta\gamma$
71 ±21	116	[10] AUBERT	07AK	BABR	10.6 $e^+ e^- \rightarrow K^+ K^- \pi^+ \pi^- \gamma$
102 ±27	149	[10] AUBERT	07AK	BABR	10.6 $e^+ e^- \rightarrow K^+ K^- \pi^0 \pi^0 \gamma$
58 ±16 ±20	201	[8,11] AUBERT,BE	06D	BABR	10.6 $e^+ e^- \rightarrow K^+ K^- \pi\pi\gamma$

NODE=M103W NEW OCCUR=2

[1] From a fit to the cross section between 2.00 and 3.08 GeV with a coherent sum of Breit-Wigner amplitudes, including contributions from $\omega(1420)$ and $\omega(1650)/\phi(1680)$. NODE=M103W;LINKAGE=F
[2] From a fit to the cross section below 3.5 GeV measured by BaBar and BESIII with a coherent sum of two modified Breit-Wigner amplitudes ($\phi(1680)$ and $\phi(2170)$) and a nonresonant term. NODE=M103W;LINKAGE=G
[3] From a fit using a coherent sum of a phase-space modified Breit-Wigner function and a phase-space term. NODE=M103W;LINKAGE=D
[4] By a simultaneous fit of the intermediate channels in a partial-wave analysis, assuming the same structure, modelled with a coherent sum of a nonresonant component and a resonant component by a Breit-Wigner function. NODE=M103W;LINKAGE=E
[5] From a fit to the cross section between 2.00 and 3.08 GeV with a sum of Breit-Wigner amplitude and a nonresonant contribution. The observed structure can be also due to $\rho(2150)$. NODE=M103W;LINKAGE=H
[6] The observed structure can be due to both the $\phi(2170)$ and $\rho(2150)$. NODE=M103W;LINKAGE=C
[7] Fit includes interference with the $\phi(1680)$. NODE=M103W;LINKAGE=A
[8] From the $\phi f_0(980)$ component. NODE=M103W;LINKAGE=AB
[9] From a fit with two incoherent Breit-Wigners. NODE=M103W;LINKAGE=SH
[10] From the $K^+ K^- f_0(980)$ component. NODE=M103W;LINKAGE=AU
[11] Superseded by LEES 12F. NODE=M103W;LINKAGE=B



$\phi(2170)$ DECAY MODES

NODE=M103215;NODE=M103

	Mode	Fraction (Γ_i/Γ)	
Γ_1	e^+e^-	seen	DESIG=1;OUR EVAL;→ UNCHECKED ←
Γ_2	$\phi\eta$		DESIG=5
Γ_3	$\omega\eta$		DESIG=16
Γ_4	$\phi\eta'$		DESIG=11
Γ_5	$\phi\pi\pi$		DESIG=9
Γ_6	$\phi f_0(980)$	seen	DESIG=2;OUR EVAL;→ UNCHECKED ←
Γ_7	$K^0_S K^0_L$		DESIG=17
Γ_8	$K^+K^-\pi^+\pi^-$		DESIG=3
Γ_9	$K^+K^- f_0(980) \rightarrow K^+K^-\pi^+\pi^-$	seen	DESIG=6
Γ_{10}	$K^+K^-\pi^0\pi^0$		DESIG=4
Γ_{11}	$K^+K^- f_0(980) \rightarrow K^+K^-\pi^0\pi^0$	seen	DESIG=7
Γ_{12}	$K^{*0}K^{\pm}\pi^{\mp}$	not seen	DESIG=8
Γ_{13}	$K^*(892)^0\overline{K}^*(892)^0$	not seen	DESIG=10
Γ_{14}	$K^*(892)^+K^*(892)^-$		DESIG=15
Γ_{15}	$K(1460)^+K^-$ + c.c.		DESIG=12
Γ_{16}	$K_1(1270)^+K^-$ + c.c.		DESIG=14
Γ_{17}	$K_1(1400)^+K^-$ + c.c.		DESIG=13

$\phi(2170)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma(\text{total})$

NODE=M103230

$\Gamma(\phi\eta) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_2\Gamma_1/\Gamma$

NODE=M103G2
NODE=M103G2

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.24^{+0.12}_{-0.07}$		[1] ABLIKIM 21T	BES3	$e^+e^- \rightarrow \phi\eta$
$1.7 \pm 0.7 \pm 1.3$	483	AUBERT 08S	BABR	10.6 $e^+e^- \rightarrow \phi\eta\gamma$

[1] From a solution of the fit to the cross section below 3.5 GeV measured by BaBar and BESIII with a coherent sum of two modified Breit-Wigner amplitudes ($\phi(1680)$ and $\phi(2170)$) and a nonresonant term. The other solution gives $10.11^{+3.87}_{-3.13}$ eV.

NODE=M103G2;LINKAGE=A

$\Gamma(\omega\eta) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_3\Gamma_1/\Gamma$

NODE=M103R09
NODE=M103R09

VALUE (eV)	DOCUMENT ID	TECN	COMMENT
$0.43 \pm 0.15 \pm 0.04$	[1] ABLIKIM 21A	BES3	$e^+e^- \rightarrow \omega\eta$

[1] For constructive interference with $\omega(1420)$ and $\omega(1650)/\phi(1680)$. For destructive interference: $1.25 \pm 0.48 \pm 0.18$ eV.

NODE=M103R09;LINKAGE=A

$\Gamma(\phi\eta') \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_4\Gamma_1/\Gamma$

NODE=M103R00

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
7.1±0.7±0.7	[1] ABLIKIM	20M	BES3	$e^+e^- \to \eta'\phi$

[1] From a fit using a coherent sum of a phase-space modified Breit-Wigner function and a phase-space term.

NODE=M103R00;LINKAGE=A

$\Gamma(\phi f_0(980)) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_6\Gamma_1/\Gamma$

NODE=M103G1

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
2.3±0.3±0.3		[1,2] LEES	12F	BABR	10.6 $e^+e^- \to \phi\pi^+\pi^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.5±0.8±0.4	201	[2,3] AUBERT,BE	06D	BABR	10.6 $e^+e^- \to K^+K^-\pi\pi\gamma$

[1] From a fit with constructive interference with the $\phi(1680)$. In a fit with destructive interference, the value is larger by a factor of 12.

NODE=M103G1;LINKAGE=A

[2] From the $\phi f_0(980)$ component.

NODE=M103G1;LINKAGE=AB

[3] Superseded by LEES 12F.

NODE=M103G1;LINKAGE=B

$\Gamma(K^0_S K^0_L) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_7\Gamma_1/\Gamma$

NODE=M103R10

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.9±0.6±0.7	[1] ABLIKIM	21AP	BES3	$e^+e^- \to K^0_S K^0_L$

[1] From a fit to the cross section between 2.00 and 3.08 GeV with a sum of Breit-Wigner amplitude and a nonresonant contribution. The observed structure can be also due to $\rho(2150)$.

NODE=M103R10;LINKAGE=A

$\Gamma(K^*(892)^+ K^*(892)^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{14}\Gamma_1/\Gamma$

NODE=M103R08

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<1.9	90	[1] ABLIKIM	20S	BES3	$e^+e^- \to K^+K^-\pi^0\pi^0$

[1] By a simultaneous fit of the intermediate channels in a partial-wave analysis, assuming the same structure, modelled with a coherent sum of a nonresonant component and a resonant component by a Breit-Wigner function.

NODE=M103R08;LINKAGE=A

$\Gamma(K(1460)^+ K^- + \text{c.c.}) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{15}\Gamma_1/\Gamma$

NODE=M103R05

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
3.0±3.8	[1] ABLIKIM	20S	BES3	$e^+e^- \to K^+K^-\pi^0\pi^0$

[1] By a simultaneous fit of the intermediate channels in a partial-wave analysis, assuming the same structure, modelled with a coherent sum of a nonresonant component and a resonant component by a Breit-Wigner function.

NODE=M103R05;LINKAGE=A

$\Gamma(K_1(1270)^+ K^- + \text{c.c.}) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{16}\Gamma_1/\Gamma$

NODE=M103R06

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<12.5	90	[1] ABLIKIM	20S	BES3	$e^+e^- \to K^+K^-\pi^0\pi^0$

[1] By a simultaneous fit of the intermediate channels in a partial-wave analysis, assuming the same structure, modelled with a coherent sum of a nonresonant component and a resonant component by a Breit-Wigner function. A second solution of the fit with equal fit quality gives an upper limit value of 297.6 eV.

NODE=M103R06;LINKAGE=A

$\Gamma(K_1(1400)^+ K^- + \text{c.c.}) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{17}\Gamma_1/\Gamma$

NODE=M103R07

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
4.7±3.3	[1] ABLIKIM	20S	BES3	$e^+e^- \to K^+K^-\pi^0\pi^0$

[1] By a simultaneous fit of the intermediate channels in a partial-wave analysis, assuming the same structure, modelled with a coherent sum of a nonresonant component and a resonant component by a Breit-Wigner function. A second solution of the fit with equal fit quality gives a value of 98.8 ± 7.8 eV.

NODE=M103R07;LINKAGE=A

$\phi(2170)\ \Gamma(i)\Gamma(e^+e^-)/\Gamma^2(\text{total})$

NODE=M103220

$\Gamma(\phi\pi\pi)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_5/\Gamma \times \Gamma_1/\Gamma$

NODE=M103G01

VALUE (units 10^{-7})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.65±0.15±0.18	4.8k	[1] SHEN	09	BELL	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\gamma$

[1] Multiplied by 3/2 to take into account the $\phi\pi^0\pi^0$ mode. Using B($\phi \to K^+K^-$) = (49.2 ± 0.6)%.

NODE=M103G01;LINKAGE=SH

ϕ(2170) BRANCHING RATIOS

NODE=M103225

$\Gamma(K^+K^-f_0(980) \to K^+K^-\pi^+\pi^-)/\Gamma_{total}$ Γ_9/Γ

NODE=M103R01
NODE=M103R01

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AUBERT	07AK	BABR	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\gamma$

$\Gamma(K^+K^-f_0(980) \to K^+K^-\pi^0\pi^0)/\Gamma_{total}$ Γ_{11}/Γ

NODE=M103R02
NODE=M103R02

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AUBERT	07AK	BABR	10.6 $e^+e^- \to K^+K^-\pi^0\pi^0\gamma$

$\Gamma(K^{*0}K^\pm\pi^\mp)/\Gamma_{total}$ Γ_{12}/Γ

NODE=M103R03
NODE=M103R03

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	AUBERT	07AK	BABR	10.6 GeV e^+e^-

$\Gamma(K^*(892)^0\overline{K}^*(892)^0)/\Gamma_{total}$ Γ_{13}/Γ

NODE=M103R04
NODE=M103R04

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	ABLIKIM	10C	BES2	$J/\psi \to \eta K^+\pi^-K^-\pi^+$

ϕ(2170) REFERENCES

NODE=M103

ABLIKIM 21A PL B813 136059 M. Ablikim *et al.* (BESIII Collab.) REFID=61028
ABLIKIM 21AP PR D104 092014 M. Ablikim *et al.* (BESIII Collab.) REFID=61448
ABLIKIM 21T PR D104 032007 M. Ablikim *et al.* (BESIII Collab.) REFID=61154
ABLIKIM 20M PR D102 012008 M. Ablikim *et al.* (BESIII Collab.) REFID=60337
ABLIKIM 20S PRL 124 112001 M. Ablikim *et al.* (BESIII Collab.) REFID=60542
ABLIKIM 19I PR D99 012014 M. Ablikim *et al.* (BESIII Collab.) REFID=59605
ABLIKIM 19L PR D99 032001 M. Ablikim *et al.* (BESIII Collab.) REFID=59612
ABLIKIM 15H PR D91 052017 M. Ablikim *et al.* (BESIII Collab.) REFID=56773
LEES 12F PR D86 012008 J.P. Lees *et al.* (BABAR Collab.) REFID=54298
ABLIKIM 10C PL B685 27 M. Ablikim *et al.* (BES II Collab.) REFID=53349
SHEN 09 PR D80 031101 C.P. Shen *et al.* (BELLE Collab.) REFID=53000
ABLIKIM 08F PRL 100 102003 M. Ablikim *et al.* (BES Collab.) REFID=52154
AUBERT 08S PR D77 092002 B. Aubert *et al.* (BABAR Collab.) REFID=52242
AUBERT 07AK PR D76 012008 B. Aubert *et al.* (BABAR Collab.) REFID=51908
AUBERT,BE 06D PR D74 091103 B. Aubert *et al.* (BABAR Collab.) REFID=51511

NODE=M112

f_0(2200) $I^G(J^{PC}) = 0^+(0^{++})$

OMITTED FROM SUMMARY TABLE

Seen in $K^0_S K^0_S$ (AUGUSTIN 88), K^+K^- (ABLIKIM 05Q) and $\eta\eta$ (BINON 05) system. Not seen in $\Upsilon(1S)$ radiative decays (BARU 89).

NODE=M112

f_0(2200) MASS

NODE=M112M

NODE=M112M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2187±14 OUR AVERAGE					
$2170\pm20^{+10}_{-15}$		ABLIKIM	05Q	BES2	$\psi(2S) \to \gamma\pi^+\pi^-K^+K^-$
2197±17		[1] AUGUSTIN	88	DM2	$J/\psi \to \gamma K^0_S K^0_S$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2200±25		SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma\,(\pi\pi, K\overline{K}, \eta\eta, \omega\phi)$
2206±12± 8	381	[2,3] DOBBS	15		$J/\psi \to \gamma K^+K^-$
2188±17±16	203	[2,3] DOBBS	15		$\psi(2S) \to \gamma K^+K^-$
2210±50		[4] BINON	05	GAMS	$33\ \pi^-p \to \eta\eta n$
~ 2122		HASAN	94	RVUE	$\overline{p}p \to \pi\pi$
~ 2321		HASAN	94	RVUE	$\overline{p}p \to \pi\pi$

OCCUR=2

OCCUR=2

[1] Cannot determine spin to be 0. NODE=M112M;LINKAGE=A
[2] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M112M;LINKAGE=B
[3] From a fit to a Breit-Wigner line shape with fixed Γ = 238 MeV. NODE=M112M;LINKAGE=C
[4] First solution, PWA is ambiguous. NODE=M112M;LINKAGE=BI

f_0(2200) WIDTH

NODE=M112W

NODE=M112W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
207±40 OUR AVERAGE				
$220\pm60^{+40}_{-45}$	ABLIKIM	05Q	BES2	$\psi(2S) \to \gamma\pi^+\pi^-K^+K^-$
201±51	[5] AUGUSTIN	88	DM2	$J/\psi \to \gamma K^0_S K^0_S$

• • • We do not use the following data for averages, fits, limits, etc. • • •

150±30	SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma (\pi\pi, K\overline{K}, \eta\eta, \omega\phi)$
380±90	[6] BINON	05	GAMS	$33\ \pi^- p \to \eta\eta n$
∼ 273	HASAN	94	RVUE	$\overline{p}p \to \pi\pi$
∼ 223	HASAN	94	RVUE	$\overline{p}p \to \pi\pi$

OCCUR=2

[5] Cannot determine spin to be 0.
[6] First solution, PWA is ambiguous.

NODE=M112W;LINKAGE=A
NODE=M112W;LINKAGE=BI

$f_0(2200)$ REFERENCES

NODE=M112

SARANTSEV	21	PL B816 136227	A.V. Sarantsev *et al.*	(BONN, PNPI)	REFID=61091
DOBBS	15	PR D91 052006	S. Dobbs *et al.*	(NWES)	REFID=56805
ABLIKIM	05Q	PR D72 092002	M. Ablikim *et al.*	(BES Collab.)	REFID=50958
BINON	05	PAN 68 960	F. Binon *et al.*		REFID=50780
		Translated from YAF 68 998.			
HASAN	94	PL B334 215	A. Hasan, D.V. Bugg	(LOQM)	REFID=44103
BARU	89	ZPHY C42 505	S.E. Baru *et al.*	(NOVO)	REFID=40917
AUGUSTIN	88	PRL 60 2238	J.E. Augustin *et al.*	(DM2 Collab.)	REFID=40574

NODE=M082

$f_J(2220)$

$I^G(J^{PC}) = 0^+(2^{++}$ or $4^{++})$

OMITTED FROM SUMMARY TABLE

Needs confirmation. See our mini-review in the 2004 edition of this *Review*, PDG 04.

NODE=M082

$f_J(2220)$ MASS

NODE=M082M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
2231.1± 3.5 OUR AVERAGE						NODE=M082M
2235 ± 4 ± 6	74	BAI	96B	BES	$e^+e^- \to J/\psi \to \gamma\pi^+\pi^-$	
2230 $^{+6}_{-7}$ ±16	46	BAI	96B	BES	$e^+e^- \to J/\psi \to \gamma K^+K^-$	OCCUR=2
2232 $^{+8}_{-7}$ ±15	23	BAI	96B	BES	$e^+e^- \to J/\psi \to \gamma K^0_S K^0_S$	OCCUR=3
2235 ± 4 ± 5	32	BAI	96B	BES	$e^+e^- \to J/\psi \to \gamma p\overline{p}$	OCCUR=4
2209 $^{+17}_{-15}$ ±10		ASTON	88F	LASS	$11\ K^- p \to K^+K^-\Lambda$	
2230 ±20		BOLONKIN	88	SPEC	$40\ \pi^- p \to K^0_S K^0_S n$	
2220 ±10	41	[1] ALDE	86B	GA24	$38–100\ \pi p \to n\eta\eta'$	
2230 ± 6 ±14	93	BALTRUSAIT...	86D	MRK3	$e^+e^- \to \gamma K^+K^-$	
2232 ± 7 ± 7	23	BALTRUSAIT...	86D	MRK3	$e^+e^- \to \gamma K^0_S K^0_S$	OCCUR=2
• • • We do not use the following data for averages, fits, limits, etc. • • •						
2223.9± 2.5		[2] VLADIMIRSK...	08	SPEC	$40\ \pi^- p \to K^0_S K^0_S n + m\pi^0$	
2246 ±36		BAI	98H	BES	$J/\psi \to \gamma\pi^0\pi^0$	

[1] ALDE 86B uses data from both the GAMS-2000 and GAMS-4000 detectors.
[2] $J^{PC} = 2^{++}$. Systematic uncertainties not evaluated

NODE=M082M;LINKAGE=A
NODE=M082M;LINKAGE=VL

$f_J(2220)$ WIDTH

NODE=M082W

VALUE (MeV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT	
23 $^{+8}_{-7}$ OUR AVERAGE							NODE=M082W
19 $^{+13}_{-11}$ ±12		74	BAI	96B	BES	$e^+e^- \to J/\psi \to \gamma\pi^+\pi^-$	
20 $^{+20}_{-15}$ ±17		46	BAI	96B	BES	$e^+e^- \to J/\psi \to \gamma K^+K^-$	OCCUR=2
20 $^{+25}_{-16}$ ±14		23	BAI	96B	BES	$e^+e^- \to J/\psi \to \gamma K^0_S K^0_S$	OCCUR=3
15 $^{+12}_{-9}$ ± 9		32	BAI	96B	BES	$e^+e^- \to J/\psi \to \gamma p\overline{p}$	OCCUR=4
60 $^{+107}_{-57}$			ASTON	88F	LASS	$11\ K^- p \to K^+K^-\Lambda$	
80± 30			BOLONKIN	88	SPEC	$40\ \pi^- p \to K^0_S K^0_S n$	
26 $^{+20}_{-16}$ ±17		93	BALTRUSAIT...	86D	MRK3	$e^+e^- \to \gamma K^+K^-$	

$18^{+23}_{-15}\pm 10$	23		BALTRUSAIT...	86D	MRK3	$e^+e^- \rightarrow \gamma K^0_S K^0_S$

OCCUR=2

• • • We do not use the following data for averages, fits, limits, etc. • • •

8.6 ± 2.5		[1]	VLADIMIRSK...	08	SPEC	$40\ \pi^- p \rightarrow K^0_S K^0_S n + m\pi^0$
<80	90		ALDE	87C	GAM2	$38\ \pi^- p \rightarrow \eta' \eta n$

[1] $J^{PC} = 2^{++}$. Systematic uncertainties not evaluated

NODE=M082W;LINKAGE=VL

$f_J(2220)$ DECAY MODES

NODE=M082215;NODE=M082

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\pi\pi$	not seen	DESIG=5
Γ_2	$\pi^+\pi^-$	not seen	DESIG=6;OUR EST;→ UNCHECKED ←
Γ_3	$K\overline{K}$	not seen	DESIG=1
Γ_4	$p\overline{p}$	not seen	DESIG=4;OUR EST;→ UNCHECKED ←
Γ_5	$\gamma\gamma$	not seen	DESIG=2;OUR EST;→ UNCHECKED ←
Γ_6	$\eta\eta'(958)$	seen	DESIG=3;OUR EST;→ UNCHECKED ←
Γ_7	$\phi\phi$	not seen	DESIG=7;OUR EST;→ UNCHECKED ←
Γ_8	$\eta\eta$	not seen	DESIG=8;OUR EST;→ UNCHECKED ←

$f_J(2220)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M082220

$\Gamma(K\overline{K}) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_3\Gamma_5/\Gamma$

NODE=M082G1
NODE=M082G1

VALUE (eV)	CL%		DOCUMENT ID		TECN	COMMENT
$<\ 1.4$	95	[1]	ACCIARRI	01H	L3	$\gamma\gamma \rightarrow K^0_S K^0_S$, E^{ee}_{cm}= 91, 183–209 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$<\ 5.6$	95	[1]	GODANG	97	CLE2	$\gamma\gamma \rightarrow K^0_S K^0_S$
$<\ 86$	95	[1]	ALBRECHT	90G	ARG	$\gamma\gamma \rightarrow K^+K^-$
<1000	95	[2]	ALTHOFF	85B	TASS	$\gamma\gamma$, $K\overline{K}\pi$

$\Gamma(\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_1\Gamma_5/\Gamma$

NODE=M082G3
NODE=M082G3

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<2.5	95	ALAM	98C	CLE2	$\gamma\gamma \rightarrow \pi^+\pi^-$

[1] Assuming $J^P = 2^+$.
[2] True for $J^P = 0^+$ and $J^P = 2^+$.

NODE=M082G1;LINKAGE=D
NODE=M082G1;LINKAGE=C

$f_J(2220)$ $\Gamma(i)\Gamma(p\overline{p})/\Gamma^2(\text{total})$

NODE=M082223

$\Gamma(p\overline{p})/\Gamma_{total} \times \Gamma(\pi\pi)/\Gamma_{total}$ — $\Gamma_4/\Gamma \times \Gamma_1/\Gamma$

NODE=M082GG1
NODE=M082GG1

VALUE (units 10^{-5})	CL%		DOCUMENT ID		TECN	COMMENT
<18	95	[1]	AMSLER	01	CBAR	1.4–1.5 $p\overline{p} \rightarrow \pi^0\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<(11–42)	99	[2]	HASAN	96	SPEC	1.35–1.55 $p\overline{p} \rightarrow \pi^+\pi^-$

$\Gamma(p\overline{p})/\Gamma_{total} \times \Gamma(\phi\phi)/\Gamma_{total}$ — $\Gamma_4/\Gamma \times \Gamma_7/\Gamma$

NODE=M082GG2
NODE=M082GG2

VALUE (units 10^{-5})	CL%		DOCUMENT ID		TECN	COMMENT
<6	95	[3]	EVANGELIS...	98	SPEC	1.1-2.0 $p\overline{p} \rightarrow \phi\phi$

$\Gamma(p\overline{p})/\Gamma_{total} \times \Gamma(\eta\eta)/\Gamma_{total}$ — $\Gamma_4/\Gamma \times \Gamma_8/\Gamma$

NODE=M082GG3
NODE=M082GG3

VALUE (units 10^{-5})	CL%		DOCUMENT ID		TECN	COMMENT
<4	95	[1]	AMSLER	01	CBAR	1.4–1.5 $p\overline{p} \rightarrow \eta\eta$

[1] For $J^P = 2^+$ in the mass range 2222–2240 MeV and the total width between 10 and 20 MeV.
NODE=M082GG;LINKAGE=A

[2] For $J^P = 2^+$ and $J^P = 4^+$ in the mass range 2220–2245 MeV and the total width of 15 MeV.
NODE=M082GG;LINKAGE=B

[3] For $J^P = 2^+$, the mass of 2235 MeV and the total width of 15 MeV.
NODE=M082GG;LINKAGE=C

$f_J(2220)$ BRANCHING RATIOS

NODE=M082225

$\Gamma(\pi\pi)/\Gamma_{total}$ — Γ_1/Γ

NODE=M082R00

VALUE	DOCUMENT ID		COMMENT
not seen	[1] DOBBS	15	$J/\psi \to \gamma\pi\pi$
not seen	[1] DOBBS	15	$\psi(2S) \to \gamma\pi\pi$

OCCUR=2

[1] Using CLEO-c data but not authored by the CLEO Collaboration.

NODE=M082R00;LINKAGE=A

$\Gamma(K\overline{K})/\Gamma_{total}$ — Γ_3/Γ

NODE=M082R01

VALUE	DOCUMENT ID		COMMENT
not seen	[1] DOBBS	15	$J/\psi \to \gamma K\overline{K}$
not seen	[1] DOBBS	15	$\psi(2S) \to \gamma K\overline{K}$

OCCUR=2

[1] Using CLEO-c data but not authored by the CLEO Collaboration.

NODE=M082R01;LINKAGE=A

$\Gamma(\pi\pi)/\Gamma(K\overline{K})$ — Γ_1/Γ_3

NODE=M082R2

VALUE	DOCUMENT ID		TECN	COMMENT
1.0±0.5	BAI	96B	BES	$e^+e^- \to J/\psi \to \gamma 2\pi, K\overline{K}$

$\Gamma(p\overline{p})/\Gamma_{total}$ — Γ_4/Γ

NODE=M082R1

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
not seen		[1] AUBERT	07AV	BABR	$B \to p\overline{p}K^{(*)}$
not seen		WANG	05A	BELL	$B^+ \to \overline{p}pK^+$
<3.0	95	[2] EVANGELIS...	97	SPEC	1.96-2.40 $\overline{p}p \to K^0_S K^0_S$
<1.1	99.7	[3] BARNES	93	SPEC	1.3-1.57 $\overline{p}p \to K^0_S K^0_S$
<2.6	99.7	[3] BARDIN	87	CNTR	1.3-1.5 $\overline{p}p \to K^+K^-$
<3.6	99.7	[3] SCULLI	87	CNTR	1.29-1.55 $\overline{p}p \to K^+K^-$

[1] Assuming $\Gamma < 30$ MeV.

NODE=M082R1;LINKAGE=AU

[2] Assuming $\Gamma \sim 20$ MeV, $J^P = 2^+$ and B($f_J(2220) \to K\overline{K}$) = 100%.

NODE=M082R1;LINKAGE=C

[3] Assuming Γ = 30-35 MeV, $J^P = 2^+$ and B($f_J(2220) \to K\overline{K}$) = 100%.

NODE=M082R1;LINKAGE=B

$\Gamma(p\overline{p})/\Gamma(K\overline{K})$ — Γ_4/Γ_3

NODE=M082R3

VALUE	DOCUMENT ID		TECN	COMMENT
0.17±0.09	BAI	96B	BES	$e^+e^- \to J/\psi \to \gamma p\overline{p}, K\overline{K}$

$f_J(2220)$ REFERENCES

NODE=M082

DOBBS	15	PR D91 052006	S. Dobbs *et al.*	(NWES)	REFID=56805
VLADIMIRSK...	08	PAN 71 2129	V.V. Vladimirsky *et al.*	(ITEP)	REFID=52681
		Translated from YAF 71 2166.			
AUBERT	07AV	PR D76 092004	B. Aubert *et al.*	(BABAR Collab.)	REFID=51990
WANG	05A	PL B617 141	M.-Z. Wang *et al.*	(BELLE Collab.)	REFID=50651
PDG	04	PL B592 1	S. Eidelman *et al.*	(PDG Collab.)	REFID=49653
ACCIARRI	01H	PL B501 173	M. Acciarri *et al.*	(L3 Collab.)	REFID=48321
AMSLER	01	PL B520 175	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=48558
ALAM	98C	PRL 81 3328	M.S. Alam *et al.*	(CLEO Collab.)	REFID=46326
BAI	98H	PRL 81 1179	J.Z. Bai *et al.*	(BES Collab.)	REFID=46342
EVANGELIS...	98	PR D57 5370	C. Evangelista *et al.*	(JETSET Collab.)	REFID=46365
EVANGELIS...	97	PR D56 3803	C. Evangelista *et al.*	(LEAR Collab.)	REFID=45687
GODANG	97	PRL 79 3829	R. Godang *et al.*	(CLEO Collab.)	REFID=45760
BAI	96B	PRL 76 3502	J.Z. Bai *et al.*	(BES Collab.)	REFID=44736
HASAN	96	PL B388 376	A. Hasan, D.V. Bugg	(BRUN, LOQM)	REFID=45197
BARNES	93	PL B309 469	P.D. Barnes *et al.*	(PS185 Collab.)	REFID=43601
ALBRECHT	90G	ZPHY C48 183	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=41374
ASTON	88F	PL B215 199	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS) JP	REFID=40585
BOLONKIN	88	NP B309 426	B.V. Bolonkin *et al.*	(ITEP, SERP)	REFID=40580
ALDE	87C	SJNP 45 255	D. Alde *et al.*		REFID=47474
		Translated from YAF 45 405.			
BARDIN	87	PL B195 292	G. Bardin *et al.*	(SACL, FERR, CERN, PADO+)	REFID=40235
SCULLI	87	PRL 58 1715	J. Sculli *et al.*	(NYU, BNL)	REFID=40023
ALDE	86B	PL B177 120	D.M. Alde *et al.*	(SERP, BELG, LANL, LAPP)	REFID=21864
BALTRUSAIT...	86D	PRL 56 107	R.M. Baltrusaitis	(CIT, UCSC, ILL, SLAC+)	REFID=21865
ALTHOFF	85B	ZPHY C29 189	M. Althoff *et al.*	(TASSO Collab.)	REFID=21349

OTHER RELATED PAPERS

DEL-AMO-SA...	10O	PRL 105 172001	P. del Amo Sanchez *et al.*	(BABAR Collab.)	REFID=53533

NODE=M115

$\eta(2225)$

$I^G(J^{PC}) = 0^+(0^{-+})$

OMITTED FROM SUMMARY TABLE

Seen in $J/\psi \to \gamma\phi\phi$. Possibly seen in $B \to \phi\phi K$ by LEES 11A.

NODE=M115

$\eta(2225)$ MASS

NODE=M115M

NODE=M115M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2221^{+13}_{-10} OUR AVERAGE					
2216^{+4+21}_{-5-11}		[1] ABLIKIM	16N	BES3	$J/\psi \to \gamma K^+K^-K^+K^-$
2240^{+30+30}_{-20-20}	196 ± 19	ABLIKIM	08I	BES	$J/\psi \to \gamma K^+K^-K^0_S K^0_L$
$2230 \pm 25 \pm 15$		BAI	90B	MRK3	$J/\psi \to \gamma K^+K^-K^+K^-$
$2214 \pm 20 \pm 13$		BAI	90B	MRK3	$J/\psi \to \gamma K^+K^-K^0_S K^0_L$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
~ 2220		BISELLO	86B	DM2	$J/\psi \to \gamma K^+K^-K^+K^-$

OCCUR=2

[1] From a partial wave analysis of $J/\psi \to \gamma\phi\phi$ that also finds significant signals for for $\eta(2100)$, 0^{-+} phase space, $f_0(2100)$, $f_2(2010)$, $f_2(2300)$, $f_2(2340)$, and a previously unseen 0^{-+} state $X(2500)$ (M $= 2470^{+15+101}_{-19-23}$ MeV, $\Gamma = 230^{+64+56}_{-35-33}$ MeV).

NODE=M115M;LINKAGE=B

$\eta(2225)$ WIDTH

NODE=M115W

NODE=M115W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
185^{+40}_{-20} OUR AVERAGE					
185^{+12+43}_{-14-17}		[1] ABLIKIM	16N	BES3	$J/\psi \to \gamma K^+K^-K^+K^-$
$190 \pm 30^{+60}_{-40}$	196 ± 19	ABLIKIM	08I	BES	$J/\psi \to \gamma K^+K^-K^0_S K^0_L$
$150^{+300}_{-60} \pm 60$		BAI	90B	MRK3	$J/\psi \to \gamma K^+K^-K^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
~ 80		BISELLO	86B	DM2	$J/\psi \to \gamma K^+K^-K^+K^-$

[1] From a partial wave analysis of $J/\psi \to \gamma\phi\phi$ that also finds significant signals for for $\eta(2100)$, 0^{-+} phase space, $f_0(2100)$, $f_2(2010)$, $f_2(2300)$, $f_2(2340)$, and a previously unseen 0^{-+} state $X(2500)$ (M $= 2470^{+15+101}_{-19-23}$ MeV, $\Gamma = 230^{+64+56}_{-35-33}$ MeV).

NODE=M115W;LINKAGE=A

$\eta(2225)$ REFERENCES

NODE=M115

ABLIKIM	16N	PR D93 112011	M. Ablikim	(BESIII Collab.)	REFID=57512
LEES	11A	PR D84 012001	J.P. Lees *et al.*	(BABAR Collab.)	REFID=16595
ABLIKIM	08I	PL B662 330	M. Ablikim *et al.*	(BES Collab.)	REFID=52255
BAI	90B	PRL 65 1309	Z. Bai *et al.*	(Mark III Collab.)	REFID=41354
BISELLO	86B	PL B179 294	D. Bisello *et al.*	(DM2 Collab.)	REFID=22101

NODE=M044

$\rho_3(2250)$ $I^G(J^{PC}) = 1^+(3^{--})$

OMITTED FROM SUMMARY TABLE

Contains results mostly from formation experiments. For further production experiments see the Further States entry. See also $\rho(2150)$, $f_2(2150)$, $f_4(2300)$, $\rho_5(2350)$.

NODE=M044

$\rho_3(2250)$ MASS

NODE=M044205

$\overline{p}p \to \pi\pi$ or $K\overline{K}$

NODE=M044M1

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$2248\pm17^{+59}_{-5}$	1.8k	[1] ABLIKIM	20F	BES3		$\psi(2S) \to K^+K^-\eta$
~ 2232		HASAN	94	RVUE		$\overline{p}p \to \pi\pi$
~ 2090		[2] OAKDEN	94	RVUE		0.36–1.55 $\overline{p}p \to \pi\pi$
~ 2250		[3] MARTIN	80B	RVUE		
~ 2300		[3] MARTIN	80C	RVUE		
~ 2140		[4] CARTER	78B	CNTR	0	0.7–2.4 $\overline{p}p \to K^-K^+$
~ 2150		[5] CARTER	77	CNTR	0	0.7–2.4 $\overline{p}p \to \pi\pi$

[1] Seen in $\psi(2S)$ decay with branching ratio $\psi(2S) \to X\eta \to K^+K^-\eta = (1.9 \pm 0.4^{+0.5}_{-1.3}) \times 10^{-6}$. NODE=M044M1;LINKAGE=A

[2] See however KLOET 96 who fit $\pi^+\pi^-$ only and find waves only up to $J = 3$ to be important but not significantly resonant. NODE=M044M1;LINKAGE=CC

[3] $I(J^P) = 1(3^-)$ from simultaneous analysis of $p\overline{p} \to \pi^-\pi^+$ and $\pi^0\pi^0$. NODE=M044M1;LINKAGE=P

[4] $I = 0, 1$. $J^P = 3^-$ from Barrelet-zero analysis. NODE=M044M1;LINKAGE=K

[5] $I(J^P) = 1(3^-)$ from amplitude analysis. NODE=M044M1;LINKAGE=J

S-CHANNEL $\overline{N}N$

NODE=M044M2

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2260 ± 20	[6] ANISOVICH	02	SPEC		0.6–1.9 $p\overline{p} \to \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$
~ 2190	[7] CUTTS	78B	CNTR		0.97–3 $\overline{p}p \to \overline{N}N$
2155 ± 15	[7,8] COUPLAND	77	CNTR	0	0.7–2.4 $\overline{p}p \to \overline{p}p$
2193 ± 2	[7,9] ALSPECTOR	73	CNTR		$\overline{p}p$ S channel
2190 ± 10	[10] ABRAMS	70	CNTR		S channel $\overline{p}N$

[6] From the combined analysis of ANISOVICH 00J, ANISOVICH 01D, ANISOVICH 01E, and ANISOVICH 02. NODE=M044M;LINKAGE=AY

[7] Isospins 0 and 1 not separated. NODE=M044M2;LINKAGE=I

[8] From a fit to the total elastic cross section. NODE=M044M2;LINKAGE=E

[9] Referred to as T or T region by ALSPECTOR 73. NODE=M044M2;LINKAGE=M

[10] Seen as bump in $I = 1$ state. See also COOPER 68. PEASLEE 75 confirm $\overline{p}p$ results of ABRAMS 70, no narrow structure. NODE=M044M2;LINKAGE=B

Other processes

NODE=M044M3

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$2290\pm20\pm30$	AMELIN	00	VES	37 $\pi^-p \to \eta\pi^+\pi^-n$

$\rho_3(2250)$ WIDTH

NODE=M044210

$\overline{p}p \to \pi\pi$ or $K\overline{K}$

NODE=M044W1

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$185^{+31}_{-26}{}^{+17}_{-103}$	1.8k	[11] ABLIKIM	20F	BES3		$\psi(2S) \to K^+K^-\eta$
~ 220		HASAN	94	RVUE		$\overline{p}p \to \pi\pi$
~ 60		[12] OAKDEN	94	RVUE		0.36–1.55 $\overline{p}p \to \pi\pi$
~ 250		[13] MARTIN	80B	RVUE		
~ 200		[13] MARTIN	80C	RVUE		
~ 150		[14] CARTER	78B	CNTR	0	0.7–2.4 $\overline{p}p \to K^-K^+$
~ 200		[15] CARTER	77	CNTR	0	0.7–2.4 $\overline{p}p \to \pi\pi$

[11] Seen in $\psi(2S)$ decay with branching ratio $\psi(2S) \rightarrow X\eta \rightarrow K^+K^-\eta = (1.9 \pm 0.4^{+0.5}_{-1.3}) \times 10^{-6}$. NODE=M044W1;LINKAGE=A

[12] See however KLOET 96 who fit $\pi^+\pi^-$ only and find waves only up to $J = 3$ to be important but not significantly resonant. NODE=M044W1;LINKAGE=CC

[13] $I(J^P) = 1(3^-)$ from simultaneous analysis of $p\overline{p} \rightarrow \pi^-\pi^+$ and $\pi^0\pi^0$. NODE=M044W1;LINKAGE=P

[14] $I = 0, 1$. $J^P = 3^-$ from Barrelet-zero analysis. NODE=M044W1;LINKAGE=K

[15] $I(J^P) = 1(3^-)$ from amplitude analysis. NODE=M044W1;LINKAGE=J

S-CHANNEL $\overline{N}N$

NODE=M044W2
NODE=M044W2

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
160±25	[16] ANISOVICH	02	SPEC		0.6–1.9 $p\overline{p} \rightarrow \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$
135±75	[17,18] COUPLAND	77	CNTR	0	0.7–2.4 $\overline{p}p \rightarrow \overline{p}p$
98± 8	[18] ALSPECTOR	73	CNTR		$\overline{p}p$ S channel
~ 85	[19] ABRAMS	70	CNTR		S channel $\overline{p}N$

[16] From the combined analysis of ANISOVICH 00J, ANISOVICH 01D, ANISOVICH 01E, and ANISOVICH 02. NODE=M044W;LINKAGE=AY

[17] From a fit to the total elastic cross section. NODE=M044W2;LINKAGE=E

[18] Isospins 0 and 1 not separated. NODE=M044W2;LINKAGE=I

[19] Seen as bump in $I = 1$ state. See also COOPER 68. PEASLEE 75 confirm $\overline{p}p$ results of ABRAMS 70, no narrow structure. NODE=M044W2;LINKAGE=B

Other processes

NODE=M044W3
NODE=M044W3

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
230±50±80	AMELIN	00	VES	37 $\pi^- p \rightarrow \eta\pi^+\pi^- n$

$\rho_3(2250)$ REFERENCES

NODE=M044

ABLIKIM	20F	PR D101 032008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60256
ANISOVICH	02	PL B542 8	A.V. Anisovich *et al.*		REFID=48828
ANISOVICH	01D	PL B508 6	A.V. Anisovich *et al.*		REFID=48327
ANISOVICH	01E	PL B513 281	A.V. Anisovich *et al.*		REFID=48349
AMELIN	00	NP A668 83	D. Amelin *et al.*	(VES Collab.)	REFID=47432
ANISOVICH	00J	PL B491 47	A.V. Anisovich *et al.*	(RAL, LOQM, PNPI+)	REFID=47950
KLOET	96	PR D53 6120	W.M. Kloet, F. Myhrer	(RUTG, NORD)	REFID=45212
HASAN	94	PL B334 215	A. Hasan, D.V. Bugg	(LOQM)	REFID=44103
OAKDEN	94	NP A574 731	M.N. Oakden, M.R. Pennington	(DURH)	REFID=45210
MARTIN	80B	NP B176 355	B.R. Martin, D. Morgan	(LOUC, RHEL) JP	REFID=21838
MARTIN	80C	NP B169 216	A.D. Martin, M.R. Pennington	(DURH) JP	REFID=21837
CARTER	78B	NP B141 467	A.A. Carter	(LOQM)	REFID=21964
CUTTS	78B	PR D17 16	D. Cutts *et al.*	(STON, WISC)	REFID=21733
CARTER	77	PL 67B 117	A.A. Carter *et al.*	(LOQM, RHEL) JP	REFID=21963
COUPLAND	77	PL 71B 460	M. Coupland *et al.*	(LOQM, RHEL)	REFID=21830
PEASLEE	75	PL 57B 189	D.C. Peaslee *et al.*	(CANB, BARI, BROW+)	REFID=21824
ALSPECTOR	73	PRL 30 511	J. Alspector *et al.*	(RUTG, UPNJ)	REFID=21813
ABRAMS	70	PR D1 1917	R.J. Abrams *et al.*	(BNL)	REFID=21807
COOPER	68	PRL 20 1059	W.A. Cooper *et al.*	(ANL)	REFID=21805

NODE=M107

$f_2(2300)$

$I^G(J^{PC}) = 0^+(2^{++})$

$f_2(2300)$ MASS

NODE=M107M

NODE=M107M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
2297±28	[1] ETKIN	88	MPS	$22\ \pi^- p \to \phi\phi n$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$2262 \pm 4 \pm 28$	[2] ABLIKIM	21AI	BES3	3.51–4.60 $e^+e^- \to \phi\Lambda\overline{\Lambda}$
$2243^{+7}_{-6}{}^{+3}_{-29}$	[3] UEHARA	13	BELL	$\gamma\gamma \to K^0_S K^0_S$
2270 ± 12	VLADIMIRSK...	06	SPEC	$40\ \pi^- p \to K^0_S K^0_S n$
$2327 \pm 9 \pm 6$	ABE	04	BELL	$10.6\ e^+e^- \to e^+e^- K^+K^-$
2231 ± 10	BOOTH	86	OMEG	$85\ \pi^-$ Be $\to 2\phi$Be
2220^{+90}_{-20}	LINDENBAUM	84	RVUE	
2320 ± 40	ETKIN	82	MPS	$22\ \pi^- p \to 2\phi n$

[1] Includes data of ETKIN 85. The percentage of the resonance going into $\phi\phi$ 2^{++} S_2, D_2, and D_0 is 6^{+15}_{-5}, 25^{+18}_{-14}, and 69^{+16}_{-27}, respectively.

NODE=M107M;LINKAGE=C

[2] Threshold enhancement in $\Lambda\overline{\Lambda}$, preferred J^{PC} are 2^{++}, 2^{-+}, or 1^{++}. Could be another state.

NODE=M107M;LINKAGE=B

[3] Spin 2 preferred, tentatively assigned to $f_2(2300)$.

NODE=M107M;LINKAGE=A

$f_2(2300)$ WIDTH

NODE=M107W

NODE=M107W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
149±41	[1] ETKIN	88	MPS	$22\ \pi^- p \to \phi\phi n$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$72 \pm 5 \pm 43$	[2] ABLIKIM	21AI	BES3	3.51–4.60 $e^+e^- \to \phi\Lambda\overline{\Lambda}$
$145 \pm 12^{+27}_{-34}$	[3] UEHARA	13	BELL	$\gamma\gamma \to K^0_S K^0_S$
90 ± 29	VLADIMIRSK...	06	SPEC	$40\ \pi^- p \to K^0_S K^0_S n$
$275 \pm 36 \pm 20$	ABE	04	BELL	$10.6\ e^+e^- \to e^+e^- K^+K^-$
133 ± 50	BOOTH	86	OMEG	$85\ \pi^-$ Be $\to 2\phi$Be
200 ± 50	LINDENBAUM	84	RVUE	
220 ± 70	ETKIN	82	MPS	$22\ \pi^- p \to 2\phi n$

[1] Includes data of ETKIN 85.

NODE=M107W;LINKAGE=C

[2] Threshold enhancement in $\Lambda\overline{\Lambda}$, preferred J^{PC} are 2^{++}, 2^{-+}, or 1^{++}. Could be another state.

NODE=M107W;LINKAGE=B

[3] Spin 2 preferred, tentatively assigned to $f_2(2300)$.

NODE=M107W;LINKAGE=A

$f_2(2300)$ DECAY MODES

NODE=M107215;NODE=M107

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\phi\phi$	seen	DESIG=1
Γ_2	$K\overline{K}$	seen	DESIG=2
Γ_3	$\gamma\gamma$	seen	DESIG=3
Γ_4	$\Lambda\overline{\Lambda}$	seen	DESIG=4

$f_2(2300)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M107225

$\Gamma(K\overline{K}) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_2\Gamma_3/\Gamma$

NODE=M107G1

NODE=M107G1

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$3.2^{+0.5}_{-0.4}{}^{+1.3}_{-2.2}$	UEHARA	13	BELL	$\gamma\gamma \to K^0_S K^0_S$
$44 \pm 6 \pm 12$	[1] ABE	04	BELL	$10.6\ e^+e^- \to e^+e^- K^+K^-$

[1] Assuming spin 2.

NODE=M107G1;LINKAGE=AB

f_2(2340) BRANCHING RATIOS

NODE=M107220

$\Gamma(\phi\phi)/\Gamma_{total}$ Γ_1/Γ

NODE=M107R01

VALUE	DOCUMENT ID		TECN	COMMENT
seen	BOOTH	86	OMEG	85 $\pi^- \text{Be} \rightarrow 2\phi \text{Be}$
seen	ETKIN	82	MPS	22 $\pi^- p \rightarrow 2\phi n$

$\Gamma(K\overline{K})/\Gamma_{total}$ Γ_2/Γ

NODE=M107R02

VALUE	DOCUMENT ID		TECN	COMMENT
seen	VLADIMIRSK...	06	SPEC	40 $\pi^- p \rightarrow K^0_S K^0_S n$
seen	ABE	04	BELL	10.6 $e^+ e^- \rightarrow e^+ e^- K^+ K^-$

$\Gamma(\gamma\gamma)/\Gamma_{total}$ Γ_3/Γ

NODE=M107R03

VALUE	DOCUMENT ID		TECN	COMMENT
seen	UEHARA	13	BELL	$\gamma\gamma \rightarrow K^0_S K^0_S$

$\Gamma(\Lambda\overline{\Lambda})/\Gamma_{total}$ Γ_4/Γ

NODE=M107R00

VALUE	DOCUMENT ID		TECN	COMMENT
seen	[1] ABLIKIM	21AI	BES3	3.51–4.60 $e^+ e^- \rightarrow \phi \Lambda \overline{\Lambda}$

[1] Threshold enhancement in $\Lambda\overline{\Lambda}$, preferred J^{PC} are 2^{++}, 2^{-+}, or 1^{++}. Could be another state.

NODE=M107R00;LINKAGE=A

f_2(2300) REFERENCES

NODE=M107

ABLIKIM	21AI	PR D104 052006	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61440
UEHARA	13	PTEP 2013 123C01	S. Uehara *et al.*	(BELLE Collab.)	REFID=55592
VLADIMIRSK...	06	PAN 69 493	V.V. Vladimirsky *et al.*	(ITEP, Moscow)	REFID=51191
		Translated from YAF 69 515.			
ABE	04	EPJ C32 323	K. Abe *et al.*	(BELLE Collab.)	REFID=49650
ETKIN	88	PL B201 568	A. Etkin *et al.*	(BNL, CUNY)	REFID=40285
BOOTH	86	NP B273 677	P.S.L. Booth *et al.*	(LIVP, GLAS, CERN)	REFID=21870
ETKIN	85	PL 165B 217	A. Etkin *et al.*	(BNL, CUNY)	REFID=21871
LINDENBAUM	84	CNPP 13 285	S.J. Lindenbaum	(CUNY)	REFID=21869
ETKIN	82	PRL 49 1620	A. Etkin *et al.*	(BNL, CUNY)	REFID=21866

NODE=M041

f_4(2300)

$I^G(J^{PC}) = 0^+(4^{++})$

OMITTED FROM SUMMARY TABLE

This entry was previously called U_0(2350). Contains results mostly from formation experiments. For further production experiments see the Further States entry. See also ρ(2150), f_2(2150), ρ_3(2250), ρ_5(2350).

NODE=M041

f_4(2300) MASS

NODE=M041205

NODE=M041M

$\overline{p}p \rightarrow \pi\pi$ or $\overline{K}K$

NODE=M041M1

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
~ 2314	HASAN	94	RVUE	$\overline{p}p \rightarrow \pi\pi$
~ 2300	[1] MARTIN	80B	RVUE	
~ 2300	[1] MARTIN	80C	RVUE	
~ 2340	[2] CARTER	78B	CNTR	0.7–2.4 $\overline{p}p \rightarrow K^- K^+$
~ 2330	DULUDE	78B	OSPK	1–2 $\overline{p}p \rightarrow \pi^0\pi^0$
~ 2310	[3] CARTER	77	CNTR	0.7–2.4 $\overline{p}p \rightarrow \pi\pi$

[1] $I(J^P) = 0(4^+)$ from simultaneous analysis of $p\overline{p} \rightarrow \pi^-\pi^+$ and $\pi^0\pi^0$.
[2] $I(J^P) = 0(4^+)$ from Barrelet-zero analysis.
[3] $I(J^P) = 0(4^+)$ from amplitude analysis.

NODE=M041M1;LINKAGE=P
NODE=M041M1;LINKAGE=K
NODE=M041M1;LINKAGE=J

S-CHANNEL $\overline{p}p$ or $\overline{N}N$

NODE=M041M2

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2283±17	[4] ANISOVICH	00J	SPEC	
~ 2380	[5] CUTTS	78B	CNTR	0.97–3 $\overline{p}p \rightarrow \overline{N}N$
2345±15	[5,6] COUPLAND	77	CNTR	0.7–2.4 $\overline{p}p \rightarrow \overline{p}p$
2359± 2	[5,7] ALSPECTOR	73	CNTR	$\overline{p}p$ S channel
2375±10	ABRAMS	70	CNTR	S channel $\overline{N}N$

[4] From the combined analysis of ANISOVICH 99C and ANISOVICH 99F on $\overline{p}p \rightarrow \eta\pi^0\pi^0$, $\pi^0\pi^0$, $\eta\eta$, $\eta\eta'$, $\pi^+\pi^-$.
NODE=M041M2;LINKAGE=AN

[5] Isospins 0 and 1 not separated.
NODE=M041M2;LINKAGE=I

[6] From a fit to the total elastic cross section.
NODE=M041M2;LINKAGE=E

[7] Referred to as U or U region by ALSPECTOR 73.
NODE=M041M2;LINKAGE=M

$\pi^- p \rightarrow \eta\pi\pi n$

NODE=M041M3

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2330±20±40	AMELIN	00	VES	37 $\pi^- p \rightarrow \eta\pi^+\pi^- n$

pp CENTRAL PRODUCTION

NODE=M041M4

VALUE (MeV)	DOCUMENT ID		COMMENT
2320±60 OUR ESTIMATE			
• • • We do not use the following data for averages, fits, limits, etc. • • •			
2332±15	BARBERIS	00F	450 $pp \rightarrow p_f \omega\omega p_s$

→ UNCHECKED ←

$f_4(2300)$ WIDTH

NODE=M041210

$\overline{p}p \rightarrow \pi\pi$ or $\overline{K}K$

NODE=M041W1

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
~ 278	HASAN	94	RVUE	$\overline{p}p \rightarrow \pi\pi$
~ 200	[8] MARTIN	80C	RVUE	
~ 150	[9] CARTER	78B	CNTR	0.7–2.4 $\overline{p}p \rightarrow K^- K^+$
~ 210	[10] CARTER	77	CNTR	0.7–2.4 $\overline{p}p \rightarrow \pi\pi$

[8] $I(J^P) = 0(4^+)$ from simultaneous analysis of $p\overline{p} \rightarrow \pi^-\pi^+$ and $\pi^0\pi^0$.
NODE=M041W1;LINKAGE=P

[9] $I(J^P) = 0(4^+)$ from Barrelet-zero analysis.
NODE=M041W1;LINKAGE=K

[10] $I(J^P) = 0(4^+)$ from amplitude analysis.
NODE=M041W1;LINKAGE=J

S-CHANNEL $\overline{p}p$ or $\overline{N}N$

NODE=M041W2

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
310± 25	[11] ANISOVICH	00J	SPEC	
135^{+150}_{-65}	[12,13] COUPLAND	77	CNTR	0.7–2.4 $\overline{p}p \rightarrow \overline{p}p$
165^{+18}_{-8}	[13] ALSPECTOR	73	CNTR	$\overline{p}p$ S channel
~ 190	ABRAMS	70	CNTR	S channel $\overline{N}N$

[11] From the combined analysis of ANISOVICH 99C and ANISOVICH 99F on $\overline{p}p \rightarrow \eta\pi^0\pi^0$, $\pi^0\pi^0$, $\eta\eta$, $\eta\eta'$, $\pi^+\pi^-$.
NODE=M041W2;LINKAGE=AN

[12] From a fit to the total elastic cross section.
NODE=M041W2;LINKAGE=E

[13] Isospins 0 and 1 not separated.
NODE=M041W2;LINKAGE=I

$\pi^- p \rightarrow \eta\pi\pi n$

NODE=M041W3

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
235±50±40	AMELIN	00	VES	37 $\pi^- p \rightarrow \eta\pi^+\pi^- n$

pp CENTRAL PRODUCTION

NODE=M041W4

VALUE (MeV)	DOCUMENT ID		COMMENT
250±80 OUR ESTIMATE			
• • • We do not use the following data for averages, fits, limits, etc. • • •			
260±57	BARBERIS	00F	450 $pp \rightarrow p_f \omega\omega p_s$

→ UNCHECKED ←

$f_4(2300)$ DECAY MODES

NODE=M041215;NODE=M041

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\rho\rho$	seen	DESIG=1;OUR EST;→ UNCHECKED ←
Γ_2	$\omega\omega$	seen	DESIG=2;OUR EST;→ UNCHECKED ←
Γ_3	$\eta\pi\pi$	seen	DESIG=3;OUR EST;→ UNCHECKED ←
Γ_4	$\pi\pi$	seen	DESIG=4;OUR EST;→ UNCHECKED ←
Γ_5	$K\overline{K}$	seen	DESIG=5;OUR EST;→ UNCHECKED ←
Γ_6	$N\overline{N}$	seen	DESIG=6;OUR EST;→ UNCHECKED ←

$f_4(2300)$ BRANCHING RATIOS

NODE=M041220

$\Gamma(\rho\rho)/\Gamma(\omega\omega)$ Γ_1/Γ_2

NODE=M041R1
NODE=M041R1

VALUE	DOCUMENT ID		COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
2.8±0.5	BARBERIS	00F	450 $pp \to p_f \omega\omega p_s$

$f_4(2300)$ REFERENCES

NODE=M041

AMELIN	00	NP A668 83	D. Amelin *et al.*	(VES Collab.)	REFID=47432
ANISOVICH	00J	PL B491 47	A.V. Anisovich *et al.*	(RAL, LOQM, PNPI+)	REFID=47950
BARBERIS	00F	PL B484 198	D. Barberis *et al.*	(WA 102 Collab.)	REFID=47962
ANISOVICH	99C	PL B452 173	A.V. Anisovich *et al.*		REFID=46903
ANISOVICH	99F	NP A651 253	A.V. Anisovich *et al.*		REFID=46926
HASAN	94	PL B334 215	A. Hasan, D.V. Bugg	(LOQM)	REFID=44103
MARTIN	80B	NP B176 355	B.R. Martin, D. Morgan	(LOUC, RHEL) JP	REFID=21838
MARTIN	80C	NP B169 216	A.D. Martin, M.R. Pennington	(DURH) JP	REFID=21837
CARTER	78B	NP B141 467	A.A. Carter	(LOQM)	REFID=21964
CUTTS	78B	PR D17 16	D. Cutts *et al.*	(STON, WISC)	REFID=21733
DULUDE	78B	PL 79B 335	R.S. Dulude *et al.*	(BROW, MIT, BARI) JP	REFID=21850
CARTER	77	PL 67B 117	A.A. Carter *et al.*	(LOQM, RHEL) JP	REFID=21963
COUPLAND	77	PL 71B 460	M. Coupland *et al.*	(LOQM, RHEL)	REFID=21830
ALSPECTOR	73	PRL 30 511	J. Alspector *et al.*	(RUTG, UPNJ)	REFID=21813
ABRAMS	70	PR D1 1917	R.J. Abrams *et al.*	(BNL)	REFID=21807

NODE=M169

$f_0(2330)$

$I^G(J^{PC}) = 0^+(0^{++})$

OMITTED FROM SUMMARY TABLE

$f_0(2330)$ MASS

NODE=M169M

NODE=M169M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2419±64	[1] RODAS	22	RVUE	$J/\psi(1S) \to \gamma\,(\pi\pi,\ K\overline{K})$
2340±20	SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma\,(\pi\pi,\ K\overline{K},\ \eta\eta,\ \omega\phi)$
2314±25	[2] BUGG	04A	RVUE	
2337±14	ANISOVICH	00J	SPEC	2.0 $\overline{p}p \to \pi\pi, \eta\eta$
~ 2321	HASAN	94	RVUE	$\overline{p}p \to \pi\pi$

[1] T-matrix pole from coupled channel K-matrix fit to data on $J/\psi \to \gamma\pi^0\pi^0$ (ABLIKIM 15AE) and $J/\psi \to \gamma K^0_S K^0_S$ (ABLIKIM 18AA).

NODE=M169M;LINKAGE=A

[2] Partial wave analysis of the data on $p\overline{p} \to \overline{\Lambda}\Lambda$ from BARNES 00.

NODE=M169M;LINKAGE=BU

$f_0(2330)$ WIDTH

NODE=M169W

NODE=M169W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
274±94	[1] RODAS	22	RVUE	$J/\psi(1S) \to \gamma\,(\pi\pi,\ K\overline{K})$
165±25	SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma\,(\pi\pi,\ K\overline{K},\ \eta\eta,\ \omega\phi)$
144±20	[2] BUGG	04A	RVUE	
217±33	ANISOVICH	00J	SPEC	2.0 $\overline{p}p \to \pi\pi, \eta\eta$
~ 223	HASAN	94	RVUE	$\overline{p}p \to \pi\pi$

[1] T-matrix pole from coupled channel K-matrix fit to data on $J/\psi \to \gamma\pi^0\pi^0$ (ABLIKIM 15AE) and $J/\psi \to \gamma K^0_S K^0_S$ (ABLIKIM 18AA).

NODE=M169W;LINKAGE=A

[2] Partial wave analysis of the data on $p\overline{p} \to \overline{\Lambda}\Lambda$ from BARNES 00.

NODE=M169W;LINKAGE=BU

$f_0(2330)$ REFERENCES

NODE=M169

RODAS	22	EPJ C82 80	A. Rodas *et al.*	(JPAC Collab.)	REFID=61610
SARANTSEV	21	PL B816 136227	A.V. Sarantsev *et al.*	(BONN, PNPI)	REFID=61091
ABLIKIM	18AA	PR D98 072003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59455
ABLIKIM	15AE	PR D92 052003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56984
BUGG	04A	EPJ C36 161	D.V. Bugg		REFID=50158
ANISOVICH	00J	PL B491 47	A.V. Anisovich *et al.*	(RAL, LOQM, PNPI+)	REFID=47950
BARNES	00	PR C62 055203	P.D. Barnes *et al.*		REFID=47965
HASAN	94	PL B334 215	A. Hasan, D.V. Bugg	(LOQM)	REFID=44103

NODE=M108

$f_2(2340)$

$I^G(J^{PC}) = 0^+(2^{++})$

$f_2(2340)$ MASS

NODE=M108M

NODE=M108M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
2345^{+50}_{-40} OUR AVERAGE					
$2362^{+31}_{-30}{}^{+140}_{-63}$	5.5k	[1] ABLIKIM	13N	BES3	$e^+e^- \to J/\psi \to \gamma\eta\eta$
2339 ± 55		[2] ETKIN	88	MPS	$22\ \pi^- p \to \phi\phi n$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2350 ± 7	80k	[3] UMAN	06	E835	$5.2\ \overline{p}p \to \eta\eta\pi^0$
2392 ± 10		BOOTH	86	OMEG	$85\ \pi^-\text{Be} \to 2\phi\text{Be}$
2360 ± 20		LINDENBAUM	84	RVUE	

[1] From partial wave analysis including all possible combinations of 0^{++}, 2^{++}, and 4^{++} resonances. NODE=M108M;LINKAGE=A

[2] Includes data of ETKIN 85. The percentage of the resonance going into $\phi\phi$ 2^{++} S_2, D_2, and D_0 is 37 ± 19, 4^{+12}_{-4}, and 59^{+21}_{-19}, respectively. NODE=M108M;LINKAGE=C

[3] Statistical error only. NODE=M108M;LINKAGE=ST

$f_2(2340)$ WIDTH

NODE=M108W

NODE=M108W

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
322^{+70}_{-60} OUR AVERAGE					
$334^{+62}_{-54}{}^{+165}_{-100}$	5.5k	[1] ABLIKIM	13N	BES3	$e^+e^- \to J/\psi \to \gamma\eta\eta$
319^{+81}_{-69}		[2] ETKIN	88	MPS	$22\ \pi^- p \to \phi\phi n$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
218 ± 16	80k	[3] UMAN	06	E835	$5.2\ \overline{p}p \to \eta\eta\pi^0$
198 ± 50		BOOTH	86	OMEG	$85\ \pi^-\text{Be} \to 2\phi\text{Be}$
150^{+150}_{-50}		LINDENBAUM	84	RVUE	

[1] From partial wave analysis including all possible combinations of 0^{++}, 2^{++}, and 4^{++} resonances. NODE=M108W;LINKAGE=A

[2] Includes data of ETKIN 85. NODE=M108W;LINKAGE=C

[3] Statistical error only. NODE=M108W;LINKAGE=ST

$f_2(2340)$ DECAY MODES

NODE=M108215;NODE=M108

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\phi\phi$	seen	DESIG=1;OUR EST;→ UNCHECKED ←
Γ_2	$\eta\eta$	seen	DESIG=2

$f_2(2340)$ BRANCHING RATIOS

NODE=M108220

$\Gamma(\eta\eta)/\Gamma_{total}$ — Γ_2/Γ

NODE=M108R01

NODE=M108R01

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
seen	UMAN	06	E835	$5.2\ \overline{p}p \to \eta\eta\pi^0$

$f_2(2340)$ REFERENCES

NODE=M108

ABLIKIM	13N	PR D87 092009	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55387
UMAN	06	PR D73 052009	I. Uman *et al.*	(FNAL E835)	REFID=51063
ETKIN	88	PL B201 568	A. Etkin *et al.*	(BNL, CUNY)	REFID=40285
BOOTH	86	NP B273 677	P.S.L. Booth *et al.*	(LIVP, GLAS, CERN)	REFID=21870
ETKIN	85	PL 165B 217	A. Etkin *et al.*	(BNL, CUNY)	REFID=21871
LINDENBAUM	84	CNPP 13 285	S.J. Lindenbaum	(CUNY)	REFID=21869

NODE=M033

$\rho_5(2350)$

$I^G(J^{PC}) = 1^+(5^{--})$

OMITTED FROM SUMMARY TABLE

This entry was previously called $U_1(2400)$. See also $\rho(2150)$, $f_2(2150)$, $\rho_3(2250)$, $f_4(2300)$.

NODE=M033

$\rho_5(2350)$ MASS

NODE=M033205

NODE=M033M

$\pi^- p \to \omega\pi^0 n$

NODE=M033M3

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
2330±35	ALDE	95	GAM2	38 $\pi^- p \to \omega\pi^0 n$

$\overline{p}p \to \pi\pi$ or $\overline{K}K$

NODE=M033M1

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
~ 2303	HASAN	94	RVUE		$\overline{p}p \to \pi\pi$
~ 2300	[1] MARTIN	80B	RVUE		
~ 2250	[1] MARTIN	80C	RVUE		
~ 2500	[2] CARTER	78B	CNTR	0	0.7–2.4 $\overline{p}p \to K^- K^+$
~ 2480	[3] CARTER	77	CNTR	0	0.7–2.4 $\overline{p}p \to \pi\pi$

S-CHANNEL $\overline{N}N$

NODE=M033M2

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2300±45	[4] ANISOVICH	02	SPEC		0.6–1.9 $p\overline{p} \to \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$
2295±30	ANISOVICH	00J	SPEC		
~ 2380	[5] CUTTS	78B	CNTR		0.97–3 $\overline{p}p \to \overline{N}N$
2345±15	[5,6] COUPLAND	77	CNTR	0	0.7–2.4 $\overline{p}p \to \overline{p}p$
2359± 2	[5,7] ALSPECTOR	73	CNTR		$\overline{p}p$ S channel
2350±10	[8] ABRAMS	70	CNTR		S channel $\overline{N}N$
2360±25	[9] OH	70B	HDBC	−0	$\overline{p}(pn)$, $K^* K 2\pi$

$\pi^- p \to K^+ K^- n$

NODE=M033M4

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2307±6	ALPER	80	CNTR	0	62 $\pi^- p \to K^+ K^- n$

[1] $I(J^P) = 1(5^-)$ from simultaneous analysis of $p\overline{p} \to \pi^-\pi^+$ and $\pi^0\pi^0$. NODE=M033M1;LINKAGE=P

[2] $I = 0(1)$; $J^P = 5^-$ from Barrelet-zero analysis. NODE=M033M1;LINKAGE=K

[3] $I(J^P) = 1(5^-)$ from amplitude analysis. NODE=M033M1;LINKAGE=J

[4] From the combined analysis of ANISOVICH 00J, ANISOVICH 01D, ANISOVICH 01E, and ANISOVICH 02. NODE=M033M2;LINKAGE=AY

[5] Isospins 0 and 1 not separated. NODE=M033M2;LINKAGE=I

[6] From a fit to the total elastic cross section. NODE=M033M2;LINKAGE=E

[7] Referred to as U or U region by ALSPECTOR 73. NODE=M033M2;LINKAGE=M

[8] For $I = 1$ $\overline{N}N$. NODE=M033M2;LINKAGE=A

[9] No evidence for this bump seen in the $\overline{p}p$ data of CHAPMAN 71B. Narrow state not confirmed by OH 73 with more data. NODE=M033M2;LINKAGE=N

$\rho_5(2350)$ WIDTH

NODE=M033210

$\pi^- p \to \omega\pi^0 n$

NODE=M033W3

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
400±100	ALDE	95	GAM2	38 $\pi^- p \to \omega\pi^0 n$

$\overline{p}p \to \pi\pi$ or $\overline{K}K$

NODE=M033W1

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
~ 169	HASAN	94	RVUE		$\overline{p}p \to \pi\pi$
~ 250	[10] MARTIN	80B	RVUE		
~ 300	[10] MARTIN	80C	RVUE		
~ 150	[11] CARTER	78B	CNTR	0	0.7–2.4 $\overline{p}p \to K^- K^+$
~ 210	[12] CARTER	77	CNTR	0	0.7–2.4 $\overline{p}p \to \pi\pi$

S-CHANNEL $\overline{N}N$ NODE=M033W2

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
260 ± 75	[13] ANISOVICH	02	SPEC		0.6–1.9 $p\overline{p}\to\omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$
235^{+65}_{-40}	ANISOVICH	00J	SPEC		
135^{+150}_{-65}	[14,15] COUPLAND	77	CNTR	0	0.7–2.4 $\overline{p}p\to\overline{p}p$
165^{+18}_{-8}	[15] ALSPECTOR	73	CNTR		$\overline{p}p$ S channel
< 60	[16] OH	70B	HDBC	−0	$\overline{p}(pn)$, $K^*K2\pi$
~ 140	ABRAMS	67C	CNTR		S channel $\overline{p}N$

$\pi^-p\to K^+K^-n$ NODE=M033W4

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
245 ± 20	ALPER	80	CNTR	0	62 $\pi^-p\to K^+K^-n$ (OCCUR=2)

[10] $I(J^P) = 1(5^-)$ from simultaneous analysis of $p\overline{p}\to\pi^-\pi^+$ and $\pi^0\pi^0$. NODE=M033W1;LINKAGE=P

[11] $I = 0(1)$; $J^P = 5^-$ from Barrelet-zero analysis. NODE=M033W1;LINKAGE=K

[12] $I(J^P) = 1(5^-)$ from amplitude analysis. NODE=M033W1;LINKAGE=J

[13] From the combined analysis of ANISOVICH 00J, ANISOVICH 01D, ANISOVICH 01E, and ANISOVICH 02. NODE=M033W2;LINKAGE=AY

[14] From a fit to the total elastic cross section. NODE=M033W2;LINKAGE=E

[15] Isospins 0 and 1 not separated. NODE=M033W2;LINKAGE=I

[16] No evidence for this bump seen in the $\overline{p}p$ data of CHAPMAN 71B. Narrow state not confirmed by OH 73 with more data. NODE=M033W2;LINKAGE=N

$\rho_5(2350)$ REFERENCES NODE=M033

ANISOVICH	02	PL B542 8	A.V. Anisovich *et al.*		REFID=48828
ANISOVICH	01D	PL B508 6	A.V. Anisovich *et al.*		REFID=48327
ANISOVICH	01E	PL B513 281	A.V. Anisovich *et al.*		REFID=48349
ANISOVICH	00J	PL B491 47	A.V. Anisovich *et al.*	(RAL, LOQM, PNPI+)	REFID=47950
ALDE	95	ZPHY C66 379	D.M. Alde *et al.*	(GAMS Collab.) JP	REFID=44371
HASAN	94	PL B334 215	A. Hasan, D.V. Bugg	(LOQM)	REFID=44103
ALPER	80	PL 94B 422	B. Alper *et al.*	(AMST, CERN, CRAC, MPIM+)	REFID=21665
MARTIN	80B	NP B176 355	B.R. Martin, D. Morgan	(LOUC, RHEL) JP	REFID=21838
MARTIN	80C	NP B169 216	A.D. Martin, M.R. Pennington	(DURH) JP	REFID=21837
CARTER	78B	NP B141 467	A.A. Carter	(LOQM)	REFID=21964
CUTTS	78B	PR D17 16	D. Cutts *et al.*	(STON, WISC)	REFID=21733
CARTER	77	PL 67B 117	A.A. Carter *et al.*	(LOQM, RHEL) JP	REFID=21963
COUPLAND	77	PL 71B 460	M. Coupland *et al.*	(LOQM, RHEL)	REFID=21830
ALSPECTOR	73	PRL 30 511	J. Alspector *et al.*	(RUTG, UPNJ)	REFID=21813
OH	73	NP B51 57	B.Y. Oh *et al.*	(MSU)	REFID=21931
CHAPMAN	71B	PR D4 1275	J.W. Chapman *et al.*	(MICH)	REFID=21926
ABRAMS	70	PR D1 1917	R.J. Abrams *et al.*	(BNL)	REFID=21807
OH	70B	PRL 24 1257	B.Y. Oh *et al.*	(MSU)	REFID=21925
ABRAMS	67C	PRL 18 1209	R.J. Abrams *et al.*	(BNL)	REFID=21804

NODE=M247

$X(2370)$

$I^G(J^{PC}) = ?^?(?^{??})$

OMITTED FROM SUMMARY TABLE

$X(2370)$ MASS

NODE=M247M

NODE=M247M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2341.6±6.5±5.7		[1] ABLIKIM	20Q	BES3	$J/\psi \to \gamma K \overline{K} \eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$2376.3 \pm 8.7^{+3.2}_{-4.3}$	565	ABLIKIM	11C	BES3	$J/\psi \to \gamma \pi^+ \pi^- \eta'$

[1] The state observed by ABLIKIM 11C at 2120 MeV is not observed with 90% CL upper limit of 1.49×10^{-5} for $J/\psi \to \gamma X(2120) \to \gamma K^+ K^- \eta'$ and 6.38×10^{-6} for $K^0_S K^0_S \eta'$.

NODE=M247M;LINKAGE=A

$X(2370)$ WIDTH

NODE=M247W

NODE=M247W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
117±10± 8	[1] ABLIKIM	20Q	BES3	$J/\psi \to \gamma K \overline{K} \eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$83 \pm 17^{+44}_{-\ 6}$	ABLIKIM	11C	BES3	$J/\psi \to \gamma \pi^+ \pi^- \eta'$

[1] The state observed by ABLIKIM 11C at 2120 MeV is not observed with 90% CL upper limit of 1.49×10^{-5} for $J/\psi \to \gamma X(2120) \to \gamma K^+ K^- \eta'$ and 6.38×10^{-6} for $K^0_S K^0_S \eta'$.

NODE=M247W;LINKAGE=A

$X(2370)$ DECAY MODES

NODE=M247215;NODE=M247

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$K^+ K^- \eta'$	seen	DESIG=1
Γ_2	$K^0_S K^0_S \eta'$	seen	DESIG=2
Γ_3	$\pi^+ \pi^- \eta'$	seen	DESIG=3

$X(2370)$ BRANCHING RATIOS

NODE=M247225

$\Gamma(K^+ K^- \eta')/\Gamma_{total}$ Γ_1/Γ

NODE=M247R01
NODE=M247R01

VALUE	DOCUMENT ID		TECN	COMMENT
seen	ABLIKIM	20Q	BES3	$J/\psi \to \gamma K^+ K^- \eta'$

$\Gamma(K^0_S K^0_S \eta')/\Gamma_{total}$ Γ_2/Γ

NODE=M247R02
NODE=M247R02

VALUE	DOCUMENT ID		TECN	COMMENT
seen	ABLIKIM	20Q	BES3	$J/\psi \to \gamma K^0_S K^0_S \eta'$

$\Gamma(\pi^+ \pi^- \eta')/\Gamma_{total}$ Γ_3/Γ

NODE=M247R00
NODE=M247R00

VALUE	DOCUMENT ID		TECN	COMMENT
seen	ABLIKIM	11C	BES3	$J/\psi \to \gamma \pi^+ \pi^- \eta'$

$X(2370)$ REFERENCES

NODE=M247

ABLIKIM 20Q EPJ C80 746 M. Ablikim *et al.* (BESIII Collab.) REFID=60457
ABLIKIM 11C PRL 106 072002 M. Ablikim *et al.* (BESIII Collab.) REFID=53684

NODE=M089

$f_6(2510)$ $I^G(J^{PC}) = 0^+(6^{++})$

OMITTED FROM SUMMARY TABLE

Needs confirmation.

NODE=M089

$f_6(2510)$ MASS

NODE=M089M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
2465±50 OUR AVERAGE Error includes scale factor of 2.1.				
2420±30	ALDE	98	GAM4	100 $\pi^- p \to \pi^0 \pi^0 n$
2510±30	BINON	84B	GAM2	38 $\pi^- p \to n 2\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2485±40	[1] ANISOVICH	00J	SPEC	1.92–2.41 $p\overline{p}$

NODE=M089M

[1] From the combined analysis of ANISOVICH 99C, ANISOVICH 99F, ANISOVICH 99J, ANISOVICH 99K, and ANISOVICH 00B.

NODE=M089M;LINKAGE=AN

$f_6(2510)$ WIDTH

NODE=M089W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
255±40 OUR AVERAGE				
270±60	ALDE	98	GAM4	100 $\pi^- p \to \pi^0 \pi^0 n$
240±60	BINON	84B	GAM2	38 $\pi^- p \to n 2\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
410±90	[2] ANISOVICH	00J	SPEC	1.92–2.41 $p\overline{p}$

NODE=M089W

[2] From the combined analysis of ANISOVICH 99C, ANISOVICH 99F, ANISOVICH 99J, ANISOVICH 99K, and ANISOVICH 00B.

NODE=M089W;LINKAGE=AN

$f_6(2510)$ DECAY MODES

NODE=M089215;NODE=M089

	Mode	Fraction (Γ_i/Γ)
Γ_1	$\pi\pi$	(6.0±1.0) %

DESIG=1

$f_6(2510)$ BRANCHING RATIOS

NODE=M089220

$\Gamma(\pi\pi)/\Gamma_{total}$ **Γ_1/Γ**

NODE=M089R1
NODE=M089R1

VALUE	DOCUMENT ID		TECN	COMMENT
0.06±0.01	[3] BINON	83C	GAM2	38 $\pi^- p \to n 4\gamma$

[3] Assuming one pion exchange and using data of BOLOTOV 74.

NODE=M089R1;LINKAGE=A

$f_6(2510)$ REFERENCES

NODE=M089

ANISOVICH	00B	NP A662 319	A.V. Anisovich *et al.*		REFID=47942
ANISOVICH	00J	PL B491 47	A.V. Anisovich *et al.*	(RAL, LOQM, PNPI+)	REFID=47950
ANISOVICH	99C	PL B452 173	A.V. Anisovich *et al.*		REFID=46903
ANISOVICH	99F	NP A651 253	A.V. Anisovich *et al.*		REFID=46926
ANISOVICH	99J	PL B471 271	A.V. Anisovich *et al.*		REFID=47416
ANISOVICH	99K	PL B468 309	A.V. Anisovich *et al.*		REFID=47472
ALDE	98	EPJ A3 361	D. Alde *et al.*	(GAM4 Collab.)	REFID=46605
Also		PAN 62 405	D. Alde *et al.*	(GAMS Collab.)	REFID=46914
		Translated from YAF 62 446.			
BINON	84B	LNC 39 41	F.G. Binon *et al.*	(SERP, BELG, LAPP) JP	REFID=21780
BINON	83C	SJNP 38 723	F.G. Binon *et al.*	(SERP, BRUX+)	REFID=40288
		Translated from YAF 38 1199.			
BOLOTOV	74	PL 52B 489	V.N. Bolotov *et al.*	(SERP)	REFID=44705

STRANGE MESONS
$(S = \pm1, C = B = 0)$

$K^+ = u\overline{s}$, $K^0 = d\overline{s}$, $\overline{K}^0 = \overline{d}s$, $K^- = \overline{u}s$, similarly for K^*'s

NODE=MXXX020

NODE=MXXX020

NODE=M174

$K_0^*(700)$

$I(J^P) = \frac{1}{2}(0^+)$

also known as κ; was $K_0^*(800)$

See the related review(s):

Scalar Mesons below 1 GeV

$K_0^*(700)$ T-Matrix Pole $\sqrt{s}$

NODE=M174TMP

NODE=M174TMP

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
(630–730) − i (260–340) OUR ESTIMATE	(see Fig. 64.1 in the review)		
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$(648 \pm 7) - i\,(280 \pm 16)$	[1] PELAEZ 20	RVUE	$\pi K \to \pi K$
$(670 \pm 18) - i\,(295 \pm 28)$	[2] PELAEZ 17	RVUE	$\pi K \to \pi K$
$(764 \pm 63^{+71}_{-54}) - i\,(306 \pm 149^{+143}_{-85})$	[3] ABLIKIM 11B	BES2	1.3k $J/\psi \to K^0_S K^0_S \pi^+ \pi^-$
$(665 \pm 9) - i\,(268^{+21}_{-6})$	[4] GUO 11B	RVUE	
$(849 \pm 77^{+18}_{-14}) - i\,(256 \pm 40^{+46}_{-22})$	[3] ABLIKIM 10E	BES2	1.4k $J/\psi \to K^\pm K^0_S \pi^\mp \pi^0$
$(663 \pm 8 \pm 34) - i\,(329 \pm 5 \pm 22)$	[5] BUGG 10	RVUE	S-matrix pole
$(706.0 \pm 1.8 \pm 22.8) - i\,(319.4 \pm 2.2 \pm 20.2)$	[6] BONVICINI 08A	CLEO	141k $D^+ \to K^- \pi^+ \pi^+$
$(841 \pm 30^{+81}_{-73}) - i\,(309 \pm 45^{+48}_{-72})$	[3] ABLIKIM 06C	BES2	25k $J/\psi \to \overline{K}^*(892)^0 K^+ \pi^-$
$(750^{+30}_{-55}) - i\,(342 \pm 60)$	[7] BUGG 06	RVUE	
$(658 \pm 13) - i\,(279 \pm 12)$	[8] DESCOTES-G..06	RVUE	$\pi K \to \pi K$
$(757 \pm 33) - i\,(279 \pm 41)$	[9] GUO 06	RVUE	
$(694 \pm 53) - i\,(303 \pm 30)$	[10] ZHOU 06	RVUE	$K p \to K^- \pi^+ n$
$(594 \pm 79) - i\,(362 \pm 166)$	[10] ZHENG 04	RVUE	$K^- p \to K^- \pi^+ n$
$(722 \pm 60) - i\,(386 \pm 50)$	[10] BUGG 03	RVUE	11 $K^- p \to K^- \pi^+ n$
$(875 \pm 75) - i\,(335 \pm 110)$	[11] ISHIDA 97B	RVUE	11 $K^- p \to K^- \pi^+ n$
$727 - i\,263$	[12] VANBEVEREN 86	RVUE	

→ UNCHECKED ←

[1] Extracted employing πK partial wave analysis from ESTABROOKS 78 and ASTON 88, Roy-Steiner equations and once subtracted forward dispersion relations. NODE=M174TMP;LINKAGE=J

[2] Reanalysis of ESTABROOKS 78 and ASTON 88 satisfying Forward Dispersion Relations and using sequences of Pade approximants. NODE=M174TMP;LINKAGE=N

[3] Extracted from Breit-Wigner parameters. NODE=M174TMP;LINKAGE=A

[4] Fit to scattering phase shifts using UChPT amplitudes with explicit resonances. NODE=M174TMP;LINKAGE=D

[5] Supersedes BUGG 06. Combined analysis of ASTON 88, ABLIKIM 06C, AITALA 06, and LINK 09 using an s-dependent width with couplings to $K\pi$ and $K\eta'$, and the Adler zero near thresholds. NODE=M174TMP;LINKAGE=H

[6] From a complex pole included in the fit. Using parameters from the model that fits data best. NODE=M174TMP;LINKAGE=B

[7] Reanalysis of ASTON 88, AITALA 02, and ABLIKIM 06C using for the κ an s-dependent width with an Adler zero near threshold. NODE=M174TMP;LINKAGE=G

[8] Using Roy-Steiner equations (ROY 71) consistent with unitarity, analyticity and crossing symmetry constraints. NODE=M174TMP;LINKAGE=I

[9] From UChPT fitted to MERCER 71, BINGHAM 72 and ESTABROOKS 78. Amplitude shown to be consistent with data of ABLIKIM 06C. NODE=M174TMP;LINKAGE=O

[10] Reanalysis of ASTON 88 data. NODE=M174TMP;LINKAGE=F

[11] Reanalysis of ASTON 88 using interfering Breit-Wigner amplitudes. Extracted from Breit-Wigner parameters. NODE=M174TMP;LINKAGE=M

[12] Unitarized Quark Model. NODE=M174TMP;LINKAGE=E

$K_0^*(700)$ Breit-Wigner Mass

NODE=M174M

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
845 ±17 OUR AVERAGE				
826 ±49 $^{+49}_{-34}$	1.3k	[1] ABLIKIM	11B BES2	$J/\psi \to K_S^0 K_S^0 \pi^+\pi^-$
810 ±68 $^{+15}_{-24}$	1.4k	[2] ABLIKIM	10E BES2	$J/\psi \to K^\pm K_S^0 \pi^\mp \pi^0$
856 ±17 ±13	54k	LINK	07B FOCS	$D^+ \to K^-\pi^+\pi^+$
878 ±23 $^{+64}_{-55}$	25k	[3] ABLIKIM	06C BES2	$J/\psi \to \overline{K}^*(892)^0 K^+\pi^-$
797 ±19 ±43	15k	[4,5] AITALA	02 E791	$D^+ \to K^-\pi^+\pi^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
888.0± 1.9	141k	[6] BONVICINI	08A CLEO	$D^+ \to K^-\pi^+\pi^+$
855 ±15	0.6k	[7] CAWLFIELD	06A CLEO	$D^0 \to K^+K^-\pi^0$
905 $^{+65}_{-30}$		[8] ISHIDA	97B RVUE	$11\ K^-p \to K^-\pi^+n$

OCCUR=2 OCCUR=2 OCCUR=2

[1] The Breit-Wigner parameters from a fit with seven intermediate resonances. The S-matrix pole position is $(764 \pm 63^{+71}_{-54}) - i\,(306 \pm 149^{+143}_{-85})$ MeV. NODE=M174M;LINKAGE=LI

[2] From a fit including ten additional resonances and energy-independent Breit-Wigner width. NODE=M174M;LINKAGE=BL

[3] A fit in the $K_0^*(700) + K^*(892) + K^*(1410)$ model with mass and width of the $K_0^*(700)$ from ABLIKIM 06C well describes the left slope of the $K_S^0\pi^-$ invariant mass spectrum in $\tau^- \to K_S^0\pi^-\nu_\tau$ decay studied by EPIFANOV 07. Averaged value from different parameterizations. NODE=M174M;LINKAGE=EP

[4] Not seen by KOPP 01 using 7070 events of $D^0 \to K^-\pi^+\pi^0$. LINK 02E and LINK 05I show clear evidence for a constant non-resonant scalar amplitude rather than $K_0^*(700)$ in their high statistics analysis of $D^+ \to K^-\pi^+\mu^+\nu_\mu$. NODE=M174M;LINKAGE=A

[5] AUBERT 07T does not find evidence for the charged $K_0^*(700)$ using 11k events of $D^0 \to K^-K^+\pi^0$. NODE=M174M;LINKAGE=AU

[6] Using parameters from the model that fits data best. NODE=M174M;LINKAGE=C

[7] Breit-Wigner parameters. A significant S-wave can be also modeled as a non-resonant contribution. NODE=M174M;LINKAGE=CA

[8] Reanalysis of ASTON 88 using interfering Breit-Wigner amplitudes. NODE=M174M;LINKAGE=IS

$K_0^*(700)$ Breit-Wigner Width

NODE=M174W

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
468 ± 30 OUR AVERAGE				
449 ±156 $^{+144}_{-81}$	1.3k	[1] ABLIKIM	11B BES2	$J/\psi \to K_S^0 K_S^0 \pi^+\pi^-$
536 ± 87 $^{+106}_{-47}$	1.4k	[2] ABLIKIM	10E BES2	$J/\psi \to K^\pm K_S^0 \pi^\mp \pi^0$
464 ± 28 ± 22	54k	LINK	07B FOCS	$D^+ \to K^-\pi^+\pi^+$
499 ± 52 $^{+55}_{-87}$	25k	[3] ABLIKIM	06C BES2	$J/\psi \to \overline{K}^*(892)^0 K^+\pi^-$
410 ± 43 ± 87	15k	[4,5] AITALA	02 E791	$D^+ \to K^-\pi^+\pi^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
550.4± 11.8	141k	[6] BONVICINI	08A CLEO	$D^+ \to K^-\pi^+\pi^+$
251 ± 48	0.6k	[7] CAWLFIELD	06A CLEO	$D^0 \to K^+K^-\pi^0$
545 $^{+235}_{-110}$		[8] ISHIDA	97B RVUE	$11\ K^-p \to K^-\pi^+n$

OCCUR=2 OCCUR=2 OCCUR=2

[1] The Breit-Wigner parameters from a fit with seven intermediate resonances. The S-matrix pole position is $(764 \pm 63^{+71}_{-54}) - i\,(306 \pm 149^{+143}_{-85})$ MeV. NODE=M174W;LINKAGE=LI

[2] From a fit including ten additional resonances and energy-independent Breit-Wigner width. NODE=M174W;LINKAGE=BL

[3] A fit in the $K_0^*(700) + K^*(892) + K^*(1410)$ model with mass and width of the $K_0^*(700)$ from ABLIKIM 06C well describes the left slope of the $K_S^0\pi^-$ invariant mass spectrum in $\tau^- \to K_S^0\pi^-\nu_\tau$ decay studied by EPIFANOV 07. Averaged value from different parameterizations. NODE=M174W;LINKAGE=EP

[4] Not seen by KOPP 01 using 7070 events of $D^0 \to K^-\pi^+\pi^0$. LINK 02E and LINK 05I show clear evidence for a constant non-resonant scalar amplitude rather than $K_0^*(700)$ in their high statistics analysis of $D^+ \to K^-\pi^+\mu^+\nu_\mu$. NODE=M174W;LINKAGE=A

[5] AUBERT 07T does not find evidence for the charged $K_0^*(700)$ using 11k events of $D^0 \to K^-K^+\pi^0$. NODE=M174W;LINKAGE=AU

[6] Using parameters from the model that fits data best. NODE=M174W;LINKAGE=C

[7] Statistical error only. A fit to the Dalitz plot including the $K_0^*(700)^\pm$, $K^*(892)^\pm$, and ϕ resonances modeled as Breit-Wigners. A significant S-wave can be also modeled as a non-resonant contribution. NODE=M174W;LINKAGE=CA

[8] Reanalysis of ASTON 88 using interfering Breit-Wigner amplitudes. NODE=M174W;LINKAGE=IS

$K_0^*(700)$ DECAY MODES

NODE=M174215;NODE=M174

	Mode	Fraction (Γ_i/Γ)
Γ_1	$K\pi$	100 %

DESIG=1;OUR EVAL;→ UNCHECKED ←

$K_0^*(700)$ REFERENCES

NODE=M174

PELAEZ	20	PRL 124 172001	J.R. Pelaez *et al.*		REFID=60559
PELAEZ	17	EPJ C77 91	J.R. Pelaez, A.Rodas, J.R. de Elvira		REFID=57836
ABLIKIM	11B	PL B698 183	M. Ablikim *et al.*	(BES II Collab.)	REFID=53683
GUO	11B	PR D84 034005	Z.-H. Guo, J.A. Oller		REFID=58808
ABLIKIM	10E	PL B693 88	M. Ablikim *et al.*	(BES II Collab.)	REFID=53361
BUGG	10	PR D81 014002	D.V. Bugg	(LOQM)	REFID=53213
LINK	09	PL B681 14	J.M. Link *et al.*	(FNAL FOCUS Collab.)	REFID=53056
BONVICINI	08A	PR D78 052001	G. Bonvicini *et al.*	(CLEO Collab.)	REFID=52426
AUBERT	07T	PR D76 011102	B. Aubert *et al.*	(BABAR Collab.)	REFID=51726
EPIFANOV	07	PL B654 65	D. Epifanov *et al.*	(BELLE Collab.)	REFID=51929
LINK	07B	PL B653 1	J.M. Link *et al.*	(FNAL FOCUS Collab.)	REFID=51875
ABLIKIM	06C	PL B633 681	M. Ablikim *et al.*	(BES Collab.)	REFID=51037
AITALA	06	PR D73 032004	E.M. Aitala *et al.*	(FNAL E791 Collab.)	REFID=51051
Also		PR D74 059901 (errat.)	E.M. Aitala *et al.*	(FNAL E791 Collab.)	REFID=51458
BUGG	06	PL B632 471	D.V. Bugg	(LOQM)	REFID=50996
CAWLFIELD	06A	PR D74 031108	C. Cawlfield *et al.*	(CLEO Collab.)	REFID=51153
DESCOTES-G...	06	EPJ C48 553	S. Descotes-Genon, B. Moussallam		REFID=51518
GUO	06	NP A773 78	F.K. Guo *et al.*		REFID=51164
ZHOU	06	NP A775 212	Z.Y. Zhou, H.Q. Zheng		REFID=51198
LINK	05I	PL B621 72	J.M. Link *et al.*	(FNAL FOCUS Collab.)	REFID=50679
ZHENG	04	NP A733 235	H.Q. Zheng *et al.*		REFID=50165
BUGG	03	PL B572 1	D.V. Bugg		REFID=49586
AITALA	02	PRL 89 121801	E.M. Aitala *et al.*	(FNAL E791 Collab.)	REFID=48807
LINK	02E	PL B535 43	J.M. Link *et al.*	(FNAL FOCUS Collab.)	REFID=48728
KOPP	01	PR D63 092001	S. Kopp *et al.*	(CLEO Collab.)	REFID=48134
ISHIDA	97B	PTP 98 621	S. Ishida *et al.*		REFID=48655
ASTON	88	NP B296 493	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)	REFID=40262
VANBEVEREN	86	ZPHY C30 615	E. van Beveren *et al.*	(NIJM, BIEL)	REFID=45769
ESTABROOKS	78	NP B133 490	P.G. Estabrooks *et al.*	(MCGI, CARL, DURH+)	REFID=22443
BINGHAM	72	NP B41 1	H.H. Bingham *et al.*	(International K^+ Collab.)	REFID=22415
MERCER	71	NP B32 381	R. Mercer *et al.*	(JHU)	REFID=22412
ROY	71	PL 36B 353	S.M. Roy		REFID=51107

NODE=M018

$K^*(892)$

$I(J^P) = \frac{1}{2}(1^-)$

$K^*(892)$ T-Matrix Pole $\sqrt{s}$

NODE=M018TMP

NODE=M018TMP

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
(890 ± 14) − *i* (26 ± 6) OUR ESTIMATE				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
(890 ± 2)− i (25.6 ± 1.2)	[1] PELAEZ	20	RVUE	$\pi K \to \pi K$
(892 ± 1)− i (29 ± 1)	[2] PELAEZ	17	RVUE	$\pi K \to \pi K$
(889 ± 13) − i (24 ± 4)	[3] PELAEZ	04A	RVUE	$\pi K \to \pi K$

→ UNCHECKED ←

OCCUR=2

[1] Extracted employing πK partial wave analysis from ESTABROOKS 78 and ASTON 88, Roy-Steiner equations and once subtracted forward dispersion relations.

NODE=M018TMP;LINKAGE=A

[2] Reanalysis of ESTABROOKS 78 and ASTON 88 satisfying Forward Dispersion Relations and using sequences of Pade approximants.

NODE=M018TMP;LINKAGE=E

[3] Reanalysis of data from ESTABROOKS 78 and ASTON 88 in the unitarized ChPT model.

NODE=M018TMP;LINKAGE=B

$K^*(892)$ MASS

NODE=M018205

CHARGED ONLY, HADROPRODUCED

NODE=M018M1
NODE=M018M1

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
891.67±0.26 OUR AVERAGE						
892.2 ±0.5 ±1.7		ALBRECHT	20	CBAR		0.9 $\overline{p}p \to K^+K^-\pi^0$
892.6 ±0.5	5840	BAUBILLIER	84B	HBC	−	8.25 $K^-p \to \overline{K}^0\pi^-p$
888 ±3		NAPIER	84	SPEC	+	200 $\pi^-p \to 2K_S^0X$
891 ±1		NAPIER	84	SPEC	−	200 $\pi^-p \to 2K_S^0X$
891.7 ±2.1	3700	BARTH	83	HBC	+	70 $K^+p \to K^0\pi^+X$
891 ±1	4100	TOAFF	81	HBC	−	6.5 $K^-p \to \overline{K}^0\pi^-p$
892.8 ±1.6		AJINENKO	80	HBC	+	32 $K^+p \to K^0\pi^+X$
890.7 ±0.9	1800	AGUILAR-...	78B	HBC	±	0.76 $\overline{p}p \to K^\mp K_S^0\pi^\pm$
886.6 ±2.4	1225	BALAND	78	HBC	±	12 $\overline{p}p \to (K\pi)^\pm X$

OCCUR=2

891.7 ±0.6	6706		COOPER	78	HBC	±	0.76 $\overline{p}p \to (K\pi)^{\pm} X$
891.9 ±0.7	9000	[1]	PALER	75	HBC	−	14.3 $K^- p \to (K\pi)^- X$
892.2 ±1.5	4404		AGUILAR-...	71B	HBC	−	3.9,4.6 $K^- p \to (K\pi)^- p$
891 ±2	1000		CRENNELL	69D	DBC	−	3.9 $K^- N \to K^0 \pi^- X$
890 ±3.0	720		BARLOW	67	HBC	±	1.2 $\overline{p}p \to (K^0\pi)^{\pm} K^{\mp}$
889 ±3.0	600		BARLOW	67	HBC	±	1.2 $\overline{p}p \to (K^0\pi)^{\pm} K\pi$ OCCUR=2
891 ±2.3	620	[2]	DEBAERE	67B	HBC	+	3.5 $K^+ p \to K^0 \pi^+ p$
891.0 ±1.2	1700	[3]	WOJCICKI	64	HBC	−	1.7 $K^- p \to \overline{K}^0 \pi^- p$

• • • We do not use the following data for averages, fits, limits, etc. • • •

893.6 ±0.1 $^{+0.2}_{-0.3}$	183k		ABLIKIM	19AQ	BES	±	$J/\psi \to K^+ K^- \pi^0$
895.6 ±0.8	4k	[4]	LEES	17C	BABR		$J/\psi \to K^0_S K^{\pm} \pi^{\mp}$
893.2 ±0.1 ±1.0	190k	[5]	AAIJ	16N	LHCB		$D^0 \to K^0_S K^{\pm} \pi^{\mp}$
893.5 ±1.1	27k	[6]	ABELE	99D	CBAR	±	0.0 $\overline{p}p \to K^+ K^- \pi^0$
890.4 ±0.2 ±0.5	80k	[7]	BIRD	89	LASS	−	11 $K^- p \to \overline{K}^0 \pi^- p$
890.0 ±2.3	800	[2,3]	CLELAND	82	SPEC	+	30 $K^+ p \to K^0_S \pi^+ p$
896.0 ±1.1	3200	[2,3]	CLELAND	82	SPEC	+	50 $K^+ p \to K^0_S \pi^+ p$ OCCUR=2
893 ±1	3600	[2,3]	CLELAND	82	SPEC	−	50 $K^+ p \to K^0_S \pi^- p$ OCCUR=3
896.0 ±1.9	380		DELFOSSE	81	SPEC	+	50 $K^{\pm} p \to K^{\pm} \pi^0 p$
886.0 ±2.3	187		DELFOSSE	81	SPEC	−	50 $K^{\pm} p \to K^{\pm} \pi^0 p$ OCCUR=2
894.2 ±2.0	765	[2]	CLARK	73	HBC	−	3.13 $K^- p \to \overline{K}^0 \pi^- p$
894.3 ±1.5	1150	[2,3]	CLARK	73	HBC	−	3.3 $K^- p \to \overline{K}^0 \pi^- p$ OCCUR=2
892.0 ±2.6	341	[2]	SCHWEING...	68	HBC	−	5.5 $K^- p \to \overline{K}^0 \pi^- p$ OCCUR=2

[1] Inclusive reaction. Complicated background and phase-space effects. NODE=M018M;LINKAGE=I
[2] Mass errors enlarged by us to $\Gamma/\sqrt{N}$. See note. NODE=M018M;LINKAGE=D
[3] Number of events in peak reevaluated by us. NODE=M018M;LINKAGE=W
[4] From a Dalitz plot analysis in an isobar model with charged and neutral $K^*(892)$ masses and widths floating. NODE=M018M1;LINKAGE=B
[5] Average of fit results with different parametrizations for the $K\pi$ S-wave. NODE=M018M1;LINKAGE=A
[6] K-matrix pole. NODE=M018M1;LINKAGE=AN
[7] From a partial wave amplitude analysis. NODE=M018M1;LINKAGE=F

CHARGED ONLY, PRODUCED IN τ LEPTON DECAYS

NODE=M018MCT
NODE=M018MCT

VALUE (MeV)	*EVTS*		*DOCUMENT ID*		*TECN*	*COMMENT*
895.47±0.20±0.74	53k	[1]	EPIFANOV	07	BELL	$\tau^- \to K^0_S \pi^- \nu_\tau$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
892.0 ±0.5		[2]	BOITO	10	RVUE	$\tau^- \to K^0_S \pi^- \nu_\tau$
892.0 ±0.9		[3,4]	BOITO	09	RVUE	$\tau^- \to K^0_S \pi^- \nu_\tau$
895.3 ±0.2		[4,5]	JAMIN	08	RVUE	$\tau^- \to K^0_S \pi^- \nu_\tau$
896.4 ±0.9	12k	[6]	BONVICINI	02	CLEO	$\tau^- \to K^- \pi^0 \nu_\tau$
895 ±2		[7]	BARATE	99R	ALEP	$\tau^- \to K^- \pi^0 \nu_\tau$

[1] From a fit in the $K^*_0(700) + K^*(892) + K^*(1410)$ model. NODE=M018MCT;LINKAGE=EF
[2] From the pole position of the $K\pi$ vector form factor using EPIFANOV 07 and constraints from K_{l3} decays in ANTONELLI 10. NODE=M018MCT;LINKAGE=BT
[3] From the pole position of the $K\pi$ vector form factor in the complex s-plane and using EPIFANOV 07 data. NODE=M018MCT;LINKAGE=BI
[4] Systematic uncertainties not estimated. NODE=M018MCT;LINKAGE=NS
[5] Reanalysis of EPIFANOV 07 using resonance chiral theory. NODE=M018MCT;LINKAGE=JA
[6] Calculated by us from the shift by 4.7 ± 0.9 MeV (statistical uncertainty only) reported in BONVICINI 02 with respect to the world average value from PDG 00. NODE=M018MCT;LINKAGE=BO
[7] With mass and width of the $K^*(1410)$ fixed at 1412 MeV and 227 MeV, respectively. NODE=M018MCT;LINKAGE=BA

NEUTRAL ONLY

NODE=M018M2
NODE=M018M2

VALUE (MeV)	*EVTS*		*DOCUMENT ID*		*TECN*	*COMMENT*
895.55±0.20 OUR AVERAGE			Error includes scale factor of 1.7. See the ideogram below.			
894.68±0.25±0.05		[1]	ABLIKIM	16F	BES3	$D^+ \to K^- \pi^+ e^+ \nu_e$
895.4 ±0.2 ±0.2	243k	[2]	DEL-AMO-SA...	11I	BABR	$D^+ \to K^- \pi^+ e^+ \nu_e$
895.7 ±0.2 ±0.3	141k	[3]	BONVICINI	08A	CLEO	$D^+ \to K^- \pi^+ \pi^+$
895.41±0.32 $^{+0.35}_{-0.43}$	18k	[4]	LINK	05I	FOCS	$D^+ \to K^- \pi^+ \mu^+ \nu_\mu$
896 ±2			BARBERIS	98E	OMEG	450 $pp \to p_f p_s K^* \overline{K}^*$
895.9 ±0.5 ±0.2			ASTON	88	LASS	11 $K^- p \to K^- \pi^+ n$
894.52±0.63	25k	[5]	ATKINSON	86	OMEG	20–70 γp

894.63±0.76	20k	[5] ATKINSON	86	OMEG	20–70 γp		OCCUR=2
897 ±1	28k	EVANGELIS...	80	OMEG	10 $\pi^- p \to K^+ \pi^- (\Lambda, \Sigma)$		
898.4 ±1.4	1180	AGUILAR-...	78B	HBC	0.76 $\overline{p} p \to K^\mp K^0_S \pi^\pm$		
894.9 ±1.6		WICKLUND	78	ASPK	3,4,6 $K^\pm N \to (K\pi)^0 N$		
897.6 ±0.9		BOWLER	77	DBC	5.4 $K^+ d \to K^+ \pi^- pp$		
895.5 ±1.0	3600	MCCUBBIN	75	HBC	3.6 $K^- p \to K^- \pi^+ n$		
897.1 ±0.7	22k	[5] PALER	75	HBC	14.3 $K^- p \to (K\pi)^0$ X		
896.0 ±0.6	10k	FOX	74	RVUE	2 $K^- p \to K^- \pi^+ n$		
896.0 ±0.6		FOX	74	RVUE	2 $K^+ n \to K^+ \pi^- p$		OCCUR=2
896 ±2		[6] MATISON	74	HBC	12 $K^+ p \to K^+ \pi^- \Delta$		
896 ±1	3186	LEWIS	73	HBC	2.1–2.7 $K^+ p \to K \pi \pi p$		
894.0 ±1.3		[6] LINGLIN	73	HBC	2–13 $K^+ p \to K^+ \pi^- \pi^+ p$		
898.4 ±1.3	1700	[7] BUCHNER	72	DBC	4.6 $K^+ n \to K^+ \pi^- p$		
897.9 ±1.1	2934	[7] AGUILAR-...	71B	HBC	3.9,4.6 $K^- p \to K^- \pi^+ n$		
898.0 ±0.7	5362	[7] AGUILAR-...	71B	HBC	3.9,4.6 $K^- p \to K^- \pi^+ \pi^- p$		OCCUR=2
895 ±1	4300	[8] HABER	70	DBC	3 $K^- N \to K^- \pi^+$ X		
893.7 ±2.0	10k	DAVIS	69	HBC	12 $K^+ p \to K^+ \pi^- \pi^+ p$		
894.7 ±1.4	1040	[7] DAUBER	67B	HBC	2.0 $K^- p \to K^- \pi^+ \pi^- p$		
• • • We do not use the following data for averages, fits, limits, etc. • • •							
895.50±0.92±2.6		[9] ADUSZKIEW...	20A	NA61	158 pp		
898.1 ±1.0	4k	[10] LEES	17C	BABR	$J/\psi \to K^0_S K^\pm \pi^\mp$		
895.53±0.17		LEES	13F	BABR	$D^+ \to K^+ K^- \pi^+$		
894.9 ±0.5 ±0.7	14.4k	[11] MITCHELL	09A	CLEO	$D^+_s \to K^+ K^- \pi^+$		
896.2 ±0.3	20k	[12] AUBERT	07AK	BABR	10.6 $e^+ e^- \to K^{*0} K^\pm \pi^\mp \gamma$		
900.7 ±1.1	5900	BARTH	83	HBC	70 $K^+ p \to K^+ \pi^-$ X		

[1] Taking also into account the $K_0^*(1430)^0$ and $K_2^*(1430)^0$. NODE=M018M2;LINKAGE=B

[2] Taking into account the $K^*(892)^0$, S-wave and P-wave ($K^*(1410)^0$). NODE=M018M2;LINKAGE=DE

[3] From the isobar model with a complex pole for the κ. NODE=M018M2;LINKAGE=BO

[4] Fit to $K\pi$ mass spectrum includes a non-resonant scalar component. NODE=M018M2;LINKAGE=LI

[5] Inclusive reaction. Complicated background and phase-space effects. NODE=M018M2;LINKAGE=I

[6] From pole extrapolation. NODE=M018M;LINKAGE=C

[7] Mass errors enlarged by us to $\Gamma/\sqrt{N}$. See note. NODE=M018M2;LINKAGE=D

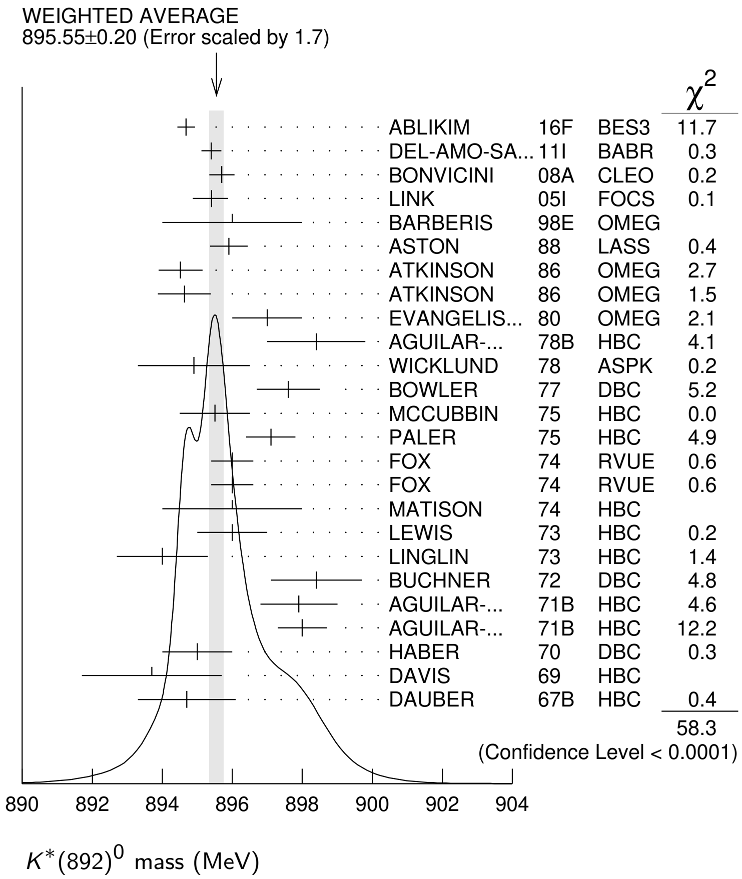
[8] Number of events in peak reevaluated by us. NODE=M018M2;LINKAGE=W

[9] For transverse momenta between 0.6 and 0.8 GeV/c and rapidity $0 < y < 0.5$. NODE=M018M2;LINKAGE=C

[10] From a Dalitz plot analysis in an isobar model with charged and neutral $K^*(892)$ masses and widths floating. NODE=M018M2;LINKAGE=A

[11] This value comes from a fit with χ^2 of 178/117. NODE=M018M2;LINKAGE=MI

[12] Systematic uncertainties not estimated. NODE=M018M2;LINKAGE=NS



NODE=M018209

$K^*(892)$ MASSES AND MASS DIFFERENCES

Unrealistically small errors have been reported by some experiments. We use simple "realistic" tests for the minimum errors on the determination of a mass and width from a sample of N events:

$$\delta_{\min}(m) = \frac{\Gamma}{\sqrt{N}}, \quad \delta_{\min}(\Gamma) = 4\frac{\Gamma}{\sqrt{N}} \ . \qquad (1)$$

We consistently increase unrealistic errors before averaging. For a detailed discussion, see the 1971 edition of this Note.

$m_{K^*(892)^0} - m_{K^*(892)^\pm}$

NODE=M018D

NODE=M018D

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
6.7±1.2 OUR AVERAGE						
7.7±1.7	2980	AGUILAR-...	78B	HBC	±0	0.76 $\overline{p}p \to K^\mp K^0_S \pi^\pm$
5.7±1.7	7338	AGUILAR-...	71B	HBC	−0	3.9,4.6 $K^- p$
6.3±4.1	283	[1] BARASH	67B	HBC		0.0 $\overline{p}p$

[1] Number of events in peak reevaluated by us.

NODE=M018D;LINKAGE=W

$K^*(892)$ RANGE PARAMETER

NODE=M018R

All from partial wave amplitude analyses.

NODE=M018R

NODE=M018R

VALUE (GeV^{-1})	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
2.1 ±0.5 ±0.5	243k	[1] DEL-AMO-SA.	11I	BABR	0	$D^+ \to K^- \pi^+ e^+ \nu_e$
$3.96 \pm 0.54^{+1.31}_{-0.90}$	18k	[2] LINK	05I	FOCS	0	$D^+ \to K^- \pi^+ \mu^+ \nu_\mu$
3.4 ±0.7		ASTON	88	LASS	0	11 $K^- p \to K^- \pi^+ n$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
12.1 ±3.2 ±3.0		BIRD	89	LASS	−	11 $K^- p \to \overline{K}^0 \pi^- p$

[1] Taking into account the $K^*(892)^0$, S-wave and P-wave ($K^*(1410)^0$). NODE=M018R;LINKAGE=DE
[2] Fit to $K\pi$ mass spectrum includes a non-resonant scalar component. NODE=M018R;LINKAGE=LI

$K^*(892)$ WIDTH

NODE=M018215

CHARGED ONLY, HADROPRODUCED

NODE=M018W1
NODE=M018W1

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT	
51.4±0.8 OUR FIT							
51.4±0.8 OUR AVERAGE							
54.4±0.9±1.7		ALBRECHT	20	CBAR		0.9 $\overline{p}p \to K^+K^-\pi^0$	
49 ±2	5840	BAUBILLIER	84B	HBC	−	8.25 $K^-p \to \overline{K}^0\pi^-p$	
56 ±4		NAPIER	84	SPEC	−	200 $\pi^-p \to 2K^0_S X$	OCCUR=2
51 ±2	4100	TOAFF	81	HBC	−	6.5 $K^-p \to \overline{K}^0\pi^-p$	
50.5±5.6		AJINENKO	80	HBC	+	32 $K^+p \to K^0\pi^+X$	
45.8±3.6	1800	AGUILAR-...	78B	HBC	±	0.76 $\overline{p}p \to K^\mp K^0_S\pi^\pm$	
52.0±2.5	6706	[1] COOPER	78	HBC	±	0.76 $\overline{p}p \to (K\pi)^\pm X$	
52.1±2.2	9000	[2] PALER	75	HBC	−	14.3 $K^-p \to (K\pi)^- X$	
46.3±6.7	765	[1] CLARK	73	HBC	−	3.13 $K^-p \to \overline{K}^0\pi^-p$	
48.2±5.7	1150	[1,3] CLARK	73	HBC	−	3.3 $K^-p \to \overline{K}^0\pi^-p$	OCCUR=2
54.3±3.3	4404	[1] AGUILAR-...	71B	HBC	−	3.9,4.6 $K^-p \to (K\pi)^-p$	
46 ±5	1700	[1,3] WOJCICKI	64	HBC	−	1.7 $K^-p \to \overline{K}^0\pi^-p$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
$46.7\pm0.2^{+0.1}_{-0.2}$	183k	ABLIKIM	19AQ	BES	±	$J/\psi \to K^+K^-\pi^0$	
43.6±1.3	4k	[4] LEES	17C	BABR		$J/\psi \to K^0_S K^\pm\pi^\mp$	
47.2±0.3±2.3	190k	[5] AAIJ	16N	LHCB		$D^0 \to K^0_S K^\pm\pi^\mp$	
54.8±1.7	27k	[6] ABELE	99D	CBAR	±	0.0 $\overline{p}p \to K^+K^-\pi^0$	
45.2±1 ±2	80k	[7] BIRD	89	LASS	−	11 $K^-p \to \overline{K}^0\pi^-p$	
42.8±7.1	3700	BARTH	83	HBC	+	70 $K^+p \to K^0\pi^+X$	
64.0±9.2	800	[1,3] CLELAND	82	SPEC	+	30 $K^+p \to K^0_S\pi^+p$	
62.0±4.4	3200	[1,3] CLELAND	82	SPEC	+	50 $K^+p \to K^0_S\pi^+p$	OCCUR=2
55 ±4	3600	[1,3] CLELAND	82	SPEC	−	50 $K^+p \to K^0_S\pi^-p$	OCCUR=3
62.6±3.8	380	DELFOSSE	81	SPEC	+	50 $K^\pm p \to K^\pm\pi^0p$	
50.5±3.9	187	DELFOSSE	81	SPEC	−	50 $K^\pm p \to K^\pm\pi^0p$	OCCUR=2

[1] Width errors enlarged by us to $4 \times \Gamma/\sqrt{N}$; see note. NODE=M018W;LINKAGE=D
[2] Inclusive reaction. Complicated background and phase-space effects. NODE=M018W;LINKAGE=I
[3] Number of events in peak reevaluated by us. NODE=M018W;LINKAGE=W
[4] From a Dalitz plot analysis in an isobar model with charged and neutral $K^*(892)$ masses and widths floating. NODE=M018W1;LINKAGE=B
[5] Average of fit results with different parametrizations for the $K\pi$ S-wave. NODE=M018W1;LINKAGE=A
[6] K-matrix pole. NODE=M018W1;LINKAGE=AN
[7] From a partial wave amplitude analysis. NODE=M018W1;LINKAGE=F

CHARGED ONLY, PRODUCED IN τ LEPTON DECAYS

NODE=M018W5
NODE=M018W5

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
46.2±0.6±1.2	53k	[1] EPIFANOV	07	BELL	$\tau^- \to K^0_S\pi^-\nu_\tau$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
46.5±1.1		[2] BOITO	10	RVUE	$\tau^- \to K^0_S\pi^-\nu_\tau$
46.2±0.4		[3,4] BOITO	09	RVUE	$\tau^- \to K^0_S\pi^-\nu_\tau$
47.5±0.4		[4,5] JAMIN	08	RVUE	$\tau^- \to K^0_S\pi^-\nu_\tau$
55 ±8		[6] BARATE	99R	ALEP	$\tau^- \to K^-\pi^0\nu_\tau$

[1] From a fit in the $K^*_0(700) + K^*(892) + K^*(1410)$ model. NODE=M018W5;LINKAGE=EF
[2] From the pole position of the $K\pi$ vector form factor using EPIFANOV 07 and constraints from K_{l3} decays in ANTONELLI 10. NODE=M018W5;LINKAGE=BT
[3] From the pole position of the $K\pi$ vector form factor in the complex s-plane and using EPIFANOV 07 data. NODE=M018W5;LINKAGE=BI
[4] Systematic uncertainties not estimated. NODE=M018W5;LINKAGE=NS
[5] Reanalysis of EPIFANOV 07 using resonance chiral theory. NODE=M018W5;LINKAGE=JA
[6] With mass and width of the $K^*(1410)$ fixed at 1412 MeV and 227 MeV, respectively. NODE=M018W5;LINKAGE=BA

NEUTRAL ONLY

NODE=M018W2
NODE=M018W2

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
47.3 ±0.5 OUR FIT Error includes scale factor of 1.9.						
47.3 ±0.5 OUR AVERAGE Error includes scale factor of 2.0. See the ideogram below.						
46.53±0.56±0.31		[1] ABLIKIM	16F	BES3	$D^+ \to K^- \pi^+ e^+ \nu_e$	
46.5 ±0.3 ±0.2	243k	[2] DEL-AMO-SA...	11I	BABR	$D^+ \to K^- \pi^+ e^+ \nu_e$	
45.3 ±0.5 ±0.6	141k	[3] BONVICINI	08A	CLEO	$D^+ \to K^- \pi^+ \pi^+$	
$47.79 \pm 0.86 ^{+1.32}_{-1.06}$	18k	[4] LINK	05I	FOCS	$D^+ \to K^- \pi^+ \mu^+ \nu_\mu$	
54 ±3		BARBERIS	98E	OMEG	450 $p p \to p_f p_s K^* \overline{K}^*$	
50.8 ±0.8 ±0.9		ASTON	88	LASS	11 $K^- p \to K^- \pi^+ n$	
46.5 ±4.3	5900	BARTH	83	HBC	70 $K^+ p \to K^+ \pi^- X$	
54 ±2	28k	EVANGELIS...	80	OMEG	10 $\pi^- p \to K^+ \pi^- (\Lambda, \Sigma)$	
45.9 ±4.8	1180	AGUILAR-...	78B	HBC	0.76 $\overline{p} p \to K^\mp K^0_S \pi^\pm$	
51.2 ±1.7		WICKLUND	78	ASPK	3,4,6 $K^\pm N \to (K \pi)^0 N$	
48.9 ±2.5		BOWLER	77	DBC	5.4 $K^+ d \to K^+ \pi^- p p$	
$48 ^{+3}_{-2}$	3600	MCCUBBIN	75	HBC	3.6 $K^- p \to K^- \pi^+ n$	
50.6 ±2.5	22k	[5] PALER	75	HBC	14.3 $K^- p \to (K \pi)^0 X$	
47 ±2	10k	FOX	74	RVUE	2 $K^- p \to K^- \pi^+ n$	
51 ±2		FOX	74	RVUE	2 $K^+ n \to K^+ \pi^- p$	OCCUR=2
46.0 ±3.3	3186	[6] LEWIS	73	HBC	2.1–2.7 $K^+ p \to K \pi \pi p$	
51.4 ±5.0	1700	[6] BUCHNER	72	DBC	4.6 $K^+ n \to K^+ \pi^- p$	
$55.8 ^{+4.2}_{-3.4}$	2934	[6] AGUILAR-...	71B	HBC	3.9,4.6 $K^- p \to K^- \pi^+ n$	
48.5 ±2.7	5362	AGUILAR-...	71B	HBC	3.9,4.6 $K^- p \to K^- \pi^+ \pi^- p$	OCCUR=2
54.0 ±3.3	4300	[6,7] HABER	70	DBC	3 $K^- N \to K^- \pi^+ X$	
53.2 ±2.1	10k	[6] DAVIS	69	HBC	12 $K^+ p \to K^+ \pi^- \pi^+ p$	
44 ±5.5	1040	[6] DAUBER	67B	HBC	2.0 $K^- p \to K^- \pi^+ \pi^- p$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
48.8 ±1.8 ±2.0		[8] ADUSZKIEW...	20A	NA61	158 $p p$	
52.6 ±1.7	4k	[9] LEES	17C	BABR	$J/\psi \to K^0_S K^\pm \pi^\mp$	
44.90±0.30		LEES	13F	BABR	$D^+ \to K^+ K^- \pi^+$	
45.7 ±1.1 ±0.5	14.4k	[10] MITCHELL	09A	CLEO	$D^+_s \to K^+ K^- \pi^+$	
50.6 ±0.9	20k	[11] AUBERT	07AK	BABR	10.6 $e^+ e^- \to K^{*0} K^\pm \pi^\mp \gamma$	

[1] Taking also into account the $K^*_0(1430)^0$ and $K^*_2(1430)^0$. NODE=M018W2;LINKAGE=B

[2] Taking into account the $K^*(892)^0$, S-wave and P-wave ($K^*(1410)^0$). NODE=M018W2;LINKAGE=DE

[3] From the isobar model with a complex pole for the κ. NODE=M018W2;LINKAGE=BO

[4] Fit to $K \pi$ mass spectrum includes a non-resonant scalar component. NODE=M018W2;LINKAGE=LN

[5] Inclusive reaction. Complicated background and phase-space effects. NODE=M018W2;LINKAGE=I

[6] Width errors enlarged by us to $4 \times \Gamma/\sqrt{N}$; see note. NODE=M018W2;LINKAGE=D

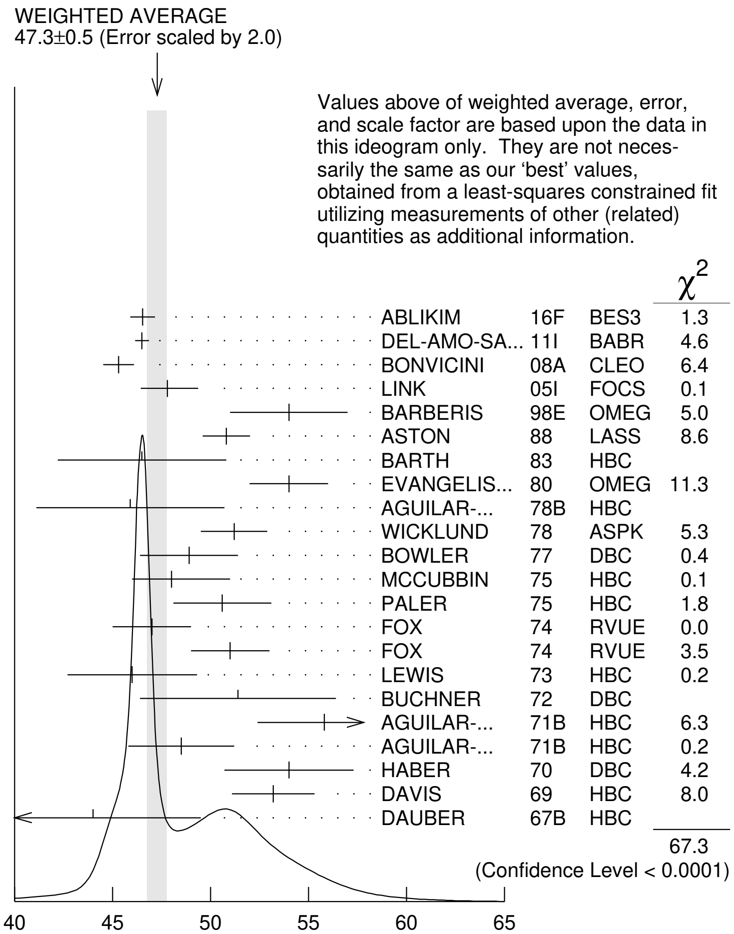
[7] Number of events in peak reevaluated by us. NODE=M018W2;LINKAGE=W

[8] For transverse momenta between 0.6 and 0.8 GeV/c and rapidity $0 < y < 0.5$. NODE=M018W2;LINKAGE=C

[9] From a Dalitz plot analysis in an isobar model with charged and neutral $K^*(892)$ masses and widths floating. NODE=M018W2;LINKAGE=A

[10] This value comes from a fit with χ^2 of 178/117. NODE=M018W2;LINKAGE=MI

[11] Systematic uncertainties not estimated. NODE=M018W2;LINKAGE=NS



NEUTRAL ONLY (MeV)

$K^*(892)$ DECAY MODES

NODE=M018220;NODE=M018

	Mode	Fraction (Γ_i/Γ)	Confidence level	
Γ_1	$K\pi$	$\sim$ 100 %		DESIG=1;OUR EVAL;→ UNCHECKED ←
Γ_2	$(K\pi)^\pm$	(99.902±0.009) %		DESIG=11
Γ_3	$(K\pi)^0$	(99.754±0.021) %		DESIG=12
Γ_4	$K^0\gamma$	(2.46 ±0.21) $\times 10^{-3}$		DESIG=4
Γ_5	$K^\pm\gamma$	(9.8 ±0.9) $\times 10^{-4}$		DESIG=3
Γ_6	$K\pi\pi$	< 7 $\times 10^{-4}$	95%	DESIG=2

CONSTRAINED FIT INFORMATION

An overall fit to the total width and a partial width uses 14 measurements and one constraint to determine 3 parameters. The overall fit has a $\chi^2 = 10.7$ for 12 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\left\langle \delta p_i \delta p_j \right\rangle / (\delta p_i \cdot \delta p_j)$, in percent, from the fit to parameters p_i, including the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_5	−100	
Γ	17	−17
	x_2	x_5

	Mode	Rate (MeV)	
Γ_2	$(K\pi)^\pm$	51.4 ±0.8	DESIG=11
Γ_5	$K^\pm\gamma$	0.050±0.005	DESIG=3

CONSTRAINED FIT INFORMATION

An overall fit to the total width and a partial width uses 23 measurements and one constraint to determine 3 parameters. The overall fit has a $\chi^2 = 68.4$ for 21 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\left\langle\delta p_i \delta p_j\right\rangle/(\delta p_i\cdot\delta p_j)$, in percent, from the fit to parameters p_i, including the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{\text{total}}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_4	−100	
Γ	12	−12
	x_3	x_4

	Mode	Rate (MeV)	Scale factor	
Γ_3	$(K\pi)^0$	47.2 ±0.5	1.9	DESIG=12
Γ_4	$K^0\gamma$	0.117±0.010		DESIG=4

$K^*(892)$ PARTIAL WIDTHS

NODE=M018225

$\Gamma(K^0\gamma)$ Γ_4

NODE=M018W4
NODE=M018W4

VALUE (keV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
116 ±10 OUR FIT						
116.5± 9.9	584	CARLSMITH	86	SPEC	0	$K^0_L A \to K^0_S \pi^0 A$

$\Gamma(K^\pm\gamma)$ Γ_5

NODE=M018W3
NODE=M018W3

VALUE (keV)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
50± 5 OUR FIT					
50± 5 OUR AVERAGE					
48±11	BERG	83	SPEC	−	156 $K^- A \to \overline{K}\pi A$
51± 5	CHANDLEE	83	SPEC	+	200 $K^+ A \to K\pi A$

$K^*(892)$ BRANCHING RATIOS

NODE=M018230

$\Gamma(K^0\gamma)/\Gamma_{\text{total}}$ Γ_4/Γ

NODE=M018R3
NODE=M018R3

VALUE (units 10^{-3})	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
2.46±0.21 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.5 ±0.7	CARITHERS	75B	CNTR	0	8–16 $\overline{K}^0 A$

$\Gamma(K^\pm\gamma)/\Gamma_{\text{total}}$ Γ_5/Γ

NODE=M018R2
NODE=M018R2

VALUE (units 10^{-3})	*CL%*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
0.98±0.09 OUR FIT						
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<1.6	95	BEMPORAD	73	CNTR	+	10–16 $K^+ A$

$\Gamma(K\pi\pi)/\Gamma((K\pi)^\pm)$ Γ_6/Γ_2

NODE=M018R1
NODE=M018R1

VALUE	*CL%*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
< 7 × 10^{-4}	95	JONGEJANS	78	HBC		4 $K^- p \to p\overline{K}^0 2\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<20 × 10^{-4}		WOJCICKI	64	HBC	−	1.7 $K^- p \to \overline{K}^0 \pi^- p$

$K^*(892)$ REFERENCES

NODE=M018

ADUSZKIEW...	20A	EPJ C80 460	A. Aduszkiewicz *et al.*	(CERN NA61 Collab.)	REFID=60631
ALBRECHT	20	EPJ C80 453	M. Albrecht *et al.*	(Crystal Barrel Collab.)	REFID=60439
PELAEZ	20	PRL 124 172001	J.R. Pelaez *et al.*		REFID=60559
ABLIKIM	19AQ	PR D100 032004	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59909
LEES	17C	PR D95 072007	J.P. Lees *et al.*	(BABAR Collab.)	REFID=57981
PELAEZ	17	EPJ C77 91	J.R. Pelaez, A.Rodas, J.R. de Elvira		REFID=57836
AAIJ	16N	PR D93 052018	R. Aaij *et al.*	(LHCb Collab.)	REFID=57273
ABLIKIM	16F	PR D94 032001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57307
LEES	13F	PR D87 052010	J.P. Lees *et al.*	(BABAR Collab.)	REFID=55127
DEL-AMO-SA...	11I	PR D83 072001	P. del Amo Sanchez *et al.*	(BABAR Collab.)	REFID=16493
ANTONELLI	10	EPJ C69 399	M. Antonelli *et al.*	(FlaviaNet Working Group)	REFID=53448
BOITO	10	JHEP 1009 031	D.R. Boito, R. Escribano, M. Jamin	(BARC)	REFID=53632
BOITO	09	EPJ C59 821	D.R. Boito, R. Escribano, M. Jamin		REFID=52728

MITCHELL	09A	PR D79 072008	R.E. Mitchell *et al.*	(CLEO Collab.)	REFID=52756
BONVICINI	08A	PR D78 052001	G. Bonvicini *et al.*	(CLEO Collab.)	REFID=52426
JAMIN	08	PL B664 78	M. Jamin, A. Pich, J. Portoles		REFID=52285
AUBERT	07AK	PR D76 012008	B. Aubert *et al.*	(BABAR Collab.)	REFID=51908
EPIFANOV	07	PL B654 65	D. Epifanov *et al.*	(BELLE Collab.)	REFID=51929
LINK	05I	PL B621 72	J.M. Link *et al.*	(FNAL FOCUS Collab.)	REFID=50679
PELAEZ	04A	MPL A19 2879	J.R. Pelaez	(MADU)	REFID=50347
BONVICINI	02	PRL 88 111803	G. Bonvicini *et al.*	(CLEO Collab.)	REFID=48701
PDG	00	EPJ C15 1	D.E. Groom *et al.*	(PDG Collab.)	REFID=47469
ABELE	99D	PL B468 178	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=47401
BARATE	99R	EPJ C11 599	R. Barate *et al.*	(ALEPH Collab.)	REFID=47366
BARBERIS	98E	PL B436 204	D. Barberis *et al.*	(Omega Expt.)	REFID=46348
BIRD	89	SLAC-332	P.F. Bird	(SLAC)	REFID=41002
ASTON	88	NP B296 493	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)	REFID=40262
ATKINSON	86	ZPHY C30 521	M. Atkinson *et al.*	(BONN, CERN, GLAS+)	REFID=20564
CARLSMITH	86	PRL 56 18	D. Carlsmith *et al.*	(EFI, SACL)	REFID=22461
BAUBILLIER	84B	ZPHY C26 37	M. Baubillier *et al.*	(BIRM, CERN, GLAS+)	REFID=22459
NAPIER	84	PL 149B 514	A. Napier *et al.*	(TUFTS, ARIZ, FNAL, FLOR+)	REFID=22460
BARTH	83	NP B223 296	M. Barth *et al.*	(BRUX, CERN, GENO, MONS+)	REFID=22456
BERG	83	Thesis UMI 83-21652	D.M. Berg	(ROCH)	REFID=22457
CHANDLEE	83	PRL 51 168	C. Chandlee *et al.*	(ROCH, FNAL, MINN)	REFID=22458
CLELAND	82	NP B208 189	W.E. Cleland *et al.*	(DURH, GEVA, LAUS+)	REFID=22455
DELFOSSE	81	NP B183 349	A. Delfosse *et al.*	(GEVA, LAUS)	REFID=21277
TOAFF	81	PR D23 1500	S. Toaff *et al.*	(ANL, KANS)	REFID=22454
AJINENKO	80	ZPHY C5 177	I.V. Ajinenko *et al.*	(SERP, BRUX, MONS+)	REFID=22449
EVANGELIS...	80	NP B165 383	C. Evangelista *et al.*	(BARI, BONN, CERN+)	REFID=22450
AGUILAR-...	78B	NP B141 101	M. Aguilar-Benitez *et al.*	(MADR, TATA+)	REFID=22438
BALAND	78	NP B140 220	J.F. Baland *et al.*	(MONS, BELG, CERN+)	REFID=20369
COOPER	78	NP B136 365	A.M. Cooper *et al.*	(TATA, CERN, CDEF+)	REFID=22441
ESTABROOKS	78	NP B133 490	P.G. Estabrooks *et al.*	(MCGI, CARL, DURH+)	REFID=22443
Also		PR D17 658	P.G. Estabrooks *et al.*	(MCGI, CARL, DURH+)	REFID=22444
JONGEJANS	78	NP B139 383	B. Jongejans *et al.*	(ZEEM, CERN, NIJM+)	REFID=22445
WICKLUND	78	PR D17 1197	A.B. Wicklund *et al.*	(ANL)	REFID=20124
BOWLER	77	NP B126 31	M.G. Bowler *et al.*	(OXF)	REFID=22437
CARITHERS	75B	PRL 35 349	W.C.J. Carithers *et al.*	(ROCH, MCGI)	REFID=22433
MCCUBBIN	75	NP B86 13	N.A. McCubbin, L. Lyons	(OXF)	REFID=22434
PALER	75	NP B96 1	K. Paler *et al.*	(RHEL, SACL, EPOL)	REFID=22435
FOX	74	NP B80 403	G.C. Fox, M.L. Griss	(CIT)	REFID=22430
MATISON	74	PR D9 1872	M.J. Matison *et al.*	(LBL)	REFID=22431
BEMPORAD	73	NP B51 1	C. Bemporad *et al.*	(CERN, ETH, LOIC)	REFID=22416
CLARK	73	NP B54 432	A.G. Clark, L. Lyons, D. Radojicic	(OXF)	REFID=22426
LEWIS	73	NP B60 283	P.H. Lewis *et al.*	(LOWC, LOIC, CDEF)	REFID=22427
LINGLIN	73	NP B55 408	D. Linglin	(CERN)	REFID=22428
BUCHNER	72	NP B45 333	K. Buchner *et al.*	(MPIM, CERN, BRUX)	REFID=22418
AGUILAR-...	71B	PR D4 2583	M. Aguilar-Benitez, R.L. Eisner, J.B. Kinson	(BNL)	REFID=22408
HABER	70	NP B17 289	B. Haber *et al.*	(REHO, SACL, BGNA, EPOL)	REFID=22406
CRENNELL	69D	PRL 22 487	D.J. Crennell *et al.*	(BNL)	REFID=22399
DAVIS	69	PRL 23 1071	P.J. Davis *et al.*	(LRL)	REFID=22400
SCHWEING...	68	PR 166 1317	F. Schweingruber *et al.*	(ANL, NWES)	REFID=22398
BARASH	67B	PR 156 1399	N. Barash *et al.*	(COLU)	REFID=20160
BARLOW	67	NC 50A 701	J. Barlow *et al.*	(CERN, CDEF, IRAD, LIVP)	REFID=20041
DAUBER	67B	PR 153 1403	P.M. Dauber *et al.*	(UCLA)	REFID=22389
DEBAERE	67B	NC 51A 401	W. de Baere *et al.*	(BRUX, CERN)	REFID=22390
WOJCICKI	64	PR 135 B484	S.G. Wojcicki	(LRL)	REFID=22379

NODE=M028

$K_1(1270)$ $I(J^P) = \frac{1}{2}(1^+)$

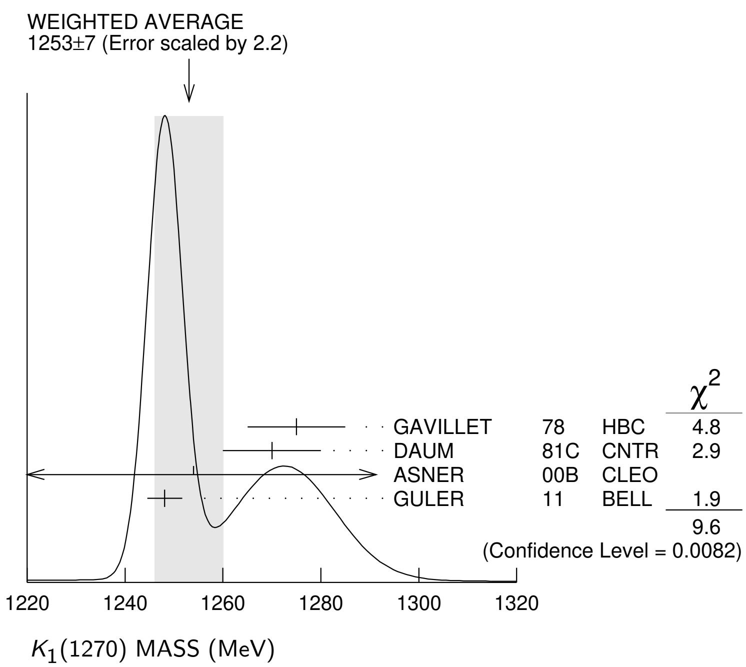
$K_1(1270)$ MASS

NODE=M028MX

NODE=M028MX

VALUE (MeV)	DOCUMENT ID

1253±7 OUR AVERAGE Includes data from the 4 datablocks that follow this one. Error includes scale factor of 2.2. See the ideogram below.



PRODUCED BY K^-, BACKWARD SCATTERING, HYPERON EXCHANGE

NODE=M028M2
NODE=M028M2

The data in this block is included in the average printed for a previous datablock.

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1275±10	700	GAVILLET	78	HBC	+	4.2 $K^- p \to \Xi^- (K\pi\pi)^+$

PRODUCED BY K BEAMS

NODE=M028M3
NODE=M028M3

The data in this block is included in the average printed for a previous datablock.

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
1270±10	[1] DAUM	81C	CNTR	−	63 $K^- p \to K^- 2\pi p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
∼ 1276	[2] TORNQVIST	82B	RVUE		
∼ 1300	VERGEEST	79	HBC	−	4.2 $K^- p \to (\overline{K}\pi\pi)^- p$
1289±25	[3] CARNEGIE	77	ASPK	±	13 $K^\pm p \to (K\pi\pi)^\pm p$
∼ 1300	BRANDENB...	76	ASPK	±	13 $K^\pm p \to (K\pi\pi)^\pm p$
∼ 1270	OTTER	76	HBC	−	10,14,16 $K^- p \to (\overline{K}\pi\pi)^- p$
1260	DAVIS	72	HBC	+	12 $K^+ p$
1234±12	FIRESTONE	72B	DBC	+	12 $K^+ d$

[1] Well described in the chiral unitary approach of GENG 07 with two poles at 1195 and 1284 MeV and widths of 246 and 146 MeV, respectively. NODE=M028M3;LINKAGE=DA

[2] From a unitarized quark-model calculation. NODE=M028M3;LINKAGE=T

[3] From a model-dependent fit with Gaussian background to BRANDENBURG 76 data. NODE=M028M3;LINKAGE=E

PRODUCED BY BEAMS OTHER THAN K MESONS

NODE=M028M1
NODE=M028M1

The data in this block is included in the average printed for a previous datablock.

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1248.1 ± 3.3 ±1.4		GULER	11	BELL	$B^+ \to J/\psi K^+ \pi^+ \pi^-$

• • • We do not use the following data for averages, fits, limits, etc. • • •

1289.81± 0.56±1.66	894k	AAIJ	18AI	LHCB	$D^0 \to K^\mp \pi^\pm \pi^\pm \pi^\mp$	
1279 ±10	25k	[1] ABLIKIM	06C	BES2	$J/\psi \to \overline{K}^*(892)^0 K^+ \pi^-$	
1294 ±10	310	RODEBACK	81	HBC	$4\ \pi^- p \to \Lambda K 2\pi$	
1300	40	CRENNELL	72	HBC	$4.5\ \pi^- p \to \Lambda K 2\pi$	
1242 $^{+9}_{-10}$		[2] ASTIER	69	HBC	$\overline{p} p$	
1300	45	CRENNELL	67	HBC	$6\ \pi^- p \to \Lambda K 2\pi$	

[1] Systematic errors not estimated. NODE=M028M1;LINKAGE=AB
[2] This was called the C meson. NODE=M028M1;LINKAGE=A

PRODUCED IN τ LEPTON DECAYS

NODE=M028MT
NODE=M028MT

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT

The data in this block is included in the average printed for a previous datablock.

1254±33±34	7k	ASNER	00B	CLEO	±	$\tau^- \to K^- \pi^+ \pi^- \nu_\tau$

K_1(1270) WIDTH

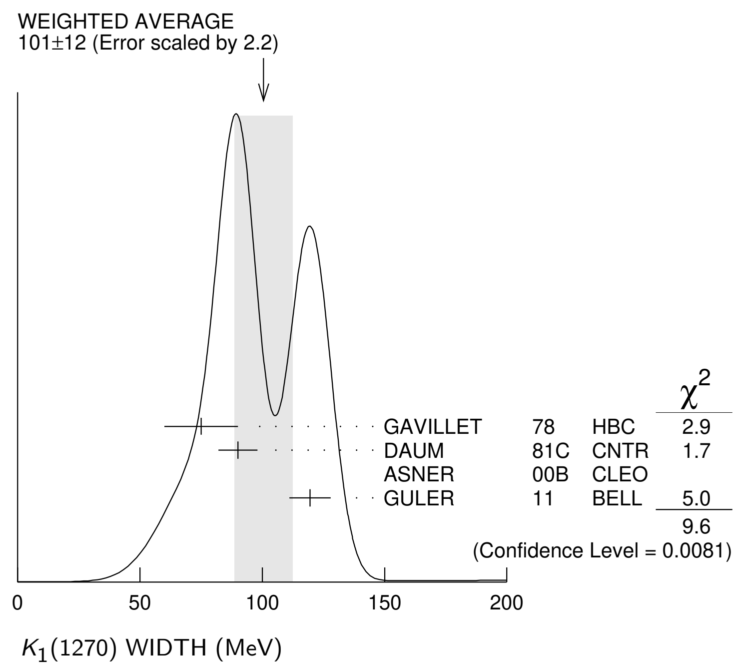
NODE=M028WX

VALUE (MeV)	DOCUMENT ID

NODE=M028WX
→ UNCHECKED ←

90±20 OUR ESTIMATE This is only an educated guess; the error given is larger than the error on the average of the published values.

101±12 OUR AVERAGE Includes data from the 4 datablocks that follow this one. Error includes scale factor of 2.2. See the ideogram below.



PRODUCED BY K^-, BACKWARD SCATTERING, HYPERON EXCHANGE

NODE=M028W2
NODE=M028W2

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT

The data in this block is included in the average printed for a previous datablock.

75±15	700	GAVILLET	78	HBC	+	$4.2\ K^- p \to \Xi^- K \pi\pi$

PRODUCED BY K BEAMS

NODE=M028W3
NODE=M028W3

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT

The data in this block is included in the average printed for a previous datablock.

90± 8	[1] DAUM	81C	CNTR	−	$63\ K^- p \to K^- 2\pi p$

• • • We do not use the following data for averages, fits, limits, etc. • • •

∼ 150	VERGEEST	79	HBC	−	$4.2\ K^- p \to (\overline{K}\pi\pi)^- p$
150±71	[2] CARNEGIE	77	ASPK	±	$13\ K^\pm p \to (K\pi\pi)^\pm p$
∼ 200	BRANDENB...	76	ASPK	±	$13\ K^\pm p \to (K\pi\pi)^\pm p$
120	DAVIS	72	HBC	+	$12\ K^+ p$
188±21	FIRESTONE	72B	DBC	+	$12\ K^+ d$

[1] Well described in the chiral unitary approach of GENG 07 with two poles at 1195 and 1284 MeV and widths of 246 and 146 MeV, respectively. NODE=M028W3;LINKAGE=DA
[2] From a model-dependent fit with Gaussian background to BRANDENBURG 76 data. NODE=M028W3;LINKAGE=E

PRODUCED BY BEAMS OTHER THAN K MESONS

NODE=M028W1
NODE=M028W1

The data in this block is included in the average printed for a previous datablock.

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
119.5 ± 5.2 ±6.7		GULER	11	BELL	$B^+ \to J/\psi K^+ \pi^+ \pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
116.11± 1.65±2.96	894k	AAIJ	18AI	LHCB	$D^0 \to K^\mp \pi^\pm \pi^\pm \pi^\mp$
131 ±21	25k	[1] ABLIKIM	06C	BES2	$J/\psi \to \overline{K}^*(892)^0 K^+ \pi^-$
66 ±15	310	RODEBACK	81	HBC	$4\ \pi^- p \to \Lambda K 2\pi$
60	40	CRENNELL	72	HBC	$4.5\ \pi^- p \to \Lambda K 2\pi$
127 $^{+7}_{-25}$		ASTIER	69	HBC	$\overline{p} p$
60	45	CRENNELL	67	HBC	$6\ \pi^- p \to \Lambda K 2\pi$

[1] Systematic errors not estimated.

NODE=M028W1;LINKAGE=AB

PRODUCED IN τ LEPTON DECAYS

NODE=M028WT
NODE=M028WT

The data in this block is included in the average printed for a previous datablock.

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
$\mathbf{260^{+90}_{-70}\pm 80}$	7k	ASNER	00B	CLEO	±	$\tau^- \to K^- \pi^+ \pi^- \nu_\tau$

$K_1(1270)$ DECAY MODES

NODE=M028215;NODE=M028

	Mode	Fraction (Γ_i/Γ)	Scale factor	
Γ_1	$K\rho$	(38 ±13) %	2.2	DESIG=2
Γ_2	$K_0^*(1430)\pi$	(28 ± 4) %		DESIG=7
Γ_3	$K^*(892)\pi$	(21 ±10) %	2.2	DESIG=1
Γ_4	$K\omega$	(11.0± 2.0) %		DESIG=5
Γ_5	$K f_0(1370)$	(3.0± 2.0) %		DESIG=8
Γ_6	γK^0	seen		DESIG=9;OUR EST;→ UNCHECKED ←

$K_1(1270)$ PARTIAL WIDTHS

NODE=M028220

$\Gamma(K\rho)$ Γ_1

NODE=M028W5
NODE=M028W5

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
57±5	MAZZUCATO	79	HBC	+	$4.2\ K^- p \to \Xi^- (K\pi\pi)^+$
75±6	CARNEGIE	77B	ASPK	±	$13\ K^\pm p \to (K\pi\pi)^\pm p$

$\Gamma(K_0^*(1430)\pi)$ Γ_2

NODE=M028W7
NODE=M028W7

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
26±6	CARNEGIE	77B	ASPK	±	$13\ K^\pm p \to (K\pi\pi)^\pm p$

$\Gamma(K^*(892)\pi)$ Γ_3

NODE=M028W4
NODE=M028W4

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
14±11	MAZZUCATO	79	HBC	+	$4.2\ K^- p \to \Xi^- (K\pi\pi)^+$
2± 2	CARNEGIE	77B	ASPK	±	$13\ K^\pm p \to (K\pi\pi)^\pm p$

$\Gamma(K\omega)$ Γ_4

NODE=M028W6
NODE=M028W6

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
4±4	MAZZUCATO	79	HBC	+	$4.2\ K^- p \to \Xi^- (K\pi\pi)^+$
24±3	CARNEGIE	77B	ASPK	±	$13\ K^\pm p \to (K\pi\pi)^\pm p$

$\Gamma(K f_0(1370))$ Γ_5

NODE=M028W8
NODE=M028W8

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
22±5	CARNEGIE	77B	ASPK	±	$13\ K^\pm p \to (K\pi\pi)^\pm p$

$\Gamma(\gamma K^0)$ — Γ_6

NODE=M028W9

VALUE (keV)	DOCUMENT ID	TECN	COMMENT
73.2±6.1±28.3	ALAVI-HARATI 02B	KTEV	$K + A \to K^* + A$

$K_1(1270)$ BRANCHING RATIOS

NODE=M028225

$\Gamma(K\rho)/\Gamma_{total}$ — Γ_1/Γ

NODE=M028R2

VALUE	DOCUMENT ID	TECN	COMMENT
0.38 ±0.13 OUR FIT Error includes scale factor of 2.2.			
0.42 ±0.06	[1] DAUM 81C	CNTR	63 $K^- p \to K^- 2\pi p$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.584±0.043	[2] GULER 11	BELL	$B^+ \to J/\psi K^+ \pi^+ \pi^-$
dominant	RODEBACK 81	HBC	4 $\pi^- p \to \Lambda K 2\pi$

$\Gamma(K_0^*(1430)\pi)/\Gamma_{total}$ — Γ_2/Γ

NODE=M028R4

VALUE	DOCUMENT ID	TECN	COMMENT
0.28 ±0.04	[1] DAUM 81C	CNTR	63 $K^- p \to K^- 2\pi p$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.0201±0.0064	[2] GULER 11	BELL	$B^+ \to J/\psi K^+ \pi^+ \pi^-$

$\Gamma(K^*(892)\pi)/\Gamma_{total}$ — Γ_3/Γ

NODE=M028R1

VALUE	DOCUMENT ID	TECN	COMMENT
0.21 ±0.10 OUR FIT Error includes scale factor of 2.2.			
0.16 ±0.05	[1] DAUM 81C	CNTR	63 $K^- p \to K^- 2\pi p$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.171±0.023	[2] GULER 11	BELL	$B^+ \to J/\psi K^+ \pi^+ \pi^-$

$\Gamma(K^*(892)\pi)/\Gamma(K\rho)$ — Γ_3/Γ_1

NODE=M028R00

VALUE	DOCUMENT ID	TECN	COMMENT
0.56±0.29 OUR FIT Error includes scale factor of 2.2.			
0.99±0.15±0.18	ABLIKIM 21U	BES3	$D_s^+ \to \overline{K}_1^0(1270) K^+$

$\Gamma(K\omega)/\Gamma_{total}$ — Γ_4/Γ

NODE=M028R3

VALUE	DOCUMENT ID	TECN	COMMENT
0.11 ±0.02	[1] DAUM 81C	CNTR	63 $K^- p \to K^- 2\pi p$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.225±0.052	[2] GULER 11	BELL	$B^+ \to J/\psi K^+ \pi^+ \pi^-$

$\Gamma(K\omega)/\Gamma(K\rho)$ — Γ_4/Γ_1

NODE=M028R6

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.30	95	RODEBACK 81	HBC	4 $\pi^- p \to \Lambda K 2\pi$

$\Gamma(K f_0(1370))/\Gamma_{total}$ — Γ_5/Γ

NODE=M028R5

VALUE	DOCUMENT ID	TECN	COMMENT
0.03±0.02	[1] DAUM 81C	CNTR	63 $K^- p \to K^- 2\pi p$

D-wave/S-wave RATIO FOR $K_1(1270) \to K^*(892)\pi$

NODE=M028R9

VALUE	DOCUMENT ID	TECN	COMMENT
1.0±0.7	[1] DAUM 81C	CNTR	63 $K^- p \to K^- 2\pi p$

[1] Average from low and high t data.

NODE=M028R;LINKAGE=F

[2] Assuming that decays are saturated by the $K\rho$, $K_0^*(1430)\pi$, $K^*(892)\pi$, $K\omega$ decay modes and neglecting interference between them. The values B($\omega \to \pi^+\pi^-$) = $(1.53^{+0.11}_{-0.13})$% and B($K_0^*(1430) \to K\pi$) = (93 ± 10)% are used. Systematic uncertainties not estimated.

NODE=M028R1;LINKAGE=GU

$K_1(1270)$ REFERENCES

NODE=M028

ABLIKIM	21U	PR D104 032011	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61155
AAIJ	18AI	EPJ C78 443	R. Aaij *et al.*	(LHCb Collab.)	REFID=59187
GULER	11	PR D83 032005	H. Guler *et al.*	(BELLE Collab.)	REFID=53668
GENG	07	PR D75 014017	L.S. Geng *et al.*		REFID=51623
ABLIKIM	06C	PL B633 681	M. Ablikim *et al.*	(BES Collab.)	REFID=51037
ALAVI-HARATI	02B	PRL 89 072001	A. Alavi-Harati *et al.*	(FNAL KTeV Collab.)	REFID=48822
ASNER	00B	PR D62 072006	D.M. Asner *et al.*	(CLEO Collab.)	REFID=47766
TORNQVIST	82B	NP B203 268	N.A. Tornqvist	(HELS)	REFID=20573
DAUM	81C	NP B187 1	C. Daum *et al.*	(AMST, CERN, CRAC, MPIM+)	REFID=22548
RODEBACK	81	ZPHY C9 9	S. Rodeback *et al.*	(CERN, CDEF, MADR+)	REFID=22550
MAZZUCATO	79	NP B156 532	M. Mazzucato *et al.*	(CERN, ZEEM, NIJM+)	REFID=20867
VERGEEST	79	NP B158 265	J.S.M. Vergeest *et al.*	(NIJM, AMST, CERN+)	REFID=22542
GAVILLET	78	PL 76B 517	P. Gavillet *et al.*	(AMST, CERN, NIJM+) JP	REFID=22538
CARNEGIE	77	NP B127 509	R.K. Carnegie *et al.*	(SLAC)	REFID=22535
CARNEGIE	77B	PL 68B 287	R.K. Carnegie *et al.*	(SLAC)	REFID=22536
BRANDENB...	76	PRL 36 703	G.W. Brandenburg *et al.*	(SLAC) JP	REFID=22532
OTTER	76	NP B106 77	G. Otter *et al.*	(AACH3, BERL, CERN, LOIC+) JP	REFID=22533
CRENNELL	72	PR D6 1220	D.J. Crennell *et al.*	(BNL)	REFID=22419
DAVIS	72	PR D5 2688	P.J. Davis *et al.*	(LBL)	REFID=22505
FIRESTONE	72B	PR D5 505	A. Firestone *et al.*	(LBL)	REFID=22506
ASTIER	69	NP B10 65	A. Astier *et al.*	(CDEF, CERN, IPNP, LIVP) IJP	REFID=22482
CRENNELL	67	PRL 19 44	D.J. Crennell *et al.*	(BNL) I	REFID=22473

$K_1(1400)$

$I(J^P) = \frac{1}{2}(1^+)$

NODE=M064

$K_1(1400)$ MASS

NODE=M064M

NODE=M064M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1403± 7 OUR AVERAGE						
1463±64±68	7k	ASNER	00B	CLEO	±	$\tau^- \rightarrow K^-\pi^+\pi^-\nu_\tau$
1373±14±18		[1] ASTON	87	LASS	0	11 $K^- p \rightarrow \overline{K}^0\pi^+\pi^- n$
1392±18		BAUBILLIER	82B	HBC	0	8.25 $K^- p \rightarrow K^0_S\pi^+\pi^- n$
1410±25		DAUM	81C	CNTR	−	63 $K^- p \rightarrow K^- 2\pi p$
1415±15		ETKIN	80	MPS	0	6 $K^- p \rightarrow \overline{K}^0\pi^+\pi^- n$
1404±10		[2] CARNEGIE	77	ASPK	±	13 $K^\pm p \rightarrow (K\pi\pi)^\pm p$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1418± 8	25k	[3] ABLIKIM	06C	BES2		$J/\psi \rightarrow \overline{K}^*(892)^0 K^+\pi^-$
∼ 1350		[4] TORNQVIST	82B	RVUE		
∼ 1400		VERGEEST	79	HBC	−	4.2 $K^- p \rightarrow (\overline{K}\pi\pi)^- p$
∼ 1400		BRANDENB...	76	ASPK	±	13 $K^\pm p \rightarrow (K\pi\pi)^\pm p$
1420		DAVIS	72	HBC	+	12 $K^+ p$
1368±18		FIRESTONE	72B	DBC	+	12 $K^+ d$

[1] From partial-wave analysis of $K^0\pi^+\pi^-$ system. NODE=M064M;LINKAGE=P

[2] From a model-dependent fit with Gaussian background to BRANDENBURG 76 data. NODE=M064M;LINKAGE=E

[3] Systematic errors not estimated. NODE=M064M;LINKAGE=AB

[4] From a unitarized quark-model calculation. NODE=M064M;LINKAGE=T

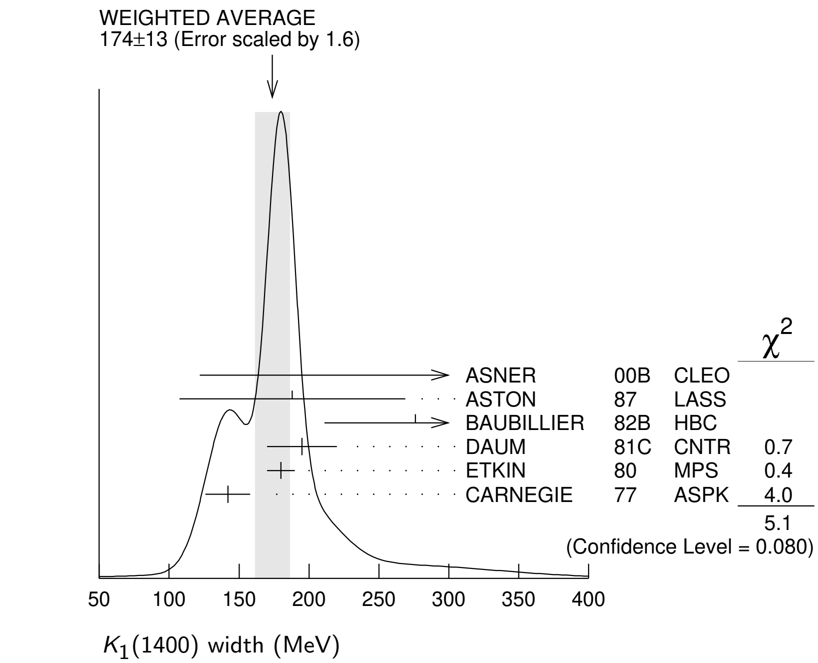
$K_1(1400)$ WIDTH

NODE=M064W

NODE=M064W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
174± 13 OUR AVERAGE Error includes scale factor of 1.6. See the ideogram below.						
$300^{+370}_{-110}\pm140$	7k	ASNER	00B	CLEO	±	$\tau^- \rightarrow K^-\pi^+\pi^-\nu_\tau$
188± 54± 60		[5] ASTON	87	LASS	0	11 $K^- p \rightarrow \overline{K}^0\pi^+\pi^- n$
276± 65		BAUBILLIER	82B	HBC	0	8.25 $K^- p \rightarrow K^0_S\pi^+\pi^- n$
195± 25		DAUM	81C	CNTR	−	63 $K^- p \rightarrow K^- 2\pi p$
180± 10		ETKIN	80	MPS	0	6 $K^- p \rightarrow \overline{K}^0\pi^+\pi^- n$
142± 16		[6] CARNEGIE	77	ASPK	±	13 $K^\pm p \rightarrow (K\pi\pi)^\pm p$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
152± 16	25k	[7] ABLIKIM	06C	BES2		$J/\psi \rightarrow \overline{K}^*(892)^0 K^+\pi^-$
∼ 200		VERGEEST	79	HBC	−	4.2 $K^- p \rightarrow (\overline{K}\pi\pi)^- p$
∼ 160		BRANDENB...	76	ASPK	±	13 $K^\pm p \rightarrow (K\pi\pi)^\pm p$
80		DAVIS	72	HBC	+	12 $K^+ p$
241± 30		FIRESTONE	72B	DBC	+	12 $K^+ d$

[5] From partial-wave analysis of $K^0\pi^+\pi^-$ system. NODE=M064W;LINKAGE=P
[6] From a model-dependent fit with Gaussian background to BRANDENBURG 76 data. NODE=M064W;LINKAGE=E
[7] Systematic errors not estimated. NODE=M064W;LINKAGE=AB



$K_1(1400)$ DECAY MODES

NODE=M064215;NODE=M064

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$K^*(892)\pi$	(94 ±6) %	DESIG=1
Γ_2	$K\rho$	(3.0±3.0) %	DESIG=2
Γ_3	$K f_0(1370)$	(2.0±2.0) %	DESIG=8
Γ_4	$K\omega$	(1.0±1.0) %	DESIG=5
Γ_5	$K_0^*(1430)\pi$	not seen	DESIG=7;OUR EST;→ UNCHECKED ←
Γ_6	γK^0	seen	DESIG=9;OUR EST;→ UNCHECKED ←
Γ_7	$K\phi$	seen	DESIG=10

$K_1(1400)$ PARTIAL WIDTHS

NODE=M064220

$\Gamma(K^*(892)\pi)$ Γ_1

NODE=M064W1

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
117±10	CARNEGIE	77	ASPK	±	13 $K^\pm p \to (K\pi\pi)^\pm p$

$\Gamma(K\rho)$ Γ_2

NODE=M064W2

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
2±1	CARNEGIE	77	ASPK	±	13 $K^\pm p \to (K\pi\pi)^\pm p$

$\Gamma(K\omega)$ Γ_4

NODE=M064W5

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
23±12	CARNEGIE	77	ASPK	±	13 $K^\pm p \to (K\pi\pi)^\pm p$

$\Gamma(\gamma K^0)$ Γ_6

NODE=M064W6

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
280.8±23.2±40.4	ALAVI-HARATI	02B	KTEV	$K + A \to K^* + A$

$K_1(1400)$ BRANCHING RATIOS

NODE=M064225

$\Gamma(K^*(892)\pi)/\Gamma_{total}$ Γ_1/Γ

NODE=M064R1

VALUE	DOCUMENT ID		TECN	COMMENT
0.94±0.06	[9] DAUM	81C	CNTR	63 $K^- p \to K^- 2\pi p$

$\Gamma(K\rho)/\Gamma_{total}$ — Γ_2/Γ — NODE=M064R2

VALUE	DOCUMENT ID		TECN	COMMENT
0.03±0.03	[9] DAUM	81C	CNTR	63 $K^- p \to K^- 2\pi p$

$\Gamma(K f_0(1370))/\Gamma_{total}$ — Γ_3/Γ — NODE=M064R5

VALUE	DOCUMENT ID		TECN	COMMENT
0.02±0.02	[9] DAUM	81C	CNTR	63 $K^- p \to K^- 2\pi p$

$\Gamma(K\omega)/\Gamma_{total}$ — Γ_4/Γ — NODE=M064R3

VALUE	DOCUMENT ID		TECN	COMMENT
0.01±0.01	[9] DAUM	81C	CNTR	63 $K^- p \to K^- 2\pi p$

$\Gamma(K\phi)/\Gamma_{total}$ — Γ_7/Γ — NODE=M064R00

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	24k	[8] AAIJ	21E	LHCB	$B^+ \to J/\psi \phi K^+$

ERROR=8

[8] From an amplitude analysis of the decay $B^+ \to J/\psi \phi K^+$ with a significance of 9.2 σ. — NODE=M064R00;LINKAGE=A

$\Gamma(K_0^*(1430)\pi)/\Gamma_{total}$ — Γ_5/Γ — NODE=M064R4

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	[9] DAUM	81C	CNTR	63 $K^- p \to K^- 2\pi p$

D-wave/*S*-wave RATIO FOR $K_1(1400) \to K^*(892)\pi$ — NODE=M064R9

VALUE	DOCUMENT ID		TECN	COMMENT
0.04±0.01	[9] DAUM	81C	CNTR	63 $K^- p \to K^- 2\pi p$

[9] Average from low and high t data. — NODE=M064R;LINKAGE=F

$K_1(1400)$ REFERENCES — NODE=M064

AAIJ	21E	PRL 127 082001	R. Aaij *et al.*	(LHCb Collab.)	REFID=61150
ABLIKIM	06C	PL B633 681	M. Ablikim *et al.*	(BES Collab.)	REFID=51037
ALAVI-HARATI	02B	PRL 89 072001	A. Alavi-Harati *et al.*	(FNAL KTeV Collab.)	REFID=48822
ASNER	00B	PR D62 072006	D.M. Asner *et al.*	(CLEO Collab.)	REFID=47766
ASTON	87	NP B292 693	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)	REFID=40234
BAUBILLIER	82B	NP B202 21	M. Baubillier *et al.*	(BIRM, CERN, GLAS+)	REFID=22551
TORNQVIST	82B	NP B203 268	N.A. Tornqvist	(HELS)	REFID=20573
DAUM	81C	NP B187 1	C. Daum *et al.*	(AMST, CERN, CRAC, MPIM+)	REFID=22548
ETKIN	80	PR D22 42	A. Etkin *et al.*	(BNL, CUNY) JP	REFID=22545
VERGEEST	79	NP B158 265	J.S.M. Vergeest *et al.*	(NIJM, AMST, CERN+)	REFID=22542
CARNEGIE	77	NP B127 509	R.K. Carnegie *et al.*	(SLAC)	REFID=22535
BRANDENB...	76	PRL 36 703	G.W. Brandenburg *et al.*	(SLAC) JP	REFID=22532
DAVIS	72	PR D5 2688	P.J. Davis *et al.*	(LBL)	REFID=22505
FIRESTONE	72B	PR D5 505	A. Firestone *et al.*	(LBL)	REFID=22506

NODE=M094

$K^*(1410)$

$I(J^P) = \frac{1}{2}(1^-)$

$K^*(1410)$ T-MATRIX POLE $\sqrt{s}$ — NODE=M094PP

NODE=M094PP

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$(1368 \pm 38) - i\,(106^{+48}_{-59})$	[1] PELAEZ	17	RVUE	$\pi K \to \pi K$

OCCUR=2

[1] Reanalysis of ESTABROOKS 78 and ASTON 88 satisfying Forward Dispersion Relations and using sequences of Pade approximants. — NODE=M094PP;LINKAGE=B

$K^*(1410)$ MASS — NODE=M094M

NODE=M094M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1414±15 OUR AVERAGE		Error includes scale factor of 1.3.				
1380±21±19		ASTON	88	LASS	0	11 $K^- p \to K^- \pi^+ n$
1420± 7±10		ASTON	87	LASS	0	11 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1437± 8±16	190k	[1] AAIJ	16N	LHCB		$D^0 \to (K^0_S \pi^\mp) K^\pm$
1426± 8±24	190k	[2] AAIJ	16N	LHCB		$D^0 \to K^0_S (K^\pm \pi^\mp)$
1276^{+72}_{-77}		[3,4] BOITO	09	RVUE		$\tau^- \to K^0_S \pi^- \nu_\tau$
1367±54		BIRD	89	LASS	−	11 $K^- p \to \overline{K}^0 \pi^- p$
1474±25		BAUBILLIER	82B	HBC	0	8.25 $K^- p \to \overline{K}^0 2\pi n$
1500±30		ETKIN	80	MPS	0	6 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$

OCCUR=2

[1] Using a parametrization for the $K\pi$ S-wave similar to ASTON 88 with fixed resonance width. NODE=M094M;LINKAGE=A
[2] Using a $K\pi$ S-wave parametrization with resonant and non-resonant contributions. NODE=M094M;LINKAGE=C
[3] From the pole position of the $K\pi$ vector form factor in the complex s-plane and using EPIFANOV 07 data. NODE=M094M;LINKAGE=BI
[4] Systematic uncertainties not estimated. NODE=M094M;LINKAGE=NS

$K^*(1410)$ WIDTH

NODE=M094W

NODE=M094W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
232± 21 OUR AVERAGE		Error includes scale factor of 1.1.				
176± 52±22		ASTON	88	LASS	0	11 $K^- p \to K^- \pi^+ n$
240± 18±12		ASTON	87	LASS	0	11 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
210± 20±60	190k	[1] AAIJ	16N	LHCB		$D^0 \to (K^0_S \pi^\mp) K^\pm$
270± 20±40	190k	[1] AAIJ	16N	LHCB		$D^0 \to K^0_S (K^\pm \pi^\mp)$
$198^{+\ 61}_{-\ 87}$		[2,3] BOITO	09	RVUE		$\tau^- \to K^0_S \pi^- \nu_\tau$
114±101		BIRD	89	LASS	−	11 $K^- p \to \overline{K}^0 \pi^- p$
275± 65		BAUBILLIER	82B	HBC	0	8.25 $K^- p \to \overline{K}^0 2\pi n$
500±100		ETKIN	80	MPS	0	6 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$

OCCUR=2

[1] Using a $K\pi$ S-wave parametrization with resonant and non-resonant contributions. NODE=M094W;LINKAGE=A
[2] From the pole position of the $K\pi$ vector form factor in the complex s-plane and using EPIFANOV 07 data. NODE=M094W;LINKAGE=BI
[3] Systematic uncertainties not estimated. NODE=M094W;LINKAGE=NS

$K^*(1410)$ DECAY MODES

NODE=M094215;NODE=M094

	Mode	Fraction (Γ_i/Γ)	Confidence level	
Γ_1	$K^*(892)\pi$	> 40 %	95%	DESIG=2
Γ_2	$K\pi$	(6.6±1.3) %		DESIG=1
Γ_3	$K\rho$	< 7 %	95%	DESIG=3;OUR EST;→ UNCHECKED ←
Γ_4	γK^0	< 2.3 $\times 10^{-4}$	90%	DESIG=4
Γ_5	$K\phi$	seen		DESIG=5

$K^*(1410)$ PARTIAL WIDTHS

NODE=M094217

$\Gamma(\gamma K^0)$ Γ_4

NODE=M094W1

NODE=M094W1

VALUE (keV)	CL%	DOCUMENT ID		TECN	COMMENT
<52.9	90	ALAVI-HARATI	02B	KTEV	$K + A \to K^* + A$

$K^*(1410)$ BRANCHING RATIOS

NODE=M094220

$\Gamma(K\rho)/\Gamma(K^*(892)\pi)$ Γ_3/Γ_1

NODE=M094R1

NODE=M094R1

VALUE	CL%	DOCUMENT ID		TECN	CHG	COMMENT
<0.17	95	ASTON	84	LASS	0	11 $K^- p \to \overline{K}^0 2\pi n$

$\Gamma(K\pi)/\Gamma(K^*(892)\pi)$ Γ_2/Γ_1

NODE=M094R2

NODE=M094R2

VALUE	CL%	DOCUMENT ID		TECN	CHG	COMMENT
<0.16	95	ASTON	84	LASS	0	11 $K^- p \to \overline{K}^0 2\pi n$

$\Gamma(K\pi)/\Gamma_{total}$ Γ_2/Γ

NODE=M094R3

NODE=M094R3

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.066±0.010±0.008	ASTON	88	LASS	0	11 $K^- p \to K^- \pi^+ n$

$\Gamma(K\phi)/\Gamma_{total}$ Γ_5/Γ

NODE=M094R00

NODE=M094R00

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	24k	[1] AAIJ	21E	LHCB	$B^+ \to J/\psi \phi K^+$

[1] From an amplitude analysis of the decay $B^+ \to J/\psi \phi K^+$ with a significance of 7.7 σ. NODE=M094R00;LINKAGE=A

$K^*(1410)$ REFERENCES

NODE=M094

AAIJ	21E	PRL 127 082001	R. Aaij *et al.*	(LHCb Collab.)	REFID=61150
PELAEZ	17	EPJ C77 91	J.R. Pelaez, A.Rodas, J.R. de Elvira		REFID=57836
AAIJ	16N	PR D93 052018	R. Aaij *et al.*	(LHCb Collab.)	REFID=57273
BOITO	09	EPJ C59 821	D.R. Boito, R. Escribano, M. Jamin		REFID=52728
EPIFANOV	07	PL B654 65	D. Epifanov *et al.*	(BELLE Collab.)	REFID=51929
ALAVI-HARATI	02B	PRL 89 072001	A. Alavi-Harati *et al.*	(FNAL KTeV Collab.)	REFID=48822
BIRD	89	SLAC-332	P.F. Bird	(SLAC)	REFID=41002
ASTON	88	NP B296 493	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)	REFID=40262
ASTON	87	NP B292 693	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)	REFID=40234
ASTON	84	PL 149B 258	D. Aston *et al.*	(SLAC, CARL, OTTA) JP	REFID=22689
BAUBILLIER	82B	NP B202 21	M. Baubillier *et al.*	(BIRM, CERN, GLAS+)	REFID=22551
ETKIN	80	PR D22 42	A. Etkin *et al.*	(BNL, CUNY) JP	REFID=22545
ESTABROOKS	78	NP B133 490	P.G. Estabrooks *et al.*	(MCGI, CARL, DURH+)	REFID=22443

NODE=M019

$K_0^*(1430)$

$I(J^P) = \frac{1}{2}(0^+)$

See our minireview in the 1994 edition and in this edition under the $f_0(500)$.

NODE=M019

$K_0^*(1430)$ T-MATRIX POLE $\sqrt{s}$

NODE=M019PP

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$(1431 \pm 6) - i\,(110 \pm 19)$	[1] PELAEZ	17	RVUE	$\pi K \to \pi K$

NODE=M019PP

[1] Reanalysis of ESTABROOKS 78 and ASTON 88 satisfying Forward Dispersion Relations and using sequences of Pade approximants.

NODE=M019PP;LINKAGE=A

$K_0^*(1430)$ MASS

NODE=M019M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1425 ±50 OUR ESTIMATE					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1449 ±17 ± 2		[1] LEES	21A	BABR	$\eta_c(1S) \to \eta' K^+ K^-$
1438 ± 8 ± 4	5.4k	[2] LEES	14E	BABR	$\eta_c(1S) \to K^+ K^- \eta/\pi^0$
1427 ± 4 ±13		[3] BUGG	10	RVUE	S-matrix pole
1466.6± 0.7± 3.4	141k	[4] BONVICINI	08A	CLEO	$D^+ \to K^- \pi^+ \pi^+$
∼ 1412		[5] LINK	07	FOCS	$D^+ \to K^- K^+ \pi^+$
1461.0± 4.0± 2.1	54k	[6] LINK	07B	FOCS	$D^+ \to K^- \pi^+ \pi^+$
1406 ±29		[7] BUGG	06	RVUE	
1435 ± 6		[8] ZHOU	06	RVUE	$K p \to K^- \pi^+ n$
1455 ±20 ±15		ABLIKIM	05Q	BES2	$\psi(2S) \to \gamma \pi^+ \pi^- K^+ K^-$
1456 ± 8		[9] ZHENG	04	RVUE	$K^- p \to K^- \pi^+ n$
∼ 1419		[10] BUGG	03	RVUE	11 $K^- p \to K^- \pi^+ n$
∼ 1440		[11] LI	03	RVUE	11 $K^- p \to K^- \pi^+ n$
1459 ± 9	15k	[12] AITALA	02	E791	$D^+ \to K^- \pi^+ \pi^+$
∼ 1440		[13] JAMIN	00	RVUE	$K p \to K p$
1436 ± 8		[14] BARBERIS	98E	OMEG	450 $p p \to p_f p_s K^+ K^- \pi^+ \pi^-$
1415 ±25		[10] ANISOVICH	97C	RVUE	11 $K^- p \to K^- \pi^+ n$
∼ 1450		[15] TORNQVIST	96	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$, $K\pi$
1412 ± 6		[16] ASTON	88	LASS	11 $K^- p \to K^- \pi^+ n$
∼ 1430		BAUBILLIER	84B	HBC	8.25 $K^- p \to \overline{K}^0 \pi^- p$
∼ 1425		[17] ESTABROOKS	78	ASPK	13 $K^\pm p \to K^\pm \pi^\pm (n, \Delta)$
∼ 1450.0		MARTIN	78	SPEC	10 $K^\pm p \to K_S^0 \pi p$

NODE=M019M
→ UNCHECKED ←

[1] Using a $K\pi$–$K\eta'$ coupled channel Breit-Wigner function.
NODE=M019M;LINKAGE=C

[2] Using both $\eta \to \gamma\gamma$ and $\eta \to \pi^+\pi^-\pi^0$. From a likelihood scan in the presence of several interfering scalar-meson resonances with fixed width $\Gamma(K_0^*(1430)) = 210$ MeV.
NODE=M019M;LINKAGE=LE

[3] S-Matrix pole. Supersedes BUGG 06. Combined analysis of ASTON 88, ABLIKIM 06C, AITALA 06, and LINK 09 using an s-dependent width with couplings to $K\pi$ and $K\eta'$, and the Adler zero near thresholds.
NODE=M019M;LINKAGE=BG

[4] From the isobar model with a complex pole for the κ.
NODE=M019M;LINKAGE=BO

[5] From a non-parametric analysis.
NODE=M019M;LINKAGE=LI

[6] A Breit-Wigner mass and width.
NODE=M019M;LINKAGE=BW

[7] S-matrix pole. Reanalysis of ASTON 88, AITALA 02, and ABLIKIM 06C including the κ with an s-dependent width and an Adler zero near threshold.
NODE=M019M;LINKAGE=BU

[8] S-matrix pole. Using ASTON 88 and assuming $K_0^*(700)$, $K_0^*(1950)$. NODE=M019M;LINKAGE=ZU
[9] Using ASTON 88 and assuming $K_0^*(700)$. NODE=M019M;LINKAGE=ZH
[10] T-matrix pole. Reanalysis of ASTON 88 data. NODE=M019M;LINKAGE=A1
[11] Breit-Wigner fit. Using ASTON 88. NODE=M019M;LINKAGE=E
[12] Assuming a low-mass scalar $K\pi$ resonance, $\kappa(700)$. NODE=M019M;LINKAGE=A0
[13] T-matrix pole. Using data from ESTABROOKS 78 and ASTON 88. NODE=M019M;LINKAGE=JM
[14] J^P not determined, could be $K_2^*(1430)$. NODE=M019M;LINKAGE=JP
[15] T-matrix pole. NODE=M019M;LINKAGE=TT
[16] Uses a model for the background, without this background they get a mass 1340 MeV, where the phase shift passes 90°. NODE=M019M;LINKAGE=D
[17] Mass defined by pole position. From elastic $K\pi$ partial-wave analysis. NODE=M019M;LINKAGE=A

$K_0^*(1430)$ WIDTH

NODE=M019W

NODE=M019W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
270 ±80 OUR ESTIMATE					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
210 ±20 ±12	5.4k	[1] LEES	14E	BABR	$\eta_c(1S) \to K^+K^-\eta/\pi^0$
270 ±10 ±40		[2] BUGG	10	RVUE	S-matrix pole
174.2± 1.9± 3.2	141k	[3] BONVICINI	08A	CLEO	$D^+ \to K^-\pi^+\pi^+$
∼ 500		[4] LINK	07	FOCS	$D^+ \to K^-K^+\pi^+$
177.0± 8.0± 3.4	54k	[5] LINK	07B	FOCS	$D^+ \to K^-\pi^+\pi^+$
350 ±40		[6] BUGG	06	RVUE	
288 ±22		[7] ZHOU	06	RVUE	$Kp \to K^-\pi^+n$
270 ±45 $^{+30}_{-35}$		ABLIKIM	05Q	BES2	$\psi(2S) \to \gamma\pi^+\pi^-K^+K^-$
217 ±31		[8] ZHENG	04	RVUE	$K^-p \to K^-\pi^+n$
∼ 316		[9] BUGG	03	RVUE	11 $K^-p \to K^-\pi^+n$
∼ 350		[10] LI	03	RVUE	11 $K^-p \to K^-\pi^+n$
175 ±17	15k	[11] AITALA	02	E791	$D^+ \to K^-\pi^+\pi^+$
∼ 300		[12] JAMIN	00	RVUE	$Kp \to Kp$
196 ±45		[13] BARBERIS	98E	OMEG	450 $pp \to p_f p_s K^+K^-\pi^+\pi^-$
330 ±50		[9] ANISOVICH	97C	RVUE	11 $K^-p \to K^-\pi^+n$
∼ 320		[14] TORNQVIST	96	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$, $K\pi$
294 ±23		ASTON	88	LASS	11 $K^-p \to K^-\pi^+n$
∼ 200		BAUBILLIER	84B	HBC	8.25 $K^-p \to \overline{K}^0\pi^-p$
200 to 300		[15] ESTABROOKS	78	ASPK	13 $K^\pm p \to K^\pm\pi^\pm(n,\Delta)$

→ UNCHECKED ←

[1] Using both $\eta \to \gamma\gamma$ and $\eta \to \pi^+\pi^-\pi^0$. From a likelihood scan in the presence of several interfering scalar-meson resonances with fixed mass $M(K_0^*(1430))$ = 1435 MeV. NODE=M019W;LINKAGE=LE
[2] S-Matrix pole. Supersedes BUGG 06. Combined analysis of ASTON 88, ABLIKIM 06C, AITALA 06, and LINK 09 using an s-dependent width with couplings to $K\pi$ and $K\eta'$, and the Adler zero near thresholds. NODE=M019W;LINKAGE=BG
[3] From the isobar model with a complex pole for the κ. NODE=M019W;LINKAGE=BO
[4] From a non-parametric analysis. NODE=M019W;LINKAGE=LI
[5] A Breit-Wigner mass and width. NODE=M019W;LINKAGE=BW
[6] S-matrix pole. Reanalysis of ASTON 88, AITALA 02, and ABLIKIM 06C including the κ with an s-dependent width and an Adler zero near threshold. NODE=M019W;LINKAGE=BU
[7] S-matrix pole. Using ASTON 88 and assuming $K_0^*(700)$, $K_0^*(1950)$. NODE=M019W;LINKAGE=ZU
[8] Using ASTON 88 and assuming $K_0^*(700)$. NODE=M019W;LINKAGE=ZH
[9] T-matrix pole. Reanalysis of ASTON 88 data. NODE=M019W;LINKAGE=A1
[10] Breit-Wigner fit. Using ASTON 88. NODE=M019W;LINKAGE=E
[11] Assuming a low-mass scalar $K\pi$ resonance, $\kappa(700)$. NODE=M019W;LINKAGE=A0
[12] T-matrix pole. Using data from ESTABROOKS 78 and ASTON 88. NODE=M019W;LINKAGE=JM
[13] J^P not determined, could be $K_2^*(1430)$. NODE=M019W;LINKAGE=JP
[14] T-matrix pole. NODE=M019W;LINKAGE=TT
[15] From elastic $K\pi$ partial-wave analysis. NODE=M019W;LINKAGE=C

$K_0^*(1430)$ DECAY MODES

NODE=M019215;NODE=M019

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$K\pi$	(93 ±10) %	DESIG=1
Γ_2	$K\eta$	($8.6^{+2.7}_{-3.4}$) %	DESIG=2
Γ_3	$K\eta'(958)$	seen	DESIG=3

$K_0^*(1430)$ BRANCHING RATIOS

NODE=M019220

$\Gamma(K\pi)/\Gamma_{total}$ Γ_1/Γ

NODE=M019R1
NODE=M019R1

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.93±0.04±0.09	ASTON	88	LASS	0	11 $K^- p \to K^- \pi^+ n$

$\Gamma(K\eta)/\Gamma(K\pi)$ Γ_2/Γ_1

NODE=M019R01
NODE=M019R01

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
$9.2\pm2.5^{+1.0}_{-2.5}$	5.4k	[1] LEES	14E	BABR	$\eta_c(1S) \to K^+ K^- \eta/\pi^0$

[1] Using both $\eta \to \gamma\gamma$ and $\eta \to \pi^+\pi^-\pi^0$. From a Dalitz analysis in the presence of several interfering scalar-meson resonances.

NODE=M019R01;LINKAGE=LE

$\Gamma(K\eta'(958))/\Gamma_{total}$ Γ_3/Γ

NODE=M019R00
NODE=M019R00

VALUE	DOCUMENT ID		TECN	COMMENT
seen	ABLIKIM	14J	BES3	$\psi(2S) \to \gamma K^+ K^- \eta'(958)$

$\Gamma(K\eta'(958))/\Gamma(K\pi)$ Γ_3/Γ_1

NODE=M019R02
NODE=M019R02

VALUE	DOCUMENT ID		TECN	COMMENT
0.397±0.064±0.054	[1] LEES	21A	BABR	$\eta_c(1S) \to \eta' K^+ K^-$

[1] Using $K\pi$ data from LEES 14E.

NODE=M019R02;LINKAGE=A

$K_0^*(1430)$ REFERENCES

NODE=M019

LEES	21A	PR D104 072002	J.P. Lees *et al.*	(BABAR Collab.)	REFID=61442
PELAEZ	17	EPJ C77 91	J.R. Pelaez, A.Rodas, J.R. de Elvira		REFID=57836
ABLIKIM	14J	PR D89 074030	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55901
LEES	14E	PR D89 112004	J.P. Lees *et al.*	(BABAR Collab.)	REFID=55937
BUGG	10	PR D81 014002	D.V. Bugg	(LOQM)	REFID=53213
LINK	09	PL B681 14	J.M. Link *et al.*	(FNAL FOCUS Collab.)	REFID=53056
BONVICINI	08A	PR D78 052001	G. Bonvicini *et al.*	(CLEO Collab.)	REFID=52426
LINK	07	PL B648 156	J.M. Link *et al.*	(FNAL FOCUS Collab.)	REFID=51702
LINK	07B	PL B653 1	J.M. Link *et al.*	(FNAL FOCUS Collab.)	REFID=51875
ABLIKIM	06C	PL B633 681	M. Ablikim *et al.*	(BES Collab.)	REFID=51037
AITALA	06	PR D73 032004	E.M. Aitala *et al.*	(FNAL E791 Collab.)	REFID=51051
Also		PR D74 059901 (errat.)	E.M. Aitala *et al.*	(FNAL E791 Collab.)	REFID=51458
BUGG	06	PL B632 471	D.V. Bugg	(LOQM)	REFID=50996
ZHOU	06	NP A775 212	Z.Y. Zhou, H.Q. Zheng		REFID=51198
ABLIKIM	05Q	PR D72 092002	M. Ablikim *et al.*	(BES Collab.)	REFID=50958
ZHENG	04	NP A733 235	H.Q. Zheng *et al.*		REFID=50165
BUGG	03	PL B572 1	D.V. Bugg		REFID=49586
LI	03	PR D67 034025	L. Li, B. Zou, G. Li		REFID=49192
AITALA	02	PRL 89 121801	E.M. Aitala *et al.*	(FNAL E791 Collab.)	REFID=48807
JAMIN	00	NP B587 331	M. Jamin *et al.*		REFID=47983
BARBERIS	98E	PL B436 204	D. Barberis *et al.*	(Omega Expt.)	REFID=46348
ANISOVICH	97C	PL B413 137	A.V. Anisovich, A.V. Sarantsev		REFID=45815
TORNQVIST	96	PRL 76 1575	N.A. Tornqvist, M. Roos	(HELS)	REFID=44507
ASTON	88	NP B296 493	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)	REFID=40262
BAUBILLIER	84B	ZPHY C26 37	M. Baubillier *et al.*	(BIRM, CERN, GLAS+)	REFID=22459
ESTABROOKS	78	NP B133 490	P.G. Estabrooks *et al.*	(MCGI, CARL, DURH+)	REFID=22443
MARTIN	78	NP B134 392	A.D. Martin *et al.*	(DURH, GEVA)	REFID=22446

NODE=M022

$K_2^*(1430)$

$I(J^P) = \frac{1}{2}(2^+)$

We consider that phase-shift analyses provide more reliable determinations of the mass and width.

NODE=M022

$K_2^*(1430)$ T-MATRIX POLE $\sqrt{s}$

NODE=M022PP

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$(1424 \pm 4) - i\,(66 \pm 2)$	[1] PELAEZ	17	RVUE	$\pi K \to \pi K$

NODE=M022PP

[1] Reanalysis of ESTABROOKS 78 and ASTON 88 satisfying Forward Dispersion Relations and using sequences of Pade approximants.

NODE=M022PP;LINKAGE=A

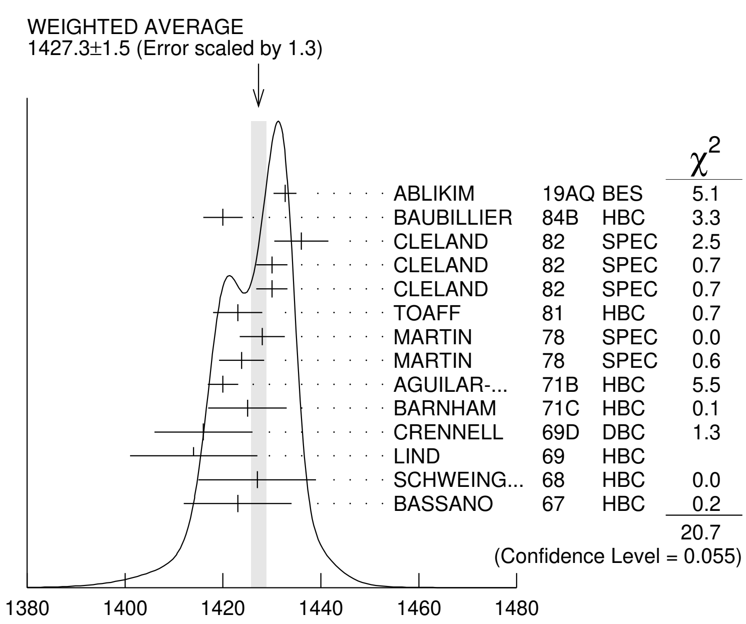
$K_2^*(1430)$ MASS

NODE=M022205

CHARGED ONLY, WITH FINAL STATE $K\pi$

NODE=M022M1
NODE=M022M1

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT	
1427.3± 1.5 OUR AVERAGE		Error includes scale factor of 1.3. See the ideogram below.					
$1432.7 \pm 0.7^{+2.2}_{-2.3}$	183k	ABLIKIM	19AQ	BES	$\pm$	$J/\psi \to K^+ K^- \pi^0$	
1420 ± 4	1587	BAUBILLIER	84B	HBC	$-$	$8.25\ K^- p \to \overline{K}^0 \pi^- p$	
1436 ± 5.5	400	[2,3] CLELAND	82	SPEC	$+$	$30\ K^+ p \to K_S^0 \pi^+ p$	
1430 ± 3.2	1500	[2,3] CLELAND	82	SPEC	$+$	$50\ K^+ p \to K_S^0 \pi^+ p$	OCCUR=2
1430 ± 3.2	1200	[2,3] CLELAND	82	SPEC	$-$	$50\ K^+ p \to K_S^0 \pi^- p$	OCCUR=3
1423 ± 5	935	TOAFF	81	HBC	$-$	$6.5\ K^- p \to \overline{K}^0 \pi^- p$	
1428.0 ± 4.6		[4] MARTIN	78	SPEC	$+$	$10\ K^\pm p \to K_S^0 \pi p$	
1423.8 ± 4.6		[4] MARTIN	78	SPEC	$-$	$10\ K^\pm p \to K_S^0 \pi p$	OCCUR=2
1420.0 ± 3.1	1400	AGUILAR-...	71B	HBC	$-$	$3.9{,}4.6\ K^- p$	
1425 ± 8.0	225	[2,3] BARNHAM	71C	HBC	$+$	$K^+ p \to K^0 \pi^+ p$	
1416 ± 10	220	CRENNELL	69D	DBC	$-$	$3.9\ K^- N \to \overline{K}^0 \pi^- N$	
1414 ± 13.0	60	[2] LIND	69	HBC	$+$	$9\ K^+ p \to K^0 \pi^+ p$	
1427 ± 12	63	[2] SCHWEING...	68	HBC	$-$	$5.5\ K^- p \to \overline{K} \pi N$	OCCUR=2
1423 ± 11.0	39	[2] BASSANO	67	HBC	$-$	$4.6\text{–}5.0\ K^- p \to \overline{K}^0 \pi^- p$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
$1423.4 \pm 2 \pm 3$	24809 ± 820	[5] BIRD	89	LASS	$-$	$11\ K^- p \to \overline{K}^0 \pi^- p$	



$K_2^*(1430)$ mass, combined neutral and charged (MeV)

NEUTRAL ONLY

NODE=M022M4

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1432.4± 1.3 OUR AVERAGE					
1431.2± 1.8± 0.7		[6] ASTON	88	LASS	11 $K^- p \to K^- \pi^+ n$
1434 ± 4 ± 6		[6] ASTON	87	LASS	11 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$
1433 ± 6 ±10		[6] ASTON	84B	LASS	11 $K^- p \to \overline{K}^0 2\pi n$
1471 ±12		[6] BAUBILLIER	82B	HBC	8.25 $K^- p \to N K^0_S \pi\pi$
1428 ± 3		[6] ASTON	81C	LASS	11 $K^- p \to K^- \pi^+ n$
1434 ± 2		[6] ESTABROOKS	78	ASPK	13 $K^\pm p \to p K \pi$
1440 ±10		[6] BOWLER	77	DBC	5.5 $K^+ d \to K \pi p p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1428.5± 3.9	1786± 127	[7] AUBERT	07AK	BABR	10.6 $e^+ e^- \to K^{*0} K^\pm \pi^\mp \gamma$
1420 ± 7	300	HENDRICK	76	DBC	8.25 $K^+ N \to K^+ \pi N$
1421.6± 4.2	800	MCCUBBIN	75	HBC	3.6 $K^- p \to K^- \pi^+ n$
1420.1± 4.3		[8] LINGLIN	73	HBC	2–13 $K^+ p \to K^+ \pi^- X$
1419.1± 3.7	1800	AGUILAR-...	71B	HBC	3.9,4.6 $K^- p$
1416 ± 6	600	CORDS	71	DBC	9 $K^+ n \to K^+ \pi^- p$
1421.1± 2.6	2200	DAVIS	69	HBC	12 $K^+ p \to K^+ \pi^- X$

[2] Errors enlarged by us to $\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M022M;LINKAGE=D

[3] Number of events in peak re-evaluated by us. NODE=M022M;LINKAGE=W

[4] Systematic error added by us. NODE=M022M;LINKAGE=B

[5] From a partial wave amplitude analysis. NODE=M022M;LINKAGE=F

[6] From phase shift or partial-wave analysis. NODE=M022M;LINKAGE=P

[7] Systematic errors not estimated. NODE=M022M4;LINKAGE=NS

[8] From pole extrapolation, using world $K^+ p$ data summary tape. NODE=M022M;LINKAGE=C

$K_2^*(1430)$ WIDTH

NODE=M022210

CHARGED ONLY, WITH FINAL STATE $K\pi$

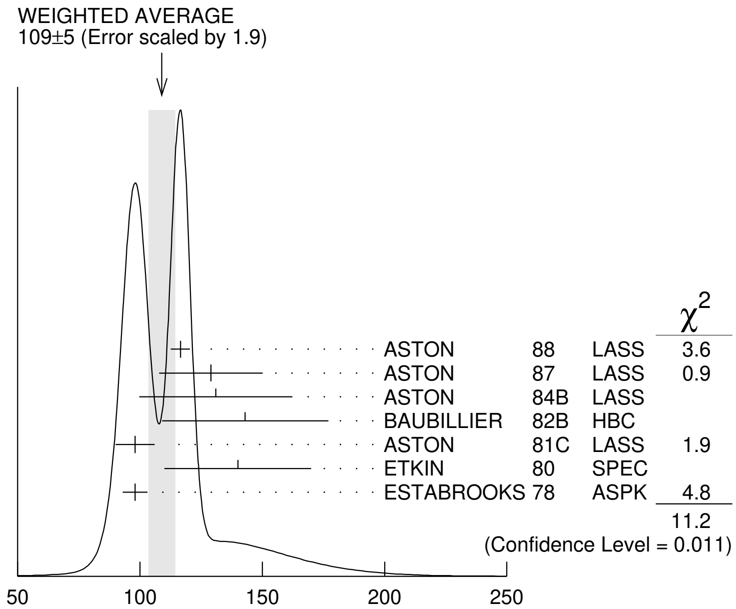
NODE=M022W1

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT	
100.0± 2.1 OUR FIT							
100.0± 2.2 OUR AVERAGE Error includes scale factor of 1.1.							
102.5± 1.6$^{+3.1}_{-2.8}$	183k	ABLIKIM	19AQ	BES	±	$J/\psi \to K^+ K^- \pi^0$	
109 ±22	400	[9,10] CLELAND	82	SPEC	+	30 $K^+ p \to K^0_S \pi^+ p$	
124 ±12.8	1500	[9,10] CLELAND	82	SPEC	+	50 $K^+ p \to K^0_S \pi^+ p$	OCCUR=2
113 ±12.8	1200	[9,10] CLELAND	82	SPEC	−	50 $K^+ p \to K^0_S \pi^- p$	OCCUR=3
85 ±16	935	TOAFF	81	HBC	−	6.5 $K^- p \to \overline{K}^0 \pi^- p$	
96.5± 3.8		MARTIN	78	SPEC	+	10 $K^\pm p \to K^0_S \pi p$	
97.7± 4.0		MARTIN	78	SPEC	−	10 $K^\pm p \to K^0_S \pi p$	OCCUR=2
94.7$^{+15.1}_{-12.5}$	1400	AGUILAR-...	71B	HBC	−	3.9,4.6 $K^- p$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
98 ± 4 ±4	25k	[11] BIRD	89	LASS	−	11 $K^- p \to \overline{K}^0 \pi^- p$	

NEUTRAL ONLY

NODE=M022W4

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
109 ± 5 OUR AVERAGE Error includes scale factor of 1.9. See the ideogram below.					
116.5± 3.6± 1.7		[12] ASTON	88	LASS	11 $K^- p \to K^- \pi^+ n$
129 ±15 ±15		[12] ASTON	87	LASS	11 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$
131 ±24 ±20		[12] ASTON	84B	LASS	11 $K^- p \to \overline{K}^0 2\pi n$
143 ±34		[12] BAUBILLIER	82B	HBC	8.25 $K^- p \to N K^0_S \pi\pi$
98 ± 8		[12] ASTON	81C	LASS	11 $K^- p \to K^- \pi^+ n$
140 ±30		[12] ETKIN	80	SPEC	6 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$
98 ± 5		[12] ESTABROOKS	78	ASPK	13 $K^\pm p \to p K \pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
113.7± 9.2	1786± 127	[13] AUBERT	07AK	BABR	10.6 $e^+ e^- \to K^{*0} K^\pm \pi^\mp \gamma$
125 ±29	300	[9] HENDRICK	76	DBC	8.25 $K^+ N \to K^+ \pi N$
116 ±18	800	MCCUBBIN	75	HBC	3.6 $K^- p \to K^- \pi^+ n$
61 ±14		[14] LINGLIN	73	HBC	2–13 $K^+ p \to K^+ \pi^- X$
116.6$^{+10.3}_{-15.5}$	1800	AGUILAR-...	71B	HBC	3.9,4.6 $K^- p$
144 ±24.0	600	[9] CORDS	71	DBC	9 $K^+ n \to K^+ \pi^- p$
101 ±10	2200	DAVIS	69	HBC	12 $K^+ p \to K^+ \pi^- \pi^+ p$



$K_2^*(1430)^0$ width (MeV)

[9] Errors enlarged by us to $4\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M022W;LINKAGE=D
[10] Number of events in peak re-evaluated by us. NODE=M022W;LINKAGE=W
[11] From a partial wave amplitude analysis. NODE=M022W;LINKAGE=F
[12] From phase shift or partial-wave analysis. NODE=M022W;LINKAGE=P
[13] Systematic errors not estimated. NODE=M022W4;LINKAGE=NS
[14] From pole extrapolation, using world $K^+ p$ data summary tape. NODE=M022W;LINKAGE=C

$K_2^*(1430)$ DECAY MODES

NODE=M022215;NODE=M022

	Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	
Γ_1	$K\pi$	(49.9 ± 1.2) %		DESIG=1
Γ_2	$K^*(892)\pi$	(24.7 ± 1.5) %		DESIG=2
Γ_3	$K^*(892)\pi\pi$	(13.4 ± 2.2) %		DESIG=6
Γ_4	$K\rho$	(8.7 ± 0.8) %	S=1.2	DESIG=3
Γ_5	$K\omega$	(2.9 ± 0.8) %		DESIG=4
Γ_6	$K^+\gamma$	$(2.4\pm0.5)\times10^{-3}$	S=1.1	DESIG=8
Γ_7	$K\eta$	$(1.5^{+3.4}_{-1.0})\times10^{-3}$	S=1.3	DESIG=5
Γ_8	$K\omega\pi$	$< 7.2 \times10^{-4}$	CL=95%	DESIG=7
Γ_9	$K^0\gamma$	$< 9 \times10^{-4}$	CL=90%	DESIG=10;OUR EVAL;→ UNCHECKED ←

CONSTRAINED FIT INFORMATION

An overall fit to the total width, a partial width, and 10 branching ratios uses 32 measurements and one constraint to determine 8 parameters. The overall fit has a $\chi^2 = 21.1$ for 25 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\left\langle\delta p_i \delta p_j\right\rangle/(\delta p_i \cdot \delta p_j)$, in percent, from the fit to parameters p_i, including the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_2	−9						
x_3	−40	−73					
x_4	−8	36	−52				
x_5	−11	−3	−26	−7			
x_6	−1	−1	−1	−1	0		
x_7	−4	−7	−5	−5	−2	0	
Γ	0	0	0	0	0	−10	0
	x_1	x_2	x_3	x_4	x_5	x_6	x_7

	Mode	Rate (MeV)	Scale factor	
Γ_1	$K\pi$	49.9 ±1.6		DESIG=1
Γ_2	$K^*(892)\pi$	24.7 ±1.6		DESIG=2
Γ_3	$K^*(892)\pi\pi$	13.5 ±2.3		DESIG=6
Γ_4	$K\rho$	8.7 ±0.8	1.2	DESIG=3
Γ_5	$K\omega$	2.9 ±0.8		DESIG=4
Γ_6	$K^+\gamma$	0.24±0.05	1.1	DESIG=8
Γ_7	$K\eta$	$0.15^{+0.34}_{-0.10}$	1.3	DESIG=5

$K_2^*(1430)$ PARTIAL WIDTHS

NODE=M022220

$\Gamma(K^+\gamma)$ Γ_6

NODE=M022W8
NODE=M022W8

VALUE (keV)	DOCUMENT ID		TECN	CHG	COMMENT
241±50 OUR FIT	Error includes scale factor of 1.1.				
240±45	CIHANGIR	82	SPEC	+	200 $K^+ Z \to Z K^+ \pi^0$, $Z K_S^0 \pi^+$

$\Gamma(K^0\gamma)$ Γ_9

NODE=M022W9
NODE=M022W9

VALUE (keV)	CL%	DOCUMENT ID		TECN	CHG	COMMENT
< 5.4	90	ALAVI-HARATI	02B	KTEV		$K + A \to K^* + A$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<84	90	CARLSMITH	87	SPEC	0	60–200 $K_L^0 A \to K_S^0 \pi^0 A$

$K_2^*(1430)$ BRANCHING RATIOS

NODE=M022225

$\Gamma(K\pi)/\Gamma_{total}$ Γ_1/Γ

NODE=M022R1
NODE=M022R1

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.499±0.012 OUR FIT					
0.488±0.014 OUR AVERAGE					
0.485±0.006±0.020	[15] ASTON	88	LASS	0	11 $K^- p \to K^- \pi^+ n$
0.49 ±0.02	[15] ESTABROOKS	78	ASPK	±	13 $K^\pm p \to p K \pi$

$\Gamma(K^*(892)\pi)/\Gamma(K\pi)$ Γ_2/Γ_1

NODE=M022R4
NODE=M022R4

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.496±0.034 OUR FIT					
0.47 ±0.04 OUR AVERAGE					
0.44 ±0.09	ASTON	84B	LASS	0	11 $K^- p \to \overline{K}^0 2\pi n$
0.62 ±0.19	LAUSCHER	75	HBC	0	10,16 $K^- p \to K^- \pi^+ n$
0.54 ±0.16	DEHM	74	DBC	0	4.6 $K^+ N$
0.47 ±0.08	AGUILAR-...	71B	HBC		3.9,4.6 $K^- p$
0.47 ±0.10	BASSANO	67	HBC	−0	4.6,5.0 $K^- p$
0.45 ±0.13	BADIER	65C	HBC	−	3 $K^- p$

$\Gamma(K\omega)/\Gamma(K\pi)$ Γ_5/Γ_1

NODE=M022R5

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.059±0.017 OUR FIT					
0.070±0.035 OUR AVERAGE					
0.05 ±0.04	AGUILAR-...	71B	HBC		3.9,4.6 $K^- p$
0.13 ±0.07	BASSOMPIE...	69	HBC	0	5 $K^+ p$

OCCUR=2

$\Gamma(K\rho)/\Gamma(K\pi)$ Γ_4/Γ_1

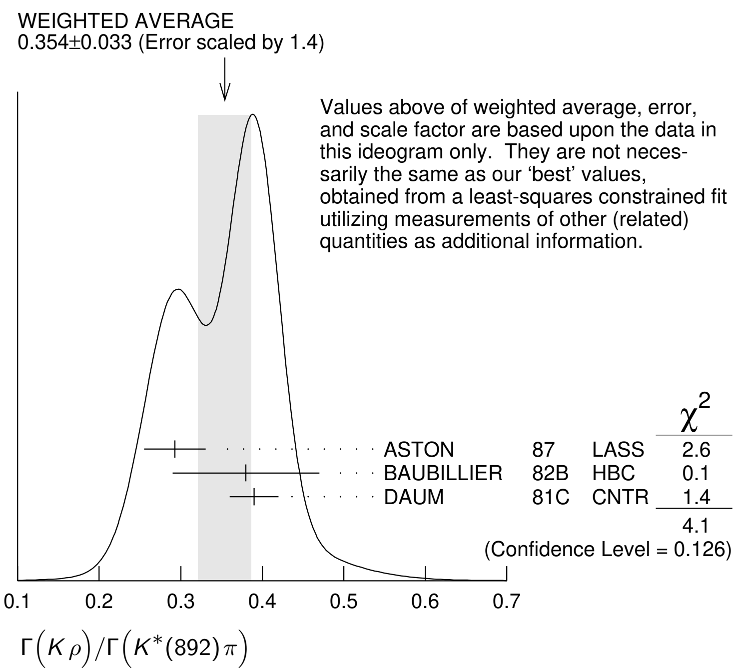
NODE=M022R6

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.174±0.017 OUR FIT Error includes scale factor of 1.2.					
0.150$^{+0.029}_{-0.017}$ OUR AVERAGE					
0.18 ±0.05	ASTON	84B	LASS	0	11 $K^- p \to \overline{K}^0 2\pi n$
0.02 $^{+0.10}_{-0.02}$	DEHM	74	DBC	0	4.6 $K^+ N$
0.16 ±0.05	AGUILAR-...	71B	HBC		3.9,4.6 $K^- p$
0.14 ±0.10	BASSANO	67	HBC	−0	4.6,5.0 $K^- p$
0.14 ±0.07	BADIER	65C	HBC	−	3 $K^- p$

$\Gamma(K\rho)/\Gamma(K^*(892)\pi)$ Γ_4/Γ_2

NODE=M022R7

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.350±0.031 OUR FIT Error includes scale factor of 1.4.					
0.354±0.033 OUR AVERAGE Error includes scale factor of 1.4. See the ideogram below.					
0.293±0.032±0.020	ASTON	87	LASS	0	11 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$
0.38 ±0.09	BAUBILLIER	82B	HBC	0	8.25 $K^- p \to N K^0_S \pi\pi$
0.39 ±0.03	DAUM	81C	CNTR		63 $K^- p \to K^- 2\pi p$



$\Gamma(K\omega)/\Gamma(K^*(892)\pi)$ Γ_5/Γ_2

NODE=M022R8

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.118±0.034 OUR FIT					
0.10 ±0.04	FIELD	67	HBC	−	3.8 $K^- p$

$\Gamma(K\eta)/\Gamma(K^*(892)\pi)$ Γ_7/Γ_2

NODE=M022R9

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.006$^{+0.014}_{-0.004}$ OUR FIT Error includes scale factor of 1.2.					
0.07 ±0.04	FIELD	67	HBC	−	3.8 $K^- p$

$\Gamma(K\eta)/\Gamma(K\pi)$ Γ_7/Γ_1

NODE=M022R10

VALUE	CL%	DOCUMENT ID		TECN	CHG	COMMENT
0.0030$^{+0.0070}_{-0.0020}$ OUR FIT Error includes scale factor of 1.3.						
0 ±0.0056		[16] ASTON	88B	LASS	−	11 $K^- p \to K^- \eta p$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<0.04	95	AGUILAR-...	71B	HBC	3.9,4.6 $K^- p$
<0.065		[17] BASSOMPIE...	69	HBC	5.0 $K^+ p$
<0.02		BISHOP	69	HBC	3.5 $K^+ p$

$\Gamma(K^*(892)\pi\pi)/\Gamma_{total}$ Γ_3/Γ

NODE=M022R11
NODE=M022R11

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.134±0.022 OUR FIT					
0.12 ±0.04	[18] GOLDBERG	76	HBC	−	3 $K^- p \to p\overline{K}^0 \pi\pi\pi$

$\Gamma(K^*(892)\pi\pi)/\Gamma(K\pi)$ Γ_3/Γ_1

NODE=M022R12
NODE=M022R12

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.27±0.05 OUR FIT					
0.21±0.08	[17,18] JONGEJANS	78	HBC	−	4 $K^- p \to p\overline{K}^0 \pi\pi\pi$

$\Gamma(K\omega\pi)/\Gamma_{total}$ Γ_8/Γ

NODE=M022R13
NODE=M022R13

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<0.72	95	0	JONGEJANS	78	HBC	4 $K^- p \to p\overline{K}^0 4\pi$

[15] From phase shift analysis. NODE=M022R;LINKAGE=P

[16] ASTON 88B quote < 0.0092 at CL=95%. We convert this to a central value and 1 sigma error in order to be able to use it in our constrained fit. NODE=M022R;LINKAGE=PQ

[17] Restated by us. NODE=M022R;LINKAGE=R

[18] Assuming $\pi\pi$ system has isospin 1, which is supported by the data. NODE=M022R;LINKAGE=T

$K_2^*(1430)$ REFERENCES

NODE=M022

ABLIKIM	19AQ	PR D100 032004	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59909
PELAEZ	17	EPJ C77 91	J.R. Pelaez, A.Rodas, J.R. de Elvira		REFID=57836
AUBERT	07AK	PR D76 012008	B. Aubert *et al.*	(BABAR Collab.)	REFID=51908
ALAVI-HARATI	02B	PRL 89 072001	A. Alavi-Harati *et al.*	(FNAL KTeV Collab.)	REFID=48822
BIRD	89	SLAC-332	P.F. Bird	(SLAC)	REFID=41002
ASTON	88	NP B296 493	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)	REFID=40262
ASTON	88B	PL B201 169	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)	REFID=40281
ASTON	87	NP B292 693	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)	REFID=40234
CARLSMITH	87	PR D36 3502	D. Carlsmith *et al.*	(EFI, SACL)	REFID=40557
ASTON	84B	NP B247 261	D. Aston *et al.*	(SLAC, CARL, OTTA)	REFID=22763
BAUBILLIER	84B	ZPHY C26 37	M. Baubillier *et al.*	(BIRM, CERN, GLAS+)	REFID=22459
BAUBILLIER	82B	NP B202 21	M. Baubillier *et al.*	(BIRM, CERN, GLAS+)	REFID=22551
CIHANGIR	82	PL 117B 123	S. Cihangir *et al.*	(FNAL, MINN, ROCH)	REFID=21280
CLELAND	82	NP B208 189	W.E. Cleland *et al.*	(DURH, GEVA, LAUS+)	REFID=22455
ASTON	81C	PL 106B 235	D. Aston *et al.*	(SLAC, CARL, OTTA) JP	REFID=22821
DAUM	81C	NP B187 1	C. Daum *et al.*	(AMST, CERN, CRAC, MPIM+)	REFID=22548
TOAFF	81	PR D23 1500	S. Toaff *et al.*	(ANL, KANS)	REFID=22454
ETKIN	80	PR D22 42	A. Etkin *et al.*	(BNL, CUNY) JP	REFID=22545
ESTABROOKS	78	NP B133 490	P.G. Estabrooks *et al.*	(MCGI, CARL, DURH+)	REFID=22443
Also		PR D17 658	P.G. Estabrooks *et al.*	(MCGI, CARL, DURH+)	REFID=22444
JONGEJANS	78	NP B139 383	B. Jongejans *et al.*	(ZEEM, CERN, NIJM+)	REFID=22445
MARTIN	78	NP B134 392	A.D. Martin *et al.*	(DURH, GEVA)	REFID=22446
BOWLER	77	NP B126 31	M.G. Bowler *et al.*	(OXF)	REFID=22437
GOLDBERG	76	LNC 17 253	J. Goldberg	(HAIF)	REFID=22742
HENDRICK	76	NP B112 189	K. Hendrickx *et al.*	(MONS, SACL, PARIS+)	REFID=22743
LAUSCHER	75	NP B86 189	P. Lauscher *et al.*	(ABCLV Collab.) JP	REFID=22582
MCCUBBIN	75	NP B86 13	N.A. McCubbin, L. Lyons	(OXF)	REFID=22434
DEHM	74	NP B75 47	G. Dehm *et al.*	(MPIM, BRUX, MONS, CERN)	REFID=22736
LINGLIN	73	NP B55 408	D. Linglin	(CERN)	REFID=22428
AGUILAR-...	71B	PR D4 2583	M. Aguilar-Benitez, R.L. Eisner, J.B. Kinson	(BNL)	REFID=22408
BARNHAM	71C	NP B28 171	K.W.J. Barnham *et al.*	(BIRM, GLAS)	REFID=22409
CORDS	71	PR D4 1974	D. Cords *et al.*	(PURD, UCD, IUPU)	REFID=22411
BASSOMPIE...	69	NP B13 189	G. Bassompierre *et al.*	(CERN, BRUX) JP	REFID=22710
BISHOP	69	NP B9 403	J.M. Bishop *et al.*	(WISC)	REFID=22485
CRENNELL	69D	PRL 22 487	D.J. Crennell *et al.*	(BNL)	REFID=22399
DAVIS	69	PRL 23 1071	P.J. Davis *et al.*	(LRL)	REFID=22400
LIND	69	NP B14 1	V.G. Lind *et al.*	(LRL) JP	REFID=22404
SCHWEING...	68	PR 166 1317	F. Schweingruber *et al.*	(ANL, NWES)	REFID=22398
Also		Thesis	F.L. Schweingruber	(NWES, NWES)	REFID=22709
BASSANO	67	PRL 19 968	D. Bassano *et al.*	(BNL, SYRA)	REFID=22695
FIELD	67	PL 24B 638	J.H. Field *et al.*	(UCSD)	REFID=22701
BADIER	65C	PL 19 612	J. Badier *et al.*	(EPOL, SACL, AMST)	REFID=22690

NODE=M021

$K(1460)$

$I(J^P) = \frac{1}{2}(0^-)$

Observed in $K\pi\pi$ partial-wave analysis.

NODE=M021

$K(1460)$ MASS

NODE=M021M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$1482.40 \pm 3.58 \pm 15.22$	894k	AAIJ	18AI	LHCB		$D^0 \to K^\mp 2\pi^\pm \pi^\mp$
~ 1460	63	DAUM	81C	CNTR	$-$	$K^- p \to K^- 2\pi p$
~ 1400	13	[1] BRANDENB...	76B	ASPK	$\pm$	$K^\pm p \to K^+ 2\pi p$

NODE=M021M

[1] Coupled mainly to $K f_0(1370)$. Decay into $K^*(892)\pi$ seen.

NODE=M021M;LINKAGE=A

$K(1460)$ WIDTH

NODE=M021W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$335.60 \pm 6.20 \pm 8.65$	894k	AAIJ	18AI	LHCB		$D^0 \to K^\mp 2\pi^\pm \pi^\mp$
~ 260	63	DAUM	81C	CNTR	$-$	$K^- p \to K^- 2\pi p$
~ 250	15	[1] BRANDENB...	76B	ASPK	$\pm$	$K^\pm p \to K^+ 2\pi p$

NODE=M021W

[1] Coupled mainly to $K f_0(1370)$. Decay into $K^*(892)\pi$ seen.

NODE=M021W;LINKAGE=A

$K(1460)$ DECAY MODES

NODE=M021215;NODE=M021

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$K^*(892)\pi$	seen	DESIG=1;OUR EST;→ UNCHECKED ←
Γ_2	$K\rho$	seen	DESIG=2;OUR EST;→ UNCHECKED ←
Γ_3	$K_0^*(1430)\pi$	seen	DESIG=3;OUR EST;→ UNCHECKED ←
Γ_4	$K\phi$	seen	DESIG=4

$K(1460)$ PARTIAL WIDTHS

NODE=M021220

$\Gamma(K^*(892)\pi)$ Γ_1

NODE=M021W1
NODE=M021W1

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
~ 109	DAUM	81C	CNTR	63 $K^- p \to K^- 2\pi p$

$\Gamma(K\rho)$ Γ_2

NODE=M021W2
NODE=M021W2

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
~ 34	DAUM	81C	CNTR	63 $K^- p \to K^- 2\pi p$

$\Gamma(K_0^*(1430)\pi)$ Γ_3

NODE=M021W3
NODE=M021W3

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
~ 117	DAUM	81C	CNTR	63 $K^- p \to K^- 2\pi p$

$\Gamma(K\phi)/\Gamma_{total}$ Γ_4/Γ

NODE=M021R00
NODE=M021R00

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	24k	[1] AAIJ	21E	LHCB	$B^+ \to J/\psi\phi K^+$

[1] From an amplitude analysis of the decay $B^+ \to J/\psi\phi K^+$ with a significance of 12 σ.

NODE=M021R00;LINKAGE=A

$K(1460)$ REFERENCES

NODE=M021

AAIJ	21E	PRL 127 082001	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	18AI	EPJ C78 443	R. Aaij *et al.*	(LHCb Collab.)
DAUM	81C	NP B187 1	C. Daum *et al.*	(AMST, CERN, CRAC, MPIM+)
BRANDENB...	76B	PRL 36 1239	G.W. Brandenburg *et al.*	(SLAC) JP

REFID=61150
REFID=59187
REFID=22548
REFID=22767

NODE=M039

$K_2(1580)$

$I(J^P) = \frac{1}{2}(2^-)$

OMITTED FROM SUMMARY TABLE

Seen in partial-wave analysis of the $K^- \pi^+ \pi^-$ system. Needs confirmation.

NODE=M039

$K_2(1580)$ MASS

NODE=M039M

VALUE (MeV)	DOCUMENT ID		CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$\sim$ 1580	OTTER	79	$-$	10,14,16 $K^- p$

NODE=M039M

$K_2(1580)$ WIDTH

NODE=M039W

VALUE (MeV)	DOCUMENT ID		CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$\sim$ 110	OTTER	79	$-$	10,14,16 $K^- p$

NODE=M039W

$K_2(1580)$ DECAY MODES

NODE=M039215;NODE=M039

	Mode	Fraction (Γ_i/Γ)
Γ_1	$K^*(892)\pi$	seen
Γ_2	$K_2^*(1430)\pi$	possibly seen

DESIG=1
DESIG=2

$K_2(1580)$ BRANCHING RATIOS

NODE=M039220

$\Gamma(K^*(892)\pi)/\Gamma_{total}$ Γ_1/Γ

NODE=M039R1
NODE=M039R1

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
seen	OTTER	79	HBC	$-$	10,14,16 $K^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
possibly seen	GULER	11	BELL		$B^+ \to J/\psi K^+ \pi^+ \pi^-$

$\Gamma(K_2^*(1430)\pi)/\Gamma_{total}$ Γ_2/Γ

NODE=M039R2
NODE=M039R2

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
possibly seen	OTTER	79	HBC	$-$	10,14,16 $K^- p$

$K_2(1580)$ REFERENCES

NODE=M039

GULER 11 PR D83 032005 H. Guler *et al.* (BELLE Collab.)
OTTER 79 NP B147 1 G. Otter *et al.* (AACH3, BERL, CERN, LOIC+) JP

REFID=53668
REFID=22772

NODE=M160

$K(1630)$

$I(J^P) = \frac{1}{2}(?^?)$

OMITTED FROM SUMMARY TABLE

NODE=M160

Seen as a narrow peak, compatible with the experimental resolution, in the invariant mass of the $K^0_S \pi^+ \pi^-$ system produced in $\pi^- p$ interactions at high momentum transfers.

$K(1630)$ MASS

NODE=M160M

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
1629±7	~ 75	KARNAUKHOV 98	BC	16.0 $\pi^- p \to (K^0_S \pi^+ \pi^-) X^+ \pi^- X^0$

NODE=M160M

$K(1630)$ WIDTH

NODE=M160W

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
$\mathbf{16^{+19}_{-16}}$	~ 75	[1] KARNAUKHOV 98	BC	16.0 $\pi^- p \to (K^0_S \pi^+ \pi^-) X^+ \pi^- X^0$

NODE=M160W

[1] Compatible with an experimental resolution of 14 ± 1 MeV.

NODE=M160W;LINKAGE=A

$K(1630)$ DECAY MODES

NODE=M160215;NODE=M160

	Mode
Γ_1	$K^0_S \pi^+ \pi^-$

DESIG=1

$K(1630)$ REFERENCES

NODE=M160

KARNAUKHOV 98 PAN 61 203 V.M. Karnaukhov, C. Coca, V.I. Moroz
Translated from YAF 61 252.

REFID=46371

NODE=M099

$K_1(1650)$

$I(J^P) = \frac{1}{2}(1^+)$

NODE=M099

This entry contains various peaks in strange meson systems ($K^+ \phi$, $K \pi \pi$) reported in partial-wave analysis in the 1600–1900 mass region.

$K_1(1650)$ MASS

NODE=M099M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1650±50 OUR AVERAGE	[1672 ± 50 MeV OUR 2021 AVERAGE Scale factor = 1.1]					
1650±50		FRAME	86	OMEG	+	13 $K^+ p \to \phi K^+ p$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$1861 \pm 10^{+16}_{-46}$	24k	[1] AAIJ	21E	LHCB		$B^+ \to J/\psi \phi K^+$
$1911 \pm 37^{+124}_{-48}$	24k	[1] AAIJ	21E	LHCB		$B^+ \to J/\psi \phi K^+$
$1793 \pm 59^{+153}_{-101}$	4289	[2,3] AAIJ	17C	LHCB		$B^+ \to J/\psi \phi K^+$
~ 1840		ARMSTRONG	83	OMEG	−	18.5 $K^- p \to 3K p$
~ 1800		DAUM	81C	CNTR	−	63 $K^- p \to K^- 2\pi p$

NODE=M099M

NEW

OCCUR=2

[1] One of two K_1 states reported by AAIJ 21E. From an amplitude analysis of the decay $B^+ \to J/\psi \phi K^+$ with a significance of 4.5 σ.

NODE=M099M;LINKAGE=C

[2] From an amplitude analysis of the decay $B^+ \to J/\psi \phi K^+$ with a significance of 7.6 σ.

NODE=M099M;LINKAGE=A

[3] Superseded by AAIJ 21E.

NODE=M099M;LINKAGE=B

$K_1(1650)$ WIDTH

NODE=M099W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
150± 50 OUR AVERAGE	[158 ± 50 MeV OUR 2021 AVERAGE]					
150± 50		FRAME	86	OMEG	+	13 $K^+ p \to \phi K^+ p$

NODE=M099W

NEW

• • • We do not use the following data for averages, fits, limits, etc. • • •

$149 \pm 41^{+231}_{-23}$	24k	[1] AAIJ	21E	LHCB		$B^+ \to J/\psi \phi K^+$
$276 \pm 50^{+319}_{-159}$	24k	[1] AAIJ	21E	LHCB		$B^+ \to J/\psi \phi K^+$
$365 \pm 157^{+138}_{-215}$	4289	[2,3] AAIJ	17C	LHCB		$B^+ \to J/\psi \phi K^+$
~ 250		DAUM	81C	CNTR	−	$63\ K^- p \to K^- 2\pi p$

OCCUR=2

[1] One of two K_1 states reported by AAIJ 21E. From an amplitude analysis of the decay $B^+ \to J/\psi \phi K^+$ with a significance of 4.5 σ.
[2] From an amplitude analysis of the decay $B^+ \to J/\psi \phi K^+$ with a significance of 7.6 σ.
[3] Superseded by AAIJ 21E.

NODE=M099W;LINKAGE=C
NODE=M099W;LINKAGE=A
NODE=M099W;LINKAGE=B

$K_1(1650)$ DECAY MODES

NODE=M099215;NODE=M099

	Mode
Γ_1	$K \pi \pi$
Γ_2	$K \phi$

DESIG=1
DESIG=2

$K_1(1650)$ REFERENCES

NODE=M099

AAIJ	21E	PRL 127 082001	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	17C	PRL 118 022003	R. Aaij *et al.*	(LHCb Collab.)
Also		PR D95 012002	R. Aaij *et al.*	(LHCb Collab.)
FRAME	86	NP B276 667	D. Frame *et al.*	(GLAS)
ARMSTRONG	83	NP B221 1	T.A. Armstrong *et al.*	(BARI, BIRM, CERN+)
DAUM	81C	NP B187 1	C. Daum *et al.*	(AMST, CERN, CRAC, MPIM+)

REFID=61150
REFID=57657
REFID=57636
REFID=20569
REFID=22801
REFID=22548

NODE=M095

$K^*(1680)$

$I(J^P) = \frac{1}{2}(1^-)$

$K^*(1680)$ MASS

NODE=M095M

NODE=M095M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
1718±18 OUR AVERAGE						
$1722 \pm 20^{+33}_{-109}$	4289	[1] AAIJ	17C	LHCB		$B^+ \to J/\psi \phi K^+$
$1677 \pm 10 \pm 32$		ASTON	88	LASS	0	$11\ K^- p \to K^- \pi^+ n$
$1735 \pm 10 \pm 20$		ASTON	87	LASS	0	$11\ K^- p \to \overline{K}^0 \pi^+ \pi^- n$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1678 ± 64		BIRD	89	LASS	−	$11\ K^- p \to \overline{K}^0 \pi^- p$
1800 ± 70		ETKIN	80	MPS	0	$6\ K^- p \to \overline{K}^0 \pi^+ \pi^- n$
~ 1650		ESTABROOKS	78	ASPK	0	$13\ K^\pm p \to K^\pm \pi^\pm n$

[1] From an amplitude analysis of the decay $B^+ \to J/\psi \phi K^+$ with a significance of 8.5 σ.

NODE=M095M;LINKAGE=A

$K^*(1680)$ WIDTH

NODE=M095W

NODE=M095W

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
322±110 OUR AVERAGE	Error includes scale factor of 4.2.					
$354 \pm 75^{+140}_{-181}$	4289	[2] AAIJ	17C	LHCB		$B^+ \to J/\psi \phi K^+$
$205 \pm 16 \pm 34$		ASTON	88	LASS	0	$11\ K^- p \to K^- \pi^+ n$
$423 \pm 18 \pm 30$		ASTON	87	LASS	0	$11\ K^- p \to \overline{K}^0 \pi^+ \pi^- n$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
454 ± 270		BIRD	89	LASS	−	$11\ K^- p \to \overline{K}^0 \pi^- p$
170 ± 30		ETKIN	80	MPS	0	$6\ K^- p \to \overline{K}^0 \pi^+ \pi^- n$
250 to 300		ESTABROOKS	78	ASPK	0	$13\ K^\pm p \to K^\pm \pi^\pm n$

[2] From an amplitude analysis of the decay $B^+ \to J/\psi \phi K^+$ with a significance of 8.5 σ.

NODE=M095W;LINKAGE=A

$K^*(1680)$ DECAY MODES

NODE=M095215;NODE=M095

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$K\pi$	(38.7 ± 2.5) %	DESIG=1
Γ_2	$K\rho$	$(31.4^{+5.0}_{-2.1})$ %	DESIG=3
Γ_3	$K^*(892)\pi$	$(29.9^{+2.2}_{-5.0})$ %	DESIG=2
Γ_4	$K\phi$	seen	DESIG=4
Γ_5	$K\eta$	$(1.4^{+1.0}_{-0.8})$ %	DESIG=6

CONSTRAINED FIT INFORMATION

An overall fit to 4 branching ratios uses 4 measurements and one constraint to determine 3 parameters. The overall fit has a $\chi^2 =$ 2.9 for 2 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\left\langle\delta x_i\delta x_j\right\rangle/(\delta x_i\cdot\delta x_j)$, in percent, from the fit to the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_2	−36	
x_3	−39	−72
	x_1	x_2

$K^*(1680)$ BRANCHING RATIOS

NODE=M095220

$\Gamma(K\pi)/\Gamma_{total}$ — Γ_1/Γ

NODE=M095R4
NODE=M095R4

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.387±0.026 OUR FIT					
0.388±0.014±0.022	ASTON	88	LASS	0	11 $K^-p\to K^-\pi^+n$

$\Gamma(K\pi)/\Gamma(K^*(892)\pi)$ — Γ_1/Γ_3

NODE=M095R2
NODE=M095R2

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
$1.30^{+0.23}_{-0.14}$ OUR FIT					
2.8 ±1.1	ASTON	84	LASS	0	11 $K^-p\to \overline{K}^0 2\pi n$

$\Gamma(K\rho)/\Gamma(K\pi)$ — Γ_2/Γ_1

NODE=M095R3
NODE=M095R3

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
$0.81^{+0.14}_{-0.09}$ OUR FIT					
1.2 ±0.4	ASTON	84	LASS	0	11 $K^-p\to \overline{K}^0 2\pi n$

$\Gamma(K\rho)/\Gamma(K^*(892)\pi)$ — Γ_2/Γ_3

NODE=M095R1
NODE=M095R1

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
$1.05^{+0.27}_{-0.11}$ OUR FIT					
$0.97\pm0.09^{+0.30}_{-0.10}$	ASTON	87	LASS	0	11 $K^-p\to \overline{K}^0\pi^+\pi^-n$

$\Gamma(K\phi)/\Gamma_{total}$ — Γ_4/Γ

NODE=M095R00
NODE=M095R00

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	24k	[3] AAIJ	21E	LHCB	$B^+\to J/\psi\phi K^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	4289	[4,5] AAIJ	17C	LHCB	$B^+\to J/\psi\phi K^+$

[3] From an amplitude analysis of the decay $B^+\to J/\psi\phi K^+$ with a significance of 4.7 σ. NODE=M095R00;LINKAGE=B

[4] From an amplitude analysis of the decay $B^+\to J/\psi\phi K^+$ with a significance of 8.5 σ. NODE=M095R00;LINKAGE=A

[5] Superseded by AAIJ 21E. NODE=M095R00;LINKAGE=C

$\Gamma(K\eta)/\Gamma(K\pi)$ Γ_5/Γ_1

NODE=M095R02
NODE=M095R02

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
$0.037\pm0.007^{+0.024}_{-0.018}$	116k	[6] CHEN 20A	BELL	$D^0 \to K^-\pi^+\eta$

[6] CHEN 20A quotes the ratio $\Gamma(K^*(1680)^- \to K^-\eta)/\Gamma(K^*(1680)^- \to K^-\pi^0)$ $=0.11 \pm 0.02^{+0.06}_{-0.04} \pm 0.04(\mathrm{B_{PDG}})$ where the last uncertainty comes from $\mathrm{B}(\eta \to \gamma\gamma) = (39.41 \pm 0.20)\%$. We divide it by 3 taking into account that $\Gamma(K^*(1680)^- \to K^-\pi^0)/\Gamma(K^*(1680)^- \to (K\pi)^-) = 1/3$.

NODE=M095R02;LINKAGE=A

$\Gamma(K\eta)/\Gamma_{\text{total}}$ Γ_5/Γ

NODE=M095R01
NODE=M095R01

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$1.44\pm0.21^{+0.96}_{-0.73}$	116k	[7] CHEN 20A	BELL	$D^0 \to K^-\pi^+\eta$

[7] From an amplitude analysis of the decay $D^0 \to K^-\pi^+\eta$ with a significance of 16 σ. Not independent of the CHEN 20A measurement of $\Gamma\big(K^*(1680) \to K\eta\big)/\Gamma\big(K^*(1680) \to K\pi\big)$.

NODE=M095R01;LINKAGE=A

$K^*(1680)$ REFERENCES

NODE=M095

AAIJ	21E	PRL 127 082001	R. Aaij *et al.*	(LHCb Collab.)
CHEN	20A	PR D102 012002	Y.Q. Chen *et al.*	(BELLE Collab.)
AAIJ	17C	PRL 118 022003	R. Aaij *et al.*	(LHCb Collab.)
Also		PR D95 012002	R. Aaij *et al.*	(LHCb Collab.)
BIRD	89	SLAC-332	P.F. Bird	(SLAC)
ASTON	88	NP B296 493	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)
ASTON	87	NP B292 693	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)
ASTON	84	PL 149B 258	D. Aston *et al.*	(SLAC, CARL, OTTA) JP
ETKIN	80	PR D22 42	A. Etkin *et al.*	(BNL, CUNY) JP
ESTABROOKS	78	NP B133 490	P.G. Estabrooks *et al.*	(MCGI, CARL, DURH+) JP

REFID=61150
REFID=60333
REFID=57657
REFID=57636
REFID=41002
REFID=40262
REFID=40234
REFID=22689
REFID=22545
REFID=22443

NODE=M023

$K_2(1770)$

$I(J^P) = \frac{1}{2}(2^-)$

See our mini-review in the 2004 edition of this *Review*, PDG 04.

NODE=M023

$K_2(1770)$ MASS

NODE=M023M

NODE=M023M

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
1773± 8 OUR AVERAGE					
$1777\pm35^{+122}_{-77}$	4289	[1] AAIJ 17C	LHCB		$B^+ \to J/\psi\phi K^+$
1773 ± 8		[2] ASTON 93	LASS		$11 K^- p \to K^-\omega p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1743 ± 15		TIKHOMIROV 03	SPEC		$40.0\ \pi^- C \to K^0_S K^0_S K^0_L X$
1810 ± 20		FRAME 86	OMEG	+	$13\ K^+ p \to \phi K^+ p$
~ 1730		ARMSTRONG 83	OMEG	−	$18.5\ K^- p \to 3K p$
~ 1780		[3] DAUM 81C	CNTR	−	$63\ K^- p \to K^- 2\pi p$
1710 ± 15	60	CHUNG 74	HBC	−	$7.3\ K^- p \to K^-\omega p$
1767 ± 6		BLIEDEN 72	MMS	−	11–16 $K^- p$
1730 ± 20	306	[4] FIRESTONE 72B	DBC	+	$12\ K^+ d$
1765 ± 40		[5] COLLEY 71	HBC	+	$10\ K^+ p \to K 2\pi N$
1740		DENEGRI 71	DBC	−	$12.6\ K^- d \to \overline{K} 2\pi d$
1745 ± 20		AGUILAR-... 70C	HBC	−	$4.6\ K^- p$
1780 ± 15		BARTSCH 70C	HBC	−	$10.1\ K^- p$
1760 ± 15		LUDLAM 70	HBC	−	$12.6\ K^- p$

[1] From an amplitude analysis of the decay $B^+ \to J/\psi\phi K^+$ with a significance of 5.0 σ.
[2] From a partial wave analysis of the $K^-\omega$ system.
[3] From a partial wave analysis of the $K^- 2\pi$ system.
[4] Produced in conjunction with excited deuteron.
[5] Systematic errors added correspond to spread of different fits.

NODE=M023M;LINKAGE=C
NODE=M023M;LINKAGE=A
NODE=M023M;LINKAGE=B
NODE=M023M;LINKAGE=P
NODE=M023M;LINKAGE=X

$K_2(1770)$ WIDTH

NODE=M023W

NODE=M023W

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
186± 14 OUR AVERAGE					
$217\pm116^{+221}_{-154}$	4289	[6] AAIJ 17C	LHCB		$B^+ \to J/\psi\phi K^+$
186 ± 14		[7] ASTON 93	LASS		$11 K^- p \to K^-\omega p$

• • • We do not use the following data for averages, fits, limits, etc. • • •

147± 70			TIKHOMIROV 03	SPEC		40.0 $\pi^- C \to K^0_S K^0_S K^0_L X$
140± 40			FRAME 86	OMEG	+	13 $K^+ p \to \phi K^+ p$
∼ 220			ARMSTRONG 83	OMEG	−	18.5 $K^- p \to 3K p$
∼ 210		[8]	DAUM 81C	CNTR	−	63 $K^- p \to K^- 2\pi p$
110± 50	60		CHUNG 74	HBC	−	7.3 $K^- p \to K^- \omega p$
100± 26			BLIEDEN 72	MMS	−	11–16 $K^- p$
210± 30	306	[9]	FIRESTONE 72B	DBC	+	12 $K^+ d$
90± 70		[10]	COLLEY 71	HBC	+	10 $K^+ p \to K 2\pi N$
130			DENEGRI 71	DBC	−	12.6 $K^- d \to \overline{K} 2\pi d$
100± 50			AGUILAR-... 70C	HBC	−	4.6 $K^- p$
138± 40			BARTSCH 70C	HBC	−	10.1 $K^- p$
50^{+40}_{-20}			LUDLAM 70	HBC	−	12.6 $K^- p$

[6] From an amplitude analysis of the decay $B^+ \to J/\psi \phi K^+$ with a significance of 5.0 σ. NODE=M023W;LINKAGE=A
[7] From a partial wave analysis of the $K^- \omega$ system. NODE=M023W;LINKAGE=B
[8] From a partial wave analysis of the $K^- 2\pi$ system. NODE=M023W;LINKAGE=C
[9] Produced in conjunction with excited deuteron. NODE=M023W;LINKAGE=P
[10] Systematic errors added correspond to spread of different fits. NODE=M023W;LINKAGE=X

$K_2(1770)$ DECAY MODES

NODE=M023215;NODE=M023

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$K\pi\pi$		DESIG=1;OUR EST;→ UNCHECKED ←
Γ_2	$K^*_2(1430)\pi$	seen	DESIG=2;OUR EST;→ UNCHECKED ←
Γ_3	$K^*(892)\pi$	seen	DESIG=4;OUR EST;→ UNCHECKED ←
Γ_4	$K f_2(1270)$	seen	DESIG=9;OUR EST;→ UNCHECKED ←
Γ_5	$K f_0(980)$		DESIG=11
Γ_6	$K\phi$	seen	DESIG=10
Γ_7	$K\omega$	seen	DESIG=8

$K_2(1770)$ BRANCHING RATIOS

NODE=M023220

$\Gamma(K^*_2(1430)\pi)/\Gamma(K\pi\pi)$ — Γ_2/Γ_1

NODE=M023R1

$(K^*_2(1430) \to K\pi)$

NODE=M023R1
NODE=M023R1

VALUE		DOCUMENT ID	TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
∼ 0.03		DAUM 81C	CNTR		63 $K^- p \to K^- 2\pi p$
∼ 1.0	[11]	FIRESTONE 72B	DBC	+	12 $K^+ d$
<1.0		COLLEY 71	HBC		10 $K^+ p$
0.2 ±0.2		AGUILAR-... 70C	HBC	−	4.6 $K^- p$
<1.0		BARTSCH 70C	HBC	−	10.1 $K^- p$
1.0		BARBARO-... 69	HBC	+	12.0 $K^+ p$

[11] Produced in conjunction with excited deuteron. NODE=M023R1;LINKAGE=P

$\Gamma(K^*(892)\pi)/\Gamma(K\pi\pi)$ — Γ_3/Γ_1

NODE=M023R3
NODE=M023R3

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
∼ 0.23	DAUM 81C	CNTR	63 $K^- p \to K^- 2\pi p$

$\Gamma(K f_2(1270))/\Gamma(K\pi\pi)$ — Γ_4/Γ_1

NODE=M023R4

$(f_2(1270) \to \pi\pi)$

NODE=M023R4
NODE=M023R4

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
∼ 0.74	DAUM 81C	CNTR	63 $K^- p \to K^- 2\pi p$

$\Gamma(K f_0(980))/\Gamma_{total}$ — Γ_5/Γ

NODE=M023R6
NODE=M023R6

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
possibly seen	TIKHOMIROV 03	SPEC	40.0 $\pi^- C \to K^0_S K^0_S K^0_L X$

$\Gamma(K\phi)/\Gamma_{total}$ — Γ_6/Γ

NODE=M023R5
NODE=M023R5

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
seen	24k	[12] AAIJ	21E	LHCB		$B^+ \to J/\psi\phi K^+$
seen		ARMSTRONG	83	OMEG	−	18.5 $K^- p \to K^- \phi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
seen	4289	[13,14] AAIJ	17C	LHCB		$B^+ \to J/\psi\phi K^+$

[12] From an amplitude analysis of the decay $B^+ \to J/\psi\phi K^+$ with a significance of 7.9 σ. NODE=M023R5;LINKAGE=C
[13] From an amplitude analysis of the decay $B^+ \to J/\psi\phi K^+$ with a significance of 5.0 σ. NODE=M023R5;LINKAGE=A
[14] Superseded by AAIJ 21E. NODE=M023R5;LINKAGE=B

$\Gamma(K\omega)/\Gamma_{total}$ — Γ_7/Γ

NODE=M023R2
NODE=M023R2

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
seen	OTTER	81	HBC	±	8.25,10,16 $K^\pm p$
seen	CHUNG	74	HBC	−	7.3 $K^- p \to K^- \omega p$

$K_2(1770)$ REFERENCES

NODE=M023

AAIJ	21E	PRL 127 082001	R. Aaij *et al.*	(LHCb Collab.)	REFID=61150
AAIJ	17C	PRL 118 022003	R. Aaij *et al.*	(LHCb Collab.)	REFID=57657
Also		PR D95 012002	R. Aaij *et al.*	(LHCb Collab.)	REFID=57636
PDG	04	PL B592 1	S. Eidelman *et al.*	(PDG Collab.)	REFID=49653
TIKHOMIROV	03	PAN 66 828	G.D. Tikhomirov *et al.*		REFID=49423
		Translated from YAF 66 860.			
ASTON	93	PL B308 186	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)	REFID=43597
FRAME	86	NP B276 667	D. Frame *et al.*	(GLAS)	REFID=20569
ARMSTRONG	83	NP B221 1	T.A. Armstrong *et al.*	(BARI, BIRM, CERN+)	REFID=22801
DAUM	81C	NP B187 1	C. Daum *et al.*	(AMST, CERN, CRAC, MPIM+)	REFID=22548
OTTER	81	NP B181 1	G. Otter	(AACH3, BERL, LOIC, VIEN, BIRM+)	REFID=22549
CHUNG	74	PL 51B 413	S.U. Chung *et al.*	(BNL)	REFID=22735
BLIEDEN	72	PL 39B 668	H.R. Blieden *et al.*	(STON, NEAS)	REFID=22788
FIRESTONE	72B	PR D5 505	A. Firestone *et al.*	(LBL)	REFID=22506
COLLEY	71	NP B26 71	D.C. Colley *et al.*	(BIRM, GLAS)	REFID=22785
DENEGRI	71	NP B28 13	D. Denegri *et al.*	(JHU) JP	REFID=22497
AGUILAR-...	70C	PRL 25 54	M. Aguilar-Benitez *et al.*	(BNL)	REFID=22782
BARTSCH	70C	PL 33B 186	J. Bartsch *et al.*	(AACH, BERL, CERN+)	REFID=22783
LUDLAM	70	PR D2 1234	T. Ludlam, J. Sandweiss, A.J. Slaughter	(YALE)	REFID=22784
BARBARO-...	69	PRL 22 1207	A. Barbaro-Galtieri *et al.*	(LRL)	REFID=22483

NODE=M060

$K_3^*(1780)$

$I(J^P) = \frac{1}{2}(3^-)$

$K_3^*(1780)$ T-MATRIX POLE $\sqrt{s}$

NODE=M060PP

NODE=M060PP

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$(1754 \pm 13) - i\,(119 \pm 14)$	[1] PELAEZ	17	RVUE	$\pi K \to \pi K$

[1] Reanalysis of ESTABROOKS 78 and ASTON 88 satisfying Forward Dispersion Relations and using sequences of Pade approximants. NODE=M060PP;LINKAGE=A

$K_3^*(1780)$ MASS

NODE=M060M

NODE=M060M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1779± 8 OUR AVERAGE		Error includes scale factor of 1.2.				
$1813 \pm 15^{+65}_{-16}$	18k	[1] ABLIKIM	20F	BES3		$\psi(2S) \to K^+ K^- \eta$
$1781 \pm 8 \pm 4$		[2] ASTON	88	LASS	0	11 $K^- p \to K^- \pi^+ n$
$1740 \pm 14 \pm 15$		[2] ASTON	87	LASS	0	11 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$
1779 ± 11		[3] BALDI	76	SPEC	+	10 $K^+ p \to K^0 \pi^+ p$
1776 ± 26		[4] BRANDENB...	76D	ASPK	0	13 $K^\pm p \to K^\pm \pi^\mp N$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$1720 \pm 10 \pm 15$	6111	[5] BIRD	89	LASS	−	11 $K^- p \to \overline{K}^0 \pi^- p$
1749 ± 10		ASTON	88B	LASS	−	11 $K^- p \to K^- \eta p$
1780 ± 9	300	BAUBILLIER	84B	HBC	−	8.25 $K^- p \to \overline{K}^0 \pi^- p$
1790 ± 15		BAUBILLIER	82B	HBC	0	8.25 $K^- p \to K^0_S 2\pi N$
1784 ± 9	2060	CLELAND	82	SPEC	±	50 $K^+ p \to K^0_S \pi^\pm p$
1786 ± 15		[6] ASTON	81D	LASS	0	11 $K^- p \to K^- \pi^+ n$
1762 ± 9	190	TOAFF	81	HBC	−	6.5 $K^- p \to \overline{K}^0 \pi^- p$
1850 ± 50		ETKIN	80	MPS	0	6 $K^- p \to \overline{K}^0 \pi^+ \pi^-$
1812 ± 28		BEUSCH	78	OMEG		10 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$
1786 ± 8		CHUNG	78	MPS	0	6 $K^- p \to K^- \pi^+ n$

[1] Seen in $\psi(2S)$ decay with branching ratio $\psi(2S) \to K^{\pm}X \to K^{+}K^{-}\eta$ = $(2.0 \pm 0.4^{+1.9}_{-0.4}) \times 10^{-6}$. NODE=M060M;LINKAGE=D
[2] From energy-independent partial-wave analysis. NODE=M060M;LINKAGE=K
[3] From a fit to Y^2_6 moment. $J^P = 3^-$ found. NODE=M060M;LINKAGE=M
[4] Confirmed by phase shift analysis of ESTABROOKS 78, yields $J^P = 3^-$. NODE=M060M;LINKAGE=A
[5] From a partial wave amplitude analysis. NODE=M060M;LINKAGE=F
[6] From a fit to the Y^0_6 moment. NODE=M060M;LINKAGE=J

$K_3^*(1780)$ WIDTH

NODE=M060W

NODE=M060W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
161±17 OUR AVERAGE		Error includes scale factor of 1.1.				
$191^{+43}_{-37}{}^{+3}_{-81}$	1.8k	[1] ABLIKIM	20F	BES3		$\psi(2S) \to K^+K^-\eta$
203±30± 8		[2] ASTON	88	LASS	0	11 $K^- p \to K^- \pi^+ n$
171±42±20		[2] ASTON	87	LASS	0	11 $K^- p \to \overline{K}{}^0 \pi^+ \pi^- n$
135±22		[3] BALDI	76	SPEC	+	10 $K^+ p \to K^0 \pi^+ p$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
187±31±20	6111	[4] BIRD	89	LASS	−	11 $K^- p \to \overline{K}{}^0 \pi^- p$
193^{+51}_{-37}		ASTON	88B	LASS	−	11 $K^- p \to K^- \eta p$
99±30	300	BAUBILLIER	84B	HBC	−	8.25 $K^- p \to \overline{K}{}^0 \pi^- p$
∼ 130		BAUBILLIER	82B	HBC	0	8.25 $K^- p \to K^0_S 2\pi N$
191±24	2060	CLELAND	82	SPEC	±	50 $K^+ p \to K^0_S \pi^\pm p$
225±60		[5] ASTON	81D	LASS	0	11 $K^- p \to K^- \pi^+ n$
∼ 80	190	TOAFF	81	HBC	−	6.5 $K^- p \to \overline{K}{}^0 \pi^- p$
240±50		ETKIN	80	MPS	0	6 $K^- p \to \overline{K}{}^0 \pi^+ \pi^-$
181±44		[6] BEUSCH	78	OMEG		10 $K^- p \to \overline{K}{}^0 \pi^+ \pi^- n$
96±31		CHUNG	78	MPS	0	6 $K^- p \to K^- \pi^+ n$
270±70		[7] BRANDENB...	76D	ASPK	0	13 $K^\pm p \to K^\pm \pi^\mp N$

[1] Seen in $\psi(2S)$ decay with branching ratio $\psi(2S) \to K^{\pm}X \to K^{+}K^{-}\eta$ = $(2.0 \pm 0.4^{+1.9}_{-0.4}) \times 10^{-6}$. NODE=M060W;LINKAGE=A
[2] From energy-independent partial-wave analysis. NODE=M060W;LINKAGE=K
[3] From a fit to Y^2_6 moment. $J^P = 3^-$ found. NODE=M060W;LINKAGE=M
[4] From a partial wave amplitude analysis. NODE=M060W;LINKAGE=F
[5] From a fit to Y^0_6 moment. NODE=M060W;LINKAGE=J
[6] Errors enlarged by us to $4\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M060W;LINKAGE=D
[7] ESTABROOKS 78 find that BRANDENBURG 76D data are consistent with 175 MeV width. Not averaged. NODE=M060W;LINKAGE=E

$K_3^*(1780)$ DECAY MODES

NODE=M060215;NODE=M060

	Mode	Fraction (Γ_i/Γ)	Confidence level	
Γ_1	$K\rho$	(31 ± 9) %		DESIG=3
Γ_2	$K^*(892)\pi$	(20 ± 5) %		DESIG=2
Γ_3	$K\pi$	(18.8± 1.0) %		DESIG=1
Γ_4	$K\eta$	(30 ±13) %		DESIG=6
Γ_5	$K_2^*(1430)\pi$	< 16 %	95%	DESIG=4

CONSTRAINED FIT INFORMATION

An overall fit to 3 branching ratios uses 4 measurements and one constraint to determine 4 parameters. The overall fit has a $\chi^2 =$ 0.0 for 1 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\left\langle \delta x_i \delta x_j \right\rangle / (\delta x_i \cdot \delta x_j)$, in percent, from the fit to the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_2	85		
x_3	18	21	
x_4	−98	−94	−27
	x_1	x_2	x_3

$K_3^*(1780)$ BRANCHING RATIOS

NODE=M060220

$\Gamma(K\rho)/\Gamma(K^*(892)\pi)$ Γ_1/Γ_2

NODE=M060R5
NODE=M060R5

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
1.52±0.23 OUR FIT					
1.52±0.21±0.10	ASTON	87	LASS	0	11 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$

$\Gamma(K^*(892)\pi)/\Gamma(K\pi)$ Γ_2/Γ_3

NODE=M060R7
NODE=M060R7

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
1.09±0.26 OUR FIT					
1.09±0.26	ASTON	84B	LASS	0	11 $K^- p \to \overline{K}^0 2\pi n$

$\Gamma(K\pi)/\Gamma_{total}$ Γ_3/Γ

NODE=M060R4
NODE=M060R4

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.188±0.010 OUR FIT					
0.188±0.010 OUR AVERAGE					
0.187±0.008±0.008	ASTON	88	LASS	0	11 $K^- p \to K^- \pi^+ n$
0.19 ±0.02	ESTABROOKS	78	ASPK	0	13 $K^\pm p \to K \pi N$

$\Gamma(K\eta)/\Gamma(K\pi)$ Γ_4/Γ_3

NODE=M060R8
NODE=M060R8

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
1.6 ±0.7 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.41±0.050	[1] BIRD	89	LASS	−	11 $K^- p \to \overline{K}^0 \pi^- p$
0.50±0.18	ASTON	88B	LASS	−	11 $K^- p \to K^- \eta p$

[1] This result supersedes ASTON 88B.

NODE=M060R8;LINKAGE=H

$\Gamma(K_2^*(1430)\pi)/\Gamma(K^*(892)\pi)$ Γ_5/Γ_2

NODE=M060R6
NODE=M060R6

VALUE	CL%	DOCUMENT ID		TECN	CHG	COMMENT
<0.78	95	ASTON	87	LASS	0	11 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$

$K_3^*(1780)$ REFERENCES

NODE=M060

ABLIKIM	20F	PR D101 032008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60256
PELAEZ	17	EPJ C77 91	J.R. Pelaez, A.Rodas, J.R. de Elvira		REFID=57836
BIRD	89	SLAC-332	P.F. Bird	(SLAC)	REFID=41002
ASTON	88	NP B296 493	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)	REFID=40262
ASTON	88B	PL B201 169	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS) JP	REFID=40281
ASTON	87	NP B292 693	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)	REFID=40234
ASTON	84B	NP B247 261	D. Aston *et al.*	(SLAC, CARL, OTTA)	REFID=22763
BAUBILLIER	84B	ZPHY C26 37	M. Baubillier *et al.*	(BIRM, CERN, GLAS+)	REFID=22459
BAUBILLIER	82B	NP B202 21	M. Baubillier *et al.*	(BIRM, CERN, GLAS+)	REFID=22551
CLELAND	82	NP B208 189	W.E. Cleland *et al.*	(DURH, GEVA, LAUS+)	REFID=22455
ASTON	81D	PL 99B 502	D. Aston *et al.*	(SLAC, CARL, OTTA) JP	REFID=22820
TOAFF	81	PR D23 1500	S. Toaff *et al.*	(ANL, KANS)	REFID=22454
ETKIN	80	PR D22 42	A. Etkin *et al.*	(BNL, CUNY) JP	REFID=22545
BEUSCH	78	PL 74B 282	W. Beusch *et al.*	(CERN, AACH3, ETH) JP	REFID=22537
CHUNG	78	PRL 40 355	S.U. Chung *et al.*	(BNL, BRAN, CUNY+) JP	REFID=22814
ESTABROOKS	78	NP B133 490	P.G. Estabrooks *et al.*	(MCGI, CARL, DURH+) JP	REFID=22443
Also		PR D17 658	P.G. Estabrooks *et al.*	(MCGI, CARL, DURH+)	REFID=22444
BALDI	76	PL 63B 344	R. Baldi *et al.*	(GEVA) JP	REFID=22807
BRANDENB...	76D	PL 60B 478	G.W. Brandenburg *et al.*	(SLAC) JP	REFID=22808

NODE=M146

$K_2(1820)$

$I(J^P) = \frac{1}{2}(2^-)$

NODE=M146

See our mini-review in the 2004 edition of this *Review* (PDG 04) under $K_2(1770)$.

$K_2(1820)$ MASS

NODE=M146M

NODE=M146M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1819±12 OUR AVERAGE					
$1853 \pm 27^{+18}_{-35}$	4289	[1] AAIJ	17C	LHCB	$B^+ \rightarrow J/\psi \phi K^+$
1816 ± 13		[2] ASTON	93	LASS	$11 K^- p \rightarrow K^- \omega p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
~ 1840		[3] DAUM	81C	CNTR	$63\ K^- p \rightarrow K^- 2\pi p$

[1] From an amplitude analysis of the decay $B^+ \rightarrow J/\psi \phi K^+$ with a significance of 3.0 σ. NODE=M146M;LINKAGE=B

[2] From a partial wave analysis of the $K^- \omega$ system. NODE=M146M;LINKAGE=A

[3] From a partial wave analysis of the $K^- 2\pi$ system. NODE=M146M;LINKAGE=C

$K_2(1820)$ WIDTH

NODE=M146W

NODE=M146W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
264±34 OUR AVERAGE					
$167 \pm 58^{+82}_{-72}$	4289	[1] AAIJ	17C	LHCB	$B^+ \rightarrow J/\psi \phi K^+$
276 ± 35		[2] ASTON	93	LASS	$11 K^- p \rightarrow K^- \omega p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
~ 230		[3] DAUM	81C	CNTR	$63\ K^- p \rightarrow K^- 2\pi p$

[1] From an amplitude analysis of the decay $B^+ \rightarrow J/\psi \phi K^+$ with a significance of 3.0 σ. NODE=M146W;LINKAGE=A

[2] From a partial wave analysis of the $K^- \omega$ system. NODE=M146W;LINKAGE=B

[3] From a partial wave analysis of the $K^- 2\pi$ system. NODE=M146W;LINKAGE=C

$K_2(1820)$ DECAY MODES

NODE=M146215;NODE=M146

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$K \pi \pi$		DESIG=5
Γ_2	$K_2^*(1430)\pi$	seen	DESIG=1;OUR EVAL;→ UNCHECKED ←
Γ_3	$K^*(892)\pi$	seen	DESIG=2;OUR EVAL;→ UNCHECKED ←
Γ_4	$K f_2(1270)$	seen	DESIG=3;OUR EVAL;→ UNCHECKED ←
Γ_5	$K \omega$	seen	DESIG=6;OUR EVAL;→ UNCHECKED ←
Γ_6	$K \phi$	seen	DESIG=7

$K_2(1820)$ BRANCHING RATIOS

NODE=M146220

$\Gamma(K_2^*(1430)\pi)/\Gamma(K\pi\pi)$ — Γ_2/Γ_1

NODE=M146R1
NODE=M146R1

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
~ 0.77	DAUM	81C	CNTR	$63 K^- p \rightarrow \overline{K} 2\pi p$

$\Gamma(K^*(892)\pi)/\Gamma(K\pi\pi)$ — Γ_3/Γ_1

NODE=M146R2
NODE=M146R2

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
~ 0.05	DAUM	81C	CNTR	$63 K^- p \rightarrow \overline{K} 2\pi p$

$\Gamma(K f_2(1270))/\Gamma(K\pi\pi)$ — Γ_4/Γ_1

NODE=M146R3
NODE=M146R3

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
~ 0.18	DAUM	81C	CNTR	$63 K^- p \rightarrow \overline{K} 2\pi p$

$\Gamma(K\phi)/\Gamma_{total}$ — Γ_6/Γ

NODE=M146R00
NODE=M146R00

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
seen	24k	[1] AAIJ 21E	LHCB	$B^+ \to J/\psi\phi K^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	4289	[2,3] AAIJ 17C	LHCB	$B^+ \to J/\psi\phi K^+$

[1] From an amplitude analysis of the decay $B^+ \to J/\psi\phi K^+$ with a significance of 5.8 σ.
[2] From an amplitude analysis of the decay $B^+ \to J/\psi\phi K^+$ with a significance of 3.0 σ.
[3] Superseded by AAIJ 21E.

NODE=M146R00;LINKAGE=B
NODE=M146R00;LINKAGE=A
NODE=M146R00;LINKAGE=C

$K_2(1820)$ REFERENCES

NODE=M146

AAIJ	21E	PRL 127 082001	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	17C	PRL 118 022003	R. Aaij *et al.*	(LHCb Collab.)
Also		PR D95 012002	R. Aaij *et al.*	(LHCb Collab.)
PDG	04	PL B592 1	S. Eidelman *et al.*	(PDG Collab.)
ASTON	93	PL B308 186	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)
DAUM	81C	NP B187 1	C. Daum *et al.*	(AMST, CERN, CRAC, MPIM+)

REFID=61150
REFID=57657
REFID=57636
REFID=49653
REFID=43597
REFID=22548

NODE=M088

$K(1830)$ — $I(J^P) = \frac{1}{2}(0^-)$

OMITTED FROM SUMMARY TABLE

Seen in partial-wave analysis of $K\phi$ system. Needs confirmation.

NODE=M088

$K(1830)$ MASS

NODE=M088M

NODE=M088M

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1874\pm43^{+59}_{-115}$	4289	[1,2] AAIJ 17C	LHCB		$B^+ \to J/\psi\phi K^+$
$\sim$ 1830		ARMSTRONG 83	OMEG	$-$	18.5 $K^- p \to 3K p$

[1] From an amplitude analysis of the decay $B^+ \to J/\psi\phi K^+$ with a significance of 3.5 σ.
[2] A subsequent amplitude analysis of $B^+ \to J/\psi\phi K^+$ by AAIJ 21E did not confirm this measurement.

NODE=M088M;LINKAGE=A
NODE=M088M;LINKAGE=B

$K(1830)$ WIDTH

NODE=M088W

NODE=M088W

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$168\pm90^{+280}_{-104}$	4289	[3,4] AAIJ 17C	LHCB		$B^+ \to J/\psi\phi K^+$
$\sim$ 250		ARMSTRONG 83	OMEG	$-$	18.5 $K^- p \to 3K p$

[3] From an amplitude analysis of the decay $B^+ \to J/\psi\phi K^+$ with a significance of 3.5 σ.
[4] A subsequent amplitude analysis of $B^+ \to J/\psi\phi K^+$ by AAIJ 21E did not confirm this measurement.

NODE=M088W;LINKAGE=A
NODE=M088W;LINKAGE=B

$K(1830)$ DECAY MODES

NODE=M088215;NODE=M088

	Mode
Γ_1	$K\phi$

DESIG=1

$K(1830)$ REFERENCES

NODE=M088

AAIJ	21E	PRL 127 082001	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	17C	PRL 118 022003	R. Aaij *et al.*	(LHCb Collab.)
Also		PR D95 012002	R. Aaij *et al.*	(LHCb Collab.)
ARMSTRONG	83	NP B221 1	T.A. Armstrong *et al.*	(BARI, BIRM, CERN+) JP

REFID=61150
REFID=57657
REFID=57636
REFID=22801

NODE=M134

$K_0^*(1950)$ $I(J^P) = \frac{1}{2}(0^+)$

OMITTED FROM SUMMARY TABLE

Seen in partial-wave analysis of the $K^-\pi^+$ system. Needs confirmation.

NODE=M134

$K_0^*(1950)$ MASS

NODE=M134M

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
1944±18 OUR AVERAGE [1945 ± 22 MeV OUR 2021 AVERAGE]					
1942±22±21	LEES	21A	BABR		$\gamma\gamma \to \eta_c(1S) \to \eta' K^+ K^-$
1945±10±20	[1] ASTON	88	LASS	0	11 $K^- p \to K^-\pi^+ n$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1917±12	[2] ZHOU	06	RVUE		$K p \to K^-\pi^+ n$
1820±40	[3] ANISOVICH	97C	RVUE		11 $K^- p \to K^-\pi^+ n$

NODE=M134M NEW

[1] We take the central value of the two solutions and the larger error given. NODE=M134M;LINKAGE=A

[2] S-matrix pole. Using ASTON 88 and assuming $K_0^*(700)$, $K_0^*(1430)$. NODE=M134M;LINKAGE=ZU

[3] T-matrix pole. Reanalysis of ASTON 88 data. NODE=M134M;LINKAGE=A1

$K_0^*(1950)$ WIDTH

NODE=M134W

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
100± 40 OUR AVERAGE Error includes scale factor of 1.3. [201 ± 90 MeV OUR 2021 AVERAGE]					
80± 32±20	LEES	21A	BABR		$\gamma\gamma \to \eta_c(1S) \to \eta' K^+ K^-$
201± 34±79	[4] ASTON	88	LASS	0	11 $K^- p \to K^-\pi^+ n$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
145± 38	[5] ZHOU	06	RVUE		$K p \to K^-\pi^+ n$
250±100	[6] ANISOVICH	97C	RVUE		11 $K^- p \to K^-\pi^+ n$

NODE=M134W NEW

[4] We take the central value of the two solutions and the larger error given. NODE=M134W;LINKAGE=A

[5] S-matrix pole. Using ASTON 88 and assuming $K_0^*(700)$, $K_0^*(1430)$. NODE=M134W;LINKAGE=ZU

[6] T-matrix pole. Reanalysis of ASTON 88 data. NODE=M134W;LINKAGE=A1

$K_0^*(1950)$ DECAY MODES

NODE=M134215;NODE=M134

	Mode	Fraction (Γ_i/Γ)
Γ_1	$K^-\pi^+$	(52±14) %

DESIG=1

$K_0^*(1950)$ BRANCHING RATIOS

NODE=M134220

$\Gamma(K^-\pi^+)/\Gamma_{total}$ Γ_1/Γ

NODE=M134R1 NODE=M134R1

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.52±0.08±0.12	[7] ASTON	88	LASS	0	11 $K^- p \to K^-\pi^+ n$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
~ 0.60	[8] ZHOU	06	RVUE		$K p \to K^-\pi^+ n$

[7] We take the central value of the two solutions and the larger error given. NODE=M134R1;LINKAGE=A

[8] S-matrix pole. Using ASTON 88 and assuming $K_0^*(700)$, $K_0^*(1430)$. NODE=M134R1;LINKAGE=ZU

$K_0^*(1950)$ REFERENCES

NODE=M134

LEES	21A	PR D104 072002	J.P. Lees *et al.*	(BABAR Collab.)	REFID=61442
ZHOU	06	NP A775 212	Z.Y. Zhou, H.Q. Zheng		REFID=51198
ANISOVICH	97C	PL B413 137	A.V. Anisovich, A.V. Sarantsev		REFID=45815
ASTON	88	NP B296 493	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)	REFID=40262

NODE=M104

$K_2^*(1980)$

$I(J^P) = \frac{1}{2}(2^+)$

Needs confirmation.

NODE=M104

$K_2^*(1980)$ MASS

NODE=M104M

NODE=M104M

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
$\mathbf{1994^{+60}_{-50}}$ **OUR AVERAGE**		Error includes scale factor of 2.8. See the ideogram below.			
[1995^{+60}_{-50} MeV OUR 2021 AVERAGE Scale factor = 2.8]					
$2046^{+17}_{-16}{}^{+67}_{-15}$	1.8k	[1] ABLIKIM 20F	BES3		$\psi(2S) \rightarrow K^+ K^- \eta$
$1868 \pm 8^{+40}_{-57}$	183k	ABLIKIM 19AQ	BES	$\pm$	$J/\psi \rightarrow K^+ K^- \pi^0$
$1973 \pm 8 \pm 25$		ASTON 87	LASS	0	$11\ K^- p \rightarrow \overline{K}^0 \pi^+ \pi^- n$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$2073 \pm 94^{+245}_{-240}$	4289	[2,3] AAIJ 17C	LHCB		$B^+ \rightarrow J/\psi \phi K^+$
2020 ± 20		TIKHOMIROV 03	SPEC		$40.0\ \pi^- C \rightarrow K^0_S K^0_S K^0_L X$
1978 ± 40	241	BIRD 89	LASS	$-$	$11\ K^- p \rightarrow \overline{K}^0 \pi^- p$

NEW

[1] Seen in $\psi(2S)$ decay with branching ratio $\psi(2S) \rightarrow K^{\pm} X \rightarrow K^+ K^- \eta = (7.0 \pm 0.5^{+3.7}_{-0.6}) \times 10^{-6}$.

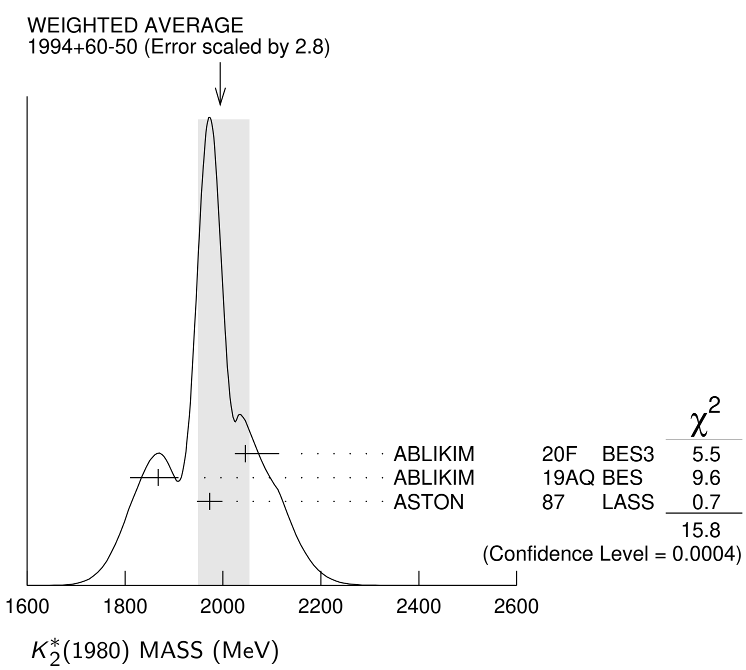
NODE=M104M;LINKAGE=C

[2] From an amplitude analysis of the decay $B^+ \rightarrow J/\psi \phi K^+$ with a significance of 5.4 σ.

NODE=M104M;LINKAGE=B

[3] A reanalysis by AAIJ 21E using a larger data sample did not confirm this measurement, the new result having a significance of only 1.6 σ.

NODE=M104M;LINKAGE=E



$K_2^*(1980)$ WIDTH

NODE=M104W

NODE=M104W

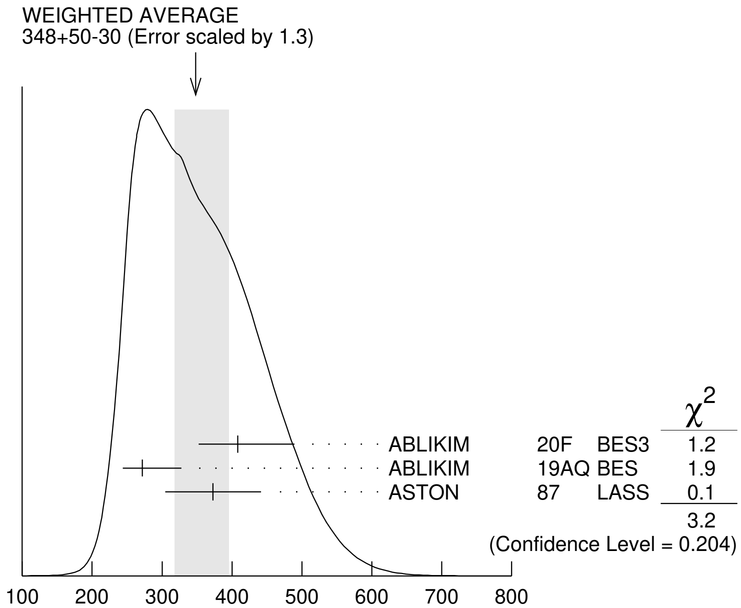
VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
$\mathbf{348^{+50}_{-30}}$ **OUR AVERAGE**		Error includes scale factor of 1.3. See the ideogram below.			
[349^{+50}_{-30} MeV OUR 2021 AVERAGE Scale factor = 1.3]					
$408^{+38}_{-34}{}^{+72}_{-44}$	1.8k	[1] ABLIKIM 20F	BES3		$\psi(2S) \rightarrow K^+ K^- \eta$
$272 \pm 24^{+50}_{-15}$	183k	ABLIKIM 19AQ	BES	$\pm$	$J/\psi \rightarrow K^+ K^- \pi^0$
$373 \pm 33 \pm 60$		ASTON 87	LASS	0	$11\ K^- p \rightarrow \overline{K}^0 \pi^+ \pi^- n$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$678 \pm 311^{+1153}_{-559}$	4289	[2,3] AAIJ 17C	LHCB		$B^+ \rightarrow J/\psi \phi K^+$
180 ± 70		TIKHOMIROV 03	SPEC		$40.0\ \pi^- C \rightarrow K^0_S K^0_S K^0_L X$
398 ± 47	241	BIRD 89	LASS	$-$	$11\ K^- p \rightarrow \overline{K}^0 \pi^- p$

NEW

[1] Seen in $\psi(2S)$ decay with branching ratio $\psi(2S) \rightarrow K^{\pm} X \rightarrow K^{+} K^{-} \eta = (7.0 \pm 0.5^{+3.7}_{-0.6}) \times 10^{-6}$. NODE=M104W;LINKAGE=C

[2] From an amplitude analysis of the decay $B^{+} \rightarrow J/\psi \phi K^{+}$ with a significance of 5.4 σ. NODE=M104W;LINKAGE=B

[3] A reanalysis by AAIJ 21E using a larger data sample did not confirm this measurement, the new result having a significance of only 1.6 σ. NODE=M104W;LINKAGE=E



$K_2^*(1980)$ width (MeV)

$K_2^*(1980)$ DECAY MODES

NODE=M104215;NODE=M104

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$K^*(892)\pi$	possibly seen	DESIG=2
Γ_2	$K\rho$	possibly seen	DESIG=3
Γ_3	$K f_2(1270)$	possibly seen	DESIG=4
Γ_4	$K\phi$		DESIG=5
Γ_5	$K\eta$	seen	DESIG=6

$K_2^*(1980)$ BRANCHING RATIOS

NODE=M104220

$\Gamma(K^*(892)\pi)/\Gamma_{total}$ — Γ_1/Γ

NODE=M104R01
NODE=M104R01

VALUE	DOCUMENT ID		TECN	COMMENT
possibly seen	GULER	11	BELL	$B^{+} \rightarrow J/\psi K^{+} \pi^{+} \pi^{-}$

$\Gamma(K\rho)/\Gamma_{total}$ — Γ_2/Γ

NODE=M104R02
NODE=M104R02

VALUE	DOCUMENT ID		TECN	COMMENT
possibly seen	GULER	11	BELL	$B^{+} \rightarrow J/\psi K^{+} \pi^{+} \pi^{-}$

$\Gamma(K\rho)/\Gamma(K^*(892)\pi)$ — Γ_2/Γ_1

NODE=M104R1
NODE=M104R1

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
1.49±0.24±0.09	ASTON	87	LASS	0	11 $K^{-} p \rightarrow \overline{K}^0 \pi^{+} \pi^{-} n$

$\Gamma(K f_2(1270))/\Gamma_{total}$ — Γ_3/Γ

NODE=M104R3
NODE=M104R3

VALUE	DOCUMENT ID		TECN	COMMENT
possibly seen	TIKHOMIROV	03	SPEC	40.0 π^{-} C $\rightarrow K^0_S K^0_S K^0_L X$

$\Gamma(K\phi)/\Gamma_{total}$ — Γ_4/Γ

NODE=M104R00
NODE=M104R00

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	4289	[1,2] AAIJ	17C	LHCB	$B^{+} \rightarrow J/\psi \phi K^{+}$

[1] From an amplitude analysis of the decay $B^{+} \rightarrow J/\psi \phi K^{+}$ with a significance of 5.4 σ. NODE=M104R00;LINKAGE=A

[2] A reanalysis by AAIJ 21E using a larger data sample did not confirm this measurement, the new result having a significance of only 1.6 σ. NODE=M104R00;LINKAGE=C

$\Gamma(K\eta)/\Gamma_{total}$ — Γ_5/Γ

NODE=M104R03

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	1.8k	[1] ABLIKIM	20F	BES3	$\psi(2S) \to K^+K^-\eta$
seen	116k	[2] CHEN	20A	BELL	$D^0 \to K^-\pi^+\eta$

[1] Seen decaying to $K\eta$ in an amplitude analysis of $\psi(2S) \to K^+K^-\eta$.
[2] From an amplitude analysis of the decay $D^0 \to K^-\pi^+\eta$ with a significance of 17 σ.

NODE=M104R03;LINKAGE=A
NODE=M104R03;LINKAGE=B

$K_2^*(1980)$ REFERENCES

NODE=M104

AAIJ	21E	PRL 127 082001	R. Aaij *et al.*	(LHCb Collab.)	REFID=61150
ABLIKIM	20F	PR D101 032008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60256
CHEN	20A	PR D102 012002	Y.Q. Chen *et al.*	(BELLE Collab.)	REFID=60333
ABLIKIM	19AQ	PR D100 032004	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59909
AAIJ	17C	PRL 118 022003	R. Aaij *et al.*	(LHCb Collab.)	REFID=57657
Also		PR D95 012002	R. Aaij *et al.*	(LHCb Collab.)	REFID=57636
GULER	11	PR D83 032005	H. Guler *et al.*	(BELLE Collab.)	REFID=53668
TIKHOMIROV	03	PAN 66 828	G.D. Tikhomirov *et al.*		REFID=49423
		Translated from YAF 66 860.			
BIRD	89	SLAC-332	P.F. Bird	(SLAC)	REFID=41002
ASTON	87	NP B292 693	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)	REFID=40234

NODE=M035

$K_4^*(2045)$

$I(J^P) = \frac{1}{2}(4^+)$

$K_4^*(2045)$ MASS

NODE=M035M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
2048^{+8}_{-9} OUR AVERAGE		Error includes scale factor of 1.1.				
$2090\pm 9^{+11}_{-29}$	183k	ABLIKIM	19AQ	BES	$\pm$	$J/\psi \to K^+K^-\pi^0$
$2062\pm 14\pm 13$		[1] ASTON	86	LASS	0	11 $K^-p \to K^-\pi^+n$
2039 ± 10	400	[2,3] CLELAND	82	SPEC	$\pm$	50 $K^+p \to K^0_S\pi^\pm p$
2070^{+100}_{-40}		[4] ASTON	81C	LASS	0	11 $K^-p \to K^-\pi^+n$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
2079 ± 7	431	TORRES	86	MPSF		400 $pA \to 4KX$
2088 ± 20	650	BAUBILLIER	82	HBC	$-$	8.25 $K^-p \to K^0_S\pi^-p$
2115 ± 46	488	CARMONY	77	HBC	0	9 $K^+d \to K^+\pi$'s X

[1] From a fit to all moments.
[2] From a fit to 8 moments.
[3] Number of events evaluated by us.
[4] From energy-independent partial-wave analysis.

NODE=M035M;LINKAGE=E
NODE=M035M;LINKAGE=B
NODE=M035M;LINKAGE=W
NODE=M035M;LINKAGE=D

$K_4^*(2045)$ WIDTH

NODE=M035W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
199^{+27}_{-19} OUR AVERAGE						
$201\pm 19^{+57}_{-17}$	183k	ABLIKIM	19AQ	BES	$\pm$	$J/\psi \to K^+K^-\pi^0$
$221\pm 48\pm 27$		[5] ASTON	86	LASS	0	11 $K^-p \to K^-\pi^+n$
189 ± 35	400	[6,7] CLELAND	82	SPEC	$\pm$	50 $K^+p \to K^0_S\pi^\pm p$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
61 ± 58	431	TORRES	86	MPSF		400 $pA \to 4KX$
170^{+100}_{-50}	650	BAUBILLIER	82	HBC	$-$	8.25 $K^-p \to K^0_S\pi^-p$
240^{+500}_{-100}		[8] ASTON	81C	LASS	0	11 $K^-p \to K^-\pi^+n$
300 ± 200		CARMONY	77	HBC	0	9 $K^+d \to K^+\pi$'s X

[5] From a fit to all moments.
[6] From a fit to 8 moments.
[7] Number of events evaluated by us.
[8] From energy-independent partial-wave analysis.

NODE=M035W;LINKAGE=E
NODE=M035W;LINKAGE=B
NODE=M035W;LINKAGE=W
NODE=M035W;LINKAGE=D

$K_4^*(2045)$ DECAY MODES

NODE=M035215;NODE=M035

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$K\pi$	(9.9±1.2) %	DESIG=1
Γ_2	$K^*(892)\pi\pi$	(9 ±5) %	DESIG=2
Γ_3	$K^*(892)\pi\pi\pi$	(7 ±5) %	DESIG=5
Γ_4	$\rho K\pi$	(5.7±3.2) %	DESIG=3
Γ_5	$\omega K\pi$	(5.0±3.0) %	DESIG=4
Γ_6	$\phi K\pi$	(2.8±1.4) %	DESIG=6
Γ_7	$\phi K^*(892)$	(1.4±0.7) %	DESIG=7

$K_4^*(2045)$ BRANCHING RATIOS

NODE=M035220

$\Gamma(K\pi)/\Gamma_{total}$ Γ_1/Γ

NODE=M035R1
NODE=M035R1

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.099±0.012	ASTON	88	LASS	0	11 $K^- p \to K^- \pi^+ n$

$\Gamma(K^*(892)\pi\pi)/\Gamma(K\pi)$ Γ_2/Γ_1

NODE=M035R2
NODE=M035R2

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.89±0.53	BAUBILLIER	82	HBC	−	8.25 $K^- p \to p K^0_S 3\pi$

$\Gamma(K^*(892)\pi\pi\pi)/\Gamma(K\pi)$ Γ_3/Γ_1

NODE=M035R5
NODE=M035R5

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.75±0.49	BAUBILLIER	82	HBC	−	8.25 $K^- p \to p K^0_S 3\pi$

$\Gamma(\rho K\pi)/\Gamma(K\pi)$ Γ_4/Γ_1

NODE=M035R3
NODE=M035R3

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.58±0.32	BAUBILLIER	82	HBC	−	8.25 $K^- p \to p K^0_S 3\pi$

$\Gamma(\omega K\pi)/\Gamma(K\pi)$ Γ_5/Γ_1

NODE=M035R4
NODE=M035R4

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.50±0.30	BAUBILLIER	82	HBC	−	8.25 $K^- p \to p K^0_S 3\pi$

$\Gamma(\phi K\pi)/\Gamma_{total}$ Γ_6/Γ

NODE=M035R6
NODE=M035R6

VALUE	DOCUMENT ID		TECN	COMMENT
0.028±0.014	[9] TORRES	86	MPSF	400 $pA \to 4KX$

$\Gamma(\phi K^*(892))/\Gamma_{total}$ Γ_7/Γ

NODE=M035R7
NODE=M035R7

VALUE	DOCUMENT ID		TECN	COMMENT
0.014±0.007	[9] TORRES	86	MPSF	400 $pA \to 4KX$

[9] Error determination is model dependent.

NODE=M035R;LINKAGE=A

$K_4^*(2045)$ REFERENCES

NODE=M035

ABLIKIM	19AQ	PR D100 032004	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59909
ASTON	88	NP B296 493	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)	REFID=40262
ASTON	86	PL B180 308	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)	REFID=22462
TORRES	86	PR D34 707	S. Torres *et al.*	(VPI, ARIZ, FNAL, FSU+)	REFID=22845
BAUBILLIER	82	PL 118B 447	M. Baubillier *et al.*	(BIRM, CERN, GLAS+)	REFID=22842
CLELAND	82	NP B208 189	W.E. Cleland *et al.*	(DURH, GEVA, LAUS+)	REFID=22455
ASTON	81C	PL 106B 235	D. Aston *et al.*	(SLAC, CARL, OTTA) JP	REFID=22821
CARMONY	77	PR D16 1251	D.D. Carmony *et al.*	(PURD, UCD, IUPU)	REFID=22811

NODE=M040

$K_2(2250)$

$I(J^P) = \frac{1}{2}(2^-)$

OMITTED FROM SUMMARY TABLE

NODE=M040

This entry contains various peaks in strange meson systems reported in the 2150–2260 MeV region, as well as enhancements seen in the antihyperon-nucleon system, either in the mass spectra or in the $J^P = 2^-$ wave.

$K_2(2250)$ MASS

NODE=M040M

NODE=M040M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
2247±17 OUR AVERAGE						
2200±40		[1] ARMSTRONG	83C	OMEG	−	18 $K^- p \rightarrow \Lambda \overline{p} X$
2235±50		[1] BAUBILLIER	81	HBC	−	8 $K^- p \rightarrow \Lambda \overline{p} X$
2260±20		[1] CLELAND	81	SPEC	±	50 $K^+ p \rightarrow \Lambda \overline{p} X$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
2280±20		TIKHOMIROV	03	SPEC		40.0 $\pi^- C \rightarrow K^0_S K^0_S K^0_L X$
2147± 4	37	CHLIAPNIK...	79	HBC	+	32 $K^+ p \rightarrow \overline{\Lambda} p X$
2240±20	20	LISSAUER	70	HBC		9 $K^+ p$

[1] $J^P = 2^-$ from moments analysis.

NODE=M040M;LINKAGE=Q

$K_2(2250)$ WIDTH

NODE=M040W

NODE=M040W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
180±30 OUR AVERAGE		Error includes scale factor of 1.4.				
150±30		[2] ARMSTRONG	83C	OMEG	−	18 $K^- p \rightarrow \Lambda \overline{p} X$
210±30		[2] CLELAND	81	SPEC	±	50 $K^+ p \rightarrow \Lambda \overline{p} X$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
180±60		TIKHOMIROV	03	SPEC		40.0 $\pi^- C \rightarrow K^0_S K^0_S K^0_L X$
∼ 200		[2] BAUBILLIER	81	HBC	−	8 $K^- p \rightarrow \Lambda \overline{p} X$
∼ 40	37	CHLIAPNIK...	79	HBC	+	32 $K^+ p \rightarrow \overline{\Lambda} p X$
80±20	20	LISSAUER	70	HBC		9 $K^+ p$

[2] $J^P = 2^-$ from moments analysis.

NODE=M040W;LINKAGE=Q

$K_2(2250)$ DECAY MODES

NODE=M040215;NODE=M040

	Mode	
Γ_1	$K \pi \pi$	DESIG=1
Γ_2	$K f_2(1270)$	DESIG=3
Γ_3	$K^*(892) f_0(980)$	DESIG=4
Γ_4	$p \overline{\Lambda}$	DESIG=2

$K_2(2250)$ REFERENCES

NODE=M040

TIKHOMIROV	03	PAN 66 828	G.D. Tikhomirov *et al.*		REFID=49423
		Translated from YAF 66 860.			
ARMSTRONG	83C	NP B227 365	T.A. Armstrong *et al.*	(BARI, BIRM, CERN+)	REFID=22852
BAUBILLIER	81	NP B183 1	M. Baubillier *et al.*	(BIRM, CERN, GLAS+) JP	REFID=22850
CLELAND	81	NP B184 1	W.E. Cleland *et al.*	(PITT, GEVA, LAUS+) JP	REFID=22851
CHLIAPNIK...	79	NP B158 253	P.V. Chliapnikov *et al.*	(CERN, BELG, MONS)	REFID=22849
LISSAUER	70	NP B18 491	D. Lissauer *et al.*	(LBL)	REFID=22847

NODE=M090

$K_3(2320)$

$I(J^P) = \frac{1}{2}(3^+)$

OMITTED FROM SUMMARY TABLE

Seen in the $J^P = 3^+$ wave of the antihyperon-nucleon system. Needs confirmation.

NODE=M090

$K_3(2320)$ MASS

NODE=M090M

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
2324±24 OUR AVERAGE					
2330±40	[1] ARMSTRONG	83C	OMEG	−	18 $K^- p \to \Lambda \overline{p} X$
2320±30	[1] CLELAND	81	SPEC	±	50 $K^+ p \to \Lambda \overline{p} X$

NODE=M090M

[1] $J^P = 3^+$ from moments analysis.

NODE=M090M;LINKAGE=P

$K_3(2320)$ WIDTH

NODE=M090W

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
150±30	[2] ARMSTRONG	83C	OMEG	−	18 $K^- p \to \Lambda \overline{p} X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
∼ 250	[2] CLELAND	81	SPEC	±	50 $K^+ p \to \Lambda \overline{p} X$

NODE=M090W

[2] $J^P = 3^+$ from moments analysis.

NODE=M090W;LINKAGE=P

$K_3(2320)$ DECAY MODES

NODE=M090215;NODE=M090

	Mode
Γ_1	$p\overline{\Lambda}$

DESIG=1

$K_3(2320)$ REFERENCES

NODE=M090

ARMSTRONG 83C NP B227 365 T.A. Armstrong *et al.* (BARI, BIRM, CERN+)
CLELAND 81 NP B184 1 W.E. Cleland *et al.* (PITT, GEVA, LAUS+)

REFID=22852
REFID=22851

NODE=M098

$K_5^*(2380)$

$I(J^P) = \frac{1}{2}(5^-)$

OMITTED FROM SUMMARY TABLE

Needs confirmation.

NODE=M098

$K_5^*(2380)$ MASS

NODE=M098M

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
2382±14±19	[1] ASTON	86	LASS	0	11 $K^- p \to K^- \pi^+ n$

NODE=M098M

[1] From a fit to all the moments.

NODE=M098M;LINKAGE=E

$K_5^*(2380)$ WIDTH

NODE=M098W

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
178±37±32	[2] ASTON	86	LASS	0	11 $K^- p \to K^- \pi^+ n$

NODE=M098W

[2] From a fit to all the moments.

NODE=M098W;LINKAGE=E

$K_5^*(2380)$ DECAY MODES

NODE=M098215;NODE=M098

	Mode	Fraction (Γ_i/Γ)
Γ_1	$K\pi$	(6.1±1.2) %

DESIG=1

$K_5^*(2380)$ BRANCHING RATIOS

NODE=M098220

$\Gamma(K\pi)/\Gamma_{total}$ **Γ_1/Γ**

NODE=M098R1
NODE=M098R1

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.061±0.012	ASTON	88	LASS	0	11 $K^- p \to K^- \pi^+ n$

NODE=M098

$K_5^*(2380)$ REFERENCES

ASTON	88	NP B296 493	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)	REFID=40262
ASTON	86	PL B180 308	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)	REFID=22462

NODE=M091

$K_4(2500)$

$I(J^P) = \frac{1}{2}(4^-)$

OMITTED FROM SUMMARY TABLE

Needs confirmation.

NODE=M091

$K_4(2500)$ MASS

NODE=M091M

NODE=M091M

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
2490±20	[1] CLELAND	81	SPEC	±	50 $K^+ p \to \Lambda \overline{p}$

[1] $J^P = 4^-$ from moments analysis.

NODE=M091M;LINKAGE=R

$K_4(2500)$ WIDTH

NODE=M091W

NODE=M091W

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
∼ 250	[2] CLELAND	81	SPEC	±	50 $K^+ p \to \Lambda \overline{p}$

[2] $J^P = 4^-$ from moments analysis.

NODE=M091W;LINKAGE=R

$K_4(2500)$ DECAY MODES

NODE=M091215;NODE=M091

	Mode
Γ_1	$p\overline{\Lambda}$

DESIG=1

$K_4(2500)$ REFERENCES

NODE=M091

CLELAND	81	NP B184 1	W.E. Cleland *et al.*	(PITT, GEVA, LAUS+)	REFID=22851

NODE=M129

$K(3100)$

$I^G(J^{PC}) = ?^?(?^{??})$

OMITTED FROM SUMMARY TABLE

Narrow peak observed in several ($\Lambda \overline{p}$ + pions) and ($\overline{\Lambda} p$ + pions) states in Σ^- Be reactions by BOURQUIN 86 and in np and nA reactions by ALEEV 93. Not seen by BOEHNLEIN 91. If due to strong decays, this state has exotic quantum numbers (B=0,Q=+1,S=−1 for $\Lambda \overline{p} \pi^+ \pi^+$ and $I \geq 3/2$ for $\Lambda \overline{p} \pi^-$). Needs confirmation.

NODE=M129

$K(3100)$ MASS

NODE=M129205

NODE=M129M

VALUE (MeV)	*DOCUMENT ID*
≈ 3100 OUR ESTIMATE	

→ UNCHECKED ←

3-BODY DECAYS

NODE=M129M1

NODE=M129M1

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*	
3054±11 OUR AVERAGE					
3060± 7±20	[1] ALEEV	93	BIS2	$K(3100) \to \Lambda \overline{p} \pi^+$	
3056± 7±20	[1] ALEEV	93	BIS2	$K(3100) \to \overline{\Lambda} p \pi^-$	OCCUR=2
3055± 8±20	[1] ALEEV	93	BIS2	$K(3100) \to \Lambda \overline{p} \pi^-$	OCCUR=3
3045± 8±20	[1] ALEEV	93	BIS2	$K(3100) \to \overline{\Lambda} p \pi^+$	OCCUR=4

4-BODY DECAYS

NODE=M129M2

NODE=M129M2

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*	
3059±11 OUR AVERAGE					
3067± 6±20	[1] ALEEV	93	BIS2	$K(3100) \to \Lambda \overline{p} \pi^+ \pi^+$	
3060± 8±20	[1] ALEEV	93	BIS2	$K(3100) \to \Lambda \overline{p} \pi^+ \pi^-$	OCCUR=2
3055± 7±20	[1] ALEEV	93	BIS2	$K(3100) \to \overline{\Lambda} p \pi^- \pi^-$	OCCUR=3
3052± 8±20	[1] ALEEV	93	BIS2	$K(3100) \to \overline{\Lambda} p \pi^- \pi^+$	OCCUR=4
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3105±30	BOURQUIN	86	SPEC	$K(3100) \to \Lambda \overline{p} \pi^+ \pi^+$	
3115±30	BOURQUIN	86	SPEC	$K(3100) \to \Lambda \overline{p} \pi^+ \pi^-$	OCCUR=2

5-BODY DECAYS

NODE=M129M3

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
3095 ± 30	BOURQUIN	86	SPEC	$K(3100) \rightarrow \Lambda\overline{p}\pi^+\pi^+\pi^-$

[1] Supersedes ALEEV 90.

NODE=M129M;LINKAGE=A

K(3100) WIDTH

NODE=M129210

3-BODY DECAYS

NODE=M129W1

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
42 ± 16	[2] ALEEV	93	BIS2	$K(3100) \rightarrow \Lambda\overline{p}\pi^+$	
36 ± 15	[2] ALEEV	93	BIS2	$K(3100) \rightarrow \overline{\Lambda}p\pi^-$	OCCUR=2
50 ± 18	[2] ALEEV	93	BIS2	$K(3100) \rightarrow \Lambda\overline{p}\pi^-$	OCCUR=3
30 ± 15	[2] ALEEV	93	BIS2	$K(3100) \rightarrow \overline{\Lambda}p\pi^+$	OCCUR=4

4-BODY DECAYS

NODE=M129W2

VALUE (MeV)	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$22\pm\ 8$		[2] ALEEV	93	BIS2	$K(3100) \rightarrow \Lambda\overline{p}\pi^+\pi^+$	
28 ± 12		[2] ALEEV	93	BIS2	$K(3100) \rightarrow \Lambda\overline{p}\pi^+\pi^-$	OCCUR=2
32 ± 15		[2] ALEEV	93	BIS2	$K(3100) \rightarrow \overline{\Lambda}p\pi^-\pi^-$	OCCUR=3
30 ± 15		[2] ALEEV	93	BIS2	$K(3100) \rightarrow \overline{\Lambda}p\pi^-\pi^+$	OCCUR=4
<30	90	BOURQUIN	86	SPEC	$K(3100) \rightarrow \Lambda\overline{p}\pi^+\pi^+$	
<80	90	BOURQUIN	86	SPEC	$K(3100) \rightarrow \Lambda\overline{p}\pi^+\pi^-$	OCCUR=2

5-BODY DECAYS

NODE=M129W3

VALUE (MeV)	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<30	90	BOURQUIN	86	SPEC	$K(3100) \rightarrow \Lambda\overline{p}\pi^+\pi^+\pi^-$

[2] Supersedes ALEEV 90.

NODE=M129W;LINKAGE=A

K(3100) DECAY MODES

NODE=M129215;NODE=M129

	Mode	
Γ_1	$K(3100)^0 \rightarrow \Lambda\overline{p}\pi^+$	DESIG=1
Γ_2	$K(3100)^{--} \rightarrow \Lambda\overline{p}\pi^-$	DESIG=2
Γ_3	$K(3100)^- \rightarrow \Lambda\overline{p}\pi^+\pi^-$	DESIG=3
Γ_4	$K(3100)^+ \rightarrow \Lambda\overline{p}\pi^+\pi^+$	DESIG=4
Γ_5	$K(3100)^0 \rightarrow \Lambda\overline{p}\pi^+\pi^+\pi^-$	DESIG=5
Γ_6	$K(3100)^0 \rightarrow \Sigma(1385)^+\overline{p}$	DESIG=6

$\Gamma(\Sigma(1385)^+\overline{p})/\Gamma(\Lambda\overline{p}\pi^+)$ Γ_6/Γ_1

NODE=M129R1

VALUE	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<0.04	90	ALEEV	93	BIS2	$K(3100)^0 \rightarrow \Sigma(1385)^+\overline{p}$

K(3100) REFERENCES

NODE=M129

ALEEV	93	PAN 56 1358	A.N. Aleev *et al.*	(BIS-2 Collab.)	REFID=43668
		Translated from YAF 56 100.			
BOEHNLEIN	91	NPBPS B21 174	A. Boehnlein *et al.*	(FLOR, BNL, IND+)	REFID=41743
ALEEV	90	ZPHY C47 533	A.N. Aleev *et al.*	(BIS-2 Collab.)	REFID=42173
BOURQUIN	86	PL B172 113	M.H. Bourquin *et al.*	(GEVA, RAL, HEIDP+)	REFID=22928

CHARMED MESONS
($C = \pm1$)

NODE=MXXX035

$D^+ = c\overline{d}$, $D^0 = c\overline{u}$, $\overline{D}^0 = \overline{c}\,u$, $D^- = \overline{c}\,d$, similarly for D^*'s

NODE=MXXX035

NODE=M061

$D^*(2007)^0$

$I(J^P) = \frac{1}{2}(1^-)$
I, J, P need confirmation.

J consistent with 1, value 0 ruled out (NGUYEN 77).

NODE=M061

$D^*(2007)^0$ MASS

NODE=M061M

The fit includes $D^\pm$, D^0, $D_s^\pm$, $D^{*\pm}$, D^{*0}, $D_s^{*\pm}$, $D_1(2420)^0$, $D_2^*(2460)^0$, and $D_{s1}(2536)^\pm$ mass and mass difference measurements.

NODE=M061M

NODE=M061M

VALUE (MeV)	*DOCUMENT ID*	*TECN*	*COMMENT*
2006.85±0.05 OUR FIT Error includes scale factor of 1.1.			
• • • We do not use the following data for averages, fits, limits, etc. • • •			
2006 ±1.5	[1] GOLDHABER 77	MRK1	e^+e^-

[1] From simultaneous fit to $D^*(2010)^+$, $D^*(2007)^0$, D^+, and D^0.

NODE=M061M;LINKAGE=G

$m_{D^*(2007)^0} - m_{D^0}$

NODE=M061DM

The fit includes $D^\pm$, D^0, $D_s^\pm$, $D^{*\pm}$, D^{*0}, $D_s^{*\pm}$, $D_1(2420)^0$, $D_2^*(2460)^0$, and $D_{s1}(2536)^\pm$ mass and mass difference measurements.

NODE=M061DM

NODE=M061DM

VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
142.014±0.030 OUR FIT Error includes scale factor of 1.5.				
142.016±0.030 OUR AVERAGE Error includes scale factor of 1.5.				
142.007±0.015±0.014	10k	[2] TOMARADZE 15	CLEO	$e^+e^- \rightarrow$ hadrons
142.2 ±0.3 ±0.2	145	ALBRECHT 95F	ARG	$e^+e^- \rightarrow$ hadrons
142.12 ±0.05 ±0.05	1176	BORTOLETTO 92B	CLE2	$e^+e^- \rightarrow$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •				
142.2 ±2.0		SADROZINSKI 80	CBAL	$D^{*0} \rightarrow D^0\pi^0$
142.7 ±1.7		[3] GOLDHABER 77	MRK1	e^+e^-

[2] Obtained by analyzing CLEO-c data but not authored by the CLEO Collaboration . This value comes from the average of the results for two decay modes, $D^0 \rightarrow K^-\pi^+$ and $D^0 \rightarrow K^-\pi^+\pi^-\pi^+$.

NODE=M061DM;LINKAGE=A

[3] From simultaneous fit to $D^*(2010)^+$, $D^*(2007)^0$, D^+, and D^0.

NODE=M061DM;LINKAGE=G

$D^*(2007)^0$ WIDTH

NODE=M061W

NODE=M061W

VALUE (MeV)	*CL%*	*DOCUMENT ID*	*TECN*	*COMMENT*
<2.1	90	[4] ABACHI 88B	HRS	$D^{*0} \rightarrow D^+\pi^-$

[4] Assuming $m_{D^{*0}} = 2007.2 \pm 2.1$ MeV/c^2.

NODE=M061W;LINKAGE=A

$D^*(2007)^0$ DECAY MODES

NODE=M061220;NODE=M061

$\overline{D}^*(2007)^0$ modes are charge conjugates of modes below.

NODE=M061

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$D^0\pi^0$	(64.7 ± 0.9) %	DESIG=1
Γ_2	$D^0\gamma$	(35.3 ± 0.9) %	DESIG=2
Γ_3	$D^0e^+e^-$	$(3.91 \pm 0.33) \times 10^{-3}$	DESIG=3

CONSTRAINED FIT INFORMATION

An overall fit to 2 branching ratios uses 5 measurements and one constraint to determine 2 parameters. The overall fit has a $\chi^2 =$ 2.5 for 4 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\left<\delta x_i \delta x_j\right>/(\delta x_i \cdot \delta x_j)$, in percent, from the fit to the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_2	−100
	x_1

$D^*(2007)^0$ BRANCHING RATIOS

NODE=M061225

$\Gamma(D^0\pi^0)/\Gamma(D^0\gamma)$ — Γ_1/Γ_2

NODE=M061R3
NODE=M061R3

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
1.83±0.07 OUR FIT Error includes scale factor of 1.1.					
1.85±0.07 OUR AVERAGE					
1.90±0.07±0.05	4.9k	ABLIKIM	15B	BES3	10.6 $e^+e^- \to$ hadrons
1.74±0.02±0.13		AUBERT,BE	05G	BABR	10.6 $e^+e^- \to$ hadrons

$\Gamma(D^0 e^+ e^-)/\Gamma(D^0\gamma)$ — Γ_3/Γ_2

NODE=M061R00
NODE=M061R00

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
11.08±0.76±0.49	421	ABLIKIM	21BD	BES3	4.178 GeV e^+e^-

$\Gamma(D^0\pi^0)/\Gamma_{total}$ — Γ_1/Γ

NODE=M061R2
NODE=M061R2

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.647±0.009 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.655±0.008±0.005	3.2k	[5] ABLIKIM	15B	BES3	$e^+e^- \to$ hadrons
0.635±0.003±0.017	69k	[5] AUBERT,BE	05G	BABR	10.6 $e^+e^- \to$ hadrons
0.596±0.035±0.028	858	[6] ALBRECHT	95F	ARG	$e^+e^- \to$ hadrons
0.636±0.023±0.033	1097	[6] BUTLER	92	CLE2	$e^+e^- \to$ hadrons

$\Gamma(D^0\gamma)/\Gamma_{total}$ — Γ_2/Γ

NODE=M061R1
NODE=M061R1

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.353±0.009 OUR FIT					
0.381±0.029 OUR AVERAGE					
0.404±0.035±0.028	456	[6] ALBRECHT	95F	ARG	$e^+e^- \to$ hadrons
0.364±0.023±0.033	621	[6] BUTLER	92	CLE2	$e^+e^- \to$ hadrons
0.37 ±0.08 ±0.08		ADLER	88D	MRK3	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.345±0.008±0.005	1.8k	[5] ABLIKIM	15B	BES3	$e^+e^- \to$ hadrons
0.365±0.003±0.017	68k	[5] AUBERT,BE	05G	BABR	10.6 $e^+e^- \to$ hadrons
0.47 ±0.23		LOW	87	HRS	29 GeV e^+e^-
0.53 ±0.13		BARTEL	85G	JADE	e^+e^-, hadrons
0.47 ±0.12		COLES	82	MRK2	e^+e^-
0.45 ±0.15		GOLDHABER	77	MRK1	e^+e^-

[5] Derived from the ratio $\Gamma(D^0\pi^0)$ / $\Gamma(D^0\gamma)$ assuming that the branching fractions of $D^{*0} \to D^0\pi^0$ and $D^{*0} \to D^0\gamma$ decays sum to 100% NODE=M061R;LINKAGE=AU

[6] The BUTLER 92 and ALBRECHT 95F branching ratios are not independent, they have been constrained by the authors to sum to 100%. NODE=M061R;LINKAGE=A

$D^*(2007)^0$ REFERENCES

NODE=M061

ABLIKIM	21BD	PR D104 112012	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61535
ABLIKIM	15B	PR D91 031101	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56375
TOMARADZE	15	PR D91 011102	A. Tomaradze *et al.*	(NWES)	REFID=57142
AUBERT,BE	05G	PR D72 091101	B. Aubert *et al.*	(BABAR Collab.)	REFID=50942
ALBRECHT	95F	ZPHY C66 63	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=44374
BORTOLETTO	92B	PRL 69 2046	D. Bortoletto *et al.*	(CLEO Collab.)	REFID=43116
BUTLER	92	PRL 69 2041	F. Butler *et al.*	(CLEO Collab.)	REFID=43170
ABACHI	88B	PL B212 533	S. Abachi *et al.*	(ANL, IND, MICH, PURD+)	REFID=40584
ADLER	88D	PL B208 152	J. Adler *et al.*	(Mark III Collab.)	REFID=40579
LOW	87	PL B183 232	E.H. Low *et al.*	(HRS Collab.)	REFID=40017
BARTEL	85G	PL 161B 197	W. Bartel *et al.*	(JADE Collab.)	REFID=22880
COLES	82	PR D26 2190	M.W. Coles *et al.*	(LBL, SLAC)	REFID=22866
SADROZINSKI	80	Madison Conf. 681	H.F.W. Sadrozinski *et al.*	(PRIN, CIT+)	REFID=22877
GOLDHABER	77	PL 69B 503	G. Goldhaber *et al.*	(Mark I Collab.)	REFID=11434
NGUYEN	77	PRL 39 262	H.K. Nguyen *et al.*	(LBL, SLAC) J	REFID=11543

NODE=M062

$D^*(2010)^\pm$

$I(J^P) = \frac{1}{2}(1^-)$
I, J, P need confirmation.

$D^*(2010)^\pm$ MASS

NODE=M062M

The fit includes $D^\pm$, D^0, $D_s^\pm$, $D^{*\pm}$, D^{*0}, $D_s^{*\pm}$, $D_1(2420)^0$, $D_2^*(2460)^0$, and $D_{s1}(2536)^\pm$ mass and mass difference measurements.

NODE=M062M

NODE=M062M

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
2010.26±0.05 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2008 ±3	[1] GOLDHABER	77	MRK1	±	e^+e^-
2008.6 ±1.0	[2] PERUZZI	77	LGW	±	e^+e^-

[1] From simultaneous fit to $D^*(2010)^+$, $D^*(2007)^0$, D^+, and D^0; not independent of FELDMAN 77B mass difference below.

NODE=M062M;LINKAGE=G

[2] PERUZZI 77 mass not independent of FELDMAN 77B mass difference below and PERUZZI 77 D^0 mass value.

NODE=M062M;LINKAGE=P

$m_{D^*(2010)^+} - m_{D^+}$

NODE=M062MD

The fit includes $D^\pm$, D^0, $D_s^\pm$, $D^{*\pm}$, D^{*0}, $D_s^{*\pm}$, $D_1(2420)^0$, $D_2^*(2460)^0$, and $D_{s1}(2536)^\pm$ mass and mass difference measurements.

NODE=M062MD

NODE=M062MD

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
140.603 ±0.015 OUR FIT					
140.602 ±0.014 OUR AVERAGE					
140.6010±0.0068±0.0129	151k	LEES	17F	BABR	$e^+e^- \to$ hadrons
140.64 ±0.08 ±0.06	620	BORTOLETTO	92B	CLE2	$e^+e^- \to$ hadrons

$m_{D^*(2010)^+} - m_{D^0}$

NODE=M062DM

The fit includes $D^\pm$, D^0, $D_s^\pm$, $D^{*\pm}$, D^{*0}, $D_s^{*\pm}$, $D_1(2420)^0$, $D_2^*(2460)^0$, and $D_{s1}(2536)^\pm$ mass and mass difference measurements.

NODE=M062DM

NODE=M062DM

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
145.4258±0.0017 OUR FIT						
145.4258±0.0020 OUR AVERAGE		Error includes scale factor of 1.2.				
145.4259±0.0004±0.0017	312.8k	LEES	13X	BABR	$D^{*\pm} \to D^0\pi^\pm \to (K\pi, K3\pi)\pi^\pm$	OCCUR=3
145.412 ±0.002 ±0.012		ANASTASSOV	02	CLE2	$D^{*\pm} \to D^0\pi^\pm \to (K\pi)\pi^\pm$	
145.54 ±0.08	611	[3] ADINOLFI	99	BEAT	$D^{*\pm} \to D^0\pi^\pm$	
145.45 ±0.02		[3] BREITWEG	99	ZEUS	$D^{*\pm} \to D^0\pi^\pm \to (K\pi)\pi^\pm$	
145.42 ±0.05		[3] BREITWEG	99	ZEUS	$D^{*\pm} \to D^0\pi^\pm \to (K^-3\pi)\pi^\pm$	OCCUR=2
145.5 ±0.15	103	[4] ADLOFF	97B	H1	$D^{*\pm} \to D^0\pi^\pm$	
145.44 ±0.08	152	[4] BREITWEG	97	ZEUS	$D^{*\pm} \to D^0\pi^\pm$, $D^0 \to K^-3\pi$	
145.42 ±0.11	199	[4] BREITWEG	97	ZEUS	$D^{*\pm} \to D^0\pi^\pm$, $D^0 \to K^-\pi^+$	OCCUR=2
145.4 ±0.2	48	[4] DERRICK	95	ZEUS	$D^{*\pm} \to D^0\pi^\pm$	
145.39 ±0.06 ±0.03		BARLAG	92B	ACCM	π^- 230 GeV	
145.5 ±0.2	115	[4] ALEXANDER	91B	OPAL	$D^{*\pm} \to D^0\pi^\pm$	
145.30 ±0.06		[4] DECAMP	91J	ALEP	$D^{*\pm} \to D^0\pi^\pm$	
145.40 ±0.05 ±0.10		ABACHI	88B	HRS	$D^{*\pm} \to D^0\pi^\pm$	
145.46 ±0.07 ±0.03		ALBRECHT	85F	ARG	$D^{*\pm} \to D^0\pi^+$	
145.5 ±0.3	28	BAILEY	83	SPEC	$D^{*\pm} \to D^0\pi^\pm$	OCCUR=2
145.5 ±0.3	60	FITCH	81	SPEC	π^- A	
145.3 ±0.5	30	FELDMAN	77B	MRK1	$D^{*+} \to D^0\pi^+$	

• • • We do not use the following data for averages, fits, limits, etc. • • •

145.4256±0.0006±0.0017	138.5k	LEES	13X	BABR	$D^{*\pm} \to D^0\pi^\pm \to (K^-\pi^+)\pi^\pm$	
145.4266±0.0005±0.0019	174.3k	LEES	13X	BABR	$D^{*\pm} \to D^0\pi^\pm \to (K^-2\pi^+\pi^-)\pi^\pm$	OCCUR=2
145.44 ±0.09	122	[4] BREITWEG	97B	ZEUS	$D^{*\pm} \to D^0\pi^\pm$, $D^0 \to K^-\pi^+$	
145.8 ±1.5	16	AHLEN	83	HRS	$D^{*+} \to D^0\pi^+$	
145.1 ±1.8	12	BAILEY	83	SPEC	$D^{*\pm} \to D^0\pi^\pm$	
145.1 ±0.5	14	BAILEY	83	SPEC	$D^{*\pm} \to D^0\pi^\pm$	OCCUR=3
145.5 ±0.5	14	YELTON	82	MRK2	29 $e^+e^- \to K^-\pi^+$	
~ 145.5		AVERY	80	SPEC	γA	
145.2 ±0.6	2	BLIETSCHAU	79	BEBC	νp	

[3] Statistical errors only. NODE=M062DM;LINKAGE=AV

[4] Systematic error not evaluated. NODE=M062DM;LINKAGE=A

$m_{D^*(2010)^+} - m_{D^*(2007)^0}$

NODE=M062EM

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.6±1.8	[5] PERUZZI	77	LGW	e^+e^-

NODE=M062EM

[5] Not independent of FELDMAN 77B mass difference above, PERUZZI 77 D^0 mass, and GOLDHABER 77 $D^*(2007)^0$ mass. NODE=M062EM;LINKAGE=P

$D^*(2010)^\pm$ WIDTH

NODE=M062W

VALUE (keV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT	
83.4±1.8 OUR AVERAGE							NODE=M062W
83.3±1.2± 1.4		312.8k	[6] LEES	13X	BABR	$D^{*\pm} \to D^0\pi^\pm \to (K\pi,K3\pi)\pi^\pm$	OCCUR=3
96 ±4 ±22			[6] ANASTASSOV	02	CLE2	$D^{*\pm} \to D^0\pi^\pm \to (K\pi)\pi^\pm$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
83.4±1.7± 1.5		138.5k	[6] LEES	13X	BABR	$D^{*\pm} \to D^0\pi^\pm \to (K^-\pi^+)\pi^\pm$	
83.2±1.5± 2.6		174.3k	[6] LEES	13X	BABR	$D^{*\pm} \to D^0\pi^\pm \to (K^-2\pi^+\pi^-)\pi^\pm$	OCCUR=2
<131	90	110	BARLAG	92B	ACCM	π^- 230 GeV	

[6] Ignoring the electromagnetic contribution from $D^{*\pm} \to D^\pm\gamma$. NODE=M062W;LINKAGE=LE

$D^*(2010)^\pm$ DECAY MODES

NODE=M062225;NODE=M062

$D^*(2010)^-$ modes are charge conjugates of the modes below. NODE=M062

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$D^0\pi^+$	(67.7±0.5) %	DESIG=1
Γ_2	$D^+\pi^0$	(30.7±0.5) %	DESIG=3
Γ_3	$D^+\gamma$	(1.6±0.4) %	DESIG=2

CONSTRAINED FIT INFORMATION

An overall fit to 3 branching ratios uses 6 measurements and one constraint to determine 3 parameters. The overall fit has a $\chi^2 =$ 0.3 for 4 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\langle\delta x_i \delta x_j\rangle/(\delta x_i \cdot \delta x_j)$, in percent, from the fit to the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_2	−62	
x_3	−43	−44
	x_1	x_2

$D^*(2010)^+$ BRANCHING RATIOS

NODE=M062230

$\Gamma(D^0\pi^+)/\Gamma_{total}$ Γ_1/Γ

NODE=M062R1
NODE=M062R1

VALUE	DOCUMENT ID	TECN	COMMENT
0.677 ±0.005 OUR FIT			
0.677 ±0.006 OUR AVERAGE			
0.6759±0.0029±0.0064	[7,8,9] BARTELT 98	CLE2	e^+e^-
0.688 ±0.024 ±0.013	ALBRECHT 95F	ARG	$e^+e^-\rightarrow$ hadrons
0.681 ±0.010 ±0.013	[7] BUTLER 92	CLE2	$e^+e^-\rightarrow$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.57 ±0.04 ±0.04	ADLER 88D	MRK3	e^+e^-
0.44 ±0.10	COLES 82	MRK2	e^+e^-
0.6 ±0.15	[9] GOLDHABER 77	MRK1	e^+e^-

$\Gamma(D^+\pi^0)/\Gamma_{total}$ Γ_2/Γ

NODE=M062R3
NODE=M062R3

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.307 ±0.005 OUR FIT				
0.3073±0.0013±0.0062		[7,8,9] BARTELT 98	CLE2	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.312 ±0.011 ±0.008	1404	ALBRECHT 95F	ARG	$e^+e^-\rightarrow$ hadrons
0.308 ±0.004 ±0.008	410	[7] BUTLER 92	CLE2	$e^+e^-\rightarrow$ hadrons
0.26 ±0.02 ±0.02		ADLER 88D	MRK3	e^+e^-
0.34 ±0.07		COLES 82	MRK2	e^+e^-

$\Gamma(D^+\gamma)/\Gamma_{total}$ Γ_3/Γ

NODE=M062R2
NODE=M062R2

VALUE	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
0.016 ±0.004 OUR FIT					
0.016 ±0.005 OUR AVERAGE					
0.0168±0.0042±0.0029			[7,8] BARTELT 98	CLE2	e^+e^-
0.011 ±0.014 ±0.016		12	[7] BUTLER 92	CLE2	$e^+e^-\rightarrow$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.052	90		ALBRECHT 95F	ARG	$e^+e^-\rightarrow$ hadrons
0.17 ±0.05 ±0.05			ADLER 88D	MRK3	e^+e^-
0.22 ±0.12			[10] COLES 82	MRK2	e^+e^-

[7] The branching ratios are not independent, they have been constrained by the authors to sum to 100%. NODE=M062R;LINKAGE=A

[8] Systematic error includes theoretical error on the prediction of the ratio of hadronic modes. NODE=M062R;LINKAGE=B

[9] Assuming that isospin is conserved in the decay. NODE=M062R;LINKAGE=G

[10] Not independent of $\Gamma(D^0\pi^+)/\Gamma_{total}$ and $\Gamma(D^+\pi^0)/\Gamma_{total}$ measurement. NODE=M062R;LINKAGE=C

$D^*(2010)^\pm$ REFERENCES

NODE=M062

LEES 17F PRL 119 202003 J.P. Lees *et al.* (BABAR Collab.) REFID=58277
LEES 13X PRL 111 111801 J.P. Lees *et al.* (BABAR Collab.) REFID=55564
Also PR D88 052003 J.P. Lees *et al.* (BABAR Collab.) REFID=55547
Also PR D88 079902 (errat.) J.P. Lees *et al.* (BABAR Collab.) REFID=55695
ANASTASSOV 02 PR D65 032003 A. Anastassov *et al.* (CLEO Collab.) REFID=48550
ADINOLFI 99 NP B547 3 M. Adinolfi *et al.* (Beatrice Collab.) REFID=46925
BREITWEG 99 EPJ C6 67 J. Breitweg *et al.* (ZEUS Collab.) REFID=46604
BARTELT 98 PRL 80 3919 J. Bartelt *et al.* (CLEO Collab.) REFID=46349
ADLOFF 97B ZPHY C72 593 C. Adloff *et al.* (H1 Collab.) REFID=45421
BREITWEG 97 PL B401 192 J. Breitweg *et al.* (ZEUS Collab.) REFID=45520
BREITWEG 97B PL B407 402 J. Breitweg *et al.* (ZEUS Collab.) REFID=45699
ALBRECHT 95F ZPHY C66 63 H. Albrecht *et al.* (ARGUS Collab.) REFID=44374
DERRICK 95 PL B349 225 M. Derrick *et al.* (ZEUS Collab.) REFID=44373
BARLAG 92B PL B278 480 S. Barlag *et al.* (ACCMOR Collab.) REFID=42174
BORTOLETTO 92B PRL 69 2046 D. Bortoletto *et al.* (CLEO Collab.) REFID=43116
BUTLER 92 PRL 69 2041 F. Butler *et al.* (CLEO Collab.) REFID=43170
ALEXANDER 91B PL B262 341 G. Alexander *et al.* (OPAL Collab.) REFID=41553
DECAMP 91J PL B266 218 D. Decamp *et al.* (ALEPH Collab.) REFID=41614
ABACHI 88B PL B212 533 S. Abachi *et al.* (ANL, IND, MICH, PURD+) REFID=40584
ADLER 88D PL B208 152 J. Adler *et al.* (Mark III Collab.) REFID=40579
ALBRECHT 85F PL 150B 235 H. Albrecht *et al.* (ARGUS Collab.) REFID=11527
AHLEN 83 PRL 51 1147 S.P. Ahlen *et al.* (ANL, IND, LBL+) REFID=22868
BAILEY 83 PL 132B 230 R. Bailey *et al.* (AMST, BRIS, CERN, CRAC+) REFID=22870
COLES 82 PR D26 2190 M.W. Coles *et al.* (LBL, SLAC) REFID=22866
YELTON 82 PRL 49 430 J.M. Yelton *et al.* (SLAC, LBL, UCB+) REFID=22867
FITCH 81 PRL 46 761 V.L. Fitch *et al.* (PRIN, SACL, TORI+) REFID=22863
AVERY 80 PRL 44 1309 P. Avery *et al.* (ILL, FNAL, COLU) REFID=11498
BLIETSCHAU 79 PL 86B 108 J. Blietschau *et al.* (AACH3, BONN, CERN+) REFID=22861
FELDMAN 77B PRL 38 1313 G.J. Feldman *et al.* (Mark I Collab.) REFID=22858
GOLDHABER 77 PL 69B 503 G. Goldhaber *et al.* (Mark I Collab.) REFID=11434
PERUZZI 77 PRL 39 1301 I. Peruzzi *et al.* (LGW Collab.) REFID=11435

NODE=M252

$D_0^*(2300)$

$I(J^P) = \frac{1}{2}(0^+)$

was $D_0^*(2400)$

There is a strong evidence that recent data on $B \to D\pi\pi$ (AAIJ 15Y, AAIJ 16AH) and $B \to D\pi K$ (AAIJ 14BH, AAIJ 15V, AAIJ 15X) call for two poles in the scalar $I = 1/2$ πD amplitude in this mass range. The data are consistent with a lower pole at $(2105^{+6}_{-8}) - i(102^{+10}_{-11})$ MeV and a higher pole at $(2451^{+35}_{-26}) - i(134^{+7}_{-8})$ MeV (DU 18A, DU 19, DU 21). For details see review on "Heavy Non-$q\overline{q}$ Mesons."

NODE=M252

$D_0^*(2300)$ MASS

NODE=M252M

NODE=M252M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
2343±10 OUR AVERAGE		Error includes scale factor of 1.5. See the ideogram below.				
2360±15±30		[1] AAIJ	15X	LHCB	+	$B^0 \to \overline{D}^0 K^+ \pi^-$
2349± 6± 4		[2] AAIJ	15Y	LHCB	+	$B^0 \to \overline{D}^0 \pi^+ \pi^-$
2297± 8±20	3.4k	AUBERT	09AB	BABR	0	$B^- \to D^+ \pi^- \pi^-$
2308±17±32		ABE	04D	BELL	0	$B^- \to D^+ \pi^- \pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
2354± 7±11		[3] AAIJ	15Y	LHCB	+	$B^0 \to \overline{D}^0 \pi^+ \pi^-$
2403±14±35	18.8k	[4] LINK	04A	FOCS	+	γ A
2407±21±35	9.8k	[4] LINK	04A	FOCS	0	γ A

OCCUR=2

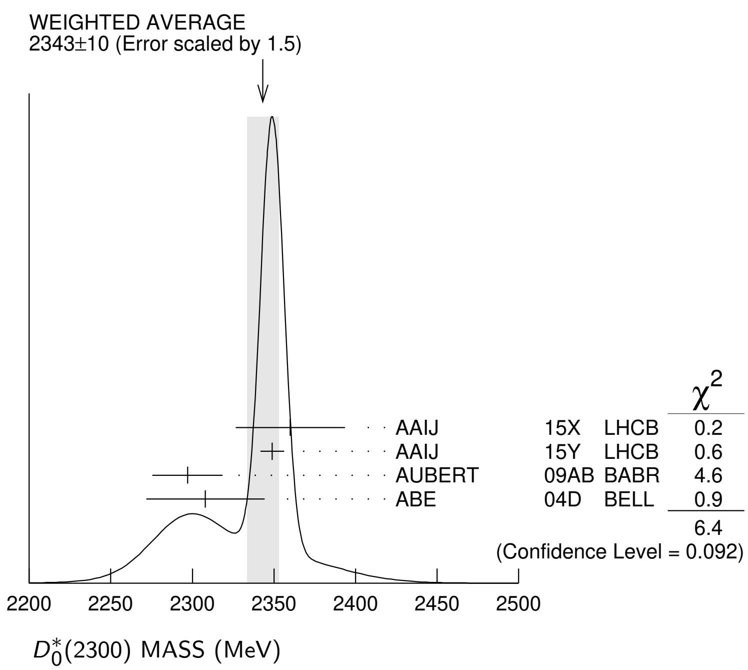
OCCUR=2

[1] From the Dalitz plot analysis including various K^* and D^{**} mesons as well as broad structures in the $K\pi$ S-wave and the $D\pi$ S- and P-waves. NODE=M252M;LINKAGE=A

[2] Modeling the $\pi^+\pi^-$ S-wave with the Isobar formalism. NODE=M252M;LINKAGE=B

[3] Modeling the $\pi^+\pi^-$ S-wave with the K-matrix formalism. NODE=M252M;LINKAGE=C

[4] Possibly the feed-down from another state. NODE=M252M;LINKAGE=D



$D_0^*(2300)$ WIDTH

NODE=M252W

NODE=M252W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
229±16 OUR AVERAGE						
255±26±51		[1] AAIJ	15X	LHCB	+	$B^0 \to \overline{D}^0 K^+ \pi^-$
217±13±13		[2] AAIJ	15Y	LHCB	+	$B^0 \to \overline{D}^0 \pi^+ \pi^-$
273±12±48	3.4k	AUBERT	09AB	BABR	0	$B^- \to D^+ \pi^- \pi^-$
276±21±63		ABE	04D	BELL	0	$B^- \to D^+ \pi^- \pi^-$

• • • We do not use the following data for averages, fits, limits, etc. • • •

230±15±21		[3] AAIJ	15Y	LHCB	+	$B^0 \to \overline{D}^0 \pi^+ \pi^-$	OCCUR=2
283±24±34	18.8k	[4] LINK	04A	FOCS	+	γ A	
240±55±59	9.8k	[4] LINK	04A	FOCS	0	γ A	OCCUR=2

[1] From the Dalitz plot analysis including various K^* and D^{**} mesons as well as broad structures in the $K\pi$ S-wave and the $D\pi$ S- and P-waves. NODE=M252W;LINKAGE=A
[2] Modeling the $\pi^+\pi^-$ S-wave with the Isobar formalism. NODE=M252W;LINKAGE=B
[3] Modeling the $\pi^+\pi^-$ S-wave with the K-matrix formalism. NODE=M252W;LINKAGE=C
[4] Possibly the feed-down from another state. NODE=M252W;LINKAGE=D

$D_0^*(2300)$ DECAY MODES

NODE=M252215;NODE=M252

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$D\pi^{\pm}$	seen	DESIG=1

$\Gamma(D\pi^{\pm})/\Gamma_{total}$ — Γ_1/Γ

NODE=M252R01
NODE=M252R01

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
seen		AAIJ	15X	LHCB	+	$D^*(2300)^+ \to D^0\pi^+$
seen		AAIJ	15Y	LHCB	+	$D^*(2300)^+ \to D^0\pi^+$
seen	3.4k	AUBERT	09AB	BABR	0	$D^*(2300)^0 \to D^+\pi^-$
seen		ABE	04D	BELL	0	$D^*(2300)^0 \to D^+\pi^-$
seen	18.8k	LINK	04A	FOCS	+	$D^*(2300)^+ \to D^0\pi^+$

$D_0^*(2300)$ REFERENCES

NODE=M252

DU	21	PRL 126 192001	M.-L. Du *et al.*		REFID=61096
DU	19	PR D99 114002	M.-L. Du, F.-K. Guo, U.-G. Meissner		REFID=59893
DU	18A	PR D98 094018	M.-L. Du *et al.*		REFID=61424
AAIJ	16AH	PR D94 072001	R. Aaij *et al.*	(LHCb Collab.)	REFID=57518
AAIJ	15V	PR D91 092002	R. Aaij *et al.*	(LHCb Collab.)	REFID=56575
Also		PR D93 119901 (errat.)	R. Aaij *et al.*	(LHCb Collab.)	REFID=57289
AAIJ	15X	PR D92 012012	R. Aaij *et al.*	(LHCb Collab.)	REFID=56588
AAIJ	15Y	PR D92 032002	R. Aaij *et al.*	(LHCb Collab.)	REFID=56609
AAIJ	14BH	PR D90 072003	R. Aaij *et al.*	(LHCb Collab.)	REFID=56208
AUBERT	09AB	PR D79 112004	B. Aubert *et al.*	(BABAR Collab.)	REFID=52941
ABE	04D	PR D69 112002	K. Abe *et al.*	(BELLE Collab.)	REFID=50011
LINK	04A	PL B586 11	J.M. Link *et al.*	(FOCUS Collab.)	REFID=49775

NODE=M253

$D_1(2420)$

$I(J^P) = \frac{1}{2}(1^+)$

$D_1(2420)$ MASS

NODE=M253M

The fit includes $D^{\pm}$, D^0, $D_s^{\pm}$, $D^{*\pm}$, D^{*0}, $D_s^{*\pm}$, $D_1(2420)^0$, $D_2^*(2460)^0$, and $D_{s1}(2536)^{\pm}$ mass and mass difference measurements.

NODE=M253M

NODE=M253M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT	
2422.1±0.6 OUR FIT Error includes scale factor of 1.7.							
2422.1±0.8 OUR AVERAGE Error includes scale factor of 2.1. See the ideogram below.							
2424.8±0.1±0.7	79k	[1] AAIJ	20D	LHCB	0	$B^- \to D^{*+}\pi^-\pi^-$	
2427.2±1.0±1.2	4207	ABLIKIM	20P	BES3	+	$e^+e^- \to D^+D^-\pi^+\pi^-$	OCCUR=2
2419.6±0.1±0.7	210k	AAIJ	13CC	LHCB	0	$pp \to D^{*+}\pi^- X$	
$2423.1\pm1.5^{+0.4}_{-1.0}$	2.7k	[2] ABRAMOWICZ13		ZEUS	0	$e^{\pm}p \to D^{(*)+}\pi^- X$	
$2421.9\pm4.7^{+3.4}_{-1.2}$	759	[3] ABRAMOWICZ13		ZEUS	+	$e^{\pm}p \to D^{(*)0}\pi^+ X$	OCCUR=2
2420.1±0.1±0.8	103k	DEL-AMO-SA...	10P	BABR	0	$e^+e^- \to D^{*+}\pi^- X$	
2426 ±3 ±1	151	ABE	05A	BELL	0	$B^- \to D^0\pi^+\pi^-\pi^-$	
2421 ±2 ±1	124	ABE	05A	BELL	+	$\overline{B}^0 \to D^+\pi^+\pi^-\pi^-$	OCCUR=2
2421.4±1.5±0.9		[4] ABE	04D	BELL	0	$B^- \to D^{*+}\pi^-\pi^-$	
$2421\ ^{+1}_{-2}\ \pm2$	286	AVERY	94C	CLE2	0	$e^+e^- \to D^{*+}\pi^- X$	
2425 ±2 ±2	146	BERGFELD	94B	CLE2	+	$e^+e^- \to D^{*0}\pi^+ X$	OCCUR=2
2422 ±2 ±2	51	FRABETTI	94B	E687	0	γBe $\to D^{*+}\pi^- X$	
2428 ±3 ±2	279	AVERY	90	CLEO	0	$e^+e^- \to D^{*+}\pi^- X$	
2414 ±2 ±5	171	ALBRECHT	89H	ARG	0	$e^+e^- \to D^{*+}\pi^- X$	
2428 ±8 ±5	171	ANJOS	89C	TPS	0	$\gamma N \to D^{*+}\pi^- X$	
2443 ±7 ±5	190	ANJOS	89C	TPS	+	$\gamma N \to D^0\pi^+ X^0$	OCCUR=2

• • • We do not use the following data for averages, fits, limits, etc. • • •

2420.5±2.1±0.9	3.1k	[5] CHEKANOV	09	ZEUS	0	$e^{\pm} p \to D^{*+} \pi^- X$
2421.7±0.7±0.6	7.5k	ABULENCIA	06A	CDF	0	1900 $p\overline{p} \to D^{*+} \pi^- X$
2425 ±3	235	[6] ABREU	98M	DLPH	0	$e^+ e^-$

[1] From a full four-body amplitude analysis of the $B^- \to D^{*+} \pi^- \pi^-$ decay. NODE=M253M;LINKAGE=B

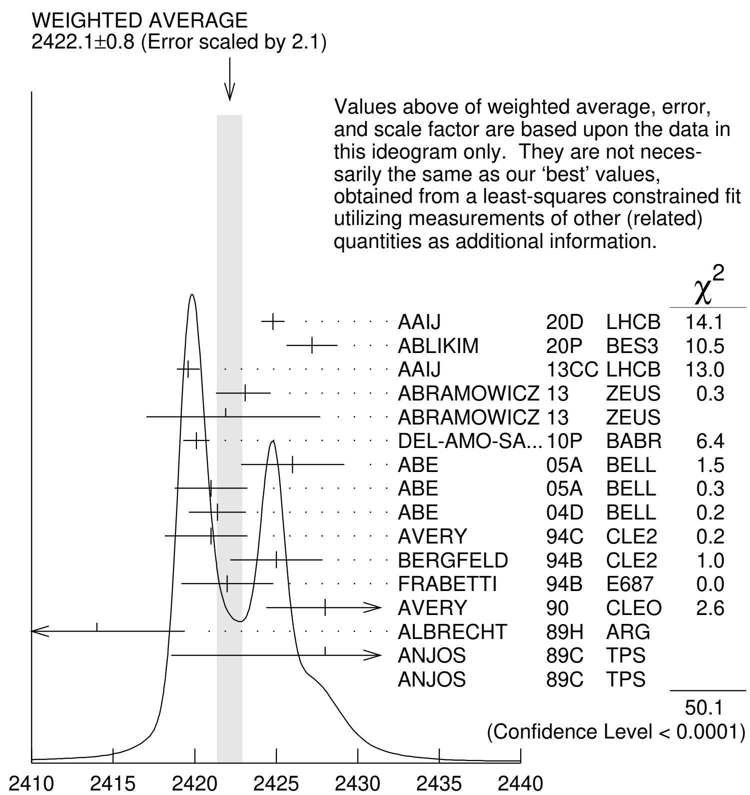
[2] From the combined fit of the $M(D^+ \pi^-)$ and $M(D^{*+} \pi^-)$ distributions. and A_{D_2} fixed to the theoretical prediction of -1. NODE=M253M;LINKAGE=AR

[3] From the fit of the $M(D^0 \pi^+)$ distribution. The widths of the D_1^+ and D_2^{*+} are fixed to 25 MeV and 37 MeV, and A_{D_1} and A_{D_2} are fixed to the theoretical predictions of 3 and -1, respectively. NODE=M253M;LINKAGE=BA

[4] Fit includes the contribution from $D_1^*(2430)^0$. NODE=M253M;LINKAGE=AB

[5] Calculated using the mass difference $m(D_1^0) - m(D^{*+})_{PDG}$ reported below and $m(D^{*+})_{PDG}$ = 2010.27 ± 0.17 MeV. The 0.17 MeV uncertainty of the PDG mass value should be added to the experimental uncertainty of 0.9 MeV. NODE=M253M;LINKAGE=CH

[6] No systematic error given. NODE=M253M;LINKAGE=K



$D_1(2420)$ mass (MeV)

$m_{D_1(2420)^0} - m_{D^{*+}}$

NODE=M253DM

The fit includes $D^{\pm}$, D^0, $D_s^{\pm}$, $D^{*\pm}$, D^{*0}, $D_s^{*\pm}$, $D_1(2420)^0$, $D_2^*(2460)^0$, and $D_{s1}(2536)^{\pm}$ mass and mass difference measurements. NODE=M253DM

NODE=M253DM

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
411.8±0.6 OUR FIT	Error includes scale factor of 1.7.				
411.5±0.8 OUR AVERAGE					
410.2±2.1±0.9	3.1k	CHEKANOV	09	ZEUS	$e^{\pm} p \to D^{*+} \pi^- X$
411.7±0.7±0.4	7.5k	ABULENCIA	06A	CDF	1900 $p\overline{p} \to D^{*+} \pi^- X$

$m_{D_1(2420)^{\pm}} - m_{D_1(2420)^0}$

NODE=M253DMC

NODE=M253DMC

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
$\mathbf{4^{+2}_{-3}\pm3}$	BERGFELD	94B	CLE2	$e^+ e^- \to$ hadrons

$D_1(2420)$ WIDTH

NODE=M253W

NODE=M253W

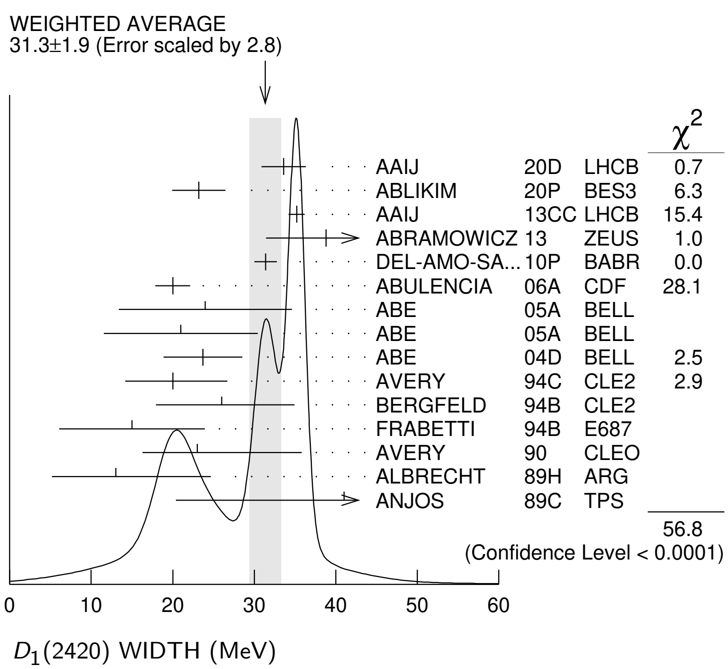
VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
31.3± 1.9 OUR AVERAGE		Error includes scale factor of 2.8. See the ideogram below.			
33.6± 0.3± 2.7	79k	[1] AAIJ 20D	LHCB	0	$B^- \to D^{*+}\pi^-\pi^-$
23.2± 2.3± 2.3	4207	ABLIKIM 20P	BES3	+	$e^+e^- \to D^+D^-\pi^+\pi^-$
35.2± 0.4± 0.9	210k	AAIJ 13CC	LHCB	0	$pp \to D^{*+}\pi^- X$
$38.8\pm 5.0^{+1.9}_{-5.4}$	2.7k	[2] ABRAMOWICZ 13	ZEUS	0	$e^\pm p \to D^{(*)+}\pi^- X$
31.4± 0.5± 1.3	103k	DEL-AMO-SA..10P	BABR	0	$e^+e^- \to D^{*+}\pi^- X$
20.0± 1.7± 1.3	7.5k	ABULENCIA 06A	CDF	0	1900 $p\overline{p} \to D^{*+}\pi^- X$
24 ± 7 ± 8	151	ABE 05A	BELL	0	$B^- \to D^0\pi^+\pi^-\pi^-$
21 ± 5 ± 8	124	ABE 05A	BELL	+	$\overline{B}^0 \to D^+\pi^+\pi^-\pi^-$
23.7± 2.7± 4.0		[3] ABE 04D	BELL	0	$B^- \to D^{*+}\pi^-\pi^-$
$20\ ^{+6}_{-5}\pm 3$	286	AVERY 94C	CLE2	0	$e^+e^- \to D^{*+}\pi^- X$
$26\ ^{+8}_{-7}\pm 4$	146	BERGFELD 94B	CLE2	+	$e^+e^- \to D^{*0}\pi^+ X$
15 ± 8 ± 4	51	FRABETTI 94B	E687	0	γBe $\to D^{*+}\pi^- X$
$23\ ^{+8}_{-6}\ ^{+10}_{-3}$	279	AVERY 90	CLEO	0	$e^+e^- \to D^{*+}\pi^- X$
$13 \pm 6\ ^{+10}_{-5}$	171	ALBRECHT 89H	ARG	0	$e^+e^- \to D^{*+}\pi^- X$
41 ±19 ± 8	190	ANJOS 89C	TPS	+	$\gamma N \to D^0\pi^+ X^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$53.2\pm 7.2^{+3.3}_{-4.9}$	3.1k	CHEKANOV 09	ZEUS	0	$e^\pm p \to D^{*+}\pi^- X$
58 ±14 ±10	171	ANJOS 89C	TPS	0	$\gamma N \to D^{*+}\pi^- X$

OCCUR=2 (ABLIKIM 20P)
OCCUR=2 (ABE 05A, +)
OCCUR=2 (BERGFELD 94B)
OCCUR=2 (ANJOS 89C, +)

[1] From a full four-body amplitude analysis of the $B^- \to D^{*+}\pi^-\pi^-$ decay. NODE=M253W;LINKAGE=B

[2] From the combined fit of the $M(D^+\pi^-)$ and $M(D^{*+}\pi^-)$ distributions. and A_{D_2} fixed to the theoretical prediction of -1. NODE=M253W;LINKAGE=AR

[3] Fit includes the contribution from $D_1^*(2430)^0$. NODE=M253W;LINKAGE=AB



$D_1(2420)$ DECAY MODES

NODE=M253215;NODE=M253

$\overline{D}_1(2420)$ modes are charge conjugates of modes below.

NODE=M253

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$D^*(2007)^0\pi$	seen	DESIG=1
Γ_2	$D\pi^+\pi^-$		DESIG=3
Γ_3	$D\rho^0$		DESIG=4

Γ_4	$D f_0(500)$	DESIG=5
Γ_5	$D_0^*(2300)^0 \pi$	DESIG=6
Γ_6	$D^0 \pi$	DESIG=2
Γ_7	$D^* \pi^+ \pi^-$	DESIG=7

$D_1(2420)$ BRANCHING RATIOS

NODE=M253220

$\Gamma(D^*(2007)^0 \pi)/\Gamma_{total}$ — Γ_1/Γ

NODE=M253R01
NODE=M253R01

VALUE	DOCUMENT ID		TECN	CHG	COMMENT	
seen	ACKERSTAFF	97W	OPAL	0	$e^+ e^- \to D^{*+} \pi^- X$	
seen	AVERY	90	CLEO	0	$e^+ e^- \to D^{*+} \pi^- X$	
seen	ALBRECHT	89H	ARG	0	$e^+ e^- \to D^* \pi^- X$	
seen	ANJOS	89C	TPS	0	$\gamma N \to D^{*+} \pi^- X$	
seen	ANJOS	89C	TPS	+	$\gamma N \to D^0 \pi^+ X^0$	OCCUR=2

$\Gamma(D^0 \pi)/\Gamma(D^*(2007)^0 \pi)$ — Γ_6/Γ_1

NODE=M253R02
NODE=M253R02

VALUE	CL%	DOCUMENT ID		TECN	CHG	COMMENT	
<0.18	90	BERGFELD	94B	CLE2	+	$e^+ e^- \to$ hadrons	OCCUR=2
• • • We do not use the following data for averages, fits, limits, etc. • • •							
<0.24	90	AVERY	90	CLEO	0	$e^+ e^- \to D^+ \pi^- X$	

$D_1(2420)$ POLARIZATION AMPLITUDE A_{D_1}

NODE=M253PAH

NODE=M253PAH

A polarization amplitude A_{D_1} is a parameter that depends on the initial polarization of the D_1 and is sensitive to a possible S-wave contribution to its decay. For D_1 decays the helicity angle, θ_h, distribution varies like $1 + A_{D_1} \cos^2\theta_h$, where θ_h is the angle in the D^* rest frame between the two pions emitted by the $D_1 \to D^* \pi$ and the $D^* \to D \pi$.

Unpolarized D_1 decaying purely via D-wave is predicted to give $A_{D_1} = 3$.

NODE=M253PAH

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT	
5.73±0.25 OUR AVERAGE							
$7.8 \ {}^{+6.7}_{-2.7} \ {}^{+4.6}_{-1.8}$	2.7k	[1] ABRAMOWICZ	13	ZEUS	0	$e^\pm p \to D^{(*)+} \pi^- X$	
5.72 ± 0.25	103k	DEL-AMO-SA...	10P	BABR	0	$e^+ e^- \to D^{*+} \pi^- X$	
$5.9 \ {}^{+3.0}_{-1.7} \ {}^{+2.4}_{-1.0}$		CHEKANOV	09	ZEUS	0	$e^\pm p \to D^{*+} \pi^- X$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
3.30 ± 0.48	210k	[2] AAIJ	13CC	LHCB	0	$p p \to D^{*+} \pi^- X$	
$3.8 \pm 0.6 \pm 0.8$		[3] AUBERT	09Y	BABR	0	$B^+ \to D_1^0 \ell^+ \nu_\ell$	
$3.8 \pm 0.6 \pm 0.8$		[3] AUBERT	09Y	BABR	+	$B^0 \to D_1^- \ell^+ \nu_\ell$	OCCUR=2
$2.74 {}^{+1.40}_{-0.93}$		[4] AVERY	94C	CLE2	0	$e^+ e^- \to D^{*+} \pi^- X$	

[1] From the combined fit of the $M(D^+ \pi^-)$ and $M(D^{*+} \pi^-)$ distributions. and A_{D_2} fixed to the theoretical prediction of -1. A pure D-wave not excluded although some S-wave mixing possible. NODE=M253PAH;LINKAGE=AR

[2] Systematic uncertainty not estimated. Resonance parameters fixed. NODE=M253PAH;LINKAGE=A

[3] Assuming $\Gamma(\Upsilon(4S) \to B^+ B^-) / \Gamma(\Upsilon(4S) \to B^0 \overline{B}^0) = 1.065 \pm 0.026$ and equal partial widths and helicity angle distributions for charged and neutral D_1 mesons. NODE=M253PAH;LINKAGE=AU

[4] Systematic uncertainties not estimated. NODE=M253PAH;LINKAGE=AV

$D_1(2420)$ REFERENCES

NODE=M253

AAIJ	20D	PR D101 032005	R. Aaij *et al.*	(LHCb Collab.)	REFID=60253
ABLIKIM	20P	PL B804 135395	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60395
AAIJ	13CC	JHEP 1309 145	R. Aaij *et al.*	(LHCb Collab.)	REFID=55581
ABRAMOWICZ	13	NP B866 229	H. Abramowicz *et al.*	(ZEUS Collab.)	REFID=54743
DEL-AMO-SA...	10P	PR D82 111101	P. del Amo Sanchez *et al.*	(BABAR Collab.)	REFID=53534
AUBERT	09Y	PRL 103 051803	B. Aubert *et al.*	(BABAR Collab.)	REFID=52929
CHEKANOV	09	EPJ C60 25	S. Chekanov *et al.*	(ZEUS Collab.)	REFID=52733
ABULENCIA	06A	PR D73 051104	A. Abulencia *et al.*	(CDF Collab.)	REFID=51054
ABE	05A	PRL 94 221805	K. Abe *et al.*	(BELLE Collab.)	REFID=50755
ABE	04D	PR D69 112002	K. Abe *et al.*	(BELLE Collab.)	REFID=50011
ABREU	98M	PL B426 231	P. Abreu *et al.*	(DELPHI Collab.)	REFID=46315
ACKERSTAFF	97W	ZPHY C76 425	K. Ackerstaff *et al.*	(OPAL Collab.)	REFID=45788
AVERY	94C	PL B331 236	P. Avery *et al.*	(CLEO Collab.)	REFID=44096
BERGFELD	94B	PL B340 194	T. Bergfeld *et al.*	(CLEO Collab.)	REFID=44099
FRABETTI	94B	PRL 72 324	P.L. Frabetti *et al.*	(FNAL E687 Collab.)	REFID=43687
AVERY	90	PR D41 774	P. Avery, D. Besson	(CLEO Collab.)	REFID=41013
ALBRECHT	89H	PL B232 398	H. Albrecht *et al.*	(ARGUS Collab.) JP	REFID=41001
ANJOS	89C	PRL 62 1717	J.C. Anjos *et al.*	(FNAL E691 Collab.)	REFID=40737

NODE=M180

$D_1(2430)^0$

$I(J^P) = \frac{1}{2}(1^+)$

$J^P = 1^+$ determined by AAIJ 20D.

NODE=M180

$D_1(2430)^0$ MASS

NODE=M180M

NODE=M180M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2412± 9 OUR AVERAGE					
2411± 3± 9	79k	[1] AAIJ	20D	LHCB	$B^- \to D^{*+}\pi^-\pi^-$
2427±26±25		ABE	04D	BELL	$B^- \to D^{*+}\pi^-\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2477±28		[2] AUBERT	06L	BABR	$\overline{B}^0 \to D^{*+}\omega\pi^-$

[1] From a full four-body amplitude analysis of the $B^- \to D^{*+}\pi^-\pi^-$ decay.
[2] Systematic errors not estimated.

NODE=M180M;LINKAGE=A
NODE=M180M;LINKAGE=AU

$D_1(2430)^0$ WIDTH

NODE=M180W

NODE=M180W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
314± 29 OUR AVERAGE					
309± 9±28	79k	[1] AAIJ	20D	LHCB	$B^- \to D^{*+}\pi^-\pi^-$
$384^{+107}_{-75}\pm74$		ABE	04D	BELL	$B^- \to D^{*+}\pi^-\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
266± 97		[2] AUBERT	06L	BABR	$\overline{B}^0 \to D^{*+}\omega\pi^-$

[1] From a full four-body amplitude analysis of the $B^- \to D^{*+}\pi^-\pi^-$ decay.
[2] Systematic errors not estimated.

NODE=M180W;LINKAGE=A
NODE=M180W;LINKAGE=AU

$D_1(2430)^0$ DECAY MODES

NODE=M180215;NODE=M180

	Mode	Fraction (Γ_i/Γ)
Γ_1	$D^*(2010)^+\pi^-$	seen

DESIG=1;OUR EVAL;→ UNCHECKED ←

$D_1(2430)^0$ REFERENCES

NODE=M180

AAIJ	20D	PR D101 032005	R. Aaij *et al.*	(LHCb Collab.) JP
AUBERT	06L	PR D74 012001	B. Aubert *et al.*	(BABAR Collab.)
ABE	04D	PR D69 112002	K. Abe *et al.*	(BELLE Collab.)

REFID=60253
REFID=51140
REFID=50011

NODE=M254

$D_2^*(2460)$

$I(J^P) = \frac{1}{2}(2^+)$

$J^P = 2^+$ assignment strongly favored (ALBRECHT 89B, ALBRECHT 89H), natural parity confirmed by the helicity analysis (DEL-AMO-SANCHEZ 10P). AAIJ 13CC confirms $J^P = 2^+$ and natural parity.

NODE=M254

$D_2^*(2460)$ MASS

NODE=M254M

The fit includes $D^\pm$, D^0, $D_s^\pm$, $D^{*\pm}$, D^{*0}, $D_s^{*\pm}$, $D_1(2420)^0$, $D_2^*(2460)^0$, and $D_{s1}(2536)^\pm$ mass and mass difference measurements.

NODE=M254M

NODE=M254M

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT	
$2461.1^{+0.7}_{-0.8}$ OUR FIT		Error includes scale factor of 6.2.				
2461.1±0.7 OUR AVERAGE		Error includes scale factor of 5.2. See the ideogram below.				
2463.7±0.4±0.7	28k	[1] AAIJ 16AH	LHCB	0	$B^- \to D^+\pi^-\pi^-$	OCCUR=2
2464.0±1.4±0.5	2k	[2] AAIJ 15V	LHCB	0	$B^- \to D^+K^-\pi^-$	
2465.6±1.8±1.3		[3] AAIJ 15X	LHCB	+	$B^0 \to \overline{D}{}^0K^+\pi^-$	
2468.6±0.6±0.3		[4] AAIJ 15Y	LHCB	+	$B^0 \to \overline{D}{}^0\pi^+\pi^-$	
2460.4±0.4±1.2	82k	AAIJ 13CC	LHCB	0	$pp \to D^{*+}\pi^-X$	
2460.4±0.1±0.1	675k	AAIJ 13CC	LHCB	0	$pp \to D^+\pi^-X$	OCCUR=2
2463.1±0.2±0.6	342k	AAIJ 13CC	LHCB	+	$pp \to D^0\pi^+X$	OCCUR=3
$2462.5\pm2.4^{+1.3}_{-1.1}$	2.3k	[5] ABRAMOWICZ 13	ZEUS	0	$e^\pm p \to D^{(*)+}\pi^-X$	
$2460.6\pm4.4^{+3.6}_{-0.8}$	1371	[6] ABRAMOWICZ 13	ZEUS	+	$e^\pm p \to D^{(*)0}\pi^+X$	OCCUR=2
2462.2±0.1±0.8	243k	DEL-AMO-SA...10P	BABR	0	$e^+e^- \to D^+\pi^-X$	
2465.4±0.2±1.1	111k	[7] DEL-AMO-SA...10P	BABR	+	$e^+e^- \to D^0\pi^+X$	OCCUR=2
2460.4±1.2±2.2	3.4k	AUBERT 09AB	BABR	0	$B^- \to D^+\pi^-\pi^-$	
$2465.7\pm1.8^{+1.4}_{-4.8}$	2909	KUZMIN 07	BELL	+	$e^+e^- \to$ hadrons	
2461.6±2.1±3.3		[8] ABE 04D	BELL	0	$B^- \to D^+\pi^-\pi^-$	
2464.5±1.1±1.9	5.8k	[8] LINK 04A	FOCS	0	γ A	
2465 ±3 ±3	486	AVERY 94C	CLE2	0	$e^+e^- \to D^+\pi^-X$	
2463 ±3 ±3	310	BERGFELD 94B	CLE2	+	$e^+e^- \to D^0\pi^+X$	
2453 ±3 ±2	128	FRABETTI 94B	E687	0	γBe $\to D^+\pi^-X$	
2453 ±3 ±2	185	FRABETTI 94B	E687	+	γBe $\to D^0\pi^+X$	OCCUR=2
2461 ±3 ±1	440	AVERY 90	CLEO	0	$e^+e^- \to D^{*+}\pi^-X$	
2455 ±3 ±5	337	ALBRECHT 89B	ARG	0	$e^+e^- \to D^+\pi^-X$	
2469 ±4 ±6		ALBRECHT 89F	ARG	+	$e^+e^- \to D^0\pi^+X$	OCCUR=2
2459 ±3 ±2	153	ANJOS 89C	TPS	0	$\gamma N \to D^+\pi^-X$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
2468.1±0.6±0.5		[9] AAIJ 15Y	LHCB	+	$B^0 \to \overline{D}{}^0\pi^+\pi^-$	OCCUR=2
$2469.1\pm3.7^{+1.2}_{-1.3}$	1.5k	[10] CHEKANOV 09	ZEUS	0	$e^\pm p \to D^{(*)+}\pi^-X$	
2463.3±0.6±0.8	20k	ABULENCIA 06A	CDF	0	1900 $p\overline{p} \to D^+\pi^-X$	
2467.6±1.5±0.8	3.5k	[11] LINK 04A	FOCS	+	γ A	OCCUR=2
2461 ±6	126	[12] ABREU 98M	DLPH	0	e^+e^-	
2466 ±7	1	ASRATYAN 95	BEBC	0	53,40 $\nu(\overline{\nu}) \to pX, dX$	

[1] From the amplitude analysis in the model describing the $D^+\pi^-$ wave together with virtual contributions from the $D^*(2007)^0$ and B^{*0} states, and components corresponding to the $D_2^*(2460)^0$, $D_1^*(2680)^0$, $D_3^*(2760)^0$, and $D_2^*(3000)^0$ resonances. NODE=M254M;LINKAGE=B

[2] From the amplitude analysis in the model describing the $D^+\pi^-$ wave together with virtual contributions from the $D^*(2007)^0$ and B^{*0} states, nonresonant spin-0 and spin-1 components as well as the $D_0^*(2400)^0$, $D_2^*(2460)^0$ and $D_1^*(2760)^0$ resonances. NODE=M254M;LINKAGE=A

[3] From the Dalitz plot analysis including various K^* and D^{**} mesons as well as broad structures in the $K\pi$ S-wave and the $D\pi$ S- and P-waves. NODE=M254M;LINKAGE=CA

[4] Modeling the $\pi^+\pi^-$ S-wave with the Isobar formalism. NODE=M254M;LINKAGE=BC

[5] From the combined fit of the $M(D^+\pi^-)$ and $M(D^{*+}\pi^-)$ distributions. and A_{D_2} fixed to the theoretical prediction of −1. NODE=M254M;LINKAGE=AR

[6] From the fit of the $M(D^0\pi^+)$ distribution. The widths of the D_1^+ and D_2^{*+} are fixed to 25 MeV and 37 MeV, and A_{D_1} and A_{D_2} are fixed to the theoretical predictions of 3 and −1, respectively. NODE=M254M;LINKAGE=AB

[7] At a fixed width of 50.5 MeV. NODE=M254M;LINKAGE=DE

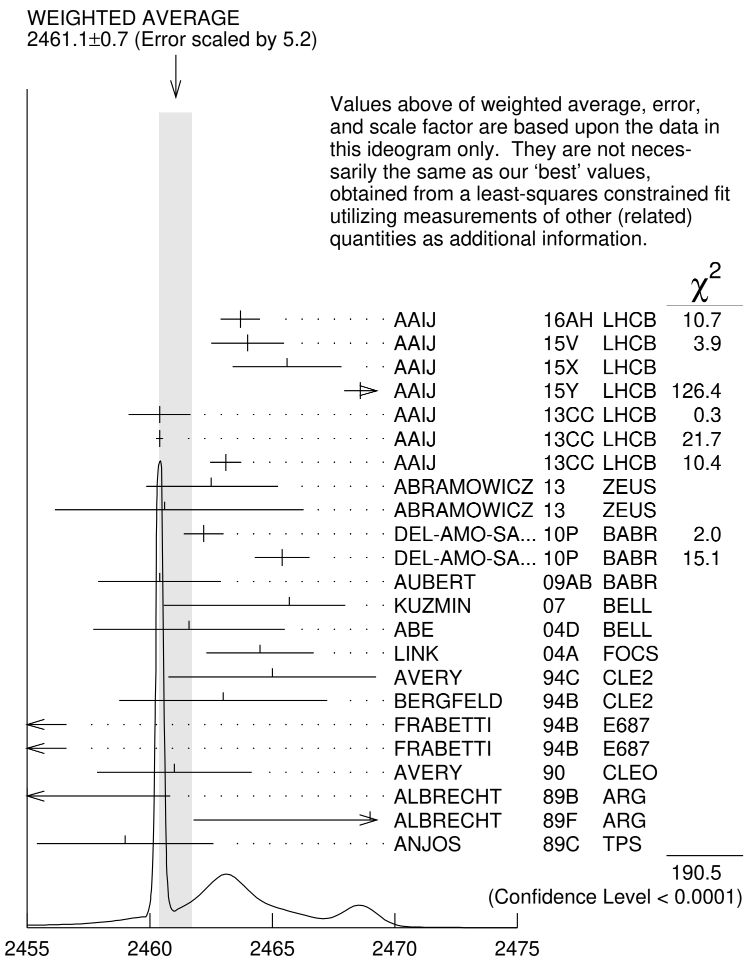
[8] Fit includes the contribution from $D_0^*(2400)^0$. NODE=M254M;LINKAGE=LI

[9] Modeling the $\pi^+\pi^-$ S-wave with the K-matrix formalism. NODE=M254M;LINKAGE=CC

[10] Calculated using the mass difference $m(D_2^{*0}) - m(D^{*+})_{PDG}$ reported below and $m(D^{*+})_{PDG}$ = 2010.27 ± 0.17 MeV. The 0.17 MeV uncertainty of the PDG mass value should be added to the experimental uncertainty of $^{+1.2}_{-1.3}$ MeV. NODE=M254M;LINKAGE=CH

[11] Fit includes the contribution from $D_0^*(2400)^{\pm}$. Not independent of the corresponding mass difference measurement, $(m_{D_2^*(2460)^{\pm}}) - (m_{D_2^*(2460)^0})$. NODE=M254M;LINKAGE=LC

[12] No systematic error given. NODE=M254M;LINKAGE=K



$D_2^*(2460)$ mass (MeV)

$m_{D_2^*(2460)^0} - m_{D^+}$

NODE=M254DM

The fit includes $D^{\pm}$, D^0, $D_s^{\pm}$, $D^{*\pm}$, D^{*0}, $D_s^{*\pm}$, $D_1(2420)^0$, $D_2^*(2460)^0$, and $D_{s1}(2536)^{\pm}$ mass and mass difference measurements. NODE=M254DM

NODE=M254DM

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
591.5$^{+0.7}_{-0.8}$ OUR FIT	Error includes scale factor of 5.9.				
593.9±0.6±0.5	20k	ABULENCIA	06A	CDF	1900 $p\overline{p} \rightarrow D^+\pi^- X$

$m_{D_2^*(2460)^0} - m_{D^{*+}}$

NODE=M254DM2

The fit includes $D^{\pm}$, D^0, $D_s^{\pm}$, $D^{*\pm}$, D^{*0}, $D_s^{*\pm}$, $D_1(2420)^0$, $D_2^*(2460)^0$, and $D_{s1}(2536)^{\pm}$ mass and mass difference measurements. NODE=M254DM2

NODE=M254DM2

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$450.9^{+0.7}_{-0.8}$ OUR FIT	Error includes scale factor of 5.9.				
$458.8\pm3.7^{+1.2}_{-1.3}$	1.5k	CHEKANOV	09	ZEUS	$e^{\pm}p \to D^{(*)+}\pi^- X$

$m_{D_2^*(2460)^{\pm}} - m_{D_2^*(2460)^0}$

NODE=M254DMC

NODE=M254DMC

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
2.4±1.7 OUR AVERAGE				
3.1±1.9±0.9	LINK	04A	FOCS	γ A
−2 ±4 ±4	BERGFELD	94B	CLE2	$e^+e^- \to$ hadrons
0 ±4	FRABETTI	94B	E687	$\gamma \text{Be} \to D\pi X$
14 ±5 ±8	ALBRECHT	89F	ARG	$e^+e^- \to D^0\pi^+ X$

$D_2^*(2460)$ WIDTH

NODE=M254W

NODE=M254W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT	
47.3± 0.8 OUR AVERAGE	Error includes scale factor of 1.5. See the ideogram below.						
47.0± 0.8± 1.0	28k	[1] AAIJ	16AH	LHCB	0	$B^- \to D^+\pi^-\pi^-$	OCCUR=3
43.8± 2.9± 1.8	2k	[2] AAIJ	15V	LHCB	0	$B^- \to D^+K^-\pi^-$	
46.0± 3.4± 3.2		[3] AAIJ	15X	LHCB	+	$B^0 \to \overline{D}^0 K^+\pi^-$	
47.3± 1.5± 0.7		[4] AAIJ	15Y	LHCB	+	$B^0 \to \overline{D}^0\pi^+\pi^-$	
43.2± 1.2± 3.0	82k	AAIJ	13CC	LHCB	0	$pp \to D^{*+}\pi^- X$	
45.6± 0.4± 1.1	675k	AAIJ	13CC	LHCB	0	$pp \to D^+\pi^- X$	OCCUR=2
48.6± 1.3± 1.9	342k	AAIJ	13CC	LHCB	+	$pp \to D^0\pi^+ X$	OCCUR=3
$46.6\pm 8.1^{+5.9}_{-3.8}$	2.3k	[5] ABRAMOWICZ	13	ZEUS	0	$e^{\pm}p \to D^{(*)+}\pi^- X$	
50.5± 0.6± 0.7	243k	DEL-AMO-SA...	10P	BABR	0	$e^+e^- \to D^+\pi^- X$	
41.8± 2.5± 2.9	3.4k	AUBERT	09AB	BABR	0	$B^- \to D^+\pi^-\pi^-$	
49.7± 3.8± 6.4	2909	KUZMIN	07	BELL	+	$e^+e^- \to$ hadrons	
49.2± 2.3± 1.3	20k	ABULENCIA	06A	CDF	0	1900 $p\overline{p} \to D^+\pi^- X$	
45.6± 4.4± 6.7		[6] ABE	04D	BELL	0	$B^- \to D^+\pi^-\pi^-$	
38.7± 5.3± 2.9	5.8k	[6] LINK	04A	FOCS	0	γ A	
34.1± 6.5± 4.2	3.5k	[7] LINK	04A	FOCS	+	γ A	OCCUR=2
$28\ ^{+8}_{-7}\pm 6$	486	AVERY	94C	CLE2	0	$e^+e^- \to D^+\pi^- X$	
$27\ ^{+11}_{-8}\pm 5$	310	BERGFELD	94B	CLE2	+	$e^+e^- \to D^0\pi^+ X$	
25 ±10 ± 5	128	FRABETTI	94B	E687	0	$\gamma \text{Be} \to D^+\pi^- X$	
23 ± 9 ± 5	185	FRABETTI	94B	E687	+	$\gamma \text{Be} \to D^0\pi^+ X$	OCCUR=2
$20\ ^{+9}_{-12}\ ^{+9}_{-10}$	440	AVERY	90	CLEO	0	$e^+e^- \to D^{*+}\pi^- X$	
$15\ ^{+13}_{-10}\ ^{+5}_{-10}$	337	ALBRECHT	89B	ARG	0	$e^+e^- \to D^+\pi^- X$	
20 ±10 ± 5	153	ANJOS	89C	TPS	0	$\gamma N \to D^+\pi^- X$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
46.0± 1.4± 1.8		[8] AAIJ	15Y	LHCB	+	$B^0 \to \overline{D}^0\pi^+\pi^-$	OCCUR=2

[1] From the amplitude analysis in the model describing the $D^+\pi^-$ wave together with virtual contributions from the $D^*(2007)^0$ and B^{*0} states, and components corresponding to the $D_2^*(2460)^0$, $D_1^*(2680)^0$, $D_3^*(2760)^0$, and $D_2^*(3000)^0$ resonances. NODE=M254W;LINKAGE=D

[2] From the amplitude analysis in the model describing the $D^+\pi^-$ wave together with virtual contributions from the $D^*(2007)^0$ and B^{*0} states, nonresonant spin-0 and spin-1 components as well as the $D_0^*(2400)^0$, $D_2^*(2460)^0$ and $D_1^*(2760)^0$ resonances. NODE=M254W;LINKAGE=A

[3] From the Dalitz plot analysis including various K^* and D^{**} mesons as well as broad structures in the $K\pi$ S-wave and the $D\pi$ S- and P-waves. NODE=M254W;LINKAGE=AC

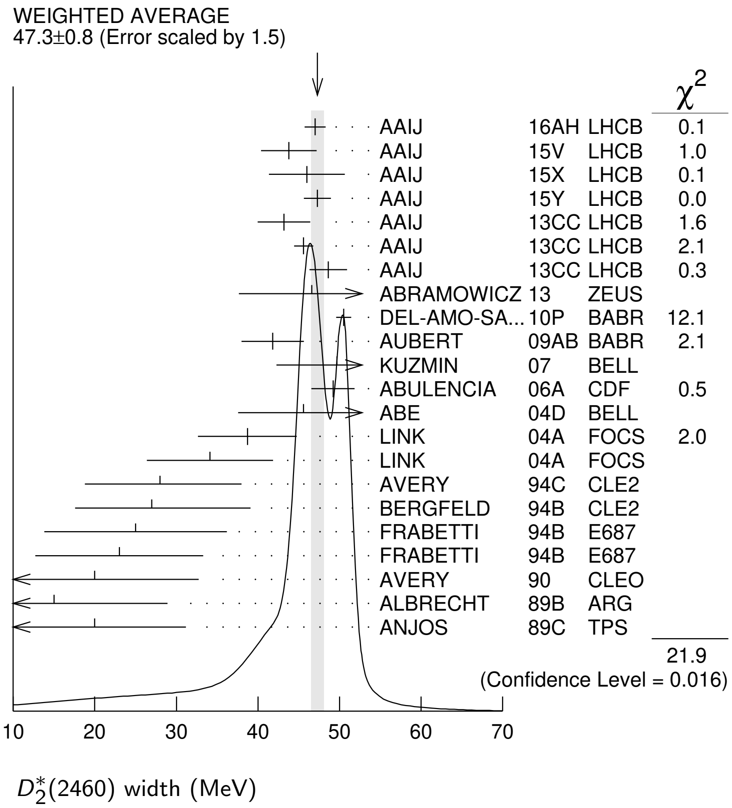
[4] Modeling the $\pi^+\pi^-$ S-wave with the Isobar formalism. NODE=M254W;LINKAGE=B

[5] From the combined fit of the $M(D^+\pi^-)$ and $M(D^{*+}\pi^-)$ distributions. and A_{D_2} fixed to the theoretical prediction of −1. NODE=M254W;LINKAGE=AR

[6] Fit includes the contribution from $D_0^*(2400)^0$. NODE=M254W;LINKAGE=LI

[7] Fit includes the contribution from $D_0^*(2400)^{\pm}$. NODE=M254W;LINKAGE=LC

[8] Modeling the $\pi^+\pi^-$ S-wave with the K-matrix formalism. NODE=M254W;LINKAGE=C



$D_2^*(2460)$ DECAY MODES

NODE=M254215;NODE=M254

$\overline{D}_2^*(2460)$ modes are charge conjugates of modes below.

NODE=M254

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$D\pi^-$	seen	DESIG=1
Γ_2	$D^*(2010)\pi^-$	seen	DESIG=2
Γ_3	$D\pi^+\pi^-$		DESIG=3
Γ_4	$D^*\pi^+\pi^-$		DESIG=4

$D_2^*(2460)$ BRANCHING RATIOS

NODE=M254220

$\Gamma(D\pi^-)/\Gamma_{total}$ Γ_1/Γ

NODE=M254R1
NODE=M254R1

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
seen	3.4k	AUBERT	09AB	BABR	0	$B^- \to D^+\pi^-\pi^-$
seen	337	ALBRECHT	89B	ARG	0	$e^+e^- \to D^+\pi^- X$
seen		ALBRECHT	89F	ARG	+	$e^+e^- \to D^0\pi^+ X$
seen		ANJOS	89C	TPS	0	$\gamma N \to D^+\pi^- X$

$\Gamma(D^*(2010)\pi^-)/\Gamma_{total}$ Γ_2/Γ

NODE=M254R2
NODE=M254R2

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
seen	ACKERSTAFF	97W	OPAL	0	$e^+e^- \to D^{*+}\pi^- X$
seen	AVERY	90	CLEO	0	$e^+e^- \to D^{*+}\pi^- X$
seen	ALBRECHT	89H	ARG	0	$e^+e^- \to D^*\pi^- X$

$\Gamma(D\pi^-)/\Gamma(D^*(2010)\pi^-)$ Γ_1/Γ_2

NODE=M254R3
NODE=M254R3

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1.52±0.14 OUR AVERAGE						
1.4 ±0.3 ±0.3	2.3k	[1] ABRAMOWICZ	13	ZEUS	0	$e^\pm p \to D^{(*)+}\pi^- X$
1.1 ±0.4 $^{+0.3}_{-0.2}$	1371	[2] ABRAMOWICZ	13	ZEUS	+	$e^\pm p \to D^{(*)0}\pi^+ X$
1.47±0.03±0.16	379k	DEL-AMO-SA...	10P	BABR	0	$e^+e^- \to D^{(*)+}\pi^- X$
2.8 ±0.8 $^{+0.5}_{-0.6}$	1.5k	CHEKANOV	09	ZEUS	0	$e^\pm p \to D^{(*)+}\pi^- X$
2.2 ±0.7 ±0.6		AVERY	94C	CLE2	0	$e^+e^- \to D^{*+}\pi^- X$

OCCUR=2

1.9 ±1.1 ±0.3		BERGFELD	94B	CLE2	+	$e^+ e^- \to$ hadrons	OCCUR=2
2.3 ±0.8		AVERY	90	CLEO	0	$e^+ e^-$
3.0 ±1.1 ±1.5		ALBRECHT	89H	ARG	0	$e^+ e^- \to D^* \pi^- X$

• • • We do not use the following data for averages, fits, limits, etc. • • •

1.9 ±0.5		ABE	04D	BELL	0	$B^- \to D^{(*)+} \pi^- \pi^-$

[1] From the combined fit of the $M(D^+ \pi^-)$ and $M(D^{*+} \pi^-)$ distributions. and A_{D_2} fixed to the theoretical prediction of -1. NODE=M254R3;LINKAGE=AR

[2] From the fit of the $M(D^0 \pi^+)$ distribution. The widths of the D_1^+ and D_2^{*+} are fixed to 25 MeV and 37 MeV, and A_{D_1} and A_{D_2} are fixed to the theoretical predictions of 3 and -1, respectively. NODE=M254R3;LINKAGE=AB

$\Gamma(D\pi^-)/[\Gamma(D\pi^-)+\Gamma(D^*(2010)\pi^-)]$ $\Gamma_1/(\Gamma_1+\Gamma_2)$

NODE=M254R01

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
0.62±0.03±0.02	8414	[1] AUBERT	09Y	BABR	0	$B^+ \to D_2^{*0} \ell^+ \nu_\ell$
0.62±0.03±0.02	3361	[1] AUBERT	09Y	BABR	+	$\overline{B}^0 \to D_2^{*+} \ell^- \nu_\ell$

OCCUR=2

[1] Assuming $\Gamma(\Upsilon(4S) \to B^+ B^-) / \Gamma(\Upsilon(4S) \to B^0 \overline{B}^0) = 1.065 \pm 0.026$ and equal partial widths for charged and neutral D_2^* mesons. NODE=M254R01;LINKAGE=AU

$D_2^*(2460)$ POLARIZATION AMPLITUDE A_{D_2}

NODE=M254PAM

A polarization amplitude A_{D_2} is a parameter that depends on the initial polarization of the D_2. For D_2 decays the helicity angle, θ_H, distribution varies like $1 + A_{D_2} \cos^2(\theta_H)$, where θ_H is the angle in the D^* rest frame between the two pions emitted by the $D_2 \to D^* \pi$ and $D^* \to D \pi$.

NODE=M254PAM

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
-1.16 ± 0.35	2.3k	[1] ABRAMOWICZ	13	ZEUS	0	$e^\pm p \to D^{(*)+} \pi^- X$
consistent with -1	243k	DEL-AMO-SA...	10P	BABR	0	$e^+ e^- \to D^+ \pi^- X$
$-0.74^{+0.49}_{-0.38}$		[2] AVERY	94C	CLE2	0	$e^+ e^- \to D^{*+} \pi^- X$

NODE=M254PAM

[1] From the combined fit of the $M(D^+ \pi^-)$ and $M(D^{*+} \pi^-)$ distributions. NODE=M254PAM;LINKAGE=AB

[2] Systematic uncertainties not estimated. NODE=M254PAM;LINKAGE=AV

$D_2^*(2460)$ REFERENCES

NODE=M254

AAIJ	16AH	PR D94 072001	R. Aaij *et al.*	(LHCb Collab.)	REFID=57518
AAIJ	15V	PR D91 092002	R. Aaij *et al.*	(LHCb Collab.)	REFID=56575
Also		PR D93 119901 (errat.)	R. Aaij *et al.*	(LHCb Collab.)	REFID=57289
AAIJ	15X	PR D92 012012	R. Aaij *et al.*	(LHCb Collab.)	REFID=56588
AAIJ	15Y	PR D92 032002	R. Aaij *et al.*	(LHCb Collab.)	REFID=56609
AAIJ	13CC	JHEP 1309 145	R. Aaij *et al.*	(LHCb Collab.)	REFID=55581
ABRAMOWICZ	13	NP B866 229	H. Abramowicz *et al.*	(ZEUS Collab.)	REFID=54743
DEL-AMO-SA...	10P	PR D82 111101	P. del Amo Sanchez *et al.*	(BABAR Collab.)	REFID=53534
AUBERT	09AB	PR D79 112004	B. Aubert *et al.*	(BABAR Collab.)	REFID=52941
AUBERT	09Y	PRL 103 051803	B. Aubert *et al.*	(BABAR Collab.)	REFID=52929
CHEKANOV	09	EPJ C60 25	S. Chekanov *et al.*	(ZEUS Collab.)	REFID=52733
KUZMIN	07	PR D76 012006	A. Kuzmin *et al.*	(BELLE Collab.)	REFID=51854
ABULENCIA	06A	PR D73 051104	A. Abulencia *et al.*	(CDF Collab.)	REFID=51054
ABE	04D	PR D69 112002	K. Abe *et al.*	(BELLE Collab.)	REFID=50011
LINK	04A	PL B586 11	J.M. Link *et al.*	(FOCUS Collab.)	REFID=49775
ABREU	98M	PL B426 231	P. Abreu *et al.*	(DELPHI Collab.)	REFID=46315
ACKERSTAFF	97W	ZPHY C76 425	K. Ackerstaff *et al.*	(OPAL Collab.)	REFID=45788
ASRATYAN	95	ZPHY C68 43	A.E. Asratyan *et al.*	(BIRM, BELG, CERN+)	REFID=44439
AVERY	94C	PL B331 236	P. Avery *et al.*	(CLEO Collab.)	REFID=44096
BERGFELD	94B	PL B340 194	T. Bergfeld *et al.*	(CLEO Collab.)	REFID=44099
FRABETTI	94B	PRL 72 324	P.L. Frabetti *et al.*	(FNAL E687 Collab.)	REFID=43687
AVERY	90	PR D41 774	P. Avery, D. Besson	(CLEO Collab.)	REFID=41013
ALBRECHT	89B	PL B221 422	H. Albrecht *et al.*	(ARGUS Collab.) JP	REFID=40736
ALBRECHT	89F	PL B231 208	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=40931
ALBRECHT	89H	PL B232 398	H. Albrecht *et al.*	(ARGUS Collab.) JP	REFID=41001
ANJOS	89C	PRL 62 1717	J.C. Anjos *et al.*	(FNAL E691 Collab.)	REFID=40737

NODE=M198

$D_0(2550)^0$

$I(J^P) = \frac{1}{2}(0^-)$

OMITTED FROM SUMMARY TABLE

$J^P = 0^-$ determined by AAIJ 20D.

NODE=M198

$D_0(2550)^0$ MASS

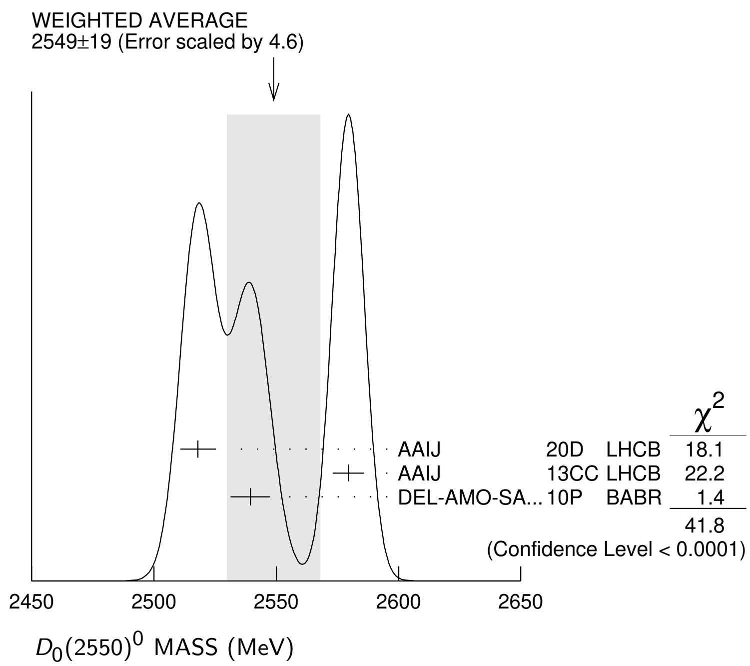
NODE=M198M

NODE=M198M

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
2549 ±19 OUR AVERAGE		Error includes scale factor of 4.6. See the ideogram below.		
2518 ± 2 ±7	79k	[1] AAIJ 20D	LHCB	$B^- \to D^{*+}\pi^-\pi^-$
2579.5± 3.4±5.5	60k	AAIJ 13CC	LHCB	$pp \to D^{*+}\pi^- X$
2539.4± 4.5±6.8	34k	DEL-AMO-SA..10P	BABR	$e^+e^- \to D^{*+}\pi^- X$

[1] From a full four-body amplitude analysis of the $B^- \to D^{*+}\pi^-\pi^-$ decay.

NODE=M198M;LINKAGE=A



$D_0(2550)^0$ WIDTH

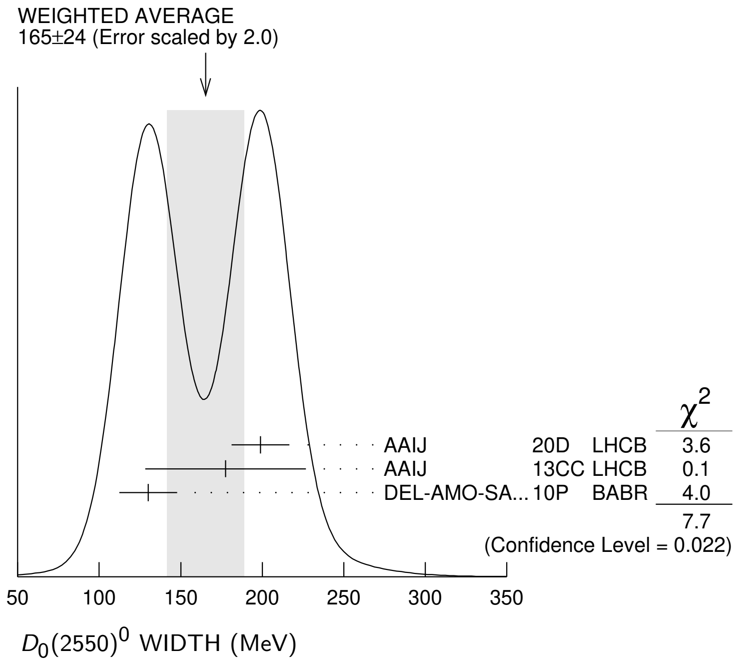
NODE=M198W

NODE=M198W

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
165 ±24 OUR AVERAGE		Error includes scale factor of 2.0. See the ideogram below.		
199 ± 5 ±17	79k	[1] AAIJ 20D	LHCB	$B^- \to D^{*+}\pi^-\pi^-$
177.5±17.8±46.0	60k	AAIJ 13CC	LHCB	$pp \to D^{*+}\pi^- X$
130 ±12 ±13	34k	DEL-AMO-SA..10P	BABR	$e^+e^- \to D^{*+}\pi^- X$

[1] From a full four-body amplitude analysis of the $B^- \to D^{*+}\pi^-\pi^-$ decay.

NODE=M198W;LINKAGE=A



$D_0(2550)^0$ DECAY MODES

NODE=M198215;NODE=M198

	Mode	Fraction (Γ_i/Γ)
Γ_1	$D^{*+}\pi^-$	seen

DESIG=1;OUR EVAL;→ UNCHECKED ←

$D_0(2550)^0$ POLARIZATION AMPLITUDE A_{D_J}

NODE=M198PAM

A polarization amplitude A_{D_J} is a parameter that depends on the initial polarization of the D_J. For D_J decays the helicity angle, θ_H, distribution varies like $1 + A_{D_J}\cos^2(\theta_H)$, where θ_H is the angle in the D_J rest frame between the two pions emitted in the $D_J \to D^*\pi$ and $D^* \to D\pi$ decays.

NODE=M198PAM

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
4.2±1.3	60k	[1] AAIJ	13CC	LHCB $pp \to D^{*+}\pi^- X$

NODE=M198PAM

[1] Systematic uncertainty not estimated.

NODE=M198PAM;LINKAGE=A

$D_0(2550)^0$ REFERENCES

NODE=M198

AAIJ 20D PR D101 032005 R. Aaij *et al.* (LHCb Collab.) JP
AAIJ 13CC JHEP 1309 145 R. Aaij *et al.* (LHCb Collab.)
DEL-AMO-SA... 10P PR D82 111101 P. del Amo Sanchez *et al.* (BABAR Collab.)

REFID=60253
REFID=55581
REFID=53534

NODE=M199

$D_1^*(2600)^0$

$I(J^P) = \frac{1}{2}(1^-)$

OMITTED FROM SUMMARY TABLE
was $D_J^*(2600)$

$J^P = 1^-$ determined by AAIJ 20D.

NODE=M199

$D_1^*(2600)^0$ MASS

NODE=M199M

NODE=M199M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
2627 ±10 OUR AVERAGE		Error includes scale factor of 4.4. See the ideogram below.				
2641.9± 1.8± 4.5	79k	[1] AAIJ	20D	LHCB		$B^- \to D^{*+}\pi^-\pi^-$
2681.1± 5.6±14.0	28k	[2] AAIJ	16AH	LHCB		$B^- \to D^+\pi^-\pi^-$
2649.2± 3.5± 3.5	51k	AAIJ	13CC	LHCB		$pp \to D^{*+}\pi^- X$
2608.7± 2.4± 2.5	26k	DEL-AMO-SA..	10P	BABR	0	$e^+e^- \to D^+\pi^- X$
2621.3± 3.7± 4.2	13k	[3] DEL-AMO-SA..	10P	BABR	+	$e^+e^- \to D^0\pi^+ X$

OCCUR=2

[1] From a full four-body amplitude analysis of the $B^- \to D^{*+}\pi^-\pi^-$ decay.

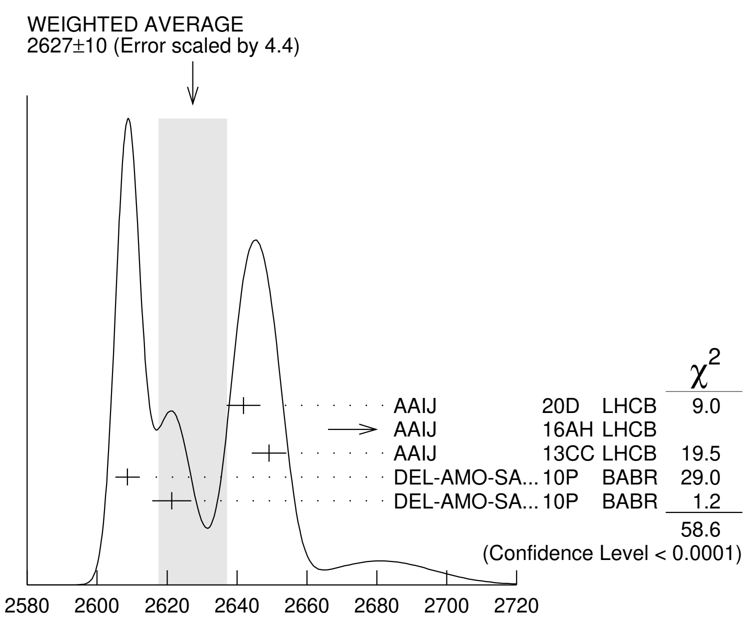
NODE=M199M;LINKAGE=B

[2] From the amplitude analysis in the model describing the $D^+\pi^-$ wave together with virtual contributions from the $D^*(2007)^0$ and B^{*0} states, and components corresponding to the $D_2^*(2460)^0$, $D_1^*(2680)^0$, $D_3^*(2760)^0$, and $D_2^*(3000)^0$ resonances.

NODE=M199M;LINKAGE=A

[3] At a fixed width of 93 MeV.

NODE=M199M;LINKAGE=DE



$D_1^*(2600)^0$ MASS (MeV)

$D_1^*(2600)^0$ WIDTH

NODE=M199W

NODE=M199W

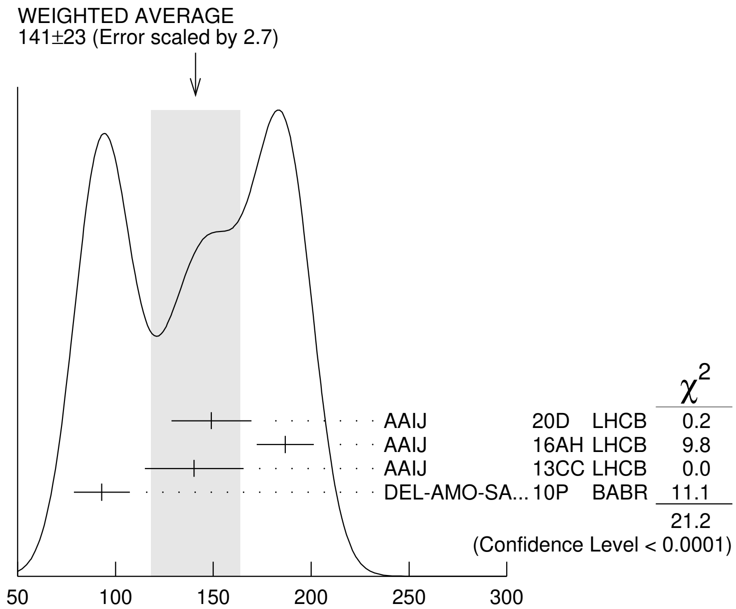
VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
141 ±23 OUR AVERAGE		Error includes scale factor of 2.7. See the ideogram below.			
149 ± 4 ±20	79k	[1] AAIJ	20D	LHCB	$B^- \to D^{*+}\pi^-\pi^-$
186.7± 8.5±11.9	28k	[2] AAIJ	16AH	LHCB	$B^- \to D^+\pi^-\pi^-$
140.2±17.1±18.6	51k	AAIJ	13CC	LHCB	$pp \to D^{*+}\pi^- X$
93 ± 6 ±13	26k	DEL-AMO-SA..	10P	BABR	$e^+e^- \to D^+\pi^- X$

[1] From a full four-body amplitude analysis of the $B^- \to D^{*+}\pi^-\pi^-$ decay.

NODE=M199W;LINKAGE=B

[2] From the amplitude analysis in the model describing the $D^+\pi^-$ wave together with virtual contributions from the $D^*(2007)^0$ and B^{*0} states, and components corresponding to the $D_2^*(2460)^0$, $D_1^*(2680)^0$, $D_3^*(2760)^0$, and $D_2^*(3000)^0$ resonances.

NODE=M199W;LINKAGE=A



$D_1^*(2600)^0$ WIDTH (MeV)

$D_1^*(2600)^0$ DECAY MODES

NODE=M199215;NODE=M199

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$D\pi$	seen	DESIG=1;OUR EVAL;→ UNCHECKED ←
Γ_2	$D^+\pi^-$	seen	DESIG=2;OUR EVAL;→ UNCHECKED ←
Γ_3	$D^0\pi^{\pm}$	seen	DESIG=3;OUR EVAL;→ UNCHECKED ←
Γ_4	$D^*\pi$	seen	DESIG=4;OUR EVAL;→ UNCHECKED ←
Γ_5	$D^{*+}\pi^-$	seen	DESIG=5;OUR EVAL;→ UNCHECKED ←

$D_1^*(2600)^0$ BRANCHING RATIOS

NODE=M199220

$\Gamma(D^+\pi^-)/\Gamma(D^{*+}\pi^-)$ Γ_2/Γ_5

NODE=M199R01
NODE=M199R01

VALUE	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
0.32±0.02±0.09	76k	DEL-AMO-SA...10P	BABR	$e^+e^- \rightarrow D^{(*)+}\pi^- X$

$D_1^*(2600)^0$ REFERENCES

NODE=M199

AAIJ 20D PR D101 032005 R. Aaij *et al.* (LHCb Collab.) JP REFID=60253
AAIJ 16AH PR D94 072001 R. Aaij *et al.* (LHCb Collab.) REFID=57518
AAIJ 13CC JHEP 1309 145 R. Aaij *et al.* (LHCb Collab.) REFID=55581
DEL-AMO-SA... 10P PR D82 111101 P. del Amo Sanchez *et al.* (BABAR Collab.) REFID=53534

NODE=M158

$D^*(2640)^\pm$

$I(J^P) = \frac{1}{2}(?^?)$

OMITTED FROM SUMMARY TABLE

Seen in Z decays by ABREU 98M. Not seen by ABBIENDI 01N and CHEKANOV 09. Needs confirmation.

NODE=M158

$D^*(2640)^\pm$ MASS

NODE=M158M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2637±2±6	66 ± 14	ABREU	98M	DLPH	$e^+e^- \to D^{*+}\pi^+\pi^- X$

NODE=M158M

$D^*(2640)^\pm$ WIDTH

NODE=M158W

VALUE (MeV)	CL%	DOCUMENT ID		TECN	COMMENT
<15	95	ABREU	98M	DLPH	$e^+e^- \to D^{*+}\pi^+\pi^- X$

NODE=M158W

$D^*(2640)^+$ DECAY MODES

NODE=M158215;NODE=M158

$D^*(2640)^-$ modes are charge conjugates of modes below.

NODE=M158

	Mode	Fraction (Γ_i/Γ)
Γ_1	$D^*(2010)^+\pi^+\pi^-$	seen

DESIG=1;OUR EST;→ UNCHECKED ←

$D^*(2640)^\pm$ REFERENCES

NODE=M158

CHEKANOV	09	EPJ C60 25	S. Chekanov *et al.*	(ZEUS Collab.)
ABBIENDI	01N	EPJ C20 445	G. Abbiendi *et al.*	(OPAL Collab.)
ABREU	98M	PL B426 231	P. Abreu *et al.*	(DELPHI Collab.)

REFID=52733
REFID=48296
REFID=46315

NODE=M228

$D_2(2740)^0$

$I(J^P) = \frac{1}{2}(2^-)$

OMITTED FROM SUMMARY TABLE

was $D(2740)^0$

$J^P = 2^-$ determined by (AAIJ 20D).

NODE=M228

$D_2(2740)^0$ MASS

NODE=M228M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2747 ±6 OUR AVERAGE					
2751 ±3 ± 7	79k	[1] AAIJ	20D	LHCB	$B^- \to D^{*+}\pi^-\pi^-$
2737.0±3.5±11.2	7.7k	AAIJ	13CC	LHCB	$pp \to D^{*+}\pi^- X$

NODE=M228M

[1] From a full four-body amplitude analysis of the $B^- \to D^{*+}\pi^-\pi^-$ decay.

NODE=M228M;LINKAGE=A

$D_2(2740)^0$ WIDTH

NODE=M228W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
88 ±19 OUR AVERAGE					
102 ± 6 ±26	79k	[1] AAIJ	20D	LHCB	$B^- \to D^{*+}\pi^-\pi^-$
73.2±13.4±25.0	7.7k	AAIJ	13CC	LHCB	$pp \to D^{*+}\pi^- X$

NODE=M228W

[1] From a full four-body amplitude analysis of the $B^- \to D^{*+}\pi^-\pi^-$ decay.

NODE=M228W;LINKAGE=A

$D_2(2740)^0$ DECAY MODES

NODE=M228215;NODE=M228

	Mode	Fraction (Γ_i/Γ)
Γ_1	$D^{*+}\pi^-$	seen

DESIG=1;OUR EVAL;→ UNCHECKED ←

$D_2(2740)^0$ POLARIZATION AMPLITUDE A_{D_J}

NODE=M228PAM

A polarization amplitude A_{D_J} is a parameter that depends on the initial polarization of the D_J. For D_J decays the helicity angle, θ_H, distribution varies like $1 + A_{D_J}\cos^2(\theta_H)$, where θ_H is the angle in the D_J rest frame between the two pions emitted in the $D_J \to D^*\pi$ and $D^* \to D\pi$ decays.

NODE=M228PAM

NODE=M228PAM

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
3.1±2.2	7.7k	[1] AAIJ 13CC	LHCB	$pp \to D^{*+}\pi^- X$

[1] Systematic uncertainty not estimated.

NODE=M228PAM;LINKAGE=A

$D_2(2740)^0$ REFERENCES

NODE=M228

AAIJ 20D PR D101 032005 R. Aaij *et al.* (LHCb Collab.) JP

AAIJ 13CC JHEP 1309 145 R. Aaij *et al.* (LHCb Collab.)

REFID=60253
REFID=55581

NODE=M203

$D_3^*(2750)$

$I(J^P) = \frac{1}{2}(3^-)$

J^P determined by AAIJ 15Y from the Dalitz plot analysis of $B^0 \to \overline{D}{}^0\pi^+\pi^-$ decays.

NODE=M203

$D_3^*(2750)$ MASS

NODE=M203M

NODE=M203M

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT	
2763.1± 3.2 OUR AVERAGE		Error includes scale factor of 2.1. See the ideogram below.				
2753 ± 4 ± 6	79k	[1] AAIJ 20D	LHCB		$B^- \to D^{*+}\pi^-\pi^-$	
2775.5± 4.5± 6.5	28k	[2] AAIJ 16AH	LHCB		$B^- \to D^+\pi^-\pi^-$	
2798 ± 7 ± 7		[3] AAIJ 15Y	LHCB		$B^0 \to \overline{D}{}^0\pi^+\pi^-$	
2761.1± 5.1± 6.5	14k	AAIJ 13CC	LHCB	0	$pp \to D^{*+}\pi^- X$	
2760.1± 1.1± 3.7	56k	AAIJ 13CC	LHCB	0	$pp \to D^+\pi^- X$	OCCUR=2
2771.7± 1.7± 3.8	20k	AAIJ 13CC	LHCB	+	$pp \to D^0\pi^+ X$	OCCUR=3
2752.4± 1.7± 2.7	23.5k	[4] DEL-AMO-SA..10P	BABR	0	$e^+e^- \to D^{*+}\pi^- X$	
2763.3± 2.3± 2.3	11.3k	[4] DEL-AMO-SA..10P	BABR	0	$e^+e^- \to D^+\pi^- X$	OCCUR=2
2769.7± 3.8± 1.5	5.7k	[4,5] DEL-AMO-SA..10P	BABR	+	$e^+e^- \to D^0\pi^+ X$	OCCUR=3
• • • We do not use the following data for averages, fits, limits, etc. • • •						
2802 ±11 ±10		[6] AAIJ 15Y	LHCB		$B^0 \to \overline{D}{}^0\pi^+\pi^-$	OCCUR=2

[1] From a full four-body amplitude analysis of the $B^- \to D^{*+}\pi^-\pi^-$ decay.

NODE=M203M;LINKAGE=D

[2] From the amplitude analysis in the model describing the $D^+\pi^-$ wave together with virtual contributions from the $D^*(2007)^0$ and B^{*0} states, and components corresponding to the $D_2^*(2460)^0$, $D_1^*(2680)^0$, $D_3^*(2760)^0$, and $D_2^*(3000)^0$ resonances.

NODE=M203M;LINKAGE=C

[3] Modeling the $\pi^+\pi^-$ S-wave with the Isobar formalism.

NODE=M203M;LINKAGE=A

[4] The states observed in the $D^*\pi$ and $D\pi$ final states are not necessarily the same.

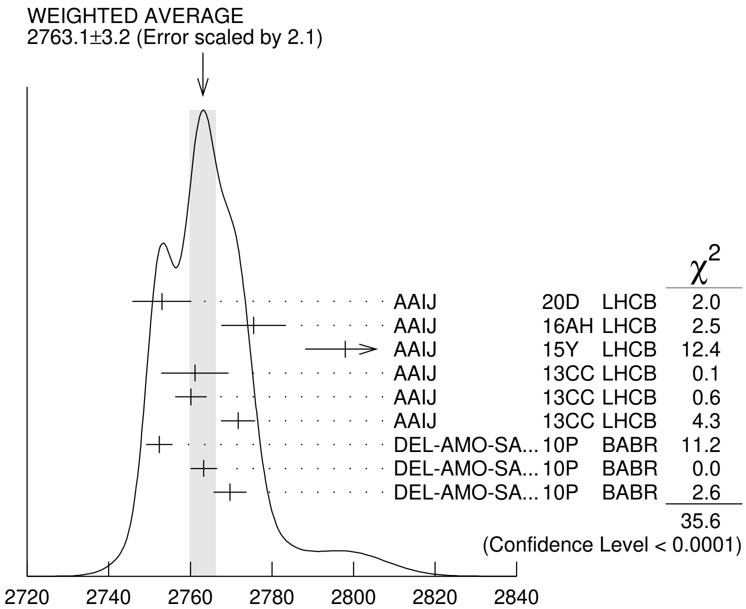
NODE=M203M;LINKAGE=DE

[5] At a fixed width of 60.9 MeV.

NODE=M203M;LINKAGE=DA

[6] Modeling the $\pi^+\pi^-$ S-wave with the K-matrix formalism.

NODE=M203M;LINKAGE=B



$D_3^*(2750)$ MASS (MeV)

$D_3^*(2750)$ WIDTH

NODE=M203W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT	
66 ± 5 OUR AVERAGE							
66 ±10 ±14	79k	[1] AAIJ	20D	LHCB		$B^- \to D^{*+}\pi^-\pi^-$	
95.3± 9.6±34.0	28k	[2] AAIJ	16AH	LHCB		$B^- \to D^+\pi^-\pi^-$	
105 ±18 ±24		[3] AAIJ	15Y	LHCB		$B^0 \to \overline{D}^0\pi^+\pi^-$	
74.4± 3.4±37.0	14k	AAIJ	13CC	LHCB	0	$pp \to D^{*+}\pi^- X$	
74.4± 3.4±19.1	56k	AAIJ	13CC	LHCB	0	$pp \to D^+\pi^- X$	OCCUR=2
66.7± 6.6±10.5	20k	AAIJ	13CC	LHCB	+	$pp \to D^0\pi^+ X$	OCCUR=4
71 ± 6 ±11	23.5k	[4] DEL-AMO-SA..	10P	BABR		$e^+e^- \to D^{*+}\pi^- X$	
60.9± 5.1± 3.6	11.3k	[4] DEL-AMO-SA..	10P	BABR		$e^+e^- \to D^+\pi^- X$	OCCUR=2
• • • We do not use the following data for averages, fits, limits, etc. • • •							
154 ±27 ±16		[5] AAIJ	15Y	LHCB		$B^0 \to \overline{D}^0\pi^+\pi^-$	OCCUR=2

[1] From a full four-body amplitude analysis of the $B^- \to D^{*+}\pi^-\pi^-$ decay. NODE=M203W;LINKAGE=D

[2] From the amplitude analysis in the model describing the $D^+\pi^-$ wave together with virtual contributions from the $D^*(2007)^0$ and B^{*0} states, and components corresponding to the $D_2^*(2460)^0$, $D_1^*(2680)^0$, $D_3^*(2760)^0$, and $D_2^*(3000)^0$ resonances. NODE=M203W;LINKAGE=C

[3] Modeling the $\pi^+\pi^-$ S-wave with the Isobar formalism. NODE=M203W;LINKAGE=A

[4] The states observed in the $D^*\pi$ and $D\pi$ final states are not necessarily the same. NODE=M203W;LINKAGE=DE

[5] Modeling the $\pi^+\pi^-$ S-wave with the K-matrix formalism. NODE=M203W;LINKAGE=B

$D_3^*(2750)$ DECAY MODES

NODE=M203215;NODE=M203

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$D\pi$	seen	DESIG=1;OUR EVAL;→ UNCHECKED ←
Γ_2	$D^+\pi^-$	seen	DESIG=2;OUR EVAL;→ UNCHECKED ←
Γ_3	$D^0\pi^\pm$	seen	DESIG=3;OUR EVAL;→ UNCHECKED ←
Γ_4	$D^*\pi$	seen	DESIG=4;OUR EVAL;→ UNCHECKED ←
Γ_5	$D^{*+}\pi^-$	seen	DESIG=5;OUR EVAL;→ UNCHECKED ←

$D_3^*(2750)$ BRANCHING RATIOS

NODE=M203220

$\Gamma(D^+\pi^-)/\Gamma(D^{*+}\pi^-)$ Γ_2/Γ_5

NODE=M203R01
NODE=M203R01

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.42±0.05±0.11	34.8k	[1] DEL-AMO-SA..	10P	BABR	$e^+e^- \to D^{(*)+}\pi^- X$

[1] The states observed in the $D^*\pi$ and $D\pi$ final states are not necessarily the same. NODE=M203R01;LINKAGE=DE

$D_3^*(2750)$ POLARIZATION AMPLITUDE A_D NODE=M203PAM

A polarization amplitude A_D is a parameter that depends on the initial polarization of the $D_3^*(2750)$. For $D_3^*(2750)$ decays the helicity angle, θ_H, distribution varies like $1 + A_D \cos(\theta_H)$, where θ_H is the angle in the D^* rest frame between the two pions emitted by the $D_3^*(2750) \to D^*\pi$ and $D^* \to D\pi$. NODE=M203PAM

NODE=M203PAM

VALUE	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
-0.33 ± 0.28	23.5k	[1] DEL-AMO-SA..10P	BABR	$e^+e^- \to D^{*+}\pi^- X$

[1] Systematic uncertainties not estimated. The states observed in the $D^*\pi$ and $D\pi$ final states are not necessarily the same. NODE=M203PAM;LINKAGE=DE

$D_3^*(2750)$ REFERENCES NODE=M203

AAIJ	20D	PR D101 032005	R. Aaij *et al.*	(LHCb Collab.)	REFID=60253
AAIJ	16AH	PR D94 072001	R. Aaij *et al.*	(LHCb Collab.)	REFID=57518
AAIJ	15Y	PR D92 032002	R. Aaij *et al.*	(LHCb Collab.) JP	REFID=56609
AAIJ	13CC	JHEP 1309 145	R. Aaij *et al.*	(LHCb Collab.)	REFID=55581
DEL-AMO-SA...	10P	PR D82 111101	P. del Amo Sanchez *et al.*	(BABAR Collab.)	REFID=53534

NODE=M249

$D_1^*(2760)^0$

$I(J^P) = \frac{1}{2}(1^-)$

OMITTED FROM SUMMARY TABLE

J^P determined by AAIJ 15V from the Dalitz plot analysis of $B^- \to D^+K^-\pi^-$ decays. NODE=M249

$D_1^*(2760)^0$ MASS NODE=M249M

NODE=M249M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
2781±18±13	2k	[1] AAIJ 15V	LHCB	$B^- \to D^+K^-\pi^-$

[1] From the amplitude analysis in the model describing the $D^+\pi^-$ wave together with virtual contributions from the $D^*(2007)^0$ and B^{*0} states, nonresonant spin-0 and spin-1 components as well as the $D_0^*(2400)^0$, $D_2^*(2460)^0$ and $D_1^*(2760)^0$ resonances. NODE=M249M;LINKAGE=A

$D_1^*(2760)^0$ WIDTH NODE=M249W

NODE=M249W

VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
177±32±21	2k	[1] AAIJ 15V	LHCB	$B^- \to D^+K^-\pi^-$

[1] From the amplitude analysis in the model describing the $D^+\pi^-$ wave together with virtual contributions from the $D^*(2007)^0$ and B^{*0} states, nonresonant spin-0 and spin-1 components as well as the $D_0^*(2400)^0$, $D_2^*(2460)^0$ and $D_1^*(2760)^0$ resonances. NODE=M249W;LINKAGE=A

$D_1^*(2760)^0$ DECAY MODES NODE=M249215;NODE=M249

	Mode	Fraction (Γ_i/Γ)
Γ_1	D^+K^-	seen

DESIG=1

$D_1^*(2760)^0$ BRANCHING RATIOS NODE=M249225

$\Gamma(D^+K^-)/\Gamma_{total}$ Γ_1/Γ

NODE=M249R01
NODE=M249R01

VALUE	*DOCUMENT ID*	*TECN*	*COMMENT*
seen	[1] AAIJ 15V	LHCB	$B^- \to D^+K^-\pi^-$

OCCUR=2

[1] From the amplitude analysis in the model describing the $D^+\pi^-$ wave together with virtual contributions from the $D^*(2007)^0$ and B^{*0} states, nonresonant spin-0 and spin-1 components as well as the $D_0^*(2400)^0$, $D_2^*(2460)^0$ and $D_1^*(2760)^0$ resonances. NODE=M249R01;LINKAGE=A

$D_1^*(2760)^0$ REFERENCES

NODE=M249

AAIJ	15V	PR D91 092002	R. Aaij *et al.*	(LHCb Collab.) JP	REFID=56575
Also		PR D93 119901 (errat.)	R. Aaij *et al.*	(LHCb Collab.)	REFID=57289

NODE=M229

$D(3000)^0$

$I(J^P) = \frac{1}{2}(?^?)$

OMITTED FROM SUMMARY TABLE

Both natural- and unnatural-parity components observed depending on the decay mode (AAIJ 13CC).

NODE=M229

$D(3000)^0$ MASS

NODE=M229M

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
3214 ±29 ±49	28k	[1] AAIJ	16AH LHCB	$B^- \to D^+\pi^-\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2971.8± 8.7	9.5k	[2,3] AAIJ	13CC LHCB	$pp \to D^{*+}\pi^- X$
3008.1± 4.0	17.6k	[2,4] AAIJ	13CC LHCB	$pp \to D^+\pi^- X$

NODE=M229M; OCCUR=2

[1] From the amplitude analysis in the model describing the $D^+\pi^-$ wave together with virtual contributions from the $D^*(2007)^0$ and B^{*0} states, and components corresponding to the $D_2^*(2460)^0$, $D_1^*(2680)^0$, $D_3^*(2760)^0$, and $D_2^*(3000)^0$ resonances. NODE=M229M;LINKAGE=D

[2] Systematic uncertainty not estimated. NODE=M229M;LINKAGE=A

[3] Unnatural parity preferred. NODE=M229M;LINKAGE=B

[4] Natural parity state. A state $D(3000)^+$ is possibly seen in $D^0\pi^+$ final state. NODE=M229M;LINKAGE=C

$D(3000)^0$ WIDTH

NODE=M229W

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
186 ±38 ±72	28k	[5] AAIJ	16AH LHCB	$B^- \to D^+\pi^-\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
188.1±44.8	9.5k	[6,7] AAIJ	13CC LHCB	$pp \to D^{*+}\pi^- X$
110.5±11.5	17.6k	[6,8] AAIJ	13CC LHCB	$pp \to D^+\pi^- X$

NODE=M229W; OCCUR=2

[5] From the amplitude analysis in the model describing the $D^+\pi^-$ wave together with virtual contributions from the $D^*(2007)^0$ and B^{*0} states, and components corresponding to the $D_2^*(2460)^0$, $D_1^*(2680)^0$, $D_3^*(2760)^0$, and $D_2^*(3000)^0$ resonances. NODE=M229W;LINKAGE=D

[6] Systematic uncertainty not estimated. NODE=M229W;LINKAGE=A

[7] Unnatural parity preferred. NODE=M229W;LINKAGE=C

[8] Natural parity state. A state $D(3000)^+$ is possibly seen in $D^0\pi^+$ final state. NODE=M229W;LINKAGE=B

$D(3000)^0$ DECAY MODES

NODE=M229215;NODE=M229

	Mode	Fraction (Γ_i/Γ)
Γ_1	$D^{*+}\pi^-$	seen

DESIG=1;OUR EVAL;→ UNCHECKED ←

$D(3000)^0$ POLARIZATION AMPLITUDE A_{D_J}

NODE=M229PAM

A polarization amplitude A_{D_J} is a parameter that depends on the initial polarization of the D_J. For D_J decays the helicity angle, θ_H, distribution varies like $1 + A_{D_J}\cos^2(\theta_H)$, where θ_H is the angle in the D_J rest frame between the two pions emitted in the $D_J \to D^*\pi$ and $D^* \to D\pi$ decays.

NODE=M229PAM

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.5±0.9	9.5k	[9] AAIJ	13CC LHCB	$pp \to D^{*+}\pi^- X$

NODE=M229PAM

[9] Systematic uncertainty not estimated. NODE=M229PAM;LINKAGE=A

$D(3000)^0$ REFERENCES

NODE=M229

AAIJ	16AH	PR D94 072001	R. Aaij *et al.*	(LHCb Collab.)	REFID=57518
AAIJ	13CC	JHEP 1309 145	R. Aaij *et al.*	(LHCb Collab.)	REFID=55581

CHARMED, STRANGE MESONS ($C = S = \pm1$) (including possibly non-$q\overline{q}$ states)

NODE=MXXX040

$D_s^+ = c\overline{s}$, $D_s^- = \overline{c}s$, similarly for D_s^*'s

NODE=MXXX040

NODE=S074

$D_s^{*\pm}$

$I(J^P) = 0(?^?)$

J^P is natural, width and decay modes consistent with 1^-.

NODE=S074

$D_s^{*\pm}$ MASS

NODE=S074M

The fit includes $D^\pm$, D^0, $D_s^\pm$, $D^{*\pm}$, D^{*0}, $D_s^{*\pm}$, $D_1(2420)^0$, $D_2^*(2460)^0$, and $D_{s1}(2536)^\pm$ mass and mass difference measurements.

NODE=S074M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
2112.2±0.4 OUR FIT				
2106.6±2.1±2.7	[1] BLAYLOCK	87	MRK3	$e^+e^- \to D_s^\pm \gamma X$

NODE=S074M

[1] Assuming $D_s^\pm$ mass = 1968.7 ± 0.9 MeV.

NODE=S074M;LINKAGE=E

$m_{D_s^{*\pm}} - m_{D_s^\pm}$

NODE=S074DM

The fit includes $D^\pm$, D^0, $D_s^\pm$, $D^{*\pm}$, D^{*0}, $D_s^{*\pm}$, $D_1(2420)^0$, $D_2^*(2460)^0$, and $D_{s1}(2536)^\pm$ mass and mass difference measurements.

NODE=S074DM

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
143.8 ± 0.4 OUR FIT					
143.9 ± 0.4 OUR AVERAGE					
143.76± 0.39±0.40		GRONBERG	95	CLE2	e^+e^-
144.22± 0.47±0.37		BROWN	94	CLE2	e^+e^-
142.5 ± 0.8 ±1.5		[2] ALBRECHT	88	ARG	$e^+e^- \to D_s^\pm \gamma X$
139.5 ± 8.3 ±9.7	60	AIHARA	84D	TPC	$e^+e^- \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
143.0 ±18.0	8	ASRATYAN	85	HLBC	FNAL 15-ft, ν-^{2}H
110 ±46		BRANDELIK	79	DASP	$e^+e^- \to D_s^\pm \gamma X$

NODE=S074DM

[2] Result includes data of ALBRECHT 84B.

NODE=S074DM;LINKAGE=A

$D_s^{*\pm}$ WIDTH

NODE=S074W

VALUE (MeV)	CL%	DOCUMENT ID		TECN	COMMENT
< 1.9	90	GRONBERG	95	CLE2	e^+e^-
< 4.5	90	ALBRECHT	88	ARG	E_{cm}^{ee} = 10.2 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 4.9	90	BROWN	94	CLE2	e^+e^-
<22	90	BLAYLOCK	87	MRK3	$e^+e^- \to D_s^\pm \gamma X$

NODE=S074W

D_s^{*+} DECAY MODES

NODE=S074215;NODE=S074

D_s^{*-} modes are charge conjugates of the modes below.

NODE=S074

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$D_s^+\gamma$	(93.5±0.7) %	DESIG=1
Γ_2	$D_s^+\pi^0$	(5.8±0.7) %	DESIG=2
Γ_3	$D_s^+e^+e^-$	(6.7±1.6) × 10^{-3}	DESIG=3

CONSTRAINED FIT INFORMATION

An overall fit to 2 branching ratios uses 3 measurements and one constraint to determine 3 parameters. The overall fit has a $\chi^2 =$ 0.0 for 1 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\left\langle \delta x_i \delta x_j \right\rangle / (\delta x_i \cdot \delta x_j)$, in percent, from the fit to the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{\text{total}}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_2	−97	
x_3	−19	−4
	x_1	x_2

D_s^{*+} BRANCHING RATIOS

NODE=S074220

$\Gamma(D_s^+ \gamma)/\Gamma_{\text{total}}$ — Γ_1/Γ

NODE=S074R1
NODE=S074R1

VALUE	DOCUMENT ID		TECN	COMMENT
0.935±0.007 OUR FIT				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	ASRATYAN	91	HLBC	$\overline{\nu}_\mu$ Ne
seen	ALBRECHT	88	ARG	$e^+ e^- \rightarrow D_s^\pm \gamma X$
seen	AIHARA	84D		
seen	ALBRECHT	84B		
seen	BRANDELIK	79		

$\Gamma(D_s^+ \pi^0)/\Gamma(D_s^+ \gamma)$ — Γ_2/Γ_1

NODE=S074R2
NODE=S074R2

VALUE	DOCUMENT ID		TECN	COMMENT
0.062±0.008 OUR FIT				
0.062±0.008 OUR AVERAGE				
0.062±0.005±0.006	AUBERT,BE	05G	BABR	10.6 $e^+ e^- \rightarrow$ hadrons
$0.062^{+0.020}_{-0.018}\pm0.022$	GRONBERG	95	CLE2	$e^+ e^-$

$\Gamma(D_s^+ e^+ e^-)/\Gamma(D_s^+ \gamma)$ — Γ_3/Γ_1

NODE=S074R01
NODE=S074R01

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
7.2±1.7 OUR FIT				
$\mathbf{7.2^{+1.5}_{-1.3}\pm1.0}$	38	CRONIN-HEN..12	CLEO	4.17 $e^+ e^- \rightarrow$ hadrons

$D_s^{*\pm}$ REFERENCES

NODE=S074

CRONIN-HEN...	12	PR D86 072005	D. Cronin-Hennessey *et al.*	(CLEO Collab.)	REFID=54627
AUBERT,BE	05G	PR D72 091101	B. Aubert *et al.*	(BABAR Collab.)	REFID=50942
GRONBERG	95	PRL 75 3232	J. Gronberg *et al.*	(CLEO Collab.)	REFID=44568
BROWN	94	PR D50 1884	D. Brown *et al.*	(CLEO Collab.)	REFID=43868
ASRATYAN	91	PL B257 525	A.E. Asratyan *et al.*	(ITEP, BELG, SACL+)	REFID=41582
ALBRECHT	88	PL B207 349	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=40269
BLAYLOCK	87	PRL 58 2171	G.T. Blaylock *et al.*	(Mark III Collab.)	REFID=40005
ASRATYAN	85	PL 156B 441	A.E. Asratyan *et al.*	(ITEP, SERP)	REFID=22887
AIHARA	84D	PRL 53 2465	H. Aihara *et al.*	(TPC Collab.)	REFID=11561
ALBRECHT	84B	PL 146B 111	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=22886
BRANDELIK	79	PL 80B 412	R. Brandelik *et al.*	(DASP Collab.)	REFID=11442

NODE=M172

$D^*_{s0}(2317)^\pm$

$I(J^P) = 0(0^+)$
J, P need confirmation.

AUBERT 06P and CHOI 15A do not observe neutral and doubly charged partners of the $D^*_{s0}(2317)^+$.

NODE=M172

$D^*_{s0}(2317)^\pm$ MASS

NODE=M172M

The fit includes $D^\pm$, D^0, $D^\pm_s$, $D^{*\pm}$, D^{*0}, $D^{*\pm}_s$, $D_1(2420)^0$, $D^*_2(2460)^0$, and $D_{s1}(2536)^\pm$ mass and mass difference measurements.

NODE=M172M

NODE=M172M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2317.8±0.5 OUR FIT					
2318.0±0.7 OUR AVERAGE					
2318.3±1.2±1.2	115	[1] ABLIKIM	18J	BES3	4.6 $e^+e^- \to D^{*\pm}_s D^*_{s0}(2317)^\mp$
2319.6±0.2±1.4	3.1k	AUBERT	06P	BABR	10.6 $e^+e^- \to D^+_s \pi^0 X$
2317.3±0.4±0.8	1.0k	[2] AUBERT	04E	BABR	10.6 e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2317.2±1.3	88	[3] AUBERT,B	04S	BABR	$B \to D^{(*)}_{s0}(2317)^+ \overline{D}^{(*)}$
2317.2±0.5±0.9	761	[4] MIKAMI	04	BELL	10.6 e^+e^-
2316.8±0.4±3.0	1.2k	[4,5] AUBERT	03G	BABR	10.6 e^+e^-
2317.6±1.3	273	[4,6] AUBERT	03G	BABR	10.6 e^+e^-
2319.8±2.1±2.0	24	[4] KROKOVNY	03B	BELL	10.6 e^+e^-

OCCUR=2

[1] From a fit of the D^*_s recoil mass where the $D^*_{s0}(2317)$ signal is described with a Crystal Ball function convolved with a Gaussian function.
[2] Supersedes AUBERT 03G.
[3] Systematic errors not evaluated.
[4] Not independent of the corresponding $m_{D^*_{s0}(2317)} - m_{D_s}$.
[5] From $D^+_s \to K^+ K^- \pi^+$ decay.
[6] From $D^+_s \to K^+ K^- \pi^+ \pi^0$ decay.

NODE=M172M;LINKAGE=A
NODE=M172M;LINKAGE=AU
NODE=M172M;LINKAGE=AB
NODE=M172M;LINKAGE=B1
NODE=M172M;LINKAGE=A1
NODE=M172M;LINKAGE=A2

$m_{D^*_{s0}(2317)^\pm} - m_{D^\pm_s}$

NODE=M172DM

The fit includes $D^\pm$, D^0, $D^\pm_s$, $D^{*\pm}$, D^{*0}, $D^{*\pm}_s$, $D_1(2420)^0$, $D^*_2(2460)^0$, and $D_{s1}(2536)^\pm$ mass and mass difference measurements.

NODE=M172DM

NODE=M172DM

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
349.4±0.5 OUR FIT					
349.2±0.7 OUR AVERAGE					
348.7±0.5±0.7	761	MIKAMI	04	BELL	10.6 e^+e^-
350.0±1.2±1.0	135	BESSON	03	CLE2	10.6 e^+e^-
351.3±2.1±1.9	24	[7] KROKOVNY	03B	BELL	10.6 e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
349.6±0.4±3.0	1267	[8,9] AUBERT	03G	BABR	10.6 e^+e^-
350.2±1.3	273	[10,11] AUBERT	03G	BABR	10.6 e^+e^-

OCCUR=2

[7] Recalculated by us using $m_{D^+_s}$ = 1968.5 ± 0.6 MeV.
[8] From $D^+_s \to K^+ K^- \pi^+$ decay.
[9] Recalculated by us using $m_{D^+_s}$ = 1967.20 ± 0.03 MeV.
[10] From $D^+_s \to K^+ K^- \pi^+ \pi^0$ decay.
[11] Recalculated by us using $m_{D^+_s}$ = 1967.4 ± 0.2 MeV. Systematic errors not estimated.

NODE=M172DM;LINKAGE=K3
NODE=M172DM;LINKAGE=A1
NODE=M172DM;LINKAGE=C1
NODE=M172DM;LINKAGE=A2
NODE=M172DM;LINKAGE=C2

$D^*_{s0}(2317)^\pm$ WIDTH

NODE=M172W

NODE=M172W

VALUE (MeV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
< 3.8	95	3180	AUBERT	06P	BABR	10.6 $e^+e^- \to D^+_s \pi^0 X$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 4.6	90	761	MIKAMI	04	BELL	10.6 e^+e^-
<10			AUBERT	03G	BABR	10.6 e^+e^-
< 7	90	135	BESSON	03	CLE2	10.6 e^+e^-

$D^*_{s0}(2317)^\pm$ DECAY MODES

NODE=M172215;NODE=M172

$D^*_{s0}(2317)^-$ modes are charge conjugates of modes below.

NODE=M172

	Mode	Fraction (Γ_i/Γ)	Confidence level	
Γ_1	$D_s^+ \pi^0$	$(100^{+\ 0}_{-20})$ %		DESIG=1
Γ_2	$D_s^+ \gamma$	< 5 %	90%	DESIG=2
Γ_3	$D_s^*(2112)^+ \gamma$	< 6 %	90%	DESIG=3
Γ_4	$D_s^+ \gamma\gamma$	< 18 %	95%	DESIG=4
Γ_5	$D_s^*(2112)^+ \pi^0$	< 11 %	90%	DESIG=5
Γ_6	$D_s^+ \pi^+ \pi^-$	< 4 $\times 10^{-3}$	90%	DESIG=6
Γ_7	$D_s^+ \pi^0 \pi^0$	not seen		DESIG=7;OUR EVAL;→ UNCHECKED ←

$D^*_{s0}(2317)^\pm$ BRANCHING RATIOS

NODE=M172220

$\Gamma(D_s^+ \pi^0)/\Gamma_{total}$ — Γ_1/Γ

NODE=M172R1
NODE=M172R1

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$1.00^{+0.00}_{-0.14}{}^{+0.00}_{-0.14}$	47	ABLIKIM	18J	BES3	4.6 $e^+ e^- \rightarrow D_s^{*\pm} D^*_{s0}(2317)^\mp$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	1.5k	AUBERT	03G	BABR	10.6 $e^+ e^-$

$\Gamma(D_s^+ \gamma)/\Gamma(D_s^+ \pi^0)$ — Γ_2/Γ_1

NODE=M172R5
NODE=M172R5

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.05	90	MIKAMI	04	BELL	10.6 $e^+ e^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.14	95	AUBERT	06P	BABR	10.6 $e^+ e^-$
<0.052	90	BESSON	03	CLE2	10.6 $e^+ e^-$

$\Gamma(D_s^*(2112)^+ \gamma)/\Gamma(D_s^+ \pi^0)$ — Γ_3/Γ_1

NODE=M172R6
NODE=M172R6

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.059	90	BESSON	03	CLE2	10.6 $e^+ e^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.16	95	AUBERT	06P	BABR	10.6 $e^+ e^-$
<0.18	90	MIKAMI	04	BELL	10.6 $e^+ e^-$

$\Gamma(D_s^+ \gamma\gamma)/\Gamma(D_s^+ \pi^0)$ — Γ_4/Γ_1

NODE=M172R7
NODE=M172R7

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.18	95	AUBERT	06P	BABR	10.6 $e^+ e^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
not seen		AUBERT	03G	BABR	10.6 $e^+ e^-$

$\Gamma(D_s^*(2112)^+ \pi^0)/\Gamma(D_s^+ \pi^0)$ — Γ_5/Γ_1

NODE=M172R8
NODE=M172R8

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.11	90	BESSON	03	CLE2	10.6 $e^+ e^-$

$\Gamma(D_s^+ \pi^+ \pi^-)/\Gamma(D_s^+ \pi^0)$ — Γ_6/Γ_1

NODE=M172R9
NODE=M172R9

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.004	90	MIKAMI	04	BELL	10.6 $e^+ e^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.005	95	AUBERT	06P	BABR	10.6 $e^+ e^-$
<0.019	90	BESSON	03	CLE2	10.6 $e^+ e^-$

$\Gamma(D_s^+ \pi^0 \pi^0)/\Gamma(D_s^+ \pi^0)$ — Γ_7/Γ_1

NODE=M172R10
NODE=M172R10

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.25	95	AUBERT	06P	BABR	10.6 $e^+ e^-$

$D^*_{s0}(2317)^\pm$ REFERENCES

NODE=M172

ABLIKIM	18J	PR D97 051103	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58895
CHOI	15A	PR D91 092011	S.-K. Choi *et al.*	(BELLE Collab.)	REFID=56577
AUBERT	06P	PR D74 032007	B. Aubert *et al.*	(BABAR Collab.)	REFID=51144
AUBERT	04E	PR D69 031101	B. Aubert *et al.*	(BABAR Collab.)	REFID=49747
AUBERT,B	04S	PRL 93 181801	B. Aubert *et al.*	(BABAR Collab.)	REFID=50195
MIKAMI	04	PRL 92 012002	Y. Mikami *et al.*	(BELLE Collab.)	REFID=49629
AUBERT	03G	PRL 90 242001	B. Aubert *et al.*	(BABAR Collab.)	REFID=49417
BESSON	03	PR D68 032002	D. Besson *et al.*	(CLEO Collab.)	REFID=49583
KROKOVNY	03B	PRL 91 262002	P. Krokovny *et al.*	(BELLE Collab.)	REFID=49615

NODE=M173

$D_{s1}(2460)^\pm$

$I(J^P) = 0(1^+)$

$D_{s1}(2460)^\pm$ MASS

NODE=M173M

The fit includes $D^\pm$, D^0, $D_s^\pm$, $D^{*\pm}$, D^{*0}, $D_s^{*\pm}$, $D_1(2420)^0$, $D_2^*(2460)^0$, and $D_{s1}(2536)^\pm$ mass and mass difference measurements.

NODE=M173M

NODE=M173M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*	
2459.5±0.6 OUR FIT Error includes scale factor of 1.1.					
2459.6±0.9 OUR AVERAGE Error includes scale factor of 1.3.					
2460.1±0.2±0.8		[1] AUBERT	06P	BABR	$10.6\ e^+e^-$
2458.0±1.0±1.0	195	AUBERT	04E	BABR	$10.6\ e^+e^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2459.5±1.2±3.7	920	AUBERT	06P	BABR	$10.6\ e^+e^- \to D_s^+\gamma X$ OCCUR=2
2458.6±1.0±2.5	560	AUBERT	06P	BABR	$10.6\ e^+e^- \to D_s^+\pi^0\gamma X$ OCCUR=3
2460.2±0.2±0.8	123	AUBERT	06P	BABR	$10.6\ e^+e^- \to D_s^+\pi^+\pi^- X$ OCCUR=4
2458.9±1.5	112	[2] AUBERT,B	04S	BABR	$B \to D_{s1}(2460)^+\overline{D}^{(*)}$
2461.1±1.6	139	[3] AUBERT,B	04S	BABR	$B \to D_{s1}(2460)^+\overline{D}^{(*)}$ OCCUR=2
2456.5±1.3±1.3	126	[4,5] MIKAMI	04	BELL	$10.6\ e^+e^-$
2459.5±1.3±2.0	152	[6,7] MIKAMI	04	BELL	$10.6\ e^+e^-$ OCCUR=2
2459.9±0.9±1.6	60	[6,7] MIKAMI	04	BELL	$10.6\ e^+e^-$ OCCUR=3
2459.2±1.6±2.0	57	KROKOVNY	03B	BELL	$10.6\ e^+e^-$

[1] The average of the values obtained from the $D_s^+\gamma$, $D_s^+\pi^0\gamma$, $D_s^+\pi^+\pi^-$ final state. NODE=M173M;LINKAGE=UB

[2] Systematic errors not evaluated. From the decay to $D_s^{*+}\pi^0$. NODE=M173M;LINKAGE=AU

[3] Systematic errors not evaluated. From the decay to $D_s^+\gamma$. NODE=M173M;LINKAGE=AB

[4] Not independent of the corresponding $m_{D_{s1}(2460)^\pm} - m_{D_s^{*\pm}}$. NODE=M173M;LINKAGE=B1

[5] Using $m_{D_s^{*+}} = 2112.4 \pm 0.7$ MeV. NODE=M173M;LINKAGE=B2

[6] Not independent of the corresponding $m_{D_{s1}(2460)^\pm} - m_{D_s^\pm}$. NODE=M173M;LINKAGE=B3

[7] Using $m_{D_s^+} = 1968.5 \pm 0.6$ MeV. NODE=M173M;LINKAGE=B4

$m_{D_{s1}(2460)^\pm} - m_{D_s^{*\pm}}$

NODE=M173MD

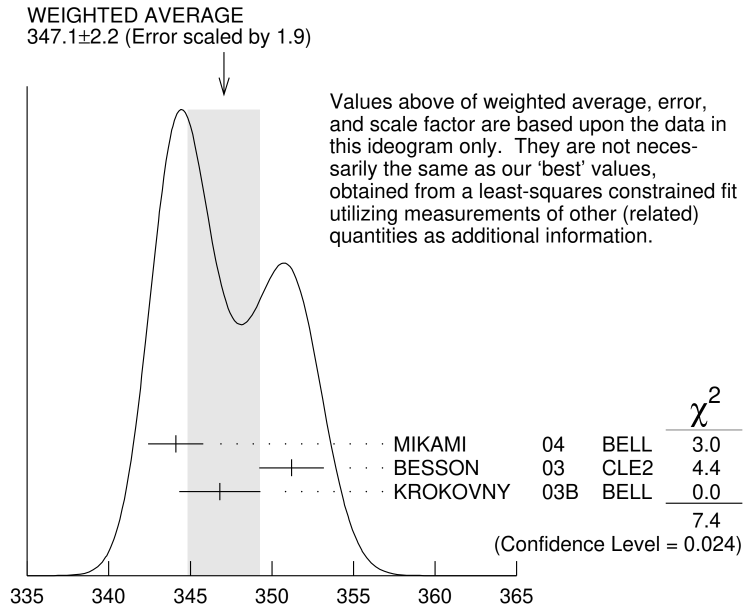
The fit includes $D^\pm$, D^0, $D_s^\pm$, $D^{*\pm}$, D^{*0}, $D_s^{*\pm}$, $D_1(2420)^0$, $D_2^*(2460)^0$, and $D_{s1}(2536)^\pm$ mass and mass difference measurements.

NODE=M173MD

NODE=M173MD

VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
347.3±0.7 OUR FIT Error includes scale factor of 1.2.				
347.1±2.2 OUR AVERAGE Error includes scale factor of 1.9. See the ideogram below.				
344.1±1.3±1.1	126	MIKAMI	04	BELL $10.6\ e^+e^-$
351.2±1.7±1.0	41	BESSON	03	CLE2 $10.6\ e^+e^-$
346.8±1.6±1.9	57	[8] KROKOVNY	03B	BELL $10.6\ e^+e^-$

[8] Recalculated by us using $m_{D_s^{*+}} = 2112.4 \pm 0.7$ MeV. NODE=M173MD;LINKAGE=K3



$m_{D_{s1}(2460)^\pm} - m_{D_s^{*\pm}}$ (MeV)

$m_{D_{s1}(2460)^\pm} - m_{D_s^\pm}$

NODE=M173DM

The fit includes $D^\pm$, D^0, $D_s^\pm$, $D^{*\pm}$, D^{*0}, $D_s^{*\pm}$, $D_1(2420)^0$, $D_2^*(2460)^0$, and $D_{s1}(2536)^\pm$ mass and mass difference measurements. NODE=M173DM

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
491.1±0.6 OUR FIT	Error includes scale factor of 1.1.					NODE=M173DM
491.3±1.4 OUR AVERAGE						
491.0±1.3±1.9	152	[9] MIKAMI	04	BELL	10.6 e^+e^-	
491.4±0.9±1.5	60	[10] MIKAMI	04	BELL	10.6 e^+e^-	OCCUR=2

[9] From the decay to $D_s^\pm\gamma$. NODE=M173DM;LINKAGE=M1

[10] From the decay to $D_s^\pm\pi^+\pi^-$. NODE=M173DM;LINKAGE=M2

$D_{s1}(2460)^\pm$ WIDTH

NODE=M173W

VALUE (MeV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT	
< 3.5	95	123	AUBERT	06P	BABR	10.6 $e^+e^- \to D_s^+\pi^+\pi^- X$	NODE=M173W
• • • We do not use the following data for averages, fits, limits, etc. • • •							
< 6.3	95	560	AUBERT	06P	BABR	10.6 $e^+e^- \to D_s^+\pi^0\gamma X$	OCCUR=2
<10		195	AUBERT	04E	BABR	10.6 e^+e^-	
< 5.5	90	126	MIKAMI	04	BELL	10.6 e^+e^-	
< 7	90	41	BESSON	03	CLE2	10.6 e^+e^-	

$D_{s1}(2460)^+$ DECAY MODES

NODE=M173215;NODE=M173

$D_{s1}(2460)^-$ modes are charge conjugates of the modes below. NODE=M173

	Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	
Γ_1	$D_s^{*+}\pi^0$	(48 ±11) %		DESIG=1
Γ_2	$D_s^+\gamma$	(18 ± 4) %		DESIG=2
Γ_3	$D_s^+\pi^+\pi^-$	(4.3± 1.3) %	S=1.1	DESIG=3
Γ_4	$D_s^{*+}\gamma$	< 8 %	CL=90%	DESIG=4

Γ_5	$D^*_{s0}(2317)^+\gamma$	$(3.7^{+5.0}_{-2.4})$ %	DESIG=5
Γ_6	$D_s^+\pi^0$		DESIG=7
Γ_7	$D_s^+\pi^0\pi^0$		DESIG=8
Γ_8	$D_s^+\gamma\gamma$		DESIG=9

CONSTRAINED FIT INFORMATION

An overall fit to 7 branching ratios uses 8 measurements and one constraint to determine 5 parameters. The overall fit has a $\chi^2 =$ 3.4 for 4 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\langle\delta x_i \delta x_j\rangle/(\delta x_i \cdot \delta x_j)$, in percent, from the fit to the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_2	80		
x_3	68	62	
x_5	−3	25	26
	x_1	x_2	x_3

$D_{s1}(2460)^\pm$ BRANCHING RATIOS

NODE=M173220

$\Gamma(D_s^{*+}\pi^0)/\Gamma_{total}$ — Γ_1/Γ

NODE=M173R1
NODE=M173R1

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.48±0.11 OUR FIT					
0.56±0.13±0.09		[11] AUBERT	06N	BABR	$B \to D_{s1}(2460)^- \overline{D}^{(*)}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	41	BESSON	03	CLE2	10.6 e^+e^-

[11] Evaluated in AUBERT 06N including measurements from AUBERT,B 04S.

NODE=M173R1;LINKAGE=AU

$\Gamma(D_s^+\gamma)/\Gamma_{total}$ — Γ_2/Γ

NODE=M173R6
NODE=M173R6

VALUE	DOCUMENT ID		TECN	COMMENT
0.18±0.04 OUR FIT				
0.16±0.04±0.03	[12] AUBERT	06N	BABR	$B \to D_{s1}(2460)^- \overline{D}^{(*)}$

[12] Evaluated in AUBERT 06N including measurements from AUBERT,B 04S.

NODE=M173R6;LINKAGE=AU

$\Gamma(D_s^+\gamma)/\Gamma(D_s^{*+}\pi^0)$ — Γ_2/Γ_1

NODE=M173R2
NODE=M173R2

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.38 ±0.05 OUR FIT						
0.44 ±0.09 OUR AVERAGE						
0.55 ±0.13 ±0.08		152	MIKAMI	04	BELL	10.6 e^+e^-
0.38 ±0.11 ±0.04		38	KROKOVNY	03B	BELL	10.6 e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •						
0.274±0.045±0.020		251	[13] AUBERT,B	04S	BABR	$B \to D_{s1}(2460)^+ \overline{D}^{(*)}$
< 0.49	90		BESSON	03	CLE2	10.6 e^+e^-

[13] Used by AUBERT 06N in their measurement of B($D_s^{*-}\pi^0$) and B($D_s^-\gamma$).

NODE=M173R2;LINKAGE=AU

$\Gamma(D_s^+\pi^+\pi^-)/\Gamma(D_s^{*+}\pi^0)$ — Γ_3/Γ_1

NODE=M173R3
NODE=M173R3

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.090±0.020 OUR FIT	Error includes scale factor of 1.2.					
0.14 ±0.04 ±0.02		60	MIKAMI	04	BELL	10.6 e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.08	90		BESSON	03	CLE2	10.6 e^+e^-

$\Gamma(D_s^{*+}\gamma)/\Gamma(D_s^{*+}\pi^0)$ — Γ_4/Γ_1

NODE=M173R4
NODE=M173R4

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.16	90	BESSON	03	CLE2	10.6 e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.31	90	MIKAMI	04	BELL	10.6 e^+e^-

$\Gamma(D_{s0}^*(2317)^+\gamma)/\Gamma(D_s^{*+}\pi^0)$ — Γ_5/Γ_1

NODE=M173R5

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.22	95	AUBERT	04E	BABR	10.6 e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.58	90	BESSON	03	CLE2	10.6 e^+e^-

$\Gamma(D_s^{*+}\pi^0)/[\Gamma(D_s^{*+}\pi^0)+\Gamma(D_{s0}^*(2317)^+\gamma)]$ — $\Gamma_1/(\Gamma_1+\Gamma_5)$

NODE=M173R7

VALUE	DOCUMENT ID		TECN	COMMENT
0.93±0.09 OUR FIT				
0.97±0.09±0.05	AUBERT	06P	BABR	10.6 e^+e^-

$\Gamma(D_s^+\gamma)/[\Gamma(D_s^{*+}\pi^0)+\Gamma(D_{s0}^*(2317)^+\gamma)]$ — $\Gamma_2/(\Gamma_1+\Gamma_5)$

NODE=M173R8

VALUE	DOCUMENT ID		TECN	COMMENT
0.35 ±0.04 OUR FIT				
0.337±0.036±0.038	AUBERT	06P	BABR	10.6 e^+e^-

$\Gamma(D_s^+\pi^+\pi^-)/[\Gamma(D_s^{*+}\pi^0)+\Gamma(D_{s0}^*(2317)^+\gamma)]$ — $\Gamma_3/(\Gamma_1+\Gamma_5)$

NODE=M173R9

VALUE	DOCUMENT ID		TECN	COMMENT
0.083±0.017 OUR FIT Error includes scale factor of 1.2.				
0.077±0.013±0.008	AUBERT	06P	BABR	10.6 e^+e^-

$\Gamma(D_s^{*+}\gamma)/[\Gamma(D_s^{*+}\pi^0)+\Gamma(D_{s0}^*(2317)^+\gamma)]$ — $\Gamma_4/(\Gamma_1+\Gamma_5)$

NODE=M173R10

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.24	95	AUBERT	06P	BABR	10.6 e^+e^-

$\Gamma(D_{s0}^*(2317)^+\gamma)/[\Gamma(D_s^{*+}\pi^0)+\Gamma(D_{s0}^*(2317)^+\gamma)]$ — $\Gamma_5/(\Gamma_1+\Gamma_5)$

NODE=M173R11

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.25	95	AUBERT	06P	BABR	10.6 e^+e^-

$\Gamma(D_s^+\pi^0)/[\Gamma(D_s^{*+}\pi^0)+\Gamma(D_{s0}^*(2317)^+\gamma)]$ — $\Gamma_6/(\Gamma_1+\Gamma_5)$

NODE=M173R12

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.042	95	AUBERT	06P	BABR	10.6 e^+e^-

$\Gamma(D_s^+\pi^0\pi^0)/[\Gamma(D_s^{*+}\pi^0)+\Gamma(D_{s0}^*(2317)^+\gamma)]$ — $\Gamma_7/(\Gamma_1+\Gamma_5)$

NODE=M173R13

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.68	95	AUBERT	06P	BABR	10.6 e^+e^-

$\Gamma(D_s^+\gamma\gamma)/[\Gamma(D_s^{*+}\pi^0)+\Gamma(D_{s0}^*(2317)^+\gamma)]$ — $\Gamma_8/(\Gamma_1+\Gamma_5)$

NODE=M173R14

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.33	95	AUBERT	06P	BABR	10.6 e^+e^-

$D_{s1}(2460)^\pm$ REFERENCES

NODE=M173

AUBERT	06N	PR D74 031103	B. Aubert *et al.*	(BABAR Collab.)	REFID=51142
AUBERT	06P	PR D74 032007	B. Aubert *et al.*	(BABAR Collab.)	REFID=51144
AUBERT	04E	PR D69 031101	B. Aubert *et al.*	(BABAR Collab.)	REFID=49747
AUBERT,B	04S	PRL 93 181801	B. Aubert *et al.*	(BABAR Collab.)	REFID=50195
MIKAMI	04	PRL 92 012002	Y. Mikami *et al.*	(BELLE Collab.)	REFID=49629
BESSON	03	PR D68 032002	D. Besson *et al.*	(CLEO Collab.)	REFID=49583
KROKOVNY	03B	PRL 91 262002	P. Krokovny *et al.*	(BELLE Collab.)	REFID=49615

NODE=M121

$D_{s1}(2536)^{\pm}$

$I(J^P) = 0(1^+)$
J, P need confirmation.

Seen in $D^*(2010)^+ K^0$, $D^*(2007)^0 K^+$, and $D_s^+ \pi^+ \pi^-$. Not seen in $D^+ K^0$ or $D^0 K^+$. $J^P = 1^+$ assignment strongly favored.

NODE=M121

$D_{s1}(2536)^{\pm}$ MASS

NODE=M121M

The fit includes $D^{\pm}$, D^0, $D_s^{\pm}$, $D^{*\pm}$, D^{*0}, $D_s^{*\pm}$, $D_1(2420)^0$, $D_2^*(2460)^0$, and $D_{s1}(2536)^{\pm}$ mass and mass difference measurements.

NODE=M121M

NODE=M121M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2535.11±0.06 OUR FIT					
2535.21±0.28 OUR AVERAGE					
2537.7 ±0.5 ±3.1	24	[1] ABLIKIM	19P	BES3	4.6 $e^+ e^- \rightarrow D_s^+ \overline{D}^0 K^-$
2535.7 ±0.6 ±0.5	46	[2] ABAZOV	09G	D0	$B_s^0 \rightarrow D_{s1}^- \mu^+ \nu_\mu X$
2534.78±0.31±0.40	182	AUBERT	08B	BABR	$B \rightarrow \overline{D}^{(*)} D^* K$
2534.6 ±0.3 ±0.7	193	AUBERT	06P	BABR	10.6 $e^+ e^- \rightarrow D_s^+ \pi^+ \pi^- X$
2535.3 ±0.7	92	[3] HEISTER	02B	ALEP	$e^+ e^- \rightarrow D^{*+} K^0 X$, $D^{*0} K^+ X$
2534.2 ±1.2	9	ASRATYAN	94	BEBC	$\nu N \rightarrow D^* K^0 X, D^{*0} K^{\pm} X$
2535 ±0.6 ±1	75	FRABETTI	94B	E687	γBe $\rightarrow D^{*+} K^0 X$, $D^{*0} K^+ X$
2535.2 ±0.5 ±1.5	28	ALBRECHT	92R	ARG	10.4 $e^+ e^- \rightarrow D^{*0} K^+ X$
2536.6 ±0.7 ±0.4		AVERY	90	CLEO	$e^+ e^- \rightarrow D^{*+} K^0 X$
2535.9 ±0.6 ±2.0		ALBRECHT	89E	ARG	$D_{s1}^* \rightarrow D^*(2010) K^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2534.1 ±0.6	116	[4] AUSHEV	11	BELL	$B \rightarrow D_{s1}(2536)^+ D^{(*)}$
2535.08±0.01±0.15	8038	[5] LEES	11B	BABR	10.6 $e^+ e^- \rightarrow D^{*+} K_S^0 X$
$2535.57^{+0.44}_{-0.41}$±0.10	236	[6] CHEKANOV	09	ZEUS	$e^{\pm} p \rightarrow D^{*+} K_S^0 X$, $D^{*0} K^+ X$
2535.3 ±0.2 ±0.5	134	[7] ALEXANDER	93	CLE2	$e^+ e^- \rightarrow D^{*0} K^+ X$
2534.8 ±0.6 ±0.6	44	[8] ALEXANDER	93	CLE2	$e^+ e^- \rightarrow D^{*+} K^0 X$
2535 ± 28		[9] ASRATYAN	88	HLBC	$\nu N \rightarrow D_s \gamma \gamma X$

OCCUR=2

[1] From a fit of the D_s^+ recoil mass distribution with an incoherent sum of the S-wave and D-wave Breit-Wigner line shapes. NODE=M121M;LINKAGE=D

[2] Using the $D^*(2010)^{\pm}$ mass of 2010.0 ± 0.4 MeV from PDG 06. NODE=M121M;LINKAGE=AB

[3] Calculated using $m(D^*(2010)^{\pm})$ = 2010.0 ± 0.5 MeV, $m(D^*(2007)^0)$ = 2006.7 ± 0.5 MeV, and the mass difference below. NODE=M121M;LINKAGE=HI

[4] Systematic uncertainties not evaluated. NODE=M121M;LINKAGE=AU

[5] Calculated using the mass difference $m(D_{s1}^+) - m(D^{*+})_{PDG}$ below and $m(D^{*+})_{PDG}$ = 2010.25 ± 0.14 MeV. Assuming S-wave decay of the $D_{s1}(2536)$ to $D^{*+} K_S^0$, using a Breit-Wigner line shape corresponding to L=0. NODE=M121M;LINKAGE=LE

[6] Calculated using the mass difference $m(D_{s1}^+) - m(D^{*+})_{PDG}$ reported below and $m(D^{*+})_{PDG}$ = 2010.27 ± 0.17 MeV. NODE=M121M;LINKAGE=CH

[7] Calculated using $m(D^*(2007)^0)$=2006.6 ± 0.5 MeV and the mass difference below. NODE=M121M;LINKAGE=A

[8] Calculated using $m(D^*(2010)^{\pm})$=2010.1 ± 0.6 MeV and the mass difference below. NODE=M121M;LINKAGE=C

[9] Not seen in $D^* K$. NODE=M121M;LINKAGE=B

$m_{D_{s1}(2536)^{\pm}} - m_{D_s^*(2111)}$

NODE=M121DM

The fit includes $D^{\pm}$, D^0, $D_s^{\pm}$, $D^{*\pm}$, D^{*0}, $D_s^{*\pm}$, $D_1(2420)^0$, $D_2^*(2460)^0$, and $D_{s1}(2536)^{\pm}$ mass and mass difference measurements.

NODE=M121DM

NODE=M121DM

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
422.9± 0.4 OUR FIT				
424 ±28	ASRATYAN	88	HLBC	$D_s^{*\pm} \gamma$

$m_{D_{s1}(2536)^{\pm}} - m_{D^*(2010)^{\pm}}$

NODE=M121DN

The fit includes $D^{\pm}$, D^0, $D_s^{\pm}$, $D^{*\pm}$, D^{*0}, $D_s^{*\pm}$, $D_1(2420)^0$, $D_2^*(2460)^0$, and $D_{s1}(2536)^{\pm}$ mass and mass difference measurements. NODE=M121DN

NODE=M121DN

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
524.85±0.04 OUR FIT					
524.84±0.04 OUR AVERAGE					
524.83±0.01±0.04	8038	[10] LEES	11B	BABR	10.6 $e^+e^- \to D^{*+}K_S^0X$
$525.30^{+0.44}_{-0.41}$±0.10	236 ± 30	CHEKANOV	09	ZEUS	$e^{\pm}p \to D^{*+}K_S^0X$, $D^{*0}K^+X$
525.3 ±0.6 ±0.1	41	HEISTER	02B	ALEP	$e^+e^- \to D^{*+}K^0X$
524.7 ±0.6 ±0.2	44	ALEXANDER	93	CLE2	$e^+e^- \to D^{*+}K_S^0X$

OCCUR=2

[10] Assuming S-wave decay of the $D_{s1}(2536)$ to $D^{*+}K_S^0$, using a Breit-Wigner line shape corresponding to L=0. NODE=M121DN;LINKAGE=LE

$m_{D_{s1}(2536)^{\pm}} - m_{D^*(2007)^0}$

NODE=M121DP

The fit includes $D^{\pm}$, D^0, $D_s^{\pm}$, $D^{*\pm}$, D^{*0}, $D_s^{*\pm}$, $D_1(2420)^0$, $D_2^*(2460)^0$, and $D_{s1}(2536)^{\pm}$ mass and mass difference measurements. NODE=M121DP

NODE=M121DP

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
528.26±0.05 OUR FIT	Error includes scale factor of 1.2.				
528.68±0.28 OUR AVERAGE					
528.7 ±1.9 ±0.5	51	HEISTER	02B	ALEP	$e^+e^- \to D^{*0}K^+X$
527.3 ±2.2	29	ACKERSTAFF	97W	OPAL	$e^+e^- \to D^{*0}K^+X$
528.7 ±0.2 ±0.2	134	ALEXANDER	93	CLE2	$e^+e^- \to D^{*0}K^+X$

OCCUR=2

$D_{s1}(2536)^{\pm}$ WIDTH

NODE=M121W

NODE=M121W

VALUE (MeV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.92±0.05 OUR AVERAGE						
1.7 ±1.2 ±0.6		24	[11] ABLIKIM	19P	BES3	4.6 $e^+e^- \to D_s^+\overline{D}^0K^-$
0.92±0.03±0.04		8038	[12] LEES	11B	BABR	10.6 $e^+e^- \to D^{*+}K_S^0X$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
0.75±0.23		116	[13] AUSHEV	11	BELL	$B \to D_{s1}(2536)^+D^{(*)}$
< 2.5	95	193	AUBERT	06P	BABR	10.6 $e^+e^- \to D_s^+\pi^+\pi^-X$
< 3.2	90	75	FRABETTI	94B	E687	γBe $\to D^{*+}K^0X$, $D^{*0}K^+X$
< 2.3	90		ALEXANDER	93	CLEO	$e^+e^- \to D^{*0}K^+X$
< 3.9	90		ALBRECHT	92R	ARG	10.4 $e^+e^- \to D^{*0}K^+X$
< 5.44	90		AVERY	90	CLEO	$e^+e^- \to D^{*+}K^0X$
< 4.6	90		ALBRECHT	89E	ARG	$D_{s1}^* \to D^*(2010)K^0$

[11] From a fit of the D_s^+ recoil mass distribution with an incoherent sum of the S-wave and S-wave Breit-Wigner line shapes. NODE=M121W;LINKAGE=A

[12] Assuming S-wave decay of the $D_{s1}(2536)$ to $D^{*+}K_S^0$, using a Breit-Wigner line shape corresponding to L=0. NODE=M121W;LINKAGE=LE

[13] Systematic uncertainties not evaluated. NODE=M121W;LINKAGE=AU

$D_{s1}(2536)^+$ DECAY MODES

NODE=M121215;NODE=M121

Branching fractions are given relative to the one **DEFINED AS 1**. $D_{s1}(2536)^-$ modes are charge conjugates of the modes below. NODE=M121

	Mode	Fraction (Γ_i/Γ)	Confidence level	
Γ_1	$D^*(2010)^+K^0$	0.85 ±0.12		DESIG=1
Γ_2	$(D^*(2010)^+K^0)_{S-wave}$	0.61 ±0.09		DESIG=7
Γ_3	$(D^*(2010)^+K^0)_{D-wave}$			DESIG=9
Γ_4	$D^+\pi^-K^+$	0.028±0.005		DESIG=8
Γ_5	$D^*(2007)^0K^+$	**DEFINED AS 1**		DESIG=4
Γ_6	D^+K^0	<0.34	90%	DESIG=2
Γ_7	D^0K^+	<0.12	90%	DESIG=5
Γ_8	$D_s^{*+}\gamma$	possibly seen		DESIG=3
Γ_9	$D_s^+\pi^+\pi^-$	seen		DESIG=6

$D_{s1}(2536)^+$ BRANCHING RATIOS

NODE=M121220

$\Gamma(D^*(2007)^0 K^+)/\Gamma(D^*(2010)^+ K^0)$ — Γ_5/Γ_1

NODE=M121R6

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
1.18±0.16 OUR AVERAGE					
0.88±0.24±0.08	116	AUSHEV	11	BELL	$B \to D_{s1}(2536)^+ D^{(*)}$
2.3 ±0.6 ±0.3	236 ± 30	CHEKANOV	09	ZEUS	$e^{\pm} p \to D^{*+} K^0_S X$, $D^{*0} K^+ X$
1.32±0.47±0.23	92	[14] HEISTER	02B	ALEP	$e^+ e^- \to D^{*+} K^0 X$, $D^{*0} K^+ X$
1.9 $^{+1.1}_{-0.9}$ ±0.4	35	[14] ACKERSTAFF	97W	OPAL	$e^+ e^- \to D^{*0} K^+ X$, $D^{*+} K^0 X$
1.1 ±0.3		ALEXANDER	93	CLEO	$e^+ e^- \to D^{*0} K^+ X$, $D^{*+} K^0 X$
1.4 ±0.3 ±0.2		[15] ALBRECHT	92R	ARG	10.4 $e^+ e^- \to D^{*0} K^+ X$, $D^{*+} K^0 X$

[14] Ratio of the production rates measured in Z^0 decays. NODE=M121R6;LINKAGE=6A

[15] Evaluated by us from published inclusive cross-sections. NODE=M121R6;LINKAGE=A

$\Gamma((D^*(2010)^+ K^0)_{S-wave})/\Gamma(D^*(2010)^+ K^0)$ — Γ_2/Γ_1

NODE=M121R8

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.72±0.05±0.01	5485	BALAGURA	08	BELL	10.6 $e^+ e^- \to D^{*+} K^0 X$

$\Gamma(D^+ \pi^- K^+)/\Gamma(D^*(2010)^+ K^0)$ — Γ_4/Γ_1

NODE=M121R9

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
3.27±0.18±0.37	1264	BALAGURA	08	BELL	10.6 $e^+ e^- \to D^+ \pi^- K^+ X$

$\Gamma(D^+ K^0)/\Gamma(D^*(2010)^+ K^0)$ — Γ_6/Γ_1

NODE=M121R1

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.40	90	ALEXANDER	93	CLEO	$e^+ e^- \to D^{*+} K^0 X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.43	90	ALBRECHT	89E	ARG	$D^*_{s1} \to D^*(2010) K^0$

$\Gamma(D^0 K^+)/\Gamma(D^*(2007)^0 K^+)$ — Γ_7/Γ_5

NODE=M121R4

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.12	90	ALEXANDER	93	CLEO	$e^+ e^- \to D^{*0} K^+ X$

$\Gamma(D_s^{*+} \gamma)/\Gamma_{total}$ — Γ_8/Γ

NODE=M121R3

VALUE	DOCUMENT ID		TECN	COMMENT
possibly seen	ASRATYAN	88	HLBC	$\nu N \to D_s \gamma\gamma X$

$\Gamma(D_s^{*+} \gamma)/\Gamma(D^*(2007)^0 K^+)$ — Γ_8/Γ_5

NODE=M121R5

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.42	90	ALEXANDER	93	CLEO	$e^+ e^- \to D^{*0} K^+ X$

$\Gamma(D_s^+ \pi^+ \pi^-)/\Gamma_{total}$ — Γ_9/Γ

NODE=M121R7

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AUBERT	06P	BABR	10.6 $e^+ e^- \to D_s^+ \pi^+ \pi^- X$

$D_{s1}(2536)^{\pm}$ REFERENCES

NODE=M121

ABLIKIM	19P	CP C43 031001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59617
AUSHEV	11	PR D83 051102	T. Aushev *et al.*	(BELLE Collab.)	REFID=16505
LEES	11B	PR D83 072003	J.P. Lees *et al.*	(BABAR Collab.)	REFID=16773
ABAZOV	09G	PRL 102 051801	V.M. Abazov *et al.*	(D0 Collab.)	REFID=52652
CHEKANOV	09	EPJ C60 25	S. Chekanov *et al.*	(ZEUS Collab.)	REFID=52733
AUBERT	08B	PR D77 011102	B. Aubert *et al.*	(BABAR Collab.)	REFID=52120
BALAGURA	08	PR D77 032001	V. Balagura *et al.*	(BELLE Collab.)	REFID=52133
AUBERT	06P	PR D74 032007	B. Aubert *et al.*	(BABAR Collab.)	REFID=51144
PDG	06	JP G33 1	W.-M. Yao *et al.*	(PDG Collab.)	REFID=51004
HEISTER	02B	PL B526 34	A. Heister *et al.*	(ALEPH Collab.)	REFID=48562
ACKERSTAFF	97W	ZPHY C76 425	K. Ackerstaff *et al.*	(OPAL Collab.)	REFID=45788
ASRATYAN	94	ZPHY C61 563	A.E. Asratyan *et al.*	(BIRM, BELG, CERN+)	REFID=43667
FRABETTI	94B	PRL 72 324	P.L. Frabetti *et al.*	(FNAL E687 Collab.)	REFID=43687
ALEXANDER	93	PL B303 377	J. Alexander *et al.*	(CLEO Collab.)	REFID=43316
ALBRECHT	92R	PL B297 425	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=43179
AVERY	90	PR D41 774	P. Avery, D. Besson	(CLEO Collab.)	REFID=41013
ALBRECHT	89E	PL B230 162	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=40914
ASRATYAN	88	ZPHY C40 483	A.E. Asratyan *et al.*	(ITEP, SERP)	REFID=40916

NODE=M148

$D_{s2}^*(2573)$ $I(J^P) = 0(2^+)$

J^P is natural, width and decay modes consistent with 2^+. AAIJ 14AW confirms $J^P = 2^+$.

NODE=M148

$D_{s2}^*(2573)$ MASS

NODE=M148M

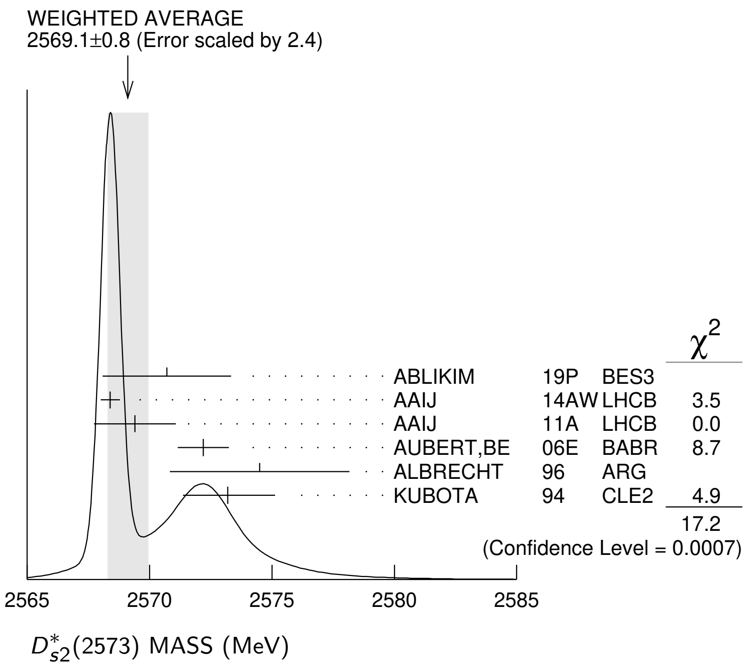
NODE=M148M

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
2569.1 ±0.8 OUR AVERAGE Error includes scale factor of 2.4. See the ideogram below.				
2570.7 ±2.0 ±1.7	62	[1] ABLIKIM 19P	BES3	4.6 $e^+ e^- \rightarrow D_s^+ \overline{D}^0 K^-$
2568.39±0.29±0.26		AAIJ 14AW	LHCB	$B_s^0 \rightarrow \overline{D}^0 K^- \pi^+$
2569.4 ±1.6 ±0.5	82	AAIJ 11A	LHCB	$B_s \rightarrow D_{s2}^*(2573) \mu \overline{\nu} X$
2572.2 ±0.3 ±1.0		AUBERT,BE 06E	BABR	$e^+ e^- \rightarrow D K X$
2574.5 ±3.3 ±1.6		ALBRECHT 96	ARG	$e^+ e^- \rightarrow D^0 K^+ X$
2573.2 $^{+1.7}_{-1.6}$ ±0.9	217	KUBOTA 94	CLE2	$e^+ e^- \sim$ 10.5 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2570.0 ±4.3	25	[2] EVDOKIMOV 04	SELX	600 $\Sigma^- A \rightarrow D^0 K^+ X$
2568.6 ±3.2	64	[3] HEISTER 02B	ALEP	$e^+ e^- \rightarrow D^0 K^+ X$

[1] From a fit of the D_s^+ recoil mass distribution . NODE=M148M;LINKAGE=A

[2] Not independent of the mass difference below. NODE=M148M;LINKAGE=EV

[3] Calculated using m_{D^0} = 1864.5 ± 0.5 MeV and the mass difference below. NODE=M148M;LINKAGE=HI



$m_{D_{s2}^*(2573)} - m_{D^0}$

NODE=M148DM

NODE=M148DM

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
704 ±3 ±1	64	HEISTER 02B	ALEP	$e^+ e^- \rightarrow D^0 K^+ X$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
705.4±4.3	25	[1] EVDOKIMOV 04	SELX	600 $\Sigma^- A \rightarrow D^0 K^+ X$

[1] Systematic errors not estimated. NODE=M148DM;LINKAGE=EV

$D_{s2}^*(2573)$ WIDTH

NODE=M148W

NODE=M148W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
16.9±0.7 OUR AVERAGE					
17.2±3.6±1.1	62	[1] ABLIKIM	19P	BES3	4.6 $e^+e^- \to D_s^+ \overline{D}^0 K^-$
16.9±0.5±0.6		AAIJ	14AW	LHCB	$B_s^0 \to \overline{D}^0 K^- \pi^+$
12.1±4.5±1.6	82	AAIJ	11A	LHCB	$B_s \to D_{s2}^*(2573) \mu \overline{\nu} X$
27.1±0.6±5.6		AUBERT,BE	06E	BABR	$e^+e^- \to DKX$
10.4±8.3±3.0		ALBRECHT	96	ARG	$e^+e^- \to D^0 K^+ X$
$16\ ^{+5}_{-4}\ \pm 3$	217	KUBOTA	94	CLE2	$e^+e^- \sim$ 10.5 GeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

$14\ ^{+9}_{-6}$	25	[2] EVDOKIMOV	04	SELX	600 $\Sigma^- A \to D^0 K^+ X$

[1] From a fit of the D_s^+ recoil mass distribution .

[2] Systematic errors not estimated.

NODE=M148W;LINKAGE=A
NODE=M148W;LINKAGE=EV

$D_{s2}^*(2573)^+$ DECAY MODES

NODE=M148215;NODE=M148

$D_{s2}^*(2573)^-$ modes are charge conjugates of the modes below.

NODE=M148

	Mode	Fraction (Γ_i/Γ)
Γ_1	$D^0 K^+$	seen
Γ_2	$D^*(2007)^0 K^+$	not seen
Γ_3	$D^+ K_S^0$	
Γ_4	$D^{*+} K_S^0$	

DESIG=1
DESIG=2;OUR EVAL;→ UNCHECKED ←
DESIG=4
DESIG=5

$D_{s2}^*(2573)^+$ BRANCHING RATIOS

NODE=M148220

$\Gamma(D^0 K^+)/\Gamma_{total}$ Γ_1/Γ

NODE=M148R2
NODE=M148R2

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
seen	217	KUBOTA	94	CLE2	±	$e^+e^- \sim$ 10.5 GeV

$\Gamma(D^*(2007)^0 K^+)/\Gamma(D^0 K^+)$ Γ_2/Γ_1

NODE=M148R1
NODE=M148R1

VALUE	CL%	DOCUMENT ID		TECN	CHG	COMMENT
<0.33	90	KUBOTA	94	CLE2	+	$e^+e^- \sim$ 10.5 GeV

$\Gamma(D^{*+} K_S^0)/\Gamma(D^+ K_S^0)$ Γ_4/Γ_3

NODE=M148R00
NODE=M148R00

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.044±0.005±0.011	2000	[1] AAIJ	16AW	LHCB	$pp \to D^{*+} K_S^0 X$ at 7, 8 TeV

[1] First observation of the $D_{s2}^*(2573)^+ \to D^{*+} K_S^0$ decay with a significance of 6.9 σ.

NODE=M148R00;LINKAGE=A

$D_{s2}^*(2573)$ REFERENCES

NODE=M148

ABLIKIM	19P	CP C43 031001	M. Ablikim *et al.*	(BESIII Collab.)
AAIJ	16AW	JHEP 1602 133	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	14AW	PRL 113 162001	R. Aaij *et al.*	(LHCb Collab.) JP
AAIJ	11A	PL B698 14	R. Aaij *et al.*	(LHCb Collab.)
AUBERT,BE	06E	PRL 97 222001	B. Aubert *et al.*	(BABAR Collab.)
EVDOKIMOV	04	PRL 93 242001	A.V. Evdokimov *et al.*	(SELEX Collab.)
HEISTER	02B	PL B526 34	A. Heister *et al.*	(ALEPH Collab.)
ALBRECHT	96	ZPHY C69 405	H. Albrecht *et al.*	(ARGUS Collab.)
KUBOTA	94	PRL 72 1972	Y. Kubota *et al.*	(CLEO Collab.)

REFID=59617
REFID=60464
REFID=56105
REFID=16665
REFID=51512
REFID=50337
REFID=48562
REFID=44631
REFID=43781

NODE=M256

$D_{s0}(2590)^{+}$

$I(J^P) = 0(0^-)$

OMITTED FROM SUMMARY TABLE

$D_{s0}(2590)^{+}$ MASS

NODE=M256M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2591±6±7	444	[1] AAIJ	21A	LHCB	$B^0 \to D^-(D^+ K^+ \pi^-)$

[1] The mass is calculated from the position of the T-matrix pole

NODE=M256M;LINKAGE=B

$D_{s0}(2590)^{+}$ WIDTH

NODE=M256W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
89±16±12	444	[1] AAIJ	21A	LHCB	$B^0 \to D^-(D^+ K^+ \pi^-)$

[1] The width is calculated from the position of the T-matrix pole

NODE=M256W;LINKAGE=B

$D_{s0}(2590)^{+}$ DECAY MODES

NODE=M256215;NODE=M256

	Mode	Fraction (Γ_i/Γ)
Γ_1	$D^+ K^+ \pi^-$	seen

DESIG=1

$\Gamma(D^+ K^+ \pi^-)/\Gamma_{total}$ Γ_1/Γ

NODE=M256R01
NODE=M256R01

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	444	AAIJ	21A	LHCB	$B^0 \to D^-(D^+ K^+ \pi^-)$

$D_{s0}(2590)^{+}$ REFERENCES

NODE=M256

AAIJ 21A PRL 126 122002 R. Aaij *et al.* (LHCb Collab.)

REFID=61092

NODE=M182

$D^*_{s1}(2700)^{\pm}$

$I(J^P) = 0(1^-)$

$D^*_{s1}(2700)^{+}$ MASS

NODE=M182M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2714 ± 5 OUR AVERAGE		Error includes scale factor of 1.5. See the ideogram below.			
2732.3± 4.3± 5.8	15.7k	AAIJ	16AW	LHCB	$pp \to D^{*+} K^0_S X$ at 7, 8 TeV
2699 $^{+14}_{-7}$		[1] LEES	15C	BABR	$B \to D D^0 K^+$
2709.2± 1.9± 4.5	52k	[2] AAIJ	12AU	LHCB	$pp \to (DK)^+ X$ at 7 TeV
2710 ± 2 $^{+12}_{-7}$	10.4k	[3] AUBERT	09AR	BABR	$e^+ e^- \to D^{(*)} K X$
2708 ± 9 $^{+11}_{-10}$	182	BRODZICKA	08	BELL	$B^+ \to D^0 \overline{D}^0 K^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2694 ± 8 $^{+13}_{-3}$		LEES	15C	BABR	$B^0 \to D^- D^0 K^+$
2707 ± 8 ± 8		LEES	15C	BABR	$B^+ \to \overline{D}^0 D^0 K^+$
2688 ± 4 ± 3		[4] AUBERT,BE	06E	BABR	10.6 $e^+ e^- \to D K X$

OCCUR=2
OCCUR=3

[1] From a combined analysis of $B^0 \to D^- D^0 K^+$ and $B^+ \to \overline{D}^0 D^0 K^+$.

NODE=M182M;LINKAGE=B

[2] From the combined fit of the $D^+ K^0_S$ and $D^0 K^+$ modes in the model including the $D^*_{s2}(2573)^+$, $D^*_{s1}(2700)^+$ and spin-0 $D^*_{sJ}(2860)^+$.

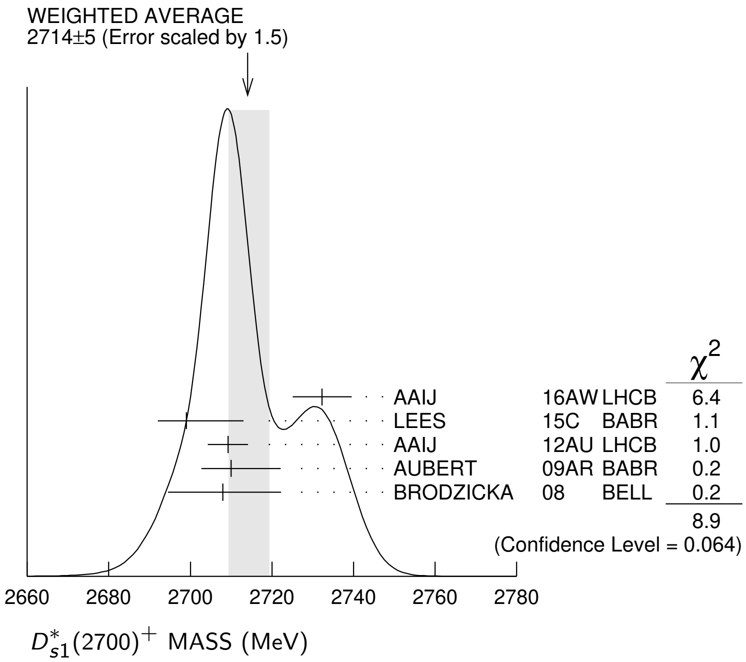
NODE=M182M;LINKAGE=AA

[3] From simultaneous fits to the two DK mass spectra and to the total $D^* K$ mass spectrum.

NODE=M182M;LINKAGE=AB

[4] Superseded by AUBERT 09AR.

NODE=M182M;LINKAGE=AU



$D^*_{s1}(2700)^+$ WIDTH

NODE=M182W

NODE=M182W

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
122 ±10 OUR AVERAGE				
136 ±19 ±24	15.7k	AAIJ 16AW	LHCB	$p p \to D^{*+} K^0_S X$ at 7, 8 TeV
127 $^{+24}_{-19}$		[1] LEES 15C	BABR	$B \to D D^0 K^+$
115.8± 7.3±12.1	52k	[2] AAIJ 12AU	LHCB	$p p \to (D K)^+ X$ at 7 TeV
149 ± 7 $^{+39}_{-52}$	10.4k	[3] AUBERT 09AR	BABR	$e^+ e^- \to D^{(*)} K X$
108 ±23 $^{+36}_{-31}$	182	BRODZICKA 08	BELL	$B^+ \to D^0 \overline{D}^0 K^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
145 ±24 $^{+22}_{-14}$		LEES 15C	BABR	$B^0 \to D^- D^0 K^+$
113 ±21 $^{+20}_{-16}$		LEES 15C	BABR	$B^+ \to \overline{D}^0 D^0 K^+$
112 ± 7 ±36		[4] AUBERT,BE 06E	BABR	10.6 $e^+ e^- \to D K X$

OCCUR=2

OCCUR=3

[1] From a combined analysis of $B^0 \to D^- D^0 K^+$and $B^+ \to \overline{D}^0 D^0 K^+$.

NODE=M182W;LINKAGE=A

[2] From the combined fit of the $D^+ K^0_S$ and $D^0 K^+$ modes in the model including the $D^*_{s2}(2573)^+$, $D^*_{s1}(2700)^+$ and spin-0 $D^*_{sJ}(2860)^+$.

NODE=M182W;LINKAGE=AA

[3] From simultaneous fits to the two $D K$ mass spectra and to the total $D^* K$ mass spectrum.

NODE=M182W;LINKAGE=AB

[4] Superseded by AUBERT 09AR.

NODE=M182W;LINKAGE=AU

$D^*_{s1}(2700)^\pm$ DECAY MODES

NODE=M182215;NODE=M182

	Mode	
Γ_1	$D K$	DESIG=2
Γ_2	$D^0 K^+$	DESIG=1
Γ_3	$D^+ K^0_S$	DESIG=3
Γ_4	$D^* K$	DESIG=4
Γ_5	$D^{*0} K^+$	DESIG=5
Γ_6	$D^{*+} K^0_S$	DESIG=6

$D^*_{s1}(2700)^\pm$ BRANCHING RATIOS

NODE=M182225

$\Gamma(D^* K)/\Gamma(D K)$ — Γ_4/Γ_1

NODE=M182R01
NODE=M182R01

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.91±0.13±0.12	10.4k	[1] AUBERT 09AR	BABR	$e^+ e^- \to D^{(*)} K X$

[1] From the average of the corresponding ratios with $D^{(*)0} K^+$ and $D^{(*)+} K^0_S$.

NODE=M182R01;LINKAGE=AU

$\Gamma(D^{*0}K^+)/\Gamma(D^0K^+)$ — Γ_5/Γ_2

NODE=M182R02

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.88\pm0.14\pm0.14$	7716	[1] AUBERT	09AR BABR	$e^+e^- \rightarrow D^{(*)}KX$

[1] From the $D^{*0}K^+$ and D^0K^+, where $D^{*0} \rightarrow D^0\pi^0$.

NODE=M182R02;LINKAGE=AU

$\Gamma(D^{*+}K^0_S)/\Gamma(D^+K^0_S)$ — Γ_6/Γ_3

NODE=M182R03

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$1.14\pm0.39\pm0.23$	2700	[1] AUBERT	09AR BABR	$e^+e^- \rightarrow D^{(*)}KX$

[1] From the $D^{*+}K^0_S$ and $D^+K^0_S$, where $D^{*+} \rightarrow D^+\pi^0$.

NODE=M182R03;LINKAGE=AU

$D^*_{s1}(2700)^\pm$ REFERENCES

NODE=M182

AAIJ	16AW	JHEP 1602 133	R. Aaij *et al.*	(LHCb Collab.)	REFID=60464
LEES	15C	PR D91 052002	J.P. Lees *et al.*	(BABAR Collab.)	REFID=56412
AAIJ	12AU	JHEP 1210 151	R. Aaij *et al.*	(LHCb Collab.)	REFID=54735
AUBERT	09AR	PR D80 092003	B. Aubert *et al.*	(BABAR Collab.)	REFID=53135
BRODZICKA	08	PRL 100 092001	J. Brodzicka *et al.*	(BELLE Collab.)	REFID=52144
AUBERT,BE	06E	PRL 97 222001	B. Aubert *et al.*	(BABAR Collab.)	REFID=51512

NODE=M196

$D^*_{s1}(2860)^\pm$

$I(J^P) = 0(1^-)$

OMITTED FROM SUMMARY TABLE

J^P consistent with 1^- from angular analysis of AAIJ 14AW.

NODE=M196

$D^*_{s1}(2860)^+$ MASS

NODE=M196M

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
2859±12±24	[1] AAIJ	14AW LHCB	$B^0_s \rightarrow \overline{D}^0K^-\pi^+$

[1] Separated from the spin-3 component $D^*_{s3}(2860)^-$ by a fit of the helicity angle of the $\overline{D}^0K^-$ system, with a statistical significance of the spin-3 and spin-1 components in excess of 10 σ.

NODE=M196M;LINKAGE=A

$D^*_{s1}(2860)^+$ WIDTH

NODE=M196W

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
159±23±77	[1] AAIJ	14AW LHCB	$B^0_s \rightarrow \overline{D}^0K^-\pi^+$

[1] Separated from the spin-3 component $D^*_{s3}(2860)^-$ by a fit of the helicity angle of the $\overline{D}^0K^-$ system, with a statistical significance of the spin-3 and spin-1 components in excess of 10 σ.

NODE=M196W;LINKAGE=A

$D^*_{s1}(2860)^\pm$ REFERENCES

NODE=M196

AAIJ 14AW PRL 113 162001 R. Aaij *et al.* (LHCb Collab.) JP REFID=56105

NODE=M226

$D_{s3}^*(2860)^{\pm}$

$I(J^P) = 0(3^-)$

OMITTED FROM SUMMARY TABLE

NODE=M226

J^P consistent with 3^- from angular analysis of AAIJ 14AW. Observed by AUBERT,BE 06E and AUBERT 09AR in inclusive production of $D K$ and $D^* K$ in $e^+ e^-$ annihilation.

$D_{s3}^*(2860)^+$ MASS

NODE=M226M

NODE=M226M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2860.5±2.6±6.5		[1] AAIJ	14AW	LHCB	$B_s^0 \to \overline{D}^0 K^- \pi^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2867.1±4.3±1.9	3.1k	AAIJ	16AW	LHCB	$p p \to D^{*+} K_S^0 X$ at 7, 8 TeV
2866.1±1.0±6.3	36k	[2,3] AAIJ	12AU	LHCB	$p p \to (D K)^+ X$ at 7 TeV
2862 ±2 $^{+5}_{-2}$	3122	[2,4] AUBERT	09AR	BABR	$e^+ e^- \to D^{(*)} K X$
2856.6±1.5±5.0		[5] AUBERT,BE	06E	BABR	$e^+ e^- \to D K X$

[1] Separated from the spin-1 component $D_{s1}^*(2860)^-$ by a fit of the helicity angle of the $\overline{D}^0 K^-$ system, with a statistical significance of the spin-3 and spin-1 components in excess of 10 σ. NODE=M226M;LINKAGE=A

[2] Possible contribution from the $D_{s1}^*(2860)$ state. NODE=M226M;LINKAGE=D

[3] From the combined fit of the $D^+ K_S^0$ and $D^0 K^+$ modes in the model including the $D_{s2}^*(2573)^+$, $D_{s1}^*(2700)^+$ and spin-0 $D_{sJ}^*(2860)^+$. NODE=M226M;LINKAGE=E

[4] From simultaneous fits to the two $D K$ mass spectra and to the total $D^* K$ mass spectrum. NODE=M226M;LINKAGE=C

[5] Superseded by AUBERT 09AR. NODE=M226M;LINKAGE=B

$D_{s3}^*(2860)^+$ WIDTH

NODE=M226W

NODE=M226W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
53 ± 7 ± 7		[1] AAIJ	14AW	LHCB	$B_s^0 \to \overline{D}^0 K^- \pi^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
50 ±11 ±13	3.1k	AAIJ	16AW	LHCB	$p p \to D^{*+} K_S^0 X$ at 7, 8 TeV
69.9± 3.2± 6.6	36k	[2,3] AAIJ	12AU	LHCB	$p p \to (D K)^+ X$ at 7 TeV
48 ± 3 ± 6	3122	[2,4] AUBERT	09AR	BABR	$e^+ e^- \to D^{(*)} K X$
47 ± 7 ±10		[5] AUBERT,BE	06E	BABR	$e^+ e^- \to D K X$

[1] Separated from the spin-1 component $D_{s1}^*(2860)^-$ by a fit of the helicity angle of the $\overline{D}^0 K^-$ system, with a statistical significance of the spin-3 and spin-1 components in excess of 10 σ. NODE=M226W;LINKAGE=A

[2] Possible contribution from the $D_{s1}^*(2860)$ state. NODE=M226W;LINKAGE=D

[3] From the combined fit of the $D^+ K_S^0$ and $D^0 K^+$ modes in the model including the $D_{s2}^*(2573)^+$, $D_{s1}^*(2700)^+$ and spin-0 $D_{sJ}^*(2860)^+$. NODE=M226W;LINKAGE=E

[4] From simultaneous fits to the two $D K$ mass spectra and to the total $D^* K$ mass spectrum. NODE=M226W;LINKAGE=C

[5] Superseded by AUBERT 09AR. NODE=M226W;LINKAGE=B

$D_{s3}^*(2860)^{\pm}$ DECAY MODES

NODE=M226215;NODE=M226

	Mode	
Γ_1	$D K$	DESIG=1
Γ_2	$D^0 K^+$	DESIG=2
Γ_3	$D^+ K_S^0$	DESIG=3
Γ_4	$D^* K$	DESIG=4
Γ_5	$D^{*0} K^+$	DESIG=5
Γ_6	$D^{*+} K_S^0$	DESIG=6

$D^*_{s3}(2860)^{\pm}$ BRANCHING RATIOS

NODE=M226225

$\Gamma(D^* K)/\Gamma(D K)$ — Γ_4/Γ_1

NODE=M226R01

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
1.10±0.15±0.19	3122	[1] AUBERT	09AR	BABR	$e^+ e^- \to D^{(*)} K X$

[1] From the average of the corresponding ratios with $D^{(*)0} K^+$ and $D^{(*)+} K^0_S$.

NODE=M226R01;LINKAGE=AU

$\Gamma(D^{*0} K^+)/\Gamma(D^0 K^+)$ — Γ_5/Γ_2

NODE=M226R02

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.04±0.17±0.20	2241	[1] AUBERT	09AR	BABR	$e^+ e^- \to D^{(*)} K X$

[1] From the $D^{*0} K^+$ and $D^0 K^+$, where $D^{*0} \to D^0 \pi^0$.

NODE=M226R02;LINKAGE=AU

$\Gamma(D^{*+} K^0_S)/\Gamma(D^+ K^0_S)$ — Γ_6/Γ_3

NODE=M226R03

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.38±0.35±0.49	881	[1] AUBERT	09AR	BABR	$e^+ e^- \to D^{(*)} K X$

[1] From the $D^{*+} K^0_S$ and $D^+ K^0_S$, where $D^{*+} \to D^+ \pi^0$.

NODE=M226R03;LINKAGE=AU

$D^*_{s3}(2860)^{\pm}$ REFERENCES

NODE=M226

AAIJ 16AW JHEP 1602 133 R. Aaij *et al.* (LHCb Collab.) REFID=60464
AAIJ 14AW PRL 113 162001 R. Aaij *et al.* (LHCb Collab.) JP REFID=56105
AAIJ 12AU JHEP 1210 151 R. Aaij *et al.* (LHCb Collab.) REFID=54735
AUBERT 09AR PR D80 092003 B. Aubert *et al.* (BABAR Collab.) REFID=53135
AUBERT,BE 06E PRL 97 222001 B. Aubert *et al.* (BABAR Collab.) REFID=51512

NODE=M250

$X_0(2900)$

$I(J^P) = ?(0^+)$

OMITTED FROM SUMMARY TABLE

An exotic state with minimal quark content $\overline{c} d \overline{s} u$. Observed by AAIJ 20AI using full amplitude analysis of $B^+ \to D^+ D^- K^+$ decays.

NODE=M250

$X_0(2900)$ MASS

NODE=M250M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2866±7±2	1.2k	[1] AAIJ	20AI	LHCB	$B^+ \to D^+ D^- K^+$

[1] Obtained from the full amplitude analysis. Parameterized with the relativistic Breit-Wigner line shape. Also confirmed by the model-independent analysis of AAIJ 20AF.

NODE=M250M;LINKAGE=A

$X_0(2900)$ WIDTH

NODE=M250W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
57±12±4	1.2k	[1] AAIJ	20AI	LHCB	$B^+ \to D^+ D^- K^+$

[1] Obtained from the full amplitude analysis. Parameterized with the relativistic Breit-Wigner line shape. Also confirmed by the model-independent analysis of AAIJ 20AF.

NODE=M250W;LINKAGE=A

$X_0(2900)$ DECAY MODES

NODE=M250215;NODE=M250

	Mode	Fraction (Γ_i/Γ)
Γ_1	$D^- K^+$	seen

DESIG=1

$X_0(2900)$ BRANCHING RATIOS

NODE=M250225

$\Gamma(D^- K^+)/\Gamma_{total}$ — Γ_1/Γ

NODE=M250R01

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AAIJ	20AI	LHCB	$B^+ \to D^+ D^- K^+$

$X_0(2900)$ REFERENCES

NODE=M250

AAIJ 20AF PRL 125 242001 R. Aaij *et al.* (LHCb Collab.) REFID=60702
AAIJ 20AI PR D102 112003 R. Aaij *et al.* (LHCb Collab.) REFID=60739

NODE=M251

$X_1(2900)$

$I(J^P) = ?(1^-)$

OMITTED FROM SUMMARY TABLE

An exotic state with minimal quark content $\overline{c} d \overline{s} u$. Observed by AAIJ 20AI using full amplitude analysis of $B^+ \to D^+ D^- K^+$ decays.

NODE=M251

$X_1(2900)$ MASS

NODE=M251M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2904±5±1	1.2k	[1] AAIJ	20AI	LHCB	$B^+ \to D^+ D^- K^+$

NODE=M251M

[1] Obtained from the full amplitude analysis. Parameterized with the relativistic Breit-Wigner line shape. Also confirmed by the model-independent analysis of AAIJ 20AF.

NODE=M251M;LINKAGE=B

$X_1(2900)$ WIDTH

NODE=M251W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
110±11±4	1.2k	[1] AAIJ	20AI	LHCB	$B^+ \to D^+ D^- K^+$

NODE=M251W

[1] Obtained from the full amplitude analysis. Parameterized with the relativistic Breit-Wigner line shape. Also confirmed by the model-independent analysis of AAIJ 20AF.

NODE=M251W;LINKAGE=A

$X_1(2900)$ DECAY MODES

NODE=M251215;NODE=M251

	Mode	Fraction (Γ_i/Γ)
Γ_1	$D^- K^+$	seen

DESIG=1

$X_1(2900)$ BRANCHING RATIOS

NODE=M251225

$\Gamma(D^- K^+)/\Gamma_{total}$ **Γ_1/Γ**

NODE=M251R01
NODE=M251R01

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AAIJ	20AI	LHCB	$B^+ \to D^+ D^- K^+$

$X_1(2900)$ REFERENCES

NODE=M251

AAIJ 20AF PRL 125 242001 R. Aaij *et al.* (LHCb Collab.)
AAIJ 20AI PR D102 112003 R. Aaij *et al.* (LHCb Collab.)

REFID=60702
REFID=60739

NODE=M197

$D_{sJ}(3040)^{\pm}$

$I(J^P) = 0(?^?)$

OMITTED FROM SUMMARY TABLE

Observed by AUBERT 09AR in inclusive production of $D^* K$ in $e^+ e^-$ annihilation.

NODE=M197

$D_{sJ}(3040)^+$ MASS

NODE=M197M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
$3044 \pm 8^{+30}_{-5}$	AUBERT	09AR	BABR	$e^+ e^- \to D^* K X$

NODE=M197M

$D_{sJ}(3040)^+$ WIDTH

NODE=M197W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
$239 \pm 35^{+46}_{-42}$	AUBERT	09AR	BABR	$e^+ e^- \to D^* K X$

NODE=M197W

$D_{sJ}(3040)^{\pm}$ DECAY MODES

NODE=M197215;NODE=M197

	Mode
Γ_1	$D^* K$
Γ_2	$D^{*0} K^+$
Γ_3	$D^{*+} K^0_S$

DESIG=1
DESIG=2
DESIG=3

$D_{sJ}(3040)^{\pm}$ REFERENCES

NODE=M197

AUBERT 09AR PR D80 092003 B. Aubert *et al.* (BABAR Collab.)

REFID=53135

NODE=M259

$Z_{cs}(4000)^{+}$

$I(J^P) = \frac{1}{2}(1^+)$

OMITTED FROM SUMMARY TABLE

Properties incompatible with a $q\overline{q}$ structure (exotic state). See the review on "Heavy Non-$q\overline{q}$ Mesons."

NODE=M259

Seen by AAIJ 21E in $B^+ \to Z_{cs}(4000)^+ \phi$ with $Z_{cs}(4000)^+ \to J/\psi K^+$ using an amplitude analysis of $B^+ \to J/\psi \phi K^+$ with a significance (accounting for systematic uncertainties) of 15 σ. The $J^P = 1^+$ assignment is favored with high significance. ABLIKIM 21G also reports a $J^P = 1^+$ Z_{cs} state in this mass region using $e^+ e^- \to K^+ (D_s^- D^{*0} + D_s^{*-} D^0)$ with a significance of 5.3 σ. The incompatible values for the widths reported by AAIJ 21E and ABLIKIM 21G could either indicate the existence of two separate states or possibly be explained in a coupled channel model (see ORTEGA 21).

$Z_{cs}(4000)^{+}$ MASS

NODE=M259M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
3980 - 4010 OUR EVALUATION					
$3983.2^{+2.6}_{-3.3}$ OUR AVERAGE					
$4003 \pm 6\ ^{+4}_{-14}$	24k	[1] AAIJ	21E	LHCB	$B^+ \to J/\psi \phi K^+$
$3982.5^{+1.8}_{-2.6} \pm 2.1$		[2] ABLIKIM	21G	BES3	$e^+ e^- \to K^+ (D_s^- D^{*0} + D_s^{*-} D^0)$

NODE=M259M → UNCHECKED ←

[1] From an amplitude analysis of the decay $B^+ \to J/\psi \phi K^+$ with a significance of 15 σ.

[2] Pole mass for a mass-dependent Breit-Wigner fit to the mass spectrum recoiling against K^+ at center of mass energies between 4.628 and 4.698 GeV, with a significance of 5.3 σ.

NODE=M259M;LINKAGE=A
NODE=M259M;LINKAGE=B

$Z_{cs}(4000)^{+}$ WIDTH

NODE=M259W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
5 - 150 OUR EVALUATION					
$17\ ^{+6}_{-5}$ OUR AVERAGE					
$131 \pm 15 \pm 26$	24k	[1] AAIJ	21E	LHCB	$B^+ \to J/\psi \phi K^+$
$12.8^{+5.3}_{-4.4} \pm 3.0$		[2] ABLIKIM	21G	BES3	$e^+ e^- \to K^+ (D_s^- D^{*0} + D_s^{*-} D^0)$

NODE=M259W → UNCHECKED ←

[1] From an amplitude analysis of the decay $B^+ \to J/\psi \phi K^+$ with a significance of 15 σ.

[2] Pole width for a mass-dependent Breit-Wigner fit to the mass spectrum recoiling against K^+ at center of mass energies between 4.628 and 4.698 GeV, with a significance of 5.3 σ.

NODE=M259W;LINKAGE=A
NODE=M259W;LINKAGE=B

$Z_{cs}(4000)^{+}$ DECAY MODES

NODE=M259215;NODE=M259

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$J/\psi K^+$	seen	DESIG=1
Γ_2	$D_s^+ \overline{D}^{*0}$ or $D_s^{*+} \overline{D}^0$	seen	DESIG=2

$\Gamma(J/\psi K^+)/\Gamma_{total}$ Γ_1/Γ

NODE=M259R01
NODE=M259R01

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	24k	[1] AAIJ	21E	LHCB	$B^+ \to J/\psi \phi K^+$

[1] From an amplitude analysis of the decay $B^+ \to J/\psi \phi K^+$ with a significance of 15 σ.

NODE=M259R01;LINKAGE=A

$\Gamma(D_s^+ \overline{D}^{*0}$ or $D_s^{*+} \overline{D}^0)/\Gamma_{total}$ Γ_2/Γ

NODE=M259R00
NODE=M259R00

VALUE	DOCUMENT ID		TECN	COMMENT
seen	[1] ABLIKIM	21G	BES3	$e^+ e^- \to K^+ (D_s^- D^{*0} + D_s^{*-} D^0)$

[1] Seen in the spectrum recoiling against K^+ in $e^+ e^- \to K^+ (D_s^- D^{*0} + D_s^{*-} D^0)$ collisions at center of mass energies between 4.628 and 4.698 GeV, with a significance of 5.3 σ.

NODE=M259R00;LINKAGE=A

$Z_{cs}(4000)^+$ REFERENCES

NODE=M259

AAIJ	21E	PRL 127 082001	R. Aaij *et al.*	(LHCb Collab.) JP
ABLIKIM	21G	PRL 126 102001	M. Ablikim *et al.*	(BESIII Collab.)
ORTEGA	21	PL B818 136382	P.G. Ortega, D.R. Entem, F. Fernandez	

REFID=61150
REFID=61065
REFID=61108

NODE=M260

$Z_{cs}(4220)^+$

$I(J^P) = \frac{1}{2}(1^+)$

OMITTED FROM SUMMARY TABLE

Properties incompatible with a $q\overline{q}$ structure (exotic state). See the review on "Heavy Non-$q\overline{q}$ Mesons."

NODE=M260

Seen by AAIJ 21E in $B^+ \to Z_{cs}(4220)^+ \phi$ with $Z_{cs}(4220)^+ \to J/\psi K^+$ using an amplitude analysis of $B^+ \to J/\psi \phi K^+$ with a significance (accounting for systematic uncertainties) of 5.9 σ. The $J^P = 1^+$ assignment is favored over 1^- with a significance of 2 σ and other assignments are disfavored by 4.9 σ.

$Z_{cs}(4220)^+$ MASS

NODE=M260M

NODE=M260M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$4216 \pm 24^{+43}_{-30}$	24k	[1] AAIJ	21E	LHCB	$B^+ \to J/\psi \phi K^+$

[1] From an amplitude analysis of the decay $B^+ \to J/\psi \phi K^+$ with a significance of 5.9 σ.

NODE=M260M;LINKAGE=A

$Z_{cs}(4220)^+$ WIDTH

NODE=M260W

NODE=M260W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$233 \pm 52^{+97}_{-73}$	24k	[1] AAIJ	21E	LHCB	$B^+ \to J/\psi \phi K^+$

[1] From an amplitude analysis of the decay $B^+ \to J/\psi \phi K^+$ with a significance of 5.9 σ.

NODE=M260W;LINKAGE=A

$Z_{cs}(4220)^+$ DECAY MODES

NODE=M260215;NODE=M260

	Mode	Fraction (Γ_i/Γ)
Γ_1	$J/\psi K^+$	seen

DESIG=1

$\Gamma(J/\psi K^+)/\Gamma_{total}$ Γ_1/Γ

NODE=M260R01
NODE=M260R01

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	24k	[1] AAIJ	21E	LHCB	$B^+ \to J/\psi \phi K^+$

[1] From an amplitude analysis of the decay $B^+ \to J/\psi \phi K^+$ with a significance of 5.9 σ.

NODE=M260R01;LINKAGE=A

$Z_{cs}(4220)^+$ REFERENCES

NODE=M260

AAIJ	21E	PRL 127 082001	R. Aaij *et al.*	(LHCb Collab.) JP

REFID=61150

BOTTOM MESONS
($B = \pm 1$)

$B^+ = u\overline{b}$, $B^0 = d\overline{b}$, $\overline{B}^0 = \overline{d}\,b$, $B^- = \overline{u}\,b$, similarly for B^*'s

NODE=MXXX045

NODE=MXXX045

NODE=M244

$B_1(5721)$

$I(J^P) = \frac{1}{2}(1^+)$
I, J, P need confirmation.

Quantum numbers shown are quark-model predictions.

NODE=M244

B_1(5721) MASS

NODE=M244205

$B_1(5721)^+$ mass

NODE=M244M+

OUR FIT uses $m_{B^{*0}}$ and $m_{B_1^+} - m_{B^{*0}}$ to determine $m_{B_1(5721)^+}$.

NODE=M244M+
NODE=M244M+

VALUE (MeV)	DOCUMENT ID
$5725.9^{+2.5}_{-2.7}$ OUR FIT	

$m_{B_1^+} - m_{B^{*0}}$

NODE=M244DM+
NODE=M244DM+

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
$401.2^{+2.4}_{-2.7}$ OUR FIT				
$401.2^{+2.4}_{-2.7}$ OUR AVERAGE				
$400.5 \pm 1.8 \pm 3.1$	8k	[1] AAIJ	15AB LHCB	pp at 7, 8 TeV
$402 \pm 3\ ^{+1}_{-3}$		[2] AALTONEN	14I CDF	$p\overline{p}$ at 1.96 TeV

[1] AAIJ 15AB reports $[m_{B_1^+} - m_{B^0}] - (m_{B^{*0}} - m_{B^0}) - m_{\pi^+} = 260.9 \pm 1.8 \pm 3.1$ MeV which we adjust by the π^+ mass and assume $(m_{B^{*0}} - m_{B^0}) = (m_{B^{*+}} - m_{B^+}) = 45.01 \pm 0.30 \pm 0.23$ MeV. The masses inside the square brackets were measured for each candidate event.

NODE=M244DM+;LINKAGE=A

[2] AALTONEN 14I reports $m_{B_1(5721)^+} - m_{B^{*0}} - m_{\pi^+} = 262 \pm 3^{+1}_{-3}$ MeV which we adjusted by the π^+ mass.

NODE=M244DM+;LINKAGE=AA

$B_1(5721)^0$ mass

NODE=M244M0

OUR FIT uses mass differences measurements listed below to determine the mass $m_{B_1(5721)^0}$.

NODE=M244M0

NODE=M244M0

VALUE (MeV)	DOCUMENT ID
5726.1 ± 1.3 OUR FIT Error includes scale factor of 1.2.	

$m_{B_1^0} - m_{B^+}$

NODE=M244DM0
NODE=M244DM0

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
446.7 ± 1.3 OUR FIT Error includes scale factor of 1.2.			
$441.5 \pm 2.4 \pm 1.3$	[1] ABAZOV	07T D0	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$446.2^{+1.9}_{-2.1}{}^{+1.0}_{-1.2}$	[1] AALTONEN	09D CDF	Repl. by AALTONEN 14I

[1] Observed in $B_1^0 \to B^{*+}\pi^-$.

NODE=M244DM0;LINKAGE=AA

$m_{B_1^0} - m_{B^{*+}}$

NODE=M244DM1
NODE=M244DM1

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
401.4 ± 1.2 OUR FIT Error includes scale factor of 1.2.				
402.8 ± 1.1 OUR AVERAGE				
$403.4 \pm 0.7 \pm 1.5$	35k	[1] AAIJ	15AB LHCB	pp at 7, 8 TeV
$402.3 \pm 0.9^{+1.1}_{-1.2}$		[2] AALTONEN	14I CDF	$p\overline{p}$ at 1.96 TeV

[1] AAIJ 15AB reports $[m_{B_1^0} - m_{B^+}] - (m_{B^{*+}} - m_{B^+}) - m_{\pi^-} = 263.9 \pm 0.7 \pm 1.4$ MeV which we adjust by the π^- mass and $(m_{B^{*+}} - m_{B^+}) = 45.01 \pm 0.30 \pm 0.23$ MeV. The masses inside the square brackets were measured for each candidate event.

NODE=M244DM1;LINKAGE=B

[2] AALTONEN 14I reports $m_{B_1(5721)^0} - m_{B^{*+}} - m_{\pi^-} = 262.7 \pm 0.9^{+1.1}_{-1.2}$ MeV which we adjusted by the π^- mass.

NODE=M244DM1;LINKAGE=AA

$B_1(5721)$ WIDTH

NODE=M244210

$B_1(5721)^+$ width

NODE=M244W+
NODE=M244W+

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
31 ± 6 OUR AVERAGE Error includes scale factor of 1.1.					
29.1 ± 3.6 ± 4.3	8k	AAIJ	15AB	LHCB	pp at 7, 8 TeV
$49\ ^{+12}_{-10}\ ^{+2}_{-13}$		AALTONEN	14I	CDF	$p\overline{p}$ at 1.96 TeV

$B_1(5721)^0$ width

NODE=M244W0
NODE=M244W0

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
27.5±3.4 OUR AVERAGE Error includes scale factor of 1.1.					
30.1±1.5±3.5	35k	AAIJ	15AB	LHCB	pp at 7, 8 TeV
23 ±3 ±4		AALTONEN	14I	CDF	$p\overline{p}$ at 1.96 TeV

$B_1(5721)$ DECAY MODES

NODE=M244215;NODE=M244

	Mode	Fraction (Γ_i/Γ)
Γ_1	$B^*\pi$	seen

DESIG=1

$\Gamma(B^*\pi)/\Gamma_{total}$ Γ_1/Γ

NODE=M244R01
NODE=M244R01

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
seen	AAIJ	15AB	LHCB	±0	pp at 7, 8 TeV
seen	AALTONEN	14I	CDF	±	$p\overline{p}$ at 1.96 TeV
seen	AALTONEN	09D	CDF	0	$p\overline{p}$ at 1.96 TeV
seen	[1] ABAZOV	07T	D0	0	$p\overline{p}$ at 1.96 TeV

OCCUR=2

[1] Observed in $B_1^0 \rightarrow B^{*+}\pi^-$ with $B^{*+} \rightarrow B^+\gamma$ and $B^+ \rightarrow J/\psi\pi^+$.

NODE=M244R01;LINKAGE=AB

$B_1(5721)$ REFERENCES

NODE=M244

AAIJ	15AB	JHEP 1504 024	R. Aaij *et al.*	(LHCb Collab.)
AALTONEN	14I	PR D90 012013	T. Aaltonen *et al.*	(CDF Collab.)
AALTONEN	09D	PRL 102 102003	T. Aaltonen *et al.*	(CDF Collab.)
ABAZOV	07T	PRL 99 172001	V.M. Abazov *et al.*	(D0 Collab.)

REFID=56628
REFID=56029
REFID=52700
REFID=52014

NODE=M151

$B_J^*(5732)$

$I(J^P) = ?(?^?)$
I, J, P need confirmation.

OMITTED FROM SUMMARY TABLE
also known as B^{**}

Quantum numbers shown are quark-model predictions. Signal can be interpreted as stemming from several narrow and broad resonances.

NODE=M151

$B_J^*(5732)$ MASS

NODE=M151M

NODE=M151M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
5698± 8 OUR AVERAGE Error includes scale factor of 1.2.					
5710±20		[1] AFFOLDER	01F	CDF	$p\overline{p}$ at 1.8 TeV
5695^{+17}_{-19}		[2] BARATE	98L	ALEP	$e^+e^- \rightarrow Z$
5704± 4±10	1944	[3] BUSKULIC	96D	ALEP	E^{ee}_{cm}= 88–94 GeV
5732± 5±20	2157	ABREU	95B	DLPH	E^{ee}_{cm}= 88–94 GeV
5681±11	1738	AKERS	95E	OPAL	E^{ee}_{cm}= 88–94 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
5713± 2		[4] ACCIARRI	99N	L3	$e^+e^- \rightarrow Z$

[1] AFFOLDER 01F uses the reconstructed B meson through semileptonic decay channels. The fraction of light B mesons that are produced at L=1 B^{**} states is measured to be 0.28 ± 0.06 ± 0.03.

NODE=M151M;LINKAGE=MF

[2] BARATE 98L uses fully reconstructed B mesons to search for B^{**} production in the $B\pi^\pm$ system. In the framework of heavy quark symmetry (HQS), they also measured the mass of B_2^* to be $5739^{+8}_{-11}{}^{+6}_{-4}$ MeV/c^2 and the relative production rate of B($b \rightarrow B_2^* \rightarrow B^{(*)}\pi$)/B($b \rightarrow B_{u,d}$) = $(31 \pm 9^{+6}_{-5})$%.

NODE=M151M;LINKAGE=B

[3] Using $m_{B\pi} - m_B$ = 424 ± 4 ± 10 MeV.

NODE=M151M;LINKAGE=A

[4] ACCIARRI 99N uses inclusive reconstructed B mesons to search for B^{**} production in the $B^{(*)}\pi^{\pm}$ system. In the framework of HQET, they measured the mass of B_1^* and B_2^* to be $5670 \pm 10 \pm 13$ MeV and $5768 \pm 5 \pm 6$ with the B($b \to B^{**}$)= $(32 \pm 3 \pm 6) \times 10^{-2}$. They also reported the evidence for the existence of an excited B-meson state or mixture of states in the region 5.9–6.0 GeV. NODE=M151M;LINKAGE=N

B_J^*(5732) WIDTH

NODE=M151W

NODE=M151W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
128±18 OUR AVERAGE					
145±28	2157	ABREU	95B	DLPH	E^{ee}_{cm}= 88–94 GeV
116±24	1738	AKERS	95E	OPAL	E^{ee}_{cm}= 88–94 GeV

B_J^*(5732) DECAY MODES

NODE=M151215;NODE=M151

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$B^*\pi + B\pi$	seen	DESIG=1;OUR EST;→ UNCHECKED ←
Γ_2	$B^*\pi$(X)	[a] (85±29) %	DESIG=2

[a] X refers to decay modes with or without additional accompanying decay particles. LINKAGE=151

B_J^*(5732) BRANCHING RATIOS

NODE=M151220

X refers to decay modes with or without additional accompanying decay particles. NODE=M151220

$\Gamma(B^*\pi(X))/\Gamma_{total}$ Γ_2/Γ

NODE=M151R1

NODE=M151R1

VALUE	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.85^{+0.26}_{-0.27} \pm 0.12}$	ABBIENDI	02E	OPAL	$e^+ e^- \to Z$

B_J^*(5732) REFERENCES

NODE=M151

ABBIENDI	02E	EPJ C23 437	G. Abbiendi *et al.*	(OPAL Collab.)	REFID=48742
AFFOLDER	01F	PR D64 072002	T. Affolder *et al.*	(CDF Collab.)	REFID=48369
ACCIARRI	99N	PL B465 323	M. Acciarri *et al.*	(L3 Collab.)	REFID=47247
BARATE	98L	PL B425 215	R. Barate *et al.*	(ALEPH Collab.)	REFID=46082
BUSKULIC	96D	ZPHY C69 393	D. Buskulic *et al.*	(ALEPH Collab.)	REFID=44677
ABREU	95B	PL B345 598	P. Abreu *et al.*	(DELPHI Collab.)	REFID=44131
AKERS	95E	ZPHY C66 19	R. Akers *et al.*	(OPAL Collab.)	REFID=44182

NODE=M245

$B_2^*(5747)$

$I(J^P) = \frac{1}{2}(2^+)$
I, J, P need confirmation.

Quantum numbers shown are quark-model predictions.

NODE=M245

$B_2^*(5747)$ MASS

NODE=M245205

$B_2^*(5747)^+$ mass

NODE=M245M+

OUR FIT uses m_{B^0} and $m_{B_2^{*+}} - m_{B^0}$ to determine $m_{B_2^*(5747)^+}$.

NODE=M245M+
NODE=M245M+

VALUE (MeV)	DOCUMENT ID
5737.2±0.7 OUR FIT	

$m_{B_2^{*+}} - m_{B^0}$

NODE=M245DM+
NODE=M245DM+

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
457.5 ±0.7 OUR FIT				
457.5 ±0.7 OUR AVERAGE				
457.62±0.72±0.40	4k	[1] AAIJ 15AB	LHCB	pp at 7, 8 TeV
457.3 ±1.3 $^{+0.3}_{-0.9}$		[2] AALTONEN 14I	CDF	$p\overline{p}$ at 1.96 TeV

[1] AAIJ 15AB reports $[m_{B_2^{*+}} - m_{B^0}] - m_{\pi^+} = 318.1 \pm 0.7 \pm 0.4$ MeV which we adjust by the π^+ mass. The masses inside the square brackets were measured for each candidate event.

NODE=M245DM+;LINKAGE=B

[2] AALTONEN 14I reports $m_{B_2^*(5747)^+} - m_{B^0} - m_{\pi^+} = 317.7 \pm 1.2^{+0.3}_{-0.9}$ MeV which we adjusted by the π^+ mass.

NODE=M245DM+;LINKAGE=A

$B_2^*(5747)^0$ mass

NODE=M245M0

OUR FIT uses m_{B^+}, $m_{B_1^0} - m_{B^+}$, and mass differences below to determine $m_{B_2^*(5747)^0}$. The −0.659 correlation between statistical uncertainties of $m_{B_1^0} - m_{B^+}$ and $m_{B_2^{*0}} - m_{B_1^0}$ measurements reported by ABAZOV 07T is taken into account.

NODE=M245M0

NODE=M245M0

VALUE (MeV)	DOCUMENT ID
5739.5±0.7 OUR FIT Error includes scale factor of 1.4.	

$m_{B_2^{*0}} - m_{B_1^0}$

NODE=M245DM0
NODE=M245DM0

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
13.4±1.4 OUR FIT Error includes scale factor of 1.3.			
26.2±3.1±0.9	[1] ABAZOV 07T	D0	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$14.9^{+2.2}_{-2.5}{}^{+1.2}_{-1.4}$	[1] AALTONEN 09D	CDF	Repl. by AALTONEN 14I

[1] Observed in $B_2^{*0} \to B^{*+}\pi^-$ and $B_2^{*0} \to B^+\pi^-$.

NODE=M245DM0;LINKAGE=AB

$m_{B_2^{*0}} - m_{B^+}$

NODE=M245DM2
NODE=M245DM2

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
460.2 ±0.6 OUR FIT Error includes scale factor of 1.4.				
459.9 ±0.8 OUR AVERAGE Error includes scale factor of 1.8.				
460.18±0.37±0.33	17k	[1] AAIJ 15AB	LHCB	pp at 7, 8 TeV
457.5 ±1.2 $^{+0.8}_{-0.9}$		[2] AALTONEN 14I	CDF	$p\overline{p}$ at 1.96 TeV

[1] AAIJ 15AB reports $[m_{B_2^{*0}} - m_{B^+}] - m_{\pi^-} = 320.6 \pm 0.4 \pm 0.3$ MeV which we adjust by the π^- mass. The masses inside the square brackets were measured for each candidate event.

NODE=M245DM2;LINKAGE=A

[2] AALTONEN 14I reports $m_{B_2^*(5747)^0} - m_{B^+} - m_{\pi^-} = 317.9 \pm 1.2^{+0.8}_{-0.9}$ MeV which we adjusted by the π^- mass.

NODE=M245DM2;LINKAGE=AA

$B_2^*(5747)$ WIDTH

NODE=M245210

$B_2^*(5747)^+$ width

NODE=M245W+
NODE=M245W+

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
20 ±5 OUR AVERAGE Error includes scale factor of 2.2.				
23.6±2.0±2.1	4k	AAIJ 15AB	LHCB	pp at 7, 8 TeV
$11\ ^{+4}_{-3}\ ^{+3}_{-4}$		AALTONEN 14I	CDF	$p\overline{p}$ at 1.96 TeV

$B_2^*(5747)^0$ width

NODE=M245W0
NODE=M245W0

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
24.2±1.7 OUR AVERAGE					
$24.5 \pm 1.0 \pm 1.5$	17k	AAIJ	15AB	LHCB	pp at 7, 8 TeV
$22 \ {}^{+3}_{-2} \ {}^{+4}_{-5}$		AALTONEN	14I	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$22.7 {}^{+3.8}_{-3.2} {}^{+3.2}_{-10.2}$		AALTONEN	09D	CDF	Repl. by AALTONEN 14I

$B_2^*(5747)$ DECAY MODES

NODE=M245215;NODE=M245

	Mode	Fraction (Γ_i/Γ)
Γ_1	$B\pi$	seen
Γ_2	$B^*\pi$	seen

DESIG=1
DESIG=2

$\Gamma(B\pi)/\Gamma_{total}$ — Γ_1/Γ

NODE=M245R01
NODE=M245R01

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
seen	4k,17k	AAIJ	15AB	LHCB	± 0	pp at 7, 8 TeV
seen		AALTONEN	14I	CDF	$\pm$	$p\overline{p}$ at 1.96 TeV
seen		AALTONEN	09D	CDF	0	$p\overline{p}$ at 1.96 TeV
seen		ABAZOV	07T	D0	0	$p\overline{p}$ at 1.96 TeV

$\Gamma(B^*\pi)/\Gamma_{total}$ — Γ_2/Γ

NODE=M245R02
NODE=M245R02

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
seen	4k,17k	AAIJ	15AB	LHCB	± 0	pp at 7, 8 TeV
seen		AALTONEN	09D	CDF	0	$p\overline{p}$ at 1.96 TeV
seen		ABAZOV	07T	D0	0	$p\overline{p}$ at 1.96 TeV

$\Gamma(B^*\pi)/\Gamma(B\pi)$ — Γ_2/Γ_1

NODE=M245R03
NODE=M245R03

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
0.84±0.27 OUR AVERAGE						
$0.71 \pm 0.14 \pm 0.30$	17k	AAIJ	15AB	LHCB	0	pp at 7, 8 TeV
$1.0 \pm 0.5 \pm 0.8$	4k	AAIJ	15AB	LHCB	$\pm$	pp at 7, 8 TeV
$1.10 \pm 0.42 \pm 0.31$		[1] ABAZOV	07T	D0	0	$p\overline{p}$ at 1.96 TeV

OCCUR=2

[1] Converted from measured ratio of R = B($B_2^{*0} \to B^{*+}\pi^-$) / B($B_2^{*0} \to B^{(*)+}\pi^-$) = 0.475 ± 0.095 ± 0.069.

NODE=M245R03;LINKAGE=AB

$B_2^*(5747)$ REFERENCES

NODE=M245

AAIJ	15AB	JHEP 1504 024	R. Aaij *et al.*	(LHCb Collab.)
AALTONEN	14I	PR D90 012013	T. Aaltonen *et al.*	(CDF Collab.)
AALTONEN	09D	PRL 102 102003	T. Aaltonen *et al.*	(CDF Collab.)
ABAZOV	07T	PRL 99 172001	V.M. Abazov *et al.*	(D0 Collab.)

REFID=56628
REFID=56029
REFID=52700
REFID=52014

NODE=M246

$B_J(5840)$

$I(J^P) = \frac{1}{2}(?^?)$
I, J, P need confirmation.

OMITTED FROM SUMMARY TABLE

Quantum numbers shown are quark-model predictions.

NODE=M246

$B_J(5840)$ MASS

NODE=M246205

$B_J(5840)^+$ MASS

NODE=M246M+

OUR FIT uses m_{B^0} and $m_{B_J(5840)^+} - m_{B^0}$ to determine $m_{B_J(5840)^+}$.

NODE=M246M+
NODE=M246M+

VALUE (MeV)	DOCUMENT ID
5851±19 OUR FIT	

$m_{B_J(5840)^+} - m_{B^0}$

NODE=M246DM+
NODE=M246DM+

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
571±19 OUR FIT				
571±13±14	7k	[1] AAIJ 15AB	LHCB	pp at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
595±26±14	7k	[2] AAIJ 15AB	LHCB	pp at 7, 8 TeV

OCCUR=2

[1] AAIJ 15AB reports $[m_{B_J^+} - m_{B^0}] - m_{\pi^+} = 431 \pm 13 \pm 14$ MeV which we adjust by the π^+ mass. The masses inside the square brackets were measured for each candidate event. The result assumes $P = (-1)^J$ and uses two relativistic Breit-Wigner functions in the fit for mass difference.

NODE=M246DM+;LINKAGE=A

[2] AAIJ 15AB reports $[m_{B_J^+} - m_{B^0}] - m_{\pi^+} = 455 \pm 26 \pm 14$ MeV which we adjust by the π^+ mass. The masses inside the square brackets were measured for each candidate event. The result assumes $P = (-1)^J$ and uses three relativistic Breit-Wigner functions in the fit for mass difference.

NODE=M246DM+;LINKAGE=B

$m_{B_J(5840)^+} - m_{B^{*0}}$

NODE=M246DM1
NODE=M246DM1

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
565±15±14	7k	[1] AAIJ 15AB	LHCB	pp at 7, 8 TeV

[1] AAIJ 15AB reports $[m_{B_J^+} - m_{B^0}] - (m_{B^{*+}} - m_{B^+}) - m_{\pi^+} = 425 \pm 15 \pm 14$ MeV which we adjust by the π^+ mass. The masses inside the square brackets were measured for each candidate event. The result assumes $P = -(-1)^J$, $(m_{B^{*0}} - m_{B^0}) = (m_{B^{*+}} - m_{B^+}) = 45.01 \pm 0.30 \pm 0.23$ MeV, and uses three relativistic Breit-Wigner functions in the fit for mass difference.

NODE=M246DM1;LINKAGE=A

$B_J(5840)^0$ MASS

NODE=M246M0

OUR FIT uses m_{B^+} and $m_{B_J(5840)^0} - m_{B^+}$ to determine $m_{B_J(5840)^0}$.

NODE=M246M0
NODE=M246M0

VALUE (MeV)	DOCUMENT ID
5863±9 OUR FIT	

$m_{B_J(5840)^0} - m_{B^+}$

NODE=M246DM0
NODE=M246DM0

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
584± 9 OUR FIT				
584± 5±7	12k	[1] AAIJ 15AB	LHCB	pp at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
610±22±7	12k	[2] AAIJ 15AB	LHCB	pp at 7, 8 TeV

OCCUR=2

[1] AAIJ 15AB reports $[m_{B_J^0} - m_{B^+}] - m_{\pi^-} = 444 \pm 5 \pm 7$ MeV which we adjust by the π^- mass. The masses inside the square brackets were measured for each candidate event. The result assumes $P = (-1)^J$ and uses two relativistic Breit-Wigner functions in the fit for mass difference.

NODE=M246DM0;LINKAGE=A

[2] AAIJ 15AB reports $[m_{B_J^0} - m_{B^+}] - m_{\pi^-} = 471 \pm 22 \pm 7$ MeV which we adjust by the π^- mass. The masses inside the square brackets were measured for each candidate event. The result assumes $P = (-1)^J$ and uses three relativistic Breit-Wigner functions in the fit for mass difference.

NODE=M246DM0;LINKAGE=B

$m_{B_J(5840)^0} - m_{B^{*+}}$

NODE=M246DM2
NODE=M246DM2

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$584\pm5\pm7$	12k	[1] AAIJ 15AB	LHCB	pp at 7, 8 TeV

[1] AAIJ 15AB reports $[m_{B_J^0} - m_{B^+}] - (m_{B^{*+}} - m_{B^+}) - m_{\pi^-} = 444 \pm 5 \pm 7$ MeV which we adjust by the π^- mass. The masses inside the square brackets were measured for each candidate event. The result assumes $P = -(-1)^J$, $(m_{B^{*+}} - m_{B^+}) = 45.01 \pm 0.30 \pm 0.23$ MeV, and uses three relativistic Breit-Wigner functions in the fit for mass difference. NODE=M246DM2;LINKAGE=A

$B_J(5840)$ WIDTH

NODE=M246210

$B_J(5840)^+$ WIDTH

NODE=M246W+
NODE=M246W+

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT	
224±24±80	7k	[1] AAIJ 15AB	LHCB	pp at 7, 8 TeV	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$215\pm27\pm80$	7k	[2] AAIJ 15AB	LHCB	pp at 7, 8 TeV	OCCUR=2
$229\pm27\pm80$	7k	[3] AAIJ 15AB	LHCB	pp at 7, 8 TeV	OCCUR=3

[1] Assuming $P = (-1)^J$ and using two relativistic Breit-Wigner functions in the fit for mass difference. NODE=M246W+;LINKAGE=A

[2] Assuming $P = (-1)^J$ and using three relativistic Breit-Wigner functions in the fit for mass difference. NODE=M246W+;LINKAGE=B

[3] Assuming $P = -(-1)^J$ and using three relativistic Breit-Wigner functions in the fit for mass difference. NODE=M246W+;LINKAGE=C

$B_J(5840)^0$ WIDTH

NODE=M246W0
NODE=M246W0

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT	
127±17±34	12k	[1] AAIJ 15AB	LHCB	pp at 7, 8 TeV	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$107\pm20\pm34$	12k	[2] AAIJ 15AB	LHCB	pp at 7, 8 TeV	OCCUR=2
$119\pm17\pm34$	12k	[3] AAIJ 15AB	LHCB	pp at 7, 8 TeV	OCCUR=3

[1] Assuming $P = (-1)^J$ and using two relativistic Breit-Wigner functions in the fit for mass difference. NODE=M246W0;LINKAGE=A

[2] Assuming $P = (-1)^J$ and using three relativistic Breit-Wigner functions in the fit for mass difference. NODE=M246W0;LINKAGE=B

[3] Assuming $P = -(-1)^J$ and using three relativistic Breit-Wigner functions in the fit for mass difference. NODE=M246W0;LINKAGE=C

$B_J(5840)$ DECAY MODES

NODE=M246215;NODE=M246

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$B^*\pi$	seen	DESIG=1
Γ_2	$B\pi$	possibly seen	DESIG=2

$B_J(5840)$ BRANCHING RATIOS

NODE=M246220

$\Gamma(B^*\pi)/\Gamma_{total}$ Γ_1/Γ

NODE=M246R01
NODE=M246R01

VALUE	EVTS	DOCUMENT ID	TECN	CHG	COMMENT	
seen	7k	AAIJ 15AB	LHCB	$\pm$	pp at 7, 8 TeV	
seen	12k	AAIJ 15AB	LHCB	0	pp at 7, 8 TeV	OCCUR=2

$\Gamma(B\pi)/\Gamma_{total}$ Γ_2/Γ

NODE=M246R02
NODE=M246R02

VALUE	EVTS	DOCUMENT ID	TECN	CHG	COMMENT	
possibly seen	7k	[1] AAIJ 15AB	LHCB	$\pm$	pp at 7, 8 TeV	
possibly seen		[1] AAIJ 15AB	LHCB	0	pp at 7, 8 TeV	OCCUR=2

[1] A $B\pi$ decay is forbidden from a $P = -(-1)^J$ parent, whereas $B^*\pi$ is allowed. NODE=M246R02;LINKAGE=A

$B_J(5840)$ REFERENCES

NODE=M246

AAIJ 15AB JHEP 1504 024 R. Aaij *et al.* (LHCb Collab.) REFID=56628

NODE=M248

$B_J(5970)$

$I(J^P) = \frac{1}{2}(?^?)$
I, J, P need confirmation.

Quantum numbers shown are quark-model predictions.

NODE=M248

$B_J(5970)$ MASS

NODE=M248205

$B_J(5970)^+$ MASS

NODE=M248M+

OUR FIT uses m_{B^0} and $m_{B_J(5970)^+} - m_{B^0}$ to determine $m_{B_J(5970)^+}$.

NODE=M248M+
NODE=M248M+

VALUE (MeV)	DOCUMENT ID
5964±5 OUR FIT	

$m_{B_J(5970)^+} - m_{B^0}$

NODE=M248DM+
NODE=M248DM+

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
685 ±5 OUR FIT				
685 ±5 OUR AVERAGE				
685.3±4.1± 2.5	2k	[1] AAIJ 15AB	LHCB	pp at 7, 8 TeV
681 ±5 ±12	1.4k	[2] AALTONEN 14I	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
686.8±4.5± 2.5	2k	[3] AAIJ 15AB	LHCB	pp at 7, 8 TeV

OCCUR=2

[1] AAIJ 15AB reports $[m_{B_J^+} - m_{B^0}] - m_{\pi^+} = 545.8 \pm 4.1 \pm 2.5$ MeV which we adjust by the π^+ mass. The masses inside the square brackets were measured for each candidate event. The result assumes $P = (-1)^J$ and uses two relativistic Breit-Wigner functions in the fit for mass difference.

NODE=M248DM+;LINKAGE=B

[2] AALTONEN 14I reports $m_{B_J(5970)^+} - m_{B^0} - m_{\pi^+} = 541 \pm 5 \pm 12$ MeV which we adjusted by the π^+ mass.

NODE=M248DM+;LINKAGE=A

[3] AAIJ 15AB reports $[m_{B_J^+} - m_{B^0}] - m_{\pi^+} = 547 \pm 5 \pm 3$ MeV which we adjust by the π^+ mass. The masses inside the square brackets were measured for each candidate event. The result assumes $P = (-1)^J$ and uses three relativistic Breit-Wigner functions in the fit for mass difference.

NODE=M248DM+;LINKAGE=C

$m_{B_J(5970)^+} - m_{B^{*0}}$

NODE=M248DM1
NODE=M248DM1

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
686.0±4.0±2.5	2k	[1] AAIJ 15AB	LHCB	pp at 7, 8 TeV

[1] AAIJ 15AB reports $[m_{B_J^+} - m_{B^0}] - (m_{B^{*+}} - m_{B^+}) - m_{\pi^+} = 547 \pm 4 \pm 3$ MeV which we adjust by the π^+ mass. The masses inside the square brackets were measured for each candidate event. The result assumes $P = -(-1)^J$, $(m_{B^{*0}} - m_{B^0}) = (m_{B^{*+}} - m_{B^+}) = 45.01 \pm 0.30 \pm 0.23$ MeV, and uses three relativistic Breit-Wigner functions in the fit for mass difference.

NODE=M248DM1;LINKAGE=A

$B_J(5970)^0$ MASS

NODE=M248M0

OUR FIT uses m_{B^+} and $m_{B_J(5970)^0} - m_{B^+}$ to determine $m_{B_J(5970)^0}$.

NODE=M248M0
NODE=M248M0

VALUE (MeV)	DOCUMENT ID
5971±5 OUR FIT	

$m_{B_J(5970)^0} - m_{B^+}$

NODE=M248DM0
NODE=M248DM0

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
691 ±5 OUR FIT				
691 ±5 OUR AVERAGE				
689.9±2.9± 5.1	10k	[1] AAIJ 15AB	LHCB	pp at 7, 8 TeV
698 ±5 ±12	2.6k	[2] AALTONEN 14I	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
714.3±6.4± 5.1	10k	[3] AAIJ 15AB	LHCB	pp at 7, 8 TeV

OCCUR=2

[1] AAIJ 15AB reports $[m_{B_J^0} - m_{B^+}] - m_{\pi^-} = 550.4 \pm 2.9 \pm 5.1$ MeV which we adjust by the π^- mass. The masses inside the square brackets were measured for each candidate event. The result assumes $P = (-1)^J$ and uses two relativistic Breit-Wigner functions in the fit for mass difference.

NODE=M248DM0;LINKAGE=B

[2] AALTONEN 14I reports $m_{B_J(5970)^0} - m_{B^+} - m_{\pi^-} = 558 \pm 5 \pm 12$ MeV which we adjusted by the π^- mass.

NODE=M248DM0;LINKAGE=A

[3] AAIJ 15AB reports $[m_{B_J^0} - m_{B^+}] - m_{\pi^-} = 575 \pm 6 \pm 5$ MeV which we adjust by the π^- mass. The masses inside the square brackets were measured for each candidate event. The result assumes $P = (-1)^J$ and uses three relativistic Breit-Wigner functions in the fit for mass difference.

NODE=M248DM0;LINKAGE=C

$m_{B_J(5970)^0} - m_{B^{*+}}$

NODE=M248DM2

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$691.6 \pm 3.7 \pm 5.1$	10k	[1] AAIJ	15AB	LHCB	pp at 7, 8 TeV

[1] AAIJ 15AB reports $[m_{B_J^0} - m_{B^+}] - (m_{B^{*+}} - m_{B^+}) - m_{\pi^-} = 552 \pm 4 \pm 5$ MeV which we adjust by the π^- mass. The masses inside the square brackets were measured for each candidate event. The result assumes $P = -(-1)^J$, $(m_{B^{*+}} - m_{B^+}) = 45.01 \pm 0.30 \pm 0.23$ MeV, and uses three relativistic Breit-Wigner functions in the fit for mass difference. NODE=M248DM2;LINKAGE=A

$B_J(5970)$ WIDTH

NODE=M248210

$B_J(5970)^+$ WIDTH

NODE=M248W+

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
62±20 OUR AVERAGE					
$63 \pm 15 \pm 17$	2k	[1] AAIJ	15AB	LHCB	pp at 7, 8 TeV
$60^{+30}_{-20} \pm 40$	1.4k	AALTONEN	14I	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$61 \pm 14 \pm 17$	2k	[2] AAIJ	15AB	LHCB	pp at 7, 8 TeV (OCCUR=2)
$61 \pm 15 \pm 17$	2k	[3] AAIJ	15AB	LHCB	pp at 7, 8 TeV (OCCUR=3)

[1] Assuming $P = (-1)^J$ and using two relativistic Breit-Wigner functions in the fit for mass difference. NODE=M248W+;LINKAGE=A

[2] Assuming $P = (-1)^J$ and using three relativistic Breit-Wigner functions in the fit for mass difference. NODE=M248W+;LINKAGE=B

[3] Assuming $P = -(-1)^J$ and using three relativistic Breit-Wigner functions in the fit for mass difference. NODE=M248W+;LINKAGE=C

$B_J(5970)^0$ WIDTH

NODE=M248W0

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
81±12 OUR AVERAGE					
$82 \pm 8 \pm 9$	10k	[1] AAIJ	15AB	LHCB	pp at 7, 8 TeV
$70^{+30}_{-20} \pm 30$	2.6k	AALTONEN	14I	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$56 \pm 7 \pm 9$	10k	[2] AAIJ	15AB	LHCB	pp at 7, 8 TeV (OCCUR=2)
$82 \pm 10 \pm 9$	10k	[3] AAIJ	15AB	LHCB	pp at 7, 8 TeV (OCCUR=3)

[1] Assuming $P = (-1)^J$ and using two relativistic Breit-Wigner functions in the fit for mass difference. NODE=M248W0;LINKAGE=A

[2] Assuming $P = (-1)^J$ and using three relativistic Breit-Wigner functions in the fit for mass difference. NODE=M248W0;LINKAGE=B

[3] Assuming $P = -(-1)^J$ and using three relativistic Breit-Wigner functions in the fit for mass difference. NODE=M248W0;LINKAGE=C

$B_J(5970)$ DECAY MODES

NODE=M248215;NODE=M248

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$B\pi$	possibly seen	DESIG=1
Γ_2	$B^*\pi$	seen	DESIG=2

$B_J(5970)$ BRANCHING RATIOS

NODE=M248220

$\Gamma(B\pi)/\Gamma_{total}$ — Γ_1/Γ

NODE=M248R01

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
possibly seen	2k	[1] AAIJ	15AB	LHCB	±	pp at 7, 8 TeV
possibly seen	10k	[1] AAIJ	15AB	LHCB	0	pp at 7, 8 TeV (OCCUR=2)
possibly seen	2.6k	AALTONEN	14I	CDF	0	$p\overline{p}$ at 1.96 TeV
possibly seen	1.4k	AALTONEN	14I	CDF	±	$p\overline{p}$ at 1.96 TeV (OCCUR=2)

[1] A $B\pi$ decay is forbidden from a $P = -(-1)^J$ parent, whereas $B^*\pi$ is allowed. NODE=M248R01;LINKAGE=A

$\Gamma(B^*\pi)/\Gamma_{total}$ — Γ_2/Γ

NODE=M248R02

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
seen	10k	AAIJ	15AB	LHCB	0	pp at 7, 8 TeV
seen	2k	AAIJ	15AB	LHCB	±	pp at 7, 8 TeV (OCCUR=2)
seen	2.6k	AALTONEN	14I	CDF	0	$p\overline{p}$ at 1.96 TeV
seen	1.4k	AALTONEN	14I	CDF	±	$p\overline{p}$ at 1.96 TeV (OCCUR=2)

$B_J(5970)$ REFERENCES

NODE=M248

AAIJ 15AB JHEP 1504 024 R. Aaij *et al.* (LHCb Collab.) REFID=56628
AALTONEN 14I PR D90 012013 T. Aaltonen *et al.* (CDF Collab.) REFID=56029

BOTTOM, STRANGE MESONS ($B = \pm1$, $S = \mp1$)

$B_s^0 = s\overline{b}$, $\overline{B}_s^0 = \overline{s}\,b$, similarly for B_s^*'s

NODE=MXXX046

NODE=MXXX046

NODE=M232

$X(5568)^{\pm}$

$I(J^P) = ?(?^?)$

OMITTED FROM SUMMARY TABLE

Seen as a peak in the $B_s\pi^{\pm}$ mass spectrum with a significance of more than 3σ by ABAZOV 16E and ABAZOV 18A in inclusive $p\overline{p}$ collisions at 1.96 TeV. Not seen by AAIJ 16AI, AABOUD 18L, AALTONEN 18A, and SIRUNYAN 18J. Needs confirmation.

NODE=M232

$X(5568)^{\pm}$ MASS

NODE=M232M

NODE=M232M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
$5566.9^{+3.2+0.6}_{-3.1-1.2}$	278	[1] ABAZOV	18A	D0	$p\overline{p} \to B_s^0\pi^{\pm}X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$5567.8\pm2.9^{+0.9}_{-1.9}$	133	[2] ABAZOV	16E	D0	$p\overline{p} \to B_s^0\pi^{\pm}X$

[1] From the combined analysis of $B_s^0 \to J/\psi\phi$ and $B_s^0 \to D_s^{\pm}\mu^{\mp}X$ decays.

NODE=M232M;LINKAGE=B

[2] Assumes $X(5568)^{\pm} \to B_s\pi^{\pm}$ decay. If $X(5568)^{\pm} \to B_s^*\pi^{\pm}$ decay is assumed, the mass shifts upward by 49 MeV.

NODE=M232M;LINKAGE=A

$X(5568)^{\pm}$ WIDTH

NODE=M232W

NODE=M232W

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
$18.6^{+7.9+3.5}_{-6.1-3.8}$	278	[1] ABAZOV	18A	D0	$p\overline{p} \to B_s\pi^{\pm}X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$21.9\pm6.4^{+5.0}_{-2.5}$	133	ABAZOV	16E	D0	$p\overline{p} \to B_s\pi^{\pm}X$

[1] From the combined analysis of $B_s^0 \to J/\psi\phi$ and $B_s^0 \to D_s^{\pm}\mu^{\mp}X$ decays.

NODE=M232W;LINKAGE=B

$X(5568)^{\pm}$ DECAY MODES

NODE=M232215;NODE=M232

	Mode	Fraction (Γ_i/Γ)
Γ_1	$B_s\pi^{\pm}$	seen

DESIG=1

$\Gamma(B_s\pi^{\pm})/\Gamma_{total}$ — Γ_1/Γ

NODE=M232R01
NODE=M232R01

VALUE	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
seen	145	[1] ABAZOV	18A	D0	$p\overline{p} \to B_s^0\pi^{\pm}X$
seen	133	[2] ABAZOV	16E	D0	$p\overline{p} \to B_s^0\pi^{\pm}X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
not seen		[3] AABOUD	18L	ATLS	$pp \to B_s^0\pi^{\pm}X$
not seen		[4] AALTONEN	18A	CDF	$p\overline{p} \to B_s^0\pi^{\pm}X$
not seen		[5] SIRUNYAN	18J	CMS	$pp \to B_s^0\pi^{\pm}X$
not seen		[6] AAIJ	16AI	LHCB	$pp \to B_s^0\pi^{\pm}X$

OCCUR=2

[1] With B_s mesons reconstructed in decays to $D_s^{\pm}\mu^{\mp}X$.

NODE=M232R01;LINKAGE=F

[2] Seen in $p\overline{p}$ collisions at 1.96 TeV at a rate of $(8.6 \pm 1.9 \pm 1.4)\%$ relative to inclusive B_s production in the kinematic region $10 < p_T(B_s) < 30$ GeV/c, with B_s mesons reconstructed in decays to $J/\psi\phi$.An alternative possibility, $X(5568)^{\pm} \to B_s^*\pi^{\pm}$ with a missing γ, could not be ruled out.

NODE=M232R01;LINKAGE=A

[3] Not seen in 24.4 fb^{-1} of pp collision data at $\sqrt{s} = 7$ and 8 TeV with B_s mesons reconstructed in decays to $J/\psi\phi$. An upper limit on the production rate times branching

NODE=M232R01;LINKAGE=E

fraction for $X(5568)^{\pm} \rightarrow B_s \pi^{\pm}$ relative to inclusive B_s production is less than 1.5% at $p_T(B_s) > 10$ GeV/c and less than 1.6% at $p_T(B_s) > 15$ GeV/c at 95% CL.

[4] Not seen in 9.6 fb^{-1} of $p\overline{p}$ collision data at $\sqrt{s} = 1.96$ TeV with B_s mesons reconstructed in decays to $J/\psi\phi$. An upper limit on the production rate times branching fraction for $X(5568)^{\pm} \rightarrow B_s \pi^{\pm}$ relative to inclusive B_s production is less than 6.7% at 95% CL. NODE=M232R01;LINKAGE=D

[5] Not seen in 19.7 fb^{-1} of pp collisions data at $\sqrt{s} = 8$ TeV with B_s mesons reconstructed in decays to $J/\psi\phi$. An upper limit on the production rate times branching fraction for $X(5568)^{\pm} \rightarrow B_s \pi^{\pm}$ relative to inclusive B_s production is less than 1.1% at $p_T(B_s) > 10$ GeV/c and less than 1.0% at $p_T(B_s) > 15$ GeV/c at 95%CL. NODE=M232R01;LINKAGE=C

[6] Not seen in 3 fb^{-1} of pp collision data at $\sqrt{s} = 7$ and 8 TeV in a scan over the $X(5568)$ mass and width, with B_s mesons reconstructed in decays to $D_s^- \pi^+$ or $J/\psi\phi$. An upper limit on the production rate times branching fraction for $X(5568)^{\pm} \rightarrow B_s \pi^{\pm}$ relative to inclusive B_s production is less than 2.1% at $p_T(B_s) > 10$ GeV/c at 90% CL. NODE=M232R01;LINKAGE=B

$X(5568)^{\pm}$ REFERENCES

NODE=M232

AABOUD	18L	PRL 120 202007	M. Aaboud *et al.*	(ATLAS Collab.)	REFID=58829
AALTONEN	18A	PRL 120 202006	T. Aaltonen *et al.*	(CDF Collab.)	REFID=58828
ABAZOV	18A	PR D97 092004	V.M. Abazov *et al.*	(D0 Collab.)	REFID=58937
SIRUNYAN	18J	PRL 120 202005	A.M. Sirunyan *et al.*	(CMS Collab.)	REFID=58827
AAIJ	16AI	PRL 117 152003	R. Aaij *et al.*	(LHCb Collab.)	REFID=57549
ABAZOV	16E	PRL 117 022003	V.M. Abazov *et al.*	(D0 Collab.)	REFID=57453

NODE=M187

$B_{s1}(5830)^0$

$I(J^P) = 0(1^+)$
I, J, P need confirmation.

Quantum numbers shown are quark-model predictions. NODE=M187

$B_{s1}(5830)^0$ MASS

NODE=M187M

NODE=M187M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
5828.70±0.20 OUR FIT				
5828.65±0.24 OUR AVERAGE				
5828.78±0.09±0.29	SIRUNYAN	18DF	CMS	pp at 8 TeV
5828.40±0.04±0.41	[1] AAIJ	13O	LHCB	pp at 7 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
5829.4 ±0.7	[2] AALTONEN	08K	CDF	Repl. by AALTONEN 14I

[1] Uses $B_{s1}(5830)^0 \rightarrow B^{*+} K^-$ decay. NODE=M187M;LINKAGE=AI

[2] Uses two-body decays into K^- and B^+ mesons reconstructed as $B^+ \rightarrow J/\psi K^+$, $J/\psi \rightarrow \mu^+\mu^-$ or $B^+ \rightarrow \overline{D}^0 \pi^+$, $\overline{D}^0 \rightarrow K^+\pi^-$. NODE=M187M;LINKAGE=AA

$m_{B_{s1}^0} - m_{B^{*+}}$

NODE=M187DM

NODE=M187DM

NEW

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
503.99±0.17 OUR FIT				
[504.00 ± 0.17 MeV OUR 2021 FIT]				
504.03±0.12±0.15	[1] AALTONEN	14I	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
504.41±0.21±0.14	[2] AALTONEN	08K	CDF	Repl. by AALTONEN 14I

[1] AALTONEN 14I reports $m_{B_{s1}(5830)^0} - m_{B^{*+}} - m_{K^-} = 10.35 \pm 0.12 \pm 0.15$ MeV which we adjusted by the K^- mass. NODE=M187DM;LINKAGE=AL

[2] Uses two-body decays into K^- and B^+ mesons reconstructed as $B^+ \rightarrow J/\psi K^+$, $J/\psi \rightarrow \mu^+\mu^-$ or $B^+ \rightarrow \overline{D}^0 \pi^+$, $\overline{D}^0 \rightarrow K^+\pi^-$. NODE=M187DM;LINKAGE=AA

$B_{s1}(5830)^0$ WIDTH

NODE=M187W

NODE=M187W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
0.5±0.3±0.3	AALTONEN	14I	CDF	$p\overline{p}$ at 1.96 TeV

$B_{s1}(5830)^0$ DECAY MODES

NODE=M187215;NODE=M187

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$B^{*+} K^-$	seen	DESIG=1
Γ_2	$B^{*0} K_S^0$		DESIG=2

$B_{s1}(5830)^0$ BRANCHING RATIOS

NODE=M187220

$\Gamma(B^{*+}K^-)/\Gamma_{total}$ — Γ_1/Γ

NODE=M187R01

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AALTONEN	08K	CDF	$p\overline{p}$ at 1.96 TeV

$\Gamma(B^{*0}K^0_S)/\Gamma(B^{*+}K^-)$ — Γ_2/Γ_1

NODE=M187R00

VALUE	DOCUMENT ID		TECN	COMMENT
0.49±0.12±0.07	[1] SIRUNYAN	18DF	CMS	pp at 8 TeV

[1] With the branching fractions B($B^+ \to J/\psi K^+$) = $(1.026 \pm 0.031) \times 10^{-3}$ and B($B^0 \to J/\psi K^{*0}$) = $(1.28 \pm 0.05) \times 10^{-3}$.

NODE=M187R00;LINKAGE=A

$B_{s1}(5830)^0$ REFERENCES

NODE=M187

SIRUNYAN	18DF	EPJ C78 939	A.M. Sirunyan *et al.*	(CMS Collab.)
AALTONEN	14I	PR D90 012013	T. Aaltonen *et al.*	(CDF Collab.)
AAIJ	13O	PRL 110 151803	R. Aaij *et al.*	(LHCb Collab.)
AALTONEN	08K	PRL 100 082001	T. Aaltonen *et al.*	(CDF Collab.)

REFID=59328
REFID=56029
REFID=54968
REFID=52235

NODE=M186

$B^*_{s2}(5840)^0$

$I(J^P) = 0(2^+)$
I, J, P need confirmation.

Quantum numbers shown are quark-model predictions.

NODE=M186

$B^*_{s2}(5840)^0$ MASS

NODE=M186M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
5839.86±0.12 OUR FIT				
5839.92±0.14 OUR AVERAGE				
5839.86±0.09±0.17	SIRUNYAN	18DF	CMS	pp at 8 TeV
5839.99±0.05±0.20	AAIJ	13O	LHCB	pp at 7 TeV
5839.6 ±1.1 ±0.7	[1] ABAZOV	08E	D0	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
5839.7 ±0.7	[2] AALTONEN	08K	CDF	Repl. by AALTONEN 14I

[1] Observed in $B^{*0}_{s2} \to B^+K^-$. Measured production rate of B^{*0}_{s2} relative to B^+ to be $(1.15 \pm 0.23 \pm 0.13)$%.

NODE=M186M;LINKAGE=AB

[2] Uses two-body decays into K^- and B^+ mesons reconstructed as $B^+ \to J/\psi K^+$, $J/\psi \to \mu^+\mu^-$ or $B^+ \to \overline{D}^0\pi^+$, $\overline{D}^0 \to K^+\pi^-$.

NODE=M186M;LINKAGE=AA

$m_{B^{*0}_{s2}} - m_{B^0_{s1}}$

NODE=M186DM

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
10.5±0.6	[1] AALTONEN	08K	CDF	Repl. by AALTONEN 14I

[1] Uses two-body decays into K^- and B^+ mesons reconstructed as $B^+ \to J/\psi K^+$, $J/\psi \to \mu^+\mu^-$ or $B^+ \to \overline{D}^0\pi^+$, $\overline{D}^0 \to K^+\pi^-$.

NODE=M186DM;LINKAGE=AA

$m_{B^{*0}_{s2}} - m_{B^+}$

NODE=M186DM2

NEW

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
560.51±0.14 OUR FIT				
[560.52 ± 0.14 MeV OUR 2021 FIT]				
560.41±0.13±0.14	[1] AALTONEN	14I	CDF	$p\overline{p}$ at 1.96 TeV

[1] AALTONEN 14I reports $m_{B_{s2}(5840)^0} - m_{B^+} - m_{K^-} = 66.73 \pm 0.13 \pm 0.14$ MeV which we adjusted by the K^- mass.

NODE=M186DM2;LINKAGE=AL

$B^*_{s2}(5840)^0$ WIDTH

NODE=M186W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1.49±0.27 OUR AVERAGE				
1.52±0.34±0.30	SIRUNYAN	18DF	CMS	pp at 8 TeV
1.4 ±0.4 ±0.2	AALTONEN	14I	CDF	$p\overline{p}$ at 1.96 TeV
1.56±0.13±0.47	[1] AAIJ	13O	LHCB	pp at 7 TeV

[1] Uses $B^*_{s2}(5840)^0 \to B^{*+}K^-$ decays.

NODE=M186W;LINKAGE=AI

NODE=M186215;NODE=M186

$B^*_{s2}(5840)^0$ DECAY MODES

NODE=M186

Branching fractions are given relative to the one **DEFINED AS 1**.

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$B^+ K^-$	**DEFINED AS 1**	DESIG=1
Γ_2	$B^{*+} K^-$	0.093 ± 0.018	DESIG=2
Γ_3	$B^0 K^0_S$	0.43 ± 0.11	DESIG=4
Γ_4	$B^{*0} K^0_S$	0.04 ± 0.04	DESIG=3

$B^*_{s2}(5840)^0$ BRANCHING RATIOS

NODE=M186220

$\Gamma(B^+ K^-)/\Gamma_{total}$ — Γ_1/Γ

NODE=M186R01
NODE=M186R01

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AALTONEN	08K	CDF	$p\overline{p}$ at 1.96 TeV
seen	[1] ABAZOV	08E	D0	$p\overline{p}$ at 1.96 TeV

[1] Measured production rate of B^{*0}_{s2} relative to B^+ to be $(1.15 \pm 0.23 \pm 0.13)\%$.

NODE=M186R01;LINKAGE=AB

$\Gamma(B^{*+} K^-)/\Gamma(B^+ K^-)$ — Γ_2/Γ_1

NODE=M186R02
NODE=M186R02

VALUE	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.093 \pm 0.013 \pm 0.012}$	AAIJ	13O	LHCB	pp at 7 TeV

$\Gamma(B^{*0} K^0_S)/\Gamma(B^0 K^0_S)$ — Γ_4/Γ_3

NODE=M186R00
NODE=M186R00

VALUE	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.093 \pm 0.086 \pm 0.014}$	[1] SIRUNYAN	18DF	CMS	pp at 8 TeV

[1] With the branching fraction $B(B^0 \rightarrow J/\psi K^{*0}) = (1.28 \pm 0.05) \times 10^{-3}$.

NODE=M186R00;LINKAGE=A

$\Gamma(B^0 K^0_S)/\Gamma(B^+ K^-)$ — Γ_3/Γ_1

NODE=M186R03
NODE=M186R03

VALUE	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.432 \pm 0.077 \pm 0.078}$	[1] SIRUNYAN	18DF	CMS	pp at 8 TeV

[1] With the branching fractions $B(B^+ \rightarrow J/\psi K^+) = (1.026 \pm 0.031) \times 10^{-3}$ and $B(B^0 \rightarrow J/\psi K^{*0}) = (1.28 \pm 0.05) \times 10^{-3}$.

NODE=M186R03;LINKAGE=A

$\Gamma(B^{*+} K^-)/\Gamma(B^+ K^-)$ — Γ_2/Γ_1

NODE=M186R04
NODE=M186R04

VALUE	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.081 \pm 0.021 \pm 0.015}$	[1] SIRUNYAN	18DF	CMS	pp at 8 TeV

[1] With the branching fraction $B(B^+ \rightarrow J/\psi K^+) = (1.026 \pm 0.031) \times 10^{-3}$.

NODE=M186R04;LINKAGE=A

$B^*_{s2}(5840)^0$ REFERENCES

NODE=M186

SIRUNYAN	18DF	EPJ C78 939	A.M. Sirunyan *et al.*	(CMS Collab.)	REFID=59328
AALTONEN	14I	PR D90 012013	T. Aaltonen *et al.*	(CDF Collab.)	REFID=56029
AAIJ	13O	PRL 110 151803	R. Aaij *et al.*	(LHCb Collab.)	REFID=54968
AALTONEN	08K	PRL 100 082001	T. Aaltonen *et al.*	(CDF Collab.)	REFID=52235
ABAZOV	08E	PRL 100 082002	V.M. Abazov *et al.*	(D0 Collab.)	REFID=52232

NODE=M153

$B^*_{sJ}(5850)$

$I(J^P) = ?(?^?)$
I, J, P need confirmation.

OMITTED FROM SUMMARY TABLE

Signal can be interpreted as coming from $\overline{b}s$ states. Needs confirmation.

NODE=M153

$B^*_{sJ}(5850)$ MASS

NODE=M153M

NODE=M153M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{5853 \pm 15}$	141	AKERS	95E	OPAL	$E^{ee}_{cm} = 88\text{–}94$ GeV

$B^*_{sJ}(5850)$ WIDTH

NODE=M153W

NODE=M153W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{47 \pm 22}$	141	AKERS	95E	OPAL	$E^{ee}_{cm} = 88\text{–}94$ GeV

$B^*_{sJ}(5850)$ REFERENCES

NODE=M153

AKERS 95E ZPHY C66 19 R. Akers *et al.* (OPAL Collab.) REFID=44182

NODE=M257

$B_{sJ}(6063)^0$

$I(J^P) = 0(?^?)$

OMITTED FROM SUMMARY TABLE

$B_{sJ}(6063)^0$ MASS

NODE=M257M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
6063.5±1.2±0.8	[1] AAIJ	21D	LHCB	pp at 7, 8, 13 TeV

[1] Seen in the decay channel $B^{\pm} K^{\mp}$. Integrated luminosity = 9 fb^{-1}.

NODE=M257M;LINKAGE=A

$B_{sJ}(6063)^0$ WIDTH

NODE=M257W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
26±4±4	[1] AAIJ	21D	LHCB	pp at 7, 8, 13 TeV

[1] Seen in the decay channel $B^{\pm} K^{\mp}$. Integrated luminosity = 9 fb^{-1}.

NODE=M257W;LINKAGE=A

$B_{sJ}(6063)^0$ DECAY MODES

NODE=M257215;NODE=M257

	Mode	Fraction (Γ_i/Γ)
Γ_1	$B^+ K^-$	seen

DESIG=1

$\Gamma(B^+ K^-)/\Gamma_{total}$ Γ_1/Γ

NODE=M257R01

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AAIJ	21D	LHCB	$B^{\pm} K^{\mp}$ mass spectrum

$B_{sJ}(6063)^0$ REFERENCES

NODE=M257

AAIJ 21D EPJ C81 601 R. Aaij *et al.* (LHCb Collab.)

REFID=61130

NODE=M258

$B_{sJ}(6114)^0$

$I(J^P) = 0(?^?)$

OMITTED FROM SUMMARY TABLE

$B_{sJ}(6114)^0$ MASS

NODE=M258M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
6114±3±5	[1] AAIJ	21D	LHCB	pp at 7, 8, 13 TeV

[1] Seen in the decay channel $B^{\pm} K^{\mp}$. Integrated luminosity = 9 fb^{-1}.

NODE=M258M;LINKAGE=A

$B_{sJ}(6114)^0$ WIDTH

NODE=M258W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
66±18±21	[1] AAIJ	21D	LHCB	pp at 7, 8, 13 TeV

[1] Seen in the decay channel $B^{\pm} K^{\mp}$. Integrated luminosity = 9 fb^{-1}.

NODE=M258W;LINKAGE=B

$B_{sJ}(6114)^0$ DECAY MODES

NODE=M258215;NODE=M258

	Mode	Fraction (Γ_i/Γ)
Γ_1	$B^+ K^-$	seen

DESIG=1

$\Gamma(B^+ K^-)/\Gamma_{total}$ Γ_1/Γ

NODE=M258R01

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AAIJ	21D	LHCB	$B^{\pm} K^{\mp}$ mass spectrum

$B_{sJ}(6114)^0$ REFERENCES

NODE=M258

AAIJ 21D EPJ C81 601 R. Aaij *et al.* (LHCb Collab.)

REFID=61130

BOTTOM, CHARMED MESONS ($B = C = \pm1$)

NODE=MXXX049

$B_c^+ = c\overline{b}$, $B_c^- = \overline{c}\,b$, similarly for B_c^*'s

NODE=MXXX049

NODE=M217

$B_c(2S)^\pm$

$I(J^P) = 0(0^-)$

Quantum numbers neither measured nor confirmed.

NODE=M217

$B_c(2S)^\pm$ MASS

NODE=M217M

NODE=M217M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
6871.2±1.0 OUR AVERAGE					
6871.7±1.3±0.3	24	[1,2] AAIJ	19Y	LHCB	pp at 7, 8, 13 TeV
6870.6±1.4±0.3	51	[3,4] SIRUNYAN	19M	CMS	pp at 13 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
not seen		[5] AAIJ	18AL	LHCB	pp at 8 TeV
6842 ±4 ±5	57	[6,7] AAD	14AQ	ATLS	pp at 7, 8 TeV

SYCLP=A
SYCLP=A

[1] AAIJ 19Y observed $B_c(2S)^+$ in the decay mode $B_c(2S)^+ \to B_c^+\pi^+\pi^-$ ($B_c^+ \to J/\psi\pi^+$) with 2.2 (3.2) global (local) standard deviations significance.

NODE=M217M;LINKAGE=E

[2] AAIJ 19Y reports mass difference measurement of M($B_c(2S)^+$) − M(B_c^+) = 597.2 ± 1.3 ± 0.1 MeV. We have adjusted this measurement with our best value of M(B_c^+) = 6274.47 ± 0.32 MeV. The first uncertainty of the M($B_c(2S)^+$) value is a total of uncertainties reported by the experiment and the second one comes from our best value of M(B_c^+).

NODE=M217M;LINKAGE=F

[3] SIRUNYAN 19M observed $B_c(2S)^+$ in the decay mode $B_c(2S)^+ \to B_c^+\pi^+\pi^-$ ($B_c^+ \to J/\psi\pi^+$) with 6.5 standard deviations significance.

NODE=M217M;LINKAGE=B

[4] SIRUNYAN 19M reports mass difference measurement of M($B_c(2S)^+$) − M(B_c^+) = 596.1 ± 1.2 ± 0.8 MeV. We have adjusted this measurement with our best value of M(B_c^+) = 6274.47 ± 0.32 MeV. The first uncertainty of the M($B_c(2S)^+$) value is a total of uncertainties reported by the experiment and the second one comes from our best value of M(B_c^+).

NODE=M217M;LINKAGE=D

[5] AAIJ 18AL reports an upper limit on the ratio of production cross sections for $[\sigma(B_c(2S)^+)/\sigma(B_c^+)]\cdot B(B_c(2S)^+ \to B_c^+\pi^+\pi^-) < 0.04$–$0.09$ at 95% CL for the mass value reported by AAD 14AQ.

NODE=M217M;LINKAGE=A

[6] Observed in the decay mode $B_c(2S)^+ \to B_c^+\pi^+\pi^-$ ($B_c^+ \to J/\psi\pi^+$) with 5.2 standard deviations significance.

NODE=M217M;LINKAGE=AA

[7] Might be the $B_c^*(2S)$.

NODE=M217M;LINKAGE=C

$B_c(2S)^\pm$ DECAY MODES

NODE=M217215;NODE=M217

	Mode	Fraction (Γ_i/Γ)
Γ_1	$B_c^+\pi^+\pi^-$	seen

DESIG=1

$B_c(2S)^\pm$ BRANCHING RATIOS

NODE=M217225

$\Gamma(B_c^+\pi^+\pi^-)/\Gamma_{\text{total}}$ **Γ_1/Γ**

NODE=M217R01
NODE=M217R01

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	57	[1] AAD	14AQ	ATLS	pp at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
not seen		[2] AAIJ	18AL	LHCB	pp at 8 TeV

[1] Observed with 5.2 standard deviations significance.

NODE=M217R01;LINKAGE=AA

[2] AAIJ 18AL reports an upper limit on the ratio of production cross sections for $[\sigma(B_c(2S)^+)/\sigma(B_c^+)]\cdot B(B_c(2S)^+ \to B_c^+\pi^+\pi^-) < 0.04$–$0.09$ at 95% CL for the mass value reported by AAD 14AQ.

NODE=M217R01;LINKAGE=A

$B_c(2S)^{\pm}$ REFERENCES

NODE=M217

AAIJ	19Y	PRL 122 232001	R. Aaij *et al.*	(LHCb Collab.)	REFID=59795
SIRUNYAN	19M	PRL 122 132001	A.M. Sirunyan *et al.*	(CMS Collab.)	REFID=59639
AAIJ	18AL	JHEP 1801 138	R. Aaij *et al.*	(LHCb Collab.)	REFID=59246
AAD	14AQ	PRL 113 212004	G. Aad *et al.*	(ATLAS Collab.)	REFID=56117

See the related review(s):

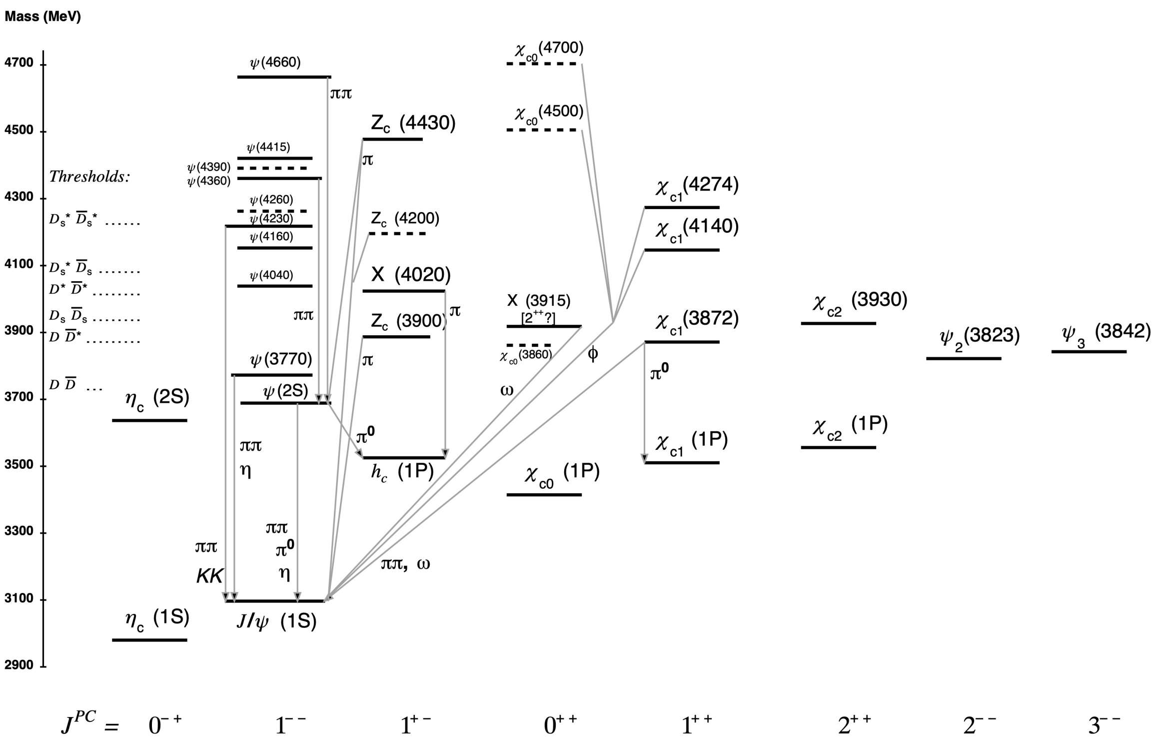
Spectroscopy of Mesons Containing Two Heavy Quarks

$c\overline{c}$ MESONS (including possibly non-$q\overline{q}$ states)

NODE=MXXX025

NODE=M826

Updated July 2021.



The level scheme of meson states containing a minimal quark content of $c\overline{c}$. The name of a state is determined by its quantum numbers $I^G J^{PC}$ (see the review "Naming Scheme for Hadrons"). States with unestablished quantum numbers are called X and are drawn according to our best estimate of their likely J^{PC}. States included in the Summary Tables are shown with solid lines; selected states not in the Summary Tables, but with assigned quantum numbers, are shown with dotted lines. The arrows indicate the most dominant hadronic transitions. Single photon transitions, including $\psi(nS) \to \gamma\eta_c(mS)$, $\psi(nS) \to \gamma\chi_{cJ}(1P)$, and $\chi_{cJ}(1P) \to \gamma J/\psi$, are omitted for clarity. For orientation, the location of the thresholds related to a pair of ground state open charm mesons is indicated in the figure.

NODE=M026

$\eta_c(1S)$ $I^G(J^{PC}) = 0^+(0^{-+})$

$\eta_c(1S)$ MASS

NODE=M026M

NODE=M026M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
2983.9 ± 0.4 OUR AVERAGE		Error includes scale factor of 1.2.				
2983.9 ± 0.7 ± 0.1		[1] AAIJ	20H	LHCB	$pp \to bX \to p\overline{p}X$	
2985.9 ± 0.7 ± 2.1	1705	ABLIKIM	19AV	BES3	$J/\psi \to \gamma\omega\omega$	
2984.6 ± 0.7 ± 2.2	2673	XU	18	BELL	$e^+e^- \to e^+e^-\eta'\pi^+\pi^-$	
2986.7 ± 0.5 ± 0.9	11k	[2] AAIJ	17AD	LHCB	$pp \to B^+X \to p\overline{p}K^+X$	
2982.8 ± 1.0 ± 0.5	6.4k	[3] AAIJ	17BB	LHCB	$pp \to b\overline{b}X \to 2(K^+K^-)X$	
2982.2 ± 1.5 ± 0.1	2.0k	[4] AAIJ	15BI	LHCB	$pp \to \eta_c(1S)X$	
2983.5 ± 1.4 $^{+1.6}_{-3.6}$		[5] ANASHIN	14	KEDR	$J/\psi \to \gamma\eta_c$	
2979.8 ± 0.8 ± 3.5	4.5k	[6,7] LEES	14E	BABR	$\gamma\gamma \to K^+K^-\pi^0$	
2984.1 ± 1.1 ± 2.1	900	[6,7,8] LEES	14E	BABR	$\gamma\gamma \to K^+K^-\eta$	OCCUR=2
2984.3 ± 0.6 ± 0.6		[9,10] ABLIKIM	12F	BES3	$\psi(2S) \to \gamma\eta_c$	
2984.49 ± 1.16 ± 0.52	832	[6] ABLIKIM	12N	BES3	$\psi(2S) \to \pi^0\gamma$ hadrons	
2982.7 ± 1.8 ± 2.2	486	ZHANG	12A	BELL	$e^+e^- \to e^+e^-\eta'\pi^+\pi^-$	
2984.5 ± 0.8 ± 3.1	11k	DEL-AMO-SA...	11M	BABR	$\gamma\gamma \to K^+K^-\pi^+\pi^-\pi^0$	
2985.4 ± 1.5 $^{+0.5}_{-2.0}$	920	[10] VINOKUROVA	11	BELL	$B^\pm \to K^\pm(K^0_S K^\pm\pi^\mp)$	
2982.2 ± 0.4 ± 1.6	14k	[11] LEES	10	BABR	$10.6\ e^+e^- \to e^+e^-K^0_S K^\pm\pi^\mp$	
2985.8 ± 1.5 ± 3.1	0.9k	AUBERT	08AB	BABR	$B \to \eta_c(1S)K^{(*)} \to K\overline{K}\pi K^{(*)}$	
2986.1 ± 1.0 ± 2.5	7.5k	UEHARA	08	BELL	$\gamma\gamma \to \eta_c \to$ hadrons	
2970 ± 5 ± 6	501	[12] ABE	07	BELL	$e^+e^- \to J/\psi(c\overline{c})$	
2971 ± 3 $^{+2}_{-1}$	195	WU	06	BELL	$B^+ \to p\overline{p}K^+$	
2974 ± 7 $^{+2}_{-1}$	20	WU	06	BELL	$B^+ \to \Lambda\overline{\Lambda}K^+$	OCCUR=2
2981.8 ± 1.3 ± 1.5	592	ASNER	04	CLEO	$\gamma\gamma \to \eta_c \to K^0_S K^\pm\pi^\mp$	
2984.1 ± 2.1 ± 1.0	190	[13] AMBROGIANI	03	E835	$\overline{p}p \to \eta_c \to \gamma\gamma$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
2982.5 ± 0.4 ± 1.4	12k	[14] DEL-AMO-SA...	11M	BABR	$\gamma\gamma \to K^0_S K^\pm\pi^\mp$	OCCUR=2
2982.2 ± 0.6		[15] MITCHELL	09	CLEO	$e^+e^- \to \gamma X$	
2982 ± 5	270	[16] AUBERT	06E	BABR	$B^\pm \to K^\pm X_{c\overline{c}}$	
2982.5 ± 1.1 ± 0.9	2.5k	[17] AUBERT	04D	BABR	$\gamma\gamma \to \eta_c(1S) \to K\overline{K}\pi$	
2977.5 ± 1.0 ± 1.2		[15,18] BAI	03	BES	$J/\psi \to \gamma\eta_c$	
2979.6 ± 2.3 ± 1.6	180	[19] FANG	03	BELL	$B \to \eta_c K$	
2976.3 ± 2.3 ± 1.2		[15,20] BAI	00F	BES	$J/\psi,\ \psi(2S) \to \gamma\eta_c$	
2976.6 ± 2.9 ± 1.3	140	[15,21] BAI	00F	BES	$J/\psi \to \gamma\eta_c$	OCCUR=2
2980.4 ± 2.3 ± 0.6		[22] BRANDENB...	00B	CLE2	$\gamma\gamma \to \eta_c \to K^\pm K^0_S\pi^\mp$	
2975.8 ± 3.9 ± 1.2		[21] BAI	99B	BES	Sup. by BAI 00F	
2999 ± 8	25	ABREU	98O	DLPH	$e^+e^- \to e^+e^-$ +hadrons	
2988.3 $^{+3.3}_{-3.1}$		ARMSTRONG	95F	E760	$\overline{p}p \to \gamma\gamma$	
2974.4 ± 1.9		[15,23] BISELLO	91	DM2	$J/\psi \to \eta_c\gamma$	
2969 ± 4 ± 4	80	[15] BAI	90B	MRK3	$J/\psi \to \gamma K^+K^-K^+K^-$	
2956 ±12 ±12		[15] BAI	90B	MRK3	$J/\psi \to \gamma K^+K^-K^0_S K^0_L$	OCCUR=3
2982.6 $^{+2.7}_{-2.3}$	12	BAGLIN	87B	SPEC	$\overline{p}p \to \gamma\gamma$	
2980.2 ± 1.6		[15,23] BALTRUSAIT...	86	MRK3	$J/\psi \to \eta_c\gamma$	

2984 ± 2.3 ± 4.0		[15] GAISER	86	CBAL	$J/\psi \to \gamma X$, $\psi(2S) \to \gamma X$
2976 ± 8		[15,24] BALTRUSAIT...84		MRK3	$J/\psi \to 2\phi\gamma$
2982 ± 8	18	[25] HIMEL	80B	MRK2	$e^+ e^-$
2980 ± 9		[25] PARTRIDGE	80B	CBAL	$e^+ e^-$

[1] AAIJ 20H report $m_{J/\psi} - m_{\eta_c(1S)} = 113.0 \pm 0.7 \pm 0.1$ MeV. We use the current value $m_{J/\psi} = 3096.900 \pm 0.006$ MeV to obtain the quoted mass. NODE=M026M;LINKAGE=H

[2] AAIJ 17AD report $m_{J/\psi} - m_{\eta_c(1S)} = 110.2 \pm 0.5 \pm 0.9$ MeV. We use the current value $m_{J/\psi} = 3096.900 \pm 0.006$ MeV to obtain the quoted mass. NODE=M026M;LINKAGE=F

[3] From a fit of the $\phi\phi$ invariant mass with the mass and width of $\eta_c(1S)$ as free parameters. NODE=M026M;LINKAGE=G

[4] AAIJ 15BI reports $m_{J/\psi} - m_{\eta_c(1S)} = 114.7 \pm 1.5 \pm 0.1$ MeV from a sample of $\eta_c(1S)$ and J/ψ produced in b-hadron decays. We have used current value of $m_{J/\psi} = 3096.900 \pm 0.006$ MeV to arrive at the quoted $m_{\eta_c(1S)}$ result. NODE=M026M;LINKAGE=D

[5] Taking into account an asymmetric photon lineshape. NODE=M026M;LINKAGE=E

[6] With floating width. NODE=M026M;LINKAGE=AL

[7] Ignoring possible interference with the non-resonant 0^- amplitude. NODE=M026M;LINKAGE=LS

[8] Using both, $\eta \to \gamma\gamma$ and $\eta \to \pi^+\pi^-\pi^0$ decays. NODE=M026M;LINKAGE=EL

[9] From a simultaneous fit to six decay modes of the η_c. NODE=M026M;LINKAGE=BL

[10] Accounts for interference with non-resonant continuum. NODE=M026M;LINKAGE=VA

[11] Taking into account interference with the non-resonant $J^P = 0^-$ amplitude. NODE=M026M;LINKAGE=LE

[12] From a fit of the J/ψ recoil mass spectrum. Supersedes ABE,K 02 and ABE 04G. NODE=M026M;LINKAGE=EB

[13] Using mass of $\psi(2S) = 3686.00$ MeV. NODE=M026M;LINKAGE=BG

[14] Not independent from the measurements reported by LEES 10. NODE=M026M;LINKAGE=DE

[15] MITCHELL 09 observes a significant asymmetry in the lineshapes of $\psi(2S) \to \gamma\eta_c$ and $J/\psi \to \gamma\eta_c$ transitions. If ignored, this asymmetry could lead to significant bias whenever the mass and width are measured in $\psi(2S)$ or J/ψ radiative decays. NODE=M026M;LINKAGE=MI

[16] From the fit of the kaon momentum spectrum. Systematic errors not evaluated. NODE=M026M;LINKAGE=AU

[17] Superseded by LEES 10. NODE=M026M;LINKAGE=UB

[18] From a simultaneous fit of five decay modes of the η_c. NODE=M026M;LINKAGE=AK

[19] Superseded by VINOKUROVA 11. NODE=M026M;LINKAGE=FA

[20] Weighted average of the $\psi(2S)$ and $J/\psi(1S)$ samples. Using an η_c width of 13.2 MeV. NODE=M026M;LINKAGE=KZ

[21] Average of several decay modes. Using an η_c width of 13.2 MeV. NODE=M026M;LINKAGE=C1

[22] Superseded by ASNER 04. NODE=M026M;LINKAGE=NN

[23] Average of several decay modes. NODE=M026M;LINKAGE=A

[24] $\eta_c \to \phi\phi$. NODE=M026M;LINKAGE=B

[25] Mass adjusted by us to correspond to $J/\psi(1S)$ mass = 3097 MeV. NODE=M026M;LINKAGE=M

$\eta_c(1S)$ WIDTH

NODE=M026W

NODE=M026W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
32.0± 0.7 OUR FIT					
32.1± 0.8 OUR AVERAGE	Error includes scale factor of 1.1.				
$33.8 \pm 1.6 \pm 4.1$	1705	ABLIKIM	19AV	BES3	$J/\psi \to \gamma\omega\omega$
$30.8^{+2.3}_{-2.2} \pm 2.9$	2673	XU	18	BELL	$e^+e^- \to e^+e^-\eta'\pi^+\pi^-$
$34.0 \pm 1.9 \pm 1.3$	11k	AAIJ	17AD	LHCB	$pp \to B^+X \to p\overline{p}K^+X$
$31.4 \pm 3.5 \pm 2.0$	6.4k	[1] AAIJ	17BB	LHCB	$pp \to b\overline{b}X \to 2(K^+K^-)X$
$27.2 \pm 3.1^{+5.4}_{-2.6}$		[2] ANASHIN	14	KEDR	$J/\psi \to \gamma\eta_c$
$25.2 \pm 2.6 \pm 2.4$	4.5k	[3,4] LEES	14E	BABR	$\gamma\gamma \to K^+K^-\pi^0$
$34.8 \pm 3.1 \pm 4.0$	900	[3,4,5] LEES	14E	BABR	$\gamma\gamma \to K^+K^-\eta$ OCCUR=2
$32.0 \pm 1.2 \pm 1.0$		[6,7] ABLIKIM	12F	BES3	$\psi(2S) \to \gamma\eta_c$
$36.4 \pm 3.2 \pm 1.7$	832	[3] ABLIKIM	12N	BES3	$\psi(2S) \to \pi^0\gamma$ hadrons
$37.8^{+5.8}_{-5.3} \pm 3.1$	486	ZHANG	12A	BELL	$e^+e^- \to e^+e^-\eta'\pi^+\pi^-$
$36.2 \pm 2.8 \pm 3.0$	11k	DEL-AMO-SA...	11M	BABR	$\gamma\gamma \to K^+K^-\pi^+\pi^-\pi^0$
$35.1 \pm 3.1^{+1.0}_{-1.6}$	920	[7] VINOKUROVA	11	BELL	$B^\pm \to K^\pm(K^0_S K^\pm\pi^\mp)$
$31.7 \pm 1.2 \pm 0.8$	14k	[8] LEES	10	BABR	$10.6\ e^+e^- \to e^+e^-K^0_S K^\pm\pi^\mp$
$36.3^{+3.7}_{-3.6} \pm 4.4$	0.9k	AUBERT	08AB	BABR	$B \to \eta_c(1S)K^{(*)} \to K\overline{K}\pi K^{(*)}$
$28.1 \pm 3.2 \pm 2.2$	7.5k	UEHARA	08	BELL	$\gamma\gamma \to \eta_c \to$ hadrons
$48^{+8}_{-7} \pm 5$	195	WU	06	BELL	$B^+ \to p\overline{p}K^+$

40 ±19 ±5	20	WU	06	BELL	$B^+ \to \Lambda\overline{\Lambda}K^+$	OCCUR=2
24.8± 3.4±3.5	592	ASNER	04	CLEO	$\gamma\gamma \to \eta_c \to K^0_S K^\pm \pi^\mp$	
$20.4^{+7.7}_{-6.7}$±2.0	190	AMBROGIANI	03	E835	$\overline{p}p \to \eta_c \to \gamma\gamma$	
$23.9^{+12.6}_{-7.1}$		ARMSTRONG	95F	E760	$\overline{p}p \to \gamma\gamma$	

• • • We do not use the following data for averages, fits, limits, etc. • • •

32.1± 1.1±1.3	12k	[9] DEL-AMO-SA...	11M	BABR	$\gamma\gamma \to K^0_S K^\pm \pi^\mp$	OCCUR=2
34.3± 2.3±0.9	2.5k	[10] AUBERT	04D	BABR	$\gamma\gamma \to \eta_c(1S) \to K\overline{K}\pi$	
17.0± 3.7±7.4		[11] BAI	03	BES	$J/\psi \to \gamma\eta_c$	
29 ± 8 ±6	180	[12] FANG	03	BELL	$B \to \eta_c K$	
11.0± 8.1±4.1		[13] BAI	00F	BES	$J/\psi \to \gamma\eta_c$ and $\psi(2S) \to \gamma\eta_c$	
27.0± 5.8±1.4		[14] BRANDENB...	00B	CLE2	$\gamma\gamma \to \eta_c \to K^\pm K^0_S \pi^\mp$	
$7.0^{+7.5}_{-7.0}$	12	BAGLIN	87B	SPEC	$\overline{p}p \to \gamma\gamma$	
$10.1^{+33.0}_{-8.2}$	23	[15] BALTRUSAIT...	86	MRK3	$J/\psi \to \gamma p\overline{p}$	
11.5± 4.5		GAISER	86	CBAL	$J/\psi \to \gamma X$, $\psi(2S) \to \gamma X$	
< 40 90% CL	18	HIMEL	80B	MRK2	e^+e^-	
< 20 90% CL		PARTRIDGE	80B	CBAL	e^+e^-	

[1] From a fit of the $\phi\phi$ invariant mass with the mass and width of $\eta_c(1S)$ as free parameters. NODE=M026W;LINKAGE=B
[2] Taking into account an asymmetric photon lineshape. NODE=M026W;LINKAGE=A
[3] With floating mass. NODE=M026W;LINKAGE=AL
[4] Ignoring possible interference with the non-resonant 0^- amplitude. NODE=M026W;LINKAGE=LS
[5] Using both, $\eta \to \gamma\gamma$ and $\eta \to \pi^+\pi^-\pi^0$ decays. NODE=M026W;LINKAGE=EL
[6] From a simultaneous fit to six decay modes of the η_c. NODE=M026W;LINKAGE=BL
[7] Accounts for interference with non-resonant continuum. NODE=M026W;LINKAGE=VA
[8] Taking into account interference with the non-resonant $J^P = 0^-$ amplitude. NODE=M026W;LINKAGE=LE
[9] Not independent from the measurements reported by LEES 10. NODE=M026W;LINKAGE=DE
[10] Superseded by LEES 10. NODE=M026W;LINKAGE=UB
[11] From a simultaneous fit of five decay modes of the η_c. NODE=M026W;LINKAGE=AK
[12] Superseded by VINOKUROVA 11. NODE=M026W;LINKAGE=FA
[13] From a fit to the 4-prong invariant mass in $\psi(2S) \to \gamma\eta_c$ and $J/\psi(1S) \to \gamma\eta_c$ decays. NODE=M026W;LINKAGE=KZ
[14] Superseded by ASNER 04. NODE=M026W;LINKAGE=NN
[15] Positive and negative errors correspond to 90% confidence level. NODE=M026W;LINKAGE=L

$\eta_c(1S)$ DECAY MODES

NODE=M026215;NODE=M026

	Mode	Fraction (Γ_i/Γ)	Confidence level	
	Decays involving hadronic resonances			NODE=M026;CLUMP=A
Γ_1	$\eta'(958)\pi\pi$	(4.1 ±1.7) %		DESIG=24
Γ_2	$\eta'(958)K\overline{K}$	(3.5 ±1.5) %		DESIG=85
Γ_3	$\rho\rho$	(1.8 ±0.5) %		DESIG=19
Γ_4	$K^*(892)^0 K^- \pi^+$ + c.c.	(2.0 ±0.7) %		DESIG=26
Γ_5	$K^*(892)\overline{K}^*(892)$	(6.9 ±1.3) $\times 10^{-3}$		DESIG=18
Γ_6	$K^*(892)^0\overline{K}^*(892)^0\pi^+\pi^-$	(1.1 ±0.5) %		DESIG=57
Γ_7	$\phi K^+ K^-$	(2.9 ±1.4) $\times 10^{-3}$		DESIG=28
Γ_8	$\phi\phi$	(1.74±0.19) $\times 10^{-3}$		DESIG=17
Γ_9	$\phi 2(\pi^+\pi^-)$	< 4 $\times 10^{-3}$	90%	DESIG=58
Γ_{10}	$a_0(980)\pi$	seen		DESIG=21
Γ_{11}	$a_2(1320)\pi$	< 2 %	90%	DESIG=22
Γ_{12}	$K^*(892)\overline{K}$ + c.c.	< 1.28 %	90%	DESIG=40
Γ_{13}	$f_2(1270)\eta$	< 1.1 %	90%	DESIG=23
Γ_{14}	$f_2(1270)\eta'$	seen		DESIG=92
Γ_{15}	$\omega\omega$	(2.9 ±0.8) $\times 10^{-3}$		DESIG=20
Γ_{16}	$\omega\phi$	< 2.5 $\times 10^{-4}$	90%	DESIG=47
Γ_{17}	$f_2(1270)f_2(1270)$	(9.8 ±2.5) $\times 10^{-3}$		DESIG=46
Γ_{18}	$f_2(1270)f'_2(1525)$	(9.5 ±3.2) $\times 10^{-3}$		DESIG=59
Γ_{19}	$f_0(500)\eta$	seen		DESIG=86

Γ_{20}	$f_0(500)\eta'$		seen		DESIG=87
Γ_{21}	$f_0(980)\eta$		seen		DESIG=70
Γ_{22}	$f_0(980)\eta'$		seen		DESIG=88
Γ_{23}	$f_0(1500)\eta$		seen		DESIG=71
Γ_{24}	$f_0(1710)\eta'$		seen		DESIG=90
Γ_{25}	$f_0(2100)\eta'$		seen		DESIG=91
Γ_{26}	$f_0(2200)\eta$		seen		DESIG=72
Γ_{27}	$a_0(1320)\pi$		seen		DESIG=74
Γ_{28}	$a_0(1450)\pi$		seen		DESIG=75
Γ_{29}	$a_0(1700)\pi$		seen		DESIG=89
Γ_{30}	$a_0(1950)\pi$		seen		DESIG=79
Γ_{31}	$K_0^*(1430)\overline{K}$		seen		DESIG=76
Γ_{32}	$K_2^*(1430)\overline{K}$		seen		DESIG=77
Γ_{33}	$K_0^*(1950)\overline{K}$		seen		DESIG=78

Decays into stable hadrons

NODE=M026;CLUMP=B

Γ_{34}	$K\overline{K}\pi$		(7.3 ± 0.4) %		DESIG=14
Γ_{35}	$K\overline{K}\eta$		(1.36 ± 0.15) %		DESIG=25
Γ_{36}	$\eta\pi^+\pi^-$		(1.7 ± 0.6) %		DESIG=16
Γ_{37}	$\eta 2(\pi^+\pi^-)$		(4.4 ± 1.6) %		DESIG=61
Γ_{38}	$K^+K^-\pi^+\pi^-$		$(6.6 \pm 1.1) \times 10^{-3}$		DESIG=15
Γ_{39}	$K^+K^-\pi^+\pi^-\pi^0$		(3.5 ± 0.6) %		DESIG=60
Γ_{40}	$K^0K^-\pi^+\pi^-\pi^+$+c.c.		(5.6 ± 1.9) %		DESIG=62
Γ_{41}	$K^+K^-2(\pi^+\pi^-)$		$(7.5 \pm 2.4) \times 10^{-3}$		DESIG=55
Γ_{42}	$2(K^+K^-)$		$(1.43\pm 0.30) \times 10^{-3}$		DESIG=27
Γ_{43}	$\pi^+\pi^-\pi^0$		$< 5 \times 10^{-4}$	90%	DESIG=81
Γ_{44}	$\pi^+\pi^-\pi^0\pi^0$		(4.7 ± 1.4) %		DESIG=63
Γ_{45}	$2(\pi^+\pi^-)$		$(9.1 \pm 1.2) \times 10^{-3}$		DESIG=11
Γ_{46}	$2(\pi^+\pi^-\pi^0)$		(15.8 ± 2.3) %		DESIG=64
Γ_{47}	$3(\pi^+\pi^-)$		(1.7 ± 0.4) %		DESIG=56
Γ_{48}	$p\overline{p}$		$(1.44\pm 0.14) \times 10^{-3}$		DESIG=12
Γ_{49}	$p\overline{p}\pi^0$		$(3.6 \pm 1.5) \times 10^{-3}$		DESIG=65
Γ_{50}	$\Lambda\overline{\Lambda}$		$(1.06\pm 0.23) \times 10^{-3}$		DESIG=45
Γ_{51}	$K^+\overline{p}\Lambda$+ c.c.		$(2.5 \pm 0.4) \times 10^{-3}$		DESIG=82
Γ_{52}	$\overline{\Lambda}(1520)\Lambda$+ c.c.		$(3.1 \pm 1.3) \times 10^{-3}$		DESIG=83
Γ_{53}	$\Sigma^+\overline{\Sigma}^-$		$(2.1 \pm 0.6) \times 10^{-3}$		DESIG=66
Γ_{54}	$\Xi^-\overline{\Xi}^+$		$(9.0 \pm 2.6) \times 10^{-4}$		DESIG=67
Γ_{55}	$\pi^+\pi^-p\overline{p}$		$(5.3 \pm 2.1) \times 10^{-3}$		DESIG=13

Radiative decays

NODE=M026;CLUMP=C

Γ_{56}	$\gamma\gamma$		$(1.61\pm 0.12) \times 10^{-4}$		DESIG=31

Charge conjugation (C), Parity (P), Lepton family number (LF) violating modes

NODE=M026;CLUMP=D

Γ_{57}	$\pi^+\pi^-$	P,CP	$< 1.1 \times 10^{-4}$	90%	DESIG=51
Γ_{58}	$\pi^0\pi^0$	P,CP	$< 4 \times 10^{-5}$	90%	DESIG=52
Γ_{59}	K^+K^-	P,CP	$< 6 \times 10^{-4}$	90%	DESIG=53
Γ_{60}	$K_S^0K_S^0$	P,CP	$< 3.1 \times 10^{-4}$	90%	DESIG=54

CONSTRAINED FIT INFORMATION

An overall fit to the total width, 8 combinations of partial widths obtained from integrated cross section, and 19 branching ratios uses 93 measurements and one constraint to determine 13 parameters. The overall fit has a $\chi^2 = 117.8$ for 81 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\langle \delta p_i \delta p_j \rangle / (\delta p_i \cdot \delta p_j)$, in percent, from the fit to parameters p_i, including the branching fractions, $x_i \equiv \Gamma_i / \Gamma_{total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

	x_5	x_8	x_{17}	x_{34}	x_{35}	x_{38}	x_{42}	x_{45}	x_{48}	x_{50}
x_8	16									
x_{17}	3	5								
x_{34}	18	35	6							
x_{35}	9	17	3	47						
x_{38}	10	18	3	21	10					
x_{42}	7	13	2	21	10	8				
x_{45}	12	22	4	25	12	14	10			
x_{48}	11	20	4	27	13	12	10	15		
x_{50}	3	5	1	6	3	3	2	4	23	
x_{56}	−27	−51	−9	−59	−28	−32	−23	−38	−38	−9
Γ	−1	−3	0	−3	−1	−2	−1	−2	6	1

	x_{56}
Γ	−27

	Mode	Rate (MeV)	
Γ_5	$K^*(892)\overline{K}^*(892)$	0.22 ±0.04	DESIG=18
Γ_8	$\phi\phi$	0.056 ±0.006	DESIG=17
Γ_{17}	$f_2(1270) f_2(1270)$	0.31 ±0.08	DESIG=46
Γ_{34}	$K\overline{K}\pi$	2.32 ±0.14	DESIG=14
Γ_{35}	$K\overline{K}\eta$	0.43 ±0.05	DESIG=25
Γ_{38}	$K^+K^-\pi^+\pi^-$	0.210 ±0.035	DESIG=15
Γ_{42}	$2(K^+K^-)$	0.046 ±0.010	DESIG=27
Γ_{45}	$2(\pi^+\pi^-)$	0.29 ±0.04	DESIG=11
Γ_{48}	$p\overline{p}$	0.046 ±0.005	DESIG=12
Γ_{50}	$\Lambda\overline{\Lambda}$	0.034 ±0.008	DESIG=45
Γ_{56}	$\gamma\gamma$	0.00515±0.00035	DESIG=31

$\eta_c(1S)$ PARTIAL WIDTHS

NODE=M026217

$\Gamma(\gamma\gamma)$ Γ_{56}

NODE=M026W1
NODE=M026W1

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
5.15± 0.35 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
5.8 ± 1.1	486	[1] ZHANG	12A	BELL	$e^+e^- \to e^+e^-\eta'\pi^+\pi^-$
5.2 ± 1.2	273 ± 43	[2,3] AUBERT	06E	BABR	$B^\pm \to K^\pm X_{c\overline{c}}$
5.5 ± 1.2 ± 1.8	157 ± 33	[4] KUO	05	BELL	$\gamma\gamma \to p\overline{p}$
7.4 ± 0.4 ± 2.3		[5] ASNER	04	CLEO	$\gamma\gamma \to \eta_c \to K^0_S K^\pm \pi^\mp$
13.9 ± 2.0 ± 3.0	41	[6] ABDALLAH	03J	DLPH	$\gamma\gamma \to \eta_c$
$3.8\,^{+1.1}_{-1.0}\,^{+1.9}_{-1.0}$	190	[7] AMBROGIANI	03	E835	$\overline{p}p \to \eta_c \to \gamma\gamma$
7.6 ± 0.8 ± 2.3		[5,8] BRANDENB...	00B	CLE2	$\gamma\gamma \to \eta_c \to K^\pm K^0_S \pi^\mp$
6.9 ± 1.7 ± 2.1	76	[9] ACCIARRI	99T	L3	$e^+e^- \to e^+e^-\eta_c$
27 ±16 ±10	5	[5] SHIRAI	98	AMY	58 e^+e^-
$6.7\,^{+2.4}_{-1.7} \pm 2.3$		[4] ARMSTRONG	95F	E760	$\overline{p}p \to \gamma\gamma$

11.3 ± 4.2		[10] ALBRECHT	94H	ARG	$e^+e^- \to e^+e^-\eta_c$
8.0 ± 2.3 ± 2.4	17	[11] ADRIANI	93N	L3	$e^+e^- \to e^+e^-\eta_c$
$5.9\ ^{+2.1}_{-1.8}$ ± 1.9		[7] CHEN	90B	CLEO	$e^+e^- \to e^+e^-\eta_c$
$6.4\ ^{+5.0}_{-3.4}$		[12] AIHARA	88D	TPC	$e^+e^- \to e^+e^-X$
$4.3\ ^{+3.4}_{-3.7}$ ± 2.4		[4] BAGLIN	87B	SPEC	$\overline{p}p \to \gamma\gamma$
28 ±15		[5,13] BERGER	86	PLUT	$\gamma\gamma \to K\overline{K}\pi$

[1] Assuming there is no interference with the non-resonant background. NODE=M026W1;LINKAGE=ZH
[2] Calculated by us using $\Gamma(\eta_c \to K\overline{K}\pi) \times \Gamma(\eta_c \to \gamma\gamma)$ / Γ = 0.44 ± 0.05 keV from PDG 06 and B($\eta_c \to K\overline{K}\pi$) = (8.5 ± 1.8)% from AUBERT 06E. NODE=M026W1;LINKAGE=AU
[3] Systematic errors not evaluated. NODE=M026W1;LINKAGE=NS
[4] Normalized to B($\eta_c \to p\overline{p}$)= $(1.3 \pm 0.4) \times 10^{-3}$. NODE=M026W1;LINKAGE=N3
[5] Normalized to B($\eta_c \to K^\pm K^0_S \pi^\mp$). NODE=M026W1;LINKAGE=N2
[6] Average of $K^0_S K^\pm \pi^\mp$, $\pi^+\pi^- K^+K^-$, and $2(K^+K^-)$ decay modes. NODE=M026W;LINKAGE=FF
[7] Normalized to the sum of B($\eta_c \to K^\pm K^0_S \pi^\mp$), B($\eta_c \to K^+K^-\pi^+\pi^-$), and B($\eta_c \to 2\pi^+2\pi^-$). NODE=M026W1;LINKAGE=N6
[8] Superseded by ASNER 04. NODE=M026W1;LINKAGE=NN
[9] Normalized to the sum of 9 branching ratios. NODE=M026W1;LINKAGE=N1
[10] Normalized to the sum of B($\eta_c \to K^\pm K^0_S \pi^\mp$), B($\eta_c \to \phi\phi$), B($\eta_c \to K^+K^-\pi^+\pi^-$), and B($\eta_c \to 2\pi^+2\pi^-$). NODE=M026W1;LINKAGE=N5
[11] Superseded by ACCIARRI 99T. NODE=M026W1;LINKAGE=WD
[12] Normalized to the sum of B($\eta_c \to K^\pm K^0_S \pi^\mp$), B($\eta_c \to 2K^+2K^-$), B($\eta_c \to K^+K^-\pi^+\pi^-$), and B($\eta_c \to 2\pi^+2\pi^-$). NODE=M026W1;LINKAGE=N4
[13] Re-evaluated by AIHARA 88D. NODE=M026W1;LINKAGE=A

$\eta_c(1S)$ Γ(i)Γ(γγ)/Γ(total)

NODE=M026220

$\Gamma(\eta'(958)\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_1\Gamma_{56}/\Gamma$

NODE=M026G10
NODE=M026G10

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
98.1±3.9±11.7	2673	XU	18	BELL	$e^+e^- \to e^+e^-\eta'\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$75.8^{+6.3}_{-6.2}$ ± 8.4	486	[1] ZHANG	12A	BELL	$e^+e^- \to e^+e^-\eta'\pi^+\pi^-$

[1] Superseded by XU 18. NODE=M026G10;LINKAGE=A

$\Gamma(\rho\rho) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_3\Gamma_{56}/\Gamma$

NODE=M026G09
NODE=M026G09

VALUE (eV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<39	90	< 1556	UEHARA	08	BELL	$\gamma\gamma \to 2(\pi^+\pi^-)$

$\Gamma(K^*(892)\overline{K}^*(892)) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_5\Gamma_{56}/\Gamma$

NODE=M026G08
NODE=M026G08

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
36 ±6 OUR FIT					
32.4±4.2±5.8	882 ± 115	UEHARA	08	BELL	$\gamma\gamma \to \pi^+\pi^-K^+K^-$

$\Gamma(\phi\phi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_8\Gamma_{56}/\Gamma$

NODE=M026G07
NODE=M026G07

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
9.0 ±0.8 OUR FIT					
7.75±0.66±0.62	386 ± 31	[1] LIU	12B	BELL	$\gamma\gamma \to 2(K^+K^-)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
6.8 ±1.2 ±1.3	132 ± 23	UEHARA	08	BELL	$\gamma\gamma \to 2(K^+K^-)$

[1] Supersedes UEHARA 08. Using B($\phi \to K^+K^-$) = (48.9 ± 0.5)%. NODE=M026G07;LINKAGE=LI

$\Gamma(\omega\omega) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_{15}\Gamma_{56}/\Gamma$

NODE=M026G03
NODE=M026G03

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
8.67±2.86±0.96	85 ± 29	[1] LIU	12B	BELL	$\gamma\gamma \to 2(\pi^+\pi^-\pi^0)$

[1] Using B($\omega \to \pi^+\pi^-\pi^0$) = (89.2 ± 0.7)%. NODE=M026G03;LINKAGE=LI

$\Gamma(\omega\phi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_{16}\Gamma_{56}/\Gamma$

NODE=M026G04
NODE=M026G04

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.49	90	[1] LIU	12B	BELL	$\gamma\gamma \to K^+K^-\pi^+\pi^-\pi^0$

[1] Using B($\phi \to K^+K^-$) = (48.9 ± 0.5)% and B($\omega \to \pi^+\pi^-\pi^0$) = (89.2 ± 0.7)%. NODE=M026G04;LINKAGE=LI

$\Gamma(f_2(1270) f_2(1270)) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{17}\Gamma_{56}/\Gamma$

NODE=M026G19

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
50±13 OUR FIT					
69±17±12	3182±766	UEHARA	08	BELL	$\gamma\gamma \to 2(\pi^+\pi^-)$

$\Gamma(f_2(1270) f'_2(1525)) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{18}\Gamma_{56}/\Gamma$

NODE=M026G20

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
49±9±13	1128±206	UEHARA	08	BELL	$\gamma\gamma \to \pi^+\pi^- K^+ K^-$

$\Gamma(K\overline{K}\pi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{34}\Gamma_{56}/\Gamma$

NODE=M026G14

VALUE (keV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.374±0.021 OUR FIT						
0.407±0.027 OUR AVERAGE Error includes scale factor of 1.2.						
0.374±0.009±0.031		14k	[1] LEES	10	BABR	10.6 $e^+e^- \to e^+e^- K^0_S K^\pm \pi^\mp$
0.407±0.022±0.028			[2,3] ASNER	04	CLEO	$\gamma\gamma \to \eta_c \to K^0_S K^\pm \pi^\mp$
0.60 ±0.12 ±0.09		41	[3,4] ABDALLAH	03J	DLPH	$\gamma\gamma \to K^0_S K^\pm \pi^\mp$
1.47 ±0.87 ±0.27			[3] SHIRAI	98	AMY	$\gamma\gamma \to \eta_c \to K^\pm K^0_S \pi^\mp$
0.84 ±0.21			[3] ALBRECHT	94H	ARG	$\gamma\gamma \to K^\pm K^0_S \pi^\mp$
0.60 $^{+0.23}_{-0.20}$			[3] CHEN	90B	CLEO	$\gamma\gamma \to \eta_c K^\pm K^0_S \pi^\mp$
1.06 ±0.41 ±0.27		11	[3] BRAUNSCH...	89	TASS	$\gamma\gamma \to K\overline{K}\pi$
1.5 $^{+0.60}_{-0.45}$ ±0.3		7	[3] BERGER	86	PLUT	$\gamma\gamma \to K\overline{K}\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
0.386±0.008±0.021		12k	[5] DEL-AMO-SA...	11M	BABR	$\gamma\gamma \to K^0_S K^\pm \pi^\mp$
0.418±0.044±0.022			[3,6] BRANDENB...	00B	CLE2	$\gamma\gamma \to \eta_c \to K^\pm K^0_S \pi^\mp$
<0.63	95		[3] BEHREND	89	CELL	$\gamma\gamma \to K^0_S K^\pm \pi^\mp$
<4.4	95		ALTHOFF	85B	TASS	$\gamma\gamma \to K\overline{K}\pi$

[1] From the corrected and unfolded mass spectrum. NODE=M026G14;LINKAGE=LE

[2] Calculated by us from the value reported in ASNER 04 that assumes B($\eta_c \to K\overline{K}\pi$) = 5.5 ± 1.7% NODE=M026G14;LINKAGE=AA

[3] We have multiplied $K^\pm K^0_S \pi^\mp$ measurement by 3 to obtain $K\overline{K}\pi$. NODE=M026G14;LINKAGE=C

[4] Calculated by us from the value reported in ABDALLAH 03J, which uses B($\eta_c \to K^0_S K^\pm \pi^\mp$) = (1.5 ± 0.4)%. NODE=M026G;LINKAGE=BB

[5] Not independent from the measurements reported by LEES 10. NODE=M026G14;LINKAGE=DE

[6] Superseded by ASNER 04. NODE=M026G14;LINKAGE=NN

$\Gamma(K^+K^-\pi^+\pi^-) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{38}\Gamma_{56}/\Gamma$

NODE=M026G15

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
34 ± 5 OUR FIT					
27 ± 6 OUR AVERAGE					
25.7± 3.2± 4.9	2019±248	UEHARA	08	BELL	$\gamma\gamma \to \pi^+\pi^- K^+ K^-$
280 ±100 ±60	42	[1] ABDALLAH	03J	DLPH	$\gamma\gamma \to \pi^+\pi^- K^+ K^-$
170 ± 80 ±20	13.9 ± 6.6	ALBRECHT	94H	ARG	$\gamma\gamma \to \pi^+\pi^- K^+ K^-$

[1] Calculated by us from the value reported in ABDALLAH 03J, which uses B($\eta_c \to \pi^+\pi^- K^+ K^-$) = (2.0 ± 0.7)%. NODE=M026G;LINKAGE=CC

$\Gamma(K^+K^-\pi^+\pi^-\pi^0) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{39}\Gamma_{56}/\Gamma$

NODE=M026G02

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.190±0.006±0.028	11k	[1] DEL-AMO-SA...	11M	BABR	$\gamma\gamma \to K^+K^-\pi^+\pi^-\pi^0$

[1] Not independent from other measurements reported in DEL-AMO-SANCHEZ 11M. NODE=M026G02;LINKAGE=DE

$\Gamma(2(K^+K^-)) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{42}\Gamma_{56}/\Gamma$

NODE=M026G27

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
7.3± 1.5 OUR FIT					
5.8± 1.9 OUR AVERAGE					
5.6± 1.1± 1.6	216 ± 42	UEHARA	08	BELL	$\gamma\gamma \to 2(K^+K^-)$
350 ±90 ±60	46	[1] ABDALLAH	03J	DLPH	$\gamma\gamma \to 2(K^+K^-)$
231 ±90 ±23	9.1 ± 3.3	[2] ALBRECHT	94H	ARG	$\gamma\gamma \to 2(K^+K^-)$

[1] Calculated by us from the value reported in ABDALLAH 03J, which uses B($\eta_c \to$) $2(K^+K^-)$ = (2.1 ± 1.2)%. NODE=M026G;LINKAGE=DD

[2] Includes all topological modes except $\eta_c \to \phi\phi$. NODE=M026G;LINKAGE=EE

$\Gamma(2(\pi^+\pi^-)) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{45}\Gamma_{56}/\Gamma$

NODE=M026G11

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
47 ± 6 OUR FIT					
42 ± 6 OUR AVERAGE					
40.7 ± 3.7 ± 5.3	5381 ± 492	UEHARA	08	BELL	$\gamma\gamma \to 2(\pi^+\pi^-)$
180 ± 70 ± 20	21.4 ± 8.6	ALBRECHT	94H	ARG	$\gamma\gamma \to 2(\pi^+\pi^-)$

$\Gamma(p\overline{p}) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{48}\Gamma_{56}/\Gamma$

NODE=M026G01

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
7.4 ± 0.7 OUR FIT					
$7.20 \pm 1.53^{+0.67}_{-0.75}$	157 ± 33	[1] KUO	05	BELL	$\gamma\gamma \to p\overline{p}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$4.6\ ^{+1.3}_{-1.1} \pm 0.4$	190	[1] AMBROGIANI	03	E835	$\overline{p}p \to \gamma\gamma$
$8.1\ ^{+2.9}_{-2.0}$		[1] ARMSTRONG	95F	E760	$\overline{p}p \to \gamma\gamma$

[1] Not independent from the $\Gamma_{\gamma\gamma}$ reported by the same experiment. NODE=M026G01;LINKAGE=GG

$\Gamma(K^0_S K^0_S) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{60}\Gamma_{56}/\Gamma$

NODE=M026G05

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<1.6	90	[1] UEHARA	13	BELL	$\gamma\gamma \to K^0_S K^0_S$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.29	90	[2] UEHARA	13	BELL	$\gamma\gamma \to K^0_S K^0_S$ (OCCUR=2)

[1] Taking into account interference with the non-resonant continuum. NODE=M026G05;LINKAGE=U1

[2] Neglecting interference with the non-resonant continuum. NODE=M026G05;LINKAGE=U2

$\eta_c(1S)$ BRANCHING RATIOS

NODE=M026225

HADRONIC DECAYS

NODE=M026305

$\Gamma(\eta'(958)\pi\pi)/\Gamma_{total}$ — Γ_1/Γ

NODE=M026R14

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.041 ± 0.017	14	[1] BALTRUSAIT...	86	MRK3	$J/\psi \to \eta_c\gamma$

[1] The quoted branching ratios use $B(J/\psi(1S) \to \gamma\eta_c(1S)) = 0.0127 \pm 0.0036$. NODE=M026R14;LINKAGE=E

$\Gamma(\rho\rho)/\Gamma_{total}$ — Γ_3/Γ

NODE=M026R9

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
18 ± 5 OUR AVERAGE						
12.6 ± 3.8 ± 5.1		72	[1] ABLIKIM	05L	BES2	$J/\psi \to \pi^+\pi^-\pi^+\pi^-\gamma$
26.0 ± 2.4 ± 8.8		113	[1] BISELLO	91	DM2	$J/\psi \to \gamma\rho^0\rho^0$
23.6 ± 10.6 ± 8.2		32	[1] BISELLO	91	DM2	$J/\psi \to \gamma\rho^+\rho^-$ (OCCUR=2)
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<14	90		[1] BALTRUSAIT...	86	MRK3	$J/\psi \to \eta_c\gamma$

[1] The quoted branching ratios use $B(J/\psi(1S) \to \gamma\eta_c(1S)) = 0.0127 \pm 0.0036$. Where relevant, the error in this branching ratio is treated as a common systematic in computing averages. NODE=M026R9;LINKAGE=E

$\Gamma(K^*(892)^0 K^-\pi^+ + c.c.)/\Gamma_{total}$ — Γ_4/Γ

NODE=M026R16

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.02 ± 0.007	63	[1,2] BALTRUSAIT...	86	MRK3	$J/\psi \to \eta_c\gamma$

[1] BALTRUSAITIS 86 has an error according to Partridge. NODE=M026R;LINKAGE=03

[2] The quoted branching ratios use $B(J/\psi(1S) \to \gamma\eta_c(1S)) = 0.0127 \pm 0.0036$. NODE=M026R16;LINKAGE=E

$\Gamma(K^*(892)\overline{K}^*(892))/\Gamma_{total}$ — Γ_5/Γ

NODE=M026R8

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
69 ± 13 OUR FIT					
91 ± 26 OUR AVERAGE					
108 ± 25 ± 44	60	[1] ABLIKIM	05L	BES2	$J/\psi \to K^+K^-\pi^+\pi^-\gamma$
82 ± 28 ± 27	14	[1] BISELLO	91	DM2	$e^+e^- \to \gamma K^+K^-\pi^+\pi^-$
90 ± 50	9	[1] BALTRUSAIT...	86	MRK3	$J/\psi \to \eta_c\gamma$

[1] The quoted branching ratios use $B(J/\psi(1S) \to \gamma\eta_c(1S)) = 0.0127 \pm 0.0036$. Where relevant, the error in this branching ratio is treated as a common systematic in computing averages. NODE=M026R8;LINKAGE=E

$\Gamma(K^*(892)^0 \overline{K}^*(892)^0 \pi^+ \pi^-)/\Gamma_{total}$ Γ_6/Γ

NODE=M026R25

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
113±47±24	45	[1] ABLIKIM 06A	BES2	$J/\psi \to K^{*0}\overline{K}^{*0}\pi^+\pi^-\gamma$

[1] ABLIKIM 06A reports $[\Gamma(\eta_c(1S) \to K^*(892)^0\overline{K}^*(892)^0\pi^+\pi^-)/\Gamma_{total}] \times [B(J/\psi(1S) \to \gamma\eta_c(1S))] = (1.91 \pm 0.64 \pm 0.48) \times 10^{-4}$ which we divide by our best value $B(J/\psi(1S) \to \gamma\eta_c(1S)) = (1.7 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M026R25;LINKAGE=AB

$\Gamma(\phi K^+ K^-)/\Gamma_{total}$ Γ_7/Γ

NODE=M026R21

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
$\mathbf{2.9^{+0.9}_{-0.8}\pm1.1}$	$14.1^{+4.4}_{-3.7}$	[1] HUANG 03	BELL	$B^+ \to (\phi K^+ K^-) K^+$

[1] Using $B(B^+ \to \eta_c K^+) = (1.25 \pm 0.12^{+0.10}_{-0.12}) \times 10^{-3}$ from FANG 03 and $B(\eta_c \to K\overline{K}\pi) = (5.5 \pm 1.7) \times 10^{-2}$. NODE=M026R;LINKAGE=BB

$\Gamma(\phi\phi)/\Gamma_{total}$ Γ_8/Γ

NODE=M026R7

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
17.4± 1.9 OUR FIT				
28 ± 4 OUR AVERAGE				
$26\ ^{+4}_{-8} \pm 5$	1.2k	[1] ABLIKIM 17P	BES3	$J/\psi \to K^+K^-K^+K^-\gamma$
25.3± 5.1± 9.1	72	[2] ABLIKIM 05L	BES2	$J/\psi \to K^+K^-K^+K^-\gamma$
26 ± 9	357	[2] BAI 04	BES	$J/\psi \to \gamma K^+K^-K^+K^-$
31 ± 7 ±10	19	[2] BISELLO 91	DM2	$J/\psi \to \gamma K^+K^-K^+K^-$
$30\ ^{+18}_{-12} \pm 10$	5	[2] BISELLO 91	DM2	$J/\psi \to \gamma K^+K^-K^0_S K^0_L$ OCCUR=2
74 ±18 ±24	80	[2] BAI 90B	MRK3	$J/\psi \to \gamma K^+K^-K^+K^-$
67 ±21 ±24		[2] BAI 90B	MRK3	$J/\psi \to \gamma K^+K^-K^0_S K^0_L$ OCCUR=3
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$18\ ^{+8}_{-6} \pm 7$	7	[3] HUANG 03	BELL	$B^+ \to (\phi\phi) K^+$

[1] ABLIKIM 17P reports $[\Gamma(\eta_c(1S) \to \phi\phi)/\Gamma_{total}] \times [B(J/\psi(1S) \to \gamma\eta_c(1S))] = (4.3 \pm 0.5^{+0.5}_{-1.2}) \times 10^{-5}$ which we divide by our best value $B(J/\psi(1S) \to \gamma\eta_c(1S)) = (1.7 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M026R7;LINKAGE=A

[2] The quoted branching ratios use $B(J/\psi(1S) \to \gamma\eta_c(1S)) = 0.0127 \pm 0.0036$. Where relevant, the error in this branching ratio is treated as a common systematic in computing averages. NODE=M026R;LINKAGE=E

[3] Using $B(B^+ \to \eta_c K^+) = (1.25 \pm 0.12^{+0.10}_{-0.12}) \times 10^{-3}$ from FANG 03 and $B(\eta_c \to K\overline{K}\pi) = (5.5 \pm 1.7) \times 10^{-2}$. NODE=M026R7;LINKAGE=BB

$\Gamma(\phi\phi)/\Gamma(K\overline{K}\pi)$ Γ_8/Γ_{34}

NODE=M026R39

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.0240±0.0025 OUR FIT				
$\mathbf{0.044\ ^{+0.012}_{-0.010}}$ **OUR AVERAGE**				
0.055 ±0.014 ±0.005		AUBERT,B 04B	BABR	$B^\pm \to K^\pm \eta_c$
$0.032\ ^{+0.014}_{-0.010} \pm 0.009$	7	[1] HUANG 03	BELL	$B^\pm \to K^\pm \phi\phi$

[1] Using $B(B^+ \to \eta_c K^+) = (1.25 \pm 0.12^{+0.10}_{-0.12}) \times 10^{-3}$ from FANG 03 and $B(\eta_c \to K\overline{K}\pi) = (5.5 \pm 1.7) \times 10^{-2}$. NODE=M026R39;LINKAGE=BB

$\Gamma(\phi\phi)/\Gamma(p\overline{p})$ Γ_8/Γ_{48}

NODE=M026R52

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
1.79±0.14±0.32	6.4k	[1] AAIJ 17BB	LHCB	$pp \to b\overline{b}X \to 2(K^+K^-)X$

[1] Using inputs from AAIJ 15AS and AAIJ 15BI and $\Gamma(b \to J/\psi(1S)\text{anything}))/\Gamma_{total} = (1.16 \pm 0.10)\%$ and $\Gamma(J/\psi(1S) \to p\overline{p})/\Gamma_{total} = (2.120 \pm 0.029) \times 10^{-3}$ from PDG 16. NODE=M026R52;LINKAGE=A

$\Gamma(\phi 2(\pi^+\pi^-))/\Gamma_{total}$ Γ_9/Γ

NODE=M026R26

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT
<40	90	[1] ABLIKIM 06A	BES2	$J/\psi \to \phi 2(\pi^+\pi^-)\gamma$

[1] ABLIKIM 06A reports $[\Gamma(\eta_c(1S) \to \phi 2(\pi^+\pi^-))/\Gamma_{total}] \times [B(J/\psi(1S) \to \gamma\eta_c(1S))] < 0.603 \times 10^{-4}$ which we divide by our best value $B(J/\psi(1S) \to \gamma\eta_c(1S)) = 1.7 \times 10^{-2}$. NODE=M026R26;LINKAGE=AB

$\Gamma(a_0(980)\pi)/\Gamma_{total}$ — Γ_{10}/Γ

NODE=M026R11

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
seen [<0.02 (CL = 90%) OUR 2021 BEST LIMIT]					
seen		LEES	21A	BABR	Dalitz anal. of $\eta_c \to \pi^+\pi^-\eta$
seen		LEES	14E	BABR	Dalitz anal. of $\eta_c \to K^+K^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.02	90	[1,2] BALTRUSAIT...86		MRK3	$J/\psi \to \eta_c\gamma$

[1] The quoted branching ratios use $B(J/\psi(1S) \to \gamma\eta_c(1S)) = 0.0127 \pm 0.0036$. NODE=M026R11;LINKAGE=E

[2] We are assuming $B(a_0(980) \to \eta\pi) > 0.5$. NODE=M026R11;LINKAGE=F

$\Gamma(a_2(1320)\pi)/\Gamma_{total}$ — Γ_{11}/Γ

NODE=M026R12

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
seen		LEES	21A	BABR	Dalitz anal. of $\eta_c \to \pi^+\pi^-\eta$
<0.02	90	[1] BALTRUSAIT...86		MRK3	$J/\psi \to \eta_c\gamma$

[1] The quoted branching ratios use $B(J/\psi(1S) \to \gamma\eta_c(1S)) = 0.0127 \pm 0.0036$. NODE=M026R12;LINKAGE=E

$\Gamma(K^*(892)\overline{K}+\text{c.c.})/\Gamma_{total}$ — Γ_{12}/Γ

NODE=M026R17

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0128	90	BISELLO	91	DM2	$J/\psi \to \gamma K^0_S K^\pm\pi^\mp$
<0.0132	90	[1] BISELLO	91	DM2	$J/\psi \to \gamma K^+K^-\pi^0$

OCCUR=2

[1] The quoted branching ratios use $B(J/\psi(1S) \to \gamma\eta_c(1S)) = 0.0127 \pm 0.0036$. NODE=M026R17;LINKAGE=E

$\Gamma(f_2(1270)\eta)/\Gamma_{total}$ — Γ_{13}/Γ

NODE=M026R13

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
seen		LEES	21A	BABR	Dalitz anal. of $\eta_c \to \pi^+\pi^-\eta$
<0.011	90	[1] BALTRUSAIT...86		MRK3	$J/\psi \to \eta_c\gamma$

[1] The quoted branching ratios use $B(J/\psi(1S) \to \gamma\eta_c(1S)) = 0.0127 \pm 0.0036$. NODE=M026R13;LINKAGE=E

$\Gamma(f_2(1270)\eta')/\Gamma_{total}$ — Γ_{14}/Γ

NODE=M026R60

VALUE	DOCUMENT ID		TECN	COMMENT
seen	LEES	21A	BABR	Dalitz anal. of $\eta_c \to \pi^+\pi^-\eta'$; $K^+K^-\eta'$

$\Gamma(\omega\omega)/\Gamma_{total}$ — Γ_{15}/Γ

NODE=M026R10

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
2.9±0.5±0.6		1705	[1] ABLIKIM	19AV	BES3	$J/\psi \to \gamma\omega\omega$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<6.3	90		[2] ABLIKIM	05L	BES2	$J/\psi \to 2(\pi^+\pi^-\pi^0)\gamma$
<6.3	90		[2] BISELLO	91	DM2	$J/\psi \to \gamma\omega\omega$
<3.1	90		[2] BALTRUSAIT...86		MRK3	$J/\psi \to \eta_c\gamma$

[1] ABLIKIM 19AV reports $[\Gamma(\eta_c(1S) \to \omega\omega)/\Gamma_{total}] \times [B(J/\psi(1S) \to \gamma\eta_c(1S))] = (4.90 \pm 0.17 \pm 0.77) \times 10^{-5}$ which we divide by our best value $B(J/\psi(1S) \to \gamma\eta_c(1S)) = (1.7 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value., NODE=M026R10;LINKAGE=C

[2] The quoted branching ratios use $B(J/\psi(1S) \to \gamma\eta_c(1S)) = 0.0127 \pm 0.0036$. Where relevant, the error in this branching ratio is treated as a common systematic in computing averages. NODE=M026R10;LINKAGE=E

$\Gamma(\omega\phi)/\Gamma_{total}$ — Γ_{16}/Γ

NODE=M026R22

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
< 2.5 × 10^{-4}	90	[1] ABLIKIM	17P	BES3	$J/\psi \to \pi^+\pi^-\pi^0K^+K^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<17 × 10^{-4}	90	[2] ABLIKIM	05L	BES2	$J/\psi \to \pi^+\pi^-\pi^0K^+K^-\gamma$

[1] Using $B(J/\psi \to \gamma\eta_c) = 0.017 \pm 0.004$. NODE=M026R22;LINKAGE=A

[2] The quoted branching ratios use $B(J/\psi(1S) \to \gamma\eta_c(1S)) = 0.0127 \pm 0.0036$. NODE=M026R22;LINKAGE=E

$\Gamma(f_2(1270) f_2(1270))/\Gamma_{total}$ — Γ_{17}/Γ

NODE=M026R19

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
0.98±0.25 OUR FIT				
$0.77^{+0.25}_{-0.30}\pm0.17$	91.2 ± 19.8	[1] ABLIKIM 04M	BES	$J/\psi \to \gamma 2\pi^+ 2\pi^-$

[1] ABLIKIM 04M reports $[\Gamma(\eta_c(1S) \to f_2(1270) f_2(1270))/\Gamma_{total}] \times [B(J/\psi(1S) \to \gamma\eta_c(1S))] = (1.3 \pm 0.3^{+0.3}_{-0.4}) \times 10^{-4}$ which we divide by our best value $B(J/\psi(1S) \to \gamma\eta_c(1S)) = (1.7 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M026R19;LINKAGE=AB

$\Gamma(f_0(500)\eta)/\Gamma_{total}$ — Γ_{19}/Γ

NODE=M026R57

VALUE	DOCUMENT ID		TECN	COMMENT
seen	LEES	21A	BABR	Dalitz anal. of $\eta_c \to \pi^+\pi^-\eta$

$\Gamma(f_0(500)\eta')/\Gamma_{total}$ — Γ_{20}/Γ

NODE=M026R58

VALUE	DOCUMENT ID		TECN	COMMENT
seen	LEES	21A	BABR	Dalitz anal. of $\eta_c(1S) \to \pi^+\pi^-\eta'$

$\Gamma(f_0(980)\eta)/\Gamma_{total}$ — Γ_{21}/Γ

NODE=M026R41

VALUE	DOCUMENT ID		TECN	COMMENT
seen	LEES	21A	BABR	Dalitz anal. of $\eta_c \to \pi^+\pi^-\eta$
seen	LEES	14E	BABR	Dalitz anal. of $\eta_c \to K^+K^-\eta$

$\Gamma(f_0(980)\eta')/\Gamma_{total}$ — Γ_{22}/Γ

NODE=M026R56

VALUE	DOCUMENT ID		TECN	COMMENT
seen	LEES	21A	BABR	Dalitz anal. of $\eta_c \to \pi^+\pi^-\eta'$, $K^+K^-\eta'$

$\Gamma(f_0(1500)\eta)/\Gamma_{total}$ — Γ_{23}/Γ

NODE=M026R42

VALUE	DOCUMENT ID		TECN	COMMENT
seen	LEES	21A	BABR	Dalitz anal. of $\eta_c \to \pi^+\pi^-\eta$
seen	LEES	14E	BABR	Dalitz anal. of $\eta_c \to K^+K^-\eta$

$\Gamma(f_0(1710)\eta')/\Gamma_{total}$ — Γ_{24}/Γ

NODE=M026R59

VALUE	DOCUMENT ID		TECN	COMMENT
seen	LEES	21A	BABR	Dalitz anal. of $\eta_c \to K^+K^-\eta'$

$\Gamma(f_0(2100)\eta')/\Gamma_{total}$ — Γ_{25}/Γ

NODE=M026R61

VALUE	DOCUMENT ID		TECN	COMMENT
seen	LEES	21A	BABR	Dalitz anal. of $\eta_c \to \pi^+\pi^-\eta$

$\Gamma(f_0(2200)\eta)/\Gamma_{total}$ — Γ_{26}/Γ

NODE=M026R43

VALUE	DOCUMENT ID		TECN	COMMENT
seen	LEES	14E	BABR	Dalitz anal. of $\eta_c \to K^+K^-\eta$

$\Gamma(a_0(1320)\pi)/\Gamma_{total}$ — Γ_{27}/Γ

NODE=M026R45

VALUE	DOCUMENT ID		TECN	COMMENT
seen	LEES	14E	BABR	Dalitz anal. of $\eta_c \to K^+K^-\pi^0$

$\Gamma(a_0(1450)\pi)/\Gamma_{total}$ — Γ_{28}/Γ

NODE=M026R46

VALUE	DOCUMENT ID		TECN	COMMENT
seen	LEES	21A	BABR	Dalitz anal. of $\eta_c \to \pi^+\pi^-\eta$
seen	LEES	14E	BABR	Dalitz anal. of $\eta_c \to K^+K^-\pi^0$

$\Gamma(a_0(1700)\pi)/\Gamma_{total}$ — Γ_{29}/Γ

NODE=M026R62

VALUE	DOCUMENT ID		TECN	COMMENT
seen	LEES	21A	BABR	Dalitz anal. of $\eta_c \to \pi^+\pi^-\eta'$

$\Gamma(a_0(1950)\pi)/\Gamma_{total}$ — Γ_{30}/Γ

NODE=M026R00

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen		LEES	21A	BABR	Dalitz anal. of $\eta_c(1S) \to \pi^+\pi^-\eta'$
seen	12k	[1] LEES	16A	BABR	$\gamma\gamma \to \eta_c(1S) \to K\overline{K}\pi$

[1] From a model-independant partial wave analysis.

NODE=M026R00;LINKAGE=A

$\Gamma(K_0^*(1430)\overline{K})/\Gamma_{total}$ Γ_{31}/Γ

NODE=M026R47
NODE=M026R47

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	12k	[1] LEES	16A	BABR	$\gamma\gamma \to \eta_c(1S) \to K\overline{K}\pi$
seen		LEES	14E	BABR	Dalitz anal. of $\eta_c \to K^+K^-\eta/\pi^0$

[1] From a model-independant partial wave analysis.

NODE=M026R47;LINKAGE=A

$\Gamma(K_2^*(1430)\overline{K})/\Gamma_{total}$ Γ_{32}/Γ

NODE=M026R48
NODE=M026R48

VALUE	DOCUMENT ID		TECN	COMMENT
seen	LEES	21A	BABR	Dalitz anal. of $\eta_c \to K^+K^-\eta'$
seen	LEES	14E	BABR	Dalitz anal. of $\eta_c \to K^+K^-\pi^0$

$\Gamma(K_0^*(1950)\overline{K})/\Gamma_{total}$ Γ_{33}/Γ

NODE=M026R49
NODE=M026R49

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen		LEES	21A	BABR	Dalitz anal. of $\eta_c \to K^+K^-\eta'$
seen	12k	[1] LEES	16A	BABR	$\gamma\gamma \to \eta_c(1S) \to K\overline{K}\pi$
seen		LEES	14E	BABR	Dalitz anal. of $\eta_c \to K^+K^-\eta/\pi^0$

[1] From a Dalitz plot analysis using an isobar model.

NODE=M026R49;LINKAGE=A

$\Gamma(K\overline{K}\pi)/\Gamma_{total}$ Γ_{34}/Γ

NODE=M026R4
NODE=M026R4

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
7.3 ±0.4 OUR FIT					
6.9 ±0.5 OUR AVERAGE					
6.9 ±0.7 ±0.6	146	[1] ABLIKIM	19AP	BES3	$h_c \to \gamma\eta_c$
7.8 ±0.6 ±0.6	267	[2] ABLIKIM	19AP	BES3	$h_c \to \gamma\eta_c$
6.3 ±1.3 ±1.4	55	[3,4] ABLIKIM	12N	BES3	$\psi(2S) \to \pi^0\gamma K^+K^-\pi^0$
7.9 ±1.4 ±1.8	107	[5,6] ABLIKIM	12N	BES3	$\psi(2S) \to \pi^0\gamma K_S^0 K^\mp\pi^\pm$
8.5 ±1.8		[7] AUBERT	06E	BABR	$B^\pm \to K^\pm X_{c\overline{c}}$
5.1 ±2.1	0.6k	[8] BAI	04	BES	$J/\psi \to \gamma K^\pm\pi^\mp K_S^0$
6.90±1.42±1.32	33	[8] BISELLO	91	DM2	$J/\psi \to \gamma K^+K^-\pi^0$
5.43±0.94±0.94	68	[8] BISELLO	91	DM2	$J/\psi \to \gamma K^\pm\pi^\mp K_S^0$
4.8 ±1.7	95	[8,9] BALTRUSAIT...	86	MRK3	$J/\psi \to \eta_c\gamma$
16.1 $^{+9.2}_{-7.3}$		[10,11] HIMEL	80B	MRK2	$\psi(2S) \to \eta_c\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 10.7 90% CL		[8,12] PARTRIDGE	80B	CBAL	$J/\psi \to \eta_c\gamma$

OCCUR=2
OCCUR=2
OCCUR=2

[1] ABLIKIM 19AP quotes $B(\eta_c \to K^+K^-\pi^0) = (1.15 \pm 0.12 \pm 0.10) \times 10^{-2}$ which we multiply by 6 to account for isospin symmetry.

NODE=M026R4;LINKAGE=C

[2] ABLIKIM 19AP quotes $B(\eta_c \to K_S^0 K^\pm\pi^\mp) = (2.60 \pm 0.21 \pm 0.20) \times 10^{-2}$ which we multiply by 3 to account for isospin symmetry.

NODE=M026R4;LINKAGE=F

[3] ABLIKIM 12N quotes $B(\psi(2S) \to \pi^0 h_c) \cdot B(h_c \to \gamma\eta_c) \cdot B(\eta_c \to K^+K^-\pi^0) = (4.54 \pm 0.76 \pm 0.48) \times 10^{-6}$ which we multiply by 6 to account for isospin symmetry.

NODE=M026R4;LINKAGE=BK

[4] ABLIKIM 12N reports $[\Gamma(\eta_c(1S) \to K\overline{K}\pi)/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] \times [B(h_c(1P) \to \gamma\eta_c(1S))] = (27.24 \pm 4.56 \pm 2.88) \times 10^{-6}$ which we divide by our best values $B(\psi(2S) \to h_c(1P)\pi^0) = (8.6 \pm 1.3) \times 10^{-4}$, $B(h_c(1P) \to \gamma\eta_c(1S)) = (50 \pm 9) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

NODE=M026R4;LINKAGE=CK

[5] ABLIKIM 12N quotes $B(\psi(2S) \to \pi^0 h_c) \cdot B(h_c \to \gamma\eta_c) \cdot B(\eta_c \to K_S^0 K^\pm\pi^\mp) = (11.35 \pm 1.25 \pm 1.50) \times 10^{-6}$ which we multiply by 3 to account for isospin symmetry.

NODE=M026R4;LINKAGE=BL

[6] ABLIKIM 12N reports $[\Gamma(\eta_c(1S) \to K\overline{K}\pi)/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] \times [B(h_c(1P) \to \gamma\eta_c(1S))] = (34.05 \pm 3.75 \pm 4.50) \times 10^{-6}$ which we divide by our best values $B(\psi(2S) \to h_c(1P)\pi^0) = (8.6 \pm 1.3) \times 10^{-4}$, $B(h_c(1P) \to \gamma\eta_c(1S)) = (50 \pm 9) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

NODE=M026R4;LINKAGE=CL

[7] Determined from the ratio of $B(B^\pm \to K^\pm\eta_c)$ $B(\eta_c \to K\overline{K}\pi) = (7.4 \pm 0.5 \pm 0.7) \times 10^{-5}$ reported in AUBERT,B 04B and $B(B^\pm \to K^\pm\eta_c) = (8.7 \pm 1.5) \times 10^{-3}$ reported in AUBERT 06E.

NODE=M026R4;LINKAGE=AB

[8] The quoted branching ratios use $B(J/\psi(1S) \to \gamma\eta_c(1S)) = 0.0127 \pm 0.0036$. Where relevant, the error in this branching ratio is treated as a common systematic in computing averages.

NODE=M026R4;LINKAGE=E

[9] Average from $K^+K^-\pi^0$ and $K^\pm K_S^0\pi^\mp$ decay channels.

NODE=M026R4;LINKAGE=D

[10] $K^\pm K_S^0\pi^\mp$ corrected to $K\overline{K}\pi$ by factor 3. KS, MR.

NODE=M026R4;LINKAGE=01

[11] Estimated using $B(\psi(2S) \to \gamma\eta_c(1S)) = 0.0028 \pm 0.0006$.

NODE=M026R4;LINKAGE=A

[12] $K^+K^-\pi^0$ corrected to $K\overline{K}\pi$ by factor 6. KS, MR

NODE=M026R4;LINKAGE=02

$\Gamma(\phi K^+ K^-)/\Gamma(K\overline{K}\pi)$ Γ_7/Γ_{34}

NODE=M026R02

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
$\mathbf{0.052^{+0.016}_{-0.014}\pm0.014}$	7	[1] HUANG 03	BELL	$B^\pm \to K^\pm \phi\phi$

[1] Using B($B^+ \to \eta_c K^+$) = ($1.25 \pm 0.12^{+0.10}_{-0.12}$) $\times 10^{-3}$ from FANG 03 and B($\eta_c \to K\overline{K}\pi$) = ($5.5 \pm 1.7$) $\times 10^{-2}$. NODE=M026R02;LINKAGE=BB

$\Gamma(K\overline{K}\eta)/\Gamma_{total}$ Γ_{35}/Γ

NODE=M026R15

VALUE (units 10^{-2})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
1.36±0.15 OUR FIT					
1.0 ±0.5 ±0.2		7	[1,2] ABLIKIM 12N	BES3	$\psi(2S) \to \pi^0 \gamma\eta K^+ K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<3.1	90		[3] BALTRUSAIT...86	MRK3	$J/\psi \to \eta_c \gamma$

OCCUR=2

[1] ABLIKIM 12N quotes B($\psi(2S) \to \pi^0 h_c$) · B($h_c \to \gamma\eta_c$) · B($\eta_c \to K^+ K^- \eta$) = ($2.11 \pm 1.01 \pm 0.32$) $\times 10^{-6}$ which we multiply by 2 to account for isospin symmetry. NODE=M026R15;LINKAGE=AK

[2] ABLIKIM 12N reports [$\Gamma(\eta_c(1S) \to K\overline{K}\eta)/\Gamma_{total}$] × [B($\psi(2S) \to h_c(1P)\pi^0$)] × [B($h_c(1P) \to \gamma\eta_c(1S)$)] = ($4.22 \pm 2.02 \pm 0.64$) $\times 10^{-6}$ which we divide by our best values B($\psi(2S) \to h_c(1P)\pi^0$) = ($8.6 \pm 1.3$) $\times 10^{-4}$, B($h_c(1P) \to \gamma\eta_c(1S)$) = ($50 \pm 9$) $\times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values. NODE=M026R15;LINKAGE=AM

[3] The quoted branching ratios use B($J/\psi(1S) \to \gamma\eta_c(1S)$) = 0.0127 ± 0.0036. NODE=M026R15;LINKAGE=E

$\Gamma(K\overline{K}\eta)/\Gamma(K\overline{K}\pi)$ Γ_{35}/Γ_{34}

NODE=M026R40

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.187±0.018 OUR FIT				
0.190±0.008±0.017	5.4k	[1] LEES 14E	BABR	$\gamma\gamma \to K^+ K^- \eta/\pi^0$

[1] LEES 14E reports B($\eta_c(1S) \to K^+ K^- \eta$)/B($\eta_c(1S) \to K^+ K^- \pi^0$) = $0.571 \pm 0.025 \pm 0.051$, which we divide by 3 to account for isospin symmetry. It uses both $\eta \to \gamma\gamma$ and $\eta \to \pi^+\pi^-\pi^0$ decays. NODE=M026R40;LINKAGE=LE

$\Gamma(\eta\pi^+\pi^-)/\Gamma_{total}$ Γ_{36}/Γ

NODE=M026R6

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
1.7±0.4±0.4	33	[1] ABLIKIM 12N	BES3	$\psi(2S) \to \pi^0 \gamma\eta\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
5.4±2.0	75	[2] BALTRUSAIT...86	MRK3	$J/\psi \to \eta_c \gamma$
3.7±1.3±2.0	18	[2] PARTRIDGE 80B	CBAL	$J/\psi \to \eta\pi^+\pi^-\gamma$

[1] ABLIKIM 12N reports [$\Gamma(\eta_c(1S) \to \eta\pi^+\pi^-)/\Gamma_{total}$] × [B($\psi(2S) \to h_c(1P)\pi^0$)] × [B($h_c(1P) \to \gamma\eta_c(1S)$)] = ($7.22 \pm 1.47 \pm 1.11$) $\times 10^{-6}$ which we divide by our best values B($\psi(2S) \to h_c(1P)\pi^0$) = ($8.6 \pm 1.3$) $\times 10^{-4}$, B($h_c(1P) \to \gamma\eta_c(1S)$) = ($50 \pm 9$) $\times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values. NODE=M026R6;LINKAGE=AB

[2] The quoted branching ratios use B($J/\psi(1S) \to \gamma\eta_c(1S)$) = 0.0127 ± 0.0036. Where relevant, the error in this branching ratio is treated as a common systematic in computing averages. NODE=M026R6;LINKAGE=E

$\Gamma(\eta 2(\pi^+\pi^-))/\Gamma_{total}$ Γ_{37}/Γ

NODE=M026R05

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
4.4±1.2±1.0	39	[1] ABLIKIM 12N	BES3	$\psi(2S) \to \pi^0 \gamma\eta 2(\pi^+\pi^-)$

[1] ABLIKIM 12N reports [$\Gamma(\eta_c(1S) \to \eta 2(\pi^+\pi^-))/\Gamma_{total}$] × [B($\psi(2S) \to h_c(1P)\pi^0$)] × [B($h_c(1P) \to \gamma\eta_c(1S)$)] = ($19.17 \pm 3.77 \pm 3.72$) $\times 10^{-6}$ which we divide by our best values B($\psi(2S) \to h_c(1P)\pi^0$) = ($8.6 \pm 1.3$) $\times 10^{-4}$, B($h_c(1P) \to \gamma\eta_c(1S)$) = ($50 \pm 9$) $\times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values. NODE=M026R05;LINKAGE=AB

$\Gamma(K^+ K^- \pi^+\pi^-)/\Gamma_{total}$ Γ_{38}/Γ

NODE=M026R5

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
6.6± 1.1 OUR FIT				
11.8± 2.3 OUR AVERAGE				
9.7± 2.2±2.2	38	[1] ABLIKIM 12N	BES3	$\psi(2S) \to \pi^0 \gamma K^+ K^- \pi^+\pi^-$
12 ± 4	0.4k	[2] BAI 04	BES	$J/\psi \to \gamma K^+ K^- \pi^+\pi^-$
21 ± 7	110	[2] BALTRUSAIT...86	MRK3	$J/\psi \to \eta_c \gamma$
$14\ ^{+22}_{-\ 9}$		[3] HIMEL 80B	MRK2	$\psi(2S) \to \eta_c \gamma$

[1] ABLIKIM 12N reports $[\Gamma(\eta_c(1S) \to K^+ K^- \pi^+ \pi^-)/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] \times [B(h_c(1P) \to \gamma\eta_c(1S))] = (4.16 \pm 0.76 \pm 0.59) \times 10^{-6}$ which we divide by our best values $B(\psi(2S) \to h_c(1P)\pi^0) = (8.6 \pm 1.3) \times 10^{-4}$, $B(h_c(1P) \to \gamma\eta_c(1S)) = (50 \pm 9) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values. NODE=M026R5;LINKAGE=AB

[2] The quoted branching ratios use $B(J/\psi(1S) \to \gamma\eta_c(1S)) = 0.0127 \pm 0.0036$. Where relevant, the error in this branching ratio is treated as a common systematic in computing averages. NODE=M026R5;LINKAGE=E

[3] Estimated using $B(\psi(2S) \to \gamma\eta_c(1S)) = 0.0028 \pm 0.0006$. NODE=M026R5;LINKAGE=A

$\Gamma(K^+ K^- \pi^+ \pi^- \pi^0)/\Gamma(K\overline{K}\pi)$ Γ_{39}/Γ_{34}

NODE=M026R01
NODE=M026R01

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.477±0.017±0.070	11k	[1] DEL-AMO-SA..11M	BABR	$\gamma\gamma \to K^+ K^- \pi^+ \pi^- \pi^0$

[1] We have multiplied the value of $\Gamma(K^+ K^- \pi^+ \pi^- \pi^0)/\Gamma(K^0_S K^\pm \pi^\mp)$ reported in DEL-AMO-SANCHEZ 11M by a factor 1/3 to obtain $\Gamma(K^+ K^- \pi^+ \pi^- \pi^0)/\Gamma(K\overline{K}\pi)$. Not independent from other measurements reported in DEL-AMO-SANCHEZ 11M. NODE=M026R01;LINKAGE=DE

$\Gamma(K^0 K^- \pi^+ \pi^- \pi^+ + \text{c.c.})/\Gamma_{total}$ Γ_{40}/Γ

NODE=M026R06
NODE=M026R06

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
5.6±1.4±1.3	43	[1,2] ABLIKIM	12N	BES3	$\psi(2S) \to \pi^0 \gamma K^0_S K^\mp \pi^\mp 2\pi^\pm$

[1] ABLIKIM 12N quotes $B(\psi(2S) \to \pi^0 h_c) \cdot B(h_c \to \gamma\eta_c) \cdot B(\eta_c \to K^0_S K^- \pi^- 2\pi^+) = (12.01 \pm 2.22 \pm 2.04) \times 10^{-6}$ which we multiply by 2 to take c.c. into account. NODE=M026R06;LINKAGE=AA

[2] ABLIKIM 12N reports $[\Gamma(\eta_c(1S) \to K^0 K^- \pi^+ \pi^- \pi^+ + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] \times [B(h_c(1P) \to \gamma\eta_c(1S))] = (24.02 \pm 4.44 \pm 4.08) \times 10^{-6}$ which we divide by our best values $B(\psi(2S) \to h_c(1P)\pi^0) = (8.6 \pm 1.3) \times 10^{-4}$, $B(h_c(1P) \to \gamma\eta_c(1S)) = (50 \pm 9) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values. NODE=M026R06;LINKAGE=AB

$\Gamma(K^+ K^- 2(\pi^+ \pi^-))/\Gamma_{total}$ Γ_{41}/Γ

NODE=M026R23
NODE=M026R23

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
7.5±2.4 OUR AVERAGE					
8 ±4 ±2	10	[1] ABLIKIM	12N	BES3	$\psi(2S) \to \pi^0 \gamma K^+ K^- 2(\pi^+ \pi^-)$
7.2±2.4±1.5	100	[2] ABLIKIM	06A	BES2	$J/\psi \to K^+ K^- 2(\pi^+ \pi^-)\gamma$

[1] ABLIKIM 12N reports $[\Gamma(\eta_c(1S) \to K^+ K^- 2(\pi^+ \pi^-))/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] \times [B(h_c(1P) \to \gamma\eta_c(1S))] = (3.60 \pm 1.71 \pm 0.64) \times 10^{-6}$ which we divide by our best values $B(\psi(2S) \to h_c(1P)\pi^0) = (8.6 \pm 1.3) \times 10^{-4}$, $B(h_c(1P) \to \gamma\eta_c(1S)) = (50 \pm 9) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values. NODE=M026R23;LINKAGE=AL

[2] ABLIKIM 06A reports $[\Gamma(\eta_c(1S) \to K^+ K^- 2(\pi^+ \pi^-))/\Gamma_{total}] \times [B(J/\psi(1S) \to \gamma\eta_c(1S))] = (1.21 \pm 0.32 \pm 0.24) \times 10^{-4}$ which we divide by our best value $B(J/\psi(1S) \to \gamma\eta_c(1S)) = (1.7 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M026R23;LINKAGE=AB

$\Gamma(2(K^+ K^-))/\Gamma_{total}$ Γ_{42}/Γ

NODE=M026R20
NODE=M026R20

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.43± 0.30 OUR FIT					
2.2 ± 0.9 ±0.5	7	[1] ABLIKIM	12N	BES3	$\psi(2S) \to \pi^0 \gamma 2(K^+ K^-)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1.4 ^{+0.5}_{-0.4} \pm 0.6$	$14.5^{+4.6}_{-3.0}$	[2] HUANG	03	BELL	$B^+ \to 2(K^+ K^-) K^+$
21 ±10 ±6		[3] ALBRECHT	94H	ARG	$\gamma\gamma \to K^+ K^- K^+ K^-$

[1] ABLIKIM 12N reports $[\Gamma(\eta_c(1S) \to 2(K^+ K^-))/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] \times [B(h_c(1P) \to \gamma\eta_c(1S))] = (0.94 \pm 0.37 \pm 0.14) \times 10^{-6}$ which we divide by our best values $B(\psi(2S) \to h_c(1P)\pi^0) = (8.6 \pm 1.3) \times 10^{-4}$, $B(h_c(1P) \to \gamma\eta_c(1S)) = (50 \pm 9) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values. NODE=M026R20;LINKAGE=AB

[2] Using $B(B^+ \to \eta_c K^+) = (1.25 \pm 0.12 ^{+0.10}_{-0.12}) \times 10^{-3}$ from FANG 03 and $B(\eta_c \to K\overline{K}\pi) = (5.5 \pm 1.7) \times 10^{-2}$. NODE=M026R20;LINKAGE=BB

[3] Normalized to the sum of $B(\eta_c \to K^\pm K^0_S \pi^\mp)$, $B(\eta_c \to \phi\phi)$, $B(\eta_c \to K^+ K^- \pi^+ \pi^-)$, and $B(\eta_c \to 2\pi^+ 2\pi^-)$. NODE=M026R20;LINKAGE=AL

$\Gamma(2(K^+K^-))/\Gamma(K\overline{K}\pi)$ Γ_{42}/Γ_{34}

NODE=M026R38

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.020±0.004 OUR FIT				
0.024±0.007 OUR AVERAGE				
0.023±0.007±0.006		AUBERT,B 04B	BABR	$B^\pm \to K^\pm \eta_c$
$0.026^{+0.009}_{-0.007}\pm0.007$	15	[1] HUANG 03	BELL	$B^\pm \to K^\pm (2K^+ 2K^-)$

[1] Using $B(B^+ \to \eta_c K^+) = (1.25 \pm 0.12^{+0.10}_{-0.12}) \times 10^{-3}$ from FANG 03 and $B(\eta_c \to K\overline{K}\pi) = (5.5 \pm 1.7) \times 10^{-2}$.

NODE=M026R38;LINKAGE=BB

$\Gamma(\eta'(958)K\overline{K})/\Gamma(\eta'(958)\pi\pi)$ Γ_2/Γ_1

NODE=M026R55

VALUE	DOCUMENT ID	TECN	COMMENT
0.859±0.052±0.043	[1] LEES 21A	BABR	$\gamma\gamma \to \eta' K^+ K^-$, $\eta' \pi^+ \pi^-$

[1] Based on Dalitz-plot analysis of the $\eta_c \to \eta' K^+ K^-$, $\eta' \pi^+ \pi^-$ final states where the fit fractions and relative phases are determined for numerous two-body intermediate states.

NODE=M026R55;LINKAGE=A

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{43}/Γ

NODE=M026R51

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<5 \times 10^{-4}$	90	[1] ABLIKIM 17AJ	BES3	$\psi(2S) \to \gamma \pi^+ \pi^- \pi^0$

[1] ABLIKIM 17AJ reports $[\Gamma(\eta_c(1S) \to \pi^+\pi^-\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\eta_c(1S))] < 1.6 \times 10^{-6}$ which we divide by our best value $B(\psi(2S) \to \gamma\eta_c(1S)) = 3.4 \times 10^{-3}$.

NODE=M026R51;LINKAGE=A

$\Gamma(\pi^+\pi^-\pi^0\pi^0)/\Gamma_{total}$ Γ_{44}/Γ

NODE=M026R07

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
4.7±0.9±1.1	118	[1] ABLIKIM 12N	BES3	$\psi(2S) \to \pi^0 \gamma \pi^+ \pi^- 2\pi^0$

[1] ABLIKIM 12N reports $[\Gamma(\eta_c(1S) \to \pi^+\pi^-\pi^0\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] \times [B(h_c(1P) \to \gamma\eta_c(1S))] = (20.31 \pm 2.20 \pm 3.33) \times 10^{-6}$ which we divide by our best values $B(\psi(2S) \to h_c(1P)\pi^0) = (8.6 \pm 1.3) \times 10^{-4}$, $B(h_c(1P) \to \gamma\eta_c(1S)) = (50 \pm 9) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

NODE=M026R07;LINKAGE=AB

$\Gamma(2(\pi^+\pi^-))/\Gamma_{total}$ Γ_{45}/Γ

NODE=M026R1

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
0.91±0.12 OUR FIT				
1.27±0.23 OUR AVERAGE				
1.7 ±0.3 ±0.4	100	[1] ABLIKIM 12N	BES3	$\psi(2S) \to \pi^0 \gamma 2(\pi^+\pi^-)$
1.0 ±0.5	542 ± 75	[2] BAI 04	BES	$J/\psi \to \gamma\, 2(\pi^+\pi^-)$
1.05±0.17±0.34	137	[2] BISELLO 91	DM2	$J/\psi \to \gamma 2\pi^+ 2\pi^-$
1.3 ±0.6	25	[2] BALTRUSAIT...86	MRK3	$J/\psi \to \eta_c \gamma$
$2.0\ ^{+1.5}_{-1.0}$		[3] HIMEL 80B	MRK2	$\psi(2S) \to \eta_c \gamma$

[1] ABLIKIM 12N reports $[\Gamma(\eta_c(1S) \to 2(\pi^+\pi^-))/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] \times [B(h_c(1P) \to \gamma\eta_c(1S))] = (7.51 \pm 0.85 \pm 1.11) \times 10^{-6}$ which we divide by our best values $B(\psi(2S) \to h_c(1P)\pi^0) = (8.6 \pm 1.3) \times 10^{-4}$, $B(h_c(1P) \to \gamma\eta_c(1S)) = (50 \pm 9) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

NODE=M026R1;LINKAGE=AB

[2] The quoted branching ratios use $B(J/\psi(1S) \to \gamma\eta_c(1S)) = 0.0127 \pm 0.0036$. Where relevant, the error in this branching ratio is treated as a common systematic in computing averages.

NODE=M026R1;LINKAGE=E

[3] Estimated using $B(\psi(2S) \to \gamma\eta_c(1S)) = 0.0028 \pm 0.0006$.

NODE=M026R1;LINKAGE=A

$\Gamma(2(\pi^+\pi^-\pi^0))/\Gamma_{total}$ Γ_{46}/Γ

NODE=M026R08

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
15.8±2.3 OUR AVERAGE				
15.3±1.8±1.8	333	ABLIKIM 19AP	BES3	$h_c \to \gamma\eta_c$
17 ±3 ±4	175	[1] ABLIKIM 12N	BES3	$\psi(2S) \to \pi^0 \gamma 2(\pi^+\pi^-\pi^0)$

[1] ABLIKIM 12N reports $[\Gamma(\eta_c(1S) \to 2(\pi^+\pi^-\pi^0))/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] \times [B(h_c(1P) \to \gamma\eta_c(1S))] = (75.13 \pm 7.42 \pm 9.99) \times 10^{-6}$ which we divide by our best values $B(\psi(2S) \to h_c(1P)\pi^0) = (8.6 \pm 1.3) \times 10^{-4}$, $B(h_c(1P) \to \gamma\eta_c(1S)) = (50 \pm 9) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

NODE=M026R08;LINKAGE=AB

$\Gamma(3(\pi^+\pi^-))/\Gamma_{total}$ Γ_{47}/Γ

NODE=M026R24

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
17 ±4 OUR AVERAGE					
20 ±5 ±5	51	[1] ABLIKIM	12N	BES3	$\psi(2S) \to \pi^0\gamma 3(\pi^+\pi^-)$
15.4±3.4±3.3	479	[2] ABLIKIM	06A	BES2	$J/\psi \to 3(\pi^+\pi^-)\gamma$

[1] ABLIKIM 12N reports $[\Gamma(\eta_c(1S) \to 3(\pi^+\pi^-))/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] \times [B(h_c(1P) \to \gamma\eta_c(1S))] = (8.82 \pm 1.57 \pm 1.59) \times 10^{-6}$ which we divide by our best values $B(\psi(2S) \to h_c(1P)\pi^0) = (8.6 \pm 1.3) \times 10^{-4}$, $B(h_c(1P) \to \gamma\eta_c(1S)) = (50 \pm 9) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values. NODE=M026R24;LINKAGE=AL

[2] ABLIKIM 06A reports $[\Gamma(\eta_c(1S) \to 3(\pi^+\pi^-))/\Gamma_{total}] \times [B(J/\psi(1S) \to \gamma\eta_c(1S))] = (2.59 \pm 0.32 \pm 0.47) \times 10^{-4}$ which we divide by our best value $B(J/\psi(1S) \to \gamma\eta_c(1S)) = (1.7 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M026R24;LINKAGE=AB

$\Gamma(p\overline{p})/\Gamma_{total}$ Γ_{48}/Γ

NODE=M026R2

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
14.4± 1.4 OUR FIT					
12.6± 2.1 OUR AVERAGE					
12.0± 2.6±1.5	34	ABLIKIM	19AP	BES3	$h_c \to \gamma\eta_c$
15 ± 5 ±3	15	[1] ABLIKIM	12N	BES3	$\psi(2S) \to \pi^0\gamma p\overline{p}$
15 ± 6	213 ± 33	[2] BAI	04	BES	$J/\psi \to \gamma p\overline{p}$
10 ± 3 ±4	18	[2] BISELLO	91	DM2	$J/\psi \to \gamma p\overline{p}$
11 ± 6	23	[2] BALTRUSAIT...	86	MRK3	$J/\psi \to \eta_c\gamma$
$29\ ^{+29}_{-15}$		[3] HIMEL	80B	MRK2	$\psi(2S) \to \eta_c\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$13.1^{+1.8}_{-2.1}\pm0.9$	195	[4] WU	06	BELL	$B^+ \to p\overline{p}K^+$

[1] ABLIKIM 12N reports $[\Gamma(\eta_c(1S) \to p\overline{p})/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] \times [B(h_c(1P) \to \gamma\eta_c(1S))] = (0.65 \pm 0.19 \pm 0.10) \times 10^{-6}$ which we divide by our best values $B(\psi(2S) \to h_c(1P)\pi^0) = (8.6 \pm 1.3) \times 10^{-4}$, $B(h_c(1P) \to \gamma\eta_c(1S)) = (50 \pm 9) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values. NODE=M026R2;LINKAGE=AB

[2] The quoted branching ratios use $B(J/\psi(1S) \to \gamma\eta_c(1S)) = 0.0127 \pm 0.0036$. Where relevant, the error in this branching ratio is treated as a common systematic in computing averages. NODE=M026R2;LINKAGE=E

[3] Estimated using $B(\psi(2S) \to \gamma\eta_c(1S)) = 0.0028 \pm 0.0006$. NODE=M026R2;LINKAGE=A

[4] WU 06 reports $[\Gamma(\eta_c(1S) \to p\overline{p})/\Gamma_{total}] \times [B(B^+ \to \eta_c K^+)] = (1.42 \pm 0.11 ^{+0.16}_{-0.20}) \times 10^{-6}$ which we divide by our best value $B(B^+ \to \eta_c K^+) = (1.09 \pm 0.08) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M026R2;LINKAGE=WU

$\Gamma(p\overline{p})/\Gamma(K\overline{K}\pi)$ Γ_{48}/Γ_{34}

NODE=M026R03

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0198±0.0019 OUR FIT					
$0.021 \pm 0.002\ ^{+0.004}_{-0.006}$	195	[1] WU	06	BELL	$B^\pm \to K^\pm p\overline{p}$

[1] Using $B(B^+ \to \eta_c K^+) = (1.25 \pm 0.12 ^{+0.10}_{-0.12}) \times 10^{-3}$ from FANG 03 and $B(\eta_c \to K\overline{K}\pi) = (5.5 \pm 1.7) \times 10^{-2}$. NODE=M026R03;LINKAGE=BB

$\Gamma(p\overline{p})/\Gamma_{total} \times \Gamma(\phi\phi)/\Gamma_{total}$ $\Gamma_{48}/\Gamma \times \Gamma_8/\Gamma$

NODE=M026R33

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
0.25±0.04 OUR FIT				
$4.0\ ^{+3.5}_{-3.2}$	BAGLIN	89	SPEC	$\overline{p}p \to K^+K^-K^+K^-$

$\Gamma(p\overline{p}\pi^0)/\Gamma_{total}$ Γ_{49}/Γ

NODE=M026R09

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
0.36±0.13±0.08	14	[1] ABLIKIM	12N	BES3	$\psi(2S) \to \pi^0\gamma p\overline{p}\pi^0$

[1] ABLIKIM 12N reports $[\Gamma(\eta_c(1S) \to p\overline{p}\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] \times [B(h_c(1P) \to \gamma\eta_c(1S))] = (1.53 \pm 0.49 \pm 0.23) \times 10^{-6}$ which we divide by our best values $B(\psi(2S) \to h_c(1P)\pi^0) = (8.6 \pm 1.3) \times 10^{-4}$, $B(h_c(1P) \to \gamma\eta_c(1S)) = (50 \pm 9) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values. NODE=M026R09;LINKAGE=AB

$\Gamma(\Lambda\overline{\Lambda})/\Gamma_{total}$ Γ_{50}/Γ

NODE=M026R18

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
10.6±2.3 OUR FIT						
11.8±2.3±2.5			[1] ABLIKIM	12B	BES3	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$8.7^{+2.4}_{-2.3}\pm0.6$		20	[2] WU	06	BELL	$B^+ \to \Lambda\overline{\Lambda}K^+$
<20	90		[3] BISELLO	91	DM2	$e^+e^- \to \gamma\Lambda\overline{\Lambda}$

[1] ABLIKIM 12B reports $[\Gamma(\eta_c(1S) \to \Lambda\overline{\Lambda})/\Gamma_{total}] \times [B(J/\psi(1S) \to \gamma\eta_c(1S))] = (0.198 \pm 0.021 \pm 0.032) \times 10^{-4}$ which we divide by our best value $B(J/\psi(1S) \to \gamma\eta_c(1S)) = (1.7 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M026R18;LINKAGE=AB

[2] WU 06 reports $[\Gamma(\eta_c(1S) \to \Lambda\overline{\Lambda})/\Gamma_{total}] \times [B(B^+ \to \eta_c K^+)] = (0.95^{+0.25+0.08}_{-0.22-0.11}) \times 10^{-6}$ which we divide by our best value $B(B^+ \to \eta_c K^+) = (1.09 \pm 0.08) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M026R18;LINKAGE=WU

[3] The quoted branching ratios use $B(J/\psi(1S) \to \gamma\eta_c(1S)) = 0.0127 \pm 0.0036$. NODE=M026R18;LINKAGE=E

$\Gamma(\Lambda\overline{\Lambda})/\Gamma(p\overline{p})$ Γ_{50}/Γ_{48}

NODE=M026R27

VALUE	DOCUMENT ID		TECN	COMMENT
0.74±0.16 OUR FIT				
$\mathbf{0.67^{+0.19}_{-0.16}\pm0.12}$	[1] WU	06	BELL	$B^+ \to p\overline{p}K^+, \Lambda\overline{\Lambda}K^+$

[1] Not independent from other $\eta_c \to \Lambda\overline{\Lambda}$, $p\overline{p}$ branching ratios reported by WU 06. NODE=M026R27;LINKAGE=WU

$\Gamma(K^+\overline{p}\Lambda + \text{c.c.})/\Gamma_{total}$ Γ_{51}/Γ

NODE=M026R53

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{2.50^{+0.34+0.17}_{-0.32-0.18}}$	157	[1] LU	19	BELL	$B^+ \to \overline{p}\Lambda K^+K^+$

[1] LU 19 reports $(2.83^{+0.36}_{-0.34} \pm 0.35) \times 10^{-3}$ from a measurement of $[\Gamma(\eta_c(1S) \to K^+\overline{p}\Lambda+ \text{c.c.})/\Gamma_{total}] \times [B(B^+ \to \eta_c K^+)]$ assuming $B(B^+ \to \eta_c K^+) = (9.6 \pm 1.1) \times 10^{-4}$, which we rescale to our best value $B(B^+ \to \eta_c K^+) = (1.09 \pm 0.08) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M026R53;LINKAGE=A

$\Gamma(\overline{\Lambda}(1520)\Lambda + \text{c.c.})/\Gamma_{total}$ Γ_{52}/Γ

NODE=M026R54

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
3.1±1.3±0.2	43	[1] LU	19	BELL	$B^+ \to \overline{p}\Lambda K^+K^+$

[1] LU 19 reports $(3.48 \pm 1.48 \pm 0.46) \times 10^{-3}$ from a measurement of $[\Gamma(\eta_c(1S) \to \overline{\Lambda}(1520)\Lambda+ \text{c.c.})/\Gamma_{total}] \times [B(B^+ \to \eta_c K^+)]$ assuming $B(B^+ \to \eta_c K^+) = (9.6 \pm 1.1) \times 10^{-4}$, which we rescale to our best value $B(B^+ \to \eta_c K^+) = (1.09 \pm 0.08) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M026R54;LINKAGE=A

$\Gamma(\Sigma^+\overline{\Sigma}^-)/\Gamma_{total}$ Γ_{53}/Γ

NODE=M026R28

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
2.1±0.3±0.5	112	[1] ABLIKIM	13C	BES3	$J/\psi \to \gamma p\overline{p}\pi^0\pi^0$

[1] ABLIKIM 13C reports $[\Gamma(\eta_c(1S) \to \Sigma^+\overline{\Sigma}^-)/\Gamma_{total}] \times [B(J/\psi(1S) \to \gamma\eta_c(1S))] = (3.60 \pm 0.48 \pm 0.31) \times 10^{-5}$ which we divide by our best value $B(J/\psi(1S) \to \gamma\eta_c(1S)) = (1.7 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M026R28;LINKAGE=AB

$\Gamma(\Xi^-\overline{\Xi}^+)/\Gamma_{total}$ Γ_{54}/Γ

NODE=M026R29

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.90±0.18±0.19	78	[1] ABLIKIM	13C	BES3	$J/\psi \to \gamma\Lambda\overline{\Lambda}\pi^+\pi^-$

[1] ABLIKIM 13C reports $[\Gamma(\eta_c(1S) \to \Xi^-\overline{\Xi}^+)/\Gamma_{total}] \times [B(J/\psi(1S) \to \gamma\eta_c(1S))] = (1.51 \pm 0.27 \pm 0.14) \times 10^{-5}$ which we divide by our best value $B(J/\psi(1S) \to \gamma\eta_c(1S)) = (1.7 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M026R29;LINKAGE=AB

$\Gamma(\pi^+\pi^- p\overline{p})/\Gamma_{total}$ — Γ_{55}/Γ

NODE=M026R3

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
5.3±1.7±1.2		19	[1] ABLIKIM	12N	BES3	$\psi(2S) \to \pi^0 \gamma p\overline{p}\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<12	90		HIMEL	80B	MRK2	$\psi(2S) \to \eta_c \gamma$

[1] ABLIKIM 12N reports $[\Gamma(\eta_c(1S) \to \pi^+\pi^- p\overline{p})/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] \times [B(h_c(1P) \to \gamma\eta_c(1S))] = (2.30 \pm 0.65 \pm 0.36) \times 10^{-6}$ which we divide by our best values $B(\psi(2S) \to h_c(1P)\pi^0) = (8.6 \pm 1.3) \times 10^{-4}$, $B(h_c(1P) \to \gamma\eta_c(1S)) = (50 \pm 9) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values. NODE=M026R3;LINKAGE=AB

RADIATIVE DECAYS

NODE=M026310

$\Gamma(\gamma\gamma)/\Gamma_{total}$ — Γ_{56}/Γ

NODE=M026R31

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
1.61±0.12 OUR FIT						
1.9 $^{+0.7}_{-0.6}$ OUR AVERAGE						
2.7 ±0.8 ±0.6			[1] ABLIKIM	13I	BES3	
1.4 $^{+0.7}_{-0.5}$ ±0.3		$1.2^{+2.8}_{-1.1}$	[2] ADAMS	08	CLEO	$\psi(2S) \to \pi^+\pi^- J/\psi$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
2.0 $^{+0.9}_{-0.7}$ ±0.1		13	[3] WICHT	08	BELL	$B^\pm \to K^\pm\gamma\gamma$
2.80$^{+0.67}_{-0.58}$±1.0			[4] ARMSTRONG	95F	E760	$\overline{p}p \to \gamma\gamma$
< 9	90		[5] BISELLO	91	DM2	$J/\psi \to \gamma\gamma\gamma$
6 $^{+4}_{-3}$ ±4			[4] BAGLIN	87B	SPEC	$\overline{p}p \to \gamma\gamma$
< 18	90		[6] BLOOM	83	CBAL	$J/\psi \to \eta_c\gamma$

[1] ABLIKIM 13I reports $[\Gamma(\eta_c(1S) \to \gamma\gamma)/\Gamma_{total}] \times [B(J/\psi(1S) \to \gamma\eta_c(1S))] = (4.5 \pm 1.2 \pm 0.6) \times 10^{-6}$ which we divide by our best value $B(J/\psi(1S) \to \gamma\eta_c(1S)) = (1.7 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M026R31;LINKAGE=AL

[2] ADAMS 08 reports $[\Gamma(\eta_c(1S) \to \gamma\gamma)/\Gamma_{total}] \times [B(J/\psi(1S) \to \gamma\eta_c(1S))] = (2.4^{+1.1}_{-0.8} \pm 0.3) \times 10^{-6}$ which we divide by our best value $B(J/\psi(1S) \to \gamma\eta_c(1S)) = (1.7 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M026R31;LINKAGE=AD

[3] WICHT 08 reports $[\Gamma(\eta_c(1S) \to \gamma\gamma)/\Gamma_{total}] \times [B(B^+ \to \eta_c K^+)] = (2.2^{+0.9}_{-0.7}{}^{+0.4}_{-0.2}) \times 10^{-7}$ which we divide by our best value $B(B^+ \to \eta_c K^+) = (1.09 \pm 0.08) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M026R31;LINKAGE=WI

[4] Not independent from the values of the total and two-photon width quoted by the same experiment. NODE=M026R31;LINKAGE=AB

[5] The quoted branching ratios use $B(J/\psi(1S) \to \gamma\eta_c(1S)) = 0.0127 \pm 0.0036$. NODE=M026R31;LINKAGE=E

[6] Using $B(J/\psi(1S) \to \gamma\eta_c(1S)) = 0.0127 \pm 0.0036$. NODE=M026R31;LINKAGE=C

$\Gamma(\gamma\gamma)/\Gamma(K\overline{K}\pi)$ — Γ_{56}/Γ_{34}

NODE=M026R04

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
2.22±0.25 OUR FIT					
3.2 $^{+1.3}_{-1.0}$ $^{+0.8}_{-0.6}$	13	[1] WICHT	08	BELL	$B^\pm \to K^\pm\gamma\gamma$

[1] Using $B(B^+ \to \eta_c K^+) = (1.25 \pm 0.12^{+0.10}_{-0.12}) \times 10^{-3}$ from FANG 03 and $B(\eta_c \to K\overline{K}\pi) = (5.5 \pm 1.7) \times 10^{-2}$. NODE=M026R04;LINKAGE=BB

$\Gamma(p\overline{p})/\Gamma_{total} \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{48}/\Gamma \times \Gamma_{56}/\Gamma$

NODE=M026R32

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
0.232±0.022 OUR FIT					
0.26 ±0.05 OUR AVERAGE Error includes scale factor of 1.4.					
0.224$^{+0.038}_{-0.037}$±0.020	190	AMBROGIANI	03	E835	$\overline{p}p \to \eta_c \to \gamma\gamma$
0.336$^{+0.080}_{-0.070}$		ARMSTRONG	95F	E760	$\overline{p}p \to \gamma\gamma$
0.68 $^{+0.42}_{-0.31}$	12	BAGLIN	87B	SPEC	$\overline{p}p \to \gamma\gamma$

Charge conjugation (C), Parity (P), Lepton family number (LF) violating modes

NODE=M026320

$\Gamma(\pi^+\pi^-)/\Gamma_{total}$ — Γ_{57}/Γ

NODE=M026R34
NODE=M026R34

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<11	90	[1] ABLIKIM	11G	BES3	$J/\psi \to \gamma\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<70	90	[2] ABLIKIM	06B	BES2	$J/\psi \to \pi^+\pi^-\gamma$

[1] ABLIKIM 11G reports $[\Gamma(\eta_c(1S) \to \pi^+\pi^-)/\Gamma_{total}] \times [B(J/\psi(1S) \to \gamma\eta_c(1S))] < 1.82\times10^{-6}$ which we divide by our best value $B(J/\psi(1S) \to \gamma\eta_c(1S)) = 1.7\times10^{-2}$.

NODE=M026R34;LINKAGE=AL

[2] ABLIKIM 06B reports $[\Gamma(\eta_c(1S) \to \pi^+\pi^-)/\Gamma_{total}] \times [B(J/\psi(1S) \to \gamma\eta_c(1S))] < 1.1\times10^{-5}$ which we divide by our best value $B(J/\psi(1S) \to \gamma\eta_c(1S)) = 1.7\times10^{-2}$.

NODE=M026R34;LINKAGE=AB

$\Gamma(\pi^0\pi^0)/\Gamma_{total}$ — Γ_{58}/Γ

NODE=M026R35
NODE=M026R35

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
< 4	90	[1] ABLIKIM	11G	BES3	$J/\psi \to \gamma\pi^0\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<40	90	[2] ABLIKIM	06B	BES2	$J/\psi \to \pi^0\pi^0\gamma$

[1] ABLIKIM 11G reports $[\Gamma(\eta_c(1S) \to \pi^0\pi^0)/\Gamma_{total}] \times [B(J/\psi(1S) \to \gamma\eta_c(1S))] < 6.0 \times 10^{-7}$ which we divide by our best value $B(J/\psi(1S) \to \gamma\eta_c(1S)) = 1.7 \times 10^{-2}$.

NODE=M026R35;LINKAGE=AL

[2] ABLIKIM 06B reports $[\Gamma(\eta_c(1S) \to \pi^0\pi^0)/\Gamma_{total}] \times [B(J/\psi(1S) \to \gamma\eta_c(1S))] < 0.71 \times 10^{-5}$ which we divide by our best value $B(J/\psi(1S) \to \gamma\eta_c(1S)) = 1.7 \times 10^{-2}$.

NODE=M026R35;LINKAGE=AB

$\Gamma(K^+K^-)/\Gamma_{total}$ — Γ_{59}/Γ

NODE=M026R36
NODE=M026R36

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<60	90	[1] ABLIKIM	06B	BES2	$J/\psi \to K^+K^-\gamma$

[1] ABLIKIM 06B reports $[\Gamma(\eta_c(1S) \to K^+K^-)/\Gamma_{total}] \times [B(J/\psi(1S) \to \gamma\eta_c(1S))] < 0.96\times10^{-5}$ which we divide by our best value $B(J/\psi(1S) \to \gamma\eta_c(1S)) = 1.7\times10^{-2}$.

NODE=M026R36;LINKAGE=AB

$\Gamma(K^0_S K^0_S)/\Gamma_{total}$ — Γ_{60}/Γ

NODE=M026R37
NODE=M026R37

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<31	90	[1] ABLIKIM	06B	BES2	$J/\psi \to K^0_S K^0_S\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<32	90	[2] UEHARA	13	BELL	$\gamma\gamma \to K^0_S K^0_S$
< 5.6	90	[3] UEHARA	13	BELL	$\gamma\gamma \to K^0_S K^0_S$

OCCUR=2

[1] ABLIKIM 06B reports $[\Gamma(\eta_c(1S) \to K^0_S K^0_S)/\Gamma_{total}] \times [B(J/\psi(1S) \to \gamma\eta_c(1S))] < 0.53\times10^{-5}$ which we divide by our best value $B(J/\psi(1S) \to \gamma\eta_c(1S)) = 1.7\times10^{-2}$.

NODE=M026R37;LINKAGE=AB

[2] Taking into account interference with the non-resonant continuum.

NODE=M026R37;LINKAGE=U1

[3] Neglecting interference with the non-resonant continuum.

NODE=M026R37;LINKAGE=U2

$\eta_c(1S)$ REFERENCES

NODE=M026

LEES	21A	PR D104 072002	J.P. Lees *et al.*	(BABAR Collab.)	REFID=61442
AAIJ	20H	EPJ C80 191	R. Aaij *et al.*	(LHCb Collab.)	REFID=60419
ABLIKIM	19AP	PR D100 012003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59901
ABLIKIM	19AV	PR D100 052012	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59998
LU	19	PR D99 032003	P.-C. Lu *et al.*	(BELLE Collab.)	REFID=59614
XU	18	PR D98 072001	Q.N. Xu *et al.*	(BELLE Collab.)	REFID=59453
AAIJ	17AD	PL B769 305	R. Aaij *et al.*	(LHCb Collab.)	REFID=57896
AAIJ	17BB	EPJ C77 609	R. Aaij *et al.*	(LHCb Collab.)	REFID=58191
ABLIKIM	17AJ	PR D96 112008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58322
ABLIKIM	17P	PR D95 092004	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57989
LEES	16A	PR D93 012005	J.P. Lees *et al.*	(BABAR Collab.)	REFID=57125
PDG	16	CP C40 100001	C. Patrignani *et al.*	(PDG Collab.)	REFID=57140
AAIJ	15AS	JHEP 1510 053	R. Aaij *et al.*	(LHCb Collab.)	REFID=56857
AAIJ	15BI	EPJ C75 311	R. Aaij *et al.*	(LHCb Collab.)	REFID=57147
ANASHIN	14	PL B738 391	V.V. Anashin *et al.*	(KEDR Collab.)	REFID=56130
LEES	14E	PR D89 112004	J.P. Lees *et al.*	(BABAR Collab.)	REFID=55937
ABLIKIM	13C	PR D87 012003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54878
ABLIKIM	13I	PR D87 032003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54954
UEHARA	13	PTEP 2013 123C01	S. Uehara *et al.*	(BELLE Collab.)	REFID=55592
ABLIKIM	12B	PR D86 032008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54267
ABLIKIM	12F	PRL 108 222002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54271
ABLIKIM	12N	PR D86 092009	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54741
LIU	12B	PRL 108 232001	Z.Q. Liu *et al.*	(BELLE Collab.)	REFID=54303
ZHANG	12A	PR D86 052002	C.C. Zhang *et al.*	(BELLE Collab.)	REFID=54763
ABLIKIM	11G	PR D84 032006	M. Ablikim *et al.*	(BESIII Collab.)	REFID=53711
DEL-AMO-SA...	11M	PR D84 012004	P. del Amo Sanchez *et al.*	(BABAR Collab.)	REFID=16751
VINOKUROVA	11	PL B706 139	A. Vinokurova *et al.*	(BELLE Collab.)	REFID=53927
LEES	10	PR D81 052010	J.P. Lees *et al.*	(BABAR Collab.)	REFID=53236
MITCHELL	09	PRL 102 011801	R.E. Mitchell *et al.*	(CLEO Collab.)	REFID=52676
ADAMS	08	PRL 101 101801	G.S. Adams *et al.*	(CLEO Collab.)	REFID=52261
AUBERT	08AB	PR D78 012006	B. Aubert *et al.*	(BABAR Collab.)	REFID=52267
UEHARA	08	EPJ C53 1	S. Uehara *et al.*	(BELLE Collab.)	REFID=52064

WICHT	08	PL B662 323	J. Wicht *et al.*	(BELLE Collab.)	REFID=52204
ABE	07	PRL 98 082001	K. Abe *et al.*	(BELLE Collab.)	REFID=51627
ABLIKIM	06A	PL B633 19	M. Ablikim *et al.*	(BES Collab.)	REFID=50987
ABLIKIM	06B	EPJ C45 337	M. Ablikim *et al.*	(BES Collab.)	REFID=50988
AUBERT	06E	PRL 96 052002	B. Aubert *et al.*	(BABAR Collab.)	REFID=51059
PDG	06	JP G33 1	W.-M. Yao *et al.*	(PDG Collab.)	REFID=51004
WU	06	PRL 97 162003	C.-H. Wu *et al.*	(BELLE Collab.)	REFID=51472
ABLIKIM	05L	PR D72 072005	M. Ablikim *et al.*	(BES Collab.)	REFID=50837
KUO	05	PL B621 41	C.C. Kuo *et al.*	(BELLE Collab.)	REFID=50801
ABE	04G	PR D70 071102	K. Abe *et al.*	(BELLE Collab.)	REFID=50182
ABLIKIM	04M	PR D70 112008	M. Ablikim *et al.*	(BES Collab.)	REFID=50329
ASNER	04	PRL 92 142001	D.M. Asner *et al.*	(CLEO Collab.)	REFID=49745
AUBERT	04D	PRL 92 142002	B. Aubert *et al.*	(BABAR Collab.)	REFID=49746
AUBERT,B	04B	PR D70 011101	B. Aubert *et al.*	(BABAR Collab.)	REFID=50043
BAI	04	PL B578 16	J.Z. Bai *et al.*	(BES Collab.)	REFID=49620
ABDALLAH	03J	EPJ C31 481	J. Abdallah *et al.*	(DELPHI Collab.)	REFID=49625
AMBROGIANI	03	PL B566 45	M. Ambrogiani *et al.*	(FNAL E835 Collab.)	REFID=49465
BAI	03	PL B555 174	J.Z. Bai *et al.*	(BES Collab.)	REFID=49185
FANG	03	PRL 90 071801	F. Fang *et al.*	(BELLE Collab.)	REFID=49206
HUANG	03	PRL 91 241802	H.-C. Huang *et al.*	(BELLE Collab.)	REFID=49621
ABE,K	02	PRL 89 142001	K. Abe *et al.*	(BELLE Collab.)	REFID=49188
BAI	00F	PR D62 072001	J.Z. Bai *et al.*	(BES Collab.)	REFID=48546
BRANDENB...	00B	PRL 85 3095	G. Brandenburg *et al.*	(CLEO Collab.)	REFID=48553
ACCIARRI	99T	PL B461 155	M. Acciarri *et al.*	(L3 Collab.)	REFID=47476
BAI	99B	PR D60 072001	J.Z. Bai *et al.*	(BES Collab.)	REFID=47385
ABREU	98O	PL B441 479	P. Abreu *et al.*	(DELPHI Collab.)	REFID=46553
SHIRAI	98	PL B424 405	M. Shirai *et al.*	(AMY Collab.)	REFID=46381
ARMSTRONG	95F	PR D52 4839	T.A. Armstrong *et al.*	(FNAL, FERR, GENO+)	REFID=44623
ALBRECHT	94H	PL B338 390	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=44098
ADRIANI	93N	PL B318 575	O. Adriani *et al.*	(L3 Collab.)	REFID=43670
BISELLO	91	NP B350 1	D. Bisello *et al.*	(DM2 Collab.)	REFID=41668
BAI	90B	PRL 65 1309	Z. Bai *et al.*	(Mark III Collab.)	REFID=41354
CHEN	90B	PL B243 169	W.Y. Chen *et al.*	(CLEO Collab.)	REFID=41360
BAGLIN	89	PL B231 557	C. Baglin, S. Baird, G. Bassompierre	(R704 Collab.)	REFID=41015
BEHREND	89	ZPHY C42 367	H.J. Behrend *et al.*	(CELLO Collab.)	REFID=40732
BRAUNSCH...	89	ZPHY C41 533	W. Braunschweig *et al.*	(TASSO Collab.)	REFID=40728
AIHARA	88D	PRL 60 2355	H. Aihara *et al.*	(TPC Collab.)	REFID=40588
BAGLIN	87B	PL B187 191	C. Baglin *et al.*	(R704 Collab.)	REFID=40018
BALTRUSAIT...	86	PR D33 629	R.M. Baltrusaitis *et al.*	(Mark III Collab.)	REFID=22009
BERGER	86	PL 167B 120	C. Berger *et al.*	(PLUTO Collab.)	REFID=22010
GAISER	86	PR D34 711	J. Gaiser *et al.*	(Crystal Ball Collab.)	REFID=22012
ALTHOFF	85B	ZPHY C29 189	M. Althoff *et al.*	(TASSO Collab.)	REFID=21349
BALTRUSAIT...	84	PRL 52 2126	R.M. Baltrusaitis *et al.*	(CIT, UCSC+) JP	REFID=22006
BLOOM	83	ARNS 33 143	E.D. Bloom, C. Peck	(SLAC, CIT)	REFID=21682
HIMEL	80B	PRL 45 1146	T.M. Himel *et al.*	(SLAC, LBL, UCB)	REFID=22003
PARTRIDGE	80B	PRL 45 1150	R. Partridge *et al.*	(CIT, HARV, PRIN+)	REFID=22004

NODE=M070

$J/\psi(1S)$

$I^G(J^{PC}) = 0^-(1^{--})$

$J/\psi(1S)$ MASS

NODE=M070M

NODE=M070M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
3096.900±0.006 OUR AVERAGE					
3096.900±0.002±0.006		[1] ANASHIN	15	KEDR	$e^+e^- \to$ hadrons
3096.89 ±0.09	502	[2] ARTAMONOV	00	OLYA	$e^+e^- \to$ hadrons
3096.91 ±0.03 ±0.01		[3] ARMSTRONG	93B	E760	$\overline{p}p \to e^+e^-$
3096.95 ±0.1 ±0.3	193	BAGLIN	87	SPEC	$\overline{p}p \to e^+e^-X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3096.66 ±0.19 ±0.02	6.1k	[4] AAIJ	15BI	LHCB	$pp \to J/\psi X$
3096.917±0.010±0.007		AULCHENKO	03	KEDR	$e^+e^- \to$ hadrons
3097.5 ±0.3		GRIBUSHIN	96	FMPS	515 π^- Be $\to 2\mu X$
3098.4 ±2.0	38k	LEMOIGNE	82	GOLI	185 π^- Be $\to \gamma\mu^+\mu^-$ A
3096.93 ±0.09	502	[5] ZHOLENTZ	80	REDE	e^+e^-
3097.0 ±1		[6] BRANDELIK	79C	DASP	e^+e^-

[1] Supersedes AULCHENKO 03. NODE=M070M;LINKAGE=A

[2] Reanalysis of ZHOLENTZ 80 using new electron mass (COHEN 87) and radiative corrections (KURAEV 85). NODE=M070M;LINKAGE=AR

[3] Mass central value and systematic error recalculated by us according to Eq. (16) in ARMSTRONG 93B, using the value for the $\psi(2S)$ mass from AULCHENKO 03. NODE=M070M;LINKAGE=NW

[4] From a sample of $\eta_c(1S)$ and J/ψ produced in b-hadron decays. Systematic uncertainties not estimated. NODE=M070M;LINKAGE=B

[5] Superseded by ARTAMONOV 00. NODE=M070M;LINKAGE=RZ

[6] From a simultaneous fit to e^+e^-, $\mu^+\mu^-$ and hadronic channels assuming $\Gamma(e^+e^-) = \Gamma(\mu^+\mu^-)$. NODE=M070M;LINKAGE=F

$J/\psi(1S)$ WIDTH

NODE=M070W

NODE=M070W

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
92.6 ± 1.7 OUR AVERAGE	Error includes scale factor of 1.1.				
92.45± 1.40±1.48		[1] ANASHIN	20	KEDR	e^+e^-
96.1 ± 3.2	13k	[2] ADAMS	06A	CLEO	$e^+e^- \to \mu^+\mu^-\gamma$
84.4 ± 8.9		BAI	95B	BES	e^+e^-
91 ±11 ±6		[3] ARMSTRONG	93B	E760	$\overline{p}p \to e^+e^-$
85.5 $^{+6.1}_{-5.8}$		[4] HSUEH	92	RVUE	See Υ mini-review
• • • We do not use the following data for averages, fits, limits, etc. • • •					
92.94± 1.83		[5,6] ANASHIN	18A	KEDR	e^+e^-
94.1 ± 2.7		[7] ANASHIN	10	KEDR	3.097 $e^+e^- \to e^+e^-$, $\mu^+\mu^-$
93.7 ± 3.5	7.8k	[2] AUBERT	04	BABR	$e^+e^- \to \mu^+\mu^-\gamma$

[1] Based on the same dataset as ANASHIN 18A and correlated to the values reported there . NODE=M070W;LINKAGE=C

[2] Calculated by us from the reported values of $\Gamma(e^+e^-)\times B(\mu^+\mu^-)$ using $B(e^+e^-) = (5.94 \pm 0.06)\%$ and $B(\mu^+\mu^-) = (5.93 \pm 0.06)\%$. NODE=M070W;LINKAGE=AA

[3] The initial-state radiation correction reevaluated by ANDREOTTI 07 in its Ref. [4]. NODE=M070W;LINKAGE=AN

[4] Using data from COFFMAN 92, BALDINI-CELIO 75, BOYARSKI 75, ESPOSITO 75B, BRANDELIK 79C. NODE=M070W;LINKAGE=A

[5] Using $\Gamma(e^+e^-)$ from ANASHIN 18A and $B(J/\psi(1S) \to e^+e^-) = (5.971 \pm 0.032)\%$ from PDG 16. NODE=M070W;LINKAGE=B

[6] Superseded by ANASHIN 20 that is based on the same dataset . NODE=M070W;LINKAGE=D

[7] Assuming $\Gamma(e^+e^-) = \Gamma(\mu^+\mu^-)$ and using $\Gamma(e^+e^-)/\Gamma_{total} = (5.94 \pm 0.06)\%$. NODE=M070W;LINKAGE=AS

$J/\psi(1S)$ DECAY MODES

NODE=M070215;NODE=M070

	Mode		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	
Γ_1	hadrons		(87.7 ± 0.5) %		DESIG=3
Γ_2	virtual $\gamma \to$ hadrons		(13.50 ± 0.30) %		DESIG=4
Γ_3	ggg		(64.1 ± 1.0) %		DESIG=249
Γ_4	γgg		(8.8 ± 1.1) %		DESIG=250
Γ_5	e^+e^-		(5.971± 0.032) %		DESIG=1
Γ_6	$e^+e^-\gamma$	[a]	(8.8 ± 1.4) $\times 10^{-3}$		DESIG=5
Γ_7	$\mu^+\mu^-$		(5.961± 0.033) %		DESIG=2

Decays involving hadronic resonances

NODE=M070;CLUMP=A

	Mode		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	
Γ_{8}	$\rho\pi$		(1.69 ± 0.15) %	S=2.4	DESIG=20
Γ_{9}	$\rho^0\pi^0$		$(5.6 \pm 0.7) \times 10^{-3}$		DESIG=21
Γ_{10}	$a_2(1320)\rho$		(1.09 ± 0.22) %		DESIG=43
Γ_{11}	$\eta\pi^+\pi^-$		$(3.8 \pm 0.7) \times 10^{-4}$		DESIG=239
Γ_{12}	$\eta\pi^+\pi^-\pi^0$		(1.17 ± 0.20) %		DESIG=420
Γ_{13}	$\eta\pi^+\pi^-3\pi^0$		$(4.9 \pm 1.0) \times 10^{-3}$		DESIG=422
Γ_{14}	$\eta\rho$		$(1.93 \pm 0.23) \times 10^{-4}$		DESIG=22
Γ_{15}	$\eta\phi(2170) \to \eta\phi f_0(980) \to \eta\phi\pi^+\pi^-$		$(1.2 \pm 0.4) \times 10^{-4}$		DESIG=287
Γ_{16}	$\eta\phi(2170) \to \eta K^*(892)^0\overline{K}^*(892)^0$		$< 2.52 \times 10^{-4}$	CL=90%	DESIG=253
Γ_{17}	$\eta K^\pm K^0_S\pi^\mp$	[b]	$(2.2 \pm 0.4) \times 10^{-3}$		DESIG=230
Γ_{18}	$\eta K^*(892)^0\overline{K}^*(892)^0$		$(1.15 \pm 0.26) \times 10^{-3}$		DESIG=252
Γ_{19}	$\rho\eta'(958)$		$(8.1 \pm 0.8) \times 10^{-5}$	S=1.6	DESIG=23
Γ_{20}	$\rho^\pm\pi^\mp\pi^+\pi^-2\pi^0$		(2.8 ± 0.8) %		DESIG=415
Γ_{21}	$\rho^+\rho^-\pi^+\pi^-\pi^0$		$(6 \pm 4) \times 10^{-3}$		DESIG=416
Γ_{22}	$\rho^\mp K^\pm K^0_S$		$(1.9 \pm 0.4) \times 10^{-3}$		DESIG=342
Γ_{23}	$\rho(1450)\pi$				DESIG=310
Γ_{24}	$\rho(1450)\pi \to \pi^+\pi^-\pi^0$		$(2.3 \pm 0.7) \times 10^{-3}$		DESIG=328
Γ_{25}	$\rho(1450)^\pm\pi^\mp \to K^0_S K^\pm\pi^\mp$		$(3.5 \pm 0.6) \times 10^{-4}$		DESIG=329
Γ_{26}	$\rho(1450)^0\pi^0 \to K^+K^-\pi^0$		$(2.7 \pm 0.6) \times 10^{-4}$		DESIG=312
Γ_{27}	$\rho(1450)\eta'(958) \to \pi^+\pi^-\eta'(958)$		$(3.3 \pm 0.7) \times 10^{-6}$		DESIG=345
Γ_{28}	$\rho(1700)\pi$				DESIG=325
Γ_{29}	$\rho(1700)\pi \to \pi^+\pi^-\pi^0$		$(1.7 \pm 1.1) \times 10^{-4}$		DESIG=313
Γ_{30}	$\rho(2150)\pi$				DESIG=326
Γ_{31}	$\rho(2150)\pi \to \pi^+\pi^-\pi^0$		$(8 \pm 40) \times 10^{-6}$		DESIG=314
Γ_{32}	$\rho_3(1690)\pi \to \pi^+\pi^-\pi^0$				DESIG=316
Γ_{33}	$\omega\pi^0$		$(4.5 \pm 0.5) \times 10^{-4}$	S=1.4	DESIG=32
Γ_{34}	$\omega\pi^0 \to \pi^+\pi^-\pi^0$		$(1.7 \pm 0.8) \times 10^{-5}$		DESIG=327
Γ_{35}	$\omega\pi^+\pi^-$		$(7.2 \pm 1.0) \times 10^{-3}$		DESIG=24
Γ_{36}	$\omega\pi^0\pi^0$		$(3.4 \pm 0.8) \times 10^{-3}$		DESIG=140
Γ_{37}	$\omega 3\pi^0$		$(1.9 \pm 0.6) \times 10^{-3}$		DESIG=421
Γ_{38}	$\omega f_2(1270)$		$(4.3 \pm 0.6) \times 10^{-3}$		DESIG=28
Γ_{39}	$\omega\eta$		$(1.74 \pm 0.20) \times 10^{-3}$	S=1.6	DESIG=30
Γ_{40}	$\omega\pi^+\pi^-\pi^0$		$(4.0 \pm 0.7) \times 10^{-3}$		DESIG=211
Γ_{41}	$\omega\pi^0\eta$		$(3.4 \pm 1.7) \times 10^{-4}$		DESIG=360
Γ_{42}	$\omega\pi^+\pi^+\pi^-\pi^-$		$(8.5 \pm 3.4) \times 10^{-3}$		DESIG=26
Γ_{43}	$\omega\pi^+\pi^-2\pi^0$		(3.3 ± 0.5) %		DESIG=412
Γ_{44}	$\omega\eta'\pi^+\pi^-$		$(1.12 \pm 0.13) \times 10^{-3}$		DESIG=385
Γ_{45}	$\omega\eta'(958)$		$(1.89 \pm 0.18) \times 10^{-4}$		DESIG=31
Γ_{46}	$\omega f_0(980)$		$(1.4 \pm 0.5) \times 10^{-4}$		DESIG=150
Γ_{47}	$\omega f_0(1710) \to \omega K\overline{K}$		$(4.8 \pm 1.1) \times 10^{-4}$		DESIG=130
Γ_{48}	$\omega f_1(1420)$		$(6.8 \pm 2.4) \times 10^{-4}$		DESIG=105
Γ_{49}	$\omega f'_2(1525)$		$< 2.2 \times 10^{-4}$	CL=90%	DESIG=29
Γ_{50}	$\omega X(1835) \to \omega p\overline{p}$		$< 3.9 \times 10^{-6}$	CL=95%	DESIG=263
Γ_{51}	$\omega X(1835),\ X \to \eta'\pi^+\pi^-$		$< 6.2 \times 10^{-5}$		DESIG=386
Γ_{52}	$\omega K^\pm K^0_S\pi^\mp$	[b]	$(3.4 \pm 0.5) \times 10^{-3}$		DESIG=101
Γ_{53}	$\omega K\overline{K}$		$(1.9 \pm 0.4) \times 10^{-3}$		DESIG=27
Γ_{54}	$\omega K^*(892)\overline{K}$ + c.c.		$(6.1 \pm 0.9) \times 10^{-3}$		DESIG=102
Γ_{55}	$\eta' K^{*\pm}K^\mp$		$(1.48 \pm 0.13) \times 10^{-3}$		DESIG=355
Γ_{56}	$\eta' K^{*0}\overline{K}^0$ + c.c.		$(1.66 \pm 0.21) \times 10^{-3}$		DESIG=357
Γ_{57}	$\eta' h_1(1415) \to \eta' K^*\overline{K}$ + c.c.		$(2.16 \pm 0.31) \times 10^{-4}$		DESIG=353
Γ_{58}	$\eta' h_1(1415) \to \eta' K^{*\pm}K^\mp$		$(1.51 \pm 0.23) \times 10^{-4}$		DESIG=354
Γ_{59}	$\overline{K}K^*(892)$+c.c.				DESIG=331
Γ_{60}	$\overline{K}K^*(892)$+c.c. $\to K^0_S K^\pm\pi^\mp$		$(5.0 \pm 0.5) \times 10^{-3}$		DESIG=332
Γ_{61}	$K^+K^*(892)^-$ + c.c.		$(6.0 {}^{+0.8}_{-1.0}) \times 10^{-3}$	S=2.9	DESIG=121

Γ_{62}	$K^+ K^*(892)^- +$ c.c. $\to K^+ K^- \pi^0$	$(2.69 {}^{+0.13}_{-0.20}) \times 10^{-3}$		DESIG=231
Γ_{63}	$K^+ K^*(892)^- +$ c.c. $\to K^0 K^\pm \pi^\mp +$ c.c.	$(3.0 \pm 0.4) \times 10^{-3}$		DESIG=232
Γ_{64}	$K^0 \overline{K}^*(892)^0 +$ c.c.	$(4.2 \pm 0.4) \times 10^{-3}$		DESIG=122
Γ_{65}	$K^0 \overline{K}^*(892)^0 +$ c.c. $\to K^0 K^\pm \pi^\mp +$ c.c.	$(3.2 \pm 0.4) \times 10^{-3}$		DESIG=233
Γ_{66}	$\overline{K}^*(892)^0 K^+ \pi^- +$ c.c.	$(7.7 \pm 1.6) \times 10^{-3}$		DESIG=214
Γ_{67}	$K^*(892)^\pm K^\mp \pi^0$	$(4.1 \pm 1.3) \times 10^{-3}$		DESIG=343
Γ_{68}	$K^*(892)^+ K^0_S \pi^- +$ c.c.	$(2.0 \pm 0.5) \times 10^{-3}$		DESIG=299
Γ_{69}	$K^*(892)^+ K^0_S \pi^- +$ c.c. $\to K^0_S K^0_S \pi^+ \pi^-$	$(6.7 \pm 2.2) \times 10^{-4}$		DESIG=300
Γ_{70}	$K^*(892)^0 K^0_S \to \gamma K^0_S K^0_S$	$(6.3 {}^{+0.6}_{-0.5}) \times 10^{-6}$		DESIG=376
Γ_{71}	$K^*(892)^0 K^0_S \pi^0$	$(7 \pm 4) \times 10^{-4}$		DESIG=344
Γ_{72}	$K^*(892)^\pm K^*(700)^\mp$	$(1.1 {}^{+1.0}_{-0.6}) \times 10^{-3}$		DESIG=257
Γ_{73}	$K^*(892)^0 \overline{K}^*(892)^0$	$(2.3 \pm 0.6) \times 10^{-4}$		DESIG=46
Γ_{74}	$K^*(892)^\pm K^*(892)^\mp$	$(1.00 {}^{+0.22}_{-0.40}) \times 10^{-3}$		DESIG=256
Γ_{75}	$K_1(1400)^\pm K^\mp$	$(3.8 \pm 1.4) \times 10^{-3}$		DESIG=132
Γ_{76}	$K^*(1410) \overline{K}$ +c.c.			DESIG=317
Γ_{77}	$K^*(1410) \overline{K}$ +c.c $\to K^\pm K^\mp \pi^0$	$(7 \pm 4) \times 10^{-5}$		DESIG=330
Γ_{78}	$K^*(1410) \overline{K} +$ c.c. $\to K^0_S K^\pm \pi^\mp$	$(8 \pm 6) \times 10^{-5}$		DESIG=318
Γ_{79}	$K^*_2(1430) \overline{K}$ +c.c.			DESIG=319
Γ_{80}	$K^*_2(1430) \overline{K}$ +c.c. $\to K^\pm K^\mp \pi^0$	$(1.0 \pm 0.5) \times 10^{-4}$		DESIG=321
Γ_{81}	$K^*_2(1430) \overline{K} +$ c.c. $\to K^0_S K^\pm \pi^\mp$	$(4.0 \pm 1.0) \times 10^{-4}$		DESIG=320
Γ_{82}	$\overline{K}^*_2(1430) K +$ c.c.	$< 4.0 \times 10^{-3}$	CL=90%	DESIG=45
Γ_{83}	$K^*_2(1430)^+ K^- +$ c.c. $\to K^+ K^- \pi^0$	$(2.69 {}^{+0.25}_{-0.19}) \times 10^{-4}$		DESIG=381
Γ_{84}	$K^*_2(1430)^+ K^0_S \pi^- +$ c.c.	$(3.6 \pm 1.8) \times 10^{-3}$		DESIG=301
Γ_{85}	$\overline{K}^*_2(1430)^0 K^*(892)^0 +$ c.c.	$(4.67 \pm 0.29) \times 10^{-3}$		DESIG=48
Γ_{86}	$K^*_2(1430)^- K^*(892)^+ +$ c.c.	$(3.4 \pm 2.9) \times 10^{-3}$		DESIG=303
Γ_{87}	$K^*_2(1430)^- K^*(892)^+ +$ c.c. $\to K^*(892)^+ K^0_S \pi^- +$ c.c.	$(4 \pm 4) \times 10^{-4}$		DESIG=304
Γ_{88}	$K^*_2(1430)^0 \overline{K}^*_2(1430)^0$	$< 2.9 \times 10^{-3}$	CL=90%	DESIG=47
Γ_{89}	$\overline{K}_2(1770)^0 K^*(892)^0 +$ c.c. $\to K^*(892)^0 K^- \pi^+ +$ c.c.	$(6.9 \pm 0.9) \times 10^{-4}$		DESIG=235
Γ_{90}	$K^*_2(1980)^+ K^- +$ c.c. $\to K^+ K^- \pi^0$	$(1.10 {}^{+0.60}_{-0.14}) \times 10^{-5}$		DESIG=382
Γ_{91}	$K^*_4(2045)^+ K^- +$ c.c. $\to K^+ K^- \pi^0$	$(6.2 {}^{+2.9}_{-1.6}) \times 10^{-6}$		DESIG=383
Γ_{92}	$K_1(1270)^\pm K^\mp$	$< 3.0 \times 10^{-3}$	CL=90%	DESIG=131
Γ_{93}	$K_1(1270) K^0_S \to \gamma K^0_S K^0_S$	$(8.5 \pm 2.5) \times 10^{-7}$		DESIG=377
Γ_{94}	$a_2(1320)^\pm \pi^\mp$	[b] $< 4.3 \times 10^{-3}$	CL=90%	DESIG=42
Γ_{95}	$\phi \pi^0$	3×10^{-6} or 1×10^{-7}		DESIG=33;OUR EVAL;→ UNCHECKED ←
Γ_{96}	$\phi \pi^+ \pi^-$	$(9.4 \pm 1.5) \times 10^{-4}$	S=1.7	DESIG=34
Γ_{97}	$\phi \pi^0 \pi^0$	$(5.0 \pm 1.0) \times 10^{-4}$		DESIG=76
Γ_{98}	$\phi 2(\pi^+ \pi^-)$	$(1.60 \pm 0.32) \times 10^{-3}$		DESIG=35
Γ_{99}	$\phi \eta$	$(7.4 \pm 0.8) \times 10^{-4}$	S=1.5	DESIG=37
Γ_{100}	$\phi \eta'(958)$	$(4.6 \pm 0.5) \times 10^{-4}$	S=2.2	DESIG=38
Γ_{101}	$\phi \eta \eta'$	$(2.32 \pm 0.17) \times 10^{-4}$		DESIG=387
Γ_{102}	$\phi f_0(980)$	$(3.2 \pm 0.9) \times 10^{-4}$	S=1.9	DESIG=41
Γ_{103}	$\phi f_0(980) \to \phi \pi^+ \pi^-$	$(2.60 \pm 0.34) \times 10^{-4}$		DESIG=236

Γ_{104}	$\phi f_0(980) \to \phi\pi^0\pi^0$		$(1.8 \pm 0.5) \times 10^{-4}$		DESIG=237
Γ_{105}	$\phi\pi^0 f_0(980) \to \phi\pi^0\pi^+\pi^-$		$(4.5 \pm 1.0) \times 10^{-6}$		DESIG=278
Γ_{106}	$\phi\pi^0 f_0(980) \to \phi\pi^0 p^0\pi^0$		$(1.7 \pm 0.6) \times 10^{-6}$		DESIG=279
Γ_{107}	$\phi f_0(980)\eta \to \eta\phi\pi^+\pi^-$		$(3.2 \pm 1.0) \times 10^{-4}$		DESIG=229
Γ_{108}	$\phi a_0(980)^0 \to \phi\eta\pi^0$		$(4.4 \pm 1.4) \times 10^{-6}$		DESIG=258
Γ_{109}	$\phi f_2(1270)$		$(3.2 \pm 0.6) \times 10^{-4}$		DESIG=39
Γ_{110}	$\phi f_1(1285)$		$(2.6 \pm 0.5) \times 10^{-4}$		DESIG=106
Γ_{111}	$\phi f_1(1285) \to \phi\pi^0 f_0(980) \to \phi\pi^0\pi^+\pi^-$		$(9.4 \pm 2.8) \times 10^{-7}$		DESIG=280
Γ_{112}	$\phi f_1(1285) \to \phi\pi^0 f_0(980) \to \phi 3\pi^0$		$(2.1 \pm 2.2) \times 10^{-7}$		DESIG=281
Γ_{113}	$\phi\eta(1405) \to \phi\eta\pi^+\pi^-$		$(2.0 \pm 1.0) \times 10^{-5}$		DESIG=128
Γ_{114}	$\phi f'_2(1525)$		$(8 \pm 4) \times 10^{-4}$	S=2.7	DESIG=40
Γ_{115}	$\phi X(1835) \to \phi p\overline{p}$		$< 2.1 \times 10^{-7}$	CL=90%	DESIG=291
Γ_{116}	$\phi X(1835) \to \phi\eta\pi^+\pi^-$		$< 2.8 \times 10^{-4}$	CL=90%	DESIG=288
Γ_{117}	$\phi X(1870) \to \phi\eta\pi^+\pi^-$		$< 6.13 \times 10^{-5}$	CL=90%	DESIG=289
Γ_{118}	$\phi K\overline{K}$		$(1.77 \pm 0.16) \times 10^{-3}$	S=1.3	DESIG=36
Γ_{119}	$\phi f_0(1710) \to \phi K\overline{K}$		$(3.6 \pm 0.6) \times 10^{-4}$		DESIG=129
Γ_{120}	$\phi K^+ K^-$		$(8.3 \pm 1.1) \times 10^{-4}$		DESIG=295
Γ_{121}	$\phi K^0_S K^0_S$		$(5.9 \pm 1.5) \times 10^{-4}$		DESIG=305
Γ_{122}	$\phi K^\pm K^0_S \pi^\mp$	[b]	$(7.2 \pm 0.8) \times 10^{-4}$		DESIG=103
Γ_{123}	$\phi K^*(892)\overline{K}$ + c.c.		$(2.18 \pm 0.23) \times 10^{-3}$		DESIG=104
Γ_{124}	$b_1(1235)^\pm\pi^\mp$	[b]	$(3.0 \pm 0.5) \times 10^{-3}$		DESIG=49
Γ_{125}	$b_1(1235)^0\pi^0$		$(2.3 \pm 0.6) \times 10^{-3}$		DESIG=160
Γ_{126}	$f'_2(1525) K^+ K^-$		$(1.06 \pm 0.35) \times 10^{-3}$		DESIG=308
Γ_{127}	$\Delta(1232)^+\overline{p}$		$< 1 \times 10^{-4}$	CL=90%	DESIG=112
Γ_{128}	$\Delta(1232)^{++}\overline{p}\pi^-$		$(1.6 \pm 0.5) \times 10^{-3}$		DESIG=70
Γ_{129}	$\Delta(1232)^{++}\overline{\Delta}(1232)^{--}$		$(1.10 \pm 0.29) \times 10^{-3}$		DESIG=66
Γ_{130}	$\overline{\Sigma}(1385)^0 p K^-$		$(5.1 \pm 3.2) \times 10^{-4}$		DESIG=74
Γ_{131}	$\Sigma(1385)^0\overline{\Lambda}$ + c.c.		$< 8.2 \times 10^{-6}$	CL=90%	DESIG=111
Γ_{132}	$\Sigma(1385)^-\overline{\Sigma}^+$ (or c.c.)	[b]	$(3.1 \pm 0.5) \times 10^{-4}$		DESIG=68
Γ_{133}	$\Sigma(1385)^-\overline{\Sigma}(1385)^+$ (or c.c.)	[b]	$(1.16 \pm 0.05) \times 10^{-3}$		DESIG=67
Γ_{134}	$\Sigma(1385)^0\overline{\Sigma}(1385)^0$		$(1.07 \pm 0.08) \times 10^{-3}$		DESIG=309
Γ_{135}	$\Lambda(1520)\overline{\Lambda}$ + c.c. $\to \gamma\Lambda\overline{\Lambda}$		$< 4.1 \times 10^{-6}$	CL=90%	DESIG=260
Γ_{136}	$\overline{\Lambda}(1520)\Lambda$ + c.c.		$< 1.80 \times 10^{-3}$	CL=90%	DESIG=364
Γ_{137}	$\Xi^0\overline{\Xi}^0$		$(1.17 \pm 0.04) \times 10^{-3}$		DESIG=248
Γ_{138}	$\Xi(1530)^-\overline{\Xi}^+$ + c.c.		$(3.18 \pm 0.08) \times 10^{-4}$		DESIG=107
Γ_{139}	$\Xi(1530)^0\overline{\Xi}^0$		$(3.2 \pm 1.4) \times 10^{-4}$		DESIG=108
Γ_{140}	$\Theta(1540)\overline{\Theta}(1540) \to K^0_S p K^-\overline{n}$ + c.c.	[c]	$< 1.1 \times 10^{-5}$	CL=90%	DESIG=205
Γ_{141}	$\Theta(1540) K^-\overline{n} \to K^0_S p K^-\overline{n}$	[c]	$< 2.1 \times 10^{-5}$	CL=90%	DESIG=206
Γ_{142}	$\Theta(1540) K^0_S\overline{p} \to K^0_S\overline{p} K^+ n$	[c]	$< 1.6 \times 10^{-5}$	CL=90%	DESIG=207
Γ_{143}	$\overline{\Theta}(1540) K^+ n \to K^0_S\overline{p} K^+ n$	[c]	$< 5.6 \times 10^{-5}$	CL=90%	DESIG=208
Γ_{144}	$\overline{\Theta}(1540) K^0_S p \to K^0_S p K^-\overline{n}$	[c]	$< 1.1 \times 10^{-5}$	CL=90%	DESIG=209
	Decays into stable hadrons				NODE=M070;CLUMP=B
Γ_{145}	$2(\pi^+\pi^-)\pi^0$		(3.71 ± 0.28) %	S=1.3	DESIG=9
Γ_{146}	$3(\pi^+\pi^-)\pi^0$		(2.9 ± 0.6) %		DESIG=11
Γ_{147}	$\pi^+\pi^- 3\pi^0$		(1.9 ± 0.9) %		DESIG=358
Γ_{148}	$\pi^+\pi^- 4\pi^0$		$(6.5 \pm 1.3) \times 10^{-3}$		DESIG=419
Γ_{149}	$\rho^\pm\pi^\mp\pi^0\pi^0$		(1.41 ± 0.22) %		DESIG=362
Γ_{150}	$\rho^+\rho^-\pi^0$		$(6.0 \pm 1.1) \times 10^{-3}$		DESIG=363
Γ_{151}	$\pi^+\pi^-\pi^0$		(2.10 ± 0.08) %	S=1.6	DESIG=7
Γ_{152}	$2(\pi^+\pi^-\pi^0)$		(1.61 ± 0.20) %		DESIG=210
Γ_{153}	$\pi^+\pi^-\pi^0 K^+ K^-$		(1.20 ± 0.30) %		DESIG=18
Γ_{154}	$\pi^+\pi^-$		$(1.47 \pm 0.14) \times 10^{-4}$		DESIG=6
Γ_{155}	$2(\pi^+\pi^-)$		$(3.57 \pm 0.30) \times 10^{-3}$		DESIG=8
Γ_{156}	$3(\pi^+\pi^-)$		$(4.3 \pm 0.4) \times 10^{-3}$		DESIG=10
Γ_{157}	$2(\pi^+\pi^-)3\pi^0$		(6.2 ± 0.9) %		DESIG=411
Γ_{158}	$4(\pi^+\pi^-)\pi^0$		$(9.0 \pm 3.0) \times 10^{-3}$		DESIG=12

Γ_{159}	$2(\pi^+\pi^-)\eta$		$(2.29 \pm 0.28) \times 10^{-3}$		DESIG=201
Γ_{160}	$3(\pi^+\pi^-)\eta$		$(7.2 \pm 1.5) \times 10^{-4}$		DESIG=202
Γ_{161}	$2(\pi^+\pi^-\pi^0)\eta$		$(1.6 \pm 0.5) \times 10^{-3}$		DESIG=418
Γ_{162}	$\pi^+\pi^-\pi^0\pi^0\eta$		$(2.4 \pm 0.5) \times 10^{-3}$		DESIG=359
Γ_{163}	$\rho^\pm\pi^\mp\pi^0\eta$		$(1.9 \pm 0.8) \times 10^{-3}$		DESIG=361
Γ_{164}	K^+K^-		$(2.86 \pm 0.21) \times 10^{-4}$		DESIG=13
Γ_{165}	$K^0_S K^0_L$		$(1.95 \pm 0.11) \times 10^{-4}$	S=2.4	DESIG=75
Γ_{166}	$K^0_S K^0_S$		$< 1.4 \times 10^{-8}$	CL=95%	DESIG=14
Γ_{167}	$K\overline{K}\pi$		$(6.1 \pm 1.0) \times 10^{-3}$		DESIG=15
Γ_{168}	$K^+K^-\pi^0$		$(2.88 \pm 0.12) \times 10^{-3}$		DESIG=334
Γ_{169}	$K^0_S K^\pm\pi^\mp$		$(5.6 \pm 0.5) \times 10^{-3}$		DESIG=335
Γ_{170}	$K^0_S K^0_L\pi^0$		$(2.06 \pm 0.26) \times 10^{-3}$		DESIG=336
Γ_{171}	$K^*(892)^0\overline{K}^0$ + c.c. $\to$ $K^0_S K^0_L\pi^0$		$(1.21 \pm 0.18) \times 10^{-3}$		DESIG=339
Γ_{172}	$K^*_2(1430)^0\overline{K}^0$ + c.c. $\to$ $K^0_S K^0_L\pi^0$		$(4.3 \pm 1.3) \times 10^{-4}$		DESIG=338
Γ_{173}	$K^+K^-\pi^+\pi^-$		$(6.86 \pm 0.28) \times 10^{-3}$		DESIG=16
Γ_{174}	$K^+K^-\pi^0\pi^0$		$(2.13 \pm 0.22) \times 10^{-3}$		DESIG=234
Γ_{175}	$K^0_S K^0_L\pi^+\pi^-$		$(3.8 \pm 0.6) \times 10^{-3}$		DESIG=296
Γ_{176}	$K^0_S K^0_L\pi^0\pi^0$		$(1.9 \pm 0.4) \times 10^{-3}$		DESIG=337
Γ_{177}	$K^0_S K^0_L\eta$		$(1.45 \pm 0.33) \times 10^{-3}$		DESIG=340
Γ_{178}	$K^0_S K^0_S\pi^+\pi^-$		$(1.68 \pm 0.19) \times 10^{-3}$		DESIG=297
Γ_{179}	$K^\mp K^0_S\pi^\pm\pi^0$		$(5.7 \pm 0.5) \times 10^{-3}$		DESIG=341
Γ_{180}	$K^+K^-2(\pi^+\pi^-)$		$(3.1 \pm 1.3) \times 10^{-3}$		DESIG=17
Γ_{181}	$K^+K^-\pi^+\pi^-\eta$		$(4.7 \pm 0.7) \times 10^{-3}$		DESIG=238
Γ_{182}	$2(K^+K^-)$		$(7.2 \pm 0.8) \times 10^{-4}$		DESIG=19
Γ_{183}	$K^+K^-K^0_S K^0_S$		$(4.2 \pm 0.7) \times 10^{-4}$		DESIG=298
Γ_{184}	$p\overline{p}$		$(2.120 \pm 0.029) \times 10^{-3}$		DESIG=50
Γ_{185}	$p\overline{p}\pi^0$		$(1.19 \pm 0.08) \times 10^{-3}$	S=1.1	DESIG=52
Γ_{186}	$p\overline{p}\pi^+\pi^-$		$(6.0 \pm 0.5) \times 10^{-3}$	S=1.3	DESIG=54
Γ_{187}	$p\overline{p}\pi^+\pi^-\pi^0$	[d]	$(2.3 \pm 0.9) \times 10^{-3}$	S=1.9	DESIG=55
Γ_{188}	$p\overline{p}\eta$		$(2.00 \pm 0.12) \times 10^{-3}$		DESIG=56
Γ_{189}	$p\overline{p}\rho$		$< 3.1 \times 10^{-4}$	CL=90%	DESIG=57
Γ_{190}	$p\overline{p}\omega$		$(9.8 \pm 1.0) \times 10^{-4}$	S=1.3	DESIG=58
Γ_{191}	$p\overline{p}\eta'(958)$		$(1.29 \pm 0.14) \times 10^{-4}$	S=2.0	DESIG=59
Γ_{192}	$p\overline{p}a_0(980) \to p\overline{p}\pi^0\eta$		$(6.8 \pm 1.8) \times 10^{-5}$		DESIG=276
Γ_{193}	$p\overline{p}\phi$		$(5.19 \pm 0.33) \times 10^{-5}$		DESIG=127
Γ_{194}	$p\overline{n}\pi^-$		$(2.12 \pm 0.09) \times 10^{-3}$		DESIG=53
Γ_{195}	$n\overline{n}$		$(2.09 \pm 0.16) \times 10^{-3}$		DESIG=64
Γ_{196}	$n\overline{n}\pi^+\pi^-$		$(4 \pm 4) \times 10^{-3}$		DESIG=65
Γ_{197}	$nN(1440)$		seen		DESIG=215;OUR EST;→ UNCHECKED ←
Γ_{198}	$nN(1520)$		seen		DESIG=216;OUR EST;→ UNCHECKED ←
Γ_{199}	$nN(1535)$		seen		DESIG=217;OUR EST;→ UNCHECKED ←
Γ_{200}	$\Lambda\overline{\Lambda}$		$(1.89 \pm 0.09) \times 10^{-3}$	S=2.8	DESIG=60
Γ_{201}	$\Lambda\overline{\Lambda}\pi^0$		$(3.8 \pm 0.4) \times 10^{-5}$		DESIG=109
Γ_{202}	$\Lambda\overline{\Lambda}\pi^+\pi^-$		$(4.3 \pm 1.0) \times 10^{-3}$		DESIG=261
Γ_{203}	$\Lambda\overline{\Lambda}\eta$		$(1.62 \pm 0.17) \times 10^{-4}$		DESIG=228
Γ_{204}	$\Lambda\overline{\Sigma}^-\pi^+$ (or c.c.)	[b]	$(8.3 \pm 0.7) \times 10^{-4}$	S=1.2	DESIG=71
Γ_{205}	$pK^-\overline{\Lambda}$+c.c.		$(8.6 \pm 1.1) \times 10^{-4}$		DESIG=72
Γ_{206}	$pK^-\overline{\Sigma}^0$		$(2.9 \pm 0.8) \times 10^{-4}$		DESIG=73
Γ_{207}	$\overline{\Lambda}nK^0_S$ + c.c.		$(6.5 \pm 1.1) \times 10^{-4}$		DESIG=225
Γ_{208}	$\Lambda\overline{\Sigma}$ + c.c.		$(2.83 \pm 0.23) \times 10^{-5}$		DESIG=61
Γ_{209}	$\Sigma^+\overline{\Sigma}^-$		$(1.07 \pm 0.04) \times 10^{-3}$		DESIG=247
Γ_{210}	$\Sigma^0\overline{\Sigma}^0$		$(1.172 \pm 0.032) \times 10^{-3}$	S=1.4	DESIG=63
Γ_{211}	$\Xi^-\overline{\Xi}^+$		$(9.7 \pm 0.8) \times 10^{-4}$	S=1.4	DESIG=62

Radiative decays

NODE=M070;CLUMP=C

Γ_{212}	$\gamma\eta_c(1S)$	(1.7 ± 0.4) %	S=1.5	DESIG=85
Γ_{213}	$\gamma\eta_c(1S) \to 3\gamma$	$(3.8 {}^{+1.3}_{-1.0}) \times 10^{-6}$	S=1.1	DESIG=246
Γ_{214}	$\gamma\eta_c(1S) \to \gamma\eta\eta\eta'$	$(4.9 \pm 0.8) \times 10^{-5}$		DESIG=391
Γ_{215}	3γ	$(1.16 \pm 0.22) \times 10^{-5}$		DESIG=81
Γ_{216}	4γ	$< 9 \times 10^{-6}$	CL=90%	DESIG=244
Γ_{217}	5γ	$< 1.5 \times 10^{-5}$	CL=90%	DESIG=245
Γ_{218}	$\gamma\pi^0$	$(3.56 \pm 0.17) \times 10^{-5}$		DESIG=82
Γ_{219}	$\gamma\pi^0\pi^0$	$(1.15 \pm 0.05) \times 10^{-3}$		DESIG=283
Γ_{220}	$\gamma 2\pi^+ 2\pi^-$	$(2.8 \pm 0.5) \times 10^{-3}$	S=1.9	DESIG=95
Γ_{221}	$\gamma f_2(1270) f_2(1270)$	$(9.5 \pm 1.7) \times 10^{-4}$		DESIG=203
Γ_{222}	$\gamma f_2(1270) f_2(1270)$ (non resonant)	$(8.2 \pm 1.9) \times 10^{-4}$		DESIG=204
Γ_{223}	$\gamma\pi^+\pi^- 2\pi^0$	$(8.3 \pm 3.1) \times 10^{-3}$		DESIG=99
Γ_{224}	$\gamma K^0_S K^0_S$	$(8.1 \pm 0.4) \times 10^{-4}$		DESIG=378
Γ_{225}	$\gamma(K\overline{K}\pi)$ $[J^{PC} = 0^{-+}]$	$(7 \pm 4) \times 10^{-4}$	S=2.1	DESIG=176
Γ_{226}	$\gamma K^+ K^- \pi^+\pi^-$	$(2.1 \pm 0.6) \times 10^{-3}$		DESIG=143
Γ_{227}	$\gamma K^*(892)\overline{K}^*(892)$	$(4.0 \pm 1.3) \times 10^{-3}$		DESIG=145
Γ_{228}	$\gamma\eta$	$(1.085 \pm 0.018) \times 10^{-3}$		DESIG=83
Γ_{229}	$\gamma\eta\pi^0$	$(2.14 \pm 0.31) \times 10^{-5}$		DESIG=292
Γ_{230}	$\gamma f_0(500) \to \gamma\pi\pi$			DESIG=398
Γ_{231}	$\gamma f_0(500) \to \gamma K\overline{K}$			DESIG=399
Γ_{232}	$\gamma f_0(500) \to \gamma\eta\eta$			DESIG=400
Γ_{233}	$\gamma a_0(980)^0 \to \gamma\eta\pi^0$	$< 2.5 \times 10^{-6}$	CL=95%	DESIG=293
Γ_{234}	$\gamma a_2(1320)^0 \to \gamma\eta\pi^0$	$< 6.6 \times 10^{-6}$	CL=95%	DESIG=294
Γ_{235}	$\gamma\eta\pi\pi$	$(6.1 \pm 1.0) \times 10^{-3}$		DESIG=96
Γ_{236}	$\gamma\eta_2(1870) \to \gamma\eta\pi^+\pi^-$	$(6.2 \pm 2.4) \times 10^{-4}$		DESIG=142
Γ_{237}	$\gamma\eta'(958)$	$(5.25 \pm 0.07) \times 10^{-3}$	S=1.3	DESIG=84
Γ_{238}	$\gamma f_0(980) \to \gamma\pi\pi$			DESIG=393
Γ_{239}	$\gamma f_0(980) \to \gamma K\overline{K}$			DESIG=394
Γ_{240}	$\gamma\rho\rho$	$(4.5 \pm 0.8) \times 10^{-3}$		DESIG=94
Γ_{241}	$\gamma\rho\omega$	$< 5.4 \times 10^{-4}$	CL=90%	DESIG=226
Γ_{242}	$\gamma\rho\phi$	$< 8.8 \times 10^{-5}$	CL=90%	DESIG=227
Γ_{243}	$\gamma\omega\omega$	$(1.61 \pm 0.33) \times 10^{-3}$		DESIG=97
Γ_{244}	$\gamma\phi\phi$	$(4.0 \pm 1.2) \times 10^{-4}$	S=2.1	DESIG=98
Γ_{245}	$\gamma\eta(1405/1475) \to \gamma K\overline{K}\pi$	$(2.8 \pm 0.6) \times 10^{-3}$	S=1.6	DESIG=89
Γ_{246}	$\gamma\eta(1405/1475) \to \gamma\gamma\rho^0$	$(7.8 \pm 2.0) \times 10^{-5}$	S=1.8	DESIG=171
Γ_{247}	$\gamma\eta(1405/1475) \to \gamma\eta\pi^+\pi^-$	$(3.0 \pm 0.5) \times 10^{-4}$		DESIG=170
Γ_{248}	$\gamma\eta(1405/1475) \to \gamma\rho^0\rho^0$	$(1.7 \pm 0.4) \times 10^{-3}$	S=1.3	DESIG=124
Γ_{249}	$\gamma\eta(1405/1475) \to \gamma\gamma\phi$	$< 8.2 \times 10^{-5}$	CL=95%	DESIG=212
Γ_{250}	$\gamma\eta(1405) \to \gamma\gamma\gamma$	$< 2.63 \times 10^{-6}$	CL=90%	DESIG=348
Γ_{251}	$\gamma\eta(1475) \to \gamma\gamma\gamma$	$< 1.86 \times 10^{-6}$	CL=90%	DESIG=349
Γ_{252}	$\gamma\eta(1760) \to \gamma\rho^0\rho^0$	$(1.3 \pm 0.9) \times 10^{-4}$		DESIG=125
Γ_{253}	$\gamma\eta(1760) \to \gamma\omega\omega$	$(1.98 \pm 0.33) \times 10^{-3}$		DESIG=224
Γ_{254}	$\gamma\eta(1760) \to \gamma\gamma\gamma$	$< 4.80 \times 10^{-6}$	CL=90%	DESIG=347
Γ_{255}	$\gamma\eta(2225)$	$(3.14 {}^{+0.50}_{-0.19}) \times 10^{-4}$		DESIG=126
Γ_{256}	$\gamma f_2(1270)$	$(1.64 \pm 0.12) \times 10^{-3}$	S=1.3	DESIG=86
Γ_{257}	$\gamma f_2(1270) \to \gamma K^0_S K^0_S$	$(2.58 {}^{+0.60}_{-0.22}) \times 10^{-5}$		DESIG=373
Γ_{258}	$\gamma f_1(1285)$	$(6.1 \pm 0.8) \times 10^{-4}$		DESIG=88
Γ_{259}	$\gamma f_0(1370) \to \gamma\pi\pi$			DESIG=395
Γ_{260}	$\gamma f_0(1370) \to \gamma K\overline{K}$	$(4.2 \pm 1.5) \times 10^{-4}$		DESIG=284
Γ_{261}	$\gamma f_0(1370) \to \gamma K^0_S K^0_S$	$(1.1 \pm 0.4) \times 10^{-5}$		DESIG=368
Γ_{262}	$\gamma f_0(1370) \to \gamma\eta\eta$			DESIG=396
Γ_{263}	$\gamma f_0(1370) \to \gamma\eta\eta'$			DESIG=397
Γ_{264}	$\gamma f_1(1420) \to \gamma K\overline{K}\pi$	$(7.9 \pm 1.3) \times 10^{-4}$		DESIG=175
Γ_{265}	$\gamma f_0(1500) \to \gamma\pi\pi$	$(1.09 \pm 0.24) \times 10^{-4}$		DESIG=172
Γ_{266}	$\gamma f_0(1500) \to \gamma\eta\eta$	$(1.7 {}^{+0.6}_{-1.4}) \times 10^{-5}$		DESIG=265

Γ_{267}	$\gamma f_0(1500) \to \gamma K^0_S K^0_S$	$(1.59 {}^{+0.24}_{-0.60}) \times 10^{-5}$			DESIG=369
Γ_{268}	$\gamma f_0(1500) \to \gamma \eta \eta'$				DESIG=401
Γ_{269}	$\gamma f_1(1510) \to \gamma \eta \pi^+ \pi^-$	$(4.5 \pm 1.2) \times 10^{-4}$			DESIG=141
Γ_{270}	$\gamma f'_2(1525)$	$(5.7 {}^{+0.8}_{-0.5}) \times 10^{-4}$		S=1.5	DESIG=87
Γ_{271}	$\gamma f'_2(1525) \to \gamma K^0_S K^0_S$	$(8.0 {}^{+0.7}_{-0.5}) \times 10^{-5}$			DESIG=374
Γ_{272}	$\gamma f'_2(1525) \to \gamma \eta \eta$	$(3.4 \pm 1.4) \times 10^{-5}$			DESIG=268
Γ_{273}	$\gamma f_2(1640) \to \gamma \omega \omega$	$(2.8 \pm 1.8) \times 10^{-4}$			DESIG=222
Γ_{274}	$\gamma f_0(1710) \to \gamma \pi \pi$	$(3.8 \pm 0.5) \times 10^{-4}$			DESIG=135
Γ_{275}	$\gamma f_0(1710) \to \gamma K \overline{K}$	$(9.5 {}^{+1.0}_{-0.5}) \times 10^{-4}$		S=1.5	DESIG=91
Γ_{276}	$\gamma f_0(1710) \to \gamma \omega \omega$	$(3.1 \pm 1.0) \times 10^{-4}$			DESIG=221
Γ_{277}	$\gamma f_0(1710) \to \gamma \eta \eta$	$(2.4 {}^{+1.2}_{-0.7}) \times 10^{-4}$			DESIG=266
Γ_{278}	$\gamma f_0(1710) \to \gamma \eta \eta'$				DESIG=402
Γ_{279}	$\gamma f_0(1710) \to \gamma \omega \phi$	$(2.5 \pm 0.6) \times 10^{-4}$			DESIG=262
Γ_{280}	$\gamma f_0(1750) \to \gamma K^0_S K^0_S$	$(1.11 {}^{+0.20}_{-0.33}) \times 10^{-5}$			DESIG=370
Γ_{281}	$\gamma f_2(1810) \to \gamma \eta \eta$	$(5.4 {}^{+3.5}_{-2.4}) \times 10^{-5}$			DESIG=269
Γ_{282}	$\gamma f_2(1910) \to \gamma \omega \omega$	$(2.0 \pm 1.4) \times 10^{-4}$			DESIG=223
Γ_{283}	$\gamma f_2(1950) \to \gamma K^*(892) \overline{K}^*(892)$	$(7.0 \pm 2.2) \times 10^{-4}$			DESIG=144
Γ_{284}	$\gamma f_0(2020) \to \gamma \pi \pi$				DESIG=403
Γ_{285}	$\gamma f_0(2020) \to \gamma K \overline{K}$				DESIG=404
Γ_{286}	$\gamma f_0(2020) \to \gamma \eta \eta$				DESIG=405
Γ_{287}	$\gamma f_4(2050)$	$(2.7 \pm 0.7) \times 10^{-3}$			DESIG=100
Γ_{288}	$\gamma f_0(2100) \to \gamma \eta \eta$	$(1.13 {}^{+0.60}_{-0.30}) \times 10^{-4}$			DESIG=267
Γ_{289}	$\gamma f_0(2100) \to \gamma K \overline{K}$				DESIG=406
Γ_{290}	$\gamma f_0(2100) \to \gamma \pi \pi$	$(6.2 \pm 1.0) \times 10^{-4}$			DESIG=286
Γ_{291}	$\gamma f_0(2200)$				DESIG=123
Γ_{292}	$\gamma f_0(2200) \to \gamma K \overline{K}$	$(5.9 \pm 1.3) \times 10^{-4}$			DESIG=285
Γ_{293}	$\gamma f_0(2200) \to \gamma K^0_S K^0_S$	$(2.72 {}^{+0.19}_{-0.50}) \times 10^{-4}$			DESIG=371
Γ_{294}	$\gamma f_0(2200) \to \gamma \pi \pi$				DESIG=407
Γ_{295}	$\gamma f_0(2200) \to \gamma \eta \eta$				DESIG=408
Γ_{296}	$\gamma f_J(2220)$				DESIG=92
Γ_{297}	$\gamma f_J(2220) \to \gamma \pi \pi$	$< 3.9 \times 10^{-5}$		CL=90%	DESIG=136
Γ_{298}	$\gamma f_J(2220) \to \gamma K \overline{K}$	$< 4.1 \times 10^{-5}$		CL=90%	DESIG=137
Γ_{299}	$\gamma f_J(2220) \to \gamma p \overline{p}$	$(1.5 \pm 0.8) \times 10^{-5}$			DESIG=138
Γ_{300}	$\gamma f_0(2330) \to \gamma K^0_S K^0_S$	$(4.9 \pm 0.7) \times 10^{-5}$			DESIG=372
Γ_{301}	$\gamma f_0(2330) \to \gamma \pi \pi$				DESIG=409
Γ_{302}	$\gamma f_0(2330) \to \gamma \eta \eta$				DESIG=410
Γ_{303}	$\gamma f_2(2340) \to \gamma \eta \eta$	$(5.6 {}^{+2.4}_{-2.2}) \times 10^{-5}$			DESIG=270
Γ_{304}	$\gamma f_2(2340) \to \gamma K^0_S K^0_S$	$(5.5 {}^{+4.0}_{-1.5}) \times 10^{-5}$			DESIG=375
Γ_{305}	$\gamma X(1835) \to \gamma \pi^+ \pi^- \eta'$	$(2.7 {}^{+0.6}_{-0.8}) \times 10^{-4}$		S=1.6	DESIG=213
Γ_{306}	$\gamma X(1835) \to \gamma p \overline{p}$	$(7.7 {}^{+1.5}_{-0.9}) \times 10^{-5}$			DESIG=254
Γ_{307}	$\gamma X(1835) \to \gamma K^0_S K^0_S \eta$	$(3.3 {}^{+2.0}_{-1.3}) \times 10^{-5}$			DESIG=282
Γ_{308}	$\gamma X(1835) \to \gamma \gamma \phi(1020)$				DESIG=346
Γ_{309}	$\gamma X(1835) \to \gamma \gamma \gamma$	$< 3.56 \times 10^{-6}$		CL=90%	DESIG=350
Γ_{310}	$\gamma X(1835) \to \gamma 3(\pi^+ \pi^-)$	$(2.4 {}^{+0.7}_{-0.8}) \times 10^{-5}$			DESIG=264
Γ_{311}	$\gamma X(2370) \to \gamma K^+ K^- \eta'$	$(1.8 \pm 0.7) \times 10^{-5}$			DESIG=388
Γ_{312}	$\gamma X(2370) \to \gamma K^0_S K^0_S \eta'$	$(1.2 \pm 0.5) \times 10^{-5}$			DESIG=389
Γ_{313}	$\gamma X(2370) \to \gamma \eta \eta \eta'$	$< 9.2 \times 10^{-6}$		CL=90%	DESIG=390
Γ_{314}	$\gamma p \overline{p}$	$(3.8 \pm 1.0) \times 10^{-4}$			DESIG=90
Γ_{315}	$\gamma p \overline{p} \pi^+ \pi^-$	$< 7.9 \times 10^{-4}$		CL=90%	DESIG=93
Γ_{316}	$\gamma \Lambda \overline{\Lambda}$	$< 1.3 \times 10^{-4}$		CL=90%	DESIG=200
Γ_{317}	$\gamma A \to \gamma$ invisible	$< 1.7 \times 10^{-6}$	[e]	CL=90%	DESIG=251
Γ_{318}	$\gamma A^0 \to \gamma \mu^+ \mu^-$	$< 5 \times 10^{-6}$	[f]	CL=90%	DESIG=259

Dalitz decays

NODE=M070;CLUMP=G

Γ_{319}	$\pi^0 e^+ e^-$			$(7.6 \pm 1.4) \times 10^{-7}$		DESIG=271
Γ_{320}	$\eta e^+ e^-$			$(1.42 \pm 0.08) \times 10^{-5}$		DESIG=272
Γ_{321}	$\eta'(958) e^+ e^-$			$(6.59 \pm 0.18) \times 10^{-5}$		DESIG=273
Γ_{322}	$\eta U \to \eta e^+ e^-$		[g]	$< 9.11 \times 10^{-7}$	CL=90%	DESIG=352
Γ_{323}	$\eta'(958) U \to \eta'(958) e^+ e^-$		[g]	$< 2.0 \times 10^{-7}$	CL=90%	DESIG=366
Γ_{324}	$\phi e^+ e^-$			$< 1.2 \times 10^{-7}$	CL=90%	DESIG=384

Weak decays

NODE=M070;CLUMP=E

Γ_{325}	$D^- e^+ \nu_e$ + c.c.			$< 7.1 \times 10^{-8}$	CL=90%	DESIG=218
Γ_{326}	$\overline{D}^0 e^+ e^-$ + c.c.			$< 8.5 \times 10^{-8}$	CL=90%	DESIG=219
Γ_{327}	$D_s^- e^+ \nu_e$ + c.c.			$< 1.3 \times 10^{-6}$	CL=90%	DESIG=220
Γ_{328}	$D_s^{*-} e^+ \nu_e$ + c.c.			$< 1.8 \times 10^{-6}$	CL=90%	DESIG=290
Γ_{329}	$D^- \pi^+$ + c.c.			$< 7.5 \times 10^{-5}$	CL=90%	DESIG=241
Γ_{330}	$\overline{D}^0 \overline{K}^0$ + c.c.			$< 1.7 \times 10^{-4}$	CL=90%	DESIG=242
Γ_{331}	$\overline{D}^0 \overline{K}^{*0}$ + c.c.			$< 2.5 \times 10^{-6}$	CL=90%	DESIG=275
Γ_{332}	$D_s^- \pi^+$ + c.c.			$< 1.3 \times 10^{-4}$	CL=90%	DESIG=243
Γ_{333}	$D_s^- \rho^+$ + c.c.			$< 1.3 \times 10^{-5}$	CL=90%	DESIG=274

Charge conjugation (*C*), Parity (*P*), Lepton Family number (*LF*) violating modes

NODE=M070;CLUMP=D

Γ_{334}	$\gamma\gamma$	*C*		$< 2.7 \times 10^{-7}$	CL=90%	DESIG=80
Γ_{335}	$\gamma\phi$	*C*		$< 1.4 \times 10^{-6}$	CL=90%	DESIG=277
Γ_{336}	$e^\pm \mu^\mp$	*LF*		$< 1.6 \times 10^{-7}$	CL=90%	DESIG=177
Γ_{337}	$e^\pm \tau^\mp$	*LF*		$< 7.5 \times 10^{-8}$	CL=90%	DESIG=178
Γ_{338}	$\mu^\pm \tau^\mp$	*LF*		$< 2.0 \times 10^{-6}$	CL=90%	DESIG=179
Γ_{339}	$\Lambda_c^+ e^-$ +c.c.			$< 6.9 \times 10^{-8}$	CL=90%	DESIG=379

Other decays

NODE=M070;CLUMP=F

Γ_{340}	invisible			$< 7 \times 10^{-4}$	CL=90%	DESIG=240

[*a*] For $E_\gamma > 100$ MeV. LINKAGE=EGM

[*b*] The value is for the sum of the charge states or particle/antiparticle states indicated. LINKAGE=SG

[*c*] $\Theta(1540)$ is a hypothetical pentaquark state of 1.54 GeV/c^2 mass and a width of less than 25 MeV/c^2. LINKAGE=THT

[*d*] Includes $p\overline{p}\pi^+\pi^-\gamma$ and excludes $p\overline{p}\eta$, $p\overline{p}\omega$, $p\overline{p}\eta'$. LINKAGE=MF

[*e*] For a narrow state *A* with mass less than 960 MeV. LINKAGE=NSA

[*f*] For a narrow scalar or pseudoscalar A^0 with mass 0.21–3.0 GeV. LINKAGE=NA0

[*g*] For a dark photon *U* with mass between 100 and 2100 MeV. LINKAGE=DPH

$J/\psi(1S)$ PARTIAL WIDTHS

NODE=M070220

Γ(hadrons) Γ_1

NODE=M070W3
NODE=M070W3

VALUE (keV)	*DOCUMENT ID*		*TECN*	*COMMENT*
81.37± 1.36±1.30	[1] ANASHIN	20	KEDR	$e^+ e^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
74.1 ± 8.1	BAI	95B	BES	$e^+ e^-$
59 ±24	BALDINI-...	75	FRAG	$e^+ e^-$
59 ±14	BOYARSKI	75	MRK1	$e^+ e^-$
50 ±25	ESPOSITO	75B	FRAM	$e^+ e^-$

[1] Based on the same dataset as ANASHIN 18A and correlated to the values reported there . NODE=M070W3;LINKAGE=A

$\Gamma(e^+e^-)$ Γ_5

NODE=M070W1

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
5.53 ±0.10 OUR AVERAGE					
5.550±0.056±0.089		[1,2] ANASHIN	18A	KEDR	e^+e^-
5.36 $^{+0.29}_{-0.28}$		[3] HSUEH	92	RVUE	See Υ mini-review
• • • We do not use the following data for averages, fits, limits, etc. • • •					
5.58 ±0.05 ±0.08		[4] ABLIKIM	16Q	BES3	3.773 $e^+e^- \rightarrow \mu^+\mu^-\gamma$
5.71 ±0.16	13k	[5] ADAMS	06A	CLEO	$e^+e^- \rightarrow \mu^+\mu^-\gamma$
5.57 ±0.19	7.8k	[5] AUBERT	04	BABR	$e^+e^- \rightarrow \mu^+\mu^-\gamma$
5.14 ±0.39		BAI	95B	BES	e^+e^-
4.72 ±0.35		ALEXANDER	89	RVUE	See Υ mini-review
4.4 ±0.6		[3] BRANDELIK	79C	DASP	e^+e^-
4.6 ±0.8		[6] BALDINI-...	75	FRAG	e^+e^-
4.8 ±0.6		BOYARSKI	75	MRK1	e^+e^-
4.6 ±1.0		ESPOSITO	75B	FRAM	e^+e^-

OCCUR=4

[1] From the cross sections of $e^+e^- \rightarrow e^+e^-$ and $e^+e^- \rightarrow$ hadrons near the $J/\psi(1S)$ peak. NODE=M070W1;LINKAGE=D

[2] Based on the same dataset as ANASHIN 20 and correlated to the values reported there. NODE=M070W1;LINKAGE=E

[3] From a simultaneous fit to e^+e^-, $\mu^+\mu^-$, and hadronic channels assuming $\Gamma(e^+e^-) = \Gamma(\mu^+\mu^-)$. NODE=M070W1;LINKAGE=F

[4] Using B($J/\psi \rightarrow \mu^+\mu^-$) = (5.973 ± 0.007 ± 0.037)% from ABLIKIM 13R. NODE=M070W1;LINKAGE=A

[5] Calculated by us from the reported values of $\Gamma(e^+e^-)\times$B($\mu^+\mu^-$) using B($\mu^+\mu^-$) = (5.93 ± 0.06)%. NODE=M070W1;LINKAGE=AA

[6] Assuming equal partial widths for e^+e^- and $\mu^+\mu^-$. NODE=M070W1;LINKAGE=B

$\Gamma(\mu^+\mu^-)$ Γ_7

NODE=M070W2

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
5.13±0.52	BAI	95B	BES	e^+e^-
4.8 ±0.6	BOYARSKI	75	MRK1	e^+e^-
5 ±1	ESPOSITO	75B	FRAM	e^+e^-

$\Gamma(\gamma\gamma)$ Γ_{334}

NODE=M070W70

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<5.4	90	BRANDELIK	79C	DASP	e^+e^-

$J/\psi(1S)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma(\text{total})$

NODE=M070225

This combination of a partial width with the partial width into e^+e^- and with the total width is obtained from the integrated cross section into channel(I) in the e^+e^- annihilation.

NODE=M070225

$\Gamma(\text{hadrons}) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_1\Gamma_5/\Gamma$

NODE=M070G3

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
4.884±0.048±0.078	[1,2] ANASHIN	18A	KEDR	e^+e^-
4 ±0.8	[3] BALDINI-...	75	FRAG	e^+e^-
3.9 ±0.8	[3] ESPOSITO	75B	FRAM	e^+e^-

[1] From the cross sections of $e^+e^- \rightarrow e^+e^-$ and $e^+e^- \rightarrow$ hadrons near the $J/\psi(1S)$ peak. NODE=M070G3;LINKAGE=A

[2] Based on the same dataset as ANASHIN 20 and correlated to the values reported there. NODE=M070G3;LINKAGE=B

[3] Data redundant with branching ratios or partial widths above. NODE=M070G3;LINKAGE=S

$\Gamma(e^+e^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_5\Gamma_5/\Gamma$

NODE=M070G1

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
333.1± 6.6±4.0	[1,2] ANASHIN	18A	KEDR	e^+e^-
332.3± 6.4±4.8	ANASHIN	10	KEDR	3.097 $e^+e^- \rightarrow e^+e^-$
350 ± 20	BRANDELIK	79C	DASP	e^+e^-
320 ± 70	[3] BALDINI-...	75	FRAG	e^+e^-
340 ± 90	[3] ESPOSITO	75B	FRAM	e^+e^-
360 ±100	[3] FORD	75	SPEC	e^+e^-

OCCUR=2

[1] From the cross sections of $e^+e^- \rightarrow e^+e^-$ and $e^+e^- \rightarrow$ hadrons near the $J/\psi(1S)$ peak. NODE=M070G1;LINKAGE=A

[2] Based on the same dataset as ANASHIN 20 and correlated to the values reported there. NODE=M070G1;LINKAGE=B

[3] Data redundant with branching ratios or partial widths above. NODE=M070G1;LINKAGE=S

$\Gamma(\mu^+\mu^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_7\Gamma_5/\Gamma$

NODE=M070G2
NODE=M070G2

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
333 ± 4 OUR AVERAGE					
333.4± 2.5±4.4		ABLIKIM	16Q	BES3	3.773 $e^+e^- \to \mu^+\mu^-\gamma$
331.8± 5.2±6.3		ANASHIN	10	KEDR	3.097 $e^+e^- \to \mu^+\mu^-$
338.4± 5.8±7.1	13k	ADAMS	06A	CLEO	$e^+e^- \to \mu^+\mu^-\gamma$
330.1± 7.7±7.3	7.8k	AUBERT	04	BABR	$e^+e^- \to \mu^+\mu^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
510 ±90		DASP	75	DASP	e^+e^-
380 ±50		[1] ESPOSITO	75B	FRAM	e^+e^-

[1] Data redundant with branching ratios or partial widths above.

NODE=M070G2;LINKAGE=S

$\Gamma(\eta\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{11}\Gamma_5/\Gamma$

NODE=M070G25
NODE=M070G25

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
2.3 ±0.4 OUR AVERAGE					
2.34±0.43±0.16	49	LEES	18	BABR	$e^+e^- \to \eta\pi^+\pi^-\gamma$
2.22±0.96±0.02	9	[1] AUBERT	07AU	BABR	10.6 $e^+e^- \to \eta\pi^+\pi^-\gamma$

[1] AUBERT 07AU reports $[\Gamma(J/\psi(1S) \to \eta\pi^+\pi^-) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}] \times [B(\eta \to \pi^+\pi^-\pi^0)] = 0.51 \pm 0.22 \pm 0.03$ eV which we divide by our best value $B(\eta \to \pi^+\pi^-\pi^0) = (23.02 \pm 0.25) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M070G25;LINKAGE=AU

$\Gamma(\eta\pi^+\pi^-\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{12}\Gamma_5/\Gamma$

NODE=M070Q20
NODE=M070Q20

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
64.8±11.1±0.4	200	[1] LEES	21C	BABR	$e^+e^- \to \gamma_{ISR}(\pi^+\pi^-4\pi^0)$

[1] LEES 21C reports $[\Gamma(J/\psi(1S) \to \eta\pi^+\pi^-\pi^0) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}] \times [B(\eta \to 3\pi^0)] = 21.1 \pm 1.7 \pm 3.2$ eV which we divide by our best value $B(\eta \to 3\pi^0) = (32.57 \pm 0.21) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M070Q20;LINKAGE=A

$\Gamma(\eta\pi^+\pi^-3\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{13}\Gamma_5/\Gamma$

NODE=M070Q19
ERROR=9;NODE=M070Q19

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
26.9±5.7±0.1	101	[1] LEES	21C	BABR	$e^+e^- \to \gamma_{ISR}(\pi^+\pi^-3\pi^0\gamma\gamma)$

[1] LEES 21C reports $[\Gamma(J/\psi(1S) \to \eta\pi^+\pi^-3\pi^0) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}] \times [B(\eta \to 2\gamma)] = 10.6 \pm 1.6 \pm 1.6$ eV which we divide by our best value $B(\eta \to 2\gamma) = (39.36 \pm 0.18) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M070Q19;LINKAGE=A

$\Gamma(\eta K^\pm K^0_S\pi^\mp) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{17}\Gamma_5/\Gamma$

NODE=M070G38
NODE=M070G38

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
7.3±1.4±0.4	44	LEES	17D	BABR	$e^+e^- \to K^0_S K^\pm\pi^\mp\pi^0\gamma$

$\Gamma(\rho^\pm\pi^\mp\pi^+\pi^-2\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{20}\Gamma_5/\Gamma$

NODE=M070Q13
NODE=M070Q13

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
155±26±36	14k	LEES	21	BABR	10.6 $e^+e^- \to 2(\pi^+\pi^-)3\pi^0\gamma$

$\Gamma(\rho^+\rho^-\pi^+\pi^-\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{21}\Gamma_5/\Gamma$

NODE=M070Q14
NODE=M070Q14

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
32±13±15	14k	LEES	21	BABR	10.6 $e^+e^- \to 2(\pi^+\pi^-)3\pi^0\gamma$

$\Gamma(\rho^\mp K^\pm K^0_S) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{22}\Gamma_5/\Gamma$

NODE=M070G31
NODE=M070G31

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
10.4±1.0±1.9	130	LEES	17D	BABR	$e^+e^- \to K^0_S K^\pm\pi^\mp\pi^0\gamma$

$\Gamma(\omega\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{35}\Gamma_5/\Gamma$

NODE=M070G24
NODE=M070G24

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
53.6±5.0±0.4	788	[1] AUBERT	07AU	BABR	10.6 $e^+e^- \to \omega\pi^+\pi^-\gamma$

[1] AUBERT 07AU reports $[\Gamma(J/\psi(1S) \to \omega\pi^+\pi^-) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}] \times [B(\omega(782) \to \pi^+\pi^-\pi^0)] = 47.8 \pm 3.1 \pm 3.2$ eV which we divide by our best value $B(\omega(782) \to \pi^+\pi^-\pi^0) = (89.2 \pm 0.7) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M070G24;LINKAGE=AU

$\Gamma(\omega\pi^0\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{36}\Gamma_5/\Gamma$

NODE=M070P54

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
27.8±3.5±0.2	398	[1] LEES	18E	BABR	10.6 $e^+e^- \to \pi^+\pi^- 3\pi^0\gamma$

[1] LEES 18E reports $[\Gamma(J/\psi(1S) \to \omega\pi^0\pi^0) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}] \times [B(\omega(782) \to \pi^+\pi^-\pi^0)] = 24.8 \pm 1.8 \pm 2.5$ eV which we divide by our best value $B(\omega(782) \to \pi^+\pi^-\pi^0) = (89.2 \pm 0.7) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M070P54;LINKAGE=A

$\Gamma(\omega 3\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{37}\Gamma_5/\Gamma$

NODE=M070Q18

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
10.5±3.1±0.1	89	[1] LEES	21C	BABR	$e^+e^- \to \gamma_{ISR}(\pi^+\pi^- 4\pi^0)$

[1] LEES 21C reports $[\Gamma(J/\psi(1S) \to \omega 3\pi^0) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}] \times [B(\omega(782) \to \pi^+\pi^-\pi^0)] = 9.4 \pm 2.3 \pm 1.5$ eV which we divide by our best value $B(\omega(782) \to \pi^+\pi^-\pi^0) = (89.2 \pm 0.7) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M070Q18;LINKAGE=A

$\Gamma(\omega\pi^+\pi^-\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{40}\Gamma_5/\Gamma$

NODE=M070G8

VALUE (10^{-2} keV)	EVTS	DOCUMENT ID		TECN	COMMENT
2.2±0.3±0.2	170	AUBERT	06D	BABR	10.6 $e^+e^- \to \omega\pi^+\pi^-\pi^0\gamma$

$\Gamma(\omega\eta) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{39}\Gamma_5/\Gamma$

NODE=M070Q21

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
16.9±7.6±0.2	[1] LEES	21C	BABR	$e^+e^- \to \gamma_{ISR}(\pi^+\pi^- 4\pi^0)$

[1] Different final state as in AUBERT 06. LEES 21C reports $[\Gamma(J/\psi(1S) \to \omega\eta) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}] \times [B(\eta \to 3\pi^0)] \times [B(\omega(782) \to \pi^+\pi^-\pi^0)] = 4.9 \pm 2.1 \pm 0.7$ eV which we divide by our best values $B(\eta \to 3\pi^0) = (32.57 \pm 0.21) \times 10^{-2}$, $B(\omega(782) \to \pi^+\pi^-\pi^0) = (89.2 \pm 0.7) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

NODE=M070Q21;LINKAGE=A

$\Gamma(\omega\pi^0\eta) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{41}\Gamma_5/\Gamma$

NODE=M070P58

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
1.90±0.96±0.01	27	[1] LEES	18E	BABR	10.6 $e^+e^- \to \pi^+\pi^-\pi^0\pi^0\eta\gamma$

[1] LEES 18E reports $[\Gamma(J/\psi(1S) \to \omega\pi^0\eta) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}] \times [B(\omega(782) \to \pi^+\pi^-\pi^0)] = 1.7 \pm 0.8 \pm 0.3$ eV which we divide by our best value $B(\omega(782) \to \pi^+\pi^-\pi^0) = (89.2 \pm 0.7) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M070P58;LINKAGE=A

$\Gamma(\omega\pi^+\pi^- 2\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{43}\Gamma_5/\Gamma$

NODE=M070Q11

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
185±30±1	14k	[1] LEES	21	BABR	10.6 $e^+e^- \to 2(\pi^+\pi^-)3\pi^0\gamma$

[1] LEES 21 reports $[\Gamma(J/\psi(1S) \to \omega\pi^+\pi^- 2\pi^0) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}] \times [B(\omega(782) \to \pi^+\pi^-\pi^0)] = 165 \pm 9 \pm 25$ eV which we divide by our best value $B(\omega(782) \to \pi^+\pi^-\pi^0) = (89.2 \pm 0.7) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M070Q11;LINKAGE=A

$\Gamma(\omega K\overline{K}) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{53}\Gamma_5/\Gamma$

NODE=M070G29

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
3.70±1.98±0.03	24	[1] AUBERT	07AU	BABR	10.6 $e^+e^- \to \omega K^+K^-\gamma$

[1] AUBERT 07AU reports $[\Gamma(J/\psi(1S) \to \omega K\overline{K}) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}] \times [B(\omega(782) \to \pi^+\pi^-\pi^0)] = 3.3 \pm 1.3 \pm 1.2$ eV which we divide by our best value $B(\omega(782) \to \pi^+\pi^-\pi^0) = (89.2 \pm 0.7) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M070G29;LINKAGE=AU

$\Gamma(K^+K^*(892)^- + \text{c.c.}) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{61}\Gamma_5/\Gamma$

NODE=M070G18

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
29.0±1.7±1.3	AUBERT	08S	BABR	10.6 $e^+e^- \to K^+K^*(892)^-\gamma$

$\Gamma(K^+K^*(892)^- + \text{c.c.} \to K^+K^-\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{62}\Gamma_5/\Gamma$

NODE=M070G20

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
10.96±0.85±0.70	155	AUBERT	08S	BABR	10.6 $e^+e^- \to K^+K^-\pi^0\gamma$

$\Gamma(K^+K^*(892)^- + \text{c.c.} \to K^0K^\pm\pi^\mp + \text{c.c.}) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{63}\Gamma_5/\Gamma$

NODE=M070G21

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
16.76±1.70±1.00	89	AUBERT	08S	BABR	10.6 $e^+e^- \to K^0_S K^\pm\pi^\mp\gamma$

$\Gamma(K^0\overline{K}^*(892)^0 + \text{c.c.}) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_{64}\Gamma_5/\Gamma$

NODE=M070G19

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
26.6±2.5±1.5	AUBERT	08S	BABR	10.6 $e^+e^- \rightarrow K^0\overline{K}^*(892)^0\gamma$

$\Gamma(K^0\overline{K}^*(892)^0 + \text{c.c.} \rightarrow K^0K^\pm\pi^\mp + \text{c.c.}) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_{65}\Gamma_5/\Gamma$

NODE=M070G22

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
17.70±1.70±1.00	94	AUBERT	08S	BABR	10.6 $e^+e^- \rightarrow K^0_SK^\pm\pi^\mp\gamma$

$\Gamma(\overline{K}^*(892)^0K^+\pi^- + \text{c.c.}) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_{66}\Gamma_5/\Gamma$

NODE=M070G39

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
42.6±4.8±7.2	99	[1] LEES	17D	BABR	$e^+e^- \rightarrow K^0_SK^\pm\pi^\mp\pi^0\gamma$

[1] Dividing by 1/6 to account for B($K^*(892)^0 \rightarrow K^0_S\pi^0$)=1/6.

NODE=M070G39;LINKAGE=A

$\Gamma(K^*(892)^\pm K^\mp\pi^0) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_{67}\Gamma_5/\Gamma$

NODE=M070G32

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
22.8±2.8±6.8	80	[1] LEES	17D	BABR	$e^+e^- \rightarrow K^0_SK^\pm\pi^\mp\pi^0\gamma$

[1] Dividing by 1/4 to account for B($K^*(892)^\pm \rightarrow K^0_S\pi^\pm$) = 1/4.

NODE=M070G32;LINKAGE=A

$\Gamma(K^*(892)^+K^0_S\pi^- + \text{c.c.}) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_{68}\Gamma_5/\Gamma$

NODE=M070GY4

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
11.0±2.8 OUR AVERAGE					
9.2±1.2±3.2	64	[1] LEES	17D	BABR	$e^+e^- \rightarrow K^0_SK^\pm\pi^\mp\pi^0\gamma$
14.8±4.8±1.2	53	[2] LEES	14H	BABR	$e^+e^- \rightarrow \pi^+\pi^-K^0_SK^0_S\gamma$

[1] Dividing by 1/2 to take into account B($K^*(892)^\pm \rightarrow K^\pm\pi^\mp$) = 1/2.

NODE=M070GY4;LINKAGE=B

[2] Dividing by 1/4 to take into account B($K^*(892) \rightarrow K^0_S\pi$) = 1/4.

NODE=M070GY4;LINKAGE=A

$\Gamma(K^*(892)^+K^0_S\pi^- + \text{c.c.} \rightarrow K^0_SK^0_S\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_{69}\Gamma_5/\Gamma$

NODE=M070GY5

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
3.7±1.2±0.3	53	LEES	14H	BABR	$e^+e^- \rightarrow \pi^+\pi^-K^0_SK^0_S\gamma$

$\Gamma(K^*(892)^0K^0_S\pi^0) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_{71}\Gamma_5/\Gamma$

NODE=M070G33

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
3.60±0.75±2.25	34	[1] LEES	17D	BABR	$e^+e^- \rightarrow K^0_SK^\pm\pi^\mp\pi^0\gamma$

[1] Dividing by 2/3 to account for B($K^*(892)^0 \rightarrow K^+\pi^-$) = 2/3.

NODE=M070G33;LINKAGE=A

$\Gamma(K^*(892)^0\overline{K}^*(892)^0) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_{73}\Gamma_5/\Gamma$

NODE=M070G01

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
1.28±0.34±0.07	47 ± 12	[1] LEES	12F	BABR	10.6 $e^+e^- \rightarrow \pi^+\pi^-K^+K^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.28±0.40±0.11	25 ± 8	[1,2] AUBERT	07AK	BABR	10.6 $e^+e^- \rightarrow \pi^+\pi^-K^+K^-\gamma$

[1] Dividing by $(2/3)^2$ to take twice into account that B($K^{*0} \rightarrow K^+\pi^-$) = 2/3 B($K^{*0} \rightarrow K\pi$).

NODE=M070G01;LINKAGE=AE

[2] Superseded by LEES 12F.

NODE=M070G01;LINKAGE=A

$\Gamma(K^*(892)^\pm K^*(892)^\mp) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_{74}\Gamma_5/\Gamma$

NODE=M070GY8

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.80±0.48±0.32	1 ± 5	[1] LEES	14H	BABR	$e^+e^- \rightarrow \pi^+\pi^-K^0_SK^0_S\gamma$

[1] Dividing by $(1/4)^2$ to take twice into account B($K^*(892) \rightarrow K^0_S\pi$) = 1/4.

NODE=M070GY8;LINKAGE=A

$\Gamma(K^*_2(1430)^+K^0_S\pi^- + \text{c.c.}) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_{84}\Gamma_5/\Gamma$

NODE=M070GY6

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
20.1±9.8±0.5	35	[1,2] LEES	14H	BABR	$e^+e^- \rightarrow \pi^+\pi^-K^0_SK^0_S\gamma$

[1] Dividing by 1/4 to take into account B($K^*(1430) \rightarrow K^0_S\pi$) = 1/4 B($K^*(1430) \rightarrow K\pi$).

NODE=M070GY6;LINKAGE=A

[2] LEES 14H reports [$\Gamma(J/\psi(1S) \rightarrow K^*_2(1430)^+K^0_S\pi^- + \text{c.c.}) \times \Gamma(J/\psi(1S) \rightarrow e^+e^-)/\Gamma_{\text{total}}$] × [B($K^*_2(1430) \rightarrow K\pi$)] = 10.0 ± 4.8 ± 0.8 eV which we divide by our best value B($K^*_2(1430) \rightarrow K\pi$) = $(49.9 \pm 1.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M070GY6;LINKAGE=B

$\Gamma(\overline{K}^*_2(1430)^0 K^*(892)^0 + c.c.) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{85}\Gamma_5/\Gamma$

NODE=M070G02
NODE=M070G02

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
25.8±1.4±0.6	710	[1,2,3] LEES 12F	BABR	10.6 $e^+e^- \to \pi^+\pi^-K^+K^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
33 ±4 ±1	317	[2,4] AUBERT 07AK	BABR	10.6 $e^+e^- \to \pi^+\pi^-K^+K^-\gamma$

[1] LEES 12F reports $[\Gamma(J/\psi(1S) \to \overline{K}^*_2(1430)^0 K^*(892)^0 + c.c.) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}] \times [B(K^*_2(1430) \to K\pi)] = 12.89 \pm 0.54 \pm 0.41$ eV which we divide by our best value $B(K^*_2(1430) \to K\pi) = (49.9 \pm 1.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070G02;LINKAGE=A

[2] Dividing by 2/3 to take into account that $B(K^{*0} \to K^+\pi^-) = 2/3\ B(K^{*0} \to K\pi)$. NODE=M070G02;LINKAGE=AE

[3] The $K^*_2(1430)$ cannot be distinguished from the $K^*_0(1430)$. NODE=M070G02;LINKAGE=B

[4] Superseded by LEES 12F. AUBERT 07AK reports $[\Gamma(J/\psi(1S) \to \overline{K}^*_2(1430)^0 K^*(892)^0 + c.c.) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}] \times [B(K^*_2(1430) \to K\pi)] = 16.4 \pm 1.1 \pm 1.4$ eV which we divide by our best value $B(K^*_2(1430) \to K\pi) = (49.9 \pm 1.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070G02;LINKAGE=UB

$\Gamma(K^*_2(1430)^- K^*(892)^+ + c.c.) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{86}\Gamma_5/\Gamma$

NODE=M070GY9
NODE=M070GY9

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
18.6±16.1±0.4	8 ± 8	[1,2] LEES 14H	BABR	$e^+e^- \to \pi^+\pi^-K^0_S K^0_S\gamma$

[1] Dividing by $(1/4)^2$ to take into account $B(K^*(892) \to K^0_S\pi) = 1/4$ and $B(K^*(1430) \to K^0_S\pi) = 1/4\ B(K^*(1430) \to K\pi)$. NODE=M070GY9;LINKAGE=A

[2] LEES 14H reports $[\Gamma(J/\psi(1S) \to K^*_2(1430)^- K^*(892)^+ + c.c.) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}] \times [B(K^*_2(1430) \to K\pi)] = 9.28 \pm 8.0 \pm 0.32$ eV which we divide by our best value $B(K^*_2(1430) \to K\pi) = (49.9 \pm 1.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070GY9;LINKAGE=B

$\Gamma(K^*_2(1430)^- K^*(892)^+ + c.c. \to K^*(892)^+ K^0_S\pi^- + c.c.) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{87}\Gamma_5/\Gamma$

NODE=M070GZ0
NODE=M070GZ0

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
2.32±2.00±0.08	8 ± 8	[1] LEES 14H	BABR	$e^+e^- \to \pi^+\pi^-K^0_S K^0_S\gamma$

[1] Dividing by 1/4 to take into account $B(K^*(892) \to K^0_S\pi) = 1/4$. NODE=M070GZ0;LINKAGE=A

$\Gamma(\overline{K}_2(1770)^0 K^*(892)^0 + c.c. \to K^*(892)^0 K^-\pi^+ + c.c.) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{89}\Gamma_5/\Gamma$

NODE=M070G03
NODE=M070G03

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
3.8±0.4±0.3	110 ± 14	[1] AUBERT 07AK	BABR	10.6 $e^+e^- \to \pi^+\pi^-K^+K^-\gamma$

[1] Dividing by 2/3 to take into account that $B(K^{*0} \to K^+\pi^-) = 2/3$. NODE=M070G03;LINKAGE=AE

$\Gamma(\phi\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{96}\Gamma_5/\Gamma$

NODE=M070G14
NODE=M070G14

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
4.48±0.35 OUR AVERAGE				
[4.47 ± 0.35 eV OUR 2021 AVERAGE]				
4.46±0.49±0.05	181	[1] LEES 12F	BABR	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\gamma$
4.51±0.48±0.05	254±23	[2] SHEN 09	BELL	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
5.3 ±0.7 ±0.1	103	[3] AUBERT,BE 06D	BABR	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\gamma$

NEW

[1] LEES 12F reports $[\Gamma(J/\psi(1S) \to \phi\pi^+\pi^-) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}] \times [B(\phi(1020) \to K^+K^-)] = 2.19 \pm 0.23 \pm 0.07$ eV which we divide by our best value $B(\phi(1020) \to K^+K^-) = (49.1 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070G14;LINKAGE=B

[2] SHEN 09 reports $4.50 \pm 0.41 \pm 0.26$ eV from a measurement of $[\Gamma(J/\psi(1S) \to \phi\pi^+\pi^-) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}] \times [B(\phi(1020) \to K^+K^-)]$ assuming $B(\phi(1020) \to K^+K^-) = (49.2 \pm 0.6) \times 10^{-2}$, which we rescale to our best value $B(\phi(1020) \to K^+K^-) = (49.1 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070G14;LINKAGE=SH

[3] Superseded by LEES 12F. AUBERT,BE 06D reports $[\Gamma(J/\psi(1S) \to \phi\pi^+\pi^-) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}] \times [B(\phi(1020) \to K^+K^-)] = 2.61 \pm 0.30 \pm 0.18$ eV which we divide by our best value $B(\phi(1020) \to K^+K^-) = (49.1 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070G14;LINKAGE=AU

$\Gamma(\phi\pi^0\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{97}\Gamma_5/\Gamma$

NODE=M070G15
NODE=M070G15

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
2.77±0.57±0.03	45	[1] LEES	12F	BABR	10.6 $e^+e^- \to K^+K^-\pi^0\pi^0\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3.13±0.88±0.03	23	[2] AUBERT,BE	06D	BABR	10.6 $e^+e^- \to K^+K^-\pi^0\pi^0\gamma$

[1] LEES 12F reports $[\Gamma(J/\psi(1S) \to \phi\pi^0\pi^0) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}] \times [B(\phi(1020) \to K^+K^-)] = 1.36 \pm 0.27 \pm 0.07$ eV which we divide by our best value $B(\phi(1020) \to K^+K^-) = (49.1 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070G15;LINKAGE=A

[2] Superseded by LEES 12F. AUBERT,BE 06D reports $[\Gamma(J/\psi(1S) \to \phi\pi^0\pi^0) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}] \times [B(\phi(1020) \to K^+K^-)] = 1.54 \pm 0.40 \pm 0.16$ eV which we divide by our best value $B(\phi(1020) \to K^+K^-) = (49.1 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070G15;LINKAGE=AU

$\Gamma(\phi 2(\pi^+\pi^-)) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{98}\Gamma_5/\Gamma$

NODE=M070G10
NODE=M070G10

VALUE (10^{-2} keV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.96±0.19 OUR AVERAGE	[$(0.95 \pm 0.19) \times 10^{-2}$ keV OUR 2021 AVERAGE]				
0.96±0.19±0.01	35	[1] AUBERT	06D	BABR	10.6 $e^+e^- \to \phi 2(\pi^+\pi^-)\gamma$

NEW

[1] AUBERT 06D reports $[\Gamma(J/\psi(1S) \to \phi 2(\pi^+\pi^-)) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}] \times [B(\phi(1020) \to K^+K^-)] = (0.47 \pm 0.09 \pm 0.03) \times 10^{-2}$ keV which we divide by our best value $B(\phi(1020) \to K^+K^-) = (49.1 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070G10;LINKAGE=AU

$\Gamma(\phi\eta) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{99}\Gamma_5/\Gamma$

NODE=M070G28
NODE=M070G28

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
6.1±2.7±0.4	6	[1] AUBERT	07AU	BABR	10.6 $e^+e^- \to \phi\eta\gamma$

[1] AUBERT 07AU quotes $\Gamma_{ee}^{J/\psi} \cdot B(J/\psi \to \phi\eta) \cdot B(\phi \to K^+K^-) \cdot B(\eta \to 3\pi) = 0.84 \pm 0.37 \pm 0.05$ eV. NODE=M070G28;LINKAGE=AU

$\Gamma(\phi f_0(980) \to \phi\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{103}\Gamma_5/\Gamma$

NODE=M070G05
NODE=M070G05

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
1.44±0.19 OUR AVERAGE					
1.40±0.25±0.02	57 ± 9	[1] LEES	12F	BABR	10.6 $e^+e^- \to \pi^+\pi^-K^+K^-\gamma$
1.48±0.27±0.09	60±11	[2] SHEN	09	BELL	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.02±0.24±0.01	20 ± 5	[3] AUBERT	07AK	BABR	10.6 $e^+e^- \to \pi^+\pi^-K^+K^-\gamma$

[1] LEES 12F reports $[\Gamma(J/\psi(1S) \to \phi f_0(980) \to \phi\pi^+\pi^-) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}] \times [B(\phi(1020) \to K^+K^-)] = 0.69 \pm 0.11 \pm 0.05$ eV which we divide by our best value $B(\phi(1020) \to K^+K^-) = (49.1 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070G05;LINKAGE=A

[2] Multiplied by 2/3 to take into account the $\phi\pi^+\pi^-$ mode only. Using $B(\phi \to K^+K^-) = (49.2 \pm 0.6)\%$. NODE=M070G05;LINKAGE=SH

[3] Superseded by LEES 12F. AUBERT 07AK reports $[\Gamma(J/\psi(1S) \to \phi f_0(980) \to \phi\pi^+\pi^-) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}] \times [B(\phi(1020) \to K^+K^-)] = 0.50 \pm 0.11 \pm 0.04$ eV which we divide by our best value $B(\phi(1020) \to K^+K^-) = (49.1 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070G05;LINKAGE=UB

$\Gamma(\phi f_0(980) \to \phi\pi^0\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{104}\Gamma_5/\Gamma$

NODE=M070G06
NODE=M070G06

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.98±0.26±0.01	16 ± 4	[1] LEES	12F	BABR	10.6 $e^+e^- \to \pi^0\pi^0K^+K^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.96±0.40±0.01	7.0 ± 2.8	[2] AUBERT	07AK	BABR	10.6 $e^+e^- \to \pi^0\pi^0K^+K^-\gamma$

[1] LEES 12F reports $[\Gamma(J/\psi(1S) \to \phi f_0(980) \to \phi\pi^0\pi^0) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}] \times [B(\phi(1020) \to K^+K^-)] = 0.48 \pm 0.12 \pm 0.05$ eV which we divide by our best value $B(\phi(1020) \to K^+K^-) = (49.1 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070G06;LINKAGE=A

[2] Superseded by LEES 12F. AUBERT 07AK reports $[\Gamma(J/\psi(1S) \to \phi f_0(980) \to \phi\pi^0\pi^0) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}] \times [B(\phi(1020) \to K^+K^-)] = 0.47 \pm 0.19 \pm 0.05$ eV which we divide by our best value $B(\phi(1020) \to K^+K^-) = (49.1 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070G06;LINKAGE=UB

$\Gamma(\phi f_2(1270)) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{109}\Gamma_5/\Gamma$

NODE=M070G07

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
$1.79\pm0.32^{+0.02}_{-0.06}$	61	[1,2,3] LEES	12F	BABR	$10.6\ e^+e^- \to \pi^+\pi^-K^+K^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$4.08\pm0.73^{+0.04}_{-0.14}$	44	[2,4] AUBERT	07AK	BABR	$10.6\ e^+e^- \to \pi^+\pi^-K^+K^-\gamma$

[1] LEES 12F reports $[\Gamma(J/\psi(1S) \to \phi f_2(1270)) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}] \times [B(f_2(1270) \to \pi\pi)] = 1.51 \pm 0.25 \pm 0.10$ eV which we divide by our best value $B(f_2(1270) \to \pi\pi) = (84.2^{+2.9}_{-0.9}) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070G07;LINKAGE=A

[2] Using $B(\phi \to K^+K^-) = (48.9 \pm 0.5)\%$. NODE=M070G07;LINKAGE=AE

[3] Using $\pi^+\pi^-$ invariant mass between 1.1 and 1.5 GeV. May include other sources such as $f_0(1370)$. NODE=M070G07;LINKAGE=B

[4] Superseded by LEES 12F. AUBERT 07AK reports $[\Gamma(J/\psi(1S) \to \phi f_2(1270)) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}] \times [B(f_2(1270) \to \pi\pi)] = 3.44 \pm 0.55 \pm 0.28$ eV which we divide by our best value $B(f_2(1270) \to \pi\pi) = (84.2^{+2.9}_{-0.9}) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070G07;LINKAGE=UB

$\Gamma(\phi f'_2(1525)) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{114}\Gamma_5/\Gamma$

NODE=M070GZ2

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
$8.2\pm3.2\pm0.2$	11	[1,2] LEES	14H	BABR	$e^+e^- \to K^0_SK^0_SK^+K^-\gamma$

[1] Dividing by 1/4 to take into account $B(f'_2(1525) \to K^0_SK^0_S) = 1/4\ B(f'_2(1525) \to K\overline{K})$ and using $B(\phi \to K^+K^-) = (48.9 \pm 0.5)\%$. NODE=M070GZ2;LINKAGE=A

[2] LEES 14H reports $[\Gamma(J/\psi(1S) \to \phi f'_2(1525)) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}] \times [B(f'_2(1525) \to K\overline{K})] = 7.2 \pm 2.8 \pm 0.3$ eV which we divide by our best value $B(f'_2(1525) \to K\overline{K}) = (87.6 \pm 2.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070GZ2;LINKAGE=B

$\Gamma(\phi K^+K^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{120}\Gamma_5/\Gamma$

NODE=M070G09

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
$4.60\pm0.62\pm0.05$	163	[1] LEES	12F	BABR	$10.6\ e^+e^- \to K^+K^-K^+K^-\gamma$

[1] LEES 12F reports $[\Gamma(J/\psi(1S) \to \phi K^+K^-) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}] \times [B(\phi(1020) \to K^+K^-)] = 2.26 \pm 0.26 \pm 0.16$ eV which we divide by our best value $B(\phi(1020) \to K^+K^-) = (49.1 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070G09;LINKAGE=A

$\Gamma(\phi K^0_SK^0_S) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{121}\Gamma_5/\Gamma$

NODE=M070GZ1

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
$3.26\pm0.84\pm0.04$	29	[1] LEES	14H	BABR	$e^+e^- \to K^0_SK^0_SK^+K^-\gamma$

[1] LEES 14H reports $[\Gamma(J/\psi(1S) \to \phi K^0_SK^0_S) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}] \times [B(\phi(1020) \to K^+K^-)] = 1.6 \pm 0.4 \pm 0.1$ eV which we divide by our best value $B(\phi(1020) \to K^+K^-) = (49.1 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070GZ1;LINKAGE=A

$\Gamma(f'_2(1525)K^+K^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{126}\Gamma_5/\Gamma$

NODE=M070GZ4

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
$5.8\pm1.9\pm0.1$	16	[1,2] LEES	14H	BABR	$e^+e^- \to K^0_SK^0_SK^+K^-\gamma$

[1] Dividing by 1/4 to take into account $B(f'_2(1525) \to K^0_SK^0_S) = 1/4\ B(f'_2(1525) \to K\overline{K})$. NODE=M070GZ4;LINKAGE=A

[2] LEES 14H reports $[\Gamma(J/\psi(1S) \to f'_2(1525)K^+K^-) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}] \times [B(f'_2(1525) \to K\overline{K})] = 5.12 \pm 1.68 \pm 0.20$ eV which we divide by our best value $B(f'_2(1525) \to K\overline{K}) = (87.6 \pm 2.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070GZ4;LINKAGE=B

$\Gamma(2(\pi^+\pi^-)\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{145}\Gamma_5/\Gamma$

NODE=M070G23

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
$303\pm5\pm18$	4990	AUBERT	07AU	BABR	$10.6\ e^+e^- \to 2(\pi^+\pi^-)\pi^0\gamma$

$\Gamma(\pi^+\pi^-3\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{147}\Gamma_5/\Gamma$

NODE=M070P53

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
104 ±50 OUR AVERAGE Error includes scale factor of 4.3. [150 ± 16 eV OUR 2021 AVERAGE]					
55.4±15.9± 0.5	14k	[1] LEES	21	BABR	10.6 $e^+e^- \to 2(\pi^+\pi^-)3\pi^0\gamma$
150.0± 4.0±15.0	2.3k	LEES	18E	BABR	10.6 $e^+e^- \to \pi^+\pi^-3\pi^0\gamma$

NEW

[1] LEES 21 reports $[\Gamma(J/\psi(1S) \to \pi^+\pi^-3\pi^0) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}] \times [\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)/\Gamma_{total}] = 19.2 \pm 4.5 \pm 3.2$ eV which we divide by our best value $\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)/\Gamma_{total} = 0.3468 \pm 0.0030$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M070P53;LINKAGE=A

$\Gamma(\pi^+\pi^-4\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{148}\Gamma_5/\Gamma$

NODE=M070Q17

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
35.8±4.4±5.4	340	LEES	21C	BABR	$e^+e^- \to \gamma_{ISR}(\pi^+\pi^-4\pi^0)$

$\Gamma(\rho^\pm\pi^\mp\pi^0\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{149}\Gamma_5/\Gamma$

NODE=M070P55

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
78.0±9.0±8.0	1.2k	LEES	18E	BABR	10.6 $e^+e^- \to \pi^+\pi^-3\pi^0\gamma$

$\Gamma(\rho^+\rho^-\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{150}\Gamma_5/\Gamma$

NODE=M070P56

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
33.0±5.0±3.3	529	LEES	18E	BABR	10.6 $e^+e^- \to \pi^+\pi^-3\pi^0\gamma$

$\Gamma(\pi^+\pi^-\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{151}\Gamma_5/\Gamma$

NODE=M070G5

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
0.1248±0.0032 OUR AVERAGE [0.122 ± 0.009 keV OUR 2021 AVERAGE]				
0.1248±0.0019±0.0026	LEES	21B	BABR	10.5 $e^+e^- \to \pi^+\pi^-\pi^0\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.122 ±0.005 ±0.008	AUBERT,B	04N	BABR	10.6 $e^+e^- \to \pi^+\pi^-\pi^0\gamma$

NEW

$\Gamma(2(\pi^+\pi^-\pi^0)) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{152}\Gamma_5/\Gamma$

NODE=M070G7

VALUE (10^{-2} keV)	EVTS	DOCUMENT ID		TECN	COMMENT
8.9±0.5±1.0	761	AUBERT	06D	BABR	10.6 $e^+e^- \to 2(\pi^+\pi^-\pi^0)\gamma$

$\Gamma(\pi^+\pi^-\pi^0K^+K^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{153}\Gamma_5/\Gamma$

NODE=M070G27

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
107.0±4.3±6.4	768	AUBERT	07AU	BABR	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\pi^0\gamma$

$\Gamma(2(\pi^+\pi^-)) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{155}\Gamma_5/\Gamma$

NODE=M070G11

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
20.4±0.9±0.4		LEES	12E	BABR	10.6 $e^+e^- \to 2\pi^+2\pi^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
19.5±1.4±1.3	270	[1] AUBERT	05D	BABR	10.6 $e^+e^- \to 2(\pi^+\pi^-)\gamma$

[1] Superseded by LEES 12E.

NODE=M070G11;LINKAGE=AU

$\Gamma(3(\pi^+\pi^-)) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{156}\Gamma_5/\Gamma$

NODE=M070G6

VALUE (10^{-2} keV)	EVTS	DOCUMENT ID		TECN	COMMENT
2.37±0.16±0.14	496	AUBERT	06D	BABR	10.6 $e^+e^- \to 3(\pi^+\pi^-)\gamma$

$\Gamma(2(\pi^+\pi^-)3\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{157}\Gamma_5/\Gamma$

NODE=M070Q12

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
345±10±50	14k	LEES	21	BABR	10.6 $e^+e^- \to 2(\pi^+\pi^-)3\pi^0\gamma$

$\Gamma(2(\pi^+\pi^-)\eta) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{159}\Gamma_5/\Gamma$

NODE=M070G26

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
13.1±2.4±0.1	85	[1] AUBERT	07AU	BABR	10.6 $e^+e^- \to 2(\pi^+\pi^-)\eta\gamma$

[1] AUBERT 07AU reports $[\Gamma(J/\psi(1S) \to 2(\pi^+\pi^-)\eta) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}] \times [B(\eta \to 2\gamma)] = 5.16 \pm 0.85 \pm 0.39$ eV which we divide by our best value $B(\eta \to 2\gamma) = (39.36 \pm 0.18) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M070G26;LINKAGE=AU

$\Gamma(2(\pi^+\pi^-\pi^0)\eta) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{161}\Gamma_5/\Gamma$

NODE=M070Q15

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
9.1±2.6±1.4	14k	LEES	21	BABR	10.6 $e^+e^- \to 2(\pi^+\pi^-)3\pi^0\gamma$

$\Gamma(\pi^+\pi^-\pi^0\pi^0\eta) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{162}\Gamma_5/\Gamma$

NODE=M070P57

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
13.1± 2.7 OUR AVERAGE					
[12.8 ± 2.7 eV OUR 2021 AVERAGE]					
26.1±17.9±0.3	14k	[1] LEES	21	BABR	10.6 $e^+e^- \to 2(\pi^+\pi^-)3\pi^0\gamma$
12.8± 1.8±2.0	203	LEES	18E	BABR	10.6 $e^+e^- \to \pi^+\pi^-\pi^0\pi^0\eta\gamma$

NEW

[1] LEES 21 reports $[\Gamma(J/\psi(1S) \to \pi^+\pi^-\pi^0\pi^0\eta) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}] \times [B(\eta \to \pi^+\pi^-\pi^0)] = 6 \pm 4 \pm 1$ eV which we divide by our best value $B(\eta \to \pi^+\pi^-\pi^0) = (23.02 \pm 0.25) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M070P57;LINKAGE=A

$\Gamma(\rho^\pm\pi^\mp\pi^0\eta) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{163}\Gamma_5/\Gamma$

NODE=M070P59

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
10.5±4.1±1.6	168	LEES	18E	BABR	10.6 $e^+e^- \to \pi^+\pi^-\pi^0\pi^0\eta\gamma$

$\Gamma(K^+K^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{164}\Gamma_5/\Gamma$

NODE=M070G08

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.78±0.11±0.05	462	[1] LEES	15J	BABR	$e^+e^- \to K^+K^-\gamma$
1.94±0.11±0.05	462	[2] LEES	15J	BABR	$e^+e^- \to K^+K^-\gamma$
1.42±0.23±0.08	51	[3] LEES	13Q	BABR	$e^+e^- \to K^+K^-\gamma$

OCCUR=2

[1] $\sin\phi > 0$.
NODE=M070G08;LINKAGE=A

[2] $\sin\phi < 0$.
NODE=M070G08;LINKAGE=B

[3] Interference with non-resonant K^+K^- production not taken into account.
NODE=M070G08;LINKAGE=BA

$\Gamma(K^0_S K^0_L \pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{170}\Gamma_5/\Gamma$

NODE=M070G41

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
11.4±1.3±0.6	182	LEES	17A	BABR	$e^+e^- \to K^0_S K^0_L \pi^0\gamma$

$\Gamma(K^*(892)^0\overline{K}^0 + \text{c.c.} \to K^0_S K^0_L \pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{171}\Gamma_5/\Gamma$

NODE=M070G42

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
6.7±0.9±0.4	106	LEES	17A	BABR	$e^+e^- \to K^0_S K^0_L \pi^0\gamma$

$\Gamma(K^*_2(1430)^0\overline{K}^0 + \text{c.c.} \to K^0_S K^0_L \pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{172}\Gamma_5/\Gamma$

NODE=M070G43

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
2.4±0.7±0.1	37	LEES	17A	BABR	$e^+e^- \to K^0_S K^0_L \pi^0\gamma$

$\Gamma(K^+K^-\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{173}\Gamma_5/\Gamma$

NODE=M070G12

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
37.94±0.81±1.10	3.1k	LEES	12F	BABR	10.6 $e^+e^- \to \pi^+\pi^-K^+K^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
36.3 ±1.3 ±2.1	1.5k	[1] AUBERT	07AK	BABR	10.6 $e^+e^- \to \pi^+\pi^-K^+K^-\gamma$
33.6 ±2.7 ±2.7	233	[2] AUBERT	05D	BABR	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\gamma$

OCCUR=2

[1] Superseded by LEES 12F.
NODE=M070G12;LINKAGE=B

[2] Superseded by AUBERT 07AK.
NODE=M070G12;LINKAGE=AU

$\Gamma(K^+K^-\pi^0\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{174}\Gamma_5/\Gamma$

NODE=M070G04

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
11.75±0.81±0.90	388	LEES	12F	BABR	10.6 $e^+e^- \to \pi^0\pi^0K^+K^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
13.6 ±1.1 ±1.3	203	[1] AUBERT	07AK	BABR	10.6 $e^+e^- \to \pi^0\pi^0K^+K^-\gamma$

[1] Superseded by LEES 12F.
NODE=M070G04;LINKAGE=A

$\Gamma(K^0_S K^0_L \pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{175}\Gamma_5/\Gamma$

NODE=M070GY1

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
20.8±2.3±2.1	248	LEES	14H	BABR	$e^+e^- \to \pi^+\pi^-K^0_S K^0_L\gamma$

$\Gamma(K^0_S K^0_L \pi^0\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{176}\Gamma_5/\Gamma$

NODE=M070G40

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
10.3±2.3±0.5	47	LEES	17A	BABR	$e^+e^- \to K^0_S K^0_L \pi^0\pi^0\gamma$

$\Gamma(K^0_S K^0_L \eta) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{177}\Gamma_5/\Gamma$

NODE=M070G35
NODE=M070G35

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
8.0±1.8±0.4	45	LEES	17A	BABR	$e^+e^- \to K^0_S K^0_L \eta\gamma$

$\Gamma(K^0_S K^0_S \pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{178}\Gamma_5/\Gamma$

NODE=M070GY2
NODE=M070GY2

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
9.3±0.9±0.5	133	LEES	14H	BABR	$e^+e^- \to \pi^+\pi^- K^0_S K^0_S \gamma$

$\Gamma(K^\mp K^0_S \pi^\pm \pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{179}\Gamma_5/\Gamma$

NODE=M070G34
NODE=M070G34

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
31.7±1.9±1.8	393	LEES	17D	BABR	$e^+e^- \to K^0_S K^\pm \pi^\mp \pi^0 \gamma$

$\Gamma(K^+K^- 2(\pi^+\pi^-)) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{180}\Gamma_5/\Gamma$

NODE=M070G9
NODE=M070G9

VALUE (10^{-2} keV)	EVTS	DOCUMENT ID		TECN	COMMENT
2.75±0.23±0.17	205	AUBERT	06D	BABR	10.6 $e^+e^- \to K^+K^- 2(\pi^+\pi^-)\gamma$

$\Gamma(K^+K^-\pi^+\pi^-\eta) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{181}\Gamma_5/\Gamma$

NODE=M070G30
NODE=M070G30

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
25.9±3.9±0.1	73	[1] AUBERT	07AU	BABR	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\eta\gamma$

[1] AUBERT 07AU reports $[\Gamma(J/\psi(1S) \to K^+K^-\pi^+\pi^-\eta) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}] \times [B(\eta \to 2\gamma)] = 10.2 \pm 1.3 \pm 0.8$ eV which we divide by our best value $B(\eta \to 2\gamma) = (39.36 \pm 0.18) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M070G30;LINKAGE=AU

$\Gamma(2(K^+K^-)) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{182}\Gamma_5/\Gamma$

NODE=M070G13
NODE=M070G13

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
4.00±0.33±0.29	287 ± 24	LEES	12F	BABR	10.6 $e^+e^- \to 2(K^+K^-)\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
4.11±0.39±0.30	156 ± 15	[1] AUBERT	07AK	BABR	10.6 $e^+e^- \to 2(K^+K^-)\gamma$
4.0 ±0.7 ±0.6	38	[2] AUBERT	05D	BABR	10.6 $e^+e^- \to 2(K^+K^-)\gamma$

[1] Superseded by LEES 12F.
[2] Superseded by AUBERT 07AK.

NODE=M070G13;LINKAGE=A
NODE=M070G13;LINKAGE=AU

$\Gamma(K^+K^-K^0_S K^0_S) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{183}\Gamma_5/\Gamma$

NODE=M070GY3
NODE=M070GY3

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
2.3±0.4±0.1	29	LEES	14H	BABR	$e^+e^- \to K^0_S K^0_S K^+K^-\gamma$

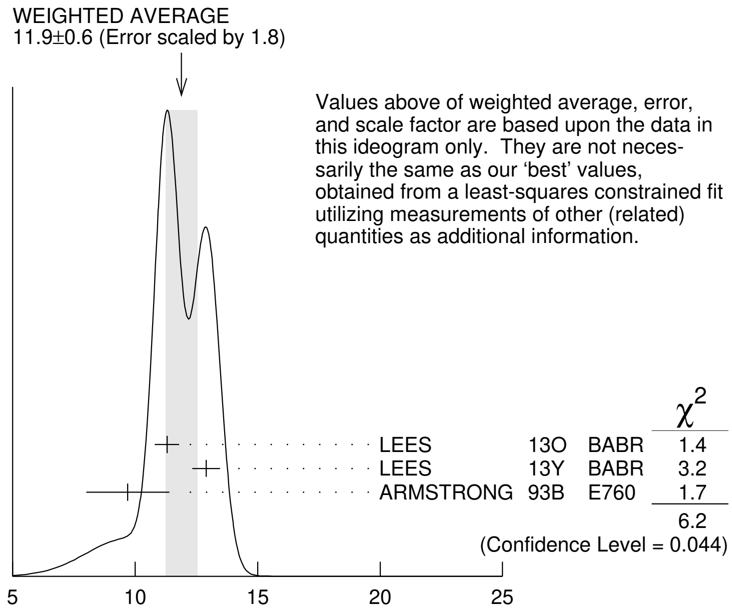
$\Gamma(p\overline{p}) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{184}\Gamma_5/\Gamma$

NODE=M070G4
NODE=M070G4

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
11.9±0.6 OUR AVERAGE Error includes scale factor of 1.8. See the ideogram below.					
11.3±0.4±0.3	821	[1] LEES	13O	BABR	$e^+e^- \to p\overline{p}\gamma$
12.9±0.4±0.4	918	[2] LEES	13Y	BABR	$e^+e^- \to p\overline{p}\gamma$
9.7±1.7		[3] ARMSTRONG	93B	E760	$\overline{p}p \to e^+e^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
12.0±0.6±0.5	438	[4] AUBERT	06B	BABR	$e^+e^- \to p\overline{p}\gamma$

[1] ISR photon reconstructed in the detector
[2] ISR photon undetected
[3] Using $\Gamma_{total} = 85.5^{+6.1}_{-5.8}$ MeV.
[4] Superseded by LEES 13O

NODE=M070G4;LINKAGE=B
NODE=M070G4;LINKAGE=C
NODE=M070G;LINKAGE=A
NODE=M070G4;LINKAGE=A



$\Gamma(p\overline{p}) \times \Gamma(e^+e^-)/\Gamma_{total}$ (eV)

$\Gamma(\Lambda\overline{\Lambda}) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{200}\Gamma_5/\Gamma$

NODE=M070G16

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
10.7±0.9±0.7	AUBERT	07BD	BABR	10.6 $e^+e^- \to \Lambda\overline{\Lambda}\gamma$

$\Gamma(\Sigma^0\overline{\Sigma}^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{210}\Gamma_5/\Gamma$

NODE=M070G17

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
6.4±1.2±0.6	AUBERT	07BD	BABR	10.6 $e^+e^- \to \Sigma^0\overline{\Sigma}^0\gamma$

$J/\psi(1S)$ BRANCHING RATIOS

NODE=M070230

For the first four branching ratios, see also the partial widths, and (partial widths) $\times\ \Gamma(e^+e^-)/\Gamma_{total}$ above.

NODE=M070300

$\Gamma(\text{hadrons})/\Gamma_{total}$ Γ_1/Γ

NODE=M070R3

VALUE	DOCUMENT ID		TECN	COMMENT
0.877±0.005 OUR AVERAGE				
0.878±0.005	BAI	95B	BES	e^+e^-
0.86 ±0.02	BOYARSKI	75	MRK1	e^+e^-

$\Gamma(\text{virtual}\,\gamma \to \text{hadrons})/\Gamma_{total}$ Γ_2/Γ

NODE=M070R4

VALUE	DOCUMENT ID		TECN	COMMENT
0.135±0.003	[1,2] SETH	04	RVUE	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.17 ±0.02	[1] BOYARSKI	75	MRK1	e^+e^-

[1] Included in $\Gamma(\text{hadrons})/\Gamma_{total}$. NODE=M070R4;LINKAGE=C

[2] Using B($J/\psi \to \ell^+\ell^-$) = (5.90 ± 0.09)% from RPP-2002 and R = 2.28 ± 0.04 determined by a fit to data from BAI 00 and BAI 02C. NODE=M070R4;LINKAGE=SE

$\Gamma(ggg)/\Gamma_{total}$ Γ_3/Γ

NODE=M070S65

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
64.1±1.0	6 M	[1] BESSON	08	CLEO	$\psi(2S) \to \pi^+\pi^- +$ hadrons

[1] Calculated using the value $\Gamma(\gamma gg)/\Gamma(ggg) = 0.137 \pm 0.001 \pm 0.016 \pm 0.004$ from BESSON 08 and the PDG 08 values of B($\ell^+\ell^-$), B(virtual $\gamma \to$ hadrons), and B($\gamma\eta_c$). The statistical error is negligible and the systematic error is partially correlated with that of $\Gamma(\gamma gg)/\Gamma_{total}$ measurement of BESSON 08. NODE=M070S65;LINKAGE=BE

$\Gamma(\gamma gg)/\Gamma_{total}$ Γ_4/Γ

NODE=M070S66

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
8.79±1.05	200 k	[1] BESSON	08	CLEO	$\psi(2S) \to \pi^+\pi^-\gamma +$ hadrons

[1] Calculated using the value $\Gamma(\gamma gg)/\Gamma(ggg) = 0.137 \pm 0.001 \pm 0.016 \pm 0.004$ from BESSON 08 and the value of $\Gamma(ggg)/\Gamma_{total}$. The statistical error is negligible and the systematic error is partially correlated with that of $\Gamma(ggg)/\Gamma_{total}$ measurement of BESSON 08. NODE=M070S66;LINKAGE=BE

$\Gamma(\gamma gg)/\Gamma(ggg)$ Γ_4/Γ_3

NODE=M070S67
NODE=M070S67

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
13.7±0.1±0.7	6 M	BESSON	08	CLEO	$\psi(2S) \to \pi^+\pi^- J/\psi$

$\Gamma(e^+e^-)/\Gamma_{total}$ Γ_5/Γ

NODE=M070R1
NODE=M070R1

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
5.971±0.032 OUR AVERAGE					
5.983±0.007±0.037	720k	ABLIKIM	13R	BES3	$\psi(2S) \to J/\psi\pi^+\pi^-$
5.945±0.067±0.042	15k	LI	05C	CLEO	$\psi(2S) \to J/\psi\pi^+\pi^-$
5.90 ±0.05 ±0.10		BAI	98D	BES	$\psi(2S) \to J/\psi\pi^+\pi^-$
6.09 ±0.33		BAI	95B	BES	e^+e^-
5.92 ±0.15 ±0.20		COFFMAN	92	MRK3	$\psi(2S) \to J/\psi\pi^+\pi^-$
6.9 ±0.9		BOYARSKI	75	MRK1	e^+e^-

$\Gamma(e^+e^-\gamma)/\Gamma_{total}$ Γ_6/Γ

NODE=M070S33
NODE=M070S33

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
8.8±1.3±0.4	[1] ARMSTRONG	96	E760	$\overline{p}p \to e^+e^-\gamma$

[1] For E_γ > 100 MeV.

NODE=M070S33;LINKAGE=A

$\Gamma(\mu^+\mu^-)/\Gamma_{total}$ Γ_7/Γ

NODE=M070R2
NODE=M070R2

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
5.961±0.033 OUR AVERAGE					
5.973±0.007±0.038	770k	ABLIKIM	13R	BES3	$\psi(2S) \to J/\psi\pi^+\pi^-$
5.960±0.065±0.050	17k	LI	05C	CLEO	$\psi(2S) \to J/\psi\pi^+\pi^-$
5.84 ±0.06 ±0.10		BAI	98D	BES	$\psi(2S) \to J/\psi\pi^+\pi^-$
6.08 ±0.33		BAI	95B	BES	e^+e^-
5.90 ±0.15 ±0.19		COFFMAN	92	MRK3	$\psi(2S) \to J/\psi\pi^+\pi^-$
6.9 ±0.9		BOYARSKI	75	MRK1	e^+e^-

$\Gamma(e^+e^-)/\Gamma(\mu^+\mu^-)$ Γ_5/Γ_7

NODE=M070R5
NODE=M070R5

VALUE	DOCUMENT ID		TECN	COMMENT
1.0016±0.0031 OUR AVERAGE				
1.0022±0.0044±0.0048	[1] AULCHENKO	14	KEDR	3.097 $e^+e^- \to e^+e^-,\mu^+\mu^-$
1.0017±0.0017±0.0033	[2] ABLIKIM	13R	BES3	$\psi(2S) \to J/\psi\pi^+\pi^-$
1.002 ±0.021 ±0.013	[3] ANASHIN	10	KEDR	3.097 $e^+e^- \to e^+e^-,\mu^+\mu^-$
0.997 ±0.012 ±0.006	LI	05C	CLEO	$\psi(2S) \to J/\psi\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.011 ±0.013 ±0.016	BAI	98D	BES	$\psi(2S) \to J/\psi\pi^+\pi^-$
1.00 ±0.07	BAI	95B	BES	e^+e^-
1.00 ±0.05	BOYARSKI	75	MRK1	e^+e^-
0.91 ±0.15	ESPOSITO	75B	FRAM	e^+e^-
0.93 ±0.10	FORD	75	SPEC	e^+e^-

[1] From 235.3k $J/\psi \to e^+e^-$ and 156.6k $J/\psi \to \mu^+\mu^-$ observed events.

NODE=M070R5;LINKAGE=A

[2] Not independent of the corresponding measurements of Γ(e+ e-)/Γ_{total} and Γ(mu+ mu-)/Γ_{total}.

NODE=M070R5;LINKAGE=AB

[3] Not independent of the corresponding measurements of $\Gamma(e^+e^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ and $\Gamma(\mu^+\mu^-) \times \Gamma(e^+e^-)/\Gamma_{total}$.

NODE=M070R5;LINKAGE=AN

HADRONIC DECAYS

NODE=M070305

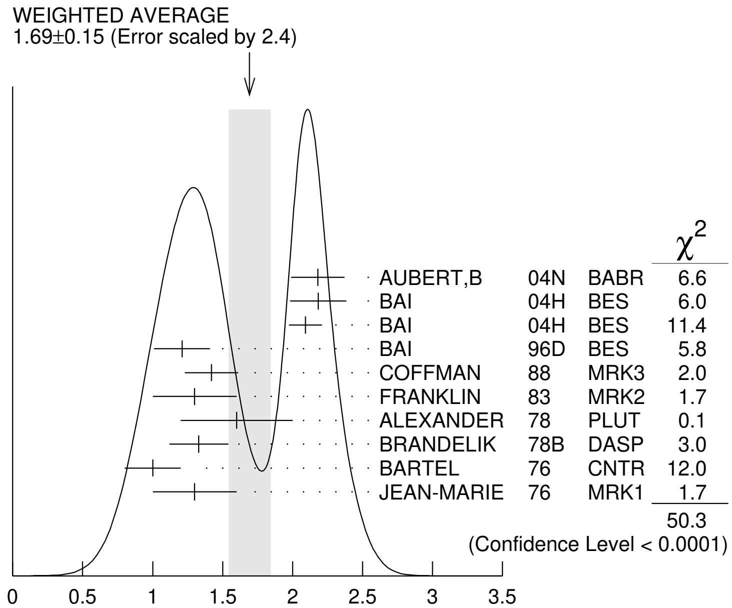
$\Gamma(\rho\pi)/\Gamma_{total}$ Γ_8/Γ

NODE=M070R20
NODE=M070R20

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
1.69 ±0.15 OUR AVERAGE		Error includes scale factor of 2.4. See the ideogram below.			
2.18 ±0.19		[1,2] AUBERT,B	04N	BABR	10.6 $e^+e^- \to \pi^+\pi^-\pi^0\gamma$
2.184±0.005±0.201	220k	[2,3] BAI	04H	BES	$e^+e^- \to J/\psi \to \pi^+\pi^-\pi^0$
2.091±0.021±0.116		[2,4] BAI	04H	BES	$\psi(2S) \to \pi^+\pi^- J/\psi$
1.21 ±0.20		BAI	96D	BES	$e^+e^- \to \rho\pi$
1.42 ±0.01 ±0.19		COFFMAN	88	MRK3	e^+e^-
1.3 ±0.3	150	FRANKLIN	83	MRK2	e^+e^-
1.6 ±0.4	183	ALEXANDER	78	PLUT	e^+e^-
1.33 ±0.21		BRANDELIK	78B	DASP	e^+e^-
1.0 ±0.2	543	BARTEL	76	CNTR	e^+e^-
1.3 ±0.3	153	JEAN-MARIE	76	MRK1	e^+e^-

OCCUR=2

[1] From the ratio of $\Gamma(e^+e^-)$ B($\pi^+\pi^-\pi^0$) and $\Gamma(e^+e^-)$ B($\mu^+\mu^-$) (AUBERT 04). NODE=M070R20;LINKAGE=AU
[2] Not independent of their B($\pi^+\pi^-\pi^0$). NODE=M070R20;LINKAGE=BU
[3] From $J/\psi \to \pi^+\pi^-\pi^0$ events directly. NODE=M070R20;LINKAGE=BA
[4] Obtained comparing the rates for $\pi^+\pi^-\pi^0$ and $\mu^+\mu^-$, using J/ψ events produced via $\psi(2S) \to \pi^+\pi^- J/\psi$ and with B($J/\psi \to \mu^+\mu^-$) = 5.88 ± 0.10%. NODE=M070R20;LINKAGE=BI



$\Gamma(\rho\pi)/\Gamma_{total}$ (units 10^{-2})

$\Gamma(\rho\pi)/\Gamma(\pi^+\pi^-\pi^0)$ Γ_8/Γ_{151}

NODE=M070P18
NODE=M070P18

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
1.142±0.011±0.026	20k	[1] LEES	17C	BABR	$J/\psi \to \pi^+\pi^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.331±0.033	20k	[2] LEES	17C	BABR	$J/\psi \to \pi^+\pi^-\pi^0$

OCCUR=2

[1] From a Dalitz plot analysis in an isobar model. NODE=M070P18;LINKAGE=A
[2] From a Dalitz plot analysis in a Veneziano model. NODE=M070P18;LINKAGE=B

$\Gamma(\rho^0\pi^0)/\Gamma(\rho\pi)$ Γ_9/Γ_8

NODE=M070R21
NODE=M070R21

VALUE	DOCUMENT ID		TECN	COMMENT
0.328±0.005±0.027	COFFMAN	88	MRK3	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.35 ±0.08	ALEXANDER	78	PLUT	e^+e^-
0.32 ±0.08	BRANDELIK	78B	DASP	e^+e^-
0.39 ±0.11	BARTEL	76	CNTR	e^+e^-
0.37 ±0.09	JEAN-MARIE	76	MRK1	e^+e^-

$\Gamma(a_2(1320)\rho)/\Gamma_{total}$ Γ_{10}/Γ

NODE=M070R43
NODE=M070R43

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
10.9±2.2 OUR AVERAGE					
11.7±0.7±2.5	7584	AUGUSTIN	89	DM2	$J/\psi \to \rho^0\rho^\pm\pi^\mp$
8.4±4.5	36	VANNUCCI	77	MRK1	$e^+e^- \to 2(\pi^+\pi^-)\pi^0$

$\Gamma(\eta\pi^+\pi^-)/\Gamma_{total}$ Γ_{11}/Γ

NODE=M070P81
NODE=M070P81

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.78±0.68	471	[1] ABLIKIM	19Q	BES3	$e^+e^- \to J/\psi \to \eta\pi^+\pi^-$

[1] From an energy scan of $e^+e^- \to J/\psi \to \eta\pi^+\pi^-$ assuming PDG 16 values for $\Gamma(e^+e^-)$, $\Gamma(\mu^+\mu^-)$, and Γ(total). NODE=M070P81;LINKAGE=A

$\Gamma(\eta\rho)/\Gamma_{total}$ Γ_{14}/Γ

NODE=M070R22
NODE=M070R22

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.193±0.023 OUR AVERAGE					
0.194±0.017±0.029	299	JOUSSET	90	DM2	$J/\psi \to$ hadrons
0.193±0.013±0.029		COFFMAN	88	MRK3	$e^+e^- \to \pi^+\pi^-\eta$

$\Gamma(\eta\phi(2170) \to \eta\phi f_0(980) \to \eta\phi\pi^+\pi^-)/\Gamma_{total}$ — Γ_{15}/Γ

NODE=M070B12

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.20±0.14±0.37	471	ABLIKIM	15H	BES3	$e^+e^- \to J/\psi \to \phi\eta\pi^+\pi^-$

$\Gamma(\eta\phi(2170) \to \eta K^*(892)^0 \overline{K}^*(892)^0)/\Gamma_{total}$ — Γ_{16}/Γ

NODE=M070S70

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<2.52 × 10^{-4}	90	ABLIKIM	10C	BES2	$J/\psi \to \eta K^+\pi^- K^-\pi^+$

$\Gamma(\eta K^\pm K^0_S \pi^\mp)/\Gamma_{total}$ — Γ_{17}/Γ

NODE=M070S57

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
21.8±2.2±3.4	232 ± 23	ABLIKIM	08E	BES2	$e^+e^- \to J/\psi$

$\Gamma(\eta K^*(892)^0 \overline{K}^*(892)^0)/\Gamma_{total}$ — Γ_{18}/Γ

NODE=M070S69

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.15±0.13±0.22	209	ABLIKIM	10C	BES2	$J/\psi \to \eta K^+\pi^- K^-\pi^+$

$\Gamma(\rho\eta'(958))/\Gamma_{total}$ — Γ_{19}/Γ

NODE=M070R23

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
8.1 ±0.8 OUR AVERAGE	Error includes scale factor of 1.6.				
7.90±0.19±0.49	3476	[1] ABLIKIM	17AK	BES3	$J/\psi \to \pi^+\pi^-\eta'$
8.3 ±3.0 ±1.2	19	JOUSSET	90	DM2	$J/\psi \to$ hadrons
11.4 ±1.4 ±1.6		COFFMAN	88	MRK3	$J/\psi \to \pi^+\pi^-\eta'$

[1] From a partial wave analysis of the decay $J/\psi \to \pi^+\pi^-\eta'$. NODE=M070R23;LINKAGE=A

$\Gamma(\rho(1450)\pi \to \pi^+\pi^-\pi^0)/\Gamma(\pi^+\pi^-\pi^0)$ — Γ_{24}/Γ_{151}

NODE=M070P25

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
10.9 ±1.7 ±2.7	20k	[1] LEES	17C	BABR	$J/\psi \to \pi^+\pi^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.80±0.27	20k	[2] LEES	17C	BABR	$J/\psi \to \pi^+\pi^-\pi^0$

OCCUR=2

[1] From a Dalitz plot analysis in an isobar model. NODE=M070P25;LINKAGE=A
[2] From a Dalitz plot analysis in a Veneziano model. NODE=M070P25;LINKAGE=B

$\Gamma(\rho(1450)^\pm\pi^\mp \to K^0_S K^\pm\pi^\mp)/\Gamma(K^0_S K^\pm\pi^\mp)$ — Γ_{25}/Γ_{169}

NODE=M070P31

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
6.3±0.8±0.6	4k	[1] LEES	17C	BABR	$J/\psi \to K^0_S K^\pm\pi^\mp$

[1] From a Dalitz plot analysis in an isobar model. NODE=M070P31;LINKAGE=A

$\Gamma(\rho(1450)^0\pi^0 \to K^+K^-\pi^0)/\Gamma(K^+K^-\pi^0)$ — Γ_{26}/Γ_{168}

NODE=M070P27

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
9.3±2.0±0.6	2k	[1] LEES	17C	BABR	$J/\psi \to K^+K^-\pi^0$

[1] From a Dalitz plot analysis in an isobar model. NODE=M070P27;LINKAGE=A

$\Gamma(\rho(1450)\eta'(958) \to \pi^+\pi^-\eta'(958))/\Gamma_{total}$ — Γ_{27}/Γ

NODE=M070P36

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
3.28±0.55±0.44	119	[1] ABLIKIM	17AK	BES3	$J/\psi \to \pi^+\pi^-\eta'$

[1] From a partial wave analysis of the decay $J/\psi \to \pi^+\pi^-\eta'$. NODE=M070P36;LINKAGE=A

$\Gamma(\rho(1700)\pi \to \pi^+\pi^-\pi^0)/\Gamma(\pi^+\pi^-\pi^0)$ — Γ_{29}/Γ_{151}

NODE=M070P21

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
8±2±5	20k	[1] LEES	17C	BABR	$J/\psi \to \pi^+\pi^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
22±6	20k	[2] LEES	17C	BABR	$J/\psi \to \pi^+\pi^-\pi^0$

OCCUR=2

[1] From a Dalitz plot analysis in an isobar model. NODE=M070P21;LINKAGE=A
[2] From a Dalitz plot analysis in a Veneziano model. NODE=M070P21;LINKAGE=B

$\Gamma(\rho(2150)\pi \to \pi^+\pi^-\pi^0)/\Gamma(\pi^+\pi^-\pi^0)$ — Γ_{31}/Γ_{151}

NODE=M070P22

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
4± 1±20	20k	[1] LEES	17C	BABR	$J/\psi \to \pi^+\pi^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
600±250	20k	[2] LEES	17C	BABR	$J/\psi \to \pi^+\pi^-\pi^0$

OCCUR=2

[1] From a Dalitz plot analysis in an isobar model. NODE=M070P22;LINKAGE=A
[2] From a Dalitz plot analysis in a Veneziano model. NODE=M070P22;LINKAGE=B

$\Gamma(\rho_3(1690)\pi \to \pi^+\pi^-\pi^0)/\Gamma(\pi^+\pi^-\pi^0)$ — Γ_{32}/Γ_{151}

NODE=M070P24
NODE=M070P24

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
4.0 ± 0.8	20k	[1] LEES	17C	BABR	$J/\psi \to \pi^+\pi^-\pi^0$

[1] From a Dalitz plot analysis in a Veneziano model.

NODE=M070P24;LINKAGE=A

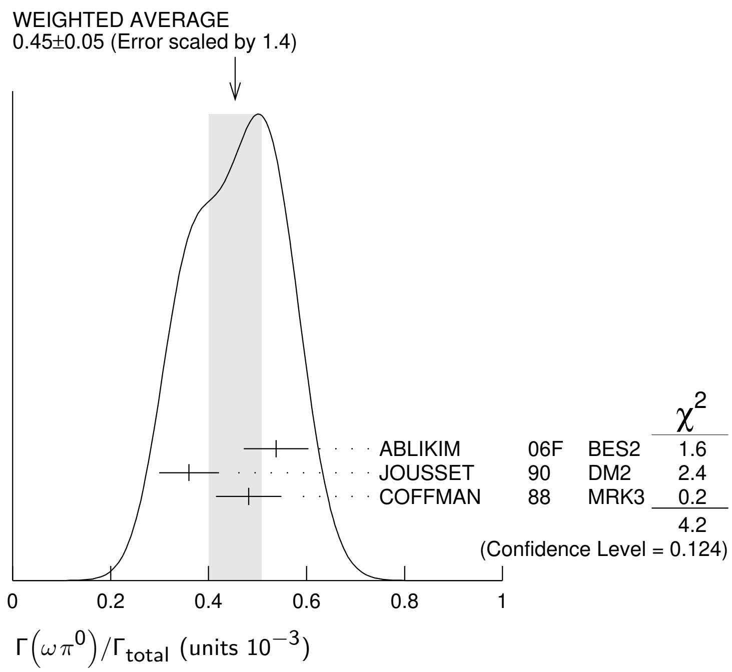
$\Gamma(\omega\pi^0)/\Gamma_{total}$ — Γ_{33}/Γ

NODE=M070R32
NODE=M070R32

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.45 ±0.05 OUR AVERAGE	Error includes scale factor of 1.4. See the ideogram below.				
$0.538\pm0.012\pm0.065$	2090	[1] ABLIKIM	06F	BES2	$J/\psi \to \omega\pi^0$
$0.360\pm0.028\pm0.054$	222	JOUSSET	90	DM2	$J/\psi \to$ hadrons
$0.482\pm0.019\pm0.064$		COFFMAN	88	MRK3	$e^+e^- \to \pi^0\pi^+\pi^-\pi^0$

[1] Using $B(\omega \to \pi^+\pi^-\pi^0) = (89.1 \pm 0.7)\%$.

NODE=M070R32;LINKAGE=BL



$\Gamma(\omega\pi^0 \to \pi^+\pi^-\pi^0)/\Gamma(\pi^+\pi^-\pi^0)$ — Γ_{34}/Γ_{151}

NODE=M070P23
NODE=M070P23

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
8±3±2	20k	[1] LEES	17C	BABR	$J/\psi \to \pi^+\pi^-\pi^0$

[1] From a Dalitz plot analysis in an isobar model and significance 4.9 σ.

NODE=M070P23;LINKAGE=A

$\Gamma(\omega\pi^+\pi^-)/\Gamma_{total}$ — Γ_{35}/Γ

NODE=M070R24
NODE=M070R24

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
7.2±1.0 OUR AVERAGE					
7.0 ± 1.6	18058	AUGUSTIN	89	DM2	$J/\psi \to 2(\pi^+\pi^-)\pi^0$
7.8 ± 1.6	215	BURMESTER	77D	PLUT	e^+e^-
6.8 ± 1.9	348	VANNUCCI	77	MRK1	$e^+e^- \to 2(\pi^+\pi^-)\pi^0$

$\Gamma(\omega\pi^0\pi^0)/\Gamma_{total}$ — Γ_{36}/Γ

NODE=M070S26
NODE=M070S26

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
3.4±0.3±0.7	509	AUGUSTIN	89	DM2	$J/\psi \to \pi^+\pi^-3\pi^0$

$\Gamma(\omega f_2(1270))/\Gamma_{total}$ — Γ_{38}/Γ

NODE=M070R28
NODE=M070R28

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
4.3±0.6 OUR AVERAGE					
$4.3\pm0.2\pm0.6$	5860	AUGUSTIN	89	DM2	e^+e^-
4.0 ± 1.6	70	BURMESTER	77D	PLUT	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.9 ± 0.8	81	VANNUCCI	77	MRK1	$e^+e^- \to 2(\pi^+\pi^-)\pi^0$

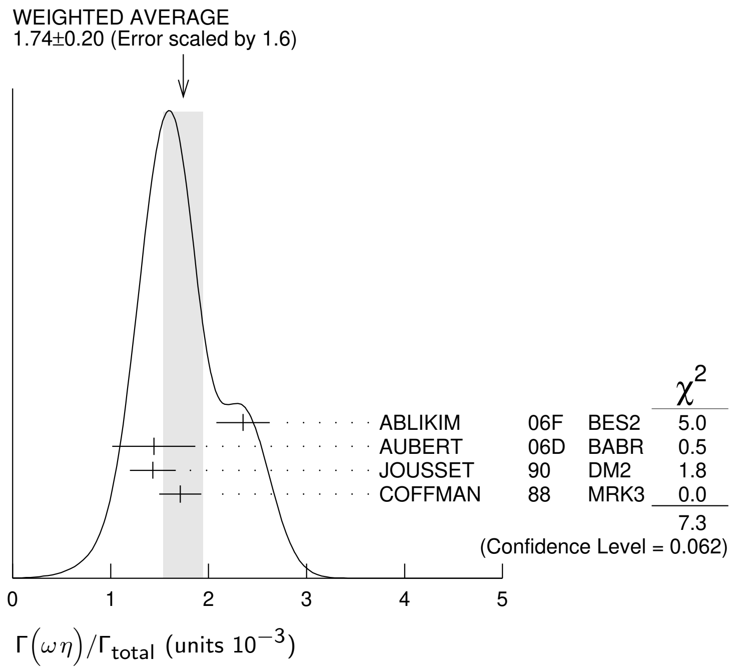
$\Gamma(\omega\eta)/\Gamma_{total}$ Γ_{39}/Γ

NODE=M070R30

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.74 ±0.20 OUR AVERAGE		Error includes scale factor of 1.6. See the ideogram below.			
2.352±0.273	5k	[1] ABLIKIM	06F	BES2	$J/\psi \to \omega\eta$
1.44 ±0.40 ±0.14	13	[2] AUBERT	06D	BABR	10.6 $e^+e^- \to \omega\eta\gamma$
1.43 ±0.10 ±0.21	378	JOUSSET	90	DM2	$J/\psi \to$ hadrons
1.71 ±0.08 ±0.20		COFFMAN	88	MRK3	$e^+e^- \to 3\pi\eta$

[1] Using B($\eta \to 2\gamma$) = (39.43 ± 0.26)%, B($\eta \to \pi^+\pi^-\pi^0$) = 22.6 ± 0.4%, B($\eta \to \pi^+\pi^-\gamma$) = 4.68 ± 0.11%, and B($\omega \to \pi^+\pi^-\pi^0$) = (89.1 ± 0.7)%. NODE=M070R30;LINKAGE=BL

[2] Using $\Gamma(J/\psi \to e^+e^-)$ = 5.52 ± 0.14 ± 0.04 keV. NODE=M070R30;LINKAGE=EE



$\Gamma(\omega\pi^+\pi^+\pi^-\pi^-)/\Gamma_{total}$ Γ_{42}/Γ

NODE=M070R26

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
85±34	140	VANNUCCI	77	MRK1	$e^+e^- \to 3(\pi^+\pi^-)\pi^0$

$\Gamma(\omega\eta'\pi^+\pi^-)/\Gamma_{total}$ Γ_{44}/Γ

NODE=M070P83

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.12±0.02±0.13	14k	[1] ABLIKIM	19AC	BES3	$J/\psi \to \omega\eta'\pi^+\pi^-$

[1] Using the decays $\omega \to \pi^+\pi^-\pi^0$ and $\eta' \to \eta\pi^+\pi^-$. NODE=M070P83;LINKAGE=A

$\Gamma(\omega\eta'(958))/\Gamma_{total}$ Γ_{45}/Γ

NODE=M070R31

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.89±0.18 OUR AVERAGE					
2.08±0.30±0.14	137	[1] ABLIKIM	17AK	BES3	$J/\psi \to \pi^+\pi^-\eta'$
2.26±0.43	218	[2] ABLIKIM	06F	BES2	$J/\psi \to \omega\eta'$
1.8 $^{+1.0}_{-0.8}$ ±0.3	6	JOUSSET	90	DM2	$J/\psi \to$ hadrons
1.66±0.17±0.19		COFFMAN	88	MRK3	$e^+e^- \to 3\pi\eta'$

[1] From a partial wave analysis of the decay $J/\psi \to \pi^+\pi^-\eta'$. NODE=M070R31;LINKAGE=A

[2] Using B($\eta' \to \pi^+\pi^-\eta$) = (44.3 ± 1.5)%, B($\eta' \to \pi^+\pi^-\gamma$) = 29.5 ± 1.0%, B($\eta \to 2\gamma$) = 39.43 ± 0.26%, and B($\omega \to \pi^+\pi^-\pi^0$) = (89.1 ± 0.7)%. NODE=M070R31;LINKAGE=BL

$\Gamma(\omega f_0(980))/\Gamma_{total}$ Γ_{46}/Γ

NODE=M070S27

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
1.41±0.27±0.47	[1] AUGUSTIN	89	DM2	$J/\psi \to 2(\pi^+\pi^-)\pi^0$

[1] Assuming B($f_0(980) \to \pi\pi$) = 0.78. NODE=M070S27;LINKAGE=K

$\Gamma(\omega f_0(1710) \to \omega K\overline{K})/\Gamma_{total}$ — Γ_{47}/Γ

NODE=M070S25
NODE=M070S25

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
4.8±1.1±0.3	[1,2] FALVARD	88	DM2	$J/\psi \to$ hadrons

[1] Includes unknown branching fraction $f_0(1710) \to K\overline{K}$. NODE=M070S25;LINKAGE=F
[2] Addition of $f_0(1710) \to K^+K^-$ and $f_0(1710) \to K^0\overline{K}^0$ branching ratios. NODE=M070S25;LINKAGE=G

$\Gamma(\omega f_1(1420))/\Gamma_{total}$ — Γ_{48}/Γ

NODE=M070S5
NODE=M070S5

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
$6.8^{+1.9}_{-1.6}\pm1.7$	111^{+31}_{-26}	BECKER	87	MRK3	$e^+e^- \to$ hadrons

$\Gamma(\omega f'_2(1525))/\Gamma_{total}$ — Γ_{49}/Γ

NODE=M070R29
NODE=M070R29

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.2 \times 10^{-4}$	90	[1] VANNUCCI	77	MRK1	$e^+e^- \to \pi^+\pi^-\pi^0K^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<2.8 \times 10^{-4}$	90	[1] FALVARD	88	DM2	$J/\psi \to$ hadrons

[1] Re-evaluated assuming $B(f'_2(1525) \to K\overline{K}) = 0.713$. NODE=M070R29;LINKAGE=C

$\Gamma(\omega X(1835) \to \omega p\overline{p})/\Gamma_{total}$ — Γ_{50}/Γ

NODE=M070S81
NODE=M070S81

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<3.9 \times 10^{-6}$	95	ABLIKIM	13P	BES3	$J/\psi \to \gamma\pi^0 p\overline{p}$

$\Gamma(\omega X(1835),\ X \to \eta'\pi^+\pi^-)/\Gamma_{total}$ — Γ_{51}/Γ

NODE=M070P84
NODE=M070P84

VALUE	DOCUMENT ID		TECN	COMMENT
$<6.2 \times 10^{-5}$	[1] ABLIKIM	19AC	BES3	$J/\psi \to \omega\eta'\pi^+\pi^-$

[1] Using the decays $\omega \to \pi^+\pi^-\pi^0$ and $\eta' \to \eta\pi^+\pi^-$. NODE=M070P84;LINKAGE=A

$\Gamma(\omega K^\pm K^0_S\pi^\mp)/\Gamma_{total}$ — Γ_{52}/Γ

NODE=M070S1
NODE=M070S1

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
34 ±5 OUR AVERAGE					
37.7±0.8±5.8	1972 ± 41	ABLIKIM	08E	BES2	$e^+e^- \to J/\psi$
29.5±1.4±7.0	879 ± 41	BECKER	87	MRK3	$e^+e^- \to$ hadrons

$\Gamma(\omega K\overline{K})/\Gamma_{total}$ — Γ_{53}/Γ

NODE=M070R27
NODE=M070R27

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
19 ± 4 OUR AVERAGE					
19.8± 2.1±3.9		[1] FALVARD	88	DM2	$J/\psi \to$ hadrons
16 ±10	22	FELDMAN	77	MRK1	e^+e^-

[1] Addition of ωK^+K^- and $\omega K^0\overline{K}^0$ branching ratios. NODE=M070R27;LINKAGE=B

$\Gamma(\omega K^*(892)\overline{K} + c.c.)/\Gamma_{total}$ — Γ_{54}/Γ

NODE=M070S2
NODE=M070S2

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT	
61 ± 9 OUR AVERAGE						
62.0± 6.8±10.6	899 ± 98	ABLIKIM	08E	BES2	$J/\psi \to \omega K^0_S K^\pm\pi^\mp$	
65.3±10.2±13.5	176 ± 28	ABLIKIM	08E	BES2	$J/\psi \to \omega K^+K^-\pi^0$	OCCUR=2
53 ±14 ±14	530 ± 140	BECKER	87	MRK3	$e^+e^- \to$ hadrons	

$\Gamma(\eta' K^{*\pm} K^\mp)/\Gamma_{total}$ — Γ_{55}/Γ

NODE=M070P48
NODE=M070P48

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT	
1.48±0.13 OUR AVERAGE					
1.50±0.02±0.19	[1] ABLIKIM	18AB	BES3	$J/\psi \to \eta' K^*\overline{K}$	
1.47±0.03±0.17	[2] ABLIKIM	18AB	BES3	$J/\psi \to \eta' K^*\overline{K}$	OCCUR=2

[1] From $\eta' K^+K^-\pi^0$. NODE=M070P48;LINKAGE=A
[2] From $\eta' K^0_S K^\pm\pi^\mp$. NODE=M070P48;LINKAGE=B

$\Gamma(\eta' K^{*0}\overline{K}^0 + c.c.)/\Gamma_{total}$ — Γ_{56}/Γ

NODE=M070P49
NODE=M070P49

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
1.66±0.03±0.21	[1] ABLIKIM	18AB	BES3	$J/\psi \to \eta' K^*\overline{K}$

[1] From $\eta' K^0_S K^\pm\pi^\mp$. NODE=M070P49;LINKAGE=A

$\Gamma(\eta' h_1(1415) \to \eta' K^* \overline{K} + c.c.)/\Gamma_{total}$ — Γ_{57}/Γ

NODE=M070P52

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.16±0.12±0.29	1.1k	[1] ABLIKIM	18AB	BES3	$J/\psi \to \eta' h_1 \to \eta' K^* \overline{K}$

[1] From $\eta' K^0_S K^\pm \pi^\mp$.

NODE=M070P52;LINKAGE=A

$\Gamma(\eta' h_1(1415) \to \eta' K^{*\pm} K^\mp)/\Gamma_{total}$ — Γ_{58}/Γ

NODE=M070P44

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.51±0.09±0.21	1.0k	[1] ABLIKIM	18AB	BES3	$J/\psi \to \eta' h_1 \to \eta' K^* \overline{K}$

[1] From $\eta' K^+ K^- \pi^0$.

NODE=M070P44;LINKAGE=A

$\Gamma(\overline{K} K^*(892) + c.c. \to K^0_S K^\pm \pi^\mp)/\Gamma(K^0_S K^\pm \pi^\mp)$ — Γ_{60}/Γ_{169}

NODE=M070P30

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
90.5±0.9±3.8	4k	[1] LEES	17C	BABR	$J/\psi \to K^0_S K^\pm \pi^\mp$

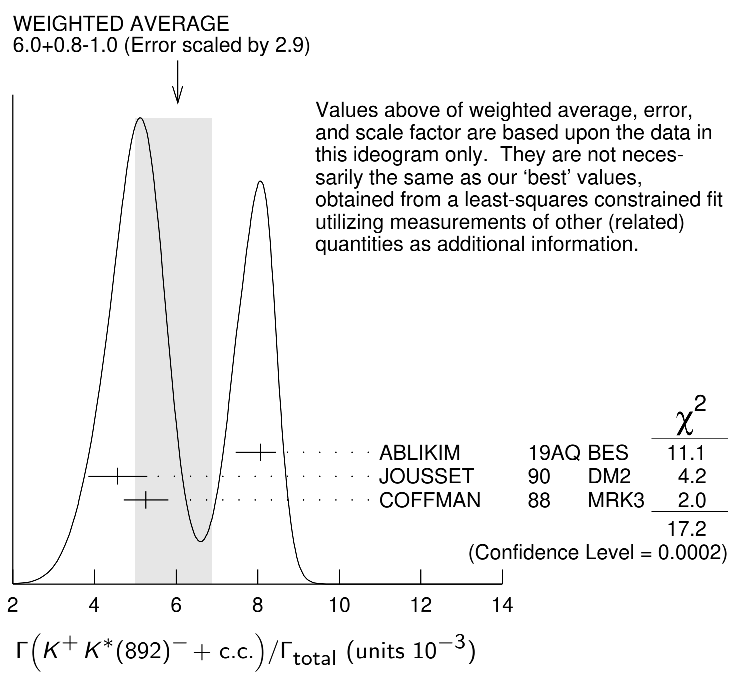
[1] From a Dalitz plot analysis in an isobar model.

NODE=M070P30;LINKAGE=A

$\Gamma(K^+ K^*(892)^- + c.c.)/\Gamma_{total}$ — Γ_{61}/Γ

NODE=M070S15

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
6.0 $^{+0.8}_{-1.0}$ OUR AVERAGE	Error includes scale factor of 2.9. See the ideogram below.				
$8.07\pm0.04^{+0.38}_{-0.61}$	183k	ABLIKIM	19AQ	BES	$J/\psi \to K^+ K^- \pi^0$
4.57±0.17±0.70	2285	JOUSSET	90	DM2	$J/\psi \to$ hadrons
5.26±0.13±0.53		COFFMAN	88	MRK3	$J/\psi \to K^\pm K^0_S \pi^\mp$, $K^+ K^- \pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.6 ±0.6	24	FRANKLIN	83	MRK2	$J/\psi \to K^+ K^- \pi^0$
3.2 ±0.6	48	VANNUCCI	77	MRK1	$J/\psi \to K^\pm K^0_S \pi^\mp$
4.1 ±1.2	39	BRAUNSCH...	76	DASP	$J/\psi \to K^\pm X$



$\Gamma(K^+ K^*(892)^- + c.c. \to K^+ K^- \pi^0)/\Gamma_{total}$ — Γ_{62}/Γ

NODE=M070P79

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
$2.69\pm0.01^{+0.13}_{-0.20}$	183k	ABLIKIM	19AQ	BES	$J/\psi \to K^+ K^- \pi^0$

$\Gamma(K^+ K^*(892)^- + c.c. \to K^+ K^- \pi^0)/\Gamma(K^+ K^- \pi^0)$ — Γ_{62}/Γ_{168}

NODE=M070P26

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
92.4±1.5±3.4	2k	[1] LEES	17C	BABR	$J/\psi \to K^+ K^- \pi^0$

[1] From a Dalitz plot analysis in an isobar model.

NODE=M070P26;LINKAGE=A

$\Gamma(K^0 \overline{K}^*(892)^0 + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{64}/Γ

NODE=M070S16

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
4.2 ±0.4 OUR AVERAGE					
3.96±0.15±0.60	1192	JOUSSET	90	DM2	$J/\psi \to$ hadrons
4.33±0.12±0.45		COFFMAN	88	MRK3	$J/\psi \to K^\pm K^0_S \pi^\mp$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.7 ±0.6	45	VANNUCCI	77	MRK1	$J/\psi \to K^\pm K^0_S \pi^\mp$

$\Gamma(\overline{K}^*(892)^0 K^+ \pi^- + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{66}/Γ

NODE=M070S52

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	[1] ABLIKIM	06C	BES2	$J/\psi \to \overline{K}^*(892)^0 K^+ \pi^-$

[1] A $K^*_0(700)$ is observed by ABLIKIM 06C in the $K^+\pi^-$ mass spectrum of the $\overline{K}^*(892)^0 K^+ \pi^-$ final state against the $\overline{K}^*(892)$. A corresponding branching fraction of the $J/\psi(1S)$ is not presented.

NODE=M070S52;LINKAGE=AB

$\Gamma(K^*(892)^0 K^0_S \to \gamma K^0_S K^0_S)/\Gamma_{\text{total}}$ Γ_{70}/Γ

NODE=M070P71

VALUE (units 10^{-6})	DOCUMENT ID		TECN	COMMENT
$\mathbf{6.28^{+0.16+0.59}_{-0.17-0.52}}$	ABLIKIM	18AA	BES3	$J/\psi \to \gamma K^0_S K^0_S$

$\Gamma(K^*(892)^\pm K^*(700)^\mp)/\Gamma_{\text{total}}$ Γ_{72}/Γ

NODE=M070S74

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{1.09\pm0.18^{+0.94}_{-0.54}}$	655	ABLIKIM	10E	BES2	$J/\psi \to K^\pm K^0_S \pi^\mp \pi^0$

$\Gamma(K^*(892)^0 \overline{K}^*(892)^0)/\Gamma_{\text{total}}$ Γ_{73}/Γ

NODE=M070R46

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<5	90	VANNUCCI	77	MRK1	$e^+ e^- \to \pi^+ \pi^- K^+ K^-$

$\Gamma(K^*(892)^\pm K^*(892)^\mp)/\Gamma_{\text{total}}$ Γ_{74}/Γ

NODE=M070S73

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{1.00\pm0.19^{+0.11}_{-0.32}}$	323	ABLIKIM	10E	BES2	$J/\psi \to K^\pm K^0_S \pi^\mp \pi^0$

$\Gamma(K_1(1400)^\pm K^\mp)/\Gamma_{\text{total}}$ Γ_{75}/Γ

NODE=M070S35

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
3.8±0.8±1.2	[1] BAI	99C	BES	$e^+ e^-$

[1] Assuming B($K_1(1400) \to K^* \pi$)=0.94 ± 0.06

NODE=M070S35;LINKAGE=M3

$\Gamma(K^*(1410)\overline{K}\text{+c.c} \to K^\pm K^\mp \pi^0)/\Gamma(K^+ K^- \pi^0)$ Γ_{77}/Γ_{168}

NODE=M070P28

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
2.3±1.1±0.7	2k	[1] LEES	17C	BABR	$J/\psi \to K^+ K^- \pi^0$

[1] From a Dalitz plot analysis in an isobar model.

NODE=M070P28;LINKAGE=A

$\Gamma(K^*(1410)\overline{K} + \text{c.c.} \to K^0_S K^\pm \pi^\mp)/\Gamma(K^0_S K^\pm \pi^\mp)$ Γ_{78}/Γ_{169}

NODE=M070P32

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
1.5±0.5±0.9	4k	[1] LEES	17C	BABR	$J/\psi \to K^0_S K^\pm \pi^\mp$

[1] From a Dalitz plot analysis in an isobar model.

NODE=M070P32;LINKAGE=A

$\Gamma(K^*_2(1430)\overline{K}\text{+c.c.} \to K^\pm K^\mp \pi^0)/\Gamma(K^+ K^- \pi^0)$ Γ_{80}/Γ_{168}

NODE=M070P29

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
3.5±1.3±0.9	2k	[1] LEES	17C	BABR	$J/\psi \to K^+ K^- \pi^0$

[1] From a Dalitz plot analysis in an isobar model.

NODE=M070P29;LINKAGE=A

$\Gamma(K^*_2(1430)\overline{K} + \text{c.c.} \to K^0_S K^\pm \pi^\mp)/\Gamma(K^0_S K^\pm \pi^\mp)$ Γ_{81}/Γ_{169}

NODE=M070P33

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
7.1±1.3±1.2	4k	[1] LEES	17C	BABR	$J/\psi \to K^0_S K^\pm \pi^\mp$

[1] From a Dalitz plot analysis in an isobar model.

NODE=M070P33;LINKAGE=A

$\Gamma\left(\overline{K}^*_2(1430) K + \text{c.c.}\right)/\Gamma_{\text{total}}$ — Γ_{82}/Γ

NODE=M070R45
NODE=M070R45

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<40 × 10^{-4}	90	VANNUCCI	77	MRK1	$e^+e^- \to K^0 \overline{K}^{*0}_2$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<66 × 10^{-4}	90	BRAUNSCH...	76	DASP	$e^+e^- \to K^\pm \overline{K}^{*\mp}_2$

$\Gamma\left(K^*_2(1430)^+ K^- + \text{c.c.} \to K^+K^-\pi^0\right)/\Gamma_{\text{total}}$ — Γ_{83}/Γ

NODE=M070P76
NODE=M070P76

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
$2.69\pm0.04^{+0.25}_{-0.19}$	183k	ABLIKIM	19AQ	BES	$J/\psi \to K^+K^-\pi^0$

$\Gamma\left(\overline{K}^*_2(1430)^0 K^*(892)^0 + \text{c.c.}\right)/\Gamma_{\text{total}}$ — Γ_{85}/Γ

NODE=M070R48
NODE=M070R48

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
6.7±2.6	40	VANNUCCI	77	MRK1	$e^+e^- \to \pi^+\pi^-K^+K^-$

$\Gamma\left(K^*_2(1430)^0 \overline{K}^*_2(1430)^0\right)/\Gamma_{\text{total}}$ — Γ_{88}/Γ

NODE=M070R47
NODE=M070R47

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<29 × 10^{-4}	90	VANNUCCI	77	MRK1	$e^+e^- \to \pi^+\pi^-K^+K^-$

$\Gamma\left(K^*_2(1980)^+ K^- + \text{c.c.} \to K^+K^-\pi^0\right)/\Gamma_{\text{total}}$ — Γ_{90}/Γ

NODE=M070P77
NODE=M070P77

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$1.1\pm0.1^{+0.6}_{-0.1}$	183k	ABLIKIM	19AQ	BES	$J/\psi \to K^+K^-\pi^0$

$\Gamma\left(K^*_4(2045)^+ K^- + \text{c.c.} \to K^+K^-\pi^0\right)/\Gamma_{\text{total}}$ — Γ_{91}/Γ

NODE=M070P78
NODE=M070P78

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
$6.2\pm0.7^{+2.8}_{-1.4}$	183k	ABLIKIM	19AQ	BES	$J/\psi \to K^+K^-\pi^0$

$\Gamma\left(K_1(1270)^\pm K^\mp\right)/\Gamma_{\text{total}}$ — Γ_{92}/Γ

NODE=M070S34
NODE=M070S34

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<3.0 × 10^{-3}	90	[1] BAI	99C	BES	e^+e^-

[1] Assuming B($K_1(1270) \to K\rho$)=0.42 ± 0.06

NODE=M070S34;LINKAGE=M2

$\Gamma\left(K_1(1270) K^0_S \to \gamma K^0_S K^0_S\right)/\Gamma_{\text{total}}$ — Γ_{93}/Γ

NODE=M070P72
NODE=M070P72

VALUE (units 10^{-7})	DOCUMENT ID		TECN	COMMENT
$8.54^{+1.07}_{-1.20}{}^{+2.35}_{-2.13}$	ABLIKIM	18AA	BES3	$J/\psi \to \gamma K^0_S K^0_S$

$\Gamma\left(a_2(1320)^\pm \pi^\mp\right)/\Gamma_{\text{total}}$ — Γ_{94}/Γ

NODE=M070R42
NODE=M070R42

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<43 × 10^{-4}	90	BRAUNSCH...	76	DASP	e^+e^-

$\Gamma\left(\phi\pi^0\right)/\Gamma_{\text{total}}$ — Γ_{95}/Γ

NODE=M070R33

The two different fit values of ABLIKIM 15K below have the same statistical significance of 6.4 σ and cannot be distinguished at this moment.

NODE=M070R33

NODE=M070R33

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
2.94 ±0.16 ±0.16		0.8k	[1] ABLIKIM	15K	BES3	$e^+e^- \to J/\psi \to K^+K^-\gamma\gamma$
0.124±0.033±0.030		35 ± 9	[2] ABLIKIM	15K	BES3	$e^+e^- \to J/\psi \to K^+K^-\gamma\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<6.4	90		[3] ABLIKIM	05B	BES2	$e^+e^- \to J/\psi \to \phi\gamma\gamma$
<6.8	90		COFFMAN	88	MRK3	$e^+e^- \to K^+K^-\pi^0$

OCCUR=2

[1] Corresponding to one of the two fit solutions with $\delta = (-95.9 \pm 1.5)^\circ$ for the phase angle between the resonant $J/\psi \to \phi\pi^0$ and non-phi $J/\psi \to K^+K^-\pi^0$ contributions.

NODE=M070R33;LINKAGE=A

[2] Corresponding to one of the two fit solutions with $\delta = (-152.1 \pm 7.7)^\circ$ for the phase angle between the resonant $J/\psi \to \phi\pi^0$ and non-phi $J/\psi \to K^+K^-\pi^0$ contributions.

NODE=M070R33;LINKAGE=C

[3] Superseded by ABLIKIM 15K.

NODE=M070R33;LINKAGE=B

$\Gamma(\phi\pi^+\pi^-)/\Gamma_{total}$ Γ_{96}/Γ

NODE=M070R34

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.94±0.15 OUR AVERAGE		Error includes scale factor of 1.7.			
1.09±0.02±0.13		ABLIKIM	05	BES2	$J/\psi \to \phi\pi^+\pi^-$
0.78±0.03±0.12		FALVARD	88	DM2	$J/\psi \to$ hadrons
2.1 ±0.9	23	FELDMAN	77	MRK1	e^+e^-

$\Gamma(\phi 2(\pi^+\pi^-))/\Gamma_{total}$ Γ_{98}/Γ

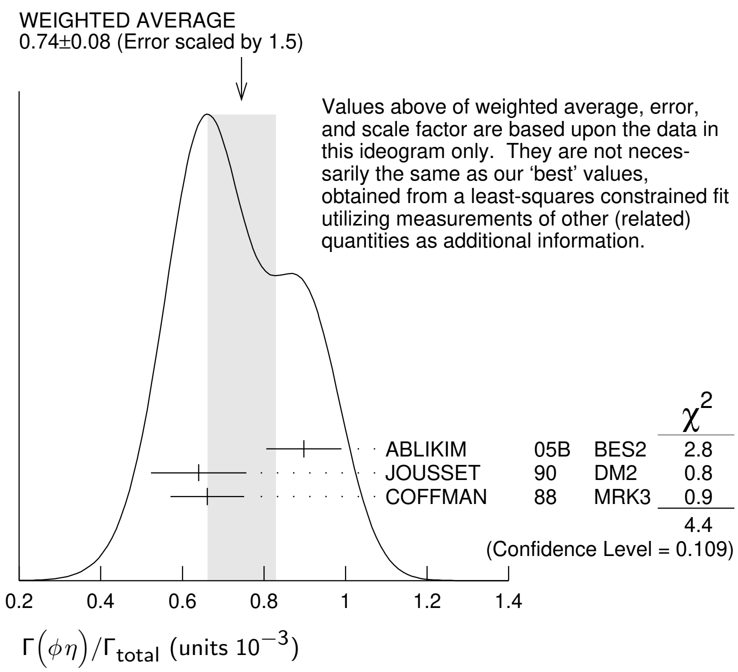
NODE=M070R35

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
16.0±1.0±3.0	FALVARD	88	DM2	$J/\psi \to$ hadrons

$\Gamma(\phi\eta)/\Gamma_{total}$ Γ_{99}/Γ

NODE=M070R37

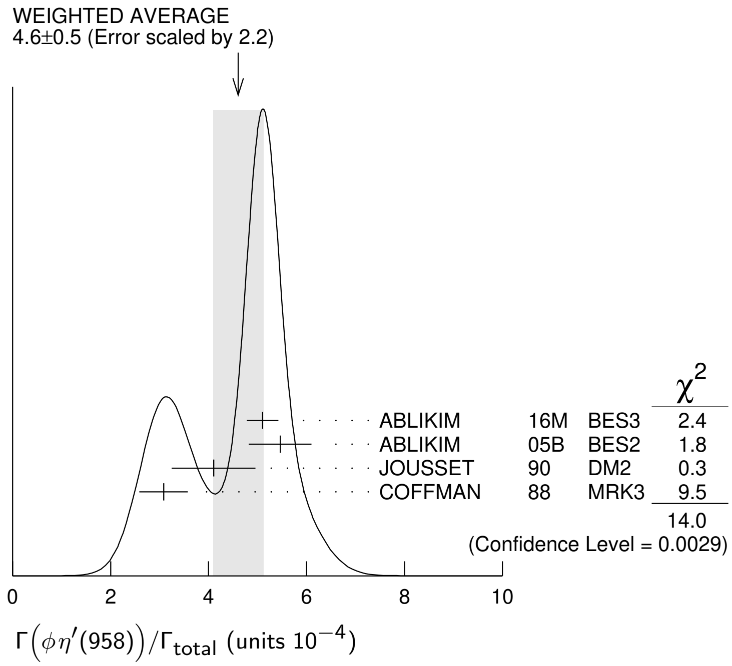
VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.74 ±0.08 OUR AVERAGE		Error includes scale factor of 1.5. See the ideogram below.			
0.898±0.024±0.089		ABLIKIM	05B	BES2	$e^+e^- \to J/\psi \to$ hadr
0.64 ±0.04 ±0.11	346	JOUSSET	90	DM2	$J/\psi \to$ hadrons
0.661±0.045±0.078		COFFMAN	88	MRK3	$e^+e^- \to K^+K^-\eta$



$\Gamma(\phi\eta'(958))/\Gamma_{total}$ Γ_{100}/Γ

NODE=M070R38

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
4.6 ±0.5 OUR AVERAGE			Error includes scale factor of 2.2. See the ideogram below.			
5.10±0.03±0.32		31k	ABLIKIM	16M	BES3	$e^+e^- \to J/\psi \to$ hadrons
5.46±0.31±0.56			ABLIKIM	05B	BES2	$e^+e^- \to J/\psi \to$ hadrons
4.1 ±0.3 ±0.8		167	JOUSSET	90	DM2	$J/\psi \to$ hadrons
3.08±0.34±0.36			COFFMAN	88	MRK3	$e^+e^- \to K^+K^-\eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$<$ 13	90		VANNUCCI	77	MRK1	e^+e^-



$\Gamma(\phi\eta\eta')/\Gamma_{total}$ Γ_{101}/Γ

NODE=M070P85
NODE=M070P85

VALUE (units 10^{-4})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
2.32±0.06±0.16	2.2k	[1] ABLIKIM	19AN	BES3	$e^+e^- \to J/\psi \to$ hadrons

[1] Including contributions from intermediate resonances. Evidence for an intermediate resonance at M ≈ 2 GeV and Γ ≈ 150 MeV decaying to $\phi\eta'$ with $J^P = 1^+$ or $J^P = 1^-$, and B($J/\psi \to \eta X$) × B($X \to \phi\eta'$) ≈ 10^{-4}.

NODE=M070P85;LINKAGE=A

$\Gamma(\phi f_0(980))/\Gamma_{total}$ Γ_{102}/Γ

NODE=M070R41
NODE=M070R41

VALUE (units 10^{-4})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
3.2±0.9 OUR AVERAGE	Error includes scale factor of 1.9.				
4.6±0.4±0.8		[1] FALVARD	88	DM2	$J/\psi \to$ hadrons
2.6±0.6	50	[1] GIDAL	81	MRK2	$J/\psi \to K^+K^-K^+K^-$

[1] Assuming B($f_0(980) \to \pi\pi$) = 0.78.

NODE=M070R41;LINKAGE=A

$\Gamma(\phi\pi^0 f_0(980) \to \phi\pi^0\pi^+\pi^-)/\Gamma_{total}$ Γ_{105}/Γ

NODE=M070S97
NODE=M070S97

VALUE (units 10^{-6})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
4.50±0.80±0.61	355	ABLIKIM	15P	BES3	$J/\psi \to K^+K^-3\pi$

$\Gamma(\phi\pi^0 f_0(980) \to \phi\pi^0 p^0\pi^0)/\Gamma_{total}$ Γ_{106}/Γ

NODE=M070S98
NODE=M070S98

VALUE (units 10^{-6})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1.67±0.50±0.24	70	ABLIKIM	15P	BES3	$J/\psi \to K^+K^-3\pi$

$\Gamma(\phi f_0(980)\eta \to \eta\phi\pi^+\pi^-)/\Gamma_{total}$ Γ_{107}/Γ

NODE=M070R08
NODE=M070R08

VALUE (units 10^{-4})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
3.23±0.75±0.73	52	ABLIKIM	08F	BES	$J/\psi \to \eta\phi f_0(980)$

$\Gamma(\phi a_0(980)^0 \to \phi\eta\pi^0)/\Gamma_{total}$ Γ_{108}/Γ

NODE=M070S75
NODE=M070S75

VALUE (units 10^{-6})	*DOCUMENT ID*		*TECN*	*COMMENT*
4.37±1.35	[1] ABLIKIM	18D	BES3	$J/\psi \to \phi\eta\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
5.0 ±2.7 ±2.5	[2] ABLIKIM	11D	BES3	$J/\psi \to \phi\eta\pi^0$

[1] Assuming constructive interference between $a_0(980) - f_0(980)$ mixing and electromagnetic decay. Destructive interference gives a value of (4.93 ± 1.77) × 10^{-6} for this branching fraction.

NODE=M070S75;LINKAGE=A

[2] Assuming $a_0(980) - f_0(980)$ mixing and isospin breaking via γ^* and K^*K loops.

NODE=M070S75;LINKAGE=AB

$\Gamma(\phi f_2(1270))/\Gamma_{total}$ Γ_{109}/Γ

NODE=M070R39
NODE=M070R39

VALUE (units 10^{-3})	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 0.45	90	FALVARD	88	DM2	$J/\psi \to$ hadrons
< 0.37	90	VANNUCCI	77	MRK1	$e^+e^- \to \pi^+\pi^-K^+K^-$

$\Gamma(\phi f_1(1285))/\Gamma_{total}$ Γ_{110}/Γ

NODE=M070S6

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.6±0.5 OUR AVERAGE					
3.4±1.8±1.5	1.1k	[1] ABLIKIM	15H	BES3	$e^+e^- \to J/\psi \to \phi\eta\pi^+\pi^-$
3.2±0.6±0.4		JOUSSET	90	DM2	$J/\psi \to \phi 2(\pi^+\pi^-)$
2.1±0.5±0.4	25	[2] JOUSSET	90	DM2	$J/\psi \to \phi\eta\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.6±0.2±0.1	16	BECKER	87	MRK3	$J/\psi \to \phi K\overline{K}\pi$

OCCUR=2

[1] ABLIKIM 15H reports $[\Gamma(J/\psi(1S) \to \phi f_1(1285))/\Gamma_{total}] \times [B(f_1(1285) \to \eta\pi^+\pi^-)] = (1.20 \pm 0.6 \pm 0.14) \times 10^{-4}$ which we divide by our best value $B(f_1(1285) \to \eta\pi^+\pi^-) = (35 \pm 15) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M070S6;LINKAGE=A

[2] We attribute to the $f_1(1285)$ the signal observed in the $\pi^+\pi^-\eta$ invariant mass distribution at 1297 MeV.

NODE=M070S6;LINKAGE=Q

$\Gamma(\phi f_1(1285) \to \phi\pi^0 f_0(980) \to \phi\pi^0\pi^+\pi^-)/\Gamma_{total}$ Γ_{111}/Γ

NODE=M070S99

VALUE (units 10^{-7})	EVTS	DOCUMENT ID		TECN	COMMENT
9.36±2.31±1.54	78	ABLIKIM	15P	BES3	$J/\psi \to K^+K^-3\pi$

$\Gamma(\phi f_1(1285) \to \phi\pi^0 f_0(980) \to \phi 3\pi^0)/\Gamma_{total}$ Γ_{112}/Γ

NODE=M070S00

VALUE (units 10^{-7})	EVTS	DOCUMENT ID		TECN	COMMENT
2.08±1.63±1.47	9	ABLIKIM	15P	BES3	$J/\psi \to K^+K^-3\pi$

$\Gamma(\phi\eta(1405) \to \phi\eta\pi^+\pi^-)/\Gamma_{total}$ Γ_{113}/Γ

NODE=M070S23

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
2.01±0.58±0.82		172	[1] ABLIKIM	15H	BES3	$e^+e^- \to J/\psi \to \phi\eta\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 17	90		[2] FALVARD	88	DM2	$J/\psi \to$ hadrons

[1] With 3.6 σ significance.

NODE=M070S23;LINKAGE=B

[2] Includes unknown branching fraction $\eta(1405) \to \eta\pi\pi$.

NODE=M070S23;LINKAGE=A

$\Gamma(\phi f'_2(1525))/\Gamma_{total}$ Γ_{114}/Γ

NODE=M070R40

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
8 ±4 OUR AVERAGE Error includes scale factor of 2.7.					
12.3±0.6±2.0		[1,2] FALVARD	88	DM2	$J/\psi \to$ hadrons
4.8±1.8	46	[1] GIDAL	81	MRK2	$J/\psi \to K^+K^-K^+K^-$

[1] Re-evaluated using $B(f'_2(1525) \to K\overline{K}) = 0.713$.

NODE=M070R40;LINKAGE=B

[2] Including interference with $f_0(1710)$.

NODE=M070R40;LINKAGE=C

$\Gamma(\phi X(1835) \to \phi p\overline{p})/\Gamma_{total}$ Γ_{115}/Γ

NODE=M070P00

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<2.1 × 10^{-7}	90	[1] ABLIKIM	16K	BES3	$J/\psi \to p\overline{p}K^0_S K^0_L$, $p\overline{p}K^+K^-$

OCCUR=2

[1] Upper limit applies to any $p\overline{p}$ mass enhancement near threshold.

NODE=M070P00;LINKAGE=A

$\Gamma(\phi X(1835) \to \phi\eta\pi^+\pi^-)/\Gamma_{total}$ Γ_{116}/Γ

NODE=M070B10

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<2.8 × 10^{-4}	90	ABLIKIM	15H	BES3	$e^+e^- \to J/\psi \to \phi\eta\pi^+\pi^-$

$\Gamma(\phi X(1870) \to \phi\eta\pi^+\pi^-)/\Gamma_{total}$ Γ_{117}/Γ

NODE=M070B11

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<6.13 × 10^{-5}	90	ABLIKIM	15H	BES3	$e^+e^- \to J/\psi \to \phi\eta\pi^+\pi^-$

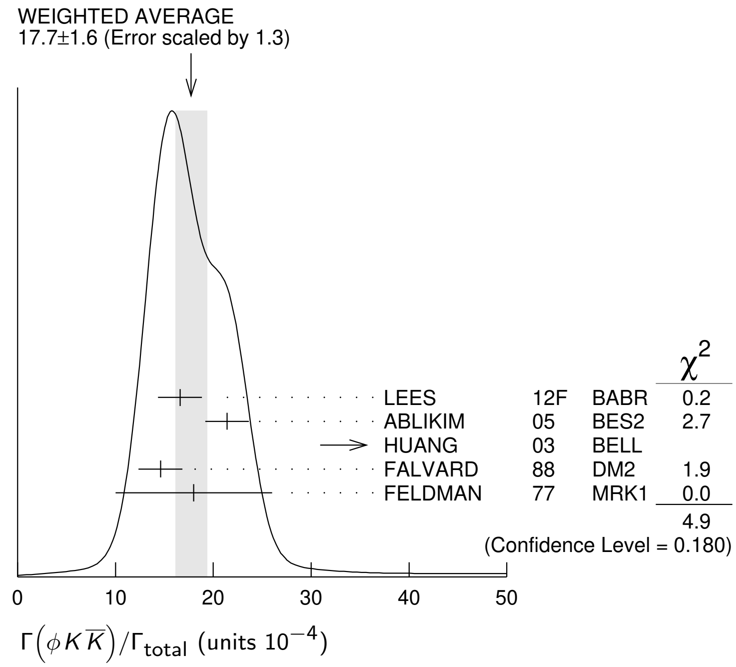
$\Gamma(\phi K\overline{K})/\Gamma_{total}$ Γ_{118}/Γ

NODE=M070R36

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
17.7± 1.6 OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below.					
16.6± 1.9±1.2	163 ± 19	LEES	12F	BABR	$10.6\ e^+e^- \to 2(K^+K^-)\gamma$
21.4± 0.4±2.2		ABLIKIM	05	BES2	$J/\psi \to \phi\pi^+\pi^-$
48 $^{+20}_{-16}$ ±6	$9.0^{+3.7}_{-3.0}$	[1,2] HUANG	03	BELL	$B^+ \to (\phi K^+K^-)K^+$
14.6± 0.8±2.1		[3] FALVARD	88	DM2	$J/\psi \to$ hadrons
18 ± 8	14	FELDMAN	77	MRK1	e^+e^-

[1] We have multiplied $K^+ K^-$ measurement by 2 to obtain $K\overline{K}$.
[2] Using B($B^+ \to J/\psi K^+$) = ($1.01 \pm 0.05) \times 10^{-3}$.
[3] Addition of $\phi K^+ K^-$ and $\phi K^0 \overline{K}^0$ branching ratios.

NODE=M070R36;LINKAGE=AA
NODE=M070R36;LINKAGE=CC
NODE=M070R36;LINKAGE=A



$\Gamma(\phi f_0(1710) \to \phi K\overline{K})/\Gamma_{total}$ Γ_{119}/Γ

NODE=M070S24
NODE=M070S24

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
3.6±0.2±0.6	[1,2] FALVARD	88	DM2	$J/\psi \to$ hadrons

[1] Including interference with $f'_2(1525)$.
[2] Includes unknown branching fraction $f_0(1710) \to K\overline{K}$.

NODE=M070S24;LINKAGE=D
NODE=M070S24;LINKAGE=E

$\Gamma(\phi K^\pm K^0_S \pi^\mp)/\Gamma_{total}$ Γ_{122}/Γ

NODE=M070S3
NODE=M070S3

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
7.2±0.8 OUR AVERAGE					
7.4±0.6±1.4	227 ± 19	ABLIKIM	08E	BES2	$e^+ e^- \to J/\psi$
7.4±0.9±1.1		FALVARD	88	DM2	$J/\psi \to$ hadrons
7 ±0.6±1.0	163 ± 15	BECKER	87	MRK3	$e^+ e^- \to$ hadrons

$\Gamma(\phi K^*(892)\overline{K} + c.c.)/\Gamma_{total}$ Γ_{123}/Γ

NODE=M070S4
NODE=M070S4

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
21.8±2.3 OUR AVERAGE					
20.8±2.7±3.9	195 ± 25	ABLIKIM	08E	BES2	$J/\psi \to \phi K^0_S K^\pm \pi^\mp$
29.6±3.7±4.7	238 ± 30	ABLIKIM	08E	BES2	$J/\psi \to \phi K^+ K^- \pi^0$
20.7±2.4±3.0		FALVARD	88	DM2	$J/\psi \to$ hadrons
20 ±3 ±3	155 ± 20	BECKER	87	MRK3	$e^+ e^- \to$ hadrons

OCCUR=2

$\Gamma(b_1(1235)^\pm \pi^\mp)/\Gamma_{total}$ Γ_{124}/Γ

NODE=M070R49
NODE=M070R49

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
30±5 OUR AVERAGE					
31±6	4600	AUGUSTIN	89	DM2	$J/\psi \to 2(\pi^+ \pi^-)\pi^0$
29±7	87	BURMESTER	77D	PLUT	$e^+ e^-$

$\Gamma(b_1(1235)^0 \pi^0)/\Gamma_{total}$ Γ_{125}/Γ

NODE=M070S28
NODE=M070S28

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
23±3±5	229	AUGUSTIN	89	DM2	$e^+ e^-$

$\Gamma(\Delta(1232)^+ \overline{p})/\Gamma_{total}$ Γ_{127}/Γ

NODE=M070S14
NODE=M070S14

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<0.1 \times 10^{-3}$	90	HENRARD	87	DM2	$e^+ e^-$

$\Gamma(\Delta(1232)^{++} \overline{p} \pi^-)/\Gamma_{total}$ Γ_{128}/Γ

NODE=M070R70
NODE=M070R70

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.58±0.23±0.40	332	EATON	84	MRK2	$e^+ e^-$

$\Gamma(\Delta(1232)^{++}\overline{\Delta}(1232)^{--})/\Gamma_{total}$ — Γ_{129}/Γ

NODE=M070R66

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.10±0.09±0.28	233	EATON	84	MRK2	e^+e^-

$\Gamma(\overline{\Sigma}(1385)^0 p K^-)/\Gamma_{total}$ — Γ_{130}/Γ

NODE=M070R74

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.51±0.26±0.18	89	EATON	84	MRK2	e^+e^-

$\Gamma(\Sigma(1385)^0\overline{\Lambda}+$ c.c.$)/\Gamma_{total}$ — Γ_{131}/Γ

NODE=M070S13

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.82 × 10⁻⁵	90	ABLIKIM	13F	BES3	$J/\psi \to p\overline{p}\pi^+\pi^-\gamma\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.2 × 10⁻³	90	HENRARD	87	DM2	e^+e^-

$\Gamma(\Sigma(1385)^-\overline{\Sigma}^+$ (or c.c.)$)/\Gamma_{total}$ — Γ_{132}/Γ

NODE=M070R68

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT	
0.31±0.05 OUR AVERAGE						
0.30±0.03±0.07	74 ± 8	HENRARD	87	DM2	$e^+e^- \to \Sigma^{*-}$	
0.34±0.04±0.07	77 ± 9	HENRARD	87	DM2	$e^+e^- \to \Sigma^{*+}$	OCCUR=2
0.29±0.11±0.10	26	EATON	84	MRK2	$e^+e^- \to \Sigma^{*-}$	
0.31±0.11±0.11	28	EATON	84	MRK2	$e^+e^- \to \Sigma^{*+}$	OCCUR=2

$\Gamma(\Sigma(1385)^-\overline{\Sigma}(1385)^+$ (or c.c.)$)/\Gamma_{total}$ — Γ_{133}/Γ

NODE=M070R67

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT	
1.16 ±0.05 OUR AVERAGE						
1.096±0.012±0.071	43k	ABLIKIM	16L	BES3	$J/\psi \to \Sigma(1385)^-\overline{\Sigma}(1385)^+$	
1.258±0.014±0.078	53k	ABLIKIM	16L	BES3	$J/\psi \to \Sigma(1385)^+\overline{\Sigma}(1385)^-$	OCCUR=2
1.23 ±0.07 ±0.30	0.8k	ABLIKIM	12P	BES2	$J/\psi \to \Sigma(1385)^-\overline{\Sigma}(1385)^+$	
1.50 ±0.08 ±0.38	1k	ABLIKIM	12P	BES2	$J/\psi \to \Sigma(1385)^+\overline{\Sigma}(1385)^-$	OCCUR=2
1.00 ±0.04 ±0.21	0.6k	HENRARD	87	DM2	$e^+e^- \to \Sigma^{*-}$	
1.19 ±0.04 ±0.25	0.7k	HENRARD	87	DM2	$e^+e^- \to \Sigma^{*+}$	OCCUR=2
0.86 ±0.18 ±0.22	56	EATON	84	MRK2	$e^+e^- \to \Sigma^{*-}$	
1.03 ±0.24 ±0.25	68	EATON	84	MRK2	$e^+e^- \to \Sigma^{*+}$	OCCUR=2

$\Gamma(\Sigma(1385)^0\overline{\Sigma}(1385)^0)/\Gamma_{total}$ — Γ_{134}/Γ

NODE=M070P17

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT	
1.071±0.009±0.082	103k	ABLIKIM	17E	BES3	$e^+e^- \to J/\psi \to$ hadrons	OCCUR=2

$\Gamma(\Lambda(1520)\overline{\Lambda}+$ c.c. $\to \gamma\Lambda\overline{\Lambda})/\Gamma_{total}$ — Γ_{135}/Γ

NODE=M070S77

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<4.1 × 10⁻⁶	90	ABLIKIM	12B	BES3	$J/\psi \to \Lambda\overline{\Lambda}\gamma$

$\Gamma(\overline{\Lambda}(1520)\Lambda+$ c.c.$)/\Gamma_{total}$ — Γ_{136}/Γ

NODE=M070P60

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.80 × 10⁻³	90	LU	19	BELL	$B^+ \to \overline{p}\Lambda K^+K^+$

$\Gamma(\Xi^0\overline{\Xi}^0)/\Gamma_{total}$ — Γ_{137}/Γ

NODE=M070S64

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.17 ±0.04 OUR AVERAGE					
1.165±0.004±0.043	135k	ABLIKIM	17E	BES3	$e^+e^- \to J/\psi \to$ hadrons
1.20 ±0.12 ±0.21	206	ABLIKIM	08O	BES2	$e^+e^- \to J/\psi$

$\Gamma(\Xi(1530)^-\overline{\Xi}^+ +$ c.c.$)/\Gamma_{total}$ — Γ_{138}/Γ

NODE=M070S9

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.318±0.008 OUR AVERAGE					
0.317±0.002±0.008	70k	ABLIKIM	20	BES3	$e^+e^- \to J/\psi$
0.59 ±0.09 ±0.12	75	HENRARD	87	DM2	e^+e^-

$\Gamma(\Xi(1530)^0\overline{\Xi}^0)/\Gamma_{total}$ — Γ_{139}/Γ

NODE=M070S10

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.32±0.12±0.07	24 ± 9	HENRARD	87	DM2	e^+e^-

$\Gamma\big(\Theta(1540)\overline{\Theta}(1540) \to K^0_S p K^- \overline{n} + \text{c.c.}\big)/\Gamma_{\text{total}}$ Γ_{140}/Γ

NODE=M070S47
NODE=M070S47

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.1 \times 10^{-5}$	90	BAI	04G	BES2	$e^+ e^-$

$\Gamma\big(\Theta(1540) K^- \overline{n} \to K^0_S p K^- \overline{n}\big)/\Gamma_{\text{total}}$ Γ_{141}/Γ

NODE=M070S48
NODE=M070S48

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.1 \times 10^{-5}$	90	BAI	04G	BES2	$e^+ e^-$

$\Gamma\big(\Theta(1540) K^0_S \overline{p} \to K^0_S \overline{p} K^+ n\big)/\Gamma_{\text{total}}$ Γ_{142}/Γ

NODE=M070S49
NODE=M070S49

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.6 \times 10^{-5}$	90	BAI	04G	BES2	$e^+ e^-$

$\Gamma\big(\overline{\Theta}(1540) K^+ n \to K^0_S \overline{p} K^+ n\big)/\Gamma_{\text{total}}$ Γ_{143}/Γ

NODE=M070S50
NODE=M070S50

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<5.6 \times 10^{-5}$	90	BAI	04G	BES2	$e^+ e^-$

$\Gamma\big(\overline{\Theta}(1540) K^0_S p \to K^0_S p K^- \overline{n}\big)/\Gamma_{\text{total}}$ Γ_{144}/Γ

NODE=M070S51
NODE=M070S51

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.1 \times 10^{-5}$	90	BAI	04G	BES2	$e^+ e^-$

STABLE HADRONS

NODE=M070307

$\Gamma\big(2(\pi^+\pi^-)\pi^0\big)/\Gamma_{\text{total}}$ Γ_{145}/Γ

NODE=M070R9
NODE=M070R9

NEW

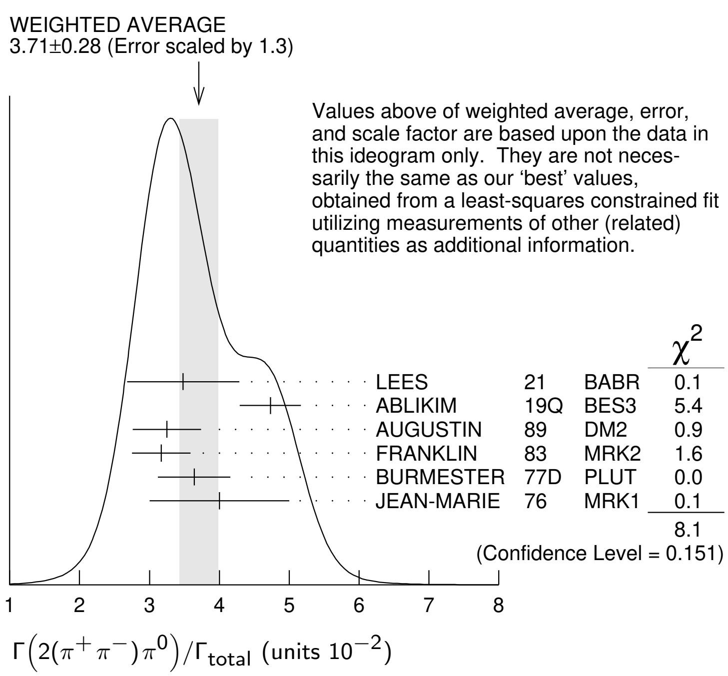
VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
3.71±0.28 OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below.					
[$(3.73 \pm 0.32) \times 10^{-2}$ OUR 2021 AVERAGE Scale factor = 1.4]					
3.5 ±0.8 ±0.1	14k	[1] LEES	21	BABR	10.6 $e^+ e^- \to 2(\pi^+\pi^-)3\pi^0\gamma$
4.73±0.44	228k	[2] ABLIKIM	19Q	BES3	$J/\psi \to 2(\pi^+\pi^-)\pi^0$
3.25±0.49	46055	AUGUSTIN	89	DM2	$J/\psi \to 2(\pi^+\pi^-)\pi^0$
3.17±0.42	147	FRANKLIN	83	MRK2	$e^+ e^- \to$ hadrons
3.64±0.52	1500	BURMESTER	77D	PLUT	$e^+ e^-$
4 ±1	675	JEAN-MARIE	76	MRK1	$e^+ e^-$

[1] LEES 21 reports $[\Gamma(J/\psi(1S) \to 2(\pi^+\pi^-)\pi^0)/\Gamma_{\text{total}}] \times [\Gamma(\psi(2S) \to e^+e^-)] \times [B(\psi(2S) \to J/\psi(1S)\pi^0\pi^0)] = (14.8 \pm 2.6 \pm 2.2) \times 10^{-3}$ keV which we divide by our best values $\Gamma(\psi(2S) \to e^+e^-) = 2.33 \pm 0.04$ keV, $B(\psi(2S) \to J/\psi(1S)\pi^0\pi^0) = (18.24 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

NODE=M070R9;LINKAGE=B

[2] From an energy scan of $e^+e^- \to J/\psi \to 2(\pi^+\pi^-)\pi^0$, assuming PDG 16 values for $\Gamma(e^+e^-)$, $\Gamma(\mu^+\mu^-)$, and Γ(total), and for a phase difference between strong and electromagnetic amplitudes of $(84.9 \pm 3.6)^\circ$. An alternative solution is (4.85 ± 0.45)% with a phase of $(-84.7 \pm 3.1)^\circ$.

NODE=M070R9;LINKAGE=A



$\Gamma(3(\pi^+\pi^-)\pi^0)/\Gamma_{total}$ Γ_{146}/Γ

NODE=M070R11

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.029±0.006 OUR AVERAGE					
0.028±0.009	11	FRANKLIN	83	MRK2	$e^+e^- \to$ hadrons
0.029±0.007	181	JEAN-MARIE	76	MRK1	e^+e^-

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{151}/Γ

NODE=M070R7

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
21.0 ±0.8 OUR AVERAGE		Error includes scale factor of 1.6. See the ideogram below.			
$21.37\pm0.04^{+0.64}_{-0.62}$	1.8M	[1,2] ABLIKIM	12H	BES3	$e^+e^- \to J/\psi$
23.0 ±2.0 ±0.4	256	[3] AUBERT	07AU	BABR	10.6 $e^+e^- \to J/\psi\pi^+\pi^-\gamma$
21.84±0.05±2.01	220k	[1,4] BAI	04H	BES	e^+e^-
20.91±0.21±1.16		[4,5] BAI	04H	BES	e^+e^-
15 ±2	168	FRANKLIN	83	MRK2	e^+e^-

OCCUR=2

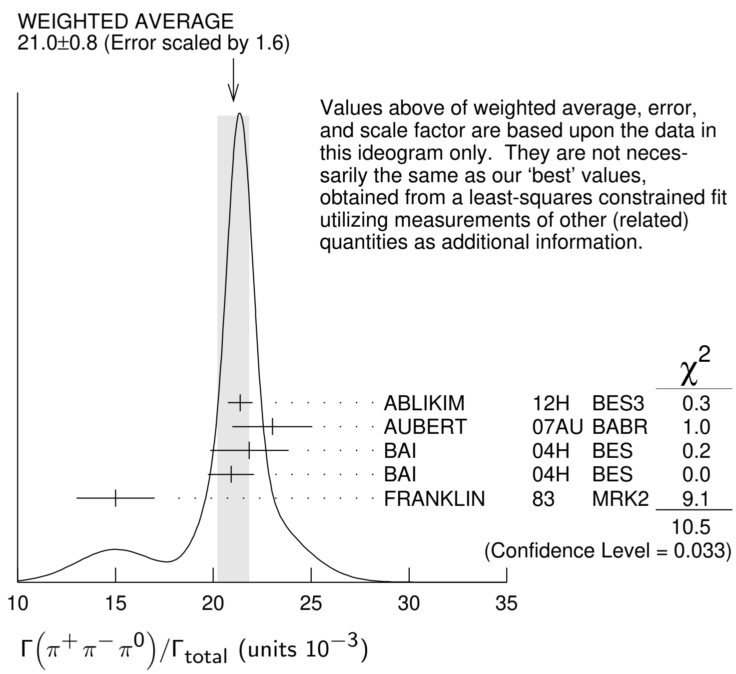
[1] From $J/\psi \to \pi^+\pi^-\pi^0$ events directly. NODE=M070R;LINKAGE=BA

[2] The quoted systematic error includes a contribution of 1.23% (added in quadrature) from the uncertainty on the number of J/ψ events. NODE=M070R7;LINKAGE=AB

[3] AUBERT 07AU reports $[\Gamma(J/\psi(1S) \to \pi^+\pi^-\pi^0)/\Gamma_{total}] \times [\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) \times \Gamma(\psi(2S) \to e^+e^-)/\Gamma_{total}] = (18.6\pm1.2\pm1.1)\times10^{-3}$ keV which we divide by our best value $\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) \times \Gamma(\psi(2S) \to e^+e^-)/\Gamma_{total} = 0.808 \pm 0.013$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070R7;LINKAGE=AU

[4] Mostly $\rho\pi$, see also $\rho\pi$ subsection. NODE=M070R;LINKAGE=BU

[5] Obtained comparing the rates for $\pi^+\pi^-\pi^0$ and $\mu^+\mu^-$, using J/ψ events produced via $\psi(2S) \to \pi^+\pi^- J/\psi$ and with $B(J/\psi \to \mu^+\mu^-) = 5.88 \pm 0.10\%$. NODE=M070R;LINKAGE=BI



$\Gamma(\pi^+\pi^-\pi^0K^+K^-)/\Gamma_{total}$ Γ_{153}/Γ

NODE=M070R18

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
1.2±0.3	309	VANNUCCI	77	MRK1	e^+e^-

$\Gamma(\pi^+\pi^-)/\Gamma_{total}$ Γ_{154}/Γ

NODE=M070R6

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.47±0.14 OUR AVERAGE					
1.47±0.13±0.13	140	[1] METREVELI	12		$\psi(2S) \to 2(\pi^+\pi^-)$
1.58±0.20±0.15	84	BALTRUSAIT...	85D	MRK3	e^+e^-
1.0 ±0.5	5	BRANDELIK	78B	DASP	e^+e^-
1.6 ±1.6	1	VANNUCCI	77	MRK1	e^+e^-

[1] Obtained by analyzing CLEO-c data but not authored by the CLEO Collaboration. NODE=M070R6;LINKAGE=ME

$\Gamma(2(\pi^+\pi^-))/\Gamma_{total}$ Γ_{155}/Γ

NODE=M070R8
NODE=M070R8

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
3.57±0.30 OUR AVERAGE					
3.53±0.12±0.29	1107	[1] ABLIKIM	05H	BES2	$e^+e^- \to \psi(2S) \to J/\psi\pi^+\pi^-$, $J/\psi \to 2(\pi^+\pi^-)$
4.0 ±1.0	76	JEAN-MARIE	76	MRK1	e^+e^-

[1] Computed using B($J/\psi \to \mu^+\mu^-$) = 0.0588 ± 0.0010.

NODE=M070R8;LINKAGE=AB

$\Gamma(3(\pi^+\pi^-))/\Gamma_{total}$ Γ_{156}/Γ

NODE=M070R10
NODE=M070R10

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
40±20	32	JEAN-MARIE	76	MRK1	e^+e^-

$\Gamma(4(\pi^+\pi^-)\pi^0)/\Gamma_{total}$ Γ_{158}/Γ

NODE=M070R12
NODE=M070R12

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
90±30	13	JEAN-MARIE	76	MRK1	e^+e^-

$\Gamma(2(\pi^+\pi^-)\eta)/\Gamma_{total}$ Γ_{159}/Γ

NODE=M070S42
NODE=M070S42

NEW

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
2.29±0.28 OUR AVERAGE					
[(2.26 ± 0.28) × 10^{-3} OUR 2021 AVERAGE]					
3.1 ±1.5 ±0.1	14k	[1] LEES	21	BABR	10.6 $e^+e^- \to 2(\pi^+\pi^-)3\pi^0\gamma$
2.26±0.08±0.27	4.8k	ABLIKIM	05C	BES2	$e^+e^- \to 2(\pi^+\pi^-)\eta$

[1] LEES 21 reports $[\Gamma(J/\psi(1S) \to 2(\pi^+\pi^-)\eta)/\Gamma_{total}] \times [\Gamma(J/\psi(1S) \to e^+e^-)] \times [B(\eta \to 3\pi^0)] = (5.6 \pm 2.6 \pm 0.8) \times 10^{-3}$ keV which we divide by our best values $\Gamma(J/\psi(1S) \to e^+e^-) = 5.53 \pm 0.10$ keV, $B(\eta \to 3\pi^0) = (32.57 \pm 0.21) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

NODE=M070S42;LINKAGE=A

$\Gamma(3(\pi^+\pi^-)\eta)/\Gamma_{total}$ Γ_{160}/Γ

NODE=M070S43
NODE=M070S43

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
7.24±0.96±1.11	616	ABLIKIM	05C	BES2	$e^+e^- \to 3(\pi^+\pi^-)\eta$

$\Gamma(K^+K^-)/\Gamma_{total}$ Γ_{164}/Γ

NODE=M070R13
NODE=M070R13

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.86±0.09±0.19	1k	[1] METREVELI	12		$\psi(2S) \to \pi^+\pi^-K^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.39±0.24±0.22	107	[2] BALTRUSAIT...	85D	MRK3	e^+e^-
2.2 ±0.9	6	[2] BRANDELIK	79C	DASP	e^+e^-

[1] Obtained by analyzing CLEO-c data but not authored by the CLEO Collaboration.
[2] Interference with non-resonant K^+K^- production not taken into account.

NODE=M070R13;LINKAGE=ME
NODE=M070R13;LINKAGE=BA

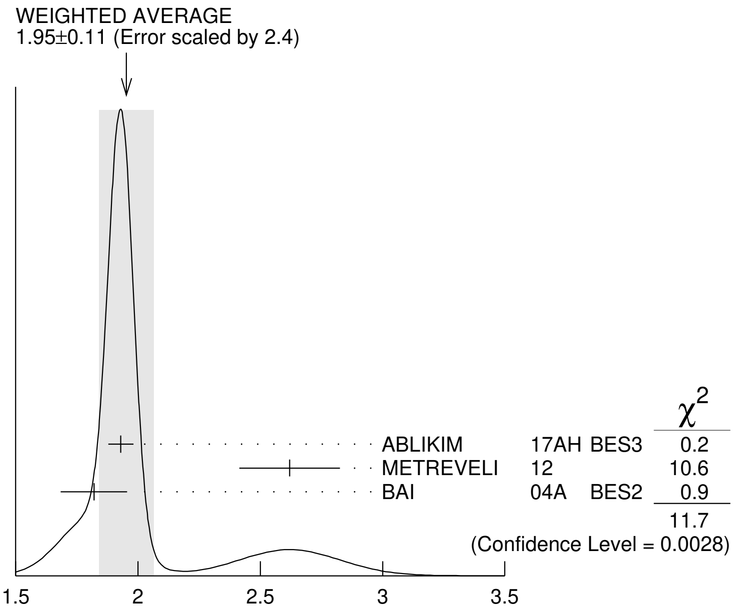
$\Gamma(K^0_S K^0_L)/\Gamma_{total}$ Γ_{165}/Γ

NODE=M070R75
NODE=M070R75

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.95±0.11 OUR AVERAGE	Error includes scale factor of 2.4. See the ideogram below.				
1.93±0.01±0.05	110k	ABLIKIM	17AH	BES3	$J/\psi \to K^0_S K^0_L \to \pi^+\pi^- X$
2.62±0.15±0.14	0.3k	[1] METREVELI	12		$\psi(2S) \to \pi^+\pi^- K^0_S K^0_L$
1.82±0.04±0.13	2.1k	[2] BAI	04A	BES2	$J/\psi \to K^0_S K^0_L \to \pi^+\pi^- X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.18±0.12±0.18		JOUSSET	90	DM2	$J/\psi \to$ hadrons
1.01±0.16±0.09	74	BALTRUSAIT...	85D	MRK3	e^+e^-

[1] Obtained by analyzing CLEO-c data but not authored by the CLEO Collaboration.
[2] Using B($K^0_S \to \pi^+\pi^-$) = 0.6868 ± 0.0027.

NODE=M070R75;LINKAGE=ME
NODE=M070R;LINKAGE=HZ



$\Gamma\left(K_S^0 K_L^0\right)/\Gamma_{\text{total}}$ Γ_{165}/Γ

$\Gamma\left(K_S^0 K_S^0\right)/\Gamma_{\text{total}}$ Γ_{166}/Γ

NODE=M070R14
NODE=M070R14

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<1.4 × 10^{-8}	95	[1] ABLIKIM 17AH	BES3	$J/\psi \to K_S^0 K_S^0 \to \pi^+\pi^-\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<1 × 10^{-6}	95	[1] BAI 04D	BES	$e^+ e^-$
<5.2 × 10^{-6}	90	[1] BALTRUSAIT...85C	MRK3	$e^+ e^-$

[1] Forbidden by *CP*.

NODE=M070R14;LINKAGE=C

$\Gamma\left(K\overline{K}\pi\right)/\Gamma_{\text{total}}$ Γ_{167}/Γ

NODE=M070R15
NODE=M070R15

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
61 ±10 OUR AVERAGE				
55.2±12.0	25	FRANKLIN 83	MRK2	$e^+ e^- \to K^+ K^- \pi^0$
78.0±21.0	126	VANNUCCI 77	MRK1	$e^+ e^- \to K_S^0 K^\pm \pi^\mp$

$\Gamma\left(K^+ K^- \pi^0\right)/\Gamma_{\text{total}}$ Γ_{168}/Γ

NODE=M070P80
NODE=M070P80

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
2.88±0.01±0.12	183k	ABLIKIM 19AQ	BES	$J/\psi \to K^+ K^- \pi^0$

$\Gamma\left(K^+ K^- \pi^0\right)/\Gamma\left(\pi^+ \pi^- \pi^0\right)$ $\Gamma_{168}/\Gamma_{151}$

NODE=M070P34
NODE=M070P34

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
12.0±0.3±0.9	23k	LEES 17C	BABR	$J/\psi \to h^+ h^- \pi^0$

$\Gamma\left(K_S^0 K^\pm \pi^\mp\right)/\Gamma\left(\pi^+ \pi^- \pi^0\right)$ $\Gamma_{169}/\Gamma_{151}$

NODE=M070P35
NODE=M070P35

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
26.5±0.5±2.1	24k	LEES 17C	BABR	$J/\psi \to h^0 h^+ h^-$

$\Gamma\left(K^+ K^- \pi^+ \pi^-\right)/\Gamma_{\text{total}}$ Γ_{173}/Γ

NODE=M070R16
NODE=M070R16

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
7.2±2.3	205	VANNUCCI 77	MRK1	$e^+ e^-$

$\Gamma\left(K^+ K^- 2(\pi^+ \pi^-)\right)/\Gamma_{\text{total}}$ Γ_{180}/Γ

NODE=M070R17
NODE=M070R17

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
31±13	30	VANNUCCI 77	MRK1	$e^+ e^-$

$\Gamma(2(K^+K^-))/\Gamma_{total}$ Γ_{182}/Γ

NODE=M070R19
NODE=M070R19

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1.4^{+0.5}_{-0.4}\pm0.2$	$11.0^{+4.3}_{-3.5}$	[1] HUANG	03	BELL	$B^+ \to 2(K^+K^-) K^+$
0.7 ± 0.3		VANNUCCI	77	MRK1	e^+e^-

[1] Using B($B^+ \to J/\psi K^+$) = $(1.01 \pm 0.05) \times 10^{-3}$.

NODE=M070R19;LINKAGE=CC

$\Gamma(p\overline{p})/\Gamma_{total}$ Γ_{184}/Γ

NODE=M070R50
NODE=M070R50

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
2.120±0.029 OUR AVERAGE					
2.112±0.004±0.031	314k	ABLIKIM	12C	BES3	e^+e^-
2.17 ±0.16 ±0.04	317	[1] WU	06	BELL	$B^+ \to p\overline{p}K^+$
2.26 ±0.01 ±0.14	63316	BAI	04E	BES2	$e^+e^- \to J/\psi$
1.97 ±0.22	99	BALDINI	98	FENI	e^+e^-
1.91 ±0.04 ±0.30		PALLIN	87	DM2	e^+e^-
2.16 ±0.07 ±0.15	1420	EATON	84	MRK2	e^+e^-
2.5 ±0.4	133	BRANDELIK	79C	DASP	e^+e^-
2.0 ±0.5		BESCH	78	BONA	e^+e^-
2.2 ±0.2	331	[2] PERUZZI	78	MRK1	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.0 ±0.3	48	ANTONELLI	93	SPEC	e^+e^-

[1] WU 06 reports $[\Gamma(J/\psi(1S) \to p\overline{p})/\Gamma_{total}] \times [B(B^+ \to J/\psi(1S)K^+)] = (2.21 \pm 0.13 \pm 0.10) \times 10^{-6}$ which we divide by our best value $B(B^+ \to J/\psi(1S)K^+) = (1.020 \pm 0.019) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M070R50;LINKAGE=WU

[2] Assuming angular distribution $(1+\cos^2\theta)$.

NODE=M070R50;LINKAGE=A

$\Gamma(p\overline{p}\pi^0)/\Gamma_{total}$ Γ_{185}/Γ

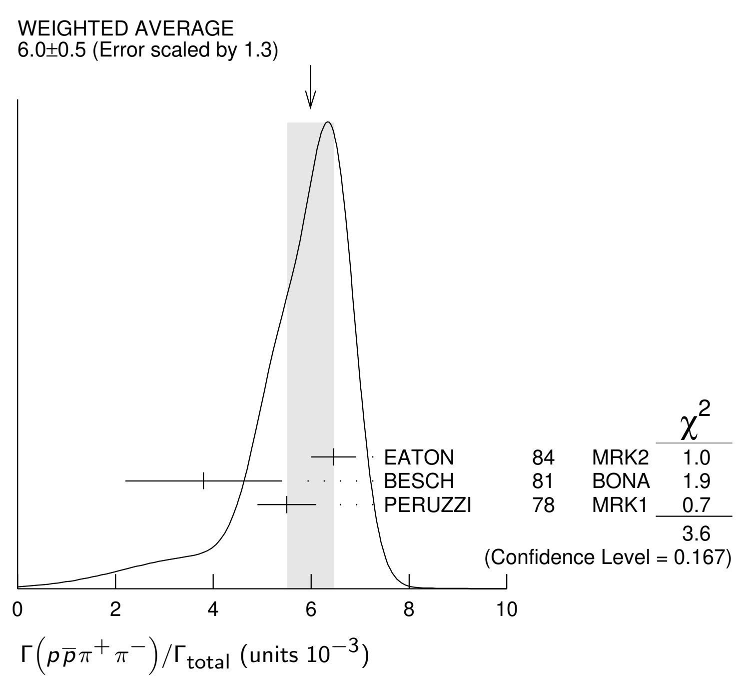
NODE=M070R52
NODE=M070R52

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.19±0.08 OUR AVERAGE Error includes scale factor of 1.1.					
1.33±0.02±0.11	11k	ABLIKIM	09B	BES2	e^+e^-
1.13±0.09±0.09	685	EATON	84	MRK2	e^+e^-
1.4 ±0.4		BRANDELIK	79C	DASP	e^+e^-
1.00±0.15	109	PERUZZI	78	MRK1	e^+e^-

$\Gamma(p\overline{p}\pi^+\pi^-)/\Gamma_{total}$ Γ_{186}/Γ

NODE=M070R54
NODE=M070R54

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
6.0 ±0.5 OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below.					
6.46±0.17±0.43	1435	EATON	84	MRK2	e^+e^-
3.8 ±1.6	48	BESCH	81	BONA	e^+e^-
5.5 ±0.6	533	PERUZZI	78	MRK1	e^+e^-



$\Gamma(p\overline{p}\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{187}/Γ

NODE=M070R55

Including $p\overline{p}\pi^+\pi^-\gamma$ and excluding ω, η, η'

NODE=M070R55
NODE=M070R55

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
2.3 ±0.9 OUR AVERAGE	Error includes scale factor of 1.9.				
3.36±0.65±0.28	364	EATON	84	MRK2	e^+e^-
1.6 ±0.6	39	PERUZZI	78	MRK1	e^+e^-

$\Gamma(p\overline{p}\eta)/\Gamma_{total}$ Γ_{188}/Γ

NODE=M070R56
NODE=M070R56

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
2.00±0.12 OUR AVERAGE					
1.91±0.02±0.17	13k	[1] ABLIKIM	09	BES2	e^+e^-
2.03±0.13±0.15	826	EATON	84	MRK2	e^+e^-
2.5 ±1.2		BRANDELIK	79C	DASP	e^+e^-
2.3 ±0.4	197	PERUZZI	78	MRK1	e^+e^-

[1] From the combination of $p\overline{p}\eta \to p\overline{p}\gamma\gamma$ and $p\overline{p}\eta \to p\overline{p}\pi^+\pi^-\pi^0$ channels.

NODE=M070R56;LINKAGE=AB

$\Gamma(p\overline{p}\rho)/\Gamma_{total}$ Γ_{189}/Γ

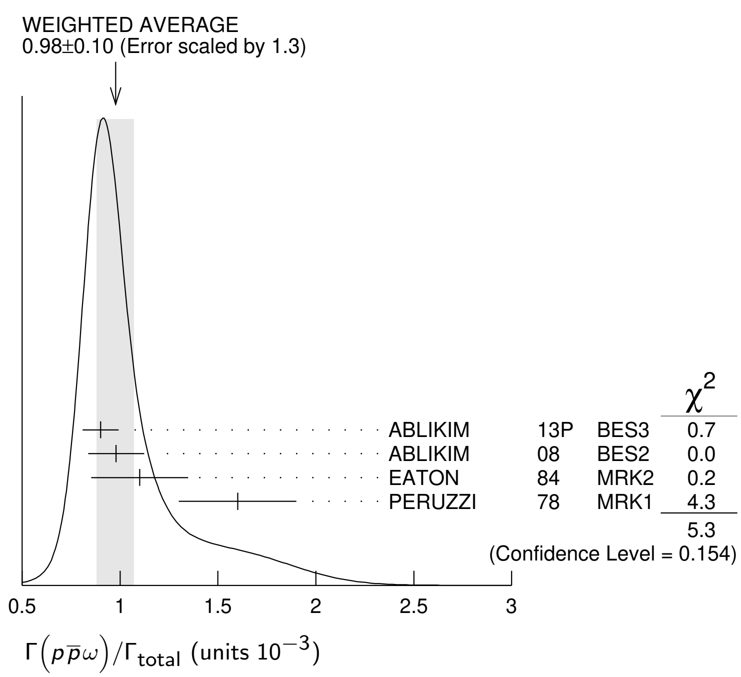
NODE=M070R57
NODE=M070R57

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.31 × 10^{-3}	90	EATON	84	MRK2	$e^+e^- \to$ hadronsγ

$\Gamma(p\overline{p}\omega)/\Gamma_{total}$ Γ_{190}/Γ

NODE=M070R58
NODE=M070R58

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.98±0.10 OUR AVERAGE	Error includes scale factor of 1.3. See the ideogram below.				
0.90±0.02±0.09	2670	ABLIKIM	13P	BES3	e^+e^-
0.98±0.03±0.14	2449	ABLIKIM	08	BES2	e^+e^-
1.10±0.17±0.18	486	EATON	84	MRK2	e^+e^-
1.6 ±0.3	77	PERUZZI	78	MRK1	e^+e^-



$\Gamma(p\overline{p}\eta'(958))/\Gamma_{total}$ Γ_{191}/Γ

NODE=M070R59
NODE=M070R59

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.129±0.014 OUR AVERAGE	Error includes scale factor of 2.0.				
0.126±0.002±0.007	16k	[1] ABLIKIM	19N	BES3	e^+e^-
0.200±0.023±0.028	265 ± 31	[2] ABLIKIM	09	BES2	e^+e^-
0.68 ±0.23 ±0.17	19	EATON	84	MRK2	e^+e^-
1.8 ±0.6	19	PERUZZI	78	MRK1	e^+e^-

[1] From the combination of $p\overline{p}\eta' \to p\overline{p}\pi^+\pi^-\eta$ and $p\overline{p}\eta' \to p\overline{p}\pi^+\pi^-\gamma$ channels.

NODE=M070R59;LINKAGE=A

[2] From the combination of $p\overline{p}\eta' \to p\overline{p}\pi^+\pi^-\eta$ and $p\overline{p}\eta' \to p\overline{p}\gamma\rho^0$ channels.

NODE=M070R59;LINKAGE=AB

$\Gamma(p\overline{p}a_0(980) \to p\overline{p}\pi^0\eta)/\Gamma_{total}$ Γ_{192}/Γ

NODE=M070S94
NODE=M070S94

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
6.8±1.2±1.3	ABLIKIM	14N	BES3	$e^+e^- \to J/\psi$

$\Gamma(p\overline{p}\phi)/\Gamma_{total}$ — Γ_{193}/Γ

NODE=M070S22

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.519±0.033 OUR AVERAGE					
0.523±0.006±0.033	14k	ABLIKIM	16K	BES3	$J/\psi \rightarrow p\overline{p}K^0_S K^0_L$, $p\overline{p}K^+K^-$
0.45 ±0.13 ±0.07		FALVARD	88	DM2	$J/\psi \rightarrow$ hadrons

$\Gamma(p\overline{n}\pi^-)/\Gamma_{total}$ — Γ_{194}/Γ

NODE=M070R53

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT	
2.12±0.09 OUR AVERAGE						
2.36±0.02±0.21	59k	ABLIKIM	06K	BES2	$J/\psi \rightarrow p\pi^-\overline{n}$	
2.47±0.02±0.24	55k	ABLIKIM	06K	BES2	$J/\psi \rightarrow \overline{p}\pi^+ n$	OCCUR=2
2.02±0.07±0.16	1288	EATON	84	MRK2	$e^+e^- \rightarrow p\pi^-$	
1.93±0.07±0.16	1191	EATON	84	MRK2	$e^+e^- \rightarrow \overline{p}\pi^+$	OCCUR=2
1.7 ±0.7	32	BESCH	81	BONA	$e^+e^- \rightarrow p\pi^-$	
1.6 ±1.2	5	BESCH	81	BONA	$e^+e^- \rightarrow \overline{p}\pi^+$	OCCUR=2
2.16±0.29	194	PERUZZI	78	MRK1	$e^+e^- \rightarrow p\pi^-$	
2.04±0.27	204	PERUZZI	78	MRK1	$e^+e^- \rightarrow \overline{p}\pi^+$	OCCUR=2

$\Gamma(n\overline{n})/\Gamma_{total}$ — Γ_{195}/Γ

NODE=M070R64

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
2.09±0.16 OUR AVERAGE					
2.07±0.01±0.17	36k	ABLIKIM	12C	BES3	e^+e^-
2.31±0.49	79	BALDINI	98	FENI	e^+e^-
1.8 ±0.9		BESCH	78	BONA	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.90±0.55	40	ANTONELLI	93	SPEC	e^+e^-

$\Gamma(n\overline{n}\pi^+\pi^-)/\Gamma_{total}$ — Γ_{196}/Γ

NODE=M070R65

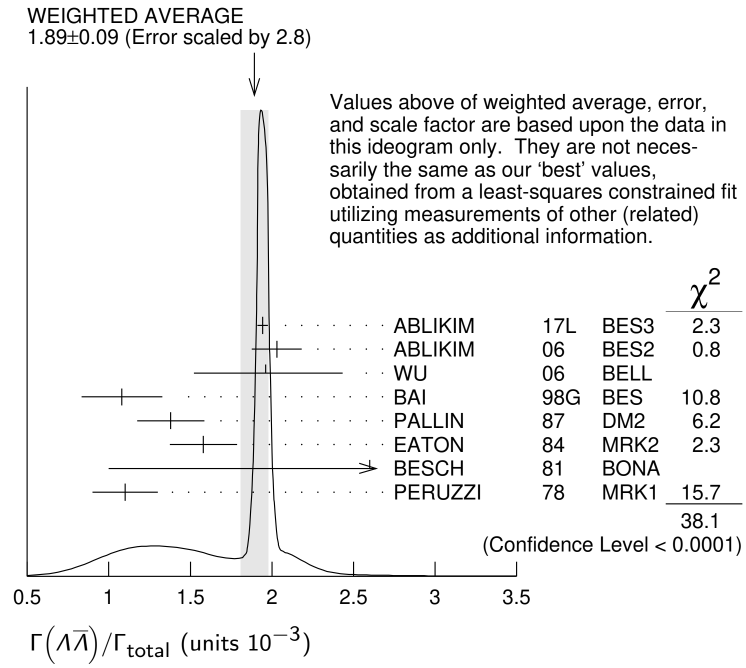
VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
3.8±3.6	5	BESCH	81	BONA	e^+e^-

$\Gamma(\Lambda\overline{\Lambda})/\Gamma_{total}$ — Γ_{200}/Γ

NODE=M070R60

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.89 ±0.09 OUR AVERAGE		Error includes scale factor of 2.8. See the ideogram below.			
1.943±0.003±0.033	441k	ABLIKIM	17L	BES3	e^+e^-
2.03 ±0.03 ±0.15	8887	ABLIKIM	06	BES2	$J/\psi \rightarrow \Lambda\overline{\Lambda}$
1.96 $^{+0.47}_{-0.44}$ ±0.04	46	[1] WU	06	BELL	$B^+ \rightarrow \Lambda\overline{\Lambda}K^+$
1.08 ±0.06 ±0.24	631	BAI	98G	BES	e^+e^-
1.38 ±0.05 ±0.20	1847	PALLIN	87	DM2	e^+e^-
1.58 ±0.08 ±0.19	365	EATON	84	MRK2	e^+e^-
2.6 ±1.6	5	BESCH	81	BONA	e^+e^-
1.1 ±0.2	196	PERUZZI	78	MRK1	e^+e^-

[1] WU 06 reports $[\Gamma(J/\psi(1S) \rightarrow \Lambda\overline{\Lambda})/\Gamma_{total}] \times [B(B^+ \rightarrow J/\psi(1S)K^+)] = (2.00^{+0.34}_{-0.29} \pm 0.34) \times 10^{-6}$ which we divide by our best value $B(B^+ \rightarrow J/\psi(1S)K^+) = (1.020 \pm 0.019) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070R60;LINKAGE=WU



$\Gamma(\Lambda\overline{\Lambda}\pi^0)/\Gamma_{total}$ Γ_{201}/Γ

NODE=M070S11
NODE=M070S11

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
3.78±0.27±0.30		323	[1] ABLIKIM	13F	BES3	$J/\psi \to p\overline{p}\pi^+\pi^-\gamma\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 6.4	90		[2] ABLIKIM	07H	BES2	$e^+e^- \to \psi(2S)$
23 ±7 ±8		11	BAI	98G	BES	e^+e^-
22 ±5 ±5		19	HENRARD	87	DM2	e^+e^-

[1] Using B($\Lambda \to \pi^- p$) = 63.9% and B($\pi^0 \to \gamma\gamma$) = 98.8%. NODE=M070S11;LINKAGE=AL
[2] Using B($\Lambda \to \pi^- p$) = 63.9%. NODE=M070S11;LINKAGE=AB

$\Gamma(\Lambda\overline{\Lambda}\pi^+\pi^-)/\Gamma_{total}$ Γ_{202}/Γ

NODE=M070S78
NODE=M070S78

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
4.30±0.13±0.99	2.4k	ABLIKIM	12P	BES2	J/ψ

$\Gamma(\Lambda\overline{\Lambda}\eta)/\Gamma_{total}$ Γ_{203}/Γ

NODE=M070R07
NODE=M070R07

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
16.2±1.7 OUR AVERAGE					
15.7±0.80±1.54	454	[1] ABLIKIM	13F	BES3	$J/\psi \to p\overline{p}\pi^+\pi^-\gamma\gamma$
26.2±6.0 ±4.4	44	[2] ABLIKIM	07H	BES2	$e^+e^- \to \psi(2S)$

[1] Using B($\Lambda \to \pi^- p$) = 63.9% and B($\eta \to \gamma\gamma$) = 39.31%. NODE=M070R07;LINKAGE=AL
[2] Using B($\Lambda \to \pi^- p$) = 63.9% and B($\eta \to \gamma\gamma$) = 39.4%. NODE=M070R07;LINKAGE=AB

$\Gamma(\Lambda\overline{\Sigma}^-\pi^+ (\text{or c.c.}))/\Gamma_{total}$ Γ_{204}/Γ

NODE=M070R71
NODE=M070R71

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT	
0.83 ±0.07 OUR AVERAGE Error includes scale factor of 1.2.						
0.770±0.051±0.083	335	[1] ABLIKIM	07H	BES2	$e^+e^- \to \overline{\Lambda}\Sigma^+\pi^-$	
0.747±0.056±0.076	254	[1] ABLIKIM	07H	BES2	$e^+e^- \to \Lambda\overline{\Sigma}^-\pi^+$	OCCUR=2
0.90 ±0.06 ±0.16	225 ± 15	HENRARD	87	DM2	$e^+e^- \to \overline{\Lambda}\Sigma^+\pi^-$	
1.11 ±0.06 ±0.20	342 ± 18	HENRARD	87	DM2	$e^+e^- \to \Lambda\overline{\Sigma}^-\pi^+$	OCCUR=2
1.53 ±0.17 ±0.38	135	EATON	84	MRK2	$e^+e^- \to \overline{\Lambda}\Sigma^+\pi^-$	
1.38 ±0.21 ±0.35	118	EATON	84	MRK2	$e^+e^- \to \Lambda\overline{\Sigma}^-\pi^+$	OCCUR=2

[1] Using B($\Lambda \to \pi^- p$) = 63.9% and B($\Sigma^+ \to \pi^0 p$) = 51.6%. NODE=M070R71;LINKAGE=AB

$\Gamma(pK^-\overline{\Lambda}\text{+c.c.})/\Gamma_{total}$ Γ_{205}/Γ

NODE=M070R72
NODE=M070R72

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.86±0.11 OUR AVERAGE					
$0.84^{+0.17}_{-0.15}$±0.02	45	[1] LU	19	BELL	$B^+ \to \overline{p}\Lambda K^+K^+$
0.89±0.07±0.14	307	EATON	84	MRK2	e^+e^-

[1] LU 19 reports $(8.32^{+1.63}_{-1.45} \pm 0.49) \times 10^{-4}$ from a measurement of $[\Gamma(J/\psi(1S) \to pK^-\overline{\Lambda}+\text{c.c.})/\Gamma_{total}] \times [B(B^+ \to J/\psi(1S)K^+)]$ assuming $B(B^+ \to J/\psi(1S)K^+) = (1.026 \pm 0.031) \times 10^{-3}$, which we rescale to our best value $B(B^+ \to J/\psi(1S)K^+) = (1.020 \pm 0.019) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M070R72;LINKAGE=A

$\Gamma(pK^-\overline{\Sigma}^0)/\Gamma_{total}$ — Γ_{206}/Γ

NODE=M070R73
NODE=M070R73

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.29±0.06±0.05	90	EATON	84	MRK2	e^+e^-

$\Gamma(\overline{\Lambda}nK^0_S+\text{c.c.})/\Gamma_{total}$ — Γ_{207}/Γ

NODE=M070S56
NODE=M070S56

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
6.46±0.20±1.07	1058	[1] ABLIKIM	08C	BES2	$e^+e^- \to J/\psi$

[1] Using $B(\overline{\Lambda} \to \overline{p}\pi^+) = 63.9\%$ and $B(K^0_S \to \pi^+\pi^-) = 69.2\%$.

NODE=M070S56;LINKAGE=AB

$\Gamma(\Lambda\overline{\Sigma}+\text{c.c.})/\Gamma_{total}$ — Γ_{208}/Γ

NODE=M070R61
NODE=M070R61

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
2.83±0.23 OUR AVERAGE						
2.74±0.24±0.22		234 ± 21	[1] ABLIKIM	12B	BES3	$J/\psi \to \Lambda\overline{\Sigma}^0$
2.92±0.22±0.24		308 ± 24	[2] ABLIKIM	12B	BES3	$J/\psi \to \overline{\Lambda}\Sigma^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<18			[2] HENRARD	87	DM2	$J/\psi \to \overline{\Lambda}\Sigma^0$
<15	90		PERUZZI	78	MRK1	$e^+e^- \to \Lambda X$

OCCUR=2

[1] ABLIKIM 12B quotes $B(J/\psi \to \Lambda\overline{\Sigma}^0)$ which we multiply by 2.

NODE=M070R61;LINKAGE=AB

[2] ABLIKIM 12B and HENRARD 87 quote results for $B(J/\psi \to \overline{\Lambda}\Sigma^0)$ which we multiply by 2.

NODE=M070R61;LINKAGE=AC

$\Gamma(\Sigma^+\overline{\Sigma}^-)/\Gamma_{total}$ — Γ_{209}/Γ

NODE=M070S09
NODE=M070S09

NEW

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.07 ±0.04 OUR AVERAGE					
[(1.50 ± 0.24) × 10^{-3} OUR 2021 AVERAGE]					
1.061±0.004±0.036	87k	ABLIKIM	21AT	BES3	$J/\psi \to p\pi^0\overline{p}\pi^0$
1.50 ±0.10 ±0.22	399	ABLIKIM	08O	BES2	$e^+e^- \to J/\psi$

$\Gamma(\Sigma^0\overline{\Sigma}^0)/\Gamma_{total}$ — Γ_{210}/Γ

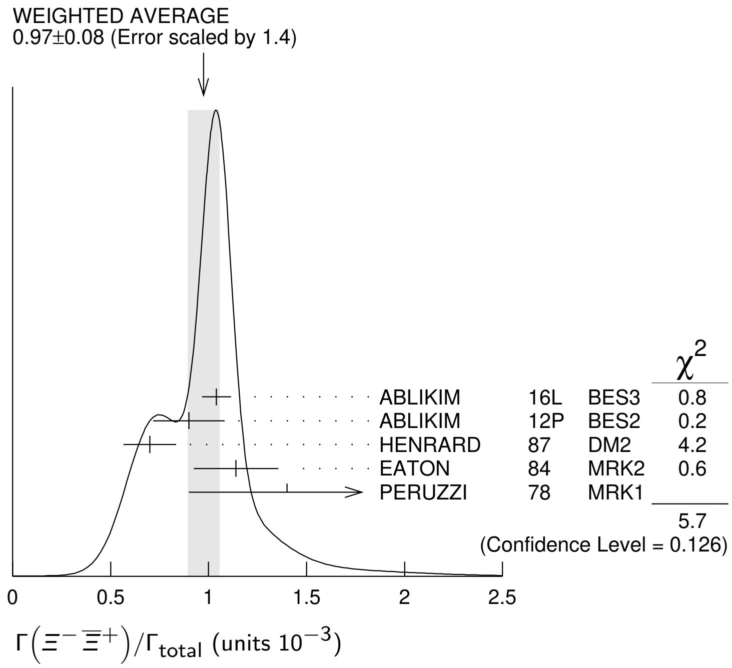
NODE=M070R63
NODE=M070R63

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.172±0.032 OUR AVERAGE	Error includes scale factor of 1.4.				
1.164±0.004±0.023	111k	ABLIKIM	17L	BES3	$J/\psi \to \Sigma^0\overline{\Sigma}^0$
1.33 ±0.04 ±0.11	1.7k	ABLIKIM	06	BES2	$J/\psi \to \Sigma^0\overline{\Sigma}^0$
1.06 ±0.04 ±0.23	884	PALLIN	87	DM2	$e^+e^- \to \Sigma^0\overline{\Sigma}^0$
1.58 ±0.16 ±0.25	90	EATON	84	MRK2	$e^+e^- \to \Sigma^0\overline{\Sigma}^0$
1.3 ±0.4	52	PERUZZI	78	MRK1	$e^+e^- \to \Sigma^0\overline{\Sigma}^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.4 ±2.6	3	BESCH	81	BONA	$e^+e^- \to \Sigma^+\overline{\Sigma}^-$

$\Gamma(\Xi^-\overline{\Xi}^+)/\Gamma_{total}$ — Γ_{211}/Γ

NODE=M070R62
NODE=M070R62

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.97 ±0.08 OUR AVERAGE	Error includes scale factor of 1.4. See the ideogram below.				
1.040±0.006±0.074	43k	ABLIKIM	16L	BES3	$J/\psi \to \Xi^-\overline{\Xi}^+$
0.90 ±0.03 ±0.18	961	ABLIKIM	12P	BES2	$J/\psi \to \Xi^-\overline{\Xi}^+$
0.70 ±0.06 ±0.12	132	HENRARD	87	DM2	$e^+e^- \to \Xi^-\overline{\Xi}^+$
1.14 ±0.08 ±0.20	194	EATON	84	MRK2	$e^+e^- \to \Xi^-\overline{\Xi}^+$
1.4 ±0.5	51	PERUZZI	78	MRK1	$e^+e^- \to \Xi^-\overline{\Xi}^+$



RADIATIVE DECAYS

NODE=M070310

$\Gamma(\gamma\eta_c(1S))/\Gamma_{total}$ — Γ_{212}/Γ

NODE=M070R85
NODE=M070R85

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1.7 ±0.4 OUR AVERAGE Error includes scale factor of 1.5.					
2.00±0.31±0.02		[1] MITCHELL	09	CLEO	$e^+e^- \to \gamma X$
1.27±0.36		GAISER	86	CBAL	$J/\psi \to \gamma X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen		ANASHIN	14	KEDR	$J/\psi \to \gamma\eta_c$
0.79±0.20	273 ± 43	[2] AUBERT	06E	BABR	$B^\pm \to K^\pm X_{c\overline{c}}$
seen	16	BALTRUSAIT...84		MRK3	$J/\psi \to 2\phi\gamma$

[1] MITCHELL 09 reports $(1.98 \pm 0.09 \pm 0.30) \times 10^{-2}$ from a measurement of $[\Gamma(J/\psi(1S) \to \gamma\eta_c(1S))/\Gamma_{total}] \times [B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)]$ assuming $B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) = (35.04 \pm 0.07 \pm 0.77) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) = (34.68 \pm 0.30) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M070R85;LINKAGE=MI

[2] Calculated by the authors using an average of $B(J/\psi \to \gamma\eta_c) \times B(\eta_c \to K\overline{K}\pi)$ from BALTRUSAITIS 86, BISELLO 91, BAI 04 and $B(\eta_c \to K\overline{K}\pi) = (8.5 \pm 1.8)\%$ from AUBERT 06E.

NODE=M070R85;LINKAGE=AU

$\Gamma(\gamma\eta_c(1S) \to 3\gamma)/\Gamma_{total}$ — Γ_{213}/Γ

NODE=M070S08
NODE=M070S08

VALUE (units 10^{-6})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
$3.8^{+1.3}_{-1.0}$ OUR AVERAGE Error includes scale factor of 1.1.					
4.5±1.2±0.6	33 ± 9	ABLIKIM	13I	BES3	$\psi(2S) \to \pi^+\pi^- J/\psi$
$1.2^{+2.7}_{-1.1}\pm0.3$	$1.2^{+2.8}_{-1.1}$	ADAMS	08	CLEO	$\psi(2S) \to \pi^+\pi^- J/\psi$

$\Gamma(\gamma\eta_c(1S) \to \gamma\eta\eta\eta')/\Gamma_{total}$ — Γ_{214}/Γ

NODE=M070P89
NODE=M070P89

VALUE (units 10^{-5})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
4.86±0.62±0.45	137	ABLIKIM	21C	BES3	$J/\psi(1S) \to \gamma\eta\eta\eta'$

$\Gamma(3\gamma)/\Gamma_{total}$ — Γ_{215}/Γ

NODE=M070R81
NODE=M070R81

VALUE (units 10^{-6})	*CL%*	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
11.6±2.2 OUR AVERAGE						
11.3±1.8±2.0		113 ± 18	ABLIKIM	13I	BES3	$\psi(2S) \to \pi^+\pi^- J/\psi$
12 ±3 ±2		$24.2^{+7.2}_{-6.0}$	ADAMS	08	CLEO	$\psi(2S) \to \pi^+\pi^- J/\psi$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<55	90		PARTRIDGE	80	CBAL	e^+e^-

$\Gamma(4\gamma)/\Gamma_{total}$ Γ_{216}/Γ

NODE=M070S06

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<9 × 10^{-6}	90	ADAMS	08	CLEO	$\psi(2S) \to \pi^+\pi^- J/\psi$

$\Gamma(5\gamma)/\Gamma_{total}$ Γ_{217}/Γ

NODE=M070S07

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<15 × 10^{-6}	90	ADAMS	08	CLEO	$\psi(2S) \to \pi^+\pi^- J/\psi$

$\Gamma(\gamma\pi^0)/\Gamma_{total}$ Γ_{218}/Γ

NODE=M070R82

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
3.56±0.17 OUR AVERAGE					
3.59±0.20±0.03	1.6k	[1] ABLIKIM	18O	BES3	$\psi(2S) \to \pi^+\pi^-\gamma\gamma\gamma$
3.63±0.36±0.13		PEDLAR	09	CLE3	$J/\psi \to \pi^0\gamma$
$3.13^{+0.65}_{-0.47}$	586	ABLIKIM	06E	BES2	$J/\psi \to \pi^0\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3.6 ±1.1 ±0.7		BLOOM	83	CBAL	e^+e^-
7.3 ±4.7	10	BRANDELIK	79C	DASP	e^+e^-

[1] ABLIKIM 18O reports $[\Gamma(J/\psi(1S) \to \gamma\pi^0)/\Gamma_{total}] \times [B(\pi^0 \to 2\gamma)] = (3.57 \pm 0.12 \pm 0.16) \times 10^{-5}$ from a measurement of $[\Gamma(J/\psi(1S) \to \gamma\pi^0)/\Gamma_{total}] \times [B(\pi^0 \to 2\gamma)] \times [B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)]$ assuming $B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) = (34.49 \pm 0.30) \times 10^{-2}$, which we rescale to our best values $B(\pi^0 \to 2\gamma) = (98.823 \pm 0.034) \times 10^{-2}$, $B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) = (34.68 \pm 0.30) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values. NODE=M070R82;LINKAGE=A

$\Gamma(\gamma\pi^0\pi^0)/\Gamma_{total}$ Γ_{219}/Γ

NODE=M070B00

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
1.15±0.05	[1] ABLIKIM	15AE	BES3	$J/\psi \to \gamma\pi^0\pi^0$

[1] The uncertainty is systematic as statistical is netligible. NODE=M070B00;LINKAGE=A

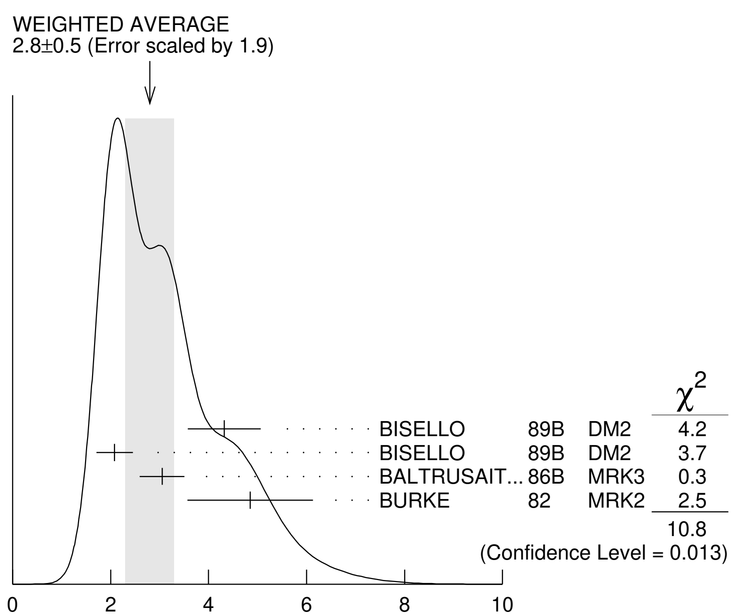
$\Gamma(\gamma 2\pi^+ 2\pi^-)/\Gamma_{total}$ Γ_{220}/Γ

NODE=M070R95

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
2.8 ±0.5 OUR AVERAGE	Error includes scale factor of 1.9. See the ideogram below.			
4.32±0.14±0.73	[1] BISELLO	89B	DM2	$J/\psi \to 4\pi\gamma$
2.08±0.13±0.35	[2] BISELLO	89B	DM2	$J/\psi \to 4\pi\gamma$
3.05±0.08±0.45	[2] BALTRUSAIT...	86B	MRK3	$J/\psi \to 4\pi\gamma$
4.85±0.45±1.20	[3] BURKE	82	MRK2	e^+e^-

OCCUR=2

[1] 4π mass less than 3.0 GeV. NODE=M070R95;LINKAGE=A
[2] 4π mass less than 2.0 GeV. NODE=M070R95;LINKAGE=B
[3] 4π mass less than 2.5 GeV. NODE=M070R95;LINKAGE=M



$\Gamma(\gamma 2\pi^+ 2\pi^-)/\Gamma_{total}$ (units 10^{-3})

$\Gamma(\gamma f_2(1270) f_2(1270))/\Gamma_{total}$ — Γ_{221}/Γ

NODE=M070S45

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
9.5±0.7±1.6	646 ± 45	ABLIKIM	04M	BES	$J/\psi \to \gamma 2\pi^+ 2\pi^-$

$\Gamma(\gamma f_2(1270) f_2(1270)\text{(non resonant)})/\Gamma_{total}$ — Γ_{222}/Γ

NODE=M070S46

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
8.2±0.8±1.7	[1] ABLIKIM	04M	BES	$J/\psi \to \gamma 2\pi^+ 2\pi^-$

[1] Subtracting contribution from intermediate $\eta_c(1S)$ decays. NODE=M070S46;LINKAGE=AB

$\Gamma(\gamma \pi^+ \pi^- 2\pi^0)/\Gamma_{total}$ — Γ_{223}/Γ

NODE=M070R99

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
8.3±0.2±3.1	[1] BALTRUSAIT...	86B	MRK3	$J/\psi \to 4\pi\gamma$

[1] 4π mass less than 2.0 GeV. NODE=M070R99;LINKAGE=M

$\Gamma(\gamma K^0_S K^0_S)/\Gamma_{total}$ — Γ_{224}/Γ

NODE=M070P73

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
8.1±0.4	ABLIKIM	18AA	BES3	$J/\psi \to \gamma K^0_S K^0_S$

$\Gamma(\gamma (K\overline{K}\pi)\,[J^{PC}=0^{-+}])/\Gamma_{total}$ — Γ_{225}/Γ

NODE=M070S38

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.7 ±0.4 OUR AVERAGE	Error includes scale factor of 2.1.			
0.58±0.03±0.20	[1] BAI	00D	BES	$J/\psi \to \gamma K^\pm K^0_S \pi^\mp$
2.1 ±0.1 ±0.7	[2] BAI	00D	BES	$J/\psi \to \gamma K^\pm K^0_S \pi^\mp$

OCCUR=2

[1] For a broad structure around 1800 MeV. NODE=M070S38;LINKAGE=BD
[2] For a broad structure around 2040 MeV. NODE=M070S38;LINKAGE=BE

$\Gamma(\gamma K^+ K^- \pi^+ \pi^-)/\Gamma_{total}$ — Γ_{226}/Γ

NODE=M070B05

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
2.1±0.1±0.6	1516	BAI	00B	BES	$J/\psi \to \gamma K^+ K^0 \pi^+ \pi^-$

$\Gamma(\gamma K^*(892) \overline{K}^*(892))/\Gamma_{total}$ — Γ_{227}/Γ

NODE=M070B07

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
4.0±0.3±1.3	320	[1] BAI	00B	BES	$J/\psi \to \gamma K^+ K^0 \pi^+ \pi^-$

[1] Summed over all charges. NODE=M070R;LINKAGE=B7

$\Gamma(\gamma \eta)/\Gamma_{total}$ — Γ_{228}/Γ

NODE=M070R83

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.085±0.018 OUR AVERAGE					
[(1.108 ± 0.027) × 10^{-3} OUR 2021 AVERAGE]					
1.067±0.005±0.023	87.9k	ABLIKIM	21AM	BES3	$e^+ e^- \to J/\psi$
1.12 ±0.05 ±0.01	18.6k	[1] ABLIKIM	18O	BES3	$\psi(2S) \to \pi^+ \pi^- \gamma\gamma\gamma$
1.101±0.029±0.022		PEDLAR	09	CLE3	$J/\psi \to \eta\gamma$
1.123±0.089	11k	ABLIKIM	06E	BES2	$J/\psi \to \eta\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.88 ±0.08 ±0.11		BLOOM	83	CBAL	$e^+ e^-$
0.82 ±0.10		BRANDELIK	79C	DASP	$e^+ e^-$
1.3 ±0.4	21	BARTEL	77	CNTR	$e^+ e^-$

NEW

[1] ABLIKIM 18O reports $[\Gamma(J/\psi(1S) \to \gamma\eta)/\Gamma_{total}] \times [B(\eta \to 2\gamma)] = (4.42 \pm 0.04 \pm 0.18) \times 10^{-4}$ from a measurement of $[\Gamma(J/\psi(1S) \to \gamma\eta)/\Gamma_{total}] \times [B(\eta \to 2\gamma)] \times [B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)]$ assuming $B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) = (34.49 \pm 0.30) \times 10^{-2}$, which we rescale to our best values $B(\eta \to 2\gamma) = (39.36 \pm 0.18) \times 10^{-2}$, $B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) = (34.68 \pm 0.30) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values. NODE=M070R83;LINKAGE=A

$\Gamma(\gamma \eta \pi^0)/\Gamma_{total}$ — Γ_{229}/Γ

NODE=M070P01

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
21.4±1.8±2.5	596	ABLIKIM	16P	BES3	$J/\psi \to 5\gamma$

$\Gamma(\gamma a_0(980)^0 \to \gamma\eta\pi^0)/\Gamma_{total}$ — Γ_{233}/Γ

NODE=M070P02

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<2.5 × 10^{-6}	95	ABLIKIM	16P	BES3	$J/\psi \to 5\gamma$

$\Gamma(\gamma a_2(1320)^0 \to \gamma\eta\pi^0)/\Gamma_{total}$ — Γ_{234}/Γ

NODE=M070P03
NODE=M070P03

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<6.6 × 10^{-6}	95	ABLIKIM	16P	BES3	$J/\psi \to 5\gamma$

$\Gamma(\gamma\eta\pi\pi)/\Gamma_{total}$ — Γ_{235}/Γ

NODE=M070R96
NODE=M070R96

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
6.1 ±1.0 OUR AVERAGE				
5.85±0.3±1.05	[1] EDWARDS	83B	CBAL	$J/\psi \to \eta\pi^+\pi^-$
7.8 ±1.2±2.4	[1] EDWARDS	83B	CBAL	$J/\psi \to \eta 2\pi^0$

OCCUR=2

[1] Broad enhancement at 1700 MeV.

NODE=M070R96;LINKAGE=M

$\Gamma(\gamma\eta_2(1870) \to \gamma\eta\pi^+\pi^-)/\Gamma_{total}$ — Γ_{236}/Γ

NODE=M070S37
NODE=M070S37

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
6.2±2.2±0.9	BAI	99	BES	$J/\psi \to \gamma\eta\pi^+\pi^-$

$\Gamma(\gamma\eta'(958))/\Gamma_{total}$ — Γ_{237}/Γ

NODE=M070R84
NODE=M070R84

5.25±0.07 OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below.
[(5.25 ± 0.07) × 10^{-3} OUR 2021 AVERAGE Scale factor = 1.3]

NEW

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
5.27±0.03±0.05	36k	ABLIKIM	19T	BES	$J/\psi \to \gamma\eta'$
5.43±0.23±0.09	5.0k	[1] ABLIKIM	18O	BES3	$\psi(2S) \to \pi^+\pi^-\gamma\gamma\gamma$
4.77±0.22±0.06		[2] ABLIKIM	11	BES3	$J/\psi \to \eta'\gamma$
5.24±0.12±0.11		PEDLAR	09	CLE3	$J/\psi \to \eta'\gamma$
5.55±0.44	35k	ABLIKIM	06E	BES2	$J/\psi \to \eta'\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
4.50±0.14±0.53		BOLTON	92B	MRK3	$J/\psi \to \gamma\pi^+\pi^-\eta$, $\eta \to \gamma\gamma$
4.30±0.31±0.71		BOLTON	92B	MRK3	$J/\psi \to \gamma\pi^+\pi^-\eta$, $\eta \to \pi^+\pi^-\pi^0$
4.04±0.16±0.85	622	AUGUSTIN	90	DM2	$J/\psi \to \gamma\eta\pi^+\pi^-$
4.39±0.09±0.66	2420	AUGUSTIN	90	DM2	$J/\psi \to \gamma\gamma\pi^+\pi^-$
4.1 ±0.3 ±0.6		BLOOM	83	CBAL	$e^+e^- \to 3\gamma +$ hadrons
2.9 ±1.1	6	BRANDELIK	79C	DASP	$e^+e^- \to 3\gamma$
2.4 ±0.7	57	BARTEL	76	CNTR	$e^+e^- \to 2\gamma\rho$

OCCUR=2 (BOLTON 92B, second entry)

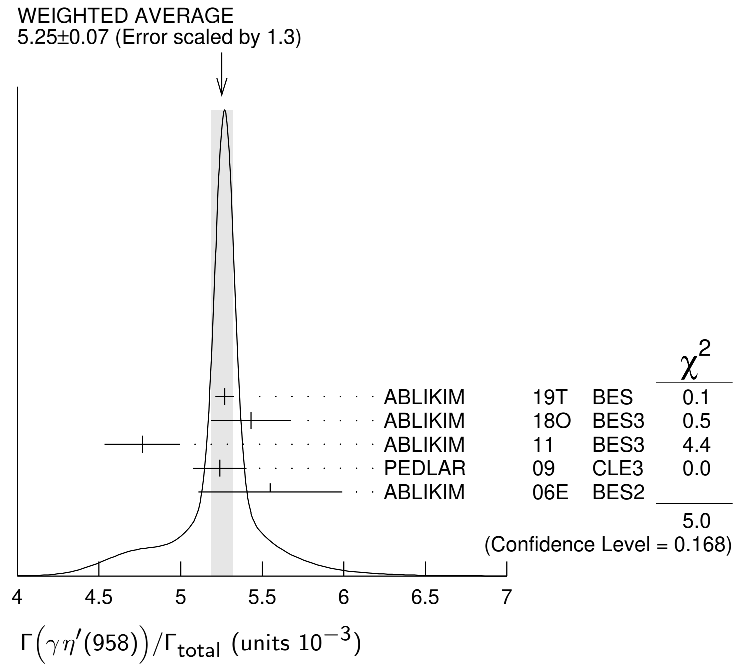
OCCUR=2 (AUGUSTIN 90, second entry)

[1] ABLIKIM 18O reports $[\Gamma(J/\psi(1S) \to \gamma\eta'(958))/\Gamma_{total}] \times [B(\eta'(958) \to \gamma\gamma)] = (1.26 \pm 0.02 \pm 0.05) \times 10^{-4}$ from a measurement of $[\Gamma(J/\psi(1S) \to \gamma\eta'(958))/\Gamma_{total}] \times [B(\eta'(958) \to \gamma\gamma)] \times [B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)]$ assuming $B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) = (34.49 \pm 0.30) \times 10^{-2}$, which we rescale to our best values $B(\eta'(958) \to \gamma\gamma) = (2.307 \pm 0.033) \times 10^{-2}$, $B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) = (34.68 \pm 0.30) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

NODE=M070R84;LINKAGE=A

[2] ABLIKIM 11 reports $(4.84 \pm 0.03 \pm 0.24) \times 10^{-3}$ from a measurement of $[\Gamma(J/\psi(1S) \to \gamma\eta'(958))/\Gamma_{total}]$ / $[B(\eta'(958) \to \pi^+\pi^-\eta)]$ / $[B(\eta \to 2\gamma)]$ assuming $B(\eta'(958) \to \pi^+\pi^-\eta) = (43.2 \pm 0.7) \times 10^{-2}$, $B(\eta \to 2\gamma) = (39.31 \pm 0.20) \times 10^{-2}$, which we rescale to our best values $B(\eta'(958) \to \pi^+\pi^-\eta) = (42.5 \pm 0.5) \times 10^{-2}$, $B(\eta \to 2\gamma) = (39.36 \pm 0.18) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

NODE=M070R84;LINKAGE=AB



$\Gamma(\gamma f_0(500) \to \gamma\pi\pi)/\Gamma_{total}$ Γ_{230}/Γ

NODE=M070P95

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
10.5 ± 2.0	SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma(\pi\pi, K\overline{K}, \eta\eta, \omega\phi)$

$\Gamma(\gamma f_0(500) \to \gamma K\overline{K})/\Gamma_{total}$ Γ_{231}/Γ

NODE=M070P97

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
5 ± 5	SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma(\pi\pi, K\overline{K}, \eta\eta, \omega\phi)$

$\Gamma(\gamma f_0(500) \to \gamma\eta\eta)/\Gamma_{total}$ Γ_{232}/Γ

NODE=M070P98

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
4 ± 3	SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma(\pi\pi, K\overline{K}, \eta\eta, \omega\phi)$

$\Gamma(\gamma f_0(980) \to \gamma\pi\pi)/\Gamma_{total}$ Γ_{238}/Γ

NODE=M070P90

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.3 ± 0.2	SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma(\pi\pi, K\overline{K}, \eta\eta, \omega\phi)$

$\Gamma(\gamma f_0(980) \to \gamma K\overline{K})/\Gamma_{total}$ Γ_{239}/Γ

NODE=M070P91

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.8 ± 0.3	SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma(\pi\pi, K\overline{K}, \eta\eta, \omega\phi)$

$\Gamma(\gamma\rho\rho)/\Gamma_{total}$ Γ_{240}/Γ

NODE=M070R94

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
4.5 ±0.8 OUR AVERAGE					
$4.7\pm0.3\pm0.9$		[1] BALTRUSAIT...	86B	MRK3	$J/\psi \to 4\pi\gamma$
$3.75\pm1.05\pm1.20$		[2] BURKE	82	MRK2	$J/\psi \to 4\pi\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.09	90	[3] BISELLO	89B		$J/\psi \to 4\pi\gamma$

[1] 4π mass less than 2.0 GeV. NODE=M070R94;LINKAGE=N

[2] 4π mass less than 2.0 GeV. We have multiplied $2\rho^0$ measurement by 3 to obtain 2ρ. NODE=M070R94;LINKAGE=M

[3] 4π mass in the range 2.0–25 GeV. NODE=M070R94;LINKAGE=A

$\Gamma(\gamma\rho\omega)/\Gamma_{total}$ Γ_{241}/Γ

NODE=M070R05

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<5.4\times10^{-4}$	90	ABLIKIM	08A	BES2	$e^+e^- \to J/\psi$

$\Gamma(\gamma\rho\phi)/\Gamma_{total}$ Γ_{242}/Γ

NODE=M070R06
NODE=M070R06

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<8.8 × 10^{-5}	90	ABLIKIM	08A	BES2	$e^+e^- \rightarrow J/\psi$

$\Gamma(\gamma\omega\omega)/\Gamma_{total}$ Γ_{243}/Γ

NODE=M070R97
NODE=M070R97

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.61±0.33 OUR AVERAGE					
6.0 ±4.8 ±1.8		ABLIKIM	08A	BES2	$J/\psi \rightarrow \gamma\omega\pi^+\pi^-$
1.41±0.2 ±0.42	120 ± 17	BISELLO	87	SPEC	e^+e^-, hadronsγ
1.76±0.09±0.45		BALTRUSAIT...	85C	MRK3	$e^+e^- \rightarrow$ hadronsγ

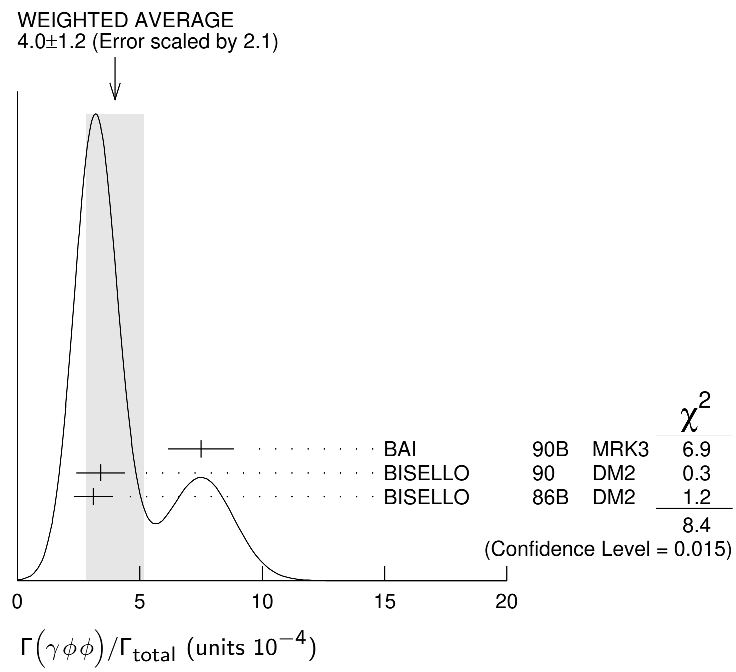
$\Gamma(\gamma\phi\phi)/\Gamma_{total}$ Γ_{244}/Γ

NODE=M070R98
NODE=M070R98

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
4.0±1.2 OUR AVERAGE	Error includes scale factor of 2.1. See the ideogram below.				
7.5±0.6±1.2	168	BAI	90B	MRK3	$J/\psi \rightarrow \gamma 4K$
3.4±0.8±0.6	33 ± 7	[1] BISELLO	90	DM2	$J/\psi \rightarrow \gamma K^+K^-K^0_S K^0_L$
3.1±0.7±0.4		[1] BISELLO	86B	DM2	$J/\psi \rightarrow \gamma K^+K^-K^+K^-$

[1] $\phi\phi$ mass less than 2.9 GeV, η_c excluded.

NODE=M070R98;LINKAGE=C



$\Gamma(\gamma\eta(1405/1475) \rightarrow \gamma K\overline{K}\pi)/\Gamma_{total}$ Γ_{245}/Γ

NODE=M070R89
NODE=M070R89

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT	
2.8 ±0.6 OUR AVERAGE	Error includes scale factor of 1.6. See the ideogram below.				
1.66±0.1 ±0.58	[1,2] BAI	00D	BES	$J/\psi \rightarrow \gamma K^\pm K^0_S\pi^\mp$	
3.8 ±0.3 ±0.6	[3] AUGUSTIN	90	DM2	$J/\psi \rightarrow \gamma K\overline{K}\pi$	
4.0 ±0.7 ±1.0	[3] EDWARDS	82E	CBAL	$J/\psi \rightarrow K^+K^-\pi^0\gamma$	
4.3 ±1.7	[3,4] SCHARRE	80	MRK2	e^+e^-	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.78±0.21±0.33	[3,5,6] AUGUSTIN	92	DM2	$J/\psi \rightarrow \gamma K\overline{K}\pi$	
0.83±0.13±0.18	[3,7,8] AUGUSTIN	92	DM2	$J/\psi \rightarrow \gamma K\overline{K}\pi$	OCCUR=2
$0.66^{+0.17+0.24}_{-0.16-0.15}$	[3,6,9] BAI	90C	MRK3	$J/\psi \rightarrow \gamma K^0_S K^\pm\pi^\mp$	
$1.03^{+0.21+0.26}_{-0.18-0.19}$	[3,8,10] BAI	90C	MRK3	$J/\psi \rightarrow \gamma K^0_S K^\pm\pi^\mp$	OCCUR=2

[1] Interference with the $J/\psi(1S)$ radiative transition to the broad $K\overline{K}\pi$ pseudoscalar state around 1800 is $(0.15 \pm 0.01 \pm 0.05) \times 10^{-3}$. NODE=M070R89;LINKAGE=BD

[2] Interference with $J/\psi \rightarrow \gamma f_1(1420)$ is $(-0.03 \pm 0.01 \pm 0.01) \times 10^{-3}$. NODE=M070R89;LINKAGE=BE

[3] Includes unknown branching fraction $\eta(1405) \rightarrow K\overline{K}\pi$. NODE=M070R89;LINKAGE=B

[4] Corrected for spin-zero hypothesis for $\eta(1405)$. NODE=M070R89;LINKAGE=C

[5] From fit to the $a_0(980)\pi$ 0^{-+} partial wave. NODE=M070R89;LINKAGE=H

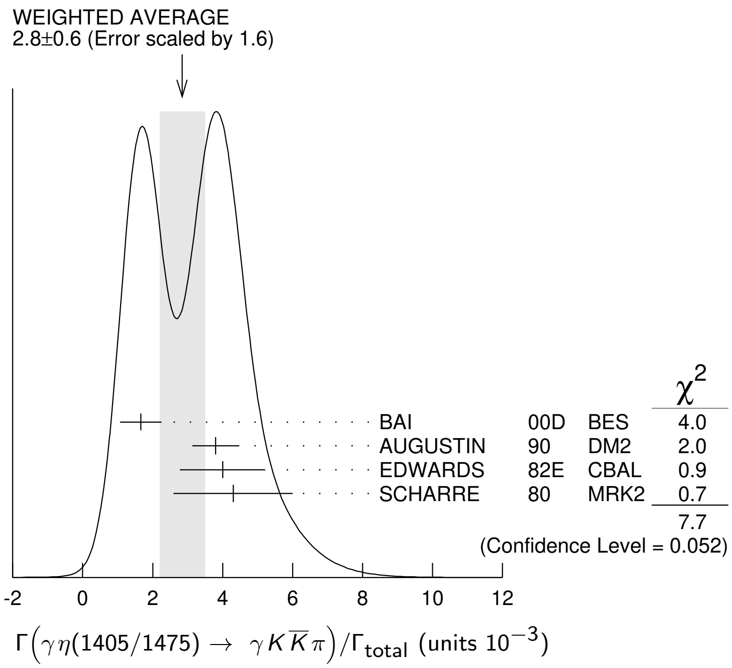
[6] $a_0(980)\pi$ mode. NODE=M070R89;LINKAGE=K9

[7] From fit to the $K^*(892)K$ 0^{-+} partial wave. NODE=M070R89;LINKAGE=J

[8] K^*K mode. NODE=M070R89;LINKAGE=K8

[9] From $a_0(980)\pi$ final state. NODE=M070R89;LINKAGE=D

[10] From $K^*(890)K$ final state. NODE=M070R89;LINKAGE=E



$\Gamma\big(\gamma\eta(1405/1475) \to \gamma\gamma\rho^0\big)/\Gamma_{total}$ Γ_{246}/Γ

NODE=M070S30

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
0.78±0.20 OUR AVERAGE	Error includes scale factor of 1.8.			
1.07±0.17±0.11	[1] BAI	04J	BES2	$J/\psi \to \gamma\gamma\pi^+\pi^-$
0.64±0.12±0.07	[1] COFFMAN	90	MRK3	$J/\psi \to \gamma\gamma\pi^+\pi^-$

[1] Includes unknown branching fraction $\eta(1405) \to \gamma\rho^0$. NODE=M070S30;LINKAGE=C

$\Gamma\big(\gamma\eta(1405/1475) \to \gamma\eta\pi^+\pi^-\big)/\Gamma_{total}$ Γ_{247}/Γ

NODE=M070S29

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.0 ±0.5 OUR AVERAGE					
2.6 ±0.7 ±0.4		BAI	99	BES	$J/\psi \to \gamma\eta\pi^+\pi^-$
3.38±0.33±0.64		[1] BOLTON	92B	MRK3	$J/\psi \to \gamma\eta\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
7.0 ±0.6 ±1.1	261	[2] AUGUSTIN	90	DM2	$J/\psi \to \gamma\eta\pi^+\pi^-$

[1] Via $a_0(980)\pi$. NODE=M070S29;LINKAGE=RR

[2] Includes unknown branching fraction to $\eta\pi^+\pi^-$. NODE=M070S29;LINKAGE=R

$\Gamma\big(\gamma\eta(1405/1475) \to \gamma\rho^0\rho^0\big)/\Gamma_{total}$ Γ_{248}/Γ

NODE=M070S19

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
1.7 ±0.4 OUR AVERAGE	Error includes scale factor of 1.3.			
2.1 ±0.4	BUGG	95	MRK3	$J/\psi \to \gamma\pi^+\pi^-\pi^+\pi^-$
1.36±0.38	[1,2] BISELLO	89B	DM2	$J/\psi \to 4\pi\gamma$

[1] Estimated by us from various fits. NODE=M070S19;LINKAGE=A

[2] Includes unknown branching fraction to $\rho^0\rho^0$. NODE=M070S19;LINKAGE=B

$\Gamma\big(\gamma\eta(1405/1475) \to \gamma\gamma\phi\big)/\Gamma_{total}$ Γ_{249}/Γ

NODE=M070R77

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<82	95		BAI	04J	BES2	$J/\psi \to \gamma\gamma K^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
7.03±0.92±0.91		1.3k	[1] ABLIKIM	18I	BES3	$J/\psi \to \gamma\gamma\phi(1020)$
10.36±1.51±1.54		1.9k	[2] ABLIKIM	18I	BES3	$J/\psi \to \gamma\gamma\phi(1020)$ OCCUR=2

[1] Constructive interference between the $X(1835)$ and $\eta(1405)/\eta(1475)$ is assumed in a fit to the $\gamma\phi$ invariant mass. NODE=M070R77;LINKAGE=B

[2] Destructive interference between the $X(1835)$ and $\eta(1405)/\eta(1475)$ is assumed in a fit to the $\gamma\phi$ invariant mass. NODE=M070R77;LINKAGE=A

$\Gamma\big(\gamma\eta(1405) \to \gamma\gamma\gamma\big)/\Gamma_{total}$ Γ_{250}/Γ

NODE=M070P38

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<2.63 × 10^{-6}	90	ABLIKIM	18O	BES3	$\psi(2S) \to \pi^+\pi^-\gamma\gamma\gamma$

$\Gamma(\gamma\eta(1475) \to \gamma\gamma\gamma)/\Gamma_{total}$ — Γ_{251}/Γ

NODE=M070P39

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.86 × 10^{-6}	90	ABLIKIM	18O	BES3	$\psi(2S) \to \pi^+\pi^-\gamma\gamma\gamma$

$\Gamma(\gamma\eta(1760) \to \gamma\rho^0\rho^0)/\Gamma_{total}$ — Γ_{252}/Γ

NODE=M070S20

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.13±0.09	[1,2] BISELLO	89B	DM2	$J/\psi \to 4\pi\gamma$

[1] Estimated by us from various fits. NODE=M070S20;LINKAGE=A

[2] Includes unknown branching fraction to $\rho^0\rho^0$. NODE=M070S20;LINKAGE=B

$\Gamma(\gamma\eta(1760) \to \gamma\omega\omega)/\Gamma_{total}$ — Γ_{253}/Γ

NODE=M070R04

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.98±0.08±0.32	1045	ABLIKIM	06H	BES	$J/\psi \to \gamma\omega\omega$

$\Gamma(\gamma\eta(1760) \to \gamma\gamma\gamma)/\Gamma_{total}$ — Γ_{254}/Γ

NODE=M070P40

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<4.80 × 10^{-6}	90	ABLIKIM	18O	BES3	$\psi(2S) \to \pi^+\pi^-\gamma\gamma\gamma$

$\Gamma(\gamma\eta(2225))/\Gamma_{total}$ — Γ_{255}/Γ

NODE=M070S21

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
$3.14^{+0.50}_{-0.19}$ OUR AVERAGE					
$2.40\pm0.10^{+2.47}_{-0.18}$		[1,2] ABLIKIM	16N	BES3	$J/\psi \to \gamma K^+K^-K^+K^-$
4.4 ±0.4 ±0.8	196	[2] ABLIKIM	08I	BES	$J/\psi \to \gamma K^+K^-K^0_S K^0_L$
3.3 ±0.8 ±0.5		[2] BAI	90B	MRK3	$J/\psi \to \gamma K^+K^-K^+K^-$
2.7 ±0.6 ±0.6		[2] BAI	90B	MRK3	$J/\psi \to \gamma K^+K^-K^0_S K^0_L$ OCCUR=2
$2.4\ ^{+1.5}_{-1.0}$		[3,4] BISELLO	89B	DM2	$J/\psi \to 4\pi\gamma$

[1] From a partial wave analysis of $J/\psi \to \gamma\phi\phi$ that also finds significant signals for for $\eta(2100)$, 0^{-+} phase space, $f_0(2100)$, $f_2(2010)$, $f_2(2300)$, $f_2(2340)$, and a previously unseen 0^{-+} state $X(2500)$ (M = $2470^{+15}_{-19}{}^{+101}_{-23}$ MeV, $\Gamma = 230^{+64}_{-35}{}^{+56}_{-33}$ MeV). NODE=M070S21;LINKAGE=C

[2] Includes unknown branching fraction to $\phi\phi$. NODE=M070S21;LINKAGE=U

[3] Estimated by us from various fits. NODE=M070S21;LINKAGE=A

[4] Includes unknown branching fraction to $\rho^0\rho^0$. NODE=M070S21;LINKAGE=B

$\Gamma(\gamma f_2(1270))/\Gamma_{total}$ — Γ_{256}/Γ

NODE=M070R86

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.64±0.12 OUR AVERAGE	Error includes scale factor of 1.3. See the ideogram below.				
$2.07\pm0.16^{+0.02}_{-0.07}$	2.4k	[1,2] DOBBS	15		$J/\psi \to \gamma\pi\pi$
$1.63\pm0.26^{+0.02}_{-0.06}$		[3] ABLIKIM	06V	BES2	$e^+e^- \to J/\psi \to \gamma\pi^+\pi^-$
$1.42\pm0.21^{+0.01}_{-0.05}$		[4] ABLIKIM	06V	BES2	$e^+e^- \to J/\psi \to \gamma\pi^0\pi^0$ OCCUR=2
1.33±0.05±0.20		[5] AUGUSTIN	87	DM2	$J/\psi \to \gamma\pi^+\pi^-$
1.36±0.09±0.23		[5] BALTRUSAIT...	87	MRK3	$J/\psi \to \gamma\pi^+\pi^-$
1.48±0.25±0.30	178	EDWARDS	82B	CBAL	$e^+e^- \to 2\pi^0\gamma$
2.0 ±0.7	35	ALEXANDER	78	PLUT	e^+e^-
1.2 ±0.6	30	[6] BRANDELIK	78B	DASP	$e^+e^- \to \pi^+\pi^-\gamma$

[1] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M070R86;LINKAGE=A

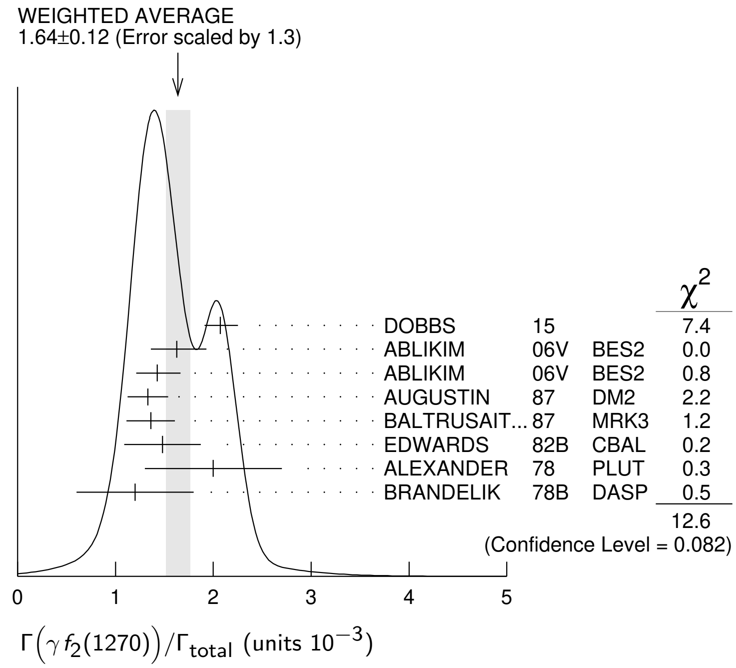
[2] DOBBS 15 reports $[\Gamma(J/\psi(1S) \to \gamma f_2(1270))/\Gamma_{total}] \times [B(f_2(1270) \to \pi\pi)] = (1.744 \pm 0.052 \pm 0.122) \times 10^{-3}$ which we divide by our best value $B(f_2(1270) \to \pi\pi) = (84.2^{+2.9}_{-0.9}) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070R86;LINKAGE=DO

[3] ABLIKIM 06V reports $[\Gamma(J/\psi(1S) \to \gamma f_2(1270))/\Gamma_{total}] \times [B(f_2(1270) \to \pi\pi)] = (1.371 \pm 0.010 \pm 0.222) \times 10^{-3}$ which we divide by our best value $B(f_2(1270) \to \pi\pi) = (84.2^{+2.9}_{-0.9}) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070R86;LINKAGE=AI

[4] ABLIKIM 06V reports $[\Gamma(J/\psi(1S) \to \gamma f_2(1270))/\Gamma_{total}] \times [B(f_2(1270) \to \pi\pi)] = (1.200 \pm 0.027 \pm 0.174) \times 10^{-3}$ which we divide by our best value $B(f_2(1270) \to \pi\pi) = (84.2^{+2.9}_{-0.9}) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070R86;LINKAGE=AL

[5] Estimated using $B(f_2(1270) \to \pi\pi)$=0.843 ± 0.012. The errors do not contain the uncertainty in the $f_2(1270)$ decay. NODE=M070R86;LINKAGE=X

[6] Restated by us to take account of spread of E1, M2, E3 transitions. NODE=M070R86;LINKAGE=T



$\Gamma(\gamma f_2(1270) \to \gamma K^0_S K^0_S)/\Gamma_{total}$ Γ_{257}/Γ

NODE=M070P68

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
$\mathbf{2.58^{+0.08}_{-0.09}{}^{+0.59}_{-0.20}}$	ABLIKIM	18AA	BES3	$J/\psi \to \gamma K^0_S K^0_S$

$\Gamma(\gamma f_1(1285))/\Gamma_{total}$ Γ_{258}/Γ

NODE=M070R88

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.61 ±0.08 OUR AVERAGE				
0.69 ±0.16 ±0.20	[1] BAI	04J	BES2	$J/\psi \to \gamma\gamma\rho^0$
0.61 ±0.04 ±0.21	[2] BAI	00D	BES	$J/\psi \to \gamma K^{\pm} K^0_S \pi^{\mp}$
0.45 ±0.09 ±0.17	[3] BAI	99	BES	$J/\psi \to \gamma\eta\pi^+\pi^-$
0.625±0.063±0.103	[4] BOLTON	92	MRK3	$J/\psi \to \gamma f_1(1285)$
0.70 ±0.08 ±0.16	[5] BOLTON	92B	MRK3	$J/\psi \to \gamma\eta\pi^+\pi^-$

[1] Assuming B($f_1(1285) \to \rho^0\gamma$) = 0.055 ± 0.013. NODE=M070R88;LINKAGE=BI

[2] Assuming $\Gamma(f_1(1285) \to K\overline{K}\pi)/\Gamma_{total}$ = 0.090 ± 0.004. NODE=M070R88;LINKAGE=BD

[3] Assuming $\Gamma(f_1(1285) \to \eta\pi\pi)/\Gamma_{total}$ =0.5 ± 0.18. NODE=M070R88;LINKAGE=BA

[4] Obtained summing the sequential decay channels NODE=M070R88;LINKAGE=B
B($J/\psi \to \gamma f_1(1285), f_1(1285) \to \pi\pi\pi\pi$) = (1.44 ± 0.39 ± 0.27) × 10^{-4};
B($J/\psi \to \gamma f_1(1285), f_1(1285) \to a_0(980)\pi, a_0(980) \to \eta\pi$) = (3.90 ± 0.42 ± 0.87) × 10^{-4};
B($J/\psi \to \gamma f_1(1285), f_1(1285) \to a_0(980)\pi, a_0(980) \to K\overline{K}$) = (0.66 ± 0.26 ± 0.29) × 10^{-4};
B($J/\psi \to \gamma f_1(1285), f_1(1285) \to \gamma\rho^0$) = (0.25 ± 0.07 ± 0.03) × 10^{-4}.

[5] Using B($f_1(1285) \to a_0(980)\pi$) = 0.37, and including unknown branching ratio for $a_0(980) \to \eta\pi$. NODE=M070R88;LINKAGE=A

$\Gamma(\gamma f_0(1370) \to \gamma\pi\pi)/\Gamma_{total}$ Γ_{259}/Γ

NODE=M070P92

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
38±10	SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma(\pi\pi,\ K\overline{K},\ \eta\eta,\ \omega\phi)$

$\Gamma(\gamma f_0(1370) \to \gamma K\overline{K})/\Gamma_{total}$ Γ_{260}/Γ

NODE=M070R00

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
4.19±0.73±1.34	478	[1] DOBBS	15		$J/\psi \to \gamma K\overline{K}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.3 ±0.4		SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma(\pi\pi,\ K\overline{K},\ \eta\eta,\ \omega\phi)$

[1] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M070R00;LINKAGE=A

$\Gamma(\gamma f_0(1370) \to \gamma K^0_S K^0_S)/\Gamma_{total}$ — Γ_{261}/Γ

NODE=M070P63

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
$1.07^{+0.08}_{-0.07}{}^{+0.36}_{-0.34}$	ABLIKIM	18AA	BES3	$J/\psi \to \gamma K^0_S K^0_S$

$\Gamma(\gamma f_0(1370) \to \gamma\eta\eta)/\Gamma_{total}$ — Γ_{262}/Γ

NODE=M070P93

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
3.5 ± 1.0	SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma(\pi\pi,\ K\overline{K},\ \eta\eta,\ \omega\phi)$

$\Gamma(\gamma f_0(1370) \to \gamma\eta\eta')/\Gamma_{total}$ — Γ_{263}/Γ

NODE=M070P94

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.9 ± 0.3	SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma(\pi\pi,\ K\overline{K},\ \eta\eta,\ \omega\phi)$

$\Gamma(\gamma f_1(1420) \to \gamma K\overline{K}\pi)/\Gamma_{total}$ — Γ_{264}/Γ

NODE=M070S31

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.79 ± 0.13 OUR AVERAGE				
$0.68\pm0.04\pm0.24$	BAI	00D	BES	$J/\psi \to \gamma K^\pm K^0_S \pi^\mp$
$0.76\pm0.15\pm0.21$	[1,2] AUGUSTIN	92	DM2	$J/\psi \to \gamma K\overline{K}\pi$
$0.87\pm0.14^{+0.14}_{-0.11}$	[1] BAI	90C	MRK3	$J/\psi \to \gamma K^0_S K^\pm \pi^\mp$

OCCUR=2

[1] Included unknown branching fraction $f_1(1420) \to K\overline{K}\pi$. NODE=M070S31;LINKAGE=A

[2] From fit to the $K^*(892)K$ 1^{++} partial wave. NODE=M070S31;LINKAGE=D

$\Gamma(\gamma f_0(1500) \to \gamma\pi\pi)/\Gamma_{total}$ — Γ_{265}/Γ

NODE=M070S32

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.09 ± 0.24 OUR AVERAGE					
$1.21\pm0.29\pm0.24$	174	[1] DOBBS	15		$J/\psi \to \gamma\pi\pi$
$1.00\pm0.03\pm0.45$		[2] ABLIKIM	06V	BES2	$e^+e^- \to J/\psi \to \gamma\pi^+\pi^-$
$1.02\pm0.09\pm0.45$		[2] ABLIKIM	06V	BES2	$e^+e^- \to J/\psi \to \gamma\pi^0\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.90 ± 0.17		SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma\ (\pi\pi,\ K\overline{K},\ \eta\eta,\ \omega\phi)$
$5.7\ \pm0.8$		[3,4] BUGG	95	MRK3	$J/\psi \to \gamma\pi^+\pi^-\pi^+\pi^-$

OCCUR=2

[1] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M070S32;LINKAGE=C

[2] Including unknown branching fraction to $\pi\pi$. NODE=M070S32;LINKAGE=AB

[3] Including unknown branching ratio for $f_0(1500) \to \pi^+\pi^-\pi^+\pi^-$. NODE=M070S32;LINKAGE=A

[4] Assuming that $f_0(1500)$ decays only to two S-wave dipions. NODE=M070S32;LINKAGE=B

$\Gamma(\gamma f_0(1500) \to \gamma\eta\eta)/\Gamma_{total}$ — Γ_{266}/Γ

NODE=M070S83

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$1.65^{+0.26}_{-0.31}{}^{+0.51}_{-1.40}$	5.5k	[1] ABLIKIM	13N	BES3	$J/\psi \to \gamma\eta\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1.1\ \pm0.4$		SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma\ (\pi\pi,\ K\overline{K},\ \eta\eta,\ \omega\phi)$

[1] From partial wave analysis including all possible combinations of 0^{++}, 2^{++}, and 4^{++} resonances. NODE=M070S83;LINKAGE=A

$\Gamma(\gamma f_0(1500) \to \gamma K^0_S K^0_S)/\Gamma_{total}$ — Γ_{267}/Γ

NODE=M070P64

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
$1.59\pm0.16^{+0.18}_{-0.56}$	ABLIKIM	18AA	BES3	$J/\psi \to \gamma K^0_S K^0_S$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.7\ \pm0.3$	SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma\ (\pi\pi,\ K\overline{K},\ \eta\eta,\ \omega\phi)$

$\Gamma(\gamma f_0(1500) \to \gamma\eta\eta')/\Gamma_{total}$ — Γ_{268}/Γ

NODE=M070P99

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.2 ± 0.5	SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma(\pi\pi,\ K\overline{K},\ \eta\eta,\ \omega\phi)$

$\Gamma(\gamma f_1(1510) \rightarrow \gamma\eta\pi^+\pi^-)/\Gamma_{total}$ — Γ_{269}/Γ

NODE=M070S36
NODE=M070S36

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
4.5±1.0±0.7	BAI	99	BES	$J/\psi \rightarrow \gamma\eta\pi^+\pi^-$

$\Gamma(\gamma f'_2(1525))/\Gamma_{total}$ — Γ_{270}/Γ

NODE=M070R87
NODE=M070R87

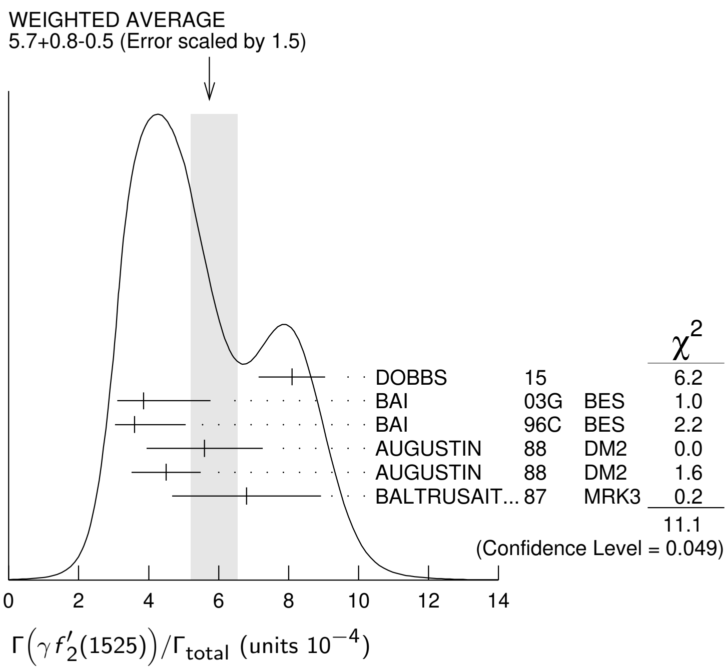
VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT	
5.7 $^{+0.8}_{-0.5}$ OUR AVERAGE Error includes scale factor of 1.5. See the ideogram below.							
8.1 ±0.9 ±0.2		750	[1,2] DOBBS	15		$J/\psi \rightarrow \gamma K\overline{K}$	
3.85±0.17$^{+1.91}_{-0.73}$			[3] BAI	03G	BES	$J/\psi \rightarrow \gamma K\overline{K}$	
3.6 ±0.4 $^{+1.4}_{-0.4}$			[3] BAI	96C	BES	$J/\psi \rightarrow \gamma K^+K^-$	
5.6 ±1.4 ±0.9			[3] AUGUSTIN	88	DM2	$J/\psi \rightarrow \gamma K^+K^-$	OCCUR=3
4.5 ±0.4 ±0.9			[3] AUGUSTIN	88	DM2	$J/\psi \rightarrow \gamma K^0_S K^0_S$	OCCUR=4
6.8 ±1.6 ±1.4			[3] BALTRUSAIT...	87	MRK3	$J/\psi \rightarrow \gamma K^+K^-$	OCCUR=2
• • • We do not use the following data for averages, fits, limits, etc. • • •							
<3.4	90	4	[4] BRANDELIK	79C	DASP	$e^+e^- \rightarrow \pi^+\pi^-\gamma$	
<2.3	90	3	ALEXANDER	78	PLUT	$e^+e^- \rightarrow K^+K^-\gamma$	

[1] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M070R87;LINKAGE=B

[2] DOBBS 15 reports $[\Gamma(J/\psi(1S) \rightarrow \gamma f'_2(1525))/\Gamma_{total}] \times [B(f'_2(1525) \rightarrow K\overline{K})] = (7.09 \pm 0.46 \pm 0.67) \times 10^{-4}$ which we divide by our best value $B(f'_2(1525) \rightarrow K\overline{K}) = (87.6 \pm 2.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070R87;LINKAGE=DO

[3] Using $B(f'_2(1525) \rightarrow K\overline{K}) = 0.888$. NODE=M070R87;LINKAGE=A1

[4] Assuming isotropic production and decay of the $f'_2(1525)$ and isospin. NODE=M070R87;LINKAGE=I



$\Gamma(\gamma f'_2(1525) \rightarrow \gamma K^0_S K^0_S)/\Gamma_{total}$ — Γ_{271}/Γ

NODE=M070P69
NODE=M070P69

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
7.99$^{+0.03}_{-0.04}$$^{+0.69}_{-0.50}$	ABLIKIM	18AA	BES3	$J/\psi \rightarrow \gamma K^0_S K^0_S$

$\Gamma(\gamma f'_2(1525) \rightarrow \gamma\eta\eta)/\Gamma_{total}$ — Γ_{272}/Γ

NODE=M070S86
NODE=M070S86

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
3.42$^{+0.43}_{-0.51}$$^{+1.37}_{-1.30}$	5.5k	[1] ABLIKIM	13N	BES3	$J/\psi \rightarrow \gamma\eta\eta$

[1] From partial wave analysis including all possible combinations of 0^{++}, 2^{++}, and 4^{++} resonances. NODE=M070S86;LINKAGE=A

$\Gamma(\gamma f_2(1640) \rightarrow \gamma\omega\omega)/\Gamma_{total}$ — Γ_{273}/Γ

NODE=M070R02
NODE=M070R02

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.28±0.05±0.17	141	ABLIKIM	06H	BES	$J/\psi \rightarrow \gamma\omega\omega$

$\Gamma(\gamma f_0(1710) \to \gamma\pi\pi)/\Gamma_{total}$ Γ_{274}/Γ

NODE=M070B01
NODE=M070B01

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.8 ±0.5 OUR AVERAGE					
3.72±0.30±0.43	483	[1] DOBBS	15		$J/\psi \to \gamma\pi\pi$
3.96±0.06±1.12		[2] ABLIKIM	06V	BES2	$e^+e^- \to J/\psi \to \gamma\pi^+\pi^-$
3.99±0.15±2.64		[2] ABLIKIM	06V	BES2	$e^+e^- \to J/\psi \to \gamma\pi^0\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.6 ±0.2		[3] SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma(\pi\pi, K\overline{K}, \eta\eta, \omega\phi)$
2.5 ±1.6 ±0.8		BAI	98H	BES	$J/\psi \to \gamma\pi^0\pi^0$

OCCUR=2

[1] Using CLEO-c data but not authored by the CLEO Collaboration.
[2] Including unknown branching fraction to $\pi\pi$.
[3] There is a further (2.4 ± 0.8) × 10^{-4} scalar contribution at 1765 MeV.

NODE=M070B01;LINKAGE=A
NODE=M070B01;LINKAGE=AB
NODE=M070B01;LINKAGE=B

$\Gamma(\gamma f_0(1710) \to \gamma K\overline{K})/\Gamma_{total}$ Γ_{275}/Γ

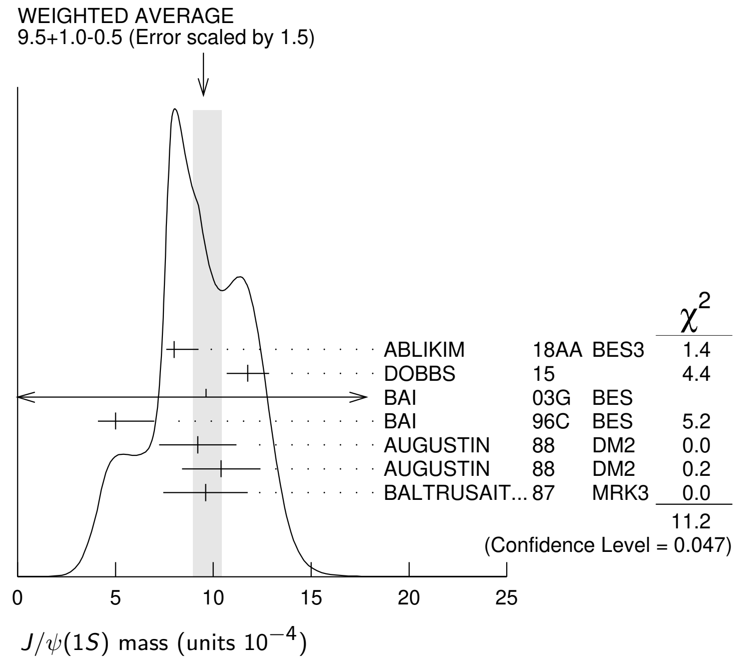
NODE=M070R91
NODE=M070R91

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$9.5^{+1.0}_{-0.5}$ OUR AVERAGE Error includes scale factor of 1.5. See the ideogram below.						
$8.00^{+0.12}_{-0.08}{}^{+1.24}_{-0.40}$			[1] ABLIKIM	18AA	BES3	$J/\psi \to \gamma K^0_S K^0_S$
11.76± 0.54±0.94		1.2k	[2] DOBBS	15		$J/\psi \to \gamma K\overline{K}$
$9.62\pm029^{+3.51}_{-1.86}$			[3] BAI	03G	BES	$J/\psi \to \gamma K\overline{K}$
$5.0 \pm 0.8^{+1.8}_{-0.4}$			[1,4] BAI	96C	BES	$J/\psi \to \gamma K^+K^-$
9.2 ± 1.4 ±1.4			[1] AUGUSTIN	88	DM2	$J/\psi \to \gamma K^+K^-$
10.4 ± 1.2 ±1.6			[1] AUGUSTIN	88	DM2	$J/\psi \to \gamma K^0_S K^0_S$
9.6 ± 1.2 ±1.8			[1] BALTRUSAIT...	87	MRK3	$J/\psi \to \gamma K^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
2.3 ± 0.8			[5] SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma(\pi\pi, K\overline{K}, \eta\eta, \omega\phi)$
$1.6 \pm 0.2^{+0.6}_{-0.2}$			[1,6] BAI	96C	BES	$J/\psi \to \gamma K^+K^-$
< 0.8	90		[7] BISELLO	89B		$J/\psi \to 4\pi\gamma$
1.6 ± 0.4 ±0.3			[8] BALTRUSAIT...	87	MRK3	$J/\psi \to \gamma\pi^+\pi^-$
3.8 ± 1.6			[9] EDWARDS	82D	CBAL	$e^+e^- \to \eta\eta\gamma$

OCCUR=2
OCCUR=2
OCCUR=2

[1] Includes unknown branching fraction to K^+K^- or $K^0_S K^0_S$. We have multiplied K^+K^- measurement by 2, and $K^0_S K^0_S$ by 4 to obtain $K\overline{K}$ result.
[2] Using CLEO-c data but not authored by the CLEO Collaboration.
[3] Includes unknown branching ratio to K^+K^- or $K^0_S K^0_S$.
[4] Assuming $J^P = 2^+$ for $f_0(1710)$.
[5] There is a further (6 ± 2) × 10^{-4} scalar contribution at 1765 MeV.
[6] Assuming $J^P = 0^+$ for $f_0(1710)$.
[7] Includes unknown branching fraction to $\rho^0\rho^0$.
[8] Includes unknown branching fraction to $\pi^+\pi^-$.
[9] Includes unknown branching fraction to $\eta\eta$.

NODE=M070R91;LINKAGE=B
NODE=M070R91;LINKAGE=D
NODE=M070R91;LINKAGE=K9
NODE=M070R91;LINKAGE=A1
NODE=M070R91;LINKAGE=E
NODE=M070R91;LINKAGE=A2
NODE=M070R91;LINKAGE=C
NODE=M070R91;LINKAGE=Z
NODE=M070R91;LINKAGE=A



$\Gamma(\gamma f_0(1710) \to \gamma\omega\omega)/\Gamma_{total}$ — Γ_{276}/Γ

NODE=M070R01

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.31±0.06±0.08	180	ABLIKIM	06H	BES	$J/\psi \to \gamma\omega\omega$

$\Gamma(\gamma f_0(1710) \to \gamma\eta\eta)/\Gamma_{total}$ — Γ_{277}/Γ

NODE=M070S84

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{2.35^{+0.13}_{-0.11}{}^{+1.24}_{-0.74}}$	5.5k	[1] ABLIKIM	13N	BES3	$J/\psi \to \gamma\eta\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.2 ±0.4		[2] SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma\,(\pi\pi, K\overline{K}, \eta\eta, \omega\phi)$

[1] From partial wave analysis including all possible combinations of 0^{++}, 2^{++}, and 4^{++} resonances.

[2] There is a further $(0.7 \pm 0.1) \times 10^{-4}$ scalar contribution at 1765 MeV.

NODE=M070S84;LINKAGE=A
NODE=M070S84;LINKAGE=B

$\Gamma(\gamma f_0(1710) \to \gamma\eta\eta')/\Gamma_{total}$ — Γ_{278}/Γ

NODE=M070Q00

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
6.5±2.5	[1] SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma(\pi\pi, K\overline{K}, \eta\eta, \omega\phi)$

[1] There is a further $(2.5 \pm 1.1) \times 10^{-5}$ scalar contribution at 1765 MeV.

NODE=M070Q00;LINKAGE=A

$\Gamma(\gamma f_0(1710) \to \gamma\omega\phi)/\Gamma_{total}$ — Γ_{279}/Γ

NODE=M070S79

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.5 ±0.6 OUR AVERAGE					
$2.00\pm0.08^{+1.38}_{-1.64}$	1.3k	ABLIKIM	13J	BES3	$J/\psi \to \gamma\omega\phi$
2.61±0.27±0.65	95	ABLIKIM	06J	BES2	$J/\psi \to \gamma\omega\phi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.1 ±0.1		[1] SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma\,(\pi\pi, K\overline{K}, \eta\eta, \omega\phi)$

[1] There is a further $(2.2 \pm 0.4) \times 10^{-4}$ scalar contribution at 1765 MeV.

NODE=M070S79;LINKAGE=A

$\Gamma(\gamma f_0(1750) \to \gamma K^0_S K^0_S)/\Gamma_{total}$ — Γ_{280}/Γ

NODE=M070P65

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
$\mathbf{1.11\pm0.06^{+0.19}_{-0.32}}$	ABLIKIM	18AA	BES3	$J/\psi \to \gamma K^0_S K^0_S$

$\Gamma(\gamma f_2(1810) \to \gamma\eta\eta)/\Gamma_{total}$ — Γ_{281}/Γ

NODE=M070S87

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		COMMENT
$\mathbf{5.40^{+0.60}_{-0.67}{}^{+3.42}_{-2.35}}$	5.5k	[1] ABLIKIM	13N	$J/\psi \to \gamma\eta\eta$

[1] From partial wave analysis including all possible combinations of 0^{++}, 2^{++}, and 4^{++} resonances.

NODE=M070S87;LINKAGE=A

$\Gamma(\gamma f_2(1910) \to \gamma\omega\omega)/\Gamma_{total}$ — Γ_{282}/Γ

NODE=M070R03

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.20±0.04±0.13	151	ABLIKIM	06H	BES	$J/\psi \to \gamma\omega\omega$

$\Gamma(\gamma f_2(1950) \to \gamma K^*(892)\overline{K}^*(892))/\Gamma_{total}$ — Γ_{283}/Γ

NODE=M070B06

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.7±0.1±0.2	BAI	00B	BES	$J/\psi \to \gamma K^+ K^0 \pi^+ \pi^-$

$\Gamma(\gamma f_0(2020) \to \gamma\pi\pi)/\Gamma_{total}$ — Γ_{284}/Γ

NODE=M070Q01

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
42±10	SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma(\pi\pi, K\overline{K}, \eta\eta, \omega\phi)$

$\Gamma(\gamma f_0(2020) \to \gamma K\overline{K})/\Gamma_{total}$ — Γ_{285}/Γ

NODE=M070Q02

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
55±25	SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma(\pi\pi, K\overline{K}, \eta\eta, \omega\phi)$

$\Gamma(\gamma f_0(2020) \to \gamma\eta\eta)/\Gamma_{total}$ — Γ_{286}/Γ

NODE=M070Q03

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
10±10	SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma(\pi\pi, K\overline{K}, \eta\eta, \omega\phi)$

$\Gamma(\gamma f_4(2050))/\Gamma_{total}$ — Γ_{287}/Γ

NODE=M070S7

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
2.7±0.5±0.5	[1] BALTRUSAIT...	87	MRK3	$J/\psi \to \gamma\pi^+\pi^-$

[1] Assuming branching fraction $f_4(2050) \to \pi\pi/$ total = 0.167.

NODE=M070S7;LINKAGE=V

$\Gamma(\gamma f_0(2100) \to \gamma\eta\eta)/\Gamma_{total}$ — Γ_{288}/Γ

NODE=M070S85

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{1.13^{+0.09}_{-0.10}{}^{+0.64}_{-0.28}}$	5.5k	[1] ABLIKIM	13N	BES3	$J/\psi \to \gamma\eta\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.8 ±1.5		SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma(\pi\pi, K\overline{K}, \eta\eta, \omega\phi)$

[1] From partial wave analysis including all possible combinations of 0^{++}, 2^{++}, and 4^{++} resonances.

NODE=M070S85;LINKAGE=A

$\Gamma(\gamma f_0(2100) \to \gamma\pi\pi)/\Gamma_{total}$ — Γ_{290}/Γ

NODE=M070B08

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
6.24±0.48±0.87	744	[1] DOBBS	15		$J/\psi \to \gamma\pi\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.0 ±0.8		SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma(\pi\pi, K\overline{K}, \eta\eta, \omega\phi)$

[1] Using CLEO-c data but not authored by the CLEO Collaboration.

NODE=M070B08;LINKAGE=A

$\Gamma(\gamma f_0(2100) \to \gamma K\overline{K})/\Gamma_{total}$ — Γ_{289}/Γ

NODE=M070Q04

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
32±20	SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma(\pi\pi, K\overline{K}, \eta\eta, \omega\phi)$

$\Gamma(\gamma f_0(2200))/\Gamma_{total}$ — Γ_{291}/Γ

NODE=M070S18

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.5	[1] AUGUSTIN	88	DM2	$J/\psi \to \gamma K^0_S K^0_S$

[1] Includes unknown branching fraction to $K^0_S K^0_S$.

NODE=M070S18;LINKAGE=A

$\Gamma(\gamma f_0(2200) \to \gamma\pi\pi)/\Gamma_{total}$ — Γ_{294}/Γ

NODE=M070Q05

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
5±2	SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma(\pi\pi, K\overline{K}, \eta\eta, \omega\phi)$

$\Gamma(\gamma f_0(2200) \to \gamma K\overline{K})/\Gamma_{total}$ — Γ_{292}/Γ

NODE=M070B09

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
5.86±0.49±1.20	490	[1] DOBBS	15		$J/\psi \to \gamma K\overline{K}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.5 ±0.5		SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma(\pi\pi, K\overline{K}, \eta\eta, \omega\phi)$

[1] Using CLEO-c data but not authored by the CLEO Collaboration.

NODE=M070B09;LINKAGE=A

$\Gamma(\gamma f_0(2200) \to \gamma K^0_S K^0_S)/\Gamma_{total}$ — Γ_{293}/Γ

NODE=M070P66

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
$2.72^{+0.08}_{-0.06}{}^{+0.17}_{-0.47}$	ABLIKIM	18AA	BES3	$J/\psi \to \gamma K^0_S K^0_S$

$\Gamma(\gamma f_0(2200) \to \gamma\eta\eta)/\Gamma_{total}$ — Γ_{295}/Γ

NODE=M070Q06

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.7±0.4	SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma(\pi\pi, K\overline{K}, \eta\eta, \omega\phi)$

$\Gamma(\gamma f_J(2220))/\Gamma_{total}$ — Γ_{296}/Γ

NODE=M070R92

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
>300			[1] BAI	96B	BES	$e^+e^- \to \gamma\overline{p}p, K\overline{K}$
>250	99.9		[2] HASAN	96	SPEC	$\overline{p}p \to \pi^+\pi^-$
< 2.3	95		[3] AUGUSTIN	88	DM2	$J/\psi \to \gamma K^+K^-$
< 1.6	95		[3] AUGUSTIN	88	DM2	$J/\psi \to \gamma K^0_S K^0_S$
$12.4^{+6.4}_{-5.2}\pm2.8$		23	[3] BALTRUSAIT...	86D	MRK3	$J/\psi \to \gamma K^0_S K^0_S$
$8.4^{+3.4}_{-2.8}\pm1.6$		93	[3] BALTRUSAIT...	86D	MRK3	$J/\psi \to \gamma K^+K^-$

OCCUR=2

OCCUR=2

[1] Using BARNES 93.
[2] Using BAI 96B.
[3] Includes unknown branching fraction to K^+K^- or $K^0_S K^0_S$.

NODE=M070R92;LINKAGE=A
NODE=M070R92;LINKAGE=M
NODE=M070R92;LINKAGE=W

$\Gamma(\gamma f_J(2220) \to \gamma\pi\pi)/\Gamma_{total}$ — Γ_{297}/Γ

NODE=M070B02

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
< 3.9	90	[1,2] DOBBS	15		$J/\psi \to \gamma\pi\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
14 ±8 ±4		BAI	98H	BES	$J/\psi \to \gamma\pi^0\pi^0$
8.4±2.6±3.0		BAI	96B	BES	$e^+e^- \to J/\psi \to \gamma\pi^+\pi^-$

[1] Using CLEO-c data but not authored by the CLEO Collaboration.
[2] For $\Gamma = 20/50$ MeV, the 90% CL upper limits for $\pi^+\pi^-$ and $\pi^0\pi^0$ are $2.6/5.2 \times 10^{-5}$ and $1.3/1.9 \times 10^{-5}$, respectively.

NODE=M070B02;LINKAGE=A
NODE=M070B02;LINKAGE=DO

$\Gamma(\gamma f_J(2220) \to \gamma K\overline{K})/\Gamma_{total}$ — Γ_{298}/Γ

NODE=M070B03

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
< 4.1	90	[1,2] DOBBS	15		$J/\psi \to \gamma K\overline{K}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 3.6		[3] DEL-AMO-SA...	10O	BABR	$e^+e^- \to J/\psi \to \gamma K^+K^-$
< 2.9		[3] DEL-AMO-SA...	10O	BABR	$e^+e^- \to J/\psi \to \gamma K^0_S K^0_S$
6.6±2.9±2.4		BAI	96B	BES	$e^+e^- \to J/\psi \to \gamma K^+K^-$
10.8±4.0±3.2		BAI	96B	BES	$e^+e^- \to J/\psi \to \gamma K^0_S K^0_S$

OCCUR=2

OCCUR=2

[1] Using CLEO-c data but not authored by the CLEO Collaboration.
[2] For $\Gamma = 20/50$ MeV, the 90% CL upper limits for K^+K^- and $K^0_S K^0_S$ are $1.7/3.1 \times 10^{-5}$ and $1.2/2.0 \times 10^{-5}$, respectively.
[3] For spin 2 and helicity 0; other combinations lead to more stringent upper limits.

NODE=M070B03;LINKAGE=A
NODE=M070B03;LINKAGE=DO
NODE=M070B03;LINKAGE=DE

$\Gamma(\gamma f_J(2220) \to \gamma p\overline{p})/\Gamma_{total}$ — Γ_{299}/Γ

NODE=M070B04

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
1.5±0.6±0.5	BAI	96B	BES	$e^+e^- \to J/\psi \to \gamma p\overline{p}$

$\Gamma(\gamma f_0(2330) \to \gamma K^0_S K^0_S)/\Gamma_{total}$ — Γ_{300}/Γ

NODE=M070P67

VALUE (units 10^{-5})	*DOCUMENT ID*		*TECN*	*COMMENT*
$4.95\pm0.21^{+0.66}_{-0.72}$	ABLIKIM	18AA	BES3	$J/\psi \to \gamma K^0_S K^0_S$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.6 ± 0.1	SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma (\pi\pi, K\overline{K}, \eta\eta, \omega\phi)$

$\Gamma(\gamma f_0(2330) \to \gamma\pi\pi)/\Gamma_{total}$ — Γ_{301}/Γ

NODE=M070Q07

VALUE (units 10^{-5})	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
4 ± 2	SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma(\pi\pi, K\overline{K}, \eta\eta, \omega\phi)$

$\Gamma(\gamma f_0(2330) \to \gamma\eta\eta)/\Gamma_{total}$ — Γ_{302}/Γ

NODE=M070Q08

VALUE (units 10^{-5})	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.5 ± 0.4	SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma(\pi\pi, K\overline{K}, \eta\eta, \omega\phi)$

$\Gamma(\gamma f_2(2340) \to \gamma\eta\eta)/\Gamma_{total}$ — Γ_{303}/Γ

NODE=M070S88

VALUE (units 10^{-5})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
$5.60^{+0.62}_{-0.65}{}^{+2.37}_{-2.07}$	5.5k	[1] ABLIKIM	13N	BES3	$J/\psi \to \gamma\eta\eta$

[1] From partial wave analysis including all possible combinations of 0^{++}, 2^{++}, and 4^{++} resonances.

NODE=M070S88;LINKAGE=A

$\Gamma(\gamma f_2(2340) \to \gamma K^0_S K^0_S)/\Gamma_{total}$ — Γ_{304}/Γ

NODE=M070P70

VALUE (units 10^{-5})	*DOCUMENT ID*		*TECN*	*COMMENT*
$5.54^{+0.34}_{-0.40}{}^{+3.82}_{-1.49}$	ABLIKIM	18AA	BES3	$J/\psi \to \gamma K^0_S K^0_S$

$\Gamma(\gamma X(1835) \to \gamma\pi^+\pi^-\eta')/\Gamma_{total}$ — Γ_{305}/Γ

NODE=M070R78

VALUE (units 10^{-4})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
$2.7^{+0.6}_{-0.8}$ OUR AVERAGE Error includes scale factor of 1.6.					
$3.93\pm0.38^{+0.31}_{-0.84}$		[1] ABLIKIM	16J	BES3	$J/\psi \to \gamma\pi^+\pi^-\eta'$
$2.2 \pm0.4 \pm0.4$	264	ABLIKIM	05R	BES2	$J/\psi \to \gamma\pi^+\pi^-\eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$2.87\pm0.09^{+0.49}_{-0.52}$	4265	[2] ABLIKIM	11C	BES3	$J/\psi \to \gamma\pi^+\pi^-\eta'$

[1] From a fit of the measured $\pi^+\pi^-\eta'$ lineshape that accounts for the abrupt distortion observed at the $p\overline{p}$ threshold with a Flatte formula in addition to known backgrounds and contributors, as well as an *ad hoc* Breit-Wigner (M $\approx$ 1919 MeV; $\Gamma \approx$ 51 MeV) that is required for a good fit. Another explanation for the distortion provided by ABLIKIM 16J is that a second resonance near 1870 MeV interferes with the $X(1835)$; fits to this possibility yield product branching fraction values compatible with that shown within the respective systematic uncertainties.

NODE=M070R78;LINKAGE=A

[2] From a fit of the $\pi^+\pi^-\eta'$ mass distribution to a combination of $\gamma f_1(1510)$, $\gamma X(1835)$, and two states $\gamma X(2120)$ and $\gamma X(2370)$, for $M(\pi^+\pi^-\eta') < 2.8$ GeV,and accounting for backgrounds from non-η' events and $J/\psi \to \pi^0\pi^+\pi^-\eta'$.

NODE=M070R78;LINKAGE=AI

$\Gamma(\gamma X(1835) \to \gamma p\overline{p})/\Gamma_{total}$ — Γ_{306}/Γ

NODE=M070S71

VALUE (units 10^{-4})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
$0.77^{+0.15}_{-0.09}$ OUR AVERAGE					
$0.90^{+0.04}_{-0.11}{}^{+0.27}_{-0.55}$		[1] ABLIKIM	12D	BES3	$J/\psi \to \gamma p\overline{p}$
$1.14^{+0.43}_{-0.30}{}^{+0.42}_{-0.26}$	231	[2] ALEXANDER	10	CLEO	$J/\psi \to \gamma p\overline{p}$
$0.70\pm0.04^{+0.19}_{-0.08}$		BAI	03F	BES2	$J/\psi \to \gamma p\overline{p}$

[1] From the fit including final state interaction effects in isospin 0 *S*-wave according to SIBIRTSEV 05A.

NODE=M070S71;LINKAGE=AK

[2] From a fit of the $p\overline{p}$ mass distribution to a combination of $\gamma X(1835)$, γR with $M(R)$ = 2100 MeV and $\Gamma(R)$ = 160 MeV, and $\gamma p\overline{p}$ phase space, for $M(p\overline{p}) < 2.85$ GeV.

NODE=M070S71;LINKAGE=AL

$\Gamma(\gamma X(1835) \to \gamma K^0_S K^0_S \eta)/\Gamma_{total}$ Γ_{307}/Γ

NODE=M070S96

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
$3.31^{+0.33}_{-0.30}{}^{+1.96}_{-1.29}$	ABLIKIM	15T	BES3	$J/\psi \to \gamma K^0_S K^0_S \eta$

$\Gamma(\gamma X(1835) \to \gamma\gamma\phi(1020))/\Gamma_{total}$ Γ_{308}/Γ

NODE=M070P37

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1.77\pm0.35\pm0.25$	305	[1] ABLIKIM	18I	BES3	$J/\psi \to \gamma\gamma\phi(1020)$
$8.09\pm1.99\pm1.36$	1.3k	[2] ABLIKIM	18I	BES3	$J/\psi \to \gamma\gamma\phi(1020)$

OCCUR=2

[1] Constructive interference between the $X(1835)$ and $\eta(1405)/\eta(1475)$ is assumed in a fit to the $\gamma\phi$ invariant mass. NODE=M070P37;LINKAGE=A

[2] Destructive interference between the $X(1835)$ and $\eta(1405)/\eta(1475)$ is assumed in a fit to the $\gamma\phi$ invariant mass. NODE=M070P37;LINKAGE=B

$\Gamma(\gamma X(1835) \to \gamma\gamma\gamma)/\Gamma_{total}$ Γ_{309}/Γ

NODE=M070P41

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<3.56 \times 10^{-6}$	90	ABLIKIM	18O	BES3	$\psi(2S) \to \pi^+\pi^-\gamma\gamma\gamma$

$\Gamma(\gamma X(1835) \to \gamma 3(\pi^+\pi^-))/\Gamma_{total}$ Γ_{310}/Γ

NODE=M070S82

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$2.44\pm0.36^{+0.60}_{-0.74}$	0.6k	ABLIKIM	13U	BES3	$J/\psi \to \gamma 3(\pi^+\pi^-)$

$\Gamma(\gamma X(2370) \to \gamma K^+ K^- \eta')/\Gamma_{total}$ Γ_{311}/Γ

NODE=M070P86

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
$1.79\pm0.23\pm0.65$	ABLIKIM	20Q	BES3	$J/\psi \to \gamma K^+ K^- \eta'$

$\Gamma(\gamma X(2370) \to \gamma K^0_S K^0_S \eta')/\Gamma_{total}$ Γ_{312}/Γ

NODE=M070P87

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
$1.18\pm0.32\pm0.39$	ABLIKIM	20Q	BES3	$J/\psi \to \gamma K^0_S K^0_S \eta'$

$\Gamma(\gamma X(2370) \to \gamma\eta\eta\eta')/\Gamma_{total}$ Γ_{313}/Γ

NODE=M070P88

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<9.2	90	ABLIKIM	21C	BES3	$J/\psi(1S) \to \gamma\eta\eta\eta'$

$\Gamma(\gamma p\overline{p})/\Gamma_{total}$ Γ_{314}/Γ

NODE=M070R90

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$0.38\pm0.07\pm0.07$		49	EATON	84	MRK2	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.11	90		PERUZZI	78	MRK1	e^+e^-

$\Gamma(\gamma p\overline{p}\pi^+\pi^-)/\Gamma_{total}$ Γ_{315}/Γ

NODE=M070R93

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<0.79 \times 10^{-3}$	90	EATON	84	MRK2	e^+e^-

$\Gamma(\gamma\Lambda\overline{\Lambda})/\Gamma_{total}$ Γ_{316}/Γ

NODE=M070S8

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<0.13 \times 10^{-3}$	90	HENRARD	87	DM2	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<0.16 \times 10^{-3}$	90	BAI	98G	BES	e^+e^-

$\Gamma(\gamma A \to \gamma \text{invisible})/\Gamma_{total}$ Γ_{317}/Γ

NODE=M070S68

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$<1.7 \times 10^{-6}$	90	88M	[1] ABLIKIM	20K	BES3	$\psi(2S) \to J/\psi\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$<6.3 \times 10^{-6}$	90	3.7M	[2] INSLER	10	CLEO	$\psi(2S) \to J/\psi\pi^+\pi^-$

[1] For a narrow state A with mass $m_A < 1.2$ GeV. The limit varies with m_A, reaching its largest value of 1.7×10^{-6} at 1.2 GeV and being 7.0×10^{-7} for $m_A = 0$. NODE=M070S68;LINKAGE=A

[2] The limit varies with mass m_A of a narrow state A and is 4.3×10^{-6} for $m_A = 0$,reaches its largest value of 6.3×10^{-6} at $m_A = 500$ MeV, and is 3.6×10^{-6} at $m_A = 960$ MeV. NODE=M070S68;LINKAGE=IN

$\Gamma(\gamma A^0 \to \gamma \mu^+ \mu^-)/\Gamma_{total}$ — Γ_{318}/Γ

(narrow state A^0 with 0.2 GeV $< m_{A^0} <$ 3 GeV)

NODE=M070S76
NODE=M070S76

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<0.5 \times 10^{-5}$	90	[1] ABLIKIM	16E	BES3	$J/\psi \to \gamma \mu^+ \mu^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<2.1 \times 10^{-5}$	90	[2] ABLIKIM	12	BES3	$J/\psi \to \gamma \mu^+ \mu^-$

[1] For a narrow scalar or pseudoscalar, A^0, with a mass in the range 0.212–3 GeV. The measured 90% CL limit as a function of m_{A^0} is in the range $(2.8–495.3) \times 10^{-8}$. NODE=M070S76;LINKAGE=A

[2] For a narrow scalar or pseudoscalar, A^0, with a mass in the range 0.21–3.00 GeV. The measured 90% CL limit as a function of m_{A^0} ranges from 4×10^{-7} to 2.1×10^{-5}. NODE=M070S76;LINKAGE=AB

DALITZ DECAYS

NODE=M070330

$\Gamma(\pi^0 e^+ e^-)/\Gamma_{total}$ — Γ_{319}/Γ

NODE=M070S89
NODE=M070S89

VALUE (units 10^{-7})	EVTS	DOCUMENT ID		TECN	COMMENT
7.56±1.32±0.50	39	ABLIKIM	14I	BES3	$J/\psi \to \pi^0 e^+ e^-$

$\Gamma(\eta e^+ e^-)/\Gamma_{total}$ — Γ_{320}/Γ

NODE=M070S90
NODE=M070S90

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
1.42±0.08 OUR AVERAGE [$(1.43 \pm 0.07) \times 10^{-5}$ OUR 2021 AVERAGE] NEW					
1.42±0.04±0.07	2.47k	[1,2] ABLIKIM	19A	BES3	$J/\psi \to \eta e^+ e^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.16±0.07±0.06	320	[1] ABLIKIM	14I	BES3	$J/\psi \to \eta e^+ e^-$

[1] Using both $\eta \to \gamma\gamma$ and $\eta \to \pi^+ \pi^- \pi^0$ decays. NODE=M070S90;LINKAGE=A

[2] Approximation of the transition form factor squared as an incoherent sum of the ρ-meson and one-pole non-resonant amplitudes gives the pole mass m(Λ) = 2.56 ± 0.04 ± 0.03 GeV. Supersedes ABLIKIM 14I. NODE=M070S90;LINKAGE=C

$\Gamma(\eta'(958) e^+ e^-)/\Gamma_{total}$ — Γ_{321}/Γ

NODE=M070S91
NODE=M070S91

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
6.59±0.07±0.17	8.9k	[1] ABLIKIM	19H	BES3	$J/\psi \to \eta'(958) e^+ e^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
5.81±0.16±0.31	1.4k	[1,2] ABLIKIM	14I	BES3	$J/\psi \to \eta'(958) e^+ e^-$

[1] Using both $\eta' \to \gamma \pi^+ \pi^-$ and $\eta' \to \pi^+ \pi^- \eta$ decays. NODE=M070S91;LINKAGE=A

[2] Superseded by ABLIKIM 19H. NODE=M070S91;LINKAGE=B

$\Gamma(\eta U \to \eta e^+ e^-)/\Gamma_{total}$ — Γ_{322}/Γ

NODE=M070P42
NODE=M070P42

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<9.11 \times 10^{-7}$	90	[1] ABLIKIM	19A	BES3	$J/\psi \to \eta e^+ e^-$

[1] For a dark photon U with mass between 10 and 2400 MeV. Obtained 90% C.L. limits as a function of m_U range from 1.9×10^{-8} to 91.1×10^{-8}. NODE=M070P42;LINKAGE=A

$\Gamma(\eta'(958) U \to \eta'(958) e^+ e^-)/\Gamma_{total}$ — Γ_{323}/Γ

NODE=M070P61
NODE=M070P61

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.0 \times 10^{-7}$	90	[1] ABLIKIM	19H	BES3	$J/\psi \to \eta'(958) e^+ e^-$

[1] For a dark photon U with mass between 100 and 2100 MeV. Obtained 90% C.L. limits as a function of m_U range from 1.8×10^{-8} to 2.0×10^{-7}. The corresponding limits on the branching fraction $J/\psi \to \eta' U$ range from 5.7×10^{-8} to 7.4×10^{-7}. NODE=M070P61;LINKAGE=A

$\Gamma(\phi e^+ e^-)/\Gamma_{total}$ — Γ_{324}/Γ

NODE=M070P82
NODE=M070P82

VALUE (units 10^{-7})	CL%	DOCUMENT ID		TECN	COMMENT
<1.2	90	[1] ABLIKIM	19AB	BES3	$J/\psi \to \phi e^+ e^-$

[1] Using B($\phi \to K^+ K^-$) = (48.9 ± 0.5)% and B($\psi(2S) \to \pi^+ \pi^- J/\psi$) = (34.49 ± 0.30)%. NODE=M070P82;LINKAGE=A

WEAK DECAYS

NODE=M070320

$\Gamma(D^- e^+ \nu_e + c.c.)/\Gamma_{total}$ — Γ_{325}/Γ

NODE=M070S53
NODE=M070S53

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<7.1 \times 10^{-8}$ (CL = 90%) [$<1.2 \times 10^{-5}$ (CL = 90%) OUR 2021 BEST LIMIT]					
$<7.1 \times 10^{-8}$	90	ABLIKIM	21Q	BES3	$e^+ e^- \to J/\psi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<1.2 \times 10^{-5}$	90	ABLIKIM	06M	BES2	$e^+ e^- \to J/\psi$

$\Gamma(\overline{D}^0 e^+ e^- + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_{326}/Γ

NODE=M070S54

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<8.5 × 10⁻⁸	90	[1] ABLIKIM 17AF	BES3	$e^+ e^- \to J/\psi$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$<1.1 \times 10^{-5}$	90	ABLIKIM 06M	BES2	$e^+ e^- \to J/\psi$

[1] Using D^0 decays to $K^- \pi^+$, $K^- \pi^+ \pi^0$, and $K^- \pi^+ \pi^+ \pi^-$.

NODE=M070S54;LINKAGE=A

$\Gamma(D_s^- e^+ \nu_e + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_{327}/Γ

NODE=M070S55

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<1.3 × 10⁻⁶	90	ABLIKIM 14R	BES3	$e^+ e^- \to J/\psi$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$<3.6 \times 10^{-5}$	90	[1] ABLIKIM 06M	BES2	$e^+ e^- \to J/\psi$

[1] Using $B(D_s^- \to \phi\pi^-) = 4.4 \pm 0.5$ %.

NODE=M070S55;LINKAGE=AB

$\Gamma(D_s^{*-} e^+ \nu_e + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_{328}/Γ

NODE=M070B13

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<1.8 × 10⁻⁶	90	ABLIKIM 14R	BES3	$e^+ e^- \to J/\psi$

$\Gamma(D^- \pi^+ + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_{329}/Γ

NODE=M070S61

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<7.5 × 10⁻⁵	90	ABLIKIM 08J	BES2	$e^+ e^- \to J/\psi$

$\Gamma(\overline{D}^0 \overline{K}^0 + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_{330}/Γ

NODE=M070S62

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<1.7 × 10⁻⁴	90	ABLIKIM 08J	BES2	$e^+ e^- \to J/\psi$

$\Gamma(\overline{D}^0 \overline{K}^{*0} + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_{331}/Γ

NODE=M070S93

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<2.5 × 10⁻⁶	90	ABLIKIM 14K	BES3	$e^+ e^- \to J/\psi$

$\Gamma(D_s^- \pi^+ + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_{332}/Γ

NODE=M070S63

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<1.3 × 10⁻⁴	90	ABLIKIM 08J	BES2	$e^+ e^- \to J/\psi$

$\Gamma(D_s^- \rho^+ + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_{333}/Γ

NODE=M070S92

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<1.3 × 10⁻⁵	90	ABLIKIM 14K	BES3	$e^+ e^- \to J/\psi$

CHARGE CONJUGATION (*C*), PARITY (*P*), LEPTON FAMILY NUMBER (*LF*) VIOLATING MODES

NODE=M070315

$\Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — Γ_{334}/Γ

NODE=M070R80

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
< 2.7 × 10⁻⁷	90	ABLIKIM 14Q	BES3	$\psi(2S) \to \pi^+ \pi^- J/\psi$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$< 0.5 \times 10^{-5}$	90	ADAMS 08	CLEO	$\psi(2S) \to \pi^+ \pi^- J/\psi$
$< 1.6 \times 10^{-4}$	90	[1] WICHT 08	BELL	$B^\pm \to K^\pm \gamma\gamma$
$< 2.2 \times 10^{-5}$	90	ABLIKIM 07J	BES2	$\psi(2S) \to J/\psi \pi^+ \pi^-$
$<50 \times 10^{-5}$	90	BARTEL 77	CNTR	$e^+ e^-$

[1] WICHT 08 reports $[\Gamma(J/\psi(1S) \to \gamma\gamma)/\Gamma_{\text{total}}] \times [B(B^+ \to J/\psi(1S) K^+)] < 0.16 \times 10^{-6}$ which we divide by our best value $B(B^+ \to J/\psi(1S) K^+) = 1.020 \times 10^{-3}$.

NODE=M070R80;LINKAGE=WI

$\Gamma(\gamma\phi)/\Gamma_{\text{total}}$ — Γ_{335}/Γ

NODE=M070S95

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<1.4 × 10⁻⁶	90	ABLIKIM 14Q	BES3	$\psi(2S) \to \pi^+ \pi^- J/\psi$

$\Gamma(e^\pm \mu^\mp)/\Gamma_{\text{total}}$ — Γ_{336}/Γ

NODE=M070S39

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<1.6 × 10⁻⁷	90	ABLIKIM 13L	BES3	$e^+ e^- \to J/\psi$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$<1.1 \times 10^{-6}$	90	BAI 03D	BES	$e^+ e^- \to J/\psi$

$\Gamma(e^{\pm}\tau^{\mp})/\Gamma_{total}$ — Γ_{337}/Γ — NODE=M070S40

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<7.5 × 10^−8 (CL = 90%) [<8.3 × 10^−6 (CL = 90%) OUR 2021 BEST LIMIT]					
<7.5 × 10^−8	90	ABLIKIM	21M	BES3	$e^+e^- \rightarrow J/\psi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<8.3 × 10^−6	90	[1] ABLIKIM	04	BES	$e^+e^- \rightarrow J/\psi$

[1] Superseded by ABLIKIM 21M. NODE=M070S40;LINKAGE=A

$\Gamma(\mu^{\pm}\tau^{\mp})/\Gamma_{total}$ — Γ_{338}/Γ — NODE=M070S41

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<2.0 × 10^−6	90	ABLIKIM	04	BES	$e^+e^- \rightarrow J/\psi$

$\Gamma(\Lambda_c^+ e^- + \text{c.c.})/\Gamma_{total}$ — Γ_{339}/Γ — NODE=M070P74

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<6.9 × 10^−8	90	ABLIKIM	19AF	BES3	$e^+e^- \rightarrow J/\psi \rightarrow pK^-\pi^+e^-$ (+ c.c.)

OTHER DECAYS — NODE=M070325

$\Gamma(\text{invisible})/\Gamma(e^+e^-)$ — Γ_{340}/Γ_5 — NODE=M070S80

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<6.6 × 10^−2	90	LEES	13I	BABR	$B \rightarrow K^{(*)} J/\psi$

$\Gamma(\text{invisible})/\Gamma(\mu^+\mu^-)$ — Γ_{340}/Γ_7 — NODE=M070S60

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.2 × 10^−2	90	ABLIKIM	08G	BES2	$\psi(2S) \rightarrow \pi^+\pi^- J/\psi$

$J/\psi(1S)$ REFERENCES — NODE=M070

ABLIKIM	21AM	PR D104 092004	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61445
ABLIKIM	21AT	JHEP 2111 226	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61463
ABLIKIM	21C	PR D103 012009	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61030
ABLIKIM	21M	PR D103 112007	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61118
ABLIKIM	21Q	JHEP 2106 157	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61125
LEES	21	PR D103 092001	J.P. Lees *et al.*	(BABAR Collab.)	REFID=61113
LEES	21B	PR D104 112003	J.P. Lees *et al.*	(BABAR Collab.)	REFID=61450
LEES	21C	PR D104 112004	J.P. Lees *et al.*	(BABAR Collab.)	REFID=61451
SARANTSEV	21	PL B816 136227	A.V. Sarantsev *et al.*	(BONN, PNPI)	REFID=61091
ABLIKIM	20	PR D101 012004	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60048
ABLIKIM	20K	PR D101 112005	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60316
ABLIKIM	20Q	EPJ C80 746	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60457
ANASHIN	20	JHEP 2007 112	V. V. Anashin *et al.*	(KEDR Collab.)	REFID=60512
ABLIKIM	19A	PR D99 012006	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59517
Also		PR D104 099901 (errat.)	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61449
ABLIKIM	19AB	PR D99 052010	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59846
ABLIKIM	19AC	PR D99 071101	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59850
ABLIKIM	19AF	PR D99 072006	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59857
ABLIKIM	19AN	PR D99 112008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59890
ABLIKIM	19AQ	PR D100 032004	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59909
ABLIKIM	19H	PR D99 012013	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59604
ABLIKIM	19N	PR D99 032006	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59615
ABLIKIM	19Q	PL B791 375	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59747
ABLIKIM	19T	PRL 122 142002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59773
LU	19	PR D99 032003	P.-C. Lu *et al.*	(BELLE Collab.)	REFID=59614
ABLIKIM	18AA	PR D98 072003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59455
ABLIKIM	18AB	PR D98 072005	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59456
ABLIKIM	18D	PRL 121 022001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58849
ABLIKIM	18I	PR D97 051101	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58893
ABLIKIM	18O	PR D97 072014	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58925
ANASHIN	18A	JHEP 1805 119	V.V. Anashin *et al.*	(KEDR Collab.)	REFID=59102
LEES	18	PR D97 052007	J.P. Lees *et al.*	(BABAR Collab.)	REFID=58900
LEES	18E	PR D98 112015	J.P. Lees *et al.*	(BABAR Collab.)	REFID=59505
ABLIKIM	17AF	PR D96 111101	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58315
ABLIKIM	17AH	PR D96 112001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58317
ABLIKIM	17AK	PR D96 112012	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58324
ABLIKIM	17E	PL B770 217	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57903
ABLIKIM	17L	PR D95 052003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57967
LEES	17A	PR D95 052001	J.P. Lees *et al.*	(BABAR Collab.)	REFID=57966
LEES	17C	PR D95 072007	J.P. Lees *et al.*	(BABAR Collab.)	REFID=57981
LEES	17D	PR D95 092005	J.P. Lees *et al.*	(BABAR Collab.)	REFID=57990
ABLIKIM	16E	PR D93 052005	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57265
ABLIKIM	16J	PRL 117 042002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57454
ABLIKIM	16K	PR D93 052010	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57509
ABLIKIM	16L	PR D93 072003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57510
ABLIKIM	16M	PR D93 072008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57511
ABLIKIM	16N	PR D93 112011	M. Ablikim	(BESIII Collab.)	REFID=57512
ABLIKIM	16P	PR D94 072005	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57522
ABLIKIM	16Q	PL B761 98	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57566
PDG	16	CP C40 100001	C. Patrignani *et al.*	(PDG Collab.)	REFID=57140
AAIJ	15BI	EPJ C75 311	R. Aaij *et al.*	(LHCb Collab.)	REFID=57147
ABLIKIM	15AE	PR D92 052003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56984
ABLIKIM	15H	PR D91 052017	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56773
ABLIKIM	15K	PR D91 112001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56776
ABLIKIM	15P	PR D92 012007	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56781
ABLIKIM	15T	PRL 115 091803	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56785

ANASHIN	15	PL B749 50	V.V. Anashin *et al.*	(KEDR Collab.)	REFID=56792
DOBBS	15	PR D91 052006	S. Dobbs *et al.*	(NWES)	REFID=56805
LEES	15J	PR D92 072008	J.P. Lees *et al.*	(BABAR Collab.)	REFID=56988
ABLIKIM	14I	PR D89 092008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55900
ABLIKIM	14K	PR D89 071101	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55902
ABLIKIM	14N	PR D90 052009	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55905
ABLIKIM	14Q	PR D90 092002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56238
ABLIKIM	14R	PR D90 112014	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56388
ANASHIN	14	PL B738 391	V.V. Anashin *et al.*	(KEDR Collab.)	REFID=56130
AULCHENKO	14	PL B731 227	V.M. Aulchenko *et al.*	(KEDR Collab.)	REFID=55655
LEES	14H	PR D89 092002	J.P. Lees *et al.*	(BABAR Collab.)	REFID=55940
ABLIKIM	13F	PR D87 052007	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54920
ABLIKIM	13I	PR D87 032003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54954
ABLIKIM	13J	PR D87 032008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54955
ABLIKIM	13L	PR D87 112007	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55300
ABLIKIM	13N	PR D87 092009	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55387
ABLIKIM	13P	PR D87 112004	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55392
ABLIKIM	13R	PR D88 032007	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55402
ABLIKIM	13U	PR D88 091502	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55582
LEES	13I	PR D87 112005	J.P. Lees *et al.*	(BABAR Collab.)	REFID=55161
LEES	13O	PR D87 092005	J.P. Lees *et al.*	(BABAR Collab.)	REFID=55293
LEES	13Q	PR D88 032013	J.P. Lees *et al.*	(BABAR Collab.)	REFID=55404
LEES	13Y	PR D88 072009	J.P. Lees *et al.*	(BABAR Collab.)	REFID=55589
ABLIKIM	12	PR D85 092012	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54265
ABLIKIM	12B	PR D86 032008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54267
ABLIKIM	12C	PR D86 032014	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54268
ABLIKIM	12D	PRL 108 112003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54269
ABLIKIM	12H	PL B710 594	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54273
ABLIKIM	12P	CP C36 1031	M. Ablikim *et al.*	(BES II Collab.)	REFID=54863
LEES	12E	PR D85 112009	J.P. Lees *et al.*	(BABAR Collab.)	REFID=54297
LEES	12F	PR D86 012008	J.P. Lees *et al.*	(BABAR Collab.)	REFID=54298
METREVELI	12	PR D85 092007	Z. Metreveli *et al.*	(NWES, FLOR, WAYN+)	REFID=54304
ABLIKIM	11	PR D83 012003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=53646
ABLIKIM	11C	PRL 106 072002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=53684
ABLIKIM	11D	PR D83 032003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=16715
ABLIKIM	10C	PL B685 27	M. Ablikim *et al.*	(BES II Collab.)	REFID=53349
ABLIKIM	10E	PL B693 88	M. Ablikim *et al.*	(BES II Collab.)	REFID=53361
ALEXANDER	10	PR D82 092002	J.P. Alexander *et al.*	(CLEO Collab.)	REFID=53525
ANASHIN	10	PL B685 134	V.V. Anashin *et al.*	(KEDR Collab.)	REFID=53220
DEL-AMO-SA...	10O	PRL 105 172001	P. del Amo Sanchez *et al.*	(BABAR Collab.)	REFID=53533
INSLER	10	PR D81 091101	J. Insler *et al.*	(CLEO Collab.)	REFID=53359
ABLIKIM	09	PL B676 25	M. Ablikim *et al.*	(BES Collab.)	REFID=52718
ABLIKIM	09B	PR D80 052004	M. Ablikim *et al.*	(BES II Collab.)	REFID=53099
MITCHELL	09	PRL 102 011801	R.E. Mitchell *et al.*	(CLEO Collab.)	REFID=52676
PEDLAR	09	PR D79 111101	T.K. Pedlar *et al.*	(CLEO Collab.)	REFID=52998
SHEN	09	PR D80 031101	C.P. Shen *et al.*	(BELLE Collab.)	REFID=53000
ABLIKIM	08	EPJ C53 15	M. Ablikim *et al.*	(BES Collab.)	REFID=52047
ABLIKIM	08A	PR D77 012001	M. Ablikim *et al.*	(BES Collab.)	REFID=52128
ABLIKIM	08C	PL B659 789	M. Ablikim *et al.*	(BES Collab.)	REFID=52130
ABLIKIM	08E	PR D77 032005	M. Ablikim *et al.*	(BES Collab.)	REFID=52143
ABLIKIM	08F	PRL 100 102003	M. Ablikim *et al.*	(BES Collab.)	REFID=52154
ABLIKIM	08G	PRL 100 192001	M. Ablikim *et al.*	(BES Collab.)	REFID=52253
ABLIKIM	08I	PL B662 330	M. Ablikim *et al.*	(BES Collab.)	REFID=52255
ABLIKIM	08J	PL B663 297	M. Ablikim *et al.*	(BES Collab.)	REFID=52256
ABLIKIM	08O	PR D78 092005	M. Ablikim *et al.*	(BES Collab.)	REFID=52571
ADAMS	08	PRL 101 101801	G.S. Adams *et al.*	(CLEO Collab.)	REFID=52261
AUBERT	08S	PR D77 092002	B. Aubert *et al.*	(BABAR Collab.)	REFID=52242
BESSON	08	PR D78 032012	D. Besson *et al.*	(CLEO Collab.)	REFID=52685
PDG	08	PL B667 1	C. Amsler *et al.*	(PDG Collab.)	REFID=52166
WICHT	08	PL B662 323	J. Wicht *et al.*	(BELLE Collab.)	REFID=52204
ABLIKIM	07H	PR D76 092003	M. Ablikim *et al.*	(BES Collab.)	REFID=52046
ABLIKIM	07J	PR D76 117101	M. Ablikim *et al.*	(BES Collab.)	REFID=52072
ANDREOTTI	07	PL B654 74	M. Andreotti *et al.*	(Femilab E835 Collab.)	REFID=51944
AUBERT	07AK	PR D76 012008	B. Aubert *et al.*	(BABAR Collab.)	REFID=51908
AUBERT	07AU	PR D76 092005	B. Aubert *et al.*	(BABAR Collab.)	REFID=52049
Also		PR D77 119902E (errat.)	B. Aubert *et al.*	(BABAR Collab.)	REFID=52266
AUBERT	07BD	PR D76 092006	B. Aubert *et al.*	(BABAR Collab.)	REFID=52050
ABLIKIM	06	PL B632 181	M. Ablikim *et al.*	(BES Collab.)	REFID=50986
ABLIKIM	06C	PL B633 681	M. Ablikim *et al.*	(BES Collab.)	REFID=51037
ABLIKIM	06E	PR D73 052008	M. Ablikim *et al.*	(BES Collab.)	REFID=51057
ABLIKIM	06F	PR D73 052007	M. Ablikim *et al.*	(BES Collab.)	REFID=51058
ABLIKIM	06H	PR D73 112007	M. Ablikim *et al.*	(BES Collab.)	REFID=51125
ABLIKIM	06J	PRL 96 162002	M. Ablikim *et al.*	(BES Collab.)	REFID=51127
ABLIKIM	06K	PRL 97 062001	M. Ablikim *et al.*	(BES II Collab.)	REFID=51128
ABLIKIM	06M	PL B639 418	M. Ablikim *et al.*	(BES Collab.)	REFID=51130
ABLIKIM	06V	PL B642 441	M. Ablikim *et al.*	(BES Collab.)	REFID=51507
ADAMS	06A	PR D73 051103	G.S. Adams *et al.*	(CLEO Collab.)	REFID=51036
AUBERT	06	PR D73 011101	B. Aubert *et al.*	(BABAR Collab.)	REFID=51017
AUBERT	06B	PR D73 012005	B. Aubert *et al.*	(BABAR Collab.)	REFID=51026
AUBERT	06D	PR D73 052003	B. Aubert *et al.*	(BABAR Collab.)	REFID=51047
AUBERT	06E	PRL 96 052002	B. Aubert *et al.*	(BABAR Collab.)	REFID=51059
AUBERT,BE	06D	PR D74 091103	B. Aubert *et al.*	(BABAR Collab.)	REFID=51511
WU	06	PRL 97 162003	C.-H. Wu *et al.*	(BELLE Collab.)	REFID=51472
ABLIKIM	05	PL B607 243	M. Ablikim *et al.*	(BES Collab.)	REFID=50450
ABLIKIM	05B	PR D71 032003	M. Ablikim *et al.*	(BES Collab.)	REFID=50496
ABLIKIM	05C	PL B610 192	M. Ablikim *et al.*	(BES Collab.)	REFID=50507
ABLIKIM	05H	PR D72 012002	M. Ablikim *et al.*	(BES Collab.)	REFID=50759
ABLIKIM	05R	PRL 95 262001	M. Ablikim *et al.*	(BES Collab.)	REFID=50985
AUBERT	05D	PR D71 052001	B. Aubert *et al.*	(BABAR Collab.)	REFID=50509
LI	05C	PR D71 111103	Z. Li *et al.*	(CLEO Collab.)	REFID=50802
SIBIRTSEV	05A	PR D71 054010	A. Sibirtsev, J. Haidenbauer		REFID=51038
ABLIKIM	04	PL B598 172	M. Ablikim *et al.*	(BES Collab.)	REFID=49739

ABLIKIM	04M	PR D70 112008	M. Ablikim *et al.*	(BES Collab.)	REFID=50329
AUBERT	04	PR D69 011103	B. Aubert *et al.*	(BABAR Collab.)	REFID=49611
AUBERT,B	04N	PR D70 072004	B. Aubert *et al.*	(BABAR Collab.)	REFID=50184
BAI	04	PL B578 16	J.Z. Bai *et al.*	(BES Collab.)	REFID=49620
BAI	04A	PR D69 012003	J.Z. Bai *et al.*	(BES Collab.)	REFID=49607
BAI	04D	PL B589 7	J.Z. Bai *et al.*	(BES Collab.)	REFID=49750
BAI	04E	PL B591 42	J.Z. Bai *et al.*	(BES Collab.)	REFID=49751
BAI	04G	PR D70 012004	J.Z. Bai *et al.*	(BES Collab.)	REFID=49753
BAI	04H	PR D70 012005	J.Z. Bai *et al.*	(BES Collab.)	REFID=49754
BAI	04J	PL B594 47	J.Z. Bai *et al.*	(BES Collab.)	REFID=50167
SETH	04	PR D69 097503	K.K. Seth		REFID=49779
AULCHENKO	03	PL B573 63	V.M. Aulchenko *et al.*	(KEDR Collab.)	REFID=49579
BAI	03D	PL B561 49	J.Z. Bai *et al.*	(BES Collab.)	REFID=49403
BAI	03F	PRL 91 022001	J.Z. Bai *et al.*	(BES II Collab.)	REFID=49473
BAI	03G	PR D68 052003	J.Z. Bai *et al.*	(BES Collab.)	REFID=49580
HUANG	03	PRL 91 241802	H.-C. Huang *et al.*	(BELLE Collab.)	REFID=49621
BAI	02C	PRL 88 101802	J.Z. Bai *et al.*	(BES Collab.)	REFID=50506
ARTAMONOV	00	PL B474 427	A.S. Artamonov *et al.*		REFID=47424
BAI	00	PRL 84 594	J.Z. Bai *et al.*	(BES Collab.)	REFID=50503
BAI	00B	PL B472 200	J.Z. Bai *et al.*	(BES Collab.)	REFID=47427
BAI	00D	PL B476 25	J.Z. Bai *et al.*	(BES Collab.)	REFID=47954
BAI	99	PL B446 356	J.Z. Bai *et al.*	(BES Collab.)	REFID=46606
BAI	99C	PRL 83 1918	J.Z. Bai *et al.*	(BES Collab.)	REFID=47420
BAI	98D	PR D58 092006	J.Z. Bai *et al.*	(BES Collab.)	REFID=46338
BAI	98G	PL B424 213	J.Z. Bai *et al.*	(BES Collab.)	REFID=46341
BAI	98H	PRL 81 1179	J.Z. Bai *et al.*	(BES Collab.)	REFID=46342
BALDINI	98	PL B444 111	R. Baldini *et al.*	(FENICE Collab.)	REFID=46608
ARMSTRONG	96	PR D54 7067	T.A. Armstrong *et al.*	(E760 Collab.)	REFID=45146
BAI	96B	PRL 76 3502	J.Z. Bai *et al.*	(BES Collab.)	REFID=44736
BAI	96C	PRL 77 3959	J.Z. Bai *et al.*	(BES Collab.)	REFID=45169
BAI	96D	PR D54 1221	J.Z. Bai *et al.*	(BES Collab.)	REFID=45198
GRIBUSHIN	96	PR D53 4723	A. Gribushin *et al.*	(E672 and E706 Collab.)	REFID=44739
HASAN	96	PL B388 376	A. Hasan, D.V. Bugg	(BRUN, LOQM)	REFID=45197
BAI	95B	PL B355 374	J.Z. Bai *et al.*	(BES Collab.)	REFID=44434
BUGG	95	PL B353 378	D.V. Bugg *et al.*	(LOQM, PNPI, WASH)	REFID=44438
ANTONELLI	93	PL B301 317	A. Antonelli *et al.*	(FENICE Collab.)	REFID=43314
ARMSTRONG	93B	PR D47 772	T.A. Armstrong *et al.*	(FNAL E760 Collab.)	REFID=43307
BARNES	93	PL B309 469	P.D. Barnes *et al.*	(PS185 Collab.)	REFID=43601
AUGUSTIN	92	PR D46 1951	J.E. Augustin, G. Cosme	(DM2 Collab.)	REFID=41584
BOLTON	92	PL B278 495	T. Bolton *et al.*	(Mark III Collab.)	REFID=42175
BOLTON	92B	PRL 69 1328	T. Bolton *et al.*	(Mark III Collab.)	REFID=42176
COFFMAN	92	PRL 68 282	D.M. Coffman *et al.*	(Mark III Collab.)	REFID=41866
HSUEH	92	PR D45 2181	S. Hsueh, S. Palestini	(FNAL, TORI)	REFID=41899
BISELLO	91	NP B350 1	D. Bisello *et al.*	(DM2 Collab.)	REFID=41668
AUGUSTIN	90	PR D42 10	J.E. Augustin *et al.*	(DM2 Collab.)	REFID=41352
BAI	90B	PRL 65 1309	Z. Bai *et al.*	(Mark III Collab.)	REFID=41354
BAI	90C	PRL 65 2507	Z. Bai *et al.*	(Mark III Collab.)	REFID=41578
BISELLO	90	PL B241 617	D. Bisello *et al.*	(DM2 Collab.)	REFID=41359
COFFMAN	90	PR D41 1410	D.M. Coffman *et al.*	(Mark III Collab.)	REFID=41350
JOUSSET	90	PR D41 1389	J. Jousset *et al.*	(DM2 Collab.)	REFID=41349
ALEXANDER	89	NP B320 45	J.P. Alexander *et al.*	(LBL, MICH, SLAC)	REFID=40345
AUGUSTIN	89	NP B320 1	J.E. Augustin, G. Cosme	(DM2 Collab.)	REFID=41004
BISELLO	89B	PR D39 701	G. Busetto *et al.*	(DM2 Collab.)	REFID=40575
AUGUSTIN	88	PRL 60 2238	J.E. Augustin *et al.*	(DM2 Collab.)	REFID=40574
COFFMAN	88	PR D38 2695	D.M. Coffman *et al.*	(Mark III Collab.)	REFID=40346
FALVARD	88	PR D38 2706	A. Falvard *et al.*	(CLER, FRAS, LALO+)	REFID=40576
AUGUSTIN	87	ZPHY C36 369	J.E. Augustin *et al.*	(LALO, CLER, FRAS+)	REFID=40268
BAGLIN	87	NP B286 592	C. Baglin *et al.*	(LAPP, CERN, GENO, LYON+)	REFID=40002
BALTRUSAIT...	87	PR D35 2077	R.M. Baltrusaitis *et al.*	(Mark III Collab.)	REFID=40010
BECKER	87	PRL 59 186	J.J. Becker *et al.*	(Mark III Collab.)	REFID=40015
BISELLO	87	PL B192 239	D. Bisello *et al.*	(PADO, CLER, FRAS+)	REFID=40012
COHEN	87	RMP 59 1121	E.R. Cohen, B.N. Taylor	(RISC, NBS)	REFID=11616
HENRARD	87	NP B292 670	P. Henrard *et al.*	(CLER, FRAS, LALO+)	REFID=40261
PALLIN	87	NP B292 653	D. Pallin *et al.*	(CLER, FRAS, LALO, PADO)	REFID=40243
BALTRUSAIT...	86	PR D33 629	R.M. Baltrusaitis *et al.*	(Mark III Collab.)	REFID=22009
BALTRUSAIT...	86B	PR D33 1222	R.M. Baltrusaitis *et al.*	(Mark III Collab.)	REFID=22100
BALTRUSAIT...	86D	PRL 56 107	R.M. Baltrusaitis	(CIT, UCSC, ILL, SLAC+)	REFID=21865
BISELLO	86B	PL B179 294	D. Bisello *et al.*	(DM2 Collab.)	REFID=22101
GAISER	86	PR D34 711	J. Gaiser *et al.*	(Crystal Ball Collab.)	REFID=22012
BALTRUSAIT...	85C	PRL 55 1723	R.M. Baltrusaitis *et al.*	(CIT, UCSC+)	REFID=22095
BALTRUSAIT...	85D	PR D32 566	R.M. Baltrusaitis *et al.*	(CIT, UCSC+)	REFID=22097
KURAEV	85	SJNP 41 466	E.A. Kuraev, V.S. Fadin	(NOVO)	REFID=40033
		Translated from YAF 41 733.			
BALTRUSAIT...	84	PRL 52 2126	R.M. Baltrusaitis *et al.*	(CIT, UCSC+)	REFID=22006
EATON	84	PR D29 804	M.W. Eaton *et al.*	(LBL, SLAC)	REFID=22092
BLOOM	83	ARNS 33 143	E.D. Bloom, C. Peck	(SLAC, CIT)	REFID=21682
EDWARDS	83B	PRL 51 859	C. Edwards *et al.*	(CIT, HARV, PRIN+)	REFID=21318
FRANKLIN	83	PRL 51 963	M.E.B. Franklin *et al.*	(LBL, SLAC)	REFID=22216
BURKE	82	PRL 49 632	D.L. Burke *et al.*	(LBL, SLAC)	REFID=21676
EDWARDS	82B	PR D25 3065	C. Edwards *et al.*	(CIT, HARV, PRIN+)	REFID=22080
EDWARDS	82D	PRL 48 458	C. Edwards *et al.*	(CIT, HARV, PRIN+)	REFID=21677
Also		ARNS 33 143	E.D. Bloom, C. Peck	(SLAC, CIT)	REFID=21682
EDWARDS	82E	PRL 49 259	C. Edwards *et al.*	(CIT, HARV, PRIN+)	REFID=21314
LEMOIGNE	82	PL 113B 509	Y. Lemoigne *et al.*	(SACL, LOIC, SHMP+)	REFID=22084
BESCH	81	ZPHY C8 1	H.J. Besch *et al.*	(BONN, DESY, MAINZ)	REFID=22077
GIDAL	81	PL 107B 153	G. Gidal *et al.*	(SLAC, LBL)	REFID=20386
PARTRIDGE	80	PRL 44 712	R. Partridge *et al.*	(CIT, HARV, PRIN+)	REFID=22073
SCHARRE	80	PL 97B 329	D.L. Scharre *et al.*	(SLAC, LBL)	REFID=21329
ZHOLENTZ	80	PL 96B 214	A.A. Zholents *et al.*	(NOVO)	REFID=10320
Also		SJNP 34 814	A.A. Zholents *et al.*	(NOVO)	REFID=10321
		Translated from YAF 34 1471.			
BRANDELIK	79C	ZPHY C1 233	R. Brandelik *et al.*	(DASP Collab.)	REFID=22114
ALEXANDER	78	PL 72B 493	G. Alexander *et al.*	(DESY, HAMB, SIEG+)	REFID=22065
BESCH	78	PL 78B 347	H.J. Besch *et al.*	(BONN, DESY, MAINZ)	REFID=22066
BRANDELIK	78B	PL 74B 292	R. Brandelik *et al.*	(DASP Collab.)	REFID=22067
PERUZZI	78	PR D17 2901	I. Peruzzi *et al.*	(SLAC, LBL)	REFID=22068
BARTEL	77	PL 66B 489	W. Bartel *et al.*	(DESY, HEIDP)	REFID=22058
BURMESTER	77D	PL 72B 135	J. Burmester *et al.*	(DESY, HAMB, SIEG+)	REFID=22060
FELDMAN	77	PRPL 33C 285	G.J. Feldman, M.L. Perl	(LBL, SLAC)	REFID=22062
VANNUCCI	77	PR D15 1814	F. Vannucci *et al.*	(SLAC, LBL)	REFID=22063
BARTEL	76	PL 64B 483	W. Bartel *et al.*	(DESY, HEIDP)	REFID=22192
BRAUNSCH...	76	PL 63B 487	W. Braunschweig *et al.*	(DASP Collab.)	REFID=22054
JEAN-MARIE	76	PRL 36 291	B. Jean-Marie *et al.*	(SLAC, LBL) IG	REFID=22056
BALDINI-...	75	PL 58B 471	R. Baldini-Celio *et al.*	(FRAS, ROMA)	REFID=22026
BOYARSKI	75	PRL 34 1357	A.M. Boyarski *et al.*	(SLAC, LBL) JPC	REFID=22030
DASP	75	PL 56B 491	W. Braunschweig *et al.*	(DASP Collab.)	REFID=22036
ESPOSITO	75B	LNC 14 73	B. Esposito *et al.*	(FRAS, NAPL, PADO+)	REFID=22038
FORD	75	PRL 34 604	R.L. Ford *et al.*	(SLAC, PENN)	REFID=22039

NODE=M870

BRANCHING RATIOS OF $\psi(2S)$ AND $\chi_{c0,1,2}$

Updated June 2021 by J.J. Hernández-Rey (IFIC, Valencia), S. Navas (U. of Granada), and C. Patrignani (Bologna Univ., INFN)

Since 2002, the treatment of the branching ratios of the $\psi(2S)$ and $\chi_{c0,1,2}$ has undergone an important restructuring.

When measuring a branching ratio experimentally, it is not always possible to normalize the number of events observed in the corresponding decay mode to the total number of particles produced. Therefore, the experimenters sometimes report the number of observed decays with respect to another decay mode of the same or another particle in the relevant decay chain. This is actually equivalent to measuring combinations of branching fractions of several decay modes.

To extract the branching ratio of a given decay mode, the collaborations use some previously reported measurements of the required branching ratios. However, the values are frequently taken from the *Review of Particle Physics* (RPP), which in turn uses the branching ratio reported by the experiment in the following edition, giving rise either to correlations or to plain vicious circles, as discussed in more detail in earlier editions of this review [1,2].

The way to avoid these dependencies and correlations is to extract the branching ratios through a fit that uses the truly measured combinations of branching fractions and partial widths. This fit, in fact, should involve decays from the four concerned particles, $\psi(2S)$, χ_{c0}, χ_{c1}, and χ_{c2}, and occasionally some combinations of branching ratios of more than one of them. This is what is done since the 2002 edition [3].

The PDG policy is to quote the results of the collaborations in a manner as close as possible to what appears in their original publications. However, in order to avoid the problems mentioned above, we had in some cases to work out the values originally measured, using the number of events and detection efficiencies given by the collaborations, or rescaling back the published results. The information was sometimes spread over several articles, and some articles referred to papers still unpublished, which in turn contained the relevant numbers in footnotes.

Even though the experimental collaborations are entitled to extract whatever branching ratios they consider appropriate by using other published results, we would like to encourage them to also quote explicitly in their articles the actual quantities measured, so that they can be used directly in averages and fits of different experimental determinations.

To inform the reader how we computed some of the values used in this edition of RPP, we use footnotes to indicate the branching ratios actually given by the experiments and the quantities they use to derive them from the true combination of branching ratios actually measured.

None of the branching ratios of the $\chi_{c0,1,2}$ are measured independently of the $\psi(2S)$ radiative decays. We tried to identify those branching ratios which can be correlated in a non-trivial way, and although we cannot preclude the existence of other cases, we are confident that the most relevant correlations have already been removed. Nevertheless, correlations in the errors of different quantities measured by the same experiment have not been taken into account.

Fit information

This is an overall fit to 4 total widths, 1 partial width, 26 combinations of partial widths, 24 branching ratios, and 108 combinations of branching ratios. Of the latter 62 involve decays of more than one particle.

The overall fit uses 248 measurements to determine 49 parameters and has a χ^2 of 378.1 for 199 degrees of freedom.

The relatively high χ^2 of the fit, 1.9 per d.o.f., can be traced back to a few specific discrepancies in the data. No scaling factors to fit uncertainties have been applied.

In the listing we provide the inter-particle correlation coefficients $< \delta x_i \delta x_j > / (\delta x_i \cdot \delta x_j)$, in percent, from the fit to the corresponding parameter x_i.

References

1. Y.F. Gu and X.H. Li, Phys. Lett. **B449**, 361 (1999).
2. C. Patrignani, Phys. Rev. **D64**, 034017 (2001).
3. Particle Data Group, K.Hagiwara *et al.*, Phys. Rev. **D68**, 010001 (2002).

NODE=M056

$\chi_{c0}(1P)$

$I^G(J^{PC}) = 0^+(0^{++})$

$\chi_{c0}(1P)$ MASS

NODE=M056M

NODE=M056M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
3414.71± 0.30 OUR AVERAGE					
3413.0 ± 1.9 ±0.6	933	[1] AAIJ	17BB	LHCB	$pp \to b\bar{b}X \to 2(K^+K^-)X$
3414.2 ± 0.5 ±2.3	5.4k	UEHARA	08	BELL	$\gamma\gamma \to \chi_{c0} \to$ hadrons
3406 ± 7 ±6	230	[2] ABE	07	BELL	$e^+e^- \to J/\psi(c\bar{c})$
3414.21± 0.39±0.27		ABLIKIM	05G	BES2	$\psi(2S) \to \gamma\chi_{c0}$
3414.7 $^{+0.7}_{-0.6}$ ±0.2		[3] ANDREOTTI	03	E835	$\bar{p}p \to \chi_{c0} \to \pi^0\pi^0$
3415.5 ± 0.4 ±0.4	392	[4] BAGNASCO	02	E835	$\bar{p}p \to \chi_{c0} \to J/\psi\gamma$
3417.4 $^{+1.8}_{-1.9}$ ±0.2		[3] AMBROGIANI	99B	E835	$\bar{p}p \to e^+e^-\gamma$
3414.1 ± 0.6 ±0.8		BAI	99B	BES	$\psi(2S) \to \gamma X$
3417.8 ± 0.4 ±4		[3] GAISER	86	CBAL	$\psi(2S) \to \gamma X$
3416 ± 3 ±4		[5] TANENBAUM	78	MRK1	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3414.6 ± 1.1	266	UEHARA	13	BELL	$\gamma\gamma \to K^0_S K^0_S$
3416.5 ± 3.0		EISENSTEIN	01	CLE2	$e^+e^- \to e^+e^-\chi_{c0}$
3422 ±10		[5] BARTEL	78B	CNTR	$e^+e^- \to J/\psi 2\gamma$
3415 ± 9		[5] BIDDICK	77	CNTR	$e^+e^- \to \gamma X$

[1] From a fit of the $\phi\phi$ invariant mass with the width of $\chi_{c0}(1P)$ fixed to the PDG 16 value. NODE=M056M;LINKAGE=A

[2] From a fit of the J/ψ recoil mass spectrum. Supersedes ABE,K 02 and ABE 04G. NODE=M056M;LINKAGE=EB

[3] Using mass of $\psi(2S)$ = 3686.0 MeV. NODE=M056M;LINKAGE=C

[4] Recalculated by ANDREOTTI 05A, using the value of $\psi(2S)$ mass from AULCHENKO 03. NODE=M056M;LINKAGE=NW

[5] Mass value shifted by us by amount appropriate for $\psi(2S)$ mass = 3686 MeV and $J/\psi(1S)$ mass = 3097 MeV. NODE=M056M;LINKAGE=D

$\chi_{c0}(1P)$ WIDTH

NODE=M056W

NODE=M056W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
10.8±0.6 OUR FIT					
10.5±0.8 OUR AVERAGE Error includes scale factor of 1.1.					
10.6±1.9±2.6	5.4k	UEHARA	08	BELL	$\gamma\gamma \to \chi_{c0} \to$ hadrons
12.6$^{+1.5}_{-1.6}{}^{+0.9}_{-1.1}$		ABLIKIM	05G	BES2	$\psi(2S) \to \gamma\chi_{c0}$
8.6$^{+1.7}_{-1.3}$±0.1		ANDREOTTI	03	E835	$\bar{p}p \to \chi_{c0} \to \pi^0\pi^0$
9.7±1.0	392	[1] BAGNASCO	02	E835	$\bar{p}p \to \chi_{c0} \to J/\psi\gamma$
16.6$^{+5.2}_{-3.7}$±0.1		AMBROGIANI	99B	E835	$\bar{p}p \to e^+e^-\gamma$
14.3±2.0±3.0		BAI	98I	BES	$\psi(2S) \to \gamma\pi^+\pi^-$
13.5±3.3±4.2		GAISER	86	CBAL	$\psi(2S) \to \gamma X$, $\gamma\pi^0\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
13.2±2.1	266	UEHARA	13	BELL	$\gamma\gamma \to K^0_S K^0_S$

[1] Recalculated by ANDREOTTI 05A. NODE=M056W;LINKAGE=AN

$\chi_{c0}(1P)$ DECAY MODES

NODE=M056215;NODE=M056

	Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	
	Hadronic decays			NODE=M056;CLUMP=A
Γ_1	$2(\pi^+\pi^-)$	(2.34±0.18) %		DESIG=3
Γ_2	$\rho^0\pi^+\pi^-$	(9.1 ±2.9) × 10^{-3}		DESIG=9
Γ_3	$\rho^0\rho^0$			DESIG=54
Γ_4	$f_0(980)f_0(980)$	(6.6 ±2.1) × 10^{-4}		DESIG=20
Γ_5	$\pi^+\pi^-\pi^0\pi^0$	(3.3 ±0.4) %		DESIG=61
Γ_6	$\rho^+\pi^-\pi^0$ + c.c.	(2.9 ±0.4) %		DESIG=62
Γ_7	$4\pi^0$	(3.3 ±0.4) × 10^{-3}		DESIG=70
Γ_8	$\pi^+\pi^-K^+K^-$	(1.81±0.14) %		DESIG=5

Γ_{9}	$K_0^*(1430)^0 \overline{K}_0^*(1430)^0 \to \pi^+\pi^- K^+ K^-$	$(9.8\ ^{+4.0}_{-2.8}) \times 10^{-4}$		DESIG=31
Γ_{10}	$K_0^*(1430)^0 \overline{K}_2^*(1430)^0 +$ c.c. $\to \pi^+\pi^- K^+ K^-$	$(8.0\ ^{+2.0}_{-2.4}) \times 10^{-4}$		DESIG=32
Γ_{11}	$K_1(1270)^+ K^- +$ c.c. $\to \pi^+\pi^- K^+ K^-$	$(6.3 \pm 1.9) \times 10^{-3}$		DESIG=33
Γ_{12}	$K_1(1400)^+ K^- +$ c.c. $\to \pi^+\pi^- K^+ K^-$	$< 2.7 \times 10^{-3}$	CL=90%	DESIG=34
Γ_{13}	$f_0(980)\, f_0(980)$	$(1.6\ ^{+1.0}_{-0.9}) \times 10^{-4}$		DESIG=23
Γ_{14}	$f_0(980)\, f_0(2200)$	$(7.9\ ^{+2.0}_{-2.5}) \times 10^{-4}$		DESIG=24
Γ_{15}	$f_0(1370)\, f_0(1370)$	$< 2.7 \times 10^{-4}$	CL=90%	DESIG=25
Γ_{16}	$f_0(1370)\, f_0(1500)$	$< 1.7 \times 10^{-4}$	CL=90%	DESIG=26
Γ_{17}	$f_0(1370)\, f_0(1710)$	$(6.7\ ^{+3.5}_{-2.3}) \times 10^{-4}$		DESIG=27
Γ_{18}	$f_0(1500)\, f_0(1370)$	$< 1.3 \times 10^{-4}$	CL=90%	DESIG=28
Γ_{19}	$f_0(1500)\, f_0(1500)$	$< 5 \times 10^{-5}$	CL=90%	DESIG=29
Γ_{20}	$f_0(1500)\, f_0(1710)$	$< 7 \times 10^{-5}$	CL=90%	DESIG=30
Γ_{21}	$K^+ K^- \pi^+ \pi^- \pi^0$	$(8.6 \pm 0.9) \times 10^{-3}$		DESIG=75
Γ_{22}	$K_S^0 K^\pm \pi^\mp \pi^+ \pi^-$	$(4.2 \pm 0.4) \times 10^{-3}$		DESIG=87
Γ_{23}	$K^+ K^- \pi^0 \pi^0$	$(5.6 \pm 0.9) \times 10^{-3}$		DESIG=63
Γ_{24}	$K^+ \pi^- \overline{K}^0 \pi^0 +$ c.c.	(2.49 ± 0.33) %		DESIG=65
Γ_{25}	$\rho^+ K^- K^0 +$ c.c.	(1.21 ± 0.21) %		DESIG=66
Γ_{26}	$K^*(892)^- K^+ \pi^0 \to K^+ \pi^- \overline{K}^0 \pi^0 +$ c.c.	$(4.6 \pm 1.2) \times 10^{-3}$		DESIG=67
Γ_{27}	$K_S^0 K_S^0 \pi^+ \pi^-$	$(5.7 \pm 1.1) \times 10^{-3}$		DESIG=41
Γ_{28}	$K^+ K^- \eta \pi^0$	$(3.0 \pm 0.7) \times 10^{-3}$		DESIG=68
Γ_{29}	$3(\pi^+ \pi^-)$	(1.20 ± 0.18) %		DESIG=4
Γ_{30}	$K^+ \overline{K}^*(892)^0 \pi^- +$ c.c.	$(7.5 \pm 1.6) \times 10^{-3}$		DESIG=10
Γ_{31}	$K^*(892)^0 \overline{K}^*(892)^0$	$(1.7 \pm 0.6) \times 10^{-3}$		DESIG=21
Γ_{32}	$\pi \pi$	$(8.51 \pm 0.33) \times 10^{-3}$		DESIG=18
Γ_{33}	$\pi^0 \eta$	$< 1.8 \times 10^{-4}$		DESIG=35
Γ_{34}	$\pi^0 \eta'$	$< 1.1 \times 10^{-3}$		DESIG=36
Γ_{35}	$\pi^0 \eta_c$	$< 1.6 \times 10^{-3}$	CL=90%	DESIG=86
Γ_{36}	$\eta \eta$	$(3.01 \pm 0.19) \times 10^{-3}$		DESIG=13
Γ_{37}	$\eta \eta'$	$(9.1 \pm 1.1) \times 10^{-5}$		DESIG=37
Γ_{38}	$\eta' \eta'$	$(2.17 \pm 0.12) \times 10^{-3}$		DESIG=46
Γ_{39}	$\omega \omega$	$(9.7 \pm 1.1) \times 10^{-4}$		DESIG=22
Γ_{40}	$\omega \phi$	$(1.41 \pm 0.13) \times 10^{-4}$		DESIG=76
Γ_{41}	$\omega K^+ K^-$	$(1.94 \pm 0.21) \times 10^{-3}$		DESIG=88
Γ_{42}	$K^+ K^-$	$(6.05 \pm 0.31) \times 10^{-3}$		DESIG=2
Γ_{43}	$K_S^0 K_S^0$	$(3.16 \pm 0.17) \times 10^{-3}$		DESIG=15
Γ_{44}	$\pi^+ \pi^- \eta$	$< 2.0 \times 10^{-4}$	CL=90%	DESIG=50
Γ_{45}	$\pi^+ \pi^- \eta'$	$< 4 \times 10^{-4}$	CL=90%	DESIG=53
Γ_{46}	$\overline{K}^0 K^+ \pi^- +$ c.c.	$< 9 \times 10^{-5}$	CL=90%	DESIG=17
Γ_{47}	$K^+ K^- \pi^0$	$< 6 \times 10^{-5}$	CL=90%	DESIG=47
Γ_{48}	$K^+ K^- \eta$	$< 2.3 \times 10^{-4}$	CL=90%	DESIG=51
Γ_{49}	$K^+ K^- K_S^0 K_S^0$	$(1.4 \pm 0.5) \times 10^{-3}$		DESIG=42
Γ_{50}	$K_S^0 K_S^0 K_S^0 K_S^0$	$(5.8 \pm 0.5) \times 10^{-4}$		DESIG=94
Γ_{51}	$K^+ K^- K^+ K^-$	$(2.82 \pm 0.29) \times 10^{-3}$		DESIG=14
Γ_{52}	$K^+ K^- \phi$	$(9.7 \pm 2.5) \times 10^{-4}$		DESIG=44
Γ_{53}	$\overline{K}^0 K^+ \pi^- \phi +$ c.c.	$(3.7 \pm 0.6) \times 10^{-3}$		DESIG=91
Γ_{54}	$K^+ K^- \pi^0 \phi$	$(1.90 \pm 0.35) \times 10^{-3}$		DESIG=92
Γ_{55}	$\phi \pi^+ \pi^- \pi^0$	$(1.18 \pm 0.15) \times 10^{-3}$		DESIG=89
Γ_{56}	$\phi \phi$	$(8.0 \pm 0.7) \times 10^{-4}$		DESIG=16
Γ_{57}	$\phi \phi \eta$	$(8.4 \pm 1.0) \times 10^{-4}$		DESIG=96
Γ_{58}	$p \overline{p}$	$(2.21 \pm 0.08) \times 10^{-4}$		DESIG=11
Γ_{59}	$p \overline{p} \pi^0$	$(7.0 \pm 0.7) \times 10^{-4}$	S=1.3	DESIG=48
Γ_{60}	$p \overline{p} \eta$	$(3.5 \pm 0.4) \times 10^{-4}$		DESIG=52

Γ_{61}	$p\overline{p}\omega$	$(5.2 \pm 0.6) \times 10^{-4}$		DESIG=69
Γ_{62}	$p\overline{p}\phi$	$(6.0 \pm 1.4) \times 10^{-5}$		DESIG=74
Γ_{63}	$p\overline{p}\pi^+\pi^-$	$(2.1 \pm 0.7) \times 10^{-3}$	S=1.4	DESIG=8
Γ_{64}	$p\overline{p}\pi^0\pi^0$	$(1.04\pm0.28) \times 10^{-3}$		DESIG=64
Γ_{65}	$p\overline{p}K^+K^-$ (non-resonant)	$(1.22\pm0.26) \times 10^{-4}$		DESIG=71
Γ_{66}	$p\overline{p}K^0_S K^0_S$	$< 8.8 \times 10^{-4}$	CL=90%	DESIG=40
Γ_{67}	$p\overline{n}\pi^-$	$(1.27\pm0.11) \times 10^{-3}$		DESIG=43
Γ_{68}	$\overline{p}n\pi^+$	$(1.37\pm0.12) \times 10^{-3}$		DESIG=82
Γ_{69}	$p\overline{n}\pi^-\pi^0$	$(2.34\pm0.21) \times 10^{-3}$		DESIG=83
Γ_{70}	$\overline{p}n\pi^+\pi^0$	$(2.21\pm0.18) \times 10^{-3}$		DESIG=84
Γ_{71}	$\Lambda\overline{\Lambda}$	$(3.59\pm0.15) \times 10^{-4}$		DESIG=19
Γ_{72}	$\Lambda\overline{\Lambda}\pi^+\pi^-$	$(1.18\pm0.13) \times 10^{-3}$		DESIG=38
Γ_{73}	$\Lambda\overline{\Lambda}\pi^+\pi^-$ (non-resonant)	$< 5 \times 10^{-4}$	CL=90%	DESIG=77
Γ_{74}	$\Sigma(1385)^+\overline{\Lambda}\pi^-$ + c.c.	$< 5 \times 10^{-4}$	CL=90%	DESIG=78
Γ_{75}	$\Sigma(1385)^-\overline{\Lambda}\pi^+$ + c.c.	$< 5 \times 10^{-4}$	CL=90%	DESIG=79
Γ_{76}	$K^+\overline{p}\Lambda$ + c.c.	$(1.25\pm0.12) \times 10^{-3}$	S=1.3	DESIG=49
Γ_{77}	$nK^0_S\overline{\Lambda}$ + c.c.	$(6.6 \pm 0.5) \times 10^{-4}$		DESIG=101
Γ_{78}	$K^*(892)^+\overline{p}\Lambda$ + c.c.	$(4.8 \pm 0.9) \times 10^{-4}$		DESIG=98
Γ_{79}	$K^+\overline{p}\Lambda(1520)$ + c.c.	$(2.9 \pm 0.7) \times 10^{-4}$		DESIG=72
Γ_{80}	$\Lambda(1520)\overline{\Lambda}(1520)$	$(3.1 \pm 1.2) \times 10^{-4}$		DESIG=73
Γ_{81}	$\Sigma^0\overline{\Sigma}^0$	$(4.68\pm0.32) \times 10^{-4}$		DESIG=58
Γ_{82}	$\Sigma^+\overline{p}K^0_S$ + c.c.	$(3.52\pm0.27) \times 10^{-4}$		DESIG=97
Γ_{83}	$\Sigma^0\overline{p}K^+$ + c.c.	$(3.03\pm0.20) \times 10^{-4}$		DESIG=100
Γ_{84}	$\Sigma^+\overline{\Sigma}^-$	$(4.6 \pm 0.8) \times 10^{-4}$	S=2.6	DESIG=59
Γ_{85}	$\Sigma^-\overline{\Sigma}^+$	$(5.1 \pm 0.5) \times 10^{-4}$		DESIG=99
Γ_{86}	$\Sigma(1385)^+\overline{\Sigma}(1385)^-$	$(1.6 \pm 0.6) \times 10^{-4}$		DESIG=80
Γ_{87}	$\Sigma(1385)^-\overline{\Sigma}(1385)^+$	$(2.3 \pm 0.7) \times 10^{-4}$		DESIG=81
Γ_{88}	$K^-\Lambda\overline{\Xi}^+$ + c.c.	$(1.94\pm0.35) \times 10^{-4}$		DESIG=85
Γ_{89}	$\Xi^0\overline{\Xi}^0$	$(3.1 \pm 0.8) \times 10^{-4}$		DESIG=60
Γ_{90}	$\Xi^-\overline{\Xi}^+$	$(4.8 \pm 0.7) \times 10^{-4}$		DESIG=39
Γ_{91}	$\eta_c\pi^+\pi^-$	$< 7 \times 10^{-4}$	CL=90%	DESIG=90
	Radiative decays			NODE=M056;CLUMP=B
Γ_{92}	$\gamma J/\psi(1S)$	(1.40 ± 0.05) %		DESIG=6
Γ_{93}	$\gamma\rho^0$	$< 9 \times 10^{-6}$	CL=90%	DESIG=55
Γ_{94}	$\gamma\omega$	$< 8 \times 10^{-6}$	CL=90%	DESIG=56
Γ_{95}	$\gamma\phi$	$< 6 \times 10^{-6}$	CL=90%	DESIG=57
Γ_{96}	$\gamma\gamma$	$(2.04\pm0.09) \times 10^{-4}$		DESIG=7
Γ_{97}	$e^+e^-J/\psi(1S)$	$(1.33\pm0.29) \times 10^{-4}$		DESIG=93
Γ_{98}	$\mu^+\mu^-J/\psi(1S)$	$< 1.9 \times 10^{-5}$	CL=90%	DESIG=95

CONSTRAINED FIT INFORMATION

A multiparticle fit to $\chi_{c1}(1P)$, $\chi_{c0}(1P)$, $\chi_{c2}(1P)$, and $\psi(2S)$ with 4 total widths, a partial width, 25 combinations of partial widths obtained from integrated cross section, and 84 branching ratios uses 248 measurements to determine 49 parameters. The overall fit has a $\chi^2 = 379.8$ for 199 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\left\langle\delta p_i \delta p_j\right\rangle/(\delta p_i \cdot \delta p_j)$, in percent, from the fit to parameters p_i, including the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{\rm total}$.

	x_1	x_2	x_8	x_{30}	x_{32}	x_{36}	x_{42}	x_{43}	x_{51}	x_{56}
x_2	24									
x_8	9	2								
x_{30}	5	1	28							
x_{32}	8	2	10	3						
x_{36}	4	1	5	1	14					
x_{42}	8	2	8	3	18	11				
x_{43}	7	2	8	2	18	10	14			
x_{51}	5	1	5	2	9	5	7	7		
x_{56}	7	2	6	2	9	5	7	7	4	
x_{58}	3	1	4	1	3	−1	7	7	3	3
x_{71}	7	2	9	2	23	13	18	18	8	9
x_{92}	5	1	6	2	17	11	13	12	6	6
x_{96}	−8	−2	−2	−3	14	9	10	10	3	1
Γ	−26	−6	−19	−10	−15	−7	−14	−12	−10	−13

	x_{58}	x_{71}	x_{92}	x_{96}
x_{71}	9			
x_{92}	−19	16		
x_{96}	6	15	13	
Γ	−4	−13	−9	−38

$\chi_{c0}(1P)$ PARTIAL WIDTHS

NODE=M056217

$\chi_{c0}(1P)$ $\Gamma(i)\Gamma(\gamma J/\psi(1S))/\Gamma(\text{total})$

NODE=M056223

$\Gamma(p\overline{p}) \times \Gamma(\gamma J/\psi(1S))/\Gamma_{\rm total}$ — $\Gamma_{58}\Gamma_{92}/\Gamma$

NODE=M056G1
NODE=M056G1

VALUE (eV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
33.6± 2.3 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
26.6± 2.6±1.4	392	[1,2] BAGNASCO	02	E835	$\overline{p}p \to \chi_{c0} \to J/\psi\gamma$
$48.7^{+11.3}_{-8.9}$±2.4		[1,2] AMBROGIANI	99B	E835	$\overline{p}p \to \gamma J/\psi$

[1] Calculated by us using B($J/\psi(1S) \to e^+e^-$) = 0.0593 ± 0.0010.

NODE=M056G;LINKAGE=7A

[2] Values in ($\Gamma(p\overline{p}) \times \Gamma(\gamma J/\psi(1S))/\Gamma_{\rm total}$) and ($\Gamma(p\overline{p})/\Gamma_{\rm total} \times \Gamma(\gamma J/\psi(1S))/\Gamma_{\rm total}$) are not independent. The latter is used in the fit since it is less correlated to the total width.

NODE=M056G;LINKAGE=KS

$\chi_{c0}(1P)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M056224

$\Gamma(2(\pi^+\pi^-)) \times \Gamma(\gamma\gamma)/\Gamma_{\rm total}$ — $\Gamma_1\Gamma_{96}/\Gamma$

NODE=M056G2
NODE=M056G2

VALUE (eV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
52 ± 4 OUR FIT					
49 ±10 OUR AVERAGE Error includes scale factor of 1.8.					
44.7± 3.6±4.9	3.6k	UEHARA	08	BELL	$\gamma\gamma \to \chi_{c0} \to 2(\pi^+\pi^-)$
75 ±13 ±8		EISENSTEIN	01	CLE2	$e^+e^- \to e^+e^-\chi_{c0}$

$\Gamma(\rho^0\rho^0) \times \Gamma(\gamma\gamma)/\Gamma_{\rm total}$ — $\Gamma_3\Gamma_{96}/\Gamma$

NODE=M056G07
NODE=M056G07

VALUE (eV)	*CL%*	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<12	90	<252	UEHARA	08	BELL	$\gamma\gamma \to \chi_{c0} \to 2(\pi^+\pi^-)$

$\Gamma(\pi^+\pi^-K^+K^-) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_8\Gamma_{96}/\Gamma$

NODE=M056G08
NODE=M056G08

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
40.0±3.5 OUR FIT					
38.8±3.7±4.7	1.7k	UEHARA	08	BELL	$\gamma\gamma \to \chi_{c0} \to K^+K^-\pi^+\pi^-$

$\Gamma(K^+K^-\pi^+\pi^-\pi^0) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{21}\Gamma_{96}/\Gamma$

NODE=M056G01
NODE=M056G01

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
26±4±4	1094	DEL-AMO-SA..11M		BABR	$\gamma\gamma \to K^+K^-\pi^+\pi^-\pi^0$

$\Gamma(K^+\overline{K}^*(892)^0\pi^- + \text{c.c.}) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{30}\Gamma_{96}/\Gamma$

NODE=M056G09
NODE=M056G09

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
16 ±4 OUR FIT					
16.7±6.1±3.0	495 ± 182	UEHARA	08	BELL	$\gamma\gamma \to \chi_{c0} \to K^+K^-\pi^+\pi^-$

$\Gamma(K^*(892)^0\overline{K}^*(892)^0) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{31}\Gamma_{96}/\Gamma$

NODE=M056G10
NODE=M056G10

VALUE (eV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<6	90	<148	UEHARA	08	BELL	$\gamma\gamma \to \chi_{c0} \to K^+K^-\pi^+\pi^-$

$\Gamma(\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{32}\Gamma_{96}/\Gamma$

NODE=M056G3
NODE=M056G3

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
18.8± 1.3 OUR FIT					
23 ± 5 OUR AVERAGE					
$29.7^{+17.4}_{-12.0}\pm4.8$	103^{+60}_{-42}	[1] UEHARA	09	BELL	10.6 $e^+e^- \to e^+e^-\pi^0\pi^0$
22.7± 3.2±3.5	129 ± 18	[2] NAKAZAWA	05	BELL	10.6 $e^+e^- \to e^+e^-\pi^+\pi^-$

[1] We multiplied the measurement by 3 to convert from $\pi^0\pi^0$ to $\pi\pi$. Interference with the continuum included.
NODE=M056G3;LINKAGE=UE

[2] We have multiplied $\pi^+\pi^-$ measurement by 3/2 to obtain $\pi\pi$.
NODE=M056G;LINKAGE=NA

$\Gamma(\eta\eta) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{36}\Gamma_{96}/\Gamma$

NODE=M056G06
NODE=M056G06

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
9.4±2.3±1.2	22	[1] UEHARA	10A	BELL	10.6 $e^+e^- \to e^+e^-\eta\eta$

[1] Interference with the continuum not included.
NODE=M056G06;LINKAGE=UE

$\Gamma(\omega\omega) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{39}\Gamma_{96}/\Gamma$

NODE=M056G02
NODE=M056G02

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<3.9	90	[1] LIU	12B	BELL	$\gamma\gamma \to 2(\pi^+\pi^-\pi^0)$

[1] Using B($\omega \to \pi^+\pi^-\pi^0$) = (89.2 ± 0.7)%.
NODE=M056G02;LINKAGE=LI

$\Gamma(\omega\phi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{40}\Gamma_{96}/\Gamma$

NODE=M056G03
NODE=M056G03

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.34	90	[1] LIU	12B	BELL	$\gamma\gamma \to K^+K^-\pi^+\pi^-\pi^0$

[1] Using B($\phi \to K^+K^-$) = (48.9 ± 0.5)% and B($\omega \to \pi^+\pi^-\pi^0$) = (89.2 ± 0.7)%.
NODE=M056G03;LINKAGE=LI

$\Gamma(K^+K^-) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{42}\Gamma_{96}/\Gamma$

NODE=M056G4
NODE=M056G4

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
13.4±1.0 OUR FIT					
14.3±1.6±2.3	153 ± 17	NAKAZAWA	05	BELL	10.6 $e^+e^- \to e^+e^-K^+K^-$

$\Gamma(K^0_SK^0_S) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{43}\Gamma_{96}/\Gamma$

NODE=M056G5
NODE=M056G5

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
7.0 ±0.5 OUR FIT					
8.7 ±1.7 ±0.9	266	[1] UEHARA	13	BELL	$\gamma\gamma \to K^0_SK^0_S$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
7.00±0.65±0.71	134 ± 12	CHEN	07B	BELL	$e^+e^- \to e^+e^-\chi_{c0}$

[1] Supersedes CHEN 07B.
NODE=M056G5;LINKAGE=UE

$\Gamma(K^+K^-K^+K^-) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{51}\Gamma_{96}/\Gamma$

NODE=M056G11
NODE=M056G11

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
6.2±0.7 OUR FIT					
7.9±1.3±1.1	215 ± 36	UEHARA	08	BELL	$\gamma\gamma \to \chi_{c0} \to 2(K^+K^-)$

$\Gamma(\phi\phi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_{56}\Gamma_{96}/\Gamma$

NODE=M056G12
NODE=M056G12

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
1.76±0.18 OUR FIT					
1.72±0.33±0.14	56 ± 11	[1] LIU	12B	BELL	$\gamma\gamma \to 2(K^+K^-)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.3 ±0.9 ±0.4	23.6 ± 9.6	UEHARA	08	BELL	$\gamma\gamma \to \chi_{c0} \to 2(K^+K^-)$

[1] Supersedes UEHARA 08. Using B($\phi \to K^+K^-$) = (48.9 ± 0.5)%.

NODE=M056G12;LINKAGE=LI

$\chi_{c0}(1P)$ BRANCHING RATIOS

NODE=M056220

HADRONIC DECAYS

NODE=M056305

$\Gamma(2(\pi^+\pi^-))/\Gamma_{total}$ Γ_1/Γ

NODE=M056R2
NODE=M056R2

VALUE	DOCUMENT ID
0.0234±0.0018 OUR FIT	

$\Gamma(\rho^0\pi^+\pi^-)/\Gamma(2(\pi^+\pi^-))$ Γ_2/Γ_1

NODE=M056R54
NODE=M056R54

VALUE	DOCUMENT ID		TECN	COMMENT
0.39±0.12 OUR FIT				
0.39±0.12	TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c0}$

$\Gamma(\rho^0\pi^+\pi^-)/\Gamma_{total}$ Γ_2/Γ

NODE=M056R9
NODE=M056R9

VALUE	DOCUMENT ID
0.0091±0.0029 OUR FIT	

$\Gamma(f_0(980)f_0(980))/\Gamma_{total}$ Γ_4/Γ

NODE=M056R24
NODE=M056R24

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
6.6±2.1±0.1	36 ± 9	[1] ABLIKIM	04G	BES	$\psi(2S) \to \gamma 2\pi^+ 2\pi^-$

[1] ABLIKIM 04G reports $[\Gamma(\chi_{c0}(1P) \to f_0(980) f_0(980))/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))] = (6.5 \pm 1.6 \pm 1.3) \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R24;LINKAGE=AB

$\Gamma(\pi^+\pi^-\pi^0\pi^0)/\Gamma_{total}$ Γ_5/Γ

NODE=M056R62
NODE=M056R62

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
3.3±0.4±0.1	1751.4	[1] HE	08B	CLEO	$e^+e^- \to \gamma h^+ h^- h^0 h^0$

[1] HE 08B reports 3.54 ± 0.10 ± 0.43 ± 0.18 % from a measurement of $[\Gamma(\chi_{c0}(1P) \to \pi^+\pi^-\pi^0\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R62;LINKAGE=HE

$\Gamma(\rho^+\pi^-\pi^0 + c.c.)/\Gamma_{total}$ Γ_6/Γ

NODE=M056R63
NODE=M056R63

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
2.9±0.4±0.1	1358.5	[1,2] HE	08B	CLEO	$e^+e^- \to \gamma h^+ h^- h^0 h^0$

[1] HE 08B reports 3.04 ± 0.18 ± 0.42 ± 0.16 % from a measurement of $[\Gamma(\chi_{c0}(1P) \to \rho^+\pi^-\pi^0 + c.c.)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R63;LINKAGE=HE

[2] Calculated by us. We have added the values from HE 08B for $\rho^+\pi^-\pi^0$ and $\rho^-\pi^+\pi^0$ decays assuming uncorrelated statistical and fully correlated systematic uncertainties.

NODE=M056R63;LINKAGE=OC

$\Gamma(4\pi^0)/\Gamma_{total}$ Γ_7/Γ

NODE=M056R71
NODE=M056R71

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
3.3±0.4±0.1	3296	[1] ABLIKIM	11A	BES3	$e^+e^- \to \psi(2S) \to \gamma\chi_{c0}$

[1] ABLIKIM 11A reports $(3.34 \pm 0.06 \pm 0.44) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to 4\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.62 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R71;LINKAGE=AB

$\Gamma(\pi^+\pi^-K^+K^-)/\Gamma_{total}$ Γ_8/Γ

NODE=M056R3
NODE=M056R3

VALUE (units 10^{-3})	DOCUMENT ID
18.1±1.4 OUR FIT	

$\Gamma(K^+ \overline{K}^*(892)^0 \pi^- + c.c.)/\Gamma(\pi^+ \pi^- K^+ K^-)$ — Γ_{30}/Γ_8

NODE=M056R55

VALUE	DOCUMENT ID	TECN	COMMENT
0.41±0.09 OUR FIT			
0.41±0.10	TANENBAUM 78	MRK1	$\psi(2S) \to \gamma \chi_{c0}$

$\Gamma(K_0^*(1430)^0 \overline{K}_0^*(1430)^0 \to \pi^+ \pi^- K^+ K^-)/\Gamma_{total}$ — Γ_9/Γ

NODE=M056R36

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
$9.8^{+3.6}_{-2.8}\pm 0.2$	83	[1] ABLIKIM 05Q	BES2	$\psi(2S) \to \gamma \pi^+ \pi^- K^+ K^-$

[1] ABLIKIM 05Q reports $(10.44 \pm 2.37^{+3.05}_{-1.90}) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to K_0^*(1430)^0 \overline{K}_0^*(1430)^0 \to \pi^+ \pi^- K^+ K^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M056R36;LINKAGE=AB

$\Gamma(K_0^*(1430)^0 \overline{K}_2^*(1430)^0 + c.c. \to \pi^+ \pi^- K^+ K^-)/\Gamma_{total}$ — Γ_{10}/Γ

NODE=M056R37

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
$8.0^{+2.0}_{-2.4}\pm 0.2$	62	[1] ABLIKIM 05Q	BES2	$\psi(2S) \to \gamma \pi^+ \pi^- K^+ K^-$

[1] ABLIKIM 05Q reports $(8.49 \pm 1.66^{+1.32}_{-1.99}) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to K_0^*(1430)^0 \overline{K}_2^*(1430)^0 + c.c. \to \pi^+ \pi^- K^+ K^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M056R37;LINKAGE=AB

$\Gamma(K_1(1270)^+ K^- + c.c. \to \pi^+ \pi^- K^+ K^-)/\Gamma_{total}$ — Γ_{11}/Γ

NODE=M056R38

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
6.3±1.9±0.1	68	[1] ABLIKIM 05Q	BES2	$\psi(2S) \to \gamma \pi^+ \pi^- K^+ K^-$

[1] ABLIKIM 05Q reports $(6.66 \pm 1.31^{+1.60}_{-1.51}) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to K_1(1270)^+ K^- + c.c. \to \pi^+ \pi^- K^+ K^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. The measurement assumes $B(K_1(1270) \to K \rho(770)) = 42 \pm 6\%$. NODE=M056R38;LINKAGE=AB

$\Gamma(K_1(1400)^+ K^- + c.c. \to \pi^+ \pi^- K^+ K^-)/\Gamma_{total}$ — Γ_{12}/Γ

NODE=M056R39

VALUE (units 10^{-3})	CL%	DOCUMENT ID	TECN	COMMENT
<2.7	90	[1] ABLIKIM 05Q	BES2	$\psi(2S) \to \gamma \pi^+ \pi^- K^+ K^-$

[1] ABLIKIM 05Q reports $< 2.85 \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to K_1(1400)^+ K^- + c.c. \to \pi^+ \pi^- K^+ K^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = 9.79 \times 10^{-2}$. The measurement assumes $B(K_1(1400) \to K^*(892)\pi) = 94 \pm 6\%$. NODE=M056R39;LINKAGE=AB

$\Gamma(f_0(980) f_0(980))/\Gamma_{total}$ — Γ_{13}/Γ

NODE=M056R28

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
$16.2^{+10.4}_{-\ 9.0}\pm 0.3$	28	[1] ABLIKIM 05Q	BES2	$\psi(2S) \to \gamma \pi^+ \pi^- K^+ K^-$

[1] ABLIKIM 05Q reports $[\Gamma(\chi_{c0}(1P) \to f_0(980) f_0(980))/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c0}(1P))] = (1.59 \pm 0.50^{+0.89}_{-0.72}) \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. One of the $f_0(980)$ mesons is identified via decay to $\pi^+ \pi^-$ while the other via $K^+ K^-$ decay. NODE=M056R28;LINKAGE=AB

$\Gamma(f_0(980) f_0(2200))/\Gamma_{total}$ — Γ_{14}/Γ

NODE=M056R29

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
$7.9^{+2.0}_{-2.5}\pm 0.2$	77	[1] ABLIKIM 05Q	BES2	$\psi(2S) \to \gamma \pi^+ \pi^- K^+ K^-$

[1] ABLIKIM 05Q reports $(8.42 \pm 1.42^{+1.65}_{-2.29}) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to f_0(980) f_0(2200))/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. The f_0 mesons are identified via $f_0(980) \to \pi^+\pi^-$ and $f_0(2200) \to K^+K^-$ decays. NODE=M056R29;LINKAGE=AB

$\Gamma(f_0(1370) f_0(1370))/\Gamma_{total}$ Γ_{15}/Γ

NODE=M056R30
NODE=M056R30

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<2.7	90	[1] ABLIKIM	05Q	BES2	$\psi(2S) \to \gamma\pi^+\pi^- K^+K^-$

[1] ABLIKIM 05Q reports $< 2.9 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to f_0(1370) f_0(1370))/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = 9.79 \times 10^{-2}$. One of the $f_0(1370)$ mesons is identified via decay to $\pi^+\pi^-$ while the other via K^+K^- decay. Both branching fractions for these f_0 decays are implicitly included in the quoted result. NODE=M056R30;LINKAGE=AB

$\Gamma(f_0(1370) f_0(1500))/\Gamma_{total}$ Γ_{16}/Γ

NODE=M056R31
NODE=M056R31

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.7	90	[1] ABLIKIM	05Q	BES2	$\psi(2S) \to \gamma\pi^+\pi^- K^+K^-$

[1] ABLIKIM 05Q reports $< 1.8 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to f_0(1370) f_0(1500))/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = 9.79 \times 10^{-2}$. The f_0 mesons are identified via $f_0(1370) \to \pi^+\pi^-$ and $f_0(1500) \to K^+K^-$ decays. Both branching fractions for these f_0 decays are implicitly included in the quoted result. NODE=M056R31;LINKAGE=AB

$\Gamma(f_0(1370) f_0(1710))/\Gamma_{total}$ Γ_{17}/Γ

NODE=M056R32
NODE=M056R32

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
$6.7^{+3.5}_{-2.3} \pm 0.1$	61	[1] ABLIKIM	05Q	BES2	$\psi(2S) \to \gamma\pi^+\pi^- K^+K^-$

[1] ABLIKIM 05Q reports $(7.12 \pm 1.85^{+3.28}_{-1.68}) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to f_0(1370) f_0(1710))/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. The f_0 mesons are identified via $f_0(1370) \to \pi^+\pi^-$ and $f_0(1710) \to K^+K^-$ decays. Both branching fractions for these f_0 decays are implicitly included in the quoted result. NODE=M056R32;LINKAGE=AB

$\Gamma(f_0(1500) f_0(1370))/\Gamma_{total}$ Γ_{18}/Γ

NODE=M056R33
NODE=M056R33

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.3	90	[1] ABLIKIM	05Q	BES2	$\psi(2S) \to \gamma\pi^+\pi^- K^+K^-$

[1] ABLIKIM 05Q reports $< 1.4 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to f_0(1500) f_0(1370))/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = 9.79 \times 10^{-2}$. The f_0 mesons are identified via $f_0(1500) \to \pi^+\pi^-$ and $f_0(1370) \to K^+K^-$ decays. Both branching fractions for these f_0 decays are implicitly included in the quoted result. NODE=M056R33;LINKAGE=AB

$\Gamma(f_0(1500) f_0(1500))/\Gamma_{total}$ Γ_{19}/Γ

NODE=M056R34
NODE=M056R34

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.5	90	[1] ABLIKIM	05Q	BES2	$\psi(2S) \to \gamma\pi^+\pi^- K^+K^-$

[1] ABLIKIM 05Q reports $< 0.55 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to f_0(1500) f_0(1500))/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = 9.79 \times 10^{-2}$. One of the $f_0(1500)$ is identified via decay to $\pi^+\pi^-$ while the other via K^+K^- decay. Both branching fractions for these f_0 decays are implicitly included in the quoted result. NODE=M056R34;LINKAGE=AB

$\Gamma(f_0(1500)\,f_0(1710))/\Gamma_{total}$ — Γ_{20}/Γ

NODE=M056R35
NODE=M056R35

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.7	90	[1] ABLIKIM	05Q	BES2	$\psi(2S) \to \gamma\pi^+\pi^- K^+ K^-$

[1] ABLIKIM 05Q reports $< 0.73 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to f_0(1500)\,f_0(1710))/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = 9.79 \times 10^{-2}$. The f_0 mesons are identified via $f_0(1500) \to \pi^+\pi^-$ and $f_0(1710) \to K^+K^-$ decays. Both branching fractions for these f_0 decays are implicitly included in the quoted result.

NODE=M056R35;LINKAGE=AB

$\Gamma(K^+K^-\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{21}/Γ

NODE=M056R85
NODE=M056R85

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
8.61±0.13±0.94	9.0k	[1] ABLIKIM	13B	BES3	$e^+e^- \to \psi(2S) \to \gamma\chi_{c0}$

[1] Using 1.06×10^8 $\psi(2S)$ mesons and $B(\psi(2S) \to \chi_{c0}\gamma) = (9.68 \pm 0.31)\%$.

NODE=M056R85;LINKAGE=A

$\Gamma(K^0_S K^\pm\pi^\mp\pi^+\pi^-)/\Gamma_{total}$ — Γ_{22}/Γ

NODE=M056R86
NODE=M056R86

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
4.22±0.10±0.43	2.7k	[1] ABLIKIM	13B	BES3	$e^+e^- \to \psi(2S) \to \gamma\chi_{c0}$

[1] Using 1.06×10^8 $\psi(2S)$ mesons and $B(\psi(2S) \to \chi_{c0}\gamma) = (9.68 \pm 0.31)\%$.

NODE=M056R86;LINKAGE=A

$\Gamma(K^+K^-\pi^0\pi^0)/\Gamma_{total}$ — Γ_{23}/Γ

NODE=M056R64
NODE=M056R64

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.56±0.09±0.01	213.5	[1] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^- h^0 h^0$

[1] HE 08B reports $0.59 \pm 0.05 \pm 0.08 \pm 0.03$ % from a measurement of $[\Gamma(\chi_{c0}(1P) \to K^+K^-\pi^0\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R64;LINKAGE=HE

$\Gamma(K^+\pi^-\overline{K}^0\pi^0 + \text{c.c.})/\Gamma_{total}$ — Γ_{24}/Γ

NODE=M056R66
NODE=M056R66

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
2.49±0.33±0.05	401.7	[1] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^- h^0 h^0$

[1] HE 08B reports $2.64 \pm 0.15 \pm 0.31 \pm 0.14$ % from a measurement of $[\Gamma(\chi_{c0}(1P) \to K^+\pi^-\overline{K}^0\pi^0 + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R66;LINKAGE=HE

$\Gamma(\rho^+K^-K^0 + \text{c.c.})/\Gamma_{total}$ — Γ_{25}/Γ

NODE=M056R67
NODE=M056R67

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
1.21±0.21±0.02	179.7	[1] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^- h^0 h^0$

[1] HE 08B reports $1.28 \pm 0.16 \pm 0.15 \pm 0.07$ % from a measurement of $[\Gamma(\chi_{c0}(1P) \to \rho^+K^-K^0 + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R67;LINKAGE=HE

$\Gamma(K^*(892)^-K^+\pi^0 \to K^+\pi^-\overline{K}^0\pi^0 + \text{c.c.})/\Gamma_{total}$ — Γ_{26}/Γ

NODE=M056R68
NODE=M056R68

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.46±0.12±0.01	64.1	[1] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^- h^0 h^0$

[1] HE 08B reports $0.49 \pm 0.10 \pm 0.07 \pm 0.03$ % from a measurement of $[\Gamma(\chi_{c0}(1P) \to K^*(892)^-K^+\pi^0 \to K^+\pi^-\overline{K}^0\pi^0 + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R68;LINKAGE=HE

$\Gamma(K^0_S K^0_S \pi^+\pi^-)/\Gamma_{total}$ — Γ_{27}/Γ

NODE=M056R47
NODE=M056R47

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
5.7±1.0±0.1	152 ± 14	[1] ABLIKIM	05O	BES2	$\psi(2S) \to \gamma\chi_{c0}$

[1] ABLIKIM 05O reports $[\Gamma(\chi_{c0}(1P) \to K^0_S K^0_S \pi^+\pi^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))] = (0.558 \pm 0.051 \pm 0.089) \times 10^{-3}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R47;LINKAGE=AB

$\Gamma(K^+K^-\eta\pi^0)/\Gamma_{total}$ — Γ_{28}/Γ

NODE=M056R69

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.30±0.07±0.01	56.4	[1] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^-h^0h^0$

[1] HE 08B reports $0.32 \pm 0.05 \pm 0.05 \pm 0.02$ % from a measurement of $[\Gamma(\chi_{c0}(1P) \to K^+K^-\eta\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R69;LINKAGE=HE

$\Gamma(3(\pi^+\pi^-))/\Gamma_{total}$ — Γ_{29}/Γ

NODE=M056R4

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
12.0±1.8 OUR EVALUATION	Treating systematic error as correlated.			
12.0±1.7 OUR AVERAGE				
11.7±1.0±1.9	[1] BAI	99B	BES	$\psi(2S) \to \gamma\chi_{c0}$
12.5±2.9±0.5	[1] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c0}$

→ UNCHECKED ←

[1] Rescaled by us using $B(\psi(2S) \to \gamma\chi_{c0}) = (9.4 \pm 0.4)\%$ and $B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) = (32.6 \pm 0.5)\%$.

NODE=M056R;LINKAGE=X1

$\Gamma(K^+\overline{K}^*(892)^0\pi^- + c.c.)/\Gamma_{total}$ — Γ_{30}/Γ

NODE=M056R10

VALUE	DOCUMENT ID
0.0075±0.0016 OUR FIT	

$\Gamma(K^*(892)^0\overline{K}^*(892)^0)/\Gamma_{total}$ — Γ_{31}/Γ

NODE=M056R26

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{1.72^{+0.60}_{-0.54}\pm0.04}$	64	[1] ABLIKIM	05Q	BES2	$\psi(2S) \to \gamma\pi^+\pi^-K^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.56±0.40±0.03	30 ± 6	[2,3] ABLIKIM	04H	BES	Repl. by ABLIKIM 05Q

[1] ABLIKIM 05Q reports $[\Gamma(\chi_{c0}(1P) \to K^*(892)^0\overline{K}^*(892)^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))] = (0.168 \pm 0.035^{+0.047}_{-0.040}) \times 10^{-3}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R26;LINKAGE=AI

[2] Assumes $B(K^*(892)^0 \to K^-\pi^+) = 2/3$.

NODE=M056R;LINKAGE=AL

[3] ABLIKIM 04H reports $[\Gamma(\chi_{c0}(1P) \to K^*(892)^0\overline{K}^*(892)^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))] = (1.53 \pm 0.29 \pm 0.26) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R26;LINKAGE=AB

$\Gamma(\pi\pi)/\Gamma_{total}$ — Γ_{32}/Γ

NODE=M056R22

VALUE (units 10^{-3})	DOCUMENT ID
8.51±0.33 OUR FIT	

$\Gamma(\pi^0\eta_c)/\Gamma_{total}$ — Γ_{35}/Γ

NODE=M056R00

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$\mathbf{<1.6\times10^{-3}}$	90	[1] ABLIKIM	15N	BES3	$\psi(2s)e^+e^- \to \gamma\pi^0\eta_c$

[1] Using $B(\eta_c \to K^0_S K^\pm\pi^\mp) \times B(K^0_S \to \pi^+\pi^-) \times B(\pi^0 \to \gamma\gamma) = (1.66 \pm 0.11) \times 10^{-2}$.

NODE=M056R00;LINKAGE=A

$\Gamma(\eta\eta)/\Gamma_{total}$ — Γ_{36}/Γ

NODE=M056R13

VALUE (units 10^{-3})	DOCUMENT ID
3.01±0.19 OUR FIT	

$\Gamma(\eta\eta)/\Gamma(\pi\pi)$ — Γ_{36}/Γ_{32}

NODE=M056R20

VALUE	DOCUMENT ID		TECN	COMMENT
0.353±0.025 OUR FIT				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.26 \pm 0.09\ ^{+0.03}_{-0.02}$	[1] ANDREOTTI	05C	E835	$\overline{p}p \to$ 2 mesons
0.24 ±0.10 ±0.08	[1] BAI	03C	BES	$\psi(2S) \to 5\gamma$

[1] We have multiplied $\pi^0\pi^0$ measurement by 3 to obtain $\pi\pi$.

NODE=M056R;LINKAGE=D1

$\Gamma(\eta\eta')/\Gamma_{total}$ Γ_{37}/Γ

NODE=M056R03
NODE=M056R03

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
9.1±1.1±0.2		85	[1] ABLIKIM	17AI	BES3	$\psi(2S) \to \gamma\eta'\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<24	90	35 ± 13	[2] ASNER	09	CLEO	$\psi(2S) \to \gamma\eta'\eta$
<50	90		[3] ADAMS	07	CLEO	$\psi(2S) \to \gamma\chi_{c0}$

[1] ABLIKIM 17AI reports $(8.92\pm0.84\pm0.65)\times10^{-5}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \eta\eta')/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.99 \pm 0.27) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M056R03;LINKAGE=A

[2] ASNER 09 reports $< 0.25 \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \eta\eta')/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.22\pm0.11\pm0.46)\times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = 9.79 \times 10^{-2}$. NODE=M056R03;LINKAGE=AS

[3] Superseded by ASNER 09. ADAMS 07 reports $< 0.5 \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \eta\eta')/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.22\pm0.11\pm0.46)\times10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = 9.79 \times 10^{-2}$. NODE=M056R03;LINKAGE=AD

$\Gamma(\eta'\eta')/\Gamma_{total}$ Γ_{38}/Γ

NODE=M056R04
NODE=M056R04

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
2.17±0.12 OUR AVERAGE					
2.23±0.13±0.05	2.5k	[1] ABLIKIM	17AI	BES3	$\psi(2S) \to \gamma\eta'\eta'$
2.00±0.21±0.04	0.4k	[2] ASNER	09	CLEO	$\psi(2S) \to \gamma\eta'\eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.60±0.41±0.03	23	[3] ADAMS	07	CLEO	$\psi(2S) \to \gamma\chi_{c0}$

[1] ABLIKIM 17AI reports $(2.19\pm0.03\pm0.14)\times10^{-3}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \eta'\eta')/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.99 \pm 0.27) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M056R04;LINKAGE=A

[2] ASNER 09 reports $(2.12 \pm 0.13 \pm 0.21) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \eta'\eta')/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M056R04;LINKAGE=AS

[3] Superseded by ASNER 09. ADAMS 07 reports $(1.7 \pm 0.4 \pm 0.2) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \eta'\eta')/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = 0.0922 \pm 0.0011 \pm 0.0046$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M056R04;LINKAGE=AD

$\Gamma(\omega\omega)/\Gamma_{total}$ Γ_{39}/Γ

NODE=M056R27
NODE=M056R27

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.97±0.11 OUR AVERAGE					
0.93±0.11±0.02	991	[1] ABLIKIM	11K	BES3	$\psi(2S) \to \gamma$ hadrons
2.16±0.66±0.04	38.1 ± 9.6	[2] ABLIKIM	05N	BES2	$\psi(2S) \to \gamma\chi_{c0} \to \gamma 6\pi$

[1] ABLIKIM 11K reports $(0.95\pm0.03\pm0.11)\times10^{-3}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \omega\omega)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.62 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M056R27;LINKAGE=AL

[2] ABLIKIM 05N reports $[\Gamma(\chi_{c0}(1P) \to \omega\omega)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))] = (0.212 \pm 0.053 \pm 0.037) \times 10^{-3}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M056R27;LINKAGE=AB

$\Gamma(\omega\phi)/\Gamma_{total}$ Γ_{40}/Γ

NODE=M056R76
NODE=M056R76

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.41±0.13±0.03	486	[1] ABLIKIM	19J	BES3	$\psi(2S) \to \gamma$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.18±0.22±0.02	76	[2,3] ABLIKIM	11K	BES3	$\psi(2S) \to \gamma$ hadrons

[1] ABLIKIM 19J reports $[\Gamma(\chi_{c0}(1P) \to \omega\phi)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))] = (13.83 \pm 0.70 \pm 1.01) \times 10^{-6}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M056R76;LINKAGE=A

[2] ABLIKIM 11K reports $(1.2 \pm 0.1 \pm 0.2) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \omega\phi)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.62 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M056R76;LINKAGE=AL

[3] Superseded by ABLIKIM 19J. NODE=M056R76;LINKAGE=B

$\Gamma(\omega K^+ K^-)/\Gamma_{total}$ Γ_{41}/Γ

NODE=M056R87
NODE=M056R87

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.94±0.06±0.20	1.4k	[1] ABLIKIM	13B	BES3	$e^+ e^- \to \psi(2S) \to \gamma\chi_{c0}$

[1] Using 1.06×10^8 $\psi(2S)$ mesons and $B(\psi(2S) \to \chi_{c0}\gamma) = (9.68 \pm 0.31)\%$. NODE=M056R87;LINKAGE=A

$\Gamma(K^+ K^-)/\Gamma_{total}$ Γ_{42}/Γ

NODE=M056R6
NODE=M056R6

VALUE (units 10^{-3})	DOCUMENT ID
6.05±0.31 OUR FIT	

$\Gamma(K^0_S K^0_S)/\Gamma_{total}$ Γ_{43}/Γ

NODE=M056R15
NODE=M056R15

VALUE (units 10^{-3})	DOCUMENT ID
3.16±0.17 OUR FIT	

$\Gamma(K^0_S K^0_S)/\Gamma(\pi\pi)$ Γ_{43}/Γ_{32}

NODE=M056R53
NODE=M056R53

VALUE	DOCUMENT ID		TECN	COMMENT
0.371±0.023 OUR FIT				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.31 ±0.05 ±0.05	[1,2] CHEN	07B	BELL	$e^+ e^- \to e^+ e^- \chi_{c0}$

[1] Using $\Gamma(\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ from the $\pi^+\pi^-$ measurement of NAKAZAWA 05 rescaled by 3/2 to convert to $\pi\pi$. NODE=M056R53;LINKAGE=CH

[2] Not independent from other measurements. NODE=M056R53;LINKAGE=NI

$\Gamma(K^0_S K^0_S)/\Gamma(K^+ K^-)$ Γ_{43}/Γ_{42}

NODE=M056R52
NODE=M056R52

VALUE	DOCUMENT ID		TECN	COMMENT
0.52±0.04 OUR FIT				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.49±0.07±0.08	[1,2] CHEN	07B	BELL	$e^+ e^- \to e^+ e^- \chi_{c0}$

[1] Using $\Gamma(K^+ K^-) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ from NAKAZAWA 05. NODE=M056R52;LINKAGE=CH

[2] Not independent from other measurements. NODE=M056R52;LINKAGE=NI

$\Gamma(\pi^+\pi^-\eta)/\Gamma_{total}$ Γ_{44}/Γ

NODE=M056R08
NODE=M056R08

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.20	90	[1] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.0	90	[2] ABLIKIM	06R	BES2	$\psi(2S) \to \gamma\chi_{c0}$

[1] ATHAR 07 reports $< 0.21 \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \pi^+\pi^-\eta)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = 9.79 \times 10^{-2}$. NODE=M056R08;LINKAGE=AT

[2] ABLIKIM 06R reports $< 1.1 \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \pi^+\pi^-\eta)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = 9.79 \times 10^{-2}$. NODE=M056R08;LINKAGE=AB

$\Gamma(\pi^+\pi^-\eta')/\Gamma_{total}$ Γ_{45}/Γ

NODE=M056R51
NODE=M056R51

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.4	90	[1] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[1] ATHAR 07 reports $< 0.38 \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \pi^+\pi^-\eta')/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = 9.79 \times 10^{-2}$. NODE=M056R51;LINKAGE=AT

$\Gamma(\overline{K}^0 K^+ \pi^- + c.c.)/\Gamma_{total}$ — Γ_{46}/Γ

NODE=M056R17

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.09	90	[1] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.7	90	[2,3] ABLIKIM	06R	BES2	$\psi(2S) \to \gamma \chi_{c0}$
<0.7	90	[3,4] BAI	99B	BES	$\psi(2S) \to \gamma \chi_{c0}$

[1] ATHAR 07 reports $< 0.10 \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \overline{K}^0 K^+ \pi^- + c.c.)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = 9.79 \times 10^{-2}$. NODE=M056R17;LINKAGE=AT

[2] ABLIKIM 06R reports $< 0.70 \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \overline{K}^0 K^+ \pi^- + c.c.)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = 9.79 \times 10^{-2}$. NODE=M056R17;LINKAGE=AB

[3] We have multiplied the $K^0_S K^+ \pi^-$ measurement by a factor of 2 to convert to $K^0 K^+ \pi^-$. NODE=M056R17;LINKAGE=BA

[4] Rescaled by us using $B(\psi(2S) \to \gamma \chi_{c0}) = (9.4 \pm 0.4)\%$ and $B(\psi(2S) \to J/\psi(1S) \pi^+ \pi^-) = (32.6 \pm 0.5)\%$. NODE=M056R17;LINKAGE=X1

$\Gamma(K^+ K^- \pi^0)/\Gamma_{total}$ — Γ_{47}/Γ

NODE=M056R05

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.06	90	[1] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[1] ATHAR 07 reports $< 0.06 \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to K^+ K^- \pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = 9.79 \times 10^{-2}$. NODE=M056R05;LINKAGE=AT

$\Gamma(K^+ K^- \eta)/\Gamma_{total}$ — Γ_{48}/Γ

NODE=M056R09

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.23	90	[1] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[1] ATHAR 07 reports $< 0.24 \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to K^+ K^- \eta)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = 9.79 \times 10^{-2}$. NODE=M056R09;LINKAGE=AT

$\Gamma(K^+ K^- K^0_S K^0_S)/\Gamma_{total}$ — Γ_{49}/Γ

NODE=M056R48

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.41±0.47±0.03	16.8 ± 4.8	[1] ABLIKIM	05O	BES2	$\psi(2S) \to \gamma \chi_{c0}$

[1] ABLIKIM 05O reports $[\Gamma(\chi_{c0}(1P) \to K^+ K^- K^0_S K^0_S)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c0}(1P))] = (0.138 \pm 0.039 \pm 0.025) \times 10^{-3}$ which we divide by our best value $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M056R48;LINKAGE=AB

$\Gamma(K^0_S K^0_S K^0_S K^0_S)/\Gamma_{total}$ — Γ_{50}/Γ

NODE=M056R95

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
5.8±0.5±0.1	319	[1] ABLIKIM	19AA	BES3	$\psi(2S) \to \gamma 4K^0_S$

[1] Using $B(K^0_S \to \pi^+ \pi^-) = (69.20 \pm 0.05)\%$. ABLIKIM 19AA reports $[\Gamma(\chi_{c0}(1P) \to K^0_S K^0_S K^0_S K^0_S)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c0}(1P))] = (5.64 \pm 0.33 \pm 0.37) \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.. NODE=M056R95;LINKAGE=A

$\Gamma(K^+ K^- K^+ K^-)/\Gamma_{total}$ — Γ_{51}/Γ

NODE=M056R14

VALUE (units 10^{-3})	DOCUMENT ID
2.82±0.29 OUR FIT	

$\Gamma(K^+ K^- \phi)/\Gamma_{total}$ — Γ_{52}/Γ

NODE=M056R01

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.97±0.25±0.02	38	[1] ABLIKIM	06T	BES2	$\psi(2S) \to \gamma 2K^+ 2K^-$

[1] ABLIKIM 06T reports $(1.03 \pm 0.22 \pm 0.15) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to K^+ K^- \phi)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M056R01;LINKAGE=AB

$\Gamma(\overline{K}^0 K^+ \pi^- \phi + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{53}/Γ

NODE=M056R90

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
3.68±0.30±0.50	ABLIKIM	15M	BES3	$\psi(2S) \to \gamma\chi_{c0}$

$\Gamma(K^+ K^- \pi^0 \phi)/\Gamma_{\text{total}}$ Γ_{54}/Γ

NODE=M056R91

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
1.90±0.14±0.32	ABLIKIM	15M	BES3	$\psi(2S) \to \gamma\chi_{c0}$

$\Gamma(\phi\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}$ Γ_{55}/Γ

NODE=M056R88

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.18±0.07±0.13	538	[1] ABLIKIM	13B	BES3	$e^+e^- \to \psi(2S) \to \gamma\chi_{c0}$

[1] Using 1.06×10^8 $\psi(2S)$ mesons and B($\psi(2S) \to \chi_{c0}\gamma$) = (9.68 ± 0.31)%.

NODE=M056R88;LINKAGE=A

$\Gamma(\phi\phi)/\Gamma_{\text{total}}$ Γ_{56}/Γ

NODE=M056R16

VALUE (units 10^{-3})	DOCUMENT ID
0.80±0.07 OUR FIT	

$\Gamma(\phi\phi\eta)/\Gamma_{\text{total}}$ Γ_{57}/Γ

NODE=M056R98

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
8.4±0.7±0.6	186.6	[1] ABLIKIM	20B	BES3	$\psi(2S) \to \gamma\phi\phi\eta$

[1] ABLIKIM 20B reports $(8.41 \pm 0.74 \pm 0.62) \times 10^{-4}$ from a measurement of [$\Gamma(\chi_{c0}(1P) \to \phi\phi\eta)/\Gamma_{\text{total}}$] × [B($\psi(2S) \to \gamma\chi_{c0}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c0}(1P)$) = $(9.79 \pm 0.20) \times 10^{-2}$.

NODE=M056R98;LINKAGE=A

$\Gamma(p\overline{p})/\Gamma_{\text{total}}$ Γ_{58}/Γ

NODE=M056R11

VALUE (units 10^{-4})	DOCUMENT ID
2.21±0.08 OUR FIT	

$\Gamma(p\overline{p}\pi^0)/\Gamma_{\text{total}}$ Γ_{59}/Γ

NODE=M056R06

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.70±0.07 OUR AVERAGE	Error includes scale factor of 1.3.			
0.73±0.06±0.01	[1] ONYISI	10	CLE3	$\psi(2S) \to \gamma p\overline{p}X$
0.56±0.12±0.01	[2] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+h^-h^0$

[1] ONYISI 10 reports $(7.76 \pm 0.37 \pm 0.51 \pm 0.39) \times 10^{-4}$ from a measurement of [$\Gamma(\chi_{c0}(1P) \to p\overline{p}\pi^0)/\Gamma_{\text{total}}$] × [B($\psi(2S) \to \gamma\chi_{c0}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c0}(1P)$) = $(9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c0}(1P)$) = $(9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R06;LINKAGE=ON

[2] ATHAR 07 reports $(0.59 \pm 0.10 \pm 0.08) \times 10^{-3}$ from a measurement of [$\Gamma(\chi_{c0}(1P) \to p\overline{p}\pi^0)/\Gamma_{\text{total}}$] × [B($\psi(2S) \to \gamma\chi_{c0}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c0}(1P)$) = $(9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c0}(1P)$) = $(9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R06;LINKAGE=AT

$\Gamma(p\overline{p}\eta)/\Gamma_{\text{total}}$ Γ_{60}/Γ

NODE=M056R50

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.35±0.04 OUR AVERAGE				
0.35±0.04±0.01	[1] ONYISI	10	CLE3	$\psi(2S) \to \gamma p\overline{p}X$
0.37±0.11±0.01	[2] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+h^-h^0$

[1] ONYISI 10 reports $(3.73 \pm 0.38 \pm 0.28 \pm 0.19) \times 10^{-4}$ from a measurement of [$\Gamma(\chi_{c0}(1P) \to p\overline{p}\eta)/\Gamma_{\text{total}}$] × [B($\psi(2S) \to \gamma\chi_{c0}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c0}(1P)$) = $(9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c0}(1P)$) = $(9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R50;LINKAGE=ON

[2] ATHAR 07 reports $(0.39 \pm 0.11 \pm 0.04) \times 10^{-3}$ from a measurement of [$\Gamma(\chi_{c0}(1P) \to p\overline{p}\eta)/\Gamma_{\text{total}}$] × [B($\psi(2S) \to \gamma\chi_{c0}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c0}(1P)$) = $(9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c0}(1P)$) = $(9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R50;LINKAGE=AT

$\Gamma(p\overline{p}\omega)/\Gamma_{total}$ Γ_{61}/Γ

NODE=M056R70
NODE=M056R70

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.52±0.06±0.01	[1] ONYISI	10	CLE3	$\psi(2S) \to \gamma p\overline{p}X$

[1] ONYISI 10 reports $(5.57 \pm 0.48 \pm 0.42 \pm 0.14) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to p\overline{p}\omega)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R70;LINKAGE=ON

$\Gamma(p\overline{p}\phi)/\Gamma_{total}$ Γ_{62}/Γ

NODE=M056R75
NODE=M056R75

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
6.0±1.4±0.1	42 ± 8	[1] ABLIKIM	11F	BES3	$\psi(2S) \to \gamma p\overline{p}K^+K^-$

[1] ABLIKIM 11F reports $(6.12 \pm 1.18 \pm 0.86) \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to p\overline{p}\phi)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.62 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R75;LINKAGE=AB

$\Gamma(p\overline{p}\pi^+\pi^-)/\Gamma_{total}$ Γ_{63}/Γ

NODE=M056R7
NODE=M056R7

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
2.1 ±0.7 OUR EVALUATION Error includes scale factor of 1.4. Treating systematic error as correlated.				
2.1 ±1.0 OUR AVERAGE Error includes scale factor of 2.0.				
1.57±0.21±0.53	[1] BAI	99B	BES	$\psi(2S) \to \gamma\chi_{c0}$
4.20±1.15±0.18	[1] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c0}$

→ UNCHECKED ←

[1] Rescaled by us using $B(\psi(2S) \to \gamma\chi_{c0}) = (9.4 \pm 0.4)\%$ and $B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) = (32.6 \pm 0.5)\%$.

NODE=M056R7;LINKAGE=X1

$\Gamma(p\overline{p}\pi^0\pi^0)/\Gamma_{total}$ Γ_{64}/Γ

NODE=M056R65
NODE=M056R65

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.104±0.028±0.002	39.5	[1] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^-h^0h^0$

[1] HE 08B reports $0.11 \pm 0.02 \pm 0.02 \pm 0.01$ % from a measurement of $[\Gamma(\chi_{c0}(1P) \to p\overline{p}\pi^0\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R65;LINKAGE=HE

$\Gamma(p\overline{p}K^+K^-\text{(non-resonant)})/\Gamma_{total}$ Γ_{65}/Γ

NODE=M056R72
NODE=M056R72

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.22±0.26±0.02	48 ± 8	[1] ABLIKIM	11F	BES3	$\psi(2S) \to \gamma p\overline{p}K^+K^-$

[1] ABLIKIM 11F reports $(1.24 \pm 0.20 \pm 0.18) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to p\overline{p}K^+K^-\text{(non-resonant)})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.62 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R72;LINKAGE=AB

$\Gamma(p\overline{p}K^0_SK^0_S)/\Gamma_{total}$ Γ_{66}/Γ

NODE=M056R46
NODE=M056R46

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<8.8	90	[1] ABLIKIM	06D	BES2	$\psi(2S) \to \chi_{c0}\gamma$

[1] Using $B(\psi(2S) \to \chi_{c0}\gamma) = (9.2 \pm 0.5)\%$

NODE=M056R;LINKAGE=AB

$\Gamma(p\overline{n}\pi^-)/\Gamma_{total}$ Γ_{67}/Γ

NODE=M056R49
NODE=M056R49

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
12.7±1.1 OUR AVERAGE					
12.9±1.1±0.3	5150	[1] ABLIKIM	12J	BES3	$\psi(2S) \to \gamma p\overline{n}\pi^-$
11.2±3.1±0.2		[2] ABLIKIM	06I	BES2	$\psi(2S) \to \gamma p\pi^-X$

[1] ABLIKIM 12J reports $[\Gamma(\chi_{c0}(1P) \to p\overline{n}\pi^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))] = (1.26 \pm 0.02 \pm 0.11) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R49;LINKAGE=AL

[2] ABLIKIM 06I reports $[\Gamma(\chi_{c0}(1P) \to p\overline{n}\pi^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))] = (1.10 \pm 0.24 \pm 0.18) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R49;LINKAGE=AB

$\Gamma(\overline{p} n \pi^+)/\Gamma_{total}$ Γ_{68}/Γ

NODE=M056R82

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
13.7±1.2±0.3	5808	[1] ABLIKIM	12J	BES3	$\psi(2S) \to \gamma \overline{p} n \pi^+$

[1] ABLIKIM 12J reports $[\Gamma(\chi_{c0}(1P) \to \overline{p} n \pi^+)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c0}(1P))] = (1.34 \pm 0.03 \pm 0.11) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R82;LINKAGE=AL

$\Gamma(p \overline{n} \pi^- \pi^0)/\Gamma_{total}$ Γ_{69}/Γ

NODE=M056R83

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
23.4±2.0±0.5	2480	[1] ABLIKIM	12J	BES3	$\psi(2S) \to \gamma p \overline{n} \pi^- \pi^0$

[1] ABLIKIM 12J reports $[\Gamma(\chi_{c0}(1P) \to p \overline{n} \pi^- \pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c0}(1P))] = (2.29 \pm 0.08 \pm 0.18) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R83;LINKAGE=AL

$\Gamma(\overline{p} n \pi^+ \pi^0)/\Gamma_{total}$ Γ_{70}/Γ

NODE=M056R84

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
22.1±1.8±0.5	2757	[1] ABLIKIM	12J	BES3	$\psi(2S) \to \gamma \overline{p} n \pi^+ \pi^0$

[1] ABLIKIM 12J reports $[\Gamma(\chi_{c0}(1P) \to \overline{p} n \pi^+ \pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c0}(1P))] = (2.16 \pm 0.07 \pm 0.16) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R84;LINKAGE=AL

$\Gamma(\Lambda \overline{\Lambda})/\Gamma_{total}$ Γ_{71}/Γ

NODE=M056R23

VALUE (units 10^{-4})	DOCUMENT ID
3.59±0.15 OUR FIT	

[$(3.27 \pm 0.24) \times 10^{-4}$ OUR 2021 FIT]

NEW

$\Gamma(\Lambda \overline{\Lambda} \pi^+ \pi^-)/\Gamma_{total}$ Γ_{72}/Γ

NODE=M056R44

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
118±12±2		426	[1] ABLIKIM	12I	BES3	$\psi(2S) \to \gamma \Lambda \overline{\Lambda} \pi^+ \pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<400	90		[2] ABLIKIM	06D	BES2	$\psi(2S) \to \chi_{c0} \gamma$

[1] ABLIKIM 12I reports $(119.0 \pm 6.4 \pm 11.4) \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \Lambda \overline{\Lambda} \pi^+ \pi^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R44;LINKAGE=AL

[2] Using $B(\psi(2S) \to \chi_{c0} \gamma) = (9.2 \pm 0.5)\%$

NODE=M056R44;LINKAGE=AB

$\Gamma(\Lambda \overline{\Lambda} \pi^+ \pi^-$ (non-resonant)$)/\Gamma_{total}$ Γ_{73}/Γ

NODE=M056R77

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<50	90	[1] ABLIKIM	12I	BES3	$\psi(2S) \to \gamma \Lambda \overline{\Lambda} \pi^+ \pi^-$

[1] ABLIKIM 12I reports $< 54 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \Lambda \overline{\Lambda} \pi^+ \pi^-$ (non-resonant)$)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = 9.79 \times 10^{-2}$.

NODE=M056R77;LINKAGE=AL

$\Gamma(\Sigma(1385)^+ \overline{\Lambda} \pi^- +$ c.c.$)/\Gamma_{total}$ Γ_{74}/Γ

NODE=M056R78

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<50	90	[1] ABLIKIM	12I	BES3	$\psi(2S) \to \gamma \Sigma(1385)^+ \overline{\Lambda} \pi^-$

[1] ABLIKIM 12I reports $< 55 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \Sigma(1385)^+ \overline{\Lambda} \pi^- +$ c.c.$)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = 9.79 \times 10^{-2}$.

NODE=M056R78;LINKAGE=AL

$\Gamma(\Sigma(1385)^- \overline{\Lambda}\pi^+ + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{75}/Γ

NODE=M056R79

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<50	90	[1] ABLIKIM	12I	BES3	$\psi(2S) \to \gamma \Sigma(1385)^- \overline{\Lambda}\pi^+$

[1] ABLIKIM 12I reports $< 50 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \Sigma(1385)^- \overline{\Lambda}\pi^+ + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = 9.79 \times 10^{-2}$.

NODE=M056R79;LINKAGE=AL

$\Gamma(K^+ \overline{p}\Lambda + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{76}/Γ

NODE=M056R07

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.25±0.12 OUR AVERAGE Error includes scale factor of 1.3.					
1.30±0.09±0.03	9k	[1,2] ABLIKIM	13D	BES3	$\psi(2S) \to \gamma\Lambda\overline{p}K^+$
1.01±0.19±0.02		[3] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[1] ABLIKIM 13D reports $(1.32\pm0.03\pm0.10)\times10^{-3}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to K^+\overline{p}\Lambda + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R07;LINKAGE=AB

[2] Using $B(\Lambda \to p\pi^-) = 63.9\%$.

NODE=M056R07;LINKAGE=LB

[3] ATHAR 07 reports $(1.07 \pm 0.17 \pm 0.12)\times10^{-3}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to K^+\overline{p}\Lambda + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.22\pm0.11\pm0.46)\times10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R07;LINKAGE=AT

$\Gamma(K^*(892)^+ \overline{p}\Lambda + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{78}/Γ

NODE=M056R99

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
4.8±0.9±0.1	254	[1] ABLIKIM	19AU	BES3	$\psi(2S) \to \gamma K^{*+}\overline{p}\Lambda$

[1] ABLIKIM 19AU reports $[\Gamma(\chi_{c0}(1P) \to K^*(892)^+\overline{p}\Lambda + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))] = (4.7 \pm 0.7 \pm 0.5) \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R99;LINKAGE=A

$\Gamma(K^+ \overline{p}\Lambda(1520) + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{79}/Γ

NODE=M056R73

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.9±0.7±0.1	62 ± 12	[1] ABLIKIM	11F	BES3	$\psi(2S) \to \gamma p\overline{p}K^+K^-$

[1] ABLIKIM 11F reports $(3.00\pm0.58\pm0.50)\times10^{-4}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to K^+\overline{p}\Lambda(1520) + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.62 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R73;LINKAGE=AB

$\Gamma(nK^0_S\overline{\Lambda} + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{77}/Γ

NODE=M056P02

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
6.7±0.3±0.4	1284	[1] ABLIKIM	21AV	BES3	$\psi(2S) \to \gamma nK^0_S\overline{\Lambda}$ + c.c.

[1] ABLIKIM 21AV reports $(6.65 \pm 0.26 \pm 0.41) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to nK^0_S\overline{\Lambda} + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = 0.0979 \pm 0.0020$. Also uses $B(\overline{\Lambda} \to \overline{p}\pi^+) = (63.9 \pm 0.5)\%$ and $B(K^0_S \to \pi^+\pi^-) = (69.20 \pm 0.05)\%$.

NODE=M056P02;LINKAGE=A

$\Gamma(\Lambda(1520)\overline{\Lambda}(1520))/\Gamma_{\text{total}}$ Γ_{80}/Γ

NODE=M056R74

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.1±1.2±0.1	28 ± 10	[1] ABLIKIM	11F	BES3	$\psi(2S) \to \gamma p\overline{p}K^+K^-$

[1] ABLIKIM 11F reports $(3.18 \pm 1.11 \pm 0.53) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \Lambda(1520)\overline{\Lambda}(1520))/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.62 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R74;LINKAGE=AB

$\Gamma(\Sigma^0 \overline{\Sigma}^0)/\Gamma_{total}$ Γ_{81}/Γ

NODE=M056R59
NODE=M056R59

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
4.68±0.32 OUR AVERAGE				
4.82±0.34±0.10	1046	[1] ABLIKIM 18V	BES3	$\psi(2S) \to \gamma \Sigma^0 \overline{\Sigma}^0$
4.2 ±0.7 ±0.1	78 ± 10	[2] NAIK 08	CLEO	$\psi(2S) \to \gamma \Sigma^0 \overline{\Sigma}^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
4.7 ±0.5 ±0.1	243	[3,4] ABLIKIM 13H	BES3	$\psi(2S) \to \gamma \Sigma^0 \overline{\Sigma}^0$

[1] ABLIKIM 18V reports $[\Gamma(\chi_{c0}(1P) \to \Sigma^0 \overline{\Sigma}^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c0}(1P))] = (4.72 \pm 0.18 \pm 0.28) \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M056R59;LINKAGE=A

[2] NAIK 08 reports $(4.41 \pm 0.56 \pm 0.47) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \Sigma^0 \overline{\Sigma}^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M056R59;LINKAGE=NA

[3] ABLIKIM 13H reports $(4.78 \pm 0.34 \pm 0.39) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \Sigma^0 \overline{\Sigma}^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.62 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M056R59;LINKAGE=AB

[4] Superseded by ABLIKIM 18V NODE=M056R59;LINKAGE=B

$\Gamma(\Sigma^+ \overline{\Sigma}^-)/\Gamma_{total}$ Γ_{84}/Γ

NODE=M056R60
NODE=M056R60

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
4.6 ±0.8 OUR AVERAGE Error includes scale factor of 2.6.				
5.10±0.35±0.10	747	[1] ABLIKIM 18V	BES3	$\psi(2S) \to \gamma \Sigma^+ \overline{\Sigma}^-$
3.1 ±0.7 ±0.1	39 ± 7	[2] NAIK 08	CLEO	$\psi(2S) \to \gamma \Sigma^+ \overline{\Sigma}^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
4.5 ±0.5 ±0.1	148	[3,4] ABLIKIM 13H	BES3	$\psi(2S) \to \gamma \Sigma^+ \overline{\Sigma}^-$

[1] ABLIKIM 18V reports $[\Gamma(\chi_{c0}(1P) \to \Sigma^+ \overline{\Sigma}^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c0}(1P))] = (4.99 \pm 0.24 \pm 0.24) \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M056R60;LINKAGE=A

[2] NAIK 08 reports $(3.25 \pm 0.57 \pm 0.43) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \Sigma^+ \overline{\Sigma}^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M056R60;LINKAGE=NA

[3] ABLIKIM 13H reports $(4.54 \pm 0.42 \pm 0.30) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \Sigma^+ \overline{\Sigma}^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.62 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M056R60;LINKAGE=AB

[4] Superseded by ABLIKIM 18V NODE=M056R60;LINKAGE=B

$\Gamma(\Sigma^- \overline{\Sigma}^+)/\Gamma_{total}$ Γ_{85}/Γ

NODE=M056P00
NODE=M056P00

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
5.1±0.2±0.4	2143	[1] ABLIKIM 20I	BES3	$\psi(2S) \to \gamma \Sigma^- \overline{\Sigma}^+$

[1] ABLIKIM 20I reports $(5.13 \pm 0.24 \pm 0.41) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \Sigma^- \overline{\Sigma}^+)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. NODE=M056P00;LINKAGE=A

$\Gamma(\Sigma(1385)^+ \overline{\Sigma}(1385)^-)/\Gamma_{total}$ Γ_{86}/Γ

NODE=M056R80
NODE=M056R80

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
16.2±5.8±0.3	27	[1] ABLIKIM 12I	BES3	$\psi(2S) \to \gamma \Lambda \overline{\Lambda} \pi^+ \pi^-$

[1] ABLIKIM 12I reports $(16.4 \pm 5.7 \pm 1.6) \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \Sigma(1385)^+ \overline{\Sigma}(1385)^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M056R80;LINKAGE=AL

$\Gamma(\Sigma(1385)^- \overline{\Sigma}(1385)^+)/\Gamma_{total}$ — Γ_{87}/Γ

NODE=M056R81

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
23.2±6.5±0.5	33	[1] ABLIKIM	12I	BES3	$\psi(2S) \to \gamma \Lambda \overline{\Lambda} \pi^+ \pi^-$

[1] ABLIKIM 12I reports $(23.5 \pm 6.2 \pm 2.3) \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \Sigma(1385)^- \overline{\Sigma}(1385)^+)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R81;LINKAGE=AL

$\Gamma(K^- \Lambda \Xi^+ + c.c.)/\Gamma_{total}$ — Γ_{88}/Γ

NODE=M056R92

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.94±0.35±0.04	57	[1] ABLIKIM	15I	BES3	$\psi(2S) \to \gamma K^- \Lambda \Xi^+ +$ c.c.

[1] ABLIKIM 15I reports $[\Gamma(\chi_{c0}(1P) \to K^- \Lambda \Xi^+ + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))] = (1.90 \pm 0.30 \pm 0.16) \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R92;LINKAGE=A

$\Gamma(\Xi^0 \overline{\Xi}^0)/\Gamma_{total}$ — Γ_{89}/Γ

NODE=M056R61

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.1±0.8±0.1	23.3 ± 4.9	[1] NAIK	08	CLEO	$\psi(2S) \to \gamma \Xi^0 \overline{\Xi}^0$

[1] NAIK 08 reports $(3.34 \pm 0.70 \pm 0.48) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \Xi^0 \overline{\Xi}^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R61;LINKAGE=NA

$\Gamma(\Xi^- \overline{\Xi}^+)/\Gamma_{total}$ — Γ_{90}/Γ

NODE=M056R45

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
4.8±0.7±0.1		95 ± 11	[1] NAIK	08	CLEO	$\psi(2S) \to \gamma \Xi^+ \overline{\Xi}^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<10.3	90		[2] ABLIKIM	06D	BES2	$\psi(2S) \to \chi_{c0}\gamma$

[1] NAIK 08 reports $(5.14 \pm 0.60 \pm 0.47) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \Xi^- \overline{\Xi}^+)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R45;LINKAGE=NA

[2] Using $B(\psi(2S) \to \chi_{c0}\gamma) = (9.2 \pm 0.5)\%$

NODE=M056R45;LINKAGE=AB

$\Gamma(\eta_c \pi^+ \pi^-)/\Gamma_{total}$ — Γ_{91}/Γ

NODE=M056R89

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
< 7 × 10^-4	90	[1,2] ABLIKIM	13B	BES3	$e^+ e^- \to \psi(2S) \to \gamma\chi_{c0}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<41 \times 10^{-4}$	90	[1,3] ABLIKIM	13B	BES3	$e^+ e^- \to \psi(2S) \to \gamma\chi_{c0}$

OCCUR=2

[1] Using 1.06×10^8 $\psi(2S)$ mesons and $B(\psi(2S) \to \chi_{c0}\gamma) = (9.68 \pm 0.31)\%$.

NODE=M056R89;LINKAGE=A

[2] From the $\eta_c \to K^0_S K^\pm \pi^\mp$ decays.

NODE=M056R89;LINKAGE=B

[3] From the $\eta_c \to K^+ K^- \pi^0$ decays.

NODE=M056R89;LINKAGE=C

$\Gamma(p\overline{p})/\Gamma_{total} \times \Gamma(\pi\pi)/\Gamma_{total}$ — $\Gamma_{58}/\Gamma \times \Gamma_{32}/\Gamma$

NODE=M056R21

VALUE (units 10^{-7})	DOCUMENT ID		TECN	COMMENT
18.8±1.0 OUR FIT				
15.3±2.4±0.8	[1] ANDREOTTI	03	E835	$\overline{p}p \to \chi_{c0} \to \pi^0\pi^0$

[1] We have multiplied $B(p\overline{p}) \cdot B(\pi^0\pi^0)$ measurement by 3 to obtain $B(p\overline{p}) \cdot B(\pi\pi)$.

NODE=M056R;LINKAGE=AD

$\Gamma(p\overline{p})/\Gamma_{total} \times \Gamma(\pi^0\eta)/\Gamma_{total}$ — $\Gamma_{58}/\Gamma \times \Gamma_{33}/\Gamma$

NODE=M056R41

VALUE (units 10^{-7})	DOCUMENT ID		TECN	COMMENT
<0.4	ANDREOTTI	05C	E835	$\overline{p}p \to \pi^0\eta$

$\Gamma(p\overline{p})/\Gamma_{total} \times \Gamma(\pi^0\eta')/\Gamma_{total}$ — $\Gamma_{58}/\Gamma \times \Gamma_{34}/\Gamma$

NODE=M056R42

VALUE (units 10^{-7})	DOCUMENT ID		TECN	COMMENT
<2.5	ANDREOTTI	05C	E835	$\overline{p}p \to \pi^0\eta$

$\Gamma(p\overline{p})/\Gamma_{total} \times \Gamma(\eta\eta)/\Gamma_{total}$ — $\Gamma_{58}/\Gamma \times \Gamma_{36}/\Gamma$

NODE=M056R40

VALUE (units 10^{-7})	DOCUMENT ID		TECN	COMMENT
6.7±0.5 OUR FIT				
$4.0\pm1.2^{+0.5}_{-0.3}$	ANDREOTTI	05C	E835	$\overline{p}p \to \eta\eta$

$\Gamma(p\overline{p})/\Gamma_{total} \times \Gamma(\eta\eta')/\Gamma_{total}$ — $\Gamma_{58}/\Gamma \times \Gamma_{37}/\Gamma$

NODE=M056R43

VALUE (units 10^{-6})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$2.1^{+2.3}_{-1.5}$	ANDREOTTI	05C	E835	$\overline{p}p \to \pi^0\eta$

RADIATIVE DECAYS

NODE=M056310

$\Gamma(\gamma J/\psi(1S))/\Gamma_{total}$ — Γ_{92}/Γ

NODE=M056R8

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
1.40±0.05 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.25±0.16±2.15	12k	[1] ABLIKIM	17U	BES3	$e^+e^- \to \gamma X$
2.0 ±0.2 ±0.2		[2] ADAM	05A	CLEO	$e^+e^- \to \psi(2S) \to \gamma\chi_{c0}$

[1] Not independent from B($\psi(2S) \to \gamma\chi_{c0}(1P)$) and the product B($\psi(2S) \to \gamma\chi_{c0}(1P)$) × B($\chi_{c0}(1P) \to \gamma J/\psi(1S)$) also measured in ABLIKIM 17U. NODE=M056R8;LINKAGE=A

[2] Uses B($\psi(2S) \to \gamma\chi_{c0} \to \gamma\gamma J/\psi$) from ADAM 05A and B($\psi(2S) \to \gamma\chi_{c0}$) from ATHAR 04. NODE=M056R8;LINKAGE=AD

$\Gamma(\gamma\rho^0)/\Gamma_{total}$ — Γ_{93}/Γ

NODE=M056R56

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
< 9	90	1.2 ± 4.5	[1] BENNETT	08A	CLEO	$\psi(2S) \to \gamma\gamma\rho^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<10	90	6 ± 12	[2] ABLIKIM	11E	BES3	$\psi(2S) \to \gamma\gamma\rho^0$

[1] BENNETT 08A reports $< 9.6 \times 10^{-6}$ from a measurement of [$\Gamma(\chi_{c0}(1P) \to \gamma\rho^0)/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c0}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c0}(1P)$) = $(9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c0}(1P)$) = 9.79×10^{-2}. NODE=M056R56;LINKAGE=BE

[2] ABLIKIM 11E reports $< 10.5 \times 10^{-6}$ from a measurement of [$\Gamma(\chi_{c0}(1P) \to \gamma\rho^0)/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c0}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c0}(1P)$) = $(9.62 \pm 0.31) \times 10^{-2}$, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c0}(1P)$) = 9.79×10^{-2}. NODE=M056R56;LINKAGE=AB

$\Gamma(\gamma\omega)/\Gamma_{total}$ — Γ_{94}/Γ

NODE=M056R57

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
< 8	90	0.0 ± 2.8	[1] BENNETT	08A	CLEO	$\psi(2S) \to \gamma\gamma\omega$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<13	90	5 ± 11	[2] ABLIKIM	11E	BES3	$\psi(2S) \to \gamma\gamma\omega$

[1] BENNETT 08A reports $< 8.8 \times 10^{-6}$ from a measurement of [$\Gamma(\chi_{c0}(1P) \to \gamma\omega)/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c0}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c0}(1P)$) = $(9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c0}(1P)$) = 9.79×10^{-2}. NODE=M056R57;LINKAGE=BE

[2] ABLIKIM 11E reports $< 12.9 \times 10^{-6}$ from a measurement of [$\Gamma(\chi_{c0}(1P) \to \gamma\omega)/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c0}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c0}(1P)$) = $(9.62 \pm 0.31) \times 10^{-2}$, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c0}(1P)$) = 9.79×10^{-2}. NODE=M056R57;LINKAGE=AB

$\Gamma(\gamma\phi)/\Gamma_{total}$ — Γ_{95}/Γ

NODE=M056R58

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
< 6	90	0.1 ± 1.6	[1] BENNETT	08A	CLEO	$\psi(2S) \to \gamma\gamma\phi$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<16	90	15 ± 7	[2] ABLIKIM	11E	BES3	$\psi(2S) \to \gamma\gamma\phi$

[1] BENNETT 08A reports $< 6.4 \times 10^{-6}$ from a measurement of [$\Gamma(\chi_{c0}(1P) \to \gamma\phi)/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c0}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c0}(1P)$) = $(9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c0}(1P)$) = 9.79×10^{-2}. NODE=M056R58;LINKAGE=BE

[2] ABLIKIM 11E reports $< 16.2 \times 10^{-6}$ from a measurement of [$\Gamma(\chi_{c0}(1P) \to \gamma\phi)/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c0}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c0}(1P)$) = $(9.62 \pm 0.31) \times 10^{-2}$, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c0}(1P)$) = 9.79×10^{-2}. NODE=M056R58;LINKAGE=AB

$\Gamma(\gamma\gamma)/\Gamma_{total}$ — Γ_{96}/Γ

NODE=M056R1

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
2.04±0.09 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<7	90	[1] WICHT	08	BELL	$B^{\pm} \to K^{\pm}\gamma\gamma$

[1] WICHT 08 reports $[\Gamma(\chi_{c0}(1P) \to \gamma\gamma)/\Gamma_{total}] \times [B(B^+ \to \chi_{c0} K^+)] < 0.11 \times 10^{-6}$ which we divide by our best value $B(B^+ \to \chi_{c0} K^+) = 1.51 \times 10^{-4}$.

NODE=M056R1;LINKAGE=WI

$\Gamma(e^+ e^- J/\psi(1S))/\Gamma_{total}$ — Γ_{97}/Γ

NODE=M056R93

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.54±0.33±0.03	56	[1,2] ABLIKIM	17I	BES3	$\psi(2S) \to \gamma e^+ e^- J/\psi$

[1] ABLIKIM 17I reports $(1.51 \pm 0.30 \pm 0.13) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to e^+ e^- J/\psi(1S))/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.99 \pm 0.27) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R93;LINKAGE=B

[2] Not independent from other measurements reported by ABLIKIM 17I

NODE=M056R93;LINKAGE=C

$\Gamma(e^+ e^- J/\psi(1S))/\Gamma(\gamma J/\psi(1S))$ — Γ_{97}/Γ_{92}

NODE=M056R94

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
9.5±1.9±0.7	56	[1] ABLIKIM	17I	BES3	$\psi(2S) \to e^+ e^- \gamma J/\psi$

[1] Uses $B(\psi(2S) \to \gamma\chi_{c0}(1P)) \times B(\chi_{c0}(1P) \to \gamma J/\psi(1S)) = (15.8 \pm 0.3 \pm 0.6) \times 10^{-4}$ from ABLIKIM 17N and accounts for common systematic errors.

NODE=M056R94;LINKAGE=A

$\Gamma(\mu^+ \mu^- J/\psi(1S))/\Gamma(e^+ e^- J/\psi(1S))$ — Γ_{98}/Γ_{97}

NODE=M056R97

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<0.14	90	<9.5	ABLIKIM	19Z	BES3	$\psi(2S) \to \gamma\chi_c \to \gamma(\mu^+ \mu^- J/\psi)$

$\Gamma(\gamma\gamma)/\Gamma(\gamma J/\psi(1S))$ — Γ_{96}/Γ_{92}

NODE=M056R18

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
1.45±0.08 OUR FIT				
2.0 ±0.4 OUR AVERAGE				
$2.2 \pm 0.4 {}^{+0.1}_{-0.2}$	[1] ANDREOTTI	04	E835	$p\overline{p} \to \chi_{c0} \to \gamma\gamma$
1.45±0.74	[2] AMBROGIANI	00B	E835	$\overline{p}p \to \chi_{c2} \to \gamma\gamma, \gamma J/\psi$

[1] The values of $B(p\overline{p})B(\gamma\gamma)$ and $B(\gamma\gamma)B(\gamma J/\psi)$ measured by ANDREOTTI 04 are not independent. The latter is used in the fit because of smaller systematics.

NODE=M056R;LINKAGE=AN

[2] Calculated by us using $B(J/\psi(1S) \to e^+ e^-) = 0.0593 \pm 0.0010$.

NODE=M056R;LINKAGE=7A

$\Gamma(p\overline{p})/\Gamma_{total} \times \Gamma(\gamma J/\psi(1S))/\Gamma_{total}$ — $\Gamma_{58}/\Gamma \times \Gamma_{92}/\Gamma$

NODE=M056R19

VALUE (units 10^{-7})	EVTS	DOCUMENT ID		TECN	COMMENT
31.1±1.5 OUR FIT					
28.2±2.1 OUR AVERAGE					
28.0±1.9±1.3	392	[1,2,3] BAGNASCO	02	E835	$\overline{p}p \to \chi_{c0} \to J/\psi\gamma$
$29.3^{+5.7}_{-4.7} \pm 1.5$	89	[1,2] AMBROGIANI	99B		$\overline{p}p \to \chi_{c0} \to J/\psi\gamma$

[1] Values in $(\Gamma(p\overline{p}) \times \Gamma(\gamma J/\psi(1S))/\Gamma_{total})$ and $(\Gamma(p\overline{p})/\Gamma_{total} \times \Gamma(\gamma J/\psi(1S))/\Gamma_{total})$ are not independent. The latter is used in the fit since it is less correlated to the total width.

NODE=M056R;LINKAGE=KS

[2] Calculated by us using $B(J/\psi(1S) \to e^+ e^-) = 0.0593 \pm 0.0010$.

NODE=M056R19;LINKAGE=7A

[3] Recalculated by ANDREOTTI 05A.

NODE=M056R19;LINKAGE=AN

$\Gamma(p\overline{p})/\Gamma_{total} \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{58}/\Gamma \times \Gamma_{96}/\Gamma$

NODE=M056R25

VALUE (units 10^{-8})	DOCUMENT ID		TECN	COMMENT
4.52±0.27 OUR FIT				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$6.52 \pm 1.18 {}^{+0.48}_{-0.72}$	[1] ANDREOTTI	04	E835	$p\overline{p} \to \chi_{c0} \to \gamma\gamma$

[1] The values of $B(p\overline{p})B(\gamma\gamma)$ and $B(\gamma\gamma)B(\gamma J/\psi)$ measured by ANDREOTTI 04 are not independent. The latter is used in the fit because of smaller systematics.

NODE=M056R25;LINKAGE=AN

$\chi_{c0}(1P)$ CROSS-PARTICLE BRANCHING RATIOS

NODE=M056230

$\Gamma(\chi_{c0}(1P) \to p\overline{p})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma_{total}$ $\Gamma_{58}/\Gamma \times \Gamma^{\psi(2S)}_{162}/\Gamma^{\psi(2S)}$

NODE=M056B6
NODE=M056B6

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
21.7±0.9 OUR FIT				
23.7±1.0 OUR AVERAGE				
23.7±0.8±0.9	1222	ABLIKIM 13V	BES3	$\psi(2S) \to \gamma p\overline{p}$
23.7±1.4±1.4	383 ± 22	[1] NAIK 08	CLEO	$\psi(2S) \to \gamma p\overline{p}$
$23.6^{+3.7}_{-3.4}\pm3.4$	89.5^{+14}_{-13}	BAI 04F	BES	$\psi(2S) \to \gamma\chi_{c0}(1P) \to \gamma\overline{p}p$

[1] Calculated by us. NAIK 08 reports $B(\chi_{c0} \to p\overline{p}) = (25.7 \pm 1.5 \pm 1.5 \pm 1.3) \times 10^{-5}$ using $B(\psi(2S) \to \gamma\chi_{c0}) = (9.22 \pm 0.11 \pm 0.46)\%$.

NODE=M056B6;LINKAGE=NA

$\Gamma(\chi_{c0}(1P) \to p\overline{p})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{58}/\Gamma \times \Gamma^{\psi(2S)}_{162}/\Gamma^{\psi(2S)}_{12}$

NODE=M056B1
NODE=M056B1

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
6.25±0.26 OUR FIT			
4.6 ±1.9	[1] BAI 98I	BES	$\psi(2S) \to \gamma\chi_{c0} \to \gamma\overline{p}p$

[1] Calculated by us. The value for $B(\chi_{c0} \to p\overline{p})$ reported in BAI 98I is derived using $B(\psi(2S) \to \gamma\chi_{c0}) = (9.3\pm0.8)\%$ and $B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) = (32.4\pm2.6)\%$ [BAI 98D].

NODE=M056B;LINKAGE=B1

$\Gamma(\chi_{c0}(1P) \to \Lambda\overline{\Lambda})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma_{total}$ $\Gamma_{71}/\Gamma \times \Gamma^{\psi(2S)}_{162}/\Gamma^{\psi(2S)}$

NODE=M056B20
NODE=M056B20

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
35.2±1.3 OUR FIT				
[$(32.0 \pm 2.3) \times 10^{-6}$ OUR 2021 FIT]				
35.1±1.4 OUR AVERAGE Error includes scale factor of 1.1. [$(31.7 \pm 2.3) \times 10^{-6}$ OUR 2021 AVERAGE]				
35.6±1.0±1.0	1486	ABLIKIM 21L	BES3	$\psi(2S) \to \gamma p\pi^-\overline{p}\pi^+$
31.2±3.3±2.0	131	[1] NAIK 08	CLEO	$\psi(2S) \to \gamma\Lambda\overline{\Lambda}$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
32.0±1.9±2.2	369	[2,3] ABLIKIM 13H	BES3	$\psi(2S) \to \gamma\Lambda\overline{\Lambda}$

NEW

NEW

[1] Calculated by us. NAIK 08 reports $B(\chi_{c0} \to \Lambda\overline{\Lambda}) = (33.8 \pm 3.6 \pm 2.2 \pm 1.7) \times 10^{-5}$ using $B(\psi(2S) \to \gamma\chi_{c0}) = (9.22 \pm 0.11 \pm 0.46)\%$.

NODE=M056B20;LINKAGE=NA

[2] Superseded by ABLIKIM 21L

NODE=M056B20;LINKAGE=A

[3] Calculated by us. ABLIKIM 13H reports $B(\chi_{c0} \to \Lambda\overline{\Lambda}) = (33.3 \pm 2.0 \pm 2.6) \times 10^{-5}$ from a measurement of $B(\chi_{c0} \to \Lambda\overline{\Lambda}) \times B(\psi(2S) \to \gamma\chi_{c0})$ assuming $B(\psi(2S) \to \gamma\chi_{c0}) = (9.62 \pm 0.31)\%$.

NODE=M056B20;LINKAGE=AB

$\Gamma(\chi_{c0}(1P) \to \Lambda\overline{\Lambda})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{71}/\Gamma \times \Gamma^{\psi(2S)}_{162}/\Gamma^{\psi(2S)}_{12}$

NODE=M056B21
NODE=M056B21

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
10.1±0.4 OUR FIT				
[$(9.2 \pm 0.7) \times 10^{-5}$ OUR 2021 FIT]				
$\mathbf{13.0^{+3.6}_{-3.5}\pm2.5}$	$15.2^{+4.2}_{-4.0}$	[1] BAI 03E	BES	$\psi(2S) \to \gamma\Lambda\overline{\Lambda}$

NEW

[1] BAI 03E reports [$B(\chi_{c0} \to \Lambda\overline{\Lambda})$ $B(\psi(2S) \to \gamma\chi_{c0})$ / $B(\psi(2S) \to J/\psi\pi^+\pi^-)$] × [$B^2(\Lambda \to \pi^- p)$ / $B(J/\psi \to p\overline{p})$] = $(2.45^{+0.68}_{-0.65} \pm 0.46)\%$. We calculate from this measurement the presented value using $B(\Lambda \to \pi^- p) = (63.9 \pm 0.5)\%$ and $B(J/\psi \to p\overline{p}) = (2.17 \pm 0.07) \times 10^{-3}$.

NODE=M056B21;LINKAGE=BA

$\Gamma(\chi_{c0}(1P) \to \gamma J/\psi(1S))/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma_{total}$ $\Gamma_{92}/\Gamma \times \Gamma^{\psi(2S)}_{162}/\Gamma^{\psi(2S)}$

NODE=M056B2
NODE=M056B2

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
0.138±0.005 OUR FIT				
0.147±0.029 OUR AVERAGE Error includes scale factor of 4.6.				
0.158±0.003±0.006	4.8k	[1] ABLIKIM 17N	BES3	$\psi(2S) \to \gamma\gamma J/\psi$
0.024±0.015±0.205	12k	ABLIKIM 17U	BES3	$e^+e^- \to \gamma X$
0.069±0.018		[2] OREGLIA 82	CBAL	$\psi(2S) \to \gamma\chi_{c0}$
0.4 ±0.3		[3] BRANDELIK 79B	DASP	$\psi(2S) \to \gamma\chi_{c0}$
0.16 ±0.11		[3] BARTEL 78B	CNTR	$\psi(2S) \to \gamma\chi_{c0}$
3.3 ±1.7		[4] BIDDICK 77	CNTR	$e^+e^- \to \gamma X$

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.151±0.003±0.010	4.3k	[5] ABLIKIM	12O	BES3	$\psi(2S) \to \gamma\chi_{c0}$
0.125±0.007±0.013	560	[6] MENDEZ	08	CLEO	$\psi(2S) \to \gamma\chi_{c0}$
0.18 ±0.01 ±0.02	172	[7] ADAM	05A	CLEO	Repl. by MENDEZ 08

[1] Uses B($J/\psi \to e^+e^-$) = (5.971 ± 0.032)% and B($J/\psi \to \mu^+\mu^-$) = (5.961 ± 0.033)%. NODE=M056B2;LINKAGE=A
[2] Recalculated by us using B($J/\psi(1S) \to \ell^+\ell^-$) = 0.1181 ± 0.0020. NODE=M056B;LINKAGE=3Q
[3] Recalculated by us using B($J/\psi(1S) \to \mu^+\mu^-$) = 0.0588 ± 0.0010. NODE=M056B;LINKAGE=2Q
[4] Assumes isotropic gamma distribution. NODE=M056B;LINKAGE=EA
[5] Superseded by ABLIKIM 17N. NODE=M056B2;LINKAGE=B
[6] Not independent from other measurements of MENDEZ 08. NODE=M056B2;LINKAGE=ME
[7] Not independent from other values reported by ADAM 05A. NODE=M056B2;LINKAGE=AD

$\Gamma(\chi_{c0}(1P) \to \gamma J/\psi(1S))/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\,\text{anything})$ $\Gamma_{92}/\Gamma \times \Gamma^{\psi(2S)}_{162}/\Gamma^{\psi(2S)}_{10}$

NODE=M056B7

$\Gamma_{92}/\Gamma \times \Gamma^{\psi(2S)}_{162}/\Gamma^{\psi(2S)}_{10} = \Gamma_{92}/\Gamma \times \Gamma^{\psi(2S)}_{162}/(\Gamma^{\psi(2S)}_{12}+\Gamma^{\psi(2S)}_{13}+\Gamma^{\psi(2S)}_{14}+0.343\Gamma^{\psi(2S)}_{163}+0.190\Gamma^{\psi(2S)}_{164})$ NODE=M056B7

NODE=M056B7

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
0.224±0.009 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.201±0.011±0.021	560	[1] MENDEZ	08	CLEO	$\psi(2S) \to \gamma\chi_{c0}$
0.31 ±0.02 ±0.03	172	ADAM	05A	CLEO	Repl. by MENDEZ 08

[1] Not independent from other measurements of MENDEZ 08. NODE=M056B7;LINKAGE=ME

$\Gamma(\chi_{c0}(1P) \to \gamma J/\psi(1S))/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{92}/\Gamma \times \Gamma^{\psi(2S)}_{162}/\Gamma^{\psi(2S)}_{12}$

NODE=M056B8
NODE=M056B8

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
0.397±0.015 OUR FIT					
0.358±0.020±0.037	560	MENDEZ	08	CLEO	$\psi(2S) \to \gamma\chi_{c0}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.55 ±0.04 ±0.06	172	[1] ADAM	05A	CLEO	Repl. by MENDEZ 08

[1] Not independent from other values reported by ADAM 05A. NODE=M056B;LINKAGE=AD

$\Gamma(\chi_{c0}(1P) \to \gamma\gamma)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma_{total}$ $\Gamma_{96}/\Gamma \times \Gamma^{\psi(2S)}_{162}/\Gamma^{\psi(2S)}$

NODE=M056B3
NODE=M056B3

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
2.00±0.08 OUR FIT					
1.95±0.09 OUR AVERAGE					
1.93±0.08±0.05	3.5k	ABLIKIM	17AE	BES3	$\psi(2S) \to \gamma\chi_{c0} \to 3\gamma$
2.17±0.32±0.10	0.2k	ECKLUND	08A	CLEO	$\psi(2S) \to \gamma\chi_{c0} \to 3\gamma$
3.7 ±1.8 ±1.0		LEE	85	CBAL	$\psi(2S) \to \gamma\chi_{c0}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.17±0.17±0.12	0.8k	[1] ABLIKIM	12A	BES3	$\psi(2S) \to \gamma\chi_{c0} \to 3\gamma$

[1] Superseded by ABLIKIM 17AE. NODE=M056B3;LINKAGE=A

$\Gamma(\chi_{c0}(1P) \to \pi\pi)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma_{total}$ $\Gamma_{32}/\Gamma \times \Gamma^{\psi(2S)}_{162}/\Gamma^{\psi(2S)}$

NODE=M056B22
NODE=M056B22

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
8.34±0.29 OUR FIT					
8.80±0.34 OUR AVERAGE					
9.11±0.08±0.65	17k	[1] ABLIKIM	10A	BES3	$e^+e^- \to \psi(2S) \to \gamma\chi_{c0}$
8.81±0.11±0.43	8.9k	[2] ASNER	09	CLEO	$\psi(2S) \to \gamma\pi^+\pi^-$
8.13±0.19±0.89	2.8k	[3] ASNER	09	CLEO	$\psi(2S) \to \gamma\pi^0\pi^0$

OCCUR=2

[1] Calculated by us. ABLIKIM 10A reports B($\chi_{c0} \to \pi^0\pi^0$) = (3.23 ± 0.03 ± 0.23 ± 0.14) × 10^{-3} using B($\psi(2S) \to \gamma\chi_{c0}$) = (9.4 ± 0.4)%. We have multiplied the $\pi^0\pi^0$ measurement by 3 to obtain $\pi\pi$. NODE=M056B22;LINKAGE=AB
[2] Calculated by us. ASNER 09 reports B($\chi_{c0} \to \pi^+\pi^-$) = (6.37 ± 0.08 ± 0.31 ± 0.32) × 10^{-3} using B($\psi(2S) \to \gamma\chi_{c0}$) = (9.22 ± 0.11 ± 0.46)%. We have multiplied the $\pi^+\pi^-$ measurement by 3/2 to obtain $\pi\pi$. NODE=M056B22;LINKAGE=AS
[3] Calculated by us. ASNER 09 reports B($\chi_{c0} \to \pi^0\pi^0$) = (2.94 ± 0.07 ± 0.32 ± 0.15) × 10^{-3} using B($\psi(2S) \to \gamma\chi_{c0}$) = (9.22 ± 0.11 ± 0.46)%. We have multiplied the $\pi^0\pi^0$ measurement by 3 to obtain $\pi\pi$. NODE=M056B22;LINKAGE=AN

$\Gamma(\chi_{c0}(1P) \to \pi\pi)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{32}/\Gamma \times \Gamma^{\psi(2S)}_{162}/\Gamma^{\psi(2S)}_{12}$

NODE=M056B5
NODE=M056B5

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
24.0±0.8 OUR FIT				
20.7±1.7 OUR AVERAGE				
23.9±2.7±4.1	97 ± 11	[1] BAI 03C	BES	$\psi(2S) \to \gamma\chi_{c0} \to \gamma\pi^0\pi^0$
20.2±1.1±1.5	720 ± 32	[2] BAI 98I	BES	$\psi(2S) \to \gamma\chi_{c0} \to \gamma\pi^+\pi^-$

[1] We have multiplied $\pi^0\pi^0$ measurement by 3 to obtain $\pi\pi$. NODE=M056B;LINKAGE=D1

[2] Calculated by us. The value for B($\chi_{c0} \to \pi^+\pi^-$) reported in BAI 98I is derived using B($\psi' \to \gamma\chi_{c0}$)= (9.3 ± 0.8)% and B($\psi' \to J/\psi\pi^+\pi^-$) = (32.4 ± 2.6)% [BAI 98D]. We have multiplied $\pi^+\pi^-$ measurement by 3/2 to obtain $\pi\pi$. NODE=M056B;LINKAGE=D2

$\Gamma(\chi_{c0}(1P) \to \eta\eta)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma_{total}$ $\Gamma_{36}/\Gamma \times \Gamma^{\psi(2S)}_{162}/\Gamma^{\psi(2S)}$

NODE=M056B11
NODE=M056B11

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
2.95±0.18 OUR FIT				
3.12±0.19 OUR AVERAGE				
3.23±0.09±0.23	2132	[1] ABLIKIM 10A	BES3	$e^+e^- \to \psi(2S) \to \gamma\chi_{c0}$
2.93±0.12±0.29	0.9k	[2] ASNER 09	CLEO	$\psi(2S) \to \gamma\eta\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.86±0.46±0.37	48	[3] ADAMS 07	CLEO	$\psi(2S) \to \gamma\chi_{c0}$

[1] Calculated by us. ABLIKIM 10A reports B($\chi_{c0} \to \eta\eta$) = (3.44 ± 0.10 ± 0.24 ± 0.13) × 10^{-3} using B($\psi(2S) \to \gamma\chi_{c0}$) = (9.4 ± 0.4)%. NODE=M056B11;LINKAGE=AB

[2] Calculated by us. ASNER 09 reports B($\chi_{c0} \to \eta\eta$) = (3.18 ± 0.13 ± 0.31 ± 0.16) × 10^{-3} using B($\psi(2S) \to \gamma\chi_{c0}$) = (9.22 ± 0.11 ± 0.46)%. NODE=M056B11;LINKAGE=AS

[3] Superseded by ASNER 09. Calculated by us. The value of B($\chi_{c0}(1P) \to \eta\eta$) reported by ADAMS 07 was derived using B($\psi(2S) \to \gamma\chi_{c0}(1P)$) = (9.22 ± 0.11 ± 0.46)% (ATHAR 04). NODE=M056B11;LINKAGE=AD

$\Gamma(\chi_{c0}(1P) \to \eta\eta)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{36}/\Gamma \times \Gamma^{\psi(2S)}_{162}/\Gamma^{\psi(2S)}_{12}$

NODE=M056B10
NODE=M056B10

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
0.85 ±0.05 OUR FIT			
0.578±0.241±0.158	BAI 03C	BES	$\psi(2S) \to \gamma\eta\eta$

$\Gamma(\chi_{c0}(1P) \to K^+K^-)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma_{total}$ $\Gamma_{42}/\Gamma \times \Gamma^{\psi(2S)}_{162}/\Gamma^{\psi(2S)}$

NODE=M056B23
NODE=M056B23

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
5.92±0.28 OUR FIT				
5.97±0.07±0.32	8.1k	[1] ASNER 09	CLEO	$\psi(2S) \to \gamma K^+K^-$

[1] Calculated by us. ASNER 09 reports B($\chi_{c0} \to K^+K^-$) = (6.47 ± 0.08 ± 0.35 ± 0.32) × 10^{-3} using B($\psi(2S) \to \gamma\chi_{c0}$) = (9.22 ± 0.11 ± 0.46)%. NODE=M056B23;LINKAGE=AS

$\Gamma(\chi_{c0}(1P) \to K^+K^-)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{42}/\Gamma \times \Gamma^{\psi(2S)}_{162}/\Gamma^{\psi(2S)}_{12}$

NODE=M056B9
NODE=M056B9

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
1.71±0.08 OUR FIT				
1.63±0.10±0.15	774 ± 38	[1] BAI 98I	BES	$\psi(2S) \to \gamma K^+K^-$

[1] Calculated by us. The value for B($\chi_{c0} \to K^+K^-$) reported by BAI 98I is derived using B($\psi(2S) \to \gamma\chi_{c0}$) = (9.3 ± 0.8)% and B($\psi(2S) \to J/\psi\pi^+\pi^-$) = (32.4 ± 2.6)% [BAI 98D]. NODE=M056B9;LINKAGE=BA

$\Gamma(\chi_{c0}(1P) \to K^0_S K^0_S)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma_{total}$ $\Gamma_{43}/\Gamma \times \Gamma^{\psi(2S)}_{162}/\Gamma^{\psi(2S)}$

NODE=M056B12
NODE=M056B12

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
3.10±0.16 OUR FIT				
3.18±0.17 OUR AVERAGE				
3.22±0.07±0.17	2.1k	[1] ASNER 09	CLEO	$\psi(2S) \to \gamma K^0_S K^0_S$
3.02±0.19±0.33	322	ABLIKIM 05O	BES2	$\psi(2S) \to \gamma K^0_S K^0_S$

[1] Calculated by us. ASNER 09 reports B($\chi_{c0} \to K^0_S K^0_S$) = (3.49 ± 0.08 ± 0.18 ± 0.17) × 10^{-3} using B($\psi(2S) \to \gamma\chi_{c0}$) = (9.22 ± 0.11 ± 0.46)%. NODE=M056B12;LINKAGE=AS

$\Gamma(\chi_{c0}(1P) \to K^0_S K^0_S)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ — $\Gamma_{43}/\Gamma \times \Gamma^{\psi(2S)}_{162}/\Gamma^{\psi(2S)}_{12}$

NODE=M056B13
NODE=M056B13

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
8.9±0.5 OUR FIT				
5.6±0.8±1.3	[1] BAI	99B	BES	$\psi(2S) \to \gamma K^0_S K^0_S$

[1] Calculated by us. The value of $B(\chi_{c0} \to K^0_S K^0_S)$ reported by BAI 99B was derived using $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.3 \pm 0.8)\%$ and $B(\psi(2S) \to J/\psi\pi^+\pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D]. NODE=M056B13;LINKAGE=BA

$\Gamma(\chi_{c0}(1P) \to 2(\pi^+\pi^-))/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ — $\Gamma_1/\Gamma \times \Gamma^{\psi(2S)}_{162}/\Gamma^{\psi(2S)}_{12}$

NODE=M056B4
NODE=M056B4

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
6.6±0.5 OUR FIT				
6.9±2.4 OUR AVERAGE Error includes scale factor of 3.8.				
4.4±0.1±0.9	[1] BAI	99B	BES	$\psi(2S) \to \gamma\chi_{c0}$
9.3±0.9	[2] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c0}$

[1] Calculated by us. The value for $B(\chi_{c0} \to 2\pi^+ 2\pi^-)$ reported in BAI 99B is derived using $B(\psi(2S) \to \gamma\chi_{c0}) = (9.3 \pm 0.8)\%$ and $B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D]. NODE=M056B;LINKAGE=B2

[2] The value $B(\psi(1S) \to \gamma\chi_{c0}) \times B(\chi_{c0} \to 2\pi^+ 2\pi^-)$ reported in TANENBAUM 78 is derived using $B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) \times B(J/\psi(1S) \to \ell^+\ell^-) = (4.6 \pm 0.7)\%$. Calculated by us using $B(J/\psi(1S) \to \ell^+\ell^-) = 0.1181 \pm 0.0020$. NODE=M056B;LINKAGE=J1

$\Gamma(\chi_{c0}(1P) \to \pi^+\pi^- K^+ K^-)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma_{total}$ — $\Gamma_8/\Gamma \times \Gamma^{\psi(2S)}_{162}/\Gamma^{\psi(2S)}$

NODE=M056B18
NODE=M056B18

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
1.78±0.14 OUR FIT				
1.64±0.05±0.2	ABLIKIM	05Q	BES2	$\psi(2S) \to \gamma\chi_{c0}$

$\Gamma(\chi_{c0}(1P) \to \pi^+\pi^- K^+ K^-)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ — $\Gamma_8/\Gamma \times \Gamma^{\psi(2S)}_{162}/\Gamma^{\psi(2S)}_{12}$

NODE=M056B19
NODE=M056B19

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
5.1 ±0.4 OUR FIT				
5.8 ±1.6 OUR AVERAGE Error includes scale factor of 2.3.				
4.22±0.20±0.97	BAI	99B	BES	$\psi(2S) \to \gamma\chi_{c0}$
7.4 ±1.0	[1] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c0}$

[1] The reported value is derived using $B(\psi(2S) \to \pi^+\pi^- J/\psi) \times B(J/\psi \to \ell^+\ell^-) = (4.6 \pm 0.7)\%$. Calculated by us using $B(J/\psi \to \ell^+\ell^-) = 0.1181 \pm 0.0020$. NODE=M056B19;LINKAGE=TA

$\Gamma(\chi_{c0}(1P) \to K^+K^-K^+K^-)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma_{total}$ — $\Gamma_{51}/\Gamma \times \Gamma^{\psi(2S)}_{162}/\Gamma^{\psi(2S)}$

NODE=M056B14
NODE=M056B14

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.76±0.28 OUR FIT					
3.20±0.11±0.41	278	[1] ABLIKIM	06T	BES2	$\psi(2S) \to \gamma 2K^+ 2K^-$

[1] Calculated by us. The value of $B(\chi_{c0} \to 2K^+ 2K^-)$ reported by ABLIKIM 06T was derived using $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.2 \pm 0.4)\%$. NODE=M056B14;LINKAGE=AB

$\Gamma(\chi_{c0}(1P) \to K^+K^-K^+K^-)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ — $\Gamma_{51}/\Gamma \times \Gamma^{\psi(2S)}_{162}/\Gamma^{\psi(2S)}_{12}$

NODE=M056B15
NODE=M056B15

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
8.0±0.8 OUR FIT				
6.1±0.8±0.9	[1] BAI	99B	BES	$\psi(2S) \to \gamma 2K^+ 2K^-$

[1] Calculated by us. The value of $B(\chi_{c0} \to 2K^+ 2K^-)$ reported by BAI 99B was derived using $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.3 \pm 0.8)\%$ and $B(\psi(2S) \to J/\psi\pi^+\pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D]. NODE=M056B15;LINKAGE=BA

$\Gamma(\chi_{c0}(1P) \to \phi\phi)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma_{total}$ $\Gamma_{56}/\Gamma \times \Gamma^{\psi(2S)}_{162}/\Gamma^{\psi(2S)}$

NODE=M056B16
NODE=M056B16

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.78±0.07 OUR FIT					
0.78±0.08 OUR AVERAGE					
0.77±0.03±0.08	612	[1] ABLIKIM	11K	BES3	$\psi(2S) \to \gamma$ hadrons
0.86±0.19±0.12	26	[2] ABLIKIM	06T	BES2	$\psi(2S) \to \gamma 2K^+ 2K^-$

[1] Calculated by us. The value of B($\chi_{c0} \to \phi\phi$) reported by ABLIKIM 11K was derived using B($\psi(2S) \to \gamma\chi_{c0}(1P)$) = (9.62 ± 0.31)%. NODE=M056B16;LINKAGE=AL

[2] Calculated by us. The value of B($\chi_{c0} \to \phi\phi$) reported by ABLIKIM 06T was derived using B($\psi(2S) \to \gamma\chi_{c0}(1P)$) = (9.2 ± 0.4)%. NODE=M056B16;LINKAGE=AB

$\Gamma(\chi_{c0}(1P) \to \phi\phi)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{56}/\Gamma \times \Gamma^{\psi(2S)}_{162}/\Gamma^{\psi(2S)}_{12}$

NODE=M056B17
NODE=M056B17

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
2.25±0.21 OUR FIT				
2.6 ±1.0 ±1.1	[1] BAI	99B	BES	$\psi(2S) \to \gamma 2K^+ 2K^-$

[1] Calculated by us. The value of B($\chi_{c0} \to \phi\phi$) reported by BAI 99B was derived using B($\psi(2S) \to \gamma\chi_{c0}(1P)$) = (9.3 ± 0.8)% and B($\psi(2S) \to J/\psi\pi^+\pi^-$) = (32.4 ± 2.6)% [BAI 98D]. NODE=M056B17;LINKAGE=BA

$\Gamma(\chi_{c0}(1P) \to \Sigma^+\overline{p}K^0_S + c.c.)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma_{total}$ $\Gamma_{82}/\Gamma \times \Gamma^{\psi(2S)}_{162}/\Gamma^{\psi(2S)}$

NODE=M056B24
NODE=M056B24

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
3.45±0.17±0.19	493	[1] ABLIKIM	19BB	BES3	$\psi(2S) \to \gamma\Sigma^+\overline{p}K^0_S$ + c.c.

[1] Calculated by us. ABLIKIM 19BB reports B($\chi^0_c \to \Sigma^+\overline{p}K^0_S$ + c.c.) = (3.52 ± 0.19 ± 0.21) × 10^{-4} using B($\psi(2S) \to \gamma\chi^0_c$) = (9.79 ± 0.20)% and other branching fractions from PDG 18. NODE=M056B24;LINKAGE=A

$\Gamma(\chi_{c0}(1P) \to \Sigma^0\overline{p}K^+ + c.c.)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma_{total}$ $\Gamma_{83}/\Gamma \times \Gamma^{\psi(2S)}_{162}/\Gamma^{\psi(2S)}$

NODE=M056P01
NODE=M056P01

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
2.97±0.12±0.14	871	[1] ABLIKIM	20AE	BES3	$\psi(2S) \to \gamma\Sigma^0\overline{p}K^+$ + c.c.

[1] Calculated by us. ABLIKIM 20AE reports B($\chi^0_c \to \Sigma^0\overline{p}K^+$ + c.c.) = (3.03 ± 0.12 ± 0.15) × 10^{-4} using B($\psi(2S) \to \gamma\chi^0_c$) = (9.79 ± 0.20)% and other branching fractions from PDG 20. NODE=M056P01;LINKAGE=A

$\chi_{c0}(1P)$ REFERENCES

NODE=M056

ABLIKIM	21AV	JHEP 2111 217	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61465
ABLIKIM	21L	PR D103 112004	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61117
ABLIKIM	20AE	PR D102 092006	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60733
ABLIKIM	20B	PR D101 012012	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60212
ABLIKIM	20I	PR D101 092002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60303
PDG	20	PTEP 2020 083C01	P.A. Zyla *et al.*	(PDG Collab.)	REFID=60676
ABLIKIM	19AA	PR D99 052008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59844
ABLIKIM	19AU	PR D100 052010	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59996
ABLIKIM	19BB	PR D100 092006	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60026
ABLIKIM	19J	PR D99 012015	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59606
ABLIKIM	19Z	PR D99 051101	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59837
ABLIKIM	18V	PR D97 052011	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58990
PDG	18	PR D98 030001	M. Tanabashi *et al.*	(PDG Collab.)	REFID=59304
AAIJ	17BB	EPJ C77 609	R. Aaij *et al.*	(LHCb Collab.)	REFID=58191
ABLIKIM	17AE	PR D96 092007	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58310
ABLIKIM	17AI	PR D96 112006	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58321
ABLIKIM	17I	PRL 118 221802	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57931
ABLIKIM	17N	PR D95 072004	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57978
ABLIKIM	17U	PR D96 032001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58026
PDG	16	CP C40 100001	C. Patrignani *et al.*	(PDG Collab.)	REFID=57140
ABLIKIM	15I	PR D91 092006	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56774
ABLIKIM	15M	PR D91 112008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56778
ABLIKIM	15N	PR D91 112018	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56779
ABLIKIM	13B	PR D87 012002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54877
ABLIKIM	13D	PR D87 012007	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54879
ABLIKIM	13H	PR D87 032007	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54953
ABLIKIM	13V	PR D88 112001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55583
UEHARA	13	PTEP 2013 123C01	S. Uehara *et al.*	(BELLE Collab.)	REFID=55592
ABLIKIM	12A	PR D85 112008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54266
ABLIKIM	12I	PR D86 052004	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54736
ABLIKIM	12J	PR D86 052011	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54737
ABLIKIM	12O	PRL 109 172002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54742
LIU	12B	PRL 108 232001	Z.Q. Liu *et al.*	(BELLE Collab.)	REFID=54303
ABLIKIM	11A	PR D83 012006	M. Ablikim *et al.*	(BESIII Collab.)	REFID=53647
ABLIKIM	11E	PR D83 112005	M. Ablikim *et al.*	(BESIII Collab.)	REFID=16717
ABLIKIM	11F	PR D83 112009	M. Ablikim *et al.*	(BESIII Collab.)	REFID=16719

ABLIKIM	11K	PRL 107 092001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=53940
DEL-AMO-SA...	11M	PR D84 012004	P. del Amo Sanchez *et al.*	(BABAR Collab.)	REFID=16751
ABLIKIM	10A	PR D81 052005	M. Ablikim *et al.*	(BESIII Collab.)	REFID=53347
ONYISI	10	PR D82 011103	P.U.E. Onyisi *et al.*	(CLEO Collab.)	REFID=53360
UEHARA	10A	PR D82 114031	S. Uehara *et al.*	(BELLE Collab.)	REFID=53641
ASNER	09	PR D79 072007	D.M. Asner *et al.*	(CLEO Collab.)	REFID=52721
UEHARA	09	PR D79 052009	S. Uehara *et al.*	(BELLE Collab.)	REFID=52761
BENNETT	08A	PRL 101 151801	J.V. Bennett *et al.*	(CLEO Collab.)	REFID=52575
ECKLUND	08A	PR D78 091501	K.M. Ecklund *et al.*	(CLEO Collab.)	REFID=52583
HE	08B	PR D78 092004	Q. He *et al.*	(CLEO Collab.)	REFID=52588
MENDEZ	08	PR D78 011102	H. Mendez *et al.*	(CLEO Collab.)	REFID=52684
NAIK	08	PR D78 031101	P. Naik *et al.*	(CLEO Collab.)	REFID=52301
UEHARA	08	EPJ C53 1	S. Uehara *et al.*	(BELLE Collab.)	REFID=52064
WICHT	08	PL B662 323	J. Wicht *et al.*	(BELLE Collab.)	REFID=52204
ABE	07	PRL 98 082001	K. Abe *et al.*	(BELLE Collab.)	REFID=51627
ADAMS	07	PR D75 071101	G.S. Adams *et al.*	(CLEO Collab.)	REFID=51651
ATHAR	07	PR D75 032002	S.B. Athar *et al.*	(CLEO Collab.)	REFID=51618
CHEN	07B	PL B651 15	W.T. Chen *et al.*	(BELLE Collab.)	REFID=51710
ABLIKIM	06D	PR D73 052006	M. Ablikim *et al.*	(BES Collab.)	REFID=51049
ABLIKIM	06I	PR D74 012004	M. Ablikim *et al.*	(BES Collab.)	REFID=51126
ABLIKIM	06R	PR D74 072001	M. Ablikim *et al.*	(BES Collab.)	REFID=51447
ABLIKIM	06T	PL B642 197	M. Ablikim *et al.*	(BES Collab.)	REFID=51453
ABLIKIM	05G	PR D71 092002	M. Ablikim *et al.*	(BES Collab.)	REFID=50756
ABLIKIM	05N	PL B630 7	M. Ablikim *et al.*	(BES Collab.)	REFID=50847
ABLIKIM	05O	PL B630 21	M. Ablikim *et al.*	(BES Collab.)	REFID=50846
ABLIKIM	05Q	PR D72 092002	M. Ablikim *et al.*	(BES Collab.)	REFID=50958
ADAM	05A	PRL 94 232002	N.E. Adam *et al.*	(CLEO Collab.)	REFID=50763
ANDREOTTI	05A	NP B717 34	M. Andreotti *et al.*	(FNAL E835 Collab.)	REFID=50769
ANDREOTTI	05C	PR D72 112002	M. Andreotti *et al.*	(FNAL E835 Collab.)	REFID=50991
NAKAZAWA	05	PL B615 39	H. Nakazawa *et al.*	(BELLE Collab.)	REFID=50807
ABE	04G	PR D70 071102	K. Abe *et al.*	(BELLE Collab.)	REFID=50182
ABLIKIM	04G	PR D70 092002	M. Ablikim *et al.*	(BES Collab.)	REFID=50187
ABLIKIM	04H	PR D70 092003	M. Ablikim *et al.*	(BES Collab.)	REFID=50188
ANDREOTTI	04	PL B584 16	M. Andreotti *et al.*	(E835 Collab.)	REFID=49744
ATHAR	04	PR D70 112002	S.B. Athar *et al.*	(CLEO Collab.)	REFID=50331
BAI	04F	PR D69 092001	J.Z. Bai *et al.*	(BES Collab.)	REFID=49752
ANDREOTTI	03	PRL 91 091801	M. Andreotti *et al.*	(FNAL E835 Collab.)	REFID=49578
AULCHENKO	03	PL B573 63	V.M. Aulchenko *et al.*	(KEDR Collab.)	REFID=49579
BAI	03C	PR D67 032004	J.Z. Bai *et al.*	(BES Collab.)	REFID=49190
BAI	03E	PR D67 112001	J.Z. Bai *et al.*	(BES Collab.)	REFID=49416
ABE,K	02	PRL 89 142001	K. Abe *et al.*	(BELLE Collab.)	REFID=49188
BAGNASCO	02	PL B533 237	S. Bagnasco *et al.*	(FNAL E835 Collab.)	REFID=48833
EISENSTEIN	01	PRL 87 061801	B.I. Eisenstein *et al.*	(CLEO Collab.)	REFID=48344
AMBROGIANI	00B	PR D62 052002	M. Ambrogiani *et al.*	(FNAL E835 Collab.)	REFID=47940
AMBROGIANI	99B	PRL 83 2902	M. Ambrogiani *et al.*	(FNAL E835 Collab.)	REFID=47389
BAI	99B	PR D60 072001	J.Z. Bai *et al.*	(BES Collab.)	REFID=47385
BAI	98D	PR D58 092006	J.Z. Bai *et al.*	(BES Collab.)	REFID=46338
BAI	98I	PRL 81 3091	J.Z. Bai *et al.*	(BES Collab.)	REFID=46343
GAISER	86	PR D34 711	J. Gaiser *et al.*	(Crystal Ball Collab.)	REFID=22012
LEE	85	SLAC 282	R.A. Lee	(SLAC)	REFID=40589
OREGLIA	82	PR D25 2259	M.J. Oreglia *et al.*	(SLAC, CIT, HARV+)	REFID=22120
BRANDELIK	79B	NP B160 426	R. Brandelik *et al.*	(DASP Collab.)	REFID=22115
BARTEL	78B	PL 79B 492	W. Bartel *et al.*	(DESY, HEIDP)	REFID=22111
TANENBAUM	78	PR D17 1731	W.M. Tanenbaum *et al.*	(SLAC, LBL)	REFID=22112
Also		Private Comm.	G. Trilling	(LBL, UCB)	REFID=22113
BIDDICK	77	PRL 38 1324	C.J. Biddick *et al.*	(UCSD, UMD, PAVI+)	REFID=22059

NODE=M055

$\chi_{c1}(1P)$

$I^G(J^{PC}) = 0^+(1^{++})$

See the Review on "$\psi(2S)$ and χ_c branching ratios" before the $\chi_{c0}(1P)$ Listings.

NODE=M055

$\chi_{c1}(1P)$ MASS

NODE=M055M

NODE=M055M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
3510.67 ± 0.05 OUR AVERAGE		Error includes scale factor of 1.2.			
3508.4 ± 1.9 ±0.7	460	[1] AAIJ	17BB	LHCB	$p p \to b \bar{b} X \to 2(K^+ K^-) X$
3510.71 ± 0.04 ±0.09	4.8k	[2] AAIJ	17BI	LHCB	$\chi_{c1} \to J/\psi \mu^+ \mu^-$
3510.30 ± 0.14 ±0.16		ABLIKIM	05G	BES2	$\psi(2S) \to \gamma \chi_{c1}$
3510.719 ± 0.051 ± 0.019		ANDREOTTI	05A	E835	$p \bar{p} \to e^+ e^- \gamma$
3509.4 ± 0.9		BAI	99B	BES	$\psi(2S) \to \gamma X$
3510.60 ± 0.087 ± 0.019	513	[3] ARMSTRONG	92	E760	$\bar{p} p \to e^+ e^- \gamma$
3511.3 ± 0.4 ±0.4	30	BAGLIN	86B	SPEC	$\bar{p} p \to e^+ e^- X$
3512.3 ± 0.3 ±4.0		[4] GAISER	86	CBAL	$\psi(2S) \to \gamma X$
3507.4 ± 1.7	91	[5] LEMOIGNE	82	GOLI	185 π^- Be $\to \gamma \mu^+ \mu^-$ A
3510.4 ± 0.6		OREGLIA	82	CBAL	$e^+ e^- \to J/\psi 2\gamma$
3510.1 ± 1.1	254	[6] HIMEL	80	MRK2	$e^+ e^- \to J/\psi 2\gamma$
3509 ±11	21	BRANDELIK	79B	DASP	$e^+ e^- \to J/\psi 2\gamma$
3507 ± 3		[6] BARTEL	78B	CNTR	$e^+ e^- \to J/\psi 2\gamma$
3505.0 ± 4 ±4		[6,7] TANENBAUM	78	MRK1	$e^+ e^-$
3513 ± 7	367	[6] BIDDICK	77	CNTR	$\psi(2S) \to \gamma X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3500 ±10	40	TANENBAUM	75	MRK1	Hadrons γ

OCCUR=2

[1] From a fit of the $\phi\phi$ invariant mass with the width of $\chi_{c1}(1P)$ fixed to the PDG 16 value. NODE=M055M;LINKAGE=A

[2] AAIJ 17BI reports also $m(\chi_{c2}) - m(\chi_{c1}) = 45.39 \pm 0.07 \pm 0.03$ MeV. NODE=M055M;LINKAGE=B

[3] Recalculated by ANDREOTTI 05A, using the value of $\psi(2S)$ mass from AULCHENKO 03. NODE=M055M;LINKAGE=NW

[4] Using mass of $\psi(2S) = 3686.0$ MeV. NODE=M055M;LINKAGE=C

[5] $J/\psi(1S)$ mass constrained to 3097 MeV. NODE=M055M;LINKAGE=P

[6] Mass value shifted by us by amount appropriate for $\psi(2S)$ mass = 3686 MeV and $J/\psi(1S)$ mass = 3097 MeV. NODE=M055M;LINKAGE=D

[7] From a simultaneous fit to radiative and hadronic decay channels. NODE=M055M;LINKAGE=M

$\chi_{c1}(1P)$ WIDTH

NODE=M055W

NODE=M055W

VALUE (MeV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.84 ±0.04 OUR FIT						
0.88 ±0.05 OUR AVERAGE						
1.39 $^{+0.40}_{-0.38}$ $^{+0.26}_{-0.77}$			ABLIKIM	05G	BES2	$\psi(2S) \to \gamma \chi_{c1}$
0.876 ± 0.045 ± 0.026			ANDREOTTI	05A	E835	$p \bar{p} \to e^+ e^- \gamma$
0.87 ±0.11 ±0.08		513	[1] ARMSTRONG	92	E760	$\bar{p} p \to e^+ e^- \gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<1.3	95		BAGLIN	86B	SPEC	$\bar{p} p \to e^+ e^- X$
<3.8	90		GAISER	86	CBAL	$\psi(2S) \to \gamma X$

[1] Recalculated by ANDREOTTI 05A. NODE=M055W;LINKAGE=AN

$\chi_{c1}(1P)$ DECAY MODES

NODE=M055215;NODE=M055

Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level

Hadronic decays

NODE=M055;CLUMP=A

Γ_{1}	$3(\pi^+\pi^-)$	$(5.8 \pm 1.4) \times 10^{-3}$	S=1.2	DESIG=6
Γ_{2}	$2(\pi^+\pi^-)$	$(7.6 \pm 2.6) \times 10^{-3}$		DESIG=5
Γ_{3}	$\pi^+\pi^-\pi^0\pi^0$	(1.19 ± 0.15) %		DESIG=51
Γ_{4}	$\rho^+\pi^-\pi^0$ + c.c.	(1.45 ± 0.24) %		DESIG=52
Γ_{5}	$\rho^0\pi^+\pi^-$	$(3.9 \pm 3.5) \times 10^{-3}$		DESIG=9
Γ_{6}	$4\pi^0$	$(5.4 \pm 0.8) \times 10^{-4}$		DESIG=60
Γ_{7}	$\pi^+\pi^-K^+K^-$	$(4.5 \pm 1.0) \times 10^{-3}$		DESIG=7
Γ_{8}	$K^+K^-\pi^0\pi^0$	$(1.12 \pm 0.27) \times 10^{-3}$		DESIG=53
Γ_{9}	$K^+K^-\pi^+\pi^-\pi^0$	(1.15 ± 0.13) %		DESIG=79
Γ_{10}	$K^0_S K^\pm\pi^\mp\pi^+\pi^-$	$(7.5 \pm 0.8) \times 10^{-3}$		DESIG=84
Γ_{11}	$K^+\pi^-\overline{K}^0\pi^0$ + c.c.	$(8.6 \pm 1.4) \times 10^{-3}$		DESIG=55
Γ_{12}	$\rho^-K^+\overline{K}^0$ + c.c.	$(5.0 \pm 1.2) \times 10^{-3}$		DESIG=56
Γ_{13}	$K^*(892)^0\overline{K}^0\pi^0 \to K^+\pi^-\overline{K}^0\pi^0$ + c.c.	$(2.3 \pm 0.6) \times 10^{-3}$		DESIG=57
Γ_{14}	$K^+K^-\eta\pi^0$	$(1.12 \pm 0.34) \times 10^{-3}$		DESIG=58
Γ_{15}	$\pi^+\pi^-K^0_S K^0_S$	$(6.9 \pm 2.9) \times 10^{-4}$		DESIG=28
Γ_{16}	$K^+K^-\eta$	$(3.2 \pm 1.0) \times 10^{-4}$		DESIG=42
Γ_{17}	$\overline{K}^0K^+\pi^-$ + c.c.	$(7.0 \pm 0.6) \times 10^{-3}$		DESIG=17
Γ_{18}	$K^*(892)^0\overline{K}^0$ + c.c.	$(10 \pm 4) \times 10^{-4}$		DESIG=32
Γ_{19}	$K^*(892)^+K^-$ + c.c.	$(1.4 \pm 0.6) \times 10^{-3}$		DESIG=33
Γ_{20}	$K^*_J(1430)^0\overline{K}^0$ + c.c. $\to K^0_S K^+\pi^-$ + c.c.	$< 8 \times 10^{-4}$	CL=90%	DESIG=34
Γ_{21}	$K^*_J(1430)^+K^-$ + c.c. $\to K^0_S K^+\pi^-$ + c.c.	$< 2.1 \times 10^{-3}$	CL=90%	DESIG=35
Γ_{22}	$K^+K^-\pi^0$	$(1.81 \pm 0.24) \times 10^{-3}$		DESIG=38
Γ_{23}	$\eta\pi^+\pi^-$	$(4.62 \pm 0.23) \times 10^{-3}$		DESIG=31
Γ_{24}	$a_0(980)^+\pi^-$ + c.c. $\to \eta\pi^+\pi^-$	$(3.2 \pm 0.4) \times 10^{-3}$	S=2.2	DESIG=36
Γ_{25}	$a_2(1320)^+\pi^-$ + c.c. $\to \eta\pi^+\pi^-$	$(1.76 \pm 0.24) \times 10^{-4}$		DESIG=93
Γ_{26}	$a_2(1700)^+\pi^-$ + c.c. $\to \eta\pi^+\pi^-$	$(4.6 \pm 0.7) \times 10^{-5}$		DESIG=96
Γ_{27}	$f_2(1270)\eta \to \eta\pi^+\pi^-$	$(3.5 \pm 0.6) \times 10^{-4}$		DESIG=94
Γ_{28}	$f_4(2050)\eta \to \eta\pi^+\pi^-$	$(2.5 \pm 0.9) \times 10^{-5}$		DESIG=95
Γ_{29}	$\pi_1(1400)^+\pi^-$ + c.c. $\to \eta\pi^+\pi^-$	$< 5 \times 10^{-5}$	CL=90%	DESIG=97
Γ_{30}	$\pi_1(1600)^+\pi^-$ + c.c. $\to \eta\pi^+\pi^-$	$< 1.5 \times 10^{-5}$	CL=90%	DESIG=98
Γ_{31}	$\pi_1(2015)^+\pi^-$ + c.c. $\to \eta\pi^+\pi^-$	$< 8 \times 10^{-6}$	CL=90%	DESIG=99
Γ_{32}	$f_2(1270)\eta$	$(6.7 \pm 1.1) \times 10^{-4}$		DESIG=37
Γ_{33}	$\pi^+\pi^-\eta'$	$(2.2 \pm 0.4) \times 10^{-3}$		DESIG=44
Γ_{34}	$K^+K^-\eta'(958)$	$(8.8 \pm 0.9) \times 10^{-4}$		DESIG=85
Γ_{35}	$K^*_0(1430)^+K^-$ + c.c.	$(6.4\ ^{+2.2}_{-2.8}) \times 10^{-4}$		DESIG=86
Γ_{36}	$f_0(980)\eta'(958)$	$(1.6\ ^{+1.4}_{-0.7}) \times 10^{-4}$		DESIG=87
Γ_{37}	$f_0(1710)\eta'(958)$	$(7\ ^{+7}_{-5}) \times 10^{-5}$		DESIG=88
Γ_{38}	$f'_2(1525)\eta'(958)$	$(9 \pm 6) \times 10^{-5}$		DESIG=89
Γ_{39}	$\pi^0 f_0(980) \to \pi^0\pi^+\pi^-$	$(3.5 \pm 0.9) \times 10^{-7}$		DESIG=61
Γ_{40}	$K^+\overline{K}^*(892)^0\pi^-$ + c.c.	$(3.2 \pm 2.1) \times 10^{-3}$		DESIG=10
Γ_{41}	$K^*(892)^0\overline{K}^*(892)^0$	$(1.4 \pm 0.4) \times 10^{-3}$		DESIG=21
Γ_{42}	$K^+K^-K^0_S K^0_S$	$< 4 \times 10^{-4}$	CL=90%	DESIG=29
Γ_{43}	$K^0_S K^0_S K^0_S K^0_S$	$(3.5 \pm 1.0) \times 10^{-5}$		DESIG=102
Γ_{44}	$K^+K^-K^+K^-$	$(5.4 \pm 1.1) \times 10^{-4}$		DESIG=14
Γ_{45}	$K^+K^-\phi$	$(4.1 \pm 1.5) \times 10^{-4}$		DESIG=30
Γ_{46}	$\overline{K}^0K^+\pi^-\phi$ + c.c.	$(3.3 \pm 0.5) \times 10^{-3}$		DESIG=90
Γ_{47}	$K^+K^-\pi^0\phi$	$(1.62 \pm 0.30) \times 10^{-3}$		DESIG=91
Γ_{48}	$\phi\pi^+\pi^-\pi^0$	$(7.5 \pm 1.0) \times 10^{-4}$		DESIG=82
Γ_{49}	$\omega\omega$	$(5.7 \pm 0.7) \times 10^{-4}$		DESIG=66
Γ_{50}	ωK^+K^-	$(7.8 \pm 0.9) \times 10^{-4}$		DESIG=81
Γ_{51}	$\omega\phi$	$(2.7 \pm 0.4) \times 10^{-5}$		DESIG=67
Γ_{52}	$\phi\phi$	$(4.2 \pm 0.5) \times 10^{-4}$		DESIG=68

Γ_{53}	$\phi\phi\eta$	$(3.0 \pm 0.5) \times 10^{-4}$		DESIG=104
Γ_{54}	$p\overline{p}$	$(7.60\pm0.34) \times 10^{-5}$		DESIG=11
Γ_{55}	$p\overline{p}\pi^0$	$(1.55\pm0.18) \times 10^{-4}$		DESIG=39
Γ_{56}	$p\overline{p}\eta$	$(1.45\pm0.25) \times 10^{-4}$		DESIG=43
Γ_{57}	$p\overline{p}\omega$	$(2.12\pm0.31) \times 10^{-4}$		DESIG=59
Γ_{58}	$p\overline{p}\phi$	$< 1.7 \times 10^{-5}$	CL=90%	DESIG=65
Γ_{59}	$p\overline{p}\pi^+\pi^-$	$(5.0 \pm 1.9) \times 10^{-4}$		DESIG=8
Γ_{60}	$p\overline{p}\pi^0\pi^0$	$< 5 \times 10^{-4}$	CL=90%	DESIG=54
Γ_{61}	$p\overline{p}K^+K^-$ (non-resonant)	$(1.27\pm0.22) \times 10^{-4}$		DESIG=62
Γ_{62}	$p\overline{p}K^0_S K^0_S$	$< 4.5 \times 10^{-4}$	CL=90%	DESIG=25
Γ_{63}	$p\overline{n}\pi^-$	$(3.8 \pm 0.5) \times 10^{-4}$		DESIG=74
Γ_{64}	$\overline{p}n\pi^+$	$(3.9 \pm 0.5) \times 10^{-4}$		DESIG=75
Γ_{65}	$p\overline{n}\pi^-\pi^0$	$(1.03\pm0.12) \times 10^{-3}$		DESIG=76
Γ_{66}	$\overline{p}n\pi^+\pi^0$	$(1.01\pm0.12) \times 10^{-3}$		DESIG=77
Γ_{67}	$\Lambda\overline{\Lambda}$	$(1.27\pm0.08) \times 10^{-4}$		DESIG=19
Γ_{68}	$\Lambda\overline{\Lambda}\pi^+\pi^-$	$(2.9 \pm 0.5) \times 10^{-4}$		DESIG=24
Γ_{69}	$\Lambda\overline{\Lambda}\pi^+\pi^-$ (non-resonant)	$(2.5 \pm 0.6) \times 10^{-4}$		DESIG=69
Γ_{70}	$\Sigma(1385)^+\overline{\Lambda}\pi^-$ + c.c.	$< 1.3 \times 10^{-4}$	CL=90%	DESIG=70
Γ_{71}	$\Sigma(1385)^-\overline{\Lambda}\pi^+$ + c.c.	$< 1.3 \times 10^{-4}$	CL=90%	DESIG=71
Γ_{72}	$K^+\overline{p}\Lambda$+c.c.	$(4.2 \pm 0.4) \times 10^{-4}$	S=1.2	DESIG=40
Γ_{73}	$nK^0_S\overline{\Lambda}$ + c.c.	$(1.66\pm0.17) \times 10^{-4}$		DESIG=109
Γ_{74}	$K^*(892)^+\overline{p}\Lambda$+ c.c.	$(4.9 \pm 0.7) \times 10^{-4}$		DESIG=106
Γ_{75}	$K^+\overline{p}\Lambda(1520)$+ c.c.	$(1.7 \pm 0.4) \times 10^{-4}$		DESIG=63
Γ_{76}	$\Lambda(1520)\overline{\Lambda}(1520)$	$< 9 \times 10^{-5}$	CL=90%	DESIG=64
Γ_{77}	$\Sigma^0\overline{\Sigma}^0$	$(4.2 \pm 0.6) \times 10^{-5}$		DESIG=48
Γ_{78}	$\Sigma^+\overline{p}K^0_S$+ c.c.	$(1.53\pm0.12) \times 10^{-4}$		DESIG=105
Γ_{79}	$\Sigma^0\overline{p}K^+$+ c.c.	$(1.46\pm0.10) \times 10^{-4}$		DESIG=108
Γ_{80}	$\Sigma^+\overline{\Sigma}^-$	$(3.6 \pm 0.7) \times 10^{-5}$		DESIG=49
Γ_{81}	$\Sigma^-\overline{\Sigma}^+$	$(5.7 \pm 1.5) \times 10^{-5}$		DESIG=107
Γ_{82}	$\Sigma(1385)^+\overline{\Sigma}(1385)^-$	$< 9 \times 10^{-5}$	CL=90%	DESIG=72
Γ_{83}	$\Sigma(1385)^-\overline{\Sigma}(1385)^+$	$< 5 \times 10^{-5}$	CL=90%	DESIG=73
Γ_{84}	$K^-\Lambda\overline{\Xi}^+$ + c.c.	$(1.35\pm0.24) \times 10^{-4}$		DESIG=92
Γ_{85}	$\Xi^0\overline{\Xi}^0$	$< 6 \times 10^{-5}$	CL=90%	DESIG=50
Γ_{86}	$\Xi^-\overline{\Xi}^+$	$(8.0 \pm 2.1) \times 10^{-5}$		DESIG=26
Γ_{87}	$\pi^+\pi^-$ + K^+K^-	$< 2.1 \times 10^{-3}$		DESIG=23
Γ_{88}	$K^0_S K^0_S$	$< 6 \times 10^{-5}$	CL=90%	DESIG=27
Γ_{89}	$\eta_c\pi^+\pi^-$	$< 3.2 \times 10^{-3}$	CL=90%	DESIG=83
	Radiative decays			NODE=M055;CLUMP=B
Γ_{90}	$\gamma J/\psi(1S)$	(34.3 ± 1.0) %		DESIG=1
Γ_{91}	$\gamma\rho^0$	$(2.16\pm0.17) \times 10^{-4}$		DESIG=45
Γ_{92}	$\gamma\omega$	$(6.8 \pm 0.8) \times 10^{-5}$		DESIG=46
Γ_{93}	$\gamma\phi$	$(2.4 \pm 0.5) \times 10^{-5}$		DESIG=47
Γ_{94}	$\gamma\gamma$	$< 6.3 \times 10^{-6}$	CL=90%	DESIG=4
Γ_{95}	$e^+e^-J/\psi(1S)$	$(3.46\pm0.22) \times 10^{-3}$		DESIG=100
Γ_{96}	$\mu^+\mu^-J/\psi(1S)$	$(2.33\pm0.29) \times 10^{-4}$		DESIG=103

CONSTRAINED FIT INFORMATION

A multiparticle fit to $\chi_{c1}(1P)$, $\chi_{c0}(1P)$, $\chi_{c2}(1P)$, and $\psi(2S)$ with 4 total widths, a partial width, 25 combinations of partial widths obtained from integrated cross section, and 84 branching ratios uses 248 measurements to determine 49 parameters. The overall fit has a $\chi^2 = 379.8$ for 199 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\left\langle\delta p_i \delta p_j\right\rangle/(\delta p_i{\cdot}\delta p_j)$, in percent, from the fit to parameters p_i, including the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{\rm total}$.

x_{44}	3				
x_{54}	4	2			
x_{67}	11	4	5		
x_{90}	23	9	2	29	
Γ	−12	−5	−63	−15	−41
	x_{17}	x_{44}	x_{54}	x_{67}	x_{90}

$\chi_{c1}(1P)$ PARTIAL WIDTHS

NODE=M055220

$\chi_{c1}(1P)$ $\Gamma(i)\Gamma(\gamma J/\psi(1S))/\Gamma(\text{total})$

NODE=M055223

$\Gamma(p\overline{p}) \times \Gamma(\gamma J/\psi(1S))/\Gamma_{\text{total}}$ $\Gamma_{54}\Gamma_{90}/\Gamma$

NODE=M055G1
NODE=M055G1

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
21.9±0.8 OUR FIT				
21.4±0.9 OUR AVERAGE				
21.5±0.5±0.8	[1] ANDREOTTI	05A	E835	$p\overline{p} \to e^+e^-\gamma$
21.4±1.5±2.2	[1,2] ARMSTRONG	92	E760	$\overline{p}p \to e^+e^-\gamma$
$19.9^{+4.4}_{-4.0}$	[1] BAGLIN	86B	SPEC	$\overline{p}p \to e^+e^-X$

[1] Calculated by us using B($J/\psi(1S) \to e^+e^-$) = 0.0593 ± 0.0010. NODE=M055G;LINKAGE=7A
[2] Recalculated by ANDREOTTI 05A. NODE=M055G;LINKAGE=AN

$\chi_{c1}(1P)$ BRANCHING RATIOS

NODE=M055225

HADRONIC DECAYS

NODE=M055305

$\Gamma(3(\pi^+\pi^-))/\Gamma_{\text{total}}$ Γ_1/Γ

NODE=M055R6
NODE=M055R6

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
5.8±1.4 OUR EVALUATION Error includes scale factor of 1.2. Treating systematic error as correlated.				
5.8±1.1 OUR AVERAGE				
5.4±0.7±0.9	[1] BAI	99B	BES	$\psi(2S) \to \gamma\chi_{c1}$
16.0±5.9±0.8	[1] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c1}$

→ UNCHECKED ←

[1] Rescaled by us using B($\psi(2S) \to \gamma\chi_{c1}$) = (8.8 ± 0.4)% and B($\psi(2S) \to J/\psi(1S)\pi^+\pi^-$) = (32.6 ± 0.5)%. NODE=M055R;LINKAGE=X2

$\Gamma(2(\pi^+\pi^-))/\Gamma_{\text{total}}$ Γ_2/Γ

NODE=M055R4
NODE=M055R4

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
7.6±2.6 OUR EVALUATION Treating systematic error as correlated.				
8 ±4 OUR AVERAGE Error includes scale factor of 1.5.				
4.6±2.1±2.6	[1] BAI	99B	BES	$\psi(2S) \to \gamma\chi_{c1}$
12.5±4.2±0.6	[1] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c1}$

→ UNCHECKED ←

[1] Rescaled by us using B($\psi(2S) \to \gamma\chi_{c1}$) = (8.8 ± 0.4)% and B($\psi(2S) \to J/\psi(1S)\pi^+\pi^-$) = (32.6 ± 0.5)%. NODE=M055R4;LINKAGE=X2

$\Gamma(\pi^+\pi^-\pi^0\pi^0)/\Gamma_{\text{total}}$ Γ_3/Γ

NODE=M055R35
NODE=M055R35

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
1.19±0.15±0.03	604.7	[1] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^-h^0h^0$

[1] HE 08B reports 1.28 ± 0.06 ± 0.15 ± 0.08 % from a measurement of [$\Gamma(\chi_{c1}(1P) \to \pi^+\pi^-\pi^0\pi^0)/\Gamma_{\text{total}}$] × [B($\psi(2S) \to \gamma\chi_{c1}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c1}(1P)$) = $(9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c1}(1P)$) = $(9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M055R35;LINKAGE=HE

$\Gamma(\rho^+\pi^-\pi^0 + \text{c.c.})/\Gamma_{\text{total}}$ Γ_4/Γ

NODE=M055R36
NODE=M055R36

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
1.45±0.24±0.04	712.3	[1,2] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^-h^0h^0$

[1] HE 08B reports 1.56 ± 0.13 ± 0.22 ± 0.10 % from a measurement of [$\Gamma(\chi_{c1}(1P) \to \rho^+\pi^-\pi^0 + \text{c.c.})/\Gamma_{\text{total}}$] × [B($\psi(2S) \to \gamma\chi_{c1}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c1}(1P)$) = $(9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c1}(1P)$) = $(9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M055R36;LINKAGE=HE
[2] Calculated by us. We have added the values from HE 08B for $\rho^+\pi^-\pi^0$ and $\rho^-\pi^+\pi^0$ decays assuming uncorrelated statistical and fully correlated systematic uncertainties. NODE=M055R36;LINKAGE=OC

$\Gamma(\rho^0\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_5/Γ

NODE=M055R8
NODE=M055R8

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
3.9±3.5	[1] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c1}$

[1] Estimated using B($\psi(2S) \to \gamma\chi_{c1}(1P)$) = 0.087. The errors do not contain the uncertainty in the $\psi(2S)$ decay. NODE=M055R;LINKAGE=T

$\Gamma(4\pi^0)/\Gamma_{total}$ Γ_6/Γ

NODE=M055R44
NODE=M055R44

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
5.4±0.8±0.1	608	[1] ABLIKIM	11A	BES3	$e^+e^- \to \psi(2S) \to \gamma\chi_{c1}$

[1] ABLIKIM 11A reports $(0.57\pm0.03\pm0.08)\times10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to 4\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R44;LINKAGE=AB

$\Gamma(\pi^+\pi^-K^+K^-)/\Gamma_{total}$ Γ_7/Γ

NODE=M055R5
NODE=M055R5

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
4.5±1.0 OUR EVALUATION	Treating systematic error as correlated.			
4.5±0.9 OUR AVERAGE				
4.2±0.4±0.9	[1] BAI	99B	BES	$\psi(2S) \to \gamma\chi_{c1}$
7.3±3.0±0.4	[1] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c1}$

→ UNCHECKED ←

[1] Rescaled by us using $B(\psi(2S) \to \gamma\chi_{c1}) = (8.8 \pm 0.4)\%$ and $B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) = (32.6 \pm 0.5)\%$.

NODE=M055R5;LINKAGE=X2

$\Gamma(K^+K^-\pi^0\pi^0)/\Gamma_{total}$ Γ_8/Γ

NODE=M055R37
NODE=M055R37

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.12±0.27±0.03	45.1	[1] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^-h^0h^0$

[1] HE 08B reports $(0.12\pm0.02\pm0.02\pm0.01)\times10^{-2}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^+K^-\pi^0\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R37;LINKAGE=HE

$\Gamma(K^+K^-\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_9/Γ

NODE=M055R00
NODE=M055R00

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
11.46±0.12±1.29	12k	[1] ABLIKIM	13B	BES3	$e^+e^- \to \psi(2S) \to \gamma\chi_{c1}$

[1] Using 1.06×10^8 $\psi(2S)$ mesons and $B(\psi(2S) \to \chi_{c1}\gamma) = (9.2 \pm 0.4)\%$.

NODE=M055R00;LINKAGE=A

$\Gamma(K^0_S K^\pm\pi^\mp\pi^+\pi^-)/\Gamma_{total}$ Γ_{10}/Γ

NODE=M055R60
NODE=M055R60

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
7.52±0.11±0.79	5.1k	[1] ABLIKIM	13B	BES3	$e^+e^- \to \psi(2S) \to \gamma\chi_{c1}$

[1] Using 1.06×10^8 $\psi(2S)$ mesons and $B(\psi(2S) \to \chi_{c1}\gamma) = (9.2 \pm 0.4)\%$.

NODE=M055R60;LINKAGE=A

$\Gamma(K^+\pi^-\overline{K}^0\pi^0 + c.c.)/\Gamma_{total}$ Γ_{11}/Γ

NODE=M055R39
NODE=M055R39

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.86±0.13±0.02	141.3	[1] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^-h^0h^0$

[1] HE 08B reports $0.92 \pm 0.09 \pm 0.11 \pm 0.06$ % from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^+\pi^-\overline{K}^0\pi^0 + c.c.)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.07\pm0.11\pm0.54)\times10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R39;LINKAGE=HE

$\Gamma(\rho^-K^+\overline{K}^0 + c.c.)/\Gamma_{total}$ Γ_{12}/Γ

NODE=M055R40
NODE=M055R40

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.50±0.12±0.01	141.3	[1] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^-h^0h^0$

[1] HE 08B reports $0.54 \pm 0.11 \pm 0.07 \pm 0.03$ % from a measurement of $[\Gamma(\chi_{c1}(1P) \to \rho^-K^+\overline{K}^0 + c.c.)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.07\pm0.11\pm0.54)\times10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R40;LINKAGE=HE

$\Gamma(K^*(892)^0\overline{K}^0\pi^0 \to K^+\pi^-\overline{K}^0\pi^0 + c.c.)/\Gamma_{total}$ Γ_{13}/Γ

NODE=M055R41
NODE=M055R41

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.23±0.06±0.01	141.3	[1] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^-h^0h^0$

[1] HE 08B reports $0.25 \pm 0.06 \pm 0.03 \pm 0.02$ % from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^*(892)^0\overline{K}^0\pi^0 \to K^+\pi^-\overline{K}^0\pi^0 + c.c.)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R41;LINKAGE=HE

$\Gamma(K^+K^-\eta\pi^0)/\Gamma_{total}$ Γ_{14}/Γ

NODE=M055R42
NODE=M055R42

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.112±0.034±0.003	141.3	[1] HE	08B	CLEO	$e^+e^- \to \gamma h^+ h^- h^0 h^0$

[1] HE 08B reports 0.12 ± 0.03 ± 0.02 ± 0.01 % from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^+K^-\eta\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R42;LINKAGE=HE

$\Gamma(\pi^+\pi^-K^0_S K^0_S)/\Gamma_{total}$ Γ_{15}/Γ

NODE=M055R05
NODE=M055R05

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
6.9±2.9±0.2	19.8 ± 7.7	[1] ABLIKIM	05O	BES2	$\psi(2S) \to \chi_{c1}\gamma$

[1] ABLIKIM 05O reports $[\Gamma(\chi_{c1}(1P) \to \pi^+\pi^-K^0_S K^0_S)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))] = (0.67 \pm 0.26 \pm 0.11) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R05;LINKAGE=AB

$\Gamma(K^+K^-\eta)/\Gamma_{total}$ Γ_{16}/Γ

NODE=M055R25
NODE=M055R25

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
3.2±1.0±0.1	[1] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[1] ATHAR 07 reports $(0.34 \pm 0.10 \pm 0.04) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^+K^-\eta)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 0.0907 \pm 0.0011 \pm 0.0054$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R25;LINKAGE=AT

$\Gamma(\overline{K}^0 K^+\pi^- + \text{c.c.})/\Gamma_{total}$ Γ_{17}/Γ

NODE=M055R17
NODE=M055R17

VALUE (units 10^{-3})	DOCUMENT ID
7.0±0.6 OUR FIT	

$\Gamma(K^*(892)^0\overline{K}^0 + \text{c.c.})/\Gamma_{total}$ Γ_{18}/Γ

NODE=M055R09
NODE=M055R09

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.98±0.37±0.02	22	[1] ABLIKIM	06R	BES2	$\psi(2S) \to \gamma\chi_{c1}$

[1] ABLIKIM 06R reports $(1.1 \pm 0.4 \pm 0.1) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^*(892)^0\overline{K}^0 + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R09;LINKAGE=AB

$\Gamma(K^*(892)^+K^- + \text{c.c.})/\Gamma_{total}$ Γ_{19}/Γ

NODE=M055R10
NODE=M055R10

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.43±0.65±0.03	27	[1] ABLIKIM	06R	BES2	$\psi(2S) \to \gamma\chi_{c1}$

[1] ABLIKIM 06R reports $(1.6 \pm 0.7 \pm 0.2) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^*(892)^+K^- + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R10;LINKAGE=AB

$\Gamma(K^*_J(1430)^0\overline{K}^0 + \text{c.c.} \to K^0_S K^+\pi^- + \text{c.c.})/\Gamma_{total}$ Γ_{20}/Γ

NODE=M055R12
NODE=M055R12

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<8 × 10⁻⁴	90	[1] ABLIKIM	06R	BES2	$\psi(2S) \to \gamma\chi_{c1}$

[1] ABLIKIM 06R reports $< 0.9 \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^*_J(1430)^0\overline{K}^0 + \text{c.c.} \to K^0_S K^+\pi^- + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

NODE=M055R12;LINKAGE=AB

$\Gamma(K^*_J(1430)^+K^- + \text{c.c.} \to K^0_S K^+\pi^- + \text{c.c.})/\Gamma_{total}$ Γ_{21}/Γ

NODE=M055R13
NODE=M055R13

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.1 \times 10^{-3}$	90	[1] ABLIKIM	06R	BES2	$\psi(2S) \to \gamma\chi_{c1}$

[1] ABLIKIM 06R reports $< 2.4 \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^*_J(1430)^+K^- + \text{c.c.} \to K^0_S K^+\pi^- + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

NODE=M055R13;LINKAGE=AB

$\Gamma(K^+K^-\pi^0)/\Gamma_{total}$ Γ_{22}/Γ

NODE=M055R20
NODE=M055R20

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
1.81±0.24±0.04	[1] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[1] ATHAR 07 reports $(1.95 \pm 0.16 \pm 0.23) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^+K^-\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 0.0907 \pm 0.0011 \pm 0.0054$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R20;LINKAGE=AT

$\Gamma(\eta\pi^+\pi^-)/\Gamma_{total}$ Γ_{23}/Γ

NODE=M055R08
NODE=M055R08

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
4.62±0.23 OUR AVERAGE					
4.58±0.23±0.11		[1,2] ABLIKIM	17K	BES3	$\psi(2S) \to \gamma\eta\pi^+\pi^-$
4.7 ±0.5 ±0.1		[3] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$
5.3 ±0.9 ±0.1	222	[4] ABLIKIM	06R	BES2	$\psi(2S) \to \gamma\chi_{c1}$

[1] From an amplitude analysis using an isobar model.

NODE=M055R08;LINKAGE=A

[2] ABLIKIM 17K reports $(4.67 \pm 0.03 \pm 0.23 \pm 0.16) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \eta\pi^+\pi^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.55 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R08;LINKAGE=B

[3] ATHAR 07 reports $(5.0 \pm 0.3 \pm 0.5) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \eta\pi^+\pi^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 0.0907 \pm 0.0011 \pm 0.0054$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R08;LINKAGE=AT

[4] ABLIKIM 06R reports $(5.9 \pm 0.7 \pm 0.8) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \eta\pi^+\pi^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R08;LINKAGE=AB

$\Gamma(a_0(980)^+\pi^- + \text{c.c.} \to \eta\pi^+\pi^-)/\Gamma_{total}$ Γ_{24}/Γ

NODE=M055R15
NODE=M055R15

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
3.2 ±0.4 OUR AVERAGE Error includes scale factor of 2.2.					
3.33±0.19±0.08		[1,2] ABLIKIM	17K	BES3	$\psi(2S) \to \gamma\eta\pi^+\pi^-$
1.79±0.63±0.04	58	[3] ABLIKIM	06R	BES2	$\psi(2S) \to \gamma\chi_{c1}$

[1] From an amplitude analysis using an isobar model.

NODE=M055R15;LINKAGE=A

[2] ABLIKIM 17K reports $(3.40 \pm 0.03 \pm 0.19 \pm 0.11) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to a_0(980)^+\pi^- + \text{c.c.} \to \eta\pi^+\pi^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.55 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R15;LINKAGE=B

[3] ABLIKIM 06R reports $(2.0 \pm 0.5 \pm 0.5) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to a_0(980)^+\pi^- + \text{c.c.} \to \eta\pi^+\pi^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R15;LINKAGE=AB

$\Gamma(a_2(1320)^+\pi^- + \text{c.c.} \to \eta\pi^+\pi^-)/\Gamma_{total}$ Γ_{25}/Γ

NODE=M055R72
NODE=M055R72

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.176±0.023±0.004	[1,2] ABLIKIM	17K	BES3	$\psi(2S) \to \gamma\eta\pi^+\pi^-$

[1] From an amplitude analysis using an isobar model.

NODE=M055R72;LINKAGE=A

[2] ABLIKIM 17K reports $(0.18 \pm 0.01 \pm 0.02 \pm 0.01) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to a_2(1320)^+\pi^- + \text{c.c.} \to \eta\pi^+\pi^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.55 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R72;LINKAGE=B

$\Gamma(a_2(1700)^+\pi^- + \text{c.c.} \to \eta\pi^+\pi^-)/\Gamma_{total}$ Γ_{26}/Γ

NODE=M055R75
NODE=M055R75

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
4.6±0.7±0.1	[1,2] ABLIKIM	17K	BES3	$\psi(2S) \to \gamma\eta\pi^+\pi^-$

[1] From an amplitude analysis using an isobar model.
[2] ABLIKIM 17K reports $(4.7 \pm 0.4 \pm 0.6 \pm 0.2) \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to a_2(1700)^+ \pi^- + \text{c.c.} \to \eta\pi^+\pi^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.55 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R75;LINKAGE=A
NODE=M055R75;LINKAGE=B

$\Gamma(f_2(1270)\eta \to \eta\pi^+\pi^-)/\Gamma_{total}$ — Γ_{27}/Γ

NODE=M055R73
NODE=M055R73

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
3.5±0.6±0.1	[1,2] ABLIKIM	17K	BES3	$\psi(2S) \to \gamma\eta\pi^+\pi^-$

OCCUR=2

[1] From an amplitude analysis using an isobar model.
[2] ABLIKIM 17K reports $(0.36 \pm 0.01 \pm 0.06 \pm 0.01) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to f_2(1270)\eta \to \eta\pi^+\pi^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.55 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R73;LINKAGE=A
NODE=M055R73;LINKAGE=D

$\Gamma(f_4(2050)\eta \to \eta\pi^+\pi^-)/\Gamma_{total}$ — Γ_{28}/Γ

NODE=M055R74
NODE=M055R74

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
2.5±0.9±0.1	[1,2] ABLIKIM	17K	BES3	$\psi(2S) \to \gamma\eta\pi^+\pi^-$

[1] From an amplitude analysis using an isobar model.
[2] ABLIKIM 17K reports $(2.6 \pm 0.4 \pm 0.8 \pm 0.1) \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to f_4(2050)\eta \to \eta\pi^+\pi^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.55 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R74;LINKAGE=A
NODE=M055R74;LINKAGE=B

$\Gamma(\pi_1(1400)^+\pi^- + \text{c.c.} \to \eta\pi^+\pi^-)/\Gamma_{total}$ — Γ_{29}/Γ

NODE=M055R76
NODE=M055R76

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<5 × 10⁻⁵	90	[1,2] ABLIKIM	17K	BES3	$\psi(2S) \to \gamma\eta\pi^+\pi^-$

[1] From an amplitude analysis using an isobar model.
[2] ABLIKIM 17K reports $< 4.6 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \pi_1(1400)^+\pi^- + \text{c.c.} \to \eta\pi^+\pi^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.55 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

NODE=M055R76;LINKAGE=A
NODE=M055R76;LINKAGE=B

$\Gamma(\pi_1(1600)^+\pi^- + \text{c.c.} \to \eta\pi^+\pi^-)/\Gamma_{total}$ — Γ_{30}/Γ

NODE=M055R77
NODE=M055R77

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.5 × 10⁻⁵	90	[1,2] ABLIKIM	17K	BES3	$\psi(2S) \to \gamma\eta\pi^+\pi^-$

[1] From an amplitude analysis using an isobar model.
[2] ABLIKIM 17K reports $< 1.5 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \pi_1(1600)^+\pi^- + \text{c.c.} \to \eta\pi^+\pi^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.55 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

NODE=M055R77;LINKAGE=A
NODE=M055R77;LINKAGE=B

$\Gamma(\pi_1(2015)^+\pi^- + \text{c.c.} \to \eta\pi^+\pi^-)/\Gamma_{total}$ — Γ_{31}/Γ

NODE=M055R78
NODE=M055R78

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<8 × 10⁻⁶	90	[1,2] ABLIKIM	17K	BES3	$\psi(2S) \to \gamma\eta\pi^+\pi^-$

[1] From an amplitude analysis using an isobar model.
[2] ABLIKIM 17K reports $< 8 \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \pi_1(2015)^+\pi^- + \text{c.c.} \to \eta\pi^+\pi^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.55 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

NODE=M055R78;LINKAGE=A
NODE=M055R78;LINKAGE=B

$\Gamma(f_2(1270)\eta)/\Gamma_{total}$ — Γ_{32}/Γ

NODE=M055R16
NODE=M055R16

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.67±0.11 OUR AVERAGE					
0.63±0.11±0.02		[1,2] ABLIKIM	17K	BES3	$\psi(2S) \to \gamma\eta\pi^+\pi^-$
2.7 ±0.8 ±0.1	53	[3] ABLIKIM	06R	BES2	$\psi(2S) \to \gamma\chi_{c1}$

[1] ABLIKIM 17K reports $(6.4 \pm 1.1) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to f_2(1270)\eta)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.55 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M055R16;LINKAGE=B

[2] From an amplitude analysis using an isobar model. NODE=M055R16;LINKAGE=D

[3] ABLIKIM 06R reports $(3.0 \pm 0.7 \pm 0.5) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to f_2(1270)\eta)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M055R16;LINKAGE=C

$\Gamma(\pi^+\pi^-\eta')/\Gamma_{total}$ — Γ_{33}/Γ

NODE=M055R28
NODE=M055R28

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
2.2±0.4±0.1	[1] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[1] ATHAR 07 reports $(2.4 \pm 0.4 \pm 0.3) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \pi^+\pi^-\eta')/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 0.0907 \pm 0.0011 \pm 0.0054$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M055R28;LINKAGE=AT

$\Gamma(K^+K^-\eta'(958))/\Gamma_{total}$ — Γ_{34}/Γ

NODE=M055R64
NODE=M055R64

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
8.75±0.87	310	[1] ABLIKIM	14J	BES3	$\psi(2S) \to \gamma K^+K^-\eta'(958)$

[1] Derived using $B(\psi(2S) \to \gamma\chi_{c1}) = (9.2 \pm 0.4)\%$. Uncertainty includes both statistical and systematic contributions combined in quadrature. NODE=M055R64;LINKAGE=A

$\Gamma(K_0^*(1430)^+K^- + c.c.)/\Gamma_{total}$ — Γ_{35}/Γ

NODE=M055R65
NODE=M055R65

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
$6.41\pm0.57^{+2.09}_{-2.71}$	[1] ABLIKIM	14J	BES3	$\psi(2S) \to \gamma K^+K^-\eta'(958)$

[1] Normalized to $B(\chi_{c1} \to K^+K^-\eta'(958))$ branching fraction. NODE=M055R65;LINKAGE=A

$\Gamma(f_0(980)\eta'(958))/\Gamma_{total}$ — Γ_{36}/Γ

NODE=M055R66
NODE=M055R66

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
$1.65\pm0.47^{+1.32}_{-0.56}$	[1] ABLIKIM	14J	BES3	$\psi(2S) \to \gamma K^+K^-\eta'(958)$

[1] Normalized to $B(\chi_{c1} \to K^+K^-\eta'(958))$ branching fraction. NODE=M055R66;LINKAGE=A

$\Gamma(f_0(1710)\eta'(958))/\Gamma_{total}$ — Γ_{37}/Γ

NODE=M055R67
NODE=M055R67

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
$0.71\pm0.22^{+0.68}_{-0.48}$	[1] ABLIKIM	14J	BES3	$\psi(2S) \to \gamma K^+K^-\eta'(958)$

[1] Normalized to $B(\chi_{c1} \to K^+K^-\eta'(958))$ branching fraction. NODE=M055R67;LINKAGE=A

$\Gamma(f_2'(1525)\eta'(958))/\Gamma_{total}$ — Γ_{38}/Γ

NODE=M055R68
NODE=M055R68

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
$0.92\pm0.23^{+0.55}_{-0.51}$	[1] ABLIKIM	14J	BES3	$\psi(2S) \to \gamma K^+K^-\eta'(958)$

[1] Normalized to $B(\chi_{c1} \to K^+K^-\eta'(958))$ branching fraction. NODE=M055R68;LINKAGE=A

$\Gamma(\pi^0 f_0(980) \to \pi^0\pi^+\pi^-)/\Gamma_{total}$ — Γ_{39}/Γ

NODE=M055R18
NODE=M055R18

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
0.35±0.09		ABLIKIM	18D	BES3	$\psi(2S) \to \gamma\pi^0\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<6	90	[1] ABLIKIM	11D	BES3	$\psi(2S) \to \gamma\pi^0\pi^+\pi^-$

[1] ABLIKIM 11D reports $[\Gamma(\chi_{c1}(1P) \to \pi^0 f_0(980) \to \pi^0\pi^+\pi^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))] < 6.0 \times 10^{-7}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$. NODE=M055R18;LINKAGE=BR

$\Gamma(K^+\overline{K}^*(892)^0\pi^- + c.c.)/\Gamma_{total}$ — Γ_{40}/Γ

NODE=M055R9
NODE=M055R9

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
32±21	[1] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c1}$

[1] Estimated using $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 0.087$. The errors do not contain the uncertainty in the $\psi(2S)$ decay. NODE=M055R9;LINKAGE=T

$\Gamma(K^*(892)^0 \overline{K}^*(892)^0)/\Gamma_{total}$ — Γ_{41}/Γ

NODE=M055R26
NODE=M055R26

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
1.44±0.36±0.03	28.4 ± 5.5	[1,2] ABLIKIM 04H	BES	$\psi(2S) \to \gamma K^+ K^- \pi^+ \pi^-$

[1] ABLIKIM 04H reports $[\Gamma(\chi_{c1}(1P) \to K^*(892)^0 \overline{K}^*(892)^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))] = (1.40 \pm 0.27 \pm 0.22) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M055R26;LINKAGE=AB

[2] Assumes $B(K^*(892)^0 \to K^-\pi^+) = 2/3$. NODE=M055R26;LINKAGE=AL

$\Gamma(K^+ K^- K^0_S K^0_S)/\Gamma_{total}$ — Γ_{42}/Γ

NODE=M055R06
NODE=M055R06

VALUE	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<4 × 10⁻⁴	90	3.2 ± 2.4	[1] ABLIKIM 05O	BES2	$\psi(2S) \to \chi_{c1}\gamma$

[1] ABLIKIM 05O reports $[\Gamma(\chi_{c1}(1P) \to K^+ K^- K^0_S K^0_S)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))] < 4.2 \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$. NODE=M055R06;LINKAGE=AB

$\Gamma(K^0_S K^0_S K^0_S K^0_S)/\Gamma_{total}$ — Γ_{43}/Γ

NODE=M055R82
NODE=M055R82

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
0.35±0.10±0.01	22	[1] ABLIKIM 19AA	BES3	$\psi(2S) \to \gamma 4K^0_S$

[1] Using $B(K^0_S \to \pi^+\pi^-) = (69.20 \pm 0.05)\%$. ABLIKIM 19AA reports $[\Gamma(\chi_{c1}(1P) \to K^0_S K^0_S K^0_S K^0_S)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))] = (3.4 \pm 0.9 \pm 0.3) \times 10^{-6}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.. NODE=M055R82;LINKAGE=A

$\Gamma(K^+ K^- K^+ K^-)/\Gamma_{total}$ — Γ_{44}/Γ

NODE=M055R14
NODE=M055R14

VALUE (units 10^{-3})	DOCUMENT ID
0.54±0.11 OUR FIT	

$\Gamma(K^+ K^- \phi)/\Gamma_{total}$ — Γ_{45}/Γ

NODE=M055R07
NODE=M055R07

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
0.41±0.15±0.01	17	[1] ABLIKIM 06T	BES2	$\psi(2S) \to \gamma 2K^+ 2K^-$

[1] ABLIKIM 06T reports $(0.46 \pm 0.16 \pm 0.06) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^+ K^- \phi)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M055R07;LINKAGE=AB

$\Gamma(\overline{K}^0 K^+ \pi^- \phi + c.c.)/\Gamma_{total}$ — Γ_{46}/Γ

NODE=M055R69
NODE=M055R69

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
3.27±0.28±0.46	ABLIKIM 15M	BES3	$\psi(2S) \to \gamma\chi_{c1}$

$\Gamma(K^+ K^- \pi^0 \phi)/\Gamma_{total}$ — Γ_{47}/Γ

NODE=M055R70
NODE=M055R70

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
1.62±0.12±0.28	ABLIKIM 15M	BES3	$\psi(2S) \to \gamma\chi_{c1}$

$\Gamma(\phi\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{48}/Γ

NODE=M055R62
NODE=M055R62

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
0.75±0.06±0.08	373	[1] ABLIKIM 13B	BES3	$e^+e^- \to \psi(2S) \to \gamma\chi_{c1}$

[1] Using 1.06×10^8 $\psi(2S)$ mesons and $B(\psi(2S) \to \chi_{c1}\gamma) = (9.2 \pm 0.4)\%$. NODE=M055R62;LINKAGE=A

$\Gamma(\omega\omega)/\Gamma_{total}$ — Γ_{49}/Γ

NODE=M055R49
NODE=M055R49

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
5.7±0.7±0.1	597	[1] ABLIKIM 11K	BES3	$\psi(2S) \to \gamma$ hadrons

[1] ABLIKIM 11K reports $(6.0 \pm 0.3 \pm 0.7) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \omega\omega)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M055R49;LINKAGE=AL

$\Gamma(\omega K^+ K^-)/\Gamma_{total}$ Γ_{50}/Γ

NODE=M055R61

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.78±0.04±0.08	628	[1] ABLIKIM	13B	BES3	$e^+ e^- \to \psi(2S) \to \gamma \chi_{c1}$

[1] Using 1.06×10^8 $\psi(2S)$ mesons and $B(\psi(2S) \to \chi_{c1}\gamma) = (9.2 \pm 0.4)\%$.

NODE=M055R61;LINKAGE=A

$\Gamma(\omega\phi)/\Gamma_{total}$ Γ_{51}/Γ

NODE=M055R50

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.27±0.04±0.01	105	[1] ABLIKIM	19J	BES3	$\psi(2S) \to \gamma$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.21±0.06±0.01	15	[2,3] ABLIKIM	11K	BES3	$\psi(2S) \to \gamma$ hadrons

[1] ABLIKIM 19J reports $[\Gamma(\chi_{c1}(1P) \to \omega\phi)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))] = (2.67 \pm 0.31 \pm 0.27) \times 10^{-6}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R50;LINKAGE=A

[2] ABLIKIM 11K reports $(0.22 \pm 0.06 \pm 0.02) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \omega\phi)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R50;LINKAGE=AL

[3] Superseded by ABLIKIM 19J.

NODE=M055R50;LINKAGE=B

$\Gamma(\phi\phi)/\Gamma_{total}$ Γ_{52}/Γ

NODE=M055R51

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
4.2±0.5±0.1	366	[1] ABLIKIM	11K	BES3	$\psi(2S) \to \gamma$ hadrons

[1] ABLIKIM 11K reports $(4.4 \pm 0.3 \pm 0.5) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \phi\phi)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R51;LINKAGE=AL

$\Gamma(\phi\phi\eta)/\Gamma_{total}$ Γ_{53}/Γ

NODE=M055R85

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.0±0.4±0.2	83.6	[1] ABLIKIM	20B	BES3	$\psi(2S) \to \gamma\phi\phi\eta$

[1] ABLIKIM 20B reports $(2.96 \pm 0.43 \pm 0.22) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \phi\phi\eta)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$.

NODE=M055R85;LINKAGE=A

$\Gamma(p\overline{p})/\Gamma_{total}$ Γ_{54}/Γ

NODE=M055R11

VALUE (units 10^{-4})	DOCUMENT ID
0.760±0.034 OUR FIT	

$\Gamma(p\overline{p}\pi^0)/\Gamma_{total}$ Γ_{55}/Γ

NODE=M055R21

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.155±0.018 OUR AVERAGE				
0.163±0.019±0.004	[1] ONYISI	10	CLE3	$\psi(2S) \to \gamma p\overline{p}X$
0.112±0.047±0.003	[2] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[1] ONYISI 10 reports $(1.75 \pm 0.16 \pm 0.13 \pm 0.11) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to p\overline{p}\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R21;LINKAGE=ON

[2] ATHAR 07 reports $(1.2 \pm 0.5 \pm 0.1) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to p\overline{p}\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R21;LINKAGE=AT

$\Gamma(p\overline{p}\eta)/\Gamma_{total}$ Γ_{56}/Γ

NODE=M055R27

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
0.145±0.024±0.004		[1] ONYISI	10	CLE3	$\psi(2S) \to \gamma p\overline{p}X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.15	90	[2] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[1] ONYISI 10 reports $(1.56 \pm 0.22 \pm 0.14 \pm 0.10) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to p\overline{p}\eta)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] ATHAR 07 reports $< 0.16 \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to p\overline{p}\eta)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

NODE=M055R27;LINKAGE=ON

NODE=M055R27;LINKAGE=AT

$\Gamma(p\overline{p}\omega)/\Gamma_{total}$ Γ_{57}/Γ

NODE=M055R43
NODE=M055R43

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.212±0.030±0.005	[1] ONYISI	10	CLE3	$\psi(2S) \to \gamma p\overline{p}X$

[1] ONYISI 10 reports $(2.28 \pm 0.28 \pm 0.16 \pm 0.14) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to p\overline{p}\omega)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R43;LINKAGE=ON

$\Gamma(p\overline{p}\phi)/\Gamma_{total}$ Γ_{58}/Γ

NODE=M055R48
NODE=M055R48

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.7 \times 10^{-5}$	90	[1] ABLIKIM	11F	BES3	$\psi(2S) \to \gamma p\overline{p}K^+K^-$

[1] ABLIKIM 11F reports $< 1.82 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to p\overline{p}\phi)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

NODE=M055R48;LINKAGE=AB

$\Gamma(p\overline{p}\pi^+\pi^-)/\Gamma_{total}$ Γ_{59}/Γ

NODE=M055R7
NODE=M055R7

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.50±0.19 OUR EVALUATION	Treating systematic error as correlated.			
0.50±0.19 OUR AVERAGE				
0.46±0.12±0.15	[1] BAI	99B	BES	$\psi(2S) \to \gamma\chi_{c1}$
1.08±0.77±0.05	[1] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c1}$

→ UNCHECKED ←

[1] Rescaled by us using $B(\psi(2S) \to \gamma\chi_{c1}) = (8.8 \pm 0.4)\%$ and $B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) = (32.6 \pm 0.5)\%$.

NODE=M055R7;LINKAGE=X2

$\Gamma(p\overline{p}\pi^0\pi^0)/\Gamma_{total}$ Γ_{60}/Γ

NODE=M055R38
NODE=M055R38

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<5 \times 10^{-4}$	90	[1] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^-h^0h^0$

[1] HE 08B reports $< 0.05 \times 10^{-2}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to p\overline{p}\pi^0\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

NODE=M055R38;LINKAGE=HE

$\Gamma(p\overline{p}K^+K^-(\text{non-resonant}))/\Gamma_{total}$ Γ_{61}/Γ

NODE=M055R45
NODE=M055R45

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.27±0.22±0.03	82 ± 9	[1] ABLIKIM	11F	BES3	$\psi(2S) \to \gamma p\overline{p}K^+K^-$

[1] ABLIKIM 11F reports $(1.35 \pm 0.15 \pm 0.19) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to p\overline{p}K^+K^-(\text{non-resonant}))/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R45;LINKAGE=AB

$\Gamma(p\overline{p}K^0_SK^0_S)/\Gamma_{total}$ Γ_{62}/Γ

NODE=M055R02
NODE=M055R02

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<4.5	90	[1] ABLIKIM	06D	BES2	$\psi(2S) \to \gamma\chi_{c1}$

[1] Using $B(\psi(2S) \to \chi_{c1}\gamma)$ $(9.1 \pm 0.6)\%$.

NODE=M055R;LINKAGE=AB

$\Gamma(p\overline{n}\pi^-)/\Gamma_{total}$ Γ_{63}/Γ

NODE=M055R56
NODE=M055R56

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.8±0.5±0.1	1412	[1] ABLIKIM	12J	BES3	$\psi(2S) \to \gamma p\overline{n}\pi^-$

[1] ABLIKIM 12J reports $[\Gamma(\chi_{c1}(1P) \to p\overline{n}\pi^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))] = (0.37 \pm 0.02 \pm 0.04) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R56;LINKAGE=AL

$\Gamma(\overline{p} n \pi^+)/\Gamma_{total}$ Γ_{64}/Γ

NODE=M055R57

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.9±0.5±0.1	1625	[1] ABLIKIM	12J	BES3	$\psi(2S) \to \gamma \overline{p} n \pi^+$

[1] ABLIKIM 12J reports $[\Gamma(\chi_{c1}(1P) \to \overline{p} n \pi^+)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))] = (0.38 \pm 0.02 \pm 0.04) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R57;LINKAGE=AL

$\Gamma(p \overline{n} \pi^- \pi^0)/\Gamma_{total}$ Γ_{65}/Γ

NODE=M055R58

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
10.3±1.1±0.2	1082	[1] ABLIKIM	12J	BES3	$\psi(2S) \to \gamma p \overline{n} \pi^- \pi^0$

[1] ABLIKIM 12J reports $[\Gamma(\chi_{c1}(1P) \to p \overline{n} \pi^- \pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))] = (1.00 \pm 0.05 \pm 0.10) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R58;LINKAGE=AL

$\Gamma(\overline{p} n \pi^+ \pi^0)/\Gamma_{total}$ Γ_{66}/Γ

NODE=M055R59

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
10.1±1.1±0.2	1261	[1] ABLIKIM	12J	BES3	$\psi(2S) \to \gamma \overline{p} n \pi^+ \pi^0$

[1] ABLIKIM 12J reports $[\Gamma(\chi_{c1}(1P) \to \overline{p} n \pi^+ \pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))] = (0.98 \pm 0.05 \pm 0.10) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R59;LINKAGE=AL

$\Gamma(\Lambda\overline{\Lambda})/\Gamma_{total}$ Γ_{67}/Γ

NODE=M055R23

VALUE (units 10^{-4})	DOCUMENT ID
1.27±0.08 OUR FIT	

NEW

[$(1.14 \pm 0.11) \times 10^{-4}$ OUR 2021 FIT]

$\Gamma(\Lambda\overline{\Lambda}\pi^+\pi^-)/\Gamma_{total}$ Γ_{68}/Γ

NODE=M055R01

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
29±5±1		105	[1] ABLIKIM	12I	BES3	$\psi(2S) \to \gamma\Lambda\overline{\Lambda}\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<150	90		[2] ABLIKIM	06D	BES2	$\psi(2S) \to \gamma\chi_{c1}$

[1] ABLIKIM 12I reports $(31.1 \pm 3.4 \pm 3.9) \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \Lambda\overline{\Lambda}\pi^+\pi^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R01;LINKAGE=AL

[2] Using $B(\psi(2S) \to \chi_{c1}\gamma)$ $(9.1 \pm 0.6)\%$.

NODE=M055R01;LINKAGE=AB

$\Gamma(\Lambda\overline{\Lambda}\pi^+\pi^-\text{ (non-resonant)})/\Gamma_{total}$ Γ_{69}/Γ

NODE=M055R19

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
25±6±1	13	[1] ABLIKIM	12I	BES3	$\psi(2S) \to \gamma\Lambda\overline{\Lambda}\pi^+\pi^-$

[1] ABLIKIM 12I reports $(26.2 \pm 5.5 \pm 3.3) \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \Lambda\overline{\Lambda}\pi^+\pi^-\text{ (non-resonant)})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R19;LINKAGE=AL

$\Gamma(\Sigma(1385)^+\overline{\Lambda}\pi^- + \text{c.c.})/\Gamma_{total}$ Γ_{70}/Γ

NODE=M055R52

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.3 × 10⁻⁴	90	[1] ABLIKIM	12I	BES3	$\psi(2S) \to \gamma\Sigma(1385)^+\overline{\Lambda}\pi^-$

[1] ABLIKIM 12I reports $< 14 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \Sigma(1385)^+\overline{\Lambda}\pi^- + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

NODE=M055R52;LINKAGE=AL

$\Gamma(\Sigma(1385)^- \overline{\Lambda}\pi^+ + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{71}/Γ

NODE=M055R53

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<13	90	[1] ABLIKIM	12I	BES3	$\psi(2S) \to \gamma \Sigma(1385)^- \overline{\Lambda}\pi^+$

[1] ABLIKIM 12I reports $< 14 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \Sigma(1385)^- \overline{\Lambda}\pi^+ + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

NODE=M055R53;LINKAGE=AL

$\Gamma(K^+ \overline{p} \Lambda + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{72}/Γ

NODE=M055R22

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
4.2±0.4 OUR AVERAGE	Error includes scale factor of 1.2.				
$9.2^{+2.8}_{-2.4} \pm 0.4$	24	[1] LU	19	BELL	$B^+ \to \overline{p}\Lambda K^+ K^+$
$4.2 \pm 0.4 \pm 0.1$	3k	[2,3] ABLIKIM	13D	BES3	$\psi(2S) \to \gamma\Lambda\overline{p}K^+$
$3.1 \pm 0.9 \pm 0.1$		[4] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[1] LU 19 reports $(9.15^{+2.63}_{-2.25} \pm 0.86) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^+ \overline{p}\Lambda + \text{c.c.})/\Gamma_{\text{total}}] \times [B(B^+ \to \chi_{c1}(1P) K^+)]$ assuming $B(B^+ \to \chi_{c1}(1P) K^+) = (4.79 \pm 0.23) \times 10^{-4}$, which we rescale to our best value $B(B^+ \to \chi_{c1}(1P) K^+) = (4.74 \pm 0.22) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R22;LINKAGE=A

[2] ABLIKIM 13D reports $(4.5 \pm 0.2 \pm 0.4) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^+ \overline{p}\Lambda + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R22;LINKAGE=AB

[3] Using $B(\Lambda \to p\pi^-) = 63.9\%$.

NODE=M055R22;LINKAGE=LB

[4] ATHAR 07 reports $(3.3 \pm 0.9 \pm 0.4) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^+ \overline{p}\Lambda + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R22;LINKAGE=AT

$\Gamma(n K^0_S \overline{\Lambda} + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{73}/Γ

NODE=M055R89

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.66±0.12±0.12	399	[1] ABLIKIM	21AV	BES3	$\psi(2S) \to \gamma n K^0_S \overline{\Lambda}$ + c.c.

[1] ABLIKIM 21AV reports $(1.66 \pm 0.12 \pm 0.12) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to n K^0_S \overline{\Lambda} + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 0.0975 \pm 0.0024$. Also uses $B(\overline{\Lambda} \to \overline{p}\pi^+) = (63.9 \pm 0.5)\%$ and $B(K^0_S \to \pi^+\pi^-) = (69.20 \pm 0.05)\%$.

NODE=M055R89;LINKAGE=A

$\Gamma(K^*(892)^+ \overline{p}\Lambda + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{74}/Γ

NODE=M055R86

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
4.9±0.7±0.1	328	[1] ABLIKIM	19AU	BES3	$\psi(2S) \to \gamma K^{*+} \overline{p}\Lambda$

[1] ABLIKIM 19AU reports $[\Gamma(\chi_{c1}(1P) \to K^*(892)^+ \overline{p}\Lambda + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))] = (4.8 \pm 0.5 \pm 0.4) \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R86;LINKAGE=F

$\Gamma(K^+ \overline{p}\Lambda(1520) + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{75}/Γ

NODE=M055R46

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.71±0.44±0.04	48 ± 10	[1] ABLIKIM	11F	BES3	$\psi(2S) \to \gamma p\overline{p}K^+K^-$

[1] ABLIKIM 11F reports $(1.81 \pm 0.38 \pm 0.28) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^+ \overline{p}\Lambda(1520) + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R46;LINKAGE=AB

$\Gamma(\Lambda(1520)\overline{\Lambda}(1520))/\Gamma_{\text{total}}$ Γ_{76}/Γ

NODE=M055R47

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<9 \times 10^{-5}$	90	[1] ABLIKIM	11F	BES3	$\psi(2S) \to \gamma p\overline{p}K^+K^-$

[1] ABLIKIM 11F reports $< 1.00 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \Lambda(1520)\overline{\Lambda}(1520))/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

NODE=M055R47;LINKAGE=AB

$\Gamma(\Sigma^0\overline{\Sigma}^0)/\Gamma_{total}$ — Γ_{77}/Γ

NODE=M055R32
NODE=M055R32

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
4.2±0.6±0.1		103	[1] ABLIKIM	18V	BES3	$\psi(2S) \to \gamma\Sigma^0\overline{\Sigma}^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<6	90		[2] ABLIKIM	13H	BES3	$\psi(2S) \to \gamma\Sigma^0\overline{\Sigma}^0$
<4	90	3.8 ± 2.5	[3] NAIK	08	CLEO	$\psi(2S) \to \gamma\Sigma^0\overline{\Sigma}^0$

[1] ABLIKIM 18V reports $[\Gamma(\chi_{c1}(1P) \to \Sigma^0\overline{\Sigma}^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))] = (0.41 \pm 0.05 \pm 0.03) \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M055R32;LINKAGE=B

[2] ABLIKIM 13H reports $< 0.62 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \Sigma^0\overline{\Sigma}^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$. NODE=M055R32;LINKAGE=AB

[3] NAIK 08 reports $< 0.44 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \Sigma^0\overline{\Sigma}^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$. NODE=M055R32;LINKAGE=NA

$\Gamma(\Sigma^+\overline{\Sigma}^-)/\Gamma_{total}$ — Γ_{80}/Γ

NODE=M055R33
NODE=M055R33

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
3.6±0.6±0.1		59	[1] ABLIKIM	18V	BES3	$\psi(2S) \to \gamma\Sigma^+\overline{\Sigma}^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<8	90		[2] ABLIKIM	13H	BES3	$\psi(2S) \to \gamma\Sigma^+\overline{\Sigma}^-$
<6	90	4.3 ± 2.3	[3] NAIK	08	CLEO	$\psi(2S) \to \gamma\Sigma^+\overline{\Sigma}^-$

[1] ABLIKIM 18V reports $[\Gamma(\chi_{c1}(1P) \to \Sigma^+\overline{\Sigma}^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))] = (0.35 \pm 0.06 \pm 0.02) \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M055R33;LINKAGE=B

[2] ABLIKIM 13H reports $< 0.87 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \Sigma^+\overline{\Sigma}^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$. NODE=M055R33;LINKAGE=AB

[3] NAIK 08 reports $< 0.65 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \Sigma^+\overline{\Sigma}^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$. NODE=M055R33;LINKAGE=NA

$\Gamma(\Sigma^-\overline{\Sigma}^+)/\Gamma_{total}$ — Γ_{81}/Γ

NODE=M055R87
NODE=M055R87

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
5.7±1.4±0.6	214	[1] ABLIKIM	20I	BES3	$\psi(2S) \to \gamma\Sigma^-\overline{\Sigma}^+$

[1] ABLIKIM 20I reports $(5.7 \pm 1.4 \pm 0.6) \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \Sigma^-\overline{\Sigma}^+)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. NODE=M055R87;LINKAGE=A

$\Gamma(\Sigma(1385)^+\overline{\Sigma}(1385)^-)/\Gamma_{total}$ — Γ_{82}/Γ

NODE=M055R54
NODE=M055R54

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<9 × 10^{-5}	90	[1] ABLIKIM	12I	BES3	$\psi(2S) \to \gamma\Lambda\overline{\Lambda}\pi^+\pi^-$

[1] ABLIKIM 12I reports $< 10 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \Sigma(1385)^+\overline{\Sigma}(1385)^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$. NODE=M055R54;LINKAGE=AL

$\Gamma(\Sigma(1385)^-\overline{\Sigma}(1385)^+)/\Gamma_{total}$ — Γ_{83}/Γ

NODE=M055R55
NODE=M055R55

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<5 × 10^{-5}	90	[1] ABLIKIM	12I	BES3	$\psi(2S) \to \gamma\Lambda\overline{\Lambda}\pi^+\pi^-$

[1] ABLIKIM 12I reports $< 5.7 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \Sigma(1385)^-\overline{\Sigma}(1385)^+)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$. NODE=M055R55;LINKAGE=AL

$\Gamma(K^- \Lambda \Xi^+ + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_{84}/Γ

NODE=M055R71

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.35±0.24±0.03	49	[1] ABLIKIM	15I	BES3	$\psi(2S) \to \gamma K^- \Lambda \Xi^+ +$ c.c.

[1] ABLIKIM 15I reports $[\Gamma(\chi_{c1}(1P) \to K^- \Lambda \Xi^+ + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))] = (1.32 \pm 0.20 \pm 0.12) \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M055R71;LINKAGE=A

$\Gamma(\Xi^0 \overline{\Xi}^0)/\Gamma_{\text{total}}$ — Γ_{85}/Γ

NODE=M055R34

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<6 × 10^−5	90	1.7 ± 2.4	[1] NAIK	08	CLEO	$\psi(2S) \to \gamma \Xi^0 \overline{\Xi}^0$

[1] NAIK 08 reports $< 0.60 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \Xi^0 \overline{\Xi}^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$. NODE=M055R34;LINKAGE=NA

$\Gamma(\Xi^- \overline{\Xi}^+)/\Gamma_{\text{total}}$ — Γ_{86}/Γ

NODE=M055R03

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.80±0.21±0.02		16.4 ± 4.3	[1] NAIK	08	CLEO	$\psi(2S) \to \gamma \Xi^+ \overline{\Xi}^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 3.4	90		[2] ABLIKIM	06D	BES2	$\psi(2S) \to \gamma\chi_{c1}$

[1] NAIK 08 reports $(0.86 \pm 0.22 \pm 0.08) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \Xi^- \overline{\Xi}^+)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M055R03;LINKAGE=NA

[2] Using $B(\psi(2S) \to \chi_{c1}\gamma)$ $(9.1 \pm 0.6)\%$. NODE=M055R03;LINKAGE=AB

$[\Gamma(\pi^+\pi^-) + \Gamma(K^+K^-)]/\Gamma_{\text{total}}$ — Γ_{87}/Γ

NODE=M055R2

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<21 × 10^−4		[1] FELDMAN	77	MRK1	$\psi(2S) \to \gamma\chi_{c1}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<38 \times 10^{-4}$	90	[1] BRANDELIK	79B	DASP	$\psi(2S) \to \gamma\chi_{c1}$

[1] Estimated using $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 0.087$. The errors do not contain the uncertainty in the $\psi(2S)$ decay. NODE=M055R2;LINKAGE=T

$\Gamma(K^0_S K^0_S)/\Gamma_{\text{total}}$ — Γ_{88}/Γ

NODE=M055R04

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<6 × 10^−5	90	[1] ABLIKIM	05O	BES2	$\psi(2S) \to \chi_{c1}\gamma$

[1] ABLIKIM 05O reports $[\Gamma(\chi_{c1}(1P) \to K^0_S K^0_S)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))] < 0.6 \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$. NODE=M055R04;LINKAGE=AB

$\Gamma(\eta_c \pi^+\pi^-)/\Gamma_{\text{total}}$ — Γ_{89}/Γ

NODE=M055R63

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<3.2 × 10^−3	90	[1,2] ABLIKIM	13B	BES3	$e^+e^- \to \psi(2S) \to \gamma\chi_{c1}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<4.4 \times 10^{-3}$	90	[1,3] ABLIKIM	13B	BES3	$e^+e^- \to \psi(2S) \to \gamma\chi_{c1}$

OCCUR=2

[1] Using 1.06×10^8 $\psi(2S)$ mesons and $B(\psi(2S) \to \chi_{c1}\gamma) = (9.2 \pm 0.4)\%$. NODE=M055R63;LINKAGE=A

[2] Using the $\eta_c \to K^0_S K^\pm \pi^\mp$ decays. NODE=M055R63;LINKAGE=B

[3] Using the $\eta_c \to K^+ K^- \pi^0$ decays. NODE=M055R63;LINKAGE=C

RADIATIVE DECAYS

NODE=M055310

$\Gamma(\gamma J/\psi(1S))/\Gamma_{\text{total}}$ — Γ_{90}/Γ

NODE=M055R1

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
34.3 ±1.0 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
34.75±0.11±1.70	1.9M	[1] ABLIKIM	17U	BES3	$e^+e^- \to \gamma X$
37.9 ±0.8 ±2.1		[2] ADAM	05A	CLEO	$e^+e^- \to \psi(2S) \to \gamma\chi_{c1}$

[1] Not independent from $B(\psi(2S) \to \gamma\chi_{c1}(1P))$ and the product $B(\psi(2S) \to \gamma\chi_{c1}(1P)) \times B(\chi_{c1}(1P) \to \gamma J/\psi(1S))$ also measured in ABLIKIM 17U. NODE=M055R1;LINKAGE=A

[2] Uses $B(\psi(2S) \to \gamma\chi_{c1} \to \gamma\gamma J/\psi)$ from ADAM 05A and $B(\psi(2S) \to \gamma\chi_{c1})$ from ATHAR 04. NODE=M055R1;LINKAGE=AD

$\Gamma(\gamma\rho^0)/\Gamma_{total}$ — Γ_{91}/Γ

NODE=M055R29

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
216±17 OUR AVERAGE					
215±22±5	432 ± 25	[1] ABLIKIM	11E	BES3	$\psi(2S) \to \gamma\gamma\rho^0$
217±24±5	186 ± 15	[2] BENNETT	08A	CLEO	$\psi(2S) \to \gamma\gamma\rho^0$

[1] ABLIKIM 11E reports $(228 \pm 13 \pm 22) \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \gamma\rho^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M055R29;LINKAGE=AB

[2] BENNETT 08A reports $(243 \pm 19 \pm 22) \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \gamma\rho^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M055R29;LINKAGE=BE

$\Gamma(\gamma\omega)/\Gamma_{total}$ — Γ_{92}/Γ

NODE=M055R30

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
68± 8 OUR AVERAGE					
66± 9±2	136 ± 14	[1] ABLIKIM	11E	BES3	$\psi(2S) \to \gamma\gamma\omega$
74±17±2	39 ± 7	[2] BENNETT	08A	CLEO	$\psi(2S) \to \gamma\gamma\omega$

[1] ABLIKIM 11E reports $(69.7 \pm 7.2 \pm 6.6) \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \gamma\omega)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M055R30;LINKAGE=AB

[2] BENNETT 08A reports $(83 \pm 15 \pm 12) \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \gamma\omega)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M055R30;LINKAGE=BE

$\Gamma(\gamma\phi)/\Gamma_{total}$ — Γ_{93}/Γ

NODE=M055R31

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
24±5±1		43 ± 9	[1] ABLIKIM	11E	BES3	$\psi(2S) \to \gamma\gamma\phi$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<23	90	5.2 ± 3.1	[2] BENNETT	08A	CLEO	$\psi(2S) \to \gamma\gamma\phi$

[1] ABLIKIM 11E reports $(25.8 \pm 5.2 \pm 2.3) \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \gamma\phi)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M055R31;LINKAGE=AB

[2] BENNETT 08A reports $< 26\times10^{-6}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \gamma\phi)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$. NODE=M055R31;LINKAGE=BE

$\Gamma(\gamma\gamma)/\Gamma_{total}$ — Γ_{94}/Γ

NODE=M055R3

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
< 6.3 × 10^{-6}	90	ABLIKIM	17AE	BES3	$\psi(2S) \to \gamma\chi_{c1} \to 3\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 3.5 × 10^{-5}	90	ECKLUND	08A	CLEO	$\psi(2S) \to \gamma\chi_{c1} \to 3\gamma$
<150 × 10^{-5}	90	[1] YAMADA	77	DASP	$e^+e^- \to 3\gamma$

[1] Estimated using $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 0.087$. The errors do not contain the uncertainty in the $\psi(2S)$ decay. NODE=M055R;LINKAGE=T1

$\Gamma(e^+e^- J/\psi(1S))/\Gamma_{total}$ — Γ_{95}/Γ

NODE=M055R79

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3.65±0.23±0.09	1.9k	[1,2] ABLIKIM	17I	BES3	$\psi(2S) \to \gamma e^+e^- J/\psi$

[1] ABLIKIM 17I reports $(3.73 \pm 0.09 \pm 0.25) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to e^+e^- J/\psi(1S))/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.55 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M055R79;LINKAGE=B

[2] Not independent from other measurements reported by ABLIKIM 17I NODE=M055R79;LINKAGE=C

$\Gamma(e^+e^- J/\psi(1S))/\Gamma(\gamma J/\psi(1S))$ Γ_{95}/Γ_{90}

NODE=M055R80
NODE=M055R80

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
10.1±0.3±0.5	1.9k	[1] ABLIKIM	17I	BES3	$\psi(2S) \to e^+e^-\gamma J/\psi$

[1] Uses B($\psi(2S) \to \gamma\chi_{c1}(1P)$) × B($\chi_{c1}(1P) \to \gamma J/\psi(1S)$) = (351.8 ± 1.0 ± 12.0) × 10^{-4} from ABLIKIM 17N and accounts for common systematic errors.

NODE=M055R80;LINKAGE=A

$\Gamma(\mu^+\mu^- J/\psi(1S))/\Gamma(e^+e^- J/\psi(1S))$ Γ_{96}/Γ_{95}

NODE=M055R84
NODE=M055R84

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
6.73±0.51±0.50	222	ABLIKIM	19Z	BES3	$\psi(2S) \to \gamma\chi_c \to \gamma(\mu^+\mu^- J/\psi)$

$\chi_{c1}(1P)$ CROSS-PARTICLE BRANCHING RATIOS

NODE=M055230

$\Gamma(\chi_{c1}(1P) \to p\overline{p})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{54}/\Gamma \times \Gamma_{163}^{\psi(2S)}/\Gamma_{12}^{\psi(2S)}$

NODE=M055B1
NODE=M055B1

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
2.14±0.10 OUR FIT				
1.1 ±1.0	[1] BAI	98I	BES	$\psi(2S) \to \gamma\chi_{c1} \to \gamma\overline{p}p$

[1] Calculated by us. The value for B($\chi_{c1} \to p\overline{p}$) reported in BAI 98I is derived using B($\psi(2S) \to \gamma\chi_{c1}$) = (8.7 ± 0.8)% and B($\psi(2S) \to J/\psi(1S)\pi^+\pi^-$) = (32.4 ± 2.6)% [BAI 98D].

NODE=M055B;LINKAGE=J2

$\Gamma(\chi_{c1}(1P) \to \Lambda\overline{\Lambda})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma_{total}$ $\Gamma_{67}/\Gamma \times \Gamma_{163}^{\psi(2S)}/\Gamma^{\psi(2S)}$

NODE=M055B10
NODE=M055B10

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
12.4±0.8 OUR FIT					
[(11.1 ± 1.1) × 10^{-6} OUR 2021 FIT]					
12.3±0.9 OUR AVERAGE Error includes scale factor of 1.2. [(10.9 ± 1.1) × 10^{-6} OUR 2021 AVERAGE]					
12.8±0.6±0.6	528	ABLIKIM	21L	BES3	$\psi(2S) \to \gamma p\pi^-\overline{p}\pi^+$
10.5±1.6±0.6	46	[1] NAIK	08	CLEO	$\psi(2S) \to \gamma\Lambda\overline{\Lambda}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
11.2±1.0±0.9	136	[2,3] ABLIKIM	13H	BES3	$\psi(2S) \to \gamma\Lambda\overline{\Lambda}$

NEW

NEW

[1] Calculated by us. NAIK 08 reports B($\chi_{c1} \to \Lambda\overline{\Lambda}$) = (11.6 ± 1.8 ± 0.7 ± 0.7) × 10^{-5} using B($\psi(2S) \to \gamma\chi_{c1}$) = (9.07 ± 0.11 ± 0.54)%.

NODE=M055B10;LINKAGE=NA

[2] Superseded by ABLIKIM 21L

NODE=M055B10;LINKAGE=A

[3] Calculated by us. ABLIKIM 13H reports B($\chi_{c1} \to \Lambda\overline{\Lambda}$) = (12.2 ± 1.1 ± 1.1) × 10^{-5} from a measurement of B($\chi_{c1} \to \Lambda\overline{\Lambda}$) × B($\psi(2S) \to \gamma\chi_{c1}$) assuming B($\psi(2S) \to \gamma\chi_{c1}$) = (9.2 ± 0.4)%.

NODE=M055B10;LINKAGE=AB

$\Gamma(\chi_{c1}(1P) \to \Lambda\overline{\Lambda})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{67}/\Gamma \times \Gamma_{163}^{\psi(2S)}/\Gamma_{12}^{\psi(2S)}$

NODE=M055B11
NODE=M055B11

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
3.58±0.22 OUR FIT					
[(3.20 ± 0.30) × 10^{-5} OUR 2021 FIT]					
7.1 $^{+2.8}_{-2.4}$ ±1.3	$9.0^{+3.5}_{-3.1}$	[1] BAI	03E	BES	$\psi(2S) \to \gamma\Lambda\overline{\Lambda}$

NEW

[1] BAI 03E reports [B($\chi_{c1} \to \Lambda\overline{\Lambda}$) B($\psi(2S) \to \gamma\chi_{c1}$) / B($\psi(2S) \to J/\psi\pi^+\pi^-$)] × [$B^2(\Lambda \to \pi^- p)$ / B($J/\psi \to p\overline{p}$)] = ($1.33^{+0.52}_{-0.46}$ ± 0.25)%. We calculate from this measurement the presented value using B($\Lambda \to \pi^- p$) = (63.9 ± 0.5)% and B($J/\psi \to p\overline{p}$) = (2.17 ± 0.07) × 10^{-3}.

NODE=M055B11;LINKAGE=BA

$\Gamma(\chi_{c1}(1P) \to \gamma J/\psi(1S))/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma_{total}$ $\Gamma_{90}/\Gamma \times \Gamma_{163}^{\psi(2S)}/\Gamma^{\psi(2S)}$

NODE=M055B2
NODE=M055B2

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
3.34 ±0.06 OUR FIT					
3.24 ±0.16 OUR AVERAGE Error includes scale factor of 2.1. See the ideogram below.					
3.518±0.010±0.120	143k	[1] ABLIKIM	17N	BES3	$\psi(2S) \to \gamma\gamma J/\psi$
3.442±0.010±0.132	1.9M	ABLIKIM	17U	BES3	$e^+e^- \to \gamma X$
2.81 ±0.05 ±0.23	13k	BAI	04I	BES2	$\psi(2S) \to J/\psi\gamma\gamma$
2.56 ±0.12 ±0.20		GAISER	86	CBAL	$\psi(2S) \to \gamma X$
2.78 ±0.30		[2] OREGLIA	82	CBAL	$\psi(2S) \to \gamma\chi_{c1}$

2.2 ±0.5		[3] BRANDELIK	79B	DASP	$\psi(2S) \to \gamma\chi_{c1}$
2.9 ±0.5		[3] BARTEL	78B	CNTR	$\psi(2S) \to \gamma\chi_{c1}$
5.0 ±1.5		[4] BIDDICK	77	CNTR	$e^+e^- \to \gamma X$
2.8 ±0.9		[2] WHITAKER	76	MRK1	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3.377±0.009±0.183	142k	[5] ABLIKIM	12O	BES3	$\psi(2S) \to \gamma\chi_{c1}$
3.56 ±0.03 ±0.12	24.9k	[6] MENDEZ	08	CLEO	$\psi(2S) \to \gamma\chi_{c1}$
3.44 ±0.06 ±0.13	3.7k	[7] ADAM	05A	CLEO	Repl. by MENDEZ 08

[1] Uses B($J/\psi \to e^+e^-$) = (5.971 ± 0.032)% and B($J/\psi \to \mu^+\mu^-$) = (5.961 ± 0.033)%. NODE=M055B2;LINKAGE=A

[2] Recalculated by us using B($J/\psi(1S) \to \ell^+\ell^-$) = 0.1181 ± 0.0020. NODE=M055B;LINKAGE=3Q

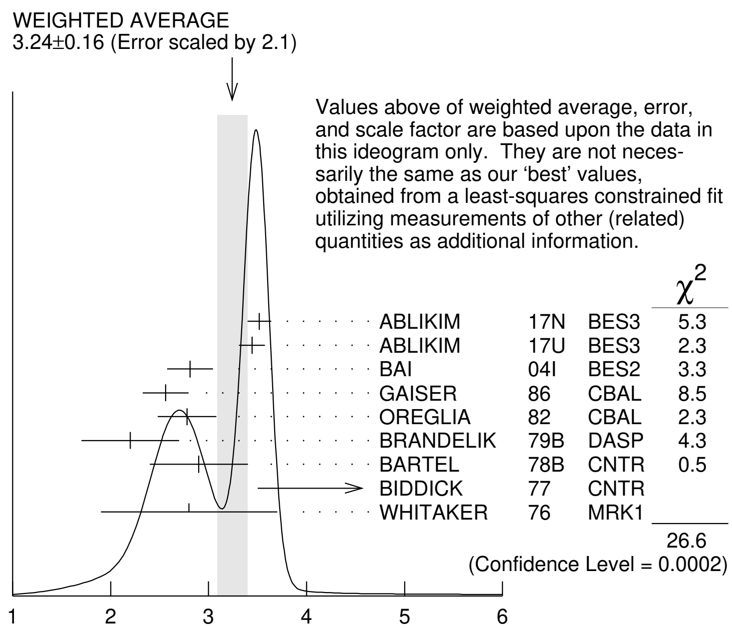
[3] Recalculated by us using B($J/\psi(1S) \to \mu^+\mu^-$) = 0.0588 ± 0.0010. NODE=M055B;LINKAGE=2Q

[4] Assumes isotropic gamma distribution. NODE=M055B;LINKAGE=EA

[5] Superseded by ABLIKIM 17N. NODE=M055B2;LINKAGE=B

[6] Not independent from other measurements of MENDEZ 08. NODE=M055B2;LINKAGE=ME

[7] Not independent from other values reported by ADAM 05A. NODE=M055B;LINKAGE=AD



$\Gamma\big(\chi_{c1}(1P) \to \gamma J/\psi(1S)\big)/\Gamma_{total} \times \Gamma\big(\psi(2S) \to \gamma\chi_{c1}(1P)\big)/\Gamma_{total}$ (units 10^{-2})

$\Gamma\big(\chi_{c1}(1P) \to \gamma J/\psi(1S)\big)/\Gamma_{total} \times \Gamma\big(\psi(2S) \to \gamma\chi_{c1}(1P)\big)/\Gamma\big(\psi(2S) \to J/\psi(1S)\,\text{anything}\big)$ $\Gamma_{90}/\Gamma \times \Gamma_{163}^{\psi(2S)}/\Gamma_{10}^{\psi(2S)}$

NODE=M055B7

$\Gamma_{90}/\Gamma \times \Gamma_{163}^{\psi(2S)}/\Gamma_{10}^{\psi(2S)} = \Gamma_{90}/\Gamma \times \Gamma_{163}^{\psi(2S)}/(\Gamma_{12}^{\psi(2S)}+\Gamma_{13}^{\psi(2S)}+\Gamma_{14}^{\psi(2S)}+0.343\Gamma_{163}^{\psi(2S)}+0.190\Gamma_{164}^{\psi(2S)})$

NODE=M055B7

NODE=M055B7

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
5.43±0.10 OUR FIT				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
5.70±0.04±0.15	24.9k	[1] MENDEZ 08	CLEO	$\psi(2S) \to \gamma\chi_{c1}$
5.77±0.10±0.12	3.7k	ADAM 05A	CLEO	Repl. by MENDEZ 08

[1] Not independent from other measurements of MENDEZ 08. NODE=M055B7;LINKAGE=ME

$\Gamma\big(\chi_{c1}(1P) \to \gamma J/\psi(1S)\big)/\Gamma_{total} \times \Gamma\big(\psi(2S) \to \gamma\chi_{c1}(1P)\big)/\Gamma\big(\psi(2S) \to J/\psi(1S)\pi^+\pi^-\big)$ $\Gamma_{90}/\Gamma \times \Gamma_{163}^{\psi(2S)}/\Gamma_{12}^{\psi(2S)}$

NODE=M055B3
NODE=M055B3

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
9.63±0.17 OUR FIT				
10.15±0.28 OUR AVERAGE				
10.17±0.07±0.27	24.9k	MENDEZ 08	CLEO	$\psi(2S) \to \gamma\chi_{c1}$
12.6 ±0.3 ±3.8	3k	[1] ABLIKIM 04B	BES	$\psi(2S) \to J/\psi X$
8.5 ±2.1		[2] HIMEL 80	MRK2	$\psi(2S) \to \gamma\chi_{c1}$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
10.24±0.17±0.23	3.7k	[3] ADAM 05A	CLEO	Repl. by MENDEZ 08

[1] From a fit to the J/ψ recoil mass spectra. NODE=M055B;LINKAGE=AB

[2] The value for $B(\psi(2S) \to \gamma\chi_{c1})\times B(\chi_{c1} \to \gamma J/\psi(1S))$ quoted in HIMEL 80 is derived using $B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) = (33 \pm 3)\%$ and $B(J/\psi(1S) \to \ell^+\ell^-) = 0.138 \pm 0.018$. Calculated by us using $B(J/\psi(1S) \to \ell^+\ell^-) = 0.1181 \pm 0.0020$. NODE=M055B;LINKAGE=J3

[3] Not independent from other values reported by ADAM 05A. NODE=M055B3;LINKAGE=AD

$\Gamma(\chi_{c1}(1P) \to \overline{K}^0 K^+\pi^- + \text{c.c.})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma_{total}$ $\Gamma_{17}/\Gamma \times \Gamma^{\psi(2S)}_{163}/\Gamma^{\psi(2S)}$

NODE=M055B16
NODE=M055B16

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
6.8±0.5 OUR FIT				
7.2±0.6 OUR AVERAGE				
7.3±0.5±0.5	[1] ATHAR	07	CLEO	$\psi(2S) \to \gamma K^0_S K^+\pi^-$
7.0±0.5±0.9	[2] ABLIKIM	06R	BES2	$\psi(2S) \to \gamma\chi_{c1}$

[1] Calculated by us. The value of $B(\chi_{c1} \to K^0 K^+\pi^- + \text{c.c.})$ reported by ATHAR 07 was derived using $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54)\%$. NODE=M055B16;LINKAGE=AT

[2] Calculated by us. ABLIKIM 06R reports $B(\chi_{c1} \to K^0_S K^+\pi^-) = (4.0 \pm 0.3 \pm 0.5) \times 10^{-3}$. We use $B(\psi(2S) \to \gamma\chi_{c1}) = (8.7 \pm 0.4) \times 10^{-2}$. NODE=M055B16;LINKAGE=AB

$\Gamma(\chi_{c1}(1P) \to \overline{K}^0 K^+\pi^- + \text{c.c.})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{17}/\Gamma \times \Gamma^{\psi(2S)}_{163}/\Gamma^{\psi(2S)}_{12}$

NODE=M055B17
NODE=M055B17

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
19.6±1.6 OUR FIT				
13.2±2.4±3.2	[1] BAI	99B	BES	$\psi(2S) \to \gamma K^0_S K^+\pi^-$

[1] Calculated by us. The value of $B(\chi_{c1} \to K^0_S K^+\pi^-)$ reported by BAI 99B was derived using $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (8.7 \pm 0.8)\%$ and $B(\psi(2S) \to J/\psi\pi^+\pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D]. NODE=M055B17;LINKAGE=BA

$\Gamma(\chi_{c1}(1P) \to K^+K^-K^+K^-)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma_{total}$ $\Gamma_{44}/\Gamma \times \Gamma^{\psi(2S)}_{163}/\Gamma^{\psi(2S)}$

NODE=M055B14
NODE=M055B14

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.53±0.11 OUR FIT					
0.61±0.11±0.08	54	[1] ABLIKIM	06T	BES2	$\psi(2S) \to \gamma K^+K^+K^-K^-$

[1] Calculated by us. The value of $B(\chi_{c1} \to 2K^+2K^-)$ reported by ABLIKIM 06T was derived using $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (8.7 \pm 0.8)\%$. NODE=M055B14;LINKAGE=AB

$\Gamma(\chi_{c1}(1P) \to K^+K^-K^+K^-)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{44}/\Gamma \times \Gamma^{\psi(2S)}_{163}/\Gamma^{\psi(2S)}_{12}$

NODE=M055B15
NODE=M055B15

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
1.52±0.31 OUR FIT				
1.13±0.40±0.29	[1] BAI	99B	BES	$\psi(2S) \to \gamma K^+K^+K^-K^-$

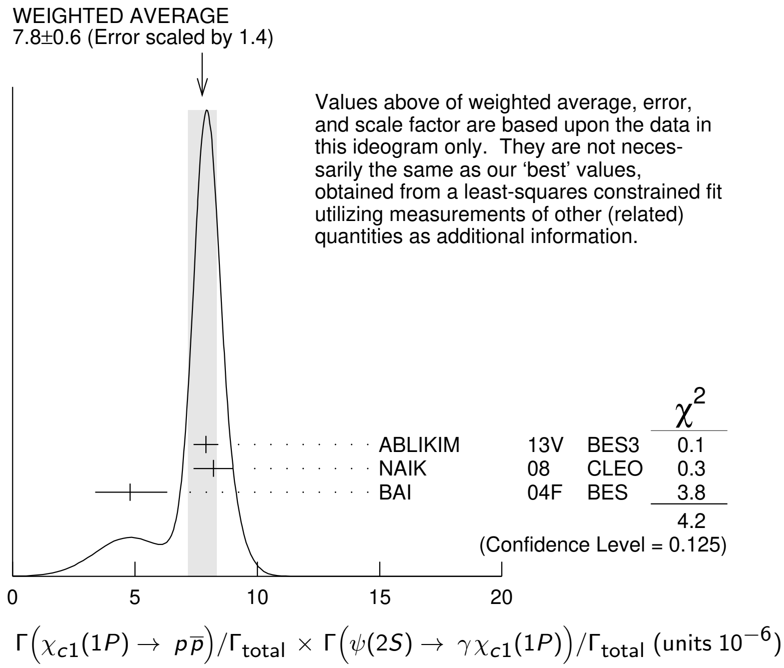
[1] Calculated by us. The value of $B(\chi_{c1} \to 2K^+2K^-)$ reported by BAI 99B was derived using $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (8.7 \pm 0.8)\%$ and $B(\psi(2S) \to J/\psi\pi^+\pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D]. NODE=M055B15;LINKAGE=BA

$\Gamma(\chi_{c1}(1P) \to p\overline{p})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma_{total}$ $\Gamma_{54}/\Gamma \times \Gamma^{\psi(2S)}_{163}/\Gamma^{\psi(2S)}$

NODE=M055B6
NODE=M055B6

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
7.41±0.35 OUR FIT					
7.8 ±0.6 OUR AVERAGE Error includes scale factor of 1.4. See the ideogram below.					
7.9 ±0.4 ±0.3	453	ABLIKIM	13V	BES3	$\psi(2S) \to \gamma p\overline{p}$
8.2 ±0.7 ±0.4	141 ± 13	[1] NAIK	08	CLEO	$\psi(2S) \to \gamma p\overline{p}$
4.8 $^{+1.4}_{-1.3}$ ±0.6	18.2$^{+5.5}_{-4.9}$	BAI	04F	BES	$\psi(2S) \to \gamma\chi_{c1}(1P) \to \gamma\overline{p}p$

[1] Calculated by us. NAIK 08 reports $B(\chi_{c1} \to p\overline{p}) = (9.0 \pm 0.8 \pm 0.4 \pm 0.5) \times 10^{-5}$ using $B(\psi(2S) \to \gamma\chi_{c1}) = (9.07 \pm 0.11 \pm 0.54)\%$. NODE=M055B6;LINKAGE=NA



$\Gamma(\chi_{c1}(1P) \to \Sigma^+ \overline{p} K^0_S + \text{c.c.})/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma_{\text{total}}$ $\Gamma_{78}/\Gamma \times \Gamma^{\psi(2S)}_{163}/\Gamma^{\psi(2S)}$

NODE=M055B01
NODE=M055B01

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
1.49±0.09±0.07	258	[1] ABLIKIM	19BB	BES3	$\psi(2S) \to \gamma\Sigma^+\overline{p}K^0_S$ + c.c.

[1] Calculated by us. ABLIKIM 19BB reports B($\chi_{c1} \to \Sigma^+\overline{p}K^0_S$ + c.c.) = $(1.53 \pm 0.10 \pm 0.08) \times 10^{-4}$ using B($\psi(2S) \to \gamma\chi_{c1}$) = (9.75 ± 0.24)% and other branching fractions from PDG 18.

NODE=M055B01;LINKAGE=A

$\Gamma(\chi_{c1}(1P) \to \Sigma^0 \overline{p} K^+ + \text{c.c.})/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma_{\text{total}}$ $\Gamma_{79}/\Gamma \times \Gamma^{\psi(2S)}_{163}/\Gamma^{\psi(2S)}$

NODE=M055R88
NODE=M055R88

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
1.42±0.07±0.06	493	[1] ABLIKIM	20AE	BES3	$\psi(2S) \to \gamma\Sigma^0\overline{p}K^+$ + c.c.

[1] Calculated by us. ABLIKIM 20AE reports B($\chi_{c1} \to \Sigma^0\overline{p}K^+$ + c.c.) = $(1.46 \pm 0.07 \pm 0.07) \times 10^{-4}$ using B($\psi(2S) \to \gamma\chi^0_c$) = (9.75 ± 0.24)% and other branching fractions from PDG 20.

NODE=M055R88;LINKAGE=A

MULTIPOLE AMPLITUDES IN $\chi_{c1}(1P) \to \gamma J/\psi(1S)$

NODE=M055240

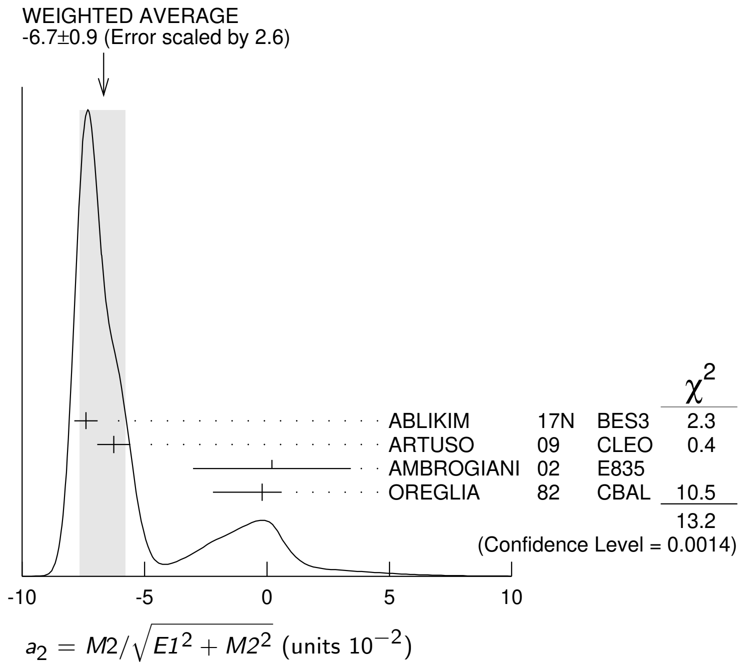
$a_2 = M2/\sqrt{E1^2 + M2^2}$ Magnetic quadrupole fractional transition amplitude

NODE=M055A1
NODE=M055A1

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
−6.7 ±0.9 OUR AVERAGE		Error includes scale factor of 2.6. See the ideogram below.			
−7.40±0.33±0.34	164k	[1] ABLIKIM	17N	BES3	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$
−6.26±0.63±0.24	39k	ARTUSO	09	CLEO	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$
0.2 ±3.2 ±0.4	2090	AMBROGIANI	02	E835	$p\overline{p} \to \chi_{c1} \to J/\psi\gamma$
$-0.2\ ^{+0.8}_{-2.0}$	921	OREGLIA	82	CBAL	$\psi(2S) \to \chi_{c1}\gamma \to J/\psi\gamma\gamma$

[1] Correlated with b_2 with correlation coefficient $\rho_{a_2 b_2} = 0.133$.

NODE=M055A1;LINKAGE=A



MULTIPOLE AMPLITUDES IN $\psi(2S) \rightarrow \gamma\chi_{c1}(1S)$ RADIATIVE DECAY

NODE=M055250

$b_2 = M2/\sqrt{E1^2 + M2^2}$ Magnetic quadrupole fractional transition amplitude

NODE=M055QB2
NODE=M055QB2

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
2.5 ±0.4 OUR AVERAGE					
2.29±0.39±0.27	164k	[1] ABLIKIM	17N	BES3	$\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$
2.76±0.73±0.23	39k	ARTUSO	09	CLEO	$\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$
$7.7 \ {}^{+5.0}_{-4.5}$	921	OREGLIA	82	CBAL	$\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$

[1] Correlated with a_2 with correlation coefficient $\rho_{a_2\,b_2} = 0.133$.

NODE=M055QB2;LINKAGE=A

MULTIPOLE AMPLITUDE RATIOS IN RADIATIVE DECAYS $\psi(2S) \rightarrow \gamma\chi_{c1}(1S)$ and $\chi_{c1} \rightarrow \gamma J/\psi(1S)$

NODE=M055260

a_2/b_2 Magnetic quadrupole transition amplitude ratio

NODE=M055QAR
NODE=M055QAR

VALUE	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
$\mathbf{-2.27^{+0.57}_{-0.99}}$	39k	[1] ARTUSO	09	CLEO	$\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$

[1] Statistical and systematic errors combined. Not independent of $a_2(\chi_{c1})$ and $b_2(\chi_{c1})$ values from ARTUSO 09.

NODE=M055QAR;LINKAGE=AR

$\chi_{c1}(1P)$ REFERENCES

NODE=M055

ABLIKIM	21AV	JHEP 2111 217	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61465
ABLIKIM	21L	PR D103 112004	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61117
ABLIKIM	20AE	PR D102 092006	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60733
ABLIKIM	20B	PR D101 012012	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60212
ABLIKIM	20I	PR D101 092002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60303
PDG	20	PTEP 2020 083C01	P.A. Zyla *et al.*	(PDG Collab.)	REFID=60676
ABLIKIM	19AA	PR D99 052008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59844
ABLIKIM	19AU	PR D100 052010	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59996
ABLIKIM	19BB	PR D100 092006	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60026
ABLIKIM	19J	PR D99 012015	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59606
ABLIKIM	19Z	PR D99 051101	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59837
LU	19	PR D99 032003	P.-C. Lu *et al.*	(BELLE Collab.)	REFID=59614
ABLIKIM	18D	PRL 121 022001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58849
ABLIKIM	18V	PR D97 052011	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58990
PDG	18	PR D98 030001	M. Tanabashi *et al.*	(PDG Collab.)	REFID=59304
AAIJ	17BB	EPJ C77 609	R. Aaij *et al.*	(LHCb Collab.)	REFID=58191
AAIJ	17BI	PRL 119 221801	R. Aaij *et al.*	(LHCb Collab.)	REFID=58278
ABLIKIM	17AE	PR D96 092007	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58310
ABLIKIM	17I	PRL 118 221802	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57931
ABLIKIM	17K	PR D95 032002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57953
ABLIKIM	17N	PR D95 072004	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57978
ABLIKIM	17U	PR D96 032001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58026
PDG	16	CP C40 100001	C. Patrignani *et al.*	(PDG Collab.)	REFID=57140
ABLIKIM	15I	PR D91 092006	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56774
ABLIKIM	15M	PR D91 112008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56778
ABLIKIM	14J	PR D89 074030	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55901
ABLIKIM	13B	PR D87 012002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54877
ABLIKIM	13D	PR D87 012007	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54879
ABLIKIM	13H	PR D87 032007	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54953
ABLIKIM	13V	PR D88 112001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55583

ABLIKIM	12I	PR D86 052004	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54736
ABLIKIM	12J	PR D86 052011	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54737
ABLIKIM	12O	PRL 109 172002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54742
ABLIKIM	11A	PR D83 012006	M. Ablikim *et al.*	(BESIII Collab.)	REFID=53647
ABLIKIM	11D	PR D83 032003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=16715
ABLIKIM	11E	PR D83 112005	M. Ablikim *et al.*	(BESIII Collab.)	REFID=16717
ABLIKIM	11F	PR D83 112009	M. Ablikim *et al.*	(BESIII Collab.)	REFID=16719
ABLIKIM	11K	PRL 107 092001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=53940
ONYISI	10	PR D82 011103	P.U.E. Onyisi *et al.*	(CLEO Collab.)	REFID=53360
ARTUSO	09	PR D80 112003	M. Artuso *et al.*	(CLEO Collab.)	REFID=53206
BENNETT	08A	PRL 101 151801	J.V. Bennett *et al.*	(CLEO Collab.)	REFID=52575
ECKLUND	08A	PR D78 091501	K.M. Ecklund *et al.*	(CLEO Collab.)	REFID=52583
HE	08B	PR D78 092004	Q. He *et al.*	(CLEO Collab.)	REFID=52588
MENDEZ	08	PR D78 011102	H. Mendez *et al.*	(CLEO Collab.)	REFID=52684
NAIK	08	PR D78 031101	P. Naik *et al.*	(CLEO Collab.)	REFID=52301
ATHAR	07	PR D75 032002	S.B. Athar *et al.*	(CLEO Collab.)	REFID=51618
ABLIKIM	06D	PR D73 052006	M. Ablikim *et al.*	(BES Collab.)	REFID=51049
ABLIKIM	06R	PR D74 072001	M. Ablikim *et al.*	(BES Collab.)	REFID=51447
ABLIKIM	06T	PL B642 197	M. Ablikim *et al.*	(BES Collab.)	REFID=51453
ABLIKIM	05G	PR D71 092002	M. Ablikim *et al.*	(BES Collab.)	REFID=50756
ABLIKIM	05O	PL B630 21	M. Ablikim *et al.*	(BES Collab.)	REFID=50846
ADAM	05A	PRL 94 232002	N.E. Adam *et al.*	(CLEO Collab.)	REFID=50763
ANDREOTTI	05A	NP B717 34	M. Andreotti *et al.*	(FNAL E835 Collab.)	REFID=50769
ABLIKIM	04B	PR D70 012003	M. Ablikim *et al.*	(BES Collab.)	REFID=49741
ABLIKIM	04H	PR D70 092003	M. Ablikim *et al.*	(BES Collab.)	REFID=50188
ATHAR	04	PR D70 112002	S.B. Athar *et al.*	(CLEO Collab.)	REFID=50331
BAI	04F	PR D69 092001	J.Z. Bai *et al.*	(BES Collab.)	REFID=49752
BAI	04I	PR D70 012006	J.Z. Bai *et al.*	(BES Collab.)	REFID=49755
AULCHENKO	03	PL B573 63	V.M. Aulchenko *et al.*	(KEDR Collab.)	REFID=49579
BAI	03E	PR D67 112001	J.Z. Bai *et al.*	(BES Collab.)	REFID=49416
AMBROGIANI	02	PR D65 052002	M. Ambrogiani *et al.*	(FNAL E835 Collab.)	REFID=48552
BAI	99B	PR D60 072001	J.Z. Bai *et al.*	(BES Collab.)	REFID=47385
BAI	98D	PR D58 092006	J.Z. Bai *et al.*	(BES Collab.)	REFID=46338
BAI	98I	PRL 81 3091	J.Z. Bai *et al.*	(BES Collab.)	REFID=46343
ARMSTRONG	92	NP B373 35	T.A. Armstrong *et al.*	(FNAL, FERR, GENO+)	REFID=41865
Also		PRL 68 1468	T.A. Armstrong *et al.*	(FNAL, FERR, GENO+)	REFID=41907
BAGLIN	86B	PL B172 455	C. Baglin	(LAPP, CERN, GENO, LYON, OSLO+)	REFID=22145
GAISER	86	PR D34 711	J. Gaiser *et al.*	(Crystal Ball Collab.)	REFID=22012
LEMOIGNE	82	PL 113B 509	Y. Lemoigne *et al.*	(SACL, LOIC, SHMP+)	REFID=22084
OREGLIA	82	PR D25 2259	M.J. Oreglia *et al.*	(SLAC, CIT, HARV+)	REFID=22120
Also		Private Comm.	M.J. Oreglia	(EFI)	REFID=22143
HIMEL	80	PRL 44 920	T. Himel *et al.*	(LBL, SLAC)	REFID=22119
Also		Private Comm.	G. Trilling	(LBL, UCB)	REFID=22113
BRANDELIK	79B	NP B160 426	R. Brandelik *et al.*	(DASP Collab.)	REFID=22115
BARTEL	78B	PL 79B 492	W. Bartel *et al.*	(DESY, HEIDP)	REFID=22111
TANENBAUM	78	PR D17 1731	W.M. Tanenbaum *et al.*	(SLAC, LBL)	REFID=22112
Also		Private Comm.	G. Trilling	(LBL, UCB)	REFID=22113
BIDDICK	77	PRL 38 1324	C.J. Biddick *et al.*	(UCSD, UMD, PAVI+)	REFID=22059
FELDMAN	77	PRPL 33C 285	G.J. Feldman, M.L. Perl	(LBL, SLAC)	REFID=22062
YAMADA	77	Hamburg Conf. 69	S. Yamada	(DASP Collab.)	REFID=22064
WHITAKER	76	PRL 37 1596	J.S. Whitaker *et al.*	(SLAC, LBL)	REFID=22151
TANENBAUM	75	PRL 35 1323	W.M. Tanenbaum *et al.*	(LBL, SLAC)	REFID=22106

NODE=M144

$h_c(1P)$

$I^G(J^{PC}) = 0^-(1^{+-})$

Quantum numbers are quark model prediction, $C = -$ established by $\eta_c \gamma$ decay.

NODE=M144

$h_c(1P)$ MASS

NODE=M144M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
3525.38±0.11 OUR AVERAGE					
3525.31±0.11±0.14	832	[1] ABLIKIM	12N	BES3	$\psi(2S) \to \pi^0 \gamma$ hadrons
3525.40±0.13±0.18	3679	ABLIKIM	10B	BES3	$\psi(2S) \to \pi^0 \gamma \eta_c$
3525.20±0.18±0.12	1282	[2] DOBBS	08A	CLEO	$\psi(2S) \to \pi^0 \eta_c \gamma$
3525.8 ±0.2 ±0.2	13	ANDREOTTI	05B	E835	$\overline{p}p \to \eta_c \gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3525.6 ±0.5	92^{+23}_{-22}	ADAMS	09	CLEO	$\psi(2S) \to 2(\pi^+\pi^-\pi^0)$
3524.4 ±0.6 ±0.4	168 ± 40	[3] ROSNER	05	CLEO	$\psi(2S) \to \pi^0 \eta_c \gamma$
3527 ±8	42	ANTONIAZZI	94	E705	300 $\pi^\pm$, pLi $\to J/\psi \pi^0 X$
3526.28±0.18±0.19	59	[4] ARMSTRONG	92D	E760	$\overline{p}p \to J/\psi \pi^0$
3525.4 ±0.8 ±0.4	5	BAGLIN	86	SPEC	$\overline{p}p \to J/\psi X$

NODE=M144M

[1] With floating width. NODE=M144M;LINKAGE=AB

[2] Combination of exclusive and inclusive analyses for the reaction $\psi(2S) \to \pi^0 h_c \to \pi^0 \eta_c \gamma$. This result is the average of DOBBS 08A and ROSNER 05. NODE=M144M;LINKAGE=DO

[3] Superseded by DOBBS 08A. NODE=M144M;LINKAGE=RO

[4] Mass central value and systematic error recalculated by us according to Eq. (16) in ARMSTRONG 93B, using the value for the $\psi(2S)$ mass from AULCHENKO 03. NODE=M144M;LINKAGE=NW

$h_c(1P)$ WIDTH

NODE=M144W

VALUE (MeV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.70±0.28±0.22		832	[1] ABLIKIM	12N	BES3	$\psi(2S) \to \pi^0 \gamma$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 1.44	90	3679	[2] ABLIKIM	10B	BES3	$\psi(2S) \to \pi^0 \gamma \eta_c$
< 1		13	ANDREOTTI	05B	E835	$\overline{p}p \to \eta_c \gamma$
< 1.1	90	59	ARMSTRONG	92D	E760	$\overline{p}p \to J/\psi \pi^0$

NODE=M144W

[1] With floating mass. NODE=M144W;LINKAGE=AL

[2] The central value is $\Gamma = 0.73 \pm 0.45 \pm 0.28$ MeV. NODE=M144W;LINKAGE=AB

$h_c(1P)$ DECAY MODES

NODE=M144215;NODE=M144

	Mode	Fraction (Γ_i/Γ)	Confidence level	
Γ_1	$J/\psi(1S)\pi^0$			DESIG=1
Γ_2	$J/\psi(1S)\pi\pi$	not seen		DESIG=2;OUR EST;→ UNCHECKED ←
Γ_3	$J/\psi(1S)\pi^+\pi^-$	$< 2.3 \times 10^{-3}$	90%	DESIG=10
Γ_4	$p\overline{p}$	$< 1.5 \times 10^{-4}$	90%	DESIG=3
Γ_5	$p\overline{p}\pi^+\pi^-$	$(2.9\pm0.6) \times 10^{-3}$		DESIG=11
Γ_6	$p\overline{p}\pi^0\pi^0$	$< 5 \times 10^{-4}$	90%	DESIG=13
Γ_7	$\pi^+\pi^-\pi^0$	$(1.6\pm0.5) \times 10^{-3}$		DESIG=5
Γ_8	$\pi^+\pi^-\pi^0\eta$	$(7.2\pm2.3) \times 10^{-3}$		DESIG=14
Γ_9	$2\pi^+2\pi^-\pi^0$	$(8.1\pm1.8) \times 10^{-3}$		DESIG=6
Γ_{10}	$3\pi^+3\pi^-\pi^0$	$< 9 \times 10^{-3}$	90%	DESIG=7
Γ_{11}	$K^+K^-\pi^+\pi^-$	$< 6 \times 10^{-4}$	90%	DESIG=12
Γ_{12}	$K^+K^-\pi^+\pi^-\pi^0$	$(3.2\pm0.8) \times 10^{-3}$		DESIG=15
Γ_{13}	$K^+K^-\pi^+\pi^-\eta$	$< 2.3 \times 10^{-3}$	90%	DESIG=16
Γ_{14}	$K^+K^-\pi^0$	$< 6 \times 10^{-4}$	90%	DESIG=17
Γ_{15}	$K^+K^-\pi^0\eta$	$< 2.1 \times 10^{-3}$	90%	DESIG=18
Γ_{16}	$K^+K^-\eta$	$< 9 \times 10^{-4}$	90%	DESIG=19
Γ_{17}	$2K^+2K^-\pi^0$	$< 2.4 \times 10^{-4}$	90%	DESIG=20
Γ_{18}	$K^0_S K^\pm \pi^\mp$	$< 6 \times 10^{-4}$	90%	DESIG=21
Γ_{19}	$K^0_S K^\pm \pi^\mp \pi^+\pi^-$	$(2.8\pm1.0) \times 10^{-3}$		DESIG=22

NODE=M144;CLUMP=R

Radiative decays

Γ_{20}	$\gamma\eta$	$(4.7\pm2.1)\times10^{-4}$	DESIG=9
Γ_{21}	$\gamma\eta'(958)$	$(1.5\pm0.4)\times10^{-3}$	DESIG=8
Γ_{22}	$\gamma\eta_c(1S)$	(50 ± 9) %	DESIG=4

$h_c(1P)$ PARTIAL WIDTHS

NODE=M144220

$h_c(1P)$ $\Gamma(i)\Gamma(\overline{p}p)/\Gamma(\text{total})$

NODE=M144223

$\Gamma(\gamma\eta_c(1S)) \times \Gamma(p\overline{p})/\Gamma_{total}$ — $\Gamma_{22}\Gamma_4/\Gamma$

NODE=M144G1
NODE=M144G1

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
12.0 ± 4.5	13	[1] ANDREOTTI	05B	E835	$\overline{p}p \to \eta_c\gamma$

[1] Assuming $\Gamma = 1$ MeV.

NODE=M144G1;LINKAGE=AN

$h_c(1P)$ BRANCHING RATIOS

NODE=M144225

$\Gamma(J/\psi(1S)\pi\pi)/\Gamma(J/\psi(1S)\pi^0)$ — Γ_2/Γ_1

NODE=M144R1
NODE=M144R1

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.18	90	ARMSTRONG	92D	E760	$\overline{p}p \to J/\psi\pi^0$

$\Gamma(J/\psi(1S)\pi^+\pi^-)/\Gamma_{total}$ — Γ_3/Γ

NODE=M144R07
NODE=M144R07

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.3\times10^{-3}$	90	[1] ABLIKIM	18M	BES3	$\psi(2S) \to \pi^0\pi^+\pi^- J/\psi$

OCCUR=2

[1] ABLIKIM 18M reports $[\Gamma(h_c(1P) \to J/\psi(1S)\pi^+\pi^-)/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] < 2.0\times10^{-6}$ which we divide by our best value $B(\psi(2S) \to h_c(1P)\pi^0) = 8.6\times10^{-4}$.

NODE=M144R07;LINKAGE=B

$\Gamma(p\overline{p})/\Gamma_{total}$ — Γ_4/Γ

NODE=M144R20
NODE=M144R20

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.5\times10^{-4}$	90	[1] ABLIKIM	13V	BES3	$\psi(2S) \to \gamma p\overline{p}$

[1] ABLIKIM 13V reports $[\Gamma(h_c(1P) \to p\overline{p})/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] < 1.3\times10^{-7}$ which we divide by our best value $B(\psi(2S) \to h_c(1P)\pi^0) = 8.6\times10^{-4}$.

NODE=M144R20;LINKAGE=A

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_7/Γ

NODE=M144R01
NODE=M144R01

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$1.6\pm0.5\pm0.2$		101	[1] ABLIKIM	19AG	BES3	$\psi(2S) \to \pi^0 h_c(1P)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<2.2	90		[2] ADAMS	09	CLEO	$\psi(2S) \to \pi^0\gamma\eta_c$

[1] ABLIKIM 19AG reports $[\Gamma(h_c(1P) \to \pi^+\pi^-\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] = (1.38\pm0.35\pm0.17)\times10^{-6}$ which we divide by our best value $B(\psi(2S) \to h_c(1P)\pi^0) = (8.6\pm1.3)\times10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M144R01;LINKAGE=A

[2] ADAMS 09 reports $[\Gamma(h_c(1P) \to \pi^+\pi^-\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] < 0.19\times10^{-5}$ which we divide by our best value $B(\psi(2S) \to h_c(1P)\pi^0) = 8.6\times10^{-4}$.

NODE=M144R01;LINKAGE=AD

$\Gamma(\pi^+\pi^-\pi^0\eta)/\Gamma_{total}$ — Γ_8/Γ

NODE=M144R11
NODE=M144R11

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
$7.2\pm2.0\pm1.0$	35	[1] ABLIKIM	20AH	BES3	$\psi(2S) \to \pi^0 h_c(1P)$

[1] ABLIKIM 20AH reports $[\Gamma(h_c(1P) \to \pi^+\pi^-\pi^0\eta)/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] = (6.2\pm1.6\pm0.7)\times10^{-6}$ which we divide by our best value $B(\psi(2S) \to h_c(1P)\pi^0) = (8.6\pm1.3)\times10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M144R11;LINKAGE=A

$\Gamma(2\pi^+2\pi^-\pi^0)/\Gamma_{total}$ — Γ_9/Γ

NODE=M144R02
NODE=M144R02

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
0.81 ± 0.18 OUR AVERAGE					
$0.74\pm0.14\pm0.11$	254	[1] ABLIKIM	19AG	BES3	$\psi(2S) \to \pi^0 h_c(1P)$
$2.2^{+0.8}_{-0.6}\pm0.3$	92	[2] ADAMS	09	CLEO	$\psi(2S) \to \pi^0\gamma\eta_c$

[1] ABLIKIM 19AG reports $[\Gamma(h_c(1P) \to 2\pi^+ 2\pi^- \pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] = (6.40 \pm 0.81 \pm 0.87) \times 10^{-6}$ which we divide by our best value $B(\psi(2S) \to h_c(1P)\pi^0) = (8.6 \pm 1.3) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M144R02;LINKAGE=A

[2] ADAMS 09 reports $[\Gamma(h_c(1P) \to 2\pi^+ 2\pi^- \pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] = (1.88^{+0.48}_{-0.45}{}^{+0.47}_{-0.30}) \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \to h_c(1P)\pi^0) = (8.6 \pm 1.3) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M144R02;LINKAGE=AD

$\Gamma(3\pi^+ 3\pi^- \pi^0)/\Gamma_{total}$ Γ_{10}/Γ

NODE=M144R03
NODE=M144R03

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<9 × 10^{-3}	90	[1] ABLIKIM 19AG	BES3	$\psi(2S) \to \pi^0 h_c(1P)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.029	90	[2] ADAMS 09	CLEO	$\psi(2S) \to \pi^0 \gamma \eta_c$

[1] ABLIKIM 19AG reports $[\Gamma(h_c(1P) \to 3\pi^+ 3\pi^- \pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] < 7.5 \times 10^{-6}$ which we divide by our best value $B(\psi(2S) \to h_c(1P)\pi^0) = 8.6 \times 10^{-4}$. NODE=M144R03;LINKAGE=A

[2] ADAMS 09 reports $[\Gamma(h_c(1P) \to 3\pi^+ 3\pi^- \pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] < 2.5 \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \to h_c(1P)\pi^0) = 8.6 \times 10^{-4}$. NODE=M144R03;LINKAGE=AD

$\Gamma(p\overline{p}\pi^+\pi^-)/\Gamma_{total}$ Γ_5/Γ

NODE=M144R08
NODE=M144R08

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
2.9±0.5±0.4	230	[1] ABLIKIM 19AG	BES3	$\psi(2S) \to \pi^0 h_c(1P)$

[1] ABLIKIM 19AG reports $[\Gamma(h_c(1P) \to p\overline{p}\pi^+\pi^-)/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] = (2.49 \pm 0.27 \pm 0.28) \times 10^{-6}$ which we divide by our best value $B(\psi(2S) \to h_c(1P)\pi^0) = (8.6 \pm 1.3) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M144R08;LINKAGE=A

$\Gamma(p\overline{p}\pi^0\pi^0)/\Gamma_{total}$ Γ_6/Γ

NODE=M144R10
NODE=M144R10

VALUE	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<5 × 10^{-4}	90	12	[1] ABLIKIM 20AH	BES3	$\psi(2S) \to \pi^0 h_c(1P)$

[1] ABLIKIM 20AH reports $[\Gamma(h_c(1P) \to p\overline{p}\pi^0\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] < 4.4 \times 10^{-7}$ which we divide by our best value $B(\psi(2S) \to h_c(1P)\pi^0) = 8.6 \times 10^{-4}$. NODE=M144R10;LINKAGE=A

$\Gamma(K^+K^-\pi^+\pi^-)/\Gamma_{total}$ Γ_{11}/Γ

NODE=M144R09
NODE=M144R09

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<6 × 10^{-4}	90	[1] ABLIKIM 19AG	BES3	$\psi(2S) \to \pi^0 h_c(1P)$

[1] ABLIKIM 19AG reports $[\Gamma(h_c(1P) \to K^+K^-\pi^+\pi^-)/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] < 0.5 \times 10^{-6}$ which we divide by our best value $B(\psi(2S) \to h_c(1P)\pi^0) = 8.6 \times 10^{-4}$. NODE=M144R09;LINKAGE=A

$\Gamma(K^+K^-\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{12}/Γ

NODE=M144R12
NODE=M144R12

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
3.2±0.7±0.5	80	[1] ABLIKIM 20AH	BES3	$\psi(2S) \to \pi^0 h_c(1P)$

[1] ABLIKIM 20AH reports $[\Gamma(h_c(1P) \to K^+K^-\pi^+\pi^-\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] = (2.8 \pm 0.5 \pm 0.3) \times 10^{-6}$ which we divide by our best value $B(\psi(2S) \to h_c(1P)\pi^0) = (8.6 \pm 1.3) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M144R12;LINKAGE=A

$\Gamma(K^+K^-\pi^+\pi^-\eta)/\Gamma_{total}$ Γ_{13}/Γ

NODE=M144R13
NODE=M144R13

VALUE	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<2.3 × 10^{-3}	90	24	[1] ABLIKIM 20AH	BES3	$\psi(2S) \to \pi^0 h_c(1P)$

[1] ABLIKIM 20AH reports $[\Gamma(h_c(1P) \to K^+K^-\pi^+\pi^-\eta)/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] < 2.0 \times 10^{-6}$ which we divide by our best value $B(\psi(2S) \to h_c(1P)\pi^0) = 8.6 \times 10^{-4}$. NODE=M144R13;LINKAGE=A

$\Gamma(K^+K^-\pi^0)/\Gamma_{total}$ Γ_{14}/Γ

NODE=M144R14
NODE=M144R14

VALUE	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<6 × 10^{-4}	90	20	[1] ABLIKIM 20AH	BES3	$\psi(2S) \to \pi^0 h_c(1P)$

[1] ABLIKIM 20AH reports $[\Gamma(h_c(1P) \to K^+K^-\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] < 4.8 \times 10^{-7}$ which we divide by our best value $B(\psi(2S) \to h_c(1P)\pi^0) = 8.6 \times 10^{-4}$. NODE=M144R14;LINKAGE=A

$\Gamma(2K^+2K^-\pi^0)/\Gamma_{total}$ Γ_{17}/Γ

NODE=M144R17

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<2.4 × 10^{-4}	90	11	[1] ABLIKIM	20AH	BES3	$\psi(2S) \to \pi^0 h_c(1P)$

[1] ABLIKIM 20AH reports $[\Gamma(h_c(1P) \to 2K^+2K^-\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] < 2.1 \times 10^{-7}$ which we divide by our best value $B(\psi(2S) \to h_c(1P)\pi^0) = 8.6 \times 10^{-4}$.

NODE=M144R17;LINKAGE=A

$\Gamma(K^+K^-\pi^0\eta)/\Gamma_{total}$ Γ_{15}/Γ

NODE=M144R15

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<2.1 × 10^{-3}	90	20	[1] ABLIKIM	20AH	BES3	$\psi(2S) \to \pi^0 h_c(1P)$

[1] ABLIKIM 20AH reports $[\Gamma(h_c(1P) \to K^+K^-\pi^0\eta)/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] < 1.8 \times 10^{-6}$ which we divide by our best value $B(\psi(2S) \to h_c(1P)\pi^0) = 8.6 \times 10^{-4}$.

NODE=M144R15;LINKAGE=A

$\Gamma(K^+K^-\eta)/\Gamma_{total}$ Γ_{16}/Γ

NODE=M144R16

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<9 × 10^{-4}	90	18	[1] ABLIKIM	20AH	BES3	$\psi(2S) \to \pi^0 h_c(1P)$

[1] ABLIKIM 20AH reports $[\Gamma(h_c(1P) \to K^+K^-\eta)/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] < 7.5 \times 10^{-7}$ which we divide by our best value $B(\psi(2S) \to h_c(1P)\pi^0) = 8.6 \times 10^{-4}$.

NODE=M144R16;LINKAGE=A

$\Gamma(K^0_S K^\pm\pi^\mp)/\Gamma_{total}$ Γ_{18}/Γ

NODE=M144R18

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<6 × 10^{-4}	90	17	[1] ABLIKIM	20AH	BES3	$\psi(2S) \to \pi^0 h_c(1P)$

[1] ABLIKIM 20AH reports $[\Gamma(h_c(1P) \to K^0_S K^\pm\pi^\mp)/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] < 4.8 \times 10^{-7}$ which we divide by our best value $B(\psi(2S) \to h_c(1P)\pi^0) = 8.6 \times 10^{-4}$.

NODE=M144R18;LINKAGE=A

$\Gamma(K^0_S K^\pm\pi^\mp\pi^+\pi^-)/\Gamma_{total}$ Γ_{19}/Γ

NODE=M144R19

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
2.8±0.9±0.4	41	[1] ABLIKIM	20AH	BES3	$\psi(2S) \to \pi^0 h_c(1P)$

[1] ABLIKIM 20AH reports $[\Gamma(h_c(1P) \to K^0_S K^\pm\pi^\mp\pi^+\pi^-)/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] = (2.4 \pm 0.7 \pm 0.3) \times 10^{-6}$ which we divide by our best value $B(\psi(2S) \to h_c(1P)\pi^0) = (8.6 \pm 1.3) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M144R19;LINKAGE=A

RADIATIVE DECAYS

NODE=M144230

$\Gamma(\gamma\eta)/\Gamma_{total}$ Γ_{20}/Γ

NODE=M144R06

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
4.7±1.5±1.4	18	ABLIKIM	16I	BES3	$\psi(2S) \to \pi^0\gamma\eta$

$\Gamma(\gamma\eta'(958))/\Gamma_{total}$ Γ_{21}/Γ

NODE=M144R00

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.52±0.27±0.29	44	ABLIKIM	16I	BES3	$\psi(2S) \to \pi^0\gamma\eta'(958)$

$\Gamma(\gamma\eta_c(1S))/\Gamma_{total}$ Γ_{22}/Γ

NODE=M144R2

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
50± 9 OUR AVERAGE					
53± 7±8	3679	[1] ABLIKIM	10B	BES3	$\psi(2S) \to \pi^0\eta_c\gamma$
48± 6±7		[2] DOBBS	08A	CLEO	$\psi(2S) \to \pi^0\eta_c\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
48± 6±7	1282	[3] DOBBS	08A	CLEO	$\psi(2S) \to \pi^0\eta_c\gamma$
46±12±7	168	[4] ROSNER	05	CLEO	$\psi(2S) \to \pi^0\eta_c\gamma$

OCCUR=2

[1] ABLIKIM 10B reports $[\Gamma(h_c(1P) \to \gamma\eta_c(1S))/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] = (4.58 \pm 0.40 \pm 0.50) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \to h_c(1P)\pi^0) = (8.6 \pm 1.3) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M144R2;LINKAGE=A

[2] Average of DOBBS 08A and ROSNER 05. DOBBS 08A reports $[\Gamma(h_c(1P) \to \gamma\eta_c(1S))/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] = (4.16 \pm 0.30 \pm 0.37) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \to h_c(1P)\pi^0) = (8.6 \pm 1.3) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M144R2;LINKAGE=DB

[3] DOBBS 08A reports $[\Gamma(h_c(1P) \to \gamma\eta_c(1S))/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] = (4.19 \pm 0.32 \pm 0.45) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \to h_c(1P)\pi^0) = (8.6 \pm 1.3) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M144R2;LINKAGE=DO

[4] ROSNER 05 reports $[\Gamma(h_c(1P) \rightarrow \gamma\eta_c(1S))/\Gamma_{total}] \times [B(\psi(2S) \rightarrow h_c(1P)\pi^0)] = (4.0 \pm 0.8 \pm 0.7) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \rightarrow h_c(1P)\pi^0) = (8.6 \pm 1.3) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M144R2;LINKAGE=RO

$h_c(1P)$ REFERENCES

NODE=M144

ABLIKIM	20AH	PR D102 112007	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60750
ABLIKIM	19AG	PR D99 072008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59858
ABLIKIM	18M	PR D97 052008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58901
ABLIKIM	16I	PRL 116 251802	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57450
ABLIKIM	13V	PR D88 112001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55583
ABLIKIM	12N	PR D86 092009	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54741
ABLIKIM	10B	PRL 104 132002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=53348
ADAMS	09	PR D80 051106	G.S. Adams *et al.*	(CLEO Collab.)	REFID=53103
DOBBS	08A	PRL 101 182003	S. Dobbs *et al.*	(CLEO Collab.)	REFID=52579
ANDREOTTI	05B	PR D72 032001	M. Andreotti *et al.*	(FNAL E835 Collab.)	REFID=50768
ROSNER	05	PRL 95 102003	J.L. Rosner *et al.*	(CLEO Collab.)	REFID=50812
AULCHENKO	03	PL B573 63	V.M. Aulchenko *et al.*	(KEDR Collab.)	REFID=49579
ANTONIAZZI	94	PR D50 4258	L. Antoniazzi *et al.*	(E705 Collab.)	REFID=44074
ARMSTRONG	93B	PR D47 772	T.A. Armstrong *et al.*	(FNAL E760 Collab.)	REFID=43307
ARMSTRONG	92D	PRL 69 2337	T.A. Armstrong *et al.*	(FNAL, FERR, GENO+)	REFID=43174
BAGLIN	86	PL B171 135	C. Baglin *et al.*	(LAPP, CERN, TORI, STRB+)	REFID=43180

NODE=M057

$\chi_{c2}(1P)$

$I^G(J^{PC}) = 0^+(2^{++})$

See the Review on "$\psi(2S)$ and χ_c branching ratios" before the $\chi_{c0}(1P)$ Listings.

NODE=M057

$\chi_{c2}(1P)$ MASS

NODE=M057M

NODE=M057M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
3556.17 ± 0.07 OUR AVERAGE					
3557.3 ± 1.7 ±0.7	611	[1] AAIJ	17BB	LHCB	$pp \rightarrow b\bar{b}X \rightarrow 2(K^+K^-)X$
3556.10 ± 0.06 ±0.11	4.0k	[2] AAIJ	17BI	LHCB	$\chi_{c2} \rightarrow J/\psi\mu^+\mu^-$
3555.3 ± 0.6 ±2.2	2.5k	UEHARA	08	BELL	$\gamma\gamma \rightarrow$ hadrons
3555.70 ± 0.59 ±0.39		ABLIKIM	05G	BES2	$\psi(2S) \rightarrow \gamma\chi_{c2}$
3556.173 ± 0.123 ± 0.020		ANDREOTTI	05A	E835	$p\bar{p} \rightarrow e^+e^-\gamma$
3559.9 ± 2.9		EISENSTEIN	01	CLE2	$e^+e^- \rightarrow e^+e^-\chi_{c2}$
3556.4 ± 0.7		BAI	99B	BES	$\psi(2S) \rightarrow \gamma X$
3556.22 ± 0.131 ± 0.020	585	[3] ARMSTRONG	92	E760	$\bar{p}p \rightarrow e^+e^-\gamma$
3556.9 ± 0.4 ±0.5	50	BAGLIN	86B	SPEC	$\bar{p}p \rightarrow e^+e^-X$
3557.8 ± 0.2 ±4		[4] GAISER	86	CBAL	$\psi(2S) \rightarrow \gamma X$
3553.4 ± 2.2	66	[5] LEMOIGNE	82	GOLI	$185\ \pi^-\text{Be} \rightarrow \gamma\mu^+\mu^-\text{A}$
3555.9 ± 0.7		[6] OREGLIA	82	CBAL	$e^+e^- \rightarrow J/\psi 2\gamma$
3557 ± 1.5	69	[7] HIMEL	80	MRK2	$e^+e^- \rightarrow J/\psi 2\gamma$
3551 ±11	15	BRANDELIK	79B	DASP	$e^+e^- \rightarrow J/\psi 2\gamma$
3553 ± 4		[7] BARTEL	78B	CNTR	$e^+e^- \rightarrow J/\psi 2\gamma$
3553 ± 4 ±4		[7,8] TANENBAUM	78	MRK1	e^+e^-
3563 ± 7	360	[7] BIDDICK	77	CNTR	$e^+e^- \rightarrow \gamma X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3555.4 ± 1.3	53	UEHARA	13	BELL	$\gamma\gamma \rightarrow K^0_S K^0_S$
3543 ±10	4	WHITAKER	76	MRK1	$e^+e^- \rightarrow J/\psi 2\gamma$

[1] From a fit of the $\phi\phi$ invariant mass with the width of $\chi_{c2}(1P)$ fixed to the PDG 16 value. NODE=M057M;LINKAGE=A

[2] AAIJ 17BI reports also $m(\chi_{c2}) - m(\chi_{c1}) = 45.39 \pm 0.07 \pm 0.03$ MeV. NODE=M057M;LINKAGE=B

[3] Recalculated by ANDREOTTI 05A, using the value of $\psi(2S)$ mass from AULCHENKO 03. NODE=M057M;LINKAGE=NW

[4] Using mass of $\psi(2S) = 3686.0$ MeV. NODE=M057M;LINKAGE=C

[5] $J/\psi(1S)$ mass constrained to 3097 MeV. NODE=M057M;LINKAGE=P

[6] Assuming $\psi(2S)$ mass = 3686 MeV and $J/\psi(1S)$ mass = 3097 MeV. NODE=M057M;LINKAGE=E

[7] Mass value shifted by us by amount appropriate for $\psi(2S)$ mass = 3686 MeV and $J/\psi(1S)$ mass = 3097 MeV. NODE=M057M;LINKAGE=D

[8] From a simultaneous fit to radiative and hadronic decay channels. NODE=M057M;LINKAGE=M

$\chi_{c2}(1P)$ WIDTH

NODE=M057W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
1.97 ±0.09 OUR FIT						NODE=M057W
2.00 ±0.11 OUR AVERAGE						
2.10 ±0.20 ±0.02	4.0k	AAIJ	17BI	LHCB	$\chi_{c2} \to J/\psi \mu^+ \mu^-$	
1.915±0.188±0.013		ANDREOTTI	05A	E835	$p \overline{p} \to e^+ e^- \gamma$	
1.96 ±0.17 ±0.07	585	[1] ARMSTRONG	92	E760	$\overline{p} p \to e^+ e^- \gamma$	
2.6 $^{+1.4}_{-1.0}$	50	BAGLIN	86B	SPEC	$\overline{p} p \to e^+ e^- X$	
2.8 $^{+2.1}_{-2.0}$		[2] GAISER	86	CBAL	$\psi(2S) \to \gamma X$	

[1] Recalculated by ANDREOTTI 05A. NODE=M057W;LINKAGE=AN

[2] Errors correspond to 90% confidence level; authors give only width range. NODE=M057W;LINKAGE=E

$\chi_{c2}(1P)$ DECAY MODES

NODE=M057215;NODE=M057

	Mode	Fraction (Γ_i/Γ)	Confidence level	
	Hadronic decays			NODE=M057;CLUMP=A
Γ_1	$2(\pi^+\pi^-)$	(1.02 ± 0.09) %		DESIG=3
Γ_2	$\rho\rho$			DESIG=43
Γ_3	$\pi^+\pi^-\pi^0\pi^0$	(1.83 ± 0.23) %		DESIG=50
Γ_4	$\rho^+\pi^-\pi^0$ + c.c.	(2.19 ± 0.34) %		DESIG=51
Γ_5	$4\pi^0$	$(1.11\pm0.15)\times10^{-3}$		DESIG=62
Γ_6	$K^+K^-\pi^0\pi^0$	$(2.1\pm0.4)\times10^{-3}$		DESIG=52
Γ_7	$K^+\pi^-\overline{K}^0\pi^0$ + c.c.	(1.38 ± 0.20) %		DESIG=54
Γ_8	$\rho^- K^+\overline{K}^0$ + c.c.	$(4.1\pm1.2)\times10^{-3}$		DESIG=55
Γ_9	$K^*(892)^0 K^-\pi^+ \to K^-\pi^+K^0\pi^0$ + c.c.	$(2.9\pm0.8)\times10^{-3}$		DESIG=60
Γ_{10}	$K^*(892)^0\overline{K}^0\pi^0 \to K^+\pi^-\overline{K}^0\pi^0$ + c.c.	$(3.8\pm0.9)\times10^{-3}$		DESIG=56
Γ_{11}	$K^*(892)^- K^+\pi^0 \to K^+\pi^-\overline{K}^0\pi^0$ + c.c.	$(3.7\pm0.8)\times10^{-3}$		DESIG=57
Γ_{12}	$K^*(892)^+\overline{K}^0\pi^- \to K^+\pi^-\overline{K}^0\pi^0$ + c.c.	$(2.9\pm0.8)\times10^{-3}$		DESIG=58
Γ_{13}	$K^+K^-\eta\pi^0$	$(1.3\pm0.4)\times10^{-3}$		DESIG=59
Γ_{14}	$K^+K^-\pi^+\pi^-$	$(8.4\pm0.9)\times10^{-3}$		DESIG=5
Γ_{15}	$K^+K^-\pi^+\pi^-\pi^0$	(1.17 ± 0.13) %		DESIG=67
Γ_{16}	$K^0_S K^\pm\pi^\mp\pi^+\pi^-$	$(7.3\pm0.8)\times10^{-3}$		DESIG=78
Γ_{17}	$K^+\overline{K}^*(892)^0\pi^-$ + c.c.	$(2.1\pm1.1)\times10^{-3}$		DESIG=10
Γ_{18}	$K^*(892)^0\overline{K}^*(892)^0$	$(2.3\pm0.4)\times10^{-3}$		DESIG=21
Γ_{19}	$3(\pi^+\pi^-)$	$(8.6\pm1.8)\times10^{-3}$		DESIG=4
Γ_{20}	$\phi\phi$	$(1.06\pm0.09)\times10^{-3}$		DESIG=16
Γ_{21}	$\phi\phi\eta$	$(5.3\pm0.6)\times10^{-4}$		DESIG=99
Γ_{22}	$\omega\omega$	$(8.4\pm1.0)\times10^{-4}$		DESIG=25
Γ_{23}	ωK^+K^-	$(7.3\pm0.9)\times10^{-4}$		DESIG=79
Γ_{24}	$\omega\phi$	$(9.6\pm2.7)\times10^{-6}$		DESIG=68
Γ_{25}	$\pi\pi$	$(2.23\pm0.09)\times10^{-3}$		DESIG=22
Γ_{26}	$\rho^0\pi^+\pi^-$	$(3.7\pm1.6)\times10^{-3}$		DESIG=9
Γ_{27}	$\pi^+\pi^-\pi^0$ (non-resonant)	$(2.0\pm0.4)\times10^{-5}$		DESIG=95
Γ_{28}	$\rho(770)^\pm\pi^\mp$	$(6\pm4)\times10^{-6}$		DESIG=96
Γ_{29}	$\pi^+\pi^-\eta$	$(4.8\pm1.3)\times10^{-4}$		DESIG=39
Γ_{30}	$\pi^+\pi^-\eta'$	$(5.0\pm1.8)\times10^{-4}$		DESIG=42
Γ_{31}	$\eta\eta$	$(5.4\pm0.4)\times10^{-4}$		DESIG=14
Γ_{32}	K^+K^-	$(1.01\pm0.06)\times10^{-3}$		DESIG=2
Γ_{33}	$K^0_S K^0_S$	$(5.2\pm0.4)\times10^{-4}$		DESIG=15
Γ_{34}	$K^*(892)^\pm K^\mp$	$(1.44\pm0.21)\times10^{-4}$		DESIG=87
Γ_{35}	$K^*(892)^0\overline{K}^0$ + c.c.	$(1.24\pm0.27)\times10^{-4}$		DESIG=88
Γ_{36}	$K^*_2(1430)^\pm K^\mp$	$(1.48\pm0.12)\times10^{-3}$		DESIG=89
Γ_{37}	$K^*_2(1430)^0\overline{K}^0$ + c.c.	$(1.24\pm0.17)\times10^{-3}$		DESIG=90
Γ_{38}	$K^*_3(1780)^\pm K^\mp$	$(5.2\pm0.8)\times10^{-4}$		DESIG=91
Γ_{39}	$K^*_3(1780)^0\overline{K}^0$ + c.c.	$(5.6\pm2.1)\times10^{-4}$		DESIG=92
Γ_{40}	$a_2(1320)^0\pi^0$	$(1.29\pm0.34)\times10^{-3}$		DESIG=93
Γ_{41}	$a_2(1320)^\pm\pi^\mp$	$(1.8\pm0.6)\times10^{-3}$		DESIG=94

Γ_{42}	$\overline{K}^0 K^+ \pi^- +$ c.c.	$(1.28\pm0.18)\times10^{-3}$		DESIG=17
Γ_{43}	$K^+ K^- \pi^0$	$(3.0\ \pm0.8\ )\times10^{-4}$		DESIG=36
Γ_{44}	$K^+ K^- \eta$	$< 3.2 \times10^{-4}$	90%	DESIG=40
Γ_{45}	$K^+ K^- \eta'(958)$	$(1.94\pm0.34)\times10^{-4}$		DESIG=82
Γ_{46}	$\eta\eta'$	$(2.2\ \pm0.5\ )\times10^{-5}$		DESIG=34
Γ_{47}	$\eta'\eta'$	$(4.6\ \pm0.6\ )\times10^{-5}$		DESIG=35
Γ_{48}	$\pi^+\pi^- K^0_S K^0_S$	$(2.2\ \pm0.5\ )\times10^{-3}$		DESIG=29
Γ_{49}	$K^+ K^- K^0_S K^0_S$	$< 4 \times10^{-4}$	90%	DESIG=30
Γ_{50}	$K^0_S K^0_S K^0_S K^0_S$	$(1.13\pm0.18)\times10^{-4}$		DESIG=97
Γ_{51}	$K^+ K^- K^+ K^-$	$(1.65\pm0.20)\times10^{-3}$		DESIG=24
Γ_{52}	$K^+ K^- \phi$	$(1.42\pm0.29)\times10^{-3}$		DESIG=32
Γ_{53}	$\overline{K}^0 K^+ \pi^- \phi +$ c.c.	$(4.8\ \pm0.7\ )\times10^{-3}$		DESIG=83
Γ_{54}	$K^+ K^- \pi^0 \phi$	$(2.7\ \pm0.5\ )\times10^{-3}$		DESIG=84
Γ_{55}	$\phi\pi^+\pi^-\pi^0$	$(9.3\ \pm1.2\ )\times10^{-4}$		DESIG=80
Γ_{56}	$p\overline{p}$	$(7.33\pm0.33)\times10^{-5}$		DESIG=11
Γ_{57}	$p\overline{p}\pi^0$	$(4.7\ \pm0.4\ )\times10^{-4}$		DESIG=37
Γ_{58}	$p\overline{p}\eta$	$(1.74\pm0.25)\times10^{-4}$		DESIG=41
Γ_{59}	$p\overline{p}\omega$	$(3.6\ \pm0.4\ )\times10^{-4}$		DESIG=61
Γ_{60}	$p\overline{p}\phi$	$(2.8\ \pm0.9\ )\times10^{-5}$		DESIG=66
Γ_{61}	$p\overline{p}\pi^+\pi^-$	$(1.32\pm0.34)\times10^{-3}$		DESIG=8
Γ_{62}	$p\overline{p}\pi^0\pi^0$	$(7.8\ \pm2.3\ )\times10^{-4}$		DESIG=53
Γ_{63}	$p\overline{p}K^+K^-$ (non-resonant)	$(1.91\pm0.32)\times10^{-4}$		DESIG=63
Γ_{64}	$p\overline{p}K^0_S K^0_S$	$< 7.9 \times10^{-4}$	90%	DESIG=28
Γ_{65}	$p\overline{n}\pi^-$	$(8.5\ \pm0.9\ )\times10^{-4}$		DESIG=31
Γ_{66}	$\overline{p}n\pi^+$	$(8.9\ \pm0.8\ )\times10^{-4}$		DESIG=75
Γ_{67}	$p\overline{n}\pi^-\pi^0$	$(2.17\pm0.18)\times10^{-3}$		DESIG=76
Γ_{68}	$\overline{p}n\pi^+\pi^0$	$(2.11\pm0.18)\times10^{-3}$		DESIG=77
Γ_{69}	$\Lambda\overline{\Lambda}$	$(1.83\pm0.16)\times10^{-4}$		DESIG=19
Γ_{70}	$\Lambda\overline{\Lambda}\pi^+\pi^-$	$(1.25\pm0.15)\times10^{-3}$		DESIG=27
Γ_{71}	$\Lambda\overline{\Lambda}\pi^+\pi^-$ (non-resonant)	$(6.6\ \pm1.5\ )\times10^{-4}$		DESIG=70
Γ_{72}	$\Sigma(1385)^+\overline{\Lambda}\pi^- +$ c.c.	$< 4 \times10^{-4}$	90%	DESIG=71
Γ_{73}	$\Sigma(1385)^-\overline{\Lambda}\pi^+ +$ c.c.	$< 6 \times10^{-4}$	90%	DESIG=72
Γ_{74}	$K^+\overline{p}\Lambda +$ c.c.	$(7.8\ \pm0.5\ )\times10^{-4}$		DESIG=38
Γ_{75}	$nK^0_S\overline{\Lambda} +$ c.c.	$(3.58\pm0.28)\times10^{-4}$		DESIG=104
Γ_{76}	$K^*(892)^+\overline{p}\Lambda +$ c.c.	$(8.2\ \pm1.1\ )\times10^{-4}$		DESIG=101
Γ_{77}	$K^+\overline{p}\Lambda(1520) +$ c.c.	$(2.8\ \pm0.7\ )\times10^{-4}$		DESIG=64
Γ_{78}	$\Lambda(1520)\overline{\Lambda}(1520)$	$(4.6\ \pm1.5\ )\times10^{-4}$		DESIG=65
Γ_{79}	$\Sigma^0\overline{\Sigma}^0$	$(3.7\ \pm0.6\ )\times10^{-5}$		DESIG=47
Γ_{80}	$\Sigma^+\overline{p}K^0_S +$ c.c.	$(8.2\ \pm0.9\ )\times10^{-5}$		DESIG=100
Γ_{81}	$\Sigma^0\overline{p}K^+ +$ c.c.	$(9.1\ \pm0.8\ )\times10^{-5}$		DESIG=103
Γ_{82}	$\Sigma^+\overline{\Sigma}^-$	$(3.4\ \pm0.7\ )\times10^{-5}$		DESIG=48
Γ_{83}	$\Sigma^-\overline{\Sigma}^+$	$(4.4\ \pm1.8\ )\times10^{-5}$		DESIG=102
Γ_{84}	$\Sigma(1385)^+\overline{\Sigma}(1385)^-$	$< 1.6 \times10^{-4}$	90%	DESIG=73
Γ_{85}	$\Sigma(1385)^-\overline{\Sigma}(1385)^+$	$< 8 \times10^{-5}$	90%	DESIG=74
Γ_{86}	$K^-\Lambda\overline{\Xi}^+ +$ c.c.	$(1.76\pm0.32)\times10^{-4}$		DESIG=85
Γ_{87}	$\Xi^0\overline{\Xi}^0$	$< 1.0 \times10^{-4}$	90%	DESIG=49
Γ_{88}	$\Xi^-\overline{\Xi}^+$	$(1.42\pm0.32)\times10^{-4}$		DESIG=26
Γ_{89}	$J/\psi(1S)\pi^+\pi^-\pi^0$	< 1.5 %	90%	DESIG=12
Γ_{90}	$\pi^0\eta_c$	$< 3.2 \times10^{-3}$	90%	DESIG=81
Γ_{91}	$\eta_c(1S)\pi^+\pi^-$	$< 5.4 \times10^{-3}$	90%	DESIG=69

Radiative decays

NODE=M057;CLUMP=B

Γ_{92}	$\gamma J/\psi(1S)$	$(19.0\ \pm0.5\ )$ %		DESIG=6
Γ_{93}	$\gamma\rho^0$	$< 1.9 \times10^{-5}$	90%	DESIG=44
Γ_{94}	$\gamma\omega$	$< 6 \times10^{-6}$	90%	DESIG=45
Γ_{95}	$\gamma\phi$	$< 7 \times10^{-6}$	90%	DESIG=46
Γ_{96}	$\gamma\gamma$	$(2.85\pm0.10)\times10^{-4}$		DESIG=7
Γ_{97}	$e^+e^-J/\psi(1S)$	$(2.15\pm0.14)\times10^{-3}$		DESIG=86
Γ_{98}	$\mu^+\mu^-J/\psi(1S)$	$(2.02\pm0.33)\times10^{-4}$		DESIG=98

CONSTRAINED FIT INFORMATION

A multiparticle fit to $\chi_{c1}(1P)$, $\chi_{c0}(1P)$, $\chi_{c2}(1P)$, and $\psi(2S)$ with 4 total widths, a partial width, 25 combinations of partial widths obtained from integrated cross section, and 84 branching ratios uses 248 measurements to determine 49 parameters. The overall fit has a $\chi^2 = 379.8$ for 199 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\left\langle \delta p_i \delta p_j \right\rangle / (\delta p_i \cdot \delta p_j)$, in percent, from the fit to parameters p_i, including the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{total}$.

x_{14}	7									
x_{17}	2	21								
x_{18}	4	3	1							
x_{20}	7	5	1	3						
x_{25}	7	6	1	4	10					
x_{26}	18	2	0	1	1	1				
x_{31}	3	3	1	2	5	12	1			
x_{32}	5	4	1	3	7	15	1	8		
x_{33}	5	4	1	2	6	13	1	7	8	
x_{42}	2	2	0	1	3	7	0	3	4	4
x_{51}	4	3	1	2	4	7	1	4	5	4
x_{56}	10	9	2	5	9	11	2	5	8	7
x_{69}	3	3	1	2	5	12	1	6	8	6
x_{92}	12	10	2	6	15	34	2	18	22	18
x_{96}	−6	−4	−1	−2	2	20	−2	12	12	10
Γ	−23	−19	−4	−11	−19	−25	−5	−12	−18	−15
	x_1	x_{14}	x_{17}	x_{18}	x_{20}	x_{25}	x_{26}	x_{31}	x_{32}	x_{33}

x_{51}	2					
x_{56}	4	5				
x_{69}	3	4	5			
x_{92}	10	11	4	17		
x_{96}	5	4	18	11	34	
Γ	−8	−11	−45	−12	−46	−43
	x_{42}	x_{51}	x_{56}	x_{69}	x_{92}	x_{96}

$\chi_{c2}(1P)$ PARTIAL WIDTHS

NODE=M057220

$\chi_{c2}(1P)$ Γ(i)Γ($\gamma J/\psi(1S)$)/Γ(total)

NODE=M057223

Γ($p\overline{p}$) × Γ($\gamma J/\psi(1S)$)/Γ$_{total}$ — $\Gamma_{56}\Gamma_{92}/\Gamma$

NODE=M057G1
NODE=M057G1

VALUE (eV)	DOCUMENT ID	TECN	COMMENT
27.5±1.2 OUR FIT			
27.5±1.5 OUR AVERAGE			
27.0±1.5±1.1	[1] ANDREOTTI 05A	E835	$p\overline{p} \to e^+e^-\gamma$
27.7±1.5±2.0	[1,2] ARMSTRONG 92	E760	$\overline{p}p \to e^+e^-\gamma$
36 ±8	[1] BAGLIN 86B	SPEC	$\overline{p}p \to e^+e^-X$

[1] Calculated by us using B($J/\psi(1S) \to e^+e^-$) = 0.0593 ± 0.0010. NODE=M057G;LINKAGE=7A

[2] Recalculated by ANDREOTTI 05A. NODE=M057G;LINKAGE=AN

Γ($\gamma\gamma$) × Γ($\gamma J/\psi(1S)$)/Γ$_{total}$ — $\Gamma_{96}\Gamma_{92}/\Gamma$

NODE=M057G2
NODE=M057G2

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
107± 5 OUR FIT				
117± 10 OUR AVERAGE				
111± 12± 9	147 ± 15	[1] DOBBS 06	CLE3	10.4 $e^+e^- \to e^+e^-\chi_{c2}$
114± 11± 9	136 ± 13.3	[1,2] ABE 02T	BELL	$e^+e^- \to e^+e^-\chi_{c2}$
139± 55± 21		[1,3] ACCIARRI 99E	L3	$e^+e^- \to e^+e^-\chi_{c2}$

242± 65± 51	[1,4] ACKER..,K...	98	OPAL	$e^+e^- \to e^+e^-\chi_{c2}$
150± 42± 36	[1,5] DOMINICK	94	CLE2	$e^+e^- \to e^+e^-\chi_{c2}$
470±240±120	[1,6] BAUER	93	TPC	$e^+e^- \to e^+e^-\chi_{c2}$

[1] Calculated by us using B($J/\psi \to \ell^+\ell^-$) = 0.1187 ± 0.0008. NODE=M057G;LINKAGE=LL

[2] All systematic errors added in quadrature. NODE=M057G;LINKAGE=GT

[3] The value for $\Gamma(\chi_{c2} \to \gamma\gamma)$ reported in ACCIARRI 99E is derived using B($\chi_{c2} \to \gamma J/\psi(1S)$)×B($J/\psi(1S) \to \ell^+\ell^-$) = 0.0162 ± 0.0014. NODE=M057G;LINKAGE=J4

[4] The value for $\Gamma(\chi_{c2} \to \gamma\gamma)$ reported in ACKERSTAFF,K 98 is derived using B($\chi_{c2} \to \gamma J/\psi(1S)$) = 0.135 ± 0.011 and B($J/\psi(1S) \to \ell^+\ell^-$) = 0.1203 ± 0.0038. NODE=M057G;LINKAGE=J5

[5] The value for $\Gamma(\chi_{c2} \to \gamma\gamma)$ reported in DOMINICK 94 is derived using B($\chi_{c2} \to \gamma J/\psi(1S)$)= 0.135 ± 0.011, B($J/\psi(1S) \to e^+e^-$) = 0.0627 ± 0.0020, and B($J/\psi(1S) \to \mu^+\mu^-$) = 0.0597 ± 0.0025. NODE=M057G;LINKAGE=J6

[6] The value for $\Gamma(\chi_{c2} \to \gamma\gamma)$ reported in BAUER 93 is derived using B($\chi_{c2} \to \gamma J/\psi(1S)$)= 0.135 ± 0.011, B($J/\psi(1S) \to e^+e^-$) = 0.0627 ± 0.0020, and B($J/\psi(1S) \to \mu^+\mu^-$) = 0.0597 ± 0.0025. NODE=M057G;LINKAGE=J7

$\chi_{c2}(1P)$ Γ(i)Γ(γγ)/Γ(total)

NODE=M057224

$\Gamma(2(\pi^+\pi^-)) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_1\Gamma_{96}/\Gamma$

NODE=M057G3

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
5.7 ±0.5 OUR FIT					
5.2 ±0.7 OUR AVERAGE					
5.01±0.44±0.55	1597±138	UEHARA	08	BELL	$\gamma\gamma \to \chi_{c2} \to 2(\pi^+\pi^-)$
6.4 ±1.8 ±0.8		EISENSTEIN	01	CLE2	$e^+e^- \to e^+e^-\chi_{c2}$

$\Gamma(\rho\rho) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_2\Gamma_{96}/\Gamma$

NODE=M057G08

VALUE (eV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<7.8	90	<598	UEHARA	08	BELL	$\gamma\gamma \to \chi_{c2} \to 2(\pi^+\pi^-)$

$\Gamma(K^+K^-\pi^+\pi^-) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{14}\Gamma_{96}/\Gamma$

NODE=M057G09

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
4.7 ±0.5 OUR FIT					
4.42±0.42±0.53	780 ± 74	UEHARA	08	BELL	$\gamma\gamma \to \chi_{c2} \to K^+K^-\pi^+\pi^-$

$\Gamma(K^+K^-\pi^+\pi^-\pi^0) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{15}\Gamma_{96}/\Gamma$

NODE=M057G02

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
6.5±0.9±1.5	1250	DEL-AMO-SA..	11M	BABR	$\gamma\gamma \to K^+K^-\pi^+\pi^-\pi^0$

$\Gamma(K^*(892)^0\overline{K}^*(892)^0) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{18}\Gamma_{96}/\Gamma$

NODE=M057G10

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
1.26±0.24 OUR FIT					
0.8 ±0.17±0.27	151 ± 30	UEHARA	08	BELL	$\gamma\gamma \to \chi_{c2} \to K^+K^-\pi^+\pi^-$

$\Gamma(\phi\phi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{20}\Gamma_{96}/\Gamma$

NODE=M057G12

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.60±0.05 OUR FIT					
0.62±0.07±0.05	89 ± 11	[1] LIU	12B	BELL	$\gamma\gamma \to 2(K^+K^-)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.58±0.18±0.16	26.5 ± 8.1	UEHARA	08	BELL	$\gamma\gamma \to \chi_{c2} \to 2(K^+K^-)$

[1] Supersedes UEHARA 08. Using B($\phi \to K^+K^-$) = (48.9 ± 0.5)%. NODE=M057G12;LINKAGE=LI

$\Gamma(\omega\omega) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{22}\Gamma_{96}/\Gamma$

NODE=M057G03

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.64	90	[1] LIU	12B	BELL	$\gamma\gamma \to 2(\pi^+\pi^-\pi^0)$

[1] Using B($\omega \to \pi^+\pi^-\pi^0$) = (89.2 ± 0.7)%. NODE=M057G03;LINKAGE=LI

$\Gamma(\omega\phi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{24}\Gamma_{96}/\Gamma$

NODE=M057G04

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.04	90	[1] LIU	12B	BELL	$\gamma\gamma \to K^+K^-\pi^+\pi^-\pi^0$

[1] Using B($\phi \to K^+K^-$) = (48.9 ± 0.5)% and B($\omega \to \pi^+\pi^-\pi^0$) = (89.2 ± 0.7)%. NODE=M057G04;LINKAGE=LI

$\Gamma(\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{25}\Gamma_{96}/\Gamma$

NODE=M057G4
NODE=M057G4

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
1.25±0.07 OUR FIT					
1.18±0.25 OUR AVERAGE					
1.44±0.54±0.47	34 ± 13	[1] UEHARA	09	BELL	10.6 $e^+e^- \rightarrow e^+e^-\pi^0\pi^0$
1.14±0.21±0.17	54 ± 10	[2] NAKAZAWA	05	BELL	10.6 $e^+e^- \rightarrow e^+e^-\pi^+\pi^-$

[1] We multiplied the measurement by 3 to convert from $\pi^0\pi^0$ to $\pi\pi$. Interference with the continuum included.
NODE=M057G4;LINKAGE=UE

[2] We have multiplied $\pi^+\pi^-$ measurement by 3/2 to obtain $\pi\pi$.
NODE=M057G;LINKAGE=NA

$\Gamma(\rho^0\pi^+\pi^-) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{26}\Gamma_{96}/\Gamma$

NODE=M057G07
NODE=M057G07

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
2.1±0.9 OUR FIT					
3.2±1.9±0.5	986 ± 578	UEHARA	08	BELL	$\gamma\gamma \rightarrow \chi_{c2} \rightarrow 2(\pi^+\pi^-)$

$\Gamma(\eta\eta) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{31}\Gamma_{96}/\Gamma$

NODE=M057G13
NODE=M057G13

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.53±0.22±0.09	8	[1] UEHARA	10A	BELL	10.6 $e^+e^- \rightarrow e^+e^-\eta\eta$

[1] Interference with the continuum not included.
NODE=M057G13;LINKAGE=UE

$\Gamma(K^+K^-) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{32}\Gamma_{96}/\Gamma$

NODE=M057G5
NODE=M057G5

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.56±0.04 OUR FIT					
0.44±0.11±0.07	33 ± 8	NAKAZAWA	05	BELL	10.6 $e^+e^- \rightarrow e^+e^-K^+K^-$

$\Gamma(K^0_S K^0_S) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{33}\Gamma_{96}/\Gamma$

NODE=M057G6
NODE=M057G6

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.294±0.025 OUR FIT					
0.27 $^{+0.07}_{-0.06}$ ±0.03	53	[1] UEHARA	13	BELL	$\gamma\gamma \rightarrow K^0_S K^0_S$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.31 ±0.05 ±0.03	38 ± 7	CHEN	07B	BELL	$e^+e^- \rightarrow e^+e^-\chi_{c2}$

[1] Supersedes CHEN 07B.
NODE=M057G6;LINKAGE=UE

$\Gamma(\overline{K}^0K^+\pi^- + c.c.) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{42}\Gamma_{96}/\Gamma$

NODE=M057G01
NODE=M057G01

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.72±0.11 OUR FIT					
1.20±0.33±0.13	126	[1] DEL-AMO-SA..11M		BABR	$\gamma\gamma \rightarrow K^0_S K^\pm\pi^\mp$

[1] We have multiplied $\overline{K}K\pi$ by 2/3 to obtain $\overline{K}^0K^+\pi^-$ + c.c.
NODE=M057G01;LINKAGE=DE

$\Gamma(K^+K^-K^+K^-) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{51}\Gamma_{96}/\Gamma$

NODE=M057G11
NODE=M057G11

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.93±0.11 OUR FIT					
1.10±0.21±0.15	126 ± 24	UEHARA	08	BELL	$\gamma\gamma \rightarrow \chi_{c2} \rightarrow 2(K^+K^-)$

$\Gamma(\eta_c(1S)\pi^+\pi^-) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{91}\Gamma_{96}/\Gamma$

NODE=M057G05
NODE=M057G05

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<15.7	90	LEES	12AE	BABR	$e^+e^- \rightarrow e^+e^-\pi^+\pi^-\eta_c$

$\chi_{c2}(1P)$ BRANCHING RATIOS

NODE=M057225

HADRONIC DECAYS

NODE=M057305

$\Gamma(2(\pi^+\pi^-))/\Gamma_{total}$ — Γ_1/Γ

NODE=M057R2
NODE=M057R2

VALUE	DOCUMENT ID
0.0102±0.0009 OUR FIT	

$\Gamma(\rho^0\pi^+\pi^-)/\Gamma(2(\pi^+\pi^-))$ — Γ_{26}/Γ_1

NODE=M057R38
NODE=M057R38

VALUE	DOCUMENT ID		TECN	COMMENT
0.36±0.15 OUR FIT				
0.31±0.17	TANENBAUM	78	MRK1	$\psi(2S) \rightarrow \gamma\chi_{c2}$

NODE=M057R46

$\Gamma(\pi^+\pi^-\pi^0\pi^0)/\Gamma_{total}$ Γ_3/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
1.83±0.23±0.04	903.5	[1] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^-h^0h^0$

[1] HE 08B reports $1.87 \pm 0.07 \pm 0.22 \pm 0.13$ % from a measurement of $[\Gamma(\chi_{c2}(1P) \to \pi^+\pi^-\pi^0\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R47

$\Gamma(\rho^+\pi^-\pi^0 + \text{c.c.})/\Gamma_{total}$ Γ_4/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
2.19±0.34±0.05	1031.9	[1,2] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^-h^0h^0$

[1] HE 08B reports $2.23 \pm 0.11 \pm 0.32 \pm 0.16$ % from a measurement of $[\Gamma(\chi_{c2}(1P) \to \rho^+\pi^-\pi^0 + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] Calculated by us. We have added the values from HE 08B for $\rho^+\pi^-\pi^0$ and $\rho^-\pi^+\pi^0$ decays assuming uncorrelated statistical and fully correlated systematic uncertainties.

NODE=M057R58

$\Gamma(4\pi^0)/\Gamma_{total}$ Γ_5/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.11±0.15±0.02	1164	[1] ABLIKIM	11A	BES3	$e^+e^- \to \psi(2S) \to \gamma\chi_{c2}$

[1] ABLIKIM 11A reports $(1.21 \pm 0.05 \pm 0.16) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to 4\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R48

$\Gamma(K^+K^-\pi^0\pi^0)/\Gamma_{total}$ Γ_6/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.206±0.040±0.004	76.9	[1] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^-h^0h^0$

[1] HE 08B reports $0.21 \pm 0.03 \pm 0.03 \pm 0.01$ % from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^+K^-\pi^0\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R50

$\Gamma(K^+\pi^-\overline{K}^0\pi^0 + \text{c.c.})/\Gamma_{total}$ Γ_7/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
1.38±0.19±0.03	211.6	[1] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^-h^0h^0$

[1] HE 08B reports $1.41 \pm 0.11 \pm 0.16 \pm 0.10$ % from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^+\pi^-\overline{K}^0\pi^0 + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R51

$\Gamma(\rho^-K^+\overline{K}^0 + \text{c.c.})/\Gamma_{total}$ Γ_8/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.41±0.12±0.01	62.9	[1] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^-h^0h^0$

[1] HE 08B reports $0.42 \pm 0.11 \pm 0.06 \pm 0.03$ % from a measurement of $[\Gamma(\chi_{c2}(1P) \to \rho^-K^+\overline{K}^0 + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R57

$\Gamma(K^*(892)^0K^-\pi^+ \to K^-\pi^+K^0\pi^0 + \text{c.c.})/\Gamma_{total}$ Γ_9/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.29±0.08±0.01	38.7	[1] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^-h^0h^0$

[1] HE 08B reports $0.30 \pm 0.07 \pm 0.04 \pm 0.02$ % from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^*(892)^0K^-\pi^+ \to K^-\pi^+K^0\pi^0 + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^*(892)^0 \overline{K}^0 \pi^0 \to K^+ \pi^- \overline{K}^0 \pi^0 + \text{c.c.})/\Gamma_{total}$ Γ_{10}/Γ

NODE=M057R52

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.38±0.09±0.01	63.0	[1] HE	08B	CLEO	$e^+ e^- \to \gamma h^+ h^- h^0 h^0$

[1] HE 08B reports 0.39 ± 0.07 ± 0.05 ± 0.03 % from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^*(892)^0 \overline{K}^0 \pi^0 \to K^+ \pi^- \overline{K}^0 \pi^0 + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R52;LINKAGE=HE

$\Gamma(K^*(892)^- K^+ \pi^0 \to K^+ \pi^- \overline{K}^0 \pi^0 + \text{c.c.})/\Gamma_{total}$ Γ_{11}/Γ

NODE=M057R53

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.37±0.08±0.01	51.1	[1] HE	08B	CLEO	$e^+ e^- \to \gamma h^+ h^- h^0 h^0$

[1] HE 08B reports 0.38 ± 0.07 ± 0.04 ± 0.03 % from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^*(892)^- K^+ \pi^0 \to K^+ \pi^- \overline{K}^0 \pi^0 + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R53;LINKAGE=HE

$\Gamma(K^*(892)^+ \overline{K}^0 \pi^- \to K^+ \pi^- \overline{K}^0 \pi^0 + \text{c.c.})/\Gamma_{total}$ Γ_{12}/Γ

NODE=M057R54

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.29±0.08±0.01	39.3	[1] HE	08B	CLEO	$e^+ e^- \to \gamma h^+ h^- h^0 h^0$

[1] HE 08B reports 0.30 ± 0.07 ± 0.04 ± 0.02 % from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^*(892)^+ \overline{K}^0 \pi^- \to K^+ \pi^- \overline{K}^0 \pi^0 + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R54;LINKAGE=HE

$\Gamma(K^+ K^- \eta \pi^0)/\Gamma_{total}$ Γ_{13}/Γ

NODE=M057R55

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.127±0.044±0.003	22.9	[1] HE	08B	CLEO	$e^+ e^- \to \gamma h^+ h^- h^0 h^0$

[1] HE 08B reports 0.13 ± 0.04 ± 0.02 ± 0.01 % from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^+ K^- \eta \pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R55;LINKAGE=HE

$\Gamma(K^+ K^- \pi^+ \pi^-)/\Gamma_{total}$ Γ_{14}/Γ

NODE=M057R3

VALUE (units 10^{-3})	DOCUMENT ID
8.4±0.9 OUR FIT	

$\Gamma(K^+ K^- \pi^+ \pi^- \pi^0)/\Gamma_{total}$ Γ_{15}/Γ

NODE=M057R00

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
11.69±0.13±1.31	11k	[1] ABLIKIM	13B	BES3	$e^+ e^- \to \psi(2S) \to \gamma \chi_{c2}$

[1] Using 1.06×10^8 $\psi(2S)$ mesons and $B(\psi(2S) \to \chi_{c2} \gamma) = (8.72 \pm 0.34)\%$.

NODE=M057R00;LINKAGE=A

$\Gamma(K^0_S K^\pm \pi^\mp \pi^+ \pi^-)/\Gamma_{total}$ Γ_{16}/Γ

NODE=M057R73

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
7.30±0.11±0.75	4.5k	[1] ABLIKIM	13B	BES3	$e^+ e^- \to \psi(2S) \to \gamma \chi_{c2}$

[1] Using 1.06×10^8 $\psi(2S)$ mesons and $B(\psi(2S) \to \chi_{c2} \gamma) = (8.72 \pm 0.34)\%$.

NODE=M057R73;LINKAGE=A

$\Gamma(K^+ \overline{K}^*(892)^0 \pi^- + \text{c.c.})/\Gamma(K^+ K^- \pi^+ \pi^-)$ Γ_{17}/Γ_{14}

NODE=M057R39

VALUE	DOCUMENT ID		TECN	COMMENT
0.25±0.13 OUR FIT				
0.25±0.13	TANENBAUM	78	MRK1	$\psi(2S) \to \gamma \chi_{c2}$

$\Gamma(K^+ \overline{K}^*(892)^0 \pi^- + \text{c.c.})/\Gamma_{total}$ Γ_{17}/Γ

NODE=M057R9

VALUE (units 10^{-4})	DOCUMENT ID
21±11 OUR FIT	

$\Gamma(K^*(892)^0 \overline{K}^*(892)^0)/\Gamma_{total}$ Γ_{18}/Γ

NODE=M057R26

VALUE (units 10^{-3})	DOCUMENT ID
2.3±0.4 OUR FIT	

$\Gamma(3(\pi^+\pi^-))/\Gamma_{total}$ — Γ_{19}/Γ

NODE=M057R4
NODE=M057R4

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
8.6±1.8 OUR EVALUATION Treating systematic error as correlated.			
8.6±1.8 OUR AVERAGE			
8.6±0.9±1.6	[1] BAI 99B	BES	$\psi(2S) \to \gamma\chi_{c2}$
8.7±5.9±0.4	[1] TANENBAUM 78	MRK1	$\psi(2S) \to \gamma\chi_{c2}$

→ UNCHECKED ←

[1] Rescaled by us using B($\psi(2S) \to \gamma\chi_{c2}$)= (8.3 ± 0.4)% and B($\psi(2S) \to J/\psi(1S)\pi^+\pi^-$) = (32.6 ± 0.5)%. Multiplied by a factor of 2 to convert from $K^0_S K^+\pi^-$ to $K^0 K^+\pi^-$ decay. NODE=M057R;LINKAGE=X3

$\Gamma(\phi\phi)/\Gamma_{total}$ — Γ_{20}/Γ

NODE=M057R20
NODE=M057R20

VALUE (units 10^{-3})	DOCUMENT ID
1.06±0.09 OUR FIT	

$\Gamma(\phi\phi\eta)/\Gamma_{total}$ — Γ_{21}/Γ

NODE=M057R97
NODE=M057R97

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
5.3±0.5±0.4	143.6	[1] ABLIKIM 20B	BES3	$\psi(2S) \to \gamma\phi\phi\eta$

[1] ABLIKIM 20B reports $(5.33 \pm 0.52 \pm 0.39) \times 10^{-4}$ from a measurement of [$\Gamma(\chi_{c2}(1P) \to \phi\phi\eta)/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c2}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = $(9.52 \pm 0.20) \times 10^{-2}$. NODE=M057R97;LINKAGE=A

$\Gamma(\omega\omega)/\Gamma_{total}$ — Γ_{22}/Γ

NODE=M057R28
NODE=M057R28

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
0.84±0.10 OUR AVERAGE				
0.82±0.10±0.02	762	[1] ABLIKIM 11K	BES3	$\psi(2S) \to \gamma$ hadrons
1.73±0.57±0.04	27.7±7.4	[2] ABLIKIM 05N	BES2	$\psi(2S) \to \gamma\chi_{c2} \to \gamma 6\pi$

[1] ABLIKIM 11K reports $(8.9 \pm 0.3 \pm 1.1) \times 10^{-4}$ from a measurement of [$\Gamma(\chi_{c2}(1P) \to \omega\omega)/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c2}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = $(8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = $(9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M057R28;LINKAGE=AL

[2] ABLIKIM 05N reports [$\Gamma(\chi_{c2}(1P) \to \omega\omega)/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c2}(1P)$)] = $(0.165 \pm 0.044 \pm 0.032) \times 10^{-3}$ which we divide by our best value B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = $(9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M057R28;LINKAGE=AB

$\Gamma(\omega K^+K^-)/\Gamma_{total}$ — Γ_{23}/Γ

NODE=M057R74
NODE=M057R74

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
0.73±0.04±0.08	512	[1] ABLIKIM 13B	BES3	$e^+e^- \to \psi(2S) \to \gamma\chi_{c2}$

[1] Using 1.06×10^8 $\psi(2S)$ mesons and B($\psi(2S) \to \chi_{c2}\gamma$) = (8.72 ± 0.34)%. NODE=M057R74;LINKAGE=A

$\Gamma(\omega\phi)/\Gamma_{total}$ — Γ_{24}/Γ

NODE=M057R63
NODE=M057R63

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
9.6±2.7±0.2		33	[1] ABLIKIM 19J	BES3	$\psi(2S) \to \gamma$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<18	90		[2,3] ABLIKIM 11K	BES3	$\psi(2S) \to \gamma$ hadrons

[1] ABLIKIM 19J reports [$\Gamma(\chi_{c2}(1P) \to \omega\phi)/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c2}(1P)$)] = $(0.91 \pm 0.23 \pm 0.12) \times 10^{-6}$ which we divide by our best value B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = $(9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M057R63;LINKAGE=A

[2] ABLIKIM 11K reports $< 2 \times 10^{-5}$ from a measurement of [$\Gamma(\chi_{c2}(1P) \to \omega\phi)/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c2}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = $(8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = 9.52×10^{-2}. NODE=M057R63;LINKAGE=AL

[3] Superseded by ABLIKIM 19J. NODE=M057R63;LINKAGE=B

$\Gamma(\pi\pi)/\Gamma_{total}$ — Γ_{25}/Γ

NODE=M057R27
NODE=M057R27

VALUE (units 10^{-3})	DOCUMENT ID
2.23±0.09 OUR FIT	

$\Gamma(\rho^0\pi^+\pi^-)/\Gamma_{total}$ — Γ_{26}/Γ

NODE=M057R8
NODE=M057R8

VALUE (units 10^{-4})	DOCUMENT ID
37±16 OUR FIT	

$\Gamma(\pi^+\pi^-\pi^0\text{(non-resonant)})/\Gamma_{total}$ — Γ_{27}/Γ

NODE=M057R84
NODE=M057R84

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
2.01±0.42±0.04	64	[1] ABLIKIM 17AG	BES3	$\psi(2S) \to \gamma\pi^+\pi^-\pi^0$

OCCUR=2

[1] ABLIKIM 17AG reports $(2.1 \pm 0.4 \pm 0.2) \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \pi^+\pi^-\pi^0\text{(non-resonant)})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R84;LINKAGE=B

$\Gamma(\rho(770)^\pm\pi^\mp)/\Gamma_{total}$ — Γ_{28}/Γ

NODE=M057R85
NODE=M057R85

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
0.61±0.38±0.01	15	[1] ABLIKIM 17AG	BES3	$\psi(2S) \to \gamma\pi^+\pi^-\pi^0$

[1] ABLIKIM 17AG reports $(0.64 \pm 0.39 \pm 0.07) \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \rho(770)^\pm\pi^\mp)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R85;LINKAGE=A

$\Gamma(\pi^+\pi^-\eta)/\Gamma_{total}$ — Γ_{29}/Γ

NODE=M057R08
NODE=M057R08

VALUE (units 10^{-3})	CL%	DOCUMENT ID	TECN	COMMENT
0.48±0.13±0.01		[1] ATHAR 07	CLEO	$\psi(2S) \to \gamma h^+h^-h^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<1.4	90	[2] ABLIKIM 06R	BES2	$\psi(2S) \to \gamma\chi_{c2}$

[1] ATHAR 07 reports $(0.49 \pm 0.12 \pm 0.06) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \pi^+\pi^-\eta)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R08;LINKAGE=AT

[2] ABLIKIM 06R reports $< 1.7 \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \pi^+\pi^-\eta)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

NODE=M057R08;LINKAGE=AB

$\Gamma(\pi^+\pi^-\eta')/\Gamma_{total}$ — Γ_{30}/Γ

NODE=M057R35
NODE=M057R35

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
0.50±0.18±0.01	[1] ATHAR 07	CLEO	$\psi(2S) \to \gamma h^+h^-h^0$

[1] ATHAR 07 reports $(0.51 \pm 0.18 \pm 0.06) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \pi^+\pi^-\eta')/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R35;LINKAGE=AT

$\Gamma(\eta\eta)/\Gamma_{total}$ — Γ_{31}/Γ

NODE=M057R16
NODE=M057R16

VALUE (units 10^{-4})	DOCUMENT ID
5.4±0.4 OUR FIT	

$\Gamma(K^+K^-)/\Gamma_{total}$ — Γ_{32}/Γ

NODE=M057R11
NODE=M057R11

VALUE (units 10^{-3})	DOCUMENT ID
1.01±0.06 OUR FIT	

$\Gamma(K^0_S K^0_S)/\Gamma_{total}$ — Γ_{33}/Γ

NODE=M057R19
NODE=M057R19

VALUE (units 10^{-3})	DOCUMENT ID
0.52±0.04 OUR FIT	

$\Gamma(K^0_S K^0_S)/\Gamma(\pi\pi)$ — Γ_{33}/Γ_{25}

NODE=M057R36
NODE=M057R36

VALUE	DOCUMENT ID	TECN	COMMENT
0.235±0.019 OUR FIT			
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.27 ±0.07 ±0.04	[1,2] CHEN 07B	BELL	$e^+e^- \to e^+e^-\chi_{c2}$

[1] Using $\Gamma(\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ from the $\pi^+\pi^-$ measurement of NAKAZAWA 05 rescaled by 3/2 to convert to $\pi\pi$.

NODE=M057R36;LINKAGE=CH

[2] Not independent from other measurements.

NODE=M057R36;LINKAGE=NI

$\Gamma(K^0_S K^0_S)/\Gamma(K^+ K^-)$ Γ_{33}/Γ_{32}

NODE=M057R37

VALUE	DOCUMENT ID	TECN	COMMENT
0.52±0.05 OUR FIT			
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.70±0.21±0.12	[1,2] CHEN 07B	BELL	$e^+ e^- \to e^+ e^- \chi_{c2}$

[1] Using $\Gamma(K^+ K^-) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ from NAKAZAWA 05.
[2] Not independent from other measurements.

NODE=M057R37;LINKAGE=CH
NODE=M057R37;LINKAGE=NI

$\Gamma(K^*(892)^\pm K^\mp)/\Gamma_{total}$ Γ_{34}/Γ

NODE=M057R86

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
1.44±0.21±0.03	[1] ABLIKIM 17AG	BES3	$\psi(2S) \to \gamma K \overline{K} \pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1.72±0.26±0.04	[2] ABLIKIM 17AG	BES3	$\psi(2S) \to \gamma K^+ K^- \pi^0$
1.34±0.27±0.03	[3] ABLIKIM 17AG	BES3	$\psi(2S) \to \gamma K^0_S K^\pm \pi^\mp$

OCCUR=2
OCCUR=3

[1] ABLIKIM 17AG reports $(1.5 \pm 0.1 \pm 0.2) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^*(892)^\pm K^\mp)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R86;LINKAGE=A

[2] ABLIKIM 17AG reports $(1.8 \pm 0.2 \pm 0.2) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^*(892)^\pm K^\mp)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R86;LINKAGE=B

[3] ABLIKIM 17AG reports $(1.4 \pm 0.2 \pm 0.2) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^*(892)^\pm K^\mp)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R86;LINKAGE=C

$\Gamma(K^*(892)^0 \overline{K}^0 + \text{c.c.})/\Gamma_{total}$ Γ_{35}/Γ

NODE=M057R87

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
1.24±0.27±0.03	[1] ABLIKIM 17AG	BES3	$\psi(2S) \to \gamma K^0_S K^\pm \pi^\mp$

[1] ABLIKIM 17AG reports $(1.3 \pm 0.2 \pm 0.2) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^*(892)^0 \overline{K}^0 + \text{ c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R87;LINKAGE=A

$\Gamma(K^*_2(1430)^\pm K^\mp)/\Gamma_{total}$ Γ_{36}/Γ

NODE=M057R88

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
14.8±1.2±0.3	[1] ABLIKIM 17AG	BES3	$\psi(2S) \to \gamma K \overline{K} \pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
17.4±1.6±0.4	[2] ABLIKIM 17AG	BES3	$\psi(2S) \to \gamma K^+ K^- \pi^0$
13.0±1.5±0.3	[3] ABLIKIM 17AG	BES3	$\psi(2S) \to \gamma K^0_S K^\pm \pi^\mp$

OCCUR=2
OCCUR=3

[1] ABLIKIM 17AG reports $(15.5 \pm 0.6 \pm 1.2) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^*_2(1430)^\pm K^\mp)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R88;LINKAGE=A

[2] ABLIKIM 17AG reports $(18.2 \pm 0.8 \pm 1.6) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^*_2(1430)^\pm K^\mp)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R88;LINKAGE=B

[3] ABLIKIM 17AG reports $(13.6 \pm 0.8 \pm 1.4) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^*_2(1430)^\pm K^\mp)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R88;LINKAGE=C

$\Gamma\big(K_2^*(1430)^0 \overline{K}^0 + \text{c.c.}\big)/\Gamma_{\text{total}}$ Γ_{37}/Γ

NODE=M057R89
NODE=M057R89

VALUE (units 10^{-4})	*DOCUMENT ID*	*TECN*	*COMMENT*
12.4±1.7±0.3	[1] ABLIKIM 17AG	BES3	$\psi(2S) \to \gamma K_S^0 K^\pm \pi^\mp$

[1] ABLIKIM 17AG reports $(13.0 \pm 1.0 \pm 1.5) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to K_2^*(1430)^0 \overline{K}^0 + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R89;LINKAGE=A

$\Gamma\big(K_3^*(1780)^\pm K^\mp\big)/\Gamma_{\text{total}}$ Γ_{38}/Γ

NODE=M057R90
NODE=M057R90

VALUE (units 10^{-4})	*DOCUMENT ID*	*TECN*	*COMMENT*	
5.2±0.8±0.1	[1] ABLIKIM 17AG	BES3	$\psi(2S) \to \gamma K \overline{K} \pi$	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
5.1±1.0±0.1	[2] ABLIKIM 17AG	BES3	$\psi(2S) \to \gamma K^+ K^- \pi^0$	OCCUR=2
5.6±1.8±0.1	[3] ABLIKIM 17AG	BES3	$\psi(2S) \to \gamma K_S^0 K^\pm \pi^\mp$	OCCUR=3

[1] ABLIKIM 17AG reports $(5.4 \pm 0.5 \pm 0.7) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to K_3^*(1780)^\pm K^\mp)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R90;LINKAGE=A

[2] ABLIKIM 17AG reports $(5.3 \pm 0.5 \pm 0.9) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to K_3^*(1780)^\pm K^\mp)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R90;LINKAGE=B

[3] ABLIKIM 17AG reports $(5.9 \pm 1.1 \pm 1.5) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to K_3^*(1780)^\pm K^\mp)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R90;LINKAGE=C

$\Gamma\big(K_3^*(1780)^0 \overline{K}^0 + \text{c.c.}\big)/\Gamma_{\text{total}}$ Γ_{39}/Γ

NODE=M057R91
NODE=M057R91

VALUE (units 10^{-4})	*DOCUMENT ID*	*TECN*	*COMMENT*
5.6±2.1±0.1	[1] ABLIKIM 17AG	BES3	$\psi(2S) \to \gamma K_S^0 K^\pm \pi^\mp$

[1] ABLIKIM 17AG reports $(5.9 \pm 1.6 \pm 1.5) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to K_3^*(1780)^0 \overline{K}^0 + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R91;LINKAGE=A

$\Gamma\big(a_2(1320)^0 \pi^0\big)/\Gamma_{\text{total}}$ Γ_{40}/Γ

NODE=M057R92
NODE=M057R92

VALUE (units 10^{-4})	*DOCUMENT ID*	*TECN*	*COMMENT*
12.9±3.4±0.3	[1] ABLIKIM 17AG	BES3	$\psi(2S) \to \gamma K^+ K^- \pi^0$

[1] ABLIKIM 17AG reports $(13.5 \pm 1.6 \pm 3.2) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to a_2(1320)^0 \pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R92;LINKAGE=A

$\Gamma\big(a_2(1320)^\pm \pi^\mp\big)/\Gamma_{\text{total}}$ Γ_{41}/Γ

NODE=M057R93
NODE=M057R93

VALUE (units 10^{-4})	*DOCUMENT ID*	*TECN*	*COMMENT*
17.6±6.1±0.4	[1] ABLIKIM 17AG	BES3	$\psi(2S) \to \gamma K_S^0 K^\pm \pi^\mp$

[1] ABLIKIM 17AG reports $(18.4 \pm 3.3 \pm 5.5) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to a_2(1320)^\pm \pi^\mp)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R93;LINKAGE=A

$\Gamma(K^+K^-\pi^0)/\Gamma_{total}$ Γ_{43}/Γ

NODE=M057R05
NODE=M057R05

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.30±0.08±0.01	[1] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[1] ATHAR 07 reports $(0.31 \pm 0.07 \pm 0.04) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^+K^-\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R05;LINKAGE=AT

$\Gamma(K^+K^-\eta)/\Gamma_{total}$ Γ_{44}/Γ

NODE=M057R09
NODE=M057R09

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.32	90	[1] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[1] ATHAR 07 reports $< 0.33 \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^+K^-\eta)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

NODE=M057R09;LINKAGE=AT

$\Gamma(K^+K^-\eta'(958))/\Gamma_{total}$ Γ_{45}/Γ

NODE=M057R78
NODE=M057R78

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.94±0.34	107	[1] ABLIKIM	14J	BES3	$\psi(2S) \to \gamma K^+K^-\eta'(958)$

[1] Derived using $B(\psi(2S) \to \gamma\chi_{c2}) = (8.72 \pm 0.34)\%$. Uncertainty includes both statistical and systematic contributions combined in quadrature.

NODE=M057R78;LINKAGE=A

$\Gamma(\eta\eta')/\Gamma_{total}$ Γ_{46}/Γ

NODE=M057R03
NODE=M057R03

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
2.17±0.47±0.05		20	[1] ABLIKIM	17AI	BES3	$\psi(2S) \to \gamma\eta'\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 6	90	3.3 ± 8.0	[2] ASNER	09	CLEO	$\psi(2S) \to \gamma\eta\eta'$
<23	90		[3] ADAMS	07	CLEO	$\psi(2S) \to \gamma\chi_{c2}$

[1] ABLIKIM 17AI reports $(2.27 \pm 0.43 \pm 0.25) \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \eta\eta')/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R03;LINKAGE=A

[2] ASNER 09 reports $< 0.6 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \eta\eta')/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

NODE=M057R03;LINKAGE=AS

[3] Superseded by ASNER 09. ADAMS 07 reports $< 2.3 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \eta\eta')/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 0.0933 \pm 0.0014 \pm 0.0061$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

NODE=M057R03;LINKAGE=AD

$\Gamma(\eta'\eta')/\Gamma_{total}$ Γ_{47}/Γ

NODE=M057R04
NODE=M057R04

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
4.6±0.6±0.1		60	[1] ABLIKIM	17AI	BES3	$\psi(2S) \to \gamma\eta'\eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<10	90	12 ± 7	[2] ASNER	09	CLEO	$\psi(2S) \to \gamma\eta'\eta'$
<30	90		[3] ADAMS	07	CLEO	$\psi(2S) \to \gamma\chi_{c2}$

[1] ABLIKIM 17AI reports $(4.76 \pm 0.56 \pm 0.38) \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \eta'\eta')/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R04;LINKAGE=A

[2] ASNER 09 reports $< 1.0 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \eta'\eta')/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

NODE=M057R04;LINKAGE=AS

[3] Superseded by ASNER 09. ADAMS 07 reports $< 3.1 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \eta'\eta')/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 0.0933 \pm 0.0014 \pm 0.0061$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

NODE=M057R04;LINKAGE=AD

$\Gamma(\pi^+\pi^- K^0_S K^0_S)/\Gamma_{total}$ Γ_{48}/Γ

NODE=M057R31
NODE=M057R31

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
2.17±0.54±0.05	57 ± 11	[1] ABLIKIM	05O	BES2	$\psi(2S) \to \gamma \chi_{c2}$

[1] ABLIKIM 05O reports $[\Gamma(\chi_{c2}(1P) \to \pi^+\pi^- K^0_S K^0_S)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c2}(1P))] = (0.207 \pm 0.039 \pm 0.033) \times 10^{-3}$ which we divide by our best value $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R31;LINKAGE=AB

$\Gamma(K^+K^- K^0_S K^0_S)/\Gamma_{total}$ Γ_{49}/Γ

NODE=M057R32
NODE=M057R32

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<4	90	2.3 ± 2.2	[1] ABLIKIM	05O	BES2	$e^+e^- \to \chi_{c2}\gamma$

[1] ABLIKIM 05O reports $[\Gamma(\chi_{c2}(1P) \to K^+K^- K^0_S K^0_S)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c2}(1P))] < 3.5 \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

NODE=M057R32;LINKAGE=AB

$\Gamma(K^0_S K^0_S K^0_S K^0_S)/\Gamma_{total}$ Γ_{50}/Γ

NODE=M057R94
NODE=M057R94

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.13±0.18±0.02	68	[1] ABLIKIM	19AA	BES3	$\psi(2S) \to \gamma 4K^0_S$

[1] Using $B(K^0_S \to \pi^+\pi^-) = (69.20 \pm 0.05)\%$. ABLIKIM 19AA reports $[\Gamma(\chi_{c2}(1P) \to K^0_S K^0_S K^0_S K^0_S)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c2}(1P))] = (10.8 \pm 1.5 \pm 0.8) \times 10^{-6}$ which we divide by our best value $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value..

NODE=M057R94;LINKAGE=A

$\Gamma(K^+K^- K^+K^-)/\Gamma_{total}$ Γ_{51}/Γ

NODE=M057R18
NODE=M057R18

VALUE (units 10^{-3})	DOCUMENT ID
1.65±0.20 OUR FIT	

$\Gamma(K^+K^-\phi)/\Gamma_{total}$ Γ_{52}/Γ

NODE=M057R01
NODE=M057R01

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.42±0.29±0.03	52	[1] ABLIKIM	06T	BES2	$\psi(2S) \to \gamma 2K^+ 2K^-$

[1] ABLIKIM 06T reports $(1.67 \pm 0.26 \pm 0.24) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^+K^-\phi)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R01;LINKAGE=AB

$\Gamma(\overline{K}^0 K^+\pi^-\phi + c.c.)/\Gamma_{total}$ Γ_{53}/Γ

NODE=M057R79
NODE=M057R79

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
4.83±0.32±0.66	ABLIKIM	15M	BES3	$\psi(2S) \to \gamma \chi_{c2}$

$\Gamma(K^+K^-\pi^0\phi)/\Gamma_{total}$ Γ_{54}/Γ

NODE=M057R80
NODE=M057R80

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
2.74±0.16±0.44	ABLIKIM	15M	BES3	$\psi(2S) \to \gamma \chi_{c2}$

$\Gamma(\phi\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{55}/Γ

NODE=M057R75
NODE=M057R75

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.93±0.06±0.10	408	[1] ABLIKIM	13B	BES3	$e^+e^- \to \psi(2S) \to \gamma \chi_{c2}$

[1] Using 1.06×10^8 $\psi(2S)$ mesons and $B(\psi(2S) \to \chi_{c2}\gamma) = (8.72 \pm 0.34)\%$.

NODE=M057R75;LINKAGE=A

$\Gamma(p\overline{p})/\Gamma_{total}$ Γ_{56}/Γ

NODE=M057R12
NODE=M057R12

VALUE (units 10^{-4})	DOCUMENT ID
0.733±0.033 OUR FIT	

$\Gamma(p\overline{p}\pi^0)/\Gamma_{total}$ Γ_{57}/Γ

NODE=M057R06
NODE=M057R06

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.47±0.04 OUR AVERAGE				
0.47±0.04±0.01	[1] ONYISI	10	CLE3	$\psi(2S) \to \gamma p\overline{p}X$
0.43±0.09±0.01	[2] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+h^- h^0$

[1] ONYISI 10 reports $(4.83 \pm 0.25 \pm 0.35 \pm 0.31) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to p\overline{p}\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] ATHAR 07 reports $(0.44 \pm 0.08 \pm 0.05) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to p\overline{p}\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R06;LINKAGE=ON

NODE=M057R06;LINKAGE=AT

$\Gamma(p\overline{p}\eta)/\Gamma_{total}$ Γ_{58}/Γ

NODE=M057R34
NODE=M057R34

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.174±0.025 OUR AVERAGE				
0.172±0.026±0.004	[1] ONYISI	10	CLE3	$\psi(2S) \to \gamma p\overline{p}X$
0.186±0.070±0.004	[2] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[1] ONYISI 10 reports $(1.76 \pm 0.23 \pm 0.14 \pm 0.11) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to p\overline{p}\eta)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] ATHAR 07 reports $(0.19 \pm 0.07 \pm 0.02) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to p\overline{p}\eta)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R34;LINKAGE=ON

NODE=M057R34;LINKAGE=AT

$\Gamma(p\overline{p}\omega)/\Gamma_{total}$ Γ_{59}/Γ

NODE=M057R56
NODE=M057R56

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.36±0.04±0.01	[1] ONYISI	10	CLE3	$\psi(2S) \to \gamma p\overline{p}X$

[1] ONYISI 10 reports $(3.68 \pm 0.35 \pm 0.26 \pm 0.24) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to p\overline{p}\omega)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R56;LINKAGE=ON

$\Gamma(p\overline{p}\phi)/\Gamma_{total}$ Γ_{60}/Γ

NODE=M057R62
NODE=M057R62

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
2.8±0.9±0.1	24 ± 7	[1] ABLIKIM	11F	BES3	$\psi(2S) \to \gamma p\overline{p}K^+K^-$

[1] ABLIKIM 11F reports $(3.04 \pm 0.85 \pm 0.43) \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to p\overline{p}\phi)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R62;LINKAGE=AB

$\Gamma(p\overline{p}\pi^+\pi^-)/\Gamma_{total}$ Γ_{61}/Γ

NODE=M057R6
NODE=M057R6

→ UNCHECKED ←

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
1.32±0.34 OUR EVALUATION Treating systematic error as correlated.				
1.3 ±0.4 OUR AVERAGE Error includes scale factor of 1.3.				
1.17±0.19±0.30	[1] BAI	99B	BES	$\psi(2S) \to \gamma\chi_{c2}$
2.64±1.03±0.14	[1] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c2}$

[1] Rescaled by us using $B(\psi(2S) \to \gamma\chi_{c2}) = (8.3 \pm 0.4)\%$ and $B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) = (32.6 \pm 0.5)\%$. Multiplied by a factor of 2 to convert from $K^0_S K^+\pi^-$ to $K^0 K^+\pi^-$ decay.

NODE=M057R6;LINKAGE=X3

$\Gamma(p\overline{p}\pi^0\pi^0)/\Gamma_{total}$ Γ_{62}/Γ

NODE=M057R49
NODE=M057R49

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.078±0.023±0.002	29.2	[1] HE	08B	CLEO	$e^+e^- \to \gamma h^+ h^- h^0 h^0$

[1] HE 08B reports $0.08 \pm 0.02 \pm 0.01 \pm 0.01$ % from a measurement of $[\Gamma(\chi_{c2}(1P) \to p\overline{p}\pi^0\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R49;LINKAGE=HE

$\Gamma(p\overline{p}K^+K^-$ (non-resonant)$)/\Gamma_{total}$ — Γ_{63}/Γ

NODE=M057R59

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.91±0.32±0.04	131 ± 12	[1] ABLIKIM	11F	BES3	$\psi(2S) \to \gamma p\overline{p}K^+K^-$

[1] ABLIKIM 11F reports $(2.08\pm0.19\pm0.30)\times10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to p\overline{p}K^+K^-$ (non-resonant)$)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M057R59;LINKAGE=AB

$\Gamma(p\overline{p}K^0_S K^0_S)/\Gamma_{total}$ — Γ_{64}/Γ

NODE=M057R30

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<7.9	90	[1] ABLIKIM	06D	BES2	$\psi(2S) \to \chi_{c2}\gamma$

[1] Using $B(\psi(2S) \to \chi_{c2}\gamma) = (9.3 \pm 0.6)\%$. NODE=M057R;LINKAGE=AB

$\Gamma(p\overline{n}\pi^-)/\Gamma_{total}$ — Γ_{65}/Γ

NODE=M057R33

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
8.5±0.9 OUR AVERAGE					
8.4±1.0±0.2	3309	[1] ABLIKIM	12J	BES3	$\psi(2S) \to \gamma p\overline{n}\pi^-$
10.2±3.4±0.2		[2] ABLIKIM	06I	BES2	$\psi(2S) \to \gamma p\pi^- X$

[1] ABLIKIM 12J reports $[\Gamma(\chi_{c2}(1P) \to p\overline{n}\pi^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))] = (0.80 \pm 0.02 \pm 0.09)\times10^{-4}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M057R33;LINKAGE=AL

[2] ABLIKIM 06I reports $[\Gamma(\chi_{c2}(1P) \to p\overline{n}\pi^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))] = (0.97 \pm 0.20 \pm 0.26)\times10^{-4}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M057R33;LINKAGE=AB

$\Gamma(\overline{p}n\pi^+)/\Gamma_{total}$ — Γ_{66}/Γ

NODE=M057R70

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
8.9±0.8±0.2	3732	[1] ABLIKIM	12J	BES3	$\psi(2S) \to \gamma\overline{p}n\pi^+$

[1] ABLIKIM 12J reports $[\Gamma(\chi_{c2}(1P) \to \overline{p}n\pi^+)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))] = (0.85 \pm 0.02 \pm 0.07)\times10^{-4}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M057R70;LINKAGE=AL

$\Gamma(p\overline{n}\pi^-\pi^0)/\Gamma_{total}$ — Γ_{67}/Γ

NODE=M057R71

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
21.7±1.7±0.5	2128	[1] ABLIKIM	12J	BES3	$\psi(2S) \to \gamma p\overline{n}\pi^-\pi^0$

[1] ABLIKIM 12J reports $[\Gamma(\chi_{c2}(1P) \to p\overline{n}\pi^-\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))] = (2.07 \pm 0.06 \pm 0.15)\times10^{-4}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M057R71;LINKAGE=AL

$\Gamma(\overline{p}n\pi^+\pi^0)/\Gamma_{total}$ — Γ_{68}/Γ

NODE=M057R72

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
21.1±1.8±0.4	2352	[1] ABLIKIM	12J	BES3	$\psi(2S) \to \gamma\overline{p}n\pi^+\pi^0$

[1] ABLIKIM 12J reports $[\Gamma(\chi_{c2}(1P) \to \overline{p}n\pi^+\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))] = (2.01 \pm 0.06 \pm 0.16)\times10^{-4}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M057R72;LINKAGE=AL

$\Gamma(\Lambda\overline{\Lambda})/\Gamma_{total}$ — Γ_{69}/Γ

NODE=M057R25

VALUE (units 10^{-4})	DOCUMENT ID
1.83±0.16 OUR FIT	
[$(1.84 \pm 0.15) \times 10^{-4}$ OUR 2021 FIT]	

NEW

$\Gamma(\Lambda\overline{\Lambda}\pi^+\pi^-)/\Gamma_{total}$ — Γ_{70}/Γ

NODE=M057R29

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
125±15±3		371	[1] ABLIKIM	12I	BES3	$\psi(2S) \to \gamma\Lambda\overline{\Lambda}\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<350	90		[2] ABLIKIM	06D	BES2	$\psi(2S) \to \chi_{c2}\gamma$

[1] ABLIKIM 12I reports $(137.0 \pm 7.6 \pm 15.7) \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \Lambda\overline{\Lambda}\pi^+\pi^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] Using $B(\psi(2S) \to \chi_{c2}\gamma) = (9.3 \pm 0.6)\%$.

NODE=M057R29;LINKAGE=AL
NODE=M057R29;LINKAGE=AB

$\Gamma(\Lambda\overline{\Lambda}\pi^+\pi^-$ (non-resonant)$)/\Gamma_{total}$ — Γ_{71}/Γ

NODE=M057R65
NODE=M057R65

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
66±15±1	36	[1] ABLIKIM	12I	BES3	$\psi(2S) \to \gamma\Lambda\overline{\Lambda}\pi^+\pi^-$

[1] ABLIKIM 12I reports $(71.8 \pm 14.5 \pm 8.2) \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \Lambda\overline{\Lambda}\pi^+\pi^-$ (non-resonant)$)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R65;LINKAGE=AL

$\Gamma(\Sigma(1385)^+\overline{\Lambda}\pi^- +$ c.c.$)/\Gamma_{total}$ — Γ_{72}/Γ

NODE=M057R66
NODE=M057R66

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<40	90	[1] ABLIKIM	12I	BES3	$\psi(2S) \to \gamma\Sigma(1385)^+\overline{\Lambda}\pi^-$

[1] ABLIKIM 12I reports $< 42 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \Sigma(1385)^+\overline{\Lambda}\pi^- +$ c.c.$)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

NODE=M057R66;LINKAGE=AL

$\Gamma(\Sigma(1385)^-\overline{\Lambda}\pi^+ +$ c.c.$)/\Gamma_{total}$ — Γ_{73}/Γ

NODE=M057R67
NODE=M057R67

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<60	90	[1] ABLIKIM	12I	BES3	$\psi(2S) \to \gamma\Sigma(1385)^-\overline{\Lambda}\pi^+$

[1] ABLIKIM 12I reports $< 61 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \Sigma(1385)^-\overline{\Lambda}\pi^+ +$ c.c.$)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

NODE=M057R67;LINKAGE=AL

$\Gamma(K^+\overline{p}\Lambda +$ c.c.$)/\Gamma_{total}$ — Γ_{74}/Γ

NODE=M057R07
NODE=M057R07

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
7.8±0.5 OUR AVERAGE					
7.7±0.5±0.2	5k	[1,2] ABLIKIM	13D	BES3	$\psi(2S) \to \gamma\Lambda\overline{p}K^+$
8.3±1.6±0.2		[3] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[1] ABLIKIM 13D reports $(8.4 \pm 0.3 \pm 0.6) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^+\overline{p}\Lambda +$ c.c.$)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] Using $B(\Lambda \to p\pi^-) = 63.9\%$.

[3] ATHAR 07 reports $(8.5 \pm 1.4 \pm 1.0) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^+\overline{p}\Lambda +$ c.c.$)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R07;LINKAGE=AB
NODE=M057R07;LINKAGE=LB
NODE=M057R07;LINKAGE=AT

$\Gamma(nK^0_S\overline{\Lambda} +$ c.c.$)/\Gamma_{total}$ — Γ_{75}/Γ

NODE=M057P01
NODE=M057P01

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.58±0.16±0.23	879	[1] ABLIKIM	21AV	BES3	$\psi(2S) \to \gamma nK^0_S\overline{\Lambda}$ + c.c.

[1] ABLIKIM 21AV reports $(3.58 \pm 0.16 \pm 0.23) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to nK^0_S\overline{\Lambda}$ + c.c.$)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 0.0952 \pm 0.0020$. Also uses $B(\overline{\Lambda} \to \overline{p}\pi^+) = (63.9 \pm 0.5)\%$ and $B(K^0_S \to \pi^+\pi^-) = (69.20 \pm 0.05)\%$.

NODE=M057P01;LINKAGE=B

$\Gamma(K^*(892)^+\overline{p}\Lambda +$ c.c.$)/\Gamma_{total}$ — Γ_{76}/Γ

NODE=M057R98
NODE=M057R98

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
8.2±1.1±0.2	476	[1] ABLIKIM	19AU	BES3	$\psi(2S) \to \gamma K^{*+}\overline{p}\Lambda$

[1] ABLIKIM 19AU reports $[\Gamma(\chi_{c2}(1P) \to K^*(892)^+\overline{p}\Lambda +$ c.c.$)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))] = (7.8 \pm 0.9 \pm 0.6) \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R98;LINKAGE=F

$\Gamma(K^+ \overline{p} \Lambda(1520) + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{77}/Γ

NODE=M057R60
NODE=M057R60

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.8±0.7±0.1	79 ± 13	[1] ABLIKIM	11F	BES3	$\psi(2S) \to \gamma p \overline{p} K^+ K^-$

[1] ABLIKIM 11F reports $(3.06 \pm 0.50 \pm 0.54) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^+ \overline{p} \Lambda(1520) + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R60;LINKAGE=AB

$\Gamma(\Lambda(1520)\overline{\Lambda}(1520))/\Gamma_{\text{total}}$ Γ_{78}/Γ

NODE=M057R61
NODE=M057R61

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
4.6±1.4±0.1	29 ± 7	[1] ABLIKIM	11F	BES3	$\psi(2S) \to \gamma p \overline{p} K^+ K^-$

[1] ABLIKIM 11F reports $(5.05 \pm 1.29 \pm 0.93) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \Lambda(1520)\overline{\Lambda}(1520))/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R61;LINKAGE=AB

$\Gamma(\Sigma^0 \overline{\Sigma}^0)/\Gamma_{\text{total}}$ Γ_{79}/Γ

NODE=M057R43
NODE=M057R43

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
3.7±0.6±0.1		91	[1] ABLIKIM	18V	BES3	$\psi(2S) \to \gamma \Sigma^0 \overline{\Sigma}^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<6	90		[2] ABLIKIM	13H	BES3	$\psi(2S) \to \gamma \Sigma^0 \overline{\Sigma}^0$
<7	90	7.5 ± 3.4	[3] NAIK	08	CLEO	$\psi(2S) \to \gamma \Sigma^0 \overline{\Sigma}^0$

[1] ABLIKIM 18V reports $[\Gamma(\chi_{c2}(1P) \to \Sigma^0 \overline{\Sigma}^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma \chi_{c2}(1P))] = (0.35 \pm 0.05 \pm 0.02) \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R43;LINKAGE=A

[2] ABLIKIM 13H reports $< 0.65 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \Sigma^0 \overline{\Sigma}^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

NODE=M057R43;LINKAGE=AB

[3] NAIK 08 reports $< 0.75 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \Sigma^0 \overline{\Sigma}^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

NODE=M057R43;LINKAGE=NA

$\Gamma(\Sigma^+ \overline{\Sigma}^-)/\Gamma_{\text{total}}$ Γ_{82}/Γ

NODE=M057R44
NODE=M057R44

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
3.4±0.7±0.1		55	[1] ABLIKIM	18V	BES3	$\psi(2S) \to \gamma \Sigma^+ \overline{\Sigma}^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<8	90		[2] ABLIKIM	13H	BES3	$\psi(2S) \to \gamma \Sigma^+ \overline{\Sigma}^-$
<7	90	4.0 ± 3.5	[3] NAIK	08	CLEO	$\psi(2S) \to \gamma \Sigma^+ \overline{\Sigma}^-$

[1] ABLIKIM 18V reports $[\Gamma(\chi_{c2}(1P) \to \Sigma^+ \overline{\Sigma}^-)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma \chi_{c2}(1P))] = (0.32 \pm 0.06 \pm 0.03) \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R44;LINKAGE=A

[2] ABLIKIM 13H reports $< 0.88 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \Sigma^+ \overline{\Sigma}^-)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

NODE=M057R44;LINKAGE=AB

[3] NAIK 08 reports $< 0.67 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \Sigma^+ \overline{\Sigma}^-)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

NODE=M057R44;LINKAGE=NA

$\Gamma(\Sigma^- \overline{\Sigma}^+)/\Gamma_{\text{total}}$ Γ_{83}/Γ

NODE=M057R99
NODE=M057R99

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
4.4±1.7±0.5	131	[1] ABLIKIM	20I	BES3	$\psi(2S) \to \gamma \Sigma^- \overline{\Sigma}^+$

[1] ABLIKIM 20I reports $(4.4 \pm 1.7 \pm 0.5) \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \Sigma^- \overline{\Sigma}^+)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$.

NODE=M057R99;LINKAGE=A

$\Gamma(\Sigma(1385)^+ \overline{\Sigma}(1385)^-)/\Gamma_{total}$ — Γ_{84}/Γ

NODE=M057R68

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<16	90	[1] ABLIKIM	12I	BES3	$\psi(2S) \to \gamma \Sigma(1385)^+ \overline{\Sigma}(1385)^-$

[1] ABLIKIM 12I reports $< 17 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \Sigma(1385)^+ \overline{\Sigma}(1385)^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

NODE=M057R68;LINKAGE=AL

$\Gamma(\Sigma(1385)^- \overline{\Sigma}(1385)^+)/\Gamma_{total}$ — Γ_{85}/Γ

NODE=M057R69

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<8	90	[1] ABLIKIM	12I	BES3	$\psi(2S) \to \gamma \Sigma(1385)^- \overline{\Sigma}(1385)^+$

[1] ABLIKIM 12I reports $< 8.5 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \Sigma(1385)^- \overline{\Sigma}(1385)^+)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

NODE=M057R69;LINKAGE=AL

$\Gamma(K^- \Lambda \Xi^+ + c.c.)/\Gamma_{total}$ — Γ_{86}/Γ

NODE=M057R81

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.76±0.32±0.04	51	[1] ABLIKIM	15I	BES3	$\psi(2S) \to \gamma K^- \Lambda \Xi^+ +$ c.c.

[1] ABLIKIM 15I reports $[\Gamma(\chi_{c2}(1P) \to K^- \Lambda \Xi^+ + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))] = (1.68 \pm 0.26 \pm 0.15) \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R81;LINKAGE=A

$\Gamma(\Xi^0 \overline{\Xi}^0)/\Gamma_{total}$ — Γ_{87}/Γ

NODE=M057R45

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<1.0	90	2.9 ± 1.7	[1] NAIK	08	CLEO	$\psi(2S) \to \gamma \Xi^0 \overline{\Xi}^0$

[1] NAIK 08 reports $< 1.06 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \Xi^0 \overline{\Xi}^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

NODE=M057R45;LINKAGE=NA

$\Gamma(\Xi^- \overline{\Xi}^+)/\Gamma_{total}$ — Γ_{88}/Γ

NODE=M057R17

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
1.42±0.31±0.03		29 ± 5	[1] NAIK	08	CLEO	$\psi(2S) \to \gamma \Xi^+ \overline{\Xi}^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 3.7	90		[2] ABLIKIM	06D	BES2	$\psi(2S) \to \chi_{c2}\gamma$

[1] NAIK 08 reports $(1.45 \pm 0.30 \pm 0.15) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \Xi^- \overline{\Xi}^+)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R17;LINKAGE=NA

[2] Using $B(\psi(2S) \to \chi_{c2}\gamma) = (9.3 \pm 0.6)\%$.

NODE=M057R17;LINKAGE=AB

$\Gamma(J/\psi(1S)\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{89}/Γ

NODE=M057R13

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.015	90	BARATE	81	SPEC	190 GeV π^- Be $\to 2\pi 2\mu$

$\Gamma(\pi^0 \eta_c)/\Gamma_{total}$ — Γ_{90}/Γ

NODE=M057R77

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<3.2 \times 10^{-3}$	90	[1] ABLIKIM	15N	BES3	$\psi(2S) e^+ e^- \to \gamma \pi^0 \eta_c$

[1] Using $B(\eta_c \to K^0_S K^\pm \pi^\mp) \times B(K^0_S \to \pi^+\pi^-) \times B(\pi^0 \to \gamma\gamma) = (1.66 \pm 0.11) \times 10^{-2}$.

NODE=M057R77;LINKAGE=A

$\Gamma(\eta_c(1S)\pi^+\pi^-)/\Gamma_{total}$ — Γ_{91}/Γ

NODE=M057R76

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<0.54 \times 10^{-2}$	90	[1,2] ABLIKIM	13B	BES3	$e^+e^- \to \psi(2S) \to \gamma\chi_{c2}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<1.2 \times 10^{-2}$	90	[1,3] ABLIKIM	13B	BES3	$e^+e^- \to \psi(2S) \to \gamma\chi_{c2}$

OCCUR=2

[1] Using 1.06×10^8 $\psi(2S)$ mesons and $B(\psi(2S) \to \chi_{c2}\gamma) = (8.72 \pm 0.34)\%$.

NODE=M057R76;LINKAGE=A

[2] From the $\eta_c \to K^0_S K^\pm \pi^\mp$ decays.

NODE=M057R76;LINKAGE=B

[3] From the $\eta_c \to K^+ K^- \pi^0$ decays.

NODE=M057R76;LINKAGE=C

$\Gamma(\eta_c(1S)\pi^+\pi^-)/\Gamma(\overline{K^0}K^+\pi^- + \text{c.c.})$ — Γ_{91}/Γ_{42}

NODE=M057R64

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<16.4	90	[1] LEES	12AE	BABR	$e^+e^- \to e^+e^-\pi^+\pi^-\eta_c$

[1] We divided the reported limit by 2 to take into account the $K^0_L K^+\pi^-$ mode.

NODE=M057R64;LINKAGE=LE

RADIATIVE DECAYS

NODE=M057310

$\Gamma(\gamma J/\psi(1S))/\Gamma_{\text{total}}$ — Γ_{92}/Γ

NODE=M057R7

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
19.0 ±0.5 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
18.64±0.08±1.69	1.0M	[1] ABLIKIM	17U	BES3	$e^+e^- \to \gamma X$
19.9 ±0.5 ±1.2		[2] ADAM	05A	CLEO	$e^+e^- \to \psi(2S) \to \gamma\chi_{c2}$

[1] Not independent from B($\psi(2S) \to \gamma\chi_{c2}(1P)$) and the product B($\psi(2S) \to \gamma\chi_{c2}(1P)$) × B($\chi_{c2}(1P) \to \gamma J/\psi(1S)$) also measured in ABLIKIM 17U.

NODE=M057R7;LINKAGE=A

[2] Uses B($\psi(2S) \to \gamma\chi_{c2} \to \gamma\gamma J/\psi$) from ADAM 05A and B($\psi(2S) \to \gamma\chi_{c2}$) from ATHAR 04.

NODE=M057R7;LINKAGE=AD

$\Gamma(\gamma\rho^0)/\Gamma_{\text{total}}$ — Γ_{93}/Γ

NODE=M057R40

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<19	90	13 ± 11	[1] ABLIKIM	11E	BES3	$\psi(2S) \to \gamma\gamma\rho^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<40	90	17.2 ± 6.8	[2] BENNETT	08A	CLEO	$\psi(2S) \to \gamma\gamma\rho^0$

[1] ABLIKIM 11E reports $< 20.8 \times 10^{-6}$ from a measurement of [$\Gamma(\chi_{c2}(1P) \to \gamma\rho^0)/\Gamma_{\text{total}}$] × [B($\psi(2S) \to \gamma\chi_{c2}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = $(8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = 9.52×10^{-2}.

NODE=M057R40;LINKAGE=AB

[2] BENNETT 08A reports $< 50 \times 10^{-6}$ from a measurement of [$\Gamma(\chi_{c2}(1P) \to \gamma\rho^0)/\Gamma_{\text{total}}$] × [B($\psi(2S) \to \gamma\chi_{c2}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = $(8.1 \pm 0.4) \times 10^{-2}$, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = 9.52×10^{-2}.

NODE=M057R40;LINKAGE=BE

$\Gamma(\gamma\omega)/\Gamma_{\text{total}}$ — Γ_{94}/Γ

NODE=M057R41

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<6	90	1 ± 6	[1] ABLIKIM	11E	BES3	$\psi(2S) \to \gamma\gamma\omega$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<6	90	0.0 ± 1.8	[2] BENNETT	08A	CLEO	$\psi(2S) \to \gamma\gamma\omega$

[1] ABLIKIM 11E reports $< 6.1 \times 10^{-6}$ from a measurement of [$\Gamma(\chi_{c2}(1P) \to \gamma\omega)/\Gamma_{\text{total}}$] × [B($\psi(2S) \to \gamma\chi_{c2}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = $(8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = 9.52×10^{-2}.

NODE=M057R41;LINKAGE=AB

[2] BENNETT 08A reports $< 7.0 \times 10^{-6}$ from a measurement of [$\Gamma(\chi_{c2}(1P) \to \gamma\omega)/\Gamma_{\text{total}}$] × [B($\psi(2S) \to \gamma\chi_{c2}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = $(8.1 \pm 0.4) \times 10^{-2}$, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = 9.52×10^{-2}.

NODE=M057R41;LINKAGE=BE

$\Gamma(\gamma\phi)/\Gamma_{\text{total}}$ — Γ_{95}/Γ

NODE=M057R42

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
< 7	90	5 ± 5	[1] ABLIKIM	11E	BES3	$\psi(2S) \to \gamma\gamma\phi$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<11	90	1.3 ± 2.5	[2] BENNETT	08A	CLEO	$\psi(2S) \to \gamma\gamma\phi$

[1] ABLIKIM 11E reports $< 8.1 \times 10^{-6}$ from a measurement of [$\Gamma(\chi_{c2}(1P) \to \gamma\phi)/\Gamma_{\text{total}}$] × [B($\psi(2S) \to \gamma\chi_{c2}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = $(8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = 9.52×10^{-2}.

NODE=M057R42;LINKAGE=AB

[2] BENNETT 08A reports $< 13 \times 10^{-6}$ from a measurement of [$\Gamma(\chi_{c2}(1P) \to \gamma\phi)/\Gamma_{\text{total}}$] × [B($\psi(2S) \to \gamma\chi_{c2}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = $(8.1 \pm 0.4) \times 10^{-2}$, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = 9.52×10^{-2}.

NODE=M057R42;LINKAGE=BE

$\Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — Γ_{96}/Γ

NODE=M057R1

VALUE (units 10^{-4})	DOCUMENT ID
2.85±0.10 OUR FIT	

$\Gamma(e^+e^- J/\psi(1S))/\Gamma_{total}$ — Γ_{97}/Γ

NODE=M057R82

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$2.37\pm0.15\pm0.05$	1.3k	[1,2] ABLIKIM	17I	BES3	$\psi(2S)\to\gamma e^+e^- J/\psi$

[1] ABLIKIM 17I reports $(2.48\pm0.08\pm0.16)\times10^{-3}$ from a measurement of $[\Gamma(\chi_{c2}(1P)\to e^+e^- J/\psi(1S))/\Gamma_{total}]\times[B(\psi(2S)\to\gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S)\to\gamma\chi_{c2}(1P)) = (9.11\pm0.31)\times10^{-2}$, which we rescale to our best value $B(\psi(2S)\to\gamma\chi_{c2}(1P)) = (9.52\pm0.20)\times10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M057R82;LINKAGE=B

[2] Not independent from other measurements reported by ABLIKIM 17I NODE=M057R82;LINKAGE=C

$\Gamma(e^+e^- J/\psi(1S))/\Gamma(\gamma J/\psi(1S))$ — Γ_{97}/Γ_{92}

NODE=M057R83

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
11.3±0.4±0.5	1.3k	[1] ABLIKIM	17I	BES3	$\psi(2S)\to e^+e^-\gamma J/\psi$

[1] Uses $B(\psi(2S)\to\gamma\chi_{c2}(1P))\times B(\chi_{c2}(1P)\to\gamma J/\psi(1S)) = (199.6\pm0.8\pm7.0)\times10^{-4}$ from ABLIKIM 17N and accounts for common systematic errors. NODE=M057R83;LINKAGE=A

$\Gamma(\mu^+\mu^- J/\psi(1S))/\Gamma(e^+e^- J/\psi(1S))$ — Γ_{98}/Γ_{97}

NODE=M057R96

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
9.40±0.79±1.15	219	ABLIKIM	19Z	BES3	$\psi(2S)\to\gamma\chi_c\to\gamma(\mu^+\mu^- J/\psi)$

$\Gamma(\gamma\gamma)/\Gamma(\gamma J/\psi(1S))$ — Γ_{96}/Γ_{92}

NODE=M057R23

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
1.50±0.05 OUR FIT				
0.99±0.18	[1] AMBROGIANI	00B	E835	$\overline{p}p\to\chi_{c2}\to\gamma\gamma,\ \gamma J/\psi$

[1] Calculated by us using $B(J/\psi(1S)\to e^+e^-) = 0.0593\pm0.0010$. NODE=M057R;LINKAGE=7A

$\Gamma(\gamma\gamma)/\Gamma_{total}\times\Gamma(p\overline{p})/\Gamma_{total}$ — $\Gamma_{96}/\Gamma\times\Gamma_{56}/\Gamma$

NODE=M057R24

VALUE (units 10^{-8})	DOCUMENT ID		TECN	COMMENT
2.09±0.13 OUR FIT				
1.7 ±0.4 OUR AVERAGE				
1.60±0.42	ARMSTRONG	93	E760	$\overline{p}p\to\gamma\gamma X$
9.9 ±4.5	BAGLIN	87B	SPEC	$\overline{p}p\to\gamma\gamma X$

$\chi_{c2}(1P)$ CROSS-PARTICLE BRANCHING RATIOS

NODE=M057230

$\Gamma(\chi_{c2}(1P)\to K^+K^-\pi^+\pi^-)/\Gamma_{total}\times\Gamma(\psi(2S)\to\gamma\chi_{c2}(1P))/\Gamma(\psi(2S)\to J/\psi(1S)\pi^+\pi^-)$ — $\Gamma_{14}/\Gamma\times\Gamma^{\psi(2S)}_{164}/\Gamma^{\psi(2S)}_{12}$

NODE=M057B18

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
2.31±0.26 OUR FIT				
2.5 ±0.9 OUR AVERAGE Error includes scale factor of 2.3.				
1.90±0.14±0.44	BAI	99B	BES	$\psi(2S)\to\gamma\chi_{c2}$
3.8 ±0.67	[1] TANENBAUM	78	MRK1	$\psi(2S)\to\gamma\chi_{c2}$

[1] The reported value is derived using $B(\psi(2S)\to\pi^+\pi^- J/\psi)\times B(J/\psi\to\ell^+\ell^-) = (4.6\pm0.7)\%$. Calculated by us using $B(J/\psi\to\ell^+\ell^-) = 0.1181\pm0.0020$. NODE=M057B18;LINKAGE=TA

$\Gamma(\chi_{c2}(1P)\to K^*(892)^0\overline{K}^*(892)^0)/\Gamma_{total}\times\Gamma(\psi(2S)\to\gamma\chi_{c2}(1P))/\Gamma_{total}$ — $\Gamma_{18}/\Gamma\times\Gamma^{\psi(2S)}_{164}/\Gamma^{\psi(2S)}$

NODE=M057B19

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
2.1 ±0.4 OUR FIT				
3.11±0.36±0.48	ABLIKIM	04H	BES2	$\psi(2S)\to\gamma\chi_{c2}$

$\Gamma(\chi_{c2}(1P)\to p\overline{p})/\Gamma_{total}\times\Gamma(\psi(2S)\to\gamma\chi_{c2}(1P))/\Gamma(\psi(2S)\to J/\psi(1S)\pi^+\pi^-)$ — $\Gamma_{56}/\Gamma\times\Gamma^{\psi(2S)}_{164}/\Gamma^{\psi(2S)}_{12}$

NODE=M057B1

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
2.01±0.09 OUR FIT				
1.4 ±1.1	[1] BAI	98I	BES	$\psi(2S)\to\gamma\chi_{c2}\to\gamma\overline{p}p$

[1] Calculated by us. The value for $B(\chi_{c2}\to p\overline{p})$ reported in BAI 98I is derived using $B(\psi(2S)\to\gamma\chi_{c2}) = (7.8\pm0.8)\%$ and $B(\psi(2S)\to J/\psi(1S)\pi^+\pi^-) = (32.4\pm2.6)\%$ [BAI 98D]. NODE=M057B;LINKAGE=J8

$\Gamma(\chi_{c2}(1P) \to p\overline{p})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma_{total}$ $\Gamma_{56}/\Gamma \times \Gamma^{\psi(2S)}_{164}/\Gamma^{\psi(2S)}$

NODE=M057B6
NODE=M057B6

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
6.98±0.32 OUR FIT				
7.1 ±0.5 OUR AVERAGE Error includes scale factor of 1.2.				
7.3 ±0.4 ±0.3	405	ABLIKIM 13V	BES3	$\psi(2S) \to \gamma p\overline{p}$
7.2 ±0.7 ±0.4	121 ± 12	[1] NAIK 08	CLEO	$\psi(2S) \to \gamma p\overline{p}$
4.4 $^{+1.6}_{-1.4}$ ±0.6	$14.3^{+5.2}_{-4.7}$	BAI 04F	BES	$\psi(2S) \to \gamma\chi_{c2}(1P) \to \gamma\overline{p}p$

[1] Calculated by us. NAIK 08 reports B($\chi_{c2} \to p\overline{p}$) = (7.7 ± 0.8 ± 0.4 ± 0.5) × 10^{-5} using B($\psi(2S) \to \gamma\chi_{c2}$) = (9.33 ± 0.14 ± 0.61)%. NODE=M057B6;LINKAGE=NA

$\Gamma(\chi_{c2}(1P) \to \Lambda\overline{\Lambda})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma_{total}$ $\Gamma_{69}/\Gamma \times \Gamma^{\psi(2S)}_{164}/\Gamma^{\psi(2S)}$

NODE=M057B10
NODE=M057B10

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
17.4±1.4 OUR FIT				
[(17.5 ± 1.3) × 10^{-6} OUR 2021 FIT]				
17.3±1.5 OUR AVERAGE				
[(17.4 ± 1.4) × 10^{-6} OUR 2021 AVERAGE]				
18.2±0.8±1.7	670	ABLIKIM 21L	BES3	$\psi(2S) \to \gamma p\pi^- \overline{p}\pi^+$
15.9±2.1±1.0	71	[1] NAIK 08	CLEO	$\psi(2S) \to \gamma\Lambda\overline{\Lambda}$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
18.2±1.4±0.9	207	[2,3] ABLIKIM 13H	BES3	$\psi(2S) \to \gamma\Lambda\overline{\Lambda}$

NEW
NEW

[1] Calculated by us. NAIK 08 reports B($\chi_{c2} \to \Lambda\overline{\Lambda}$) = (17.0 ± 2.2 ± 1.1 ± 1.1) × 10^{-5} using B($\psi(2S) \to \gamma\chi_{c2}$) = (9.33 ± 0.14 ± 0.61)%. NODE=M057B10;LINKAGE=NA

[2] Superseded by ABLIKIM 21L NODE=M057B10;LINKAGE=A

[3] Calculated by us. ABLIKIM 13H reports B($\chi_{c2} \to \Lambda\overline{\Lambda}$) = (20.8 ± 1.6 ± 2.3) × 10^{-5} from a measurement of B($\chi_{c2} \to \Lambda\overline{\Lambda}$) × B($\psi(2S) \to \gamma\chi_{c2}$) assuming B($\psi(2S) \to \gamma\chi_{c2}$) = (8.74 ± 0.35)%. NODE=M057B10;LINKAGE=AB

$\Gamma(\chi_{c2}(1P) \to \Lambda\overline{\Lambda})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{69}/\Gamma \times \Gamma^{\psi(2S)}_{164}/\Gamma^{\psi(2S)}_{12}$

NODE=M057B11
NODE=M057B11

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
5.0±0.4 OUR FIT				
[(5.1 ± 0.4) × 10^{-5} OUR 2021 FIT]				
7.1$^{+3.1}_{-2.9}$±1.3	$8.3^{+3.7}_{-3.4}$	[1] BAI 03E	BES	$\psi(2S) \to \gamma\Lambda\overline{\Lambda}$

NEW

[1] BAI 03E reports [B($\chi_{c2} \to \Lambda\overline{\Lambda}$) B($\psi(2S) \to \gamma\chi_{c2}$) / B($\psi(2S) \to J/\psi\pi^+\pi^-$)] × [B^2($\Lambda \to \pi^- p$) / B($J/\psi \to p\overline{p}$)] = $(1.33^{+0.59}_{-0.55}$ ± 0.25)%. We calculate from this measurement the presented value using B($\Lambda \to \pi^- p$) = (63.9 ± 0.5)% and B($J/\psi \to p\overline{p}$) = (2.17 ± 0.07) × 10^{-3}. NODE=M057B11;LINKAGE=BA

$\Gamma(\chi_{c2}(1P) \to \pi\pi)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma_{total}$ $\Gamma_{25}/\Gamma \times \Gamma^{\psi(2S)}_{164}/\Gamma^{\psi(2S)}$

NODE=M057B02
NODE=M057B02

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
2.12±0.08 OUR FIT				
2.17±0.09 OUR AVERAGE				
2.19±0.05±0.15	4.5k	[1] ABLIKIM 10A	BES3	$e^+e^- \to \psi(2S) \to \gamma\chi_{c2}$
2.23±0.06±0.10	2.5k	[2] ASNER 09	CLEO	$\psi(2S) \to \gamma\pi^+\pi^-$
1.90±0.08±0.20	0.8k	[3] ASNER 09	CLEO	$\psi(2S) \to \gamma\pi^0\pi^0$

OCCUR=2

[1] Calculated by us. ABLIKIM 10A reports B($\chi_{c2} \to \pi^0\pi^0$) = (0.88 ± 0.02 ± 0.06 ± 0.04) × 10^{-3} using B($\psi(2S) \to \gamma\chi_{c2}$) = (8.3 ± 0.4)%. We have multiplied the $\pi^0\pi^0$ measurement by 3 to obtain $\pi\pi$. NODE=M057B02;LINKAGE=AB

[2] Calculated by us. ASNER 09 reports B($\chi_{c2} \to \pi^+\pi^-$) = (1.59 ± 0.04 ± 0.07 ± 0.10) × 10^{-3} using B($\psi(2S) \to \gamma\chi_{c2}$) = (9.33 ± 0.14 ± 0.61)%. We have multiplied the $\pi^+\pi^-$ measurement by 3/2 to obtain $\pi\pi$. NODE=M057B02;LINKAGE=AS

[3] Calculated by us. ASNER 09 reports B($\chi_{c2} \to \pi^0\pi^0$) = (0.68 ± 0.03 ± 0.07 ± 0.04) × 10^{-3} using B($\psi(2S) \to \gamma\chi_{c2}$) = (9.33 ± 0.14 ± 0.61)%. We have multiplied the $\pi^0\pi^0$ measurement by 3 to obtain $\pi\pi$. NODE=M057B02;LINKAGE=AN

$\Gamma(\chi_{c2}(1P) \to \pi\pi)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{25}/\Gamma \times \Gamma_{164}^{\psi(2S)}/\Gamma_{12}^{\psi(2S)}$

NODE=M057B9
NODE=M057B9

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.612±0.023 OUR FIT					
0.54 ±0.06 OUR AVERAGE					
0.66 ±0.18 ±0.37	21 ± 6	[1] BAI	03C	BES	$\psi(2S) \to \gamma\pi^0\pi^0$
0.54 ±0.05 ±0.04	185 ± 16	[2] BAI	98I	BES	$\psi(2S) \to \gamma\pi^+\pi^-$

[1] We have multiplied $\pi^0\pi^0$ measurement by 3 to obtain $\pi\pi$. NODE=M057B;LINKAGE=BM

[2] Calculated by us. The value for $B(\chi_{c2} \to \pi^+\pi^-)$ reported by BAI 98I is derived using $B(\psi(2S) \to \gamma\chi_{c2}) = (7.8 \pm 0.8)\%$ and $B(\psi(2S) \to J/\psi\pi^+\pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D]. We have multiplied $\pi^+\pi^-$ measurement by 3/2 to obtain $\pi\pi$. NODE=M057B;LINKAGE=BA

$\Gamma(\chi_{c2}(1P) \to \eta\eta)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma_{total}$ $\Gamma_{31}/\Gamma \times \Gamma_{164}^{\psi(2S)}/\Gamma^{\psi(2S)}$

NODE=M057B04
NODE=M057B04

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.52±0.04 OUR FIT						
0.52±0.04 OUR AVERAGE						
0.54±0.03±0.04		386	[1] ABLIKIM	10A	BES3	$e^+e^- \to \psi(2S) \to \gamma\chi_{c2}$
0.47±0.05±0.05		156	ASNER	09	CLEO	$\psi(2S) \to \gamma\eta\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 0.44	90		[2] ADAMS	07	CLEO	$\psi(2S) \to \gamma\chi_{c2}$
< 3	90		BAI	03C	BES	$\psi(2S) \to \gamma\eta\eta \to 5\gamma$
0.62±0.31±0.19			LEE	85	CBAL	$\psi(2S) \to$ photons

[1] Calculated by us. ABLIKIM 10A reports $B(\chi_{c2} \to \eta\eta) = (0.65 \pm 0.04 \pm 0.05 \pm 0.03) \times 10^{-3}$ using $B(\psi(2S) \to \gamma\chi_{c2}) = (8.3 \pm 0.4)\%$. NODE=M057B04;LINKAGE=AB

[2] Superseded by ASNER 09. NODE=M057B04;LINKAGE=AD

$\Gamma(\chi_{c2}(1P) \to K^+K^-)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma_{total}$ $\Gamma_{32}/\Gamma \times \Gamma_{164}^{\psi(2S)}/\Gamma^{\psi(2S)}$

NODE=M057B03
NODE=M057B03

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
9.6±0.6 OUR FIT					
10.5±0.3±0.6	1.6k	[1] ASNER	09	CLEO	$\psi(2S) \to \gamma K^+K^-$

[1] Calculated by us. ASNER 09 reports $B(\chi_{c2} \to K^+K^-) = (1.13 \pm 0.03 \pm 0.06 \pm 0.07) \times 10^{-3}$ using $B(\psi(2S) \to \gamma\chi_{c2}) = (9.33 \pm 0.14 \pm 0.61)\%$. NODE=M057B03;LINKAGE=AS

$\Gamma(\chi_{c2}(1P) \to K^+K^-)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{32}/\Gamma \times \Gamma_{164}^{\psi(2S)}/\Gamma_{12}^{\psi(2S)}$

NODE=M057B8
NODE=M057B8

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.276±0.017 OUR FIT					
0.190±0.034±0.019	115 ± 13	[1] BAI	98I	BES	$\psi(2S) \to \gamma K^+K^-$

[1] Calculated by us. The value for $B(\chi_{c2} \to K^+K^-)$ reported by BAI 98I is derived using $B(\psi(2S) \to \gamma\chi_{c2}) = (7.8 \pm 0.8)\%$ and $B(\psi(2S) \to J/\psi\pi^+\pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D]. NODE=M057B;LINKAGE=BI

$\Gamma(\chi_{c2}(1P) \to K_S^0K_S^0)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma_{total}$ $\Gamma_{33}/\Gamma \times \Gamma_{164}^{\psi(2S)}/\Gamma^{\psi(2S)}$

NODE=M057B12
NODE=M057B12

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
5.0 ±0.4 OUR FIT					
5.0 ±0.4 OUR AVERAGE					
4.9 ±0.3 ±0.3	373 ± 20	[1] ASNER	09	CLEO	$\psi(2S) \to \gamma K_S^0K_S^0$
5.72±0.76±0.63	65	ABLIKIM	05O	BES2	$\psi(2S) \to \gamma K_S^0K_S^0$

[1] Calculated by us. ASNER 09 reports $B(\chi_{c2} \to K_S^0K_S^0) = (0.53 \pm 0.03 \pm 0.03 \pm 0.03) \times 10^{-3}$ using $B(\psi(2S) \to \gamma\chi_{c2}) = (9.33 \pm 0.14 \pm 0.61)\%$. NODE=M057B12;LINKAGE=AS

$\Gamma(\chi_{c2}(1P) \to K_S^0K_S^0)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{33}/\Gamma \times \Gamma_{164}^{\psi(2S)}/\Gamma_{12}^{\psi(2S)}$

NODE=M057B13
NODE=M057B13

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
14.4±1.1 OUR FIT				
14.7±4.1±3.3	[1] BAI	99B	BES	$\psi(2S) \to \gamma K_S^0K_S^0$

[1] Calculated by us. The value of $B(\chi_{c2} \to K_S^0K_S^0)$ reported by BAI 99B was derived using $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (7.8 \pm 0.8)\%$ and $B(\psi(2S) \to J/\psi\pi^+\pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D]. NODE=M057B13;LINKAGE=BA

$\Gamma(\chi_{c2}(1P) \to \overline{K}^0 K^+ \pi^- + \text{c.c.})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma_{total}$ $\Gamma_{42}/\Gamma \times \Gamma^{\psi(2S)}_{164}/\Gamma^{\psi(2S)}$

NODE=M057B05
NODE=M057B05

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.22±0.17 OUR FIT					
1.15±0.18 OUR AVERAGE					
1.21±0.19±0.09	37	[1] ATHAR	07	CLEO	$\psi(2S) \to \gamma K^0_S K^\pm \pi^\mp$
0.97±0.32±0.13	28	[2] ABLIKIM	06R	BES2	$\psi(2S) \to \gamma K^0_S K^\pm \pi^\mp$

[1] Calculated by us. ATHAR 07 reports $B(\chi_{c2} \to \overline{K}^0 K^+ \pi^- + \text{c.c.}) = (1.3 \pm 0.2 \pm 0.1 \pm 0.1) \times 10^{-3}$ using $B(\psi(2S) \to \gamma\chi_{c2}) = (9.33 \pm 0.14 \pm 0.61)\%$. NODE=M057B05;LINKAGE=AT

[2] Calculated by us. ABLIKIM 06R reports $B(\chi_{c2} \to K^0_S K^\pm \pi^\mp) = (0.6 \pm 0.2 \pm 0.1) \times 10^{-3}$ using $B(\psi(2S) \to \gamma\chi_{c2}) = (8.1 \pm 0.6)\%$. We have multiplied by 2 to obtain $\overline{K}^0 K^+ \pi^- +$ c.c. from $K^0_S K^\pm \pi^\mp$. NODE=M057B05;LINKAGE=AB

$\Gamma(\chi_{c2}(1P) \to 2(\pi^+\pi^-))/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_1/\Gamma \times \Gamma^{\psi(2S)}_{164}/\Gamma^{\psi(2S)}_{12}$

NODE=M057B5
NODE=M057B5

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
2.79±0.26 OUR FIT				
3.1 ±1.0 OUR AVERAGE Error includes scale factor of 2.5.				
2.3 ±0.1 ±0.5	[1] BAI	99B	BES	$\psi(2S) \to \gamma\chi_{c2}$
4.3 ±0.6	[2] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c2}$

[1] Calculated by us. The value for $B(\chi_{c2} \to 2\pi^+ 2\pi^-)$ reported in BAI 99B is derived using $B(\psi(2S) \to \gamma\chi_{c2}) = (7.8 \pm 0.8)\%$ and $B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D]. NODE=M057B;LINKAGE=K1

[2] The value for $B(\psi(2S) \to \gamma\chi_{c2}) \times B(\chi_{c2} \to 2\pi^+\pi^-)$ reported in TANENBAUM 78 is derived using $B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) \times B(J/\psi(1S)\ell^+\ell^-) = (4.6 \pm 0.7)\%$. Calculated by us using $B(J/\psi(1S) \to \ell^+\ell^-) = 0.1181 \pm 0.0020$. NODE=M057B;LINKAGE=K2

$\Gamma(\chi_{c2}(1P) \to K^+K^-K^+K^-)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma_{total}$ $\Gamma_{51}/\Gamma \times \Gamma^{\psi(2S)}_{164}/\Gamma^{\psi(2S)}$

NODE=M057B14
NODE=M057B14

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.57±0.19 OUR FIT					
1.76±0.16±0.24	160	[1] ABLIKIM	06T	BES2	$\psi(2S) \to \gamma 2K^+ 2K^-$

[1] Calculated by us. The value of $B(\chi_{c2} \to 2K^+ 2K^-)$ reported by ABLIKIM 06T was derived using $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.1 \pm 0.4)\%$. NODE=M057B14;LINKAGE=AB

$\Gamma(\chi_{c2}(1P) \to K^+K^-K^+K^-)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{51}/\Gamma \times \Gamma^{\psi(2S)}_{164}/\Gamma^{\psi(2S)}_{12}$

NODE=M057B15
NODE=M057B15

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
4.5±0.5 OUR FIT				
3.6±0.6±0.6	[1] BAI	99B	BES	$\psi(2S) \to \gamma 2K^+ 2K^-$

[1] Calculated by us. The value of $B(\chi_{c2} \to 2K^+ 2K^-)$ reported by BAI 99B was derived using $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (7.8 \pm 0.8)\%$ and $B(\psi(2S) \to J/\psi\pi^+\pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D]. NODE=M057B15;LINKAGE=BA

$\Gamma(\chi_{c2}(1P) \to \phi\phi)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma_{total}$ $\Gamma_{20}/\Gamma \times \Gamma^{\psi(2S)}_{164}/\Gamma^{\psi(2S)}$

NODE=M057B16
NODE=M057B16

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.01±0.08 OUR FIT					
0.98±0.13 OUR AVERAGE Error includes scale factor of 1.3.					
0.94±0.03±0.10	849	[1] ABLIKIM	11K	BES3	$\psi(2S) \to \gamma$ hadrons
1.38±0.24±0.23	41	[2] ABLIKIM	06T	BES2	$\psi(2S) \to \gamma 2K^+ 2K^-$

[1] Calculated by us. The value of $B(\chi_{c2} \to \phi\phi)$ reported by ABLIKIM 11K was derived using $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35)\%$. NODE=M057B16;LINKAGE=AL

[2] Calculated by us. The value of $B(\chi_{c2} \to \phi\phi)$ reported by ABLIKIM 06T was derived using $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.1 \pm 0.4)\%$. NODE=M057B16;LINKAGE=AB

$\Gamma(\chi_{c2}(1P) \to \phi\phi)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{20}/\Gamma \times \Gamma^{\psi(2S)}_{164}/\Gamma^{\psi(2S)}_{12}$

NODE=M057B17
NODE=M057B17

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
2.92±0.24 OUR FIT				
4.8 ±1.3 ±1.3	[1] BAI	99B	BES	$\psi(2S) \to \gamma 2K^+ 2K^-$

[1] Calculated by us. The value of $B(\chi_{c2} \to \phi\phi)$ reported by BAI 99B was derived using $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (7.8 \pm 0.8)\%$ and $B(\psi(2S) \to J/\psi\pi^+\pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D]. NODE=M057B17;LINKAGE=BA

$\Gamma(\chi_{c2}(1P) \to \Sigma^+ \overline{p} K^0_S + \text{c.c.})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma_{total}$

$\Gamma_{80}/\Gamma \times \Gamma^{\psi(2S)}_{164}/\Gamma^{\psi(2S)}$

NODE=M057B07
NODE=M057B07

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
7.85±0.77±0.44	129	[1] ABLIKIM	19BB	BES3	$\psi(2S) \to \gamma\Sigma^+ \overline{p} K^0_S$ + c.c.

[1] Calculated by us. ABLIKIM 19BB reports B($\chi_{c2} \to \Sigma^+ \overline{p} K^0_S$ + c.c.) = $(8.25 \pm 0.83 \pm 0.49) \times 10^{-5}$ using B($\psi(2S) \to \gamma\chi_{c2}$) = (9.52 ± 0.20)% and other branching fractions from PDG 18.

NODE=M057B07;LINKAGE=A

$\Gamma(\chi_{c2}(1P) \to \Sigma^0 \overline{p} K^+ + \text{c.c.})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma_{total}$

$\Gamma_{81}/\Gamma \times \Gamma^{\psi(2S)}_{164}/\Gamma^{\psi(2S)}$

NODE=M057P00
NODE=M057P00

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
0.87±0.06±0.04	271	[1] ABLIKIM	20AE	BES3	$\psi(2S) \to \gamma\Sigma^0 \overline{p} K^+$ + c.c.

[1] Calculated by us. ABLIKIM 20AE reports B($\chi_{c2} \to \Sigma^0 \overline{p} K^+$ + c.c.) = $(0.91 \pm 0.06 \pm 0.05) \times 10^{-4}$ using B($\psi(2S) \to \gamma\chi_{c2}$) = (9.52 ± 0.20)% and other branching fractions from PDG 20.

NODE=M057P00;LINKAGE=A

$\Gamma(\chi_{c2}(1P) \to \gamma J/\psi(1S))/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma_{total}$

$\Gamma_{92}/\Gamma \times \Gamma^{\psi(2S)}_{164}/\Gamma^{\psi(2S)}$

NODE=M057B2
NODE=M057B2

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
1.81 ±0.04 OUR FIT					
1.69 ±0.16 OUR AVERAGE		Error includes scale factor of 3.4. See the ideogram below.			
1.996±0.008±0.070	81k	[1] ABLIKIM	17N	BES3	$\psi(2S) \to \gamma\gamma J/\psi$
1.793±0.008±0.163	1.0M	ABLIKIM	17U	BES3	$e^+e^- \to \gamma X$
1.62 ±0.04 ±0.12	5.8k	BAI	04I	BES2	$\psi(2S) \to J/\psi\gamma\gamma$
0.99 ±0.10 ±0.08		GAISER	86	CBAL	$\psi(2S) \to \gamma X$
1.47 ±0.17		[2] OREGLIA	82	CBAL	$\psi(2S) \to \gamma\chi_{c2}$
1.8 ±0.5		[3] BRANDELIK	79B	DASP	$\psi(2S) \to \gamma\chi_{c2}$
1.2 ±0.2		[3] BARTEL	78B	CNTR	$\psi(2S) \to \gamma\chi_{c2}$
2.2 ±1.2		[4] BIDDICK	77	CNTR	$e^+e^- \to \gamma X$
1.2 ±0.7		[2] WHITAKER	76	MRK1	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.874±0.007±0.102	76k	[5] ABLIKIM	12O	BES3	$\psi(2S) \to \gamma\chi_{c2}$
1.95 ±0.02 ±0.07	12.4k	[6] MENDEZ	08	CLEO	$\psi(2S) \to \gamma\chi_{c2}$
1.85 ±0.04 ±0.07	1.9k	[7] ADAM	05A	CLEO	Repl. by MENDEZ 08

[1] Uses B($J/\psi \to e^+e^-$) = (5.971 ± 0.032)% and B($J/\psi \to \mu^+\mu^-$) = (5.961 ± 0.033)%.

NODE=M057B2;LINKAGE=A

[2] Recalculated by us using B($J/\psi(1S) \to \ell^+\ell^-$) = 0.1181 ± 0.0020.

NODE=M057B;LINKAGE=3Q

[3] Recalculated by us using B($J/\psi(1S) \to \mu^+\mu^-$) = 0.0588 ± 0.0010.

NODE=M057B;LINKAGE=2Q

[4] Assumes isotropic gamma distribution.

NODE=M057B;LINKAGE=EA

[5] Superseded by ABLIKIM 17N.

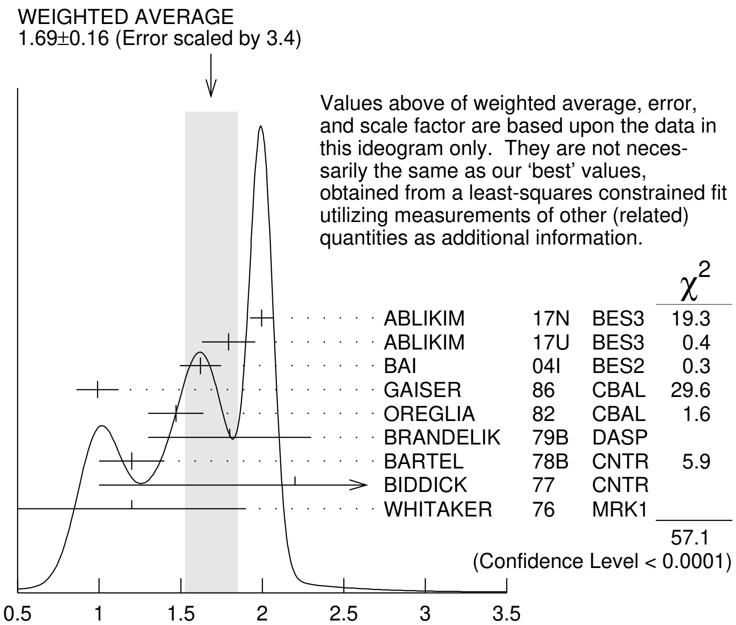
NODE=M057B2;LINKAGE=B

[6] Not independent from other measurements of MENDEZ 08.

NODE=M057B2;LINKAGE=ME

[7] Not independent from other values reported by ADAM 05A.

NODE=M057B;LINKAGE=AD



$\Gamma\big(\chi_{c2}(1P) \to \gamma J/\psi(1S)\big)/\Gamma_{\text{total}} \times \Gamma\big(\psi(2S) \to \gamma\chi_{c2}(1P)\big)/\Gamma_{\text{total}}$ (units 10^{-2})

$\Gamma\big(\chi_{c2}(1P) \to \gamma J/\psi(1S)\big)/\Gamma_{\text{total}} \times \Gamma\big(\psi(2S) \to \gamma\chi_{c2}(1P)\big)/\Gamma\big(\psi(2S) \to J/\psi(1S)\,\text{anything}\big)$ $\Gamma_{92}/\Gamma \times \Gamma^{\psi(2S)}_{164}/\Gamma^{\psi(2S)}_{10}$

NODE=M057B7

$\Gamma_{92}/\Gamma \times \Gamma^{\psi(2S)}_{164}/\Gamma^{\psi(2S)}_{10} = \Gamma_{92}/\Gamma \times \Gamma^{\psi(2S)}_{164}/(\Gamma^{\psi(2S)}_{12}+\Gamma^{\psi(2S)}_{13}+\Gamma^{\psi(2S)}_{14}+0.343\Gamma^{\psi(2S)}_{163}+0.190\Gamma^{\psi(2S)}_{164})$

NODE=M057B7

NODE=M057B7

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
2.95±0.06 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3.12±0.03±0.09	12.4k	[1] MENDEZ	08	CLEO	$\psi(2S) \to \gamma\chi_{c2}$
3.11±0.07±0.07	1.9k	ADAM	05A	CLEO	Repl. by MENDEZ 08

[1] Not independent from other measurements of MENDEZ 08.

NODE=M057B7;LINKAGE=ME

$\Gamma\big(\chi_{c2}(1P) \to \gamma J/\psi(1S)\big)/\Gamma_{\text{total}} \times \Gamma\big(\psi(2S) \to \gamma\chi_{c2}(1P)\big)/\Gamma\big(\psi(2S) \to J/\psi(1S)\pi^+\pi^-\big)$ $\Gamma_{92}/\Gamma \times \Gamma^{\psi(2S)}_{164}/\Gamma^{\psi(2S)}_{12}$

NODE=M057B3
NODE=M057B3

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
5.22±0.11 OUR FIT					
5.53±0.17 OUR AVERAGE					
5.56±0.05±0.16	12.4k	MENDEZ	08	CLEO	$\psi(2S) \to \gamma\chi_{c2}$
6.0 ±2.8	1.3k	[1] ABLIKIM	04B	BES	$\psi(2S) \to J/\psi X$
3.9 ±1.2		[2] HIMEL	80	MRK2	$\psi(2S) \to \gamma\chi_{c2}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
5.52±0.13±0.13	1.9k	[3] ADAM	05A	CLEO	Repl. by MENDEZ 08

[1] From a fit to the J/ψ recoil mass spectra.

NODE=M057B;LINKAGE=AB

[2] The value for $B(\psi(2S) \to \gamma\chi_{c2}) \times B(\chi_{c2} \to \gamma J/\psi(1S))$ reported in HIMEL 80 is derived using $B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) = (33 \pm 3)\%$ and $B(J/\psi(1S) \to \ell^+\ell^-) = 0.138 \pm 0.018$. Calculated by us using $B(J/\psi(1S) \to \ell^+\ell^-) = (0.1181 \pm 0.0020)$.

NODE=M057B;LINKAGE=H8

[3] Not independent from other values reported by ADAM 05A.

NODE=M057B3;LINKAGE=AD

$\Gamma\big(\chi_{c2}(1P) \to \gamma\gamma\big)/\Gamma_{\text{total}} \times \Gamma\big(\psi(2S) \to \gamma\chi_{c2}(1P)\big)/\Gamma_{\text{total}}$ $\Gamma_{96}/\Gamma \times \Gamma^{\psi(2S)}_{164}/\Gamma^{\psi(2S)}$

NODE=M057B4
NODE=M057B4

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
2.71±0.08 OUR FIT					
2.82±0.10 OUR AVERAGE					
2.83±0.08±0.06	5k	[1] ABLIKIM	17AE	BES3	$\psi(2S) \to \gamma\chi_{c2} \to 3\gamma$
2.68±0.28±0.15	0.3k	ECKLUND	08A	CLEO	$\psi(2S) \to \gamma\chi_{c2} \to 3\gamma$
7.0 ±2.1 ±2.0		LEE	85	CBAL	$\psi(2S) \to \gamma\chi_{c2}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.81±0.17±0.15	1.1k	[2] ABLIKIM	12A	BES3	$\psi(2S) \to \gamma\chi_{c2} \to 3\gamma$

[1] ABLIKIM 17AE measures the ratio of two-photon partial widths for the helicity $\lambda = 0$ and helicity $\lambda = 2$ components to be $f_{0/2} = \Gamma^{\lambda=0}_{\gamma\gamma} / \Gamma^{\lambda=2}_{\gamma\gamma} = 0.000 \pm 0.006 \pm 0.012$. NODE=M057B4;LINKAGE=A

[2] ABLIKIM 12A measures the ratio of two-photon partial widths for the helicity $\lambda = 0$ and helicity $\lambda = 2$ components to be $f_{0/2} = \Gamma^{\lambda=0}_{\gamma\gamma}/\Gamma^{\lambda=2}_{\gamma\gamma} = 0.00 \pm 0.02 \pm 0.02$. Superseded by ABLIKIM 17AE. NODE=M057B4;LINKAGE=AB

$\Gamma(\chi_{c2}(1P) \to \gamma\gamma)/\Gamma(\chi_{c0}(1P) \to \gamma\gamma)$ $\Gamma_{96}/\Gamma^{\chi_{c0}(1P)}_{96}$

NODE=M057B06
NODE=M057B06

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.292±0.028 OUR AVERAGE					
0.295±0.014±0.028	8k	[1] ABLIKIM	17AE	BES3	$\psi(2S) \to \gamma\chi_{cJ} \to 3\gamma$
0.278±0.050±0.036	0.5k	[1] ECKLUND	08A	CLEO	$\psi(2S) \to \gamma\chi_{cJ} \to 3\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.271±0.029±0.030	1.9k	[1,2] ABLIKIM	12A	BES3	$\psi(2S) \to \gamma\chi_{cJ} \to 3\gamma$

[1] Not independent from the values of $\Gamma(\chi_{c0}, \chi_{c2})$ and $B(\psi(2S) \to \chi_{c0}, \chi_{c2})$. NODE=M057B06;LINKAGE=AB

[2] Superseded by ABLIKIM 17AE. NODE=M057B06;LINKAGE=A

MULTIPOLE AMPLITUDES IN $\chi_{c2}(1P) \to \gamma J/\psi(1S)$ RADIATIVE DECAY

NODE=M057240

$a_2 = M2/\sqrt{E1^2 + M2^2 + E3^2}$ Magnetic quadrupole fractional transition amplitude

NODE=M057A1
NODE=M057A1

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
−11.0± 1.0 OUR AVERAGE					
−12.0± 1.3±0.4	89k	[1] ABLIKIM	17N	BES3	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$
− 9.3± 1.6±0.3	19.8k	[2] ARTUSO	09	CLEO	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$
$-9.3^{+3.9}_{-4.1}\pm0.6$	5.9k	[3] AMBROGIANI	02	E835	$p\overline{p} \to \chi_{c2} \to J/\psi\gamma$
−14 ± 6	1.9k	[3] ARMSTRONG	93E	E760	$p\overline{p} \to \chi_{c2} \to J/\psi\gamma$
$-33.3^{+11.6}_{-29.2}$	441	[3] OREGLIA	82	CBAL	$\psi(2S) \to \chi_{c1}\gamma \to J/\psi\gamma\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
− 7.9± 1.9±0.3	19.8k	[4] ARTUSO	09	CLEO	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$

OCCUR=2

[1] Correlated with a_3, b_2, and b_3 with correlation coefficients $\rho_{a_2 a_3} = 0.733$, $\rho_{a_2 b_2} = -0.605$, and $\rho_{a_2 b_3} = -0.095$. NODE=M057A1;LINKAGE=B

[2] From a fit with floating $M2$ amplitudes a_2 and b_2, and fixed $E3$ amplitudes a_3=b_3=0. NODE=M057A1;LINKAGE=AR

[3] Assuming a_3=0. NODE=M057A1;LINKAGE=A

[4] From a fit with floating $M2$ and $E3$ amplitudes a_2, b_2, and a_3, and b_3. NODE=M057A1;LINKAGE=AT

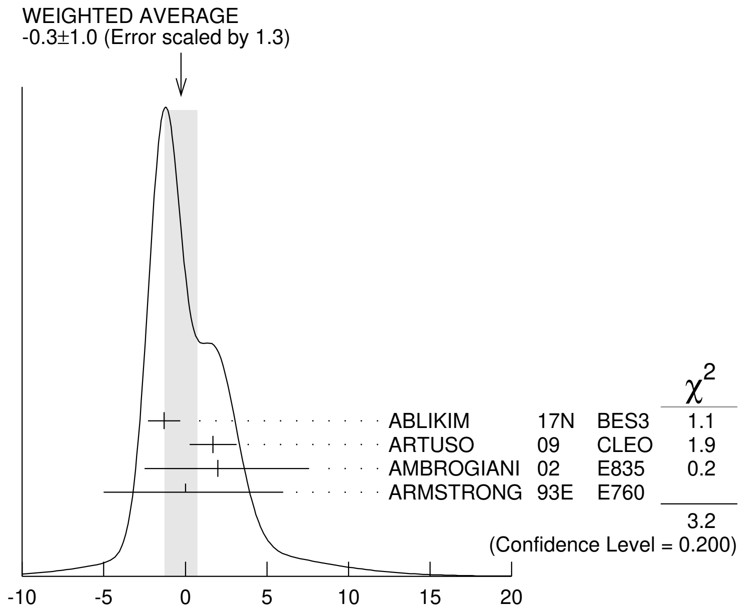
$a_3 = E3/\sqrt{E1^2 + M2^2 + E3^2}$ Electric octupole fractional transition amplitude

NODE=M057A2
NODE=M057A2

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
−0.3±1.0 OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below.					
−1.3±0.9±0.4	89k	[1] ABLIKIM	17N	BES3	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$
1.7±1.4±0.3	19.8k	[2] ARTUSO	09	CLEO	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$
$2.0^{+5.5}_{-4.4}\pm0.9$	5908	AMBROGIANI	02	E835	$p\overline{p} \to \chi_{c2} \to J/\psi\gamma$
0^{+6}_{-5}	1904	ARMSTRONG	93E	E760	$p\overline{p} \to \chi_{c2} \to J/\psi\gamma$

[1] Correlated with a_2, b_2, and b_3 with correlation coefficients $\rho_{a_2 a_3} = 0.733$, $\rho_{a_3 b_2} = -0.422$, and $\rho_{a_3 b_3} = -0.024$. NODE=M057A2;LINKAGE=A

[2] From a fit with floating $M2$ and $E3$ amplitudes a_2, b_2, and a_3, and b_3. NODE=M057A2;LINKAGE=AR



$a_3 = E3/\sqrt{E1^2 + M2^2 + E3^2}$ Electric octupole fractional transition amplitude (units 10^{-2})

MULTIPOLE AMPLITUDES IN $\psi(2S) \to \gamma\chi_{c2}(1P)$ RADIATIVE DECAY

NODE=M057250

$b_2 = M2/\sqrt{E1^2 + M2^2 + E3^2}$ Magnetic quadrupole fractional transition amplitude

NODE=M057QB2
NODE=M057QB2

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
1.9±0.9 OUR AVERAGE		Error includes scale factor of 1.4. See the ideogram below.		
1.7±0.8±0.2	89k	[1] ABLIKIM 17N	BES3	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$
4.6±1.0±1.3	13.8k	[2] ABLIKIM 11I	BES3	$\psi(2S) \to \gamma\pi^+\pi^-, \gamma K^+K^-$
0.2±1.5±0.4	19.8k	[3] ARTUSO 09	CLEO	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$
$-5.1^{+5.4}_{-3.6}$	721	[2] ABLIKIM 04I	BES2	$\psi(2S) \to \gamma\pi^+\pi^-, \gamma K^+K^-$
$13.2^{+9.8}_{-7.5}$	441	[4] OREGLIA 82	CBAL	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.0±1.3±0.3	19.8k	[4] ARTUSO 09	CLEO	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$

OCCUR=2

[1] Correlated with a_2, a_3, and b_3 with correlation coefficients $\rho_{a_2 b_2} = -0.605$, $\rho_{a_3 b_2} = -0.422$, and $\rho_{b_2 b_3} = 0.384$.

NODE=M057QB2;LINKAGE=A

[2] From a fit with floating $M2$ and $E3$ amplitudes b_2 and b_3.

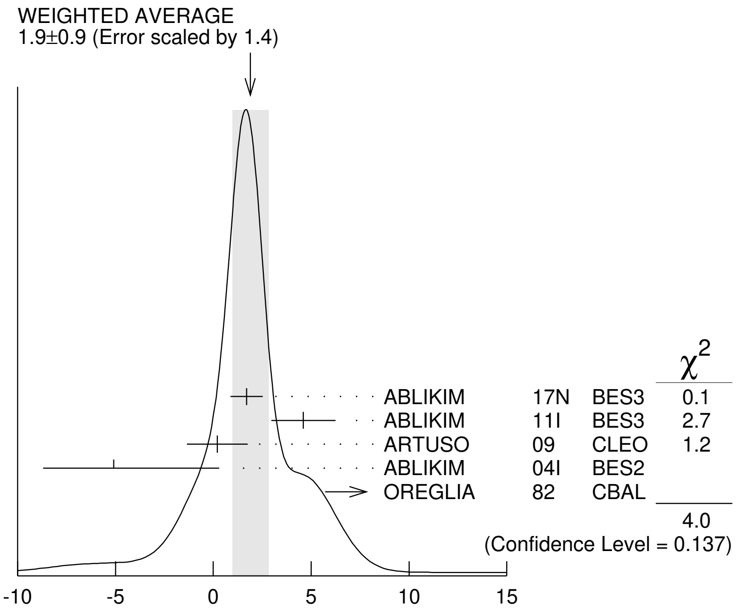
NODE=M057QB2;LINKAGE=AB

[3] From a fit with floating $M2$ and $E3$ amplitudes a_2, b_2, and a_3, and b_3.

NODE=M057QB2;LINKAGE=AT

[4] From a fit with floating $M2$ amplitudes a_2 and b_2, and fixed $E3$ amplitudes a_3=b_3=0.

NODE=M057QB2;LINKAGE=AR



$b_2 = M2/\sqrt{E1^2+M2^2+E3^2}$ Magnetic quadrupole fractional transition amplitude (units 10^{-2})

$b_3 = E3/\sqrt{E1^2+M2^2+E3^2}$ Electric octupole fractional transition amplitude

NODE=M057QB3
NODE=M057QB3

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
-1.0 ± 0.6 OUR AVERAGE					
$-1.4\pm0.7\pm0.4$	89k	[1] ABLIKIM	17N	BES3	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$
$1.5\pm0.8\pm1.8$	13.8k	[2] ABLIKIM	11I	BES3	$\psi(2S) \to \gamma\pi^+\pi^-, \gamma K^+K^-$
$-0.8\pm1.2\pm0.2$	19.8k	ARTUSO	09	CLEO	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$
$-2.7^{+4.3}_{-2.9}$	721	[2] ABLIKIM	04I	BES2	$\psi(2S) \to \gamma\pi^+\pi^-, \gamma K^+K^-$

[1] Correlated with a_2, a_3, and b_2 with correlation coefficients $\rho_{a_2 b_3} = -0.095$, $\rho_{a_3 b_3} = -0.024$, and $\rho_{b_2 b_3} = 0.384$. NODE=M057QB3;LINKAGE=A

[2] From a fit with floating $M2$ and $E3$ amplitudes b_2 and b_3. NODE=M057QB3;LINKAGE=AB

MULTIPOLE AMPLITUDE RATIOS IN RADIATIVE DECAYS $\psi(2S) \to \gamma\chi_{c2}(1P)$ and $\chi_{c2} \to \gamma J/\psi(1S)$

NODE=M057260

b_2/a_2 Magnetic quadrupole transition amplitude ratio

NODE=M057QAR
NODE=M057QAR

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{-11^{+14}_{-15}}$	19.8k	[1] ARTUSO	09	CLEO	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$

[1] Statistical and systematic errors combined. From a fit with floating $M2$ amplitudes a_2 and b_2, and fixed $E3$ amplitudes a_3=b_3=0. Not independent of values for $a_2(\chi_{c2}(1P))$ and $b_2(\chi_{c2}(1P))$ from ARTUSO 09. NODE=M057QAR;LINKAGE=AR

$\chi_{c2}(1P)$ REFERENCES

NODE=M057

ABLIKIM	21AV	JHEP 2111 217	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61465
ABLIKIM	21L	PR D103 112004	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61117
ABLIKIM	20AE	PR D102 092006	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60733
ABLIKIM	20B	PR D101 012012	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60212
ABLIKIM	20I	PR D101 092002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60303
PDG	20	PTEP 2020 083C01	P.A. Zyla *et al.*	(PDG Collab.)	REFID=60676
ABLIKIM	19AA	PR D99 052008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59844
ABLIKIM	19AU	PR D100 052010	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59996
ABLIKIM	19BB	PR D100 092006	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60026
ABLIKIM	19J	PR D99 012015	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59606
ABLIKIM	19Z	PR D99 051101	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59837
ABLIKIM	18V	PR D97 052011	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58990
PDG	18	PR D98 030001	M. Tanabashi *et al.*	(PDG Collab.)	REFID=59304
AAIJ	17BB	EPJ C77 609	R. Aaij *et al.*	(LHCb Collab.)	REFID=58191
AAIJ	17BI	PRL 119 221801	R. Aaij *et al.*	(LHCb Collab.)	REFID=58278
ABLIKIM	17AE	PR D96 092007	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58310
ABLIKIM	17AG	PR D96 111102	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58316
ABLIKIM	17AI	PR D96 112006	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58321
ABLIKIM	17I	PRL 118 221802	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57931
ABLIKIM	17N	PR D95 072004	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57978
ABLIKIM	17U	PR D96 032001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58026
PDG	16	CP C40 100001	C. Patrignani *et al.*	(PDG Collab.)	REFID=57140
ABLIKIM	15I	PR D91 092006	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56774

ABLIKIM	15M	PR D91 112008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56778
ABLIKIM	15N	PR D91 112018	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56779
ABLIKIM	14J	PR D89 074030	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55901
ABLIKIM	13B	PR D87 012002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54877
ABLIKIM	13D	PR D87 012007	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54879
ABLIKIM	13H	PR D87 032007	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54953
ABLIKIM	13V	PR D88 112001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55583
UEHARA	13	PTEP 2013 123C01	S. Uehara *et al.*	(BELLE Collab.)	REFID=55592
ABLIKIM	12A	PR D85 112008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54266
ABLIKIM	12I	PR D86 052004	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54736
ABLIKIM	12J	PR D86 052011	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54737
ABLIKIM	12O	PRL 109 172002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54742
LEES	12AE	PR D86 092005	J.P. Lees *et al.*	(BABAR Collab.)	REFID=54752
LIU	12B	PRL 108 232001	Z.Q. Liu *et al.*	(BELLE Collab.)	REFID=54303
ABLIKIM	11A	PR D83 012006	M. Ablikim *et al.*	(BESIII Collab.)	REFID=53647
ABLIKIM	11E	PR D83 112005	M. Ablikim *et al.*	(BESIII Collab.)	REFID=16717
ABLIKIM	11F	PR D83 112009	M. Ablikim *et al.*	(BESIII Collab.)	REFID=16719
ABLIKIM	11I	PR D84 092006	M. Ablikim *et al.*	(BESIII Collab.)	REFID=53930
ABLIKIM	11K	PRL 107 092001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=53940
DEL-AMO-SA...	11M	PR D84 012004	P. del Amo Sanchez *et al.*	(BABAR Collab.)	REFID=16751
ABLIKIM	10A	PR D81 052005	M. Ablikim *et al.*	(BESIII Collab.)	REFID=53347
ONYISI	10	PR D82 011103	P.U.E. Onyisi *et al.*	(CLEO Collab.)	REFID=53360
UEHARA	10A	PR D82 114031	S. Uehara *et al.*	(BELLE Collab.)	REFID=53641
ARTUSO	09	PR D80 112003	M. Artuso *et al.*	(CLEO Collab.)	REFID=53206
ASNER	09	PR D79 072007	D.M. Asner *et al.*	(CLEO Collab.)	REFID=52721
UEHARA	09	PR D79 052009	S. Uehara *et al.*	(BELLE Collab.)	REFID=52761
BENNETT	08A	PRL 101 151801	J.V. Bennett *et al.*	(CLEO Collab.)	REFID=52575
ECKLUND	08A	PR D78 091501	K.M. Ecklund *et al.*	(CLEO Collab.)	REFID=52583
HE	08B	PR D78 092004	Q. He *et al.*	(CLEO Collab.)	REFID=52588
MENDEZ	08	PR D78 011102	H. Mendez *et al.*	(CLEO Collab.)	REFID=52684
NAIK	08	PR D78 031101	P. Naik *et al.*	(CLEO Collab.)	REFID=52301
UEHARA	08	EPJ C53 1	S. Uehara *et al.*	(BELLE Collab.)	REFID=52064
ADAMS	07	PR D75 071101	G.S. Adams *et al.*	(CLEO Collab.)	REFID=51651
ATHAR	07	PR D75 032002	S.B. Athar *et al.*	(CLEO Collab.)	REFID=51618
CHEN	07B	PL B651 15	W.T. Chen *et al.*	(BELLE Collab.)	REFID=51710
ABLIKIM	06D	PR D73 052006	M. Ablikim *et al.*	(BES Collab.)	REFID=51049
ABLIKIM	06I	PR D74 012004	M. Ablikim *et al.*	(BES Collab.)	REFID=51126
ABLIKIM	06R	PR D74 072001	M. Ablikim *et al.*	(BES Collab.)	REFID=51447
ABLIKIM	06T	PL B642 197	M. Ablikim *et al.*	(BES Collab.)	REFID=51453
DOBBS	06	PR D73 071101	S. Dobbs *et al.*	(CLEO Collab.)	REFID=51062
ABLIKIM	05G	PR D71 092002	M. Ablikim *et al.*	(BES Collab.)	REFID=50756
ABLIKIM	05N	PL B630 7	M. Ablikim *et al.*	(BES Collab.)	REFID=50847
ABLIKIM	05O	PL B630 21	M. Ablikim *et al.*	(BES Collab.)	REFID=50846
ADAM	05A	PRL 94 232002	N.E. Adam *et al.*	(CLEO Collab.)	REFID=50763
ANDREOTTI	05A	NP B717 34	M. Andreotti *et al.*	(FNAL E835 Collab.)	REFID=50769
NAKAZAWA	05	PL B615 39	H. Nakazawa *et al.*	(BELLE Collab.)	REFID=50807
ABLIKIM	04B	PR D70 012003	M. Ablikim *et al.*	(BES Collab.)	REFID=49741
ABLIKIM	04H	PR D70 092003	M. Ablikim *et al.*	(BES Collab.)	REFID=50188
ABLIKIM	04I	PR D70 092004	M. Ablikim *et al.*	(BES Collab.)	REFID=50189
ATHAR	04	PR D70 112002	S.B. Athar *et al.*	(CLEO Collab.)	REFID=50331
BAI	04F	PR D69 092001	J.Z. Bai *et al.*	(BES Collab.)	REFID=49752
BAI	04I	PR D70 012006	J.Z. Bai *et al.*	(BES Collab.)	REFID=49755
AULCHENKO	03	PL B573 63	V.M. Aulchenko *et al.*	(KEDR Collab.)	REFID=49579
BAI	03C	PR D67 032004	J.Z. Bai *et al.*	(BES Collab.)	REFID=49190
BAI	03E	PR D67 112001	J.Z. Bai *et al.*	(BES Collab.)	REFID=49416
ABE	02T	PL B540 33	K. Abe *et al.*	(BELLE Collab.)	REFID=48813
AMBROGIANI	02	PR D65 052002	M. Ambrogiani *et al.*	(FNAL E835 Collab.)	REFID=48552
EISENSTEIN	01	PRL 87 061801	B.I. Eisenstein *et al.*	(CLEO Collab.)	REFID=48344
AMBROGIANI	00B	PR D62 052002	M. Ambrogiani *et al.*	(FNAL E835 Collab.)	REFID=47940
ACCIARRI	99E	PL B453 73	M. Acciarri *et al.*	(L3 Collab.)	REFID=46943
BAI	99B	PR D60 072001	J.Z. Bai *et al.*	(BES Collab.)	REFID=47385
ACKER..,K...	98	PL B439 197	K. Ackerstaff *et al.*	(OPAL Collab.)	REFID=46324
BAI	98D	PR D58 092006	J.Z. Bai *et al.*	(BES Collab.)	REFID=46338
BAI	98I	PRL 81 3091	J.Z. Bai *et al.*	(BES Collab.)	REFID=46343
DOMINICK	94	PR D50 4265	J. Dominick *et al.*	(CLEO Collab.)	REFID=44077
ARMSTRONG	93	PRL 70 2988	T.A. Armstrong *et al.*	(FNAL E760 Collab.)	REFID=43306
ARMSTRONG	93E	PR D48 3037	T.A. Armstrong *et al.*	(FNAL-E760 Collab.)	REFID=48616
BAUER	93	PL B302 345	D.A. Bauer *et al.*	(TPC Collab.)	REFID=43315
ARMSTRONG	92	NP B373 35	T.A. Armstrong *et al.*	(FNAL, FERR, GENO+)	REFID=41865
Also		PRL 68 1468	T.A. Armstrong *et al.*	(FNAL, FERR, GENO+)	REFID=41907
BAGLIN	87B	PL B187 191	C. Baglin *et al.*	(R704 Collab.)	REFID=40018
BAGLIN	86B	PL B172 455	C. Baglin	(LAPP, CERN, GENO, LYON, OSLO+)	REFID=22145
GAISER	86	PR D34 711	J. Gaiser *et al.*	(Crystal Ball Collab.)	REFID=22012
LEE	85	SLAC 282	R.A. Lee	(SLAC)	REFID=40589
LEMOIGNE	82	PL 113B 509	Y. Lemoigne *et al.*	(SACL, LOIC, SHMP+)	REFID=22084
OREGLIA	82	PR D25 2259	M.J. Oreglia *et al.*	(SLAC, CIT, HARV+)	REFID=22120
Also		Private Comm.	M.J. Oreglia	(EFI)	REFID=22143
BARATE	81	PR D24 2994	R. Barate *et al.*	(SACL, LOIC, SHMP, CERN+)	REFID=22164
HIMEL	80	PRL 44 920	T. Himel *et al.*	(LBL, SLAC)	REFID=22119
Also		Private Comm.	G. Trilling	(LBL, UCB)	REFID=22113
BRANDELIK	79B	NP B160 426	R. Brandelik *et al.*	(DASP Collab.)	REFID=22115
BARTEL	78B	PL 79B 492	W. Bartel *et al.*	(DESY, HEIDP)	REFID=22111
TANENBAUM	78	PR D17 1731	W.M. Tanenbaum *et al.*	(SLAC, LBL)	REFID=22112
Also		Private Comm.	G. Trilling	(LBL, UCB)	REFID=22113
BIDDICK	77	PRL 38 1324	C.J. Biddick *et al.*	(UCSD, UMD, PAVI+)	REFID=22059
WHITAKER	76	PRL 37 1596	J.S. Whitaker *et al.*	(SLAC, LBL)	REFID=22151

NODE=M059

$\eta_c(2S)$

$I^G(J^{PC}) = 0^+(0^{-+})$

Quantum numbers are quark model predictions.

NODE=M059

$\eta_c(2S)$ MASS

NODE=M059M

NODE=M059M

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
3637.5±1.1 OUR AVERAGE	Error includes scale factor of 1.2.			
3635.1±3.7±2.9	106	XU 18	BELL	$e^+e^- \to e^+e^-\eta'\pi^+\pi^-$
3633.6±1.7±0.6	106	[1] AAIJ 17AD	LHCB	$pp \to B^+X \to p\overline{p}K^+X$
3636.4±4.1±0.7	365	[2] AAIJ 17BB	LHCB	$pp \to b\overline{b}X \to 2(K^+K^-)X$
3637.0±5.7±3.4	178	[3,4] LEES 14E	BABR	$\gamma\gamma \to K^+K^-\pi^0$
3635.1±5.8±2.1	47	[3,5] LEES 14E	BABR	$\gamma\gamma \to K^+K^-\eta$
3646.9±1.6±3.6	57 ± 17	ABLIKIM 13K	BES3	$\psi(2S) \to \gamma K^0_S K^\pm\pi^\mp\pi^+\pi^-$
3637.6±2.9±1.6	127 ± 18	[6] ABLIKIM 12G	BES3	$\psi(2S) \to \gamma K^0 K\pi$, $KK\pi^0$
3638.5±1.5±0.8	624	[3] DEL-AMO-SA...11M	BABR	$\gamma\gamma \to K^0_S K^\pm\pi^\mp$
3640.5±3.2±2.5	1201	[3] DEL-AMO-SA...11M	BABR	$\gamma\gamma \to K^+K^-\pi^+\pi^-\pi^0$
$3636.1^{+3.9}_{-4.2}{}^{+0.7}_{-2.0}$	128	[7] VINOKUROVA 11	BELL	$B^\pm \to K^\pm(K^0_S K^\pm\pi^\mp)$
3626 ±5 ±6	311	[8] ABE 07	BELL	$e^+e^- \to J/\psi(c\overline{c})$
$3645.0\pm5.5^{+4.9}_{-7.8}$	121 ± 27	AUBERT 05C	BABR	$e^+e^- \to J/\psi c\overline{c}$
3642.9±3.1±1.5	61	ASNER 04	CLEO	$\gamma\gamma \to \eta_c \to K^0_S K^\pm\pi^\mp$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
3639 ±7	98 ± 52	[9] AUBERT 06E	BABR	$B^\pm \to K^\pm X_{c\overline{c}}$
3630.8±3.4±1.0	112 ± 24	[10] AUBERT 04D	BABR	$\gamma\gamma \to \eta_c(2S) \to K\overline{K}\pi$
3654 ±6 ±8	39 ± 11	[11] CHOI 02	BELL	$B \to KK_S K^-\pi^+$
3594 ±5		[12] EDWARDS 82C	CBAL	$e^+e^- \to \gamma X$

OCCUR=2

OCCUR=2

[1] AAIJ 17AD report $m_{\psi(2S)} - m_{\eta_c(2S)} = 52.5 \pm 1.7 \pm 0.6$ MeV. We use the current value $m_{\psi(2S)} = 3686.097 \pm 0.025$ MeV to obtain the quoted mass. NODE=M059M;LINKAGE=B

[2] From a fit of the $\phi\phi$ invariant mass with the width of $\eta_c(2S)$ fixed to the PDG 16 value. NODE=M059M;LINKAGE=C

[3] Ignoring possible interference with continuum. NODE=M059M;LINKAGE=DE

[4] With a width fixed to 11.3 MeV. NODE=M059M;LINKAGE=LE

[5] With a width fixed to 11.3 MeV. Using both $\eta \to \gamma\gamma$ and $\eta \to \pi^+\pi^-\pi^0$ decays. NODE=M059M;LINKAGE=LS

[6] From a simultaneous fit to $K^0_S K^\pm\pi^\mp$ and $K^+K^-\pi^0$ decay modes. NODE=M059M;LINKAGE=AB

[7] Accounts for interference with non-resonant continuum. NODE=M059M;LINKAGE=VA

[8] From a fit of the J/ψ recoil mass spectrum. Supersedes ABE,K 02 and ABE 04G. NODE=M059M;LINKAGE=EB

[9] From the fit of the kaon momentum spectrum. Systematic errors not evaluated. NODE=M059M;LINKAGE=AU

[10] Superseded by DEL-AMO-SANCHEZ 11M. NODE=M059M;LINKAGE=AR

[11] Superseded by VINOKUROVA 11. NODE=M059M;LINKAGE=CH

[12] Assuming mass of $\psi(2S) = 3686$ MeV. NODE=M059M;LINKAGE=A

$\eta_c(2S)$ WIDTH

NODE=M059W

NODE=M059W

VALUE (MeV)	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
$11.3^{+3.2}_{-2.9}$ OUR AVERAGE					
9.9± 4.8±2.9		57 ± 17	ABLIKIM 13K	BES3	$\psi(2S) \to \gamma K^0_S K^\pm\pi^\mp\pi^+\pi^-$
16.9± 6.4±4.8		127 ± 18	[13] ABLIKIM 12G	BES3	$\psi(2S) \to \gamma K^0 K\pi$, $KK\pi^0$
13.4± 4.6±3.2		624	[14] DEL-AMO-SA...11M	BABR	$\gamma\gamma \to K^0_S K^\pm\pi^\mp$
$6.6^{+8.4}_{-5.1}{}^{+2.6}_{-0.9}$		128	[15] VINOKUROVA 11	BELL	$B^\pm \to K^\pm(K^0_S K^\pm\pi^\mp)$
6.3±12.4±4.0		61	ASNER 04	CLEO	$\gamma\gamma \to \eta_c \to K^0_S K^\pm\pi^\mp$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 23	90	98 ± 52	[16] AUBERT 06E	BABR	$B^\pm \to K^\pm X_{c\overline{c}}$
22 ±14		121 ± 27	AUBERT 05C	BABR	$e^+e^- \to J/\psi c\overline{c}$
17.0± 8.3±2.5		112 ± 24	[17] AUBERT 04D	BABR	$\gamma\gamma \to \eta_c(2S) \to K\overline{K}\pi$
<55	90	39 ± 11	[18] CHOI 02	BELL	$B \to KK_S K^-\pi^+$
<8.0	95		[19] EDWARDS 82C	CBAL	$e^+e^- \to \gamma X$

[13] From a simultaneous fit to $K^0_S K^\pm \pi^\mp$ and $K^+ K^- \pi^0$ decay modes. NODE=M059W;LINKAGE=AB
[14] Ignoring possible interference with continuum. NODE=M059W;LINKAGE=DE
[15] Accounts for interference with non-resonant continuum. NODE=M059W;LINKAGE=VA
[16] From the fit of the kaon momentum spectrum. Systematic errors not evaluated. NODE=M059W;LINKAGE=AU
[17] Superseded by DEL-AMO-SANCHEZ 11M. NODE=M059W;LINKAGE=AR
[18] For a mass value of 3654 ± 6 MeV. Superseded by VINOKUROVA 11. NODE=M059W;LINKAGE=W2
[19] For a mass value of 3594 ± 5 MeV NODE=M059W;LINKAGE=W

$\eta_c(2S)$ DECAY MODES

NODE=M059215;NODE=M059

	Mode	Fraction (Γ_i/Γ)	Confidence level	
Γ_1	hadrons	not seen		DESIG=1
Γ_2	$K\overline{K}\pi$	(1.9±1.2) %		DESIG=4
Γ_3	$K\overline{K}\eta$	(5 ±4) $\times 10^{-3}$		DESIG=20
Γ_4	$2\pi^+ 2\pi^-$	not seen		DESIG=5
Γ_5	$\rho^0\rho^0$	not seen		DESIG=16
Γ_6	$3\pi^+ 3\pi^-$	not seen		DESIG=8;OUR EVAL;→ UNCHECKED ←
Γ_7	$K^+ K^- \pi^+ \pi^-$	not seen		DESIG=6
Γ_8	$K^{*0}\overline{K}^{*0}$	not seen		DESIG=17
Γ_9	$K^+ K^- \pi^+ \pi^- \pi^0$	(1.4±1.0) %		DESIG=9
Γ_{10}	$K^+ K^- 2\pi^+ 2\pi^-$	not seen		DESIG=10;OUR EVAL;→ UNCHECKED ←
Γ_{11}	$K^0_S K^- 2\pi^+ \pi^-$ + c.c.	seen		DESIG=11
Γ_{12}	$2K^+ 2K^-$	not seen		DESIG=7
Γ_{13}	$\phi\phi$	not seen		DESIG=18
Γ_{14}	$p\overline{p}$	seen		DESIG=3
Γ_{15}	$p\overline{p}\pi^+\pi^-$	seen		DESIG=22
Γ_{16}	$\gamma\gamma$	(1.9±1.3) $\times 10^{-4}$		DESIG=2
Γ_{17}	$\gamma J/\psi(1S)$	< 1.4 %	90%	DESIG=21
Γ_{18}	$\pi^+\pi^-\eta$	not seen		DESIG=12;OUR EVAL;→ UNCHECKED ←
Γ_{19}	$\pi^+\pi^-\eta'$	not seen		DESIG=13;OUR EVAL;→ UNCHECKED ←
Γ_{20}	$\pi^+\pi^-\eta_c(1S)$	< 25 %	90%	DESIG=15

$\eta_c(2S)$ PARTIAL WIDTHS

NODE=M059216

$\Gamma(\gamma\gamma)$ — Γ_{16}

NODE=M059W1
NODE=M059W1

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.44±0.14	106	[20] XU	18	BELL	$e^+ e^- \rightarrow e^+ e^- \eta' \pi^+ \pi^-$
1.3 ±0.6		[21] ASNER	04	CLEO	$\gamma\gamma \rightarrow \eta_c \rightarrow K^0_S K^\pm \pi^\mp$

[20] Assuming that the branching fraction into $\eta' \pi^+ \pi^-$ is the same as for $\eta_c(1S)$. NODE=M059W1;LINKAGE=A

[21] They measure $\Gamma(\eta_c(2S)\gamma\gamma)$ B($\eta_c(2S) \rightarrow K\overline{K}\pi$) = (0.18 ± 0.05 ± 0.02) $\Gamma(\eta_c(1S)\gamma\gamma)$ B($\eta_c(1S) \rightarrow K\overline{K}\pi$). The value for $\Gamma(\eta_c(2S) \rightarrow \gamma\gamma)$ is derived assuming that the branching fractions for $\eta_c(2S)$ and $\eta_c(1S)$ decays to $K_S K\pi$ are equal and using $\Gamma(\eta_c(1S) \rightarrow \gamma\gamma)$ = 7.4 ± 0.4 ± 2.3 keV. NODE=M059W1;LINKAGE=AS

$\Gamma(\gamma\gamma) \times \Gamma(\pi^+\pi^-\eta')/\Gamma_{total}$ — $\Gamma_{16}\Gamma_{19}/\Gamma$

NODE=M059R29
NODE=M059R29

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
$5.6^{+1.2}_{-1.1}$±1.1	106	XU	18	BELL	$e^+ e^- \rightarrow e^+ e^- \eta' \pi^+ \pi^-$

$\eta_c(2S)$ Γ(i)Γ(γγ)/Γ(total)

NODE=M059218

$\Gamma(2\pi^+ 2\pi^-) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_4\Gamma_{16}/\Gamma$

NODE=M059G01
NODE=M059G01

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<6.5	90	UEHARA	08	BELL	$\gamma\gamma \rightarrow \eta_c(2S) \rightarrow 2(\pi^+\pi^-)$

$\Gamma(K\overline{K}\pi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_2\Gamma_{16}/\Gamma$

NODE=M059G04
NODE=M059G04

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
41±4±6	624	[22] DEL-AMO-SA..11M	BABR	$\gamma\gamma \rightarrow K^0_S K^\pm \pi^\mp$

[22] Not independent from other measurements reported in DEL-AMO-SANCHEZ 11M. NODE=M059G04;LINKAGE=DE

$\Gamma(K^+K^-\pi^+\pi^-) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_7\Gamma_{16}/\Gamma$

NODE=M059G02
NODE=M059G02

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<5.0	90	UEHARA	08	BELL	$\gamma\gamma \to \eta_c(2S) \to K^+K^-\pi^+\pi^-$

$\Gamma(K^+K^-\pi^+\pi^-\pi^0) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_9\Gamma_{16}/\Gamma$

NODE=M059G05
NODE=M059G05

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
30±6±5	1201	[23] DEL-AMO-SA...	11M	BABR	$\gamma\gamma \to K^+K^-\pi^+\pi^-\pi^0$

[23] Not independent from other measurements reported in DEL-AMO-SANCHEZ 11M.

NODE=M059G05;LINKAGE=DE

$\Gamma(2K^+2K^-) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{12}\Gamma_{16}/\Gamma$

NODE=M059G03
NODE=M059G03

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<2.9	90	UEHARA	08	BELL	$\gamma\gamma \to \eta_c(2S) \to 2(K^+K^-)$

$\Gamma(\pi^+\pi^-\eta_c(1S)) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{20}\Gamma_{16}/\Gamma$

NODE=M059G06
NODE=M059G06

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<133	90	LEES	12AE	BABR	$e^+e^- \to e^+e^-\pi^+\pi^-\eta_c$

$\eta_c(2S)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma^2(total)$

NODE=M059217

$\Gamma(p\overline{p})/\Gamma_{total} \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{14}/\Gamma \times \Gamma_{16}/\Gamma$

NODE=M059G1
NODE=M059G1

VALUE (units 10^{-8})	CL%	DOCUMENT ID		TECN	COMMENT
< 5.6	90 [24,25,26]	AMBROGIANI	01	E835	$\overline{p}p \to \gamma\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 8.0	90 [24,25,27]	AMBROGIANI	01	E835	$\overline{p}p \to \gamma\gamma$ (OCCUR=2)
<12.0	90 [25,27]	AMBROGIANI	01	E835	$\overline{p}p \to \gamma\gamma$ (OCCUR=3)

[24] Including the measurements of of ARMSTRONG 95F in the AMBROGIANI 01 analysis. NODE=M059G1;LINKAGE=A
[25] For a total width Γ=5 MeV. NODE=M059G1;LINKAGE=B
[26] For the resonance mass region 3589–3599 MeV/c^2. NODE=M059G1;LINKAGE=C1
[27] For the resonance mass region 3575–3660 MeV/c^2. NODE=M059G1;LINKAGE=C2

$\eta_c(2S)$ BRANCHING RATIOS

NODE=M059220

$\Gamma(\text{hadrons})/\Gamma_{total}$ — Γ_1/Γ

NODE=M059R1
NODE=M059R1

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	ABREU	98O	DLPH	$e^+e^- \to e^+e^- +$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	[28] EDWARDS	82C	CBAL	$e^+e^- \to \gamma X$

[28] For a mass value of 3594 ± 5 MeV

NODE=M059R;LINKAGE=W

$\Gamma(K\overline{K}\pi)/\Gamma_{total}$ — Γ_2/Γ

NODE=M059R3
NODE=M059R3

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
1.9±0.4±1.1	59 ± 12	[29] AUBERT	08AB	BABR	$B \to \eta_c(2S)K \to K\overline{K}\pi K$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	127 ± 18	ABLIKIM	13K	BES3	$\psi(2S) \to \gamma K\overline{K}\pi$
seen	39 ± 11	[30] CHOI	02	BELL	$B \to KK_S K^-\pi^+$

[29] Derived from a measurement of $[B(B^+ \to \eta_c(2S)K^+) \times B(\eta_c(2S) \to K\overline{K}\pi)] / [B(B^+ \to \eta_c K^+) \times B(\eta_c \to K\overline{K}\pi)] = (9.6^{+2.0}_{-1.9} \pm 2.5)\%$ and using $B(B^+ \to \eta_c(2S)K^+) = (3.4 \pm 1.8) \times 10^{-4}$, and $[B(B^+ \to \eta_c K^+) \times B(\eta_c \to K\overline{K}\pi)] = (6.88 \pm 0.77^{+0.55}_{-0.66}) \times 10^{-5}$.

NODE=M059R3;LINKAGE=AU

[30] For a mass value of 3654 ± 6 MeV

NODE=M059R;LINKAGE=W2

$\Gamma(K\overline{K}\eta)/\Gamma(K\overline{K}\pi)$ — Γ_3/Γ_2

NODE=M059R26
NODE=M059R26

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
27.3±7.0±9.0	225	[31] LEES	14E	BABR	$\gamma\gamma \to K^+K^-\gamma\gamma$

[31] LEES 14E reports $B(\eta_c(2S) \to K^+K^-\eta)/B(\eta_c(2S) \to K^+K^-\pi^0) = 0.82 \pm 0.21 \pm 0.27$, which we divide by 3 to account for isospin symmetry.

NODE=M059R26;LINKAGE=LE

$\Gamma(2\pi^+2\pi^-)/\Gamma_{total}$ — Γ_4/Γ

NODE=M059R01
NODE=M059R01

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	UEHARA	08	BELL	$\gamma\gamma \to \eta_c(2S)$

$\Gamma(\rho^0\rho^0)/\Gamma_{total}$ Γ_5/Γ

NODE=M059R15

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	ABLIKIM	11H	BES3	$\psi(2S) \to \gamma 2\pi^+ 2\pi^-$

$\Gamma(K^+K^-\pi^+\pi^-)/\Gamma_{total}$ Γ_7/Γ

NODE=M059R02

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	UEHARA	08	BELL	$\gamma\gamma \to \eta_c(2S)$

$\Gamma(K^+K^-\pi^+\pi^-\pi^0)/\Gamma(K\overline{K}\pi)$ Γ_9/Γ_2

NODE=M059R21

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.73±0.17±0.17	1201	[32] DEL-AMO-SA..11M		BABR	$\gamma\gamma \to K^+K^-\pi^+\pi^-\pi^0$

[32] We have multiplied the value of $\Gamma(K^+K^-\pi^+\pi^-\pi^0)/\Gamma(K^0_S K^\pm \pi^\mp)$ reported in DEL-AMO-SANCHEZ 11M by a factor 1/3 to obtain $\Gamma(K^+K^-\pi^+\pi^-\pi^0)/\Gamma(K\overline{K}\pi)$. Not independent from other measurements reported in DEL-AMO-SANCHEZ 11M.

NODE=M059R21;LINKAGE=DE

$\Gamma(K^{*0}\overline{K}^{*0})/\Gamma_{total}$ Γ_8/Γ

NODE=M059R16

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	ABLIKIM	11H	BES3	$\psi(2S) \to \gamma K^+K^-\pi^+\pi^-$

$\Gamma(K^0_S K^- 2\pi^+\pi^- + \text{c.c.})/\Gamma_{total}$ Γ_{11}/Γ

NODE=M059R22

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	57 ± 17	ABLIKIM	13K	BES3	$\psi(2S) \to \gamma K^0_S K^\pm \pi^\mp \pi^+\pi^-$

$\Gamma(2K^+2K^-)/\Gamma_{total}$ Γ_{12}/Γ

NODE=M059R03

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	UEHARA	08	BELL	$\gamma\gamma \to \eta_c(2S)$

$\Gamma(\phi\phi)/\Gamma_{total}$ Γ_{13}/Γ

NODE=M059R17

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	ABLIKIM	11H	BES3	$\psi(2S) \to \gamma K^+K^-K^+K^-$

$\Gamma(p\overline{p})/\Gamma_{total}$ Γ_{14}/Γ

NODE=M059R04

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	106	[33] AAIJ	17AD	LHCB	$pp \to B^+X \to p\overline{p}K^+X$

OCCUR=2

[33] AAIJ 17AD report a 6.4 standard deviation signal, with $B(B^+ \to \eta_c(2S)K^+ \to p\overline{p}K^+)/B(B^+ \to J/\psi K^+ \to p\overline{p}K^+) = (1.58 \pm 0.33 \pm 0.09) \times 10^{-2}$.

NODE=M059R04;LINKAGE=A

$\Gamma(p\overline{p}\pi^+\pi^-)/\Gamma_{total}$ Γ_{15}/Γ

NODE=M059R30

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	110	[34] CHILIKIN	19	BELL	$e^+e^- \to \Upsilon(4S)$

[34] CHILIKIN 19 reports signals in $B^+ \to \eta_c(2S)K^+$ and $B^0 \to \eta_c(2S)K^0_S$ with 12.3 and 5.9 standard deviations, respectively.

NODE=M059R30;LINKAGE=A

$\Gamma(\gamma\gamma)/\Gamma_{total}$ Γ_{16}/Γ

NODE=M059R2

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<4 \times 10^{-4}$	90	[35] WICHT	08	BELL	$B^\pm \to K^\pm\gamma\gamma$
not seen		AMBROGIANI	01	E835	$\overline{p}p \to \gamma\gamma$
<0.01	90	LEE	85	CBAL	$\psi' \to$ photons

[35] WICHT 08 reports $[\Gamma(\eta_c(2S) \to \gamma\gamma)/\Gamma_{total}] \times [B(B^+ \to \eta_c(2S)K^+)] < 0.18 \times 10^{-6}$ which we divide by our best value $B(B^+ \to \eta_c(2S)K^+) = 4.4 \times 10^{-4}$.

NODE=M059R2;LINKAGE=WI

$\Gamma(\pi^+\pi^-\eta_c(1S))/\Gamma(K\overline{K}\pi)$ Γ_{20}/Γ_2

NODE=M059R23

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<3.33	90	[36] LEES	12AE	BABR	$e^+e^- \to e^+e^-\pi^+\pi^-\eta_c$

[36] We divided the reported limit by 3 to take into account isospin relations.

NODE=M059R23;LINKAGE=LE

$\eta_c(2S)$ CROSS-PARTICLE BRANCHING RATIOS

NODE=M059230

$\Gamma(\eta_c(2S) \to K\overline{K}\eta)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\eta_c(2S))/\Gamma_{total}$ $\Gamma_3/\Gamma \times \Gamma^{\psi(2S)}_{166}/\Gamma^{\psi(2S)}$

NODE=M059R25

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<11.8 \times 10^{-6}$	90	[37] CRONIN-HEN..10		CLEO	$\psi(2S) \to \gamma K^+K^-\eta$

[37] CRONIN-HENNESSY 10 reports a limit of $< 5.9 \times 10^{-6}$ for the decay $\eta_c(2S) \to K^+ K^- \eta$ which we multiply by 2 account for isospin symmetry. It assumes $\Gamma(\eta_c(2S))$ = 14 MeV. It also gives the analytic dependence of limits on width. NODE=M059R25;LINKAGE=CR

$\Gamma(\eta_c(2S) \to 2\pi^+ 2\pi^-)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\eta_c(2S))/\Gamma_{total}$

$\Gamma_4/\Gamma \times \Gamma^{\psi(2S)}_{166}/\Gamma^{\psi(2S)}$ NODE=M059R05 NODE=M059R05

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<14.6 × 10^{-6}	90	[38] CRONIN-HEN..10	CLEO	$\psi(2S) \to \gamma 2\pi^+ 2\pi^-$

[38] Assuming $\Gamma(\eta_c(2S))$ = 14 MeV. CRONIN-HENNESSY 10 gives the analytic dependence of limits on width. NODE=M059R05;LINKAGE=CR

$\Gamma(\eta_c(2S) \to \rho^0 \rho^0)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\eta_c(2S))/\Gamma_{total}$

$\Gamma_5/\Gamma \times \Gamma^{\psi(2S)}_{166}/\Gamma^{\psi(2S)}$ NODE=M059R18 NODE=M059R18

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<12.7 × 10^{-7}	90	ABLIKIM 11H	BES3	$\psi(2S) \to \gamma 2\pi^+ 2\pi^-$

$\Gamma(\eta_c(2S) \to 3\pi^+ 3\pi^-)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\eta_c(2S))/\Gamma_{total}$

$\Gamma_6/\Gamma \times \Gamma^{\psi(2S)}_{166}/\Gamma^{\psi(2S)}$ NODE=M059R06 NODE=M059R06

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<13.2 × 10^{-6}	90	[39] CRONIN-HEN..10	CLEO	$\psi(2S) \to \gamma 3\pi^+ 3\pi^-$

[39] Assuming $\Gamma(\eta_c(2S))$ = 14 MeV. CRONIN-HENNESSY 10 gives the analytic dependence of limits on width. NODE=M059R06;LINKAGE=CR

$\Gamma(\eta_c(2S) \to K^+ K^- \pi^+ \pi^-)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\eta_c(2S))/\Gamma_{total}$

$\Gamma_7/\Gamma \times \Gamma^{\psi(2S)}_{166}/\Gamma^{\psi(2S)}$ NODE=M059R07 NODE=M059R07

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<9.6 × 10^{-6}	90	[40] CRONIN-HEN..10	CLEO	$\psi(2S) \to \gamma K^+ K^- \pi^+ \pi^-$

[40] Assuming $\Gamma(\eta_c(2S))$ = 14 MeV. CRONIN-HENNESSY 10 gives the analytic dependence of limits on width. NODE=M059R07;LINKAGE=CR

$\Gamma(\eta_c(2S) \to K^{*0} \overline{K}^{*0})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\eta_c(2S))/\Gamma_{total}$

$\Gamma_8/\Gamma \times \Gamma^{\psi(2S)}_{166}/\Gamma^{\psi(2S)}$ NODE=M059R19 NODE=M059R19

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<19.6 × 10^{-7}	90	ABLIKIM 11H	BES3	$\psi(2S) \to \gamma K^+ K^- \pi^+ \pi^-$

$\Gamma(\eta_c(2S) \to K^+ K^- \pi^+ \pi^- \pi^0)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\eta_c(2S))/\Gamma_{total}$

$\Gamma_9/\Gamma \times \Gamma^{\psi(2S)}_{166}/\Gamma^{\psi(2S)}$ NODE=M059R08 NODE=M059R08

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<43.0 × 10^{-6}	90	[41] CRONIN-HEN..10	CLEO	$\psi(2S) \to \gamma K^+ K^- \pi^+ \pi^- \pi^0$

[41] Assuming $\Gamma(\eta_c(2S))$ = 14 MeV. CRONIN-HENNESSY 10 gives the analytic dependence of limits on width. NODE=M059R08;LINKAGE=CR

$\Gamma(\eta_c(2S) \to K^+ K^- 2\pi^+ 2\pi^-)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\eta_c(2S))/\Gamma_{total}$

$\Gamma_{10}/\Gamma \times \Gamma^{\psi(2S)}_{166}/\Gamma^{\psi(2S)}$ NODE=M059R09 NODE=M059R09

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<9.7 × 10^{-6}	90	[42] CRONIN-HEN..10	CLEO	$\psi(2S) \to \gamma K^+ K^- 2\pi^+ 2\pi^-$

[42] Assuming $\Gamma(\eta_c(2S))$ = 14 MeV. CRONIN-HENNESSY 10 gives the analytic dependence of limits on width. NODE=M059R09;LINKAGE=CR

$\Gamma(\eta_c(2S) \to K^0_S K^- 2\pi^+ \pi^- + c.c.)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\eta_c(2S))/\Gamma_{total}$

$\Gamma_{11}/\Gamma \times \Gamma^{\psi(2S)}_{166}/\Gamma^{\psi(2S)}$ NODE=M059R10 NODE=M059R10

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
7.03±2.10±0.7		60	ABLIKIM 13K	BES3	$\psi(2S) \to \gamma K^0_S K^- 2\pi^+ \pi^-$ +c.c.
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<$ 15.2	90		[43] CRONIN-HEN..10	CLEO	$\psi(2S) \to \gamma K^0_S K^- 2\pi^+ \pi^-$ +c.c.

[43] Assuming $\Gamma(\eta_c(2S))$ = 14 MeV. CRONIN-HENNESSY 10 gives the analytic dependence of limits on width. NODE=M059R10;LINKAGE=CR

$\Gamma(\eta_c(2S) \to \phi\phi)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\eta_c(2S))/\Gamma_{total}$

$\Gamma_{13}/\Gamma \times \Gamma^{\psi(2S)}_{166}/\Gamma^{\psi(2S)}$

NODE=M059R20
NODE=M059R20

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<7.8 × 10^−7	90	ABLIKIM	11H	BES3	$\psi(2S) \to \gamma K^+ K^- K^+ K^-$

$\Gamma(\eta_c(2S) \to p\overline{p})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\eta_c(2S))/\Gamma_{total}$

$\Gamma_{14}/\Gamma \times \Gamma^{\psi(2S)}_{166}/\Gamma^{\psi(2S)}$

NODE=M059R24
NODE=M059R24

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.4 × 10^−6	90	ABLIKIM	13V	BES3	$\psi(2S) \to \gamma p\overline{p}$

$\Gamma(\eta_c(2S) \to \gamma J/\psi(1S))/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\eta_c(2S))/\Gamma_{total}$

$\Gamma_{17}/\Gamma \times \Gamma^{\psi(2S)}_{166}/\Gamma^{\psi(2S)}$

NODE=M059R27
NODE=M059R27

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<9.7 × 10^−6	90	33	[44] ABLIKIM	17N	BES3	$\psi(2S) \to \gamma\gamma J/\psi$

[44] Uses B($J/\psi \to e^+e^-$) = (5.971 ± 0.032)% and B($J/\psi \to \mu^+\mu^-$) = (5.961 ± 0.033)%.

NODE=M059R27;LINKAGE=A

$\Gamma(\eta_c(2S) \to \pi^+\pi^-\eta)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\eta_c(2S))/\Gamma_{total}$

$\Gamma_{18}/\Gamma \times \Gamma^{\psi(2S)}_{166}/\Gamma^{\psi(2S)}$

NODE=M059R11
NODE=M059R11

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<4.3 × 10^−6	90	[45] CRONIN-HEN..10	CLEO	$\psi(2S) \to \gamma\pi^+\pi^-\eta$

[45] Assuming $\Gamma(\eta_c(2S))$ = 14 MeV. CRONIN-HENNESSY 10 gives the analytic dependence of limits on width.

NODE=M059R11;LINKAGE=CR

$\Gamma(\eta_c(2S) \to \pi^+\pi^-\eta')/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\eta_c(2S))/\Gamma_{total}$

$\Gamma_{19}/\Gamma \times \Gamma^{\psi(2S)}_{166}/\Gamma^{\psi(2S)}$

NODE=M059R12
NODE=M059R12

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<14.2 × 10^−6	90	[46] CRONIN-HEN..10	CLEO	$\psi(2S) \to \gamma\pi^+\pi^-\eta'$

[46] Assuming $\Gamma(\eta_c(2S))$ = 14 MeV. CRONIN-HENNESSY 10 gives the analytic dependence of limits on width.

NODE=M059R12;LINKAGE=CR

$\Gamma(\eta_c(2S) \to \pi^+\pi^-\eta_c(1S))/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\eta_c(2S))/\Gamma_{total}$

$\Gamma_{20}/\Gamma \times \Gamma^{\psi(2S)}_{166}/\Gamma^{\psi(2S)}$

NODE=M059R14
NODE=M059R14

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<1.7 × 10^−4	90	[47] CRONIN-HEN..10	CLEO	$\psi(2S) \to \gamma\pi^+\pi^-\eta_c(1S)$

[47] Assuming $\Gamma(\eta_c(2S))$ = 14 MeV. CRONIN-HENNESSY 10 gives the analytic dependence of limits on width.

NODE=M059R14;LINKAGE=CR

$\eta_c(2S)$ REFERENCES

NODE=M059

CHILIKIN	19	PR D100 012001	K. Chilikin *et al.*	(BELLE Collab.)	REFID=59899
XU	18	PR D98 072001	Q.N. Xu *et al.*	(BELLE Collab.)	REFID=59453
AAIJ	17AD	PL B769 305	R. Aaij *et al.*	(LHCb Collab.)	REFID=57896
AAIJ	17BB	EPJ C77 609	R. Aaij *et al.*	(LHCb Collab.)	REFID=58191
ABLIKIM	17N	PR D95 072004	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57978
PDG	16	CP C40 100001	C. Patrignani *et al.*	(PDG Collab.)	REFID=57140
LEES	14E	PR D89 112004	J.P. Lees *et al.*	(BABAR Collab.)	REFID=55937
ABLIKIM	13K	PR D87 052005	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54956
ABLIKIM	13V	PR D88 112001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55583
ABLIKIM	12G	PRL 109 042003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54272
LEES	12AE	PR D86 092005	J.P. Lees *et al.*	(BABAR Collab.)	REFID=54752
ABLIKIM	11H	PR D84 091102	M. Ablikim *et al.*	(BESIII Collab.)	REFID=53929
DEL-AMO-SA...	11M	PR D84 012004	P. del Amo Sanchez *et al.*	(BABAR Collab.)	REFID=16751
VINOKUROVA	11	PL B706 139	A. Vinokurova *et al.*	(BELLE Collab.)	REFID=53927
CRONIN-HEN...	10	PR D81 052002	D. Cronin-Hennessey *et al.*	(CLEO Collab.)	REFID=53233
AUBERT	08AB	PR D78 012006	B. Aubert *et al.*	(BABAR Collab.)	REFID=52267
UEHARA	08	EPJ C53 1	S. Uehara *et al.*	(BELLE Collab.)	REFID=52064
WICHT	08	PL B662 323	J. Wicht *et al.*	(BELLE Collab.)	REFID=52204
ABE	07	PRL 98 082001	K. Abe *et al.*	(BELLE Collab.)	REFID=51627
AUBERT	06E	PRL 96 052002	B. Aubert *et al.*	(BABAR Collab.)	REFID=51059
AUBERT	05C	PR D72 031101	B. Aubert *et al.*	(BABAR Collab.)	REFID=50773
ABE	04G	PR D70 071102	K. Abe *et al.*	(BELLE Collab.)	REFID=50182
ASNER	04	PRL 92 142001	D.M. Asner *et al.*	(CLEO Collab.)	REFID=49745
AUBERT	04D	PRL 92 142002	B. Aubert *et al.*	(BABAR Collab.)	REFID=49746
ABE,K	02	PRL 89 142001	K. Abe *et al.*	(BELLE Collab.)	REFID=49188
CHOI	02	PRL 89 102001	S.-K. Choi *et al.*	(BELLE Collab.)	REFID=48760
AMBROGIANI	01	PR D64 052003	M. Ambrogiani *et al.*	(FNAL E835 Collab.)	REFID=48340
ABREU	98O	PL B441 479	P. Abreu *et al.*	(DELPHI Collab.)	REFID=46553
ARMSTRONG	95F	PR D52 4839	T.A. Armstrong *et al.*	(FNAL, FERR, GENO+)	REFID=44623
LEE	85	SLAC 282	R.A. Lee	(SLAC)	REFID=40589
EDWARDS	82C	PRL 48 70	C. Edwards *et al.*	(CIT, HARV, PRIN+)	REFID=22173

NODE=M071

$\psi(2S)$ $\quad I^G(J^{PC}) = 0^-(1^{--})$

See the Review on "$\psi(2S)$ and χ_c branching ratios" before the $\chi_{c0}(1P)$ Listings. NODE=M071

$\psi(2S)$ MASS

NODE=M071M

OUR FIT includes measurements of $m_{\psi(2S)}$, $m_{\psi(3770)}$, and $m_{\psi(3770)} - m_{\psi(2S)}$. NODE=M071M

NODE=M071M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
3686.10 ±0.06 OUR FIT Error includes scale factor of 5.9.					
3686.097±0.010 OUR AVERAGE					
3686.099±0.004±0.009		[1] ANASHIN	15	KEDR	$e^+e^- \to$ hadrons
3686.12 ±0.06 ±0.10	4k	AAIJ	12H	LHCB	$pp \to J/\psi\pi^+\pi^- X$
3685.95 ±0.10	413	[2] ARTAMONOV	00	OLYA	$e^+e^- \to$ hadrons
3685.98 ±0.09 ±0.04		[3] ARMSTRONG	93B	E760	$\overline{p}p \to e^+e^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$3686.114\pm0.007{}^{+0.011}_{-0.016}$		[4] ANASHIN	12	KEDR	$e^+e^- \to$ hadrons
3686.111±0.025±0.009		AULCHENKO	03	KEDR	$e^+e^- \to$ hadrons
3686.00 ±0.10	413	[5] ZHOLENTZ	80	OLYA	e^+e^-

[1] Supersedes AULCHENKO 03 and ANASHIN 12. NODE=M071M;LINKAGE=A
[2] Reanalysis of ZHOLENTZ 80 using new electron mass (COHEN 87) and radiative corrections (KURAEV 85). NODE=M071M;LINKAGE=AR
[3] Mass central value and systematic error recalculated by us according to Eq. (16) in ARMSTRONG 93B, using the value for the $J/\psi(1S)$ mass from AULCHENKO 03. NODE=M071M;LINKAGE=NW
[4] From the scans in 2004 and 2006. ANASHIN 12 reports the value 3686.114 ± 0.007 ± $0.011{}^{+0.002}_{-0.012}$ MeV, where the third uncertainty is due to assumptions on the interference between the resonance and hadronic continuum. We combined the two systematic uncertainties. NODE=M071M;LINKAGE=AN
[5] Superseded by ARTAMONOV 00. NODE=M071M;LINKAGE=RZ

$m_{\psi(2S)} - m_{J/\psi(1S)}$

NODE=M071DM

NODE=M071DM

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
589.188±0.028 OUR AVERAGE				
589.194±0.027±0.011	[1] AULCHENKO	03	KEDR	$e^+e^- \to$ hadrons
589.7 ±1.2	LEMOIGNE	82	GOLI	185 π^- Be $\to \gamma\mu^+\mu^-$ A
589.07 ±0.13	[1] ZHOLENTZ	80	OLYA	e^+e^-
588.7 ±0.8	LUTH	75	MRK1	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
588 ±1	[2] BAI	98E	BES	e^+e^-

[1] Redundant with data in mass above. NODE=M071DM;LINKAGE=R
[2] Systematic errors not evaluated. NODE=M071DM;LINKAGE=BD

$\psi(2S)$ WIDTH

NODE=M071W

NODE=M071W

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
294± 8 OUR FIT					
286±16 OUR AVERAGE					
358±88± 4		ABLIKIM	08B	BES2	$e^+e^- \to$ hadrons
290±25± 4	2.7k	ANDREOTTI	07	E835	$p\overline{p} \to e^+e^-$, $J/\psi X$
331±58± 2		ABLIKIM	06L	BES2	$e^+e^- \to$ hadrons
264±27		[1] BAI	02B	BES2	e^+e^-
287±37±16		[2] ARMSTRONG	93B	E760	$\overline{p}p \to e^+e^-$

[1] From a simultaneous fit to the hadronic and $\mu^+\mu^-$ cross section, assuming $\Gamma = \Gamma_h + \Gamma_e + \Gamma_\mu + \Gamma_\tau$ and lepton universality. Does not include vacuum polarization correction. NODE=M071W;LINKAGE=BC
[2] The initial-state radiation correction reevaluated by ANDREOTTI 07 in its Ref. [4]. NODE=M071W;LINKAGE=AN

$\psi(2S)$ DECAY MODES

NODE=M071220;NODE=M071

	Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	
Γ_1	hadrons	(97.85 ± 0.13) %		DESIG=3
Γ_2	virtual $\gamma \to$ hadrons	(1.73 ± 0.14) %	S=1.5	DESIG=4
Γ_3	ggg	(10.6 ± 1.6) %		DESIG=255
Γ_4	γgg	(1.03 ± 0.29) %		DESIG=256
Γ_5	light hadrons	(15.4 ± 1.5) %		DESIG=226
Γ_6	K^0_S anything	(16.0 ± 1.1) %		DESIG=325
Γ_7	e^+e^-	$(7.93 \pm 0.17) \times 10^{-3}$		DESIG=1
Γ_8	$\mu^+\mu^-$	$(8.0 \pm 0.6) \times 10^{-3}$		DESIG=2
Γ_9	$\tau^+\tau^-$	$(3.1 \pm 0.4) \times 10^{-3}$		DESIG=68

Decays into $J/\psi(1S)$ and anything

NODE=M071;CLUMP=A

	Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	
Γ_{10}	$J/\psi(1S)$ anything	(61.4 ± 0.6) %		DESIG=11
Γ_{11}	$J/\psi(1S)$ neutrals	(25.38 ± 0.32) %		DESIG=12
Γ_{12}	$J/\psi(1S)\pi^+\pi^-$	(34.68 ± 0.30) %		DESIG=13
Γ_{13}	$J/\psi(1S)\pi^0\pi^0$	(18.24 ± 0.31) %		DESIG=14
Γ_{14}	$J/\psi(1S)\eta$	(3.37 ± 0.05) %		DESIG=15
Γ_{15}	$J/\psi(1S)\pi^0$	$(1.268 \pm 0.032) \times 10^{-3}$		DESIG=18

Hadronic decays

NODE=M071;CLUMP=B

	Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	
Γ_{16}	$\pi^+\pi^-$	$(7.8 \pm 2.6) \times 10^{-6}$		DESIG=21
Γ_{17}	$\pi^+\pi^-\pi^0$	$(2.01 \pm 0.17) \times 10^{-4}$	S=1.7	DESIG=36
Γ_{18}	$\rho(770)\pi \to \pi^+\pi^-\pi^0$	$(3.2 \pm 1.2) \times 10^{-5}$	S=1.8	DESIG=22
Γ_{19}	$\rho(2150)\pi \to \pi^+\pi^-\pi^0$	$(1.9 {}^{+1.2}_{-0.4}) \times 10^{-4}$		DESIG=201
Γ_{20}	$2(\pi^+\pi^-)$	$(2.4 \pm 0.6) \times 10^{-4}$	S=2.2	DESIG=24
Γ_{21}	$\rho^0\pi^+\pi^-$	$(2.2 \pm 0.6) \times 10^{-4}$	S=1.4	DESIG=33
Γ_{22}	$2(\pi^+\pi^-)\pi^0$	$(2.9 \pm 1.0) \times 10^{-3}$	S=4.7	DESIG=25
Γ_{23}	$\rho a_2(1320)$	$(2.6 \pm 0.9) \times 10^{-4}$		DESIG=65
Γ_{24}	$\pi^+\pi^-\pi^0\pi^0\pi^0$	$(5.3 \pm 0.9) \times 10^{-3}$		DESIG=312
Γ_{25}	$\pi^+\pi^-4\pi^0$	$(1.4 \pm 1.0) \times 10^{-3}$		DESIG=332
Γ_{26}	$\rho^\pm\pi^\mp\pi^0\pi^0$	$< 2.7 \times 10^{-3}$	CL=90%	DESIG=315
Γ_{27}	$3(\pi^+\pi^-)$	$(3.5 \pm 2.0) \times 10^{-4}$	S=2.8	DESIG=32
Γ_{28}	$2(\pi^+\pi^-\pi^0)$	$(4.8 \pm 1.5) \times 10^{-3}$		DESIG=221
Γ_{29}	$3(\pi^+\pi^-)\pi^0$	$(3.5 \pm 1.6) \times 10^{-3}$		DESIG=37
Γ_{30}	$2(\pi^+\pi^-)3\pi^0$	(1.42 ± 0.31) %		DESIG=329
Γ_{31}	$\eta\pi^+\pi^-$	$< 1.6 \times 10^{-4}$	CL=90%	DESIG=202
Γ_{32}	$\eta\pi^+\pi^-\pi^0$	$(9.5 \pm 1.7) \times 10^{-4}$		DESIG=203
Γ_{33}	$\eta 2(\pi^+\pi^-)$	$(1.2 \pm 0.6) \times 10^{-3}$		DESIG=251
Γ_{34}	$\eta\pi^+\pi^-\pi^0\pi^0$	$< 4 \times 10^{-4}$	CL=90%	DESIG=313
Γ_{35}	$\eta\pi^+\pi^-3\pi^0$	$< 2.1 \times 10^{-3}$	CL=90%	DESIG=334
Γ_{36}	$\eta 2(\pi^+\pi^-\pi^0)$	$< 2.1 \times 10^{-3}$	CL=90%	DESIG=328
Γ_{37}	$\rho\eta$	$(2.2 \pm 0.6) \times 10^{-5}$	S=1.1	DESIG=94
Γ_{38}	$\eta'\pi^+\pi^-\pi^0$	$(4.5 \pm 2.1) \times 10^{-4}$		DESIG=204
Γ_{39}	$\eta'\rho$	$(1.9 {}^{+1.7}_{-1.2}) \times 10^{-5}$		DESIG=93
Γ_{40}	$\omega\pi^0$	$(2.1 \pm 0.6) \times 10^{-5}$		DESIG=92
Γ_{41}	$\omega\pi^+\pi^-$	$(7.3 \pm 1.2) \times 10^{-4}$	S=2.1	DESIG=75
Γ_{42}	$\omega\pi^+\pi^-2\pi^0$	$(8.7 \pm 2.4) \times 10^{-3}$		DESIG=327
Γ_{43}	$b_1^\pm\pi^\mp$	$(4.0 \pm 0.6) \times 10^{-4}$	S=1.1	DESIG=40
Γ_{44}	$\omega f_2(1270)$	$(2.2 \pm 0.4) \times 10^{-4}$		DESIG=64
Γ_{45}	$\omega\pi^0\pi^0$	$(1.11 \pm 0.35) \times 10^{-3}$		DESIG=314
Γ_{46}	$\omega 3\pi^0$	$< 8 \times 10^{-4}$	CL=90%	DESIG=333
Γ_{47}	$b_1^0\pi^0$	$(2.4 \pm 0.6) \times 10^{-4}$		DESIG=193
Γ_{48}	$\omega\eta$	$< 1.1 \times 10^{-5}$	CL=90%	DESIG=95
Γ_{49}	$\omega\eta'$	$(3.2 {}^{+2.5}_{-2.1}) \times 10^{-5}$		DESIG=91
Γ_{50}	$\phi\pi^0$	$< 4 \times 10^{-7}$	CL=90%	DESIG=96
Γ_{51}	$\phi\pi^+\pi^-$	$(1.18 \pm 0.26) \times 10^{-4}$	S=1.5	DESIG=78
Γ_{52}	$\phi f_0(980) \to \pi^+\pi^-$	$(7.5 \pm 3.3) \times 10^{-5}$	S=1.6	DESIG=81
Γ_{53}	$\phi\eta$	$(3.10 \pm 0.31) \times 10^{-5}$		DESIG=89

Γ_{54}	$\eta\phi(2170)$, $\phi(2170) \to \phi f_0(980)$, $f_0 \to \pi^+\pi^-$	$< 2.2 \times 10^{-6}$	CL=90%	DESIG=316
Γ_{55}	$\phi\eta'$	$(1.54 \pm 0.20) \times 10^{-5}$		DESIG=90
Γ_{56}	$\phi f_1(1285)$	$(3.0 \pm 1.3) \times 10^{-5}$		DESIG=319
Γ_{57}	$\phi\eta(1405) \to \phi\pi^+\pi^-\eta$	$(8.5 \pm 1.7) \times 10^{-6}$		DESIG=320
Γ_{58}	$\phi f'_2(1525)$	$(4.4 \pm 1.6) \times 10^{-5}$		DESIG=67
Γ_{59}	K^+K^-	$(7.5 \pm 0.5) \times 10^{-5}$		DESIG=23
Γ_{60}	$K^+K^-\pi^+$	$(7.3 \pm 0.5) \times 10^{-4}$		DESIG=26
Γ_{61}	$K^+K^-\pi^0$	$(4.07 \pm 0.31) \times 10^{-5}$		DESIG=38
Γ_{62}	$K^0_S K^0_S$	$< 4.6 \times 10^{-6}$		DESIG=86
Γ_{63}	$K^0_S K^0_L$	$(5.34 \pm 0.33) \times 10^{-5}$		DESIG=85
Γ_{64}	$K^0_S K^0_L \pi^0$	$< 3.0 \times 10^{-4}$	CL=90%	DESIG=303
Γ_{65}	$K^+K^-\pi^0\pi^0$	$(2.6 \pm 1.3) \times 10^{-4}$		DESIG=298
Γ_{66}	$K^+K^-\pi^+\pi^-\pi^0$	$(1.26 \pm 0.09) \times 10^{-3}$		DESIG=206
Γ_{67}	$\omega f_0(1710) \to \omega K^+K^-$	$(5.9 \pm 2.2) \times 10^{-5}$		DESIG=216
Γ_{68}	$K^*(892)^0 K^-\pi^+\pi^0$ + c.c.	$(8.6 \pm 2.2) \times 10^{-4}$		DESIG=217
Γ_{69}	$K^*(892)^+ K^-\pi^+\pi^-$ + c.c.	$(9.6 \pm 2.8) \times 10^{-4}$		DESIG=218
Γ_{70}	$K^*(892)^+ K^-\rho^0$ + c.c.	$(7.3 \pm 2.6) \times 10^{-4}$		DESIG=219
Γ_{71}	$K^*(892)^0 K^-\rho^+$ + c.c.	$(6.1 \pm 1.8) \times 10^{-4}$		DESIG=220
Γ_{72}	$K^0_S K^0_S \pi^+\pi^-$	$(2.2 \pm 0.4) \times 10^{-4}$		DESIG=225
Γ_{73}	$K^0_S K^0_L \pi^0\pi^0$	$(1.3 \pm 0.6) \times 10^{-3}$		DESIG=304
Γ_{74}	$K^0_S K^0_L \eta$	$(1.3 \pm 0.5) \times 10^{-3}$		DESIG=305
Γ_{75}	$K^+K^-\rho^0$	$(2.2 \pm 0.4) \times 10^{-4}$		DESIG=205
Γ_{76}	$K^*(892)^0 \overline{K}^*_2(1430)^0$	$(1.9 \pm 0.5) \times 10^{-4}$		DESIG=66
Γ_{77}	$K^+K^-\pi^+\pi^-\eta$	$(1.3 \pm 0.7) \times 10^{-3}$		DESIG=252
Γ_{78}	$K^+K^-2(\pi^+\pi^-)$	$(1.9 \pm 0.9) \times 10^{-3}$		DESIG=222
Γ_{79}	$K^+K^-2(\pi^+\pi^-)\pi^0$	$(1.00 \pm 0.31) \times 10^{-3}$		DESIG=240
Γ_{80}	$K^+K^*(892)^-$ + c.c.	$(2.9 \pm 0.4) \times 10^{-5}$	S=1.2	DESIG=39
Γ_{81}	$2(K^+K^-)$	$(6.3 \pm 1.3) \times 10^{-5}$		DESIG=208
Γ_{82}	$2(K^+K^-)\pi^0$	$(1.10 \pm 0.28) \times 10^{-4}$		DESIG=209
Γ_{83}	$K^+K^-\phi$	$(7.0 \pm 1.6) \times 10^{-5}$		DESIG=79
Γ_{84}	$K_1(1270)^{\pm} K^{\mp}$	$(1.00 \pm 0.28) \times 10^{-3}$		DESIG=41
Γ_{85}	$K^+\overline{K}^*(892)^0\pi^-$ + c.c.	$(6.7 \pm 2.5) \times 10^{-4}$		DESIG=34
Γ_{86}	ηK^+K^-, no $\eta\phi$	$(3.49 \pm 0.17) \times 10^{-5}$		DESIG=207
Γ_{87}	$X(1750)\eta \to K^+K^-\eta$	$(4.8 \pm 2.8) \times 10^{-6}$		DESIG=324
Γ_{88}	$K_1(1400)^{\pm} K^{\mp}$	$< 3.1 \times 10^{-4}$	CL=90%	DESIG=42
Γ_{89}	$K^*_2(1430)^{\pm} K^{\mp}$	$(7.1 {}^{+1.3}_{-0.9}) \times 10^{-5}$		DESIG=265
Γ_{90}	$K^*(892)^0\overline{K}^0$ + c.c.	$(1.09 \pm 0.20) \times 10^{-4}$		DESIG=194
Γ_{91}	ωK^+K^-	$(1.62 \pm 0.11) \times 10^{-4}$	S=1.1	DESIG=76
Γ_{92}	$\omega K^0_S K^0_S$	$(7.0 \pm 0.5) \times 10^{-5}$		DESIG=330
Γ_{93}	$\omega K^*(892)^+ K^-$ + c.c.	$(2.07 \pm 0.26) \times 10^{-4}$		DESIG=276
Γ_{94}	$\omega K^*_2(1430)^+ K^-$ + c.c.	$(6.1 \pm 1.2) \times 10^{-5}$		DESIG=277
Γ_{95}	$\omega \overline{K}^*(892)^0 K^0$	$(1.68 \pm 0.30) \times 10^{-4}$		DESIG=278
Γ_{96}	$\omega \overline{K}^*_2(1430)^0 K^0$	$(5.8 \pm 2.2) \times 10^{-5}$		DESIG=279
Γ_{97}	$\omega X(1440) \to \omega K^0_S K^-\pi^+$ + c.c.	$(1.6 \pm 0.4) \times 10^{-5}$		DESIG=282
Γ_{98}	$\omega X(1440) \to \omega K^+K^-\pi^0$	$(1.09 \pm 0.26) \times 10^{-5}$		DESIG=283
Γ_{99}	$\omega f_1(1285) \to \omega K^0_S K^-\pi^+$ + c.c.	$(3.0 \pm 1.0) \times 10^{-6}$		DESIG=284
Γ_{100}	$\omega f_1(1285) \to \omega K^+K^-\pi^0$	$(1.2 \pm 0.7) \times 10^{-6}$		DESIG=285
Γ_{101}	$p\overline{p}$	$(2.94 \pm 0.08) \times 10^{-4}$		DESIG=27
Γ_{102}	$n\overline{n}$	$(3.06 \pm 0.15) \times 10^{-4}$		DESIG=309
Γ_{103}	$p\overline{p}\pi^0$	$(1.53 \pm 0.07) \times 10^{-4}$		DESIG=35
Γ_{104}	$N(940)\overline{p}$ + c.c. $\to p\overline{p}\pi^0$	$(6.4 {}^{+1.8}_{-1.3}) \times 10^{-5}$		DESIG=267
Γ_{105}	$N(1440)\overline{p}$ + c.c. $\to p\overline{p}\pi^0$	$(7.3 {}^{+1.7}_{-1.5}) \times 10^{-5}$	S=2.5	DESIG=261
Γ_{106}	$N(1520)\overline{p}$ + c.c. $\to p\overline{p}\pi^0$	$(6.4 {}^{+2.3}_{-1.8}) \times 10^{-6}$		DESIG=268

Γ_{107}	$N(1535)\overline{p}+$ c.c. $\to$ $p\overline{p}\pi^0$		$(2.5 \pm 1.0) \times 10^{-5}$		DESIG=269
Γ_{108}	$N(1650)\overline{p}+$ c.c. $\to$ $p\overline{p}\pi^0$		$(3.8 {}^{+1.4}_{-1.7}) \times 10^{-5}$		DESIG=270
Γ_{109}	$N(1720)\overline{p}+$ c.c. $\to$ $p\overline{p}\pi^0$		$(1.79 {}^{+0.26}_{-0.70}) \times 10^{-5}$		DESIG=271
Γ_{110}	$N(2300)\overline{p}+$ c.c. $\to$ $p\overline{p}\pi^0$		$(2.6 {}^{+1.2}_{-0.7}) \times 10^{-5}$		DESIG=272
Γ_{111}	$N(2570)\overline{p}+$ c.c. $\to$ $p\overline{p}\pi^0$		$(2.13 {}^{+0.40}_{-0.31}) \times 10^{-5}$		DESIG=273
Γ_{112}	$p\overline{p}\pi^+\pi^-$		$(6.0 \pm 0.4) \times 10^{-4}$		DESIG=31
Γ_{113}	$p\overline{p}K^+K^-$		$(2.7 \pm 0.7) \times 10^{-5}$		DESIG=212
Γ_{114}	$p\overline{p}\eta$		$(6.0 \pm 0.4) \times 10^{-5}$		DESIG=200
Γ_{115}	$N(1535)\overline{p}+$ c.c. $\to$ $p\overline{p}\eta$		$(4.5 {}^{+0.7}_{-0.6}) \times 10^{-5}$		DESIG=264
Γ_{116}	$p\overline{p}\pi^+\pi^-\pi^0$		$(7.3 \pm 0.7) \times 10^{-4}$		DESIG=211
Γ_{117}	$p\overline{p}\rho^0$		$(5.0 \pm 2.2) \times 10^{-5}$		DESIG=210
Γ_{118}	$p\overline{p}\omega$		$(6.9 \pm 2.1) \times 10^{-5}$		DESIG=77
Γ_{119}	$p\overline{p}\eta'$		$(1.10 \pm 0.13) \times 10^{-5}$		DESIG=317
Γ_{120}	$p\overline{p}\phi$		$(6.1 \pm 0.6) \times 10^{-6}$		DESIG=80
Γ_{121}	$\phi X(1835)$ $\to$ $p\overline{p}\phi$		$< 1.82 \times 10^{-7}$	CL=90%	DESIG=318
Γ_{122}	$p\overline{n}\pi^-$ or c.c.		$(2.48 \pm 0.17) \times 10^{-4}$		DESIG=227
Γ_{123}	$p\overline{n}\pi^-\pi^0$		$(3.2 \pm 0.7) \times 10^{-4}$		DESIG=228
Γ_{124}	$\Lambda\overline{\Lambda}$		$(3.81 \pm 0.13) \times 10^{-4}$	S=1.4	DESIG=28
Γ_{125}	$\Lambda\overline{\Lambda}\pi^0$		$< 2.9 \times 10^{-6}$	CL=90%	DESIG=238
Γ_{126}	$\Lambda\overline{\Lambda}\eta$		$(2.5 \pm 0.4) \times 10^{-5}$		DESIG=239
Γ_{127}	$\Lambda\overline{\Lambda}\pi^+\pi^-$		$(2.8 \pm 0.6) \times 10^{-4}$		DESIG=213
Γ_{128}	$\Lambda\overline{p}K^+$		$(1.00 \pm 0.14) \times 10^{-4}$		DESIG=214
Γ_{129}	$\Lambda\overline{p}K^*(892)^+ +$ c.c.		$(6.3 \pm 0.7) \times 10^{-5}$		DESIG=321
Γ_{130}	$\Lambda\overline{p}K^+\pi^+\pi^-$		$(1.8 \pm 0.4) \times 10^{-4}$		DESIG=215
Γ_{131}	$\overline{\Lambda}nK^0_S +$ c.c.		$(8.1 \pm 1.8) \times 10^{-5}$		DESIG=237
Γ_{132}	$\Delta^{++}\overline{\Delta}^{--}$		$(1.28 \pm 0.35) \times 10^{-4}$		DESIG=70
Γ_{133}	$\Lambda\overline{\Sigma}^+\pi^- +$ c.c.		$(1.40 \pm 0.13) \times 10^{-4}$		DESIG=280
Γ_{134}	$\Lambda\overline{\Sigma}^-\pi^+ +$ c.c.		$(1.54 \pm 0.14) \times 10^{-4}$		DESIG=281
Γ_{135}	$\Lambda\overline{\Sigma}^0 +$ c.c.		$(1.6 \pm 0.7) \times 10^{-6}$		DESIG=326
Γ_{136}	$\Lambda\overline{\Sigma}^0$				DESIG=307
Γ_{137}	$\Sigma^0\overline{p}K^+ +$ c.c.		$(1.67 \pm 0.18) \times 10^{-5}$		DESIG=274
Γ_{138}	$\Sigma^+\overline{\Sigma}^-$		$(2.43 \pm 0.10) \times 10^{-4}$	S=1.4	DESIG=223
Γ_{139}	$\Sigma^0\overline{\Sigma}^0$		$(2.35 \pm 0.09) \times 10^{-4}$	S=1.1	DESIG=71
Γ_{140}	$\Sigma(1385)^+\overline{\Sigma}(1385)^-$		$(8.5 \pm 0.7) \times 10^{-5}$		DESIG=72
Γ_{141}	$\Sigma(1385)^-\overline{\Sigma}(1385)^+$		$(8.5 \pm 0.8) \times 10^{-5}$		DESIG=297
Γ_{142}	$\Sigma(1385)^0\overline{\Sigma}(1385)^0$		$(6.9 \pm 0.7) \times 10^{-5}$		DESIG=299
Γ_{143}	$\Xi^-\overline{\Xi}^+$		$(2.87 \pm 0.11) \times 10^{-4}$	S=1.1	DESIG=29
Γ_{144}	$\Xi^0\overline{\Xi}^0$		$(2.3 \pm 0.4) \times 10^{-4}$	S=4.2	DESIG=224
Γ_{145}	$\Xi(1530)^0\overline{\Xi}(1530)^0$		$(6.8 \pm 0.4) \times 10^{-5}$		DESIG=73
Γ_{146}	$\Lambda\overline{\Xi}^+K^- +$ c.c.		$(3.9 \pm 0.4) \times 10^{-5}$		DESIG=293
Γ_{147}	$\Xi(1530)^-\overline{\Xi}(1530)^+$		$(1.15 \pm 0.07) \times 10^{-4}$		DESIG=322
Γ_{148}	$\Xi(1530)^-\overline{\Xi}^+$		$(7.0 \pm 1.2) \times 10^{-6}$		DESIG=323
Γ_{149}	$\Xi(1530)^0\overline{\Xi}^0$		$(5.3 \pm 0.5) \times 10^{-6}$		DESIG=331
Γ_{150}	$\Xi(1690)^-\overline{\Xi}^+$ $\to$ $K^-\Lambda\overline{\Xi}^+ +$ c.c.		$(5.2 \pm 1.6) \times 10^{-6}$		DESIG=294
Γ_{151}	$\Xi(1820)^-\overline{\Xi}^+$ $\to$ $K^-\Lambda\overline{\Xi}^+ +$ c.c.		$(1.20 \pm 0.32) \times 10^{-5}$		DESIG=295
Γ_{152}	$\Sigma^0\overline{\Xi}^+K^- +$ c.c.		$(3.7 \pm 0.4) \times 10^{-5}$		DESIG=296
Γ_{153}	$\Omega^-\overline{\Omega}^+$		$(5.66 \pm 0.30) \times 10^{-5}$	S=1.3	DESIG=74
Γ_{154}	$\eta_c\pi^+\pi^-\pi^0$		$< 1.0 \times 10^{-3}$	CL=90%	DESIG=229
Γ_{155}	$h_c(1P)\pi^0$		$(8.6 \pm 1.3) \times 10^{-4}$		DESIG=254
Γ_{156}	$\Lambda_c^+\overline{p}e^+e^- +$ c.c.		$< 1.7 \times 10^{-6}$	CL=90%	DESIG=310
Γ_{157}	$\Theta(1540)\overline{\Theta}(1540)$ $\to$ $K^0_S pK^-\overline{n}+$ c.c.	[a]	$< 8.8 \times 10^{-6}$	CL=90%	DESIG=195
Γ_{158}	$\Theta(1540)K^-\overline{n}$ $\to$ $K^0_S pK^-\overline{n}$	[a]	$< 1.0 \times 10^{-5}$	CL=90%	DESIG=196
Γ_{159}	$\Theta(1540)K^0_S\overline{p}$ $\to$ $K^0_S\overline{p}K^+n$	[a]	$< 7.0 \times 10^{-6}$	CL=90%	DESIG=197
Γ_{160}	$\overline{\Theta}(1540)K^+n$ $\to$ $K^0_S\overline{p}K^+n$	[a]	$< 2.6 \times 10^{-5}$	CL=90%	DESIG=198
Γ_{161}	$\overline{\Theta}(1540)K^0_S p$ $\to$ $K^0_S pK^-\overline{n}$	[a]	$< 6.0 \times 10^{-6}$	CL=90%	DESIG=199

Radiative decays

NODE=M071;CLUMP=C

Γ_{162}	$\gamma\chi_{c0}(1P)$	(9.79 ±0.20) %			DESIG=56
Γ_{163}	$\gamma\chi_{c1}(1P)$	(9.75 ±0.24) %			DESIG=58
Γ_{164}	$\gamma\chi_{c2}(1P)$	(9.52 ±0.20) %			DESIG=59
Γ_{165}	$\gamma\eta_c(1S)$	(3.4 ±0.5) $\times 10^{-3}$	S=1.3		DESIG=61
Γ_{166}	$\gamma\eta_c(2S)$	(7 ±5) $\times 10^{-4}$			DESIG=63
Γ_{167}	$\gamma\pi^0$	(1.04 ±0.22) $\times 10^{-6}$	S=1.4		DESIG=52
Γ_{168}	$\gamma 2(\pi^+\pi^-)$	(4.0 ±0.6) $\times 10^{-4}$			DESIG=241
Γ_{169}	$\gamma 3(\pi^+\pi^-)$	< 1.7 $\times 10^{-4}$		CL=90%	DESIG=249
Γ_{170}	$\gamma\eta'(958)$	(1.24 ±0.04) $\times 10^{-4}$			DESIG=54
Γ_{171}	$\gamma f_2(1270)$	(2.73 $^{+0.29}_{-0.25}$) $\times 10^{-4}$	S=1.8		DESIG=82
Γ_{172}	$\gamma f_0(1370) \rightarrow \gamma K\overline{K}$	(3.1 ±1.7) $\times 10^{-5}$			DESIG=286
Γ_{173}	$\gamma f_0(1500)$	(9.3 ±1.9) $\times 10^{-5}$			DESIG=287
Γ_{174}	$\gamma f'_2(1525)$	(3.3 ±0.8) $\times 10^{-5}$			DESIG=288
Γ_{175}	$\gamma f_0(1710)$				DESIG=236
Γ_{176}	$\gamma f_0(1710) \rightarrow \gamma\pi\pi$	(3.5 ±0.6) $\times 10^{-5}$			DESIG=83
Γ_{177}	$\gamma f_0(1710) \rightarrow \gamma K\overline{K}$	(6.6 ±0.7) $\times 10^{-5}$			DESIG=84
Γ_{178}	$\gamma f_0(2100) \rightarrow \gamma\pi\pi$	(4.8 ±1.0) $\times 10^{-6}$			DESIG=289
Γ_{179}	$\gamma f_0(2200) \rightarrow \gamma K\overline{K}$	(3.2 ±1.0) $\times 10^{-6}$			DESIG=290
Γ_{180}	$\gamma f_J(2220) \rightarrow \gamma\pi\pi$	< 5.8 $\times 10^{-6}$		CL=90%	DESIG=291
Γ_{181}	$\gamma f_J(2220) \rightarrow \gamma K\overline{K}$	< 9.5 $\times 10^{-6}$		CL=90%	DESIG=292
Γ_{182}	$\gamma\eta$	(9.2 ±1.8) $\times 10^{-7}$			DESIG=53
Γ_{183}	$\gamma\eta\pi^+\pi^-$	(8.7 ±2.1) $\times 10^{-4}$			DESIG=230
Γ_{184}	$\gamma\eta(1405)$				DESIG=231
Γ_{185}	$\gamma\eta(1405) \rightarrow \gamma K\overline{K}\pi$	< 9 $\times 10^{-5}$		CL=90%	DESIG=62
Γ_{186}	$\gamma\eta(1405) \rightarrow \gamma\eta\pi^+\pi^-$	(3.6 ±2.5) $\times 10^{-5}$			DESIG=232
Γ_{187}	$\gamma\eta(1405) \rightarrow \gamma f_0(980)\pi^0 \rightarrow \gamma\pi^+\pi^-\pi^0$	< 5.0 $\times 10^{-7}$		CL=90%	DESIG=308
Γ_{188}	$\gamma\eta(1475)$				DESIG=233
Γ_{189}	$\gamma\eta(1475) \rightarrow \gamma K\overline{K}\pi$	< 1.4 $\times 10^{-4}$		CL=90%	DESIG=234
Γ_{190}	$\gamma\eta(1475) \rightarrow \gamma\eta\pi^+\pi^-$	< 8.8 $\times 10^{-5}$		CL=90%	DESIG=235
Γ_{191}	$\gamma K^{*0}K^+\pi^-$ + c.c.	(3.7 ±0.9) $\times 10^{-4}$			DESIG=242
Γ_{192}	$\gamma K^{*0}\overline{K}^{*0}$	(2.4 ±0.7) $\times 10^{-4}$			DESIG=243
Γ_{193}	$\gamma K^0_S K^+\pi^-$ + c.c.	(2.6 ±0.5) $\times 10^{-4}$			DESIG=244
Γ_{194}	$\gamma K^+K^-\pi^+\pi^-$	(1.9 ±0.5) $\times 10^{-4}$			DESIG=245
Γ_{195}	$\gamma K^+K^- 2(\pi^+\pi^-)$	< 2.2 $\times 10^{-4}$		CL=90%	DESIG=248
Γ_{196}	$\gamma 2(K^+K^-)$	< 4 $\times 10^{-5}$		CL=90%	DESIG=250
Γ_{197}	$\gamma p\overline{p}$	(3.9 ±0.5) $\times 10^{-5}$	S=2.0		DESIG=246
Γ_{198}	$\gamma f_2(1950) \rightarrow \gamma p\overline{p}$	(1.20 ±0.22) $\times 10^{-5}$			DESIG=257
Γ_{199}	$\gamma f_2(2150) \rightarrow \gamma p\overline{p}$	(7.2 ±1.8) $\times 10^{-6}$			DESIG=258
Γ_{200}	$\gamma X(1835) \rightarrow \gamma p\overline{p}$	(4.6 $^{+1.8}_{-4.0}$) $\times 10^{-6}$			DESIG=259
Γ_{201}	$\gamma X \rightarrow \gamma p\overline{p}$	[b] < 2 $\times 10^{-6}$		CL=90%	DESIG=260
Γ_{202}	$\gamma p\overline{p}\pi^+\pi^-$	(2.8 ±1.4) $\times 10^{-5}$			DESIG=247
Γ_{203}	$\gamma\gamma$	< 1.5 $\times 10^{-4}$		CL=90%	DESIG=51
Γ_{204}	$\gamma\gamma J/\psi$	(3.1 $^{+1.0}_{-1.2}$) $\times 10^{-4}$			DESIG=266
Γ_{205}	$e^+e^-\eta'$	(1.90 ±0.26) $\times 10^{-6}$			DESIG=311
Γ_{206}	$e^+e^-\chi_{c0}(1P)$	(1.06 ±0.24) $\times 10^{-3}$			DESIG=300
Γ_{207}	$e^+e^-\chi_{c1}(1P)$	(8.5 ±0.6) $\times 10^{-4}$			DESIG=301
Γ_{208}	$e^+e^-\chi_{c2}(1P)$	(7.0 ±0.8) $\times 10^{-4}$			DESIG=302

Weak decays

NODE=M071;CLUMP=E

Γ_{209}	$D^0e^+e^-$ + c.c.	< 1.4 $\times 10^{-7}$		CL=90%	DESIG=306

Other decays

NODE=M071;CLUMP=D

Γ_{210}	invisible	< 1.6 %		CL=90%	DESIG=275

[a] $\Theta(1540)$ is a hypothetical pentaquark state of 1.54 GeV/c^2 mass and a width of less than 25 MeV/c^2. LINKAGE=THT

[b] For a narrow resonance in the range $2.2 < M(X) < 2.8$ GeV. LINKAGE=NMR

CONSTRAINED FIT INFORMATION

A multiparticle fit to $\chi_{c1}(1P)$, $\chi_{c0}(1P)$, $\chi_{c2}(1P)$, and $\psi(2S)$ with 4 total widths, a partial width, 25 combinations of partial widths obtained from integrated cross section, and 84 branching ratios uses 248 measurements to determine 49 parameters. The overall fit has a $\chi^2 = 379.8$ for 199 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\langle\delta p_i \delta p_j\rangle/(\delta p_i \cdot \delta p_j)$, in percent, from the fit to parameters p_i, including the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{total}$.

x_8	3									
x_9	1	0								
x_{12}	29	11	2							
x_{13}	28	6	1	48						
x_{14}	13	4	1	36	15					
x_{101}	0	0	0	4	3	2				
x_{162}	1	0	0	2	1	1	0			
x_{163}	1	0	0	2	1	1	0	0		
x_{164}	1	0	0	3	1	1	0	0	0	
Γ	−81	−4	−1	−38	−34	−16	−7	−1	−1	−1
	x_7	x_8	x_9	x_{12}	x_{13}	x_{14}	x_{101}	x_{162}	x_{163}	x_{164}

$\psi(2S)$ PARTIAL WIDTHS

NODE=M071225

Γ(hadrons) Γ_1

NODE=M071W3
NODE=M071W3

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
258±26	BAI	02B	BES2	e^+e^-
224±56	LUTH	75	MRK1	e^+e^-

$\Gamma(e^+e^-)$ Γ_7

NODE=M071W1
NODE=M071W1

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
2.33 ±0.04 OUR FIT				
2.29 ±0.06 OUR AVERAGE				
2.23 ±0.10 ±0.02	[1] ABLIKIM	15V	BES3	4.0–4.4 $e^+e^- \to \pi^+\pi^- J/\psi$
2.338±0.037±0.096	ABLIKIM	08B	BES2	$e^+e^- \to$ hadrons
2.330±0.036±0.110	ABLIKIM	06L	BES2	$e^+e^- \to$ hadrons
2.44 ±0.21	[2] BAI	02B	BES2	e^+e^-
2.14 ±0.21	ALEXANDER	89	RVUE	See Υ mini-review
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.279±0.015±0.042	[3] ANASHIN	18	KEDR	e^+e^-
2.282±0.015±0.042	[4] ANASHIN	18	KEDR	e^+e^-
2.0 ±0.3	BRANDELIK	79C	DASP	e^+e^-
2.1 ±0.3	[5] LUTH	75	MRK1	e^+e^-

OCCUR=2

[1] ABLIKIM 15V reports 2.213 ± 0.018 ± 0.099 keV from a measurement of [$\Gamma(\psi(2S) \to e^+e^-)$] × [B($\psi(2S) \to J/\psi(1S)\pi^+\pi^-$)] assuming B($\psi(2S) \to J/\psi(1S)\pi^+\pi^-$) = $(34.95 \pm 0.45) \times 10^{-2}$, which we rescale to our best value B($\psi(2S) \to J/\psi(1S)\pi^+\pi^-$) = $(34.68 \pm 0.30) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M071W1;LINKAGE=A

[2] From a simultaneous fit to e^+e^-, $\mu^+\mu^-$, and hadronic channel, assuming $\Gamma_e = \Gamma_\mu = \Gamma_\tau/0.38847$.

NODE=M071W;LINKAGE=BB

[3] Combining $\Gamma_{e^+e^-} \cdot$ B($\mu^+\mu^-$) from ANASHIN 18 with $\Gamma_{e^+e^-} \cdot$ B(hadrons) from ANASHIN 12 and assuming lepton universality.

NODE=M071W1;LINKAGE=B

[4] From the sum of $\Gamma_{e^+e^-} \cdot$B(hadrons) from ANASHIN 12, $\Gamma_{e^+e^-} \cdot$B(e^+e^-) and $\Gamma_{e^+e^-} \cdot$ B($\mu^+\mu^-$) from ANASHIN 18, and $\Gamma_{e^+e^-} \cdot$ B($\tau^+\tau^-$) from ANASHIN 07.

NODE=M071W1;LINKAGE=C

[5] From a simultaneous fit to e^+e^-, $\mu^+\mu^-$, and hadronic channels assuming $\Gamma(e^+e^-) = \Gamma(\mu^+\mu^-)$.

NODE=M071W1;LINKAGE=F

$\Gamma(\gamma\gamma)$ Γ_{203}

NODE=M071W51

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<43	90	BRANDELIK	79C	DASP	e^+e^-

$\psi(2S)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma(total)$

NODE=M071230

This combination of a partial width with the partial width into e^+e^- and with the total width is obtained from the integrated cross section into channel(i) in the e^+e^- annihilation. We list only data that have not been used to determine the partial width $\Gamma(i)$ or the branching ratio $\Gamma(i)$/total.

NODE=M071230

$\Gamma(\text{hadrons}) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_1\Gamma_7/\Gamma$

NODE=M071G3

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
2.233±0.015±0.042	[1] ANASHIN	12	KEDR	$e^+e^- \rightarrow$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.2 ±0.4	ABRAMS	75	MRK1	e^+e^-

[1] ANASHIN 12 reports the value 2.233 ± 0.015 ± 0.037 ± 0.020 keV, where the third uncertainty is due to assumptions on the interference between the resonance and hadronic continuum. We combined the two systematic uncertainties.

NODE=M071G3;LINKAGE=AN

$\Gamma(K^0_S\text{anything}) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_6\Gamma_7/\Gamma$

NODE=M071P30

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
0.3738±0.0067±0.0200	ABLIKIM	21S	BES3	$e^+e^- \rightarrow K^0_S$ anything

$\Gamma(e^+e^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_7\Gamma_7/\Gamma$

NODE=M071P14

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
21.2±0.7±1.2	[1] ANASHIN	18	KEDR	e^+e^-

[1] From the average of nine scans of the $\psi(2S)$.

NODE=M071P14;LINKAGE=A

$\Gamma(\mu^+\mu^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_8\Gamma_7/\Gamma$

NODE=M071P13

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
19.3±0.3±0.5	[1] ANASHIN	18	KEDR	$\psi(2S) \rightarrow \mu^+\mu^-$

[1] From the average of nine scans of the $\psi(2S)$.

NODE=M071P13;LINKAGE=A

$\Gamma(\tau^+\tau^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_9\Gamma_7/\Gamma$

NODE=M071G9

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
9.0±2.6	79	[1] ANASHIN	07	KEDR	$e^+e^- \rightarrow \psi(2S) \rightarrow \tau^+\tau^-$

[1] Using $\psi(2S)$ total width of 337 ± 13 keV. Systematic errors not evaluated.

NODE=M071G9;LINKAGE=AN

$\Gamma(J/\psi(1S)\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{12}\Gamma_7/\Gamma$

NODE=M071G1

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.808±0.013 OUR FIT					
0.837±0.025 OUR AVERAGE	Error includes scale factor of 1.3. See the ideogram below.				
0.837±0.028±0.005		[1] LEES	12E	BABR	10.6 $e^+e^- \rightarrow 2\pi^+2\pi^-\gamma$
0.852±0.010±0.026	19.5k	ADAM	06	CLEO	3.773 $e^+e^- \rightarrow \gamma\psi(2S)$
0.68 ±0.09		[2] BAI	98E	BES	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.88 ±0.08 ±0.03	256	[3] AUBERT	07AU	BABR	10.6 $e^+e^- \rightarrow J/\psi\pi^+\pi^-\gamma$
0.755±0.048±0.004	544	[4] AUBERT	05D	BABR	10.6 $e^+e^- \rightarrow \pi^+\pi^-\mu^+\mu^-\gamma$

[1] LEES 12E reports $[\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) \times \Gamma(\psi(2S) \rightarrow e^+e^-)/\Gamma_{total}] \times [B(J/\psi(1S) \rightarrow \mu^+\mu^-)] = (49.9 \pm 1.3 \pm 1.0) \times 10^{-3}$ keV which we divide by our best value $B(J/\psi(1S) \rightarrow \mu^+\mu^-) = (5.961 \pm 0.033) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M071G1;LINKAGE=LE

[2] The value of $\Gamma(e^+e^-)$ quoted in BAI 98E is derived using $B(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) = (32.4 \pm 2.6) \times 10^{-2}$ and $B(J/\psi(1S) \rightarrow \ell^+\ell^-) = 0.1203 \pm 0.0038$. Recalculated by us using $B(J/\psi(1S) \rightarrow \ell^+\ell^-) = 0.1181 \pm 0.0020$.

NODE=M071G1;LINKAGE=A

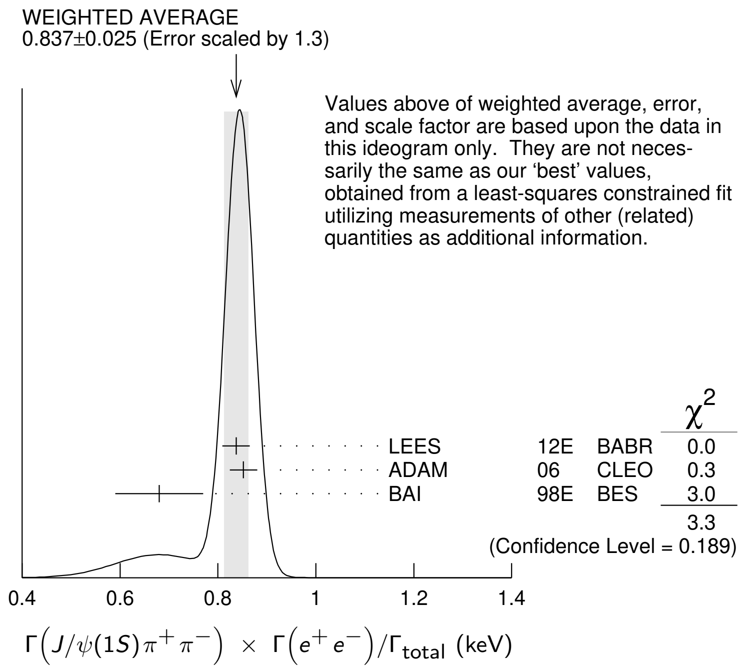
[3] AUBERT 07AU reports $[\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) \times \Gamma(\psi(2S) \rightarrow e^+e^-)/\Gamma_{total}] \times [B(J/\psi(1S) \rightarrow \pi^+\pi^-\pi^0)] = 0.0186 \pm 0.0012 \pm 0.0011$ keV which we divide by our best value $B(J/\psi(1S) \rightarrow \pi^+\pi^-\pi^0) = (2.10 \pm 0.08) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M071G1;LINKAGE=UB

[4] AUBERT 05D reports $[\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) \times \Gamma(\psi(2S) \rightarrow e^+e^-)/\Gamma_{total}] \times [B(J/\psi(1S) \rightarrow \mu^+\mu^-)] = 0.0450 \pm 0.0018 \pm 0.0022$ keV which we divide by our

NODE=M071G1;LINKAGE=AU

best value B($J/\psi(1S) \to \mu^+\mu^-$) = $(5.961 \pm 0.033) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Superseded by LEES 12E.



$\Gamma(J/\psi(1S)\pi^0\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{13}\Gamma_7/\Gamma$

NODE=M071G6
NODE=M071G6

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.425±0.009 OUR FIT					
0.411±0.008±0.018	3.6k	ADAM	06	CLEO	3.773 $e^+e^- \to \gamma\psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.48 ±0.09 ±0.02	142	[1] LEES	18E	BABR	10.6 $e^+e^- \to J/\psi\pi^0\pi^0\gamma$

[1] LEES 18E reports $[\Gamma(\psi(2S) \to J/\psi(1S)\pi^0\pi^0) \times \Gamma(\psi(2S) \to e^+e^-)/\Gamma_{total}] \times [B(J/\psi(1S) \to \pi^+\pi^-\pi^0)] = 0.0101 \pm 0.0015 \pm 0.0011$ keV which we divide by our best value B($J/\psi(1S) \to \pi^+\pi^-\pi^0$) = $(2.10 \pm 0.08) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M071G6;LINKAGE=A

$\Gamma(J/\psi(1S)\eta) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{14}\Gamma_7/\Gamma$

NODE=M071G7
NODE=M071G7

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
78.6± 1.6 OUR FIT					
87 ± 9 OUR AVERAGE					
83 ±25 ±5	14	[1] AUBERT	07AU	BABR	10.6 $e^+e^- \to J/\psi\pi^+\pi^-\pi^0\gamma$
88 ± 6 ±7	291 ± 24	ADAM	06	CLEO	3.773 $e^+e^- \to \gamma\psi(2S)$

[1] AUBERT 07AU quotes $\Gamma_{ee}^{\psi(2S)} \cdot B(\psi(2S) \to J/\psi\eta) \cdot B(J/\psi \to \mu^+\mu^-) \cdot B(\eta \to \pi^+\pi^-\pi^0) = 1.11 \pm 0.33 \pm 0.07$ eV. NODE=M071G7;LINKAGE=UB

$\Gamma(J/\psi(1S)\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{15}\Gamma_7/\Gamma$

NODE=M071G8
NODE=M071G8

VALUE (eV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<8	90	<37	ADAM	06	CLEO	3.773 $e^+e^- \to \gamma\psi(2S)$

$\Gamma(2(\pi^+\pi^-)\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{22}\Gamma_7/\Gamma$

NODE=M071G01
NODE=M071G01

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
29.7±2.2±1.8	410	AUBERT	07AU	BABR	10.6 $e^+e^- \to 2(\pi^+\pi^-)\pi^0\gamma$

$\Gamma(\pi^+\pi^-\pi^0\pi^0\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{24}\Gamma_7/\Gamma$

NODE=M071P16
NODE=M071P16

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
12.4±1.8±1.2	177	LEES	18E	BABR	10.6 $e^+e^- \to \pi^+\pi^-3\pi^0\gamma$

$\Gamma(\pi^+\pi^-4\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{25}\Gamma_7/\Gamma$

NODE=M071P36
NODE=M071P36

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
3.3±2.3±0.5	18	LEES	21C	BABR	$e^+e^- \to \gamma_{ISR}(\pi^+\pi^-4\pi^0)$

$\Gamma(\rho^{\pm}\pi^{\mp}\pi^0\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{26}\Gamma_7/\Gamma$

NODE=M071P18

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<6.2	90	LEES	18E	BABR	10.6 $e^+e^- \rightarrow \pi^+\pi^-3\pi^0\gamma$

$\Gamma(2(\pi^+\pi^-\pi^0)) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{28}\Gamma_7/\Gamma$

NODE=M071G4

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
11.2±3.3±1.3	43	AUBERT	06D	BABR	10.6 $e^+e^- \rightarrow 2(\pi^+\pi^-\pi^0)\gamma$

$\Gamma(2(\pi^+\pi^-)3\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{30}\Gamma_7/\Gamma$

NODE=M071P31

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
33±5±5	14k	LEES	21	BABR	10.6 $e^+e^- \rightarrow 2(\pi^+\pi^-)3\pi^0\gamma$

$\Gamma(\eta 2(\pi^+\pi^-)) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{33}\Gamma_7/\Gamma$

NODE=M071G03

VALUE (eV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
2.87±1.41±0.01		16	[1] AUBERT	07AU	BABR	10.6 $e^+e^- \rightarrow 2(\pi^+\pi^-)\eta\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<7	90	14k	[2] LEES	21	BABR	10.6 $e^+e^- \rightarrow 2(\pi^+\pi^-)3\pi^0\gamma$

[1] AUBERT 07AU reports $[\Gamma(\psi(2S) \rightarrow \eta 2(\pi^+\pi^-)) \times \Gamma(\psi(2S) \rightarrow e^+e^-)/\Gamma_{total}] \times [B(\eta \rightarrow 2\gamma)] = 1.13 \pm 0.55 \pm 0.08$ eV which we divide by our best value $B(\eta \rightarrow 2\gamma) = (39.36 \pm 0.18) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M071G03;LINKAGE=UB

[2] LEES 21 reports $[\Gamma(\psi(2S) \rightarrow \eta 2(\pi^+\pi^-)) \times \Gamma(\psi(2S) \rightarrow e^+e^-)/\Gamma_{total}] \times [B(\eta \rightarrow 3\pi^0)] <$ 2.3 eV which we divide by our best value $B(\eta \rightarrow 3\pi^0) = 32.57 \times 10^{-2}$.

NODE=M071G03;LINKAGE=A

$\Gamma(\eta\pi^+\pi^-\pi^0\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{34}\Gamma_7/\Gamma$

NODE=M071P15

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<0.85	90	LEES	18E	BABR	10.6 $e^+e^- \rightarrow \pi^+\pi^-\pi^0\pi^0\eta\gamma$

$\Gamma(\eta\pi^+\pi^-3\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{35}\Gamma_7/\Gamma$

NODE=M071P40

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<5	90	[1] LEES	21C	BABR	$e^+e^- \rightarrow \gamma_{ISR}(\pi^+\pi^-3\pi^0\gamma\gamma)$

[1] LEES 21C reports $[\Gamma(\psi(2S) \rightarrow \eta\pi^+\pi^-3\pi^0) \times \Gamma(\psi(2S) \rightarrow e^+e^-)/\Gamma_{total}] \times [B(\eta \rightarrow 2\gamma)] <$ 1.9 eV which we divide by our best value $B(\eta \rightarrow 2\gamma) = 39.36 \times 10^{-2}$.

NODE=M071P40;LINKAGE=A

$\Gamma(\eta 2(\pi^+\pi^-\pi^0)) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{36}\Gamma_7/\Gamma$

NODE=M071P33

VALUE (eV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<5	90	14k	[1] LEES	21	BABR	10.6 $e^+e^- \rightarrow 2(\pi^+\pi^-)3\pi^0\gamma$

[1] LEES 21 reports $[\Gamma(\psi(2S) \rightarrow \eta 2(\pi^+\pi^-\pi^0)) \times \Gamma(\psi(2S) \rightarrow e^+e^-)/\Gamma_{total}] \times [B(\eta \rightarrow 2\gamma)] <$ 1.9 eV which we divide by our best value $B(\eta \rightarrow 2\gamma) = 39.36 \times 10^{-2}$.

NODE=M071P33;LINKAGE=A

$\Gamma(\omega\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{41}\Gamma_7/\Gamma$

NODE=M071G02

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
3.01±0.84±0.02	37	[1] AUBERT	07AU	BABR	10.6 $e^+e^- \rightarrow \omega\pi^+\pi^-\gamma$

[1] AUBERT 07AU reports $[\Gamma(\psi(2S) \rightarrow \omega\pi^+\pi^-) \times \Gamma(\psi(2S) \rightarrow e^+e^-)/\Gamma_{total}] \times [B(\omega(782) \rightarrow \pi^+\pi^-\pi^0)] = 2.69 \pm 0.73 \pm 0.16$ eV which we divide by our best value $B(\omega(782) \rightarrow \pi^+\pi^-\pi^0) = (89.2 \pm 0.7) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M071G02;LINKAGE=UB

$\Gamma(\omega\pi^+\pi^-2\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{42}\Gamma_7/\Gamma$

NODE=M071P32

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
20.2±5.6±0.1	14k	[1] LEES	21	BABR	10.6 $e^+e^- \rightarrow 2(\pi^+\pi^-)3\pi^0\gamma$

[1] LEES 21 reports $[\Gamma(\psi(2S) \rightarrow \omega\pi^+\pi^-2\pi^0) \times \Gamma(\psi(2S) \rightarrow e^+e^-)/\Gamma_{total}] \times [B(\omega(782) \rightarrow \pi^+\pi^-\pi^0)] = 18 \pm 4 \pm 3$ eV which we divide by our best value $B(\omega(782) \rightarrow \pi^+\pi^-\pi^0) = (89.2 \pm 0.7) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M071P32;LINKAGE=A

$\Gamma(\omega\pi^0\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{45}\Gamma_7/\Gamma$

NODE=M071P17

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
2.58±0.82±0.02	33	[1] LEES 18E	BABR	10.6 $e^+e^- \to \pi^+\pi^- 3\pi^0\gamma$

[1] LEES 18E reports $[\Gamma(\psi(2S) \to \omega\pi^0\pi^0) \times \Gamma(\psi(2S) \to e^+e^-)/\Gamma_{total}] \times [B(\omega(782) \to \pi^+\pi^-\pi^0)] = 2.3 \pm 0.7 \pm 0.2$ eV which we divide by our best value $B(\omega(782) \to \pi^+\pi^-\pi^0) = (89.2 \pm 0.7) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M071P17;LINKAGE=A

$\Gamma(\omega 3\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{46}\Gamma_7/\Gamma$

NODE=M071P39

VALUE (eV)	CL%	DOCUMENT ID	TECN	COMMENT
<1.8	90	[1] LEES 21C	BABR	$e^+e^- \to \gamma_{ISR}(\pi^+\pi^- 4\pi^0)$

[1] LEES 21C reports $[\Gamma(\psi(2S) \to \omega 3\pi^0) \times \Gamma(\psi(2S) \to e^+e^-)/\Gamma_{total}] \times [B(\omega(782) \to \pi^+\pi^-\pi^0)] < 1.6$ eV which we divide by our best value $B(\omega(782) \to \pi^+\pi^-\pi^0) = 89.2 \times 10^{-2}$. NODE=M071P39;LINKAGE=A

$\Gamma(\phi\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{51}\Gamma_7/\Gamma$

NODE=M071G10

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
0.55±0.19±0.01	19	[1] LEES 12F	BABR	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.57±0.23±0.01	10	[2] AUBERT,BE 06D	BABR	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\gamma$

[1] LEES 12F reports $[\Gamma(\psi(2S) \to \phi\pi^+\pi^-) \times \Gamma(\psi(2S) \to e^+e^-)/\Gamma_{total}] \times [B(\phi(1020) \to K^+K^-)] = 0.27 \pm 0.09 \pm 0.02$ eV which we divide by our best value $B(\phi(1020) \to K^+K^-) = (49.1 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M071G10;LINKAGE=A

[2] Superseded by LEES 12F. AUBERT,BE 06D reports $[\Gamma(\psi(2S) \to \phi\pi^+\pi^-) \times \Gamma(\psi(2S) \to e^+e^-)/\Gamma_{total}] \times [B(\phi(1020) \to K^+K^-)] = 0.28 \pm 0.11 \pm 0.02$ eV which we divide by our best value $B(\phi(1020) \to K^+K^-) = (49.1 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M071G10;LINKAGE=AU

$\Gamma(\phi f_0(980) \to \pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{52}\Gamma_7/\Gamma$

NODE=M071G13

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
0.346±0.129±0.004	12	[1] LEES 12F	BABR	10.6 $e^+e^- \to \pi^+\pi^-K^+K^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.346±0.168±0.004	6 ± 3	[2] AUBERT 07AK	BABR	10.6 $e^+e^- \to \pi^+\pi^-K^+K^-\gamma$

[1] LEES 12F reports $[\Gamma(\psi(2S) \to \phi f_0(980) \to \pi^+\pi^-) \times \Gamma(\psi(2S) \to e^+e^-)/\Gamma_{total}] \times [B(\phi(1020) \to K^+K^-)] = 0.17 \pm 0.06 \pm 0.02$ eV which we divide by our best value $B(\phi(1020) \to K^+K^-) = (49.1 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M071G13;LINKAGE=A

[2] Superseded by LEES 12F. AUBERT 07AK reports $[\Gamma(\psi(2S) \to \phi f_0(980) \to \pi^+\pi^-) \times \Gamma(\psi(2S) \to e^+e^-)/\Gamma_{total}] \times [B(\phi(1020) \to K^+K^-)] = 0.17 \pm 0.08 \pm 0.02$ eV which we divide by our best value $B(\phi(1020) \to K^+K^-) = (49.1 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M071G13;LINKAGE=AU

$\Gamma(K^+K^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{59}\Gamma_7/\Gamma$

NODE=M071G06

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.147±0.035±0.005	66	[1] LEES 15J	BABR	$e^+e^- \to K^+K^-\gamma$
0.197±0.035±0.005	66	[2] LEES 15J	BABR	$e^+e^- \to K^+K^-\gamma$ OCCUR=2
0.35 ±0.14 ±0.03	11	[3] LEES 13Q	BABR	$e^+e^- \to K^+K^-\gamma$

[1] $\sin\phi > 0$. NODE=M071G06;LINKAGE=A

[2] $\sin\phi < 0$. NODE=M071G06;LINKAGE=B

[3] Interference with non-resonant K^+K^- production not taken into account. NODE=M071G06;LINKAGE=BA

$\Gamma(K^+K^-\pi^+) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{60}\Gamma_7/\Gamma$

NODE=M071G12

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
1.92±0.30±0.06	133	LEES 12F	BABR	10.6 $e^+e^- \to \pi^+\pi^-K^+K^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.56±0.42±0.16	85	[1] AUBERT 07AK	BABR	10.6 $e^+e^- \to \pi^+\pi^-K^+K^-\gamma$

[1] Superseded by LEES 12F. NODE=M071G12;LINKAGE=A

$\Gamma(K^0_S K^0_L \pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{64}\Gamma_7/\Gamma$

NODE=M071G15

VALUE (eV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<0.7	90	8	LEES	17A	BABR	$e^+e^- \to K^0_S K^0_L \pi^0 \gamma$

$\Gamma(K^+K^-\pi^0\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{65}\Gamma_7/\Gamma$

NODE=M071G08

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.60±0.31±0.03	17	LEES	12F	BABR	10.6 $e^+e^- \to \pi^0\pi^0 K^+K^-\gamma$

$\Gamma(K^+K^-\pi^+\pi^-\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{66}\Gamma_7/\Gamma$

NODE=M071G04

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
4.4±1.3±0.3	32	AUBERT	07AU	BABR	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\pi^0\gamma$

$\Gamma(K^0_S K^0_L \pi^0\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{73}\Gamma_7/\Gamma$

NODE=M071G14

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
2.92±1.27±0.15	14	LEES	17A	BABR	$e^+e^- \to K^0_S K^0_L \pi^0\pi^0\gamma$

$\Gamma(K^0_S K^0_L \eta) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{74}\Gamma_7/\Gamma$

NODE=M071G16

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
3.14±1.08±0.16	16	LEES	17A	BABR	$e^+e^- \to K^0_S K^0_L \eta\gamma$

$\Gamma(K^+K^-\pi^+\pi^-\eta) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{77}\Gamma_7/\Gamma$

NODE=M071G05

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
3.05±1.80±0.01	7	[1] AUBERT	07AU	BABR	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\eta\gamma$

[1] AUBERT 07AU reports $[\Gamma(\psi(2S) \to K^+K^-\pi^+\pi^-\eta) \times \Gamma(\psi(2S) \to e^+e^-)/\Gamma_{total}] \times [B(\eta \to 2\gamma)] = 1.2 \pm 0.7 \pm 0.1$ eV which we divide by our best value $B(\eta \to 2\gamma) = (39.36 \pm 0.18) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M071G05;LINKAGE=UB

$\Gamma(K^+K^-2(\pi^+\pi^-)) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{78}\Gamma_7/\Gamma$

NODE=M071G5

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
4.4±2.1±0.3	26	AUBERT	06D	BABR	10.6 $e^+e^- \to K^+K^-2(\pi^+\pi^-)\gamma$

$\Gamma(2(K^+K^-)) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{81}\Gamma_7/\Gamma$

NODE=M071G07

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.22±0.10±0.02	13	LEES	12F	BABR	10.6 $e^+e^- \to K^+K^-K^+K^-\gamma$

$\Gamma(p\overline{p}) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{101}\Gamma_7/\Gamma$

NODE=M071G2

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.686±0.019 OUR FIT					
0.63 ±0.05 OUR AVERAGE	Error includes scale factor of 1.2.				
0.67 ±0.12 ±0.02	43	[1] LEES	13O	BABR	$e^+e^- \to p\overline{p}\gamma$
0.74 ±0.07 ±0.04	142	[2] LEES	13Y	BABR	$e^+e^- \to p\overline{p}\gamma$
0.579±0.038±0.036	2.7k	ANDREOTTI	07	E835	$p\overline{p} \to e^+e^-$, $J/\psi X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.70 ±0.17 ±0.03	22	[3] AUBERT	06B	BABR	$e^+e^- \to p\overline{p}\gamma$

[1] ISR photon reconstructed in the detector

NODE=M071G2;LINKAGE=C

[2] ISR photon undetected

NODE=M071G2;LINKAGE=B

[3] Superseded by LEES 13O

NODE=M071G2;LINKAGE=A

$\Gamma(\Lambda\overline{\Lambda}) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{124}\Gamma_7/\Gamma$

NODE=M071G11

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
1.5±0.4±0.1	AUBERT	07BD	BABR	10.6 $e^+e^- \to \Lambda\overline{\Lambda}\gamma$

$\psi(2S)$ BRANCHING RATIOS

NODE=M071235

$\Gamma(\text{hadrons})/\Gamma_{total}$ Γ_1/Γ

NODE=M071R3

VALUE	DOCUMENT ID		TECN	COMMENT
0.9785±0.0013 OUR AVERAGE				
0.9779±0.0015	[1] BAI	02B	BES2	e^+e^-
0.981 ±0.003	[1] LUTH	75	MRK1	e^+e^-

[1] Includes cascade decay into $J/\psi(1S)$.

NODE=M071R;LINKAGE=P

$\Gamma(\text{virtual}\,\gamma \to \text{hadrons})/\Gamma_{total}$ — Γ_2/Γ

NODE=M071R5
NODE=M071R5

VALUE	DOCUMENT ID	TECN	COMMENT
0.0173±0.0014 OUR AVERAGE Error includes scale factor of 1.5.			
0.0166±0.0010	[1,2] SETH 04	RVUE	e^+e^-
0.0199±0.0019	[1] BAI 02B	BES2	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.029 ±0.004	[1] LUTH 75	MRK1	e^+e^-

[1] Included in $\Gamma(\text{hadrons})/\Gamma_{total}$.

[2] Using B($\psi(2S) \to \ell^+\ell^-$) = (0.73 ± 0.04)% from RPP-2002 and R = 2.28 ± 0.04 determined by a fit to data from BAI 00 and BAI 02C.

NODE=M071R;LINKAGE=Z
NODE=M071R5;LINKAGE=SE

$\Gamma(ggg)/\Gamma_{total}$ — Γ_3/Γ

NODE=M071S43
NODE=M071S43

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
10.58±1.62	2.9 M	[1] LIBBY 09	CLEO	$\psi(2S) \to$ hadrons

[1] Calculated using $\Gamma(\gamma gg)/\Gamma(ggg) = 0.097 \pm 0.026 \pm 0.016$ from LIBBY 09, B($\psi(2S) \to X J/\psi$) relative and absolute branching fractions from MENDEZ 08, B($\psi(2S) \to \gamma\eta_c$) from MITCHELL 09, and B($\psi(2S) \to$ virtual $\gamma \to$ hadrons), B($\psi(2S) \to \gamma\chi_{cJ}$), and B($\psi(2S) \to \ell^+\ell^-$) from PDG 08. The statistical error is negligible and the systematic error is largely uncorrelated with that of $\Gamma(\gamma gg)/\Gamma_{total}$ LIBBY 09 measurement.

NODE=M071S43;LINKAGE=LI

$\Gamma(\gamma gg)/\Gamma_{total}$ — Γ_4/Γ

NODE=M071S44
NODE=M071S44

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
1.025±0.288	200 k	[1] LIBBY 09	CLEO	$\psi(2S) \to \gamma$ + hadrons

[1] Calculated using $\Gamma(\gamma gg)/\Gamma(ggg) = 0.097 \pm 0.026 \pm 0.016$ from LIBBY 09. The statistical error is negligible and the systematic error is largely uncorrelated with that of $\Gamma(ggg)/\Gamma_{total}$ LIBBY 09 measurement.

NODE=M071S44;LINKAGE=LI

$\Gamma(\gamma gg)/\Gamma(ggg)$ — Γ_4/Γ_3

NODE=M071S45
NODE=M071S45

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
9.7±2.6±1.6	2.9 M	LIBBY 09	CLEO	$\psi(2S) \to (\gamma +)$ hadrons

$\Gamma(\text{light hadrons})/\Gamma_{total}$ — Γ_5/Γ

NODE=M071S27
NODE=M071S27

VALUE	DOCUMENT ID	TECN	COMMENT
0.154±0.015	[1] MENDEZ 08	CLEO	$e^+e^- \to \psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.169±0.026	[2] ADAM 05A	CLEO	$e^+e^- \to \psi(2S)$

[1] Uses B($\psi(2S) \to J/\psi X$) from MENDEZ 08 and other branching fractions from PDG 07.

[2] Uses B($J/\psi X$) from ADAM 05A, B($\chi_{cJ}\gamma$), B($\eta_c\gamma$) from ATHAR 04 and B($\ell^+\ell^-$) from PDG 04. Superseded by MENDEZ 08.

NODE=M071S27;LINKAGE=ME
NODE=M071S27;LINKAGE=AD

$\Gamma(e^+e^-)/\Gamma_{total}$ — Γ_7/Γ

NODE=M071R1
NODE=M071R1

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
79.3± 1.7 OUR FIT			
• • • We do not use the following data for averages, fits, limits, etc. • • •			
88 ±13	[1] FELDMAN 77	RVUE	e^+e^-

[1] From an overall fit assuming equal partial widths for e^+e^- and $\mu^+\mu^-$. For a measurement of the ratio see the entry $\Gamma(\mu^+\mu^-)/\Gamma(e^+e^-)$ below. Includes LUTH 75, HILGER 75, BURMESTER 77.

NODE=M071R;LINKAGE=L

$\Gamma(\mu^+\mu^-)/\Gamma_{total}$ — Γ_8/Γ

NODE=M071R2
NODE=M071R2

VALUE (units 10^{-4})	DOCUMENT ID
80±6 OUR FIT	

$\Gamma(\mu^+\mu^-)/\Gamma(e^+e^-)$ — Γ_8/Γ_7

NODE=M071R4
NODE=M071R4

VALUE	DOCUMENT ID	TECN	COMMENT
1.00±0.08 OUR FIT			
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.89±0.16	BOYARSKI 75C	MRK1	e^+e^-

$\Gamma(\tau^+\tau^-)/\Gamma_{total}$ — Γ_9/Γ

NODE=M071R75
NODE=M071R75

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
31 ±4 OUR FIT			
30.8±2.1±3.8	[1] ABLIKIM 06W	BES	$e^+e^- \to \psi(2S)$

[1] Computed using PDG 02 value of B($\psi(2S) \to$ hadrons) = 0.9810 ± 0.0030 to estimate the total number of $\psi(2S)$ events.

NODE=M071R75;LINKAGE=AB

DECAYS INTO $J/\psi(1S)$ AND ANYTHING

NODE=M071305

$\Gamma(J/\psi(1S)\,\text{anything})/\Gamma_{total}$

$$\Gamma_{10}/\Gamma = (\Gamma_{12}+\Gamma_{13}+\Gamma_{14}+0.343\Gamma_{163}+0.190\Gamma_{164})/\Gamma$$

NODE=M071R10
NODE=M071R10

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.614 ±0.006 OUR FIT					
0.55 ±0.07 OUR AVERAGE					
0.51 ±0.12		BRANDELIK	79C	DASP	$e^+e^- \to \mu^+\mu^- X$
0.57 ±0.08		ABRAMS	75B	MRK1	$e^+e^- \to \mu^+\mu^- X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.644 ±0.006 ±0.016		[1] ABLIKIM	21Z	BES3	$e^+e^- \to \ell^+\ell^- X$
0.6254±0.0016±0.0155	1.1M	[2] MENDEZ	08	CLEO	$\psi(2S) \to \ell^+\ell^- X$
0.5950±0.0015±0.0190	151k	ADAM	05A	CLEO	Repl. by MENDEZ 08

[1] From a fit to the $e^+e^- \to J/\psi X$ cross section between 3.645 and 3.891 GeV, with $\Gamma(ee)$ and Γ fixed to the PDG 20 values of the cross particle fit which are correlated to "OUR FIT" value for $B(\psi(2S) \to J/\psi X)$.

NODE=M071R10;LINKAGE=A

[2] Not independent from other measurements of MENDEZ 08.

NODE=M071R10;LINKAGE=ME

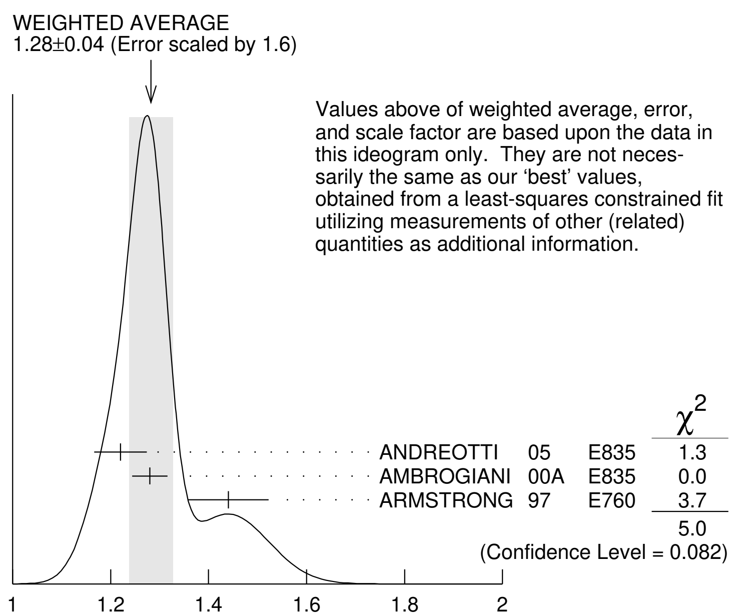
$\Gamma(e^+e^-)/\Gamma(J/\psi(1S)\,\text{anything})$ $\qquad\Gamma_7/\Gamma_{10}$

NODE=M071R72
NODE=M071R72

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
1.291±0.026 OUR FIT					
1.28 ±0.04 OUR AVERAGE Error includes scale factor of 1.6. See the ideogram below.					
1.22 ±0.02 ±0.05	5097 ± 73	[1] ANDREOTTI	05	E835	$p\overline{p} \to \psi(2S) \to e^+e^-$
1.28 ±0.03 ±0.02		[1] AMBROGIANI	00A	E835	$p\overline{p} \to \psi(2S)$
1.44 ±0.08 ±0.02		[1] ARMSTRONG	97	E760	$\overline{p}p \to \psi(2S)$

[1] Using $B(J/\psi(1S) \to e^+e^-) = 0.0593 \pm 0.0010$.

NODE=M071R;LINKAGE=7A



$\Gamma(e^+e^-)/\Gamma(J/\psi(1S)\,\text{anything})$ (units 10^{-2}) $\qquad\Gamma_7/\Gamma_{10}$

$\Gamma(\mu^+\mu^-)/\Gamma(J/\psi(1S)\,\text{anything})$ $\qquad\Gamma_8/\Gamma_{10}$

NODE=M071R74
NODE=M071R74

VALUE	DOCUMENT ID		TECN	COMMENT
0.0130±0.0010 OUR FIT				
0.014 ±0.003	HILGER	75	SPEC	e^+e^-

$\Gamma(J/\psi(1S)\,\text{neutrals})/\Gamma_{total}$ $\qquad\Gamma_{11}/\Gamma$

NODE=M071R18
NODE=M071R18

VALUE	DOCUMENT ID
0.2538±0.0032 OUR FIT	

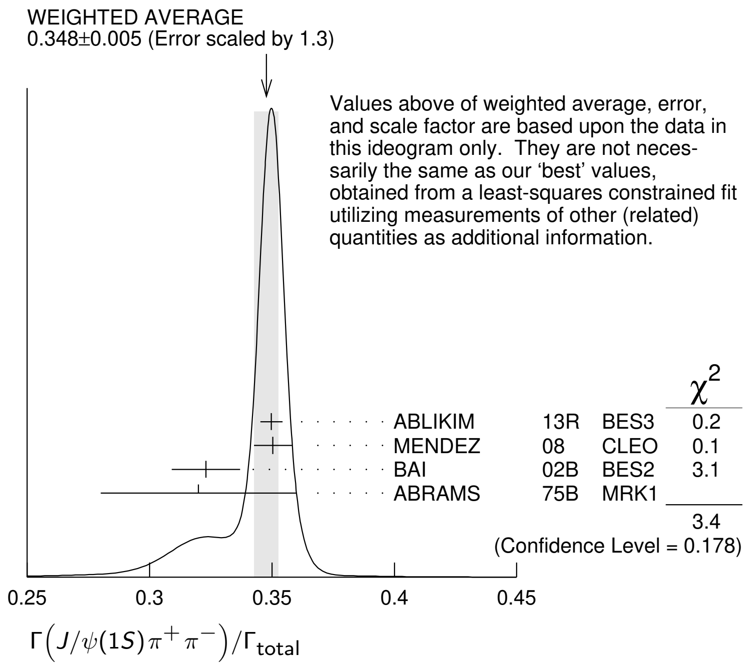
$\Gamma(J/\psi(1S)\pi^+\pi^-)/\Gamma_{total}$ — Γ_{12}/Γ

NODE=M071R12
NODE=M071R12

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.3468±0.0030 OUR FIT				
0.348 ±0.005 OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below.				
0.3498±0.0002±0.0045	20M	ABLIKIM 13R	BES3	$\psi(2S) \to J/\psi\pi^+\pi^-$
0.3504±0.0007±0.0077	565k	MENDEZ 08	CLEO	$\psi(2S) \to \ell^+\ell^-\pi^+\pi^-$
0.323 ±0.014		BAI 02B	BES2	e^+e^-
0.32 ±0.04		ABRAMS 75B	MRK1	$e^+e^- \to J/\psi\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.3354±0.0014±0.0110	60k	[1] ADAM 05A	CLEO	Repl. by MENDEZ 08

[1] Not independent from other values reported by ADAM 05A.

NODE=M071R;LINKAGE=AD



$\Gamma(e^+e^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ — Γ_7/Γ_{12}

NODE=M071R73
NODE=M071R73

VALUE	DOCUMENT ID	TECN	COMMENT
0.0229±0.0005 OUR FIT			
0.0252±0.0028±0.0011	[1] AUBERT 02B	BABR	e^+e^-

[1] Using $B(J/\psi(1S) \to e^+e^-) = 0.0593 \pm 0.0010$.

NODE=M071R73;LINKAGE=7A

$\Gamma(\mu^+\mu^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ — Γ_8/Γ_{12}

NODE=M071R63
NODE=M071R63

VALUE	DOCUMENT ID	TECN	COMMENT
0.0230±0.0017 OUR FIT			
0.0228±0.0018 OUR AVERAGE			
0.0230±0.0020±0.0012	[1] AAIJ 16Y	LHCB	$\Lambda_b^0 \to \psi(2S)X$
0.0216±0.0026±0.0014	[2] AUBERT 02B	BABR	e^+e^-
0.0327±0.0077±0.0072	[2] GRIBUSHIN 96	FMPS	$515\ \pi^-$ Be $\to 2\mu X$

[1] Using $B(J/\psi(1S) \to \mu^+\mu^-) = (5.961 \pm 0.033) \times 10^{-2}$.

NODE=M071R63;LINKAGE=A

[2] Using $B(J/\psi(1S) \to \mu^+\mu^-) = (5.88 \pm 0.10) \times 10^{-2}$.

NODE=M071R;LINKAGE=Q2

$\Gamma(\tau^+\tau^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ — Γ_9/Γ_{12}

NODE=M071R76
NODE=M071R76

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
8.8 ±1.1 OUR FIT			
8.73±1.39±1.57	BAI 02	BES	e^+e^-

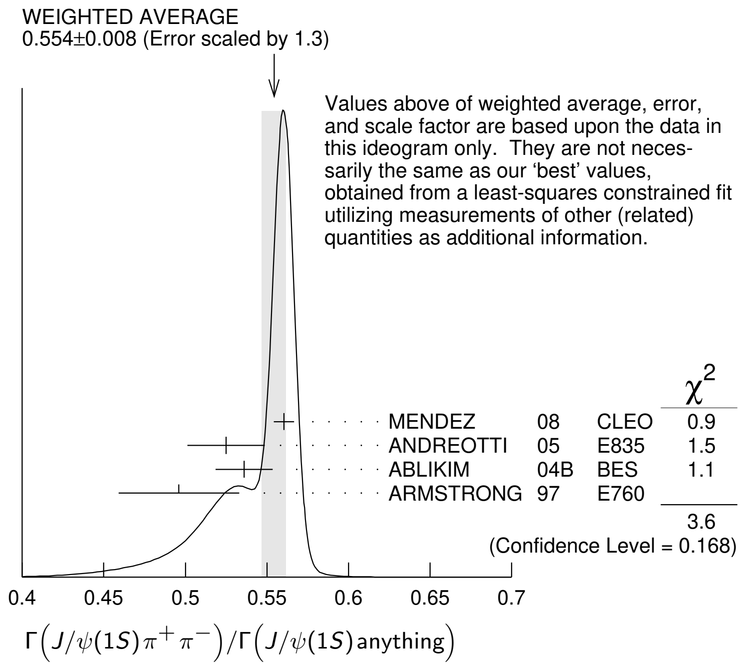
$\Gamma(J/\psi(1S)\pi^+\pi^-)/\Gamma(J/\psi(1S)\text{anything})$ — Γ_{12}/Γ_{10}

NODE=M071R70
NODE=M071R70

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.5645±0.0026 OUR FIT				
0.554 ±0.008 OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below.				
0.5604±0.0009±0.0062	565k	MENDEZ 08	CLEO	$\psi(2S) \to \ell^+\ell^-\pi^+\pi^-$
0.525 ±0.009 ±0.022	4k	ANDREOTTI 05	E835	$\psi(2S) \to J/\psi X$
0.536 ±0.007 ±0.016	20k	[1,2] ABLIKIM 04B	BES	$\psi(2S) \to J/\psi X$
0.496 ±0.037		ARMSTRONG 97	E760	$\overline{p}p \to \psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.5637±0.0027±0.0046	60k	ADAM 05A	CLEO	Repl. by MENDEZ 08

[1] From a fit to the J/ψ recoil mass spectra.
[2] ABLIKIM 04B quotes B($\psi(2S) \to J/\psi X$) / B($\psi(2S) \to J/\psi \pi^+\pi^-$).

NODE=M071R;LINKAGE=AB
NODE=M071R;LINKAGE=AL



$\Gamma(J/\psi(1S)\,\text{neutrals})/\Gamma(J/\psi(1S)\pi^+\pi^-)$
$\Gamma_{11}/\Gamma_{12} = (0.9761\Gamma_{13}+0.719\Gamma_{14}+0.343\Gamma_{163}+0.190\Gamma_{164})/\Gamma_{12}$

NODE=M071R11

VALUE	DOCUMENT ID	TECN	COMMENT
0.732±0.008 OUR FIT			
0.73 ±0.09	TANENBAUM 76	MRK1	e^+e^-

$\Gamma(J/\psi(1S)\pi^0\pi^0)/\Gamma_{total}$ — Γ_{13}/Γ

NODE=M071R17

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.1824±0.0031 OUR FIT				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.1769±0.0008±0.0053	61k	[1] MENDEZ 08	CLEO	$\psi(2S) \to \ell^+\ell^- 2\pi^0$
0.1652±0.0014±0.0058	13.4k	[2] ADAM 05A	CLEO	Repl. by MENDEZ 08

[1] Not independent from other measurements of MENDEZ 08.
[2] Not independent from other values reported by ADAM 05A.

NODE=M071R17;LINKAGE=ME
NODE=M071R17;LINKAGE=AD

$\Gamma(J/\psi(1S)\pi^0\pi^0)/\Gamma(J/\psi(1S)\,\text{anything})$ — Γ_{13}/Γ_{10}

NODE=M071R69

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.2968±0.0031 OUR FIT				
0.320 ±0.012 OUR AVERAGE				
0.300 ±0.008 ±0.022	1655 ± 44	ANDREOTTI 05	E835	$\psi(2S) \to J/\psi X$
0.328 ±0.013 ±0.008		AMBROGIANI 00A	E835	$p\overline{p} \to \psi(2S)$
0.323 ±0.033		ARMSTRONG 97	E760	$\overline{p}p \to \psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.2829±0.0012±0.0056	61k	MENDEZ 08	CLEO	$\psi(2S) \to \ell^+\ell^- 2\pi^0$
0.2776±0.0025±0.0043	13.4k	ADAM 05A	CLEO	Repl. by MENDEZ 08

$\Gamma(J/\psi(1S)\pi^0\pi^0)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ — Γ_{13}/Γ_{12}

NODE=M071R14

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.526 ±0.008 OUR FIT				
0.513 ±0.022 OUR AVERAGE Error includes scale factor of 2.2.				
0.5047±0.0022±0.0102	61k	MENDEZ 08	CLEO	$\psi(2S) \to \ell^+\ell^- 2\pi^0$
0.570 ±0.009 ±0.026	14k	[1] ABLIKIM 04B	BES	$\psi(2S) \to J/\psi X$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.4924±0.0047±0.0086	73k	[2,3] ADAM 05A	CLEO	Repl. by MENDEZ 08
0.571 ±0.018 ±0.044		[4] ANDREOTTI 05	E835	$\psi(2S) \to J/\psi X$
0.53 ±0.06		TANENBAUM 76	MRK1	e^+e^-
0.64 ±0.15		[5] HILGER 75	SPEC	e^+e^-

[1] From a fit to the J/ψ recoil mass spectra.
[2] Not independent from other values reported by ADAM 05A.
[3] Using 13,217 $J/\psi\pi^0\pi^0$ and 60,010 $J/\psi\pi^+\pi^-$ events.
[4] Not independent from other values reported by ANDREOTTI 05.
[5] Ignoring the $J/\psi(1S)\eta$ and $J/\psi(1S)\gamma\gamma$ decays.

NODE=M071R14;LINKAGE=AB
NODE=M071R14;LINKAGE=AD
NODE=M071R14;LINKAGE=AM
NODE=M071R;LINKAGE=AN
NODE=M071R;LINKAGE=I

$\Gamma(J/\psi(1S)\eta)/\Gamma_{total}$ Γ_{14}/Γ

NODE=M071R15

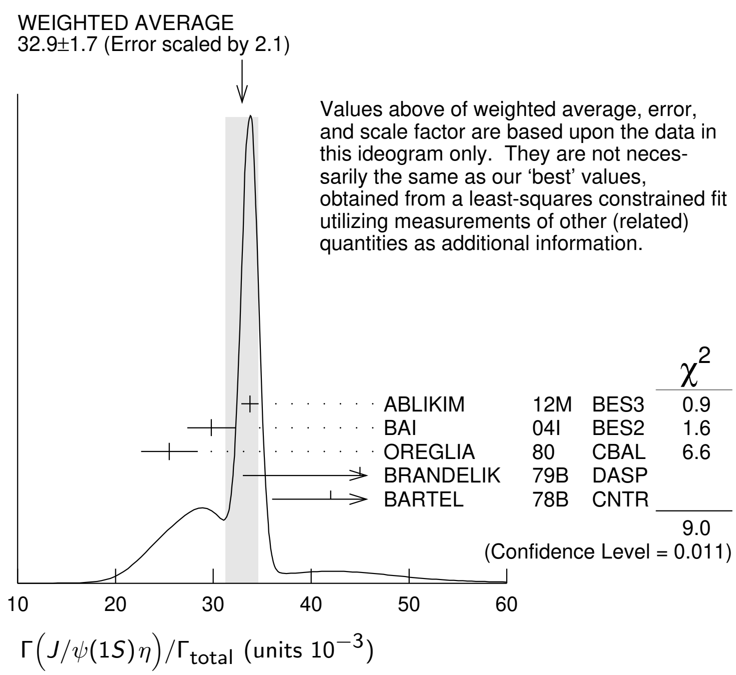
VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
33.7 ± 0.5 OUR FIT					
32.9 ± 1.7 OUR AVERAGE	Error includes scale factor of 2.1. See the ideogram below.				
33.75 ± 0.17 ± 0.86	68.2k	ABLIKIM	12M	BES3	$e^+e^- \to \ell^+\ell^- 2\gamma$
29.8 ± 0.9 ± 2.3	5.7k	BAI	04I	BES2	$\psi(2S) \to J/\psi\gamma\gamma$
25.5 ± 2.9	386	[1] OREGLIA	80	CBAL	$e^+e^- \to J/\psi 2\gamma$
45 ± 12	17	[2] BRANDELIK	79B	DASP	$e^+e^- \to J/\psi 2\gamma$
42 ± 6	164	[2] BARTEL	78B	CNTR	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
34.3 ± 0.4 ± 0.9	18.4k	[3] MENDEZ	08	CLEO	$\psi(2S) \to \ell^+\ell^-\eta$
32.5 ± 0.6 ± 1.1	2.8k	[4] ADAM	05A	CLEO	Repl. by MENDEZ 08
43 ± 8	44	TANENBAUM	76	MRK1	e^+e^-

[1] Recalculated by us using $B(J/\psi(1S) \to \ell^+\ell^-) = 0.1181 \pm 0.0020$. NODE=M071R;LINKAGE=3Q

[2] Recalculated by us using $B(J/\psi(1S) \to \mu^+\mu^-) = 0.0588 \pm 0.0010$. NODE=M071R;LINKAGE=2Q

[3] Not independent from other measurements of MENDEZ 08. NODE=M071R15;LINKAGE=ME

[4] Not independent from other values reported by ADAM 05A. NODE=M071R15;LINKAGE=AD



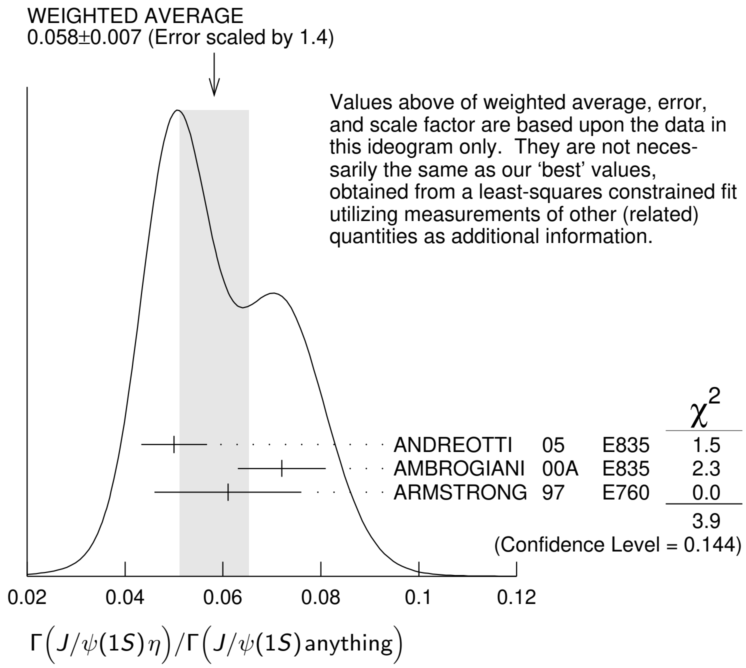
$\Gamma(J/\psi(1S)\eta)/\Gamma(J/\psi(1S)\text{anything})$ Γ_{14}/Γ_{10}

NODE=M071R68

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0549 ± 0.0008 OUR FIT					
0.058 ± 0.007 OUR AVERAGE	Error includes scale factor of 1.4. See the ideogram below.				
0.050 ± 0.006 ± 0.003	298 ± 20	ANDREOTTI	05	E835	$\psi(2S) \to J/\psi X$
0.072 ± 0.009		AMBROGIANI	00A	E835	$p\overline{p} \to \psi(2S)$
0.061 ± 0.015		ARMSTRONG	97	E760	$\overline{p}p \to \psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.0549 ± 0.0006 ± 0.0009	18.4k	[1] MENDEZ	08	CLEO	$\psi(2S) \to \ell^+\ell^-\eta$
0.0546 ± 0.0010 ± 0.0007	2.8k	ADAM	05A	CLEO	Repl. by MENDEZ 08

OCCUR=2

[1] Not independent from other measurements of MENDEZ 08. NODE=M071R68;LINKAGE=ME



$\Gamma\big(J/\psi(1S)\eta\big)/\Gamma\big(J/\psi(1S)\pi^+\pi^-\big)$ Γ_{14}/Γ_{12}

NODE=M071R71
NODE=M071R71

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0972±0.0014 OUR FIT					
0.0979±0.0018 OUR AVERAGE					
0.0979±0.0010±0.0015	18.4k	MENDEZ	08	CLEO	$\psi(2S) \to \ell^+\ell^-\eta$
0.098 ±0.005 ±0.010	2k	[1] ABLIKIM	04B	BES	$\psi(2S) \to J/\psi X$
0.091 ±0.021		[2] HIMEL	80	MRK2	$e^+e^- \to \psi(2S) X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.0968±0.0019±0.0013	2.8k	[3] ADAM	05A	CLEO	Repl. by MENDEZ 08
0.095 ±0.007 ±0.007		[4] ANDREOTTI	05	E835	$\psi(2S) \to J/\psi X$

[1] From a fit to the J/ψ recoil mass spectra. NODE=M071R71;LINKAGE=AB

[2] The value for B($\psi(2S) \to J/\psi(1s)\eta$) reported in HIMEL 80 is derived using B(ψ(2S)) $\to$ $J/\psi(1S)\pi^+\pi^-$) = (33 ± 3))% and B($J/\psi(1S) \to \ell^+\ell^-$) = 0.138 ± 0.018. Calculated by us using B($J/\psi(1S) \to \ell^+\ell^-$) = (0.1181 ± 0.0020). NODE=M071R;LINKAGE=8H

[3] Not independent from other values reported by ADAM 05A. NODE=M071R71;LINKAGE=AD

[4] Not independent from other values reported by ANDREOTTI 05. NODE=M071R71;LINKAGE=AN

$\Gamma\big(J/\psi(1S)\pi^0\big)/\Gamma_{total}$ Γ_{15}/Γ

NODE=M071R16
NODE=M071R16

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
12.68±0.32 OUR AVERAGE					
12.6 ±0.2 ±0.3	4.1k	ABLIKIM	12M	BES3	$e^+e^- \to \ell^+\ell^- 2\gamma$
13.3 ±0.8 ±0.3	530	MENDEZ	08	CLEO	$\psi(2S) \to \ell^+\ell^- 2\gamma$
14.3 ±1.4 ±1.2	280	BAI	04I	BES2	$\psi(2S) \to J/\psi\gamma\gamma$
14 ±6	7	HIMEL	80	MRK2	e^+e^-
9 ±2 ±1	23	[1] OREGLIA	80	CBAL	$\psi(2S) \to J/\psi 2\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
13 ±1 ±1	88	ADAM	05A	CLEO	Repl. by MENDEZ 08

[1] Recalculated by us using B($J/\psi(1S) \to \ell^+\ell^-$) = 0.1181 ± 0.0020. NODE=M071R16;LINKAGE=3Q

$\Gamma\big(J/\psi(1S)\pi^0\big)/\Gamma\big(J/\psi(1S)\text{anything}\big)$
$\Gamma_{15}/\Gamma_{10} = \Gamma_{15}/(\Gamma_{12}+\Gamma_{13}+\Gamma_{14}+0.343\Gamma_{163}+0.190\Gamma_{164})$

NODE=M071S25
NODE=M071S25

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.213±0.012±0.003	527	[1] MENDEZ	08	CLEO	$e^+e^- \to J/\psi\gamma\gamma$
0.22 ±0.02 ±0.01		[2] ADAM	05A	CLEO	$e^+e^- \to \psi(2S) \to J/\psi\gamma\gamma$

[1] Not independent from other values reported by MENDEZ 08. Supersedes ADAM 05A. NODE=M071S25;LINKAGE=ME

[2] Not independent from other values reported by ADAM 05A. NODE=M071S25;LINKAGE=AD

$\Gamma(J/\psi(1S)\pi^0)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ Γ_{15}/Γ_{12}

NODE=M071S26
NODE=M071S26

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.380\pm0.022\pm0.005$	527	[1] MENDEZ	08	CLEO	$e^+e^- \to J/\psi\gamma\gamma$
$0.39\ \pm0.04\ \pm0.01$		[2] ADAM	05A	CLEO	$e^+e^- \to \psi(2S) \to J/\psi\gamma\gamma$

[1] Not independent from other values reported by MENDEZ 08. Supersedes ADAM 05A.
[2] Not independent from other values reported by ADAM 05A.

NODE=M071S26;LINKAGE=ME
NODE=M071S26;LINKAGE=AD

HADRONIC DECAYS

NODE=M071310

$\Gamma(\pi^+\pi^-)/\Gamma_{total}$ Γ_{16}/Γ

NODE=M071R20
NODE=M071R20

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.78±0.26 OUR AVERAGE						
$0.76\pm0.25\pm0.06$		30	[1] METREVELI	12		$\psi(2S) \to \pi^+\pi^-$
$8\ \ \pm5$			BRANDELIK	79C	DASP	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<2.1	90		DOBBS	06A	CLEO	$e^+e^- \to \psi(2S)$
<5	90		FELDMAN	77	MRK1	e^+e^-

[1] Obtained by analyzing CLEO-c data but not authored by the CLEO Collaboration. Using $\psi(3770) \to \pi^+\pi^-$ for continuum subtraction.

NODE=M071R20;LINKAGE=ME

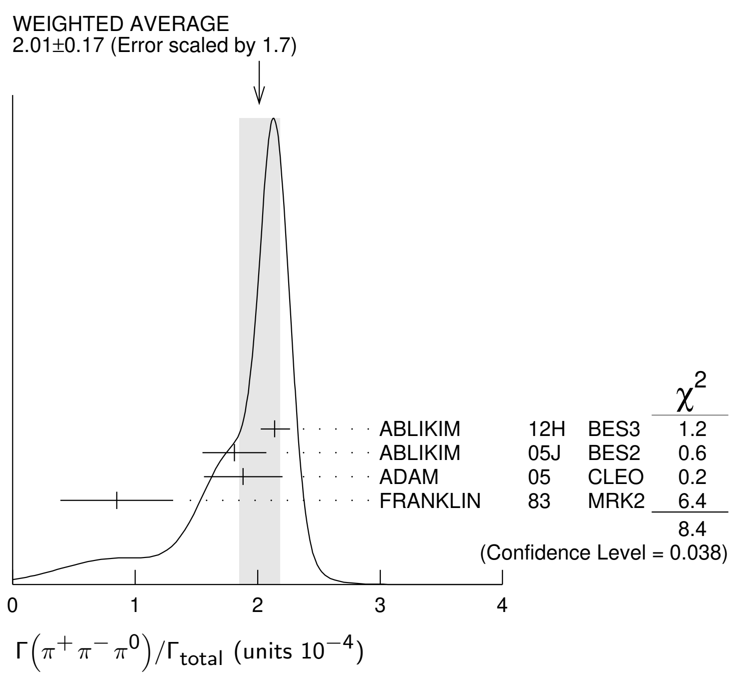
$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{17}/Γ

NODE=M071R36
NODE=M071R36

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.01±0.17 OUR AVERAGE Error includes scale factor of 1.7. See the ideogram below.					
$2.14\pm0.03^{+0.12}_{-0.11}$	7k	[1] ABLIKIM	12H	BES3	$e^+e^- \to \psi(2S)$
$1.81\pm0.18\pm0.19$	260 ± 19	[2] ABLIKIM	05J	BES2	$e^+e^- \to \psi(2S)$
$1.88^{+0.16}_{-0.15}\pm0.28$	194	ADAM	05	CLEO	$e^+e^- \to \psi(2S)$
0.85 ± 0.46	4	FRANKLIN	83	MRK2	$e^+e^- \to$ hadrons

[1] From $\psi(2S) \to \pi^+\pi^-\pi^0$ events directly. The quoted systematic error includes a contribution of 4% (added in quadrature) from the uncertainty on the number of $\psi(2S)$ events.
[2] From a PW analysis of $\psi(2S) \to \pi^+\pi^-\pi^0$.

NODE=M071R36;LINKAGE=AB
NODE=M071R;LINKAGE=AK



$\Gamma(\rho(770)\pi \to \pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{18}/Γ

NODE=M071R26
NODE=M071R26

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.32±0.12 OUR AVERAGE Error includes scale factor of 1.8.						
$0.51\pm0.07\pm0.11$			[1] ABLIKIM	05J	BES2	$\psi(2S) \to \rho(770)\pi \to \pi^+\pi^-\pi^0$
$0.24^{+0.08}_{-0.07}\pm0.02$		22	ADAM	05	CLEO	$e^+e^- \to \psi(2S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<0.83	90	1	FRANKLIN	83	MRK2	e^+e^-
<10	90		BARTEL	76	CNTR	e^+e^-
<10	90		[2] ABRAMS	75	MRK1	e^+e^-

[1] From a PW analysis of $\psi(2S) \to \pi^+\pi^-\pi^0$.
[2] Final state $\rho^0\pi^0$.

NODE=M071R26;LINKAGE=AK
NODE=M071R;LINKAGE=N

$\Gamma(\rho(2150)\pi \to \pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{19}/Γ

NODE=M071R57
NODE=M071R57

VALUE (units 10^{-4})	*DOCUMENT ID*		*TECN*	*COMMENT*
$1.94 \pm 0.25^{+1.15}_{-0.34}$	[1] ABLIKIM	05J	BES2	$\psi(2S) \to \rho(2150)\pi \to \pi^+\pi^-\pi^0$

[1] From a PW analysis of $\psi(2S) \to \pi^+\pi^-\pi^0$.

NODE=M071R57;LINKAGE=AK

$\Gamma(2(\pi^+\pi^-))/\Gamma_{total}$ — Γ_{20}/Γ

NODE=M071R27
NODE=M071R27

VALUE (units 10^{-4})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
2.4±0.6 OUR AVERAGE	Error includes scale factor of 2.2.				
2.2±0.2±0.2	308	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to 2(\pi^+\pi^-)$
4.5±1.0		TANENBAUM	78	MRK1	e^+e^-

$\Gamma(\rho^0\pi^+\pi^-)/\Gamma_{total}$ — Γ_{21}/Γ

NODE=M071R33
NODE=M071R33

VALUE (units 10^{-4})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
2.2±0.6 OUR AVERAGE	Error includes scale factor of 1.4.				
2.0±0.2±0.4	285.5	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to 2(\pi^+\pi^-)$
4.2±1.5		TANENBAUM	78	MRK1	e^+e^-

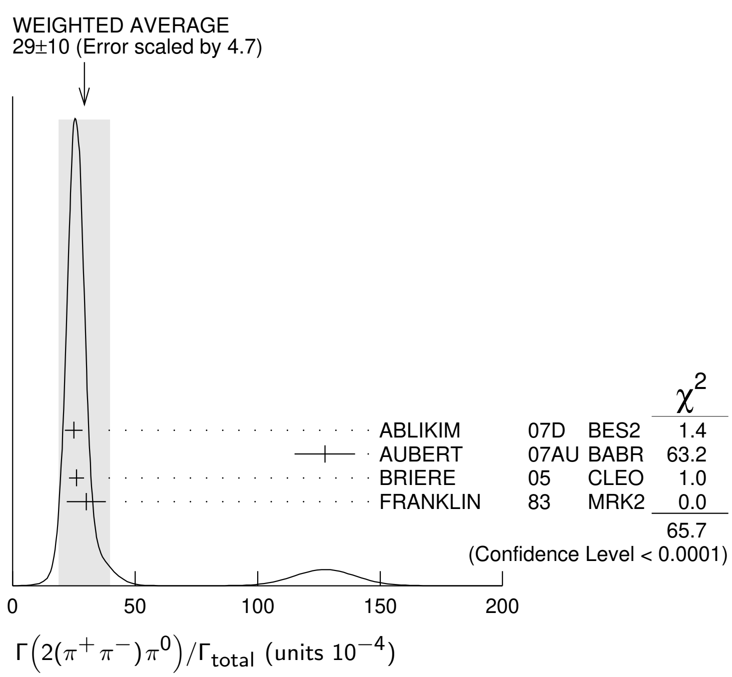
$\Gamma(2(\pi^+\pi^-)\pi^0)/\Gamma_{total}$ — Γ_{22}/Γ

NODE=M071R22
NODE=M071R22

VALUE (units 10^{-4})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
29 ±10 OUR AVERAGE	Error includes scale factor of 4.7. See the ideogram below.				
24.9± 0.7±3.6	2173	ABLIKIM	07D	BES2	$e^+e^- \to \psi(2S)$
127 ±12 ±2	410	[1] AUBERT	07AU	BABR	$10.6\ e^+e^- \to 2(\pi^+\pi^-)\pi^0\gamma$
26.1± 0.7±3.0	1703	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to 2(\pi^+\pi^-)\pi^0$
30 ± 8	42	FRANKLIN	83	MRK2	e^+e^-

[1] AUBERT 07AU reports $[\Gamma(\psi(2S) \to 2(\pi^+\pi^-)\pi^0)/\Gamma_{total}] \times [\Gamma(\psi(2S) \to e^+e^-)] = (297 \pm 22 \pm 18) \times 10^{-4}$ keV which we divide by our best value $\Gamma(\psi(2S) \to e^+e^-) = 2.33 \pm 0.04$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M071R22;LINKAGE=UB



$\Gamma(\rho a_2(1320))/\Gamma_{total}$ Γ_{23}/Γ

NODE=M071R65

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
2.55±0.73±0.47		112 ± 31	BAI	04C	BES2	$\psi(2S) \to 2(\pi^+\pi^-)\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<2.3	90		BAI	98J	BES	e^+e^-

$\Gamma(3(\pi^+\pi^-))/\Gamma_{total}$ Γ_{27}/Γ

NODE=M071R32

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.5 ±2.0 OUR AVERAGE Error includes scale factor of 2.8.					
5.45±0.42±0.87	671	ABLIKIM	05H	BES2	$e^+e^- \to \psi(2S) \to 3(\pi^+\pi^-)$
1.5 ±1.0		[1] TANENBAUM	78	MRK1	e^+e^-

[1] Assuming entirely strong decay.

NODE=M071R32;LINKAGE=K

$\Gamma(3(\pi^+\pi^-)\pi^0)/\Gamma_{total}$ Γ_{29}/Γ

NODE=M071R37

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
35±16	6	FRANKLIN	83	MRK2	$e^+e^- \to$ hadrons

$\Gamma(\eta\pi^+\pi^-)/\Gamma_{total}$ Γ_{31}/Γ

NODE=M071S06

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.6	90	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to 2(\pi^+\pi^-)\pi^0$

$\Gamma(\eta\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{32}/Γ

NODE=M071S07

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
9.5±0.7±1.5		[1] BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to$ hadr
• • • We do not use the following data for averages, fits, limits, etc. • • •					
10.3±0.8±1.4	201.7	[2] BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to \eta 3\pi(\eta \to \gamma\gamma)$
8.1±1.4±1.6	50.0	[2] BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to \eta 3\pi(\eta \to 3\pi)$

OCCUR=2

OCCUR=3

[1] Average of $\eta \to \gamma\gamma$ and $\eta \to 3\pi$.

[2] Not independent from other values reported by BRIERE 05.

NODE=M071S07;LINKAGE=BR

NODE=M071S07;LINKAGE=BI

$\Gamma(\rho\eta)/\Gamma_{total}$ Γ_{37}/Γ

NODE=M071R94

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
2.2 ±0.6 OUR AVERAGE Error includes scale factor of 1.1.					
$3.0\ ^{+1.1}_{-0.9}\ \pm0.2$	18	ADAM	05	CLEO	$e^+e^- \to \psi(2S)$
$1.78^{+0.67}_{-0.62}\pm0.17$	13	ABLIKIM	04L	BES	$e^+e^- \to \psi(2S)$

$\Gamma(\eta'\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{38}/Γ

NODE=M071S08

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
4.5±1.6±1.3	12.8	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to$ hadr

$\Gamma(\eta'\rho)/\Gamma_{total}$ Γ_{39}/Γ

NODE=M071R93

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{1.87\ ^{+1.64}_{-1.11}\ \pm0.33}$	2	ABLIKIM	04L	BES	$e^+e^- \to \psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.02 ±0.11 ±0.24	143	[1] ABLIKIM	17AK	BES3	$e^+e^- \to \psi(2S)$
0.569±0.128±0.236	80	[2] ABLIKIM	17AK	BES3	$e^+e^- \to \psi(2S)$

OCCUR=2

[1] Destructive-interference solution of a partial wave analysis of the decay $\psi(2S) \to \pi^+\pi^-\eta'$.

NODE=M071R93;LINKAGE=A

[2] Constructive-interference solution of a partial wave analysis of the decay $\psi(2S) \to \pi^+\pi^-\eta'$.

NODE=M071R93;LINKAGE=B

$\Gamma(\omega\pi^0)/\Gamma_{total}$ Γ_{40}/Γ

NODE=M071R92

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
2.1 ±0.6 OUR AVERAGE					
$2.5\ ^{+1.2}_{-1.0}\ \pm0.2$	14	ADAM	05	CLEO	$e^+e^- \to \psi(2S)$
$1.87^{+0.68}_{-0.62}\pm0.28$	14	ABLIKIM	04L	BES	$e^+e^- \to \psi(2S)$

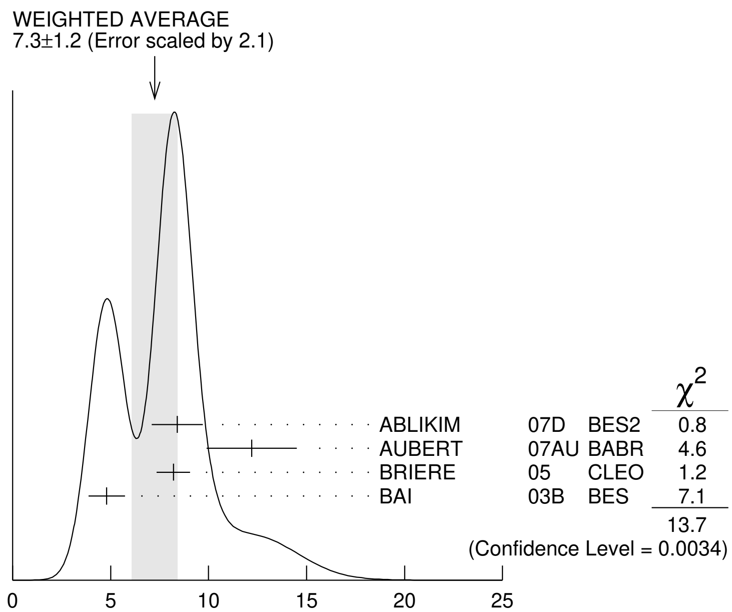
$\Gamma(\omega\pi^+\pi^-)/\Gamma_{total}$ Γ_{41}/Γ

NODE=M071R77
NODE=M071R77

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
7.3±1.2 OUR AVERAGE	Error includes scale factor of 2.1. See the ideogram below.			
8.4±0.5±1.2	386	ABLIKIM 07D	BES2	$e^+e^- \to \psi(2S)$
12.2±2.2±0.7	37	[1] AUBERT 07AU	BABR	10.6 $e^+e^- \to \omega\pi^+\pi^-\gamma$
8.2±0.5±0.7	391	BRIERE 05	CLEO	$e^+e^- \to \psi(2S) \to 2(\pi^+\pi^-)\pi^0$
4.8±0.6±0.7	100 ± 22	[2] BAI 03B	BES	$\psi(2S) \to 2(\pi^+\pi^-)\pi^0$

[1] AUBERT 07AU quotes $\Gamma_{ee}^{\psi(2S)} \cdot B(\psi(2S) \to \omega\pi^+\pi^-) \cdot B(\omega \to 3\pi) = 2.69 \pm 0.73 \pm 0.16$ eV. NODE=M071R77;LINKAGE=UB

[2] Normalized to $B(\psi(2S) \to J/\psi\pi^+\pi^-) = 0.305 \pm 0.016$. NODE=M071R77;LINKAGE=B3



$\Gamma(\omega\pi^+\pi^-)/\Gamma_{total}$ (units 10^{-4})

$\Gamma(b_1^\pm\pi^\mp)/\Gamma_{total}$ Γ_{43}/Γ

NODE=M071R40
NODE=M071R40

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
4.0 ±0.6 OUR AVERAGE	Error includes scale factor of 1.1.			
5.1 ±0.6 ±0.8	202	ABLIKIM 07D	BES2	$e^+e^- \to \psi(2S)$
$4.18^{+0.43}_{-0.42}\pm0.92$	170	ADAM 05	CLEO	$e^+e^- \to \psi(2S)$
3.2 ±0.6 ±0.5	61 ± 11	[1,2] BAI 03B	BES	$\psi(2S) \to 2(\pi^+\pi^-)\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
5.2 ±0.8 ±1.0		[1] BAI 99C	BES	Repl. by BAI 03B

[1] Assuming $B(b_1 \to \omega\pi)$=1. NODE=M071R;LINKAGE=M1

[2] Normalized to $B(\psi(2S) \to J/\psi\pi^+\pi^-) = 0.305 \pm 0.016$. NODE=M071R40;LINKAGE=B3

$\Gamma(\omega f_2(1270))/\Gamma_{total}$ Γ_{44}/Γ

NODE=M071R64
NODE=M071R64

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
2.2 ±0.4 OUR AVERAGE					
2.3 ±0.5 ±0.4		57	ABLIKIM 07D	BES2	$e^+e^- \to \psi(2S)$
2.05±0.41±0.38		62±12	BAI 04C	BES2	$\psi(2S) \to 2(\pi^+\pi^-)\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.5	90		[1] BAI 03B	BES	$\psi(2S) \to 2(\pi^+\pi^-)\pi^0$
<1.7	90		BAI 98J	BES	Repl. by BAI 03B

[1] Normalized to $B(\psi(2S) \to J/\psi\pi^+\pi^-) = 0.305 \pm 0.016$. NODE=M071R64;LINKAGE=B3

$\Gamma(b_1^0\pi^0)/\Gamma_{total}$ Γ_{47}/Γ

NODE=M071R21
NODE=M071R21

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
$\mathbf{2.35^{+0.47}_{-0.42}\pm0.40}$	45	ADAM 05	CLEO	$e^+e^- \to \psi(2S)$

$\Gamma(\omega\eta)/\Gamma_{total}$ Γ_{48}/Γ

NODE=M071R95
NODE=M071R95

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<1.1	90	ADAM	05	CLEO	$e^+e^- \to \psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<3.1	90	ABLIKIM	04K	BES	$e^+e^- \to \psi(2S)$

$\Gamma(\omega\eta')/\Gamma_{total}$ Γ_{49}/Γ

NODE=M071R91
NODE=M071R91

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$3.2^{+2.4}_{-2.0}\pm0.7$	4	[1] ABLIKIM	04K	BES	$e^+e^- \to \psi(2S)$

[1] Calculated combining $\eta' \to \gamma\rho$ and $\eta\pi^+\pi^-$ channels.

NODE=M071R91;LINKAGE=AI

$\Gamma(\phi\pi^0)/\Gamma_{total}$ Γ_{50}/Γ

NODE=M071R96
NODE=M071R96

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<0.04	90	ABLIKIM	12L	BES3	$e^+e^- \to \psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.7	90	ADAM	05	CLEO	$e^+e^- \to \psi(2S)$
<0.4	90	ABLIKIM	04K	BES	$e^+e^- \to \psi(2S)$

$\Gamma(\phi\pi^+\pi^-)/\Gamma_{total}$ Γ_{51}/Γ

NODE=M071R80
NODE=M071R80

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.18±0.26 OUR AVERAGE	Error includes scale factor of 1.5. See the ideogram below.				
2.3 ±0.8 ±0.1	19 ± 6	LEES	12F	BABR	10.6 $e^+e^- \to \pi^+\pi^-K^+K^-\gamma$
0.9 ±0.2 ±0.1	47.6	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to K^+K^-\pi^+\pi^-$
1.5 ±0.2 ±0.2	51.5±8.3	[1] BAI	03B	BES	$\psi(2S) \to K^+K^-\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.45±0.96±0.04	10 ± 4	[2,3] AUBERT	07AK	BABR	10.6 $e^+e^- \to \pi^+\pi^-K^+K^-\gamma$

[1] Normalized to B($\psi(2S) \to J/\psi\pi^+\pi^-$) = 0.305 ± 0.016.

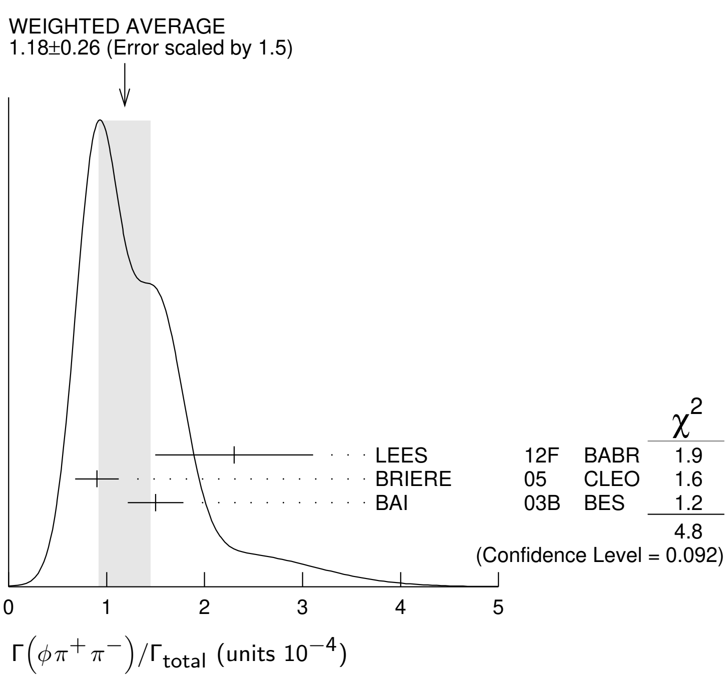
NODE=M071R80;LINKAGE=B3

[2] Superseded by LEES 12F. AUBERT 07AK reports $[\Gamma(\psi(2S) \to \phi\pi^+\pi^-)/\Gamma_{total}] \times [\Gamma(\psi(2S) \to e^+e^-)] = (0.57 \pm 0.22 \pm 0.04) \times 10^{-3}$ keV which we divide by our best value $\Gamma(\psi(2S) \to e^+e^-) = 2.33 \pm 0.04$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M071R80;LINKAGE=BE

[3] Using B($\phi \to K^+K^-$) = (49.3 ± 0.6)%.

NODE=M071R80;LINKAGE=UB



$\Gamma(\phi f_0(980) \to \pi^+\pi^-)/\Gamma_{total}$ Γ_{52}/Γ

NODE=M071R83

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.75±0.33 OUR AVERAGE	Error includes scale factor of 1.6.				
1.5 ±0.5 ±0.1	12 ± 4	LEES	12F	BABR	10.6 $e^+e^- \to \pi^+\pi^- K^+K^-\gamma$
0.6 ±0.2 ±0.1	18.4±6.4	[1] BAI	03B	BES	$\psi(2S) \to K^+K^-\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.46±0.71±0.02	6 ± 3	[2,3] AUBERT	07AK	BABR	10.6 $e^+e^- \to \pi^+\pi^- K^+K^-\gamma$

[1] Normalized to B($\psi(2S) \to J/\psi\pi^+\pi^-$) = 0.305 ± 0.016. NODE=M071R83;LINKAGE=B3

[2] Superseded by LEES 12F. AUBERT 07AK reports [$\Gamma(\psi(2S) \to \phi f_0(980) \to \pi^+\pi^-)/\Gamma_{total}$] × [$\Gamma(\psi(2S) \to e^+e^-)$] = (0.34 ± 0.16 ± 0.04) × 10^{-3} keV which we divide by our best value $\Gamma(\psi(2S) \to e^+e^-)$ = 2.33 ± 0.04 keV. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M071R83;LINKAGE=BE

[3] Using B($\phi \to K^+K^-$) = (49.3 ± 0.6)%. NODE=M071R83;LINKAGE=UB

$\Gamma(\phi\eta)/\Gamma_{total}$ Γ_{53}/Γ

NODE=M071R89

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
3.10±0.31 OUR AVERAGE					
3.14±0.23±0.23	0.2k	ABLIKIM	12L	BES3	$e^+e^- \to \psi(2S)$
2.0 $^{+1.5}_{-1.1}$ ±0.4	6	ADAM	05	CLEO	$e^+e^- \to \psi(2S)$
3.3 ±1.1 ±0.5	17	ABLIKIM	04K	BES	$e^+e^- \to \psi(2S)$

$\Gamma(\eta\phi(2170),\ \phi(2170) \to \phi f_0(980),\ f_0 \to \pi^+\pi^-)/\Gamma_{total}$ Γ_{54}/Γ

NODE=M071P19

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<2.2 × 10^{-6}	90	ABLIKIM	19I	BES3	$e^+e^- \to \eta\phi f_0(980)$

$\Gamma(\phi\eta')/\Gamma_{total}$ Γ_{55}/Γ

NODE=M071R90

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
1.54±0.20 OUR AVERAGE					
1.51±0.16±0.12	201	ABLIKIM	19BA	BES3	$e^+e^- \to \psi(2S)$
3.1 ±1.4 ±0.7	8	[1] ABLIKIM	04K	BES	$e^+e^- \to \psi(2S)$

[1] Calculated combining $\eta' \to \gamma\rho$ and $\eta\pi^+\pi^-$ channels. NODE=M071R;LINKAGE=AI

$\Gamma(\phi f_1(1285))/\Gamma_{total}$ Γ_{56}/Γ

NODE=M071P22

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
3.0±0.4±1.3	234	[1] ABLIKIM	19BA	BES3	$e^+e^- \to \psi(2S)$

[1] ABLIKIM 19BA reports [$\Gamma(\psi(2S) \to \phi f_1(1285))/\Gamma_{total}$] × [B($f_1(1285) \to \eta\pi^+\pi^-$)] = (1.03 ± 0.10 ± 0.09) × 10^{-5} which we divide by our best value B($f_1(1285) \to \eta\pi^+\pi^-$) = (35 ± 15) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M071P22;LINKAGE=B

$\Gamma(\phi\eta(1405) \to \phi\pi^+\pi^-\eta)/\Gamma_{total}$ Γ_{57}/Γ

NODE=M071P24

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
8.46±1.37±0.92	195	ABLIKIM	19BA	BES3	$e^+e^- \to \psi(2S)$

$\Gamma(\phi f_2'(1525))/\Gamma_{total}$ Γ_{58}/Γ

NODE=M071R67

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.44±0.12±0.11		20 ± 6	BAI	04C		$\psi(2S) \to 2(K^+K^-)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.45	90		BAI	98J	BES	$e^+e^- \to 2(K^+K^-)$

$\Gamma(K^+K^-)/\Gamma_{total}$ Γ_{59}/Γ

NODE=M071R23

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
7.48±0.23±0.39		1.3k	[1] METREVELI	12		$\psi(2S) \to K^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
6.2 ±1.5 ±0.2		66	[2,3] LEES	15J	BABR	$e^+e^- \to K^+K^-\gamma$
8.3 ±1.5 ±0.2		66	[3,4] LEES	15J	BABR	$e^+e^- \to K^+K^-\gamma$
6.3 ±0.6 ±0.3			[5] DOBBS	06A	CLEO	e^+e^-
10 ±7			[5] BRANDELIK	79C	DASP	e^+e^-
< 5	90		FELDMAN	77	MRK1	e^+e^-

OCCUR=2

[1] Obtained by analyzing CLEO-c data but not authored by the CLEO Collaboration. NODE=M071R23;LINKAGE=ME

[2] $\sin\phi > 0$. NODE=M071R23;LINKAGE=A

[3] Using $\Gamma(\psi(2S) \to e^+e^-)$ = (2.37 ± 0.04) keV. NODE=M071R23;LINKAGE=B

[4] $\sin\phi < 0$. NODE=M071R23;LINKAGE=C

[5] Interference with non-resonant K^+K^- production not taken into account. NODE=M071R23;LINKAGE=BA

$\Gamma(K^+K^-\pi^+)/\Gamma_{total}$ Γ_{60}/Γ

NODE=M071R24
NODE=M071R24

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
7.3±0.5 OUR AVERAGE					
8.1±1.3±0.3	133	LEES	12F	BABR	10.6 $e^+e^- \to \pi^+\pi^-K^+K^-\gamma$
7.1±0.3±0.4	817.2	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to K^+K^-\pi^+\pi^-$
16 ±4		[1] TANENBAUM	78	MRK1	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
11.0±1.9±0.2	85	[2] AUBERT	07AK	BABR	10.6 $e^+e^- \to \pi^+\pi^-K^+K^-\gamma$

[1] Assuming entirely strong decay.

[2] Superseded by LEES 12F. AUBERT 07AK reports $[\Gamma(\psi(2S) \to K^+K^-\pi^+)/\Gamma_{total}] \times [\Gamma(\psi(2S) \to e^+e^-)] = (2.56 \pm 0.42 \pm 0.16) \times 10^{-3}$ keV which we divide by our best value $\Gamma(\psi(2S) \to e^+e^-) = 2.33 \pm 0.04$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M071R24;LINKAGE=K
NODE=M071R24;LINKAGE=BE

$\Gamma(K^+K^-\pi^0)/\Gamma_{total}$ Γ_{61}/Γ

NODE=M071R38
NODE=M071R38

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
4.07±0.16±0.26		0.9k	ABLIKIM	12L	BES3	$e^+e^- \to \psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<8.9	90	1	FRANKLIN	83	MRK2	$e^+e^- \to$ hadrons

$\Gamma(K^0_S K^0_S)/\Gamma_{total}$ Γ_{62}/Γ

NODE=M071R88
NODE=M071R88

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
<0.046	[1] BAI	04D	BES	e^+e^-

[1] Forbidden by *CP*.

NODE=M071R;LINKAGE=BA

$\Gamma(K^0_S K^0_L)/\Gamma_{total}$ Γ_{63}/Γ

NODE=M071R87
NODE=M071R87

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
5.34±0.33 OUR AVERAGE					
5.28±0.25±0.34	478 ± 23	[1] METREVELI	12		$\psi(2S) \to K^0_S K^0_L$
5.8 ±0.8 ±0.4		DOBBS	06A	CLEO	e^+e^-
5.24±0.47±0.48	156 ± 14	[2] BAI	04B	BES2	$\psi(2S) \to K^0_S K^0_L \to \pi^+\pi^-X$

[1] Obtained by analyzing CLEO-c data but not authored by the CLEO Collaboration.

[2] Using $B(K^0_S \to \pi^+\pi^-) = 0.6860 \pm 0.0027$.

NODE=M071R87;LINKAGE=ME
NODE=M071R;LINKAGE=KZ

$\Gamma(K^+K^-\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{66}/Γ

NODE=M071S10
NODE=M071S10

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
12.6±0.9 OUR AVERAGE					
18.9±5.7±0.3	32	[1] AUBERT	07AU	BABR	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\pi^0\gamma$
11.7±1.0±1.5	597	ABLIKIM	06G	BES2	$\psi(2S) \to K^+K^-\pi^+\pi^-\pi^0$
12.7±0.5±1.0	711.6	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to K^+K^-\pi^+\pi^-\pi^0$

[1] AUBERT 07AU reports $[\Gamma(\psi(2S) \to K^+K^-\pi^+\pi^-\pi^0)/\Gamma_{total}] \times [\Gamma(\psi(2S) \to e^+e^-)] = (44 \pm 13 \pm 3) \times 10^{-4}$ keV which we divide by our best value $\Gamma(\psi(2S) \to e^+e^-) = 2.33 \pm 0.04$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M071S10;LINKAGE=UB

$\Gamma(\omega f_0(1710) \to \omega K^+K^-)/\Gamma_{total}$ Γ_{67}/Γ

NODE=M071S20
NODE=M071S20

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
5.9±2.0±0.9	19	ABLIKIM	06G	BES2	$\psi(2S) \to K^+K^-\pi^+\pi^-\pi^0$

$\Gamma(K^*(892)^0K^-\pi^+\pi^0 + \text{c.c.})/\Gamma_{total}$ Γ_{68}/Γ

NODE=M071S21
NODE=M071S21

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
8.6±1.3±1.8	238	ABLIKIM	06G	BES2	$\psi(2S) \to K^+K^-\pi^+\pi^-\pi^0$

$\Gamma(K^*(892)^+K^-\pi^+\pi^- + \text{c.c.})/\Gamma_{total}$ Γ_{69}/Γ

NODE=M071S22
NODE=M071S22

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
9.6±2.2±1.7	133	ABLIKIM	06G	BES2	$\psi(2S) \to K^+K^-\pi^+\pi^-\pi^0$

$\Gamma(K^*(892)^+ K^- \rho^0 + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_{70}/Γ

NODE=M071S23
NODE=M071S23

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
7.3±2.2±1.4	78	ABLIKIM	06G	BES2	$\psi(2S) \to K^+ K^- \pi^+ \pi^- \pi^0$

$\Gamma(K^*(892)^0 K^- \rho^+ + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_{71}/Γ

NODE=M071S24
NODE=M071S24

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
6.1±1.3±1.2	125	ABLIKIM	06G	BES2	$\psi(2S) \to K^+ K^- \pi^+ \pi^- \pi^0$

$\Gamma(K^0_S K^0_S \pi^+ \pi^-)/\Gamma_{\text{total}}$ — Γ_{72}/Γ

NODE=M071R49
NODE=M071R49

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.20±0.25±0.37	83 ± 9	ABLIKIM	05O	BES2	$e^+ e^- \to \psi(2S)$

$\Gamma(K^+ K^- \rho^0)/\Gamma_{\text{total}}$ — Γ_{75}/Γ

NODE=M071S09
NODE=M071S09

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.2±0.2±0.4	223.8	BRIERE	05	CLEO	$e^+ e^- \to \psi(2S) \to K^+ K^- \pi^+ \pi^-$

$\Gamma(K^*(892)^0 \overline{K}{}^*_2(1430)^0)/\Gamma_{\text{total}}$ — Γ_{76}/Γ

NODE=M071R66
NODE=M071R66

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
1.86±0.32±0.43		93 ± 16	BAI	04C		$\psi(2S) \to K^+ K^- \pi^+ \pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<1.2	90		BAI	98J	BES	$e^+ e^-$

$\Gamma(K^+ K^- \pi^+ \pi^- \eta)/\Gamma_{\text{total}}$ — Γ_{77}/Γ

NODE=M071S39
NODE=M071S39

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.3±0.7±0.1	7	[1] AUBERT	07AU	BABR	10.6 $e^+ e^- \to K^+ K^- \pi^+ \pi^- \eta \gamma$

[1] AUBERT 07AU quotes $\Gamma_{ee}^{\psi(2S)} \cdot B(\psi(2S) \to 2(\pi^+ \pi)\eta) \cdot B(\eta \to \gamma\gamma) = 1.2 \pm 0.7 \pm 0.1$ eV.

NODE=M071S39;LINKAGE=UB

$\Gamma(K^+ K^- 2(\pi^+ \pi^-)\pi^0)/\Gamma_{\text{total}}$ — Γ_{79}/Γ

NODE=M071R09
NODE=M071R09

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
10.0±2.5±1.8	65	ABLIKIM	07D	BES2	$e^+ e^- \to \psi(2S)$

$\Gamma(K^+ K^*(892)^- + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_{80}/Γ

NODE=M071R39
NODE=M071R39

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
2.9 ±0.4 OUR AVERAGE		Error includes scale factor of 1.2.				
$3.18 \pm 0.30 {}^{+0.26}_{-0.31}$		0.2k	ABLIKIM	12L	BES3	$e^+ e^- \to \psi(2S)$
$2.9 {}^{+1.3}_{-1.7} \pm 0.4$		9.6 ± 4.2	ABLIKIM	05I	BES2	$e^+ e^- \to \psi(2S)$
$1.3 {}^{+1.0}_{-0.7} \pm 0.3$		7	ADAM	05	CLEO	$e^+ e^- \to \psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<5.4	90		FRANKLIN	83	MRK2	$e^+ e^- \to$ hadrons

$\Gamma(2(K^+ K^-))/\Gamma_{\text{total}}$ — Γ_{81}/Γ

NODE=M071S12
NODE=M071S12

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.63±0.13 OUR AVERAGE					
0.9 ±0.4 ±0.1	13	LEES	12F	BABR	10.6 $e^+ e^- \to 2(K^+ K^-)\gamma$
0.6 ±0.1 ±0.1	59.2	BRIERE	05	CLEO	$e^+ e^- \to \psi(2S) \to 2(K^+ K^-)$

$\Gamma(2(K^+ K^-)\pi^0)/\Gamma_{\text{total}}$ — Γ_{82}/Γ

NODE=M071S13
NODE=M071S13

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.1±0.2±0.2	44.7	BRIERE	05	CLEO	$e^+ e^- \to \psi(2S) \to 2(K^+ K^-)\pi^0$

$\Gamma(K^+ K^- \phi)/\Gamma_{\text{total}}$ — Γ_{83}/Γ

NODE=M071R81
NODE=M071R81

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.70±0.16 OUR AVERAGE					
0.8 ±0.2 ±0.1	36.8	BRIERE	05	CLEO	$e^+ e^- \to \psi(2S) \to 2(K^+ K^-)$
0.6 ±0.2 ±0.1	16.1 ± 5.0	[1] BAI	03B	BES	$\psi(2S) \to 2(K^+ K^-)$

[1] Normalized to $B(\psi(2S) \to J/\psi \pi^+ \pi^-) = 0.305 \pm 0.016$.

NODE=M071R81;LINKAGE=B3

$\Gamma(K_1(1270)^{\pm} K^{\mp})/\Gamma_{total}$ — Γ_{84}/Γ

NODE=M071R41

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
10.0±1.8±2.1	[1] BAI	99C	BES	$e^+ e^-$

[1] Assuming B($K_1(1270) \to K\rho$)=0.42 ± 0.06

NODE=M071R;LINKAGE=M2

$\Gamma(K^+ \overline{K}^*(892)^0 \pi^- + c.c.)/\Gamma_{total}$ — Γ_{85}/Γ

NODE=M071R34

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
6.7±2.5	TANENBAUM	78	MRK1	$e^+ e^-$

$\Gamma(\eta K^+ K^-, \text{no } \eta\phi)/\Gamma_{total}$ — Γ_{86}/Γ

NODE=M071S11

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
3.49±0.09±0.15		1.8k	[1] ABLIKIM	20F	BES3	$\psi(2S) \to K^+ K^- \gamma\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
3.08±0.29±0.25		0.3k	[1,2] ABLIKIM	12L	BES3	$\psi(2S) \to K^+ K^- \gamma\gamma$
<13	90		BRIERE	05	CLEO	$e^+ e^- \to \psi(2S) \to K^+ K^- \pi^+ \pi^- \pi^0$

[1] Excluding $\eta\phi$.

NODE=M071S11;LINKAGE=AB

[2] Superseded by ABLIKIM 20F.

NODE=M071S11;LINKAGE=A

$\Gamma(X(1750)\eta \to K^+ K^- \eta)/\Gamma_{total}$ — Γ_{87}/Γ

NODE=M071P28

VALUE (units 10^{-6})	DOCUMENT ID		TECN	COMMENT
4.8±1.0±2.6	ABLIKIM	20F	BES3	$\psi(2S) \to K^+ K^- \eta$

$\Gamma(K_1(1400)^{\pm} K^{\mp})/\Gamma_{total}$ — Γ_{88}/Γ

NODE=M071R45

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<3.1	90	[1] BAI	99C	BES	$e^+ e^-$

[1] Assuming B($K_1(1400) \to K^*\pi$)=0.94 ± 0.06

NODE=M071R;LINKAGE=M3

$\Gamma(K_2^*(1430)^{\pm} K^{\mp})/\Gamma_{total}$ — Γ_{89}/Γ

NODE=M071S54

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$7.12\pm0.62^{+1.13}_{-0.61}$	251 ± 22	ABLIKIM	12L	BES3	$e^+ e^- \to \psi(2S)$

$\Gamma(K^*(892)^0 \overline{K}^0 + c.c.)/\Gamma_{total}$ — Γ_{90}/Γ

NODE=M071R30

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
10.9±2.0 OUR AVERAGE					
$13.3^{+2.4}_{-2.8}\pm1.7$	65.6 ± 9.0	ABLIKIM	05I	BES2	$e^+ e^- \to \psi(2S)$
$9.2^{+2.7}_{-2.2}\pm0.9$	25	ADAM	05	CLEO	$e^+ e^- \to \psi(2S)$

$\Gamma(K^+ K^*(892)^- + c.c.)/\Gamma(K^*(892)^0 \overline{K}^0 + c.c.)$ — Γ_{80}/Γ_{90}

NODE=M071R46

VALUE	DOCUMENT ID		TECN	COMMENT
0.16±0.06 OUR AVERAGE				
$0.22^{+0.10}_{-0.14}$	ABLIKIM	05I	BES2	$e^+ e^- \to \psi(2S)$
$0.14^{+0.08}_{-0.06}$	ADAM	05	CLEO	$e^+ e^- \to \psi(2S)$

$\Gamma(\omega K^+ K^-)/\Gamma_{total}$ — Γ_{91}/Γ

NODE=M071R78

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.62±0.11 OUR AVERAGE	Error includes scale factor of 1.1.				
1.56±0.04±0.11	2.8k	ABLIKIM	14G	BES3	$\psi(2S) \to K^+ K^- \pi^+ \pi^- \pi^0$
2.38±0.37±0.29	78	ABLIKIM	06G	BES2	$\psi(2S) \to K^+ K^- \pi^+ \pi^- \pi^0$
1.9 ±0.3 ±0.3	76.8	BRIERE	05	CLEO	$e^+ e^- \to \psi(2S) \to K^+ K^- \pi^+ \pi^- \pi^0$
1.5 ±0.3 ±0.2	23	[1] BAI	03B	BES	$\psi(2S) \to K^+ K^- \pi^+ \pi^- \pi^0$

[1] Normalized to B($\psi(2S) \to J/\psi \pi^+ \pi^-$) = 0.305 ± 0.016.

NODE=M071R78;LINKAGE=B3

$\Gamma(\omega K_S^0 K_S^0)/\Gamma_{total}$ — Γ_{92}/Γ

NODE=M071P34

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
7.04±0.39±0.36	1.5k	ABLIKIM	21AL	BES3	$\psi(2S) \to \pi^+ \pi^- \pi^0 K_S^0 K_S^0$

$\Gamma(\omega K^*(892)^+ K^- + c.c.)/\Gamma_{total}$ — Γ_{93}/Γ

NODE=M071S67

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
20.7±2.6 OUR AVERAGE					
18.9±2.9±2.2	396	ABLIKIM	13M	BES3	$\psi(2S) \to \omega K^0_S K^- \pi^+$
22.6±3.0±2.4	535	ABLIKIM	13M	BES3	$\psi(2S) \to \omega K^+ K^- \pi^0$

OCCUR=2

$\Gamma(\omega K^*_2(1430)^+ K^- + c.c.)/\Gamma_{total}$ — Γ_{94}/Γ

NODE=M071S68

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
6.1 ±1.2 OUR AVERAGE					
6.39±1.50±0.78	128	ABLIKIM	13M	BES3	$\psi(2S) \to \omega K^0_S K^- \pi^+$
5.86±1.61±0.83	143	ABLIKIM	13M	BES3	$\psi(2S) \to \omega K^+ K^- \pi^0$

OCCUR=2

$\Gamma(\omega \overline{K}^*(892)^0 K^0)/\Gamma_{total}$ — Γ_{95}/Γ

NODE=M071S69

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
16.8±2.5±1.6	356	ABLIKIM	13M	BES3	$\psi(2S) \to \omega K^0_S K^- \pi^+$

$\Gamma(\omega \overline{K}^*_2(1430)^0 K^0)/\Gamma_{total}$ — Γ_{96}/Γ

NODE=M071S70

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
5.82±2.08±0.72	116	ABLIKIM	13M	BES3	$\psi(2S) \to \omega K^0_S K^- \pi^+$

$\Gamma(\omega X(1440) \to \omega K^0_S K^- \pi^+ + c.c.)/\Gamma_{total}$ — Γ_{97}/Γ

NODE=M071S71

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
1.60±0.27±0.24	109	[1] ABLIKIM	13M	BES3	$\psi(2S) \to \omega K^0_S K^- \pi^+$

[1] $X(1440)$ compatible with $\eta(1405)$ and $\eta(1475)$. A $f_1(1420)$ is also possible.

NODE=M071S71;LINKAGE=AB

$\Gamma(\omega X(1440) \to \omega K^+ K^- \pi^0)/\Gamma_{total}$ — Γ_{98}/Γ

NODE=M071S72

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
1.09±0.20±0.16	82	[1] ABLIKIM	13M	BES3	$\psi(2S) \to \omega K^+ K^- \pi^0$

[1] $X(1440)$ compatible with $\eta(1405)$ and $\eta(1475)$. A $f_1(1420)$ is also possible.

NODE=M071S72;LINKAGE=AB

$\Gamma(\omega f_1(1285) \to \omega K^0_S K^- \pi^+ + c.c.)/\Gamma_{total}$ — Γ_{99}/Γ

NODE=M071S73

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
0.302±0.098±0.027	22	[1] ABLIKIM	13M	BES3	$\psi(2S) \to \omega K^0_S K^- \pi^+$

[1] Statistical signficance 4.5 σ. This measurement is equivalent to a limit of $< 0.478 \times 10^{-5}$ at 90% C.L.

NODE=M071S73;LINKAGE=AB

$\Gamma(\omega f_1(1285) \to \omega K^+ K^- \pi^0)/\Gamma_{total}$ — Γ_{100}/Γ

NODE=M071S74

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
0.125±0.070±0.013	10	[1] ABLIKIM	13M	BES3	$\psi(2S) \to \omega K^+ K^- \pi^0$

[1] Statistical signficance 3.2 σ. This measurement is equivalent to a limit of $< 0.221 \times 10^{-5}$ at 90% C.L.

NODE=M071S74;LINKAGE=AB

$\Gamma(p\overline{p})/\Gamma_{total}$ — Γ_{101}/Γ

NODE=M071R25

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.94±0.08 OUR FIT					
3.02±0.08 OUR AVERAGE					
3.05±0.02±0.12	19k	ABLIKIM	18T	BES3	$e^+ e^- \to \psi(2S) \to p\overline{p}$
3.08±0.05±0.18	4.5k	[1] DOBBS	14		$e^+ e^- \to \psi(2S) \to p\overline{p}$
3.36±0.09±0.25	1.6k	ABLIKIM	07C	BES	$e^+ e^- \to \psi(2S) \to p\overline{p}$
2.87±0.12±0.15	557	PEDLAR	05	CLEO	$e^+ e^- \to \psi(2S) \to p\overline{p}$
1.4 ±0.8	4	BRANDELIK	79C	DASP	$e^+ e^- \to \psi(2S) \to p\overline{p}$
2.3 ±0.7		FELDMAN	77	MRK1	$e^+ e^- \to \psi(2S) \to p\overline{p}$

[1] Using CLEO-c data but not authored by the CLEO Collaboration.

NODE=M071R25;LINKAGE=A

$\Gamma(p\overline{p})/\Gamma(J/\psi(1S)\pi^+\pi^-)$ — Γ_{101}/Γ_{12}

NODE=M071S40

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
8.49±0.23 OUR FIT				
6.98±0.49±0.97	BAI	01	BES	$e^+ e^- \to \psi(2S) \to p\overline{p}$

$\Gamma(n\overline{n})/\Gamma_{total}$ — Γ_{102}/Γ

NODE=M071P10

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.06±0.06±0.14	6k	ABLIKIM	18T	BES3	$e^+ e^- \to \psi(2S) \to n\overline{n}$

$\Gamma(p\overline{p}\pi^0)/\Gamma_{total}$ Γ_{103}/Γ

NODE=M071R35
NODE=M071R35

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.53±0.07 OUR AVERAGE					
1.65±0.03±0.15	4.5k	ABLIKIM	13A	BES3	$\psi(2S) \rightarrow p\overline{p}\pi^0$
1.54±0.06±0.06	948	ALEXANDER	10	CLEO	$\psi(2S) \rightarrow \pi^0 p\overline{p}$
1.32±0.10±0.15	256	[1] ABLIKIM	05E	BES2	$e^+e^- \rightarrow \psi(2S) \rightarrow p\overline{p}\gamma\gamma$
1.4 ±0.5	9	FRANKLIN	83	MRK2	e^+e^-

[1] Computed using B($\pi^0 \rightarrow \gamma\gamma$) = (98.80 ± 0.03)%.

NODE=M071R35;LINKAGE=AB

$\Gamma(N(940)\overline{p}+\text{c.c.} \rightarrow p\overline{p}\pi^0)/\Gamma_{total}$ Γ_{104}/Γ

NODE=M071S56
NODE=M071S56

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{6.42 \pm 0.20^{+1.78}_{-1.28}}$	1.9k	[1] ABLIKIM	13A	BES3	$\psi(2S) \rightarrow p\overline{p}\pi^0$

[1] From a fit of $\pi^0 p\overline{p}$ data to eight distinct intermediate $N\overline{p}$ resonant states.

NODE=M071S56;LINKAGE=AB

$\Gamma(N(1440)\overline{p}+\text{c.c.} \rightarrow p\overline{p}\pi^0)/\Gamma_{total}$ Γ_{105}/Γ

NODE=M071S50
NODE=M071S50

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{7.3\ ^{+1.7}_{-1.5}}$ **OUR AVERAGE** Error includes scale factor of 2.5.					
$3.58 \pm 0.25^{+1.59}_{-0.84}$	1.1k	[1] ABLIKIM	13A	BES3	$\psi(2S) \rightarrow p\overline{p}\pi^0$
8.1 ±0.7 ±0.3	474	[2] ALEXANDER	10	CLEO	$\psi(2S) \rightarrow \pi^0 p\overline{p}$

[1] From a fit of $\pi^0 p\overline{p}$ data to eight distinct intermediate $N\overline{p}$ resonant states.

NODE=M071S50;LINKAGE=AB

[2] From a fit of the $p\overline{p}$ and $p\pi^0$ mass distributions to a combination of $N(1440)\overline{p}$, a broad $p\overline{p}$ enhancement around 2100 MeV, and two other broad, unestablished resonances.

NODE=M071S50;LINKAGE=AL

$\Gamma(N(1520)\overline{p}+\text{c.c.} \rightarrow p\overline{p}\pi^0)/\Gamma_{total}$ Γ_{106}/Γ

NODE=M071S57
NODE=M071S57

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.64 \pm 0.05^{+0.22}_{-0.17}}$	0.2k	[1] ABLIKIM	13A	BES3	$\psi(2S) \rightarrow p\overline{p}\pi^0$

[1] From a fit of $\pi^0 p\overline{p}$ data to eight distinct intermediate $N\overline{p}$ resonant states.

NODE=M071S57;LINKAGE=AB

$\Gamma(N(1535)\overline{p}+\text{c.c.} \rightarrow p\overline{p}\pi^0)/\Gamma_{total}$ Γ_{107}/Γ

NODE=M071S58
NODE=M071S58

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{2.47 \pm 0.28^{+0.99}_{-0.97}}$	0.7k	[1] ABLIKIM	13A	BES3	$\psi(2S) \rightarrow p\overline{p}\pi^0$

[1] From a fit of $\pi^0 p\overline{p}$ data to eight distinct intermediate $N\overline{p}$ resonant states.

NODE=M071S58;LINKAGE=AB

$\Gamma(N(1650)\overline{p}+\text{c.c.} \rightarrow p\overline{p}\pi^0)/\Gamma_{total}$ Γ_{108}/Γ

NODE=M071S59
NODE=M071S59

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{3.76 \pm 0.28^{+1.37}_{-1.66}}$	1.1k	[1] ABLIKIM	13A	BES3	$\psi(2S) \rightarrow p\overline{p}\pi^0$

[1] From a fit of $\pi^0 p\overline{p}$ data to eight distinct intermediate $N\overline{p}$ resonant states.

NODE=M071S59;LINKAGE=AB

$\Gamma(N(1720)\overline{p}+\text{c.c.} \rightarrow p\overline{p}\pi^0)/\Gamma_{total}$ Γ_{109}/Γ

NODE=M071S60
NODE=M071S60

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{1.79 \pm 0.10^{+0.24}_{-0.71}}$	0.5k	[1] ABLIKIM	13A	BES3	$\psi(2S) \rightarrow p\overline{p}\pi^0$

[1] From a fit of $\pi^0 p\overline{p}$ data to eight distinct intermediate $N\overline{p}$ resonant states.

NODE=M071S60;LINKAGE=AB

$\Gamma(N(2300)\overline{p}+\text{c.c.} \rightarrow p\overline{p}\pi^0)/\Gamma_{total}$ Γ_{110}/Γ

NODE=M071S61
NODE=M071S61

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{2.62 \pm 0.28^{+1.12}_{-0.64}}$	0.9k	[1] ABLIKIM	13A	BES3	$\psi(2S) \rightarrow p\overline{p}\pi^0$

[1] From a fit of $\pi^0 p\overline{p}$ data to eight distinct intermediate $N\overline{p}$ resonant states.

NODE=M071S61;LINKAGE=AB

$\Gamma(N(2570)\overline{p}+\text{c.c.} \rightarrow p\overline{p}\pi^0)/\Gamma_{total}$ Γ_{111}/Γ

NODE=M071S62
NODE=M071S62

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{2.13 \pm 0.08^{+0.40}_{-0.30}}$	0.8k	[1] ABLIKIM	13A	BES3	$\psi(2S) \rightarrow p\overline{p}\pi^0$

[1] From a fit of $\pi^0 p\overline{p}$ data to eight distinct intermediate $N\overline{p}$ resonant states.

NODE=M071S62;LINKAGE=AB

$\Gamma(p\overline{p}\pi^+\pi^-)/\Gamma_{total}$ Γ_{112}/Γ

NODE=M071R31

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
6.0±0.4 OUR AVERAGE					
5.9±0.2±0.4	904.5	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to p\overline{p}\pi^+\pi^-$
8 ±2		[1] TANENBAUM	78	MRK1	e^+e^-

[1] Assuming entirely strong decay.

NODE=M071R;LINKAGE=K

$\Gamma(p\overline{p}K^+K^-)/\Gamma_{total}$ Γ_{113}/Γ

NODE=M071S16

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
2.7±0.6±0.4	30.1	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to p\overline{p}K^+K^-$

$\Gamma(p\overline{p}\eta)/\Gamma_{total}$ Γ_{114}/Γ

NODE=M071R56

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
6.0±0.4 OUR AVERAGE					
6.4±0.2±0.6	679	[1] ABLIKIM	13S	BES3	$\psi(2S) \to \eta p\overline{p}$
5.6±0.6±0.3	154	[1] ALEXANDER	10	CLEO	$\psi(2S) \to \eta p\overline{p}$
5.8±1.1±0.7	44.8 ± 8.5	[2] ABLIKIM	05E	BES2	$e^+e^- \to \psi(2S) \to p\overline{p}\gamma\gamma$
8 ±3 ±3	9.8	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to p\overline{p}\pi^+\pi^-\pi^0$

[1] With $N(1535)$ decaying to $p\eta$.

NODE=M071R56;LINKAGE=A

[2] Computed using $B(\eta \to \gamma\gamma) = (39.43 \pm 0.26)\%$.

NODE=M071R56;LINKAGE=AB

$\Gamma(N(1535)\overline{p} + \text{c.c.} \to p\overline{p}\eta)/\Gamma_{total}$ Γ_{115}/Γ

NODE=M071S53

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$4.5^{+0.7}_{-0.6}$ OUR AVERAGE					
$[(4.4 \pm 0.7) \times 10^{-5}$ OUR 2021 AVERAGE]					
$5.2\pm0.3^{+3.2}_{-1.2}$	527	[1] ABLIKIM	13S	BES3	$\psi(2S) \to \eta p\overline{p}$
4.4±0.6±0.3	123	[2] ALEXANDER	10	CLEO	$\psi(2S) \to \eta p\overline{p}$

NEW

[1] With $N(1535)$ decaying to $p\eta$.

NODE=M071S53;LINKAGE=A

[2] From a fit of the $p\overline{p}$ and $p\eta$ distributions to a combination of $N^*(1535)\overline{p}$ and a broad $p\overline{p}$ enhancement around 2100 MeV.

NODE=M071S53;LINKAGE=AL

$\Gamma(p\overline{p}\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{116}/Γ

NODE=M071S15

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
7.3±0.4±0.6	434.9	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to p\overline{p}\pi^+\pi^-\pi^0$

$\Gamma(p\overline{p}\rho^0)/\Gamma_{total}$ Γ_{117}/Γ

NODE=M071S14

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.5±0.1±0.2	61.1	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to p\overline{p}\pi^+\pi^-$

$\Gamma(p\overline{p}\omega)/\Gamma_{total}$ Γ_{118}/Γ

NODE=M071R79

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.69±0.21 OUR AVERAGE					
0.6 ±0.2 ±0.2	21.2	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to p\overline{p}\pi^+\pi^-\pi^0$
0.8 ±0.3 ±0.1	14.9 ± 0.1	[1] BAI	03B	BES	$\psi(2S) \to p\overline{p}\pi^+\pi^-\pi^0$

[1] Normalized to $B(\psi(2S) \to J/\psi\pi^+\pi^-) = 0.305 \pm 0.016$.

NODE=M071R;LINKAGE=B3

$\Gamma(p\overline{p}\eta')/\Gamma_{total}$ Γ_{119}/Γ

NODE=M071P20

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
1.10±0.10±0.08	491	[1] ABLIKIM	19N	BES3	$\psi(2S) \to \eta' p\overline{p}$

[1] From the combination of $p\overline{p}\eta' \to p\overline{p}\pi^+\pi^-\eta$ and $p\overline{p}\eta' \to p\overline{p}\pi^+\pi^-\gamma$ channels.

NODE=M071P20;LINKAGE=A

$\Gamma(p\overline{p}\phi)/\Gamma_{total}$ Γ_{120}/Γ

NODE=M071R82
NODE=M071R82

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
6.06±0.38±0.48		753	ABLIKIM	19AO	BES3	$e^+e^- \to \psi(2S) \to p\overline{p}K^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<24	90		BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to p\overline{p}K^+K^-$
<26	90		[1] BAI	03B	BES	$\psi(2S) \to K^+K^-p\overline{p}$

[1] Normalized to B($\psi(2S) \to J/\psi\pi^+\pi^-$) = 0.305 ± 0.016.

NODE=M071R82;LINKAGE=B3

$\Gamma(\phi X(1835) \to p\overline{p}\phi)/\Gamma_{total}$ Γ_{121}/Γ

NODE=M071P21
NODE=M071P21

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.82 × 10^{-7}	90	ABLIKIM	19AO	BES3	$e^+e^- \to \psi(2S) \to p\overline{p}K^+K^-$

$\Gamma(p\overline{n}\pi^-$ or c.c.$)/\Gamma_{total}$ Γ_{122}/Γ

NODE=M071R01
NODE=M071R01

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.48±0.17 OUR AVERAGE					
2.45±0.11±0.21	851	ABLIKIM	06I	BES2	$e^+e^- \to p\pi^-X$
2.52±0.12±0.22	849	ABLIKIM	06I	BES2	$e^+e^- \to \overline{p}\pi^+X$

OCCUR=2

$\Gamma(p\overline{n}\pi^-\pi^0)/\Gamma_{total}$ Γ_{123}/Γ

NODE=M071R02
NODE=M071R02

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.18±0.50±0.50	135 ± 21	ABLIKIM	06I	BES2	$e^+e^- \to p\pi^-\pi^0X$

$\Gamma(\Lambda\overline{\Lambda})/\Gamma_{total}$ Γ_{124}/Γ

NODE=M071R28
NODE=M071R28

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
3.81±0.13 OUR AVERAGE			Error includes scale factor of 1.4. See the ideogram below.			
3.97±0.02±0.12		31k	ABLIKIM	17L	BES3	$e^+e^- \to \Lambda\overline{\Lambda}$
3.71±0.05±0.15		6.5k	[1] DOBBS	17		$e^+e^- \to \Lambda\overline{\Lambda}$
3.39±0.20±0.32		337	ABLIKIM	07C	BES	$e^+e^- \to \psi(2S) \to$ hadrons
6.4 ±1.8 ±0.1			[2] AUBERT	07BD	BABR	10.6 $e^+e^- \to \Lambda\overline{\Lambda}\gamma$
3.28±0.23±0.25		208	PEDLAR	05	CLEO	$e^+e^- \to \psi(2S) \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •						
3.75±0.09±0.23		1.9k	[1,3] DOBBS	14		$e^+e^- \to \Lambda\overline{\Lambda}$
1.81±0.20±0.27		80	[4] BAI	01	BES	$e^+e^- \to \psi(2S) \to$ hadrons
< 4	90		FELDMAN	77	MRK1	$e^+e^- \to \psi(2S) \to$ hadrons

[1] Using CLEO-c data but not authored by the CLEO Collaboration.

NODE=M071R28;LINKAGE=A

[2] AUBERT 07BD reports [$\Gamma(\psi(2S) \to \Lambda\overline{\Lambda})/\Gamma_{total}$] × [$\Gamma(\psi(2S) \to e^+e^-)$] = (15 ± 4 ± 1) × 10^{-4} keV which we divide by our best value $\Gamma(\psi(2S) \to e^+e^-)$ = 2.33 ± 0.04 keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

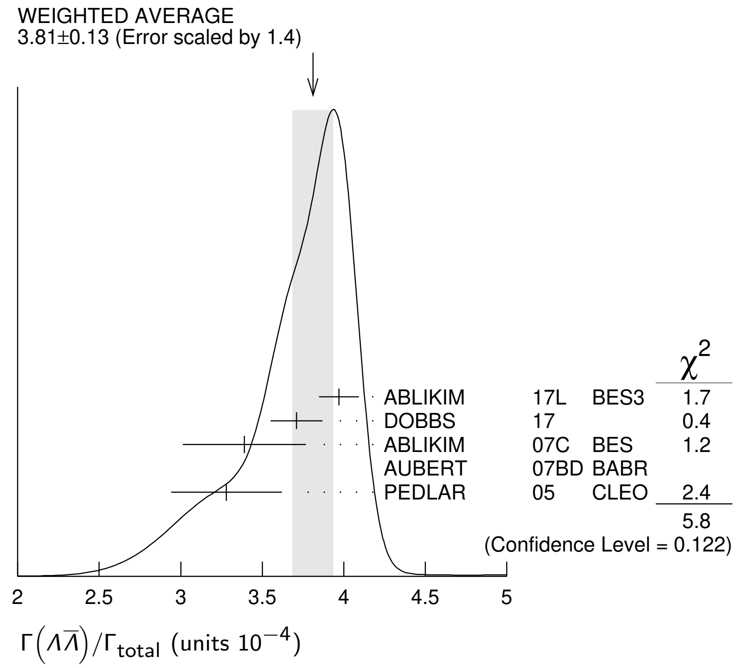
NODE=M071R28;LINKAGE=AU

[3] Superseded by DOBBS 17.

NODE=M071R28;LINKAGE=B

[4] Estimated using B($\psi(2S) \to J/\psi\pi^+\pi^-$) = 0.310 ± 0.028.

NODE=M071R28;LINKAGE=PP



$\Gamma(\Lambda\overline{\Lambda}\pi^0)/\Gamma_{total}$ — Γ_{125}/Γ

NODE=M071R6

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
< 0.29	90	[1] ABLIKIM	13F	BES3	$\psi(2S) \to p\overline{p}\pi^+\pi^-\gamma\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<12	90	[2] ABLIKIM	07H	BES2	$e^+e^- \to \psi(2S)$

[1] Using B($\Lambda \to \pi^- p$) = 63.9% and B($\pi^0 \to \gamma\gamma$) = 98.8%.
[2] Using B($\Lambda \to \pi^- p$) = 63.9% and B($\eta \to \gamma\gamma$) = 39.4%.

NODE=M071R6;LINKAGE=AL
NODE=M071R6;LINKAGE=AB

$\Gamma(\Lambda\overline{\Lambda}\eta)/\Gamma_{total}$ — Γ_{126}/Γ

NODE=M071R7

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
2.48±0.34±0.19		60	[1] ABLIKIM	13F	BES3	$\psi(2S) \to p\overline{p}\pi^+\pi^-\gamma\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<4.9	90		[2] ABLIKIM	07H	BES2	$e^+e^- \to \psi(2S)$

[1] Using B($\Lambda \to \pi^- p$) = 63.9% and B($\eta \to \gamma\gamma$) = 39.31%.
[2] Using B($\Lambda \to \pi^- p$) = 63.9%.

NODE=M071R7;LINKAGE=AL
NODE=M071R7;LINKAGE=AB

$\Gamma(\Lambda\overline{\Lambda}\pi^+\pi^-)/\Gamma_{total}$ — Γ_{127}/Γ

NODE=M071S17

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.8±0.4±0.5	73.4	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to p\overline{p}2(\pi^+\pi^-)$

$\Gamma(\Lambda\overline{p}K^+)/\Gamma_{total}$ — Γ_{128}/Γ

NODE=M071S18

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.0±0.1±0.1	74.0	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to p\overline{p}K^+\pi^-$

$\Gamma(\Lambda\overline{p}K^*(892)^+ + c.c.)/\Gamma_{total}$ — Γ_{129}/Γ

NODE=M071P25

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
6.3±0.5±0.5	1011	ABLIKIM	19AU	BES3	$e^+e^- \to \psi(2S)$

$\Gamma(\Lambda\overline{p}K^+\pi^+\pi^-)/\Gamma_{total}$ — Γ_{130}/Γ

NODE=M071S19

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.8±0.3±0.3	45.8	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to p\overline{p}K^+\pi^+\pi^-\pi^-$

$\Gamma(\overline{\Lambda}nK^0_S + c.c.)/\Gamma_{total}$ — Γ_{131}/Γ

NODE=M071R08

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.81±0.11±0.14	50	[1] ABLIKIM	08C	BES2	$e^+e^- \to J/\psi$

[1] Using B($\overline{\Lambda} \to \overline{p}\pi^+$) = 63.9% and B($K^0_S \to \pi^+\pi^-$) = 69.2%.

NODE=M071R08;LINKAGE=AB

$\Gamma(\Delta^{++}\overline{\Delta}^{--})/\Gamma_{total}$ — Γ_{132}/Γ

NODE=M071R50

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
12.8±1.0±3.4	157	[1] BAI	01	BES	$e^+e^- \to \psi(2S) \to$ hadrons

[1] Estimated using B($\psi(2S) \to J/\psi\pi^+\pi^-$)= 0.310 ± 0.028.

NODE=M071R50;LINKAGE=PP

$\Gamma(\Lambda\overline{\Sigma}^+\pi^- + \text{c.c.})/\Gamma_{total}$ — Γ_{133}/Γ

NODE=M071S65

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.40±0.03±0.13	2.8k	ABLIKIM	13W	BES3	$\psi(2S) \to$ hadrons

$\Gamma(\Lambda\overline{\Sigma}^-\pi^+ + \text{c.c.})/\Gamma_{total}$ — Γ_{134}/Γ

NODE=M071S66

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.54±0.04±0.13	2.8k	ABLIKIM	13W	BES3	$\psi(2S) \to$ hadrons

$\Gamma(\Lambda\overline{\Sigma}^0 + \text{c.c.})/\Gamma_{total}$ — Γ_{135}/Γ

NODE=M071P29

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
1.60±0.31±0.59	60	ABLIKIM	21L	BES3	$e^+e^- \to \psi(2S) \to$ hadrons

$\Gamma(\Lambda\overline{\Sigma}^0)/\Gamma_{total}$ — Γ_{136}/Γ

NODE=M071P08

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.23±0.23±0.08	30	[1] DOBBS	17	$e^+e^- \to \psi(2S) \to$ hadrons

[1] Using CLEO-c data but not authored by the CLEO Collaboration.

NODE=M071P08;LINKAGE=A

$\Gamma(\Sigma^0\overline{p}K^+ + \text{c.c.})/\Gamma_{total}$ — Γ_{137}/Γ

NODE=M071S63

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
1.67±0.13±0.12	276	[1] ABLIKIM	13D	BES3	$\psi(2S) \to \gamma\Lambda\overline{p}K^+$

[1] Using B($\Lambda \to p\pi^-$) = 63.9%, and B($\Sigma^0 \to \Lambda\gamma$) = 100%.

NODE=M071S63;LINKAGE=AB

$\Gamma(\Sigma^+\overline{\Sigma}^-)/\Gamma_{total}$ — Γ_{138}/Γ

NODE=M071R47

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.43±0.10 OUR AVERAGE	Error includes scale factor of 1.4. [(2.32 ± 0.12) × 10^{-4} OUR 2021 AVERAGE]				
2.52±0.04±0.09	5.4k	ABLIKIM	21AT	BES3	$\psi(2S) \to p\pi^0\overline{p}\pi^0$
2.31±0.06±0.10	1.9k	[1] DOBBS	17		$e^+e^- \to \psi(2S) \to$ hadrons
2.57±0.44±0.68	35	PEDLAR	05	CLEO	$e^+e^- \to \psi(2S) \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.51±0.15±0.16	281	[1,2] DOBBS	14		$e^+e^- \to \psi(2S) \to$ hadrons

NEW

[1] Using CLEO-c data but not authored by the CLEO Collaboration.
[2] Superseded by DOBBS 17.

NODE=M071R47;LINKAGE=A
NODE=M071R47;LINKAGE=B

$\Gamma(\Sigma^0\overline{\Sigma}^0)/\Gamma_{total}$ — Γ_{139}/Γ

NODE=M071R51

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.35±0.09 OUR AVERAGE	Error includes scale factor of 1.1.				
2.44±0.03±0.11	7k	ABLIKIM	17L	BES3	$e^+e^- \to \psi(2S) \to$ hadrons
2.22±0.05±0.11	2.6k	[1] DOBBS	17		$e^+e^- \to \psi(2S) \to$ hadrons
2.35±0.36±0.32	59	ABLIKIM	07C	BES	$e^+e^- \to \psi(2S) \to$ hadrons
2.63±0.35±0.21	58	PEDLAR	05	CLEO	$e^+e^- \to \psi(2S) \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.25±0.11±0.16	439	[1,2] DOBBS	14		$e^+e^- \to \psi(2S) \to$ hadrons
1.2 ±0.4 ±0.4	8	[3] BAI	01	BES	$e^+e^- \to \psi(2S) \to$ hadrons

[1] Using CLEO-c data but not authored by the CLEO Collaboration.
[2] Superseded by DOBBS 17.
[3] Estimated using B($\psi(2S) \to J/\psi\pi^+\pi^-$)= 0.310 ± 0.028.

NODE=M071R51;LINKAGE=A
NODE=M071R51;LINKAGE=B
NODE=M071R51;LINKAGE=PP

$\Gamma(\Sigma(1385)^+\overline{\Sigma}(1385)^-)/\Gamma_{total}$ — Γ_{140}/Γ

NODE=M071R52

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
8.5±0.7 OUR AVERAGE					
8.4±0.5±0.5	1.5k	ABLIKIM	16L	BES3	$\psi(2S) \to \Sigma(1385)^+\overline{\Sigma}(1385)^-$
11 ±3 ±3	14	[1] BAI	01	BES	$e^+e^- \to \psi(2S) \to$ hadrons

OCCUR=2

[1] Estimated using B($\psi(2S) \to J/\psi\pi^+\pi^-$)= 0.310 ± 0.028.

NODE=M071R52;LINKAGE=PP

$\Gamma(\Sigma(1385)^- \overline{\Sigma}(1385)^+)/\Gamma_{total}$ Γ_{141}/Γ

NODE=M071R00
NODE=M071R00

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
8.5±0.6±0.6	1.4k	ABLIKIM	16L	BES3	$\psi(2S) \rightarrow \Sigma(1385)^- \overline{\Sigma}(1385)^+$

$\Gamma(\Sigma(1385)^0 \overline{\Sigma}(1385)^0)/\Gamma_{total}$ Γ_{142}/Γ

NODE=M071P00
NODE=M071P00

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.69±0.05±0.05	2.2k	ABLIKIM	17E	BES3	$e^+ e^- \rightarrow \psi(2S) \rightarrow$ hadrons

$\Gamma(\Xi^- \overline{\Xi}^+)/\Gamma_{total}$ Γ_{143}/Γ

NODE=M071R29
NODE=M071R29

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
2.87±0.11 OUR AVERAGE			Error includes scale factor of 1.1.			
3.03±0.05±0.14		3.6k	[1] DOBBS	17		$e^+ e^- \rightarrow \psi(2S) \rightarrow$ hadrons
2.78±0.05±0.14		5k	ABLIKIM	16L	BES3	$\psi(2S) \rightarrow \Xi^- \overline{\Xi}^+$
3.03±0.40±0.32		67	ABLIKIM	07C	BES	$e^+ e^- \rightarrow \psi(2S) \rightarrow$ hadrons
2.38±0.30±0.21		63	PEDLAR	05	CLEO	$e^+ e^- \rightarrow \psi(2S) \rightarrow$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •						
2.66±0.12±0.20		548	[1,2] DOBBS	14		$e^+ e^- \rightarrow \psi(2S) \rightarrow$ hadrons
0.94±0.27±0.15		12	[3] BAI	01	BES	$e^+ e^- \rightarrow \psi(2S) \rightarrow$ hadrons
<2	90		FELDMAN	77	MRK1	$e^+ e^- \rightarrow \psi(2S) \rightarrow$ hadrons

[1] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M071R29;LINKAGE=A
[2] Superseded by DOBBS 17. NODE=M071R29;LINKAGE=B
[3] Estimated using B($\psi(2S) \rightarrow J/\psi \pi^+ \pi^-$)= 0.310 ± 0.028. NODE=M071R29;LINKAGE=PP

$\Gamma(\Xi^0 \overline{\Xi}^0)/\Gamma_{total}$ Γ_{144}/Γ

NODE=M071R48
NODE=M071R48

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.3 ±0.4 OUR AVERAGE		Error includes scale factor of 4.2.			
2.73±0.03±0.13	11k	ABLIKIM	17E	BES3	$e^+ e^- \rightarrow \psi(2S) \rightarrow$ hadrons
1.97±0.06±0.11	1.2k	[1] DOBBS	17		$e^+ e^- \rightarrow \psi(2S) \rightarrow$ hadrons
2.75±0.64±0.61	19	PEDLAR	05	CLEO	$e^+ e^- \rightarrow \psi(2S) \rightarrow$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.02±0.19±0.15	112	[1,2] DOBBS	14		$e^+ e^- \rightarrow \psi(2S) \rightarrow$ hadrons

[1] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M071R48;LINKAGE=A
[2] Superseded by DOBBS 17. NODE=M071R48;LINKAGE=B

$\Gamma(\Xi(1530)^0 \overline{\Xi}(1530)^0)/\Gamma_{total}$ Γ_{145}/Γ

NODE=M071R53
NODE=M071R53

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
6.8 ±0.4 OUR AVERAGE			[($5.2^{+3.2}_{-1.2}$) × 10^{-5} OUR 2021 AVERAGE]			
6.77±0.14±0.39		2951	ABLIKIM	21AO	BES3	$e^+ e^- \rightarrow \psi(2S) \rightarrow$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<32	90		PEDLAR	05	CLEO	$e^+ e^- \rightarrow \psi(2S) \rightarrow$ hadrons
< 8.1	90		[1] BAI	01	BES	$e^+ e^- \rightarrow \psi(2S) \rightarrow$ hadrons

NEW

[1] Estimated using B($\psi(2S) \rightarrow J/\psi \pi^+ \pi^-$) = 0.310 ± 0.028. NODE=M071R53;LINKAGE=PP

$\Gamma(\Lambda \overline{\Xi}^+ K^- + c.c.)/\Gamma_{total}$ Γ_{146}/Γ

NODE=M071S82
NODE=M071S82

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
3.86±0.27±0.32	236	ABLIKIM	15I	BES3	$e^+ e^- \rightarrow \psi(2S) \rightarrow K^- \Lambda \overline{\Xi}^+$ + c.c.

$\Gamma(\Xi(1530)^- \overline{\Xi}(1530)^+)/\Gamma_{total}$ Γ_{147}/Γ

NODE=M071P26
NODE=M071P26

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
11.45±0.40±0.59	5k	ABLIKIM	19AT	BES3	$e^+ e^- \rightarrow \psi(2S) \rightarrow$ hadrons

$\Gamma(\Xi(1530)^- \overline{\Xi}^+)/\Gamma_{total}$ Γ_{148}/Γ

NODE=M071P27
NODE=M071P27

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
7.0±1.1±0.4	399	ABLIKIM	19AT	BES3	$e^+ e^- \rightarrow \psi(2S) \rightarrow$ hadrons

$\Gamma(\Xi(1530)^0 \overline{\Xi}^0)/\Gamma_{total}$ Γ_{149}/Γ

NODE=M071P35
NODE=M071P35

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
0.53±0.04±0.03	278	ABLIKIM	21AO	BES3	$e^+ e^- \rightarrow \psi(2S) \rightarrow$ hadrons

$\Gamma(\Xi(1690)^- \overline{\Xi}^+ \to K^- \Lambda \overline{\Xi}^+ + \text{c.c.})/\Gamma_{total}$ — Γ_{150}/Γ

NODE=M071S83

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
5.21±1.48±0.57	74	ABLIKIM	15I	BES3	$e^+ e^- \to \psi(2S) \to K^- \Lambda \overline{\Xi}^+ + \text{c.c.}$

$\Gamma(\Xi(1820)^- \overline{\Xi}^+ \to K^- \Lambda \overline{\Xi}^+ + \text{c.c.})/\Gamma_{total}$ — Γ_{151}/Γ

NODE=M071S84

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
12.03±2.94±1.22	136	ABLIKIM	15I	BES3	$e^+ e^- \to \psi(2S) \to K^- \Lambda \overline{\Xi}^+ + \text{c.c.}$

$\Gamma(\Sigma^0 \overline{\Xi}^+ K^- + \text{c.c.})/\Gamma_{total}$ — Γ_{152}/Γ

NODE=M071S85

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
3.67±0.33±0.28	142	ABLIKIM	15I	BES3	$e^+ e^- \to \psi(2S) \to K^- \Sigma^0 \overline{\Xi}^+ + \text{c.c.}$

$\Gamma(\Omega^- \overline{\Omega}^+)/\Gamma_{total}$ — Γ_{153}/Γ

NODE=M071R54

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
5.66±0.30 OUR AVERAGE Error includes scale factor of 1.3.						
5.85±0.12±0.25		4k	[1] ABLIKIM	21E	BES3	$\psi(2S) \to \Omega^- \overline{\Omega}^+ \to \Lambda K^- \overline{\Lambda} K^+$
5.2 ±0.3 ±0.3		326	[1,2] DOBBS	17		$e^+ e^- \to \psi(2S) \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •						
4.7 ±0.9 ±0.5		27	[1,2,3] DOBBS	14		$e^+ e^- \to \psi(2S) \to$ hadrons
<15	90		ABLIKIM	12Q	BES2	$e^+ e^- \to \psi(2S) \to$ hadrons
<16	90		PEDLAR	05	CLEO	$e^+ e^- \to \psi(2S) \to$ hadrons
< 7.3	90		[4] BAI	01	BES	$e^+ e^- \to \psi(2S) \to$ hadrons

[1] Using B($\Omega^- \to \Lambda K^-$) = (67.8 ± 0.7)% and B($\Lambda \to p \pi^-$) = (63.9 ± 0.5)%. NODE=M071R54;LINKAGE=D
[2] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M071R54;LINKAGE=A
[3] Superseded by DOBBS 17. NODE=M071R54;LINKAGE=B
[4] Estimated using B($\psi(2S) \to J/\psi \pi^+ \pi^-$) = 0.310 ± 0.028. NODE=M071R54;LINKAGE=PP

$\Gamma(\eta_c \pi^+ \pi^- \pi^0)/\Gamma_{total}$ — Γ_{154}/Γ

NODE=M071R03

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<1.0	90	PEDLAR	07	CLEO	$e^+ e^- \to \psi(2S)$

$\Gamma(h_c(1P) \pi^0)/\Gamma_{total}$ — Γ_{155}/Γ

NODE=M071S42

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
8.6±1.3 OUR AVERAGE					
9.0±1.5±1.3	3k	[1] GE	11	CLEO	$\psi(2S) \to \pi^0$ anything
8.4±1.3±1.0	11k	ABLIKIM	10B	BES3	$\psi(2S) \to \pi^0 h_c$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	92^{+23}_{-22}	ADAMS	09	CLEO	$\psi(2S) \to 2\pi^+ 2\pi^- 2\pi^0$
seen	1282	DOBBS	08A	CLEO	$\psi(2S) \to \pi^0 \eta_c \gamma$
seen	168 ± 40	ROSNER	05	CLEO	$\psi(2S) \to \pi^0 \eta_c \gamma$

[1] Assuming a width $\Gamma(h_c(1P))$ = 0.86 MeV $\equiv \Gamma_0$, a measured dependence of the central value of $B = (7.6 + 1.4 \times \Gamma(h_c(1P)/\Gamma_0) \times 10^{-4}$, and with a systematic error that accounts for the width variation range 0.43–1.29 MeV. NODE=M071S42;LINKAGE=GE

$\Gamma(\Lambda_c^+ \overline{p} e^+ e^- + \text{c.c.})/\Gamma_{total}$ — Γ_{156}/Γ

NODE=M071P11

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<1.7 × 10⁻⁶	90	450M	ABLIKIM	18Q	BES3	$e^+ e^- \to \psi(2S)$

$\Gamma(\Theta(1540) \overline{\Theta}(1540) \to K^0_S p K^- \overline{n} + \text{c.c.})/\Gamma_{total}$ — Γ_{157}/Γ

NODE=M071S01

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<0.88	90	BAI	04G	BES2	$e^+ e^-$

$\Gamma(\Theta(1540) K^- \overline{n} \to K^0_S p K^- \overline{n})/\Gamma_{total}$ — Γ_{158}/Γ

NODE=M071S02

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<1.0	90	BAI	04G	BES2	$e^+ e^-$

$\Gamma(\Theta(1540) K^0_S \overline{p} \rightarrow K^0_S \overline{p} K^+ n)/\Gamma_{total}$ — Γ_{159}/Γ

NODE=M071S03

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<0.70	90	BAI	04G	BES2	$e^+ e^-$

$\Gamma(\overline{\Theta}(1540) K^+ n \rightarrow K^0_S \overline{p} K^+ n)/\Gamma_{total}$ — Γ_{160}/Γ

NODE=M071S04

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<2.6	90	BAI	04G	BES2	$e^+ e^-$

$\Gamma(\overline{\Theta}(1540) K^0_S p \rightarrow K^0_S p K^- \overline{n})/\Gamma_{total}$ — Γ_{161}/Γ

NODE=M071S05

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<0.60	90	BAI	04G	BES2	$e^+ e^-$

RADIATIVE DECAYS

NODE=M071315

$\Gamma(\gamma \chi_{c0}(1P))/\Gamma_{total}$ — Γ_{162}/Γ

NODE=M071R55

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
9.79 ±0.20 OUR FIT					
9.33 ±0.26 OUR AVERAGE					
9.389±0.014±0.332	4.7M	ABLIKIM	17U	BES3	$e^+ e^- \rightarrow \gamma X$
9.22 ±0.11 ±0.46	72k	ATHAR	04	CLEO	$e^+ e^- \rightarrow \gamma X$
9.9 ±0.5 ±0.8		[1] GAISER	86	CBAL	$e^+ e^- \rightarrow \gamma X$
7.2 ±2.3		[1] BIDDICK	77	CNTR	$e^+ e^- \rightarrow \gamma X$
7.5 ±2.6		[1] WHITAKER	76	MRK1	$e^+ e^-$

[1] Angular distribution ($1+\cos^2\theta$) assumed.

NODE=M071R;LINKAGE=A

$\Gamma(\gamma \chi_{c1}(1P))/\Gamma_{total}$ — Γ_{163}/Γ

NODE=M071R58

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
9.75 ±0.24 OUR FIT					
9.54 ±0.29 OUR AVERAGE					
9.905±0.011±0.353	5.0M	ABLIKIM	17U	BES3	$e^+ e^- \rightarrow \gamma X$
9.07 ±0.11 ±0.54	76k	ATHAR	04	CLEO	$e^+ e^- \rightarrow \gamma X$
9.0 ±0.5 ±0.7		[1] GAISER	86	CBAL	$e^+ e^- \rightarrow \gamma X$
7.1 ±1.9		[2] BIDDICK	77	CNTR	$e^+ e^- \rightarrow \gamma X$

[1] Angular distribution ($1-0.189 \cos^2\theta$) assumed.

NODE=M071R;LINKAGE=G

[2] Valid for isotropic distribution of the photon.

NODE=M071R;LINKAGE=B

$\Gamma(\gamma \chi_{c0}(1P))/\Gamma(\gamma \chi_{c1}(1P))$ — $\Gamma_{162}/\Gamma_{163}$

NODE=M071R97

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.02±0.01±0.07	[1] ATHAR	04	CLEO	$e^+ e^- \rightarrow \gamma X$

[1] Not independent from ATHAR 04 measurements of B($\gamma \chi_{cJ}$).

NODE=M071R97;LINKAGE=AH

$\Gamma(\gamma \chi_{c2}(1P))/\Gamma_{total}$ — Γ_{164}/Γ

NODE=M071R59

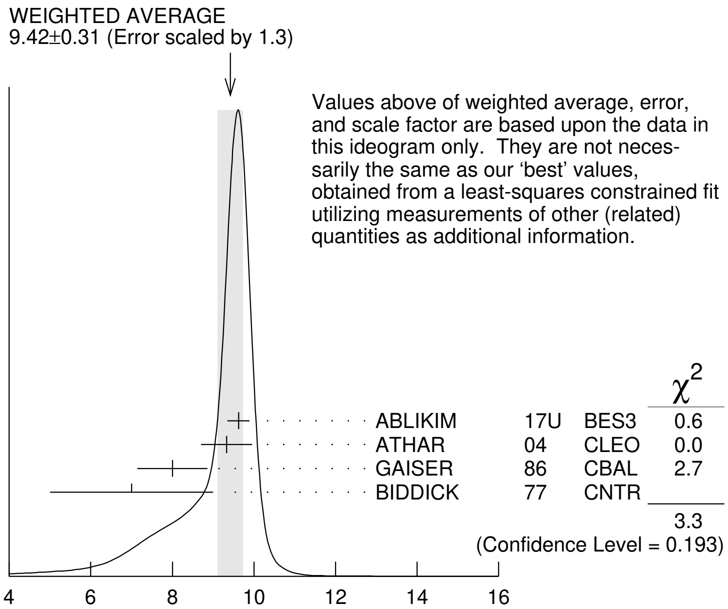
VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
9.52 ±0.20 OUR FIT					
9.42 ±0.31 OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below.					
9.621±0.013±0.272	4.2M	ABLIKIM	17U	BES3	$e^+ e^- \rightarrow \gamma X$
9.33 ±0.14 ±0.61	79k	ATHAR	04	CLEO	$e^+ e^- \rightarrow \gamma X$
8.0 ±0.5 ±0.7		[1] GAISER	86	CBAL	$e^+ e^- \rightarrow \gamma X$
7.0 ±2.0		[2] BIDDICK	77	CNTR	$e^+ e^- \rightarrow \gamma X$

[1] Angular distribution ($1-0.052 \cos^2\theta$) assumed.

NODE=M071R;LINKAGE=F

[2] Valid for isotropic distribution of the photon.

NODE=M071R59;LINKAGE=B



$\Gamma\big(\gamma\chi_{c2}(1P)\big)/\Gamma_{total}$ (units 10^{-2})

$[\Gamma(\gamma\chi_{c0}(1P))+\Gamma(\gamma\chi_{c1}(1P))+\Gamma(\gamma\chi_{c2}(1P))]/\Gamma_{total}$ $(\Gamma_{162}+\Gamma_{163}+\Gamma_{164})/\Gamma$

NODE=M071R19

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$27.6\pm0.3\pm2.0$	[1] ATHAR 04	CLEO	$e^+e^-\to\gamma X$

[1] Not independent from ATHAR 04 measurements of $B(\gamma\chi_{cJ})$.

NODE=M071R;LINKAGE=AH

$\Gamma(\gamma\chi_{c0}(1P))/\Gamma(\gamma\chi_{c2}(1P))$ $\Gamma_{162}/\Gamma_{164}$

NODE=M071R99

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.99\pm0.02\pm0.08$	[1] ATHAR 04	CLEO	$e^+e^-\to\gamma X$

[1] Not independent from ATHAR 04 measurements of $B(\gamma\chi_{cJ})$.

NODE=M071R99;LINKAGE=AH

$\Gamma(\gamma\chi_{c2}(1P))/\Gamma(\gamma\chi_{c1}(1P))$ $\Gamma_{164}/\Gamma_{163}$

NODE=M071R98

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$1.03\pm0.02\pm0.03$	[1] ATHAR 04	CLEO	$e^+e^-\to\gamma X$

[1] Not independent from ATHAR 04 measurements of $B(\gamma\chi_{cJ})$.

NODE=M071R98;LINKAGE=AH

$\Gamma(\gamma\eta_c(1S))/\Gamma_{total}$ Γ_{165}/Γ

NODE=M071R60

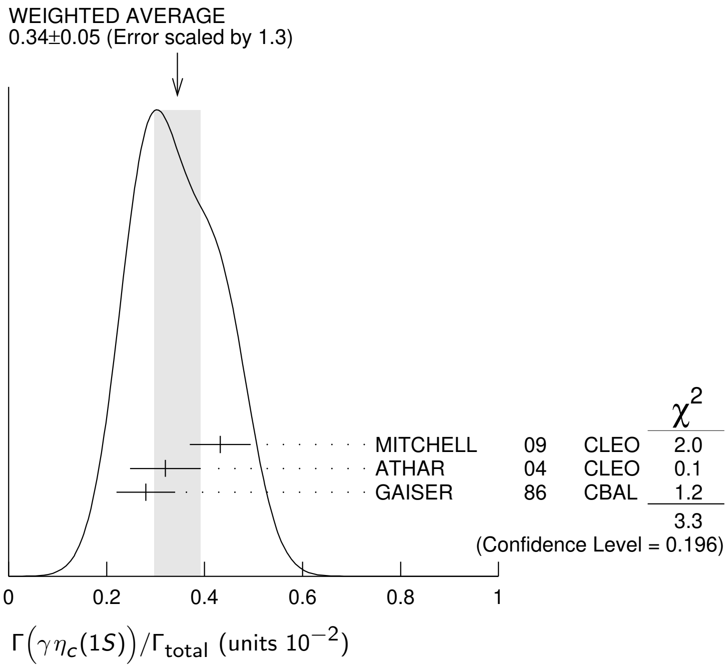
VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
0.34 ±0.05 OUR AVERAGE		Error includes scale factor of 1.3. See the ideogram below.		
$0.432\pm0.016\pm0.060$		MITCHELL 09	CLEO	$e^+e^-\to\gamma X$
$0.32\pm0.04\pm0.06$	2.5k	[1] ATHAR 04	CLEO	$e^+e^-\to\gamma X$
0.28 ± 0.06		[2] GAISER 86	CBAL	$e^+e^-\to\gamma X$

[1] ATHAR 04 used $\Gamma_{\eta_c(1S)} = 24.8\pm4.9$ MeV to obtain this result.

NODE=M071R60;LINKAGE=AT

[2] GAISER 86 used $\Gamma_{\eta_c(1S)} = 11.5\pm4.5$ MeV to obtain this result.

NODE=M071R60;LINKAGE=GA



$\Gamma(\gamma\eta_c(2S))/\Gamma_{total}$ Γ_{166}/Γ

NODE=M071R62
NODE=M071R62

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
7±2±4		[1] ABLIKIM	12G	BES3	$\psi(2S) \to \gamma K^0 K\pi$, $KK\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 8	90	[2] CRONIN-HEN...	10	CLEO	$\psi(2S) \to \gamma K\overline{K}\pi$
<20	90	ATHAR	04	CLEO	$e^+e^- \to \gamma X$
20–130	95	EDWARDS	82C	CBAL	$e^+e^- \to \gamma X$

[1] ABLIKIM 12G reports $[\Gamma(\psi(2S) \to \gamma\eta_c(2S))/\Gamma_{total}] \times [B(\eta_c(2S) \to K\overline{K}\pi)] = (1.30 \pm 0.20 \pm 0.30) \times 10^{-5}$ which we divide by our best value $B(\eta_c(2S) \to K\overline{K}\pi) = (1.9 \pm 1.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M071R62;LINKAGE=AB

[2] CRONIN-HENNESSY 10 reports $[\Gamma(\psi(2S) \to \gamma\eta_c(2S))/\Gamma_{total}] \times [B(\eta_c(2S) \to K\overline{K}\pi)] < 14.5 \times 10^{-6}$ which we divide by our best value $B(\eta_c(2S) \to K\overline{K}\pi) = 1.9 \times 10^{-2}$. This measurement assumes $\Gamma(\eta_c(2S)) = 14$ MeV. CRONIN-HENNESSY 10 gives the analytic dependence of limits on width. NODE=M071R62;LINKAGE=CR

$\Gamma(\gamma\pi^0)/\Gamma_{total}$ Γ_{167}/Γ

NODE=M071R42
NODE=M071R42

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
1.04±0.22 OUR AVERAGE Error includes scale factor of 1.4.						
0.95±0.16±0.05		423	ABLIKIM	17X	BES3	$\psi(2S) \to \gamma\pi^0$
1.58±0.40±0.13		37	ABLIKIM	10F	BES3	$\psi(2S) \to \gamma\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 5	90		PEDLAR	09	CLE3	$\psi(2S) \to \gamma X$
<5400	95		[1] LIBERMAN	75	SPEC	e^+e^-
$< 1 \times 10^4$	90		WIIK	75	DASP	e^+e^-

[1] Restated by us using $B(\psi(2S) \to \mu^+\mu^-) = 0.0077$. NODE=M071R;LINKAGE=U

$\Gamma(\gamma 2(\pi^+\pi^-))/\Gamma_{total}$ Γ_{168}/Γ

NODE=M071S28
NODE=M071S28

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
39.6±2.8±5.0	583	ABLIKIM	07D	BES2	$e^+e^- \to \psi(2S)$

$\Gamma(\gamma 3(\pi^+\pi^-))/\Gamma_{total}$ Γ_{169}/Γ

NODE=M071S36
NODE=M071S36

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<17	90	ABLIKIM	07D	BES2	$e^+e^- \to \psi(2S)$

$\Gamma(\gamma\eta'(958))/\Gamma_{total}$ Γ_{170}/Γ

NODE=M071R44
NODE=M071R44

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
1.24 ±0.04 OUR AVERAGE						
1.251±0.022±0.062		56k	ABLIKIM	17X	BES3	$\psi(2S) \to \gamma\pi^+\pi^-\eta$, $\gamma\pi^0\pi^0\eta$
1.26 ±0.03 ±0.08		2226	[1] ABLIKIM	10F	BES3	$\psi(2S) \to 3\gamma\pi^+\pi^-$, $2\gamma\pi^+\pi^-$
1.19 ±0.08 ±0.03			PEDLAR	09	CLE3	$\psi(2S) \to \gamma X$
1.24 ±0.27 ±0.15		23	ABLIKIM	06R	BES2	$e^+e^- \to \psi(2S)$
1.54 ±0.31 ±0.20		~ 43	BAI	98F	BES	$\psi(2S) \to \pi^+\pi^-2\gamma$, $\pi^+\pi^-3\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 60	90		[2] BRAUNSCH...	77	DASP	e^+e^-
< 11	90		[3] BARTEL	76	CNTR	e^+e^-

[1] Combining the results from $\eta' \to \pi^+\pi^-\eta$ and $\eta' \to \pi^+\pi^-\gamma$ decay modes.
[2] Restated by us using total decay width 228 keV.
[3] The value is normalized to the branching ratio for $\Gamma(J/\psi(1S)\eta)/\Gamma_{total}$.

NODE=M071R44;LINKAGE=AB
NODE=M071R;LINKAGE=R
NODE=M071R;LINKAGE=C

$\Gamma(\gamma f_2(1270))/\Gamma_{total}$ Γ_{171}/Γ

NODE=M071R84
NODE=M071R84

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
$2.73^{+0.29}_{-0.25}$ OUR AVERAGE Error includes scale factor of 1.8.					
$2.84\pm0.15^{+0.03}_{-0.10}$	1.9k	[1,2] DOBBS	15		$\psi(2S) \to \gamma\pi\pi$
2.12±0.19±0.32		[3,4] BAI	03C	BES	$\psi(2S) \to \gamma\pi\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.08±0.19±0.33	200.6 ± 18.8	[3] BAI	03C	BES	$\psi(2S) \to \gamma\pi^+\pi^-$
2.90±1.08±1.07	29.9 ± 11.1	[3] BAI	03C	BES	$\psi(2S) \to \gamma\pi^0\pi^0$

OCCUR=2
OCCUR=3

[1] Using CLEO-c data but not authored by the CLEO Collaboration.
[2] DOBBS 15 reports $[\Gamma(\psi(2S) \to \gamma f_2(1270))/\Gamma_{total}] \times [B(f_2(1270) \to \pi\pi)] = (2.39 \pm 0.09 \pm 0.09) \times 10^{-4}$ which we divide by our best value $B(f_2(1270) \to \pi\pi) = (84.2^{+2.9}_{-0.9}) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
[3] Normalized to $B(\psi(2S) \to J/\psi\pi^+\pi^-) = 0.305 \pm 0.016$.
[4] Combining the results from $\pi^+\pi^-$ and $\pi^0\pi^0$ decay modes.

NODE=M071R84;LINKAGE=A
NODE=M071R84;LINKAGE=B
NODE=M071R;LINKAGE=3B
NODE=M071R;LINKAGE=B9

$\Gamma(\gamma f_0(1370) \to \gamma K\overline{K})/\Gamma_{total}$ Γ_{172}/Γ

NODE=M071S75
NODE=M071S75

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		COMMENT
3.1±1.0±1.4	175	[1] DOBBS	15	$\psi(2S) \to \gamma K\overline{K}$

[1] Using CLEO-c data but not authored by the CLEO Collaboration.

NODE=M071S75;LINKAGE=A

$\Gamma(\gamma f_0(1500))/\Gamma_{total}$ Γ_{173}/Γ

NODE=M071S76
NODE=M071S76

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		COMMENT
9.3±1.8±0.6	274	[1,2] DOBBS	15	$\psi(2S) \to \gamma\pi\pi$

[1] DOBBS 15 reports $[\Gamma(\psi(2S) \to \gamma f_0(1500))/\Gamma_{total}] \times [B(f_0(1500) \to \pi\pi)] = (3.2 \pm 0.6 \pm 0.2) \times 10^{-5}$ which we divide by our best value $B(f_0(1500) \to \pi\pi) = (34.5 \pm 2.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
[2] Using CLEO-c data but not authored by the CLEO Collaboration.

NODE=M071S76;LINKAGE=A
NODE=M071S76;LINKAGE=B

$\Gamma(\gamma f'_2(1525))/\Gamma_{total}$ Γ_{174}/Γ

NODE=M071S77
NODE=M071S77

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		COMMENT
3.3±0.8±0.1	136	[1,2] DOBBS	15	$\psi(2S) \to \gamma K\overline{K}$

[1] DOBBS 15 reports $[\Gamma(\psi(2S) \to \gamma f'_2(1525))/\Gamma_{total}] \times [B(f'_2(1525) \to K\overline{K})] = (2.9 \pm 0.6 \pm 0.3) \times 10^{-5}$ which we divide by our best value $B(f'_2(1525) \to K\overline{K}) = (87.6 \pm 2.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
[2] Using CLEO-c data but not authored by the CLEO Collaboration.

NODE=M071S77;LINKAGE=A
NODE=M071S77;LINKAGE=B

$\Gamma(\gamma f_0(1710) \to \gamma\pi\pi)/\Gamma_{total}$ Γ_{176}/Γ

NODE=M071R85
NODE=M071R85

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
3.5 ±0.6 OUR AVERAGE					
3.6 ±0.4 ±0.5	290	[1] DOBBS	15		$\psi(2S) \to \gamma\pi\pi$
3.01±0.41±1.24	35.6 ± 4.8	[2] BAI	03C	BES	$\psi(2S) \to \gamma\pi^+\pi^-$

[1] Using CLEO-c data but not authored by the CLEO Collaboration.
[2] Normalized to $B(\psi(2S) \to J/\psi\pi^+\pi^-) = 0.305 \pm 0.016$.

NODE=M071R85;LINKAGE=A
NODE=M071R85;LINKAGE=3B

$\Gamma(\gamma f_0(1710) \to \gamma K\overline{K})/\Gamma_{total}$ Γ_{177}/Γ

NODE=M071R86
NODE=M071R86

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
6.6 ±0.7 OUR AVERAGE						
6.7 ±0.6 ±0.6		375	[1] DOBBS	15		$\psi(2S) \to \gamma K\overline{K}$
6.04±0.90±1.32		39.6 ± 5.9	[2,3] BAI	03C	BES	$\psi(2S) \to \gamma K^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 15.6	90	6.8 ± 3.1	[2,3] BAI	03C	BES	$\psi(2S) \to \gamma K^0_S K^0_S$

OCCUR=2

[1] Using CLEO-c data but not authored by the CLEO Collaboration.
NODE=M071R86;LINKAGE=A

[2] Includes unknown branching fractions to K^+K^- or $K^0_S K^0_S$. We have multiplied the K^+K^- result by a factor of 2 and the $K^0_S K^0_S$ result by a factor of 4 to obtain the $K\overline{K}$ result.
NODE=M071R;LINKAGE=CK

[3] Normalized to B($\psi(2S) \to J/\psi\pi^+\pi^-$) = 0.305 ± 0.016.
NODE=M071R86;LINKAGE=3B

$\Gamma(\gamma f_0(2100) \to \gamma\pi\pi)/\Gamma_{total}$ Γ_{178}/Γ

NODE=M071S78
NODE=M071S78

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		COMMENT
4.8±0.5±0.9	373	[1] DOBBS	15	$\psi(2S) \to \gamma\pi\pi$

[1] Using CLEO-c data but not authored by the CLEO Collaboration.
NODE=M071S78;LINKAGE=A

$\Gamma(\gamma f_0(2200) \to \gamma K\overline{K})/\Gamma_{total}$ Γ_{179}/Γ

NODE=M071S79
NODE=M071S79

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		COMMENT
3.2±0.6±0.8	207	[1] DOBBS	15	$\psi(2S) \to \gamma K\overline{K}$

[1] Using CLEO-c data but not authored by the CLEO Collaboration.
NODE=M071S79;LINKAGE=A

$\Gamma(\gamma f_J(2220) \to \gamma\pi\pi)/\Gamma_{total}$ Γ_{180}/Γ

NODE=M071S80
NODE=M071S80

VALUE	CL%	DOCUMENT ID		COMMENT
<5.8 × 10^{-6}	90	[1,2] DOBBS	15	$\psi(2S) \to \gamma\pi\pi$

[1] Using CLEO-c data but not authored by the CLEO Collaboration.
NODE=M071S80;LINKAGE=A

[2] For Γ = 20/50 MeV, the 90% CL upper limits for $\pi^+\pi^-$ and $\pi^0\pi^0$ are $3.2/4.3 \times 10^{-6}$ and $2.6/4.0 \times 10^{-6}$, respectively.
NODE=M071S80;LINKAGE=DO

$\Gamma(\gamma f_J(2220) \to \gamma K\overline{K})/\Gamma_{total}$ Γ_{181}/Γ

NODE=M071S81
NODE=M071S81

VALUE	CL%	DOCUMENT ID		COMMENT
<9.5 × 10^{-6}	90	[1,2] DOBBS	15	$\psi(2S) \to \gamma K\overline{K}$

[1] Using CLEO-c data but not authored by the CLEO Collaboration.
NODE=M071S81;LINKAGE=A

[2] For Γ = 20/50 MeV, the 90% CL upper limits for K^+K^- and $K^0_S K^0_S$ are $2.1/4.3\times10^{-6}$ and $3.7/5.5 \times 10^{-6}$, respectively.
NODE=M071S81;LINKAGE=DO

$\Gamma(\gamma\eta)/\Gamma_{total}$ Γ_{182}/Γ

NODE=M071R43
NODE=M071R43

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.92±0.18 OUR AVERAGE						
0.85±0.18±0.04		382	[1] ABLIKIM	17X	BES3	$\psi(2S) \to \gamma\pi^+\pi^-\pi^0$, $\gamma 3\pi^0$
1.38±0.48±0.09		13	[1] ABLIKIM	10F	BES3	$\psi(2S) \to \gamma\pi^+\pi^-\pi^0$, $\gamma 3\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 2	90		PEDLAR	09	CLE3	$\psi(2S) \to \gamma X$
< 90	90		BAI	98F	BES	$\psi(2S) \to \pi^+\pi^- 3\gamma$
<200	90		YAMADA	77	DASP	$e^+e^- \to 3\gamma$

[1] Combining the results from $\eta \to \pi^+\pi^-\pi^0$ and $\eta \to 3\pi^0$ decay modes.
NODE=M071R43;LINKAGE=AB

$\Gamma(\gamma\eta\pi^+\pi^-)/\Gamma_{total}$ Γ_{183}/Γ

NODE=M071R04
NODE=M071R04

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
8.71±1.25±1.64	418	ABLIKIM	06R	BES2	$\psi(2S) \to \gamma\eta\pi^+\pi^-$

$\Gamma(\gamma\eta(1405) \to \gamma K\overline{K}\pi)/\Gamma_{total}$ Γ_{185}/Γ

NODE=M071R61
NODE=M071R61

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.9	90	ABLIKIM	06R	BES2	$\psi(2S) \to \gamma K^0_S K^+\pi^-$ + c.c.
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.3	90	ABLIKIM	06R	BES2	$\psi(2S) \to \gamma K^+K^-\pi^0$
<1.2	90	[1] SCHARRE	80	MRK1	e^+e^-

OCCUR=2

[1] Includes unknown branching fraction $\eta(1405) \to K\overline{K}\pi$.
NODE=M071R;LINKAGE=E

$\Gamma(\gamma\eta(1405) \to \gamma\eta\pi^+\pi^-)/\Gamma_{total}$ — Γ_{186}/Γ

NODE=M071R05

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.36±0.25±0.05	10	ABLIKIM	06R	BES2	$\psi(2S) \to \gamma\eta\pi^+\pi^-$

$\Gamma(\gamma\eta(1405) \to \gamma f_0(980)\pi^0 \to \gamma\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{187}/Γ

NODE=M071P09

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<5.0 × 10^{-7}	90	ABLIKIM	17AJ	BES3	$\psi(2S) \to \gamma\pi^+\pi^-\pi^0$

$\Gamma(\gamma\eta(1475) \to \gamma K\overline{K}\pi)/\Gamma_{total}$ — Γ_{189}/Γ

NODE=M071R06

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.4	90	ABLIKIM	06R	BES2	$\psi(2S) \to \gamma K^+K^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.5	90	ABLIKIM	06R	BES2	$\psi(2S) \to \gamma K^0_S K^+\pi^-$ + c.c.

OCCUR=2

$\Gamma(\gamma\eta(1475) \to \gamma\eta\pi^+\pi^-)/\Gamma_{total}$ — Γ_{190}/Γ

NODE=M071R07

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.88	90	ABLIKIM	06R	BES2	$\psi(2S) \to \gamma\eta\pi^+\pi^-$

$\Gamma(\gamma K^{*0}K^+\pi^- + c.c.)/\Gamma_{total}$ — Γ_{191}/Γ

NODE=M071S29

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
37.0±6.1±7.2	237	ABLIKIM	07D	BES2	$e^+e^- \to \psi(2S)$

$\Gamma(\gamma K^{*0}\overline{K}^{*0})/\Gamma_{total}$ — Γ_{192}/Γ

NODE=M071S30

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
24.0±4.5±5.0	41	ABLIKIM	07D	BES2	$e^+e^- \to \psi(2S)$

$\Gamma(\gamma K^0_S K^+\pi^- + c.c.)/\Gamma_{total}$ — Γ_{193}/Γ

NODE=M071S31

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
25.6±3.6±3.6	115	ABLIKIM	07D	BES2	$e^+e^- \to \psi(2S)$

$\Gamma(\gamma K^+K^-\pi^+\pi^-)/\Gamma_{total}$ — Γ_{194}/Γ

NODE=M071S32

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
19.1±2.7±4.3	132	ABLIKIM	07D	BES2	$e^+e^- \to \psi(2S)$

$\Gamma(\gamma K^+K^-2(\pi^+\pi^-))/\Gamma_{total}$ — Γ_{195}/Γ

NODE=M071S35

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<22	90	ABLIKIM	07D	BES2	$e^+e^- \to \psi(2S)$

$\Gamma(\gamma 2(K^+K^-))/\Gamma_{total}$ — Γ_{196}/Γ

NODE=M071S37

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<4	90	ABLIKIM	07D	BES2	$e^+e^- \to \psi(2S)$

$\Gamma(\gamma p\overline{p})/\Gamma_{total}$ — Γ_{197}/Γ

NODE=M071S33

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
3.9 ±0.5 OUR AVERAGE	Error includes scale factor of 2.0.				
4.18±0.26±0.18	348	[1] ALEXANDER	10	CLEO	$\psi(2S) \to \gamma p\overline{p}$
2.9 ±0.4 ±0.4	142	ABLIKIM	07D	BES2	$e^+e^- \to \psi(2S)$

[1] From a fit of the $p\overline{p}$ mass distribution to a combination of $\gamma f_2(1950)$, $\gamma f_2(2150)$, and $\gamma p\overline{p}$ phase space, for $M(p\overline{p} < 2.85$ GeV, and accounting for backgrounds from $\psi(2S) \to \pi^0 p\overline{p}$ and continuum.

NODE=M071S33;LINKAGE=AL

$\Gamma(\gamma f_2(1950) \to \gamma p\overline{p})/\Gamma_{total}$ — Γ_{198}/Γ

NODE=M071S46

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
1.2±0.2±0.1	111	[1] ALEXANDER	10	CLEO	$\psi(2S) \to \gamma p\overline{p}$

[1] From a fit of the $p\overline{p}$ mass distribution to a combination of $\gamma f_2(1950)$, $\gamma f_2(2150)$, and $\gamma p\overline{p}$ phase space, for $M(p\overline{p} < 2.85$ GeV, and accounting for backgrounds from $\psi(2S) \to \pi^0 p\overline{p}$ and continuum.

NODE=M071S46;LINKAGE=AL

$\Gamma(\gamma f_2(2150) \to \gamma p\overline{p})/\Gamma_{total}$ — Γ_{199}/Γ

NODE=M071S47

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
0.72±0.18±0.03	73	[1] ALEXANDER	10	CLEO	$\psi(2S) \to \gamma p\overline{p}$

[1] From a fit of the $p\overline{p}$ mass distribution to a combination of $\gamma f_2(1950)$, $\gamma f_2(2150)$, and $\gamma p\overline{p}$ phase space, for $M(p\overline{p} < 2.85$ GeV, and accounting for backgrounds from $\psi(2S) \to \pi^0 p\overline{p}$ and continuum.

NODE=M071S47;LINKAGE=AL

$\Gamma(\gamma X(1835) \to \gamma p\overline{p})/\Gamma_{total}$ — Γ_{200}/Γ

NODE=M071S48

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
$4.57\pm0.36^{+1.77}_{-4.26}$		ABLIKIM	12D	BES3	$J/\psi \to \gamma p\overline{p}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.6	90	ALEXANDER	10	CLEO	$\psi(2S) \to \gamma p\overline{p}$
<5.4	90	ABLIKIM	07D	BES	$\psi(2S) \to \gamma p\overline{p}$

$\Gamma(\gamma X \to \gamma p\overline{p})/\Gamma_{total}$ — Γ_{201}/Γ

NODE=M071S49

For a narrow resonance in the range 2.2 < $M(X)$ < 2.8 GeV.

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<2	90	ALEXANDER	10	CLEO	$\psi(2S) \to \gamma p\overline{p}$

$\Gamma(\gamma p\overline{p}\pi^+\pi^-)/\Gamma_{total}$ — Γ_{202}/Γ

NODE=M071S34

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$2.8\pm1.2\pm0.7$	17	ABLIKIM	07D	BES2	$e^+e^- \to \psi(2S)$

$\Gamma(\gamma\gamma J/\psi)/\Gamma_{total}$ — Γ_{204}/Γ

NODE=M071S55

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
$3.1\pm0.6^{+0.8}_{-1.0}$	1.1k	ABLIKIM	12O	BES3	$e^+e^- \to \psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3.2 ± 0.6	1.1k	[1] ABLIKIM	17N	BES3	$\psi(2S) \to \gamma\gamma J/\psi$

[1] Uses B($J/\psi \to e^+e^-$) = (5.971 ± 0.032)% and B($J/\psi \to \mu^+\mu^-$) = (5.961 ± 0.033)%. No systematic error estimation. NODE=M071S55;LINKAGE=A

$\Gamma(e^+e^-\eta')/\Gamma_{total}$ — Γ_{205}/Γ

NODE=M071P12

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
1.90 ± 0.26 OUR AVERAGE					
$1.99\pm0.33\pm0.12$	57	ABLIKIM	18Z	BES3	$\psi(2S) \to \eta' e^+e^-$, $\eta' \to \gamma\pi^+\pi^-$
$1.79\pm0.38\pm0.11$	20	ABLIKIM	18Z	BES3	$\psi(2S) \to \eta' e^+e^-$, $\eta' \to \eta\pi^+\pi^-$ (OCCUR=2)

$\Gamma(e^+e^-\chi_{c0}(1P))/\Gamma_{total}$ — Γ_{206}/Γ

NODE=M071P01

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
$10.6\pm2.4\pm0.4$	48	[1] ABLIKIM	17I	BES3	$\psi(2S) \to e^+e^-\gamma J/\psi$

[1] ABLIKIM 17I reports (11.7 ± 2.5 ± 1.0) × 10^{-4} from a measurement of [$\Gamma(\psi(2S) \to e^+e^-\chi_{c0}(1P))/\Gamma_{total}$] × [B($\chi_{c0}(1P) \to \gamma J/\psi(1S)$)] assuming B($\chi_{c0}(1P) \to \gamma J/\psi(1S)$) = (1.27 ± 0.06) × 10^{-2}, which we rescale to our best value B($\chi_{c0}(1P) \to \gamma J/\psi(1S)$) = (1.40 ± 0.05) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M071P01;LINKAGE=B

$\Gamma(e^+e^-\chi_{c0}(1P))/\Gamma(\gamma\chi_{c0}(1P))$ — $\Gamma_{206}/\Gamma_{162}$

NODE=M071P04

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
$9.4\pm1.9\pm0.6$	48	[1] ABLIKIM	17I	BES3	$\psi(2S) \to e^+e^-\gamma J/\psi$

[1] Uses B($\psi(2S) \to \gamma\chi_{c0}(1P)$) × B($\chi_{c0}(1P) \to \gamma J/\psi(1S)$) = $(15.8\pm0.3\pm0.6)\times10^{-4}$ from ABLIKIM 17N and accounts for common systematic errors. NODE=M071P04;LINKAGE=A

$\Gamma(e^+e^-\chi_{c1}(1P))/\Gamma_{total}$ — Γ_{207}/Γ

NODE=M071P02

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
$8.5\pm0.6\pm0.2$	873	[1] ABLIKIM	17I	BES3	$\psi(2S) \to e^+e^-\gamma J/\psi$

[1] ABLIKIM 17I reports (8.6 ± 0.3 ± 0.6) × 10^{-4} from a measurement of [$\Gamma(\psi(2S) \to e^+e^-\chi_{c1}(1P))/\Gamma_{total}$] × [B($\chi_{c1}(1P) \to \gamma J/\psi(1S)$)] assuming B($\chi_{c1}(1P) \to \gamma J/\psi(1S)$) = (33.9 ± 1.2) × 10^{-2}, which we rescale to our best value B($\chi_{c1}(1P) \to \gamma J/\psi(1S)$) = (34.3 ± 1.0) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M071P02;LINKAGE=B

$\Gamma(e^+e^-\chi_{c1}(1P))/\Gamma(\gamma\chi_{c1}(1P))$ — $\Gamma_{207}/\Gamma_{163}$

NODE=M071P05

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
$8.3\pm0.3\pm0.4$	873	[1] ABLIKIM	17I	BES3	$\psi(2S) \to e^+e^-\gamma J/\psi$

[1] Uses B($\psi(2S) \to \gamma\chi_{c1}(1P)$) × B($\chi_{c1}(1P) \to \gamma J/\psi(1S)$) = $(351.8\pm1.0\pm12.0)\times10^{-4}$ from ABLIKIM 17N and accounts for common systematic errors. NODE=M071P05;LINKAGE=A

$\Gamma(e^+e^-\chi_{c2}(1P))/\Gamma_{total}$ — Γ_{208}/Γ

NODE=M071P03

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
7.0±0.7±0.2	227	[1] ABLIKIM	17I	BES3	$\psi(2S) \to e^+e^-\gamma J/\psi$

[1] ABLIKIM 17I reports (6.9 ± 0.5 ± 0.6) × 10^{-4} from a measurement of [$\Gamma(\psi(2S) \to e^+e^-\chi_{c2}(1P))/\Gamma_{total}$] × [B($\chi_{c2}(1P) \to \gamma J/\psi(1S)$)] assuming B($\chi_{c2}(1P) \to \gamma J/\psi(1S)$) = (19.2 ± 0.7) × 10^{-2}, which we rescale to our best value B($\chi_{c2}(1P) \to \gamma J/\psi(1S)$) = (19.0 ± 0.5) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M071P03;LINKAGE=B

$\Gamma(e^+e^-\chi_{c2}(1P))/\Gamma(\gamma\chi_{c2}(1P))$ — $\Gamma_{208}/\Gamma_{164}$

NODE=M071P06

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
6.6±0.5±0.4	227	[1] ABLIKIM	17I	BES3	$\psi(2S) \to e^+e^-\gamma J/\psi$

[1] Uses B($\psi(2S) \to \gamma\chi_{c2}(1P)$) × B($\chi_{c2}(1P) \to \gamma J/\psi(1S)$) = (199.6 ± 0.8 ± 7.0) × 10^{-4} from ABLIKIM 17N and accounts for common systematic errors.

NODE=M071P06;LINKAGE=A

WEAK DECAYS

NODE=M071330

$\Gamma(D^0 e^+e^- + \text{c.c.})/\Gamma_{total}$ — Γ_{209}/Γ

NODE=M071P07

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.4 × 10^{-7}	90	[1] ABLIKIM	17AF	BES3	$e^+e^- \to \psi(2S)$

[1] Using D^0 decays to $K^-\pi^+$, $K^-\pi^+\pi^0$, and $K^-\pi^+\pi^+\pi^-$.

NODE=M071P07;LINKAGE=A

OTHER DECAYS

NODE=M071320

$\Gamma(\text{invisible})/\Gamma(e^+e^-)$ — Γ_{210}/Γ_7

NODE=M071S64

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<2.0	90	LEES	13I	BABR	$B \to K^{(*)}\psi(2S)$

$\psi(2S)$ CROSS-PARTICLE BRANCHING RATIOS

NODE=M071240

For measurements involving B($\psi(2S) \to \gamma\chi_{cJ}(1P)$)×B($\chi_{cJ}(1P) \to X$) see the corresponding entries in the $\chi_{cJ}(1P)$ sections.

NODE=M071240

MULTIPOLE AMPLITUDE RATIOS IN RADIATIVE DECAYS $\psi(2S) \to \gamma\chi_{cJ}(1P)$ and $\chi_{cJ} \to \gamma J/\psi(1S)$

NODE=M071250

$a_2(\chi_{c1})/a_2(\chi_{c2})$ Magnetic quadrupole transition amplitude ratio

NODE=M071QAR

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
63 ± 7 OUR AVERAGE					
61.7± 8.3	253k	[1] ABLIKIM	17N	BES3	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$
67 $^{+19}_{-13}$	59k	[2] ARTUSO	09	CLEO	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$

[1] Statistical and systematic errors combined.

NODE=M071QAR;LINKAGE=A

[2] Statistical and systematic errors combined. Using values from fits with floating $M2$ amplitudes $a_2(\chi_{c1})$, $a_2(\chi_{c2})$, $b_2(\chi_{c1})$, $b_2(\chi_{c2})$ and fixed $E3$ amplitudes of $a_3(\chi_{c2})$ = $b_3(\chi_{c2})$ = 0. Not independent of values for $a_2(\chi_{c1}(1P))$ and $a_2(\chi_{c2}(1P))$ from ARTUSO 09.

NODE=M071QAR;LINKAGE=AR

$b_2(\chi_{c2})/b_2(\chi_{c1})$ Magnetic quadrupole transition amplitude ratio

NODE=M071QBR

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
60±31 OUR AVERAGE					
74±40	253k	[1] ABLIKIM	17N	BES3	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$
37$^{+53}_{-47}$	59k	[2] ARTUSO	09	CLEO	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$

[1] Statistical and systematic errors combined. Derived from the reported measurement of $b_2(\chi_{c1})/b_2(\chi_{c2})$ = 1.35 ± 0.72.

NODE=M071QBR;LINKAGE=A

[2] Statistical and systematic errors combined. Using values from fits with floating $M2$ amplitudes $a_2(\chi_{c1})$, $a_2(\chi_{c2})$, $b_2(\chi_{c1})$, $b_2(\chi_{c2})$ and fixed $E3$ amplitudes of $a_3(\chi_{c2})$ = $b_3(\chi_{c2})$ = 0. Not independent of values for $b_2(\chi_{c1}(1P))$ and $b_2(\chi_{c2}(1P))$ from ARTUSO 09.

NODE=M071QBR;LINKAGE=AR

$\psi(2S)$ REFERENCES

NODE=M071

ABLIKIM	21AL	PR D104 092003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61444
ABLIKIM	21AO	PR D104 092012	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61447
ABLIKIM	21AT	JHEP 2111 226	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61463
ABLIKIM	21E	PRL 126 092002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61033
ABLIKIM	21L	PR D103 112004	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61117
ABLIKIM	21S	PL B820 136576	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61152
ABLIKIM	21Z	PRL 127 082002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61265
LEES	21	PR D103 092001	J.P. Lees *et al.*	(BABAR Collab.)	REFID=61113
LEES	21C	PR D104 112004	J.P. Lees *et al.*	(BABAR Collab.)	REFID=61451
ABLIKIM	20F	PR D101 032008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60256
PDG	20	PTEP 2020 083C01	P.A. Zyla *et al.*	(PDG Collab.)	REFID=60676
ABLIKIM	19AO	PR D99 112010	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59892
ABLIKIM	19AT	PR D100 051101	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59989
ABLIKIM	19AU	PR D100 052010	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59996
ABLIKIM	19BA	PR D100 092003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60024
ABLIKIM	19I	PR D99 012014	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59605
ABLIKIM	19N	PR D99 032006	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59615
ABLIKIM	18Q	PR D97 091102	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58933
ABLIKIM	18T	PR D98 032006	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58975
ABLIKIM	18Z	PL B783 452	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59038
ANASHIN	18	PL B781 174	V.V. Anashin *et al.*	(KEDR Collab.)	REFID=59013
LEES	18E	PR D98 112015	J.P. Lees *et al.*	(BABAR Collab.)	REFID=59505
ABLIKIM	17AF	PR D96 111101	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58315
ABLIKIM	17AJ	PR D96 112008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58322
ABLIKIM	17AK	PR D96 112012	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58324
ABLIKIM	17E	PL B770 217	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57903
ABLIKIM	17I	PRL 118 221802	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57931
ABLIKIM	17L	PR D95 052003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57967
ABLIKIM	17N	PR D95 072004	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57978
ABLIKIM	17U	PR D96 032001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58026
ABLIKIM	17X	PR D96 052003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58216
DOBBS	17	PR D96 092004	S. Dobbs *et al.*	(NWES, WAYN)	REFID=58670
LEES	17A	PR D95 052001	J.P. Lees *et al.*	(BABAR Collab.)	REFID=57966
AAIJ	16Y	JHEP 1605 132	R. Aaij *et al.*	(LHCb Collab.)	REFID=57333
ABLIKIM	16L	PR D93 072003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57510
ABLIKIM	15I	PR D91 092006	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56774
ABLIKIM	15V	PL B749 414	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56787
ANASHIN	15	PL B749 50	V.V. Anashin *et al.*	(KEDR Collab.)	REFID=56792
DOBBS	15	PR D91 052006	S. Dobbs *et al.*	(NWES)	REFID=56805
LEES	15J	PR D92 072008	J.P. Lees *et al.*	(BABAR Collab.)	REFID=56988
ABLIKIM	14G	PR D89 112006	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55898
DOBBS	14	PL B739 90	S. Dobbs *et al.*	(NWES, WAYN)	REFID=56333
ABLIKIM	13A	PRL 110 022001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54834
ABLIKIM	13D	PR D87 012007	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54879
ABLIKIM	13F	PR D87 052007	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54920
ABLIKIM	13M	PR D87 092006	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55386
ABLIKIM	13R	PR D88 032007	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55402
ABLIKIM	13S	PR D88 032010	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55403
ABLIKIM	13W	PR D88 112007	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55634
LEES	13I	PR D87 112005	J.P. Lees *et al.*	(BABAR Collab.)	REFID=55161
LEES	13O	PR D87 092005	J.P. Lees *et al.*	(BABAR Collab.)	REFID=55293
LEES	13Q	PR D88 032013	J.P. Lees *et al.*	(BABAR Collab.)	REFID=55404
LEES	13Y	PR D88 072009	J.P. Lees *et al.*	(BABAR Collab.)	REFID=55589
AAIJ	12H	EPJ C72 1972	R. Aaij *et al.*	(LHCb Collab.)	REFID=54056
ABLIKIM	12D	PRL 108 112003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54269
ABLIKIM	12G	PRL 109 042003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54272
ABLIKIM	12H	PL B710 594	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54273
ABLIKIM	12L	PR D86 072011	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54739
ABLIKIM	12M	PR D86 092008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54740
ABLIKIM	12O	PRL 109 172002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54742
ABLIKIM	12Q	CP C36 1040	M. Ablikim *et al.*	(BES II Collab.)	REFID=54864
ANASHIN	12	PL B711 280	V.V. Anashin *et al.*	(KEDR Collab.)	REFID=54038
LEES	12E	PR D85 112009	J.P. Lees *et al.*	(BABAR Collab.)	REFID=54297
LEES	12F	PR D86 012008	J.P. Lees *et al.*	(BABAR Collab.)	REFID=54298
METREVELI	12	PR D85 092007	Z. Metreveli *et al.*	(NWES, FLOR, WAYN+)	REFID=54304
GE	11	PR D84 032008	J.Y. Ge *et al.*	(CLEO Collab.)	REFID=53960
ABLIKIM	10B	PRL 104 132002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=53348
ABLIKIM	10F	PRL 105 261801	M. Ablikim *et al.*	(BESIII Collab.)	REFID=53630
ALEXANDER	10	PR D82 092002	J.P. Alexander *et al.*	(CLEO Collab.)	REFID=53525
CRONIN-HEN...	10	PR D81 052002	D. Cronin-Hennessey *et al.*	(CLEO Collab.)	REFID=53233
ADAMS	09	PR D80 051106	G.S. Adams *et al.*	(CLEO Collab.)	REFID=53103
ARTUSO	09	PR D80 112003	M. Artuso *et al.*	(CLEO Collab.)	REFID=53206
LIBBY	09	PR D80 072002	J. Libby *et al.*	(CLEO Collab.)	REFID=53124
MITCHELL	09	PRL 102 011801	R.E. Mitchell *et al.*	(CLEO Collab.)	REFID=52676
PEDLAR	09	PR D79 111101	T.K. Pedlar *et al.*	(CLEO Collab.)	REFID=52998
ABLIKIM	08B	PL B659 74	M. Ablikim *et al.*	(BES Collab.)	REFID=52129
ABLIKIM	08C	PL B659 789	M. Ablikim *et al.*	(BES Collab.)	REFID=52130
DOBBS	08A	PRL 101 182003	S. Dobbs *et al.*	(CLEO Collab.)	REFID=52579
MENDEZ	08	PR D78 011102	H. Mendez *et al.*	(CLEO Collab.)	REFID=52684
PDG	08	PL B667 1	C. Amsler *et al.*	(PDG Collab.)	REFID=52166
ABLIKIM	07C	PL B648 149	M. Ablikim *et al.*	(BES Collab.)	REFID=51636
ABLIKIM	07D	PRL 99 011802	M. Ablikim *et al.*	(BES II Collab.)	REFID=51725
ABLIKIM	07H	PR D76 092003	M. Ablikim *et al.*	(BES Collab.)	REFID=52046
ANASHIN	07	JETPL 85 347 Translated from ZETFP 85 429.	V.V. Anashin *et al.*	(KEDR Collab.)	REFID=51655

ANDREOTTI	07	PL B654 74	M. Andreotti *et al.*	(Femilab E835 Collab.)	REFID=51944
AUBERT	07AK	PR D76 012008	B. Aubert *et al.*	(BABAR Collab.)	REFID=51908
AUBERT	07AU	PR D76 092005	B. Aubert *et al.*	(BABAR Collab.)	REFID=52049
Also		PR D77 119902E (errat.)	B. Aubert *et al.*	(BABAR Collab.)	REFID=52266
AUBERT	07BD	PR D76 092006	B. Aubert *et al.*	(BABAR Collab.)	REFID=52050
PDG	07	Unofficial 2007 WWW edition		(PDG Collab.)	REFID=52717;ERROR=10
PEDLAR	07	PR D75 011102	T.K. Pedlar *et al.*	(CLEO Collab.)	REFID=51630
ABLIKIM	06G	PR D73 052004	M. Ablikim *et al.*	(BES Collab.)	REFID=51048
ABLIKIM	06I	PR D74 012004	M. Ablikim *et al.*	(BES Collab.)	REFID=51126
ABLIKIM	06L	PRL 97 121801	M. Ablikim *et al.*	(BES Collab.)	REFID=51129
ABLIKIM	06R	PR D74 072001	M. Ablikim *et al.*	(BES Collab.)	REFID=51447
ABLIKIM	06W	PR D74 112003	M. Ablikim *et al.*	(BES Collab.)	REFID=51560
ADAM	06	PRL 96 082004	N.E. Adam *et al.*	(CLEO Collab.)	REFID=50989
AUBERT	06B	PR D73 012005	B. Aubert *et al.*	(BABAR Collab.)	REFID=51026
AUBERT	06D	PR D73 052003	B. Aubert *et al.*	(BABAR Collab.)	REFID=51047
AUBERT,BE	06D	PR D74 091103	B. Aubert *et al.*	(BABAR Collab.)	REFID=51511
DOBBS	06A	PR D74 011105	S. Dobbs *et al.*	(CLEO Collab.)	REFID=51158
ABLIKIM	05E	PR D71 072006	M. Ablikim *et al.*	(BES Collab.)	REFID=50757
ABLIKIM	05H	PR D72 012002	M. Ablikim *et al.*	(BES Collab.)	REFID=50759
ABLIKIM	05I	PL B614 37	M. Ablikim *et al.*	(BES Collab.)	REFID=50758
ABLIKIM	05J	PL B619 247	M. Ablikim *et al.*	(BES Collab.)	REFID=50760
ABLIKIM	05O	PL B630 21	M. Ablikim *et al.*	(BES Collab.)	REFID=50846
ADAM	05	PRL 94 012005	N.E. Adam *et al.*	(CLEO Collab.)	REFID=50451
ADAM	05A	PRL 94 232002	N.E. Adam *et al.*	(CLEO Collab.)	REFID=50763
ANDREOTTI	05	PR D71 032006	M. Andreotti *et al.*	(FNAL E835 Collab.)	REFID=50497
AUBERT	05D	PR D71 052001	B. Aubert *et al.*	(BABAR Collab.)	REFID=50509
BRIERE	05	PRL 95 062001	R.A. Briere *et al.*	(CLEO Collab.)	REFID=50785
PEDLAR	05	PR D72 051108	T.K. Pedlar *et al.*	(CLEO Collab.)	REFID=50808
ROSNER	05	PRL 95 102003	J.L. Rosner *et al.*	(CLEO Collab.)	REFID=50812
ABLIKIM	04B	PR D70 012003	M. Ablikim *et al.*	(BES Collab.)	REFID=49741
ABLIKIM	04K	PR D70 112003	M. Ablikim *et al.*	(BES Collab.)	REFID=50327
ABLIKIM	04L	PR D70 112007	M. Ablikim *et al.*	(BES Collab.)	REFID=50328
ATHAR	04	PR D70 112002	S.B. Athar *et al.*	(CLEO Collab.)	REFID=50331
BAI	04B	PRL 92 052001	J.Z. Bai *et al.*	(BES Collab.)	REFID=49608
BAI	04C	PR D69 072001	J.Z. Bai *et al.*	(BES Collab.)	REFID=49749
BAI	04D	PL B589 7	J.Z. Bai *et al.*	(BES Collab.)	REFID=49750
BAI	04G	PR D70 012004	J.Z. Bai *et al.*	(BES Collab.)	REFID=49753
BAI	04I	PR D70 012006	J.Z. Bai *et al.*	(BES Collab.)	REFID=49755
PDG	04	PL B592 1	S. Eidelman *et al.*	(PDG Collab.)	REFID=49653
SETH	04	PR D69 097503	K.K. Seth		REFID=49779
AULCHENKO	03	PL B573 63	V.M. Aulchenko *et al.*	(KEDR Collab.)	REFID=49579
BAI	03B	PR D67 052002	J.Z. Bai *et al.*	(BES Collab.)	REFID=49186
BAI	03C	PR D67 032004	J.Z. Bai *et al.*	(BES Collab.)	REFID=49190
AUBERT	02B	PR D65 031101	B. Aubert *et al.*	(BABAR Collab.)	REFID=48548
BAI	02	PR D65 052004	J.Z. Bai *et al.*	(BES Collab.)	REFID=48578
BAI	02B	PL B550 24	J.Z. Bai *et al.*	(BES Collab.)	REFID=49171
BAI	02C	PRL 88 101802	J.Z. Bai *et al.*	(BES Collab.)	REFID=50506
PDG	02	PR D66 010001	K. Hagiwara *et al.*	(PDG Collab.)	REFID=48632
BAI	01	PR D63 032002	J.Z. Bai *et al.*	(BES Collab.)	REFID=48003
AMBROGIANI	00A	PR D62 032004	M. Ambrogiani *et al.*	(FNAL E835 Collab.)	REFID=47939
ARTAMONOV	00	PL B474 427	A.S. Artamonov *et al.*		REFID=47424
BAI	00	PRL 84 594	J.Z. Bai *et al.*	(BES Collab.)	REFID=50503
BAI	99C	PRL 83 1918	J.Z. Bai *et al.*	(BES Collab.)	REFID=47420
BAI	98E	PR D57 3854	J.Z. Bai *et al.*	(BES Collab.)	REFID=46339
BAI	98F	PR D58 097101	J.Z. Bai *et al.*	(BES Collab.)	REFID=46340
BAI	98J	PRL 81 5080	J.Z. Bai *et al.*	(BES Collab.)	REFID=46554
ARMSTRONG	97	PR D55 1153	T.A. Armstrong *et al.*	(E760 Collab.)	REFID=45416
GRIBUSHIN	96	PR D53 4723	A. Gribushin *et al.*	(E672 and E706 Collab.)	REFID=44739
ARMSTRONG	93B	PR D47 772	T.A. Armstrong *et al.*	(FNAL E760 Collab.)	REFID=43307
ALEXANDER	89	NP B320 45	J.P. Alexander *et al.*	(LBL, MICH, SLAC)	REFID=40345
COHEN	87	RMP 59 1121	E.R. Cohen, B.N. Taylor	(RISC, NBS)	REFID=11616
GAISER	86	PR D34 711	J. Gaiser *et al.*	(Crystal Ball Collab.)	REFID=22012
KURAEV	85	SJNP 41 466 Translated from YAF 41 733.	E.A. Kuraev, V.S. Fadin	(NOVO)	REFID=40033
FRANKLIN	83	PRL 51 963	M.E.B. Franklin *et al.*	(LBL, SLAC)	REFID=22216
EDWARDS	82C	PRL 48 70	C. Edwards *et al.*	(CIT, HARV, PRIN+)	REFID=22173
LEMOIGNE	82	PL 113B 509	Y. Lemoigne *et al.*	(SACL, LOIC, SHMP+)	REFID=22084
HIMEL	80	PRL 44 920	T. Himel *et al.*	(LBL, SLAC)	REFID=22119
OREGLIA	80	PRL 45 959	M.J. Oreglia *et al.*	(SLAC, CIT, HARV+)	REFID=22207
SCHARRE	80	PL 97B 329	D.L. Scharre *et al.*	(SLAC, LBL)	REFID=21329
ZHOLENTZ	80	PL 96B 214	A.A. Zholents *et al.*	(NOVO)	REFID=10320
Also		SJNP 34 814 Translated from YAF 34 1471.	A.A. Zholents *et al.*	(NOVO)	REFID=10321
BRANDELIK	79B	NP B160 426	R. Brandelik *et al.*	(DASP Collab.)	REFID=22115
BRANDELIK	79C	ZPHY C1 233	R. Brandelik *et al.*	(DASP Collab.)	REFID=22114
BARTEL	78B	PL 79B 492	W. Bartel *et al.*	(DESY, HEIDP)	REFID=22111
TANENBAUM	78	PR D17 1731	W.M. Tanenbaum *et al.*	(SLAC, LBL)	REFID=22112
BIDDICK	77	PRL 38 1324	C.J. Biddick *et al.*	(UCSD, UMD, PAVI+)	REFID=22059
BRAUNSCH...	77	PL 67B 249	W. Braunschweig *et al.*	(DASP Collab.)	REFID=22197
BURMESTER	77	PL 66B 395	J. Burmester *et al.*	(DESY, HAMB, SIEG+)	REFID=22198
FELDMAN	77	PRPL 33C 285	G.J. Feldman, M.L. Perl	(LBL, SLAC)	REFID=22062
YAMADA	77	Hamburg Conf. 69	S. Yamada	(DASP Collab.)	REFID=22064
BARTEL	76	PL 64B 483	W. Bartel *et al.*	(DESY, HEIDP)	REFID=22192
TANENBAUM	76	PRL 36 402	W.M. Tanenbaum *et al.*	(SLAC, LBL) IG	REFID=22194
WHITAKER	76	PRL 37 1596	J.S. Whitaker *et al.*	(SLAC, LBL)	REFID=22151
ABRAMS	75	Stanford Symp. 25	G.S. Abrams	(LBL)	REFID=22176
ABRAMS	75B	PRL 34 1181	G.S. Abrams *et al.*	(LBL, SLAC)	REFID=22177
BOYARSKI	75C	Palermo Conf. 54	A.M. Boyarski *et al.*	(SLAC, LBL)	REFID=22179
HILGER	75	PRL 35 625	E. Hilger *et al.*	(STAN, PENN)	REFID=22186
LIBERMAN	75	Stanford Symp. 55	A.D. Liberman	(STAN)	REFID=22046
LUTH	75	PRL 35 1124	V. Luth *et al.*	(SLAC, LBL) JPC	REFID=22188
WIIK	75	Stanford Symp. 69	B.H. Wiik	(DESY)	REFID=22050

NODE=M053

$\psi(3770)$

$I^G(J^{PC}) = 0^-(1^{--})$

$\psi(3770)$ MASS (MeV)

NODE=M053M

OUR FIT includes measurements of $m_{\psi(2S)}$, $m_{\psi(3770)}$, and $m_{\psi(3770)} - m_{\psi(2S)}$.

NODE=M053M

NODE=M053M

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
3773.7±0.4 OUR FIT Error includes scale factor of 1.4.				
3778.1±0.7 OUR AVERAGE				
3778.1±0.7±0.6		[1] AAIJ 19M	LHCB	$pp \to D\overline{D} +$ anything
$3779.2^{+1.8+0.6}_{-1.7-0.8}$		[2] ANASHIN 12A	KEDR	$e^+e^- \to D\overline{D}$
3775.5±2.4±0.5	57	AUBERT 08B	BABR	$B \to D\overline{D}K$
3776 ±5 ±4	68	BRODZICKA 08	BELL	$B^+ \to D^0\overline{D}^0K^+$
3778.8±1.9±0.9		AUBERT 07BE	BABR	$e^+e^- \to D\overline{D}\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
3779.8±0.6		[3] SHAMOV 17	RVUE	$e^+e^- \to D\overline{D}$, hadrons
3772.0±1.9		[4,5] ABLIKIM 08D	BES2	$e^+e^- \to$ hadrons
3778.4±3.0±1.3	34	CHISTOV 04	BELL	Sup. by BRODZICKA 08

[1] Measured in prompt hadroproduction. NODE=M053M;LINKAGE=B

[2] Taking into account interference between the resonant and non-resonant $D\overline{D}$ production. NODE=M053M;LINKAGE=AN

[3] From the joint analysis of the data on the $D\overline{D}$ and inclusive hadronic cross sections in the $\psi(3770)$ region from BaBar, Belle, BES-II, CLEO and KEDR. NODE=M053M;LINKAGE=A

[4] Reanalysis of data presented in BAI 02C. From a global fit over the center-of-mass energy region 3.7–5.0 GeV covering the $\psi(3770)$, $\psi(4040)$, $\psi(4160)$, and $\psi(4415)$ resonances. Phase angle fixed in the fit to $\delta = 0^\circ$. NODE=M053M;LINKAGE=AB

[5] Interference between the resonant and non-resonant $D\overline{D}$ production not taken into account. NODE=M053M;LINKAGE=NI

$m_{\psi(3770)} - m_{\psi(2S)}$

NODE=M053DM

OUR FIT includes measurements of $m_{\psi(2S)}$, $m_{\psi(3770)}$, and $m_{\psi(3770)} - m_{\psi(2S)}$.

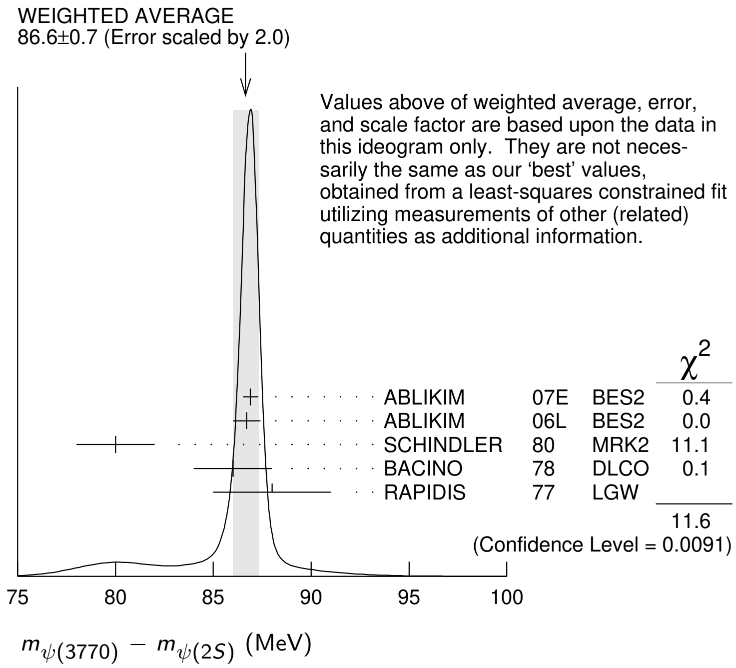
NODE=M053DM

NODE=M053DM

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
87.6±0.4 OUR FIT Error includes scale factor of 1.4.			
86.6±0.7 OUR AVERAGE Error includes scale factor of 2.0. See the ideogram below.			
86.9±0.4	[1] ABLIKIM 07E	BES2	$e^+e^- \to$ hadrons
86.7±0.7	ABLIKIM 06L	BES2	$e^+e^- \to$ hadrons
80 ±2	SCHINDLER 80	MRK2	e^+e^-
86 ±2	[2] BACINO 78	DLCO	e^+e^-
88 ±3	RAPIDIS 77	LGW	e^+e^-

[1] BES-II $\psi(2S)$ mass subtracted (see ABLIKIM 06L). NODE=M053DM;LINKAGE=AK

[2] SPEAR $\psi(2S)$ mass subtracted (see SCHINDLER 80). NODE=M053DM;LINKAGE=S



$\psi(3770)$ WIDTH

NODE=M053W

NODE=M053W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
27.2± 1.0 OUR FIT					
27.5± 0.9 OUR AVERAGE					
$24.9^{+4.6+0.5}_{-4.0-1.1}$		[1] ANASHIN	12A	KEDR	$e^+e^- \to D\overline{D}$
30.4± 8.5		[2,3] ABLIKIM	08D	BES2	$e^+e^- \to$ hadrons
27 ±10 ±5	68	BRODZICKA	08	BELL	$B^+ \to D^0\overline{D}^0 K^+$
28.5± 1.2±0.2		[3] ABLIKIM	07E	BES2	$e^+e^- \to$ hadrons
23.5± 3.7±0.9		AUBERT	07BE	BABR	$e^+e^- \to D\overline{D}\gamma$
26.9± 2.4±0.3		[3] ABLIKIM	06L	BES2	$e^+e^- \to$ hadrons
24 ± 5		[3] SCHINDLER	80	MRK2	e^+e^-
24 ± 5		[3] BACINO	78	DLCO	e^+e^-
28 ± 5		[3] RAPIDIS	77	LGW	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
25.8± 1.3		[4] SHAMOV	17	RVUE	$e^+e^- \to D\overline{D}$, hadrons

[1] Taking into account interference between the resonant and non-resonant $D\overline{D}$ production. NODE=M053W;LINKAGE=AN

[2] Reanalysis of data presented in BAI 02C. From a global fit over the center-of-mass energy region 3.7–5.0 GeV covering the $\psi(3770)$, $\psi(4040)$, $\psi(4160)$, and $\psi(4415)$ resonances. Phase angle fixed in the fit to $\delta = 0°$. NODE=M053W;LINKAGE=AB

[3] Interference between the resonant and non-resonant $D\overline{D}$ production not taken into account. NODE=M053W;LINKAGE=NI

[4] From the joint analysis of the data on the $D\overline{D}$ and inclusive hadronic cross sections in the $\psi(3770)$ region from BaBar, Belle, BES-II, CLEO and KEDR. NODE=M053W;LINKAGE=A

$\psi(3770)$ DECAY MODES

NODE=M053220;NODE=M053

	Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	
Γ_1	$D\overline{D}$	$(93\ ^{+8}_{-9})$ %	S=2.0	DESIG=2
Γ_2	$D^0\overline{D}^0$	$(52\ ^{+4}_{-5})$ %	S=2.0	DESIG=5
Γ_3	D^+D^-	(41 ±4) %	S=2.0	DESIG=6
Γ_4	$J/\psi X$	$(5.0 \pm 2.2) \times 10^{-3}$		DESIG=235
Γ_5	$J/\psi\pi^+\pi^-$	$(1.93 \pm 0.28) \times 10^{-3}$		DESIG=4
Γ_6	$J/\psi\pi^0\pi^0$	$(8.0 \pm 3.0) \times 10^{-4}$		DESIG=46
Γ_7	$J/\psi\eta$	$(9 \pm 4) \times 10^{-4}$		DESIG=47
Γ_8	$J/\psi\pi^0$	$< 2.8 \times 10^{-4}$	CL=90%	DESIG=48
Γ_9	e^+e^-	$(9.6 \pm 0.7) \times 10^{-6}$	S=1.3	DESIG=1

Decays to light hadrons

NODE=M053;CLUMP=H

Γ_{10}	$b_1(1235)\pi$	$<$ 1.4	$\times 10^{-5}$	CL=90%	DESIG=20
Γ_{11}	$\phi\eta'$	$<$ 7	$\times 10^{-4}$	CL=90%	DESIG=17
Γ_{12}	$\omega\eta'$	$<$ 4	$\times 10^{-4}$	CL=90%	DESIG=16
Γ_{13}	$\rho^0\eta'$	$<$ 6	$\times 10^{-4}$	CL=90%	DESIG=15
Γ_{14}	$\phi\eta$	(3.1 $\pm$0.7)	$\times 10^{-4}$		DESIG=8
Γ_{15}	$\omega\eta$	$<$ 1.4	$\times 10^{-5}$	CL=90%	DESIG=14
Γ_{16}	$\rho^0\eta$	$<$ 5	$\times 10^{-4}$	CL=90%	DESIG=13
Γ_{17}	$\phi\pi^0$	$<$ 3	$\times 10^{-5}$	CL=90%	DESIG=12
Γ_{18}	$\omega\pi^0$	$<$ 6	$\times 10^{-4}$	CL=90%	DESIG=11
Γ_{19}	$\pi^+\pi^-\pi^0$	$<$ 5	$\times 10^{-6}$	CL=90%	DESIG=9
Γ_{20}	$\rho\pi$	$<$ 5	$\times 10^{-6}$	CL=90%	DESIG=10
Γ_{21}	K^+K^-				DESIG=234
Γ_{22}	$K^*(892)^+K^-$ + c.c.	$<$ 1.4	$\times 10^{-5}$	CL=90%	DESIG=19
Γ_{23}	$K^*(892)^0\overline{K}^0$ + c.c.	$<$ 1.2	$\times 10^{-3}$	CL=90%	DESIG=18
Γ_{24}	$K^0_S K^0_L$	$<$ 1.2	$\times 10^{-5}$	CL=90%	DESIG=3
Γ_{25}	$2(\pi^+\pi^-)$	$<$ 1.12	$\times 10^{-3}$	CL=90%	DESIG=21
Γ_{26}	$2(\pi^+\pi^-)\pi^0$	$<$ 1.06	$\times 10^{-3}$	CL=90%	DESIG=22
Γ_{27}	$2(\pi^+\pi^-\pi^0)$	$<$ 5.85	%	CL=90%	DESIG=208
Γ_{28}	$\omega\pi^+\pi^-$	$<$ 6.0	$\times 10^{-4}$	CL=90%	DESIG=24
Γ_{29}	$3(\pi^+\pi^-)$	$<$ 9.1	$\times 10^{-3}$	CL=90%	DESIG=52
Γ_{30}	$3(\pi^+\pi^-)\pi^0$	$<$ 1.37	%	CL=90%	DESIG=55
Γ_{31}	$3(\pi^+\pi^-)2\pi^0$	$<$ 11.74	%	CL=90%	DESIG=210
Γ_{32}	$\eta\pi^+\pi^-$	$<$ 1.24	$\times 10^{-3}$	CL=90%	DESIG=23
Γ_{33}	$\pi^+\pi^-2\pi^0$	$<$ 8.9	$\times 10^{-3}$	CL=90%	DESIG=206
Γ_{34}	$\rho^0\pi^+\pi^-$	$<$ 6.9	$\times 10^{-3}$	CL=90%	DESIG=64
Γ_{35}	$\eta 3\pi$	$<$ 1.34	$\times 10^{-3}$	CL=90%	DESIG=25
Γ_{36}	$\eta 2(\pi^+\pi^-)$	$<$ 2.43	%	CL=90%	DESIG=53
Γ_{37}	$\eta\rho^0\pi^+\pi^-$	$<$ 1.45	%	CL=90%	DESIG=221
Γ_{38}	$\eta' 3\pi$	$<$ 2.44	$\times 10^{-3}$	CL=90%	DESIG=26
Γ_{39}	$K^+K^-\pi^+\pi^-$	$<$ 9.0	$\times 10^{-4}$	CL=90%	DESIG=27
Γ_{40}	$\phi\pi^+\pi^-$	$<$ 4.1	$\times 10^{-4}$	CL=90%	DESIG=28
Γ_{41}	$K^+K^-2\pi^0$	$<$ 4.2	$\times 10^{-3}$	CL=90%	DESIG=207
Γ_{42}	$4(\pi^+\pi^-)$	$<$ 1.67	%	CL=90%	DESIG=62
Γ_{43}	$4(\pi^+\pi^-)\pi^0$	$<$ 3.06	%	CL=90%	DESIG=63
Γ_{44}	$\phi f_0(980)$	$<$ 4.5	$\times 10^{-4}$	CL=90%	DESIG=29
Γ_{45}	$K^+K^-\pi^+\pi^-\pi^0$	$<$ 2.36	$\times 10^{-3}$	CL=90%	DESIG=30
Γ_{46}	$K^+K^-\rho^0\pi^0$	$<$ 8	$\times 10^{-4}$	CL=90%	DESIG=67
Γ_{47}	$K^+K^-\rho^+\pi^-$	$<$ 1.46	%	CL=90%	DESIG=68
Γ_{48}	ωK^+K^-	$<$ 3.4	$\times 10^{-4}$	CL=90%	DESIG=32
Γ_{49}	$\phi\pi^+\pi^-\pi^0$	$<$ 3.8	$\times 10^{-3}$	CL=90%	DESIG=69
Γ_{50}	$K^{*0}K^-\pi^+\pi^0$ + c.c.	$<$ 1.62	%	CL=90%	DESIG=70
Γ_{51}	$K^{*+}K^-\pi^+\pi^-$ + c.c.	$<$ 3.23	%	CL=90%	DESIG=71
Γ_{52}	$K^+K^-\pi^+\pi^-2\pi^0$	$<$ 2.67	%	CL=90%	DESIG=209
Γ_{53}	$K^+K^-2(\pi^+\pi^-)$	$<$ 1.03	%	CL=90%	DESIG=57
Γ_{54}	$K^+K^-2(\pi^+\pi^-)\pi^0$	$<$ 3.60	%	CL=90%	DESIG=58
Γ_{55}	ηK^+K^-	$<$ 4.1	$\times 10^{-4}$	CL=90%	DESIG=31
Γ_{56}	$\eta K^+K^-\pi^+\pi^-$	$<$ 1.24	%	CL=90%	DESIG=222
Γ_{57}	$\rho^0 K^+K^-$	$<$ 5.0	$\times 10^{-3}$	CL=90%	DESIG=65
Γ_{58}	$2(K^+K^-)$	$<$ 6.0	$\times 10^{-4}$	CL=90%	DESIG=33
Γ_{59}	ϕK^+K^-	$<$ 7.5	$\times 10^{-4}$	CL=90%	DESIG=34
Γ_{60}	$2(K^+K^-)\pi^0$	$<$ 2.9	$\times 10^{-4}$	CL=90%	DESIG=35
Γ_{61}	$2(K^+K^-)\pi^+\pi^-$	$<$ 3.2	$\times 10^{-3}$	CL=90%	DESIG=59
Γ_{62}	$K^0_S K^-\pi^+$	$<$ 3.2	$\times 10^{-3}$	CL=90%	DESIG=200
Γ_{63}	$K^0_S K^-\pi^+\pi^0$	$<$ 1.33	%	CL=90%	DESIG=201
Γ_{64}	$K^0_S K^-\rho^+$	$<$ 6.6	$\times 10^{-3}$	CL=90%	DESIG=214
Γ_{65}	$K^0_S K^-2\pi^+\pi^-$	$<$ 8.7	$\times 10^{-3}$	CL=90%	DESIG=202
Γ_{66}	$K^0_S K^-\pi^+\rho^0$	$<$ 1.6	%	CL=90%	DESIG=215

Γ_{67}	$K^0_S K^- \pi^+ \eta$	$<$	1.3	%	CL=90%	DESIG=216
Γ_{68}	$K^0_S K^- 2\pi^+ \pi^- \pi^0$	$<$	4.18	%	CL=90%	DESIG=203
Γ_{69}	$K^0_S K^- 2\pi^+ \pi^- \eta$	$<$	4.8	%	CL=90%	DESIG=217
Γ_{70}	$K^0_S K^- \pi^+ 2(\pi^+ \pi^-)$	$<$	1.22	%	CL=90%	DESIG=204
Γ_{71}	$K^0_S K^- \pi^+ 2\pi^0$	$<$	2.65	%	CL=90%	DESIG=205
Γ_{72}	$K^0_S K^- K^+ K^- \pi^+$	$<$	4.9	$\times 10^{-3}$	CL=90%	DESIG=218
Γ_{73}	$K^0_S K^- K^+ K^- \pi^+ \pi^0$	$<$	3.0	%	CL=90%	DESIG=219
Γ_{74}	$K^0_S K^- K^+ K^- \pi^+ \eta$	$<$	2.2	%	CL=90%	DESIG=220
Γ_{75}	$K^{*0} K^- \pi^+ +$ c.c.	$<$	9.7	$\times 10^{-3}$	CL=90%	DESIG=60
Γ_{76}	$p\overline{p}$					DESIG=233
Γ_{77}	$p\overline{p}\pi^0$	$<$	4	$\times 10^{-5}$	CL=90%	DESIG=54
Γ_{78}	$p\overline{p}\pi^+\pi^-$	$<$	5.8	$\times 10^{-4}$	CL=90%	DESIG=36
Γ_{79}	$\Lambda\overline{\Lambda}$	$<$	1.2	$\times 10^{-4}$	CL=90%	DESIG=42
Γ_{80}	$p\overline{p}\pi^+\pi^-\pi^0$	$<$	1.85	$\times 10^{-3}$	CL=90%	DESIG=37
Γ_{81}	$\omega p\overline{p}$	$<$	2.9	$\times 10^{-4}$	CL=90%	DESIG=39
Γ_{82}	$\Lambda\overline{\Lambda}\pi^0$	$<$	7	$\times 10^{-5}$	CL=90%	DESIG=72
Γ_{83}	$p\overline{p}2(\pi^+\pi^-)$	$<$	2.6	$\times 10^{-3}$	CL=90%	DESIG=61
Γ_{84}	$\eta p\overline{p}$	$<$	5.4	$\times 10^{-4}$	CL=90%	DESIG=38
Γ_{85}	$\eta p\overline{p}\pi^+\pi^-$	$<$	3.3	$\times 10^{-3}$	CL=90%	DESIG=223
Γ_{86}	$\rho^0 p\overline{p}$	$<$	1.7	$\times 10^{-3}$	CL=90%	DESIG=66
Γ_{87}	$p\overline{p}K^+K^-$	$<$	3.2	$\times 10^{-4}$	CL=90%	DESIG=40
Γ_{88}	$\eta p\overline{p}K^+K^-$	$<$	6.9	$\times 10^{-3}$	CL=90%	DESIG=224
Γ_{89}	$\pi^0 p\overline{p}K^+K^-$	$<$	1.2	$\times 10^{-3}$	CL=90%	DESIG=225
Γ_{90}	$\phi p\overline{p}$	$<$	1.3	$\times 10^{-4}$	CL=90%	DESIG=41
Γ_{91}	$\Lambda\overline{\Lambda}\pi^+\pi^-$	$<$	2.5	$\times 10^{-4}$	CL=90%	DESIG=43
Γ_{92}	$\Lambda\overline{p}K^+$	$<$	2.8	$\times 10^{-4}$	CL=90%	DESIG=44
Γ_{93}	$\Lambda\overline{p}K^+\pi^+\pi^-$	$<$	6.3	$\times 10^{-4}$	CL=90%	DESIG=45
Γ_{94}	$\Lambda\overline{\Lambda}\eta$	$<$	1.9	$\times 10^{-4}$	CL=90%	DESIG=226
Γ_{95}	$\Sigma^+\overline{\Sigma}^-$	$<$	1.0	$\times 10^{-4}$	CL=90%	DESIG=227
Γ_{96}	$\Sigma^0\overline{\Sigma}^0$	$<$	4	$\times 10^{-5}$	CL=90%	DESIG=228
Γ_{97}	$\Xi^+\overline{\Xi}^-$	$<$	1.5	$\times 10^{-4}$	CL=90%	DESIG=229
Γ_{98}	$\Xi^0\overline{\Xi}^0$	$<$	1.4	$\times 10^{-4}$	CL=90%	DESIG=230

Radiative decays NODE=M053;CLUMP=R

Γ_{99}	$\gamma\chi_{c2}$	$<$	6.4	$\times 10^{-4}$	CL=90%	DESIG=51
Γ_{100}	$\gamma\chi_{c1}$		(2.49±0.23)	$\times 10^{-3}$		DESIG=50
Γ_{101}	$\gamma\chi_{c0}$		(6.9 ±0.6)	$\times 10^{-3}$		DESIG=49
Γ_{102}	$\gamma\eta_c$	$<$	7	$\times 10^{-4}$	CL=90%	DESIG=231
Γ_{103}	$\gamma\eta_c(2S)$	$<$	9	$\times 10^{-4}$	CL=90%	DESIG=232
Γ_{104}	$\gamma\eta'$	$<$	1.8	$\times 10^{-4}$	CL=90%	DESIG=213
Γ_{105}	$\gamma\eta$	$<$	1.5	$\times 10^{-4}$	CL=90%	DESIG=212
Γ_{106}	$\gamma\pi^0$	$<$	2	$\times 10^{-4}$	CL=90%	DESIG=211

CONSTRAINED FIT INFORMATION

An overall fit to the total width, a partial width, and 3 branching ratios uses 23 measurements and one constraint to determine 5 parameters. The overall fit has a $\chi^2 = 20.1$ for 19 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\left\langle\delta p_i \delta p_j\right\rangle/(\delta p_i{\cdot}\delta p_j)$, in percent, from the fit to parameters p_i, including the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{\text{total}}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_3	99		
x_9	0	0	
Γ	0	0	−44
	x_2	x_3	x_9

	Mode	Rate (MeV)	Scale factor	
Γ_2	$D^0\overline{D}^0$	14.0 ±1.4	1.8	DESIG=5
Γ_3	D^+D^-	11.2 ±1.1	1.7	DESIG=6
Γ_9	e^+e^-	(2.62±0.18) $\times 10^{-4}$	1.4	DESIG=1

$\psi(3770)$ PARTIAL WIDTHS

NODE=M053225

$\Gamma(e^+e^-)$ — Γ_9

NODE=M053W1

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
0.262±0.018 OUR FIT Error includes scale factor of 1.4.				
0.256±0.016 OUR AVERAGE Error includes scale factor of 1.2.				
$0.154^{+0.079}_{-0.058}{}^{+0.021}_{-0.027}$		[1,2] ANASHIN 12A	KEDR	$e^+e^- \to D\overline{D}$
0.22 ± 0.05		[3,4] ABLIKIM 08D	BES2	$e^+e^- \to$ hadrons
$0.277\pm0.011\pm0.013$		[4] ABLIKIM 07E	BES2	$e^+e^- \to$ hadrons
$0.203\pm0.003^{+0.041}_{-0.027}$	1.4M	[4,5] BESSON 06	CLEO	$e^+e^- \to$ hadrons
0.276 ± 0.050		[4] SCHINDLER 80	MRK2	e^+e^-
0.18 ± 0.06		[4] BACINO 78	DLCO	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.196 ± 0.018		[6] SHAMOV 17	RVUE	$e^+e^- \to D\overline{D}$, hadrons
$0.414^{+0.072}_{-0.080}{}^{+0.093}_{-0.028}$		[2,7] ANASHIN 12A	KEDR	$e^+e^- \to D\overline{D}$
0.37 ± 0.09		[8] RAPIDIS 77	LGW	e^+e^-

OCCUR=2

OCCUR=2

[1] Solution I of the two solutions. NODE=M053W1;LINKAGE=A1

[2] Taking into account interference between the resonant and non-resonant $D\overline{D}$ production. NODE=M053W1;LINKAGE=AN

[3] Reanalysis of data presented in BAI 02C. From a global fit over the center-of-mass energy region 3.7–5.0 GeV covering the $\psi(3770)$, $\psi(4040)$, $\psi(4160)$, and $\psi(4415)$ resonances. Phase angle fixed in the fit to $\delta = 0°$. NODE=M053W1;LINKAGE=AB

[4] Interference between the resonant and non-resonant $D\overline{D}$ production not taken into account. NODE=M053W1;LINKAGE=NI

[5] BESSON 06 (as corrected in BESSON 10) measure $\sigma(e^+e^- \to \psi(3770) \to \text{hadrons}) = 6.36 \pm 0.08^{+0.41}_{-0.30}$ nb at $\sqrt{s} = 3773 \pm 1$ MeV, and obtain Γ_{ee} from the Born-level cross section calculated using $\psi(3770)$ mass and width from our 2004 edition, PDG 04. NODE=M053W1;LINKAGE=BE

[6] From the joint analysis of the data on the $D\overline{D}$ and inclusive hadronic cross sections in the $\psi(3770)$ region from BaBar, Belle, BES-II, CLEO and KEDR. NODE=M053W1;LINKAGE=B

[7] Solution II of the two solutions. NODE=M053W1;LINKAGE=A2

[8] See also $\Gamma(e^+e^-)/\Gamma_{total}$ below. NODE=M053W1;LINKAGE=R

$\psi(3770)$ BRANCHING RATIOS

NODE=M053230

$\Gamma(D\overline{D})/\Gamma_{total}$ — $\Gamma_1/\Gamma = (\Gamma_2+\Gamma_3)/\Gamma$

NODE=M053R1

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
$\mathbf{0.93^{+0.08}_{-0.09}}$ **OUR FIT** Error includes scale factor of 2.0.				
$\mathbf{0.93^{+0.08}_{-0.09}}$ **OUR AVERAGE** Error includes scale factor of 2.1.				
$0.849\pm0.056\pm0.018$		[1] ABLIKIM 08B	BES2	$e^+e^- \to$ non-$D\overline{D}$
$1.033\pm0.014^{+0.048}_{-0.066}$	1.427M	[2] BESSON 06	CLEO	$e^+e^- \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.836 ± 0.049		[3] SHAMOV 17	RVUE	$e^+e^- \to D\overline{D}$, hadrons
$0.866\pm0.050\pm0.036$		[4,5] ABLIKIM 07K	BES2	$e^+e^- \to$ non-$D\overline{D}$
$0.836\pm0.073\pm0.042$		[5] ABLIKIM 06L	BES2	$e^+e^- \to D\overline{D}$
$0.855\pm0.017\pm0.058$		[5,6] ABLIKIM 06N	BES2	$e^+e^- \to D\overline{D}$

[1] Neglecting interference. NODE=M053R1;LINKAGE=AI

[2] Obtained by comparing a measurement of the total cross section (corrected in BESSON 10) with that of $D\overline{D}$ reported by CLEO in DOBBS 07. NODE=M053R1;LINKAGE=BE

[3] From the joint analysis of the data on the $D\overline{D}$ and inclusive hadronic cross sections in the $\psi(3770)$ region from BaBar, Belle, BES-II, CLEO and KEDR. NODE=M053R1;LINKAGE=A

[4] Using $\sigma^{obs} = 7.07 \pm 0.58$ nb and neglecting interference. NODE=M053R1;LINKAGE=AL

[5] Not independent of ABLIKIM 08B. NODE=M053R1;LINKAGE=SU

[6] From a measurement of $\sigma(e^+e^- \to D\overline{D})$ at $\sqrt{s} = 3773$ MeV, using the $\psi(3770)$ resonance parameters measured by ABLIKIM 06L. NODE=M053R1;LINKAGE=AB

$\Gamma(D^0\overline{D}^0)/\Gamma_{total}$ — Γ_2/Γ

NODE=M053R46

VALUE	DOCUMENT ID	TECN	COMMENT
$\mathbf{0.52^{+0.04}_{-0.05}}$ **OUR FIT** Error includes scale factor of 2.0.			
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.467\pm0.047\pm0.023$	ABLIKIM 06L	BES2	$e^+e^- \to D^0\overline{D}^0$
$0.499\pm0.013\pm0.038$	[1] ABLIKIM 06N	BES2	$e^+e^- \to D^0\overline{D}^0$

[1] From a measurement of $\sigma(e^+e^- \to D\overline{D})$ at $\sqrt{s} = 3773$ MeV, using the $\psi(3770)$ resonance parameters measured by ABLIKIM 06L. NODE=M053R46;LINKAGE=AB

$\Gamma(D^+ D^-)/\Gamma_{total}$ Γ_3/Γ

NODE=M053R47

VALUE	DOCUMENT ID		TECN	COMMENT
0.41 ±0.04 OUR FIT Error includes scale factor of 2.0.				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.369±0.037±0.028	ABLIKIM	06L	BES2	$e^+e^- \to D^+D^-$
0.357±0.011±0.034	[1] ABLIKIM	06N	BES2	$e^+e^- \to D^+D^-$

[1] From a measurement of $\sigma(e^+e^- \to D\overline{D})$ at $\sqrt{s}$ = 3773 MeV, using the $\psi(3770)$ resonance parameters measured by ABLIKIM 06L.

NODE=M053R47;LINKAGE=AB

$\Gamma(D^0\overline{D}^0)/\Gamma(D^+D^-)$ Γ_2/Γ_3

NODE=M053R5

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
1.253±0.016 OUR FIT					
1.253±0.016 OUR AVERAGE					
1.252±0.009±0.013	5.3M	BONVICINI	14	CLEO	$e^+e^- \to D\overline{D}$
1.39 ±0.31 ±0.12		PAKHLOVA	08	BELL	10.6 $e^+e^- \to D\overline{D}\gamma$
1.78 ±0.33 ±0.24		AUBERT	07BE	BABR	$e^+e^- \to D\overline{D}\gamma$
1.27 ±0.12 ±0.08		ABLIKIM	06L	BES2	$e^+e^- \to D\overline{D}$
2.43 ±1.50 ±0.43	34	[1] CHISTOV	04	BELL	$B^+ \to \psi(3770)K^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.258±0.016±0.014		[2] DOBBS	07	CLEO	$e^+e^- \to D\overline{D}$

[1] See ADLER 88C for older measurements of this quantity.

NODE=M053R5;LINKAGE=CH

[2] Superseded by BONVICINI 14.

NODE=M053R5;LINKAGE=DO

$\Gamma(J/\psi X)/\Gamma_{total}$ Γ_4/Γ

NODE=M053P00

VALUE (%)	DOCUMENT ID		TECN	COMMENT
0.5±0.2±0.1	[1] ABLIKIM	21Z	BES3	$e^+e^- \to \ell^+\ell^- X$

[1] From a fit to the $e^+e^- \to J/\psi X$ cross section between 3.645 and 3.891 GeV, with $\psi(2S)$ and $\psi(3770)$ masses, total widths and leptonic widths fixed to the values from the PDG 20. An alternative fit with an improved χ^2, corresponding to a significance of 5.3 σ, uses an additional resonance with a mass of 3766.2 ± 3.8 ± 0.4 MeV/c^2, a total width of 22.2 ± 5.9 ± 1.4 MeV, and Γ(e e)·B($J/\psi X$) = 79.4 ± 85.5 ± 11.7 eV, possibly compatible with the results of ABLIKIM 08H.

NODE=M053P00;LINKAGE=A

$\Gamma(J/\psi\pi^+\pi^-)/\Gamma_{total}$ Γ_5/Γ

NODE=M053R4

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.93±0.28 OUR AVERAGE					
1.89±0.20±0.20	231 ± 33	ADAM	06	CLEO	$e^+e^- \to \psi(3770)$
3.4 ±1.4 ±0.9	17.8 ± 4.8	BAI	05	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(J/\psi\pi^0\pi^0)/\Gamma_{total}$ Γ_6/Γ

NODE=M053R7

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
0.080±0.025±0.016	39 ± 14	ADAM	06	CLEO	$e^+e^- \to \psi(3770)$

$\Gamma(J/\psi\eta)/\Gamma_{total}$ Γ_7/Γ

NODE=M053R8

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
87±33±22	22 ± 10	ADAM	06	CLEO	$e^+e^- \to \psi(3770)$

$\Gamma(J/\psi\pi^0)/\Gamma_{total}$ Γ_8/Γ

NODE=M053R9

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<28	90	<10	ADAM	06	CLEO	$e^+e^- \to \psi(3770)$

$\Gamma(e^+e^-)/\Gamma_{total}$ Γ_9/Γ

NODE=M053R2

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
0.96±0.07 OUR FIT Error includes scale factor of 1.3.				
1.3 ±0.2	RAPIDIS	77	LGW	e^+e^-

DECAYS TO LIGHT HADRONS

NODE=M053250

$\Gamma(b_1(1235)\pi)/\Gamma_{total}$ Γ_{10}/Γ

NODE=M053R82

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<1.4	90	[1] ADAMS	06	CLEO	$e^+e^- \to \psi(3770)$

[1] Comparing cross sections at $\sqrt{s}$ = 3.773 GeV and $\sqrt{s}$ = 3.671 GeV, neglecting interference, and using $\sigma(\psi(3770) \to D\overline{D})$ = 6.39 ± 0.20 nb.

NODE=M053R82;LINKAGE=AD

$\Gamma(\phi\eta')/\Gamma_{total}$ — Γ_{11}/Γ

NODE=M053R83

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<7	90	[1] ADAMS	06	CLEO	$e^+e^- \rightarrow \psi(3770)$

[1] Comparing cross sections at $\sqrt{s} = 3.773$ GeV and $\sqrt{s} = 3.671$ GeV, neglecting interference, and using $\sigma(\psi(3770) \rightarrow D\overline{D}) = 6.39 \pm 0.20$ nb. NODE=M053R83;LINKAGE=AD

$\Gamma(\omega\eta')/\Gamma_{total}$ — Γ_{12}/Γ

NODE=M053R84

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<4	90	[1] ADAMS	06	CLEO	$e^+e^- \rightarrow \psi(3770)$

[1] Comparing cross sections at $\sqrt{s} = 3.773$ GeV and $\sqrt{s} = 3.671$ GeV, neglecting interference, and using $\sigma(\psi(3770) \rightarrow D\overline{D}) = 6.39 \pm 0.20$ nb. NODE=M053R84;LINKAGE=AD

$\Gamma(\rho^0\eta')/\Gamma_{total}$ — Γ_{13}/Γ

NODE=M053R85

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<6	90	[1] ADAMS	06	CLEO	$e^+e^- \rightarrow \psi(3770)$

[1] Comparing cross sections at $\sqrt{s} = 3.773$ GeV and $\sqrt{s} = 3.671$ GeV, neglecting interference, and using $\sigma(\psi(3770) \rightarrow D\overline{D}) = 6.39 \pm 0.20$ nb. NODE=M053R85;LINKAGE=AD

$\Gamma(\phi\eta)/\Gamma_{total}$ — Γ_{14}/Γ

NODE=M053R6

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
3.1±0.6±0.3		[1] ADAMS	06	CLEO	3.773 $e^+e^- \rightarrow \phi\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<19	90	[2] ABLIKIM	07B	BES2	$e^+e^- \rightarrow \psi(3770)$

[1] Comparing cross sections at $\sqrt{s} = 3.773$ GeV and $\sqrt{s} = 3.671$ GeV, neglecting interference, and using $\sigma(\psi(3770) \rightarrow D\overline{D}) = 6.39 \pm 0.20$ nb. NODE=M053R6;LINKAGE=AD

[2] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb. NODE=M053R6;LINKAGE=AK

$\Gamma(\omega\eta)/\Gamma_{total}$ — Γ_{15}/Γ

NODE=M053R86

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<1.4	90	[1] ADAMS	06	CLEO	$e^+e^- \rightarrow \psi(3770)$

[1] Comparing cross sections at $\sqrt{s} = 3.773$ GeV and $\sqrt{s} = 3.671$ GeV, neglecting interference, and using $\sigma(\psi(3770) \rightarrow D\overline{D}) = 6.39 \pm 0.20$ nb. NODE=M053R86;LINKAGE=AD

$\Gamma(\rho^0\eta)/\Gamma_{total}$ — Γ_{16}/Γ

NODE=M053R87

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<5	90	[1] ADAMS	06	CLEO	$e^+e^- \rightarrow \psi(3770)$

[1] Comparing cross sections at $\sqrt{s} = 3.773$ GeV and $\sqrt{s} = 3.671$ GeV, neglecting interference, and using $\sigma(\psi(3770) \rightarrow D\overline{D}) = 6.39 \pm 0.20$ nb. NODE=M053R87;LINKAGE=AD

$\Gamma(\phi\pi^0)/\Gamma_{total}$ — Γ_{17}/Γ

NODE=M053R11

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
< 3	90	[1] ADAMS	06	CLEO	$e^+e^- \rightarrow \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<50	90	[2] ABLIKIM	07B	BES2	$e^+e^- \rightarrow \psi(3770)$

[1] Comparing cross sections at $\sqrt{s} = 3.773$ GeV and $\sqrt{s} = 3.671$ GeV, neglecting interference, and using $\sigma(\psi(3770) \rightarrow D\overline{D}) = 6.39 \pm 0.20$ nb. NODE=M053R11;LINKAGE=AD

[2] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb. NODE=M053R11;LINKAGE=AK

$\Gamma(\omega\pi^0)/\Gamma_{total}$ — Γ_{18}/Γ

NODE=M053R88

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<6	90	[1] ADAMS	06	CLEO	$e^+e^- \rightarrow \psi(3770)$

[1] Comparing cross sections at $\sqrt{s} = 3.773$ GeV and $\sqrt{s} = 3.671$ GeV, neglecting interference, and using $\sigma(\psi(3770) \rightarrow D\overline{D}) = 6.39 \pm 0.20$ nb. NODE=M053R88;LINKAGE=AD

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{19}/Γ

NODE=M053R89

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<5	90	[1,2] ADAMS	06	CLEO	$e^+e^- \rightarrow \psi(3770)$

[1] Data suggest possible destructive interference with continuum. NODE=M053R89;LINKAGE=AD

[2] Comparing cross sections at $\sqrt{s} = 3.773$ GeV and $\sqrt{s} = 3.671$ GeV, neglecting interference, and using $\sigma(\psi(3770) \rightarrow D\overline{D}) = 6.39 \pm 0.20$ nb. NODE=M053R89;LINKAGE=AS

$\Gamma(\rho\pi)/\Gamma_{total}$ Γ_{20}/Γ

NODE=M053R90
NODE=M053R90

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<5	90	[1,2] ADAMS	06	CLEO	$e^+e^- \to \psi(3770)$

[1] Comparing cross sections at $\sqrt{s}$ = 3.773 GeV and $\sqrt{s}$ = 3.671 GeV, neglecting interference, and using $\sigma(\psi(3770) \to D\overline{D})$ = 6.39 ± 0.20 nb. NODE=M053R90;LINKAGE=AD

[2] Data suggest possible destructive interference with continuum. NODE=M053R90;LINKAGE=AS

$\Gamma(K^+K^-)/\Gamma_{total}$ Γ_{21}/Γ

NODE=M053R00
NODE=M053R00

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$\sim 10^{-5}$	[1] DRUZHININ	15	RVUE	$e^+e^- \to \psi(3770)$

[1] DRUZHININ 15 uses BABAR and CLEO data takitaking into account interference of the processes $e^+e^- \to K^+K^-$ and $e^+e^- \to K^0_S K^0_L$. NODE=M053R00;LINKAGE=A

$\Gamma(K^*(892)^+K^- + \text{c.c.})/\Gamma_{total}$ Γ_{22}/Γ

NODE=M053R91
NODE=M053R91

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<1.4	90	[1] ADAMS	06	CLEO	$e^+e^- \to \psi(3770)$

[1] Comparing cross sections at $\sqrt{s}$ = 3.773 GeV and $\sqrt{s}$ = 3.671 GeV, neglecting interference, and using $\sigma(\psi(3770) \to D\overline{D})$ = 6.39 ± 0.20 nb. NODE=M053R91;LINKAGE=AS

$\Gamma(K^*(892)^0\overline{K}^0 + \text{c.c.})/\Gamma_{total}$ Γ_{23}/Γ

NODE=M053R92
NODE=M053R92

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<1.2	90	[1] ADAMS	06	CLEO	$e^+e^- \to \psi(3770)$

[1] Comparing cross sections at $\sqrt{s}$ = 3.773 GeV and $\sqrt{s}$ = 3.671 GeV, neglecting interference, and using $\sigma(\psi(3770) \to D\overline{D})$ = 6.39 ± 0.20 nb. NODE=M053R92;LINKAGE=AD

$\Gamma(K^0_S K^0_L)/\Gamma_{total}$ Γ_{24}/Γ

NODE=M053R3
NODE=M053R3

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
< 1.2	90	[1] CRONIN-HEN..	06	CLEO	$e^+e^- \to \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<21	90	[2] ABLIKIM	04F	BES	$e^+e^- \to \psi(3770)$

[1] Using $\sigma(e^+e^- \to \psi(3770) \to \text{hadrons}) = (6.38 \pm 0.08^{+0.41}_{-0.30})$ nb from BESSON 06 and $B(K^0_S \to \pi^+\pi^-)$ = 0.6895 ± 0.0014. NODE=M053R3;LINKAGE=CR

[2] Using $B(K^0_S \to \pi^+\pi^-)$ = 0.6860 ± 0.0027. NODE=M053R3;LINKAGE=AB

$\Gamma(2(\pi^+\pi^-))/\Gamma_{total}$ Γ_{25}/Γ

NODE=M053R21
NODE=M053R21

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<11.2	90	[1] HUANG	06A	CLEO	$e^+e^- \to \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<48	90	[2] ABLIKIM	07B	BES2	$e^+e^- \to \psi(3770)$

[1] Using $\sigma_{tot}(e^+e^- \to \psi(3770))$ = 7.9 ± 0.6 nb at the resonance. NODE=M053R21;LINKAGE=HU

[2] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+e^- \to \psi(3770))$ = 7.15 ± 0.38 nb. NODE=M053R21;LINKAGE=AK

$\Gamma(2(\pi^+\pi^-)\pi^0)/\Gamma_{total}$ Γ_{26}/Γ

NODE=M053R22
NODE=M053R22

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<10.6	90	[1] HUANG	06A	CLEO	$e^+e^- \to \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<62	90	[2] ABLIKIM	07B	BES2	$e^+e^- \to \psi(3770)$

[1] Using $\sigma_{tot}(e^+e^- \to \psi(3770))$ = 7.9 ± 0.6 nb at the resonance. NODE=M053R22;LINKAGE=HU

[2] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+e^- \to \psi(3770))$ = 7.15 ± 0.38 nb. NODE=M053R22;LINKAGE=AK

$\Gamma(2(\pi^+\pi^-\pi^0))/\Gamma_{total}$ Γ_{27}/Γ

NODE=M053R72
NODE=M053R72

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<58.5	90	305	ABLIKIM	08N	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(\omega\pi^+\pi^-)/\Gamma_{total}$ — Γ_{28}/Γ

NODE=M053R24
NODE=M053R24

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 6.0	90	[1] HUANG	06A	CLEO	$e^+e^- \rightarrow \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<55	90	[2] ABLIKIM	07I	BES2	3.77 e^+e^-

[1] Using $\sigma_{tot}(e^+e^- \rightarrow \psi(3770)) = 7.9 \pm 0.6$ nb at the resonance. NODE=M053R24;LINKAGE=HU

[2] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb. NODE=M053R24;LINKAGE=AK

$\Gamma(3(\pi^+\pi^-))/\Gamma_{total}$ — Γ_{29}/Γ

NODE=M053R07
NODE=M053R07

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<91	90	[1] ABLIKIM	07B	BES2	$e^+e^- \rightarrow \psi(3770)$

[1] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb. NODE=M053R07;LINKAGE=AK

$\Gamma(3(\pi^+\pi^-)\pi^0)/\Gamma_{total}$ — Γ_{30}/Γ

NODE=M053R10
NODE=M053R10

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<137	90	[1] ABLIKIM	07B	BES2	$e^+e^- \rightarrow \psi(3770)$

[1] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb. NODE=M053R10;LINKAGE=AK

$\Gamma(3(\pi^+\pi^-)2\pi^0)/\Gamma_{total}$ — Γ_{31}/Γ

NODE=M053R74
NODE=M053R74

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<117.4	90	59	ABLIKIM	08N	BES2	$e^+e^- \rightarrow \psi(3770)$

$\Gamma(\eta\pi^+\pi^-)/\Gamma_{total}$ — Γ_{32}/Γ

NODE=M053R23
NODE=M053R23

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<1.24	90	[1] HUANG	06A	CLEO	$e^+e^- \rightarrow \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<2.3	90	[2] ABLIKIM	10D	BES2	$e^+e^- \rightarrow \psi(3770)$

[1] Using $\sigma_{tot}(e^+e^- \rightarrow \psi(3770)) = 7.9 \pm 0.6$ nb at the resonance. NODE=M053R23;LINKAGE=HU

[2] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb. NODE=M053R23;LINKAGE=AK

$\Gamma(\pi^+\pi^-2\pi^0)/\Gamma_{total}$ — Γ_{33}/Γ

NODE=M053R70
NODE=M053R70

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<8.9	90	218	ABLIKIM	08N	BES2	$e^+e^- \rightarrow \psi(3770)$

$\Gamma(\rho^0\pi^+\pi^-)/\Gamma_{total}$ — Γ_{34}/Γ

NODE=M053R53
NODE=M053R53

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<6.9	90	[1] ABLIKIM	07F	BES2	$e^+e^- \rightarrow \psi(3770)$

[1] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb. NODE=M053R53;LINKAGE=AK

$\Gamma(\eta 3\pi)/\Gamma_{total}$ — Γ_{35}/Γ

NODE=M053R25
NODE=M053R25

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<13.4	90	[1] HUANG	06A	CLEO	$e^+e^- \rightarrow \psi(3770)$

[1] Using $\sigma_{tot}(e^+e^- \rightarrow \psi(3770)) = 7.9 \pm 0.6$ nb at the resonance. NODE=M053R25;LINKAGE=HU

$\Gamma(\eta 2(\pi^+\pi^-))/\Gamma_{total}$ — Γ_{36}/Γ

NODE=M053R08
NODE=M053R08

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<243	90	[1] ABLIKIM	07B	BES2	$e^+e^- \rightarrow \psi(3770)$

[1] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb. NODE=M053R08;LINKAGE=AK

$\Gamma(\eta\rho^0\pi^+\pi^-)/\Gamma_{total}$ — Γ_{37}/Γ

NODE=M053R77
NODE=M053R77

VALUE (units 10^{-2})	CL%	DOCUMENT ID		TECN	COMMENT
<1.45	90	[1] ABLIKIM	10D	BES2	$e^+e^- \rightarrow \psi(3770)$

[1] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb. NODE=M053R77;LINKAGE=AK

$\Gamma(\eta' 3\pi)/\Gamma_{total}$ — Γ_{38}/Γ

NODE=M053R26

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<24.4	90	[1] HUANG	06A	CLEO	$e^+ e^- \rightarrow \psi(3770)$

[1] Using $\sigma_{tot}(e^+ e^- \rightarrow \psi(3770)) = 7.9 \pm 0.6$ nb at the resonance.

NODE=M053R26;LINKAGE=HU

$\Gamma(K^+ K^- \pi^+ \pi^-)/\Gamma_{total}$ — Γ_{39}/Γ

NODE=M053R27

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 9.0	90	[1] HUANG	06A	CLEO	$e^+ e^- \rightarrow \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<48	90	[2] ABLIKIM	07B	BES2	$e^+ e^- \rightarrow \psi(3770)$

[1] Using $\sigma_{tot}(e^+ e^- \rightarrow \psi(3770)) = 7.9 \pm 0.6$ nb at the resonance.

[2] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+ e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb.

NODE=M053R27;LINKAGE=HU
NODE=M053R27;LINKAGE=AK

$\Gamma(\phi \pi^+ \pi^-)/\Gamma_{total}$ — Γ_{40}/Γ

NODE=M053R28

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 4.1	90	[1] HUANG	06A	CLEO	$e^+ e^- \rightarrow \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<16	90	[2] ABLIKIM	07B	BES2	$e^+ e^- \rightarrow \psi(3770)$

[1] Using $\sigma_{tot}(e^+ e^- \rightarrow \psi(3770)) = 7.9 \pm 0.6$ nb at the resonance.

[2] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+ e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb.

NODE=M053R28;LINKAGE=HU
NODE=M053R28;LINKAGE=AK

$\Gamma(K^+ K^- 2\pi^0)/\Gamma_{total}$ — Γ_{41}/Γ

NODE=M053R71

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<4.2	90	14	ABLIKIM	08N	BES2	$e^+ e^- \rightarrow \psi(3770)$

$\Gamma(4(\pi^+ \pi^-))/\Gamma_{total}$ — Γ_{42}/Γ

NODE=M053R50

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<16.7	90	[1] ABLIKIM	07F	BES2	$e^+ e^- \rightarrow \psi(3770)$

[1] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+ e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb.

NODE=M053R50;LINKAGE=AK

$\Gamma(4(\pi^+ \pi^-)\pi^0)/\Gamma_{total}$ — Γ_{43}/Γ

NODE=M053R52

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<30.6	90	[1] ABLIKIM	07F	BES2	$e^+ e^- \rightarrow \psi(3770)$

[1] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+ e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb.

NODE=M053R52;LINKAGE=AK

$\Gamma(\phi f_0(980))/\Gamma_{total}$ — Γ_{44}/Γ

NODE=M053R29

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<4.5	90	[1] HUANG	06A	CLEO	$e^+ e^- \rightarrow \psi(3770)$

[1] Using $\sigma_{tot}(e^+ e^- \rightarrow \psi(3770)) = 7.9 \pm 0.6$ nb at the resonance.

NODE=M053R29;LINKAGE=HU

$\Gamma(K^+ K^- \pi^+ \pi^- \pi^0)/\Gamma_{total}$ — Γ_{45}/Γ

NODE=M053R30

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 23.6	90	[1] HUANG	06A	CLEO	$e^+ e^- \rightarrow \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<111	90	[2] ABLIKIM	07B	BES2	$e^+ e^- \rightarrow \psi(3770)$

[1] Using $\sigma_{tot}(e^+ e^- \rightarrow \psi(3770)) = 7.9 \pm 0.6$ nb at the resonance.

[2] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+ e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb.

NODE=M053R30;LINKAGE=HU
NODE=M053R30;LINKAGE=AK

$\Gamma(K^+ K^- \rho^0 \pi^0)/\Gamma_{total}$ — Γ_{46}/Γ

NODE=M053R58

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<8	90	[1] ABLIKIM	07I	BES2	3.77 $e^+ e^-$

[1] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+ e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb.

NODE=M053R58;LINKAGE=AK

$\Gamma(K^+K^-\rho^+\pi^-)/\Gamma_{total}$ Γ_{47}/Γ

NODE=M053R59
NODE=M053R59

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<146	90	[1] ABLIKIM	07I	BES2	3.77 e^+e^-

[1] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb.

NODE=M053R59;LINKAGE=AK

$\Gamma(\omega K^+K^-)/\Gamma_{total}$ Γ_{48}/Γ

NODE=M053R32
NODE=M053R32

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 3.4	90	[1] HUANG	06A	CLEO	$e^+e^- \rightarrow \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<66	90	[2] ABLIKIM	07I	BES2	3.77 e^+e^-

[1] Using $\sigma_{tot}(e^+e^- \rightarrow \psi(3770)) = 7.9 \pm 0.6$ nb at the resonance.

NODE=M053R32;LINKAGE=HU

[2] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb.

NODE=M053R32;LINKAGE=AK

$\Gamma(\phi\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{49}/Γ

NODE=M053R60
NODE=M053R60

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<38	90	[1] ABLIKIM	07I	BES2	3.77 e^+e^-

[1] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb.

NODE=M053R60;LINKAGE=AK

$\Gamma(K^{*0}K^-\pi^+\pi^0 + \text{c.c.})/\Gamma_{total}$ Γ_{50}/Γ

NODE=M053R61
NODE=M053R61

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<162	90	[1] ABLIKIM	07I	BES2	3.77 e^+e^-

[1] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb.

NODE=M053R61;LINKAGE=AK

$\Gamma(K^{*+}K^-\pi^+\pi^- + \text{c.c.})/\Gamma_{total}$ Γ_{51}/Γ

NODE=M053R62
NODE=M053R62

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<323	90	[1] ABLIKIM	07I	BES2	3.77 e^+e^-

[1] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb.

NODE=M053R62;LINKAGE=AK

$\Gamma(K^+K^-\pi^+\pi^-2\pi^0)/\Gamma_{total}$ Γ_{52}/Γ

NODE=M053R73
NODE=M053R73

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<26.7	90	24	ABLIKIM	08N	BES2	$e^+e^- \rightarrow \psi(3770)$

$\Gamma(K^+K^-2(\pi^+\pi^-))/\Gamma_{total}$ Γ_{53}/Γ

NODE=M053R57
NODE=M053R57

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<10.3	90	[1] ABLIKIM	07F	BES2	$e^+e^- \rightarrow \psi(3770)$

[1] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb.

NODE=M053R57;LINKAGE=AK

$\Gamma(K^+K^-2(\pi^+\pi^-)\pi^0)/\Gamma_{total}$ Γ_{54}/Γ

NODE=M053R51
NODE=M053R51

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<36.0	90	[1] ABLIKIM	07F	BES2	$e^+e^- \rightarrow \psi(3770)$

[1] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb.

NODE=M053R51;LINKAGE=AK

$\Gamma(\eta K^+K^-)/\Gamma_{total}$ Γ_{55}/Γ

NODE=M053R31
NODE=M053R31

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 4.1	90	[1] HUANG	06A	CLEO	$e^+e^- \rightarrow \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<31	90	[2] ABLIKIM	10D	BES2	$e^+e^- \rightarrow \psi(3770)$

[1] Using $\sigma_{tot}(e^+e^- \rightarrow \psi(3770)) = 7.9 \pm 0.6$ nb at the resonance.

NODE=M053R31;LINKAGE=HU

[2] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb.

NODE=M053R31;LINKAGE=AK

$\Gamma(\eta K^+ K^- \pi^+ \pi^-)/\Gamma_{total}$ — Γ_{56}/Γ

NODE=M053R78
NODE=M053R78

VALUE (units 10^{-2})	CL%	DOCUMENT ID		TECN	COMMENT
<1.24	90	[1] ABLIKIM	10D	BES2	$e^+ e^- \to \psi(3770)$

[1] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+ e^- \to \psi(3770)) = 7.15 \pm 0.38$ nb.

NODE=M053R78;LINKAGE=AK

$\Gamma(\rho^0 K^+ K^-)/\Gamma_{total}$ — Γ_{57}/Γ

NODE=M053R54
NODE=M053R54

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<5.0	90	[1] ABLIKIM	07F	BES2	$e^+ e^- \to \psi(3770)$

[1] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+ e^- \to \psi(3770)) = 7.15 \pm 0.38$ nb.

NODE=M053R54;LINKAGE=AK

$\Gamma(2(K^+ K^-))/\Gamma_{total}$ — Γ_{58}/Γ

NODE=M053R33
NODE=M053R33

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 6.0	90	[1] HUANG	06A	CLEO	$e^+ e^- \to \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<17	90	[2] ABLIKIM	07B	BES2	$e^+ e^- \to \psi(3770)$

[1] Using $\sigma_{tot}(e^+ e^- \to \psi(3770)) = 7.9 \pm 0.6$ nb at the resonance.

NODE=M053R33;LINKAGE=HU

[2] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+ e^- \to \psi(3770)) = 7.15 \pm 0.38$ nb.

NODE=M053R33;LINKAGE=AK

$\Gamma(\phi K^+ K^-)/\Gamma_{total}$ — Γ_{59}/Γ

NODE=M053R34
NODE=M053R34

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 7.5	90	[1] HUANG	06A	CLEO	$e^+ e^- \to \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<24	90	[2] ABLIKIM	07B	BES2	$e^+ e^- \to \psi(3770)$

[1] Using $\sigma_{tot}(e^+ e^- \to \psi(3770)) = 7.9 \pm 0.6$ nb at the resonance.

NODE=M053R34;LINKAGE=HU

[2] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+ e^- \to \psi(3770)) = 7.15 \pm 0.38$ nb.

NODE=M053R34;LINKAGE=AK

$\Gamma(2(K^+ K^-)\pi^0)/\Gamma_{total}$ — Γ_{60}/Γ

NODE=M053R35
NODE=M053R35

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 2.9	90	[1] HUANG	06A	CLEO	$e^+ e^- \to \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<46	90	[2] ABLIKIM	07B	BES2	$e^+ e^- \to \psi(3770)$

[1] Using $\sigma_{tot}(e^+ e^- \to \psi(3770)) = 7.9 \pm 0.6$ nb at the resonance.

NODE=M053R35;LINKAGE=HU

[2] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+ e^- \to \psi(3770)) = 7.15 \pm 0.38$ nb.

NODE=M053R35;LINKAGE=AK

$\Gamma(2(K^+ K^-)\pi^+ \pi^-)/\Gamma_{total}$ — Γ_{61}/Γ

NODE=M053R48
NODE=M053R48

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<3.2	90	[1] ABLIKIM	07F	BES2	$e^+ e^- \to \psi(3770)$

[1] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+ e^- \to \psi(3770)) = 7.15 \pm 0.38$ nb.

NODE=M053R48;LINKAGE=AK

$\Gamma(K^0_S K^- \pi^+)/\Gamma_{total}$ — Γ_{62}/Γ

NODE=M053R64
NODE=M053R64

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<3.2	90	18	ABLIKIM	08M	BES2	$e^+ e^- \to \psi(3770)$

$\Gamma(K^0_S K^- \pi^+ \pi^0)/\Gamma_{total}$ — Γ_{63}/Γ

NODE=M053R65
NODE=M053R65

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<13.3	90	40	ABLIKIM	08M	BES2	$e^+ e^- \to \psi(3770)$

$\Gamma(K^0_S K^- \rho^+)/\Gamma_{total}$ — Γ_{64}/Γ

NODE=M053R15
NODE=M053R15

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<6.6	90	ABLIKIM	09C	BES2	$e^+ e^- \to \psi(3770)$

$\Gamma(K^0_S K^- 2\pi^+ \pi^-)/\Gamma_{total}$ — Γ_{65}/Γ

NODE=M053R66
NODE=M053R66

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<8.7	90	39	ABLIKIM	08M	BES2	$e^+ e^- \to \psi(3770)$

$\Gamma(K^0_S K^- \pi^+ \rho^0)/\Gamma_{total}$ — Γ_{66}/Γ

NODE=M053R16

VALUE (units 10^{-2})	CL%	DOCUMENT ID		TECN	COMMENT
<1.6	90	ABLIKIM	09C	BES2	$e^+ e^- \to \psi(3770)$

$\Gamma(K^0_S K^- \pi^+ \eta)/\Gamma_{total}$ — Γ_{67}/Γ

NODE=M053R17

VALUE (units 10^{-2})	CL%	DOCUMENT ID		TECN	COMMENT
<1.3	90	ABLIKIM	09C	BES2	$e^+ e^- \to \psi(3770)$

$\Gamma(K^0_S K^- 2\pi^+ \pi^- \pi^0)/\Gamma_{total}$ — Γ_{68}/Γ

NODE=M053R67

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<41.8	90	23	ABLIKIM	08M	BES2	$e^+ e^- \to \psi(3770)$

$\Gamma(K^0_S K^- 2\pi^+ \pi^- \eta)/\Gamma_{total}$ — Γ_{69}/Γ

NODE=M053R18

VALUE (units 10^{-2})	CL%	DOCUMENT ID		TECN	COMMENT
<4.8	90	ABLIKIM	09C	BES2	$e^+ e^- \to \psi(3770)$

$\Gamma(K^0_S K^- \pi^+ 2(\pi^+ \pi^-))/\Gamma_{total}$ — Γ_{70}/Γ

NODE=M053R68

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<12.2	90	4	ABLIKIM	08M	BES2	$e^+ e^- \to \psi(3770)$

$\Gamma(K^0_S K^- \pi^+ 2\pi^0)/\Gamma_{total}$ — Γ_{71}/Γ

NODE=M053R69

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<26.5	90	17	ABLIKIM	08M	BES2	$e^+ e^- \to \psi(3770)$

$\Gamma(K^0_S K^- K^+ K^- \pi^+)/\Gamma_{total}$ — Γ_{72}/Γ

NODE=M053R19

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<4.9	90	ABLIKIM	09C	BES2	$e^+ e^- \to \psi(3770)$

$\Gamma(K^0_S K^- K^+ K^- \pi^+ \pi^0)/\Gamma_{total}$ — Γ_{73}/Γ

NODE=M053R75

VALUE (units 10^{-2})	CL%	DOCUMENT ID		TECN	COMMENT
<3.0	90	ABLIKIM	09C	BES2	$e^+ e^- \to \psi(3770)$

$\Gamma(K^0_S K^- K^+ K^- \pi^+ \eta)/\Gamma_{total}$ — Γ_{74}/Γ

NODE=M053R76

VALUE (units 10^{-2})	CL%	DOCUMENT ID		TECN	COMMENT
<2.2	90	ABLIKIM	09C	BES2	$e^+ e^- \to \psi(3770)$

$\Gamma(K^{*0} K^- \pi^+ + \text{c.c.})/\Gamma_{total}$ — Γ_{75}/Γ

NODE=M053R55

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<9.7	90	[1] ABLIKIM	07F	BES2	$e^+ e^- \to \psi(3770)$

[1] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+ e^- \to \psi(3770)) = 7.15 \pm 0.38$ nb. NODE=M053R55;LINKAGE=AK

$\Gamma(p\overline{p})/\Gamma_{total}$ — Γ_{76}/Γ

NODE=M053R98

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
not seen		[1] AAIJ	17AD	LHCB	$p p \to B^+ X \to p\overline{p} K^+ X$
$7.1^{+8.6}_{-2.9}$	684	[2] ABLIKIM	14L	BES3	$e^+ e^- \to \psi(3770)$
310 ± 30	684	[3] ABLIKIM	14L	BES3	$e^+ e^- \to \psi(3770)$ (OCCUR=2)

[1] AAIJ 17AD reports $B(B^+ \to \psi(3770) K^+ \to p\overline{p} K^+)/B(B^+ \to J/\psi K^+ \to p\overline{p} K^+) < 0.09$ (0.10) at 90% (95%) CL. NODE=M053R98;LINKAGE=C

[2] Solution I of two equivalent solutions in a fit with a resonance interfering with continuum. NODE=M053R98;LINKAGE=A

[3] Solution II of two equivalent solutions in a fit with a resonance interfering with continuum. NODE=M053R98;LINKAGE=B

$\Gamma(p\overline{p}\pi^0)/\Gamma_{total}$ — Γ_{77}/Γ

NODE=M053R09

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 0.4	90	[1,2] ABLIKIM	14O	BES3	$e^+ e^- \to \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$59\ ^{+3}_{-2} \pm 5$		[1,3] ABLIKIM	14O	BES3	$e^+ e^- \to \psi(3770)$ (OCCUR=2)
<12	90	[4] ABLIKIM	07B	BES2	$e^+ e^- \to \psi(3770)$

[1] Calculated by the authors using $\sigma(e^+e^- \rightarrow \psi(3770) \rightarrow \text{hadrons}) = 6.36 \pm 0.08^{+0.41}_{-0.30}$ nb from BESSON 10. NODE=M053R09;LINKAGE=A
[2] Solution I of two equivalent solutions in a fit with a resonance interfering with continuum. NODE=M053R09;LINKAGE=B
[3] Solution II of two equivalent solutions in a fit with a resonance interfering with continuum. NODE=M053R09;LINKAGE=C
[4] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb. NODE=M053R09;LINKAGE=AK

$\Gamma(p\overline{p}\pi^+\pi^-)/\Gamma_{total}$ — Γ_{78}/Γ

NODE=M053R36
NODE=M053R36

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 5.8	90	[1] HUANG	06A	CLEO	$e^+e^- \rightarrow \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<16	90	[2] ABLIKIM	07B	BES2	$e^+e^- \rightarrow \psi(3770)$

[1] Using $\sigma_{tot}(e^+e^- \rightarrow \psi(3770)) = 7.9 \pm 0.6$ nb at the resonance. NODE=M053R36;LINKAGE=HU
[2] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb. NODE=M053R36;LINKAGE=AK

$\Gamma(\Lambda\overline{\Lambda})/\Gamma_{total}$ — Γ_{79}/Γ

NODE=M053R42
NODE=M053R42

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.2 × 10^{-4} (CL = 90%) [<1.2 × 10^{-4} (CL = 90%) OUR 2021 BEST LIMIT]					
<1.2 × 10^{-4}	90	[1] HUANG	06A	CLEO	$e^+e^- \rightarrow \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.8 × 10^{-4}	90	[2] ABLIKIM	21AS	BES3	$e^+e^- \rightarrow \psi(3770)$
<4 × 10^{-4}	90	[3] ABLIKIM	07F	BES2	$e^+e^- \rightarrow \psi(3770)$

[1] Using $\sigma_{tot}(e^+e^- \rightarrow \psi(3770)) = 7.9 \pm 0.6$ nb at the resonance. NODE=M053R42;LINKAGE=HU
[2] From a measurement of the $e^+e^- \rightarrow \Lambda\overline{\Lambda}$ cross section between 3.5 and 4.6 GeV. At a 90% CL the lower bound is $> 2.4 \times 10^{-6}$. NODE=M053R42;LINKAGE=A
[3] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb. NODE=M053R42;LINKAGE=AK

$\Gamma(p\overline{p}\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{80}/Γ

NODE=M053R37
NODE=M053R37

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<18.5	90	[1] HUANG	06A	CLEO	$e^+e^- \rightarrow \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<73	90	[2] ABLIKIM	07B	BES2	$e^+e^- \rightarrow \psi(3770)$

[1] Using $\sigma_{tot}(e^+e^- \rightarrow \psi(3770)) = 7.9 \pm 0.6$ nb at the resonance. NODE=M053R37;LINKAGE=HU
[2] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb. NODE=M053R37;LINKAGE=AK

$\Gamma(\omega p\overline{p})/\Gamma_{total}$ — Γ_{81}/Γ

NODE=M053R39
NODE=M053R39

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 2.9	90	[1] HUANG	06A	CLEO	$e^+e^- \rightarrow \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<30	90	[2] ABLIKIM	07I	BES2	3.77 e^+e^-

[1] Using $\sigma_{tot}(e^+e^- \rightarrow \psi(3770)) = 7.9 \pm 0.6$ nb at the resonance. NODE=M053R39;LINKAGE=HU
[2] Using $\sigma^{\text{obs}} = 7.15 \pm 0.27 \pm 0.27$ nb and neglecting interference. NODE=M053R39;LINKAGE=AB

$\Gamma(\Lambda\overline{\Lambda}\pi^0)/\Gamma_{total}$ — Γ_{82}/Γ

NODE=M053R63
NODE=M053R63

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 0.7	90	[1] ABLIKIM	13Q	BES3	$e^+e^- \rightarrow \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<12	90	[2] ABLIKIM	07I	BES2	3.77 e^+e^-

[1] Assuming that interference effects between resonance and continuum can be neglected. NODE=M053R63;LINKAGE=A
[2] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb. NODE=M053R63;LINKAGE=AK

$\Gamma(p\overline{p}2(\pi^+\pi^-))/\Gamma_{total}$ — Γ_{83}/Γ

NODE=M053R49
NODE=M053R49

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<2.6	90	[1] ABLIKIM	07F	BES2	$e^+e^- \rightarrow \psi(3770)$

[1] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb. NODE=M053R49;LINKAGE=AK

$\Gamma(\eta p\overline{p})/\Gamma_{total}$ — Γ_{84}/Γ

NODE=M053R38

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 5.4	90	[1] HUANG	06A	CLEO	$e^+e^- \rightarrow \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<11	90	[2] ABLIKIM	10D	BES2	$e^+e^- \rightarrow \psi(3770)$

[1] Using $\sigma_{tot}(e^+e^- \rightarrow \psi(3770)) = 7.9 \pm 0.6$ nb at the resonance. NODE=M053R38;LINKAGE=HU

[2] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb. NODE=M053R38;LINKAGE=AK

$\Gamma(\eta p\overline{p}\pi^+\pi^-)/\Gamma_{total}$ — Γ_{85}/Γ

NODE=M053R79

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<3.3	90	[1] ABLIKIM	10D	BES2	$e^+e^- \rightarrow \psi(3770)$

[1] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb. NODE=M053R79;LINKAGE=AK

$\Gamma(\rho^0 p\overline{p})/\Gamma_{total}$ — Γ_{86}/Γ

NODE=M053R56

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<1.7	90	[1] ABLIKIM	07F	BES2	$e^+e^- \rightarrow \psi(3770)$

[1] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb. NODE=M053R56;LINKAGE=AK

$\Gamma(p\overline{p}K^+K^-)/\Gamma_{total}$ — Γ_{87}/Γ

NODE=M053R40

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 3.2	90	[1] HUANG	06A	CLEO	$e^+e^- \rightarrow \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<11	90	[2] ABLIKIM	07B	BES2	$e^+e^- \rightarrow \psi(3770)$

[1] Using $\sigma_{tot}(e^+e^- \rightarrow \psi(3770)) = 7.9 \pm 0.6$ nb at the resonance. NODE=M053R40;LINKAGE=HU

[2] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb. NODE=M053R40;LINKAGE=AK

$\Gamma(\eta p\overline{p}K^+K^-)/\Gamma_{total}$ — Γ_{88}/Γ

NODE=M053R80

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<6.9	90	[1] ABLIKIM	10D	BES2	$e^+e^- \rightarrow \psi(3770)$

[1] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb. NODE=M053R80;LINKAGE=AK

$\Gamma(\pi^0 p\overline{p}K^+K^-)/\Gamma_{total}$ — Γ_{89}/Γ

NODE=M053R81

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<1.2	90	[1] ABLIKIM	10D	BES2	$e^+e^- \rightarrow \psi(3770)$

[1] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb. NODE=M053R81;LINKAGE=AK

$\Gamma(\phi p\overline{p})/\Gamma_{total}$ — Γ_{90}/Γ

NODE=M053R41

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.3	90	[1] HUANG	06A	CLEO	$e^+e^- \rightarrow \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<9	90	[2] ABLIKIM	07B	BES2	$e^+e^- \rightarrow \psi(3770)$

[1] Using $\sigma_{tot}(e^+e^- \rightarrow \psi(3770)) = 7.9 \pm 0.6$ nb at the resonance. NODE=M053R41;LINKAGE=HU

[2] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb. NODE=M053R41;LINKAGE=AK

$\Gamma(\Lambda\overline{\Lambda}\pi^+\pi^-)/\Gamma_{total}$ — Γ_{91}/Γ

NODE=M053R43

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 2.5	90	[1] HUANG	06A	CLEO	$e^+e^- \rightarrow \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 4.7	90	[2] ABLIKIM	13Q	BES3	$e^+e^- \rightarrow \psi(3770)$
<39	90	[3] ABLIKIM	07F	BES2	$e^+e^- \rightarrow \psi(3770)$

[1] Using $\sigma_{tot}(e^+e^- \rightarrow \psi(3770)) = 7.9 \pm 0.6$ nb at the resonance. NODE=M053R43;LINKAGE=HU

[2] Assuming that interference effects between resonance and continuum can be neglected. NODE=M053R43;LINKAGE=A

[3] Assuming that interference effects between resonance and continuum can be neglected and using $\sigma^{obs}(e^+e^- \rightarrow \psi(3770)) = 7.15 \pm 0.38$ nb. NODE=M053R43;LINKAGE=AK

$\Gamma(\Lambda\overline{p}K^+)/\Gamma_{total}$ Γ_{92}/Γ

NODE=M053R44
NODE=M053R44

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<2.8	90	[1] HUANG	06A	CLEO	$e^+e^- \rightarrow \psi(3770)$

[1] Using $\sigma_{tot}(e^+e^- \rightarrow \psi(3770)) = 7.9 \pm 0.6$ nb at the resonance.

NODE=M053R44;LINKAGE=HU

$\Gamma(\Lambda\overline{p}K^+\pi^+\pi^-)/\Gamma_{total}$ Γ_{93}/Γ

NODE=M053R45
NODE=M053R45

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<6.3	90	[1] HUANG	06A	CLEO	$e^+e^- \rightarrow \psi(3770)$

[1] Using $\sigma_{tot}(e^+e^- \rightarrow \psi(3770)) = 7.9 \pm 0.6$ nb at the resonance.

NODE=M053R45;LINKAGE=HU

$\Gamma(\Lambda\overline{\Lambda}\eta)/\Gamma_{total}$ Γ_{94}/Γ

NODE=M053R93
NODE=M053R93

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.9	90	[1] ABLIKIM	13Q	BES3	$e^+e^- \rightarrow \psi(3770)$

[1] Assuming that interference effects between resonance and continuum can be neglected.

NODE=M053R93;LINKAGE=A

$\Gamma(\Sigma^+\overline{\Sigma}^-)/\Gamma_{total}$ Γ_{95}/Γ

NODE=M053R94
NODE=M053R94

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.0	90	[1] ABLIKIM	13Q	BES3	$e^+e^- \rightarrow \psi(3770)$

[1] Assuming that interference effects between resonance and continuum can be neglected.

NODE=M053R94;LINKAGE=A

$\Gamma(\Sigma^0\overline{\Sigma}^0)/\Gamma_{total}$ Γ_{96}/Γ

NODE=M053R95
NODE=M053R95

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.4	90	[1] ABLIKIM	13Q	BES3	$e^+e^- \rightarrow \psi(3770)$

[1] Assuming that interference effects between resonance and continuum can be neglected.

NODE=M053R95;LINKAGE=A

$\Gamma(\Xi^+\overline{\Xi}^-)/\Gamma_{total}$ Γ_{97}/Γ

NODE=M053R96
NODE=M053R96

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.5	90	[1] ABLIKIM	13Q	BES3	$e^+e^- \rightarrow \psi(3770)$

[1] Assuming that interference effects between resonance and continuum can be neglected.

NODE=M053R96;LINKAGE=A

$\Gamma(\Xi^0\overline{\Xi}^0)/\Gamma_{total}$ Γ_{98}/Γ

NODE=M053R97
NODE=M053R97

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.4	90	[1] ABLIKIM	13Q	BES3	$e^+e^- \rightarrow \psi(3770)$

[1] Assuming that interference effects between resonance and continuum can be neglected.

NODE=M053R97;LINKAGE=A

RADIATIVE DECAYS

NODE=M053240

$\Gamma(\gamma\chi_{c2})/\Gamma_{total}$ Γ_{99}/Γ

NODE=M053R03
NODE=M053R03

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.64	90	[1] ABLIKIM	15J	BES3	$e^+e^- \rightarrow \psi(3770) \rightarrow \gamma\gamma J/\psi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<2.0	90	[2] BRIERE	06	CLEO	$e^+e^- \rightarrow \psi(3770) \rightarrow \gamma +$ hadrons
<0.9	90	[3] COAN	06A	CLEO	$e^+e^- \rightarrow \psi(3770) \rightarrow \gamma\gamma J/\psi$

[1] This limit is equivalent to $(0.25 \pm 0.21 \pm 0.18) \times 10^{-3}$ branching fraction value.

NODE=M053R03;LINKAGE=A

[2] Uses $B(\psi(2S) \rightarrow \gamma\chi_{c2}) = 9.22 \pm 0.11 \pm 0.46\,\%$ from ATHAR 04, $\psi(2S)$ mass and width from PDG 04, and $\Gamma_{ee}(\psi(2S)) = 2.54 \pm 0.03 \pm 0.11$ keV from ADAM 06.

NODE=M053R03;LINKAGE=BR

[3] Using $\Gamma_{ee}(\psi(2S)) = (2.54 \pm 0.03 \pm 0.11)$ keV from ADAM 06 and taking $\sigma(e^+e^- \rightarrow D\overline{D})$ from HE 05 for $\sigma(e^+e^- \rightarrow \psi(3770))$.

NODE=M053R03;LINKAGE=CO

$\Gamma(\gamma\chi_{c1})/\Gamma_{total}$ Γ_{100}/Γ

NODE=M053R02
NODE=M053R02

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
2.49±0.23 OUR AVERAGE					
1.98±0.78±0.05	202	[1] ABLIKIM	16B	BES3	$e^+e^- \rightarrow \psi(3770) \rightarrow \gamma +$ hadrons
2.48±0.15±0.23	0.6k	ABLIKIM	15J	BES3	$e^+e^- \rightarrow \psi(3770) \rightarrow \gamma\gamma J/\psi$
2.4 ±0.8 ±0.2		[2] ABLIKIM	14H	BES3	$e^+e^- \rightarrow \psi(3770) \rightarrow K^0_S K^\pm \pi^\mp$
2.9 ±0.5 ±0.4		[3] BRIERE	06	CLEO	$e^+e^- \rightarrow \psi(3770) \rightarrow \gamma +$ hadrons, $\gamma\gamma J/\psi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					

OCCUR=2

3.9 ±1.4 ±0.6	54	[4] BRIERE	06	CLEO	$e^+e^- \rightarrow \psi(3770) \rightarrow \gamma +$ hadrons
2.8 ±0.5 ±0.4	53	[5] COAN	06A	CLEO	$e^+e^- \rightarrow \psi(3770) \rightarrow \gamma\gamma J/\psi$

[1] ABLIKIM 16B reports $(1.94 \pm 0.42 \pm 0.64) \times 10^{-3}$ from a measurement of $[\Gamma(\psi(3770) \rightarrow \gamma\chi_{c1})/\Gamma_{total}]$ / $[B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.55 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M053R02;LINKAGE=A

[2] ABLIKIM 14H reports $[\Gamma(\psi(3770) \rightarrow \gamma\chi_{c1})/\Gamma_{total}] \times [B(\chi_{c1}(1P) \rightarrow K^0_S K^\pm \pi^\mp)] = (8.51 \pm 2.39 \pm 1.42) \times 10^{-6}$ which we divide by our best value $B(\chi_{c1}(1P) \rightarrow K^0_S K^\pm \pi^\mp) = 0.00349 \pm 0.00029$. Our first error is their experiment's error and our second error is the systematic error from using our best value. We have calculated the best value of $B(\chi_{c1}(1P) \rightarrow K^0_S K^\pm \pi^\mp)$ as 1/2 of $B(\chi_{c1}(1P) \rightarrow \overline{K}^0 K^+ \pi^- +$ c.c.$) = (7.0 \pm 0.6) \times 10^{-3}$. NODE=M053R02;LINKAGE=AB

[3] Averages the two measurements from COAN 06A and BRIERE 06. NODE=M053R02;LINKAGE=BI

[4] Uses $B(\psi(2S) \rightarrow \gamma\chi_{c1}) = 9.07 \pm 0.11 \pm 0.54\,\%$ from ATHAR 04, $\psi(2S)$ mass and width from PDG 04, and $\Gamma_{ee}(\psi(2S)) = 2.54 \pm 0.03 \pm 0.11$ keV from ADAM 06. NODE=M053R02;LINKAGE=BR

[5] Using $\Gamma_{ee}(\psi(2S)) = (2.54 \pm 0.03 \pm 0.11)$ keV from ADAM 06 and taking $\sigma(e^+e^- \rightarrow D\overline{D})$ from HE 05 for $\sigma(e^+e^- \rightarrow \psi(3770))$. NODE=M053R02;LINKAGE=CO

$\Gamma(\gamma\chi_{c1})/\Gamma(J/\psi\pi^+\pi^-)$ — Γ_{100}/Γ_5

NODE=M053R04
NODE=M053R04

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
1.49±0.31±0.26	53 ± 10	[1] COAN	06A	CLEO	$e^+e^- \rightarrow \psi(3770) \rightarrow \gamma\gamma J/\psi$

[1] Using $B(\psi(3770) \rightarrow J/\psi\pi^+\pi^-) = (1.89 \pm 0.20 \pm 0.20) \times 10^{-3}$ from ADAM 06. NODE=M053R04;LINKAGE=CO

$\Gamma(\gamma\chi_{c0})/\Gamma_{total}$ — Γ_{101}/Γ

NODE=M053R01
NODE=M053R01

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
6.9±0.6 OUR AVERAGE						
6.7±0.7±0.1		2.2k	[1] ABLIKIM	16B	BES3	$e^+e^- \rightarrow \psi(3770) \rightarrow \gamma +$ hadrons
7.3±0.7±0.6		274	BRIERE	06	CLEO	$e^+e^- \rightarrow \psi(3770) \rightarrow \gamma +$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<44	90		[2] COAN	06A	CLEO	$e^+e^- \rightarrow \psi(3770) \rightarrow \gamma\gamma J/\psi$

[1] ABLIKIM 16B reports $(6.88 \pm 0.28 \pm 0.67) \times 10^{-3}$ from a measurement of $[\Gamma(\psi(3770) \rightarrow \gamma\chi_{c0})/\Gamma_{total}]$ / $[B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P)) = (9.99 \pm 0.27) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P)) = (9.79 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M053R01;LINKAGE=B

[2] Using $\Gamma_{ee}(\psi(2S)) = (2.54 \pm 0.03 \pm 0.11)$ keV from ADAM 06 and taking $\sigma(e^+e^- \rightarrow D\overline{D})$ from HE 05 for $\sigma(e^+e^- \rightarrow \psi(3770))$. NODE=M053R01;LINKAGE=CO

$\Gamma(\gamma\chi_{c0})/\Gamma(\gamma\chi_{c2})$ — Γ_{101}/Γ_{99}

NODE=M053R06
NODE=M053R06

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
>8	90	[1] BRIERE	06	CLEO	$e^+e^- \rightarrow \psi(3770)$

[1] Not independent of other results in BRIERE 06. NODE=M053R06;LINKAGE=BR

$\Gamma(\gamma\chi_{c0})/\Gamma(\gamma\chi_{c1})$ — $\Gamma_{101}/\Gamma_{100}$

NODE=M053R05
NODE=M053R05

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.5±0.6	[1] BRIERE	06	CLEO	$e^+e^- \rightarrow \psi(3770)$

[1] Not independent of other results in BRIERE 06. NODE=M053R05;LINKAGE=BR

$\Gamma(\gamma\eta_c)/\Gamma_{total}$ — Γ_{102}/Γ

NODE=M053R99
NODE=M053R99

VALUE	CL%	DOCUMENT ID		TECN
<7 × 10^{-4}	90	[1] ABLIKIM	14H	BES3

[1] ABLIKIM 14H reports $[\Gamma(\psi(3770) \rightarrow \gamma\eta_c)/\Gamma_{total}] \times [B(\eta_c(1S) \rightarrow K^0_S K^\pm \pi^\mp)] < 16 \times 10^{-6}$ which we divide by our best value $B(\eta_c(1S) \rightarrow K^0_S K^\pm \pi^\mp) = 2.42 \times 10^{-2}$. We have calculated the best value of $B(\eta_c(1S) \rightarrow K^0_S K^\pm \pi^\mp)$ as 1/3 of $B(\eta_c(1S) \rightarrow K\overline{K}\pi) = 7.3 \times 10^{-2}$. NODE=M053R99;LINKAGE=AB

$\Gamma(\gamma\eta_c(2S))/\Gamma_{total}$ — Γ_{103}/Γ

NODE=M053R20

VALUE	CL%	DOCUMENT ID		TECN
$<9\times10^{-4}$	90	[1] ABLIKIM	14H	BES3

[1] ABLIKIM 14H reports $[\Gamma(\psi(3770) \to \gamma\eta_c(2S))/\Gamma_{total}] \times [B(\eta_c(2S) \to K^0_S K^\pm\pi^\mp)] < 5.6\times10^{-6}$ which we divide by our best value $B(\eta_c(2S) \to K^0_S K^\pm\pi^\mp) = 6\times10^{-3}$. We have calculated the best value of $B(\eta_c(2S) \to K^0_S K^\pm\pi^\mp)$ as 1/3 of $B(\eta_c(2S) \to K\overline{K}\pi) = 1.9\times10^{-2}$.

NODE=M053R20;LINKAGE=AB

$\Gamma(\gamma\eta')/\Gamma_{total}$ — Γ_{104}/Γ

NODE=M053R14

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.8	90	[1] PEDLAR	09	CLE3	$\psi(2S) \to \gamma X$

[1] Assuming maximal destructive interference between $\psi(3770)$ and continuum sources.

NODE=M053R14;LINKAGE=PE

$\Gamma(\gamma\eta)/\Gamma_{total}$ — Γ_{105}/Γ

NODE=M053R13

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.5	90	[1] PEDLAR	09	CLE3	$\psi(2S) \to \gamma X$

[1] Assuming maximal destructive interference between $\psi(3770)$ and continuum sources.

NODE=M053R13;LINKAGE=PE

$\Gamma(\gamma\pi^0)/\Gamma_{total}$ — Γ_{106}/Γ

NODE=M053R12

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<2	90	PEDLAR	09	CLE3	$\psi(2S) \to \gamma X$

$\psi(3770)$ REFERENCES

NODE=M053

ABLIKIM	21AS	PR D104 L091104	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61454
ABLIKIM	21Z	PRL 127 082002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61265
PDG	20	PTEP 2020 083C01	P.A. Zyla *et al.*	(PDG Collab.)	REFID=60676
AAIJ	19M	JHEP 1907 035	R. Aaij *et al.*	(LHCb Collab.)	REFID=59697
AAIJ	17AD	PL B769 305	R. Aaij *et al.*	(LHCb Collab.)	REFID=57896
SHAMOV	17	PL B769 187	A.G. Shamov, K.Yu. Todyshev		REFID=57900
ABLIKIM	16B	PL B753 103	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57126
ABLIKIM	15J	PR D91 092009	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56775
DRUZHININ	15	PR D92 054024	V.P. Druzhinin	(NOVO)	REFID=56962
ABLIKIM	14H	PR D89 112005	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55899
ABLIKIM	14L	PL B735 101	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55903
ABLIKIM	14O	PR D90 032007	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55906
BONVICINI	14	PR D89 072002	G. Bonvicini *et al.*	(CLEO Collab.)	REFID=55798
ABLIKIM	13Q	PR D87 112011	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55393
ANASHIN	12A	PL B711 292	V.V. Anashin *et al.*	(KEDR Collab.)	REFID=54055
ABLIKIM	10D	EPJ C66 11	M. Ablikim *et al.*	(BES II Collab.)	REFID=53350
BESSON	10	PRL 104 159901 (errat.)	D. Besson *et al.*	(CLEO Collab.)	REFID=53245
ABLIKIM	09C	EPJ C64 243	M. Ablikim *et al.*	(BES Collab.)	REFID=53134
PEDLAR	09	PR D79 111101	T.K. Pedlar *et al.*	(CLEO Collab.)	REFID=52998
ABLIKIM	08B	PL B659 74	M. Ablikim *et al.*	(BES Collab.)	REFID=52129
ABLIKIM	08D	PL B660 315	M. Ablikim *et al.*	(BES Collab.)	REFID=52142
ABLIKIM	08H	PRL 101 102004	M. Ablikim *et al.*	(BES Collab.)	REFID=52254
ABLIKIM	08M	PL B670 179	M. Ablikim *et al.*	(BES Collab.)	REFID=52569
ABLIKIM	08N	PL B670 184	M. Ablikim *et al.*	(BES Collab.)	REFID=52570
AUBERT	08B	PR D77 011102	B. Aubert *et al.*	(BABAR Collab.)	REFID=52120
BRODZICKA	08	PRL 100 092001	J. Brodzicka *et al.*	(BELLE Collab.)	REFID=52144
PAKHLOVA	08	PR D77 011103	G. Pakhlova *et al.*	(BELLE Collab.)	REFID=52132
ABLIKIM	07B	PL B650 111	M. Ablikim *et al.*	(BES Collab.)	REFID=51704
ABLIKIM	07E	PL B652 238	M. Ablikim *et al.*	(BES Collab.)	REFID=51882
ABLIKIM	07F	PL B656 30	M. Ablikim *et al.*	(BES Collab.)	REFID=51940
ABLIKIM	07I	EPJ C52 805	M. Ablikim *et al.*	(BES Collab.)	REFID=52045
ABLIKIM	07K	PR D76 122002	M. Ablikim *et al.*	(BES Collab.)	REFID=52073
AUBERT	07BE	PR D76 111105	B. Aubert *et al.*	(BABAR Collab.)	REFID=52074
DOBBS	07	PR D76 112001	S. Dobbs *et al.*	(CLEO Collab.)	REFID=52075
ABLIKIM	06L	PRL 97 121801	M. Ablikim *et al.*	(BES Collab.)	REFID=51129
ABLIKIM	06N	PL B641 145	M. Ablikim *et al.*	(BES Collab.)	REFID=51131
ADAM	06	PRL 96 082004	N.E. Adam *et al.*	(CLEO Collab.)	REFID=50989
ADAMS	06	PR D73 012002	G.S. Adams *et al.*	(CLEO Collab.)	REFID=50990
BESSON	06	PRL 96 092002	D. Besson *et al.*	(CLEO Collab.)	REFID=51041
Also		PRL 104 159901 (errat.)	D. Besson *et al.*	(CLEO Collab.)	REFID=53245
BRIERE	06	PR D74 031106	R.A. Briere *et al.*	(CLEO Collab.)	REFID=51149
COAN	06A	PRL 96 182002	T.E. Coan *et al.*	(CLEO Collab.)	REFID=51155
CRONIN-HEN...	06	PR D74 012005	D. Cronin-Hennessy *et al.*	(CLEO Collab.)	REFID=51156
HUANG	06A	PRL 96 032003	G.S. Huang *et al.*	(CLEO Collab.)	REFID=50999
BAI	05	PL B605 63	J.Z. Bai *et al.*	(BES Collab.)	REFID=50332
HE	05	PRL 95 121801	Q. He *et al.*	(CLEO Collab.)	REFID=50924
Also		PRL 96 199903 (errat.)	Q. He *et al.*	(CLEO Collab.)	REFID=51211
ABLIKIM	04F	PR D70 077101	M. Ablikim *et al.*	(BES Collab.)	REFID=50185
ATHAR	04	PR D70 112002	S.B. Athar *et al.*	(CLEO Collab.)	REFID=50331
CHISTOV	04	PRL 93 051803	R. Chistov *et al.*	(BELLE Collab.)	REFID=50002
PDG	04	PL B592 1	S. Eidelman *et al.*	(PDG Collab.)	REFID=49653
BAI	02C	PRL 88 101802	J.Z. Bai *et al.*	(BES Collab.)	REFID=50506
ADLER	88C	PRL 60 89	J. Adler *et al.*	(Mark III Collab.)	REFID=40361
SCHINDLER	80	PR D21 2716	R.H. Schindler *et al.*	(Mark II Collab.)	REFID=22222
BACINO	78	PRL 40 671	W.J. Bacino *et al.*	(SLAC, UCLA, UCI)	REFID=11437
RAPIDIS	77	PRL 39 526	P.A. Rapidis *et al.*	(LGW Collab.)	REFID=22220

NODE=M212

$\psi_2(3823)$

$I^G(J^{PC}) = 0^-(2^{--})$
I, J, P need confirmation.

was $\psi(3823)$, $X(3823)$

NODE=M212

Seen by BHARDWAJ 13 in $B \to \chi_{c1}\gamma K$ and ABLIKIM 15S in $e^+e^- \to \pi^+\pi^-\gamma\chi_{c1}$ decays as a narrow peak in the invariant mass distribution of the $\chi_{c1}\gamma$ system. Properties consistent with the $\psi_2(1^3D_2)$ $c\bar{c}$ state.

$\psi_2(3823)$ MASS

NODE=M212M

NODE=M212M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
3823.7 ±0.5 OUR AVERAGE		Error includes scale factor of 1.1.			
3824.08±0.53±0.14	137	[1] AAIJ	20S	LHCB	$B^+ \to J/\psi\pi^+\pi^-K^+$
3821.7 ±1.3 ±0.7	19 ± 5	[2] ABLIKIM	15S	BES3	$e^+e^- \to \pi^+\pi^-\chi_{c1}\gamma$
3823.1 ±1.8 ±0.7	33±10	[3] BHARDWAJ	13	BELL	$B^\pm \to \chi_{c1}\gamma K^\pm$

[1] Using the measured $m_{\psi_2(3823)} - m_{\psi(2S)} = 137.98 \pm 0.53 \pm 0.14$ MeV.

NODE=M212M;LINKAGE=C

[2] From a simultaneous unbinned maximum likelihood fit of $e^+e^- \to \pi^+\pi^-\chi_{c1}\gamma$ data (the $\pi^+\pi^-$ recoil mass) taken at $\sqrt{s}$ values of 4.23, 4.26, 4.36, 4.42, and 4.60 GeV to simulated events including both $\psi(2S) \to \chi_{c1}\gamma$ and $\psi_2(3823) \to \chi_{c1}\gamma$ together, with floating mass scale offset for $\psi(2S)$, floating $\psi_2(3823)$ mass, and zero $\psi_2(3823)$ width, resulting in a significance of 5.9σ when including systematic uncertainties.

NODE=M212M;LINKAGE=B

[3] From a simultaneous fit to $B^\pm \to (\chi_{c1}\gamma)K^\pm$ and $B^0 \to (\chi_{c1}\gamma)K^0_S$ with significance 4.0σ including systematics. Corrected for the measured $\psi(2S)$ mass using $B \to \psi(2S)K \to (\gamma\chi_{c1})K$ decays.

NODE=M212M;LINKAGE=A

$m_{\psi_2(3823)} - m_{\psi(2S)}$

NODE=M212A00
NODE=M212A00

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
137.98±0.53±0.14	137	[1] AAIJ	20S	LHCB	$B^+ \to J/\psi\pi^+\pi^-K^+$

[1] AAIJ 20S also reports $m_{\chi_{c1}(3872)} - m_{\psi_2(3823)} = 47.50 \pm 0.53 \pm 0.13$ MeV.

NODE=M212A00;LINKAGE=A

$\psi_2(3823)$ WIDTH

NODE=M212W

NODE=M212W

VALUE (MeV)	CL%	DOCUMENT ID		TECN	COMMENT
< 5.2	90	[1] AAIJ	20S	LHCB	$B^+ \to J/\psi\pi^+\pi^-K^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<16	90	[2] ABLIKIM	15S	BES3	$e^+e^- \to \pi^+\pi^-\chi_{c1}\gamma$
<24	90	[3] BHARDWAJ	13	BELL	$B^\pm \to \chi_{c1}\gamma K^\pm$

[1] AAIJ 20S also provides a limit of < 6.6 MeV with 95% CL.

NODE=M212W;LINKAGE=C

[2] From a fit of $e^+e^- \to \pi^+\pi^-\chi_{c1}\gamma$ data (the $\pi^+\pi^-$ recoil mass) taken at $\sqrt{s}$ values of 4.23, 4.26, 4.36, 4.42, and 4.60 GeV to a Breit-Wigner function with the mass fixed from the likelihood fit above, Gaussian resolution smearing, and floating width.

NODE=M212W;LINKAGE=B

[3] From a simultaneous fit to $B^\pm \to (\chi_{c1}\gamma)K^\pm$ and $B^0 \to (\chi_{c1}\gamma)K^0_S$ with significance 4.0σ including systematics.

NODE=M212W;LINKAGE=A

$\psi_2(3823)$ DECAY MODES

NODE=M212215;NODE=M212

Branching fractions are given relative to the one **DEFINED AS 1**.

NODE=M212

	Mode	Fraction (Γ_i/Γ)	Confidence level	
Γ_1	$J/\psi(1S)\pi^+\pi^-$	<0.06	90%	DESIG=3
Γ_2	$J/\psi(1S)\pi^0\pi^0$	<0.11	90%	DESIG=5
Γ_3	$J/\psi(1S)\pi^0$	<0.030	90%	DESIG=6
Γ_4	$J/\psi(1S)\eta$	<0.14	90%	DESIG=7
Γ_5	$\chi_{c0}\gamma$	<0.24	90%	DESIG=4
Γ_6	$\chi_{c1}\gamma$	**DEFINED AS 1**		DESIG=1
Γ_7	$\chi_{c2}\gamma$	$0.28\ ^{+0.14}_{-0.11}$		DESIG=2

$\psi_2(3823)$ BRANCHING RATIOS

NODE=M212225

$\Gamma(J/\psi(1S)\pi^+\pi^-)/\Gamma_{total}$ Γ_1/Γ

NODE=M212R00

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
not seen		[1] ABLIKIM	21O	BES3	$e^+e^- \to \pi^+\pi^- X$
seen	137 ± 26	AAIJ	20S	LHCB	$B^+ \to J/\psi\pi^+\pi^- K^+$

[1] From a simultaneous unbinned maximum likelihood fit of the $\pi^+\pi^-$ recoil mass distributions of seven decay channels in the process $e^+e^- \to \pi^+\pi^- X$.

NODE=M212R00;LINKAGE=A

$\Gamma(J/\psi(1S)\pi^+\pi^-)/\Gamma(\chi_{c1}\gamma)$ Γ_1/Γ_6

NODE=M212R06

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.06	90	[1] ABLIKIM	21O	BES3	$e^+e^- \to \pi^+\pi^- X$

[1] From a simultaneous unbinned maximum likelihood fit of the $\pi^+\pi^-$ recoil mass distributions of seven decay channels in the process $e^+e^- \to \pi^+\pi^- X$.

NODE=M212R06;LINKAGE=A

$\Gamma(J/\psi(1S)\pi^0\pi^0)/\Gamma(\chi_{c1}\gamma)$ Γ_2/Γ_6

NODE=M212R07

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.11	90	[1] ABLIKIM	21O	BES3	$e^+e^- \to \pi^+\pi^- X$

[1] From a simultaneous unbinned maximum likelihood fit of the $\pi^+\pi^-$ recoil mass distributions of seven decay channels in the process $e^+e^- \to \pi^+\pi^- X$.

NODE=M212R07;LINKAGE=A

$\Gamma(J/\psi(1S)\pi^0)/\Gamma(\chi_{c1}\gamma)$ Γ_3/Γ_6

NODE=M212R08

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.03	90	[1] ABLIKIM	21O	BES3	$e^+e^- \to \pi^+\pi^- X$

[1] From a simultaneous unbinned maximum likelihood fit of the $\pi^+\pi^-$ recoil mass distributions of seven decay channels in the process $e^+e^- \to \pi^+\pi^- X$.

NODE=M212R08;LINKAGE=A

$\Gamma(J/\psi(1S)\eta)/\Gamma(\chi_{c1}\gamma)$ Γ_4/Γ_6

NODE=M212R09

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.14	90	[1] ABLIKIM	21O	BES3	$e^+e^- \to \pi^+\pi^- X$

[1] From a simultaneous unbinned maximum likelihood fit of the $\pi^+\pi^-$ recoil mass distributions of seven decay channels in the process $e^+e^- \to \pi^+\pi^- X$.

NODE=M212R09;LINKAGE=A

$\Gamma(\chi_{c0}\gamma)/\Gamma_{total}$ Γ_5/Γ

NODE=M212R04

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	[1] ABLIKIM	21O	BES3	$e^+e^- \to \pi^+\pi^- X$

[1] From a simultaneous unbinned maximum likelihood fit of the $\pi^+\pi^-$ recoil mass distributions of seven decay channels in the process $e^+e^- \to \pi^+\pi^- X$.

NODE=M212R04;LINKAGE=A

$\Gamma(\chi_{c1}\gamma)/\Gamma_{total}$ Γ_6/Γ

NODE=M212R01

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	33 ± 10	[1] BHARDWAJ	13	BELL	$B^\pm \to \chi_{c1}\gamma K^\pm$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	63 ± 9	[2] ABLIKIM	21O	BES3	$e^+e^- \to \pi^+\pi^- X$
seen	16 ± 5	[3] ABLIKIM	21O	BES3	$e^+e^- \to \pi^0\pi^0 X$

OCCUR=2

[1] BHARDWAJ 13 reports $B(B^\pm \to \psi_2(3823)K^\pm) \times B(\psi_2(3823) \to \gamma\chi_{c1}) = (9.7 \pm 2.8 \pm 1.1) \times 10^{-6}$ with statistical significance 3.8 σ.

NODE=M212R01;LINKAGE=A

[2] From a simultaneous unbinned maximum likelihood fit of the $\pi^+\pi^-$ recoil mass distributions of seven decay channels in the process $e^+e^- \to \pi^+\pi^- X$. Signal has a 11.8 σ significance.

NODE=M212R01;LINKAGE=B

[3] From a fit of the invariant $\pi^0\pi^0$ recoil-mass distribution. Signal has a 4.3 σ significance.

NODE=M212R01;LINKAGE=C

$\Gamma(\chi_{c0}\gamma)/\Gamma(\chi_{c1}\gamma)$ Γ_5/Γ_6

NODE=M212R05

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.24	90	[1] ABLIKIM	21O	BES3	$e^+e^- \to \pi^+\pi^- X$

[1] From a simultaneous unbinned maximum likelihood fit of the $\pi^+\pi^-$ recoil mass distributions of seven decay channels in the process $e^+e^- \to \pi^+\pi^- X$.

NODE=M212R05;LINKAGE=A

$\Gamma(\chi_{c2}\gamma)/\Gamma_{total}$ — Γ_7/Γ

NODE=M212R02
NODE=M212R02

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	[1] ABLIKIM	21O	BES3	$e^+e^- \to \pi^+\pi^- X$
not seen	[2] ABLIKIM	15S	BES3	$e^+e^- \to \pi^+\pi^- \chi_{c2}\gamma$
not seen	[3] BHARDWAJ	13	BELL	$B^\pm \to \chi_{c2}\gamma K^\pm$

[1] From a simultaneous unbinned maximum likelihood fit of the $\pi^+\pi^-$ recoil mass distributions of seven decay channels in the process $e^+e^- \to \pi^+\pi^- X$. Signal has a 3.2 σ significance.

NODE=M212R02;LINKAGE=C

[2] From a simultaneous unbinned maximum likelihood fit of $e^+e^- \to \pi^+\pi^-\chi_{c2}\gamma$ data (the $\pi^+\pi^-$ recoil mass) taken at $\sqrt{s}$ values of 4.23, 4.26, 4.36, 4.42, and 4.60 GeV to simulated events including both $\psi(2S) \to \chi_{c2}\gamma$ and $\psi_2(3823) \to \chi_{c2}\gamma$ together, with floating mass scale offset for $\psi(2S)$, $\psi_2(3823)$ mass floating (fixed to that above), and zero $\psi_2(3823)$ width.

NODE=M212R02;LINKAGE=B

[3] BHARDWAJ 13 reports B($B^\pm \to \psi_2(3823) K^\pm$) × B($\psi_2(3823) \to \gamma\chi_{c2}$) < 3.6×10^{-6} at 90% CL.

NODE=M212R02;LINKAGE=A

$\Gamma(\chi_{c2}\gamma)/\Gamma(\chi_{c1}\gamma)$ — Γ_7/Γ_6

NODE=M212R03
NODE=M212R03

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.28^{+0.14}_{-0.11}\pm0.02}$		9 ± 4	[1] ABLIKIM	21O	BES3	$e^+e^- \to \pi^+\pi^-\chi_{c2}\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.42	90		[2] ABLIKIM	15S	BES3	$e^+e^- \to \pi^+\pi^-\chi_{c2}\gamma$
<0.41	90		BHARDWAJ	13	BELL	$B^\pm \to \chi_{c1/c2}\gamma K^\pm$

[1] From a simultaneous unbinned maximum likelihood fit of the $\pi^+\pi^-$ recoil mass distributions of seven decay channels in the process $e^+e^- \to \pi^+\pi^- X$.

NODE=M212R03;LINKAGE=B

[2] From a simultaneous unbinned maximum likelihood fit of $e^+e^- \to \pi^+\pi^-\chi_{c1(2)}\gamma$ data (the $\pi^+\pi^-$ recoil mass) taken at $\sqrt{s}$ values of 4.23, 4.26, 4.36, 4.42, and 4.60 GeV to simulated events including both $\psi(2S) \to \chi_{c1(2)}\gamma$ and $\psi_2(3823) \to \chi_{c1(2)}\gamma$ together, with floating mass scale offset for $\psi(2S)$, $\psi_2(3823)$ mass floating (fixed to that above), and zero $\psi_2(3823)$ width.

NODE=M212R03;LINKAGE=A

$\psi_2(3823)$ REFERENCES

NODE=M212

ABLIKIM	21O	PR D103 L091102	M. Ablikim *et al.*	(BESIII Collab.)
AAIJ	20S	JHEP 2008 123	R. Aaij *et al.*	(LHCb Collab.)
ABLIKIM	15S	PRL 115 011803	M. Ablikim *et al.*	(BESIII Collab.)
BHARDWAJ	13	PRL 111 032001	V. Bhardwaj *et al.*	(BELLE Collab.)

REFID=61121
REFID=60526
REFID=56784
REFID=55412

NODE=M241

$\psi_3(3842)$

$I^G(J^{PC}) = 0^-(3^{--})$
J, P need confirmation.

J^P has not been measured, 3^- is the quark model prediction.

NODE=M241

$\psi_3(3842)$ MASS

NODE=M241M
NODE=M241M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
3842.71±0.16±0.12	AAIJ	19M	LHCB	$pp \to D\overline{D}$ + anything

$\psi_3(3842)$ WIDTH

NODE=M241W
NODE=M241W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
2.79±0.51±0.35	AAIJ	19M	LHCB	$pp \to D\overline{D}$ + anything

$\psi_3(3842)$ DECAY MODES

NODE=M241215;NODE=M241

	Mode	Fraction (Γ_i/Γ)
Γ_1	D^+D^-	seen
Γ_2	$D^0\overline{D}^0$	seen

DESIG=1
DESIG=2

ψ_3(3842) BRANCHING RATIOS

NODE=M241225

$\Gamma(D^+ D^-)/\Gamma_{total}$ — Γ_1/Γ

NODE=M241R01

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AAIJ	19M	LHCB	$p p \to D \overline{D} +$ anything

$\Gamma(D^0 \overline{D}^0)/\Gamma_{total}$ — Γ_2/Γ

NODE=M241R02

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AAIJ	19M	LHCB	$p p \to D \overline{D} +$ anything

ψ_3(3842) REFERENCES

NODE=M241

AAIJ 19M JHEP 1907 035 R. Aaij *et al.* (LHCb Collab.) REFID=59697

NODE=M237

$\chi_{c0}(3860)$

$I^G(J^{PC}) = 0^+(0^{++})$

OMITTED FROM SUMMARY TABLE

The assignment $J^P = 0^+$ is preferred over 2^+ by 2.5 sigma.

NODE=M237

Observed by CHILIKIN 17 using full amplitude analysis of the process $e^+ e^- \to J/\psi D \overline{D}$, where $D = D^0$, D^+. Not seen by AAIJ 20AI in the decay $B^+ \to D^+ D^- K^+$.

χ_{c0}(3860) MASS

NODE=M237M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
$\mathbf{3862^{+26}_{-32}{}^{+40}_{-13}}$	CHILIKIN	17	BELL	$e^+ e^- \to J/\psi D \overline{D}$

χ_{c0}(3860) WIDTH

NODE=M237W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
$\mathbf{201^{+154}_{-\ 67}{}^{+88}_{-82}}$	CHILIKIN	17	BELL	$e^+ e^- \to J/\psi D \overline{D}$

χ_{c0}(3860) DECAY MODES

NODE=M237215;NODE=M237

	Mode	Fraction (Γ_i/Γ)
Γ_1	$D^0 \overline{D}^0$	seen
Γ_2	$D^+ D^-$	seen

DESIG=1
DESIG=2

χ_{c0}(3860) BRANCHING RATIOS

NODE=M237220

$\Gamma(D^0 \overline{D}^0)/\Gamma_{total}$ — Γ_1/Γ

NODE=M237R00

VALUE	DOCUMENT ID		TECN	COMMENT
seen	CHILIKIN	17	BELL	$e^+ e^- \to J/\psi D^0 \overline{D}^0$

$\Gamma(D^+ D^-)/\Gamma_{total}$ — Γ_2/Γ

NODE=M237R01

VALUE	DOCUMENT ID		TECN	COMMENT
seen	CHILIKIN	17	BELL	$e^+ e^- \to J/\psi D^+ D^-$

χ_{c0}(3860) REFERENCES

NODE=M237

AAIJ 20AI PR D102 112003 R. Aaij *et al.* (LHCb Collab.) REFID=60739
CHILIKIN 17 PR D95 112003 K. Chilikin *et al.* (BELLE Collab.) JPC REFID=57995

NODE=M176

$\chi_{c1}(3872)$

$I^G(J^{PC}) = 0^+(1^{++})$

also known as $X(3872)$

NODE=M176

This state shows properties different from a conventional $q\overline{q}$ state. A candidate for an exotic structure. See the review on non-$q\overline{q}$ states.

First observed by CHOI 03 in $B \to K\pi^+\pi^- J/\psi(1S)$ decays as a narrow peak in the invariant mass distribution of the $\pi^+\pi^- J/\psi(1S)$ final state. Isovector hypothesis excluded by AUBERT 05B and CHOI 11.

AAIJ 13Q perform a full five-dimensional amplitude analysis of the angular correlations between the decay products in $B^+ \to \chi_{c1}(3872) K^+$ decays, where $\chi_{c1}(3872) \to J/\psi\pi^+\pi^-$ and $J/\psi \to \mu^+\mu^-$, which unambiguously gives the $J^{PC} = 1^{++}$ assignment under the assumption that the $\pi^+\pi^-$ and J/ψ are in an S-wave. AAIJ 15AO extend this analysis with more data to limit D-wave contributions to $< 4\%$ at 95% CL.

See the review on "Spectroscopy of Mesons Containing Two Heavy Quarks."

$\chi_{c1}(3872)$ MASS FROM $J/\psi X$ MODE

NODE=M176M

NODE=M176M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
3871.65 ± 0.06 OUR AVERAGE					
3871.64 ± 0.06 ± 0.01	19.8k	[1] AAIJ	20S	LHCB	$B^+ \to J/\psi\pi^+\pi^- K^+$
3871.9 ± 0.7 ± 0.2	20	ABLIKIM	14	BES3	$e^+e^- \to J/\psi\pi^+\pi^-\gamma$
3871.95 ± 0.48 ± 0.12	0.6k	AAIJ	12H	LHCB	$pp \to J/\psi\pi^+\pi^- X$
3871.85 ± 0.27 ± 0.19	170	[2] CHOI	11	BELL	$B \to K\pi^+\pi^- J/\psi$
3873 $^{+1.8}_{-1.6}$ ± 1.3	27	[3] DEL-AMO-SA..	10B	BABR	$B \to \omega J/\psi K$
3871.61 ± 0.16 ± 0.19	6k	[3,4] AALTONEN	09AU	CDF2	$p\overline{p} \to J/\psi\pi^+\pi^- X$
3871.4 ± 0.6 ± 0.1	93.4	AUBERT	08Y	BABR	$B^+ \to K^+ J/\psi\pi^+\pi^-$
3868.7 ± 1.5 ± 0.4	9.4	AUBERT	08Y	BABR	$B^0 \to K^0_S J/\psi\pi^+\pi^-$
3871.8 ± 3.1 ± 3.0	522	[3,5] ABAZOV	04F	D0	$p\overline{p} \to J/\psi\pi^+\pi^- X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3871.695 ± 0.067 ± 0.068	15.6k	[6] AAIJ	20AD	LHCB	$pp \to J/\psi\pi^+\pi^- X$
3871.59 ± 0.06 ± 0.03	4.2k	[7] AAIJ	20S	LHCB	$B^+ \to J/\psi\pi^+\pi^- K^+$
3873.3 ± 1.1 ± 1.0	45	[8] ABLIKIM	19V	BES	$e^+e^- \to \gamma\omega J/\psi$
3860.0 ± 10.4	13.6	[3,9] AGHASYAN	18A	COMP	$\gamma^* N \to X\pi^\pm N'$
3868.6 ± 1.2 ± 0.2	8	[10] AUBERT	06	BABR	$B^0 \to K^0_S J/\psi\pi^+\pi^-$
3871.3 ± 0.6 ± 0.1	61	[10] AUBERT	06	BABR	$B^- \to K^- J/\psi\pi^+\pi^-$
3873.4 ± 1.4	25	[11] AUBERT	05R	BABR	$B^+ \to K^+ J/\psi\pi^+\pi^-$
3871.3 ± 0.7 ± 0.4	730	[3,12] ACOSTA	04	CDF2	$p\overline{p} \to J/\psi\pi^+\pi^- X$
3872.0 ± 0.6 ± 0.5	36	[13] CHOI	03	BELL	$B \to K\pi^+\pi^- J/\psi$
3836 ± 13	58	[3,14] ANTONIAZZI	94	E705	$300\ \pi^\pm \mathrm{Li} \to J/\psi\pi^+\pi^- X$

OCCUR=2 (AAIJ 20S), OCCUR=2 (AUBERT 08Y), OCCUR=2 (AUBERT 06)

[1] Calculated from $m_{\chi_{c1}(3872)} - m_{\psi(2S)} = 185.54 \pm 0.06$ MeV obtained by combining the data with $\chi_{c1}(3872)$ produced in B^+ decays from AAIJ 20S and inclusive b-hadron decays from AAIJ 20AD and using $m_{\psi(2S)} = 3686.097$ MeV. Breit-Wigner parametrization. NODE=M176M;LINKAGE=F

[2] The mass difference for the $\chi_{c1}(3872)$ produced in B^+ and B^0 decays is $(-0.71 \pm 0.96 \pm 0.19)$ MeV. NODE=M176M;LINKAGE=CO

[3] Width consistent with detector resolution. NODE=M176M;LINKAGE=AC

[4] A possible equal mixture of two states with a mass difference greater than 3.6 MeV/c^2 is excluded at 95% CL. NODE=M176M;LINKAGE=AA

[5] Calculated from the corresponding $m_{\chi_{c1}(3872)} - m_{J/\psi}$ using $m_{J/\psi}$=3096.916 MeV. NODE=M176M;LINKAGE=AB

[6] Using $\chi_{c1}(3872)$ produced in inclusive b-hadron decays and $m_{\psi(2S)} = 3686.097 \pm 0.010$ MeV. Breit-Wigner parametrization. Superseded by the combined value in AAIJ 20S. NODE=M176M;LINKAGE=D
[7] Using Breit-Wigner parametrization. Superseded by the combined value in AAIJ 20S. NODE=M176M;LINKAGE=E
[8] Fit with fixed width and including two resonances, $X(3915)$ and $X(3960)$. NODE=M176M;LINKAGE=B
[9] Could be a different state. NODE=M176M;LINKAGE=A
[10] Calculated from the corresponding $m_{\chi_{c1}(3872)} - m_{\psi(2S)}$ using $m_{\psi(2S)} = 3686.093$ MeV. Superseded by AUBERT 08Y. NODE=M176M;LINKAGE=AE
[11] Calculated from the corresponding $m_{\chi_{c1}(3872)} - m_{\psi(2S)}$ using $m_{\psi(2S)} =$ 3685.96MeV. Superseded by AUBERT 06. NODE=M176M;LINKAGE=AU
[12] Superseded by AALTONEN 09AU. NODE=M176M;LINKAGE=AT
[13] Superseded by CHOI 11. NODE=M176M;LINKAGE=CH
[14] A lower mass value can be due to an incorrect momentum scale for soft pions. NODE=M176M;LINKAGE=AN

$\chi_{c1}(3872)$ MASS FROM $\overline{D}^{*0} D^0$ MODE

NODE=M176MD0

NODE=M176MD0

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$3872.9^{+0.6}_{-0.4}{}^{+0.4}_{-0.5}$	50	[1,2] AUSHEV	10	BELL	$B \to \overline{D}^{*0} D^0 K$
$3875.1^{+0.7}_{-0.5} \pm 0.5$	33 ± 6	[2] AUBERT	08B	BABR	$B \to \overline{D}^{*0} D^0 K$
$3875.2 \pm 0.7^{+0.9}_{-1.8}$	24 ± 6	[2,3] GOKHROO	06	BELL	$B \to D^0 \overline{D}^0 \pi^0 K$

[1] Calculated from the measured $m_{\chi_{c1}(3872)} - m_{D^{*0}} - m_{\overline{D}^0} = 1.1^{+0.6}_{-0.4}{}^{+0.1}_{-0.3}$ MeV. NODE=M176MD0;LINKAGE=AS
[2] Experiments report $D^{*0}\overline{D}^0$ invariant mass above $D^{*0}\overline{D}^0$ threshold because D^{*0} decay products are kinematically constrained to the D^{*0} mass, even though the D^{*0} may decay off-shell. NODE=M176MD0;LINKAGE=AU
[3] Superseded by AUSHEV 10. NODE=M176MD0;LINKAGE=GO

$m_{\chi_{c1}(3872)} - m_{J/\psi}$

NODE=M176DM

NODE=M176DM

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
774.9±3.1±3.0	522	ABAZOV	04F	D0	$p\overline{p} \to J/\psi \pi^+ \pi^- X$

$m_{\chi_{c1}(3872)} - m_{\psi(2S)}$

NODE=M176DM2

NODE=M176DM2

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
185.598±0.067±0.068	15.6k	[1] AAIJ	20AD	LHCB	$p p \to J/\psi \pi^+ \pi^- X$
185.54 ±0.06	19.8k	[2] AAIJ	20S	LHCB	$p p \to J/\psi \pi^+ \pi^- X$
187.4 ±1.4	25	[3] AUBERT	05R	BABR	$B^+ \to K^+ J/\psi \pi^+ \pi^-$

[1] Using $\chi_{c1}(3872)$ produced in inclusive b-hadron decays. Breit-Wigner parametrization. Superseded by the combined value in AAIJ 20S. NODE=M176DM2;LINKAGE=A
[2] Combining $m_{\chi_{c1}(3872)} - m_{\psi(2S)} = 185.49 \pm 0.06 \pm 0.03$ MeV from AAIJ 20S and the measured mass difference from AAIJ 20AD. Breit-Wigner parametrization. NODE=M176DM2;LINKAGE=E
[3] Superseded by AUBERT 06. NODE=M176DM2;LINKAGE=AU

$\chi_{c1}(3872)$ WIDTH

NODE=M176W

NODE=M176W

VALUE (MeV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
1.19±0.21 OUR AVERAGE			Error includes scale factor of 1.1.			
1.39±0.24±0.10		15.6k	[1] AAIJ	20AD	LHCB	$p p \to J/\psi \pi^+ \pi^- X$ (OCCUR=3)
$0.96^{+0.19}_{-0.18} \pm 0.21$		4.2k	[2] AAIJ	20S	LHCB	$B^+ \to J/\psi \pi^+ \pi^- K^+$ (OCCUR=2)
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<2.4	90		ABLIKIM	14	BES3	$e^+ e^- \to J/\psi \pi^+ \pi^- \gamma$
<1.2	90		CHOI	11	BELL	$B \to K \pi^+ \pi^- J/\psi$
<3.3	90		AUBERT	08Y	BABR	$B^+ \to K^+ J/\psi \pi^+ \pi^-$
<4.1	90	69	AUBERT	06	BABR	$B \to K \pi^+ \pi^- J/\psi$
<2.3	90	36	[3] CHOI	03	BELL	$B \to K \pi^+ \pi^- J/\psi$

[1] Using $\chi_{c1}(3872)$ produced in inclusive b-hadron decays. Breit-Wigner parametrization. NODE=M176W;LINKAGE=E
[2] Using Breit-Wigner parametrization. Partially overlapping dataset with that of AAIJ 20AD. NODE=M176W;LINKAGE=F
[3] Superseded by CHOI 11. NODE=M176W;LINKAGE=CH

$\chi_{c1}(3872)$ WIDTH FROM $\overline{D}^{*0} D^0$ MODE

NODE=M176WD0
NODE=M176WD0

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$3.9^{+2.8+0.2}_{-1.4-1.1}$	50	[1] AUSHEV	10	BELL	$B \to \overline{D}^{*0} D^0 K$
$3.0^{+1.9}_{-1.4}\pm0.9$	33 ± 6	AUBERT	08B	BABR	$B \to \overline{D}^{*0} D^0 K$

[1] With a measured value of B($B \to \chi_{c1}(3872) K$) $\times$ B($\chi_{c1}(3872) \to D^{*0}\overline{D}^0$) = $(0.80 \pm 0.20 \pm 0.10) \times 10^{-4}$, assumed to be equal for both charged and neutral modes.

NODE=M176WD0;LINKAGE=AU

$\chi_{c1}(3872)$ DECAY MODES

NODE=M176215;NODE=M176

	Mode	Fraction (Γ_i/Γ)	Confidence level	
Γ_1	$e^+ e^-$	$< 2.8 \times 10^{-6}$	90%	DESIG=1
Γ_2	$\pi^+\pi^- J/\psi(1S)$	(3.8 ± 1.2) %		DESIG=2
Γ_3	$\pi^+\pi^-\pi^0 J/\psi(1S)$	not seen		DESIG=25
Γ_4	$\omega \eta_c(1S)$	< 33 %	90%	DESIG=24
Γ_5	$\omega J/\psi(1S)$	(4.3 ± 2.1) %		DESIG=13
Γ_6	$\phi\phi$	not seen		DESIG=26
Γ_7	$D^0 \overline{D}^0 \pi^0$	$(49 {}^{+18}_{-20})$ %		DESIG=8
Γ_8	$\overline{D}^{*0} D^0$	(37 ± 9) %		DESIG=12
Γ_9	$\gamma\gamma$	< 11 %	90%	DESIG=5
Γ_{10}	$D^0 \overline{D}^0$	< 29 %	90%	DESIG=6
Γ_{11}	$D^+ D^-$	< 19 %	90%	DESIG=7
Γ_{12}	$\pi^0 \chi_{c2}$	< 4 %	90%	DESIG=20
Γ_{13}	$\pi^0 \chi_{c1}$	(3.4 ± 1.6) %		DESIG=18
Γ_{14}	$\pi^0 \chi_{c0}$	< 70 %	90%	DESIG=19
Γ_{15}	$\pi^+\pi^- \eta_c(1S)$	< 14 %	90%	DESIG=14
Γ_{16}	$\pi^+\pi^- \chi_{c1}$	$< 7 \times 10^{-3}$	90%	DESIG=17
Γ_{17}	$p\overline{p}$	$< 2.4 \times 10^{-5}$	95%	DESIG=16
	Radiative decays			NODE=M176;CLUMP=B
Γ_{18}	$\gamma D^+ D^-$	< 4 %	90%	DESIG=21
Γ_{19}	$\gamma \overline{D}^0 D^0$	< 6 %	90%	DESIG=23
Γ_{20}	$\gamma J/\psi$	$(8 \pm 4) \times 10^{-3}$		DESIG=9
Γ_{21}	$\gamma \chi_{c1}$	$< 9 \times 10^{-3}$	90%	DESIG=3
Γ_{22}	$\gamma \chi_{c2}$	< 3.2 %	90%	DESIG=15
Γ_{23}	$\gamma \psi(2S)$	(4.5 ± 2.0) %		DESIG=11
	***C*-violating decays**			NODE=M176;CLUMP=A
Γ_{24}	$\eta J/\psi$	< 1.8 %	90%	DESIG=4

$\chi_{c1}(3872)$ PARTIAL WIDTHS

NODE=M176220

$\Gamma(e^+ e^-)$ Γ_1

NODE=M176W1
NODE=M176W1

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<$ 4.3	90	[1] ABLIKIM	15V	BES3	4.0–4.4 $e^+e^- \to \pi^+\pi^- J/\psi$
$<$280	90	[2] YUAN	04	RVUE	$e^+e^- \to \pi^+\pi^- J/\psi$

[1] ABLIKIM 15V reports this limit from the measurement of $\Gamma(\chi_{c1}(3872) \to \pi^+\pi^- J/\psi(1S)) \times \Gamma(\chi_{c1}(3872) \to e^+e^-)/\Gamma < 0.13$ eV using $\Gamma(\chi_{c1}(3872) \to \pi^+\pi^- J/\psi(1S))/\Gamma = 3\%$.

NODE=M176W1;LINKAGE=B

[2] Using BAI 98E data on $e^+e^- \to \pi^+\pi^-\ell^+\ell^-$. Assuming that $\Gamma(\pi^+\pi^- J/\psi)$ of $\chi_{c1}(3872)$ is the same as that of $\psi(2S)$ (85.4 keV).

NODE=M176W1;LINKAGE=A

$\Gamma(\gamma\gamma) \times \Gamma(\pi^+\pi^- J/\psi(1S))/\Gamma_{total}$ $\Gamma_9\Gamma_2/\Gamma$

NODE=M176R27

NODE=M176R27

NODE=M176230

$\chi_{c1}(3872)$ Γ(i)Γ(e^+e^-)/Γ(total)

$\Gamma(\pi^+\pi^- J/\psi(1S)) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_2\Gamma_1/\Gamma$

NODE=M176G1
NODE=M176G1

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
< 0.13	90	ABLIKIM	15V	BES3	4.0–4.4 $e^+e^- \to \pi^+\pi^- J/\psi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 6.2	90	[1,2] AUBERT	05D	BABR	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\gamma$
< 8.3	90	[2] DOBBS	05	CLE3	$e^+e^- \to \pi^+\pi^- J/\psi$
<10	90	[3] YUAN	04	RVUE	$e^+e^- \to \pi^+\pi^- J/\psi$

[1] Using B($\chi_{c1}(3872) \to J/\psi\pi^+\pi^-$) · B($J/\psi \to \mu^+\mu^-$) · Γ($\chi_{c1}(3872) \to e^+e^-$) < 0.37 eV from AUBERT 05D and B($J/\psi \to \mu^+\mu^-$) = 0.0588 ± 0.0010 from the PDG 04. NODE=M176G1;LINKAGE=AU

[2] Assuming $\chi_{c1}(3872)$ has $J^{PC} = 1^{--}$. NODE=M176G1;LINKAGE=DO

[3] Using BAI 98E data on $e^+e^- \to \pi^+\pi^-\ell^+\ell^-$. From theoretical calculation of the production cross section and using B($J/\psi \to \mu^+\mu^-$) = (5.88 ± 0.10)%. NODE=M176G1;LINKAGE=A

NODE=M176232

$\chi_{c1}(3872)$ Γ(i)Γ(γγ)/Γ(total)

$\Gamma(\pi^+\pi^- J/\psi(1S)) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_2\Gamma_9/\Gamma$

NODE=M176H1
NODE=M176H1

VALUE (eV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$5.5^{+4.1}_{-3.8}\pm0.7$		3	[1] TERAMOTO	21	BELL	$e^+e^- \to \gamma^*\gamma$ at Υ(nS)
<12.9	90		[2] DOBBS	05	CLE3	$e^+e^- \to \pi^+\pi^- J/\psi\gamma$

[1] Measured in single-tag two-photon production assuming Q^2 dependence of a $c\overline{c}$ meson model. Here, Γ($\chi_{c1}(3872) \to \gamma\gamma$) is the reduced two-photon decay width, $\widetilde{\Gamma}_{\gamma\gamma}$. NODE=M176H1;LINKAGE=A

[2] Assuming $\chi_{c1}(3872)$ has positive C parity and spin 0. NODE=M176H1;LINKAGE=DO

$\Gamma(\omega J/\psi(1S)) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_5\Gamma_9/\Gamma$

NODE=M176G01
NODE=M176G01

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.7	90	[1] LEES	12AD	BABR	$e^+e^- \to e^+e^-\omega J/\psi$

[1] Assuming $\chi_{c1}(3872)$ has spin 2. NODE=M176G01;LINKAGE=LE

$\Gamma(\pi^+\pi^-\eta_c(1S)) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{15}\Gamma_9/\Gamma$

NODE=M176G02
NODE=M176G02

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<11.1	90	LEES	12AE	BABR	$e^+e^- \to e^+e^-\pi^+\pi^-\eta_c$

NODE=M176235

$\chi_{c1}(3872)$ BRANCHING RATIOS

$\Gamma(\pi^+\pi^- J/\psi(1S))/\Gamma_{total}$ — Γ_2/Γ

NODE=M176R6
NODE=M176R6

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT	
0.038±0.012 OUR AVERAGE						
0.038±0.002±0.012		[1] AAIJ	20S	LHCB	$B^+ \to J/\psi\pi^+\pi^- K^+$	SYCLP=A
0.041±0.005±0.013		[2] CHOI	11	BELL	$B^+ \to \pi^+\pi^- J/\psi K^+$	SYCLP=A
0.040±0.008±0.013	93	[3,4] AUBERT	08Y	BABR	$B \to \chi_{c1}(3872) K$	SYCLP=A
• • • We do not use the following data for averages, fits, limits, etc. • • •						
seen	151	[5] BALA	15	BELL	$B \to \chi_{c1}(3872) K\pi$	
0.061±0.020±0.020	30	[6] AUBERT	05R	BABR	$B^+ \to K^+\pi^+\pi^- J/\psi$	SYCLP=A
0.065±0.014±0.021	36	[7] CHOI	03	BELL	$B^+ \to K^+\pi^+\pi^- J/\psi$	

[1] AAIJ 20S reports [Γ($\chi_{c1}(3872) \to \pi^+\pi^- J/\psi(1S)$)/$\Gamma_{total}$] × [B($B^+ \to \chi_{c1}(3872) K^+$)] = (7.95 ± 0.15 ± 0.33) × 10^{-6} which we divide by our best value B($B^+ \to \chi_{c1}(3872) K^+$) = (2.1 ± 0.7) × 10^{-4}. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M176R6;LINKAGE=E

[2] CHOI 11 reports [Γ($\chi_{c1}(3872) \to \pi^+\pi^- J/\psi(1S)$)/$\Gamma_{total}$] × [B($B^+ \to \chi_{c1}(3872) K^+$)] = (8.63 ± 0.82 ± 0.52) × 10^{-6} which we divide by our best value B($B^+ \to \chi_{c1}(3872) K^+$) = (2.1 ± 0.7) × 10^{-4}. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M176R6;LINKAGE=F

[3] AUBERT 08Y reports [Γ($\chi_{c1}(3872) \to \pi^+\pi^- J/\psi(1S)$)/$\Gamma_{total}$] × [B($B^+ \to \chi_{c1}(3872) K^+$)] = (8.4 ± 1.5 ± 0.7) × 10^{-6} which we divide by our best value B($B^+ \to \chi_{c1}(3872) K^+$) = (2.1 ± 0.7) × 10^{-4}. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M176R6;LINKAGE=AB

[4] superseded by LEES 20C NODE=M176R6;LINKAGE=C

[5] BALA 15 reports B($\chi_{c1}(3872) \rightarrow \pi^+\pi^- J/\psi$) × B($B^0 \rightarrow \chi_{c1}(3872) K^+\pi^-$) = (7.9 ± 1.3 ± 0.4) × 10^{-6} and B($\chi_{c1}(3872) \rightarrow \pi^+\pi^- J/\psi$) × B($B^+ \rightarrow \chi_{c1}(3872) K^0\pi^+$) = (10.6 ± 3.0 ± 0.9) × 10^{-6}. NODE=M176R6;LINKAGE=A

[6] Superseded by AUBERT 08Y. AUBERT 05R reports [$\Gamma(\chi_{c1}(3872) \rightarrow \pi^+\pi^- J/\psi(1S))/\Gamma_{total}$] × [B($B^+ \rightarrow \chi_{c1}(3872) K^+$)] = (1.28 ± 0.41) × 10^{-5} which we divide by our best value B($B^+ \rightarrow \chi_{c1}(3872) K^+$) = (2.1 ± 0.7) × 10^{-4}. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M176R6;LINKAGE=AE

[7] CHOI 03 reports [$\Gamma(\chi_{c1}(3872) \rightarrow \pi^+\pi^- J/\psi(1S))/\Gamma_{total}$] × [B($B^+ \rightarrow \chi_{c1}(3872) K^+$)] / [B($B^+ \rightarrow \psi(2S) K^+$)] / [B($\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-$)] = 0.063 ± 0.012 ± 0.007 which we multiply or divide by our best values B($B^+ \rightarrow \chi_{c1}(3872) K^+$) = (2.1 ± 0.7) × 10^{-4}, B($B^+ \rightarrow \psi(2S) K^+$) = (6.24 ± 0.20) × 10^{-4}, B($\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-$) = (34.68 ± 0.30) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best values. NODE=M176R6;LINKAGE=CH

$\Gamma(\pi^+\pi^-\pi^0 J/\psi(1S))/\Gamma_{total}$ — Γ_3/Γ

NODE=M176R25
NODE=M176R25

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	[1] WANG	11B	BELL	$\Upsilon(2S) \rightarrow \gamma X$
not seen	[2] SHEN	10A	BELL	$\Upsilon(1S) \rightarrow \gamma X$

[1] WANG 11B reports B($\Upsilon(2S) \rightarrow \gamma\chi_{c1}(3872)$) × B($\chi_{c1} \rightarrow \pi^+\pi^-\pi^0 J/\psi$) < 2.4 × 10^{-6} at 95% CL. NODE=M176R25;LINKAGE=B

[2] SHEN 10A reports B($\Upsilon(1S) \rightarrow \gamma\chi_{c1}(3872)$) × B($\chi_{c1} \rightarrow \pi^+\pi^-\pi^0 J/\psi$) < 2.8 × 10^{-6} at 95% CL. NODE=M176R25;LINKAGE=A

$\Gamma(\omega\eta_c(1S))/\Gamma_{total}$ — Γ_4/Γ

NODE=M176R24
NODE=M176R24

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.33	90	[1] VINOKUROVA	15	BELL	$B^+ \rightarrow \omega\eta_c K^+$

[1] VINOKUROVA 15 reports [$\Gamma(\chi_{c1}(3872) \rightarrow \omega\eta_c(1S))/\Gamma_{total}$] × [B($B^+ \rightarrow \chi_{c1}(3872) K^+$)] < 6.9 × 10^{-5} which we divide by our best value B($B^+ \rightarrow \chi_{c1}(3872) K^+$) = 2.1 × 10^{-4}. NODE=M176R24;LINKAGE=A

$\Gamma(\omega J/\psi(1S))/\Gamma_{total}$ — Γ_5/Γ

NODE=M176R14
NODE=M176R14

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.029±0.011±0.009	21 ± 7	[1] DEL-AMO-SA..10B		BABR	$B^+ \rightarrow \omega J/\psi K^+$

[1] DEL-AMO-SANCHEZ 10B reports [$\Gamma(\chi_{c1}(3872) \rightarrow \omega J/\psi(1S))/\Gamma_{total}$] × [B($B^+ \rightarrow \chi_{c1}(3872) K^+$)] = (6 ± 2 ± 1) × 10^{-6} which we divide by our best value B($B^+ \rightarrow \chi_{c1}(3872) K^+$) = (2.1 ± 0.7) × 10^{-4}. Our first error is their experiment's error and our second error is the systematic error from using our best value. DEL-AMO-SANCHEZ 10B also reports B($B^0 \rightarrow \chi_{c1}(3872) K^0$) × B($\chi_{c1}(3872) \rightarrow J/\psi\omega$) = (6 ± 3 ± 1) × 10^{-6}. NODE=M176R14;LINKAGE=DE

$\Gamma(\omega J/\psi(1S))/\Gamma(\pi^+\pi^- J/\psi(1S))$ — Γ_5/Γ_2

NODE=M176R15
NODE=M176R15

VALUE	DOCUMENT ID		TECN	COMMENT
1.1±0.4 OUR AVERAGE Error includes scale factor of 1.7.				
$1.6^{+0.4}_{-0.3}\pm0.2$	[1] ABLIKIM	19V	BES	$e^+e^- \rightarrow \gamma\omega J/\psi$
0.8±0.3	[2] DEL-AMO-SA..10B		BABR	$B \rightarrow \omega J/\psi K$

[1] Fit with fixed width and including two resonances, $X(3915)$ and $X(3960)$. NODE=M176R15;LINKAGE=A

[2] Statistical and systematic errors added in quadrature. Uses the values of B($B \rightarrow \chi_{c1}(3872) K$) × B($\chi_{c1}(3872) \rightarrow J/\psi\pi^+\pi^-$) reported in AUBERT 08Y, taking into account the common systematics. NODE=M176R15;LINKAGE=DE

$\Gamma(\phi\phi)/\Gamma_{total}$ — Γ_6/Γ

NODE=M176R26
NODE=M176R26

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	[1] AAIJ	17BB	LHCB	pp at 7, 8 TeV

[1] AAIJ 17BB reports B($b \rightarrow \chi_{c1}(3872)$anything) × B($\chi_{c1}(3872) \rightarrow \phi\phi$) < 4.5 × 10^{-7} at 95% CL. NODE=M176R26;LINKAGE=A

$\Gamma(D^0\overline{D}^0\pi^0)/\Gamma_{total}$ — Γ_7/Γ

NODE=M176R12
NODE=M176R12

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.49^{+0.18}_{-0.20}\pm0.16}$		17	[1] GOKHROO	06	BELL	$B^+ \rightarrow D^0\overline{D}^0\pi^0 K^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.29	90		[2] CHISTOV	04	BELL	Sup. by GOKHROO 06

[1] GOKHROO 06 reports $[\Gamma(\chi_{c1}(3872) \rightarrow D^0 \overline{D}^0 \pi^0)/\Gamma_{total}] \times [B(B^+ \rightarrow \chi_{c1}(3872) K^+)] = (1.02 \pm 0.31^{+0.21}_{-0.29}) \times 10^{-4}$ which we divide by our best value $B(B^+ \rightarrow \chi_{c1}(3872) K^+) = (2.1 \pm 0.7) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M176R12;LINKAGE=GO

[2] CHISTOV 04 reports $[\Gamma(\chi_{c1}(3872) \rightarrow D^0 \overline{D}^0 \pi^0)/\Gamma_{total}] \times [B(B^+ \rightarrow \chi_{c1}(3872) K^+)] < 0.6 \times 10^{-4}$ which we divide by our best value $B(B^+ \rightarrow \chi_{c1}(3872) K^+) = 2.1 \times 10^{-4}$. NODE=M176R12;LINKAGE=A

$\Gamma(D^0 \overline{D}^0 \pi^0)/\Gamma(\pi^+ \pi^- J/\psi(1S))$ Γ_7/Γ_2

NODE=M176R17
NODE=M176R17

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.16	90	ABLIKIM	20W	BES3	$e^+ e^- \rightarrow \gamma \chi_{c1}(3872)$

$\Gamma(\overline{D}^{*0} D^0)/\Gamma_{total}$ Γ_8/Γ

NODE=M176R13
NODE=M176R13

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.37±0.09±0.12	41^{+9}_{-8}	[1] AUSHEV	10	BELL	$B^+ \rightarrow D^{*0} \overline{D}^0 K^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.80±0.28±0.26	27 ± 6	[2] AUBERT	08B	BABR	$B^+ \rightarrow \overline{D}^{*0} D^0 K^+$

SYCLP=A
SYCLP=A

[1] AUSHEV 10 reports $[\Gamma(\chi_{c1}(3872) \rightarrow \overline{D}^{*0} D^0)/\Gamma_{total}] \times [B(B^+ \rightarrow \chi_{c1}(3872) K^+)] = (0.77 \pm 0.16 \pm 0.10) \times 10^{-4}$ which we divide by our best value $B(B^+ \rightarrow \chi_{c1}(3872) K^+) = (2.1 \pm 0.7) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M176R13;LINKAGE=AS

[2] AUBERT 08B reports $[\Gamma(\chi_{c1}(3872) \rightarrow \overline{D}^{*0} D^0)/\Gamma_{total}] \times [B(B^+ \rightarrow \chi_{c1}(3872) K^+)] = (1.67 \pm 0.36 \pm 0.47) \times 10^{-4}$ which we divide by our best value $B(B^+ \rightarrow \chi_{c1}(3872) K^+) = (2.1 \pm 0.7) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M176R13;LINKAGE=AU

$\Gamma(\overline{D}^{*0} D^0)/\Gamma(\pi^+ \pi^- J/\psi(1S))$ Γ_8/Γ_2

NODE=M176R16
NODE=M176R16

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
11.77±3.09	50	ABLIKIM	20W	BES3	$e^+ e^- \rightarrow \gamma \chi_{c1}(3872)$

$\Gamma(\gamma\gamma)/\Gamma_{total}$ Γ_9/Γ

NODE=M176R09
NODE=M176R09

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.11	90	[1] WICHT	08	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

[1] WICHT 08 reports $[\Gamma(\chi_{c1}(3872) \rightarrow \gamma\gamma)/\Gamma_{total}] \times [B(B^+ \rightarrow \chi_{c1}(3872) K^+)] < 2.4 \times 10^{-5}$ which we divide by our best value $B(B^+ \rightarrow \chi_{c1}(3872) K^+) = 2.1 \times 10^{-4}$. NODE=M176R09;LINKAGE=A

$\Gamma(D^0 \overline{D}^0)/\Gamma_{total}$ Γ_{10}/Γ

NODE=M176R3
NODE=M176R3

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.29	90	[1] CHISTOV	04	BELL	$B \rightarrow K D^0 \overline{D}^0$

[1] CHISTOV 04 reports $[\Gamma(\chi_{c1}(3872) \rightarrow D^0 \overline{D}^0)/\Gamma_{total}] \times [B(B^+ \rightarrow \chi_{c1}(3872) K^+)] < 6 \times 10^{-5}$ which we divide by our best value $B(B^+ \rightarrow \chi_{c1}(3872) K^+) = 2.1 \times 10^{-4}$. NODE=M176R3;LINKAGE=A

$\Gamma(D^+ D^-)/\Gamma_{total}$ Γ_{11}/Γ

NODE=M176R4
NODE=M176R4

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.19	90	[1] CHISTOV	04	BELL	$B \rightarrow K D^+ D^-$

[1] CHISTOV 04 reports $[\Gamma(\chi_{c1}(3872) \rightarrow D^+ D^-)/\Gamma_{total}] \times [B(B^+ \rightarrow \chi_{c1}(3872) K^+)] < 4 \times 10^{-5}$ which we divide by our best value $B(B^+ \rightarrow \chi_{c1}(3872) K^+) = 2.1 \times 10^{-4}$. NODE=M176R4;LINKAGE=A

$\Gamma(\pi^0 \chi_{c2})/\Gamma(\pi^+ \pi^- J/\psi(1S))$ Γ_{12}/Γ_2

NODE=M176R06
NODE=M176R06

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.1	90	ABLIKIM	19U	BES3	$e^+ e^- \rightarrow \gamma \chi_{c1}(3872)$

$\Gamma(\pi^0 \chi_{c1})/\Gamma_{total}$ Γ_{13}/Γ

NODE=M176R23
NODE=M176R23

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.04	90	[1] BHARDWAJ	19	BELL	$B^\pm \rightarrow \pi^0 \chi_{c1} K^\pm$

[1] BHARDWAJ 19 reports $[\Gamma(\chi_{c1}(3872) \rightarrow \pi^0 \chi_{c1})/\Gamma_{total}] \times [B(B^+ \rightarrow \chi_{c1}(3872) K^+)] < 8.1 \times 10^{-6}$ which we divide by our best value $B(B^+ \rightarrow \chi_{c1}(3872) K^+) = 2.1 \times 10^{-4}$. NODE=M176R23;LINKAGE=A

$\Gamma(\pi^0 \chi_{c1})/\Gamma(\pi^+\pi^- J/\psi(1S))$ Γ_{13}/Γ_2

NODE=M176R05

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
$88^{+33}_{-27}\pm10$	10.8	ABLIKIM	19U	BES3	$e^+e^- \to \gamma\chi_{c1}(3872)$

$\Gamma(\pi^0 \chi_{c0})/\Gamma(\pi^+\pi^- J/\psi(1S))$ Γ_{14}/Γ_2

NODE=M176R04

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<19	90	ABLIKIM	19U	BES3	$e^+e^- \to \gamma\chi_{c1}(3872)$

$\Gamma(\pi^+\pi^- \eta_c(1S))/\Gamma_{total}$ Γ_{15}/Γ

NODE=M176R22

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.14	90	[1] VINOKUROVA	15	BELL	$B^+ \to \pi^+\pi^-\eta_c K^+$

[1] VINOKUROVA 15 reports $[\Gamma(\chi_{c1}(3872) \to \pi^+\pi^-\eta_c(1S))/\Gamma_{total}] \times [B(B^+ \to \chi_{c1}(3872)K^+)] < 3.0 \times 10^{-5}$ which we divide by our best value $B(B^+ \to \chi_{c1}(3872)K^+) = 2.1 \times 10^{-4}$.

NODE=M176R22;LINKAGE=A

$\Gamma(\pi^+\pi^- \chi_{c1})/\Gamma_{total}$ Γ_{16}/Γ

NODE=M176R00

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<7\times10^{-3}$	90	[1] BHARDWAJ	16	BELL	$B^+ \to \pi^+\pi^-\chi_{c1}K^+$

[1] BHARDWAJ 16 reports $[\Gamma(\chi_{c1}(3872) \to \pi^+\pi^-\chi_{c1})/\Gamma_{total}] \times [B(B^+ \to \chi_{c1}(3872)K^+)] < 1.5 \times 10^{-6}$ which we divide by our best value $B(B^+ \to \chi_{c1}(3872)K^+) = 2.1 \times 10^{-4}$.

NODE=M176R00;LINKAGE=A

$\Gamma(p\overline{p})/\Gamma_{total}$ Γ_{17}/Γ

NODE=M176R03

VALUE	CL%	DOCUMENT ID		TECN	COMMENT	
$<2.4\times10^{-5}$	95	[1] AAIJ	17AD	LHCB	$B^+ \to p\overline{p}K^+$	SYCLP=A
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$<8 \times 10^{-5}$	95	[2] AAIJ	13S	LHCB	$B^+ \to p\overline{p}K^+$	SYCLP=A

[1] AAIJ 17AD reports $[\Gamma(\chi_{c1}(3872) \to p\overline{p})/\Gamma_{total}] \times [B(B^+ \to \chi_{c1}(3872)K^+)] < 0.5\times10^{-8}$ which we divide by our best value $B(B^+ \to \chi_{c1}(3872)K^+) = 2.1\times10^{-4}$.

NODE=M176R03;LINKAGE=C

[2] AAIJ 13S reports $[\Gamma(\chi_{c1}(3872) \to p\overline{p})/\Gamma_{total}] \times [B(B^+ \to \chi_{c1}(3872)K^+)] < 1.7\times10^{-8}$ which we divide by our best value $B(B^+ \to \chi_{c1}(3872)K^+) = 2.1 \times 10^{-4}$.

NODE=M176R03;LINKAGE=B

Radiative decays

NODE=M176410

$\Gamma(\gamma D^+ D^-)/\Gamma(\pi^+\pi^- J/\psi(1S))$ Γ_{18}/Γ_2

NODE=M176R20

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.99	90	ABLIKIM	20W	BES3	$e^+e^- \to \gamma\chi_{c1}(3872)$

$\Gamma(\gamma \overline{D}^0 D^0)/\Gamma(\pi^+\pi^- J/\psi(1S))$ Γ_{19}/Γ_2

NODE=M176R21

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.58	90	ABLIKIM	20W	BES3	$e^+e^- \to \gamma\chi_{c1}(3872)$

$\Gamma(\gamma J/\psi)/\Gamma_{total}$ Γ_{20}/Γ

NODE=M176R7

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT	
$0.0085^{+0.0024}_{-0.0022}\pm0.0027$		[1] BHARDWAJ	11	BELL	$B^\pm \to \gamma J/\psi K^\pm$	SYCLP=A
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$0.013 \pm0.004 \pm0.004$	20	[2] AUBERT	09B	BABR	$B^+ \to \gamma J/\psi K^+$	SYCLP=A
$0.016 \pm0.005 \pm0.005$	19	[3] AUBERT,BE	06M	BABR	$B^+ \to \gamma J/\psi K^+$	SYCLP=A

[1] BHARDWAJ 11 reports $[\Gamma(\chi_{c1}(3872) \to \gamma J/\psi)/\Gamma_{total}] \times [B(B^+ \to \chi_{c1}(3872)K^+)] = (1.78^{+0.48}_{-0.44} \pm 0.12) \times 10^{-6}$ which we divide by our best value $B(B^+ \to \chi_{c1}(3872)K^+) = (2.1 \pm 0.7) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M176R7;LINKAGE=BA

[2] AUBERT 09B reports $[\Gamma(\chi_{c1}(3872) \to \gamma J/\psi)/\Gamma_{total}] \times [B(B^+ \to \chi_{c1}(3872)K^+)] = (2.8\pm0.8\pm0.1)\times10^{-6}$ which we divide by our best value $B(B^+ \to \chi_{c1}(3872)K^+) = (2.1 \pm 0.7) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M176R7;LINKAGE=AB

[3] Superseded by AUBERT 09B. AUBERT,BE 06M reports $[\Gamma(\chi_{c1}(3872) \to \gamma J/\psi)/\Gamma_{total}] \times [B(B^+ \to \chi_{c1}(3872)K^+)] = (3.3 \pm 1.0 \pm 0.3) \times 10^{-6}$ which we divide by our best value $B(B^+ \to \chi_{c1}(3872)K^+) = (2.1 \pm 0.7) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M176R7;LINKAGE=AU

$\Gamma(\gamma J/\psi)/\Gamma(\pi^+\pi^- J/\psi(1S))$ Γ_{20}/Γ_2

NODE=M176R18

VALUE	DOCUMENT ID		TECN	COMMENT
0.79±0.28	ABLIKIM	20W	BES3	$e^+e^- \to \gamma\chi_{c1}(3872)$

$\Gamma(\gamma\chi_{c1})/\Gamma_{total}$ Γ_{21}/Γ

NODE=M176R08

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<9 × 10^{-3}	90	[1] BHARDWAJ	13	BELL	$B^\pm \to \chi_{c1}\gamma K^\pm$

[1] BHARDWAJ 13 reports $[\Gamma(\chi_{c1}(3872) \to \gamma\chi_{c1})/\Gamma_{total}] \times [B(B^+ \to \chi_{c1}(3872)K^+)] < 1.9\times10^{-6}$ which we divide by our best value $B(B^+ \to \chi_{c1}(3872)K^+) = 2.1\times10^{-4}$. NODE=M176R08;LINKAGE=B

$\Gamma(\gamma\chi_{c1})/\Gamma(\pi^+\pi^- J/\psi(1S))$ Γ_{21}/Γ_2

NODE=M176R1

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.89	90	CHOI	03	BELL	$B \to K\pi^+\pi^- J/\psi$

$\Gamma(\gamma\chi_{c2})/\Gamma_{total}$ Γ_{22}/Γ

NODE=M176R01

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.032	90	[1] BHARDWAJ	13	BELL	$B^\pm \to \chi_{c2}\gamma K^\pm$

[1] BHARDWAJ 13 reports $[\Gamma(\chi_{c1}(3872) \to \gamma\chi_{c2})/\Gamma_{total}] \times [B(B^+ \to \chi_{c1}(3872)K^+)] < 6.7\times10^{-6}$ which we divide by our best value $B(B^+ \to \chi_{c1}(3872)K^+) = 2.1\times10^{-4}$. NODE=M176R01;LINKAGE=B

$\Gamma(\gamma\psi(2S))/\Gamma_{total}$ Γ_{23}/Γ

NODE=M176R10

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.045±0.013±0.015	25 ± 7	[1] AUBERT	09B	BABR	$B^+ \to \gamma\psi(2S)K^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	36 ± 9	[2] AAIJ	14AH	LHCB	$B^+ \to \gamma\psi(2S)K^+$
not seen		[3] BHARDWAJ	11	BELL	$B^+ \to \gamma\psi(2S)K^+$

[1] AUBERT 09B reports $[\Gamma(\chi_{c1}(3872) \to \gamma\psi(2S))/\Gamma_{total}] \times [B(B^+ \to \chi_{c1}(3872)K^+)] = (9.5 \pm 2.7 \pm 0.6)\times10^{-6}$ which we divide by our best value $B(B^+ \to \chi_{c1}(3872)K^+) = (2.1 \pm 0.7)\times10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M176R10;LINKAGE=AU

[2] From 36.4 ± 9.0 events of $\chi_{c1}(3872) \to J/\psi\gamma$ decays with a statistical significance of 4.4σ. NODE=M176R10;LINKAGE=A

[3] BHARDWAJ 11 reports $B(B^+ \to K^+\chi_{c1}(3872)) \times B(\chi_{c1} \to \gamma\psi(2S)) < 3.45\times10^{-6}$ at 90% CL. NODE=M176R10;LINKAGE=BH

$\Gamma(\gamma\psi(2S))/\Gamma(\pi^+\pi^- J/\psi(1S))$ Γ_{23}/Γ_2

NODE=M176R19

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.42	90	ABLIKIM	20W	BES3	$e^+e^- \to \gamma\chi_{c1}(3872)$

$\Gamma(\gamma\psi(2S))/\Gamma(\gamma J/\psi)$ Γ_{23}/Γ_{20}

NODE=M176R11

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
2.6 ±0.6 OUR AVERAGE						
2.46±0.64±0.29		36 ± 9	[1] AAIJ	14AH	LHCB	$B^+ \to \gamma\psi(2S)K^+$
3.4 ±1.4			AUBERT	09B	BABR	$B^+ \to \gamma c\bar{c}K'$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<2.1	90		BHARDWAJ	11	BELL	$B^+ \to \gamma\psi(2S)K^+$

[1] From 36.4 ± 9.0 events of $\chi_{c1}(3872) \to J/\psi\gamma$ decays with a statistical significance of 4.4σ. NODE=M176R11;LINKAGE=A

C-violating decays

NODE=M176405

$\Gamma(\eta J/\psi)/\Gamma_{total}$ Γ_{24}/Γ

NODE=M176R2

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.018	90	[1,2] IWASHITA	14	BELL	$B \to K\eta J/\psi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.04	90	[3] AUBERT	04Y	BABR	$B \to K\eta J/\psi$

[1] IWASHITA 14 reports $[\Gamma(\chi_{c1}(3872) \to \eta J/\psi)/\Gamma_{total}] \times [B(B^+ \to \chi_{c1}(3872)K^+)] < 3.8\times10^{-6}$ which we divide by our best value $B(B^+ \to \chi_{c1}(3872)K^+) = 2.1\times10^{-4}$. NODE=M176R2;LINKAGE=A

[2] IWASHITA 14 also scans the $\eta J/\psi$ mass range 3.8–4.75 GeV and sets upper limits for $B(B^\pm \to \chi_{c1}(3872)K^\pm)\times B(\chi_{c1}(3872) \to \eta J/\psi)$ in 5 MeV intervals. NODE=M176R2;LINKAGE=C

[3] AUBERT 04Y reports $[\Gamma(\chi_{c1}(3872) \to \eta J/\psi)/\Gamma_{total}] \times [B(B^+ \to \chi_{c1}(3872)K^+)] < 7.7\times10^{-6}$ which we divide by our best value $B(B^+ \to \chi_{c1}(3872)K^+) = 2.1\times10^{-4}$. NODE=M176R2;LINKAGE=D

$\chi_{c1}(3872)$ REFERENCES

NODE=M176

TERAMOTO	21	PRL 126 122001	Y. Teramoto *et al.*	(BELLE Collab.)	REFID=61098
AAIJ	20AD	PR D102 092005	R. Aaij *et al.*	(LHCb Collab.)	REFID=60673
AAIJ	20S	JHEP 2008 123	R. Aaij *et al.*	(LHCb Collab.)	REFID=60526
ABLIKIM	20W	PRL 124 242001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60570
LEES	20C	PRL 124 152001	J.P. Lees *et al.*	(BABAR Collab.)	REFID=60554
ABLIKIM	19U	PRL 122 202001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59786
ABLIKIM	19V	PRL 122 232002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59796
BHARDWAJ	19	PR D99 111101	V. Bhardwaj *et al.*	(BELLE Collab.)	REFID=59884
AGHASYAN	18A	PL B783 334	M. Aghasyan *et al.*	(COMPASS Collab.)	REFID=59036
AAIJ	17AD	PL B769 305	R. Aaij *et al.*	(LHCb Collab.)	REFID=57896
AAIJ	17BB	EPJ C77 609	R. Aaij *et al.*	(LHCb Collab.)	REFID=58191
BHARDWAJ	16	PR D93 052016	V. Bhardwaj *et al.*	(BELLE Collab.)	REFID=57272
AAIJ	15AO	PR D92 011102	R. Aaij *et al.*	(LHCb Collab.)	REFID=56771
ABLIKIM	15V	PL B749 414	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56787
BALA	15	PR D91 051101	A. Bala *et al.*	(BELLE Collab.)	REFID=56408
VINOKUROVA	15	JHEP 1506 132	A. Vinokurova *et al.*	(BELLE Collab.)	REFID=56706
Also		JHEP 1702 088 (errat.)	A. Vinokurava *et al.*	(BELLE Collab.)	REFID=57795
AAIJ	14AH	NP B886 665	R. Aaij *et al.*	(LHCb Collab.)	REFID=55897
ABLIKIM	14	PRL 112 092001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55647
IWASHITA	14	PTEP 2014 043C01	T. Iwashita *et al.*	(BELLE Collab.)	REFID=55925
AAIJ	13Q	PRL 110 222001	R. Aaij *et al.*	(LHCb Collab.) JP	REFID=54985
AAIJ	13S	EPJ C73 2462	R. Aaij *et al.*	(LHCb Collab.)	REFID=55008
BHARDWAJ	13	PRL 111 032001	V. Bhardwaj *et al.*	(BELLE Collab.)	REFID=55412
AAIJ	12H	EPJ C72 1972	R. Aaij *et al.*	(LHCb Collab.)	REFID=54056
LEES	12AD	PR D86 072002	J.P. Lees *et al.*	(BABAR Collab.)	REFID=54751
LEES	12AE	PR D86 092005	J.P. Lees *et al.*	(BABAR Collab.)	REFID=54752
BHARDWAJ	11	PRL 107 091803	V. Bhardwaj *et al.*	(BELLE Collab.)	REFID=53779
CHOI	11	PR D84 052004	S.-K. Choi *et al.*	(BELLE Collab.)	REFID=53934
WANG	11B	PR D84 071107	X.L. Wang *et al.*	(BELLE Collab.)	REFID=53939
AUSHEV	10	PR D81 031103	T. Aushev *et al.*	(BELLE Collab.)	REFID=53225
DEL-AMO-SA...	10B	PR D82 011101	P. del Amo Sanchez *et al.*	(BABAR Collab.)	REFID=53362
SHEN	10A	PR D82 051504	C.P. Shen *et al.*	(BELLE Collab.)	REFID=53545
AALTONEN	09AU	PRL 103 152001	T. Aaltonen *et al.*	(CDF Collab.)	REFID=53098
AUBERT	09B	PRL 102 132001	B. Aubert *et al.*	(BABAR Collab.)	REFID=52722
AUBERT	08B	PR D77 011102	B. Aubert *et al.*	(BABAR Collab.)	REFID=52120
AUBERT	08Y	PR D77 111101	B. Aubert *et al.*	(BABAR Collab.)	REFID=52265
WICHT	08	PL B662 323	J. Wicht *et al.*	(BELLE Collab.)	REFID=52204
AUBERT	06	PR D73 011101	B. Aubert *et al.*	(BABAR Collab.)	REFID=51017
AUBERT,BE	06M	PR D74 071101	B. Aubert *et al.*	(BABAR Collab.)	REFID=51454
GOKHROO	06	PRL 97 162002	G. Gokhroo *et al.*	(BELLE Collab.)	REFID=51432
AUBERT	05B	PR D71 031501	B. Aubert *et al.*	(BABAR Collab.)	REFID=50498
AUBERT	05D	PR D71 052001	B. Aubert *et al.*	(BABAR Collab.)	REFID=50509
AUBERT	05R	PR D71 071103	B. Aubert *et al.*	(BABAR Collab.)	REFID=50627
DOBBS	05	PRL 94 032004	S. Dobbs *et al.*	(CLEO Collab.)	REFID=50458
ABAZOV	04F	PRL 93 162002	V.M. Abazov *et al.*	(D0 Collab.)	REFID=50200
ACOSTA	04	PRL 93 072001	D. Acosta *et al.*	(CDF Collab.)	REFID=49742
AUBERT	04Y	PRL 93 041801	B. Aubert *et al.*	(BABAR Collab.)	REFID=49997
CHISTOV	04	PRL 93 051803	R. Chistov *et al.*	(BELLE Collab.)	REFID=50002
PDG	04	PL B592 1	S. Eidelman *et al.*	(PDG Collab.)	REFID=49653
YUAN	04	PL B579 74	C.Z. Yuan *et al.*		REFID=49677
CHOI	03	PRL 91 262001	S.-K. Choi *et al.*	(BELLE Collab.)	REFID=49628
BAI	98E	PR D57 3854	J.Z. Bai *et al.*	(BES Collab.)	REFID=46339
ANTONIAZZI	94	PR D50 4258	L. Antoniazzi *et al.*	(E705 Collab.)	REFID=44074

NODE=M210

$Z_c(3900)$

$I^G(J^{PC}) = 1^+(1^{+-})$

was $X(3900)$

Properties incompatible with a $q\overline{q}$ structure (exotic state). See the review on non-$q\overline{q}$ states.

NODE=M210

Charged $Z_c(3900)$ seen as a peak in the invariant mass distribution of the $J/\psi\pi^{\pm}$ system by BES III (ABLIKIM 13T) in $e^+e^- \rightarrow \pi^+\pi^- J/\psi$ at c.m. energy of 4.26 GeV and by radiative return from e^+e^- collisions at $\sqrt{s}$ from 9.46 to 10.86 GeV at Belle (LIU 13B). Partial wave analysis of ABLIKIM 17J determines $J^P = 1^+$ with more than 7σ significance. Neutral $Z_c(3900)$ seen in the $J/\psi\pi^0$ invariant mass distribution in $e^+e^- \rightarrow \pi^0\pi^0 J/\psi$ at c.m. energies of 4.23, 4.26, and 4.36 GeV by BES III (ABLIKIM 15U) and at 4.17 GeV by XIAO 13A. Peaks in $(D\overline{D}^*)^{0,\pm}$ reported by BES III (ABLIKIM 14A, ABLIKIM 15AB) are assumed to be related.

$Z_c(3900)$ MASS

NODE=M210M

NODE=M210M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
3887.1±2.6 OUR AVERAGE		Error includes scale factor of 1.7. See the ideogram below.				
3893.1±2.2± 3.0		[1] ABLIKIM	20N	BES3	0	$e^+e^- \rightarrow \pi^0\pi^0 J/\psi$
$3902.6^{+5.2}_{-5.0}{}^{+3.3}_{-1.4}$		[2,3] ABAZOV	19	D0	±	1.96 TeV $p\overline{p} \rightarrow J/\psi\pi^+\pi^- X$
3881.2±4.2±52.7	6k	[4] ABLIKIM	17J	BES3	±	$e^+e^- \rightarrow \pi^+\pi^- J/\psi$
$3885.7^{+4.3}_{-5.7}\pm$ 8.4		[2,4] ABLIKIM	15AB	BES3	0	$e^+e^- \rightarrow \pi^0(D\overline{D}^*)^0$
3881.7±1.6± 1.6	1.2k	[2,4] ABLIKIM	15AC	BES3	±	$e^+e^- \rightarrow \pi^{\pm}(D\overline{D}^*)^{\mp}$
3883.9±1.5± 4.2	1.2k	[2,4] ABLIKIM	14A	BES3	±	$e^+e^- \rightarrow \pi^{\pm}(D\overline{D}^*)^{\mp}$
3894.5±6.6± 4.5	159	[2] LIU	13B	BELL	±	$e^+e^- \rightarrow \gamma\pi^+\pi^- J/\psi$
3886 ±4 ± 2	81	[2,5] XIAO	13A		±	4.17 $e^+e^- \rightarrow \pi^+\pi^- J/\psi$
3904 ±9 ± 5	25	[2,5] XIAO	13A		0	4.17 $e^+e^- \rightarrow \pi^0\pi^0 J/\psi$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$3895.0\pm5.2^{+4.0}_{-2.7}$	502	[2,6] ABAZOV	18B	D0	±	1.96 TeV $p\overline{p} \rightarrow J/\psi\pi^+\pi^- X$
3894.8±2.3± 3.2	356	[2,7] ABLIKIM	15U	BES3	0	$e^+e^- \rightarrow \pi^0\pi^0 J/\psi$
3899.0±3.6± 4.9	307	[2,8] ABLIKIM	13T	BES3	±	$e^+e^- \rightarrow \pi^+\pi^- J/\psi$

OCCUR=2

[1] Pole mass obtained from a fit to a relativistic Breit-Wigner. NODE=M210M;LINKAGE=L

[2] Neglecting interference between the $Z_c(3900)$ and other processes. NODE=M210M;LINKAGE=A

[3] Measured in weak decays of b-flavored hadrons (nonprompt). NODE=M210M;LINKAGE=G

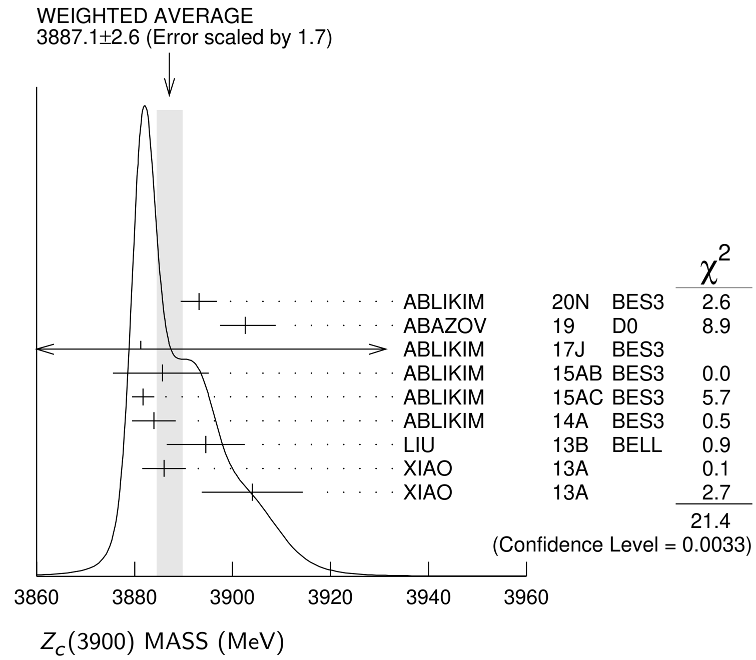
[4] Pole mass obtained from a fit to a Flatte-like formula. NODE=M210M;LINKAGE=E

[5] For $M^2(\pi^+\pi^-) < 0.65$ GeV^2. Obtained by analyzing CLEO-c data but not authored by the CLEO Collaboration. NODE=M210M;LINKAGE=B

[6] The signal of the $Z_c(3900)$ is correlated with a parent $J/\psi\pi^+\pi^-$ system in the invariant mass range 4.2–4.7 GeV. Superseded by ABAZOV 19. NODE=M210M;LINKAGE=F

[7] Superseded by ABLIKIM 20N. NODE=M210M;LINKAGE=J

[8] Superseded by ABLIKIM 17J. NODE=M210M;LINKAGE=K



$Z_c(3900)$ WIDTH

NODE=M210W

NODE=M210W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
28.4± 2.6 OUR AVERAGE						
44.4± 5.2±14.0		[1] ABLIKIM	20N	BES3	0	$e^+e^- \to \pi^0\pi^0 J/\psi$
32 $^{+28}_{-21}$ $^{+26}_{-7}$		[2,3] ABAZOV	19	D0	±	1.96 TeV $p\overline{p} \to \pi^+\pi^- J/\psi X$ (non-prompt)
51.8± 4.6±36.0	6 k	[4] ABLIKIM	17J	BES3	±	$e^+e^- \to \pi^+\pi^- J/\psi$
35 $^{+11}_{-12}$ ±15		[2,4] ABLIKIM	15AB	BES3	0	$e^+e^- \to \pi^0(D\overline{D}^*)^0$
26.6± 2.0± 2.1	1248	[2,4] ABLIKIM	15AC	BES3	±	$e^+e^- \to \pi^\pm(D\overline{D}^*)^\mp$
24.8± 3.3±11.0	1212	[2,4] ABLIKIM	14A	BES3	±	$e^+e^- \to \pi^\pm(D\overline{D}^*)^\mp$
63 ±24 ±26	159	[2] LIU	13B	BELL	±	$e^+e^- \to \gamma\pi^+\pi^- J/\psi$
37 ± 4 ± 8	81	[2,5] XIAO	13A		±	4.17 $e^+e^- \to \pi^+\pi^- J/\psi$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
29.6± 8.2± 8.2	356	[2,6] ABLIKIM	15U	BES3	0	$e^+e^- \to \pi^0\pi^0 J/\psi$
46 ±10 ±20	307	[2,7] ABLIKIM	13T	BES3	±	$e^+e^- \to \pi^+\pi^- J/\psi$

[1] Pole width obtained from a fit to a relativistic Breit-Wigner.
[2] Neglecting interference between the $Z_c(3900)$ and other processes.
[3] Measured in weak decays of b-flavored hadrons (nonprompt).
[4] Pole width obtained from a fit to a Flatte-like formula.
[5] For $M^2(\pi^+\pi^-) < 0.65$ GeV^2. Obtained by analyzing CLEO-c data but not authored by the CLEO Collaboration.
[6] Superseded by ABLIKIM 20N.
[7] Superseded by ABLIKIM 17J.

NODE=M210W;LINKAGE=G
NODE=M210W;LINKAGE=A
NODE=M210W;LINKAGE=F
NODE=M210W;LINKAGE=E
NODE=M210W;LINKAGE=B
NODE=M210W;LINKAGE=H
NODE=M210W;LINKAGE=I

$Z_c(3900)$ DECAY MODES

NODE=M210215;NODE=M210

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$J/\psi\pi$	seen	DESIG=1
Γ_2	$h_c\pi^\pm$	not seen	DESIG=2
Γ_3	$\eta_c\pi^+\pi^-$	not seen	DESIG=10
Γ_4	$\eta_c(1S)\rho(770)^\pm$		DESIG=11
Γ_5	$(D\overline{D}^*)^\pm$	seen	DESIG=3;OUR EVAL;→ UNCHECKED ←
Γ_6	$D^0 D^{*-}$ + c.c.	seen	DESIG=8
Γ_7	$D^- D^{*0}$ + c.c.	seen	DESIG=9
Γ_8	$\omega\pi^\pm$	not seen	DESIG=4
Γ_9	$J/\psi\eta$	not seen	DESIG=5
Γ_{10}	$D^+ D^{*-}$ + c.c	seen	DESIG=6
Γ_{11}	$D^0\overline{D}^{*0}$ + c.c	seen	DESIG=7

$Z_c(3900)$ BRANCHING RATIOS

NODE=M210225

$\Gamma(J/\psi\pi)/\Gamma_{total}$ — Γ_1/Γ

NODE=M210R01
NODE=M210R01

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
seen		ABLIKIM	20N	BES3	0	$e^+e^- \to \pi^0\pi^0 J/\psi$
seen		[1] ABAZOV	19	D0	$\pm$	1.96 TeV $p\overline{p} \to \pi^+\pi^- J/\psi X$ (prompt)
seen		ABLIKIM	17J	BES3	$\pm$	$e^+e^- \to \pi^+\pi^- J/\psi$
seen	356	ABLIKIM	15U	BES3	0	$e^+e^- \to \pi^0\pi^0 J/\psi$
not seen		[2] ADOLPH	15D	COMP	$\pm$	$\gamma N \to J/\psi\pi^\pm N$
seen	307	ABLIKIM	13T	BES3	$\pm$	$e^+e^- \to \pi^+\pi^- J/\psi$
seen	25	[3] XIAO	13A		0	4.17 $e^+e^- \to \pi^0\pi^0 J/\psi$

[1] But not seen in the "prompt" sample (no b-hadron enhancement). NODE=M210R01;LINKAGE=C

[2] ADOLPH 15D measure B($Z_c(3900)^\pm \to J/\psi\pi^\pm$) $\sigma(\gamma N \to Z_c(3900)^\pm N)/\sigma(\gamma N \to J/\psi N) < 3.7 \times 10^{-3}$ at 90% CL. NODE=M210R01;LINKAGE=A

[3] Obtained by analyzing CLEO-c data but not authored by the CLEO Collaboration. NODE=M210R01;LINKAGE=XI

$\Gamma(h_c\pi^\pm)/\Gamma_{total}$ — Γ_2/Γ

NODE=M210R02
NODE=M210R02

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
not seen	ABLIKIM	13X	BES3	$\pm$	$e^+e^- \to h_c\pi^+\pi^-$

$\Gamma(\eta_c\pi^+\pi^-)/\Gamma_{total}$ — Γ_3/Γ

NODE=M210R11
NODE=M210R11

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
not seen	[1] VINOKUROVA	15	BELL	0	$B^+ \to K^+\eta_c\pi^+\pi^-$

[1] VINOKUROVA 15 reports B($B^+ \to K^+ Z_c(3900)^0$) $\times$ B($X \to \eta_c\pi^+\pi^-$) $< 4.7 \times 10^{-5}$ at 90% CL. NODE=M210R11;LINKAGE=VI

$\Gamma((D\overline{D}^*)^\pm)/\Gamma(J/\psi\pi)$ — Γ_5/Γ_1

NODE=M210R03
NODE=M210R03

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
6.2±1.1±2.7	[1] ABLIKIM	14A	BES3	$\pm$	$e^+e^- \to \pi^\pm (D\overline{D}^*)^\mp$

[1] Assuming the same origin of the $(D\overline{D}^*)^\pm$ and $\pi^\pm J/\psi$ decay modes. NODE=M210R03;LINKAGE=A

$\Gamma(D^0 D^{*-} + c.c.)/\Gamma_{total}$ — Γ_6/Γ

NODE=M210R09
NODE=M210R09

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
seen	ABLIKIM	15AC	BES3	$\pm$	$e^+e^- \to \pi^+ D^0 D^{*-}$ + c.c.
seen	ABLIKIM	14A	BES3	$\pm$	$e^+e^- \to \pi^+ D^0 D^{*-}$ + c.c.

$\Gamma(D^- D^{*0} + c.c.)/\Gamma_{total}$ — Γ_7/Γ

NODE=M210R10
NODE=M210R10

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
seen	ABLIKIM	15AC	BES3	$\pm$	$e^+e^- \to \pi^+ D^- D^{*0}$ + c.c.
seen	ABLIKIM	14A	BES3	$\pm$	$e^+e^- \to \pi^+ D^- D^{*0}$ + c.c.

$\Gamma(\omega\pi^\pm)/\Gamma_{total}$ — Γ_8/Γ

NODE=M210R00
NODE=M210R00

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
not seen	ABLIKIM	15R	BES3	$\pm$	$e^+e^- \to \omega\pi^+\pi^-$

$\Gamma(J/\psi\eta)/\Gamma_{total}$ — Γ_9/Γ

NODE=M210R04
NODE=M210R04

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
not seen	ABLIKIM	15Q	BES3	0	4.0–4.6 $e^+e^- \to J/\psi\eta\pi^0$

$\Gamma(J/\psi\eta)/\Gamma(J/\psi\pi)$ — Γ_9/Γ_1

NODE=M210R05
NODE=M210R05

VALUE	CL%	DOCUMENT ID		TECN	CHG	COMMENT
<0.15	90	ABLIKIM	15Q	BES3	0	4.226 $e^+e^- \to J/\psi\eta\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.65	90	ABLIKIM	15Q	BES3	0	4.257 $e^+e^- \to J/\psi\eta\pi^0$

OCCUR=2

$\Gamma(\eta_c(1S)\rho(770)^\pm)/\Gamma(J/\psi\pi)$ — Γ_4/Γ_1

NODE=M210R12
NODE=M210R12

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
2.3±0.8	332	[1] ABLIKIM	19BC	BES3	$e^+e^- \to \pi^+\pi^-\pi^0\eta_c(1S)$

[1] Using $e^+e^- \to \pi^\mp (Z_c(3900)^\pm \to J/\psi\pi^\pm)$ cross section at 4.23 and 4.26 GeV from ABLIKIM 17J. NODE=M210R12;LINKAGE=A

$\Gamma(D^+ D^{*-} + c.c)/\Gamma_{total}$ — Γ_{10}/Γ

NODE=M210R06
NODE=M210R06

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
seen	ABLIKIM	15AB	BES3	0	$e^+e^- \to \pi^0 (D\overline{D}^*)^0$

$\Gamma(D^0\overline{D}^{*0}+c.c)/\Gamma_{total}$ — Γ_{11}/Γ

NODE=M210R07

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
seen	ABLIKIM	15AB	BES3	0	$e^+e^- \to \pi^0(D\overline{D}^*)^0$

$\Gamma(D^+D^{*-}+c.c)/\Gamma(D^0\overline{D}^{*0}+c.c)$ — Γ_{10}/Γ_{11}

NODE=M210R08

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.96±0.18±0.12	ABLIKIM	15AB	BES3	0	$e^+e^- \to \pi^0(D\overline{D}^*)^0$

$Z_c(3900)$ REFERENCES

NODE=M210

ABLIKIM	20N	PR D102 012009	M. Ablikim *et al.*	(BESIII Collab.) JP	REFID=60338
ABAZOV	19	PR D100 012005	V.M. Abazov *et al.*	(D0 Collab.)	REFID=59903
ABLIKIM	19BC	PR D100 111102	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60036
ABAZOV	18B	PR D98 052010	V.M. Abazov *et al.*	(D0 Collab.)	REFID=59442
ABLIKIM	17J	PRL 119 072001	M. Ablikim *et al.*	(BESIII Collab.) JP	REFID=57950
ABLIKIM	15AB	PRL 115 222002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56954
ABLIKIM	15AC	PR D92 092006	M. Ablikim *et al.*	(BESIII Collab.) JP	REFID=56967
ABLIKIM	15Q	PR D92 012008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56782
ABLIKIM	15R	PR D92 032009	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56783
ABLIKIM	15U	PRL 115 112003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56786
ADOLPH	15D	PL B742 330	C. Adolph *et al.*	(COMPASS Collab.)	REFID=56791
VINOKUROVA	15	JHEP 1506 132	A. Vinokurova *et al.*	(BELLE Collab.)	REFID=56706
Also		JHEP 1702 088 (errat.)	A. Vinokurava *et al.*	(BELLE Collab.)	REFID=57795
ABLIKIM	14A	PRL 112 022001	M. Ablikim *et al.*	(BESIII Collab.) JP	REFID=55648
ABLIKIM	13T	PRL 110 252001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55409
ABLIKIM	13X	PRL 111 242001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55635
LIU	13B	PRL 110 252002	Z.Q. Liu *et al.*	(BELLE Collab.)	REFID=55410
XIAO	13A	PL B727 366	T. Xiao *et al.*	(NWES)	REFID=55593

NODE=M159

$\chi_{c0}(3915)$

$I^G(J^{PC}) = 0^+(0^{++})$

was $X(3915)$

The $\chi_{c0}(3915)$ was originally seen by BELLE in its $\omega J/\psi$ decay mode and was produced in both B decays in CHOI 05 and $\gamma\gamma$ collisions in UEHARA 10. The J^{PC} was determined to be 0^{++} by BABAR in LEES 12AD but this assignment was questioned by ZHOU 15C. In AAIJ 20AI LHCb found the D^+D^- decay mode of the $\chi_{c0}(3915)$ using B decays and determined its J^{PC} to be 0^{++}. Based on their compatible mass, width, and J^{PC}, we assume the state decaying to $\omega J/\psi$ and the state decaying to D^+D^- are both the $\chi_{c0}(3915)$. See also the $\chi_{c2}(3930)$.

NODE=M159

$\chi_{c0}(3915)$ MASS

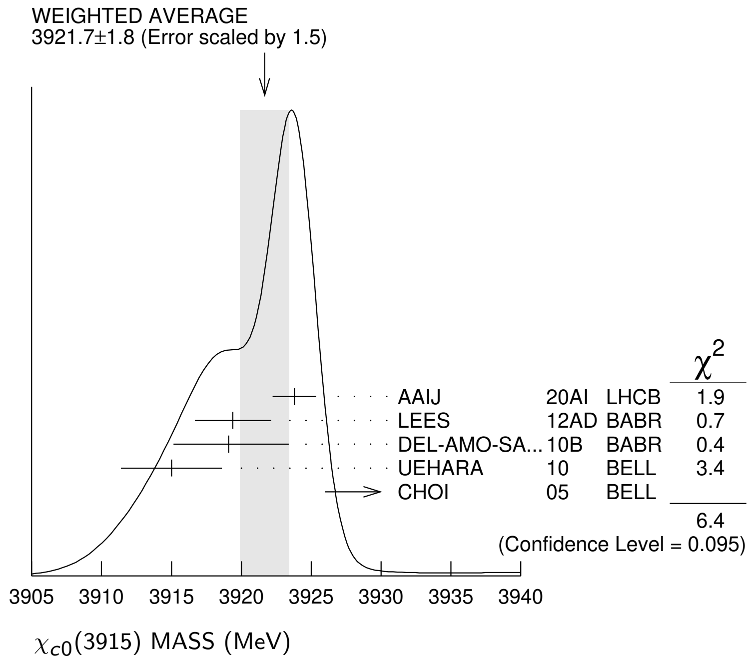
NODE=M159M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
3921.7± 1.8 OUR AVERAGE		Error includes scale factor of 1.5. See the ideogram below.			
3923.8± 1.5± 0.4	1.2k	[1] AAIJ	20AI	LHCB	$B^+ \to D^+D^-K^+$
3919.4± 2.2± 1.6	59 ± 10	LEES	12AD	BABR	$e^+e^- \to e^+e^-\omega J/\psi$
$3919.1^{+3.8}_{-3.4}\pm 2.0$		DEL-AMO-SA..	10B	BABR	$B \to \omega J/\psi K$
3915 ± 3 ± 2	49 ± 15	UEHARA	10	BELL	10.6 $e^+e^- \to e^+e^-\omega J/\psi$
3943 ±11 ±13	58 ± 11	[2] CHOI	05	BELL	$B \to \omega J/\psi K$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3926.4± 2.2± 1.2		[3] ABLIKIM	19V	BES	$e^+e^- \to \gamma\omega J/\psi$
$3914.6^{+3.8}_{-3.4}\pm 2.0$		[2] AUBERT	08W	BABR	Superseded by DEL-AMO-SANCHEZ 10B

[1] Obtained from the full amplitude analysis. Parameterized with the relativistic Breit-Wigner line shape. NODE=M159M;LINKAGE=B

[2] $\omega J/\psi$ threshold enhancement fitted as an S-wave Breit-Wigner resonance. NODE=M159M;LINKAGE=CH

[3] Could also be $X(3940)$. Significance 3.1σ. Fit with additional resonance at 3963.7 ± 5.7 MeV, significance 3.4σ. NODE=M159M;LINKAGE=A



$\chi_{c0}(3915)$ WIDTH

NODE=M159W

NODE=M159W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
18.8± 3.5 OUR AVERAGE					
17.4± 5.1± 0.8	1.2k	[1] AAIJ	20AI	LHCB	$B^+ \to D^+ D^- K^+$
13 ± 6 ± 3	59	LEES	12AD	BABR	$e^+ e^- \to e^+ e^- \omega J/\psi$
31 $^{+10}_{-8}$ ± 5		DEL-AMO-SA...	10B	BABR	$B \to \omega J/\psi K$
17 ±10 ± 3	49	UEHARA	10	BELL	10.6 $e^+ e^- \to e^+ e^- \omega J/\psi$
87 ±22 ±26	58	[2] CHOI	05	BELL	$B \to \omega J/\psi K$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3.8± 7.5± 2.6		[3] ABLIKIM	19V	BES	$e^+ e^- \to \gamma \omega J/\psi$
34 $^{+12}_{-8}$ ± 5		[2] AUBERT	08W	BABR	Superseded by DEL-AMO-SANCHEZ 10B

[1] Obtained from the full amplitude analysis. Parameterized with the relativistic Breit-Wigner line shape.
NODE=M159W;LINKAGE=B

[2] $\omega J/\psi$ threshold enhancement fitted as an S-wave Breit-Wigner resonance.
NODE=M159W;LINKAGE=CH

[3] Could also be $X(3940)$. Significance 3.1σ. Fit with additional resonance at 3963.7 ± 5.7 MeV, significance 3.4σ.
NODE=M159W;LINKAGE=A

$\chi_{c0}(3915)$ DECAY MODES

NODE=M159215;NODE=M159

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\omega J/\psi$	seen	DESIG=1;OUR EST;→ UNCHECKED ←
Γ_2	$\overline{D}^{*0} D^0$	not seen	DESIG=3;OUR EVAL;→ UNCHECKED ←
Γ_3	$D^+ D^-$	seen	DESIG=9
Γ_4	$\pi^+ \pi^- \eta_c(1S)$	not seen	DESIG=4;OUR EVAL;→ UNCHECKED ←
Γ_5	$\eta_c \eta$	not seen	DESIG=6
Γ_6	$\eta_c \pi^0$	not seen	DESIG=7
Γ_7	$K \overline{K}$	not seen	DESIG=5;OUR EVAL;→ UNCHECKED ←
Γ_8	$\gamma\gamma$	seen	DESIG=2
Γ_9	$\pi^0 \chi_{c1}$	not seen	DESIG=8

$\chi_{c0}(3915)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M159220

$\Gamma(\omega J/\psi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_1\Gamma_8/\Gamma$

NODE=M159G01
NODE=M159G01

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
54± 9 OUR AVERAGE					
52±10±3	59 ± 10	[1] LEES	12AD	BABR	$e^+ e^- \to e^+ e^- \omega J/\psi$
61±17±8	49 ± 15	[1] UEHARA	10	BELL	10.6 $e^+ e^- \to e^+ e^- \omega J/\psi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
18± 5±2	49 ± 15	[2] UEHARA	10	BELL	10.6 $e^+ e^- \to e^+ e^- \omega J/\psi$

OCCUR=2

[1] For $J^P = 0^+$.
[2] For $J^P = 2^+$, helicity-2.

NODE=M159G01;LINKAGE=UH
NODE=M159G01;LINKAGE=UR

$\Gamma(\pi^+\pi^-\eta_c(1S)) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_4\Gamma_8/\Gamma$

NODE=M159G02
NODE=M159G02

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<16	90	LEES	12AE	BABR	$e^+e^- \to e^+e^-\pi^+\pi^-\eta_c$

$\Gamma(K\overline{K}) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_7\Gamma_8/\Gamma$

NODE=M159G03
NODE=M159G03

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<1.96	90	UEHARA	13	BELL	$\gamma\gamma \to K^0_S K^0_S$

$\chi_{c0}(3915)$ BRANCHING RATIOS

NODE=M159225

$\Gamma(\omega J/\psi)/\Gamma_{total}$ — Γ_1/Γ

NODE=M159R03
NODE=M159R03

VALUE	DOCUMENT ID		TECN	COMMENT
seen	[1] DEL-AMO-SA...	10B	BABR	$B \to \omega J/\psi K$
seen	[2] CHOI	05	BELL	$B \to \omega J/\psi K$

[1] DEL-AMO-SANCHEZ 10B reports $B(B^\pm \to X(3915) K^\pm) \times B(X(3915) \to J/\psi\omega) = (3.0^{+0.7}_{-0.6}{}^{+0.5}_{-0.3}) \times 10^{-5}$ and $B(B^0 \to X(3915) K^0) \times B(X(3915) \to J/\psi\omega) = (2.1 \pm 0.9 \pm 0.3) \times 10^{-5}$.

NODE=M159R03;LINKAGE=DE

[2] CHOI 05 reports $B(B \to X(3915) K) \times B(X(3915) \to J/\psi\omega) = (7.1 \pm 1.3 \pm 3.1) \times 10^{-5}$.

NODE=M159R03;LINKAGE=CH

$\Gamma(\omega J/\psi)/\Gamma(\overline{D}^{*0} D^0)$ — Γ_1/Γ_2

NODE=M159R02
NODE=M159R02

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
>0.71	90	[1] AUSHEV	10	BELL	$B \to \overline{D}^{*0} D^0 K$

[1] By combining the upper limit $B(B \to X(3915) K) \times B(X(3915) \to D^{*0}\overline{D}^0) < 0.67 \times 10^{-4}$ from AUSHEV 10 with the average of CHOI 05 and AUBERT 08W measurements $B(B \to X(3915) K) \times B(X(3915) \to \omega J/\psi) = (0.51 \pm 0.11) \times 10^{-4}$.

NODE=M159R02;LINKAGE=AU

$\Gamma(D^+D^-)/\Gamma_{total}$ — Γ_3/Γ

NODE=M159R06
NODE=M159R06

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AAIJ	20AI	LHCB	$B^+ \to D^+D^-K^+$

$\Gamma(\eta_c\eta)/\Gamma_{total}$ — Γ_5/Γ

NODE=M159R00
NODE=M159R00
OCCUR=2

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
not seen	90	[1] VINOKUROVA	15	BELL	$B^+ \to K^+\eta_c\eta$

[1] VINOKUROVA 15 reports $B(B^+ \to K^+ X(3915)^0) \times B(X \to \eta_c\eta) < 4.7 \times 10^{-5}$ at 90% CL.

NODE=M159R00;LINKAGE=A

$\Gamma(\eta_c\pi^0)/\Gamma_{total}$ — Γ_6/Γ

NODE=M159R04
NODE=M159R04
OCCUR=2

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
not seen	90	[1] VINOKUROVA	15	BELL	$B^+ \to K^+\eta_c\pi^0$

[1] VINOKUROVA 15 reports $B(B^+ \to K^+ X(3915)^0) \times B(X \to \eta_c\pi^0) < 1.7 \times 10^{-5}$ at 90% CL.

NODE=M159R04;LINKAGE=A

$\Gamma(\gamma\gamma)/\Gamma_{total}$ — Γ_8/Γ

NODE=M159R01
NODE=M159R01

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	59 ± 10	LEES	12AD	BABR	$e^+e^- \to e^+e^-\omega J/\psi$
seen		UEHARA	10	BELL	10.6 $e^+e^- \to e^+e^-\omega J/\psi$

$\Gamma(\pi^0\chi_{c1})/\Gamma_{total}$ — Γ_9/Γ

NODE=M159R05
NODE=M159R05

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
not seen	42 ± 14	[1] BHARDWAJ	19	BELL	$B^\pm \to \chi_{c1}\pi^0 K^\pm$

[1] BHARDWAJ 19 reports $B(B^+ \to K^+ X(3915)) \times B(X(3915) \to \chi_{c1}\pi^0) < 3.8 \times 10^{-5}$ at 90% CL. A signal significance 2.3 standard deviations.

NODE=M159R05;LINKAGE=A

$\chi_{c0}(3915)$ REFERENCES

NODE=M159

AAIJ	20AI	PR D102 112003	R. Aaij *et al.*	(LHCb Collab.) JPC	REFID=60739
ABLIKIM	19V	PRL 122 232002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59796
BHARDWAJ	19	PR D99 111101	V. Bhardwaj *et al.*	(BELLE Collab.)	REFID=59884
VINOKUROVA	15	JHEP 1506 132	A. Vinokurova *et al.*	(BELLE Collab.)	REFID=56706
Also		JHEP 1702 088 (errat.)	A. Vinokurava *et al.*	(BELLE Collab.)	REFID=57795
ZHOU	15C	PRL 115 022001	Z.-Y. Zhou, Z. Xiao, H.-Q. Zhou	(BEIJT, NANJ)	REFID=56842
UEHARA	13	PTEP 2013 123C01	S. Uehara *et al.*	(BELLE Collab.)	REFID=55592
LEES	12AD	PR D86 072002	J.P. Lees *et al.*	(BABAR Collab.)	REFID=54751
LEES	12AE	PR D86 092005	J.P. Lees *et al.*	(BABAR Collab.)	REFID=54752
AUSHEV	10	PR D81 031103	T. Aushev *et al.*	(BELLE Collab.)	REFID=53225
DEL-AMO-SA...	10B	PR D82 011101	P. del Amo Sanchez *et al.*	(BABAR Collab.)	REFID=53362
UEHARA	10	PRL 104 092001	S. Uehara *et al.*	(BELLE Collab.)	REFID=53232
AUBERT	08W	PRL 101 082001	B. Aubert *et al.*	(BABAR Collab.)	REFID=52263
CHOI	05	PRL 94 182002	S.-K. Choi *et al.*	(BELLE Collab.)	REFID=50737

NODE=M050

$\chi_{c2}(3930)$ $I^G(J^{PC}) = 0^+(2^{++})$

$\chi_{c2}(3930)$ MASS

NODE=M050M

NODE=M050M

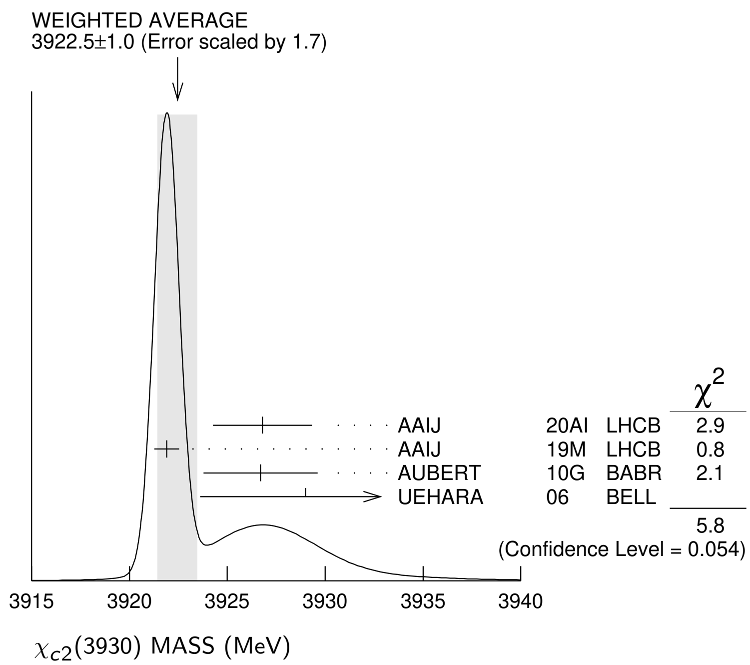
VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
3922.5±1.0 OUR AVERAGE		Error includes scale factor of 1.7. See the ideogram below.			
3926.8±2.4±0.8	1.2k	[1] AAIJ	20AI	LHCB	$B^+ \to D^+ D^- K^+$
3921.9±0.6±0.2		[2] AAIJ	19M	LHCB	$pp \to D\overline{D} +$ anything
3926.7±2.7±1.1	76 ± 17	AUBERT	10G	BABR	10.6 $e^+e^- \to e^+e^- D\overline{D}$
3929 ±5 ±2	64	UEHARA	06	BELL	10.6 $e^+e^- \to e^+e^- D\overline{D}$

[1] Obtained from the full amplitude analysis. Parameterized with the relativistic Breit-Wigner line shape. Previous measurements assumed a single state in this region. This analysis revealed the presence of $\chi_{c0}(3930)$ with the same mass.

NODE=M050M;LINKAGE=B

[2] Measured in prompt hadroproduction.

NODE=M050M;LINKAGE=A



$\chi_{c2}(3930)$ WIDTH

NODE=M050W

NODE=M050W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
35.2± 2.2 OUR AVERAGE		Error includes scale factor of 1.2.			
34.2± 6.6±1.1	1.2k	[1] AAIJ	20AI	LHCB	$B^+ \to D^+ D^- K^+$
36.6± 1.9±0.9		[2] AAIJ	19M	LHCB	$pp \to D\overline{D} +$ anything
21.3± 6.8±3.6	76 ± 17	AUBERT	10G	BABR	10.6 $e^+e^- \to e^+e^- D\overline{D}$
29 ±10 ±2	64	UEHARA	06	BELL	10.6 $e^+e^- \to e^+e^- D\overline{D}$

[1] Obtained from the full amplitude analysis. Parameterized with the relativistic Breit-Wigner line shape. Previous measurements assumed a single state in this region. This analysis revealed the presence of $\chi_{c0}(3930)$ with the same mass.

NODE=M050W;LINKAGE=B

[2] Measured in prompt hadroproduction.

NODE=M050W;LINKAGE=A

$\chi_{c2}(3930)$ DECAY MODES

NODE=M050215;NODE=M050

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\gamma\gamma$	seen	DESIG=1;OUR EVAL;→ UNCHECKED ←
Γ_2	$K\overline{K}\pi$		DESIG=5
Γ_3	$K^+K^-\pi^+\pi^-\pi^0$		DESIG=6
Γ_4	$D\overline{D}$	seen	DESIG=2;OUR EVAL;→ UNCHECKED ←
Γ_5	D^+D^-	seen	DESIG=3;OUR EVAL;→ UNCHECKED ←
Γ_6	$D^0\overline{D}^0$	seen	DESIG=4;OUR EVAL;→ UNCHECKED ←
Γ_7	$\pi^+\pi^-\eta_c(1S)$	not seen	DESIG=7;OUR EVAL;→ UNCHECKED ←
Γ_8	$K\overline{K}$	not seen	DESIG=8;OUR EVAL;→ UNCHECKED ←

$\chi_{c2}(3930)$ PARTIAL WIDTHS

NODE=M050220

$\chi_{c2}(3930)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M050222

$\Gamma(K\overline{K}\pi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_2\Gamma_1/\Gamma$

NODE=M050G01
NODE=M050G01

VALUE (eV)	CL%	DOCUMENT ID	TECN	COMMENT
<2.1	90	DEL-AMO-SA..11M	BABR	$\gamma\gamma \to K^0_S K^\pm \pi^\mp$

$\Gamma(K^+K^-\pi^+\pi^-\pi^0) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_3\Gamma_1/\Gamma$

NODE=M050G02
NODE=M050G02

VALUE (eV)	CL%	DOCUMENT ID	TECN	COMMENT
<3.4	90	DEL-AMO-SA..11M	BABR	$\gamma\gamma \to K^+K^-\pi^+\pi^-\pi^0$

$\Gamma(D\overline{D}) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_4\Gamma_1/\Gamma$

NODE=M050G1
NODE=M050G1

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
0.21±0.04 OUR AVERAGE				
0.24±0.05±0.04	76 ± 17	AUBERT 10G	BABR	10.6 $e^+e^- \to e^+e^- D\overline{D}$
0.18±0.05±0.03	64	[1] UEHARA 06	BELL	10.6 $e^+e^- \to e^+e^- D\overline{D}$

[1] Assuming B(D^+D^-) = 0.89 B($D^0\overline{D}^0$).

NODE=M050G1;LINKAGE=UE

$\Gamma(\pi^+\pi^-\eta_c(1S)) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_7\Gamma_1/\Gamma$

NODE=M050G03
NODE=M050G03

VALUE (eV)	CL%	DOCUMENT ID	TECN	COMMENT
<18	90	LEES 12AE	BABR	$e^+e^- \to e^+e^-\pi^+\pi^-\eta_c$

$\Gamma(K\overline{K}) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_8\Gamma_1/\Gamma$

NODE=M050G04
NODE=M050G04

VALUE (eV)	CL%	DOCUMENT ID	TECN	COMMENT
<0.256	90	UEHARA 13	BELL	$\gamma\gamma \to K^0_S K^0_S$

$\chi_{c2}(3930)$ BRANCHING RATIOS

NODE=M050225

$\Gamma(D^+D^-)/\Gamma(D^0\overline{D}^0)$ — Γ_5/Γ_6

NODE=M050R01
NODE=M050R01

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.74±0.43±0.16	64	UEHARA 06	BELL	10.6 $e^+e^- \to e^+e^- D\overline{D}$

$\chi_{c2}(3930)$ REFERENCES

NODE=M050

AAIJ	20AI	PR D102 112003	R. Aaij *et al.*	(LHCb Collab.)	REFID=60739
AAIJ	19M	JHEP 1907 035	R. Aaij *et al.*	(LHCb Collab.)	REFID=59697
UEHARA	13	PTEP 2013 123C01	S. Uehara *et al.*	(BELLE Collab.)	REFID=55592
LEES	12AE	PR D86 092005	J.P. Lees *et al.*	(BABAR Collab.)	REFID=54752
DEL-AMO-SA...	11M	PR D84 012004	P. del Amo Sanchez *et al.*	(BABAR Collab.)	REFID=16751
AUBERT	10G	PR D81 092003	B. Aubert *et al.*	(BABAR Collab.)	REFID=53357
UEHARA	06	PRL 96 082003	S. Uehara *et al.*	(BELLE Collab.)	REFID=51039

NODE=M029

X(3940)

$I^G(J^{PC}) = ?^?(?^{??})$

OMITTED FROM SUMMARY TABLE

Reported by ABE 07, observed in $e^+e^- \to J/\psi X$.

NODE=M029

X(3940) MASS

NODE=M029M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$3942^{+7}_{-6}\pm6$	52	PAKHLOV	08	BELL	$e^+e^- \to J/\psi X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$3943\pm 6\pm6$	25	[1] ABE	07	BELL	$e^+e^- \to J/\psi X$
3936 ± 14	266	[2] ABE	07	BELL	$e^+e^- \to J/\psi(c\bar{c})$

NODE=M029M; OCCUR=2

[1] From a fit to $D^{*+}D^-$ and $D^{*0}\overline{D}^0$ events.

[2] From the inclusive fit. Not independent of the exclusive measurement by ABE 07.

NODE=M029M;LINKAGE=EB
NODE=M029M;LINKAGE=EM

X(3940) WIDTH

NODE=M029W

VALUE (MeV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$37^{+26}_{-15}\pm8$		52	PAKHLOV	08	BELL	$e^+e^- \to J/\psi X$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<52	90	25	ABE	07	BELL	$e^+e^- \to J/\psi X$

NODE=M029W

X(3940) DECAY MODES

NODE=M029215;NODE=M029

	Mode	Fraction (Γ_i/Γ)
Γ_1	$D\overline{D}^*$ + c.c.	seen
Γ_2	$D\overline{D}$	not seen
Γ_3	$J/\psi\omega$	not seen

DESIG=1;OUR EVAL;→ UNCHECKED ←
DESIG=2;OUR EVAL;→ UNCHECKED ←
DESIG=3;OUR EVAL;→ UNCHECKED ←

X(3940) BRANCHING RATIOS

NODE=M029225

$\Gamma(D\overline{D}^*+\text{c.c.})/\Gamma_{\text{total}}$ — Γ_1/Γ

NODE=M029R01
NODE=M029R01

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
>0.45	90	25	[1,2] ABE	07	BELL	$e^+e^- \to J/\psi X$

[1] For $X(3940)$ decaying to final states with more than two tracks.

[2] PAKHLOV 08 finds that the inclusive peak near 3940 MeV/c^2 may consist of several states.

NODE=M029R01;LINKAGE=AB
NODE=M029R01;LINKAGE=AE

$\Gamma(D\overline{D})/\Gamma_{\text{total}}$ — Γ_2/Γ

NODE=M029R02
NODE=M029R02

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.41	90	[1,2] ABE	07	BELL	$e^+e^- \to J/\psi X$

[1] For $X(3940)$ decaying to final states with more than two tracks.

[2] PAKHLOV 08 finds that the inclusive peak near 3940 MeV/c^2 may consist of several states.

NODE=M029R02;LINKAGE=AB
NODE=M029R02;LINKAGE=AE

$\Gamma(J/\psi\omega)/\Gamma_{\text{total}}$ — Γ_3/Γ

NODE=M029R03
NODE=M029R03

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.26	90	[1,2] ABE	07	BELL	$e^+e^- \to J/\psi X$

[1] For $X(3940)$ decaying to final states with more than two tracks.

[2] PAKHLOV 08 finds that the inclusive peak near 3940 MeV/c^2 may consist of several states.

NODE=M029R03;LINKAGE=AB
NODE=M029R03;LINKAGE=AE

X(3940) REFERENCES

NODE=M029

PAKHLOV 08 PRL 100 202001 P. Pakhlov *et al.* (BELLE Collab.) REFID=52302

ABE 07 PRL 98 082001 K. Abe *et al.* (BELLE Collab.) REFID=51627

NODE=M213

$X(4020)^{\pm}$

$I^G(J^{PC}) = 1^+(?^{?-})$

NODE=M213

Properties incompatible with a $q\overline{q}$ structure (exotic state). See the review on non-$q\overline{q}$ states.

Charged $X(4020)$ seen by ABLIKIM 13X from $e^+e^- \to \pi^+\pi^- h_c(1P)$ at c.m. energy from 3.90 to 4.42 GeV as a peak in the invariant mass distribution of the $\pi^{\pm} h_c(1P)$ system, and by ABLIKIM 14B from $e^+e^- \to (D^*\overline{D}^*)^{\pm}\pi^{\mp}$ events in $(D^*\overline{D}^*)^{\pm}$ mass. A neutral $X(4020)$ seen by ABLIKIM 14P at three c.m. energies in the same range in $e^+e^- \to \pi^0\pi^0 h_c(1P)$ as a peak in the larger of the two masses recoiling against a π^0. ABLIKIM 15AA observes a 5.9 σ signal in $(D^*\overline{D}^*)^0$ in $e^+e^- \to (D^*\overline{D}^*)^0\,\pi^0$ events using collisions at two c.m. energies. Production rates and mass values support grouping neutral and charged $X(4020)$ together as manifestations of a single $I = 1$ particle.

$X(4020)^{\pm}$ MASS

NODE=M213M

NODE=M213M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
4024.1±1.9 OUR AVERAGE						
$4025.5^{+2.0}_{-4.7}\pm3.1$	116	[1] ABLIKIM	15AA	BES3	0	$e^+e^- \to (D^*\overline{D}^*)^0\,\pi^0$
4026.3±2.6±3.7	401	[1] ABLIKIM	14B	BES3	±	$e^+e^- \to (D^*\overline{D}^*)^{\pm}\,\pi^{\mp}$
4023.9±2.2±3.8	61	[1,2] ABLIKIM	14P	BES3	0	$e^+e^- \to \pi^0\pi^0 h_c$
4022.9±0.8±2.7	253	[1] ABLIKIM	13X	BES3	±	$e^+e^- \to \pi^+\pi^- h_c$

[1] Neglecting interference between the $X(4020)$ and non-resonant continuum.
[2] Assuming $J^P = 1^+$ and width of 7.9 ± 2.6 MeV.

NODE=M213M;LINKAGE=AB
NODE=M213M;LINKAGE=B

$X(4020)^{\pm}$ WIDTH

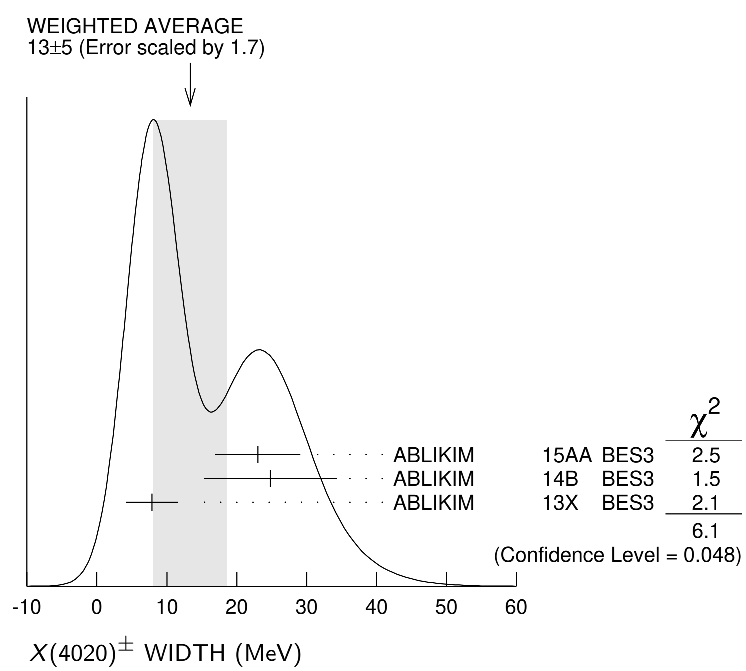
NODE=M213W

NODE=M213W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
13 ±5 OUR AVERAGE		Error includes scale factor of 1.7. See the ideogram below.				
23.0±6.0±1.0	116	[1] ABLIKIM	15AA	BES3	0	$e^+e^- \to (D^*\overline{D}^*)^0\,\pi^0$
24.8±5.6±7.7	401	[1] ABLIKIM	14B	BES3	±	$e^+e^- \to (D^*\overline{D}^*)^{\pm}\pi^{\mp}$
7.9±2.7±2.6	253	[1] ABLIKIM	13X	BES3	±	$e^+e^- \to \pi^+\pi^- h_c$

[1] Neglecting interference between the $X(4020)$ and non-resonant continuum.

NODE=M213W;LINKAGE=AB



$X(4020)^{\pm}$ DECAY MODES

NODE=M213215;NODE=M213

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$h_c(1P)\pi$	seen	DESIG=1
Γ_2	$D^*\overline{D}^*$	seen	DESIG=2
Γ_3	$D\overline{D}^*$ + c.c.	not seen	DESIG=4
Γ_4	$\eta_c\pi^+\pi^-$	not seen	DESIG=3
Γ_5	$\eta_c(1S)\rho(770)^{\pm}$		DESIG=6
Γ_6	$J/\psi(1S)\pi^{\pm}$	not seen	DESIG=5

$X(4020)^{\pm}$ BRANCHING RATIOS

NODE=M213225

$\Gamma(h_c(1P)\pi)/\Gamma_{total}$ Γ_1/Γ

NODE=M213R01
NODE=M213R01

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
seen	61	ABLIKIM	14P	BES3	0	$e^+e^- \rightarrow \pi^0\pi^0 h_c$
seen	253	ABLIKIM	13X	BES3	$\pm$	$e^+e^- \rightarrow \pi^+\pi^- h_c$

$\Gamma(D^*\overline{D}^*)/\Gamma_{total}$ Γ_2/Γ

NODE=M213R02
NODE=M213R02

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
seen	116	[1] ABLIKIM	15AA	BES3	0	$e^+e^- \rightarrow (D^*\overline{D}^*)^0\pi^0$
seen	401	[1] ABLIKIM	14B	BES3	$\pm$	$e^+e^- \rightarrow (D^*\overline{D}^*)^{\pm}\pi^{\mp}$

[1] Neglecting interference between the $X(4020)$ and non-resonant continuum.

NODE=M213R02;LINKAGE=A

$\Gamma(D\overline{D}^*+\text{c.c.})/\Gamma_{total}$ Γ_3/Γ

NODE=M213R03
NODE=M213R03

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
not seen	ABLIKIM	15AC	BES3	$\pm$	$e^+e^- \rightarrow \pi^{\pm}(D\overline{D}^*)^{\mp}$

$\Gamma(\eta_c\pi^+\pi^-)/\Gamma_{total}$ Γ_4/Γ

NODE=M213R00
NODE=M213R00

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	[1] VINOKUROVA	15	BELL	$B^+ \rightarrow K^+\eta_c\pi^+\pi^-$

[1] VINOKUROVA 15 reports B($B^+ \rightarrow K^+X(4020)^0$) $\times$ B($X \rightarrow \eta_c\pi^+\pi^-$) $< 1.6 \times 10^{-5}$ at 90% CL.

NODE=M213R00;LINKAGE=VI

$\Gamma(\eta_c(1S)\rho(770)^{\pm})/\Gamma(h_c(1P)\pi)$ Γ_5/Γ_1

NODE=M213R05
NODE=M213R05

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.2	90	[1] ABLIKIM	19BC	BES3	$e^+e^- \rightarrow \pi^+\pi^-\pi^0\eta_c(1S)$

[1] Using $e^+e^- \rightarrow \pi^{\mp}(Z_c(4020)^{\pm} \rightarrow h_c(1P)\pi^{\pm})$ cross section at 4.23, 4.26 and 4.36 GeV from ABLIKIM 13X.

NODE=M213R05;LINKAGE=A

$\Gamma(J/\psi(1S)\pi^{\pm})/\Gamma_{total}$ Γ_6/Γ

NODE=M213R04
NODE=M213R04

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	[1] ABLIKIM	17J	BES3	$e^+e^- \rightarrow \pi^+\pi^- J/\psi$

[1] From Partial Wave Analysis assuming $J^P = 1^+$.

NODE=M213R04;LINKAGE=A

$X(4020)^{\pm}$ REFERENCES

NODE=M213

ABLIKIM	19BC	PR D100 111102	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60036
ABLIKIM	17J	PRL 119 072001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57950
ABLIKIM	15AA	PRL 115 182002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56951
ABLIKIM	15AC	PR D92 092006	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56967
VINOKUROVA	15	JHEP 1506 132	A. Vinokurova *et al.*	(BELLE Collab.)	REFID=56706
Also		JHEP 1702 088 (errat.)	A. Vinokurava *et al.*	(BELLE Collab.)	REFID=57795
ABLIKIM	14B	PRL 112 132001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55654
ABLIKIM	14P	PRL 113 212002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56118
ABLIKIM	13X	PRL 111 242001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55635

NODE=M072

$\psi(4040)$

$I^G(J^{PC}) = 0^-(1^{--})$

$\psi(4040)$ MASS

NODE=M072M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
4039 ± 1 OUR ESTIMATE				
4039.6± 4.3	[1] ABLIKIM	08D	BES2	$e^+e^- \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •				
4034 ± 6	[2] MO	10	RVUE	$e^+e^- \to$ hadrons
4037 ± 2	[3] SETH	05A	RVUE	$e^+e^- \to$ hadrons
4040 ± 1	[4] SETH	05A	RVUE	$e^+e^- \to$ hadrons
4040 ±10	BRANDELIK	78C	DASP	e^+e^-

NODE=M072M → UNCHECKED ←

OCCUR=2

[1] Reanalysis of data presented in BAI 02C. From a global fit over the center-of-mass energy region 3.7–5.0 GeV covering the $\psi(3770)$, $\psi(4040)$, $\psi(4160)$, and $\psi(4415)$ resonances. Phase angle fixed in the fit to $\delta = (130 \pm 46)^\circ$.

NODE=M072M;LINKAGE=AB

[2] Reanalysis of data presented in BAI 00 and BAI 02C. From a global fit over the center-of-mass energy 3.8-4.8 GeV covering the $\psi(4040)$, $\psi(4160)$ and $\psi(4415)$ resonances and including interference effects.

NODE=M072M;LINKAGE=MO

[3] From a fit to Crystal Ball (OSTERHELD 86) data.

NODE=M072M;LINKAGE=ST

[4] From a fit to BES (BAI 02C) data.

NODE=M072M;LINKAGE=SE

$\psi(4040)$ WIDTH

NODE=M072W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
80 ±10 OUR ESTIMATE				
84.5±12.3	[5] ABLIKIM	08D	BES2	$e^+e^- \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •				
87 ±11	[6] MO	10	RVUE	$e^+e^- \to$ hadrons
85 ±10	[7] SETH	05A	RVUE	$e^+e^- \to$ hadrons
89 ± 6	[8] SETH	05A	RVUE	$e^+e^- \to$ hadrons
52 ±10	BRANDELIK	78C	DASP	e^+e^-

NODE=M072W → UNCHECKED ←

OCCUR=2

[5] Reanalysis of data presented in BAI 02C. From a global fit over the center-of-mass energy region 3.7–5.0 GeV covering the $\psi(3770)$, $\psi(4040)$, $\psi(4160)$, and $\psi(4415)$ resonances. Phase angle fixed in the fit to $\delta = (130 \pm 46)^\circ$.

NODE=M072W;LINKAGE=AB

[6] Reanalysis of data presented in BAI 00 and BAI 02C. From a global fit over the center-of-mass energy 3.8-4.8 GeV covering the $\psi(4040)$, $\psi(4160)$ and $\psi(4415)$ resonances and including interference effects.

NODE=M072W;LINKAGE=MO

[7] From a fit to Crystal Ball (OSTERHELD 86) data.

NODE=M072W;LINKAGE=ST

[8] From a fit to BES (BAI 02C) data.

NODE=M072W;LINKAGE=SE

$\psi(4040)$ DECAY MODES

NODE=M072215;NODE=M072

Due to the complexity of the $c\overline{c}$ threshold region, in this listing, "seen" ("not seen") means that a cross section for the mode in question has been measured at effective $\sqrt{s}$ near this particle's central mass value, more (less) than 2σ above zero, without regard to any peaking behavior in $\sqrt{s}$ or absence thereof. See mode listing(s) for details and references.

NODE=M072

	Mode	Fraction (Γ_i/Γ)	Confidence level	
Γ_1	e^+e^-	$(1.07\pm0.16)\times10^{-5}$		DESIG=5
Γ_2	$D\overline{D}$	seen		DESIG=17;OUR EST;→ UNCHECKED ←
Γ_3	$D^0\overline{D}^0$	seen		DESIG=1
Γ_4	D^+D^-	seen		DESIG=18
Γ_5	$D^*\overline{D}$ + c.c.	seen		DESIG=19;OUR EST;→ UNCHECKED ←
Γ_6	$D^*(2007)^0\overline{D}^0$ + c.c.	seen		DESIG=2
Γ_7	$D^*(2010)^+D^-$ + c.c.	seen		DESIG=20
Γ_8	$D^*\overline{D}^*$	seen		DESIG=21;OUR EST;→ UNCHECKED ←
Γ_9	$D^*(2007)^0\overline{D}^*(2007)^0$	seen		DESIG=3
Γ_{10}	$D^*(2010)^+D^*(2010)^-$	seen		DESIG=22
Γ_{11}	$D\overline{D}\pi$ (excl. $D^*\overline{D}$)			DESIG=23
Γ_{12}	$D^0D^-\pi^+$+c.c. (excl. $D^*(2007)^0\overline{D}^0$ +c.c., $D^*(2010)^+D^-$ +c.c.)	not seen		DESIG=24
Γ_{13}	$D\overline{D}^*\pi$ (excl. $D^*\overline{D}^*$)	not seen		DESIG=25

Γ_{14}	$D^0 \overline{D}^{*-} \pi^+$ +c.c. (excl. $D^*(2010)^+ D^*(2010)^-$)	seen			DESIG=26
Γ_{15}	$D_s^+ D_s^-$	seen			DESIG=27
Γ_{16}	$\pi^+ \pi^+ \pi^- \pi^- \pi^0$				DESIG=37
Γ_{17}	$J/\psi(1S)$ hadrons				DESIG=4
Γ_{18}	$J/\psi \pi^+ \pi^-$	< 4	$\times 10^{-3}$	90%	DESIG=7
Γ_{19}	$J/\psi \pi^0 \pi^0$	< 2	$\times 10^{-3}$	90%	DESIG=8
Γ_{20}	$J/\psi \eta$	(5.2 ± 0.7)	$\times 10^{-3}$		DESIG=9
Γ_{21}	$J/\psi \pi^0$	< 2.8	$\times 10^{-4}$	90%	DESIG=10
Γ_{22}	$J/\psi \pi^+ \pi^- \pi^0$	< 2	$\times 10^{-3}$	90%	DESIG=11
Γ_{23}	$\chi_{c1} \gamma$	< 3.4	$\times 10^{-3}$	90%	DESIG=12
Γ_{24}	$\chi_{c2} \gamma$	< 5	$\times 10^{-3}$	90%	DESIG=13
Γ_{25}	$\chi_{c1} \pi^+ \pi^- \pi^0$	< 1.1	%	90%	DESIG=14
Γ_{26}	$\chi_{c2} \pi^+ \pi^- \pi^0$	< 3.2	%	90%	DESIG=15
Γ_{27}	$h_c(1P) \pi^+ \pi^-$	< 3	$\times 10^{-3}$	90%	DESIG=28
Γ_{28}	$\phi \pi^+ \pi^-$	< 3	$\times 10^{-3}$	90%	DESIG=16
Γ_{29}	$\Lambda \overline{\Lambda} \pi^+ \pi^-$	< 2.9	$\times 10^{-4}$	90%	DESIG=29
Γ_{30}	$\Lambda \overline{\Lambda} \pi^0$	< 9	$\times 10^{-5}$	90%	DESIG=30
Γ_{31}	$\Lambda \overline{\Lambda} \eta$	< 3.0	$\times 10^{-4}$	90%	DESIG=31
Γ_{32}	$\Lambda \overline{\Lambda}$	< 6	$\times 10^{-6}$	90%	DESIG=36
Γ_{33}	$\Sigma^+ \overline{\Sigma}^-$	< 1.3	$\times 10^{-4}$	90%	DESIG=32
Γ_{34}	$\Sigma^0 \overline{\Sigma}^0$	< 7	$\times 10^{-5}$	90%	DESIG=33
Γ_{35}	$\Xi^+ \overline{\Xi}^-$	< 1.6	$\times 10^{-4}$	90%	DESIG=34
Γ_{36}	$\Xi^0 \overline{\Xi}^0$	< 1.8	$\times 10^{-4}$	90%	DESIG=35
Γ_{37}	$\mu^+ \mu^-$	(9 ± 6)	$\times 10^{-6}$		DESIG=6

$\psi(4040)$ PARTIAL WIDTHS

NODE=M072220

$\Gamma(e^+ e^-)$ — Γ_1

NODE=M072W5
NODE=M072W5

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
0.86±0.07 OUR ESTIMATE				
0.83±0.20	[9] ABLIKIM	08D	BES2	$e^+ e^- \rightarrow$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.6 to 1.4	[10] MO	10	RVUE	$e^+ e^- \rightarrow$ hadrons
0.88±0.11	[11] SETH	05A	RVUE	$e^+ e^- \rightarrow$ hadrons
0.91±0.13	[12] SETH	05A	RVUE	$e^+ e^- \rightarrow$ hadrons
0.75±0.15	BRANDELIK	78C	DASP	$e^+ e^-$

→ UNCHECKED ←

OCCUR=2

[9] Reanalysis of data presented in BAI 02C. From a global fit over the center-of-mass energy region 3.7–5.0 GeV covering the $\psi(3770)$, $\psi(4040)$, $\psi(4160)$, and $\psi(4415)$ resonances. Phase angle fixed in the fit to $\delta = (130 \pm 46)^\circ$.

NODE=M072W5;LINKAGE=AB

[10] Reanalysis of data presented in BAI 00 and BAI 02C. From a global fit over the center-of-mass energy 3.8-4.8 GeV covering the $\psi(4040)$, $\psi(4160)$ and $\psi(4415)$ resonances and including interference effects. Four sets of solutions are obtained with the same fit quality, mass and total width, but with different $e^+ e^-$ partial widths. We quote only the range of values.

NODE=M072W5;LINKAGE=MO

[11] From a fit to Crystal Ball (OSTERHELD 86) data.

NODE=M072W5;LINKAGE=ST

[12] From a fit to BES (BAI 02C) data.

NODE=M072W5;LINKAGE=SE

$\Gamma(\mu^+ \mu^-)$ — Γ_{37}

NODE=M072W2
NODE=M072W2

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
0.73±0.48±0.12	[13,14] ABLIKIM	20AG	BES3	$e^+ e^- \rightarrow \mu^+ \mu^-$

[13] From a fit to the $e^+ e^- \rightarrow \mu^+ \mu^-$ cross section between 3.8 and 4.6 GeV to the coherent sum of four resonant amplitudes assuming $\Gamma(\mu^+ \mu^-) = \Gamma(e^+ e^-)$.

NODE=M072W2;LINKAGE=A

[14] From solution 1 of 8 with equal fit quality. Other solutions range from $0.58 \pm 0.52 \pm 0.10$ to $0.80 \pm 0.48 \pm 0.13$ keV.

NODE=M072W2;LINKAGE=B

$\psi(4040)$ $\Gamma(i) \times \Gamma(e^+ e^-)/\Gamma(\text{total})$

NODE=M072235

$\Gamma(\chi_{c1} \gamma) \times \Gamma(e^+ e^-)/\Gamma_{total}$ — $\Gamma_{23}\Gamma_1/\Gamma$

NODE=M072G01
NODE=M072G01

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<2.9	90	[15] HAN	15	BELL	10.58 $e^+ e^- \rightarrow \chi_{c1} \gamma$

[15] Using $B(\eta \rightarrow \gamma\gamma) = (39.41 \pm 0.21)\%$.

NODE=M072G01;LINKAGE=A

$\Gamma(\chi_{c2}\gamma) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{24}\Gamma_1/\Gamma$

NODE=M072G02

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<4.6	90	[16] HAN	15	BELL	10.58 $e^+e^- \to \chi_{c2}\gamma$

[16] Using B($\eta \to \gamma\gamma$) = (39.41 ± 0.21)%.

NODE=M072G02;LINKAGE=A

$\Gamma(J/\psi\eta) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{20}\Gamma_1/\Gamma$

NODE=M072R00

• • • We do not use the following data for averages, fits, limits, etc. • • •

VALUE (eV)	DOCUMENT ID		TECN	COMMENT	
1.5±0.3	[17] ABLIKIM	20O	BES3	$e^+e^- \to \eta J/\psi$	
1.4±0.3	[18] ABLIKIM	20O	BES3	$e^+e^- \to \eta J/\psi$	OCCUR=2
7.0±0.6	[19] ABLIKIM	20O	BES3	$e^+e^- \to \eta J/\psi$	OCCUR=3

[17] Solution 1 of three equivalent fit solutions using three resonant structures. NODE=M072R00;LINKAGE=A

[18] Solution 2 of three equivalent fit solutions using three resonant structures. NODE=M072R00;LINKAGE=B

[19] Solution 3 of three equivalent fit solutions using three resonant structures. NODE=M072R00;LINKAGE=C

$\psi(4040)$ $\Gamma(i) \times \Gamma(e^+e^-)/\Gamma^2(total)$

NODE=M072230

$\Gamma(J/\psi\eta)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{20}/\Gamma \times \Gamma_1/\Gamma$

NODE=M072R25

• • • We do not use the following data for averages, fits, limits, etc. • • •

VALUE (units 10^{-8})	DOCUMENT ID		TECN	COMMENT	
5.1±1.4±1.5	[20] WANG	13B	BELL	$e^+e^- \to J/\psi\eta\gamma$	
12.8±2.1±1.9	[21] WANG	13B	BELL	$e^+e^- \to J/\psi\eta\gamma$	OCCUR=2

[20] Solution I of two equivalent solutions in a fit using two interfering resonances. Mass and width fixed at 4039 MeV and 80 MeV, respectively. NODE=M072R25;LINKAGE=A

[21] Solution II of two equivalent solutions in a fit using two interfering resonances. Mass and width fixed at 4039 MeV and 80 MeV, respectively. NODE=M072R25;LINKAGE=B

$\Gamma(\Lambda\overline{\Lambda}) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{32}\Gamma_1/\Gamma$

NODE=M072R33

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<5.5 × 10^−3	90	[22] ABLIKIM	21AS	BES3	$e^+e^- \to \psi(4040)$

[22] From a measurement of the $e^+e^- \to \Lambda\overline{\Lambda}$ cross section between 3.5 and 4.6 GeV. NODE=M072R33;LINKAGE=A

$\psi(4040)$ BRANCHING RATIOS

NODE=M072225

$\Gamma(e^+e^-)/\Gamma_{total}$ Γ_1/Γ

NODE=M072R4

• • • We do not use the following data for averages, fits, limits, etc. • • •

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
∼ 1.0	FELDMAN	77	MRK1	e^+e^-

$\Gamma(D^0\overline{D}^0)/\Gamma_{total}$ Γ_3/Γ

NODE=M072R14

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AUBERT	09M	BABR	$e^+e^- \to D^0\overline{D}^0\gamma$
seen	CRONIN-HEN...	09	CLEO	$e^+e^- \to D^0\overline{D}^0$
seen	PAKHLOVA	08	BELL	$e^+e^- \to D^0\overline{D}^0\gamma$

$\Gamma(D^+D^-)/\Gamma_{total}$ Γ_4/Γ

NODE=M072R15

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AUBERT	09M	BABR	$e^+e^- \to D^+D^-\gamma$
seen	CRONIN-HEN...	09	CLEO	$e^+e^- \to D^+D^-$
seen	PAKHLOVA	08	BELL	$e^+e^- \to D^+D^-\gamma$

$\Gamma(D\overline{D})/\Gamma(D^*\overline{D}+c.c.)$ Γ_2/Γ_5

NODE=M072R12

VALUE	DOCUMENT ID		TECN	COMMENT
0.24±0.05±0.12	AUBERT	09M	BABR	$e^+e^- \to \gamma D^{(*)}\overline{D}$

$\Gamma(D^0\overline{D}^0)/\Gamma(D^*(2007)^0\overline{D}^0+c.c.)$ Γ_3/Γ_6

NODE=M072R1

VALUE	DOCUMENT ID		TECN	COMMENT
0.05±0.03	[23] GOLDHABER	77	MRK1	e^+e^-

[23] Phase-space factor (p^3) explicitly removed. NODE=M072R;LINKAGE=P

$\Gamma(D^*(2007)^0\overline{D}^0+c.c.)/\Gamma_{total}$ Γ_6/Γ

NODE=M072R16

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AUBERT	09M	BABR	$e^+e^- \to D^{*0}\overline{D}^0\gamma$
seen	CRONIN-HEN...	09	CLEO	$e^+e^- \to D^{*0}\overline{D}^0$

$\Gamma(D^*(2010)^+ D^- + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_7/Γ

NODE=M072R17

VALUE	DOCUMENT ID		TECN	COMMENT
seen	[24] ZHUKOVA	18	BELL	$e^+ e^- \to D^{*+} D^- \gamma$
seen	AUBERT	09M	BABR	$e^+ e^- \to D^{*+} D^- \gamma$
seen	CRONIN-HEN...	09	CLEO	$e^+ e^- \to D^{*+} D^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	PAKHLOVA	07	BELL	$e^+ e^- \to D^{*+} D^- \gamma$

OCCUR=3

[24] Supersedes PAKHLOVA 07.

NODE=M072R17;LINKAGE=C

$\Gamma(D^*(2010)^+ D^- + \text{c.c.})/\Gamma(D^*(2007)^0 \overline{D}^0 + \text{c.c.})$ — Γ_7/Γ_6

NODE=M072R11

VALUE	DOCUMENT ID		TECN	COMMENT
0.95±0.09±0.10	AUBERT	09M	BABR	$e^+ e^- \to \gamma D^* \overline{D}$

$\Gamma(D^* \overline{D}^*)/\Gamma(D^* \overline{D} + \text{c.c.})$ — Γ_8/Γ_5

NODE=M072R13

VALUE	DOCUMENT ID		TECN	COMMENT
0.18±0.14±0.03	AUBERT	09M	BABR	$e^+ e^- \to \gamma D^{(*)} \overline{D}^{(*)}$

$\Gamma(D^*(2007)^0 \overline{D}^*(2007)^0)/\Gamma_{\text{total}}$ — Γ_9/Γ

NODE=M072R18

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AUBERT	09M	BABR	$e^+ e^- \to D^{*0} \overline{D}^{*0} \gamma$
seen	CRONIN-HEN...	09	CLEO	$e^+ e^- \to D^{*0} \overline{D}^{*0}$

$\Gamma(D^*(2007)^0 \overline{D}^*(2007)^0)/\Gamma(D^*(2007)^0 \overline{D}^0 + \text{c.c.})$ — Γ_9/Γ_6

NODE=M072R2

VALUE	DOCUMENT ID		TECN	COMMENT
32.0±12.0	[25] GOLDHABER	77	MRK1	$e^+ e^-$

[25] Phase-space factor (p^3) explicitly removed.

NODE=M072R2;LINKAGE=P

$\Gamma(D^*(2010)^+ D^*(2010)^-)/\Gamma_{\text{total}}$ — Γ_{10}/Γ

NODE=M072R19

VALUE	DOCUMENT ID		TECN	COMMENT
seen	[26] ZHUKOVA	18	BELL	$e^+ e^- \to D^{*+} D^{*-} \gamma$
seen	AUBERT	09M	BABR	$e^+ e^- \to D^{*+} D^{*-} \gamma$
seen	CRONIN-HEN...	09	CLEO	$e^+ e^- \to D^{*+} D^{*-}$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	PAKHLOVA	07	BELL	$e^+ e^- \to D^{*+} D^{*-} \gamma$

OCCUR=2

[26] Supersedes PAKHLOVA 07.

NODE=M072R19;LINKAGE=B

$\Gamma(D^0 D^- \pi^+ + \text{c.c.}$ (excl. $D^*(2007)^0 \overline{D}^0 + \text{c.c.}, D^*(2010)^+ D^- + \text{c.c.}))/\Gamma_{\text{total}}$ — Γ_{12}/Γ

NODE=M072R20

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	PAKHLOVA	08A	BELL	$e^+ e^- \to D^0 D^- \pi^+ \gamma$

$\Gamma(D \overline{D}^* \pi$ (excl. $D^* \overline{D}^*))/\Gamma_{\text{total}}$ — Γ_{13}/Γ

NODE=M072R21

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	CRONIN-HEN...	09	CLEO	$e^+ e^- \to D \overline{D}^* \pi$

$\Gamma(D^0 \overline{D}^{*-} \pi^+ + \text{c.c.}$ (excl. $D^*(2010)^+ D^*(2010)^-))/\Gamma_{\text{total}}$ — Γ_{14}/Γ

NODE=M072R22

VALUE	DOCUMENT ID		TECN	COMMENT
seen	PAKHLOVA	09	BELL	$e^+ e^- \to D^0 D^{*-} \pi^+ \gamma$

$\Gamma(D_s^+ D_s^-)/\Gamma_{\text{total}}$ — Γ_{15}/Γ

NODE=M072R23

VALUE	DOCUMENT ID		TECN	COMMENT
seen	PAKHLOVA	11	BELL	$e^+ e^- \to D_s^+ D_s^- \gamma$
seen	DEL-AMO-SA...	10N	BABR	$e^+ e^- \to D_s^+ D_s^- \gamma$
seen	CRONIN-HEN...	09	CLEO	$e^+ e^- \to D_s^+ D_s^-$

$\Gamma(\pi^+ \pi^+ \pi^- \pi^- \pi^0)/\Gamma_{\text{total}}$ — Γ_{16}/Γ

NODE=M072R34

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$(3.51 \pm 1.89 \pm 1.24) \times 10^{-5}$	[27] ABLIKIM	21AW	BES3	$e^+ e^- \to 2\pi^+ 2\pi^- \pi^0$
$(2.41 \pm 0.05 \pm 0.79) \times 10^{-2}$	[28] ABLIKIM	21AW	BES3	$e^+ e^- \to 2\pi^+ 2\pi^- \pi^0$

OCCUR=2

[27] Solution 1 of two solutions with equal fit quality. The significance of the $\psi(4040)$ signal is 3.6 σ.

NODE=M072R34;LINKAGE=A

[28] Solution 2 of two solutions with equal fit quality. The significance of the $\psi(4040)$ signal is 3.6 σ.

NODE=M072R34;LINKAGE=B

$\Gamma(J/\psi\pi^+\pi^-)/\Gamma_{total}$ — Γ_{18}/Γ

NODE=M072R01

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<4	90	COAN	06	CLEO	3.97–4.06 $e^+e^- \to$ hadrons

$\Gamma(J/\psi\pi^0\pi^0)/\Gamma_{total}$ — Γ_{19}/Γ

NODE=M072R02

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<2	90	COAN	06	CLEO	3.97–4.06 $e^+e^- \to$ hadrons

$\Gamma(J/\psi\eta)/\Gamma_{total}$ — Γ_{20}/Γ

NODE=M072R03

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
5.2±0.5±0.5		[29] ABLIKIM	12K	BES3	$e^+e^- \to \ell^+\ell^- 2\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<7	90	COAN	06	CLEO	3.97–4.06 $e^+e^- \to$ hadrons

[29] ABLIKIM 12K measure $\sigma(e^+e^- \to J/\psi\eta) = 32.1 \pm 2.8 \pm 1.3$ pb. They assume the $\eta J/\psi$ fully originates from $\psi(4040)$ decays.

NODE=M072R03;LINKAGE=AB

$\Gamma(J/\psi\pi^0)/\Gamma_{total}$ — Γ_{21}/Γ

NODE=M072R04

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.28	90	[30] ABLIKIM	12K	BES3	$e^+e^- \to \ell^+\ell^- 2\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<2	90	COAN	06	CLEO	3.97–4.06 $e^+e^- \to$ hadrons

[30] ABLIKIM 12K measure $\sigma(e^+e^- \to J/\psi\pi^0)$ <1.6 pb. They assume the $\eta J/\psi$ fully originates from $\psi(4040)$ decays.

NODE=M072R04;LINKAGE=AB

$\Gamma(J/\psi\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{22}/Γ

NODE=M072R05

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<2	90	COAN	06	CLEO	3.97–4.06 $e^+e^- \to$ hadrons

$\Gamma(\chi_{c1}\gamma)/\Gamma_{total}$ — Γ_{23}/Γ

NODE=M072R06

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<11	90	COAN	06	CLEO	3.97–4.06 $e^+e^- \to$ hadrons

$\Gamma(\chi_{c2}\gamma)/\Gamma_{total}$ — Γ_{24}/Γ

NODE=M072R07

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<17	90	COAN	06	CLEO	3.97–4.06 $e^+e^- \to$ hadrons

$\Gamma(\chi_{c1}\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{25}/Γ

NODE=M072R08

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<11	90	COAN	06	CLEO	3.97–4.06 $e^+e^- \to$ hadrons

$\Gamma(\chi_{c2}\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{26}/Γ

NODE=M072R09

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<32	90	COAN	06	CLEO	3.97–4.06 $e^+e^- \to$ hadrons

$\Gamma(h_c(1P)\pi^+\pi^-)/\Gamma_{total}$ — Γ_{27}/Γ

NODE=M072R24

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<3	90	[31] PEDLAR	11	CLEO	$e^+e^- \to h_c(1P)\pi^+\pi^-$

[31] From several values of $\sqrt{s}$ near the peak of the $\psi(4040)$, PEDLAR 11 measures $\sigma(e^+e^- \to h_c(1P)\pi^+\pi^-) = 1.0 \pm 8.0 \pm 5.4 \pm 0.2$ pb, where the errors are statistical, systematic, and due to uncertainty in B($\psi(2S) \to \pi^0 h_c(1P)$), respectively.

NODE=M072R24;LINKAGE=PE

$\Gamma(\phi\pi^+\pi^-)/\Gamma_{total}$ — Γ_{28}/Γ

NODE=M072R10

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<3	90	COAN	06	CLEO	3.97–4.06 $e^+e^- \to$ hadrons

$\Gamma(\Lambda\bar{\Lambda}\pi^+\pi^-)/\Gamma_{total}$ — Γ_{29}/Γ

NODE=M072R26

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<2.9	90	[32] ABLIKIM	13Q	BES3	$e^+e^- \to \psi(4040)$

[32] Assuming that interference effects between resonance and continuum can be neglected.

NODE=M072R26;LINKAGE=A

$\Gamma(\Lambda\overline{\Lambda}\pi^0)/\Gamma_{total}$ — Γ_{30}/Γ

NODE=M072R27
NODE=M072R27

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.9	90	[33] ABLIKIM	13Q	BES3	$e^+e^- \rightarrow \psi(4040)$

[33] Assuming that interference effects between resonance and continuum can be neglected.

NODE=M072R27;LINKAGE=A

$\Gamma(\Lambda\overline{\Lambda}\eta)/\Gamma_{total}$ — Γ_{31}/Γ

NODE=M072R28
NODE=M072R28

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<3.0	90	[34] ABLIKIM	13Q	BES3	$e^+e^- \rightarrow \psi(4040)$

[34] Assuming that interference effects between resonance and continuum can be neglected.

NODE=M072R28;LINKAGE=A

$\Gamma(\Sigma^+\overline{\Sigma}^-)/\Gamma_{total}$ — Γ_{33}/Γ

NODE=M072R29
NODE=M072R29

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.3	90	[35] ABLIKIM	13Q	BES3	$e^+e^- \rightarrow \psi(4040)$

[35] Assuming that interference effects between resonance and continuum can be neglected.

NODE=M072R29;LINKAGE=A

$\Gamma(\Sigma^0\overline{\Sigma}^0)/\Gamma_{total}$ — Γ_{34}/Γ

NODE=M072R30
NODE=M072R30

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.7	90	[36] ABLIKIM	13Q	BES3	$e^+e^- \rightarrow \psi(4040)$

[36] Assuming that interference effects between resonance and continuum can be neglected.

NODE=M072R30;LINKAGE=A

$\Gamma(\Xi^+\overline{\Xi}^-)/\Gamma_{total}$ — Γ_{35}/Γ

NODE=M072R31
NODE=M072R31

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.6	90	[37] ABLIKIM	13Q	BES3	$e^+e^- \rightarrow \psi(4040)$

[37] Assuming that interference effects between resonance and continuum can be neglected.

NODE=M072R31;LINKAGE=A

$\Gamma(\Xi^0\overline{\Xi}^0)/\Gamma_{total}$ — Γ_{36}/Γ

NODE=M072R32
NODE=M072R32

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.8	90	[38] ABLIKIM	13Q	BES3	$e^+e^- \rightarrow \psi(4040)$

[38] Assuming that interference effects between resonance and continuum can be neglected.

NODE=M072R32;LINKAGE=A

$\psi(4040)$ REFERENCES

NODE=M072

ABLIKIM	21AS	PR D104 L091104	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61454
ABLIKIM	21AW	PR D104 112009	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61479
ABLIKIM	20AG	PR D102 112009	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60744
ABLIKIM	20O	PR D102 031101	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60344
ZHUKOVA	18	PR D97 012002	V. Zhukova *et al.*	(BELLE Collab.)	REFID=58710
HAN	15	PR D92 012011	Y.L. Han *et al.*	(BELLE Collab.)	REFID=56816
ABLIKIM	13Q	PR D87 112011	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55393
WANG	13B	PR D87 051101	X.L. Wang *et al.*	(BELLE Collab.)	REFID=55377
ABLIKIM	12K	PR D86 071101	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54738
PAKHLOVA	11	PR D83 011101	G. Pakhlova *et al.*	(BELLE Collab.)	REFID=53638
PEDLAR	11	PRL 107 041803	T. Pedlar *et al.*	(CLEO Collab.)	REFID=16787
DEL-AMO-SA...	10N	PR D82 052004	P. del Amo Sanchez *et al.*	(BABAR Collab.)	REFID=53532
MO	10	PR D82 077501	X.H. Mo, C.Z. Yuan, P. Wang	(BHEP)	REFID=53540
AUBERT	09M	PR D79 092001	B. Aubert *et al.*	(BABAR Collab.)	REFID=52724
CRONIN-HEN...	09	PR D80 072001	D. Cronin-Hennessy *et al.*	(CLEO Collab.)	REFID=53114
PAKHLOVA	09	PR D80 091101	G. Pakhlova *et al.*	(BELLE Collab.)	REFID=53143
ABLIKIM	08D	PL B660 315	M. Ablikim *et al.*	(BES Collab.)	REFID=52142
PAKHLOVA	08	PR D77 011103	G. Pakhlova *et al.*	(BELLE Collab.)	REFID=52132
PAKHLOVA	08A	PRL 100 062001	G. Pakhlova *et al.*	(BELLE Collab.)	REFID=52134
PAKHLOVA	07	PRL 98 092001	G. Pakhlova *et al.*	(BELLE Collab.)	REFID=51628
COAN	06	PRL 96 162003	T.E. Coan *et al.*	(CLEO Collab.)	REFID=51075
SETH	05A	PR D72 017501	K.K. Seth		REFID=50813
BAI	02C	PRL 88 101802	J.Z. Bai *et al.*	(BES Collab.)	REFID=50506
BAI	00	PRL 84 594	J.Z. Bai *et al.*	(BES Collab.)	REFID=50503
OSTERHELD	86	SLAC-PUB-4160	A. Osterheld *et al.*	(SLAC Crystal Ball Collab.)	REFID=51064
BRANDELIK	78C	PL 76B 361	R. Brandelik *et al.*	(DASP Collab.)	REFID=22232
Also		ZPHY C1 233	R. Brandelik *et al.*	(DASP Collab.)	REFID=22114
FELDMAN	77	PRPL 33C 285	G.J. Feldman, M.L. Perl	(LBL, SLAC)	REFID=22062
GOLDHABER	77	PL 69B 503	G. Goldhaber *et al.*	(Mark I Collab.)	REFID=11434

NODE=M191

$X(4050)^{\pm}$

$I^G(J^{PC}) = 1^-(?^{?+})$
I, G, C need confirmation.

OMITTED FROM SUMMARY TABLE

Properties incompatible with a $q\overline{q}$ structure (exotic state). See the review on non-$q\overline{q}$ states.

NODE=M191

Observed by MIZUK 08 in the $\pi^+\chi_{c1}(1P)$ invariant mass distribution in $\overline{B}^0 \rightarrow K^-\pi^+\chi_{c1}(1P)$ decays. Not seen by LEES 12B in this same mode after accounting for $K\pi$ resonant mass and angular structure.

$X(4050)^{\pm}$ MASS

NODE=M191M

NODE=M191M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
$4051 \pm 14^{+20}_{-41}$	[1] MIZUK	08	BELL	$\overline{B}^0 \rightarrow K^-\pi^+\chi_{c1}(1P)$

[1] From a Dalitz plot analysis with two Breit-Wigner amplitudes.

NODE=M191M;LINKAGE=MI

$X(4050)^{\pm}$ WIDTH

NODE=M191W

NODE=M191W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
$82^{+21}_{-17}{}^{+47}_{-22}$	[1] MIZUK	08	BELL	$\overline{B}^0 \rightarrow K^-\pi^+\chi_{c1}(1P)$

[1] From a Dalitz plot analysis with two Breit-Wigner amplitudes.

NODE=M191W;LINKAGE=MI

$X(4050)^{\pm}$ DECAY MODES

NODE=M191215;NODE=M191

	Mode	Fraction (Γ_i/Γ)
Γ_1	$\pi^+\chi_{c1}(1P)$	seen
Γ_2	$\pi^{\pm}\psi(3770)$	not seen
Γ_3	$\pi^{\pm}\chi_{c0}(1P)$	not seen
Γ_4	$\pi^{\pm}\chi_{c2}(1P)$	not seen

DESIG=1
DESIG=2
DESIG=3
DESIG=4

$X(4050)^{\pm}$ BRANCHING RATIOS

NODE=M191225

$\Gamma(\pi^+\chi_{c1}(1P))/\Gamma_{\text{total}}$ Γ_1/Γ

NODE=M191R01
NODE=M191R01

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen		[1] MIZUK	08	BELL	$\overline{B}^0 \rightarrow K^-\pi^+\chi_{c1}(1P)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
not seen	16	[2] ABLIKIM	21W	BES3	$e^+e^- \rightarrow \chi_{cJ}\pi^+\pi^+$
not seen		[3] LEES	12B	BABR	$B \rightarrow K\pi\chi_{c1}(1P)$

[1] With a product branching fraction measurement of B($\overline{B}^0 \rightarrow K^- X(4050)^+$) $\times$ B($X(4050)^+ \rightarrow \pi^+\chi_{c1}(1P)$) $= (3.0^{+1.5}_{-0.8}{}^{+3.7}_{-1.6}) \times 10^{-5}$.

NODE=M191R01;LINKAGE=MI

[2] ABLIKIM 21W measurement is limited by statistics.

NODE=M191R01;LINKAGE=A

[3] With a product branching fraction limit of B($\overline{B}^0 \rightarrow X(4050)^+ K^-$) $\times$ B($X(4050)^+ \rightarrow \chi_{c1}\pi^+$) $< 1.8 \times 10^{-5}$ at 90% CL.

NODE=M191R01;LINKAGE=LE

$\Gamma(\pi^{\pm}\chi_{c0}(1P))/\Gamma_{\text{total}}$ Γ_3/Γ

NODE=M191R02
NODE=M191R02

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
not seen	18	[1] ABLIKIM	21W	BES3	$e^+e^- \rightarrow \chi_{cJ}\pi^+\pi^+$

[1] ABLIKIM 21W measurement is limited by statistics.

NODE=M191R02;LINKAGE=A

$\Gamma(\pi^{\pm}\chi_{c2}(1P))/\Gamma_{\text{total}}$ Γ_4/Γ

NODE=M191R03
NODE=M191R03

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
not seen	14	[1] ABLIKIM	21W	BES3	$e^+e^- \rightarrow \chi_{cJ}\pi^+\pi^+$

[1] ABLIKIM 21W measurement is limited by statistics.

NODE=M191R03;LINKAGE=A

$\Gamma(\pi^{\pm}\psi(3770))/\Gamma_{\text{total}}$ Γ_2/Γ

NODE=M191R00
NODE=M191R00

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	[1] ABLIKIM	19AR	BES3	$e^+e^- \rightarrow \pi^+\pi^- D\overline{D}$

[1] From a measurement of $\sigma(e^+e^- \rightarrow \pi^+\pi^- D\overline{D})$ between $\sqrt{s} = 4.08$ and 4.6 GeV.

NODE=M191R00;LINKAGE=A

$X(4050)^{\pm}$ REFERENCES

NODE=M191

ABLIKIM	21W	PR D103 052010	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61221
ABLIKIM	19AR	PR D100 032005	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59910
LEES	12B	PR D85 052003	J.P. Lees *et al.*	(BABAR Collab.)	REFID=54042
MIZUK	08	PR D78 072004	R. Mizuk *et al.*	(BELLE Collab.)	REFID=52535

NODE=M223

$X(4055)^{\pm}$

$I^G(J^{PC}) = 1^+(?^{?-})$
I, *G*, *C* need confirmation.

OMITTED FROM SUMMARY TABLE

Properties incompatible with a $q\overline{q}$ structure (exotic state). See the review on non-$q\overline{q}$ states.

NODE=M223

Needs confirmation. Seen by WANG 15A in the $\psi(2S)\pi^+$ invariant mass distribution in $\psi(4360) \rightarrow \psi(2S)\pi^+\pi^-$ decay.

$X(4055)^{\pm}$ MASS

NODE=M223M

NODE=M223M

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
4054 ±3 ±1	[1] WANG	15A	BELL	10.58 $e^+e^- \rightarrow \gamma\pi^+\pi^-\psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
4039.3±6.0	[2] ABLIKIM	18K	BES3	$e^+e^- \rightarrow \pi^0\pi^0\psi(2S)$
4032.1±2.4	[3] ABLIKIM	17V	BES3	$e^+e^- \rightarrow \pi^+\pi^-\psi(2S)$

OCCUR=2

[1] Statistical significance of 3.5 σ. NODE=M223M;LINKAGE=A

[2] Statistical error only, with significance of 5.9 σ (from a fit with a 19% CL). Identified as the same structure observed in ABLIKIM 17V in $e^+e^- \rightarrow \pi^+\pi^-\psi(2S)$ decays. NODE=M223M;LINKAGE=C

[3] Statistical error only, with significance of 9.2 σ. From an unbinned maximum likelihood fit of the $\pi^+\pi^-\psi(2S)$ Dalitz plot from data collected at $\sqrt{s}$ = 4.416 GeV for a $J^C = 1^+$ state. The fit does not match the detailed structure of the data, having a C.L. of only 8%. NODE=M223M;LINKAGE=B

$X(4055)^{\pm}$ WIDTH

NODE=M223W

NODE=M223W

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
45 ±11 ±6	[1] WANG	15A	BELL	10.58 $e^+e^- \rightarrow \gamma\pi^+\pi^-\psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
31.9±14.8	[2] ABLIKIM	18K	BES3	$e^+e^- \rightarrow \pi^0\pi^0\psi(2S)$
26.1± 5.3	[3] ABLIKIM	17V	BES3	$e^+e^- \rightarrow \pi^+\pi^-\psi(2S)$

[1] Statistical significance of 3.5 σ. NODE=M223W;LINKAGE=A

[2] Statistical error only, with significance of 5.9 σ (from a fit with a 19% CL). Identified as the same structure observed in ABLIKIM 17V in $e^+e^- \rightarrow \pi^+\pi^-\psi(2S)$ decays. NODE=M223W;LINKAGE=C

[3] Statistical error only, with significance of 9.2 σ. From an unbinned maximum likelihood fit of the $\pi^+\pi^-\psi(2S)$ Dalitz plot from data collected at $\sqrt{s}$ = 4.416 GeV for a $J^C = 1^+$ state. The fit does not match the detailed structure of the data, having a C.L. of only 8%. NODE=M223W;LINKAGE=B

$X(4055)^{\pm}$ DECAY MODES

NODE=M223215;NODE=M223

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\pi^+\psi(2S)$	seen	DESIG=1
Γ_2	$\pi^{\pm}\psi(3770)$	not seen	DESIG=2

$X(4055)^{\pm}$ BRANCHING RATIOS

NODE=M223225

$\Gamma(\pi^+\psi(2S))/\Gamma_{total}$ Γ_1/Γ

NODE=M223R01
NODE=M223R01

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
seen	[1] WANG	15A	BELL	10.58 $e^+e^- \rightarrow \gamma\pi^+\pi^-\psi(2S)$

[1] Statistical significance of 3.5 σ. NODE=M223R01;LINKAGE=A

$\Gamma(\pi^{\pm}\psi(3770))/\Gamma_{total}$ Γ_2/Γ

NODE=M223R00
NODE=M223R00

VALUE	DOCUMENT ID	TECN	COMMENT
not seen	[1] ABLIKIM 19AR	BES3	$e^+e^- \to \pi^+\pi^- D\overline{D}$

[1] From a measurement of $\sigma(e^+e^- \to \pi^+\pi^- D\overline{D})$ between $\sqrt{s}$ = 4.08 and 4.6 GeV.

NODE=M223R00;LINKAGE=A

$X(4055)^{\pm}$ REFERENCES

NODE=M223

ABLIKIM	19AR	PR D100 032005	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59910
ABLIKIM	18K	PR D97 052001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58896
ABLIKIM	17V	PR D96 032004	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58029
Also		PR D99 019903 (errat.)	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59611
WANG	15A	PR D91 112007	X.L. Wang *et al.*	(BELLE Collab.)	REFID=56839

NODE=M240

$X(4100)^{\pm}$

$I^G(J^{PC}) = 1^-(?^{??})$

OMITTED FROM SUMMARY TABLE

Properties incompatible with a $q\overline{q}$ structure (exotic state). See the review on non-$q\overline{q}$ states.

NODE=M240

Reported by AAIJ 18AN in the $\eta_c(1S)\pi^-$ invariant mass distribution in $B^0 \to \eta_c(1S)K^+\pi^-$ decays with a significance of 3.4σ. J^P = 0^+ or 1^- assignment consistent with data.

$X(4100)^{\pm}$ MASS

NODE=M240M

NODE=M240M

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
$\mathbf{4096\pm20^{+18}_{-22}}$	AAIJ 18AN	LHCB	$B^0 \to \eta_c(1S)K^+\pi^-$

$X(4100)^{\pm}$ WIDTH

NODE=M240W

NODE=M240W

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
$\mathbf{152\pm58^{+60}_{-35}}$	AAIJ 18AN	LHCB	$B^0 \to \eta_c(1S)K^+\pi^-$

$X(4100)^{\pm}$ DECAY MODES

NODE=M240215;NODE=M240

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\eta_c(1S)\pi^-$	seen	DESIG=1
Γ_2	$\pi^{\pm}\psi(3770)$	not seen	DESIG=2

$X(4100)^{\pm}$ BRANCHING RATIOS

NODE=M240225

$\Gamma(\eta_c(1S)\pi^-)/\Gamma_{total}$ Γ_1/Γ

NODE=M240R01
NODE=M240R01

VALUE	DOCUMENT ID	TECN	COMMENT
seen	[1] AAIJ 18AN	LHCB	$B^0 \to \eta_c(1S)K^+\pi^-$

[1] AAIJ 18AN quotes a fit fraction for $B^0 \to X(4100)^- K^+ \to \eta_c(1S)\pi^- K^+$ of $(3.3 \pm 1.1^{+1.2}_{-1.1})$% from an amplitude analysis.

NODE=M240R01;LINKAGE=A

$\Gamma(\pi^{\pm}\psi(3770))/\Gamma_{total}$ Γ_2/Γ

NODE=M240R00
NODE=M240R00

VALUE	DOCUMENT ID	TECN	COMMENT
not seen	[1] ABLIKIM 19AR	BES3	$e^+e^- \to \pi^+\pi^- D\overline{D}$

[1] From a measurement of $\sigma(e^+e^- \to \pi^+\pi^- D\overline{D})$ between $\sqrt{s}$ = 4.08 and 4.6 GeV.

NODE=M240R00;LINKAGE=A

$X(4100)^{\pm}$ REFERENCES

NODE=M240

ABLIKIM	19AR	PR D100 032005	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59910
AAIJ	18AN	EPJ C78 1019	R. Aaij *et al.*	(LHCb Collab.)	REFID=59335

NODE=M193

$\chi_{c1}(4140)$

$I^G(J^{PC}) = 0^+(1^{++})$

was $X(4140)$

NODE=M193

This state shows properties different from a conventional $q\overline{q}$ state. A candidate for an exotic structure. See the review on non-$q\overline{q}$ states.

Seen by AALTONEN 09AH, ABAZOV 14A, CHATRCHYAN 14M, AAIJ 17C in $B^+ \to \chi_{c1} K^+$, $\chi_{c1} \to J/\psi\phi$, and by ABAZOV 15M separately in both prompt (4.7 σ) and non-prompt (5.6 σ) production in $p\overline{p} \to J/\psi\phi +$ anything. Not seen by SHEN 10 in $\gamma\gamma \to J/\psi\phi$ and ABLIKIM 15 in $e^+e^- \to \gamma J/\psi\phi$ at $\sqrt{s}$ = 4.23, 4.26, 4.36 GeV.

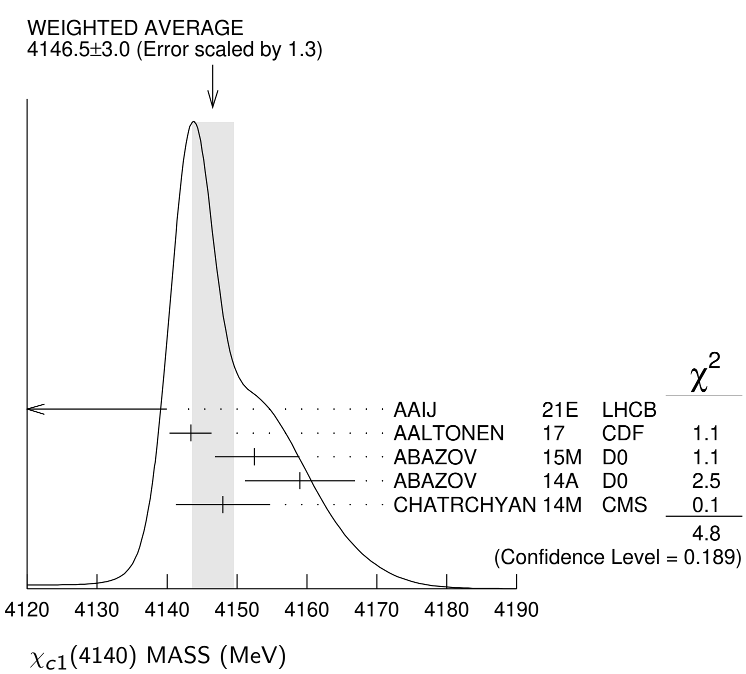
$\chi_{c1}(4140)$ MASS

NODE=M193M

NODE=M193M
NEW

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
4146.5± 3.0 OUR AVERAGE		Error includes scale factor of 1.3. See the ideogram below.		
[4146.8 ± 2.4 MeV OUR 2021 AVERAGE Scale factor = 1.1]				
$4118 \pm 11 ^{+19}_{-36}$	24k	[1] AAIJ 21E	LHCB	$B^+ \to J/\psi\phi K^+$
$4143.4^{+2.9}_{-3.0} \pm 0.6$	19	[2] AALTONEN 17	CDF	$B^+ \to J/\psi\phi K^+$
$4152.5 \pm 1.7^{+6.2}_{-5.4}$	616	[3] ABAZOV 15M	D0	$p\overline{p} \to J/\psi\phi +$ anything
$4159.0 \pm 4.3 \pm 6.6$	52	[4] ABAZOV 14A	D0	$B^+ \to J/\psi\phi K^+$
$4148.0 \pm 2.4 \pm 6.3$	0.3k	[5] CHATRCHYAN 14M	CMS	$B^+ \to J/\psi\phi K^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$4146.5 \pm 4.5^{+4.6}_{-2.8}$	4289	[6,7] AAIJ 17C	LHCB	$B^+ \to J/\psi\phi K^+$
$4143.0 \pm 2.9 \pm 1.2$	14	[8,9] AALTONEN 09AH	CDF	$B^+ \to J/\psi\phi K^+$

[1] From an amplitude analysis of the decay $B^+ \to J/\psi\phi K^+$ with a significance of 13 σ. NODE=M193M;LINKAGE=G
[2] Statistical significance of more than 5 σ. NODE=M193M;LINKAGE=E
[3] Statistical significance of more than 6 σ. NODE=M193M;LINKAGE=C
[4] Statistical significance of 3.1 σ. NODE=M193M;LINKAGE=A
[5] From a fit assuming an S-wave relativistic Breit-Wigner shape above a three-body phase-space non-resonant component with statistical significance of more than 5 σ. NODE=M193M;LINKAGE=B
[6] From an amplitude analysis of the decay $B^+ \to J/\psi\phi K^+$ with a significance of 8.4 σ. NODE=M193M;LINKAGE=D
[7] Superseded by AAIJ 21E. NODE=M193M;LINKAGE=H
[8] Statistical significance of 3.8 σ. NODE=M193M;LINKAGE=AA
[9] Superseded by AALTONEN 17. NODE=M193M;LINKAGE=F



$\chi_{c1}(4140)$ WIDTH

NODE=M193W

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
$19\ ^{+7}_{-5}$ OUR AVERAGE				
[22^{+8}_{-7} MeV OUR 2021 AVERAGE Scale factor = 1.3]				
$162\ \pm 21\ ^{+24}_{-49}$	24k	[1] AAIJ	21E LHCB	$B^+ \to J/\psi \phi K^+$
$15.3^{+10.4}_{-6.1} \pm 2.5$	19	[2] AALTONEN	17 CDF	$B^+ \to J/\psi \phi K^+$
$16.3 \pm 5.6 \pm 11.4$	616	[3] ABAZOV	15M D0	$p\overline{p} \to J/\psi \phi +$ anything
$20\ \pm 13\ ^{+3}_{-8}$	52	[4] ABAZOV	14A D0	$B^+ \to J/\psi \phi K^+$
$28\ ^{+15}_{-11} \pm 19$	0.3k	[5] CHATRCHYAN	14M CMS	$B^+ \to J/\psi \phi K^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$83\ \pm 21\ ^{+21}_{-14}$	4289	[6,7] AAIJ	17C LHCB	$B^+ \to J/\psi \phi K^+$
$11.7^{+8.3}_{-5.0} \pm 3.7$	14	[8,9] AALTONEN	09AH CDF	$B^+ \to J/\psi \phi K^+$

NEW

[1] From an amplitude analysis of the decay $B^+ \to J/\psi \phi K^+$ with a significance of 13 σ. NODE=M193W;LINKAGE=G
[2] Statistical significance of more than 5 σ. NODE=M193W;LINKAGE=E
[3] Statistical significance of more than 6 σ. NODE=M193W;LINKAGE=C
[4] Statistical significance of 3.1 σ. NODE=M193W;LINKAGE=A
[5] From a fit assuming an S-wave relativistic Breit-Wigner shape above a three-body phase-space non-resonant component with statistical significance of more than 5 σ. NODE=M193W;LINKAGE=B
[6] From an amplitude analysis of the decay $B^+ \to J/\psi \phi K^+$ with a significance of 8.4 σ. NODE=M193W;LINKAGE=D
[7] Superseded by AAIJ 21E. NODE=M193W;LINKAGE=H
[8] Statistical significance of 3.8 σ. NODE=M193W;LINKAGE=AA
[9] Superseded by AALTONEN 17. NODE=M193W;LINKAGE=F

$\chi_{c1}(4140)$ DECAY MODES

NODE=M193215;NODE=M193

	Mode	Fraction (Γ_i/Γ)
Γ_1	$J/\psi \phi$	seen
Γ_2	$\gamma\gamma$	not seen

DESIG=1
DESIG=2

$\chi_{c1}(4140)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M193220

$\Gamma(\gamma\gamma) \times \Gamma(J/\psi\phi)/\Gamma_{\text{total}}$ — $\Gamma_2\Gamma_1/\Gamma$

NODE=M193G01
NODE=M193G01

VALUE (eV)	CL%	DOCUMENT ID	TECN	COMMENT
<41	90	[1] SHEN 10	BELL	10.6 $e^+e^- \to e^+e^- J/\psi\phi$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<6	90	[2] SHEN 10	BELL	10.6 $e^+e^- \to e^+e^- J/\psi\phi$

OCCUR=2

[1] For $J^P = 0^+$. NODE=M193G01;LINKAGE=S0
[2] For $J^P = 2^+$. NODE=M193G01;LINKAGE=S2

$\chi_{c1}(4140)$ BRANCHING RATIOS

NODE=M193225

$\Gamma(J/\psi\phi)/\Gamma_{\text{total}}$ — Γ_1/Γ

NODE=M193R01
NODE=M193R01

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
seen	24k	[1] AAIJ	21E LHCB	$B^+ \to J/\psi \phi K^+$
seen	616	[2] ABAZOV	15M D0	$p\overline{p} \to J/\psi \phi +$ anything
seen	52	[3] ABAZOV	14A D0	$B^+ \to J/\psi \phi K^+$
seen	0.3k	[4] CHATRCHYAN	14M CMS	$B^+ \to J/\psi \phi K^+$
seen	14	[5] AALTONEN	09AH CDF	$B^+ \to J/\psi \phi K^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	4289	[6,7] AAIJ	17C LHCB	$B^+ \to J/\psi \phi K^+$
not seen		[8] ABLIKIM	15 BES3	$e^+e^- \to \gamma \phi J/\psi$
not seen		[9] AAIJ	12AA LHCB	$pp \to B^+ X$ at 7 TeV

[1] From an amplitude analysis of the decay $B^+ \to J/\psi\phi K^+$ with a significance of 13 σ.
[2] Statistical significance of more than 6 σ.
[3] ABAZOV 14A reports $B(B^+ \to \chi_{c1}(4140) K^+ \to J/\psi\phi K^+)/B(B^+ \to J/\psi\phi K^+) = (19 \pm 7 \pm 4)\%$ with 3.1 σ signficance.
[4] From a fit assuming an S-wave relativistic Breit-Wigner shape above a three-body phase-space non-resonant component with statistical significance of more than 5 σ.
[5] Statistical significance of 3.8 σ.
[6] From an amplitude analysis of the decay $B^+ \to J/\psi\phi K^+$ with a significance of 8.4 σ.
[7] Superseded by AAIJ 21E.
[8] Reported $\sigma(e^+e^- \to \gamma\chi_{c1}(4140))\cdot B(\chi_{c1}(4140) \to J/\psi\phi) < 0.35$, 0.28, and 0.33 pb at 4.23, 4.26, and 4.36 GeV, respectively, at 90% CL.
[9] Reported $B(B^+ \to \chi_{c1}(4140) K^+)\cdot B(\chi_{c1}(4140) \to J/\psi\phi)/B(B^+ \to J/\psi\phi K^+) <$ 0.07 at 90% CL.

NODE=M193R01;LINKAGE=F
NODE=M193R01;LINKAGE=D
NODE=M193R01;LINKAGE=A
NODE=M193R01;LINKAGE=C
NODE=M193R01;LINKAGE=AA
NODE=M193R01;LINKAGE=E
NODE=M193R01;LINKAGE=G
NODE=M193R01;LINKAGE=B
NODE=M193R01;LINKAGE=AI

$\Gamma(\gamma\gamma)/\Gamma_{total}$ — Γ_2/Γ

NODE=M193R02
NODE=M193R02

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	SHEN	10	BELL	10.6 $e^+e^- \to e^+e^- J/\psi\phi$

χ_{c1}(4140) REFERENCES

NODE=M193

AAIJ	21E	PRL 127 082001	R. Aaij *et al.*	(LHCb Collab.)	REFID=61150
AAIJ	17C	PRL 118 022003	R. Aaij *et al.*	(LHCb Collab.) JP	REFID=57657
Also		PR D95 012002	R. Aaij *et al.*	(LHCb Collab.)	REFID=57636
AALTONEN	17	MPL A32 1750139	T. Altonen *et al.*	(CDF Collab.)	REFID=58161
ABAZOV	15M	PRL 115 232001	V.M. Abazov *et al.*	(D0 Collab.)	REFID=56957
ABLIKIM	15	PR D91 032002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56368
ABAZOV	14A	PR D89 012004	V.M. Abazov *et al.*	(D0 Collab.)	REFID=55650
CHATRCHYAN	14M	PL B734 261	S. Chatrchyan *et al.*	(CMS Collab.)	REFID=55753
AAIJ	12AA	PR D85 091103	R. Aaij *et al.*	(LHCb Collab.)	REFID=54263
SHEN	10	PRL 104 112004	C.P. Shen *et al.*	(BELLE Collab.)	REFID=53235
AALTONEN	09AH	PRL 102 242002	T. Aaltonen *et al.*	(CDF Collab.)	REFID=52968

NODE=M025

$\psi(4160)$

$I^G(J^{PC}) = 0^-(1^{--})$

ψ(4160) MASS

NODE=M025M

NODE=M025M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
4191 ± 5 OUR AVERAGE				
$4191 {}^{+9}_{-8}$	AAIJ	13BC	LHCB	$B^+ \to K^+\mu^+\mu^-$
4191.7 ± 6.5	[1] ABLIKIM	08D	BES2	$e^+e^- \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •				
4193 ± 7	[2] MO	10	RVUE	$e^+e^- \to$ hadrons
4151 ± 4	[3] SETH	05A	RVUE	$e^+e^- \to$ hadrons
4155 ± 5	[4] SETH	05A	RVUE	$e^+e^- \to$ hadrons
4159 ± 20	BRANDELIK	78C	DASP	e^+e^-

OCCUR=2

[1] Reanalysis of data presented in BAI 02C. From a global fit over the center-of-mass energy region 3.7–5.0 GeV covering the ψ(3770), ψ(4040), ψ(4160), and ψ(4415) resonances. Phase angle fixed in the fit to $\delta = (293 \pm 57)^\circ$.
[2] Reanalysis of data presented in BAI 00 and BAI 02C. From a global fit over the center-of-mass energy 3.8-4.8 GeV covering the ψ(4040), ψ(4160) and ψ(4415) resonances and including interference effects.
[3] From a fit to Crystal Ball (OSTERHELD 86) data.
[4] From a fit to BES (BAI 02C) data.

NODE=M025M;LINKAGE=AB
NODE=M025M;LINKAGE=MO
NODE=M025M;LINKAGE=ST
NODE=M025M;LINKAGE=SE

ψ(4160) WIDTH

NODE=M025W

NODE=M025W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
70 ± 10 OUR AVERAGE				
$65 {}^{+22}_{-16}$	AAIJ	13BC	LHCB	$B^+ \to K^+\mu^+\mu^-$
71.8 ± 12.3	[1] ABLIKIM	08D	BES2	$e^+e^- \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •				
79 ± 14	[2] MO	10	RVUE	$e^+e^- \to$ hadrons
107 ± 10	[3] SETH	05A	RVUE	$e^+e^- \to$ hadrons
107 ± 16	[4] SETH	05A	RVUE	$e^+e^- \to$ hadrons
78 ± 20	BRANDELIK	78C	DASP	e^+e^-

OCCUR=2

[1] Reanalysis of data presented in BAI 02C. From a global fit over the center-of-mass energy region 3.7–5.0 GeV covering the $\psi(3770)$, $\psi(4040)$, $\psi(4160)$, and $\psi(4415)$ resonances. Phase angle fixed in the fit to $\delta = (293 \pm 57)^{\circ}$. NODE=M025W;LINKAGE=AB

[2] Reanalysis of data presented in BAI 00 and BAI 02C. From a global fit over the center-of-mass energy 3.8-4.8 GeV covering the $\psi(4040)$, $\psi(4160)$ and $\psi(4415)$ resonances and including interference effects. NODE=M025W;LINKAGE=MO

[3] From a fit to Crystal Ball (OSTERHELD 86) data. NODE=M025W;LINKAGE=ST

[4] From a fit to BES (BAI 02C) data. NODE=M025W;LINKAGE=SE

$\psi(4160)$ DECAY MODES

NODE=M025215;NODE=M025

Due to the complexity of the $c\overline{c}$ threshold region, in this listing, "seen" ("not seen") means that a cross section for the mode in question has been measured at effective $\sqrt{s}$ near this particle's central mass value, more (less) than 2σ above zero, without regard to any peaking behavior in $\sqrt{s}$ or absence thereof. See mode listing(s) for details and references.

NODE=M025

	Mode	Fraction (Γ_i/Γ)	Confidence level	
Γ_1	$e^+ e^-$	$(6.9 \pm 3.3) \times 10^{-6}$		DESIG=1
Γ_2	$\mu^+ \mu^-$	seen		DESIG=33
Γ_3	$D \overline{D}$	seen		DESIG=15;OUR EVAL;→ UNCHECKED ←
Γ_4	$D^0 \overline{D}^0$	seen		DESIG=16
Γ_5	$D^+ D^-$	seen		DESIG=17
Γ_6	$D^* \overline{D}$ + c.c.	seen		DESIG=18;OUR EVAL;→ UNCHECKED ←
Γ_7	$D^*(2007)^0 \overline{D}^0$ + c.c.	seen		DESIG=19
Γ_8	$D^*(2010)^+ D^-$ + c.c.	seen		DESIG=20
Γ_9	$D^* \overline{D}^*$	seen		DESIG=21;OUR EVAL;→ UNCHECKED ←
Γ_{10}	$D^*(2007)^0 \overline{D}^*(2007)^0$	seen		DESIG=22
Γ_{11}	$D^*(2010)^+ D^*(2010)^-$	seen		DESIG=23
Γ_{12}	$D^0 D^- \pi^+$+c.c. (excl. $D^*(2007)^0 \overline{D}^0$ +c.c., $D^*(2010)^+ D^-$ +c.c.)	not seen		DESIG=24
Γ_{13}	$D \overline{D}^* \pi$+c.c. (excl. $D^* \overline{D}^*$)	seen		DESIG=25
Γ_{14}	$D^0 D^{*-} \pi^+$+c.c. (excl. $D^*(2010)^+ D^*(2010)^-$)	not seen		DESIG=26
Γ_{15}	$D_s^+ D_s^-$	not seen		DESIG=27
Γ_{16}	$D_s^{*+} D_s^-$ +c.c.	seen		DESIG=28
Γ_{17}	$J/\psi \pi^+ \pi^-$	$< 3 \times 10^{-3}$	90%	DESIG=2
Γ_{18}	$J/\psi \pi^0 \pi^0$	$< 3 \times 10^{-3}$	90%	DESIG=3
Γ_{19}	$J/\psi K^+ K^-$	$< 2 \times 10^{-3}$	90%	DESIG=4
Γ_{20}	$J/\psi \eta$	$< 8 \times 10^{-3}$	90%	DESIG=5
Γ_{21}	$J/\psi \pi^0$	$< 1 \times 10^{-3}$	90%	DESIG=6
Γ_{22}	$J/\psi \eta'$	$< 5 \times 10^{-3}$	90%	DESIG=7
Γ_{23}	$J/\psi \pi^+ \pi^- \pi^0$	$< 1 \times 10^{-3}$	90%	DESIG=8
Γ_{24}	$\psi(2S) \pi^+ \pi^-$	$< 4 \times 10^{-3}$	90%	DESIG=9
Γ_{25}	$\chi_{c1} \gamma$	$< 5 \times 10^{-3}$	90%	DESIG=10
Γ_{26}	$\chi_{c2} \gamma$	< 1.3 %	90%	DESIG=11
Γ_{27}	$\chi_{c1} \pi^+ \pi^- \pi^0$	$< 2 \times 10^{-3}$	90%	DESIG=12
Γ_{28}	$\chi_{c2} \pi^+ \pi^- \pi^0$	$< 8 \times 10^{-3}$	90%	DESIG=13
Γ_{29}	$h_c(1P) \pi^+ \pi^-$	$< 5 \times 10^{-3}$	90%	DESIG=29
Γ_{30}	$h_c(1P) \pi^0 \pi^0$	$< 2 \times 10^{-3}$	90%	DESIG=30
Γ_{31}	$h_c(1P) \eta$	$< 2 \times 10^{-3}$	90%	DESIG=31
Γ_{32}	$h_c(1P) \pi^0$	$< 4 \times 10^{-4}$	90%	DESIG=32
Γ_{33}	$\phi \pi^+ \pi^-$	$< 2 \times 10^{-3}$	90%	DESIG=14
Γ_{34}	$\gamma \chi_{c1}(3872)$	$< 1.8 \times 10^{-3}$	90%	DESIG=44
Γ_{35}	$\gamma X(3915) \to \gamma J/\psi \pi^+ \pi^-$	$< 1.36 \times 10^{-4}$	90%	DESIG=35
Γ_{36}	$\gamma X(3930) \to \gamma J/\psi \pi^+ \pi^-$	$< 1.18 \times 10^{-4}$	90%	DESIG=36
Γ_{37}	$\gamma X(3940) \to \gamma J/\psi \pi^+ \pi^-$	$< 1.47 \times 10^{-4}$	90%	DESIG=37
Γ_{38}	$\gamma X(3915) \to \gamma \gamma J/\psi$	$< 1.26 \times 10^{-4}$	90%	DESIG=39
Γ_{39}	$\gamma X(3930) \to \gamma \gamma J/\psi$	$< 8.8 \times 10^{-5}$	90%	DESIG=40
Γ_{40}	$\gamma X(3940) \to \gamma \gamma J/\psi$	$< 1.79 \times 10^{-4}$	90%	DESIG=41
Γ_{41}	$K^+ K^-$			DESIG=42
Γ_{42}	$K_S^0 K^{\pm} \pi^{\mp}$			DESIG=43
Γ_{43}	$p \overline{p} p \overline{p}$	not seen		DESIG=45
Γ_{44}	$\Lambda \overline{\Lambda}$	$< 1.5 \times 10^{-6}$	90%	DESIG=46

$\psi(4160)$ PARTIAL WIDTHS

NODE=M025220

$\Gamma(e^+e^-)$ — Γ_1

NODE=M025W1

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
0.48±0.22	[1] ABLIKIM	08D	BES2	$e^+e^- \rightarrow$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.4 to 1.1	[2] MO	10	RVUE	$e^+e^- \rightarrow$ hadrons
0.83±0.08	[3] SETH	05A	RVUE	$e^+e^- \rightarrow$ hadrons
0.84±0.13	[4] SETH	05A	RVUE	$e^+e^- \rightarrow$ hadrons
0.77±0.23	BRANDELIK	78C	DASP	e^+e^-

OCCUR=2

[1] Reanalysis of data presented in BAI 02C. From a global fit over the center-of-mass energy region 3.7–5.0 GeV covering the $\psi(3770)$, $\psi(4040)$, $\psi(4160)$, and $\psi(4415)$ resonances. Phase angle fixed in the fit to $\delta = (293 \pm 57)^\circ$.

NODE=M025W1;LINKAGE=AB

[2] Reanalysis of data presented in BAI 00 and BAI 02C. From a global fit over the center-of-mass energy 3.8-4.8 GeV covering the $\psi(4040)$, $\psi(4160)$ and $\psi(4415)$ resonances and including interference effects. Four sets of solutions are obtained with the same fit quality, mass and total width, but with different e^+e^- partial widths. We quote only the range of values.

NODE=M025W1;LINKAGE=MO

[3] From a fit to Crystal Ball (OSTERHELD 86) data.

NODE=M025W1;LINKAGE=ST

[4] From a fit to BES (BAI 02C) data.

NODE=M025W1;LINKAGE=SE

$\Gamma(\mu^+\mu^-)$ — Γ_2

NODE=M025W2

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
2.45±1.24±0.94	[1,2] ABLIKIM	20AG	BES3	$e^+e^- \rightarrow \mu^+\mu^-$

[1] From a fit to the $e^+e^- \rightarrow \mu^+\mu^-$ cross section between 3.8 and 4.6 GeV to the coherent sum of four resonant amplitudes assuming $\Gamma(\mu^+\mu^-) = \Gamma(e^+e^-)$.

NODE=M025W2;LINKAGE=A

[2] From solution 1 of 8 with equal fit quality. Other solutions range from $2.08 \pm 0.99 \pm 0.80$ to $2.45 \pm 1.24 \pm 0.94$ keV.

NODE=M025W2;LINKAGE=B

$\psi(4160)$ $\Gamma(i) \times \Gamma(e^+e^-)/\Gamma(\text{total})$

NODE=M025235

$\Gamma(J/\psi\eta') \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{22}\Gamma_1/\Gamma$

NODE=M025R42

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.17±0.04	86	[1,2] ABLIKIM	20A	BES3	$e^+e^- \rightarrow \eta' J/\psi$
1.07±0.09	86	[1,3] ABLIKIM	20A	BES3	$e^+e^- \rightarrow \eta' J/\psi$

OCCUR=2

[1] Based on a fit to $\sigma(e^+e^- \rightarrow \eta' J/\psi)$ from $\sqrt{s} = 4.18$ to 4.60 GeV assuming interfering $\psi(4160)$ and $\psi(4260)$ contributions. At $\sqrt{s} = 4.18$ GeV, $\sigma(e^+e^- \rightarrow \eta' J/\psi) = 2.4 \pm 0.3 \pm 0.2$ pb.

NODE=M025R42;LINKAGE=A

[2] Solution I of the fit, corresponding to a phase of -0.03 ± 0.44 rad.

NODE=M025R42;LINKAGE=B

[3] Solution II of the fit, corresponding to a phase of 2.54 ± 0.04 rad.

NODE=M025R42;LINKAGE=C

$\Gamma(\chi_{c1}\gamma) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{25}\Gamma_1/\Gamma$

NODE=M025G01

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<2.2	90	[1] HAN	15	BELL	10.58 $e^+e^- \rightarrow \chi_{c1}\gamma$

[1] Using $B(\eta \rightarrow \gamma\gamma) = (39.41 \pm 0.21)\%$.

NODE=M025G01;LINKAGE=A

$\Gamma(\chi_{c2}\gamma) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{26}\Gamma_1/\Gamma$

NODE=M025G02

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<6.1	90	[1] HAN	15	BELL	10.58 $e^+e^- \rightarrow \chi_{c2}\gamma$

[1] Using $B(\eta \rightarrow \gamma\gamma) = (39.41 \pm 0.21)\%$.

NODE=M025G02;LINKAGE=A

$\Gamma(K^0_S K^\pm\pi^\mp) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{42}\Gamma_1/\Gamma$

NODE=M025R00

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.71 ±0.13 ±0.12	[1] ABLIKIM	19AE	BES3	$e^+e^- \rightarrow K^0_S K^\pm\pi^\mp$
0.0095±0.0088±0.0004	[2] ABLIKIM	19AE	BES3	$e^+e^- \rightarrow K^0_S K^\pm\pi^\mp$

OCCUR=5

[1] Solution I of the fit including the $\psi(4160)$ with mass 4191 ± 5 MeV and width 70 ± 10 MeV from PDG 16 and the $\psi(4230)$ with mass $4219.6 \pm 3.3 \pm 5.1$ MeV and width $56.0 \pm 3.6 \pm 6.9$ MeV from GAO 17.

NODE=M025R00;LINKAGE=A

[2] Solution II of the fit including the $\psi(4160)$ with mass 4191 ± 5 MeV and width 70 ± 10 MeV from PDG 16 and the $\psi(4230)$ with mass $4219.6 \pm 3.3 \pm 5.1$ MeV and width $56.0 \pm 3.6 \pm 6.9$ MeV from GAO 17.

NODE=M025R00;LINKAGE=D

$\psi(4160)$ $\Gamma(i) \times \Gamma(e^+e^-)/\Gamma^2(\text{total})$

NODE=M025230

$\Gamma(J/\psi\eta)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{20}/\Gamma \times \Gamma_1/\Gamma$

NODE=M025R32
NODE=M025R32

VALUE (units 10^{-8})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$2.8\pm0.9\pm0.9$	[1] WANG	13B	BELL	$e^+e^- \to J/\psi\eta\gamma$
$12.8\pm1.7\pm2.0$	[2] WANG	13B	BELL	$e^+e^- \to J/\psi\eta\gamma$

OCCUR=2

[1] Solution I of two equivalent solutions in a fit using two interfering resonances. Mass and width fixed at 4153 MeV and 103 MeV, respectively.

NODE=M025R32;LINKAGE=A

[2] Solution II of two equivalent solutions in a fit using two interfering resonances. Mass and width fixed at 4153 MeV and 103 MeV, respectively.

NODE=M025R32;LINKAGE=B

$\psi(4160)$ BRANCHING RATIOS

NODE=M025225

$\Gamma(\mu^+\mu^-)/\Gamma_{total}$ — Γ_2/Γ

NODE=M025R31
NODE=M025R31

VALUE	DOCUMENT ID		TECN	COMMENT
seen	[1] AAIJ	13BC	LHCB	$B^+ \to K^+\mu^+\mu^-$

[1] AAIJ 13BC report $B(B^+ \to K^+\psi(4160))\, B(\psi(4160) \to \mu^+\mu^-) = (3.5^{+0.9}_{-0.8}) \times 10^{-9}$.

NODE=M025R31;LINKAGE=A

$\Gamma(D\overline{D})/\Gamma(D^*\overline{D}^*)$ — Γ_3/Γ_9

NODE=M025R14
NODE=M025R14

VALUE	DOCUMENT ID		TECN	COMMENT
$0.02\pm0.03\pm0.02$	AUBERT	09M	BABR	$e^+e^- \to \gamma D^{(*)}\overline{D}^{(*)}$

$\Gamma(D^0\overline{D}^0)/\Gamma_{total}$ — Γ_4/Γ

NODE=M025R16
NODE=M025R16

VALUE	DOCUMENT ID		TECN	COMMENT
seen	CRONIN-HEN...	09	CLEO	$e^+e^- \to D^0\overline{D}^0$
seen	PAKHLOVA	08	BELL	$e^+e^- \to D^0\overline{D}^0\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	AUBERT	09M	BABR	$e^+e^- \to D^0\overline{D}^0\gamma$

$\Gamma(D^+D^-)/\Gamma_{total}$ — Γ_5/Γ

NODE=M025R17
NODE=M025R17

VALUE	DOCUMENT ID		TECN	COMMENT
seen	CRONIN-HEN...	09	CLEO	$e^+e^- \to D^+D^-$
seen	PAKHLOVA	08	BELL	$e^+e^- \to D^+D^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	AUBERT	09M	BABR	$e^+e^- \to D^+D^-\gamma$

$\Gamma(D^*(2007)^0\overline{D}^0 + \text{c.c.})/\Gamma_{total}$ — Γ_7/Γ

NODE=M025R18
NODE=M025R18

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AUBERT	09M	BABR	$e^+e^- \to D^{*0}\overline{D}^0\gamma$
seen	CRONIN-HEN...	09	CLEO	$e^+e^- \to D^{*0}\overline{D}^0$

$\Gamma(D^*(2010)^+D^- + \text{c.c.})/\Gamma_{total}$ — Γ_8/Γ

NODE=M025R19
NODE=M025R19

VALUE	DOCUMENT ID		TECN	COMMENT
seen	[1] ZHUKOVA	18	BELL	$e^+e^- \to D^{*+}D^-\gamma$
seen	AUBERT	09M	BABR	$e^+e^- \to D^{*+}D^-\gamma$
seen	CRONIN-HEN...	09	CLEO	$e^+e^- \to D^{*+}D^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	PAKHLOVA	07	BELL	$e^+e^- \to D^{*+}D^-\gamma$

[1] Supersedes PAKHLOVA 07.

NODE=M025R19;LINKAGE=A

$\Gamma(D^*\overline{D} + \text{c.c.})/\Gamma(D^*\overline{D}^*)$ — Γ_6/Γ_9

NODE=M025R15
NODE=M025R15

VALUE	DOCUMENT ID		TECN	COMMENT
$0.34\pm0.14\pm0.05$	AUBERT	09M	BABR	$e^+e^- \to \gamma D^{(*)}\overline{D}^{(*)}$

$\Gamma(D^*(2007)^0\overline{D}^*(2007)^0)/\Gamma_{total}$ — Γ_{10}/Γ

NODE=M025R20
NODE=M025R20

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AUBERT	09M	BABR	$e^+e^- \to D^{*0}\overline{D}^{*0}\gamma$
seen	CRONIN-HEN...	09	CLEO	$e^+e^- \to D^{*0}\overline{D}^{*0}$

$\Gamma(D^*(2010)^+ D^*(2010)^-)/\Gamma_{total}$ — Γ_{11}/Γ

NODE=M025R21

VALUE	DOCUMENT ID		TECN	COMMENT
seen	[1] ZHUKOVA	18	BELL	$e^+e^- \to D^{*+}D^{*-}\gamma$
seen	AUBERT	09M	BABR	$e^+e^- \to D^{*+}D^{*-}\gamma$
seen	CRONIN-HEN...	09	CLEO	$e^+e^- \to D^{*+}D^{*-}$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	PAKHLOVA	07	BELL	$e^+e^- \to D^{*+}D^{*-}\gamma$

[1] Supersedes PAKHLOVA 07.

NODE=M025R21;LINKAGE=A

$\Gamma(D^0 D^-\pi^+ + \text{c.c. (excl. } D^*(2007)^0\overline{D}^0 + \text{c.c.}, D^*(2010)^+ D^- + \text{c.c.}))/\Gamma_{total}$ — Γ_{12}/Γ

NODE=M025R22

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	PAKHLOVA	08A	BELL	$e^+e^- \to D^0 D^-\pi^+\gamma$

$\Gamma(D\overline{D}^*\pi + \text{c.c. (excl. } D^*\overline{D}^*))/\Gamma_{total}$ — Γ_{13}/Γ

NODE=M025R23

VALUE	DOCUMENT ID		TECN	COMMENT
seen	CRONIN-HEN...	09	CLEO	$e^+e^- \to D\overline{D}^*\pi$

$\Gamma(D^0 D^{*-}\pi^+ + \text{c.c. (excl. } D^*(2010)^+ D^*(2010)^-))/\Gamma_{total}$ — Γ_{14}/Γ

NODE=M025R24

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	PAKHLOVA	09	BELL	$e^+e^- \to D^0 D^{*-}\pi^+\gamma$

$\Gamma(D_s^+ D_s^-)/\Gamma_{total}$ — Γ_{15}/Γ

NODE=M025R25

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	PAKHLOVA	11	BELL	$e^+e^- \to D_s^+ D_s^-\gamma$
not seen	DEL-AMO-SA...	10N	BABR	$e^+e^- \to D_s^+ D_s^-\gamma$
not seen	CRONIN-HEN...	09	CLEO	$e^+e^- \to D_s^+ D_s^-$

$\Gamma(D_s^{*+} D_s^- + \text{c.c.})/\Gamma_{total}$ — Γ_{16}/Γ

NODE=M025R26

VALUE	DOCUMENT ID		TECN	COMMENT
seen	PAKHLOVA	11	BELL	$e^+e^- \to D_s^{*+} D_s^-\gamma$
seen	DEL-AMO-SA...	10N	BABR	$e^+e^- \to D_s^{*+} D_s^-\gamma$
seen	CRONIN-HEN...	09	CLEO	$e^+e^- \to D_s^{*+} D_s^-$

$\Gamma(J/\psi\pi^+\pi^-)/\Gamma_{total}$ — Γ_{17}/Γ

NODE=M025R01

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<3	90	COAN	06	CLEO	4.12–4.2 $e^+e^- \to$ hadrons

$\Gamma(J/\psi\pi^0\pi^0)/\Gamma_{total}$ — Γ_{18}/Γ

NODE=M025R02

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<3	90	COAN	06	CLEO	4.12–4.2 $e^+e^- \to$ hadrons

$\Gamma(J/\psi K^+K^-)/\Gamma_{total}$ — Γ_{19}/Γ

NODE=M025R03

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<2	90	COAN	06	CLEO	4.12–4.2 $e^+e^- \to$ hadrons

$\Gamma(J/\psi\eta)/\Gamma_{total}$ — Γ_{20}/Γ

NODE=M025R04

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<8	90	COAN	06	CLEO	4.12–4.2 $e^+e^- \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
possibly seen		[1] ABLIKIM	15L	BES3	$e^+e^- \to J/\psi\eta$
seen		WANG	13B	BELL	$e^+e^- \to J/\psi\eta\gamma$

[1] An enhancement around 4.2 GeV is observed.

NODE=M025R04;LINKAGE=A

$\Gamma(J/\psi\pi^0)/\Gamma_{total}$ — Γ_{21}/Γ

NODE=M025R05

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<1	90	COAN	06	CLEO	4.12–4.2 $e^+e^- \to$ hadrons

$\Gamma(J/\psi\eta')/\Gamma_{total}$ — Γ_{22}/Γ

NODE=M025R06

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<5	90	COAN	06	CLEO	4.12–4.2 $e^+e^- \to$ hadrons

$\Gamma(J/\psi\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{23}/Γ

NODE=M025R07
NODE=M025R07

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<1	90	COAN	06	CLEO	4.12–4.2 $e^+e^- \to$ hadrons

$\Gamma(\psi(2S)\pi^+\pi^-)/\Gamma_{total}$ Γ_{24}/Γ

NODE=M025R08
NODE=M025R08

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<4	90	COAN	06	CLEO	4.12–4.2 $e^+e^- \to$ hadrons

$\Gamma(\chi_{c1}\gamma)/\Gamma_{total}$ Γ_{25}/Γ

NODE=M025R09
NODE=M025R09

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<7	90	COAN	06	CLEO	4.12–4.2 $e^+e^- \to$ hadrons

$\Gamma(\chi_{c2}\gamma)/\Gamma_{total}$ Γ_{26}/Γ

NODE=M025R10
NODE=M025R10

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<13	90	COAN	06	CLEO	4.12–4.2 $e^+e^- \to$ hadrons

$\Gamma(\chi_{c1}\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{27}/Γ

NODE=M025R11
NODE=M025R11

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<2	90	COAN	06	CLEO	4.12–4.2 $e^+e^- \to$ hadrons

$\Gamma(\chi_{c2}\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{28}/Γ

NODE=M025R12
NODE=M025R12

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<8	90	COAN	06	CLEO	4.12–4.2 $e^+e^- \to$ hadrons

$\Gamma(h_c(1P)\pi^+\pi^-)/\Gamma_{total}$ Γ_{29}/Γ

NODE=M025R27
NODE=M025R27

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<5	90	[1] PEDLAR	11	CLEO	$e^+e^- \to h_c(1P)\pi^+\pi^-$

[1] At $\sqrt{s}$ = 4170 MeV, PEDLAR 11 measures $\sigma(e^+e^- \to h_c(1P)\pi^+\pi^-) = 15.6 \pm 2.3 \pm 1.9 \pm 3.0$ pb, where the errors are statistical, systematic, and due to uncertainty in B($\psi(2S) \to \pi^0 h_c(1P)$), respectively.

NODE=M025R27;LINKAGE=PE

$\Gamma(h_c(1P)\pi^0\pi^0)/\Gamma_{total}$ Γ_{30}/Γ

NODE=M025R28
NODE=M025R28

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<2	90	[1] PEDLAR	11	CLEO	$e^+e^- \to h_c(1P)\pi^0\pi^0$

[1] At $\sqrt{s}$ = 4170 MeV, PEDLAR 11 measures $\sigma(e^+e^- \to h_c(1P)\pi^0\pi^0) = 3.0 \pm 3.3 \pm 1.1 \pm 0.6$ pb, where the errors are statistical, systematic, and due to uncertainty in B($\psi(2S) \to \pi^0 h_c(1P)$), respectively.

NODE=M025R28;LINKAGE=PE

$\Gamma(h_c(1P)\eta)/\Gamma_{total}$ Γ_{31}/Γ

NODE=M025R29
NODE=M025R29

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<2	90		[1] PEDLAR	11	CLEO	$e^+e^- \to h_c(1P)\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
possibly seen		41	[2] ABLIKIM	17R	BES3	$e^+e^- \to h_c(1P)\eta$

[1] At $\sqrt{s}$ = 4170 MeV, PEDLAR 11 measures $\sigma(e^+e^- \to h_c(1P)\eta) = 4.7 \pm 1.7 \pm 1.0 \pm 0.9$ pb, where the errors are statistical, systematic, and due to uncertainty in B($\psi(2S) \to \pi^0 h_c(1P)$), respectively.

NODE=M025R29;LINKAGE=PE

[2] An enhancement around 4.2 GeV is observed.

NODE=M025R29;LINKAGE=A

$\Gamma(h_c(1P)\pi^0)/\Gamma_{total}$ Γ_{32}/Γ

NODE=M025R30
NODE=M025R30

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.4	90	[1] PEDLAR	11	CLEO	$e^+e^- \to h_c(1P)\pi^0$

[1] At $\sqrt{s}$ = 4170 MeV, PEDLAR 11 measures $\sigma(e^+e^- \to h_c(1P)\pi^0) = -0.7 \pm 1.8 \pm 0.7 \pm 0.1$ pb, where the errors are statistical, systematic, and due to uncertainty in B($\psi(2S) \to \pi^0 h_c(1P)$), respectively.

NODE=M025R30;LINKAGE=PE

$\Gamma(\phi\pi^+\pi^-)/\Gamma_{total}$ Γ_{33}/Γ

NODE=M025R13
NODE=M025R13

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<2	90	COAN	06	CLEO	4.12–4.2 $e^+e^- \to$ hadrons

$\Gamma(\gamma \chi_{c1}(3872))/\Gamma_{total}$ — Γ_{34}/Γ

NODE=M025R43

VALUE	CL%	DOCUMENT ID		COMMENT
<1.8 × 10^{-3}	90	[1,2] XIAO	13	$\psi(4160) \to \gamma J/\psi \pi^+ \pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.012	90	[1,3] XIAO	13	$\psi(4160) \to \gamma J/\psi \pi^+ \pi^-$

OCCUR=2

[1] Obtained by analyzing CLEO data but not authored by the CLEO Collaboration. NODE=M025R43;LINKAGE=A

[2] XIAO 13 reports $[\Gamma(\psi(4160) \to \gamma \chi_{c1}(3872))/\Gamma_{total}] \times [B(\chi_{c1}(3872) \to \pi^+ \pi^- J/\psi(1S))] < 0.68 \times 10^{-4}$ which we divide by our best value $B(\chi_{c1}(3872) \to \pi^+ \pi^- J/\psi(1S)) = 3.8 \times 10^{-2}$. NODE=M025R43;LINKAGE=B

[3] XIAO 13 reports $[\Gamma(\psi(4160) \to \gamma \chi_{c1}(3872))/\Gamma_{total}] \times [B(\chi_{c1}(3872) \to \gamma J/\psi)] < 1.05 \times 10^{-4}$ which we divide by our best value $B(\chi_{c1}(3872) \to \gamma J/\psi) = 8 \times 10^{-3}$. NODE=M025R43;LINKAGE=C

$\Gamma(\gamma X(3915) \to \gamma J/\psi \pi^+ \pi^-)/\Gamma_{total}$ — Γ_{35}/Γ

NODE=M025R35

VALUE	CL%	DOCUMENT ID		COMMENT
<1.36 × 10^{-4}	90	[1] XIAO	13	$\psi(4160) \to \gamma J/\psi \pi^+ \pi^-$

[1] Obtained by analyzing CLEO data but not authored by the CLEO Collaboration. NODE=M025R35;LINKAGE=A

$\Gamma(\gamma X(3930) \to \gamma J/\psi \pi^+ \pi^-)/\Gamma_{total}$ — Γ_{36}/Γ

NODE=M025R36

VALUE	CL%	DOCUMENT ID		COMMENT
<1.18 × 10^{-4}	90	[1] XIAO	13	$\psi(4160) \to \gamma J/\psi \pi^+ \pi^-$

[1] Obtained by analyzing CLEO data but not authored by the CLEO Collaboration. NODE=M025R36;LINKAGE=A

$\Gamma(\gamma X(3940) \to \gamma J/\psi \pi^+ \pi^-)/\Gamma_{total}$ — Γ_{37}/Γ

NODE=M025R37

VALUE	CL%	DOCUMENT ID		COMMENT
<1.47 × 10^{-4}	90	[1] XIAO	13	$\psi(4160) \to \gamma J/\psi \pi^+ \pi^-$

[1] Obtained by analyzing CLEO data but not authored by the CLEO Collaboration. NODE=M025R37;LINKAGE=A

$\Gamma(\gamma X(3915) \to \gamma\gamma J/\psi)/\Gamma_{total}$ — Γ_{38}/Γ

NODE=M025R39

VALUE	CL%	DOCUMENT ID		COMMENT
<1.26 × 10^{-4}	90	[1] XIAO	13	$\psi(4160) \to \gamma\gamma J/\psi$

[1] Obtained by analyzing CLEO data but not authored by the CLEO Collaboration. NODE=M025R39;LINKAGE=A

$\Gamma(\gamma X(3930) \to \gamma\gamma J/\psi)/\Gamma_{total}$ — Γ_{39}/Γ

NODE=M025R40

VALUE	CL%	DOCUMENT ID		COMMENT
<0.88 × 10^{-4}	90	[1] XIAO	13	$\psi(4160) \to \gamma\gamma J/\psi$

[1] Obtained by analyzing CLEO data but not authored by the CLEO Collaboration. NODE=M025R40;LINKAGE=A

$\Gamma(\gamma X(3940) \to \gamma\gamma J/\psi)/\Gamma_{total}$ — Γ_{40}/Γ

NODE=M025R41

VALUE	CL%	DOCUMENT ID		COMMENT
<1.79 × 10^{-4}	90	[1] XIAO	13	$\psi(4160) \to \gamma\gamma J/\psi$

[1] Obtained by analyzing CLEO data but not authored by the CLEO Collaboration. NODE=M025R41;LINKAGE=A

$\Gamma(K^+ K^-)/\Gamma_{total}$ — Γ_{41}/Γ

NODE=M025R33

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<2 \times 10^{-5}$	90	[1] DRUZHININ	15	RVUE	$e^+ e^- \to \psi(3770)$

[1] DRUZHININ 15 uses BABAR and CLEO data taking into account interference of the processes $e^+ e^- \to K^+ K^-$ and $e^+ e^- \to K^0_S K^0_L$. NODE=M025R33;LINKAGE=A

$\Gamma(p\overline{p}p\overline{p})/\Gamma_{total}$ — Γ_{43}/Γ

NODE=M025R44

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	ABLIKIM	21D	BES3	4.0–4.6 $e^+ e^- \to p\overline{p}p\overline{p}$

$\Gamma(\Lambda\overline{\Lambda}) \times \Gamma(e^+ e^-)/\Gamma_{total}$ — $\Gamma_{44}\Gamma_1/\Gamma$

NODE=M025R45

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<0.7 × 10^{-3}	90	[1] ABLIKIM	21AS	BES3	$e^+ e^- \to \psi(4160)$

[1] From a measurement of the $e^+ e^- \to \Lambda\overline{\Lambda}$ cross section between 3.5 and 4.6 GeV. NODE=M025R45;LINKAGE=A

ψ(4160) REFERENCES

NODE=M025

ABLIKIM	21AS	PR D104 L091104	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61454
ABLIKIM	21D	PR D103 052003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61031
ABLIKIM	20A	PR D101 012008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60210
ABLIKIM	20AG	PR D102 112009	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60744
ABLIKIM	19AE	PR D99 072005	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59856
ZHUKOVA	18	PR D97 012002	V. Zhukova *et al.*	(BELLE Collab.)	REFID=58710
ABLIKIM	17R	PR D96 012001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58009
GAO	17	PR D95 092007	X.Y. Gao, C.P. Shen, C.Z. Yuan		REFID=57991
PDG	16	CP C40 100001	C. Patrignani *et al.*	(PDG Collab.)	REFID=57140
ABLIKIM	15L	PR D91 112005	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56777
DRUZHININ	15	PR D92 054024	V.P. Druzhinin	(NOVO)	REFID=56962
HAN	15	PR D92 012011	Y.L. Han *et al.*	(BELLE Collab.)	REFID=56816
AAIJ	13BC	PRL 111 112003	R. Aaij *et al.*	(LHCb Collab.)	REFID=55229
WANG	13B	PR D87 051101	X.L. Wang *et al.*	(BELLE Collab.)	REFID=55377
XIAO	13	PR D87 057501	T. Xiao *et al.*	(NWES, WAYN)	REFID=55381
PAKHLOVA	11	PR D83 011101	G. Pakhlova *et al.*	(BELLE Collab.)	REFID=53638
PEDLAR	11	PRL 107 041803	T. Pedlar *et al.*	(CLEO Collab.)	REFID=16787
DEL-AMO-SA...	10N	PR D82 052004	P. del Amo Sanchez *et al.*	(BABAR Collab.)	REFID=53532
MO	10	PR D82 077501	X.H. Mo, C.Z. Yuan, P. Wang	(BHEP)	REFID=53540
AUBERT	09M	PR D79 092001	B. Aubert *et al.*	(BABAR Collab.)	REFID=52724
CRONIN-HEN...	09	PR D80 072001	D. Cronin-Hennessy *et al.*	(CLEO Collab.)	REFID=53114
PAKHLOVA	09	PR D80 091101	G. Pakhlova *et al.*	(BELLE Collab.)	REFID=53143
ABLIKIM	08D	PL B660 315	M. Ablikim *et al.*	(BES Collab.)	REFID=52142
PAKHLOVA	08	PR D77 011103	G. Pakhlova *et al.*	(BELLE Collab.)	REFID=52132
PAKHLOVA	08A	PRL 100 062001	G. Pakhlova *et al.*	(BELLE Collab.)	REFID=52134
PAKHLOVA	07	PRL 98 092001	G. Pakhlova *et al.*	(BELLE Collab.)	REFID=51628
COAN	06	PRL 96 162003	T.E. Coan *et al.*	(CLEO Collab.)	REFID=51075
SETH	05A	PR D72 017501	K.K. Seth		REFID=50813
BAI	02C	PRL 88 101802	J.Z. Bai *et al.*	(BES Collab.)	REFID=50506
BAI	00	PRL 84 594	J.Z. Bai *et al.*	(BES Collab.)	REFID=50503
OSTERHELD	86	SLAC-PUB-4160	A. Osterheld *et al.*	(SLAC Crystal Ball Collab.)	REFID=51064
BRANDELIK	78C	PL 76B 361	R. Brandelik *et al.*	(DASP Collab.)	REFID=22232

NODE=M190

$X(4160)$

$I^G(J^{PC}) = ?^?(?^{??})$

OMITTED FROM SUMMARY TABLE

Seen by PAKHLOV 08 in $e^+e^- \to J/\psi X$, $X \to D^* \overline{D}^*$

NODE=M190

A state with consistent mass and width is seen by AAIJ 21E in $B^+ \to X(4160) K^+$ with $X(4160) \to J/\psi\phi$ using an amplitude analysis of $B^+ \to J/\psi\phi K^+$ with a significance (accounting for systematic uncertainties) of 4.8 σ. The $J^{PC} = 2^{-+}$ assignment is favored over other assignments with a significance of more than 4 σ.

$X(4160)$ MASS

NODE=M190M

NODE=M190M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
4153^{+23}_{-21} OUR AVERAGE					
[4156^{+29}_{-25} MeV OUR 2021 AVERAGE]					
$4146 \pm 18 \pm 33$	24k	[1] AAIJ	21E	LHCB	$B^+ \to J/\psi\phi K^+$
$4156^{+25}_{-20} \pm 15$	24	PAKHLOV	08	BELL	$e^+e^- \to J/\psi X$

NEW

[1] From an amplitude analysis of the decay $B^+ \to J/\psi\phi K^+$ with a significance of 4.8 σ.

NODE=M190M;LINKAGE=A

$X(4160)$ WIDTH

NODE=M190W

NODE=M190W

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
$136^{+\ 60}_{-\ 35}$ OUR AVERAGE					
[$139^{+110}_{-\ 60}$ MeV OUR 2021 AVERAGE]					
$135 \pm\ 28^{+59}_{-30}$	24k	[1] AAIJ	21E	LHCB	$B^+ \to J/\psi\phi K^+$
$139^{+111}_{-\ 61} \pm 21$	24	PAKHLOV	08	BELL	$e^+e^- \to J/\psi X$

NEW

[1] From an amplitude analysis of the decay $B^+ \to J/\psi\phi K^+$ with a significance of 4.8 σ.

NODE=M190W;LINKAGE=A

$X(4160)$ DECAY MODES

NODE=M190215;NODE=M190

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$D\overline{D}$	not seen	DESIG=1;OUR EVAL;→ UNCHECKED ←
Γ_2	$D^*\overline{D}$+ c.c.	not seen	DESIG=2;OUR EVAL;→ UNCHECKED ←
Γ_3	$D^*\overline{D}^*$	seen	DESIG=3;OUR EVAL;→ UNCHECKED ←
Γ_4	$J/\psi\phi$	seen	DESIG=4

$X(4160)$ BRANCHING RATIOS

NODE=M190225

$\Gamma(D\overline{D})/\Gamma(D^*\overline{D}^*)$ Γ_1/Γ_3

NODE=M190R01
NODE=M190R01

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.09	90	PAKHLOV	08	BELL	$e^+e^- \to J/\psi X$

$\Gamma(D^*\overline{D}+\text{c.c.})/\Gamma(D^*\overline{D}^*)$ Γ_2/Γ_3

NODE=M190R02
NODE=M190R02

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.22	90	PAKHLOV	08	BELL	$e^+e^- \to J/\psi X$

$\Gamma(J/\psi\phi)/\Gamma_{\text{total}}$ Γ_4/Γ

NODE=M190R00
NODE=M190R00

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	24k	[1] AAIJ	21E	LHCB	$B^+ \to J/\psi\phi K^+$

[1] From an amplitude analysis of the decay $B^+ \to J/\psi\phi K^+$ with a significance of 4.8 σ.

NODE=M190R00;LINKAGE=A

$X(4160)$ REFERENCES

NODE=M190

AAIJ	21E	PRL 127 082001	R. Aaij *et al.*	(LHCb Collab.)	REFID=61150
PAKHLOV	08	PRL 100 202001	P. Pakhlov *et al.*	(BELLE Collab.)	REFID=52302

NODE=M231

$Z_c(4200)$

$I^G(J^{PC}) = 1^+(1^{+-})$
I, G, C need confirmation.

OMITTED FROM SUMMARY TABLE
was $X(4200)^\pm$

This state shows properties different from a conventional $q\overline{q}$ state. A candidate for an exotic structure. See the review on non-$q\overline{q}$ states.

NODE=M231

Reported by CHILIKIN 14 in $J/\psi\pi^+$ at a significance of 6.2σ. Assignments of 0^-, 1^-, 2^-, and 2^+ excluded at 6.1σ, 7.4σ, 4.4σ, and 7.0σ level, respectively. Needs confirmation.

$Z_c(4200)$ MASS

NODE=M231M

NODE=M231M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
$\mathbf{4196^{+31}_{-29}{}^{+17}_{-13}}$	CHILIKIN	14	BELL	$\overline{B}^0 \to J/\psi K^-\pi^+$

$Z_c(4200)$ WIDTH

NODE=M231W

NODE=M231W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
$\mathbf{370\pm70^{+\ 70}_{-132}}$	CHILIKIN	14	BELL	$\overline{B}^0 \to J/\psi K^-\pi^+$

$Z_c(4200)$ DECAY MODES

NODE=M231215;NODE=M231

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$J/\psi\pi^+$	seen	DESIG=1

$Z_c(4200)$ BRANCHING RATIOS

NODE=M231220

$\Gamma(J/\psi\pi^+)/\Gamma_{total}$ — Γ_1/Γ

NODE=M231R01
NODE=M231R01

VALUE	DOCUMENT ID		TECN	COMMENT
seen	CHILIKIN	14	BELL	$\overline{B}^0 \to J/\psi K^- \pi^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
possibly seen	[1] AAIJ	19R	LHCB	$B^0 \to K^+\pi^- J/\psi$ + c.c.

[1] From a model-independent analysis.

NODE=M231R01;LINKAGE=C

$Z_c(4200)$ REFERENCES

NODE=M231

AAIJ	19R	PRL 122 152002	R. Aaij *et al.*	(LHCb Collab.)
CHILIKIN	14	PR D90 112009	K. Chilikin *et al.*	(BELLE Collab.)

REFID=59776
REFID=56344

NODE=M074

$\psi(4230)$

$I^G(J^{PC}) = 0^-(1^{--})$

also known as $Y(4230)$; was $\psi(4260)$

NODE=M074

The original $\psi(4260)$ (also known as $Y(4260)$) was observed by AUBERT,B 05I as a peak in the energy dependence of the $e^+e^- \to \pi^+\pi^- J/\psi$ cross section and was confirmed by HE 06B, YUAN 07, LEES 12AC, and LIU 13B in the same process. A higher-statistics analysis by ABLIKIM 17B revealed an asymmetry in the cross section and resulted in a shift of the peak position to a lower mass. The $\psi(4260)$ was therefore renamed $\psi(4230)$. The energy-dependent cross sections for e^+e^- to other channels also exhibit peaks in the same mass region. The parameters corresponding to those peaks are also listed here, but the number of states in this region remains to be determined.

For details see the review on "Spectroscopy of mesons containing two heavy quarks."

$\psi(4230)$ MASS

NODE=M074M

NODE=M074M
NEW

4222.7 ± 2.6 OUR AVERAGE Error includes scale factor of 1.7. See the ideogram below.
[4230 ± 8 MeV OUR 2019 AVERAGE Scale factor = 2.9]

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
4234.4 ± 3.2 ± 0.2		[1] ABLIKIM	21AJ	BES3	$e^+e^- \to \pi^+\pi^-\psi(2S)$
4216.7 ± 8.9 ± 4.1		[2] ABLIKIM	20AG	BES3	$e^+e^- \to \mu^+\mu^-$
4220.4 ± 2.4 ± 2.3		[3] ABLIKIM	20N	BES3	$e^+e^- \to \pi^0\pi^0 J/\psi$
4218.6 ± 3.8 ± 2.5		[3] ABLIKIM	20O	BES3	$e^+e^- \to \eta J/\psi$
4218.5 ± 1.6 ± 4.0		[4] ABLIKIM	19AI	BES3	$e^+e^- \to \omega\chi_{c0}$
4228.6 ± 4.1 ± 6.3		ABLIKIM	19R	BES3	$e^+e^- \to \pi^+ D^0 D^{*-}$ + c.c.
$4200.6^{+7.9}_{-13.3} \pm 3.0$		[5] ABLIKIM	19V	BES3	$e^+e^- \to \gamma\chi_{c1}(3872)$
4222.0 ± 3.1 ± 1.4		[6] ABLIKIM	17B	BES3	$e^+e^- \to \pi^+\pi^- J/\psi$
$4218^{+5.5}_{-4.5} \pm 0.9$		ABLIKIM	17G	BES3	$e^+e^- \to \pi^+\pi^- h_c$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
4231.9 ± 5.3 ± 4.9		ABLIKIM	20N	BES3	$e^+e^- \to \pi^0 Z_c(3900)^0$, $Z_c^0 \to \pi^0 J/\psi$
4209.5 ± 7.4 ± 1.4		[7] ABLIKIM	17V	BES3	$e^+e^- \to \pi^+\pi^-\psi(2S)$
4209.1 ± 6.8 ± 7.0		[6] ZHANG	17B	RVUE	$e^+e^- \to \pi^+\pi^-\psi(2S)$
4223.3 ± 1.6 ± 2.5		[8] ZHANG	17C	RVUE	$e^+e^- \to \pi^+\pi^- J/\psi$ or $\psi(2S)$
4230 ± 8 ± 6	180	[9] ABLIKIM	15C	BES3	$e^+e^- \to \omega\chi_{c0}$
4258.6 ± 8.3 ± 12.1		[10] LIU	13B	BELL	$e^+e^- \to \gamma\pi^+\pi^- J/\psi$
4245 ± 5 ± 4		[11] LEES	12AC	BABR	10.58 $e^+e^- \to \gamma\pi^+\pi^- J/\psi$
$4247 \pm 12 ^{+17}_{-32}$		[10,12] YUAN	07	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^- J/\psi$
$4284^{+17}_{-16} \pm 4$	13.6	HE	06B	CLEO	9.4–10.6 $e^+e^- \to \gamma\pi^+\pi^- J/\psi$
$4259 \pm 8 ^{+2}_{-6}$	125	[13] AUBERT,B	05I	BABR	10.58 $e^+e^- \to \gamma\pi^+\pi^- J/\psi$

OCCUR=2
OCCUR=2

[1] From a three-resonance fit to the Born cross section in the range $\sqrt{s}$ = 4.008–4.698 GeV. NODE=M074M;LINKAGE=C

[2] Solution 1 of 8 with equal fit quality to the $e^+ e^- \to \mu^+ \mu^-$ cross section between 3.8 and 4.6 GeV to the coherent sum of four resonant amplitudes. Other solutions range from 4212.8 ± 7.2 ± 4.0 to 4219.4 ± 11.2 ± 4.1 MeV. NODE=M074M;LINKAGE=HP

[3] From a fit of the measured cross section in the range $\sqrt{s}$ = 3.808–4.600 GeV. NODE=M074M;LINKAGE=GP

[4] From a fit of the measured cross section from $\sqrt{s}$ = 4.178–4.278 GeV. Supersedes ABLIKIM 15C. NODE=M074M;LINKAGE=CP

[5] Simultaneous fit to $\chi_{c1} \to \omega J/\psi$ and $\chi_{c1} \to \pi^+ \pi^- J/\psi$. NODE=M074M;LINKAGE=FP

[6] From a three-resonance fit. NODE=M074M;LINKAGE=A

[7] From a fit to the cross section for $e^+ e^- \to \pi^+ \pi^- \psi(2S) \to 2(\pi^+ \pi^-) \ell^+ \ell^-$ obtained from 16 center-of-mass energies between 4.008 and 4.600 GeV and comprising 5.1 fb^{-1}. Superseded by ABLIKIM 21AJ. NODE=M074M;LINKAGE=BP

[8] From a combined fit of BELLE, BABAR and BES3 $e^+ e^- \to \pi^+ \pi^- J/\psi$ and $e^+ e^- \to \pi^+ \pi^- \psi(2S)$ data. NODE=M074M;LINKAGE=CA

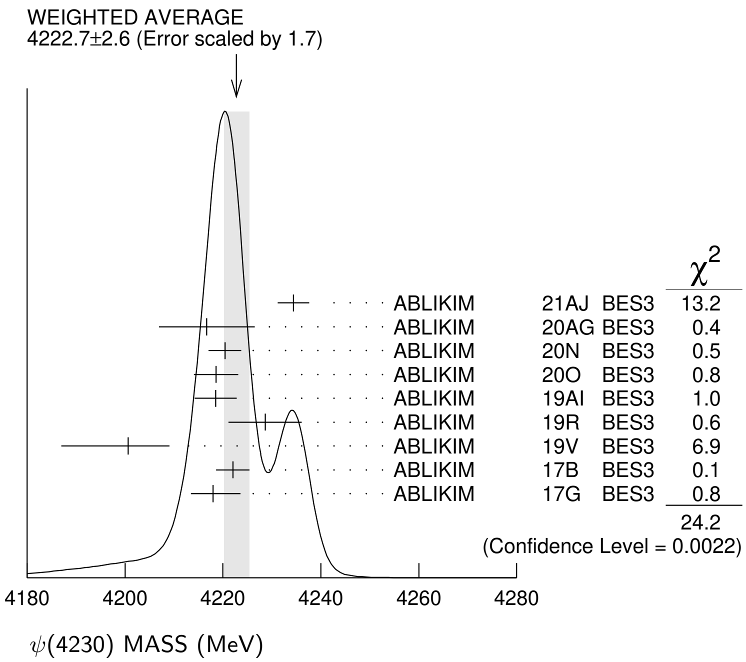
[9] From a 3-parameter fit of measured cross sections from $\sqrt{s}$ = 4.21–4.42 GeV to a phase-space modified Breit-Wigner function, using the decays $\chi_{c0} \to \pi^+ \pi^-$, $\chi_{c0} \to K^+ K^-$, and $\omega \to \pi^+ \pi^- \pi^0$. NODE=M074M;LINKAGE=AP

[10] From a two-resonance fit. NODE=M074M;LINKAGE=YU

[11] From a single-resonance fit. Supersedes AUBERT,B 05I. NODE=M074M;LINKAGE=LE

[12] Superseded by LIU 13B. NODE=M074M;LINKAGE=YN

[13] From a single-resonance fit. Two interfering resonances are not excluded. Superseded by LEES 12AC. NODE=M074M;LINKAGE=AU



ψ(4230) WIDTH

NODE=M074W

NODE=M074W NEW

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
49 ± 8 OUR AVERAGE		Error includes scale factor of 3.5. See the ideogram below.			
[55 ± 19 MeV OUR 2019 AVERAGE Scale factor = 4.4]					
17.6±18.1± 0.9		[1] ABLIKIM	21AJ	BES3	$e^+ e^- \to \pi^+ \pi^- \psi(2S)$
47.2±22.8±10.5		[2] ABLIKIM	20AG	BES3	$e^+ e^- \to \mu^+ \mu^-$
46.2± 4.7± 2.1		[3] ABLIKIM	20N	BES3	$e^+ e^- \to \pi^0 \pi^0 J/\psi$
82.0± 5.7± 0.4		[3] ABLIKIM	20O	BES3	$e^+ e^- \to \eta J/\psi$
28.2± 3.9± 1.6		[4] ABLIKIM	19AI	BES3	$e^+ e^- \to \omega \chi_{c0}$
77.0± 6.8± 6.3		ABLIKIM	19R	BES3	$e^+ e^- \to \pi^+ D^0 D^{*-}$ + c.c.
$115 {}^{+38}_{-26} \pm 12$		[5] ABLIKIM	19V	BES3	$e^+ e^- \to \gamma \chi_{c1}(3872)$
44.1± 4.3± 2.0		[6] ABLIKIM	17B	BES3	$e^+ e^- \to \pi^+ \pi^- J/\psi$
$66.0 {}^{+12.3}_{-8.3} \pm 0.4$		ABLIKIM	17G	BES3	$e^+ e^- \to \pi^+ \pi^- h_c$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$41.2 \pm 16.0 \pm 16.4$		ABLIKIM	20N	BES3	$e^+ e^- \to \pi^0 Z_c(3900)^0$, $Z_c^0 \to \pi^0 J/\psi$
$80.1 \pm 24.6 \pm 2.9$		[7] ABLIKIM	17V	BES3	$e^+ e^- \to \pi^+ \pi^- \psi(2S)$
$76.6 \pm 14.2 \pm 2.4$		[6] ZHANG	17B	RVUE	$e^+ e^- \to \pi^+ \pi^- \psi(2S)$
$54.2 \pm 2.6 \pm 1.0$		[8] ZHANG	17C	RVUE	$e^+ e^- \to \pi^+ \pi^- J/\psi$ or $\psi(2S)$
$38 \pm 12 \pm 2$	180	[9] ABLIKIM	15C	BES3	$e^+ e^- \to \omega \chi_{c0}$
$134.1 \pm 16.4 \pm 5.5$		[10] LIU	13B	BELL	$e^+ e^- \to \gamma \pi^+ \pi^- J/\psi$
$114\ ^{+16}_{-15} \pm 7$		[11] LEES	12AC	BABR	$10.58\ e^+ e^- \to \gamma \pi^+ \pi^- J/\psi$
$108 \pm 19 \pm 10$		[10,12] YUAN	07	BELL	$10.58\ e^+ e^- \to \gamma \pi^+ \pi^- J/\psi$
$73\ ^{+39}_{-25} \pm 5$	13.6	HE	06B	CLEO	$9.4–10.6\ e^+ e^- \to \gamma \pi^+ \pi^- J/\psi$
$88 \pm 23\ ^{+6}_{-4}$	125	[13] AUBERT,B	05I	BABR	$10.58\ e^+ e^- \to \gamma \pi^+ \pi^- J/\psi$

OCCUR=2

[1] From a three-resonance fit to the Born cross section in the range $\sqrt{s} = 4.008–4.698$ GeV. NODE=M074W;LINKAGE=D

[2] Solution 1 of 8 with equal fit quality to the $e^+ e^- \to \mu^+ \mu^-$ cross section between 3.8 and 4.6 GeV to the coherent sum of four resonant amplitudes. Other solutions range from $36.4 \pm 16.8 \pm 8.1$ to $49.6 \pm 22.6 \pm 11.0$ MeV. NODE=M074W;LINKAGE=GP

[3] From a fit of the measured cross section in the range $\sqrt{s} = 3.808–4.600$ GeV. NODE=M074W;LINKAGE=FP

[4] From a fit of the measured cross section from $\sqrt{s} = 4.178–4.278$ GeV. Supersedes ABLIKIM 15C. NODE=M074W;LINKAGE=CP

[5] Simultaneous fit to $\chi_{c1} \to \omega J/\psi$ and $\chi_{c1} \to \pi^+ \pi^- J/\psi$. NODE=M074W;LINKAGE=EP

[6] From a three-resonance fit. NODE=M074W;LINKAGE=C

[7] From a fit to the cross section for $e^+ e^- \to \pi^+ \pi^- \psi(2S) \to 2(\pi^+ \pi^-) \ell^+ \ell^-$ obtained from 16 center-of-mass energies between 4.008 and 4.600 GeV and comprising 5.1 fb^{-1}. Superseded by ABLIKIM 21AJ. NODE=M074W;LINKAGE=BP

[8] From a combined fit of BELLE, BABAR and BES3 $e^+ e^- \to \pi^+ \pi^- J/\psi$ and $e^+ e^- \to \pi^+ \pi^- \psi(2S)$ data. NODE=M074W;LINKAGE=B

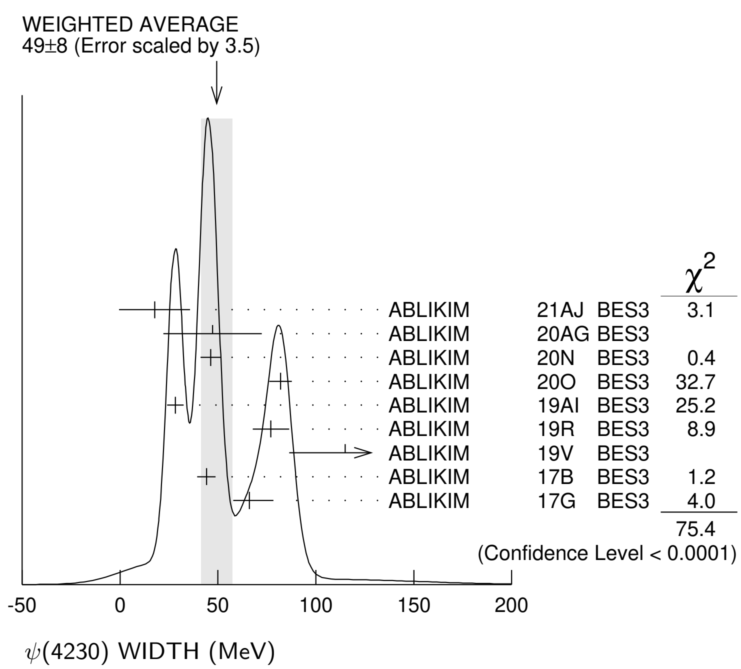
[9] From a 3-parameter fit of measured cross sections from $\sqrt{s} = 4.21–4.42$ GeV to a phase-space modified Breit-Wigner function, using the decays $\chi_{c0} \to \pi^+ \pi^-$, $\chi_{c0} \to K^+ K^-$, and $\omega \to \pi^+ \pi^- \pi^0$. NODE=M074W;LINKAGE=AP

[10] From a two-resonance fit. NODE=M074W;LINKAGE=YU

[11] From a single-resonance fit. Supersedes AUBERT,B 05I. NODE=M074W;LINKAGE=LE

[12] Superseded by LIU 13B. NODE=M074W;LINKAGE=YN

[13] From a single-resonance fit. Two interfering resonances are not excluded. Superseded by LEES 12AC. NODE=M074W;LINKAGE=AU



$\psi(4230)$ DECAY MODES

NODE=M074215;NODE=M074

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$e^+ e^-$		DESIG=1
Γ_2	$\mu^+ \mu^-$	$(3.1\pm2.8)\times10^{-5}$	DESIG=63
Γ_3	$\eta_c(1S)\pi^+\pi^-$	not seen	DESIG=65
Γ_4	$\eta_c(1S)\pi^+\pi^-\pi^0$	seen	DESIG=64
Γ_5	$J/\psi\pi^+\pi^-$	seen	DESIG=2
Γ_6	$J/\psi f_0(980),\ f_0(980)\to\ \pi^+\pi^-$	seen	DESIG=41;OUR EVAL
Γ_7	$Z_c(3900)^\pm\pi^\mp,\ Z_c^\pm\to\ J/\psi\pi^\pm$	seen	DESIG=43;OUR EVAL
Γ_8	$J/\psi\pi^0\pi^0$	seen	DESIG=4
Γ_9	$J/\psi K^+K^-$	seen	DESIG=5;OUR EVAL
Γ_{10}	$J/\psi K^0_S K^0_S$	not seen	DESIG=44
Γ_{11}	$J/\psi\eta$	seen	DESIG=6
Γ_{12}	$J/\psi\pi^0$	not seen	DESIG=7;OUR EVAL
Γ_{13}	$J/\psi\eta'$	seen	DESIG=8;OUR EVAL
Γ_{14}	$J/\psi\pi^+\pi^-\pi^0$	not seen	DESIG=9;OUR EVAL
Γ_{15}	$J/\psi\eta\pi^0$	not seen	DESIG=45
Γ_{16}	$J/\psi\eta\eta$	not seen	DESIG=10;OUR EVAL
Γ_{17}	$\psi(2S)\pi^+\pi^-$	seen	DESIG=11
Γ_{18}	$\psi(2S)\eta$	not seen	DESIG=12;OUR EVAL
Γ_{19}	$\chi_{c0}\omega$	seen	DESIG=13
Γ_{20}	$\chi_{c1}\pi^+\pi^-\pi^0$	not seen	DESIG=16;OUR EVAL
Γ_{21}	$\chi_{c2}\pi^+\pi^-\pi^0$	not seen	DESIG=17;OUR EVAL
Γ_{22}	$h_c(1P)\pi^+\pi^-$	seen	DESIG=40
Γ_{23}	$\phi\pi^+\pi^-$	not seen	DESIG=18;OUR EVAL
Γ_{24}	$\phi f_0(980)\to\ \phi\pi^+\pi^-$	not seen	DESIG=22;OUR EVAL
Γ_{25}	$D\overline{D}$	not seen	DESIG=19;OUR EVAL
Γ_{26}	$D^0\overline{D}^0$	not seen	DESIG=31
Γ_{27}	D^+D^-	not seen	DESIG=32
Γ_{28}	$D^*\overline{D}$+c.c.	not seen	DESIG=23;OUR EVAL
Γ_{29}	$D^*(2007)^0\overline{D}^0$+c.c.	not seen	DESIG=33
Γ_{30}	$D^*(2010)^+D^-$+c.c.	not seen	DESIG=34
Γ_{31}	$D^*\overline{D}^*$		DESIG=24
Γ_{32}	$D^*(2007)^0\overline{D}^*(2007)^0$	not seen	DESIG=35
Γ_{33}	$D^*(2010)^+D^*(2010)^-$	not seen	DESIG=36
Γ_{34}	$D\overline{D}\pi$+c.c.		DESIG=37
Γ_{35}	$D^0D^-\pi^+$+c.c. (excl. $D^*(2007)^0\overline{D}^{*0}$ +c.c., $D^*(2010)^+D^-$ +c.c.)	not seen	DESIG=38
Γ_{36}	$D\overline{D}^*\pi$+c.c. (excl. $D^*\overline{D}^*$)	not seen	DESIG=25
Γ_{37}	$D^0D^{*-}\pi^+$+c.c. (excl. $D^*(2010)^+D^*(2010)^-$)	not seen	DESIG=39
Γ_{38}	$D^0D^*(2010)^-\pi^+$+c.c.	seen	DESIG=30
Γ_{39}	$D_1(2420)\overline{D}$+ c.c.	not seen	DESIG=50
Γ_{40}	$D^*\overline{D}^*\pi$	not seen	DESIG=26
Γ_{41}	$D_s^+D_s^-$	not seen	DESIG=27
Γ_{42}	$D_s^{*+}D_s^-$+c.c.	not seen	DESIG=28
Γ_{43}	$D_s^{*+}D_s^{*-}$	not seen	DESIG=29
Γ_{44}	$p\overline{p}$	not seen	DESIG=3;OUR EVAL
Γ_{45}	$p\overline{p}\pi^0$	not seen	DESIG=46;OUR EVAL
Γ_{46}	$p\overline{p}\eta$	not seen	DESIG=61
Γ_{47}	$p\overline{p}\omega$	not seen	DESIG=62
Γ_{48}	$\Xi^-\overline{\Xi}^+$	not seen	DESIG=51;OUR EVAL
Γ_{49}	$\pi^+\pi^+\pi^-\pi^-$	not seen	DESIG=53;OUR EVAL
Γ_{50}	$\pi^+\pi^+\pi^-\pi^-\pi^0$	not seen	DESIG=54;OUR EVAL
Γ_{51}	$K^0_S K^\pm\pi^\mp$	not seen	DESIG=20;OUR EVAL

Γ_{52}	$K^0_S K^\pm \pi^\mp \pi^0$	not seen	DESIG=48;OUR EVAL
Γ_{53}	$K^0_S K^\pm \pi^\mp \eta$	not seen	DESIG=49;OUR EVAL
Γ_{54}	$K^+ K^- \pi^0$	not seen	DESIG=21;OUR EVAL
Γ_{55}	$K^+ K^- \pi^+ \pi^-$	not seen	DESIG=55;OUR EVAL
Γ_{56}	$K^+ K^- \pi^+ \pi^- \pi^0$	not seen	DESIG=56;OUR EVAL
Γ_{57}	$K^+ K^+ K^- K^-$	not seen	DESIG=57;OUR EVAL
Γ_{58}	$K^+ K^+ K^- K^- \pi^0$	not seen	DESIG=58;OUR EVAL
Γ_{59}	$p\overline{p}\pi^+\pi^-$	not seen	DESIG=59;OUR EVAL
Γ_{60}	$p\overline{p}\pi^+\pi^-\pi^0$	not seen	DESIG=60;OUR EVAL
Γ_{61}	$p\overline{p}p\overline{p}$	not seen	DESIG=67
Γ_{62}	$\Lambda\overline{\Lambda}$		DESIG=52;OUR EVAL

Radiative decays NODE=M074;CLUMP=C

Γ_{63}	$\eta_c(1S)\gamma$	possibly seen	DESIG=47
Γ_{64}	$\eta_c(1S)\pi^0\gamma$	not seen	DESIG=66
Γ_{65}	$\chi_{c1}\gamma$	not seen	DESIG=14;OUR EVAL
Γ_{66}	$\chi_{c2}\gamma$	not seen	DESIG=15;OUR EVAL
Γ_{67}	$\chi_{c1}(3872)\gamma$	seen	DESIG=42

ψ(4230) PARTIAL WIDTHS

NODE=M074235

$\Gamma(\mu^+\mu^-)$ Γ_2

NODE=M074W01
NODE=M074W01

VALUE (keV)	DOCUMENT ID	TECN	COMMENT
1.53±1.26±0.54	[1,2] ABLIKIM 20AG	BES3	$e^+e^- \to \mu^+\mu^-$

[1] From a fit to the $e^+e^- \to \mu^+\mu^-$ cross section between 3.8 and 4.6 GeV to the coherent sum of four resonant amplitudes assuming $\Gamma(\mu^+\mu^-) = \Gamma(e^+e^-)$. NODE=M074W01;LINKAGE=A

[2] From solution 1 of 8 with equal fit quality. Other solutions range from $1.09 \pm 0.84 \pm 0.39$ to $1.53 \pm 1.26 \pm 0.54$ keV. NODE=M074W01;LINKAGE=B

ψ(4230) $\Gamma(i) \times \Gamma(e^+e^-)/\Gamma(\text{total})$

NODE=M074230

$\Gamma(J/\psi\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_5\Gamma_1/\Gamma$

NODE=M074G1
NODE=M074G1

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT	
9.2±1.0 OUR AVERAGE					
9.2±0.8±0.7		[1] LEES 12AC	BABR	10.58 $e^+e^- \to \gamma\pi^+\pi^- J/\psi$	
$8.9^{+3.9}_{-3.1}\pm1.8$	8.1	HE 06B	CLEO	9.4–10.6 $e^+e^- \to \gamma\pi^+\pi^- J/\psi$	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
6.4±0.8±0.6		[2] LIU 13B	BELL	$e^+e^- \to \gamma\pi^+\pi^- J/\psi$	
20.5±1.4±2.0		[3] LIU 13B	BELL	$e^+e^- \to \gamma\pi^+\pi^- J/\psi$	OCCUR=2
$6.0\pm1.2^{+4.7}_{-0.5}$		[2,4] YUAN 07	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^- J/\psi$	
$20.6\pm2.3^{+9.1}_{-1.7}$		[3,4] YUAN 07	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^- J/\psi$	OCCUR=2
$5.5\pm1.0^{+0.8}_{-0.7}$	125	[5] AUBERT,B 05I	BABR	10.58 $e^+e^- \to \gamma\pi^+\pi^- J/\psi$	

[1] From a single-resonance fit. Supersedes AUBERT,B 05I. NODE=M074G1;LINKAGE=LE
[2] Solution I of two equivalent solutions in a fit using two interfering resonances. NODE=M074G1;LINKAGE=YU
[3] Solution II of two equivalent solutions in a fit using two interfering resonances. NODE=M074G1;LINKAGE=YA
[4] Superseded by LIU 13B. NODE=M074G1;LINKAGE=YN
[5] From a single-resonance fit. Two interfering resonances are not excluded. Superseded by LEES 12AC. NODE=M074G1;LINKAGE=AU

$\Gamma(J/\psi K^+K^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_9\Gamma_1/\Gamma$

NODE=M074G3
NODE=M074G3

VALUE (eV)	CL%	DOCUMENT ID	TECN	COMMENT
<1.7	90	[1] SHEN 14	BELL	9.4–10.9 $e^+e^- \to \gamma K^+K^- J/\psi$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<1.2	90	[2] YUAN 08	BELL	$e^+e^- \to \gamma K^+K^- J/\psi$

[1] From a fit of the broad $K^+K^- J/\psi$ enhancement including a coherent $\psi(4260)$ amplitude with mass and width from LIU 13B. Supersedes YUAN 08. The shape of the cross section observed by ABLIKIM 18N between 2.2 and 2.3 GeV is incompatible with that of $e^+e^- \to \pi^+\pi^- J/\psi$ in ABLIKIM 13T and ABLIKIM 17B. They also observe a broad enhancement around 2.5 GeV. NODE=M074G3;LINKAGE=A

[2] From a fit of the broad $K^+K^- J/\psi$ enhancement including a coherent $\psi(4260)$ amplitude with mass and width from YUAN 07. NODE=M074G3;LINKAGE=YU

$\Gamma(J/\psi K^0_S K^0_S) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{10}\Gamma_1/\Gamma$

NODE=M074G02

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<0.85	90	[1] SHEN	14	BELL	9.4–10.9 $e^+e^- \rightarrow \gamma K^0_S K^0_S J/\psi$

[1] From a fit of the $K^0_S K^0_S J/\psi$ mass range from 4.4 to 5.5 GeV including a coherent $\psi(4260)$ amplitude with mass and width from LIU 13B.

NODE=M074G02;LINKAGE=A

$\Gamma(J/\psi\eta) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{11}\Gamma_1/\Gamma$

NODE=M074G01

• • • We do not use the following data for averages, fits, limits, etc. • • •

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
8.0 ± 1.7		[1] ABLIKIM	20O	BES3	$e^+e^- \rightarrow \eta J/\psi$
4.8 ± 1.0		[2] ABLIKIM	20O	BES3	$e^+e^- \rightarrow \eta J/\psi$
7.0 ± 1.5		[3] ABLIKIM	20O	BES3	$e^+e^- \rightarrow \eta J/\psi$
<14.2	90	WANG	13B	BELL	$e^+e^- \rightarrow J/\psi\eta\gamma$

OCCUR=2
OCCUR=3

[1] Solution 1 of three equivalent fit solutions using three resonant structures.
[2] Solution 2 of three equivalent fit solutions using three resonant structures.
[3] Solution 3 of three equivalent fit solutions using three resonant structures.

NODE=M074G01;LINKAGE=A
NODE=M074G01;LINKAGE=B
NODE=M074G01;LINKAGE=C

$\Gamma(J/\psi\eta') \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{13}\Gamma_1/\Gamma$

NODE=M074R34

• • • We do not use the following data for averages, fits, limits, etc. • • •

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.06 ± 0.03	46	[1,2] ABLIKIM	20A	BES3	$e^+e^- \rightarrow \eta' J/\psi$
1.38 ± 0.11	46	[1,3] ABLIKIM	20A	BES3	$e^+e^- \rightarrow \eta' J/\psi$

OCCUR=2

[1] Based on a fit to $\sigma(e^+e^- \rightarrow \eta' J/\psi)$ from $\sqrt{s}$ = 4.18 to 4.60 GeV assuming interfering $\psi(4160)$ and $\psi(4260)$ contributions. At $\sqrt{s}$ = 4.23 GeV, $\sigma(e^+e^- \rightarrow \eta' J/\psi)$ = 3.6 ± 0.6 ± 0.3 pb.
[2] Solution I of the fit, corresponding to a phase of −0.03 ± 0.44 rad.
[3] Solution II of the fit, corresponding to a phase of 2.54 ± 0.04 rad.

NODE=M074R34;LINKAGE=A
NODE=M074R34;LINKAGE=B
NODE=M074R34;LINKAGE=C

$\Gamma(\psi(2S)\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{17}\Gamma_1/\Gamma$

NODE=M074G7

• • • We do not use the following data for averages, fits, limits, etc. • • •

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
1.59 ± 0.75		[1] ABLIKIM	21AJ	BES3	$e^+e^- \rightarrow \pi^+\pi^-\psi(2S)$
1.63 ± 0.78		[2] ABLIKIM	21AJ	BES3	$e^+e^- \rightarrow \pi^+\pi^-\psi(2S)$
0.02 ± 0.01		[3] ABLIKIM	21AJ	BES3	$e^+e^- \rightarrow \pi^+\pi^-\psi(2S)$
1.6 ± 1.3		[4] ABLIKIM	19K	BES3	$e^+e^- \rightarrow \pi^+\pi^-\psi(2S)$
1.8 ± 1.4		[5] ABLIKIM	19K	BES3	$e^+e^- \rightarrow \pi^+\pi^-\psi(2S)$
<4.3	90	[6] LIU	08H	RVUE	10.58 $e^+e^- \rightarrow \psi(2S)\pi^+\pi^-\gamma$
$7.4^{+2.1}_{-1.7}$		[7] LIU	08H	RVUE	10.58 $e^+e^- \rightarrow \psi(2S)\pi^+\pi^-\gamma$

OCCUR=2
OCCUR=3
OCCUR=2
OCCUR=2

[1] Solution I of four equivalent solutions in a fit using three interfering resonances.
[2] Solution II of four equivalent solutions in a fit using three interfering resonances
[3] Solutions III and IV of four equivalent solutions in a fit using three interfering resonances.
[4] Solution I of two equivalent solutions in a fit using two interfering resonances.
[5] Solution II of two equivalent solutions in a fit using two interfering resonances.
[6] For constructive interference with the $\psi(4360)$ in a combined fit of AUBERT 07S and WANG 07D data with three resonances.
[7] For destructive interference with the $\psi(4360)$ in a combined fit of AUBERT 07S and WANG 07D data with three resonances.

NODE=M074G7;LINKAGE=A
NODE=M074G7;LINKAGE=B
NODE=M074G7;LINKAGE=C
NODE=M074G7;LINKAGE=AA
NODE=M074G7;LINKAGE=BB
NODE=M074G7;LINKAGE=LI
NODE=M074G7;LINKAGE=LU

$\Gamma(\chi_{c0}\omega) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{19}\Gamma_1/\Gamma$

NODE=M074G05

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
$2.5 \pm 0.2 \pm 0.3$		[1] ABLIKIM	19AI	BES3	$e^+e^- \rightarrow \omega\chi_{c0}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$2.7 \pm 0.5 \pm 0.4$	180	[2] ABLIKIM	15C	BES3	$e^+e^- \rightarrow \omega\chi_{c0}$

[1] From a fit of the measured cross section from $\sqrt{s}$ = 4.178–4.278 GeV. Supersedes ABLIKIM 15C.
[2] From a 3-parameter fit of measured cross sections from $\sqrt{s}$ = 4.21–4.42 GeV to a phase-space modified Breit-Wigner function, using the decays $\chi_{c0} \rightarrow \pi^+\pi^-$, $\chi_{c0} \rightarrow K^+K^-$, and $\omega \rightarrow \pi^+\pi^-\pi^0$.

NODE=M074G05;LINKAGE=B
NODE=M074G05;LINKAGE=A

$\Gamma(h_c(1P)\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{22}\Gamma_1/\Gamma$

NODE=M074R47

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
$4.6^{+2.9}_{-1.4} \pm 0.8$	ABLIKIM	17G	BES3	$e^+e^- \rightarrow \pi^+\pi^- h_c$

$\Gamma(\phi\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{23}\Gamma_1/\Gamma$

NODE=M074G2

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<0.4	90	AUBERT,BE	06D	BABR	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\gamma$

$\Gamma(\phi f_0(980) \to \phi\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{24}\Gamma_1/\Gamma$

NODE=M074G6

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<0.28	90	[1] AUBERT	07AK	BABR	10.6 $e^+e^- \to \pi^+\pi^-K^+K^-\gamma$

[1] AUBERT 07AK reports $[\Gamma(\psi(4230) \to \phi f_0(980) \to \phi\pi^+\pi^-) \times \Gamma(\psi(4230) \to e^+e^-)/\Gamma_{total}] \times [B(\phi(1020) \to K^+K^-)] < 0.14$ eV which we divide by our best value $B(\phi(1020) \to K^+K^-) = 49.1 \times 10^{-2}$.

NODE=M074G6;LINKAGE=AU

$\Gamma(\Xi^-\overline{\Xi}^+) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{48}\Gamma_1/\Gamma$

NODE=M074R35

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
$<2.7 \times 10^{-4}$	90	ABLIKIM	20C	BES3	$e^+e^- \to \Xi^-\overline{\Xi}^+$

$\Gamma(\pi^+\pi^+\pi^-\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{49}\Gamma_1/\Gamma$

NODE=M074R37

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<32	90	ABLIKIM	21AW	BES3	$e^+e^- \to 2\pi^+2\pi^-$

$\Gamma(\pi^+\pi^+\pi^-\pi^-\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{50}\Gamma_1/\Gamma$

NODE=M074R38

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<16	90	ABLIKIM	21AW	BES3	$e^+e^- \to 2\pi^+2\pi^-\pi^0$

$\Gamma(K^0_S K^\pm\pi^\mp) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{51}\Gamma_1/\Gamma$

NODE=M074G4

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.04 ±0.19 ±0.09	[1] ABLIKIM	19AE	BES3	$e^+e^- \to K^0_S K^\pm\pi^\mp$
0.0027±0.0023±0.0001	[2] ABLIKIM	19AE	BES3	$e^+e^- \to K^0_S K^\pm\pi^\mp$
< 0.5 at 90% CL	AUBERT	08S	BABR	10.6 $e^+e^- \to K^0_S K^\pm\pi^\mp\gamma$

OCCUR=2

[1] Solution I of the fit including the $\psi(4160)$ with mass 4191 ± 5 MeV and width 70 ± 10 MeV from PDG 16 and the $\psi(4230)$ with mass 4219.6 ± 3.3 ± 5.1 MeV and width 56.0 ± 3.6 ± 6.9 MeV from GAO 17.

NODE=M074G4;LINKAGE=A

[2] Solution II of the fit including the $\psi(4160)$ with mass 4191 ± 5 MeV and width 70 ± 10 MeV from PDG 16 and the $\psi(4230)$ with mass 4219.6 ± 3.3 ± 5.1 MeV and width 56.0 ± 3.6 ± 6.9 MeV from GAO 17.

NODE=M074G4;LINKAGE=B

$\Gamma(K^0_S K^\pm\pi^\mp\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{52}\Gamma_1/\Gamma$

NODE=M074R31

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<0.05	90	ABLIKIM	19	BES3	$e^+e^- \to K^0_S K^\pm\pi^\mp\pi^0$

$\Gamma(K^0_S K^\pm\pi^\mp\eta) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{53}\Gamma_1/\Gamma$

NODE=M074R32

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<0.19	90	ABLIKIM	19	BES3	$e^+e^- \to K^0_S K^\pm\pi^\mp\eta$

$\Gamma(K^+K^-\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{54}\Gamma_1/\Gamma$

NODE=M074G5

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.6	90	AUBERT	08S	BABR	10.6 $e^+e^- \to K^+K^-\pi^0\gamma$

$\Gamma(K^+K^-\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{55}\Gamma_1/\Gamma$

NODE=M074R39

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<20	90	ABLIKIM	21AW	BES3	$e^+e^- \to K^+K^-\pi^+\pi^-$

$\Gamma(K^+K^-\pi^+\pi^-\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{56}\Gamma_1/\Gamma$

NODE=M074R40

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<43	90	ABLIKIM	21AW	BES3	$e^+e^- \to K^+K^-\pi^+\pi^-\pi^0$

$\Gamma(K^+K^+K^-K^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{57}\Gamma_1/\Gamma$

NODE=M074R41

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<3.8	90	ABLIKIM	21AW	BES3	$e^+e^- \to 2K^+2K^-$

$\Gamma(K^+K^+K^-K^-\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{58}\Gamma_1/\Gamma$

NODE=M074R42

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<2.1	90	ABLIKIM	21AW	BES3	$e^+e^- \to 2K^+2K^-\pi^0$

$\Gamma(p\overline{p}\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{59}\Gamma_1/\Gamma$

NODE=M074R43

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<7.2	90	ABLIKIM	21AW	BES3	$e^+e^- \to p\overline{p}\pi^+\pi^-$

$\Gamma(p\overline{p}\pi^+\pi^-\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{60}\Gamma_1/\Gamma$

NODE=M074R44

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<15	90	ABLIKIM	21AW	BES3	$e^+e^- \to p\overline{p}\pi^+\pi^-\pi^0$

$\Gamma(\Lambda\overline{\Lambda}) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{62}\Gamma_1/\Gamma$

NODE=M074R36

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
$<0.8 \times 10^{-3}$	90	[1] ABLIKIM	21AS	BES3	$e^+e^- \to \psi(4260)$

[1] From a measurement of the $e^+e^- \to \Lambda\overline{\Lambda}$ cross section between 3.5 and 4.6 GeV.

NODE=M074R36;LINKAGE=A

$\Gamma(\chi_{c1}\gamma) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{65}\Gamma_1/\Gamma$

NODE=M074G03

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<1.4	90	[1] HAN	15	BELL	$10.58\ e^+e^- \to \chi_{c1}\gamma$

[1] Using $B(\eta \to \gamma\gamma) = (39.41 \pm 0.21)\%$.

NODE=M074G03;LINKAGE=A

$\Gamma(\chi_{c2}\gamma) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{66}\Gamma_1/\Gamma$

NODE=M074G04

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<4.0	90	[1] HAN	15	BELL	$10.58\ e^+e^- \to \chi_{c2}\gamma$

[1] Using $B(\eta \to \gamma\gamma) = (39.41 \pm 0.21)\%$.

NODE=M074G04;LINKAGE=A

$\psi(4230)$ BRANCHING RATIOS

NODE=M074225

$\Gamma(\eta_c(1S)\pi^+\pi^-)/\Gamma_{total}$ — Γ_3/Γ

NODE=M074R56

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	[1] ABLIKIM	21B	BES3	$e^+e^- \to \pi^+\pi^-\eta_c$

[1] Not seen in $e^+e^- \to \pi^+\pi^-\eta_c$ at $\sqrt{s} = 4.226$ GeV with a 90% C.L. upper limit on the cross section of 16.8 pb.

NODE=M074R56;LINKAGE=A

$\Gamma(\eta_c(1S)\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_4/Γ

NODE=M074R55

VALUE	DOCUMENT ID		TECN	COMMENT
seen	[1] ABLIKIM	21B	BES3	$e^+e^- \to \pi^+\pi^-\pi^0\eta_c$

[1] Seen as a peak in the $e^+e^- \to \pi^+\pi^-\pi^0\eta_c$ cross section with a peak value of $46.1^{+9.5}_{-9.4} \pm 6.6$ pb at $\sqrt{s} = 4.226$ GeV.

NODE=M074R55;LINKAGE=A

$\Gamma(J/\psi\pi^+\pi^-)/\Gamma_{total}$ — Γ_5/Γ

NODE=M074R51

VALUE	DOCUMENT ID		TECN	COMMENT
seen	ABLIKIM	17B	BES3	$e^+e^- \to \pi^+\pi^- J/\psi$

$\Gamma(J/\psi f_0(980),\ f_0(980) \to \pi^+\pi^-)/\Gamma(J/\psi\pi^+\pi^-)$ — Γ_6/Γ_5

NODE=M074R02

• • • We do not use the following data for averages, fits, limits, etc. • • •

VALUE	DOCUMENT ID		TECN	COMMENT
0.17 ± 0.13	[1] LEES	12AC	BABR	$10.58\ e^+e^- \to \gamma\pi^+\pi^- J/\psi$

[1] Systematic uncertainties not estimated.

NODE=M074R02;LINKAGE=LE

$\Gamma(Z_c(3900)^\pm\pi^\mp,\ Z_c^\pm \to J/\psi\pi^\pm)/\Gamma(J/\psi\pi^+\pi^-)$ — Γ_7/Γ_5

NODE=M074R01

VALUE	DOCUMENT ID		TECN	COMMENT
$0.215 \pm 0.033 \pm 0.075$	[1] ABLIKIM	13T	BES3	$e^+e^- \to \pi^+\pi^- J/\psi$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.29 ± 0.08	[2] LIU	13B	BELL	$e^+e^- \to \gamma\pi^+\pi^- J/\psi$

[1] Assuming that the cross section of $e^+e^- \to \pi^+\pi^- J/\psi$ is fully due to the $\psi(4260)$.

NODE=M074R01;LINKAGE=AB

[2] Systematic error not evaluated.

NODE=M074R01;LINKAGE=A

$\Gamma(J/\psi\pi^0\pi^0)/\Gamma_{total}$ — Γ_8/Γ

NODE=M074R50

VALUE	DOCUMENT ID		TECN	COMMENT
seen	[1] ABLIKIM	20N	BES3	$e^+e^- \to \pi^0\pi^0 J/\psi$

[1] From a fit to the cross section $e^+e^- \to \pi^0\pi^0 J/\psi$ at center-of-mass energies between 3.808 and 4.600 GeV.

NODE=M074R50;LINKAGE=A

$\Gamma(J/\psi K^0_S K^0_S)/\Gamma_{total}$ — Γ_{10}/Γ

NODE=M074R27

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	SHEN	14	BELL	9.4–10.9 $e^+e^- \to \gamma K^0_S K^0_S J/\psi$

$\Gamma(J/\psi\eta)/\Gamma_{total}$ — Γ_{11}/Γ

NODE=M074R52

VALUE	DOCUMENT ID		TECN	COMMENT
seen	ABLIKIM	20O	BES3	$e^+e^- \to \eta J/\psi$

$\Gamma(J/\psi\eta\pi^0)/\Gamma_{total}$ — Γ_{15}/Γ

NODE=M074R28

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	ABLIKIM	15Q	BES3	4.0–4.6 $e^+e^- \to J/\psi\eta\pi^0$

$\Gamma(\psi(2S)\pi^+\pi^-)/\Gamma_{total}$ — Γ_{17}/Γ

NODE=M074R53

VALUE	DOCUMENT ID		TECN	COMMENT
seen	[1] ABLIKIM	17V	BES3	$e^+e^- \to \pi^+\pi^-\psi(2S)$

[1] From a fit to the cross section for $e^+e^- \to \pi^+\pi^-\psi(2S) \to 2(\pi^+\pi^-)\ell^+\ell^-$ obtained from 16 center-of-mass energies between 4.008 and 4.600 GeV and comprising 5.1 fb^{-1}. NODE=M074R53;LINKAGE=A

$\Gamma(\psi(2S)\pi^+\pi^-)/\Gamma(J/\psi\pi^+\pi^-)$ — Γ_{17}/Γ_5

NODE=M074R30

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
(0.11±0.03±0.03) to (0.55±0.18 ± 0.19)	[1] ZHANG	17C	RVUE	$e^+e^- \to \pi^+\pi^- J/\psi$ or $\psi(2S)$

[1] From a combined fit of BELLE, BABAR and BES3 $e^+e^- \to \pi^+\pi^- J/\psi$ and $e^+e^- \to \pi^+\pi^-\psi(2S)$ data. NODE=M074R30;LINKAGE=A

$\Gamma(\chi_{c0}\omega)/\Gamma_{total}$ — Γ_{19}/Γ

NODE=M074R48

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	180	[1] ABLIKIM	15C	BES3	$e^+e^- \to \omega\chi_{c0}$

[1] From a 3-parameter fit of measured cross sections from $\sqrt{s}$ = 4.21–4.42 GeV to a phase-space modified Breit-Wigner function, using the decays $\chi_{c0} \to \pi^+\pi^-$, $\chi_{c0} \to K^+K^-$, and $\omega \to \pi^+\pi^-\pi^0$. NODE=M074R48;LINKAGE=A

$\Gamma(h_c(1P)\pi^+\pi^-)/\Gamma_{total}$ — Γ_{22}/Γ

NODE=M074R49

VALUE	DOCUMENT ID		TECN	COMMENT
seen	ABLIKIM	17G	BES3	$e^+e^- \to \pi^+\pi^- h_c$

$\Gamma(h_c(1P)\pi^+\pi^-)/\Gamma(J/\psi\pi^+\pi^-)$ — Γ_{22}/Γ_5

NODE=M074R25

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.0	90	[1] PEDLAR	11	CLEO	$e^+e^- \to h_c(1P)\pi^+\pi^-$

[1] At $\sqrt{s} = 4260$ MeV, PEDLAR 11 measures $\sigma(e^+e^- \to h_c(1P)\pi^+\pi^-) = 32\pm17\pm6\pm6$ pb, where the errors are statistical, systematic, and due to uncertainty in B($\psi(2S) \to \pi^0 h_c(1P)$), respectively. NODE=M074R25;LINKAGE=PE

$\Gamma(D\overline{D})/\Gamma(J/\psi\pi^+\pi^-)$ — Γ_{25}/Γ_5

NODE=M074R2

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.0	90	[1] AUBERT	07BE	BABR	$e^+e^- \to D\overline{D}\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<4.0	90	CRONIN-HEN...	09	CLEO	e^+e^-

[1] Using 4259 ± 10 MeV for the mass and 88 ± 24 MeV for the width of $\psi(4260)$. NODE=M074R2;LINKAGE=AU

$\Gamma(D^0\overline{D}^0)/\Gamma_{total}$ — Γ_{26}/Γ

NODE=M074R12

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	CRONIN-HEN...	09	CLEO	$e^+e^- \to D^0\overline{D}^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	AUBERT	09M	BABR	$e^+e^- \to D^0\overline{D}^0\gamma$
not seen	PAKHLOVA	08	BELL	$e^+e^- \to D^0\overline{D}^0\gamma$

$\Gamma(D^+D^-)/\Gamma_{total}$ — Γ_{27}/Γ

NODE=M074R13

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	CRONIN-HEN...	09	CLEO	$e^+e^- \to D^+D^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	AUBERT	09M	BABR	$e^+e^- \to D^+D^-\gamma$
not seen	PAKHLOVA	08	BELL	$e^+e^- \to D^+D^-\gamma$

$\Gamma(D^* \overline{D}$+c.c.$)/\Gamma(J/\psi\pi^+\pi^-)$ Γ_{28}/Γ_5

NODE=M074R03

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<34	90	AUBERT	09M	BABR	$e^+e^- \rightarrow \gamma D^* \overline{D}$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<45	90	CRONIN-HEN...	09	CLEO	e^+e^-

$\Gamma(D^*(2007)^0 \overline{D}^0$+c.c.$)/\Gamma_{total}$ Γ_{29}/Γ

NODE=M074R14

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	CRONIN-HEN...	09	CLEO	$e^+e^- \rightarrow D^{*0}\overline{D}^0$

• • • We do not use the following data for averages, fits, limits, etc. • • •

not seen	AUBERT	09M	BABR	$e^+e^- \rightarrow D^{*0}\overline{D}^0\gamma$

$\Gamma(D^*(2010)^+ D^-$+c.c.$)/\Gamma_{total}$ Γ_{30}/Γ

NODE=M074R15

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	CRONIN-HEN...	09	CLEO	$e^+e^- \rightarrow D^{*+}D^-$
not seen	PAKHLOVA	07	BELL	$e^+e^- \rightarrow D^{*+}D^-\gamma$

• • • We do not use the following data for averages, fits, limits, etc. • • •

not seen	AUBERT	09M	BABR	$e^+e^- \rightarrow D^{*+}D^-\gamma$

$\Gamma(D^* \overline{D}^*)/\Gamma(J/\psi\pi^+\pi^-)$ Γ_{31}/Γ_5

NODE=M074R04

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<11	90	CRONIN-HEN...	09	CLEO	e^+e^-

• • • We do not use the following data for averages, fits, limits, etc. • • •

<40	90	AUBERT	09M	BABR	$e^+e^- \rightarrow \gamma D^* \overline{D}^*$

$\Gamma(D^*(2007)^0 \overline{D}^*(2007)^0)/\Gamma_{total}$ Γ_{32}/Γ

NODE=M074R17

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	CRONIN-HEN...	09	CLEO	$e^+e^- \rightarrow D^{*0}\overline{D}^{*0}$

• • • We do not use the following data for averages, fits, limits, etc. • • •

not seen	AUBERT	09M	BABR	$e^+e^- \rightarrow D^{*0}\overline{D}^{*0}\gamma$

$\Gamma(D^*(2010)^+ D^*(2010)^-)/\Gamma_{total}$ Γ_{33}/Γ

NODE=M074R18

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	CRONIN-HEN...	09	CLEO	$e^+e^- \rightarrow D^{*+}D^{*-}$
not seen	PAKHLOVA	07	BELL	$e^+e^- \rightarrow D^{*+}D^{*-}\gamma$

• • • We do not use the following data for averages, fits, limits, etc. • • •

not seen	AUBERT	09M	BABR	$e^+e^- \rightarrow D^{*+}D^{*-}\gamma$

$\Gamma(D^0 D^- \pi^+$+c.c. (excl. $D^*(2007)^0 \overline{D}^{*0}$+c.c., $D^*(2010)^+ D^-$+c.c.$))/\Gamma_{total}$ Γ_{35}/Γ

NODE=M074R16

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	PAKHLOVA	08A	BELL	10.6 $e^+e^- \rightarrow D^0 D^- \pi^+ \gamma$

$\Gamma(D \overline{D}^* \pi$+c.c. (excl. $D^* \overline{D}^*$$))/\Gamma_{total}$ Γ_{36}/Γ

NODE=M074R22

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	CRONIN-HEN...	09	CLEO	$e^+e^- \rightarrow D^* \overline{D}\pi$

$\Gamma(D \overline{D}^* \pi$+c.c. (excl. $D^* \overline{D}^*$$))/\Gamma(J/\psi\pi^+\pi^-)$ Γ_{36}/Γ_5

NODE=M074R05

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<15	90	CRONIN-HEN...	09	CLEO	e^+e^-

$\Gamma(D^0 D^{*-} \pi^+$+c.c. (excl. $D^*(2010)^+ D^*(2010)^-$$))/\Gamma_{total}$ Γ_{37}/Γ

NODE=M074R23

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	PAKHLOVA	09	BELL	$e^+e^- \rightarrow D^0 D^{*-}\pi^+\gamma$

$\Gamma(D^0 D^*(2010)^- \pi^+$+c.c.$)/\Gamma_{total}$ Γ_{38}/Γ

NODE=M074R54

VALUE	DOCUMENT ID		TECN	COMMENT
seen	ABLIKIM	19R	BES3	$e^+e^- \rightarrow \pi^+ D^0 D^{*-}$ + c.c.

$\Gamma(D^0 D^*(2010)^- \pi^+$+c.c.$)/\Gamma(J/\psi\pi^+\pi^-)$ Γ_{38}/Γ_5

NODE=M074R10

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<9	90	PAKHLOVA	09	BELL	$e^+e^- \rightarrow D^0 D^{*-}\pi^+$

$\Gamma(D^0 D^*(2010)^- \pi^+ + \text{c.c.})/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{38}/\Gamma \times \Gamma_1/\Gamma$

NODE=M074R11

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<0.42 \times 10^{-6}$	90	[1] PAKHLOVA 09	BELL	$e^+e^- \rightarrow D^0 D^{*-} \pi^+$

[1] Using 4263^{+8}_{-9} MeV for the mass of $\psi(4260)$.

NODE=M074R11;LINKAGE=PA

$\Gamma(D_1(2420)\overline{D} + \text{c.c.})/\Gamma_{total}$ — Γ_{39}/Γ

NODE=M074R33

VALUE	DOCUMENT ID	TECN	COMMENT
not seen	[1] ABLIKIM 19AR	BES3	$e^+e^- \rightarrow \pi^+\pi^- D\overline{D}$

[1] Results from a measurement of $\sigma(e^+e^- \rightarrow D_1(2420)\overline{D} + \text{c.c.})$ between $\sqrt{s} = 4.3$ and 4.6 GeV.

NODE=M074R33;LINKAGE=A

$\Gamma(D^* \overline{D}^* \pi)/\Gamma_{total}$ — Γ_{40}/Γ

NODE=M074R24

VALUE	DOCUMENT ID	TECN	COMMENT
not seen	CRONIN-HEN..09	CLEO	$e^+e^- \rightarrow D^* \overline{D}^* \pi$

$\Gamma(D^* \overline{D}^* \pi)/\Gamma(J/\psi \pi^+\pi^-)$ — Γ_{40}/Γ_5

NODE=M074R06

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<8.2	90	CRONIN-HEN..09	CLEO	e^+e^-

$\Gamma(D_s^+ D_s^-)/\Gamma_{total}$ — Γ_{41}/Γ

NODE=M074R19

VALUE	DOCUMENT ID	TECN	COMMENT
not seen	DEL-AMO-SA..10N	BABR	$e^+e^- \rightarrow D_s^+ D_s^- \gamma$
not seen	CRONIN-HEN..09	CLEO	$e^+e^- \rightarrow D_s^+ D_s^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
not seen	PAKHLOVA 11	BELL	$e^+e^- \rightarrow D_s^+ D_s^- \gamma$

$\Gamma(D_s^+ D_s^-)/\Gamma(J/\psi \pi^+\pi^-)$ — Γ_{41}/Γ_5

NODE=M074R07

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.7	95	DEL-AMO-SA..10N	BABR	10.6 e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<1.3	90	CRONIN-HEN..09	CLEO	e^+e^-

$\Gamma(D_s^{*+} D_s^- + \text{c.c.})/\Gamma_{total}$ — Γ_{42}/Γ

NODE=M074R20

VALUE	DOCUMENT ID	TECN	COMMENT
not seen	DEL-AMO-SA..10N	BABR	$e^+e^- \rightarrow D_s^{*+} D_s^- \gamma$
not seen	CRONIN-HEN..09	CLEO	$e^+e^- \rightarrow D_s^{*+} D_s^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
not seen	PAKHLOVA 11	BELL	$e^+e^- \rightarrow D_s^{*+} D_s^- \gamma$

$\Gamma(D_s^{*+} D_s^- + \text{c.c.})/\Gamma(J/\psi \pi^+\pi^-)$ — Γ_{42}/Γ_5

NODE=M074R08

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
< 0.8	90	CRONIN-HEN..09	CLEO	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<44	95	DEL-AMO-SA..10N	BABR	10.6 e^+e^-

$\Gamma(D_s^{*+} D_s^{*-})/\Gamma_{total}$ — Γ_{43}/Γ

NODE=M074R21

VALUE	DOCUMENT ID	TECN	COMMENT
not seen	CRONIN-HEN..09	CLEO	$e^+e^- \rightarrow D_s^{*+} D_s^{*-}$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
not seen	PAKHLOVA 11	BELL	$e^+e^- \rightarrow D_s^{*+} D_s^{*-} \gamma$
not seen	DEL-AMO-SA..10N	BABR	$e^+e^- \rightarrow D_s^{*+} D_s^{*-} \gamma$

$\Gamma(D_s^{*+} D_s^{*-})/\Gamma(J/\psi \pi^+\pi^-)$ — Γ_{43}/Γ_5

NODE=M074R09

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
< 9.5	90	CRONIN-HEN..09	CLEO	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<30	95	DEL-AMO-SA..10N	BABR	10.6 e^+e^-

$\Gamma(p\overline{p})/\Gamma(J/\psi \pi^+\pi^-)$ — Γ_{44}/Γ_5

NODE=M074R1

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.13	90	[1] AUBERT 06B	BABR	$e^+e^- \rightarrow p\overline{p}\gamma$

[1] Using 4259 ± 10 MeV for the mass and 88 ± 24 MeV for the width of $\psi(4260)$.

NODE=M074R1;LINKAGE=AU

$\Gamma(p\overline{p}\pi^0)/\Gamma(J/\psi\pi^+\pi^-)$ — Γ_{45}/Γ_5

NODE=M074R00
NODE=M074R00

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2 \times 10^{-4}$	90	ABLIKIM	17F	BES3	$e^+e^- \to \psi(4260) \to$ hadrons

OCCUR=2

$\Gamma(p\overline{p}\eta)/\Gamma_{total}$ — Γ_{46}/Γ

NODE=M074R45
NODE=M074R45

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	ABLIKIM	21AN	BES3	$e^+e^- \to p\overline{p}\eta$

$\Gamma(p\overline{p}\omega)/\Gamma_{total}$ — Γ_{47}/Γ

NODE=M074R46
NODE=M074R46

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	ABLIKIM	21AN	BES3	$e^+e^- \to p\overline{p}\omega$

$\Gamma(p\overline{p}p\overline{p})/\Gamma_{total}$ — Γ_{61}/Γ

NODE=M074R58
NODE=M074R58

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	ABLIKIM	21D	BES3	4.0–4.6 $e^+e^- \to p\overline{p}p\overline{p}$

Radiative decays

NODE=M074310

$\Gamma(\eta_c(1S)\gamma)/\Gamma_{total}$ — Γ_{63}/Γ

NODE=M074R29
NODE=M074R29

VALUE	DOCUMENT ID		COMMENT
possibly seen	[1] ABLIKIM	17W	$e^+e^- \to \gamma\eta_c(1S)$

[1] Significance ranges from 4.2 σ to as low as 1.5 σ for a flat component plus $\psi(4260)$ spectrum. Needs confirmation.

NODE=M074R29;LINKAGE=A

$\Gamma(\eta_c(1S)\pi^0\gamma)/\Gamma_{total}$ — Γ_{64}/Γ

NODE=M074R57
NODE=M074R57

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	[1] ABLIKIM	21B	BES3	$e^+e^- \to \gamma\pi^0\eta_c$

[1] Not seen in $e^+e^- \to \gamma\pi^0\eta_c$ at $\sqrt{s} = 4.226$ GeV with a 90% C.L. upper limit on the cross section of 11.2 pb.

NODE=M074R57;LINKAGE=A

$\Gamma(\chi_{c1}(3872)\gamma)/\Gamma_{total}$ — Γ_{67}/Γ

NODE=M074R26
NODE=M074R26

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen		ABLIKIM	19V	BES3	$e^+e^- \to \gamma\chi_{c1}(3872)$
seen	20 ± 5	ABLIKIM	14	BES3	$e^+e^- \to J/\psi\pi^+\pi^-\gamma$

ψ(4230) REFERENCES

NODE=M074

ABLIKIM	21AJ	PR D104 052012	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61441
ABLIKIM	21AN	PR D104 092008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61446
ABLIKIM	21AS	PR D104 L091104	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61454
ABLIKIM	21AW	PR D104 112009	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61479
ABLIKIM	21B	PR D103 032006	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61029
ABLIKIM	21D	PR D103 052003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61031
ABLIKIM	20A	PR D101 012008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60210
ABLIKIM	20AG	PR D102 112009	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60744
ABLIKIM	20C	PRL 124 032002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60215
ABLIKIM	20N	PR D102 012009	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60338
ABLIKIM	20O	PR D102 031101	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60344
ABLIKIM	19	PR D99 012003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59515
ABLIKIM	19AE	PR D99 072005	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59856
ABLIKIM	19AI	PR D99 091103	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59871
ABLIKIM	19AR	PR D100 032005	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59910
ABLIKIM	19K	PR D99 019903 (errat.)	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59611
ABLIKIM	19R	PRL 122 102002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59765
ABLIKIM	19V	PRL 122 232002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59796
ABLIKIM	18N	PR D97 071101	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58914
ABLIKIM	17B	PRL 118 092001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57755
ABLIKIM	17F	PL B771 45	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57909
ABLIKIM	17G	PRL 118 092002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57915
ABLIKIM	17V	PR D96 032004	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58029
Also		PR D99 019903 (errat.)	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59611
ABLIKIM	17W	PR D96 051101	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58212
GAO	17	PR D95 092007	X.Y. Gao, C.P. Shen, C.Z. Yuan		REFID=57991
ZHANG	17B	PR D96 054008	J. Zhang, J. Zhang		REFID=58219
ZHANG	17C	EPJ C77 727	J. Zhang, L. Yuan		REFID=58463
PDG	16	CP C40 100001	C. Patrignani *et al.*	(PDG Collab.)	REFID=57140
ABLIKIM	15C	PRL 114 092003	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56401
ABLIKIM	15Q	PR D92 012008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56782
HAN	15	PR D92 012011	Y.L. Han *et al.*	(BELLE Collab.)	REFID=56816
ABLIKIM	14	PRL 112 092001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55647
SHEN	14	PR D89 072015	C.P. Shen *et al.*	(BELLE Collab.)	REFID=55944
ABLIKIM	13T	PRL 110 252001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=55409
LIU	13B	PRL 110 252002	Z.Q. Liu *et al.*	(BELLE Collab.)	REFID=55410

WANG	13B	PR D87 051101	X.L. Wang *et al.*	(BELLE Collab.)	REFID=55377
LEES	12AC	PR D86 051102	J.P. Lees *et al.*	(BABAR Collab.)	REFID=54750
PAKHLOVA	11	PR D83 011101	G. Pakhlova *et al.*	(BELLE Collab.)	REFID=53638
PEDLAR	11	PRL 107 041803	T. Pedlar *et al.*	(CLEO Collab.)	REFID=16787
DEL-AMO-SA...	10N	PR D82 052004	P. del Amo Sanchez *et al.*	(BABAR Collab.)	REFID=53532
AUBERT	09M	PR D79 092001	B. Aubert *et al.*	(BABAR Collab.)	REFID=52724
CRONIN-HEN...	09	PR D80 072001	D. Cronin-Hennessy *et al.*	(CLEO Collab.)	REFID=53114
PAKHLOVA	09	PR D80 091101	G. Pakhlova *et al.*	(BELLE Collab.)	REFID=53143
AUBERT	08S	PR D77 092002	B. Aubert *et al.*	(BABAR Collab.)	REFID=52242
LIU	08H	PR D78 014032	Z.Q. Liu, X.S. Qin, C.Z. Yuan		REFID=52296
PAKHLOVA	08	PR D77 011103	G. Pakhlova *et al.*	(BELLE Collab.)	REFID=52132
PAKHLOVA	08A	PRL 100 062001	G. Pakhlova *et al.*	(BELLE Collab.)	REFID=52134
YUAN	08	PR D77 011105	C.Z. Yuan *et al.*	(BELLE Collab.)	REFID=52135
AUBERT	07AK	PR D76 012008	B. Aubert *et al.*	(BABAR Collab.)	REFID=51908
AUBERT	07BE	PR D76 111105	B. Aubert *et al.*	(BABAR Collab.)	REFID=52074
AUBERT	07S	PRL 98 212001	B. Aubert *et al.*	(BABAR Collab.)	REFID=51724
PAKHLOVA	07	PRL 98 092001	G. Pakhlova *et al.*	(BELLE Collab.)	REFID=51628
WANG	07D	PRL 99 142002	X.L. Wang *et al.*	(BELLE Collab.)	REFID=51959
YUAN	07	PRL 99 182004	C.Z. Yuan *et al.*	(BELLE Collab.)	REFID=51960
AUBERT	06B	PR D73 012005	B. Aubert *et al.*	(BABAR Collab.)	REFID=51026
AUBERT,BE	06D	PR D74 091103	B. Aubert *et al.*	(BABAR Collab.)	REFID=51511
HE	06B	PR D74 091104	Q. He *et al.*	(CLEO Collab.)	REFID=51523
AUBERT,B	05I	PRL 95 142001	B. Aubert *et al.*	(BABAR Collab.)	REFID=50776

NODE=M216

$R_{c0}(4240)$

$I^G(J^{PC}) = 1^+(0^{--})$
I, G, C need confirmation.

OMITTED FROM SUMMARY TABLE
was $X(4240)^{\pm}$

Properties incompatible with a $q\overline{q}$ structure (exotic state). See the review on non-$q\overline{q}$ states. NODE=M216

Spin and parity assigment $J^P = 0^-$ is favored over 1^-, 2^-, and 2^+ by 8 σ and over 1^+ by 1 σ, according to the four-dimensional amplitude analysis of AAIJ 14AG.

$R_{c0}(4240)$ MASS

NODE=M216M

NODE=M216M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
$4239 \pm 18^{+45}_{-10}$	[1] AAIJ	14AG	LHCB	$B^0 \to K^+ \pi^- \psi(2S)$

[1] From a 4-dimensional analysis when a second, lower mass resonance is allowed in the $Z_c(4430)$ fit, with significance 6 σ including systematic variations. NODE=M216M;LINKAGE=AA

$R_{c0}(4240)$ WIDTH

NODE=M216W

NODE=M216W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
$220 \pm 47^{+108}_{-74}$	[1] AAIJ	14AG	LHCB	$B^0 \to K^+ \pi^- \psi(2S)$

[1] From a 4-dimensional analysis when a second, lower mass resonance is allowed in the $Z_c(4430)$ fit, with significance 6 σ including systematic variations. NODE=M216W;LINKAGE=AA

$R_{c0}(4240)$ DECAY MODES

NODE=M216215;NODE=M216

	Mode	Fraction (Γ_i/Γ)
Γ_1	$\pi^- \psi(2S)$	seen

DESIG=1

$R_{c0}(4240)$ BRANCHING RATIOS

NODE=M216225

$\Gamma(\pi^- \psi(2S))/\Gamma_{total}$ Γ_1/Γ

NODE=M216R01
NODE=M216R01

VALUE	DOCUMENT ID		TECN	COMMENT
seen	[1] AAIJ	14AG	LHCB	$B^0 \to K^+ \pi^- \psi(2S)$

[1] From a 4-dimensional analysis when a second, lower mass resonance is allowed in the $Z_c(4430)$ fit. No partial branching fraction quoted. NODE=M216R01;LINKAGE=AA

$R_{c0}(4240)$ REFERENCES

NODE=M216

AAIJ	14AG	PRL 112 222002	R. Aaij *et al.*	(LHCb Collab.)	REFID=55896

NODE=M192

$X(4250)^{\pm}$

$I^G(J^{PC}) = 1^-(?^{?+})$
I, G, C need confirmation.

OMITTED FROM SUMMARY TABLE

Properties incompatible with a $q\overline{q}$ structure (exotic state). See the review on non-$q\overline{q}$ states. NODE=M192

Observed by MIZUK 08 in the $\pi^+\chi_{c1}(1P)$ invariant mass distribution in $\overline{B}^0 \to K^-\pi^+\chi_{c1}(1P)$ decays. Not seen by LEES 12B in this same mode after accounting for $K\pi$ resonant mass and angular structure.

$X(4250)^{\pm}$ MASS

NODE=M192M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
$4248^{+44}_{-29}{}^{+180}_{-35}$	[1] MIZUK	08	BELL	$\overline{B}^0 \to K^-\pi^+\chi_{c1}(1P)$

NODE=M192M

[1] From a Dalitz plot analysis with two Breit-Wigner amplitudes. NODE=M192M;LINKAGE=MI

$X(4250)^{\pm}$ WIDTH

NODE=M192W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
$177^{+54}_{-39}{}^{+316}_{-61}$	[1] MIZUK	08	BELL	$\overline{B}^0 \to K^-\pi^+\chi_{c1}(1P)$

NODE=M192W

[1] From a Dalitz plot analysis with two Breit-Wigner amplitudes. NODE=M192W;LINKAGE=MI

$X(4250)^{\pm}$ DECAY MODES

NODE=M192215;NODE=M192

	Mode	Fraction (Γ_i/Γ)
Γ_1	$\pi^+\chi_{c1}(1P)$	seen

DESIG=1

$X(4250)^{\pm}$ BRANCHING RATIOS

NODE=M192225

$\Gamma(\pi^+\chi_{c1}(1P))/\Gamma_{total}$ **Γ_1/Γ**

NODE=M192R01
NODE=M192R01

VALUE	DOCUMENT ID		TECN	COMMENT
seen	[1] MIZUK	08	BELL	$\overline{B}^0 \to K^-\pi^+\chi_{c1}(1P)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	[2] LEES	12B	BABR	$B \to K\pi\chi_{c1}(1P)$

[1] With a product branching fraction measurement of B($\overline{B}^0 \to K^- X(4250)^+$) × B($X(4250)^+ \to \pi^+\chi_{c1}(1P)$) = $(4.0^{+2.3}_{-0.9}{}^{+19.7}_{-0.5}) \times 10^{-5}$. NODE=M192R01;LINKAGE=MI

[2] With a product branching fraction limit of B($\overline{B}^0 \to X(4250)^+ K^-$) × B($X(4250)^+ \to \chi_{c1}\pi^+$) $< 4.0 \times 10^{-5}$ at 90% CL. NODE=M192R01;LINKAGE=LE

$X(4250)^{\pm}$ REFERENCES

NODE=M192

LEES	12B	PR D85 052003	J.P. Lees *et al.*	(BABAR Collab.)
MIZUK	08	PR D78 072004	R. Mizuk *et al.*	(BELLE Collab.)

REFID=54042
REFID=52535

NODE=M233

$\chi_{c1}(4274)$

$I^G(J^{PC}) = 0^+(1^{++})$

was $X(4274)$

This state shows properties different from a conventional $q\overline{q}$ state. A candidate for an exotic structure. See the review on non-$q\overline{q}$ states.

NODE=M233

Seen by AAIJ 17C in $B^+ \to \chi_{c1} K^+$, $\chi_{c1} \to J/\psi\phi$ using an amplitude analysis of $B^+ \to J/\psi\phi K^+$ with a significance (accounting for systematic uncertainties) of 6.0 σ.

$\chi_{c1}(4274)$ MASS

NODE=M233M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
4286 $^{+8}_{-9}$ OUR AVERAGE Error includes scale factor of 1.7. [4274$^{+8}_{-6}$ MeV OUR 2021 AVERAGE]					
4294 ±4 $^{+3}_{-6}$	24k	[1] AAIJ	21E	LHCB	$B^+ \to J/\psi\phi K^+$
4274.4$^{+8.4}_{-6.7}$± 1.9	22	[2] AALTONEN	17	CDF	$B^+ \to J/\psi\phi K^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
4273.3±8.3$^{+17.2}_{-3.6}$	4289	[3,4] AAIJ	17C	LHCB	$B^+ \to J/\psi\phi K^+$

NODE=M233M

NEW

[1] From an amplitude analysis of the decay $B^+ \to J/\psi\phi K^+$ with a significance of 18 σ.
[2] From a fit to the invariant mass spectrum with a significance of 3.1 σ.
[3] From an amplitude analysis of the decay $B^+ \to J/\psi\phi K^+$ with a significance of 6.0 σ.
[4] Superseded by AAIJ 21E.

NODE=M233M;LINKAGE=C
NODE=M233M;LINKAGE=B
NODE=M233M;LINKAGE=A
NODE=M233M;LINKAGE=D

$\chi_{c1}(4274)$ WIDTH

NODE=M233W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
51 ± 7 OUR AVERAGE [49 ± 12 MeV OUR 2021 AVERAGE]					
53 ± 5 ± 5	24k	[1] AAIJ	21E	LHCB	$B^+ \to J/\psi\phi K^+$
32.3$^{+21.9}_{-15.3}$± 7.6	22	[2] AALTONEN	17	CDF	$B^+ \to J/\psi\phi K^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
56 ±11 $^{+8}_{-11}$	4289	[3,4] AAIJ	17C	LHCB	$B^+ \to J/\psi\phi K^+$

NODE=M233W
NEW

[1] From an amplitude analysis of the decay $B^+ \to J/\psi\phi K^+$ with a significance of 18 σ.
[2] From a fit to the invariant mass spectrum with a significance of 3.1 σ.
[3] From an amplitude analysis of the decay $B^+ \to J/\psi\phi K^+$ with a significance of 6.0 σ.
[4] Superseded by AAIJ 21E.

NODE=M233W;LINKAGE=C
NODE=M233W;LINKAGE=B
NODE=M233W;LINKAGE=A
NODE=M233W;LINKAGE=D

$\chi_{c1}(4274)$ DECAY MODES

NODE=M233215;NODE=M233

	Mode	Fraction (Γ_i/Γ)
Γ_1	$J/\psi\phi$	seen

DESIG=1

$\chi_{c1}(4274)$ BRANCHING RATIOS

NODE=M233220

$\Gamma(J/\psi\phi)/\Gamma_{total}$ Γ_1/Γ

NODE=M233R01
NODE=M233R01

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	24k	[1] AAIJ	21E	LHCB	$B^+ \to J/\psi\phi K^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	4289	[2,3] AAIJ	17C	LHCB	$B^+ \to J/\psi\phi K^+$

[1] From an amplitude analysis of the decay $B^+ \to J/\psi\phi K^+$ with a significance of 18 σ.
[2] From an amplitude analysis of the decay $B^+ \to J/\psi\phi K^+$ with a significance of 6.0 σ.
[3] Superseded by AAIJ 21E.

NODE=M233R01;LINKAGE=B
NODE=M233R01;LINKAGE=A
NODE=M233R01;LINKAGE=C

$\chi_{c1}(4274)$ REFERENCES

NODE=M233

AAIJ	21E	PRL 127 082001	R. Aaij *et al.*	(LHCb Collab.)	REFID=61150
AAIJ	17C	PRL 118 022003	R. Aaij *et al.*	(LHCb Collab.) JP	REFID=57657
Also		PR D95 012002	R. Aaij *et al.*	(LHCb Collab.)	REFID=57636
AALTONEN	17	MPL A32 1750139	T. Altonen *et al.*	(CDF Collab.)	REFID=58161

NODE=M194

$X(4350)$

$I^G(J^{PC}) = 0^+(?^{?+})$

OMITTED FROM SUMMARY TABLE

Seen by SHEN 10 in the $\gamma\gamma \to J/\psi\phi$. Needs confirmation.

NODE=M194

$X(4350)$ MASS

NODE=M194M

NODE=M194M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
$\mathbf{4350.6^{+4.6}_{-5.1}\pm0.7}$	$8.8^{+4.2}_{-3.2}$	[1] SHEN	10	BELL	$10.6\ e^+e^- \to e^+e^- J/\psi\phi$

[1] Statistical significance of 3.2 σ.

NODE=M194M;LINKAGE=SH

$X(4350)$ WIDTH

NODE=M194W

NODE=M194W

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
$\mathbf{13^{+18}_{-9}\pm4}$	$8.8^{+4.2}_{-3.2}$	[1] SHEN	10	BELL	$10.6\ e^+e^- \to e^+e^- J/\psi\phi$

[1] Statistical significance of 3.2 σ.

NODE=M194W;LINKAGE=SH

$X(4350)$ DECAY MODES

NODE=M194215;NODE=M194

	Mode	Fraction (Γ_i/Γ)
Γ_1	$J/\psi\phi$	seen
Γ_2	$\gamma\gamma$	seen

DESIG=1

DESIG=2

$X(4350)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M194220

$\Gamma(\gamma\gamma) \times \Gamma(J/\psi\phi)/\Gamma_{\text{total}}$ — $\Gamma_2\Gamma_1/\Gamma$

NODE=M194G01

NODE=M194G01

VALUE (eV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
$\mathbf{6.7^{+3.2}_{-2.4}\pm1.1}$	$8.8^{+4.2}_{-3.2}$	[1] SHEN	10	BELL	$10.6\ e^+e^- \to e^+e^- J/\psi\phi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1.5^{+0.7}_{-0.6}\pm0.3$	$8.8^{+4.2}_{-3.2}$	[2] SHEN	10	BELL	$10.6\ e^+e^- \to e^+e^- J/\psi\phi$

OCCUR=2

[1] For $J^P = 0^+$. Statistical significance of 3.2 σ.

[2] For $J^P = 2^+$. Statistical significance of 3.2 σ.

NODE=M194G01;LINKAGE=S0

NODE=M194G01;LINKAGE=S2

$X(4350)$ BRANCHING RATIOS

NODE=M194225

$\Gamma(J/\psi\phi)/\Gamma_{\text{total}}$ — Γ_1/Γ

NODE=M194R01

NODE=M194R01

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
seen	[1] SHEN	10	BELL	$10.6\ e^+e^- \to e^+e^- J/\psi\phi$

[1] Statistical significance of 3.2 σ.

NODE=M194R01;LINKAGE=SH

$\Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — Γ_2/Γ

NODE=M194R02

NODE=M194R02

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
seen	[1] SHEN	10	BELL	$10.6\ e^+e^- \to e^+e^- J/\psi\phi$

[1] Statistical significance of 3.2 σ.

NODE=M194R02;LINKAGE=SH

$X(4350)$ REFERENCES

NODE=M194

SHEN 10 PRL 104 112004 C.P. Shen *et al.* (BELLE Collab.)

REFID=53235

NODE=M181

$\psi(4360)$

$I^G(J^{PC}) = 0^-(1^{--})$

also known as $Y(4360)$; was $X(4360)$

NODE=M181

This state shows properties different from a conventional $q\overline{q}$ state. A candidate for an exotic structure. See the review on non-$q\overline{q}$ states.

Seen in radiative return from e^+e^- collisions at $\sqrt{s}$ = 9.54–10.58 GeV by AUBERT 07S, WANG 07D, and LEES 14F. See also the review on "Spectroscopy of mesons containing two heavy quarks."

$\psi(4360)$ MASS

NODE=M181M

NODE=M181M

NEW

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
4372 ± 9 OUR AVERAGE Error includes scale factor of 2.9. See the ideogram below.					
[4368 ± 13 MeV OUR 2021 AVERAGE Scale factor = 3.7]					
4390.3± 6.0±0.7		[1] ABLIKIM	21AJ	BES3	$e^+e^- \to \pi^+\pi^-\psi(2S)$
4371.7± 7.5±1.8		[2] ABLIKIM	21AK	BES3	$e^+e^- \to \gamma\chi_{c2} \to \gamma\gamma J/\psi$
4382.0±13.3±1.7		[3] ABLIKIM	20O	BES3	$e^+e^- \to \eta J/\psi$
4320.0±10.4±7.0		[4] ABLIKIM	17B	BES3	$e^+e^- \to \pi^+\pi^- J/\psi$
$4391.5^{+6.3}_{-6.8}\pm1.0$		ABLIKIM	17G	BES3	$e^+e^- \to \pi^+\pi^- h_c$
4347 ± 6 ±3	279	[5] WANG	15A	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
4340 ±16 ±9	37	[6] LEES	14F	BABR	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
4383.8± 4.2±0.8		[7] ABLIKIM	17V	BES3	$e^+e^- \to \pi^+\pi^-\psi(2S)$
4383.7± 2.9±6.2		[8] ZHANG	17B	RVUE	$e^+e^- \to \pi^+\pi^-\psi(2S)$
4386.4± 2.1±6.4		[9] ZHANG	17C	RVUE	$e^+e^- \to \pi^+\pi^- J/\psi$ or $\psi(2S)$
$4355\ {}^{+\ 9}_{-10}\ \pm9$	74	[10] LIU	08H	RVUE	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
4324 ±24		[11] AUBERT	07S	BABR	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
4361 ± 9 ±9	47	[6] WANG	07D	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$

[1] From a three-resonance fit to the Born cross section in the range $\sqrt{s}$ = 4.008–4.698 GeV. NODE=M181M;LINKAGE=H

[2] From a five-resonance fit to the cross section for $e^+e^- \to \gamma\gamma J/\psi \to \gamma\gamma\ell^+\ell^-$. NODE=M181M;LINKAGE=G

[3] From a fit of the measured cross section in the range $\sqrt{s}$ = 3.808–4.600 GeV. NODE=M181M;LINKAGE=BA

[4] From a three-resonance fit. NODE=M181M;LINKAGE=B

[5] From a two-resonance fit. Supersedes WANG 07D. NODE=M181M;LINKAGE=A

[6] From a two-resonance fit. NODE=M181M;LINKAGE=WA

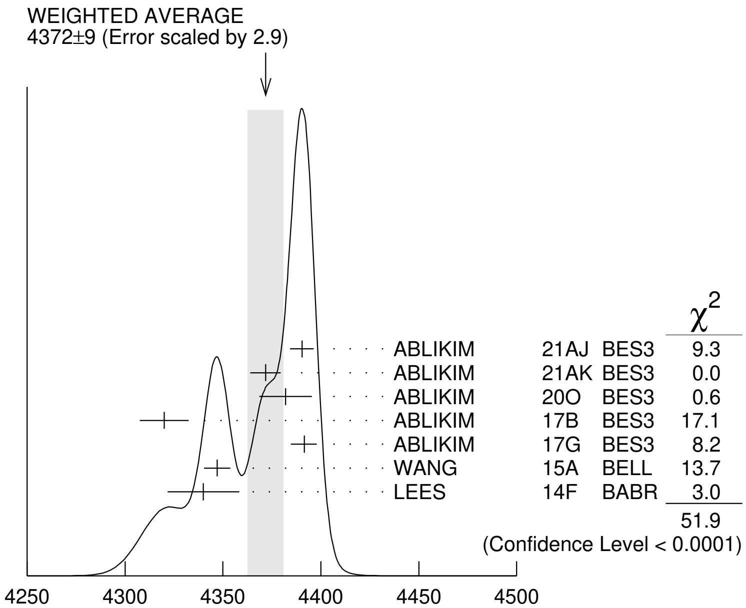
[7] From a fit to the cross section for $e^+e^- \to \pi^+\pi^-\psi(2S) \to 2(\pi^+\pi^-)\ell^+\ell^-$ obtained from 16 center-of-mass energies between 4.008 and 4.600 GeV and comprising 5.1 fb^{-1}. Superseded by ABLIKIM 21AJ. NODE=M181M;LINKAGE=C

[8] From a three-resonance fit. NODE=M181M;LINKAGE=E

[9] From a combined fit of BELLE, BABAR and BES3 $e^+e^- \to \pi^+\pi^- J/\psi$ and $e^+e^- \to \pi^+\pi^-\psi(2S)$ data. NODE=M181M;LINKAGE=D

[10] From a combined fit of AUBERT 07S and WANG 07D data with two resonances. NODE=M181M;LINKAGE=LI

[11] From a single-resonance fit. Systematic errors not estimated. NODE=M181M;LINKAGE=AU



$\psi(4360)$ MASS (MeV)

$\psi(4360)$ WIDTH

NODE=M181W

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
115 ±13 OUR AVERAGE		Error includes scale factor of 2.2. See the ideogram below.		
[96 ± 7 MeV OUR 2021 AVERAGE]				
143.3±10.0± 0.5		[1] ABLIKIM	21AJ	BES3 $e^+e^- \to \pi^+\pi^-\psi(2S)$
51.1±17.6± 1.9		[2] ABLIKIM	21AK	BES3 $e^+e^- \to \gamma\chi_{c2} \to \gamma\gamma J/\psi$
135.8±60.8±22.5		[3] ABLIKIM	20O	BES3 $e^+e^- \to \eta J/\psi$
$101.4^{+25.3}_{-19.7}$±10.2		[4] ABLIKIM	17B	BES3 $e^+e^- \to \pi^+\pi^- J/\psi$
$139.5^{+16.2}_{-20.6}$± 0.6		ABLIKIM	17G	BES3 $e^+e^- \to \pi^+\pi^- h_c$
103 ± 9 ± 5	279	[5] WANG	15A	BELL 10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
94 ±32 ±13	37	[6] LEES	14F	BABR 10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$

NODE=M181W

NEW

• • • We do not use the following data for averages, fits, limits, etc. • • •

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
84.2±12.5± 2.1		[7] ABLIKIM	17V	BES3 $e^+e^- \to \pi^+\pi^-\psi(2S)$
94.2± 7.3± 2.0		[8] ZHANG	17B	RVUE $e^+e^- \to \pi^+\pi^-\psi(2S)$
96.0± 6.7± 2.7		[9] ZHANG	17C	RVUE $e^+e^- \to \pi^+\pi^- J/\psi$ or $\psi(2S)$
$103\ ^{+17}_{-15}$ ±11	74	[10] LIU	08H	RVUE 10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
172 ±33		[11] AUBERT	07S	BABR 10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
74 ±15 ±10	47	[6] WANG	07D	BELL 10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$

[1] From a three-resonance fit to the Born cross section in the range $\sqrt{s}$ = 4.008–4.698 GeV. NODE=M181W;LINKAGE=G

[2] From a five-resonance fit to the cross section for $e^+e^- \to \gamma\gamma J/\psi \to \gamma\gamma\ell^+\ell^-$. NODE=M181W;LINKAGE=F

[3] From a fit of the measured cross section in the range $\sqrt{s}$ = 3.808–4.600 GeV. NODE=M181W;LINKAGE=BA

[4] From a three-resonance fit. NODE=M181W;LINKAGE=B

[5] From a two-resonance fit. Supersedes WANG 07D. NODE=M181W;LINKAGE=A

[6] From a two-resonance fit. NODE=M181W;LINKAGE=WA

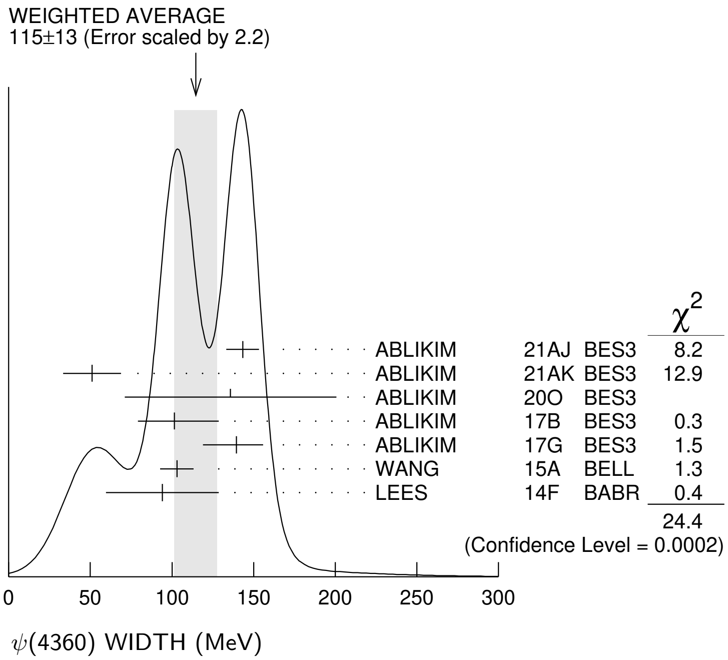
[7] From a fit to the cross section for $e^+e^- \to \pi^+\pi^-\psi(2S) \to 2(\pi^+\pi^-)\ell^+\ell^-$ obtained from 16 center-of-mass energies between 4.008 and 4.600 GeV and comprising 5.1 fb^{-1}. Superseded by ABLIKIM 21AJ. NODE=M181W;LINKAGE=C

[8] From a three-resonance fit. NODE=M181W;LINKAGE=E

[9] From a combined fit of BELLE, BABAR and BES3 $e^+e^- \to \pi^+\pi^- J/\psi$ and $e^+e^- \to \pi^+\pi^-\psi(2S)$ data. NODE=M181W;LINKAGE=D

[10] From a combined fit of AUBERT 07S and WANG 07D data with two resonances. NODE=M181W;LINKAGE=LI

[11] From a single-resonance fit. Systematic errors not estimated. NODE=M181W;LINKAGE=AU



$\psi(4360)$ DECAY MODES

NODE=M181215;NODE=M181

	Mode	Fraction (Γ_i/Γ)	
Γ_1	e^+e^-		DESIG=1
Γ_2	$h_c\pi^+\pi^-$	seen	DESIG=12
Γ_3	$J/\psi\pi^+\pi^-$		DESIG=8
Γ_4	$\psi(2S)\pi^+\pi^-$	seen	DESIG=2;OUR EVAL;→ UNCHECKED ←
Γ_5	$\psi(3770)\pi^+\pi^-$	possibly seen	DESIG=11
Γ_6	$\psi_2(3823)\pi^+\pi^-$	possibly seen	DESIG=5
Γ_7	$J/\psi\eta$	seen	DESIG=4
Γ_8	$D^0D^{*-}\pi^+$		DESIG=3
Γ_9	$D_1(2420)\overline{D}$+ c.c.	possibly seen	DESIG=10
Γ_{10}	$p\overline{p}\eta$	not seen	DESIG=13
Γ_{11}	$p\overline{p}\omega$	not seen	DESIG=14
Γ_{12}	$\chi_{c1}\gamma$		DESIG=6
Γ_{13}	$\chi_{c2}\gamma$		DESIG=7

$\psi(4360)$ $\Gamma(i)\times\Gamma(e^+e^-)/\Gamma(\text{total})$

NODE=M181230

$\Gamma(h_c\pi^+\pi^-)\times\Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_2\Gamma_1/\Gamma$

NODE=M181R11
NODE=M181R11

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
$11.6^{+5.0}_{-4.4}\pm1.9$	ABLIKIM	17G	BES3	$e^+e^-\to\pi^+\pi^-h_c$

$\Gamma(\psi(2S)\pi^+\pi^-)\times\Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_4\Gamma_1/\Gamma$

NODE=M181G1
NODE=M181G1

• • • We do not use the following data for averages, fits, limits, etc. • • •

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT	
10.7 ± 4.1		[1] ABLIKIM	21AJ	BES3	$e^+e^-\to\pi^+\pi^-\psi(2S)$	
20.7 ± 2.5		[2] ABLIKIM	21AJ	BES3	$e^+e^-\to\pi^+\pi^-\psi(2S)$	OCCUR=2
9.9 ± 4.1		[3] ABLIKIM	21AJ	BES3	$e^+e^-\to\pi^+\pi^-\psi(2S)$	OCCUR=3
19.4 ± 2.0		[4] ABLIKIM	21AJ	BES3	$e^+e^-\to\pi^+\pi^-\psi(2S)$	OCCUR=4
7.3 ± 2.8		[5] ABLIKIM	19K	BES3	$e^+e^-\to\pi^+\pi^-\psi(2S)$	
11.0 ± 3.8		[6] ABLIKIM	19K	BES3	$e^+e^-\to\pi^+\pi^-\psi(2S)$	OCCUR=2
$9.2\pm0.6\pm0.6$	279	[7] WANG	15A	BELL	$10.58\ e^+e^-\to\gamma\pi^+\pi^-\psi(2S)$	
$10.9\pm0.6\pm0.7$	279	[8] WANG	15A	BELL	$10.58\ e^+e^-\to\gamma\pi^+\pi^-\psi(2S)$	OCCUR=2
$6.0\pm1.0\pm0.5$	37	[5] LEES	14F	BABR	$10.58\ e^+e^-\to\gamma\pi^+\pi^-\psi(2S)$	
$7.2\pm1.0\pm0.6$	37	[6] LEES	14F	BABR	$10.58\ e^+e^-\to\gamma\pi^+\pi^-\psi(2S)$	OCCUR=2
$11.1^{+1.3}_{-1.2}$	74	[9] LIU	08H	RVUE	$10.58\ e^+e^-\to\gamma\pi^+\pi^-\psi(2S)$	
12.3 ± 1.2	74	[10] LIU	08H	RVUE	$10.58\ e^+e^-\to\gamma\pi^+\pi^-\psi(2S)$	OCCUR=2
$10.4\pm1.7\pm1.5$	47	[5] WANG	07D	BELL	$10.58\ e^+e^-\to\gamma\pi^+\pi^-\psi(2S)$	
$11.8\pm1.8\pm1.4$	47	[6] WANG	07D	BELL	$10.58\ e^+e^-\to\gamma\pi^+\pi^-\psi(2S)$	OCCUR=2

[1] Solution I of four equivalent solutions in a fit using three interfering resonances. Supersedes ABLIKIM 19K. NODE=M181G1;LINKAGE=E
[2] Solution II of four equivalent solutions in a fit using three interfering resonances. Supersedes ABLIKIM 19K. NODE=M181G1;LINKAGE=F
[3] Solution III of four equivalent solutions in a fit using three interfering resonances. Supersedes ABLIKIM 19K. NODE=M181G1;LINKAGE=G
[4] Solution IV of four equivalent solutions in a fit using three interfering resonances. Supersedes ABLIKIM 19K. NODE=M181G1;LINKAGE=H
[5] Solution I of two equivalent solutions in a fit using two interfering resonances. NODE=M181G1;LINKAGE=WA
[6] Solution II of two equivalent solutions in a fit using two interfering resonances. NODE=M181G1;LINKAGE=WN
[7] Solution I of two equivalent solutions from a fit using two interfering resonances. Supersedes WANG 07D. NODE=M181G1;LINKAGE=A
[8] Solution II of two equivalent solutions from a fit using two interfering resonances. Supersedes WANG 07D. NODE=M181G1;LINKAGE=B
[9] Solution I in a combined fit of AUBERT 07S and WANG 07D data with two resonances. NODE=M181G1;LINKAGE=LI
[10] Solution II in a combined fit of AUBERT 07S and WANG 07D data with two resonances. NODE=M181G1;LINKAGE=LU

$\Gamma(J/\psi\eta) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_7\Gamma_1/\Gamma$

NODE=M181G01
NODE=M181G01

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3.4 ± 2.2		[1] ABLIKIM	20O	BES3	$e^+e^- \to \eta J/\psi$
1.5 ± 1.0		[2] ABLIKIM	20O	BES3	$e^+e^- \to \eta J/\psi$
1.7 ± 1.1		[3] ABLIKIM	20O	BES3	$e^+e^- \to \eta J/\psi$
<6.8	90	WANG	13B	BELL	$e^+e^- \to J/\psi\eta\gamma$

OCCUR=2
OCCUR=3

[1] Solution 1 of three equivalent fit solutions using three resonant structures. NODE=M181G01;LINKAGE=A
[2] Solution 2 of three equivalent fit solutions using three resonant structures. NODE=M181G01;LINKAGE=B
[3] Solution 3 of three equivalent fit solutions using three resonant structures. NODE=M181G01;LINKAGE=C

$\Gamma(\chi_{c1}\gamma) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{12}\Gamma_1/\Gamma$

NODE=M181G02
NODE=M181G02

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<0.57	90	[1] HAN	15	BELL	10.58 $e^+e^- \to \chi_{c1}\gamma$

[1] Using B($\eta \to \gamma\gamma$) = (39.41 ± 0.21)%. NODE=M181G02;LINKAGE=A

$\Gamma(\chi_{c2}\gamma) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{13}\Gamma_1/\Gamma$

NODE=M181G03
NODE=M181G03

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<1.9	90	[1] HAN	15	BELL	10.58 $e^+e^- \to \chi_{c2}\gamma$

[1] Using B($\eta \to \gamma\gamma$) = (39.41 ± 0.21)%. NODE=M181G03;LINKAGE=A

$\psi(4360)$ BRANCHING RATIOS

NODE=M181225

$\Gamma(h_c\pi^+\pi^-)/\Gamma_{total}$ — Γ_2/Γ

NODE=M181R08
NODE=M181R08

VALUE	DOCUMENT ID		TECN	COMMENT
seen	ABLIKIM	17G	BES3	$e^+e^- \to \pi^+\pi^- h_c$

$\Gamma(\psi(2S)\pi^+\pi^-)/\Gamma_{total}$ — Γ_4/Γ

NODE=M181R00
NODE=M181R00

VALUE	DOCUMENT ID		TECN	COMMENT
seen	[1] ABLIKIM	17V	BES3	$e^+e^- \to \pi^+\pi^-\psi(2S)$

[1] From a fit to the cross section for $e^+e^- \to \pi^+\pi^-\psi(2S) \to 2(\pi^+\pi^-)\ell^+\ell^-$ obtained from 16 center-of-mass energies between 4.008 and 4.600 GeV and comprising 5.1 fb^{-1}. NODE=M181R00;LINKAGE=A

$\Gamma(\psi(2S)\pi^+\pi^-)/\Gamma(J/\psi\pi^+\pi^-)$ — Γ_4/Γ_3

NODE=M181R04
NODE=M181R04

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
(0.81 ± 0.12 ± 0.13) to (42 ± 15 ± 15)	[1] ZHANG	17C	RVUE	$e^+e^- \to \pi^+\pi^- J/\psi$ or $\psi(2S)$

[1] From a combined fit of BELLE, BABAR and BES3 $e^+e^- \to \pi^+\pi^- J/\psi$ and $e^+e^- \to \pi^+\pi^-\psi(2S)$ data. NODE=M181R04;LINKAGE=A

$\Gamma(\psi(3770)\pi^+\pi^-)/\Gamma_{total}$ — Γ_5/Γ

NODE=M181R06
NODE=M181R06

VALUE	DOCUMENT ID		TECN	COMMENT
possibly seen	[1] ABLIKIM	19AR	BES3	$e^+e^- \to \pi^+\pi^- D\overline{D}$

[1] Observe $e^+e^- \to \pi^+\pi^-\psi(3770)$ at $\sqrt{s}$ = 4.26, 4.36, and 4.42 GeV but cannot establish if continuum or resonant. NODE=M181R06;LINKAGE=A

$\Gamma(\psi_2(3823)\pi^+\pi^-)/\Gamma_{total}$ — Γ_6/Γ

NODE=M181R03

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
possibly seen	19	[1] ABLIKIM	15S	BES3	$e^+e^- \to \pi^+\pi^-\chi_{c1}\gamma$

[1] From a fit of $e^+e^- \to \pi^+\pi^-\psi_2(3823)$, $\psi_2(3823) \to \chi_{c1}\gamma$ cross sections taken at $\sqrt{s}$ values of 4.23, 4.26, 4.36, 4.42, and 4.60 GeV to the $\psi(4360)$ line shape.

NODE=M181R03;LINKAGE=A

$\Gamma(J/\psi\eta)/\Gamma_{total}$ — Γ_7/Γ

NODE=M181R07

VALUE	DOCUMENT ID		TECN	COMMENT
seen	[1] ABLIKIM	20O	BES3	$e^+e^- \to \eta J/\psi$

[1] With a significance of 6.0 σ.

NODE=M181R07;LINKAGE=A

$\Gamma(D^0D^{*-}\pi^+)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_8/\Gamma \times \Gamma_1/\Gamma$

NODE=M181R02

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.72 × 10^{-6}	90	[1] PAKHLOVA	09	BELL	$e^+e^- \to \psi(4360) \to D^0D^{*-}\pi^+$

[1] Using $4355^{+9}_{-10} \pm 9$ MeV for the mass of $\psi(4360)$.

NODE=M181R02;LINKAGE=PA

$\Gamma(D^0D^{*-}\pi^+)/\Gamma(\psi(2S)\pi^+\pi^-)$ — Γ_8/Γ_4

NODE=M181R01

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<8	90	PAKHLOVA	09	BELL	$e^+e^- \to \psi(4360) \to D^0D^{*-}\pi^+$

$\Gamma(D_1(2420)\overline{D}+\text{c.c.})/\Gamma_{total}$ — Γ_9/Γ

NODE=M181R05

VALUE	DOCUMENT ID		TECN	COMMENT
possibly seen	[1] ABLIKIM	19AR	BES3	$e^+e^- \to \pi^+\pi^-D\overline{D}$

[1] Evidence for $e^+e^- \to D_1(2420)\overline{D}+$ c.c. between $\sqrt{s}$ = 4.3 and 4.6 GeV, not necessarily resonant.

NODE=M181R05;LINKAGE=A

$\Gamma(p\overline{p}\eta)/\Gamma_{total}$ — Γ_{10}/Γ

NODE=M181R09

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	ABLIKIM	21AN	BES3	$e^+e^- \to p\overline{p}\eta$

$\Gamma(p\overline{p}\omega)/\Gamma_{total}$ — Γ_{11}/Γ

NODE=M181R10

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	ABLIKIM	21AN	BES3	$e^+e^- \to p\overline{p}\omega$

$\psi(4360)$ REFERENCES

NODE=M181

ABLIKIM	21AJ	PR D104 052012	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61441
ABLIKIM	21AK	PR D104 092001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61443
ABLIKIM	21AN	PR D104 092008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61446
ABLIKIM	20O	PR D102 031101	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60344
ABLIKIM	19AR	PR D100 032005	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59910
ABLIKIM	19K	PR D99 019903 (errat.)	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59611
ABLIKIM	17B	PRL 118 092001	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57755
ABLIKIM	17G	PRL 118 092002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57915
ABLIKIM	17V	PR D96 032004	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58029
Also		PR D99 019903 (errat.)	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59611
ZHANG	17B	PR D96 054008	J. Zhang, J. Zhang		REFID=58219
ZHANG	17C	EPJ C77 727	J. Zhang, L. Yuan		REFID=58463
ABLIKIM	15S	PRL 115 011803	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56784
HAN	15	PR D92 012011	Y.L. Han *et al.*	(BELLE Collab.)	REFID=56816
WANG	15A	PR D91 112007	X.L. Wang *et al.*	(BELLE Collab.)	REFID=56839
LEES	14F	PR D89 111103	J.P. Lees *et al.*	(BABAR Collab.)	REFID=55938
WANG	13B	PR D87 051101	X.L. Wang *et al.*	(BELLE Collab.)	REFID=55377
PAKHLOVA	09	PR D80 091101	G. Pakhlova *et al.*	(BELLE Collab.)	REFID=53143
LIU	08H	PR D78 014032	Z.Q. Liu, X.S. Qin, C.Z. Yuan		REFID=52296
AUBERT	07S	PRL 98 212001	B. Aubert *et al.*	(BABAR Collab.)	REFID=51724
WANG	07D	PRL 99 142002	X.L. Wang *et al.*	(BELLE Collab.)	REFID=51959

NODE=M073

$\psi(4415)$

$I^G(J^{PC}) = 0^-(1^{--})$

ψ(4415) MASS

NODE=M073M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
4421 ± 4 OUR ESTIMATE				
4415.1± 7.9	[1] ABLIKIM	08D	BES2	$e^+e^- \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •				
4412 ±15	[2] MO	10	RVUE	$e^+e^- \to$ hadrons
4411 ± 7	[3] PAKHLOVA	08A	BELL	$10.6\ e^+e^- \to D^0 D^- \pi^+ \gamma$
4425 ± 6	[4] SETH	05A	RVUE	$e^+e^- \to$ hadrons
4429 ± 9	[5] SETH	05A	RVUE	$e^+e^- \to$ hadrons
4417 ±10	BRANDELIK	78C	DASP	e^+e^-
4414 ± 7	SIEGRIST	76	MRK1	e^+e^-

NODE=M073M
→ UNCHECKED ←
OCCUR=2

[1] Reanalysis of data presented in BAI 02C. From a global fit over the center-of-mass energy region 3.7–5.0 GeV covering the $\psi(3770)$, $\psi(4040)$, $\psi(4160)$, and $\psi(4415)$ resonances. Phase angle fixed in the fit to $\delta = (234 \pm 88)^\circ$.
NODE=M073M;LINKAGE=AB

[2] Reanalysis of data presented in BAI 00 and BAI 02C. From a global fit over the center-of-mass energy 3.8-4.8 GeV covering the $\psi(4040)$, $\psi(4160)$ and $\psi(4415)$ resonances and including interference effects.
NODE=M073M;LINKAGE=MO

[3] Systematic uncertainties not estimated.
NODE=M073M;LINKAGE=NS

[4] From a fit to Crystal Ball (OSTERHELD 86) data.
NODE=M073M;LINKAGE=ST

[5] From a fit to BES (BAI 02C) data.
NODE=M073M;LINKAGE=SE

ψ(4415) WIDTH

NODE=M073W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
62 ±20 OUR ESTIMATE				
71.5±19.0	[6] ABLIKIM	08D	BES2	$e^+e^- \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •				
118 ±32	[7] MO	10	RVUE	$e^+e^- \to$ hadrons
77 ±20	[8] PAKHLOVA	08A	BELL	$10.6\ e^+e^- \to D^0 D^- \pi^+ \gamma$
119 ±16	[9] SETH	05A	RVUE	$e^+e^- \to$ hadrons
118 ±35	[10] SETH	05A	RVUE	$e^+e^- \to$ hadrons
66 ±15	BRANDELIK	78C	DASP	e^+e^-
33 ±10	SIEGRIST	76	MRK1	e^+e^-

NODE=M073W
→ UNCHECKED ←
OCCUR=2

[6] Reanalysis of data presented in BAI 02C. From a global fit over the center-of-mass energy region 3.7–5.0 GeV covering the $\psi(3770)$, $\psi(4040)$, $\psi(4160)$, and $\psi(4415)$ resonances. Phase angle fixed in the fit to $\delta = (234 \pm 88)^\circ$.
NODE=M073W;LINKAGE=AB

[7] Reanalysis of data presented in BAI 00 and BAI 02C. From a global fit over the center-of-mass energy 3.8-4.8 GeV covering the $\psi(4040)$, $\psi(4160)$ and $\psi(4415)$ resonances and including interference effects.
NODE=M073W;LINKAGE=MO

[8] Systematic uncertainties not estimated.
NODE=M073W;LINKAGE=NS

[9] From a fit to Crystal Ball (OSTERHELD 86) data.
NODE=M073W;LINKAGE=ST

[10] From a fit to BES (BAI 02C) data.
NODE=M073W;LINKAGE=SE

ψ(4415) DECAY MODES

NODE=M073215;NODE=M073

Due to the complexity of the $c\overline{c}$ threshold region, in this listing, "seen" ("not seen") means that a cross section for the mode in question has been measured at effective $\sqrt{s}$ near this particle's central mass value, more (less) than 2σ above zero, without regard to any peaking behavior in $\sqrt{s}$ or absence thereof. See mode listing(s) for details and references.

NODE=M073

	Mode	Fraction (Γ_i/Γ)	Confidence level	
Γ_1	$D\overline{D}$	seen		DESIG=7;OUR EVAL;→ UNCHECKED ←
Γ_2	$D^0\overline{D}^0$	seen		DESIG=8
Γ_3	D^+D^-	seen		DESIG=9
Γ_4	$D^*\overline{D}$ + c.c.	seen		DESIG=10;OUR EVAL;→ UNCHECKED ←
Γ_5	$D^*(2007)^0\overline{D}^0$ + c.c.	seen		DESIG=11
Γ_6	$D^*(2010)^+D^-$ + c.c.	seen		DESIG=12
Γ_7	$D^*\overline{D}^*$	seen		DESIG=13;OUR EVAL;→ UNCHECKED ←
Γ_8	$D^*(2007)^0\overline{D}^*(2007)^0$ + c.c.	seen		DESIG=14
Γ_9	$D^*(2010)^+D^*(2010)^-$ + c.c.	seen		DESIG=15

Γ_{10}	$D^0 D^- \pi^+$ (excl. $D^*(2007)^0 \overline{D}^0$ +c.c., $D^*(2010)^+ D^-$ +c.c.	< 2.3 %	90%	DESIG=4
Γ_{11}	$D \overline{D}{}_2^*(2460) \to D^0 D^- \pi^+$+c.c.	(10 ±4) %		DESIG=5
Γ_{12}	$D^0 D^{*-} \pi^+$+c.c.	< 11 %	90%	DESIG=6
Γ_{13}	$D_1(2420) \overline{D}$+ c.c.	possibly seen		DESIG=25
Γ_{14}	$D_s^+ D_s^-$	not seen		DESIG=16
Γ_{15}	$\omega \chi_{c2}$	possibly seen		DESIG=20
Γ_{16}	$D_s^{*+} D_s^-$ +c.c.	seen		DESIG=17
Γ_{17}	$D_s^{*+} D_s^{*-}$	not seen		DESIG=18
Γ_{18}	$\psi_2(3823) \pi^+ \pi^-$	possibly seen		DESIG=21
Γ_{19}	$\psi(3770) \pi^+ \pi^-$	possibly seen		DESIG=24
Γ_{20}	$J/\psi \eta$	< 6 $\times 10^{-3}$	90%	DESIG=19
Γ_{21}	$\chi_{c1} \gamma$	< 8 $\times 10^{-4}$	90%	DESIG=22
Γ_{22}	$\chi_{c2} \gamma$	< 4 $\times 10^{-3}$	90%	DESIG=23
Γ_{23}	$\Lambda \overline{\Lambda}$	< 3.1 $\times 10^{-6}$	90%	DESIG=27
Γ_{24}	$e^+ e^-$	(9.4±3.2) $\times 10^{-6}$		DESIG=1
Γ_{25}	$\mu^+ \mu^-$	(2.0±1.0) $\times 10^{-5}$		DESIG=26

ψ(4415) PARTIAL WIDTHS

NODE=M073220

$\Gamma(e^+ e^-)$ Γ_{24}

NODE=M073W1
NODE=M073W1

VALUE (keV)		DOCUMENT ID		TECN	COMMENT
0.58±0.07 OUR ESTIMATE					
0.35±0.12	[11]	ABLIKIM	08D	BES2	$e^+ e^- \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.4 to 0.8	[12]	MO	10	RVUE	$e^+ e^- \to$ hadrons
0.72±0.11	[13]	SETH	05A	RVUE	$e^+ e^- \to$ hadrons
0.64±0.23	[14]	SETH	05A	RVUE	$e^+ e^- \to$ hadrons
0.49±0.13		BRANDELIK	78C	DASP	$e^+ e^-$
0.44±0.14		SIEGRIST	76	MRK1	$e^+ e^-$

→ UNCHECKED ←

OCCUR=2

[11] Reanalysis of data presented in BAI 02C. From a global fit over the center-of-mass energy region 3.7–5.0 GeV covering the $\psi(3770)$, $\psi(4040)$, $\psi(4160)$, and $\psi(4415)$ resonances. Phase angle fixed in the fit to $\delta = (234 \pm 88)^\circ$. NODE=M073W1;LINKAGE=AB

[12] Reanalysis of data presented in BAI 00 and BAI 02C. From a global fit over the center-of-mass energy 3.8-4.8 GeV covering the $\psi(4040)$, $\psi(4160)$ and $\psi(4415)$ resonances and including interference effects. Four sets of solutions are obtained with the same fit quality, mass and total width, but with different $e^+ e^-$ partial widths. We quote only the range of values. NODE=M073W1;LINKAGE=MO

[13] From a fit to Crystal Ball (OSTERHELD 86) data. NODE=M073W1;LINKAGE=ST

[14] From a fit to BES (BAI 02C) data. NODE=M073W1;LINKAGE=SE

$\Gamma(\mu^+ \mu^-)$ Γ_{25}

NODE=M073W2
NODE=M073W2

VALUE (keV)		DOCUMENT ID		TECN	COMMENT
1.25±0.28±0.35	[15,16]	ABLIKIM	20AG	BES3	$e^+ e^- \to \mu^+ \mu^-$

[15] From a fit to the $e^+ e^- \to \mu^+ \mu^-$ cross section between 3.8 and 4.6 GeV to the coherent sum of four resonant amplitudes assuming $\Gamma(\mu^+ \mu^-) = \Gamma(e^+ e^-)$. NODE=M073W2;LINKAGE=A

[16] From solution 1 of 8 with equal fit quality. Other solutions range from $1.24 \pm 0.28 \pm 0.35$ to $1.27 \pm 0.41 \pm 0.36$ keV. NODE=M073W2;LINKAGE=B

ψ(4415) $\Gamma(i) \times \Gamma(e^+ e^-)/\Gamma(\text{total})$

NODE=M073230

$\Gamma(J/\psi \eta) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}}$ $\Gamma_{20}\Gamma_{24}/\Gamma$

NODE=M073G01
NODE=M073G01

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<3.6	90	WANG	13B	BELL	$e^+ e^- \to J/\psi \eta \gamma$

$\Gamma(\chi_{c1} \gamma) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}}$ $\Gamma_{21}\Gamma_{24}/\Gamma$

NODE=M073G02
NODE=M073G02

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<0.47	90	[17] HAN	15	BELL	10.58 $e^+ e^- \to \chi_{c1} \gamma$

[17] Using $B(\eta \to \gamma\gamma) = (39.41 \pm 0.21)\%$. NODE=M073G02;LINKAGE=A

$\Gamma(\chi_{c2}\gamma) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{22}\Gamma_{24}/\Gamma$

NODE=M073G03

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<2.3	90	[18] HAN	15	BELL	10.58 $e^+e^- \rightarrow \chi_{c2}\gamma$

[18] Using B($\eta \rightarrow \gamma\gamma$) = (39.41 ± 0.21)%.

NODE=M073G03;LINKAGE=A

$\Gamma(\Lambda\overline{\Lambda}) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{23}\Gamma_{24}/\Gamma$

NODE=M073R16

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
$<1.8 \times 10^{-3}$	90	[19] ABLIKIM	21AS	BES3	$e^+e^- \rightarrow \psi(4415)$

[19] From a measurement of the $e^+e^- \rightarrow \Lambda\overline{\Lambda}$ cross section between 3.5 and 4.6 GeV.

NODE=M073R16;LINKAGE=A

$\psi(4415)$ BRANCHING RATIOS

NODE=M073225

$\Gamma(D^0\overline{D}^0)/\Gamma_{total}$ — Γ_2/Γ

NODE=M073R04

VALUE	DOCUMENT ID		TECN	COMMENT
seen	PAKHLOVA	08	BELL	$e^+e^- \rightarrow D^0\overline{D}^0\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	AUBERT	09M	BABR	$e^+e^- \rightarrow D^0\overline{D}^0\gamma$

$\Gamma(D^+D^-)/\Gamma_{total}$ — Γ_3/Γ

NODE=M073R05

VALUE	DOCUMENT ID		TECN	COMMENT
seen	PAKHLOVA	08	BELL	$e^+e^- \rightarrow D^+D^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	AUBERT	09M	BABR	$e^+e^- \rightarrow D^+D^-\gamma$

$\Gamma(D\overline{D})/\Gamma(D^*\overline{D}^*)$ — Γ_1/Γ_7

NODE=M073R02

VALUE	DOCUMENT ID		TECN	COMMENT
0.14±0.12±0.03	AUBERT	09M	BABR	$e^+e^- \rightarrow \gamma D^{(*)}\overline{D}^{(*)}$

$\Gamma(D^*(2007)^0\overline{D}^0 + c.c.)/\Gamma_{total}$ — Γ_5/Γ

NODE=M073R06

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AUBERT	09M	BABR	$e^+e^- \rightarrow D^{*0}\overline{D}^0\gamma$

$\Gamma(D^*(2010)^+D^- + c.c.)/\Gamma_{total}$ — Γ_6/Γ

NODE=M073R07

VALUE	DOCUMENT ID		TECN	COMMENT
seen	[20] ZHUKOVA	18	BELL	$e^+e^- \rightarrow D^{*+}D^-\gamma$
seen	AUBERT	09M	BABR	$e^+e^- \rightarrow D^{*+}D^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	PAKHLOVA	07	BELL	$e^+e^- \rightarrow D^{*+}D^-\gamma$

[20] Supersedes PAKHLOVA 07.

NODE=M073R07;LINKAGE=A

$\Gamma(D^*\overline{D} + c.c.)/\Gamma(D^*\overline{D}^*)$ — Γ_4/Γ_7

NODE=M073R03

VALUE	DOCUMENT ID		TECN	COMMENT
0.17±0.25±0.03	AUBERT	09M	BABR	$e^+e^- \rightarrow \gamma D^{(*)}\overline{D}^{(*)}$

$\Gamma(D^*(2007)^0\overline{D}^*(2007)^0 + c.c.)/\Gamma_{total}$ — Γ_8/Γ

NODE=M073R08

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AUBERT	09M	BABR	$e^+e^- \rightarrow D^{*0}\overline{D}^{*0}\gamma$

$\Gamma(D^*(2010)^+D^*(2010)^- + c.c.)/\Gamma_{total}$ — Γ_9/Γ

NODE=M073R09

VALUE	DOCUMENT ID		TECN	COMMENT
seen	[21] ZHUKOVA	18	BELL	$e^+e^- \rightarrow D^{*+}D^{*-}\gamma$
seen	AUBERT	09M	BABR	$e^+e^- \rightarrow D^{*+}D^{*-}\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	PAKHLOVA	07	BELL	$e^+e^- \rightarrow D^{*+}D^{*-}\gamma$

[21] Supersedes PAKHLOVA 07.

NODE=M073R09;LINKAGE=A

$\Gamma(D\overline{D}_2^*(2460) \rightarrow D^0D^-\pi^+ + c.c.)/\Gamma_{total}$ — Γ_{11}/Γ

NODE=M073R3

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
10.5±2.4±3.8	[22] PAKHLOVA	08A	BELL	10.6 $e^+e^- \rightarrow D^0D^-\pi^+\gamma$

[22] Using 4421 ± 4 MeV for the mass and 62 ± 20 MeV for the width of $\psi(4415)$.

NODE=M073R3;LINKAGE=PA

$\Gamma(D^0 D^- \pi^+$ (excl. $D^*(2007)^0 \overline{D}^0$ +c.c., $D^*(2010)^+ D^-$ +c.c.)/ $\Gamma(D \overline{D}_2^*(2460) \to D^0 D^- \pi^+$ +c.c.) Γ_{10}/Γ_{11}

NODE=M073R4
NODE=M073R4

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.22	90	[23] PAKHLOVA	08A	BELL	10.6 $e^+ e^- \to D^0 D^- \pi^+ \gamma$

[23] Using 4421 ± 4 MeV for the mass and 62 ± 20 MeV for the width of $\psi(4415)$.

NODE=M073R4;LINKAGE=PA

$\Gamma(D^0 D^{*-} \pi^+$ +c.c.)/Γ_{total} × $\Gamma(e^+ e^-)/\Gamma_{total}$ $\Gamma_{12}/\Gamma \times \Gamma_{24}/\Gamma$

NODE=M073R01
NODE=M073R01

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<0.99 \times 10^{-6}$	90	[24] PAKHLOVA	09	BELL	$e^+ e^- \to D^0 D^{*-} \pi^+$

[24] Using 4421 ± 4 MeV for the mass of $\psi(4415)$.

NODE=M073R01;LINKAGE=PA

$\Gamma(D_1(2420) \overline{D}$ + c.c.)/Γ_{total} Γ_{13}/Γ

NODE=M073R15
NODE=M073R15

VALUE	DOCUMENT ID		TECN	COMMENT
possibly seen	[25] ABLIKIM	19AR	BES3	$e^+ e^- \to \pi^+ \pi^- D \overline{D}$

[25] Evidence for $e^+ e^- \to D_1(2420) \overline{D}$+ c.c. between $\sqrt{s}$ = 4.3 and 4.6 GeV, not necessarily resonant.

NODE=M073R15;LINKAGE=A

$\Gamma(D_s^+ D_s^-)/\Gamma_{total}$ Γ_{14}/Γ

NODE=M073R10
NODE=M073R10

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	PAKHLOVA	11	BELL	$e^+ e^- \to D_s^+ D_s^- \gamma$
not seen	DEL-AMO-SA...	10N	BABR	$e^+ e^- \to D_s^+ D_s^- \gamma$

$\Gamma(\omega \chi_{c2})/\Gamma_{total}$ Γ_{15}/Γ

NODE=M073R00
NODE=M073R00

VALUE	DOCUMENT ID		TECN	COMMENT
possibly seen	ABLIKIM	16A	BES3	$e^+ e^- \to \gamma \pi^+ \pi^- \pi^0 \ell^+ \ell^-$

$\Gamma(D_s^{*+} D_s^-$ +c.c.)/Γ_{total} Γ_{16}/Γ

NODE=M073R11
NODE=M073R11

VALUE	DOCUMENT ID		TECN	COMMENT
seen	PAKHLOVA	11	BELL	$e^+ e^- \to D_s^{*+} D_s^- \gamma$
seen	DEL-AMO-SA...	10N	BABR	$e^+ e^- \to D_s^{*+} D_s^- \gamma$

$\Gamma(D_s^{*+} D_s^{*-})/\Gamma_{total}$ Γ_{17}/Γ

NODE=M073R12
NODE=M073R12

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	PAKHLOVA	11	BELL	$e^+ e^- \to D_s^{*+} D_s^{*-} \gamma$
not seen	DEL-AMO-SA...	10N	BABR	$e^+ e^- \to D_s^{*+} D_s^{*-} \gamma$

$\Gamma(\psi(3770) \pi^+ \pi^-)/\Gamma_{total}$ Γ_{19}/Γ

NODE=M073R14
NODE=M073R14

VALUE	DOCUMENT ID		TECN	COMMENT
possibly seen	[26] ABLIKIM	19AR	BES3	$e^+ e^- \to \pi^+ \pi^- D \overline{D}$

[26] Observe $e^+ e^- \to \pi^+ \pi^- \psi(3770)$ at $\sqrt{s}$ = 4.26, 4.36, and 4.42 GeV but cannot establish if continuum or resonant.

NODE=M073R14;LINKAGE=A

$\Gamma(\psi_2(3823) \pi^+ \pi^-)/\Gamma_{total}$ Γ_{18}/Γ

NODE=M073R13
NODE=M073R13

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
possibly seen	19	[27] ABLIKIM	15S	BES3	$e^+ e^- \to \pi^+ \pi^- \chi_{c1} \gamma$

[27] From a fit of $e^+ e^- \to \pi^+ \pi^- \psi_2(3823)$, $\psi_2(3823) \to \chi_{c1} \gamma$ cross sections taken at $\sqrt{s}$ values of 4.23, 4.26, 4.36, 4.42, and 4.60 GeV to the $\psi(4415)$ line shape.

NODE=M073R13;LINKAGE=A

$\psi(4415)$ REFERENCES

NODE=M073

ABLIKIM	21AS	PR D104 L091104	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61454
ABLIKIM	20AG	PR D102 112009	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60744
ABLIKIM	19AR	PR D100 032005	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59910
ZHUKOVA	18	PR D97 012002	V. Zhukova *et al.*	(BELLE Collab.)	REFID=58710
ABLIKIM	16A	PR D93 011102	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57122
ABLIKIM	15S	PRL 115 011803	M. Ablikim *et al.*	(BESIII Collab.)	REFID=56784
HAN	15	PR D92 012011	Y.L. Han *et al.*	(BELLE Collab.)	REFID=56816
WANG	13B	PR D87 051101	X.L. Wang *et al.*	(BELLE Collab.)	REFID=55377
PAKHLOVA	11	PR D83 011101	G. Pakhlova *et al.*	(BELLE Collab.)	REFID=53638
DEL-AMO-SA...	10N	PR D82 052004	P. del Amo Sanchez *et al.*	(BABAR Collab.)	REFID=53532
MO	10	PR D82 077501	X.H. Mo, C.Z. Yuan, P. Wang	(BHEP)	REFID=53540
AUBERT	09M	PR D79 092001	B. Aubert *et al.*	(BABAR Collab.)	REFID=52724
PAKHLOVA	09	PR D80 091101	G. Pakhlova *et al.*	(BELLE Collab.)	REFID=53143
ABLIKIM	08D	PL B660 315	M. Ablikim *et al.*	(BES Collab.)	REFID=52142
PAKHLOVA	08	PR D77 011103	G. Pakhlova *et al.*	(BELLE Collab.)	REFID=52132
PAKHLOVA	08A	PRL 100 062001	G. Pakhlova *et al.*	(BELLE Collab.)	REFID=52134
PAKHLOVA	07	PRL 98 092001	G. Pakhlova *et al.*	(BELLE Collab.)	REFID=51628
SETH	05A	PR D72 017501	K.K. Seth		REFID=50813
BAI	02C	PRL 88 101802	J.Z. Bai *et al.*	(BES Collab.)	REFID=50506
BAI	00	PRL 84 594	J.Z. Bai *et al.*	(BES Collab.)	REFID=50503
OSTERHELD	86	SLAC-PUB-4160	A. Osterheld *et al.*	(SLAC Crystal Ball Collab.)	REFID=51064
BRANDELIK	78C	PL 76B 361	R. Brandelik *et al.*	(DASP Collab.)	REFID=22232
SIEGRIST	76	PRL 36 700	J.L. Siegrist *et al.*	(LBL, SLAC)	REFID=22243

NODE=M195

$Z_c(4430)$

$I^G(J^{PC}) = 1^+(1^{+-})$
G, C need confirmation.

was $X(4430)^{\pm}$

NODE=M195

Properties incompatible with a $q\overline{q}$ structure (exotic state). See the review on non-$q\overline{q}$ states.

First seen by CHOI 08 in $B \to K\pi^+\psi(2S)$ decays, confirmed by AAIJ 14AG, and confirmed in a model-independent way by AAIJ 15BH. Also seen by CHILIKIN 14 in $B \to K^+\pi J/\psi$ decays. J^P was determined by CHILIKIN 13 and AAIJ 14AG.

$Z_c(4430)$ MASS

NODE=M195M

NODE=M195M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
4478^{+15}_{-18} OUR AVERAGE				
$4475\pm 7^{+15}_{-25}$	[1] AAIJ	14AG	LHCB	$B^0 \to K^+\pi^-\psi(2S)$
$4485\pm 22^{+28}_{-11}$	[1] CHILIKIN	13	BELL	$B^0 \to K^+\pi^-\psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$4443^{+15}_{-12}{}^{+19}_{-13}$	[2] MIZUK	09	BELL	$B \to K\pi^+\psi(2S)$
$4433\pm 4\pm 2$	[3] CHOI	08	BELL	$B \to K\pi^+\psi(2S)$

[1] From a four-dimensional amplitude analysis. NODE=M195M;LINKAGE=A
[2] From a Dalitz plot analysis. Superseded by CHILIKIN 13. NODE=M195M;LINKAGE=MI
[3] Superseded by MIZUK 09 and CHILIKIN 13. NODE=M195M;LINKAGE=CH

$Z_c(4430)$ WIDTH

NODE=M195W

NODE=M195W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
181±31 OUR AVERAGE				
$172\pm 13^{+37}_{-34}$	[1] AAIJ	14AG	LHCB	$B^0 \to K^+\pi^-\psi(2S)$
$200^{+41}_{-46}{}^{+26}_{-35}$	[1] CHILIKIN	13	BELL	$B^0 \to K^+\pi^-\psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$107^{+86}_{-43}{}^{+74}_{-56}$	[2] MIZUK	09	BELL	$B \to K\pi^+\psi(2S)$
$45^{+18}_{-13}{}^{+30}_{-13}$	[3] CHOI	08	BELL	$B \to K\pi^+\psi(2S)$

[1] From a four-dimensional amplitude analysis. NODE=M195W;LINKAGE=A
[2] From a Dalitz plot analysis. Superseded by CHILIKIN 13. NODE=M195W;LINKAGE=MI
[3] Superseded by MIZUK 09 and CHILIKIN 13. NODE=M195W;LINKAGE=CH

$Z_c(4430)$ DECAY MODES

NODE=M195215;NODE=M195

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\pi^+\psi(2S)$	seen	DESIG=1
Γ_2	$\pi^+ J/\psi$	seen	DESIG=2

$Z_c(4430)$ BRANCHING RATIOS

NODE=M195225

$\Gamma(\pi^+\psi(2S))/\Gamma_{total}$ Γ_1/Γ

NODE=M195R01
NODE=M195R01

VALUE	DOCUMENT ID		TECN	COMMENT
seen	[1] AAIJ	14AG	LHCB	$B^0 \to K^+\pi^-\psi(2S)$
seen	[2] CHILIKIN	13	BELL	$B^0 \to K^+\pi^-\psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	[3] AUBERT	09AA	BABR	$B \to K\pi^+\psi(2S)$
seen	[4] MIZUK	09	BELL	$B \to K\pi^+\psi(2S)$

[1] From a four-dimensional amplitude analysis. No product of branching fractions quoted. NODE=M195R01;LINKAGE=AA
[2] From a four-dimensional amplitude analysis. Measured a product of branching fractions $B(B^0 \to Z_c(4430)^- K^+) \times B(Z_c(4430)^- \to \psi(2S)\pi^-) = (6.0^{+1.7}_{-2.0}{}^{+2.5}_{-1.4}) \times 10^{-5}$. NODE=M195R01;LINKAGE=A
[3] AUBERT 09AA quotes $B(B^+ \to \overline{K}^0 Z_c(4430)^+) \times B(Z_c(4430)^+ \to \pi^+\psi(2S)) < 4.7\times 10^{-5}$ and $B(\overline{B}^0 \to K^- Z_c(4430)^+) \times B(Z_c(4430)^+ \to \pi^+\psi(2S)) < 3.1\times 10^{-5}$ at 95% CL. NODE=M195R01;LINKAGE=AU
[4] Measured a product of branching fractions $B(\overline{B}^0 \to K^- Z_c(4430)^+) \times B(Z_c(4430)^+ \to \pi^+\psi(2S)) = (3.2^{+1.8}_{-0.9}{}^{+5.3}_{-1.6}) \times 10^{-5}$. Superseded by CHILIKIN 13. NODE=M195R01;LINKAGE=MI

$\Gamma(\pi^+ J/\psi)/\Gamma_{total}$ — Γ_2/Γ

NODE=M195R02
NODE=M195R02

VALUE	DOCUMENT ID	TECN	COMMENT
seen	[1,2] CHILIKIN 14	BELL	$\overline{B}^0 \to K^- \pi^+ J/\psi$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
not seen	[3] AUBERT 09AA	BABR	$B \to K \pi^+ J/\psi$

[1] CHILIKIN 14 reports $B(\overline{B}^0 \to Z_c(4430)^+ K^-) \times B(Z_c(4430)^+ \to J/\psi \pi^+) = (5.4^{+4.0}_{-1.0}{}^{+1.1}_{-0.9}) \times 10^{-6}$. NODE=M195R02;LINKAGE=A

[2] A broad enhancement seen by AAIJ 19R in the decays $B^0 \to J/\psi \pi^+ K^-$ at 4600 MeV can be due to an interplay of $Z_c(4430)$, $Z_c(4200)$ and the fitting polynomials. NODE=M195R02;LINKAGE=E

[3] AUBERT 09AA quotes $B(B^+ \to \overline{K}^0 Z_c(4430)^+) \times B(Z_c(4430)^+ \to \pi^+ J/\psi) < 1.5 \times 10^{-5}$ and $B(\overline{B}^0 \to K^- Z_c(4430)^+) \times B(Z_c(4430)^+ \to \pi^+ J/\psi) < 0.4 \times 10^{-5}$ at 95% CL. NODE=M195R02;LINKAGE=AU

$Z_c(4430)$ REFERENCES

NODE=M195

AAIJ	19R	PRL 122 152002	R. Aaij *et al.*	(LHCb Collab.)	REFID=59776
AAIJ	15BH	PR D92 112009	R. Aaij *et al.*	(LHCb Collab.)	REFID=57110
AAIJ	14AG	PRL 112 222002	R. Aaij *et al.*	(LHCb Collab.) JP	REFID=55896
CHILIKIN	14	PR D90 112009	K. Chilikin *et al.*	(BELLE Collab.)	REFID=56344
CHILIKIN	13	PR D88 074026	K. Chilikin *et al.*	(BELLE Collab.) JP	REFID=55551
AUBERT	09AA	PR D79 112001	B. Aubert *et al.*	(BABAR Collab.)	REFID=52940
MIZUK	09	PR D80 031104	R. Mizuk *et al.*	(BELLE Collab.)	REFID=52960
CHOI	08	PRL 100 142001	S.-K. Choi *et al.*	(BELLE Collab.)	REFID=52178

NODE=M234

$\chi_{c0}(4500)$

$I^G(J^{PC}) = 0^+(0^{++})$

OMITTED FROM SUMMARY TABLE
was $X(4500)$

This state shows properties different from a conventional $q\overline{q}$ state. A candidate for an exotic structure. See the review on non-$q\overline{q}$ states. NODE=M234

Seen by AAIJ 17C in $B^+ \to \chi_{c0} K^+$, $\chi_{c0} \to J/\psi \phi$ using an amplitude analysis of $B^+ \to J/\psi \phi K^+$ with a significance (accounting for systematic uncertainties) of 6.1 σ.

$\chi_{c0}(4500)$ MASS

NODE=M234M

NODE=M234M

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
4474± 4 OUR AVERAGE [4506^{+16}_{-19} MeV OUR 2021 AVERAGE] NEW				
4474± 3± 3	24k	[1] AAIJ 21E	LHCB	$B^+ \to J/\psi \phi K^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$4506 \pm 11^{+12}_{-15}$	4289	[2,3] AAIJ 17C	LHCB	$B^+ \to J/\psi \phi K^+$

[1] From an amplitude analysis of the decay $B^+ \to J/\psi \phi K^+$ with a significance of 20 σ. NODE=M234M;LINKAGE=B
[2] From an amplitude analysis of the decay $B^+ \to J/\psi \phi K^+$ with a significance of 6.1 σ. NODE=M234M;LINKAGE=A
[3] Superseded by AAIJ 21E. NODE=M234M;LINKAGE=C

$\chi_{c0}(4500)$ WIDTH

NODE=M234W

NODE=M234W

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
77^{+12}_{-10} OUR AVERAGE [92 ± 29 MeV OUR 2021 AVERAGE] NEW				
$77 \pm 6^{+10}_{-8}$	24k	[1] AAIJ 21E	LHCB	$B^+ \to J/\psi \phi K^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$92 \pm 21^{+21}_{-20}$	4289	[2,3] AAIJ 17C	LHCB	$B^+ \to J/\psi \phi K^+$

[1] From an amplitude analysis of the decay $B^+ \to J/\psi \phi K^+$ with a significance of 20 σ. NODE=M234W;LINKAGE=B
[2] From an amplitude analysis of the decay $B^+ \to J/\psi \phi K^+$ with a significance of 6.1 σ. NODE=M234W;LINKAGE=A
[3] Superseded by AAIJ 21E. NODE=M234W;LINKAGE=C

$\chi_{c0}(4500)$ DECAY MODES

NODE=M234215;NODE=M234

	Mode	Fraction (Γ_i/Γ)
Γ_1	$J/\psi\phi$	seen

DESIG=1

$\chi_{c0}(4500)$ BRANCHING RATIOS

NODE=M234220

$\Gamma(J/\psi\phi)/\Gamma_{total}$ Γ_1/Γ

NODE=M234R01
NODE=M234R01

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	24k	[1] AAIJ	21E	LHCB	$B^+ \to J/\psi\phi K^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	4289	[2,3] AAIJ	17C	LHCB	$B^+ \to J/\psi\phi K^+$

[1] From an amplitude analysis of the decay $B^+ \to J/\psi\phi K^+$ with a significance of 20 σ.
[2] From an amplitude analysis of the decay $B^+ \to J/\psi\phi K^+$ with a significance of 6.1 σ.
[3] Superseded by AAIJ 21E.

NODE=M234R01;LINKAGE=B
NODE=M234R01;LINKAGE=A
NODE=M234R01;LINKAGE=C

$\chi_{c0}(4500)$ REFERENCES

NODE=M234

AAIJ 21E PRL 127 082001 R. Aaij *et al.* (LHCb Collab.)
AAIJ 17C PRL 118 022003 R. Aaij *et al.* (LHCb Collab.) JP
Also PR D95 012002 R. Aaij *et al.* (LHCb Collab.)

REFID=61150
REFID=57657
REFID=57636

NODE=M262

X(4630)

$I^G(J^{PC}) = 0^+(?^{?+})$

OMITTED FROM SUMMARY TABLE

This state shows properties different from a conventional $q\overline{q}$ state. A candidate for an exotic structure. See the review on "Heavy Non-$q\overline{q}$ Mesons."

NODE=M262

Seen by AAIJ 21E in $B^+ \to X(4630) K^+$ with $X(4630) \to J/\psi\phi$ using an amplitude analysis of $B^+ \to J/\psi\phi K^+$ with a significance (accounting for systematic uncertainties) of 5.5 σ. The $J^P = 1^-$ assignment is favored over 2^- with a significance of 3 σ and other assignments are disfavored by more than 5 σ.

X(4630) MASS

NODE=M262M

NODE=M262M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{4626 \pm 16 ^{+18}_{-110}}$	24k	[1] AAIJ	21E	LHCB	$B^+ \to J/\psi\phi K^+$

[1] From an amplitude analysis of the decay $B^+ \to J/\psi\phi K^+$ with a significance of 5.5 σ.

NODE=M262M;LINKAGE=A

X(4630) WIDTH

NODE=M262W

NODE=M262W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{174 \pm 27 ^{+134}_{-\ 73}}$	24k	[1] AAIJ	21E	LHCB	$B^+ \to J/\psi\phi K^+$

[1] From an amplitude analysis of the decay $B^+ \to J/\psi\phi K^+$ with a significance of 5.5 σ.

NODE=M262W;LINKAGE=A

X(4630) DECAY MODES

NODE=M262215;NODE=M262

	Mode	Fraction (Γ_i/Γ)
Γ_1	$J/\psi\phi$	seen

DESIG=1

$\Gamma(J/\psi\phi)/\Gamma_{total}$ Γ_1/Γ

NODE=M262R01
NODE=M262R01

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	24k	[1] AAIJ	21E	LHCB	$B^+ \to J/\psi\phi K^+$

[1] From an amplitude analysis of the decay $B^+ \to J/\psi\phi K^+$ with a significance of 5.5 σ.

NODE=M262R01;LINKAGE=A

X(4630) REFERENCES

NODE=M262

AAIJ 21E PRL 127 082001 R. Aaij *et al.* (LHCb Collab.)

REFID=61150

NODE=M189

$\psi(4660)$

$I^G(J^{PC}) = 0^-(1^{--})$

also known as $Y(4660)$; was $X(4660)$

NODE=M189

This state shows properties different from a conventional $q\overline{q}$ state. A candidate for an exotic structure. See the review on non-$q\overline{q}$ states.

Seen in radiative return from e^+e^- collisions at $\sqrt{s}$ = 9.54–10.58 GeV by WANG 07D. Also obtained in a combined fit of WANG 07D, AUBERT 07S, and LEES 14F. See also the review on "Spectroscopy of mesons containing two heavy quarks."

$\psi(4660)$ MASS

NODE=M189M

NODE=M189M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
4630 ± 6 OUR AVERAGE		Error includes scale factor of 1.4. See the ideogram below.			
$4651.0 \pm 37.8 \pm 2.1$		[1] ABLIKIM	21AJ	BES3	$e^+e^- \rightarrow \pi^+\pi^-\psi(2S)$
$4619.8^{+8.9}_{-8.0} \pm 2.3$	66	[2] JIA	20	BELL	$e^+e^- \rightarrow \gamma D_s^+ D_{s2}^*(2573)^-$
$4625.9^{+6.2}_{-6.0} \pm 0.4$	89	[3] JIA	19A	BELL	$e^+e^- \rightarrow \gamma D_s^+ D_{s1}(2536)^-$
$4652 \pm 10 \pm 11$	279	[4] WANG	15A	BELL	$10.58\ e^+e^- \rightarrow \gamma\pi^+\pi^-\psi(2S)$
$4669 \pm 21 \pm 3$	37	[5] LEES	14F	BABR	$10.58\ e^+e^- \rightarrow \gamma\pi^+\pi^-\psi(2S)$
$4634^{+8}_{-7}{}^{+5}_{-8}$	142	[6] PAKHLOVA	08B	BELL	$e^+e^- \rightarrow \Lambda_c^+\Lambda_c^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$4652.5 \pm 3.4 \pm 1.1$		[7] DAI	17	RVUE	$e^+e^- \rightarrow \Lambda_c^+\Lambda_c^-$
$4645.2 \pm 9.5 \pm 6.0$		[8] ZHANG	17B	RVUE	$e^+e^- \rightarrow \pi^+\pi^-\psi(2S)$
$4646.4 \pm 9.7 \pm 4.8$		[9] ZHANG	17C	RVUE	$e^+e^- \rightarrow \pi^+\pi^- J/\psi$ or $\psi(2S)$
$4661^{+9}_{-8} \pm 6$	44	[10] LIU	08H	RVUE	$10.58\ e^+e^- \rightarrow \gamma\pi^+\pi^-\psi(2S)$
$4664 \pm 11 \pm 5$	44	WANG	07D	BELL	$10.58\ e^+e^- \rightarrow \gamma\pi^+\pi^-\psi(2S)$

[1] From a three-resonance fit to the Born cross section in the range $\sqrt{s}$ = 4.008–4.698 GeV. NODE=M189M;LINKAGE=G

[2] Using $D_{s2}^*(2573)^- \rightarrow \overline{D}^0 K^-$ decays. NODE=M189M;LINKAGE=F

[3] From a fit of a Breit-Wigner convolved with a Gaussian. NODE=M189M;LINKAGE=E

[4] From a two-resonance fit. Supersedes WANG 07D. NODE=M189M;LINKAGE=A

[5] From a two-resonance fit. NODE=M189M;LINKAGE=LE

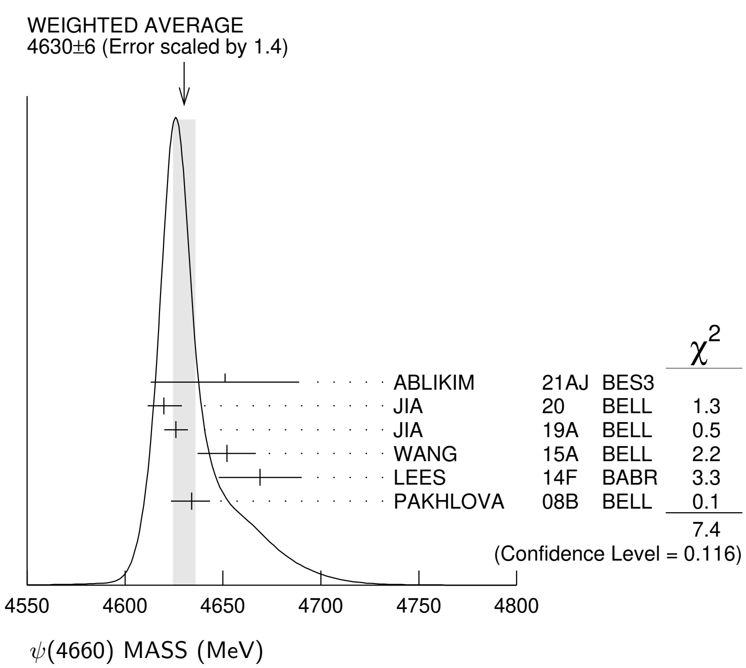
[6] The $\pi^+\pi^-\psi(2S)$ and $\Lambda_c^+\Lambda_c^-$ states are not necessarily the same. NODE=M189M;LINKAGE=PA

[7] The pole parameters are extracted from the speed plot. NODE=M189M;LINKAGE=C

[8] From a three-resonance fit. NODE=M189M;LINKAGE=D

[9] From a combined fit of BELLE, BABAR and BES3 $e^+e^- \rightarrow \pi^+\pi^- J/\psi$ and $e^+e^- \rightarrow \pi^+\pi^-\psi(2S)$ data. NODE=M189M;LINKAGE=B

[10] From a combined fit of AUBERT 07S and WANG 07D data with two resonances. NODE=M189M;LINKAGE=LI



$\psi(4660)$ WIDTH

NODE=M189W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
72 $^{+14}_{-12}$ OUR AVERAGE		Error includes scale factor of 1.7. See the ideogram below.			
[62^{+9}_{-7} MeV OUR 2021 AVERAGE]					
$155.4\pm24.8\pm\ 0.8$		[1] ABLIKIM	21AJ	BES3	$e^+e^- \to \pi^+\pi^-\psi(2S)$
$47.0^{+31.3}_{-14.8}\pm\ 4.6$	66	[2] JIA	20	BELL	$e^+e^- \to \gamma D_s^+ D_{s2}^*(2573)^-$
$49.8^{+13.9}_{-11.5}\pm\ 4.0$	89	[3] JIA	19A	BELL	$e^+e^- \to \gamma D_s^+ D_{s1}(2536)^-$
$68\ \pm11\ \pm\ 5$	279	[4] WANG	15A	BELL	$10.58\ e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
$104\ \pm48\ \pm10$	37	[5] LEES	14F	BABR	$10.58\ e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
$92\ ^{+40}_{-24}\ ^{+10}_{-21}$	142	[6] PAKHLOVA	08B	BELL	$e^+e^- \to \Lambda_c^+\Lambda_c^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$62.6\pm\ 5.6\pm\ 4.3$		[7] DAI	17	RVUE	$e^+e^- \to \Lambda_c^+\Lambda_c^-$
$113.8\pm18.1\pm\ 3.4$		[8] ZHANG	17B	RVUE	$e^+e^- \to \pi^+\pi^-\psi(2S)$
$103.5\pm15.6\pm\ 4.0$		[9] ZHANG	17C	RVUE	$e^+e^- \to \pi^+\pi^- J/\psi$ or $\psi(2S)$
$42\ ^{+17}_{-12}\ \pm\ 6$	44	[10] LIU	08H	RVUE	$10.58\ e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
$48\ \pm15\ \pm\ 3$	44	WANG	07D	BELL	$10.58\ e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$

NODE=M189W

NEW

[1] From a three-resonance fit to the Born cross section in the range $\sqrt{s}$ = 4.008–4.698 GeV.

[2] Using $D_{s2}^*(2573)^- \to \overline{D}^0 K^-$ decays.

[3] From a fit of a Breit-Wigner convolved with a Gaussian.

[4] From a two-resonance fit. Supersedes WANG 07D.

[5] From a two-resonance fit.

[6] The $\pi^+\pi^-\psi(2S)$ and $\Lambda_c^+\Lambda_c^-$ states are not necessarily the same.

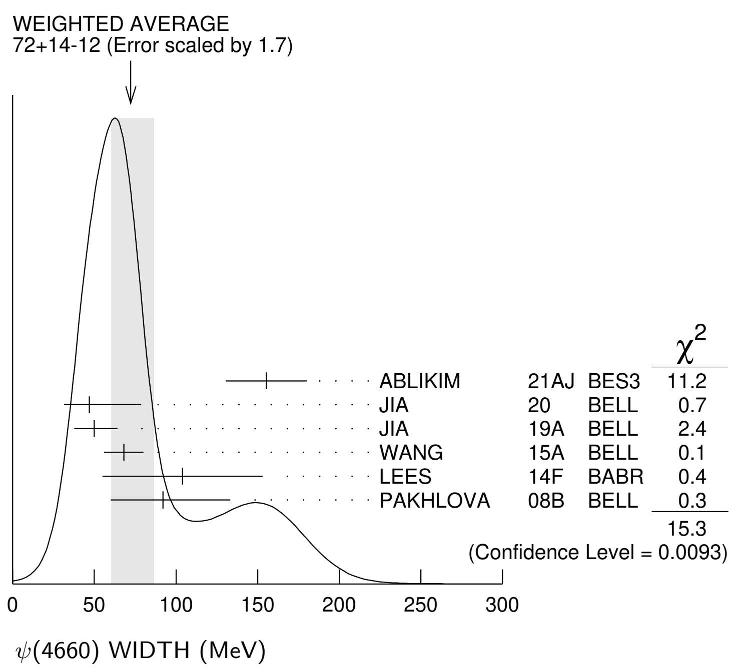
[7] The pole parameters are extracted from the speed plot.

[8] From a three-resonance fit.

[9] From a combined fit of BELLE, BABAR and BES3 $e^+e^- \to \pi^+\pi^- J/\psi$ and $e^+e^- \to \pi^+\pi^-\psi(2S)$ data.

[10] From a combined fit of AUBERT 07S and WANG 07D data with two resonances.

NODE=M189W;LINKAGE=H
NODE=M189W;LINKAGE=G
NODE=M189W;LINKAGE=F
NODE=M189W;LINKAGE=A
NODE=M189W;LINKAGE=LE
NODE=M189W;LINKAGE=B
NODE=M189W;LINKAGE=D
NODE=M189W;LINKAGE=E
NODE=M189W;LINKAGE=C
NODE=M189W;LINKAGE=LI



$\psi(4660)$ DECAY MODES

NODE=M189215;NODE=M189

	Mode	Fraction (Γ_i/Γ)
Γ_1	e^+e^-	not seen
Γ_2	$\psi(2S)\pi^+\pi^-$	seen
Γ_3	$J/\psi\eta$	not seen
Γ_4	$D^0 D^{*-}\pi^+$	not seen

DESIG=1;OUR EVAL;→ UNCHECKED ←
DESIG=2;OUR EVAL;→ UNCHECKED ←
DESIG=4;OUR EVAL;→ UNCHECKED ←
DESIG=3;OUR EVAL;→ UNCHECKED ←

Γ_5	$\chi_{c1}\gamma$	not seen	DESIG=6;OUR EVAL;→ UNCHECKED ←
Γ_6	$\chi_{c2}\gamma$	not seen	DESIG=7;OUR EVAL;→ UNCHECKED ←
Γ_7	$\Lambda_c^+\Lambda_c^-$	seen	DESIG=5;OUR EVAL;→ UNCHECKED ←
Γ_8	$D_s^+ D_{s1}(2536)^-$	seen	DESIG=8;OUR EVAL;→ UNCHECKED ←
Γ_9	$D_s^+ D_{s2}^*(2573)^-$		DESIG=9

$\psi(4660)$ $\Gamma(i) \times \Gamma(e^+e^-)/\Gamma(\text{total})$

NODE=M189230

$\Gamma(\psi(2S)\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_2\Gamma_1/\Gamma$

NODE=M189G1
NODE=M189G1

• • • We do not use the following data for averages, fits, limits, etc. • • •

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT	
4.7±3.8		[1] ABLIKIM	21AJ	BES3	$e^+e^- \to \pi^+\pi^-\psi(2S)$	
11.2±3.2		[2] ABLIKIM	21AJ	BES3	$e^+e^- \to \pi^+\pi^-\psi(2S)$	OCCUR=2
4.7±4.2		[3] ABLIKIM	21AJ	BES3	$e^+e^- \to \pi^+\pi^-\psi(2S)$	OCCUR=3
11.3±3.3		[4] ABLIKIM	21AJ	BES3	$e^+e^- \to \pi^+\pi^-\psi(2S)$	OCCUR=4
2.0±0.3±0.2	279	[5] WANG	15A	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$	
8.1±1.1±1.0	279	[6] WANG	15A	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$	OCCUR=2
2.7±1.3±0.5	37	[7] LEES	14F	BABR	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$	
7.5±1.7±0.7	37	[8] LEES	14F	BABR	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$	OCCUR=2
$2.2^{+0.7}_{-0.6}$	44	[9] LIU	08H	RVUE	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$	
5.9±1.6	44	[10] LIU	08H	RVUE	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$	OCCUR=2
3.0±0.9±0.3	44	[7] WANG	07D	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$	
7.6±1.8±0.8	44	[8] WANG	07D	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$	OCCUR=2

[1] Solution I of four equivalent solutions in a fit using three interfering resonances. NODE=M189G1;LINKAGE=C
[2] Solution II of four equivalent solutions in a fit using three interfering resonances. NODE=M189G1;LINKAGE=D
[3] Solution III of four equivalent solutions in a fit using three interfering resonances. NODE=M189G1;LINKAGE=E
[4] Solution IV of four equivalent solutions in a fit using three interfering resonances. NODE=M189G1;LINKAGE=F
[5] Solution I of two equivalent solutions from a fit using two interfering resonances. Supersedes WANG 07D. NODE=M189G1;LINKAGE=A
[6] Solution II of two equivalent solutions from a fit using two interfering resonances. Supersedes WANG 07D. NODE=M189G1;LINKAGE=B
[7] Solution I of two equivalent solutions in a fit using two interfering resonances. NODE=M189G1;LINKAGE=WA
[8] Solution II of two equivalent solutions in a fit using two interfering resonances. NODE=M189G1;LINKAGE=WN
[9] Solution I in a combined fit of AUBERT 07S and WANG 07D data with two resonances. NODE=M189G1;LINKAGE=LI
[10] Solution II in a combined fit of AUBERT 07S and WANG 07D data with two resonances. NODE=M189G1;LINKAGE=LU

$\Gamma(J/\psi\eta) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_3\Gamma_1/\Gamma$

NODE=M189G01
NODE=M189G01

• • • We do not use the following data for averages, fits, limits, etc. • • •

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<0.94	90	WANG	13B	BELL	$e^+e^- \to J/\psi\eta\gamma$

$\Gamma(\chi_{c1}\gamma) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_5\Gamma_1/\Gamma$

NODE=M189G02
NODE=M189G02

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<0.45	90	[1] HAN	15	BELL	10.58 $e^+e^- \to \chi_{c1}\gamma$

[1] Using $B(\eta \to \gamma\gamma) = (39.41 \pm 0.21)\%$. NODE=M189G02;LINKAGE=A

$\Gamma(\chi_{c2}\gamma) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_6\Gamma_1/\Gamma$

NODE=M189G03
NODE=M189G03

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<2.1	90	[1] HAN	15	BELL	10.58 $e^+e^- \to \chi_{c2}\gamma$

[1] Using $B(\eta \to \gamma\gamma) = (39.41 \pm 0.21)\%$. NODE=M189G03;LINKAGE=A

$\Gamma(D_s^+ D_{s1}(2536)^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_8\Gamma_1/\Gamma$

NODE=M189R00
NODE=M189R00

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{14.3^{+2.8}_{-2.6}\pm1.5}$	89	[1] JIA	19A	BELL	$e^+e^- \to \gamma D_s^+ D_{s1}(2536)^-$

[1] Assuming $B(D_{s1}(2536)^- \to \overline{D}^{*0}K^-) = 1$. NODE=M189R00;LINKAGE=A

$\Gamma(D_s^+ D_{s2}^*(2573)^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_9\Gamma_1/\Gamma$

NODE=M189R04
NODE=M189R04

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{14.7^{+5.9}_{-4.5}\pm3.6}$	66	[1] JIA	20	BELL	$e^+e^- \to \gamma D_s^+ D_{s2}^*(2573)^-$

[1] Assuming $B(D_{s2}^*(2573)^- \to \overline{D}^0 K^-) = 1$. NODE=M189R04;LINKAGE=A

$\psi(4660)$ BRANCHING RATIOS

NODE=M189225

$\Gamma(D^0 D^{*-}\pi^+)/\Gamma(\psi(2S)\pi^+\pi^-)$ — Γ_4/Γ_2

NODE=M189R01

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<10	90	PAKHLOVA	09	BELL	$e^+e^- \rightarrow D^0 D^{*-}\pi^+$

$\Gamma(D^0 D^{*-}\pi^+)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_4/\Gamma \times \Gamma_1/\Gamma$

NODE=M189R02

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<0.37 \times 10^{-6}$	90	[1] PAKHLOVA	09	BELL	$e^+e^- \rightarrow D^0 D^{*-}\pi^+$

[1] Using 4664 ± 11 ± 5 MeV for the mass of $\psi(4660)$.

NODE=M189R02;LINKAGE=PA

$\Gamma(\Lambda_c^+\Lambda_c^-)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_7/\Gamma \times \Gamma_1/\Gamma$

NODE=M189R03

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
$0.68^{+0.16+0.29}_{-0.15-0.30}$	142	[1] PAKHLOVA	08B	BELL	$e^+e^- \rightarrow \Lambda_c^+\Lambda_c^-$

[1] The $\pi^+\pi^-\psi(2S)$ and $\Lambda_c^+\Lambda_c^-$ states are not necessarily the same.

NODE=M189R03;LINKAGE=A

$\psi(4660)$ REFERENCES

NODE=M189

ABLIKIM	21AJ	PR D104 052012	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61441
JIA	20	PR D101 091101	S. Jia *et al.*	(BELLE Collab.)	REFID=60301
JIA	19A	PR D100 111103	S. Jia *et al.*	(BELLE Collab.)	REFID=60037
DAI	17	PR D96 116001	L.-Y. Dai, J. Haidenbauer, U.-G. Meissner	(JULI+)	REFID=58704
ZHANG	17B	PR D96 054008	J. Zhang, J. Zhang		REFID=58219
ZHANG	17C	EPJ C77 727	J. Zhang, L. Yuan		REFID=58463
HAN	15	PR D92 012011	Y.L. Han *et al.*	(BELLE Collab.)	REFID=56816
WANG	15A	PR D91 112007	X.L. Wang *et al.*	(BELLE Collab.)	REFID=56839
LEES	14F	PR D89 111103	J.P. Lees *et al.*	(BABAR Collab.)	REFID=55938
WANG	13B	PR D87 051101	X.L. Wang *et al.*	(BELLE Collab.)	REFID=55377
PAKHLOVA	09	PR D80 091101	G. Pakhlova *et al.*	(BELLE Collab.)	REFID=53143
LIU	08H	PR D78 014032	Z.Q. Liu, X.S. Qin, C.Z. Yuan		REFID=52296
PAKHLOVA	08B	PRL 101 172001	C. Pakhlova *et al.*	(BELLE Collab.)	REFID=52596
AUBERT	07S	PRL 98 212001	B. Aubert *et al.*	(BABAR Collab.)	REFID=51724
WANG	07D	PRL 99 142002	X.L. Wang *et al.*	(BELLE Collab.)	REFID=51959

NODE=M261

$\chi_{c1}(4685)$

$I^G(J^{PC}) = 0^+(1^{++})$

OMITTED FROM SUMMARY TABLE

This state shows properties different from a conventional $q\overline{q}$ state. A candidate for an exotic structure. See the review on "Heavy Non-$q\overline{q}$ Mesons."

NODE=M261

Seen by AAIJ 21E in $B^+ \rightarrow \chi_{c1}(4685)K^+$ with $\chi_{c1}(4685) \rightarrow J/\psi\phi$ using an amplitude analysis of $B^+ \rightarrow J/\psi\phi K^+$ with a significance (accounting for systematic uncertainties) of 15 σ. The $J^P = 1^+$ assignment is favored with high significance.

$\chi_{c1}(4685)$ MASS

NODE=M261M

NODE=M261M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$4684\pm7^{+13}_{-16}$	24k	[1] AAIJ	21E	LHCB	$B^+ \rightarrow J/\psi\phi K^+$

[1] From an amplitude analysis of the decay $B^+ \rightarrow J/\psi\phi K^+$ with a significance of 15 σ.

NODE=M261M;LINKAGE=A

$\chi_{c1}(4685)$ WIDTH

NODE=M261W

NODE=M261W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$126\pm15^{+37}_{-41}$	24k	[1] AAIJ	21E	LHCB	$B^+ \rightarrow J/\psi\phi K^+$

[1] From an amplitude analysis of the decay $B^+ \rightarrow J/\psi\phi K^+$ with a significance of 15 σ.

NODE=M261W;LINKAGE=A

$\chi_{c1}(4685)$ DECAY MODES

NODE=M261215;NODE=M261

	Mode	Fraction (Γ_i/Γ)
Γ_1	$J/\psi\phi$	seen

DESIG=1

$\Gamma(J/\psi\phi)/\Gamma_{total}$ — Γ_1/Γ

NODE=M261R01
NODE=M261R01

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	24k	[1] AAIJ	21E	LHCB	$B^+ \to J/\psi\phi K^+$

[1] From an amplitude analysis of the decay $B^+ \to J/\psi\phi K^+$ with a significance of 15 σ.

NODE=M261R01;LINKAGE=A

$\chi_{c1}(4685)$ REFERENCES

NODE=M261

AAIJ 21E PRL 127 082001 R. Aaij et al. (LHCb Collab.) JP

REFID=61150

NODE=M235

$\chi_{c0}(4700)$

$I^G(J^{PC}) = 0^+(0^{++})$

OMITTED FROM SUMMARY TABLE
was $X(4700)$

This state shows properties different from a conventional $q\overline{q}$ state. A candidate for an exotic structure. See the review on non-$q\overline{q}$ states.

NODE=M235

Seen by AAIJ 17C in $B^+ \to \chi_{c0} K^+$, $\chi_{c0} \to J/\psi\phi$ using an amplitude analysis of $B^+ \to J/\psi\phi K^+$ with a significance (accounting for systematic uncertainties) of 5.6 σ.

$\chi_{c0}(4700)$ MASS

NODE=M235M

NODE=M235M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
4694^{+16}_{-5} OUR AVERAGE [4704^{+17}_{-26} MeV OUR 2021 AVERAGE]					
$4694\pm 4^{+16}_{-3}$	24k	[1] AAIJ	21E	LHCB	$B^+ \to J/\psi\phi K^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$4741\pm 6\pm 6$	175	[2] AAIJ	21C	LHCB	$B^0_s \to J/\psi\phi\pi^+\pi^-$
$4704\pm10^{+14}_{-24}$	4289	[3,4] AAIJ	17C	LHCB	$B^+ \to J/\psi\phi K^+$

NEW

[1] From an amplitude analysis of the decay $B^+ \to J/\psi\phi K^+$ with a significance of 17 σ.
[2] From a 1D fit to the $J/\psi\phi$ mass distribution with a significance of 5.3 σ. The identification of this structure as the $\chi_{c0}(4700)$ needs confirmation.
[3] From an amplitude analysis of the decay $B^+ \to J/\psi\phi K^+$ with a significance of 5.6 σ.
[4] Superseded by AAIJ 21E.

NODE=M235M;LINKAGE=C
NODE=M235M;LINKAGE=B
NODE=M235M;LINKAGE=A
NODE=M235M;LINKAGE=D

$\chi_{c0}(4700)$ WIDTH

NODE=M235W

NODE=M235W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
87^{+18}_{-10} OUR AVERAGE [120 ± 50 MeV OUR 2021 AVERAGE]					
$87\pm 8^{+16}_{-6}$	24k	[1] AAIJ	21E	LHCB	$B^+ \to J/\psi\phi K^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$53\pm15\pm11$	175	[2] AAIJ	21C	LHCB	$B^0_s \to J/\psi\phi\pi^+\pi^-$
$120\pm31^{+42}_{-33}$	4289	[3,4] AAIJ	17C	LHCB	$B^+ \to J/\psi\phi K^+$

NEW

[1] From an amplitude analysis of the decay $B^+ \to J/\psi\phi K^+$ with a significance of 17 σ.
[2] From a 1D fit to the $J/\psi\phi$ mass distribution with a significance of 5.3 σ. The identification of this structure as the $\chi_{c0}(4700)$ needs confirmation.
[3] From an amplitude analysis of the decay $B^+ \to J/\psi\phi K^+$ with a significance of 5.6 σ.
[4] Superseded by AAIJ 21E.

NODE=M235W;LINKAGE=C
NODE=M235W;LINKAGE=B
NODE=M235W;LINKAGE=A
NODE=M235W;LINKAGE=D

χ_{c0}(4700) DECAY MODES

NODE=M235215;NODE=M235

	Mode	Fraction (Γ_i/Γ)
Γ_1	$J/\psi\phi$	seen

DESIG=1

χ_{c0}(4700) BRANCHING RATIOS

NODE=M235220

$\Gamma(J/\psi\phi)/\Gamma_{total}$ **Γ_1/Γ**

NODE=M235R01
NODE=M235R01

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	24k	[1] AAIJ	21E	LHCB	$B^+ \to J/\psi\phi K^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	175	[2] AAIJ	21C	LHCB	$B_s^0 \to J/\psi\phi\pi^+\pi^-$
seen	4289	[3,4] AAIJ	17C	LHCB	$B^+ \to J/\psi\phi K^+$

[1] From an amplitude analysis of the decay $B^+ \to J/\psi\phi K^+$ with a significance of 17 σ. NODE=M235R01;LINKAGE=C

[2] From a 1D fit to the $J/\psi\phi$ mass distribution with a significance of 5.3 σ. The identification of this structure as the χ_{c0}(4700) needs confirmation. NODE=M235R01;LINKAGE=B

[3] From an amplitude analysis of the decay $B^+ \to J/\psi\phi K^+$ with a significance of 5.6 σ. NODE=M235R01;LINKAGE=A

[4] Superseded by AAIJ 21E. NODE=M235R01;LINKAGE=D

χ_{c0}(4700) REFERENCES

NODE=M235

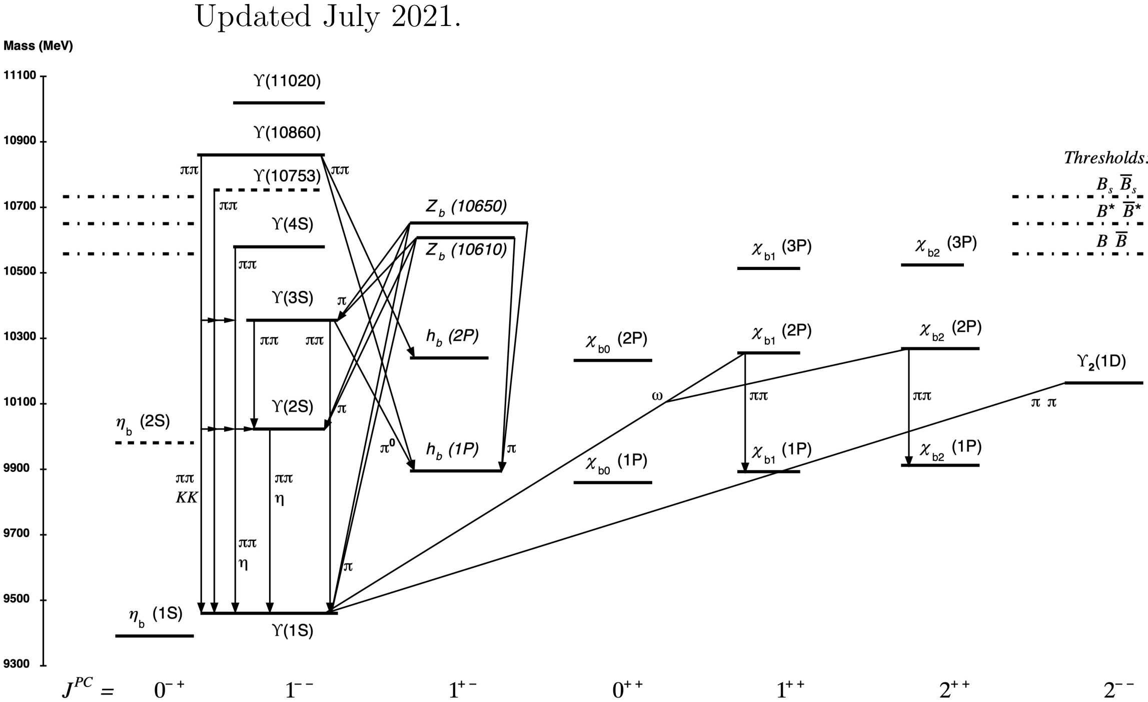
AAIJ	21C	JHEP 2102 024	R. Aaij *et al.*	(LHCb Collab.)	REFID=61124
AAIJ	21E	PRL 127 082001	R. Aaij *et al.*	(LHCb Collab.)	REFID=61150
AAIJ	17C	PRL 118 022003	R. Aaij *et al.*	(LHCb Collab.) JP	REFID=57657
Also		PR D95 012002	R. Aaij *et al.*	(LHCb Collab.)	REFID=57636

$b\overline{b}$ MESONS (including possibly non-$q\overline{q}$ states)

NODE=MXXX030

NODE=M849

Updated July 2021.



The level scheme of meson states containing a minimal quark content of $b\bar{b}$. The name of a state is determined by its quantum numbers $I^G J^{PC}$ (see the review "Naming

Scheme for Hadrons"). States included in the Summary Tables are shown with solid lines; those requiring confirmation are shown with dotted lines. The arrows indicate the most dominant hadronic transitions. Single photon transitions, including $\Upsilon(nS) \to \gamma\eta_b(mS)$, $\Upsilon(nS) \to \gamma\chi_{bJ}(mP)$, and $\chi_{bJ}(nP) \to \gamma\Upsilon(mS)$, are omitted for clarity. For orientation, the location of the thresholds related to a pair of ground state open bottom mesons is indicated in the figure.

NODE=M849

WIDTH DETERMINATIONS OF THE Υ STATES

As is the case for the $J/\psi(1S)$ and $\psi(2S)$, the full widths of the $b\bar{b}$ states $\Upsilon(1S)$, $\Upsilon(2S)$, and $\Upsilon(3S)$ are not directly measurable, since they are much narrower than the energy resolution of the e^+e^- storage rings where these states are produced. The common indirect method to determine Γ starts from

$$\Gamma = \Gamma_{\ell\ell}/B_{\ell\ell} \ , \tag{1}$$

where $\Gamma_{\ell\ell}$ is one leptonic partial width and $B_{\ell\ell}$ is the corresponding branching fraction ($\ell = e,\ \mu,$ or τ). One then assumes e-μ-τ universality and uses

$$\Gamma_{\ell\ell} = \Gamma_{ee}$$

$$B_{\ell\ell} = \text{average of } B_{ee},\ B_{\mu\mu},\ \text{and } B_{\tau\tau} \ . \tag{2}$$

The electronic partial width Γ_{ee} is also not directly measurable at e^+e^- storage rings, only in the combination $\Gamma_{ee}\Gamma_{\text{had}}/\Gamma$, where Γ_{had} is the hadronic partial width and

$$\Gamma_{\text{had}} + 3\Gamma_{ee} = \Gamma \ . \tag{3}$$

This combination is obtained experimentally from the energy-integrated hadronic cross section

$$\int_{\text{resonance}} \sigma(e^+e^- \to \Upsilon \to \text{hadrons})dE$$

$$= \frac{6\pi^2}{M^2}\frac{\Gamma_{ee}\Gamma_{\text{had}}}{\Gamma}C_r = \frac{6\pi^2}{M^2}\frac{\Gamma_{ee}^{(0)}\Gamma_{\text{had}}}{\Gamma}C_r^{(0)} \ , \tag{4}$$

where M is the Υ mass, and C_r and $C_r^{(0)}$ are radiative correction factors. C_r is used for obtaining Γ_{ee} as defined in Eq. (1), and contains corrections from all orders of QED for describing $(b\bar{b}) \to e^+e^-$. The lowest order QED value $\Gamma_{ee}^{(0)}$, relevant for comparison with potential-model calculations, is defined by the lowest order QED graph (Born term) alone, and is about 7% lower than Γ_{ee}.

The Listings give experimental results on B_{ee}, $B_{\mu\mu}$, $B_{\tau\tau}$, and $\Gamma_{ee}\Gamma_{\rm had}/\Gamma$. The entries of the last quantity have been re-evaluated consistently using the correction procedure of KURAEV 85 [1]. The partial width Γ_{ee} is obtained from the average values for $\Gamma_{ee}\Gamma_{\rm had}/\Gamma$ and $B_{\ell\ell}$ using

$$\Gamma_{ee} = \frac{\Gamma_{ee}\Gamma_{\rm had}}{\Gamma(1-3B_{\ell\ell})} \ . \qquad (5)$$

The total width Γ is then obtained from Eq. (1). We do not list Γ_{ee} and Γ values of individual experiments. The Γ_{ee} values in the Meson Summary Table are also those defined in Eq. (1).

References

1. E.A. Kuraev, V.S. Fadin, Sov. J. Nucl. Phys. **41**, 466 (1985).

$\eta_b(1S)$

$I^G(J^{PC}) = 0^+(0^{-+})$

NODE=M171

Quantum numbers shown are quark-model predictions. Observed in radiative decay of the $\Upsilon(3S)$, therefore $C = +$.

NODE=M171

$\eta_b(1S)$ MASS

NODE=M171M

NODE=M171M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
9398.7± 2.0 OUR AVERAGE		Error includes scale factor of 1.5. See the ideogram below.			
$9394.8^{+2.7}_{-3.1}{}^{+4.5}_{-2.7}$	29k	FULSOM	18	BELL	$\Upsilon(2S) \to \gamma X$
9400.7± 1.7± 1.6	33.1k	TAMPONI	15	BELL	$e^+e^- \to \gamma\eta +$ hadrons
9402.4± 1.5± 1.8	34k	[1] MIZUK	12	BELL	$e^+e^- \to \gamma\pi^+\pi^- +$ hadrons
9391.8± 6.6± 2.0	2.3k	[2] BONVICINI	10	CLEO	$\Upsilon(3S) \to \gamma X$
$9394.2^{+4.8}_{-4.9}$± 2.0	13k	[2] AUBERT	09AQ	BABR	$\Upsilon(2S) \to \gamma X$
$9388.9^{+3.1}_{-2.3}$± 2.7	19k	[2] AUBERT	08V	BABR	$\Upsilon(3S) \to \gamma X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
9393.2± 3.4± 2.3	10	[2,3] DOBBS	12		$\Upsilon(2S) \to \gamma$ hadrons
9300 ±20 ±20		HEISTER	02D	ALEP	181–209 e^+e^-

[1] With floating width. Not independent of the corresponding mass difference measurement.

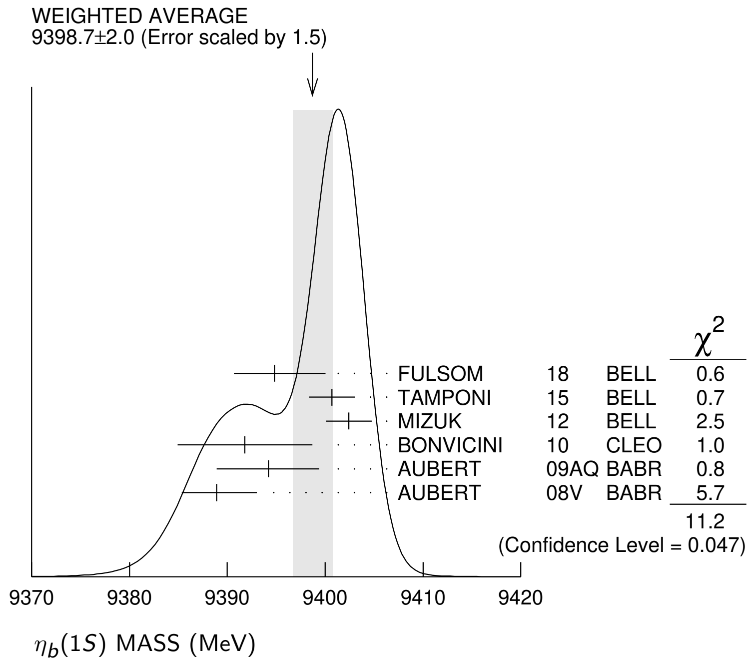
NODE=M171M;LINKAGE=MI

[2] Assuming $\Gamma_{\eta_b(1S)}$ = 10 MeV. Not independent of the corresponding γ energy or mass difference measurements.

NODE=M171M;LINKAGE=AU

[3] Obtained by analyzing CLEO III data but not authored by the CLEO Collaboration.

NODE=M171M;LINKAGE=DO



$m_{\Upsilon(1S)} - m_{\eta_b}$

NODE=M171M2

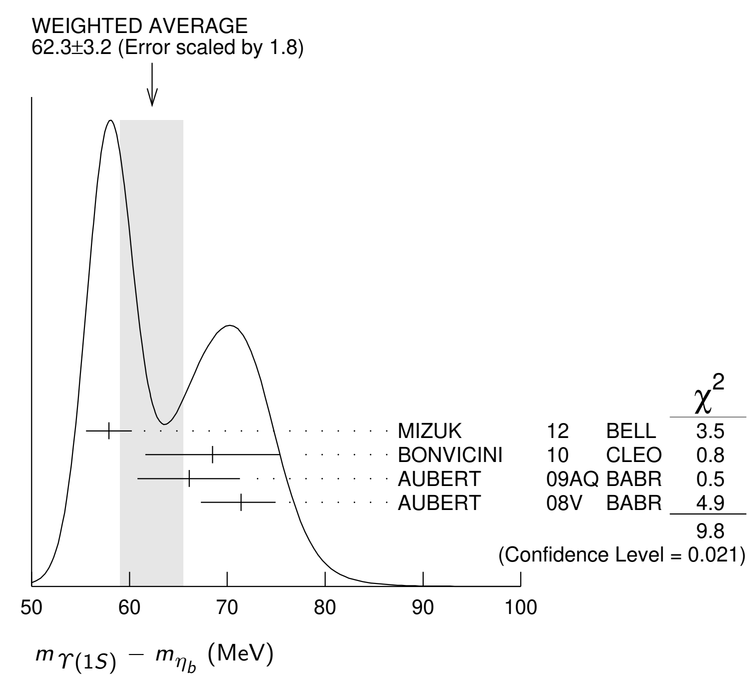
NODE=M171M2

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
62.3±3.2 OUR AVERAGE	Error includes scale factor of 1.8. See the ideogram below.			
$57.9 \pm 1.5 \pm 1.8$	34k	[1] MIZUK 12	BELL	$e^+ e^- \rightarrow \gamma \pi^+ \pi^-$ + hadrons
$68.5 \pm 6.6 \pm 2.0$	2.3 ± 0.5k	[2] BONVICINI 10	CLEO	$\Upsilon(3S) \rightarrow \gamma X$
$66.1^{+4.8}_{-4.9} \pm 2.0$	13 ± 5k	[2] AUBERT 09AQ	BABR	$\Upsilon(2S) \rightarrow \gamma X$
$71.4^{+2.3}_{-3.1} \pm 2.7$	19 ± 3k	[2] AUBERT 08V	BABR	$\Upsilon(3S) \rightarrow \gamma X$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$67.1 \pm 3.4 \pm 2.3$	10^{+5}_{-4}	[2,3] DOBBS 12		$\Upsilon(2S) \rightarrow \gamma$ hadrons

[1] With floating width. Not independent of the corresponding mass measurement. NODE=M171M2;LINKAGE=MI

[2] Assuming $\Gamma_{\eta_b(1S)}$ = 10 MeV. Not independent of the corresponding γ energy or mass measurements. NODE=M171M2;LINKAGE=AU

[3] Obtained by analyzing CLEO III data but not authored by the CLEO Collaboration. NODE=M171M2;LINKAGE=DO



γ ENERGY IN $\Upsilon(3S)$ DECAY

NODE=M171DM

NODE=M171DM

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$920.6^{+2.8}_{-3.2}$ OUR AVERAGE					
$918.6\pm6.0\pm1.9$	2.3 ± 0.5k	[1] BONVICINI	10	CLEO	$\Upsilon(3S)\to\gamma X$
$921.2^{+2.1}_{-2.8}\pm2.4$	19 ± 3k	[1] AUBERT	08V	BABR	$\Upsilon(3S)\to\gamma X$

[1] Assuming $\Gamma_{\eta_b(1S)}$ = 10 MeV. Not independent of the corresponding mass or mass difference measurements.

NODE=M171DM;LINKAGE=BO

γ ENERGY IN $\Upsilon(2S)$ DECAY

NODE=M171U2S

NODE=M171U2S

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$609.3^{+4.6}_{-4.5}\pm1.9$	13 ± 5k	[1] AUBERT	09AQ	BABR	$\Upsilon(2S)\to\gamma X$

[1] Assuming $\Gamma_{\eta_b(1S)}$ = 10 MeV. Not independent of the corresponding mass or mass difference measurements.

NODE=M171U2S;LINKAGE=AU

$\eta_b(1S)$ WIDTH

NODE=M171W

NODE=M171W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$10\ ^{+5}_{-4}$ OUR AVERAGE					
$8\ ^{+6}_{-5}\ \pm5$	33.1k	[1] TAMPONI	15	BELL	$e^+e^-\to\gamma\eta+$ hadrons
$10.8^{+4.0}_{-3.7}{}^{+4.5}_{-2.0}$	34k	[1] MIZUK	12	BELL	$e^+e^-\to\gamma\pi^+\pi^-+$ hadrons

[1] With floating mass.

NODE=M171W;LINKAGE=MI

$\eta_b(1S)$ DECAY MODES

NODE=M171225;NODE=M171

	Mode	Fraction (Γ_i/Γ)	Confidence level	
Γ_1	hadrons	seen		DESIG=7
Γ_2	$3h^+3h^-$	not seen		DESIG=1;OUR EST;→ UNCHECKED ←
Γ_3	$2h^+2h^-$	not seen		DESIG=2;OUR EST;→ UNCHECKED ←
Γ_4	$4h^+4h^-$	not seen		DESIG=4;OUR EST;→ UNCHECKED ←
Γ_5	$\gamma\gamma$	not seen		DESIG=3;OUR EST;→ UNCHECKED ←
Γ_6	$\mu^+\mu^-$	$<9\times10^{-3}$	90%	DESIG=5
Γ_7	$\tau^+\tau^-$	<8 %	90%	DESIG=6

$\eta_b(1S)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M171230

$\Gamma(3h^+3h^-)\times\Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_2\Gamma_5/\Gamma$

NODE=M171G1
NODE=M171G1

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<470	95	ABDALLAH	06	DLPH	161–209 e^+e^-
<132	95	HEISTER	02D	ALEP	181–209 e^+e^-

$\Gamma(2h^+2h^-)\times\Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_3\Gamma_5/\Gamma$

NODE=M171G2
NODE=M171G2

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<190	95	ABDALLAH	06	DLPH	161–209 e^+e^-
< 48	95	HEISTER	02D	ALEP	181–209 e^+e^-

$\Gamma(4h^+4h^-)\times\Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_4\Gamma_5/\Gamma$

NODE=M171G3
NODE=M171G3

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<660	95	ABDALLAH	06	DLPH	161–209 e^+e^-

$\eta_b(1S)$ BRANCHING RATIOS

NODE=M171235

$\Gamma(\text{hadrons})/\Gamma_{\text{total}}$ Γ_1/Γ

NODE=M171R03

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	34k	MIZUK	12	BELL	$e^+e^- \rightarrow \gamma\pi^+\pi^-$ + hadrons

$\Gamma(\mu^+\mu^-)/\Gamma_{\text{total}}$ Γ_6/Γ

NODE=M171R01

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<9 \times 10^{-3}$	90	[1] AUBERT	09Z	BABR	$e^+e^- \rightarrow \Upsilon(2S,3S) \rightarrow \gamma\eta_b$

[1] Obtained using $B(\Upsilon(2S) \rightarrow \gamma\eta_b) = (4.2^{+1.1}_{-1.0} \pm 0.9) \times 10^{-4}$ and $B(\Upsilon(3S) \rightarrow \gamma\eta_b) = (4.8 \pm 0.5 \pm 0.6) \times 10^{-4}$. This limit is equivalent to $B(\eta_b \rightarrow \mu^+\mu^-) = (-0.25 \pm 0.51 \pm 0.33)\%$ measurement.

NODE=M171R01;LINKAGE=AU

$\Gamma(\tau^+\tau^-)/\Gamma_{\text{total}}$ Γ_7/Γ

NODE=M171R02

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<8 \times 10^{-2}$	90	AUBERT	09P	BABR	$e^+e^- \rightarrow \gamma\tau^+\tau^-$

$\eta_b(1S)$ REFERENCES

NODE=M171

FULSOM	18	PRL 121 232001	B.G. Fulsom *et al.*	(BELLE Collab.)
TAMPONI	15	PRL 115 142001	U. Tamponi *et al.*	(BELLE Collab.)
DOBBS	12	PRL 109 082001	S. Dobbs *et al.*	
MIZUK	12	PRL 109 232002	R. Mizuk *et al.*	(BELLE Collab.)
BONVICINI	10	PR D81 031104	G. Bonvicini *et al.*	(CLEO Collab.)
AUBERT	09AQ	PRL 103 161801	B. Aubert *et al.*	(BABAR Collab.)
AUBERT	09P	PRL 103 181801	B. Aubert *et al.*	(BABAR Collab.)
AUBERT	09Z	PRL 103 081803	B. Aubert *et al.*	(BABAR Collab.)
AUBERT	08V	PRL 101 071801	B. Aubert *et al.*	(BABAR Collab.)
ABDALLAH	06	PL B634 340	J.M. Abdallah *et al.*	(DELPHI Collab.)
HEISTER	02D	PL B530 56	A. Heister *et al.*	(ALEPH Collab.)

REFID=59535
REFID=56996
REFID=54288
REFID=54718
REFID=53231
REFID=53106
REFID=53062
REFID=52930
REFID=52262
REFID=51042
REFID=48577

NODE=M049

$\Upsilon(1S)$

$I^G(J^{PC}) = 0^-(1^{--})$

$\Upsilon(1S)$ MASS

NODE=M049M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
9460.30±0.26 OUR AVERAGE	Error includes scale factor of 3.3.			
9460.51±0.09±0.05	[1] ARTAMONOV	00	MD1	$e^+e^- \rightarrow$ hadrons
9459.97±0.11±0.07	MACKAY	84	REDE	$e^+e^- \rightarrow$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •				
9460.60±0.09±0.05	[2,3] BARU	92B	REDE	$e^+e^- \rightarrow$ hadrons
9460.59±0.12	BARU	86	REDE	$e^+e^- \rightarrow$ hadrons
9460.6 ±0.4	[3,4] ARTAMONOV	84	REDE	$e^+e^- \rightarrow$ hadrons

[1] Reanalysis of BARU 92B and ARTAMONOV 84 using new electron mass (COHEN 87). NODE=M049M;LINKAGE=AR

[2] Superseding BARU 86. NODE=M049M;LINKAGE=A

[3] Superseded by ARTAMONOV 00. NODE=M049M;LINKAGE=RZ

[4] Value includes data of ARTAMONOV 82. NODE=M049M;LINKAGE=G

$\Upsilon(1S)$ WIDTH

NODE=M049W

VALUE (keV)	DOCUMENT ID
54.02±1.25 OUR EVALUATION	See the Note on "Width Determinations of the Υ States"

→ UNCHECKED ←

$\Upsilon(1S)$ DECAY MODES

NODE=M049215;NODE=M049

	Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	
Γ_1	$\tau^+\tau^-$	(2.60 ±0.10) %		DESIG=3
Γ_2	e^+e^-	(2.38 ±0.11) %		DESIG=2
Γ_3	$\mu^+\mu^-$	(2.48 ±0.05) %		DESIG=1

Hadronic decays

NODE=M049;CLUMP=A

Γ_4	ggg	(81.7 ±0.7) %			DESIG=117
Γ_5	γgg	(2.2 ±0.6) %			DESIG=118
Γ_6	$\eta'(958)$ anything	(2.94 ±0.24) %			DESIG=73
Γ_7	$J/\psi(1S)$ anything	(5.4 ±0.4) $\times 10^{-4}$		S=1.4	DESIG=12
Γ_8	$J/\psi(1S)\eta_c$	< 2.2	$\times 10^{-6}$	CL=90%	DESIG=146
Γ_9	$J/\psi(1S)\chi_{c0}$	< 3.4	$\times 10^{-6}$	CL=90%	DESIG=147
Γ_{10}	$J/\psi(1S)\chi_{c1}$	(3.9 ±1.2) $\times 10^{-6}$			DESIG=148
Γ_{11}	$J/\psi(1S)\chi_{c2}$	< 1.4	$\times 10^{-6}$	CL=90%	DESIG=149
Γ_{12}	$J/\psi(1S)\eta_c(2S)$	< 2.2	$\times 10^{-6}$	CL=90%	DESIG=150
Γ_{13}	$J/\psi(1S)X(3940)$	< 5.4	$\times 10^{-6}$	CL=90%	DESIG=151
Γ_{14}	$J/\psi(1S)X(4160)$	< 5.4	$\times 10^{-6}$	CL=90%	DESIG=152
Γ_{15}	$X(4350)$ anything, $X \to J/\psi(1S)\phi$	< 8.1	$\times 10^{-6}$	CL=90%	DESIG=167
Γ_{16}	$Z_c(3900)^{\pm}$ anything, $Z_c \to J/\psi(1S)\pi^{\pm}$	< 1.3	$\times 10^{-5}$	CL=90%	DESIG=168
Γ_{17}	$Z_c(4200)^{\pm}$ anything, $Z_c \to J/\psi(1S)\pi^{\pm}$	< 6.0	$\times 10^{-5}$	CL=90%	DESIG=169
Γ_{18}	$Z_c(4430)^{\pm}$ anything, $Z_c \to J/\psi(1S)\pi^{\pm}$	< 4.9	$\times 10^{-5}$	CL=90%	DESIG=170
Γ_{19}	$X^{\pm}_{cs}$ anything, $X \to J/\psi K^{\pm}$	< 5.7	$\times 10^{-6}$	CL=90%	DESIG=173
Γ_{20}	$\psi(4230)$ anything, $\psi \to J/\psi(1S)\pi^+\pi^-$	< 3.8	$\times 10^{-5}$	CL=90%	DESIG=161
Γ_{21}	$\psi(4230)$ anything, $\psi \to J/\psi(1S)K^+K^-$	< 7.5	$\times 10^{-6}$	CL=90%	DESIG=165
Γ_{22}	$\chi_{c1}(4140)$ anything, $\chi_{c1} \to J/\psi(1S)\phi$	< 5.2	$\times 10^{-6}$	CL=90%	DESIG=166
Γ_{23}	χ_{c0} anything	< 4	$\times 10^{-3}$	CL=90%	DESIG=5
Γ_{24}	χ_{c1} anything	(1.90 ±0.35) $\times 10^{-4}$			DESIG=6
Γ_{25}	$\chi_{c1}(1P)X_{tetra}$	< 3.78	$\times 10^{-5}$	CL=90%	DESIG=175
Γ_{26}	χ_{c2} anything	(2.8 ±0.8) $\times 10^{-4}$			DESIG=7
Γ_{27}	$\psi(2S)$ anything	(1.23 ±0.20) $\times 10^{-4}$			DESIG=8
Γ_{28}	$\psi(2S)\eta_c$	< 3.6	$\times 10^{-6}$	CL=90%	DESIG=153
Γ_{29}	$\psi(2S)\chi_{c0}$	< 6.5	$\times 10^{-6}$	CL=90%	DESIG=154
Γ_{30}	$\psi(2S)\chi_{c1}$	< 4.5	$\times 10^{-6}$	CL=90%	DESIG=155
Γ_{31}	$\psi(2S)\chi_{c2}$	< 2.1	$\times 10^{-6}$	CL=90%	DESIG=156
Γ_{32}	$\psi(2S)\eta_c(2S)$	< 3.2	$\times 10^{-6}$	CL=90%	DESIG=157
Γ_{33}	$\psi(2S)X(3940)$	< 2.9	$\times 10^{-6}$	CL=90%	DESIG=158
Γ_{34}	$\psi(2S)X(4160)$	< 2.9	$\times 10^{-6}$	CL=90%	DESIG=159
Γ_{35}	$\psi(4230)$ anything, $\psi \to \psi(2S)\pi^+\pi^-$	< 7.9	$\times 10^{-5}$	CL=90%	DESIG=162
Γ_{36}	$\psi(4360)$ anything, $\psi \to \psi(2S)\pi^+\pi^-$	< 5.2	$\times 10^{-5}$	CL=90%	DESIG=163
Γ_{37}	$\psi(4660)$ anything, $\psi \to \psi(2S)\pi^+\pi^-$	< 2.2	$\times 10^{-5}$	CL=90%	DESIG=164
Γ_{38}	$X(4050)^{\pm}$ anything, $X \to \psi(2S)\pi^{\pm}$	< 8.8	$\times 10^{-5}$	CL=90%	DESIG=171
Γ_{39}	$Z_c(4430)^{\pm}$ anything, $Z_c \to \psi(2S)\pi^{\pm}$	< 6.7	$\times 10^{-5}$	CL=90%	DESIG=172
Γ_{40}	$\chi_{c1}(3872)$anything	< 2.5	$\times 10^{-4}$	CL=90%	DESIG=194
Γ_{41}	$Z_c(4200)^+Z_c(4200)^-$	< 2.23	$\times 10^{-5}$	CL=90%	DESIG=178
Γ_{42}	$Z_c(3900)^{\pm}Z_c(4200)^{\mp}$	< 8.1	$\times 10^{-6}$	CL=90%	DESIG=179
Γ_{43}	$Z_c(3900)^+Z_c(3900)^-$	< 1.8	$\times 10^{-6}$	CL=90%	DESIG=180
Γ_{44}	$X(4050)^+X(4050)^-$	< 1.58	$\times 10^{-5}$	CL=90%	DESIG=181
Γ_{45}	$X(4250)^+X(4250)^-$	< 2.66	$\times 10^{-5}$	CL=90%	DESIG=182
Γ_{46}	$X(4050)^{\pm}X(4250)^{\mp}$	< 4.42	$\times 10^{-5}$	CL=90%	DESIG=183
Γ_{47}	$Z_c(4430)^+Z_c(4430)^-$	< 2.03	$\times 10^{-5}$	CL=90%	DESIG=184
Γ_{48}	$X(4055)^{\pm}X(4055)^{\mp}$	< 2.33	$\times 10^{-5}$	CL=90%	DESIG=186
Γ_{49}	$X(4055)^{\pm}Z_c(4430)^{\mp}$	< 4.55	$\times 10^{-5}$	CL=90%	DESIG=189

Γ_{50}	$\rho\pi$	< 3.68	$\times 10^{-6}$	CL=90%	DESIG=11
Γ_{51}	$\omega\pi^0$	< 3.90	$\times 10^{-6}$	CL=90%	DESIG=131
Γ_{52}	$\pi^+\pi^-$	< 5	$\times 10^{-4}$	CL=90%	DESIG=23
Γ_{53}	K^+K^-	< 5	$\times 10^{-4}$	CL=90%	DESIG=24
Γ_{54}	$p\overline{p}$	< 5	$\times 10^{-4}$	CL=90%	DESIG=25
Γ_{55}	$\pi^+\pi^-\pi^0$	(2.1 ± 0.8)	$\times 10^{-6}$		DESIG=72
Γ_{56}	ϕK^+K^-	(2.4 ± 0.5)	$\times 10^{-6}$		DESIG=136
Γ_{57}	$\omega\pi^+\pi^-$	(4.5 ± 1.0)	$\times 10^{-6}$		DESIG=137
Γ_{58}	$K^*(892)^0 K^-\pi^+$ + c.c.	(4.4 ± 0.8)	$\times 10^{-6}$		DESIG=138
Γ_{59}	$\phi f'_2(1525)$	< 1.63	$\times 10^{-6}$	CL=90%	DESIG=139
Γ_{60}	$\omega f_2(1270)$	< 1.79	$\times 10^{-6}$	CL=90%	DESIG=140
Γ_{61}	$\rho(770) a_2(1320)$	< 2.24	$\times 10^{-6}$	CL=90%	DESIG=141
Γ_{62}	$K^*(892)^0 \overline{K}^*_2(1430)^0$ + c.c.	(3.0 ± 0.8)	$\times 10^{-6}$		DESIG=142
Γ_{63}	$K_1(1270)^\pm K^\mp$	< 2.41	$\times 10^{-6}$	CL=90%	DESIG=143
Γ_{64}	$K_1(1400)^\pm K^\mp$	(1.0 ± 0.4)	$\times 10^{-6}$		DESIG=144
Γ_{65}	$b_1(1235)^\pm \pi^\mp$	< 1.25	$\times 10^{-6}$	CL=90%	DESIG=145
Γ_{66}	$\pi^+\pi^-\pi^0\pi^0$	(1.28 ± 0.30)	$\times 10^{-5}$		DESIG=132
Γ_{67}	$K^0_S K^+\pi^-$ + c.c.	(1.6 ± 0.4)	$\times 10^{-6}$		DESIG=133
Γ_{68}	$K^*(892)^0 \overline{K}^0$ + c.c.	(2.9 ± 0.9)	$\times 10^{-6}$		DESIG=134
Γ_{69}	$K^*(892)^- K^+$ + c.c.	< 1.11	$\times 10^{-6}$	CL=90%	DESIG=135
Γ_{70}	$f_1(1285)$ anything	(4.6 ± 3.1)	$\times 10^{-3}$		DESIG=174
Γ_{71}	$D^*(2010)^\pm$ anything	(2.52 ± 0.20)	%		DESIG=30
Γ_{72}	$\underline{f_1}(1285) X_{tetra}$	< 6.24	$\times 10^{-5}$	CL=90%	DESIG=176
Γ_{73}	$^2\overline{H}$ anything	(2.85 ± 0.25)	$\times 10^{-5}$		DESIG=107
Γ_{74}	Sum of 100 exclusive modes	(1.200 ± 0.017)	%		DESIG=128
	Radiative decays				NODE=M049;CLUMP=B
Γ_{75}	$\gamma\pi^+\pi^-$	(6.3 ± 1.8)	$\times 10^{-5}$		DESIG=70
Γ_{76}	$\gamma\pi^0\pi^0$	(1.7 ± 0.7)	$\times 10^{-5}$		DESIG=71
Γ_{77}	$\gamma\pi\pi$ (S-wave)	(4.6 ± 0.7)	$\times 10^{-5}$		DESIG=190
Γ_{78}	$\gamma\pi^0\eta$	< 2.4	$\times 10^{-6}$	CL=90%	DESIG=111
Γ_{79}	γK^+K^-	[a] (1.14 ± 0.13)	$\times 10^{-5}$		DESIG=102
Γ_{80}	$\gamma p\overline{p}$	[b] < 6	$\times 10^{-6}$	CL=90%	DESIG=103
Γ_{81}	$\gamma 2h^+2h^-$	(7.0 ± 1.5)	$\times 10^{-4}$		DESIG=20
Γ_{82}	$\gamma 3h^+3h^-$	(5.4 ± 2.0)	$\times 10^{-4}$		DESIG=21
Γ_{83}	$\gamma 4h^+4h^-$	(7.4 ± 3.5)	$\times 10^{-4}$		DESIG=22
Γ_{84}	$\gamma\pi^+\pi^-K^+K^-$	(2.9 ± 0.9)	$\times 10^{-4}$		DESIG=14
Γ_{85}	$\gamma 2\pi^+2\pi^-$	(2.5 ± 0.9)	$\times 10^{-4}$		DESIG=13
Γ_{86}	$\gamma 3\pi^+3\pi^-$	(2.5 ± 1.2)	$\times 10^{-4}$		DESIG=17
Γ_{87}	$\gamma 2\pi^+2\pi^-K^+K^-$	(2.4 ± 1.2)	$\times 10^{-4}$		DESIG=18
Γ_{88}	$\gamma\pi^+\pi^-p\overline{p}$	(1.5 ± 0.6)	$\times 10^{-4}$		DESIG=15
Γ_{89}	$\gamma 2\pi^+2\pi^-p\overline{p}$	(4 ± 6)	$\times 10^{-5}$		DESIG=19
Γ_{90}	$\gamma 2K^+2K^-$	(2.0 ± 2.0)	$\times 10^{-5}$		DESIG=16
Γ_{91}	$\gamma\eta'(958)$	< 1.9	$\times 10^{-6}$	CL=90%	DESIG=55
Γ_{92}	$\gamma\eta$	< 1.0	$\times 10^{-6}$	CL=90%	DESIG=54
Γ_{93}	$\gamma f_0(980)$	< 3	$\times 10^{-5}$	CL=90%	DESIG=105
Γ_{94}	$\gamma f'_2(1525)$	(2.9 ± 0.6)	$\times 10^{-5}$		DESIG=52
Γ_{95}	$\gamma f_2(1270)$	(1.01 ± 0.06)	$\times 10^{-4}$		DESIG=51
Γ_{96}	$\gamma\eta(1405)$	< 8.2	$\times 10^{-5}$	CL=90%	DESIG=65
Γ_{97}	$\gamma f_0(1500)$	< 1.5	$\times 10^{-5}$	CL=90%	DESIG=108
Γ_{98}	$\gamma f_0(1500) \to \gamma K^+K^-$	(1.0 ± 0.4)	$\times 10^{-5}$		DESIG=192
Γ_{99}	$\gamma f_0(1710)$	< 2.6	$\times 10^{-4}$	CL=90%	DESIG=53
Γ_{100}	$\gamma f_0(1710) \to \gamma K^+K^-$	(1.01 ± 0.32)	$\times 10^{-5}$		DESIG=112
Γ_{101}	$\gamma f_0(1710) \to \gamma\pi^+\pi^-$	(5.3 ± 2.0)	$\times 10^{-6}$		DESIG=191
Γ_{102}	$\gamma f_0(1710) \to \gamma\pi^0\pi^0$	< 1.4	$\times 10^{-6}$	CL=90%	DESIG=109
Γ_{103}	$\gamma f_0(1710) \to \gamma\eta\eta$	< 1.8	$\times 10^{-6}$	CL=90%	DESIG=110
Γ_{104}	$\gamma f_4(2050)$	< 5.3	$\times 10^{-5}$	CL=90%	DESIG=104

Γ_{105}	$\gamma f_0(2200) \to \gamma K^+ K^-$		<	2	$\times 10^{-4}$	CL=90%	DESIG=69
Γ_{106}	$\gamma f_J(2220) \to \gamma K^+ K^-$		<	8	$\times 10^{-7}$	CL=90%	DESIG=60
Γ_{107}	$\gamma f_J(2220) \to \gamma \pi^+ \pi^-$		<	6	$\times 10^{-7}$	CL=90%	DESIG=61
Γ_{108}	$\gamma f_J(2220) \to \gamma p \overline{p}$		<	1.1	$\times 10^{-6}$	CL=90%	DESIG=62
Γ_{109}	$\gamma \eta(2225) \to \gamma \phi \phi$		<	3	$\times 10^{-3}$	CL=90%	DESIG=68
Γ_{110}	$\gamma \eta_c(1S)$		<	2.9	$\times 10^{-5}$	CL=90%	DESIG=119
Γ_{111}	$\gamma \eta_c(2S)$		<	4	$\times 10^{-4}$	CL=90%	DESIG=193
Γ_{112}	$\gamma \chi_{c0}$		<	6.6	$\times 10^{-5}$	CL=90%	DESIG=120
Γ_{113}	$\gamma \chi_{c1}$			$(4.7 {+2.4 \atop -1.9})$	$\times 10^{-5}$		DESIG=121
Γ_{114}	$\gamma \chi_{c2}$		<	7.6	$\times 10^{-6}$	CL=90%	DESIG=122
Γ_{115}	$\gamma \chi_{c1}(3872)$		<	4	$\times 10^{-5}$	CL=90%	DESIG=195
Γ_{116}	$\gamma \chi_{c1}(3872)$, $\chi_{c1} \to \pi^+ \pi^- \pi^0 J/\psi$		<	2.8	$\times 10^{-6}$	CL=90%	DESIG=124
Γ_{117}	$\gamma X(3915) \to \omega J/\psi$		<	3.0	$\times 10^{-6}$	CL=90%	DESIG=125
Γ_{118}	$\gamma \chi_{c1}(4140) \to \phi J/\psi$		<	2.2	$\times 10^{-6}$	CL=90%	DESIG=126
Γ_{119}	γX	[c]	<	4.5	$\times 10^{-6}$	CL=90%	DESIG=66
Γ_{120}	$\gamma X \overline{X} (m_X < 3.1$ GeV$)$	[d]	<	1	$\times 10^{-3}$	CL=90%	DESIG=67
Γ_{121}	$\gamma X \overline{X} (m_X < 4.5$ GeV$)$	[e]	<	2.4	$\times 10^{-4}$	CL=90%	DESIG=127
Γ_{122}	$\gamma X \to \gamma + \geq 4$ prongs	[f]	<	1.78	$\times 10^{-4}$	CL=95%	DESIG=113
Γ_{123}	$\gamma a_1^0 \to \gamma \mu^+ \mu^-$	[g]	<	9	$\times 10^{-6}$	CL=90%	DESIG=114
Γ_{124}	$\gamma a_1^0 \to \gamma \tau^+ \tau^-$	[a]	<	1.30	$\times 10^{-4}$	CL=90%	DESIG=115
Γ_{125}	$\gamma a_1^0 \to \gamma g g$	[h]	<	1	%	CL=90%	DESIG=129
Γ_{126}	$\gamma a_1^0 \to \gamma s \overline{s}$	[h]	<	1	$\times 10^{-3}$	CL=90%	DESIG=130

Lepton Family number (*LF*) violating modes NODE=M049;CLUMP=C

Γ_{127}	$\mu^\pm \tau^\mp$	*LF*	<	6.0	$\times 10^{-6}$	CL=95%	DESIG=116

Other decays NODE=M049;CLUMP=D

Γ_{128}	invisible	<	3.0	$\times 10^{-4}$	CL=90%	DESIG=106
Γ_{129}	hadrons		(97 ± 5)	%		DESIG=101

[a] $2m_\tau < M(\tau^+ \tau^-) < 9.2$ GeV LINKAGE=E49

[b] 2 GeV $< m_{K^+ K^-} <$ 3 GeV LINKAGE=G49

[c] X = scalar with $m < 8.0$ GeV LINKAGE=A49

[d] $X \overline{X}$ = vectors with $m < 3.1$ GeV LINKAGE=B49

[e] X and $\overline{X}$ = zero spin with $m < 4.5$ GeV LINKAGE=F49

[f] 1.5 GeV $< m_X <$ 5.0 GeV LINKAGE=C49

[g] 201 MeV $< M(\mu^+ \mu^-) <$ 3565 MeV LINKAGE=D49

[h] 0.5 GeV $< m_X <$ 9.0 GeV, where m_X is the invariant mass of the hadronic final state. LINKAGE=I49

$\Upsilon(1S)$ $\Gamma(i)\Gamma(e^+ e^-)/\Gamma(\text{total})$

NODE=M049218

$\Gamma(\mu^+ \mu^-) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}}$ — $\Gamma_3\Gamma_2/\Gamma$

NODE=M049G1
NODE=M049G1

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
31.2±1.6±1.7	KOBEL	92	CBAL	$e^+ e^- \to \mu^+ \mu^-$

$\Gamma(\text{hadrons}) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}}$ — $\Gamma_{129}\Gamma_2/\Gamma$

NODE=M049G2
NODE=M049G2

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
1.240±0.016 OUR AVERAGE				
1.252±0.004±0.019	[1] ROSNER	06	CLEO	9.5 $e^+ e^- \to$ hadrons
1.187±0.023±0.031	[1] BARU	92B	MD1	$e^+ e^- \to$ hadrons
1.23 ±0.02 ±0.05	[1] JAKUBOWSKI	88	CBAL	$e^+ e^- \to$ hadrons
1.37 ±0.06 ±0.09	[2] GILES	84B	CLEO	$e^+ e^- \to$ hadrons
1.23 ±0.08 ±0.04	[2] ALBRECHT	82	DASP	$e^+ e^- \to$ hadrons
1.13 ±0.07 ±0.11	[2] NICZYPORUK	82	LENA	$e^+ e^- \to$ hadrons
1.09 ±0.25	[2] BOCK	80	CNTR	$e^+ e^- \to$ hadrons
1.35 ±0.14	[3] BERGER	79	PLUT	$e^+ e^- \to$ hadrons

[1] Radiative corrections evaluated following KURAEV 85. NODE=M049G2;LINKAGE=B

[2] Radiative corrections reevaluated by BUCHMUELLER 88 following KURAEV 85. NODE=M049G2;LINKAGE=R

[3] Radiative corrections reevaluated by ALEXANDER 89 using $B(\mu\mu) = 0.026$. NODE=M049G2;LINKAGE=P

$\Upsilon(1S)$ PARTIAL WIDTHS

NODE=M049220

$\Gamma(e^+e^-)$ Γ_2

NODE=M049W2
NODE=M049W2

VALUE (keV)	DOCUMENT ID
1.340±0.018 OUR EVALUATION	

→ UNCHECKED ←

$\Upsilon(1S)$ BRANCHING RATIOS

NODE=M049225

$\Gamma(\tau^+\tau^-)/\Gamma_{total}$ Γ_1/Γ

NODE=M049R3
NODE=M049R3

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
2.60±0.10 OUR AVERAGE					
$2.53\pm0.13\pm0.05$	60k	[1] BESSON	07	CLEO	$e^+e^- \to \Upsilon(1S) \to \tau^+\tau^-$
$2.61\pm0.12^{+0.09}_{-0.13}$	25k	CINABRO	94B	CLE2	$e^+e^- \to \tau^+\tau^-$
$2.7\pm0.4\pm0.2$		[2] ALBRECHT	85C	ARG	$\Upsilon(2S) \to \pi^+\pi^-\tau^+\tau^-$
$3.4\pm0.4\pm0.4$		GILES	83	CLEO	$e^+e^- \to \tau^+\tau^-$

[1] BESSON 07 reports $[\Gamma(\Upsilon(1S) \to \tau^+\tau^-)/\Gamma_{total}] / [B(\Upsilon(1S) \to \mu^+\mu^-)] = 1.02 \pm 0.02 \pm 0.05$ which we multiply by our best value $B(\Upsilon(1S) \to \mu^+\mu^-) = (2.48 \pm 0.05) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M049R3;LINKAGE=BE

[2] Using $B(\Upsilon(1S) \to ee) = B(\Upsilon(1S) \to \mu\mu) = 0.0256$; not used for width evaluations.

NODE=M049R3;LINKAGE=A

$\Gamma(e^+e^-)/\Gamma_{total}$ Γ_2/Γ

NODE=M049R2
NODE=M049R2

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
2.38±0.11 OUR AVERAGE					
$2.29\pm0.08\pm0.11$		ALEXANDER	98	CLE2	$\Upsilon(2S) \to \pi^+\pi^-e^+e^-$
$2.42\pm0.14\pm0.14$	307	ALBRECHT	87	ARG	$\Upsilon(2S) \to \pi^+\pi^-e^+e^-$
$2.8\pm0.3\pm0.2$	826	BESSON	84	CLEO	$\Upsilon(2S) \to \pi^+\pi^-e^+e^-$
5.1 ± 3.0		BERGER	80C	PLUT	$e^+e^- \to e^+e^-$

$\Gamma(\mu^+\mu^-)/\Gamma_{total}$ Γ_3/Γ

NODE=M049R1
NODE=M049R1

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0248±0.0005 OUR AVERAGE					
$0.0249\pm0.0002\pm0.0007$	345k	ADAMS	05	CLEO	$e^+e^- \to \mu^+\mu^-$
$0.0249\pm0.0008\pm0.0013$		ALEXANDER	98	CLE2	$\Upsilon(2S) \to \pi^+\pi^-\mu^+\mu^-$
$0.0212\pm0.0020\pm0.0010$		[1] BARU	92	MD1	$e^+e^- \to \mu^+\mu^-$
$0.0231\pm0.0012\pm0.0010$		[1] KOBEL	92	CBAL	$e^+e^- \to \mu^+\mu^-$
$0.0252\pm0.0007\pm0.0007$		CHEN	89B	CLEO	$e^+e^- \to \mu^+\mu^-$
$0.0261\pm0.0009\pm0.0011$		KAARSBERG	89	CSB2	$e^+e^- \to \mu^+\mu^-$
$0.0230\pm0.0025\pm0.0013$	86	ALBRECHT	87	ARG	$\Upsilon(2S) \to \pi^+\pi^-\mu^+\mu^-$
$0.029\pm0.003\pm0.002$	864	BESSON	84	CLEO	$\Upsilon(2S) \to \pi^+\pi^-\mu^+\mu^-$
$0.027\pm0.003\pm0.003$		ANDREWS	83	CLEO	$e^+e^- \to \mu^+\mu^-$
$0.032\pm0.013\pm0.003$		ALBRECHT	82	DASP	$e^+e^- \to \mu^+\mu^-$
$0.038\pm0.015\pm0.002$		NICZYPORUK	82	LENA	$e^+e^- \to \mu^+\mu^-$
$0.014\ ^{+0.034}_{-0.014}$		BOCK	80	CNTR	$e^+e^- \to \mu^+\mu^-$
0.022 ± 0.020		BERGER	79	PLUT	$e^+e^- \to \mu^+\mu^-$

[1] Taking into account interference between the resonance and continuum.

NODE=M049R1;LINKAGE=G

$\Gamma(\tau^+\tau^-)/\Gamma(\mu^+\mu^-)$ Γ_1/Γ_3

NODE=M049R43
NODE=M049R43

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
1.008±0.023 OUR AVERAGE					
$1.005\pm0.013\pm0.022$	0.7M	[1] DEL-AMO-SA..	10C	BABR	$\Upsilon(3S) \to \pi^+\pi^-\Upsilon(1S)$
$1.02\pm0.02\pm0.05$	60k	BESSON	07	CLEO	$e^+e^- \to \Upsilon(1S)$

[1] Allows any number of extra photons with total energy < 500 MeV.

NODE=M049R43;LINKAGE=DE

$\Gamma(ggg)/\Gamma_{total}$ Γ_4/Γ

NODE=M049R35
NODE=M049R35

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
81.7±0.7	20M	[1] BESSON	06A	CLEO	$\Upsilon(1S) \to$ hadrons

[1] Calculated using the value $\Gamma(\gamma gg)/\Gamma(ggg) = (2.70 \pm 0.01 \pm 0.13 \pm 0.24)\%$ from BESSON 06A and PDG 08 values of $B(\mu^+\mu^-) = (2.48 \pm 0.05)\%$ and $R_{hadrons} = 3.51$. The statistical error is negligible and the systematic error is partially correlated with that of $\Gamma(\gamma gg)/\Gamma_{total}$ measurement of BESSON 06A.

NODE=M049R35;LINKAGE=BE

$\Gamma(\gamma g g)/\Gamma_{total}$ Γ_5/Γ

NODE=M049R36

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
2.20±0.60	400k	[1] BESSON	06A	CLEO	$\Upsilon(1S) \to \gamma +$ hadrons

[1] Calculated using BESSON 06A values of $\Gamma(\gamma g g)/\Gamma(g g g) = (2.70 \pm 0.01 \pm 0.13 \pm 0.24)\%$ and $\Gamma(g g g)/\Gamma_{total}$. The statistical error is negligible and the systematic error is partially correlated with that of $\Gamma(g g g)/\Gamma_{total}$ measurement of BESSON 06A.

NODE=M049R36;LINKAGE=BE

$\Gamma(\gamma g g)/\Gamma(g g g)$ Γ_5/Γ_4

NODE=M049R37

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
2.70±0.01±0.27	20M	BESSON	06A	CLEO	$\Upsilon(1S) \to (\gamma +)$ hadrons

$\Gamma(\eta'(958)$ anything$)/\Gamma_{total}$ Γ_6/Γ

NODE=M049R73

VALUE	DOCUMENT ID		TECN	COMMENT
0.0294±0.0024 OUR AVERAGE				
0.030 ±0.002 ±0.002	AQUINES	06A	CLE3	$\Upsilon(1S) \to \eta'$ anything
0.028 ±0.004 ±0.002	ARTUSO	03	CLE2	$\Upsilon(1S) \to \eta'$ anything

$\Gamma(J/\psi(1S)$ anything$)/\Gamma_{total}$ Γ_7/Γ

NODE=M049R12

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
5.4 ±0.4 OUR FIT Error includes scale factor of 1.4.						
5.4 ±0.4 OUR AVERAGE Error includes scale factor of 1.5.						
5.25±0.13±0.25		3k	SHEN	16	BELL	$e^+e^- \to J/\psi X$
6.4 ±0.4 ±0.6		730	BRIERE	04	CLEO	$e^+e^- \to J/\psi X$
11 ±4 ±2			[1] FULTON	89	CLEO	$e^+e^- \to \mu^+\mu^- X$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<6.8	90		ALBRECHT	92J	ARG	$e^+e^- \to e^+e^- X$, $\mu^+\mu^- X$
<17	90		MASCHMANN	90	CBAL	$e^+e^- \to$ hadrons
<200	90		NICZYPORUK	83	LENA	

[1] Using $B((J/\psi) \to \mu^+\mu^-) = (6.9 \pm 0.9)\%$.

NODE=M049R12;LINKAGE=K

$\Gamma(J/\psi(1S)\eta_c)/\Gamma_{total}$ Γ_8/Γ

NODE=M049R85

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<2.2 × 10^{-6}	90	YANG	14	BELL	$e^+e^- \to J/\psi X$

$\Gamma(J/\psi(1S)\chi_{c0})/\Gamma_{total}$ Γ_9/Γ

NODE=M049R86

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<3.4 × 10^{-6}	90	YANG	14	BELL	$e^+e^- \to J/\psi X$

$\Gamma(J/\psi(1S)\chi_{c1})/\Gamma_{total}$ Γ_{10}/Γ

NODE=M049R87

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
3.90±1.21±0.23	20	YANG	14	BELL	$e^+e^- \to J/\psi X$

$\Gamma(J/\psi(1S)\chi_{c2})/\Gamma_{total}$ Γ_{11}/Γ

NODE=M049R88

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.4 × 10^{-6}	90	YANG	14	BELL	$e^+e^- \to J/\psi X$

$\Gamma(J/\psi(1S)\eta_c(2S))/\Gamma_{total}$ Γ_{12}/Γ

NODE=M049R89

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<2.2 × 10^{-6}	90	YANG	14	BELL	$e^+e^- \to J/\psi X$

$\Gamma(J/\psi(1S)X(3940))/\Gamma_{total}$ Γ_{13}/Γ

NODE=M049R90

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<5.4 × 10^{-6}	90	YANG	14	BELL	$e^+e^- \to J/\psi X$

$\Gamma(J/\psi(1S)X(4160))/\Gamma_{total}$ Γ_{14}/Γ

NODE=M049R91

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<5.4 × 10^{-6}	90	YANG	14	BELL	$e^+e^- \to J/\psi X$

$\Gamma(X(4350)$ anything, $X \to J/\psi(1S)\phi)/\Gamma_{total}$ Γ_{15}/Γ

NODE=M049P05

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<8.1 × 10^{-6}	90	SHEN	16	BELL	$\Upsilon(1S) \to J/\psi K^+K^- X$

$\Gamma(Z_c(3900)^{\pm}$ anything, $Z_c \to J/\psi(1S)\pi^{\pm})/\Gamma_{total}$ Γ_{16}/Γ

NODE=M049P06

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.3 × 10^{-5}	90	SHEN	16	BELL	$\Upsilon(1S) \to J/\psi\pi^{\pm} X$

$\Gamma(Z_c(4200)^{\pm}$ anything, $Z_c \to J/\psi(1S)\pi^{\pm})/\Gamma_{total}$ — Γ_{17}/Γ

NODE=M049P07

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<6.0 × 10⁻⁵	90	SHEN	16	BELL	$\Upsilon(1S) \to J/\psi\pi^{\pm}X$

$\Gamma(Z_c(4430)^{\pm}$ anything, $Z_c \to J/\psi(1S)\pi^{\pm})/\Gamma_{total}$ — Γ_{18}/Γ

NODE=M049P08

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<4.9 \times 10^{-5}$	90	SHEN	16	BELL	$\Upsilon(1S) \to J/\psi\pi^{\pm}X$

$\Gamma(X_{cs}^{\pm}$ anything, $X \to J/\psi K^{\pm})/\Gamma_{total}$ — Γ_{19}/Γ

NODE=M049P11

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<5.7 \times 10^{-6}$	90	SHEN	16	BELL	$\Upsilon(1S) \to J/\psi K^- X$

$\Gamma(\psi(4230)$ anything, $\psi \to J/\psi(1S)\pi^+\pi^-)/\Gamma_{total}$ — Γ_{20}/Γ

NODE=M049R99

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<3.8 \times 10^{-5}$	90	SHEN	16	BELL	$\Upsilon(1S) \to J/\psi\pi^+\pi^- X$

$\Gamma(\psi(4230)$ anything, $\psi \to J/\psi(1S)K^+K^-)/\Gamma_{total}$ — Γ_{21}/Γ

NODE=M049P03

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<7.5 \times 10^{-6}$	90	SHEN	16	BELL	$\Upsilon(1S) \to J/\psi K^+K^- X$

$\Gamma(\chi_{c1}(4140)$ anything, $\chi_{c1} \to J/\psi(1S)\phi)/\Gamma_{total}$ — Γ_{22}/Γ

NODE=M049P04

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<5.2 \times 10^{-6}$	90	SHEN	16	BELL	$\Upsilon(1S) \to J/\psi K^+K^- X$

$\Gamma(\chi_{c0}$ anything$)/\Gamma(J/\psi(1S)$ anything$)$ — Γ_{23}/Γ_7

NODE=M049R25

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<7.4	90	BRIERE	04	CLEO	$e^+e^- \to J/\psi X$

$\Gamma(\chi_{c1}$ anything$)/\Gamma_{total}$ — Γ_{24}/Γ

NODE=M049P13

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.90±0.35 OUR FIT					
1.90±0.43±0.14	215	JIA	17	BELL	$\Upsilon(1S) \to \gamma J/\psi(1S)$

$\Gamma(\chi_{c1}$ anything$)/\Gamma(J/\psi(1S)$ anything$)$ — Γ_{24}/Γ_7

NODE=M049R26

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.35±0.07 OUR FIT					
0.35±0.08±0.06	52 ± 12	BRIERE	04	CLEO	$e^+e^- \to J/\psi X$

$\Gamma(\chi_{c1}(1P)X_{tetra})/\Gamma_{total}$ — Γ_{25}/Γ

NODE=M049P15

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<37.8 \times 10^{-6}$	90	[1] JIA	17A	BELL	$e^+e^- \to$ hadrons

[1] For a tetraquark state X_{tetra}, with mass in the range 1.16–2.46 GeV and width in the range 0–0.3 GeV. Measured 90% CL limits as a function of X_{tetra} mass and width range from 4.4×10^{-6} to 37.8×10^{-6}.

NODE=M049P15;LINKAGE=A

$\Gamma(\chi_{c2}$ anything$)/\Gamma(J/\psi(1S)$ anything$)$ — Γ_{26}/Γ_7

NODE=M049R27

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.52±0.12±0.09	47 ± 11	BRIERE	04	CLEO	$e^+e^- \to J/\psi X$

$\Gamma(\psi(2S)$ anything$)/\Gamma_{total}$ — Γ_{27}/Γ

NODE=M049P12

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.23±0.17±0.11	215	SHEN	16	BELL	$e^+e^- \to \psi(2S)X$

$\Gamma(\psi(2S)$ anything$)/\Gamma(J/\psi(1S)$ anything$)$ — Γ_{27}/Γ_7

NODE=M049R28

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.41±0.11±0.08	42 ± 11	BRIERE	04	CLEO	$e^+e^- \to J/\psi\pi^+\pi^- X$

$\Gamma(\psi(2S)\eta_c)/\Gamma_{total}$ — Γ_{28}/Γ

NODE=M049R92

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<3.6 \times 10^{-6}$	90	YANG	14	BELL	$e^+e^- \to \psi(2S)X$

$\Gamma(\psi(2S)\chi_{c0})/\Gamma_{total}$ — Γ_{29}/Γ

NODE=M049R93

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<6.5 \times 10^{-6}$	90	YANG	14	BELL	$e^+e^- \to \psi(2S)X$

$\Gamma(\psi(2S)\chi_{c1})/\Gamma_{total}$ — Γ_{30}/Γ

NODE=M049R94

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<4.5 \times 10^{-6}$	90	YANG	14	BELL	$e^+e^- \to \psi(2S)X$

$\Gamma(\psi(2S)\chi_{c2})/\Gamma_{total}$ — Γ_{31}/Γ

NODE=M049R95

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.1 \times 10^{-6}$	90	YANG	14	BELL	$e^+e^- \to \psi(2S)X$

$\Gamma(\psi(2S)\eta_c(2S))/\Gamma_{total}$ — Γ_{32}/Γ

NODE=M049R96

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<3.2 \times 10^{-6}$	90	YANG	14	BELL	$e^+e^- \to \psi(2S)X$

$\Gamma(\psi(2S)X(3940))/\Gamma_{total}$ — Γ_{33}/Γ

NODE=M049R97

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.9 \times 10^{-6}$	90	YANG	14	BELL	$e^+e^- \to \psi(2S)X$

$\Gamma(\psi(2S)X(4160))/\Gamma_{total}$ — Γ_{34}/Γ

NODE=M049R98

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.9 \times 10^{-6}$	90	YANG	14	BELL	$e^+e^- \to \psi(2S)X$

$\Gamma(\psi(4230)$ anything, $\psi \to \psi(2S)\pi^+\pi^-)/\Gamma_{total}$ — Γ_{35}/Γ

NODE=M049P00

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<7.9 \times 10^{-5}$	90	SHEN	16	BELL	$\Upsilon(1S) \to \psi(2S)\pi^+\pi^- X$

$\Gamma(\psi(4360)$ anything, $\psi \to \psi(2S)\pi^+\pi^-)/\Gamma_{total}$ — Γ_{36}/Γ

NODE=M049P01

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<5.2 \times 10^{-5}$	90	SHEN	16	BELL	$\Upsilon(1S) \to \psi(2S)\pi^+\pi^- X$

$\Gamma(\psi(4660)$ anything, $\psi \to \psi(2S)\pi^+\pi^-)/\Gamma_{total}$ — Γ_{37}/Γ

NODE=M049P02

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.2 \times 10^{-5}$	90	SHEN	16	BELL	$\Upsilon(1S) \to \psi(2S)\pi^+\pi^- X$

$\Gamma(X(4050)^\pm$ anything, $X \to \psi(2S)\pi^\pm)/\Gamma_{total}$ — Γ_{38}/Γ

NODE=M049P09

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<8.8 \times 10^{-5}$	90	SHEN	16	BELL	$\Upsilon(1S) \to \psi(2S)\pi^\pm X$

$\Gamma(Z_c(4430)^\pm$ anything, $Z_c \to \psi(2S)\pi^\pm)/\Gamma_{total}$ — Γ_{39}/Γ

NODE=M049P10

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<6.7 \times 10^{-5}$	90	SHEN	16	BELL	$\Upsilon(1S) \to \psi(2S)\pi^\pm X$

$\Gamma(\chi_{c1}(3872)\,\text{anything})/\Gamma_{total}$ — Γ_{40}/Γ

NODE=M049P31

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.5 \times 10^{-4}$	90	[1] SHEN	16	BELL	$\Upsilon(1S) \to J/\psi\pi^+\pi^- X$

[1] SHEN 16 reports $[\Gamma(\Upsilon(1S) \to \chi_{c1}(3872)\,\text{anything})/\Gamma_{total}] \times [B(\chi_{c1}(3872) \to \pi^+\pi^- J/\psi(1S))] < 9.5 \times 10^{-6}$ which we divide by our best value $B(\chi_{c1}(3872) \to \pi^+\pi^- J/\psi(1S)) = 3.8 \times 10^{-2}$. NODE=M049P31;LINKAGE=A

$\Gamma(Z_c(4200)^+ Z_c(4200)^-)/\Gamma_{total}$ — Γ_{41}/Γ

NODE=M049P17

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<22.3 \times 10^{-6}$	90	[1] JIA	18	BELL	$\Upsilon(1S) \to J/\psi\pi^\pm X$

[1] Assuming $B(Z_c(4200)^\pm \to J/\psi\pi^\pm) = 1$. NODE=M049P17;LINKAGE=A

$\Gamma(Z_c(3900)^\pm Z_c(4200)^\mp)/\Gamma_{total}$ — Γ_{42}/Γ

NODE=M049P18

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<8.1 \times 10^{-6}$	90	[1] JIA	18	BELL	$\Upsilon(1S) \to J/\psi\pi^\pm X$

[1] Assuming $B(Z_c(4200)^\pm \to J/\psi\pi^\pm) = 1 = B(Z_c(3900)^\pm \to J/\psi\pi^\pm)$. NODE=M049P18;LINKAGE=A

$\Gamma(Z_c(3900)^+ Z_c(3900)^-)/\Gamma_{total}$ — Γ_{43}/Γ

NODE=M049P19

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.8 \times 10^{-6}$	90	[1] JIA	18	BELL	$\Upsilon(1S) \to J/\psi\pi^\pm X$

[1] Assuming $B(Z_c(3900)^\pm \to J/\psi\pi^\pm) = 1$ NODE=M049P19;LINKAGE=A

$\Gamma(X(4050)^+ X(4050)^-)/\Gamma_{total}$ — Γ_{44}/Γ

NODE=M049P20

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<15.8 × 10^{-6}	90	[1] JIA	18	BELL	$\Upsilon(1S) \rightarrow \chi_{c1}(1P)\pi^{\pm} X$

[1] Assuming B($X(4050)^{\pm} \rightarrow \chi_{c1}(1P)\pi^{\pm}$) = 1

NODE=M049P20;LINKAGE=A

$\Gamma(X(4250)^+ X(4250)^-)/\Gamma_{total}$ — Γ_{45}/Γ

NODE=M049P21

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<26.6 × 10^{-6}	90	[1] JIA	18	BELL	$\Upsilon(1S) \rightarrow \chi_{c1}(1P)\pi^{\pm} X$

[1] Assuming B($X(4250)^{\pm} \rightarrow \chi_{c1}(1P)\pi^{\pm}$) = 1

NODE=M049P21;LINKAGE=A

$\Gamma(X(4050)^{\pm} X(4250)^{\mp})/\Gamma_{total}$ — Γ_{46}/Γ

NODE=M049P22

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<44.2 × 10^{-6}	90	[1] JIA	18	BELL	$\Upsilon(1S) \rightarrow \chi_{c1}(1P)\pi^{\pm} X$

[1] Assuming B($X(4050)^{\pm} \rightarrow \chi_{c1}(1P)\pi^{\pm}$) = 1 = B($X(4250)^{\pm} \rightarrow \chi_{c1}(1P)\pi^{\pm}$)

NODE=M049P22;LINKAGE=A

$\Gamma(Z_c(4430)^+ Z_c(4430)^-)/\Gamma_{total}$ — Γ_{47}/Γ

NODE=M049P23

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<20.3 × 10^{-6}	90	[1] JIA	18	BELL	$\Upsilon(2S) \rightarrow \psi(2S)\pi^{\pm} X$

[1] Assuming B($Z_c(4430)^{\pm} \rightarrow \psi(2S)\pi^{\pm}$) = 1

NODE=M049P23;LINKAGE=A

$\Gamma(X(4055)^{\pm} X(4055)^{\mp})/\Gamma_{total}$ — Γ_{48}/Γ

NODE=M049P25

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<23.3 × 10^{-6}	90	[1] JIA	18	BELL	$\Upsilon(1S) \rightarrow \psi(2S)\pi^{\pm} X$

[1] Assuming B($X(4055)^{\pm} \rightarrow \psi(2S)\pi^{\pm}$) = 1

NODE=M049P25;LINKAGE=A

$\Gamma(X(4055)^{\pm} Z_c(4430)^{\mp})/\Gamma_{total}$ — Γ_{49}/Γ

NODE=M049P26

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<45.5 × 10^{-6}	90	[1] JIA	18	BELL	$\Upsilon(1S) \rightarrow \psi(2S)\pi^{\pm} X$

[1] Assuming B($X(4055)^{\pm} \rightarrow \psi(2S)\pi^{\pm}$) = 1 = B($Z_c(4430)^{\pm} \rightarrow \psi(2S)\pi^{\pm}$)

NODE=M049P26;LINKAGE=A

$\Gamma(\rho\pi)/\Gamma_{total}$ — Γ_{50}/Γ

NODE=M049R11

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<3.68	90	SHEN	13	BELL	$\Upsilon(1S) \rightarrow \pi^+\pi^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1 × 10^3	90	BLINOV	90	MD1	$\Upsilon(1S) \rightarrow \rho^0\pi^0$
<2 × 10^2	90	FULTON	90B		$\Upsilon(1S) \rightarrow \rho^0\pi^0$
<2.1 × 10^3	90	NICZYPORUK	83	LENA	$\Upsilon(1S) \rightarrow \rho^0\pi^0$

$\Gamma(\omega\pi^0)/\Gamma_{total}$ — Γ_{51}/Γ

NODE=M049R05

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<3.90	90	SHEN	13	BELL	$\Upsilon(1S) \rightarrow \pi^+\pi^-\pi^0\pi^0$

$\Gamma(\pi^+\pi^-)/\Gamma_{total}$ — Γ_{52}/Γ

NODE=M049R57

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<5	90	BARU	92	MD1	$\Upsilon(1S) \rightarrow \pi^+\pi^-$

$\Gamma(K^+K^-)/\Gamma_{total}$ — Γ_{53}/Γ

NODE=M049R58

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<5	90	BARU	92	MD1	$\Upsilon(1S) \rightarrow K^+K^-$

$\Gamma(p\overline{p})/\Gamma_{total}$ — Γ_{54}/Γ

NODE=M049R59

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<5	90	[1] BARU	96	MD1	$\Upsilon(1S) \rightarrow p\overline{p}$

[1] Supersedes BARU 92 in this node.

NODE=M049R59;LINKAGE=A

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{55}/Γ

NODE=M049R72

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
2.14±0.72±0.34		26 ± 9	SHEN	13	BELL	$\Upsilon(1S) \rightarrow \pi^+\pi^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<18.4	90		ANASTASSOV	99	CLE2	$e^+e^- \rightarrow$ hadrons

$\Gamma(\phi K^+ K^-)/\Gamma_{total}$ — Γ_{56}/Γ

NODE=M049R75

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
2.36±0.37±0.29	56	SHEN	12A	BELL	$\Upsilon(1S) \to 2(K^+ K^-)$

$\Gamma(\omega \pi^+ \pi^-)/\Gamma_{total}$ — Γ_{57}/Γ

NODE=M049R76

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
4.46±0.67±0.72	64	SHEN	12A	BELL	$\Upsilon(1S) \to 2(\pi^+ \pi^-)\pi^0$

$\Gamma(K^*(892)^0 K^- \pi^+ + \text{c.c.})/\Gamma_{total}$ — Γ_{58}/Γ

NODE=M049R77

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
4.42±0.50±0.58	173	SHEN	12A	BELL	$\Upsilon(1S) \to K^+ K^- \pi^+ \pi^-$

$\Gamma(\phi f_2'(1525))/\Gamma_{total}$ — Γ_{59}/Γ

NODE=M049R78

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<1.63	90	SHEN	12A	BELL	$\Upsilon(1S) \to 2(K^+ K^-)$

$\Gamma(\omega f_2(1270))/\Gamma_{total}$ — Γ_{60}/Γ

NODE=M049R79

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<1.79	90	SHEN	12A	BELL	$\Upsilon(1S) \to 2(\pi^+ \pi^-)\pi^0$

$\Gamma(\rho(770) a_2(1320))/\Gamma_{total}$ — Γ_{61}/Γ

NODE=M049R80

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<2.24	90	SHEN	12A	BELL	$\Upsilon(1S) \to 2(\pi^+ \pi^-)\pi^0$

$\Gamma(K^*(892)^0 \overline{K}{}^*_2(1430)^0 + \text{c.c.})/\Gamma_{total}$ — Γ_{62}/Γ

NODE=M049R81

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
3.02±0.68±0.34	42	SHEN	12A	BELL	$\Upsilon(1S) \to K^+ K^- \pi^+ \pi^-$

$\Gamma(K_1(1270)^\pm K^\mp)/\Gamma_{total}$ — Γ_{63}/Γ

NODE=M049R82

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<2.41	90	SHEN	12A	BELL	$\Upsilon(1S) \to K^+ K^- \pi^+ \pi^-$

$\Gamma(K_1(1400)^\pm K^\mp)/\Gamma_{total}$ — Γ_{64}/Γ

NODE=M049R83

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
1.02±0.35±0.22	24	SHEN	12A	BELL	$\Upsilon(1S) \to K^+ K^- \pi^+ \pi^-$

$\Gamma(b_1(1235)^\pm \pi^\mp)/\Gamma_{total}$ — Γ_{65}/Γ

NODE=M049R84

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<1.25	90	SHEN	12A	BELL	$\Upsilon(1S) \to 2(\pi^+ \pi^-)\pi^0$

$\Gamma(\pi^+ \pi^- \pi^0 \pi^0)/\Gamma_{total}$ — Γ_{66}/Γ

NODE=M049R06

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
12.8±2.0±2.3	143 ± 22	SHEN	13	BELL	$\Upsilon(1S) \to \pi^+ \pi^- \pi^0 \pi^0$

$\Gamma(K^0_S K^+ \pi^- + \text{c.c.})/\Gamma_{total}$ — Γ_{67}/Γ

NODE=M049R07

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
1.59±0.33±0.18		37 ± 8	SHEN	13	BELL	$\Upsilon(1S) \to K^0_S K^- \pi^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<3.4	90		[1] DOBBS	12A		$\Upsilon(1S) \to K^0_S K^- \pi^+$

[1] Obtained by analyzing CLEO III data but not authored by the CLEO Collaboration.

NODE=M049R07;LINKAGE=DO

$\Gamma(K^*(892)^0 \overline{K}{}^0 + \text{c.c.})/\Gamma_{total}$ — Γ_{68}/Γ

NODE=M049R08

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
2.92±0.85±0.37	16 ± 5	SHEN	13	BELL	$\Upsilon(1S) \to K^0_S K^- \pi^+$

$\Gamma(K^*(892)^- K^+ + \text{c.c.})/\Gamma_{total}$ — Γ_{69}/Γ

NODE=M049R09

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<1.11	90	SHEN	13	BELL	$\Upsilon(1S) \to K^0_S K^- \pi^+$

$\Gamma(f_1(1285)\text{ anything})/\Gamma_{total}$ — Γ_{70}/Γ

NODE=M049P14

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
4.6±2.8±1.3	3.1k	JIA	17A	BELL	$e^+ e^- \to$ hadrons

$\Gamma(D^*(2010)^{\pm}$ anything$)/\Gamma_{total}$ — Γ_{71}/Γ

NODE=M049R32

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
25.2±1.3±1.5		≈ 2k	[1] AUBERT	10C	BABR	$\Upsilon(2S) \to \pi^+\pi^-\Upsilon(1S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<19	90		[2] ALBRECHT	92J	ARG	$e^+e^- \to D^0\pi^{\pm}X$

[1] For $x_p > 0.1$. NODE=M049R32;LINKAGE=AU

[2] For $x_p > 0.2$. NODE=M049R32;LINKAGE=B

$\Gamma(f_1(1285)X_{tetra})/\Gamma_{total}$ — Γ_{72}/Γ

NODE=M049P16

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<62.4 × 10⁻⁶	90	[1] JIA	17A	BELL	$e^+e^- \to$ hadrons

[1] For a tetraquark state X_{tetra}, with mass in the range 1.16–2.46 GeV and width in the range 0–0.3 GeV. Measured 90% CL limits as a function of X_{tetra} mass and width range from 4.6×10^{-6} to 62.4×10^{-6}. NODE=M049P16;LINKAGE=A

$\Gamma(\overline{^2H}$ anything$)/\Gamma_{total}$ — Γ_{73}/Γ

NODE=M049R33

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
2.85±0.25 OUR AVERAGE					
$2.81\pm0.49^{+0.20}_{-0.24}$		LEES	14G	BABR	$e^+e^- \to \overline{^2H}\,X$
2.86±0.19±0.21	455	ASNER	07	CLEO	$e^+e^- \to \overline{^2H}\,X$

OCCUR=2

Γ(Sum of 100 exclusive modes)$/\Gamma_{total}$ — Γ_{74}/Γ

NODE=M049R02

VALUE (units 10^{-2})	DOCUMENT ID		COMMENT
1.200±0.017	[1,2] DOBBS	12A	$\Upsilon(1S) \to$ hadrons

[1] DOBBS 12A presents individual exclusive branching fractions or upper limits for 100 modes of four to ten pions, kaons, or protons. NODE=M049R02;LINKAGE=DO

[2] Obtained by analyzing CLEO III data but not authored by the CLEO Collaboration. NODE=M049R02;LINKAGE=NC

$\Gamma(ggg, \gamma gg \to \overline{d}$ anything$)/\Gamma(ggg, \gamma gg \to$ anything$)$

NODE=M049R34

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
3.36±0.23±0.25	455	ASNER	07	CLEO	$e^+e^- \to \overline{d}X$

$\Gamma(\gamma\pi^+\pi^-)/\Gamma_{total}$ — Γ_{75}/Γ

NODE=M049R70

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
6.3±1.2±1.3	[1] ANASTASSOV	99	CLE2	$e^+e^- \to$ hadrons

[1] For $m_{\pi\pi} > 1$ GeV. NODE=M049R70;LINKAGE=A

$\Gamma(\gamma\pi^0\pi^0)/\Gamma_{total}$ — Γ_{76}/Γ

NODE=M049R71

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
1.7±0.6±0.3	[1] ANASTASSOV	99	CLE2	$e^+e^- \to$ hadrons

[1] For $m_{\pi\pi} > 1$ GeV. NODE=M049R71;LINKAGE=A

$\Gamma(\gamma\pi\pi$(S-wave)$)/\Gamma_{total}$ — Γ_{77}/Γ

NODE=M049P27

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
4.63±0.56±0.48	LEES	18A	BABR	$\Upsilon(1S) \to \gamma\pi^+\pi^-$

$\Gamma(\gamma\pi^0\eta)/\Gamma_{total}$ — Γ_{78}/Γ

NODE=M049R47

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<2.4	90	[1] BESSON	07A	CLEO	$e^+e^- \to \Upsilon(1S)$

[1] BESSON 07A obtained this limit for $0.7 < m_{\pi^0\eta} < 3$ GeV. NODE=M049R47;LINKAGE=BE

$\Gamma(\gamma K^+K^-)/\Gamma_{total}$ — Γ_{79}/Γ

NODE=M049R24

$(2 < m_{K^+K^-} < 3$ GeV$)$

NODE=M049R24

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
1.14±0.08±0.10	90	ATHAR	06	CLE3	$\Upsilon(1S) \to \gamma K^+K^-$

$\Gamma(\gamma p\overline{p})/\Gamma_{total}$ — Γ_{80}/Γ

NODE=M049R29

$(2 < m_{p\overline{p}} < 3$ GeV$)$

NODE=M049R29

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<0.6	90	ATHAR	06	CLE3	$\Upsilon(1S) \to \gamma p\overline{p}$

$\Gamma(\gamma 2h^+ 2h^-)/\Gamma_{total}$ Γ_{81}/Γ

NODE=M049R20
NODE=M049R20

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
7.0±1.1±1.0	80 ± 12	FULTON	90B	CLEO	$e^+ e^- \to$ hadrons

$\Gamma(\gamma 3h^+ 3h^-)/\Gamma_{total}$ Γ_{82}/Γ

NODE=M049R21
NODE=M049R21

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
5.4±1.5±1.3	39 ± 11	FULTON	90B	CLEO	$e^+ e^- \to$ hadrons

$\Gamma(\gamma 4h^+ 4h^-)/\Gamma_{total}$ Γ_{83}/Γ

NODE=M049R22
NODE=M049R22

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
7.4±2.5±2.5	36 ± 12	FULTON	90B	CLEO	$e^+ e^- \to$ hadrons

$\Gamma(\gamma \pi^+ \pi^- K^+ K^-)/\Gamma_{total}$ Γ_{84}/Γ

NODE=M049R14
NODE=M049R14

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.9±0.7±0.6	29 ± 8	FULTON	90B	CLEO	$e^+ e^- \to$ hadrons

$\Gamma(\gamma 2\pi^+ 2\pi^-)/\Gamma_{total}$ Γ_{85}/Γ

NODE=M049R13
NODE=M049R13

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.5±0.7±0.5	26 ± 7	FULTON	90B	CLEO	$e^+ e^- \to$ hadrons

$\Gamma(\gamma 3\pi^+ 3\pi^-)/\Gamma_{total}$ Γ_{86}/Γ

NODE=M049R17
NODE=M049R17

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.5±0.9±0.8	17 ± 5	FULTON	90B	CLEO	$e^+ e^- \to$ hadrons

$\Gamma(\gamma 2\pi^+ 2\pi^- K^+ K^-)/\Gamma_{total}$ Γ_{87}/Γ

NODE=M049R18
NODE=M049R18

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.4±0.9±0.8	18 ± 7	FULTON	90B	CLEO	$e^+ e^- \to$ hadrons

$\Gamma(\gamma \pi^+ \pi^- p\overline{p})/\Gamma_{total}$ Γ_{88}/Γ

NODE=M049R15
NODE=M049R15

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.5±0.5±0.3	22 ± 6	FULTON	90B	CLEO	$e^+ e^- \to$ hadrons

$\Gamma(\gamma 2\pi^+ 2\pi^- p\overline{p})/\Gamma_{total}$ Γ_{89}/Γ

NODE=M049R19
NODE=M049R19

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.4±0.4±0.4	7 ± 6	FULTON	90B	CLEO	$e^+ e^- \to$ hadrons

$\Gamma(\gamma 2K^+ 2K^-)/\Gamma_{total}$ Γ_{90}/Γ

NODE=M049R16
NODE=M049R16

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.2±0.2	2 ± 2	FULTON	90B	CLEO	$e^+ e^- \to$ hadrons

$\Gamma(\gamma \eta'(958))/\Gamma_{total}$ Γ_{91}/Γ

NODE=M049R55
NODE=M049R55

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
< 1.9	90	ATHAR	07A	CLEO	$\Upsilon(1S) \to \gamma \eta' \to \gamma \pi^+ \pi^- \eta, \gamma \rho$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<16	90	RICHICHI	01B	CLE2	$\Upsilon(1S) \to \gamma \eta' \to \gamma \eta \pi^+ \pi^-$

$\Gamma(\gamma \eta)/\Gamma_{total}$ Γ_{92}/Γ

NODE=M049R54
NODE=M049R54

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
< 1.0	90	ATHAR	07A	CLEO	$\Upsilon(1S) \to \gamma \eta \to \gamma \gamma \gamma$, $\gamma \pi^+ \pi^- \pi^0$, $\gamma 3\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<21	90	MASEK	02	CLEO	$\Upsilon(1S) \to \gamma \eta$

$\Gamma(\gamma f_0(980))/\Gamma_{total}$ Γ_{93}/Γ

NODE=M049R31
NODE=M049R31

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<3	90	[1] ATHAR	06	CLE3	$\Upsilon(1S) \to \gamma \pi^+ \pi^-$

[1] Assuming $B(f_0(980) \to \pi\pi) = 1$.

NODE=M049R31;LINKAGE=AT

$\Gamma(\gamma f_2'(1525))/\Gamma_{total}$ Γ_{94}/Γ

NODE=M049R52
NODE=M049R52

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
2.9 ±0.6 OUR AVERAGE						
2.13±0.28±0.72			[1] LEES	18A	BABR	$\Upsilon(1S) \to \gamma K^+ K^-$
4.1 ±1.4 ±0.1		17	[2] BESSON	11	CLEO	$\Upsilon(1S) \to K^0_S K^0_S$
3.7 $^{+0.9}_{-0.7}$ ±0.8			ATHAR	06	CLE3	$\Upsilon(1S) \to \gamma K^+ K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<14	90		[3] FULTON	90B	CLEO	$\Upsilon(1S) \to \gamma K^+ K^-$
<19.4	90		[3] ALBRECHT	89	ARG	$\Upsilon(1S) \to \gamma K^+ K^-$

[1] Using B($f_2'(1525) \to K\overline{K}$) = 0.887 ± 0.022 and B($K^0\overline{K}^0$) = 1/2 B($K\overline{K}$).

NODE=M049R52;LINKAGE=A

[2] BESSON 11 reports (4.0 ± 1.3 ± 0.6) × 10^{-5} from a measurement of [$\Gamma(\Upsilon(1S) \to \gamma f_2'(1525))/\Gamma_{total}$] × [B($f_2'(1525) \to K\overline{K}$)] assuming B($f_2'(1525) \to K\overline{K}$) = (88.8 ± 3.1) × 10^{-2}, which we rescale to our best value B($f_2'(1525) \to K\overline{K}$) = (87.6 ± 2.2) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value. The result also assumes B($K^0_S \to \pi^+\pi^-$) = (69.20 ± 0.05)% and B($f_2'(1525) \to K\overline{K}$) = 4 B($f_2'(1525) \to K^0_S K^0_S$).

NODE=M049R52;LINKAGE=BE

[3] Assuming B($f_2'(1525) \to K\overline{K}$) = 0.71.

NODE=M049R52;LINKAGE=D

$\Gamma(\gamma f_2(1270))/\Gamma_{total}$ Γ_{95}/Γ

NODE=M049R51
NODE=M049R51

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
10.1 ±0.6 OUR AVERAGE					
10.15±0.59 $^{+0.54}_{-0.43}$		[1] LEES	18A	BABR	$\Upsilon(1S) \to \gamma\pi^+\pi^-$
10.5 ±1.6 $^{+1.9}_{-1.8}$		[2] BESSON	07A	CLE3	$\Upsilon(1S) \to \gamma\pi^0\pi^0$
10.2 ±0.8 ±0.7		ATHAR	06	CLE3	$\Upsilon(1S) \to \gamma\pi^+\pi^-$
8.1 ±2.3 $^{+2.9}_{-2.7}$		[3] ANASTASSOV	99	CLE2	$e^+e^- \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<21	90	[3] FULTON	90B	CLEO	$\Upsilon(1S) \to \gamma\pi^+\pi^-$
<13	90	[3] ALBRECHT	89	ARG	$\Upsilon(1S) \to \gamma\pi^+\pi^-$
<81	90	SCHMITT	88	CBAL	$\Upsilon(1S) \to \gamma X$

[1] Using B($f_2(1270) \to \pi^0\pi^0$) = 1/3 B($f_2(1270) \to \pi\pi$) and B($f_2(1270) \to \pi\pi$) = ($84.2^{+2.9}_{-0.9}$)%.

NODE=M049R51;LINKAGE=A

[2] Using B($f_2(1270) \to \pi^0\pi^0$) = B($f_2(1270) \to \pi\pi$)/3 and B($f_2(1270) \to \pi\pi$) = ($84.7^{+2.5}_{-1.2}$)%.

NODE=M049R51;LINKAGE=BE

[3] Using B($f_2(1270) \to \pi\pi$) = 0.84.

NODE=M049R51;LINKAGE=C

$\Gamma(\gamma\eta(1405))/\Gamma_{total}$ Γ_{96}/Γ

NODE=M049R23
NODE=M049R23

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<8.2	90	[1] FULTON	90B	CLEO	$\Upsilon(1S) \to \gamma K^\pm\pi^\mp K^0_S$

[1] Includes unknown branching ratio of $\eta(1405) \to K^\pm\pi^\mp K^0_S$.

NODE=M049R23;LINKAGE=J

$\Gamma(\gamma f_0(1500))/\Gamma_{total}$ Γ_{97}/Γ

NODE=M049R44
NODE=M049R44

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<1.5	90	[1] BESSON	07A	CLEO	$e^+e^- \to \Upsilon(1S) \to \gamma\pi^0\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<6.1	90	[2] BESSON	07A	CLEO	$e^+e^- \to \Upsilon(1S) \to \gamma\eta\eta$

OCCUR=2

[1] Using B($f_0(1500) \to \pi^0\pi^0$) = B($f_0(1500) \to \pi\pi$)/3 and B($f_0(1500) \to \pi\pi$) = (0.349 ± 0.023)%.

NODE=M049R44;LINKAGE=BE

[2] Calculated by us using B($f_0(1500) \to \eta\eta$) = (5.1 ± 0.9)%.

NODE=M049R44;LINKAGE=BS

$\Gamma(\gamma f_0(1500) \to \gamma K^+K^-)/\Gamma_{total}$ Γ_{98}/Γ

NODE=M049P29
NODE=M049P29

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
1.04±0.14±0.33	[1] LEES	18A	BABR	$e^+e^- \to \Upsilon(1S) \to \gamma K^+K^-$

[1] LEES 18A quotes B($\Upsilon(1S) \to \gamma f_0(1500) \to \gamma K\overline{K}$) = (2.08 ± 0.27 ± 0.65) × 10^{-5} assuming B($K^0\overline{K}^0$) = 1/2 B($K\overline{K}$).

NODE=M049P29;LINKAGE=A

$\Gamma(\gamma f_0(1710))/\Gamma_{total}$ — Γ_{99}/Γ

NODE=M049R53
NODE=M049R53

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 2.6	90	[1] ALBRECHT	89	ARG	$\Upsilon(1S) \to \gamma K^+ K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 6.3	90	[1] FULTON	90B	CLEO	$\Upsilon(1S) \to \gamma K^+ K^-$
<19	90	[1] FULTON	90B	CLEO	$\Upsilon(1S) \to \gamma K^0_S K^0_S$
< 8	90	[2] ALBRECHT	89	ARG	$\Upsilon(1S) \to \gamma \pi^+ \pi^-$
<24	90	[3] SCHMITT	88	CBAL	$\Upsilon(1S) \to \gamma X$

OCCUR=2
OCCUR=2

[1] Assuming B($f_0(1710) \to K\overline{K}$) = 0.38.
[2] Assuming B($f_0(1710) \to \pi\pi$) = 0.04.
[3] Assuming B($f_0(1710) \to \eta\eta$) = 0.18.

NODE=M049R53;LINKAGE=E
NODE=M049R53;LINKAGE=F
NODE=M049R53;LINKAGE=A

$\Gamma(\gamma f_0(1710) \to \gamma K^+ K^-)/\Gamma_{total}$ — Γ_{100}/Γ

NODE=M049R50
NODE=M049R50

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
1.01±0.26±0.18		[1] LEES	18A	BABR	$e^+ e^- \to \Upsilon(1S) \to \gamma K^+ K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.7	90	ATHAR	06	CLEO	$e^+ e^- \to \Upsilon(1S) \to \gamma K^+ K^-$

[1] LEES 18A quotes B($\Upsilon(1S) \to \gamma f_0(1710) \to \gamma K\overline{K}$) = $(2.02 \pm 0.51 \pm 0.35) \times 10^{-5}$ assuming B($K^0 \overline{K}^0$) = 1/2 B($K\overline{K}$).

NODE=M049R50;LINKAGE=A

$\Gamma(\gamma f_0(1710) \to \gamma \pi^+ \pi^-)/\Gamma_{total}$ — Γ_{101}/Γ

NODE=M049P28
NODE=M049P28

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
0.53±0.17±0.11	[1] LEES	18A	BABR	$\Upsilon(1S) \to \gamma \pi^+ \pi^-$

[1] LEES 18A quotes B($\Upsilon(1S) \to \gamma f_0(1710) \to \gamma \pi\pi$) = $(0.79 \pm 0.26 \pm 0.17) \times 10^{-5}$ assuming B($\pi^0 \pi^0$) = 1/3 B($\pi\pi$).

NODE=M049P28;LINKAGE=A

$\Gamma(\gamma f_0(1710) \to \gamma \pi^0 \pi^0)/\Gamma_{total}$ — Γ_{102}/Γ

NODE=M049R45
NODE=M049R45

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<1.4	90	BESSON	07A	CLEO	$e^+ e^- \to \Upsilon(1S) \to \gamma \pi^0 \pi^0$

$\Gamma(\gamma f_0(1710) \to \gamma \eta\eta)/\Gamma_{total}$ — Γ_{103}/Γ

NODE=M049R46
NODE=M049R46

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<1.8	90	BESSON	07A	CLEO	$e^+ e^- \to \Upsilon(1S) \to \gamma \eta\eta$

$\Gamma(\gamma f_4(2050))/\Gamma_{total}$ — Γ_{104}/Γ

NODE=M049R30
NODE=M049R30

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<5.3	90	[1] ATHAR	06	CLE3	$\Upsilon(1S) \to \gamma \pi^+ \pi^-$

[1] Assuming B($f_4(2050) \to \pi\pi$) = 0.17.

NODE=M049R30;LINKAGE=AT

$\Gamma(\gamma f_0(2200) \to \gamma K^+ K^-)/\Gamma_{total}$ — Γ_{105}/Γ

NODE=M049R63
NODE=M049R63

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0002	90	BARU	89	MD1	$\Upsilon(1S) \to \gamma K^+ K^-$

$\Gamma(\gamma f_J(2220) \to \gamma K^+ K^-)/\Gamma_{total}$ — Γ_{106}/Γ

NODE=M049R56
NODE=M049R56

VALUE (units 10^{-7})	CL%	DOCUMENT ID		TECN	COMMENT
< 8	90	ATHAR	06	CLE3	$\Upsilon(1S) \to \gamma K^+ K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 160	90	MASEK	02	CLEO	$\Upsilon(1S) \to \gamma K^+ K^-$
< 150	90	FULTON	90B	CLEO	$\Upsilon(1S) \to \gamma K^+ K^-$
< 290	90	ALBRECHT	89	ARG	$\Upsilon(1S) \to \gamma K^+ K^-$
<2000	90	BARU	89	MD1	$\Upsilon(1S) \to \gamma K^+ K^-$

$\Gamma(\gamma f_J(2220) \to \gamma \pi^+ \pi^-)/\Gamma_{total}$ — Γ_{107}/Γ

NODE=M049R41
NODE=M049R41

VALUE (units 10^{-7})	CL%	DOCUMENT ID		TECN	COMMENT
< 6	90	ATHAR	06	CLE3	$\Upsilon(1S) \to \gamma \pi^+ \pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<120	90	MASEK	02	CLEO	$\Upsilon(1S) \to \gamma \pi^+ \pi^-$

$\Gamma(\gamma f_J(2220) \to \gamma p\overline{p})/\Gamma_{total}$ — Γ_{108}/Γ

NODE=M049R42
NODE=M049R42

VALUE (units 10^{-7})	CL%	DOCUMENT ID		TECN	COMMENT
< 11	90	ATHAR	06	CLE3	$\Upsilon(1S) \to \gamma p\overline{p}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<160	90	MASEK	02	CLEO	$\Upsilon(1S) \to \gamma p\overline{p}$

$\Gamma(\gamma\eta(2225)\to\gamma\phi\phi)/\Gamma_{total}$ Γ_{109}/Γ

NODE=M049R62
NODE=M049R62

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.003	90	BARU	89	MD1	$\Upsilon(1S)\to\gamma K^+K^-K^+K^-$

$\Gamma(\gamma\eta_c(1S))/\Gamma_{total}$ Γ_{110}/Γ

NODE=M049R38
NODE=M049R38

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.9\times10^{-5}$	90	[1] KATRENKO	20	BELL	$e^+e^-\to\gamma+$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<5.7\times10^{-5}$	90	SHEN	10A	BELL	$\Upsilon(1S)\to\gamma X$

[1] Using $\Upsilon(2S)\to\Upsilon(1S)\pi^+\pi^-$ decays.

NODE=M049R38;LINKAGE=A

$\Gamma(\gamma\eta_c(2S))/\Gamma_{total}$ Γ_{111}/Γ

NODE=M049P30
NODE=M049P30

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<4\times10^{-4}$	90	[1] KATRENKO	20	BELL	$e^+e^-\to\gamma+$ hadrons

[1] Using $\Upsilon(2S)\to\Upsilon(1S)\pi^+\pi^-$ decays.

NODE=M049P30;LINKAGE=A

$\Gamma(\gamma\chi_{c0})/\Gamma_{total}$ Γ_{112}/Γ

NODE=M049R39
NODE=M049R39

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<6.6\times10^{-5}$	90	[1] KATRENKO	20	BELL	$\Upsilon(1S)\to\gamma+$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<6.5\times10^{-4}$	90	SHEN	10A	BELL	$\Upsilon(1S)\to\gamma X$

[1] Using $\Upsilon(2S)\to\Upsilon(1S)\pi^+\pi^-$ decays.

NODE=M049R39;LINKAGE=A

$\Gamma(\gamma\chi_{c1})/\Gamma_{total}$ Γ_{113}/Γ

NODE=M049R40
NODE=M049R40

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$4.7^{+2.4}_{-1.8}{}^{+0.4}_{-0.5}$		5	[1] KATRENKO	20	BELL	$\Upsilon(1S)\to\gamma+$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<2.3	90		SHEN	10A	BELL	$\Upsilon(1S)\to\gamma X$

[1] Using $\Upsilon(2S)\to\Upsilon(1S)\pi^+\pi^-$ decays.

NODE=M049R40;LINKAGE=A

$\Gamma(\gamma\chi_{c2})/\Gamma_{total}$ Γ_{114}/Γ

NODE=M049R48
NODE=M049R48

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<7.6\times10^{-6}$	90	SHEN	10A	BELL	$\Upsilon(1S)\to\gamma X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<3.3\times10^{-5}$	90	[1] KATRENKO	20	BELL	$\Upsilon(1S)\to\gamma+$ hadrons

[1] Using $\Upsilon(2S)\to\Upsilon(1S)\pi^+\pi^-$ decays.

NODE=M049R48;LINKAGE=A

$\Gamma(\gamma\chi_{c1}(3872))/\Gamma_{total}$ Γ_{115}/Γ

NODE=M049P32
NODE=M049P32

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<4\times10^{-5}$	90	[1] SHEN	10A	BELL	$\Upsilon(1S)\to\gamma X$

[1] SHEN 10A reports $[\Gamma(\Upsilon(1S)\to\gamma\chi_{c1}(3872))/\Gamma_{total}]\times[B(\chi_{c1}(3872)\to\pi^+\pi^-J/\psi(1S))]<1.6\times10^{-6}$ which we divide by our best value $B(\chi_{c1}(3872)\to\pi^+\pi^-J/\psi(1S))=3.8\times10^{-2}$.

NODE=M049P32;LINKAGE=A

$\Gamma(\gamma\chi_{c1}(3872),\ \chi_{c1}\to\pi^+\pi^-\pi^0J/\psi)/\Gamma_{total}$ Γ_{116}/Γ

NODE=M049R68
NODE=M049R68

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.8\times10^{-6}$	90	SHEN	10A	BELL	$\Upsilon(1S)\to\gamma X$

$\Gamma(\gamma X(3915)\to\omega J/\psi)/\Gamma_{total}$ Γ_{117}/Γ

NODE=M049R69
NODE=M049R69

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<3.0	90	SHEN	10A	BELL	$\Upsilon(1S)\to\gamma X$

$\Gamma(\gamma\chi_{c1}(4140)\to\phi J/\psi)/\Gamma_{total}$ Γ_{118}/Γ

NODE=M049R74
NODE=M049R74

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<2.2	90	SHEN	10A	BELL	$\Upsilon(1S)\to\gamma X$

$\Gamma(\gamma X)/\Gamma_{total}$ Γ_{119}/Γ

NODE=M049R60

(X = scalar with $m<$ 8.0 GeV)

NODE=M049R60
NODE=M049R60

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
< 4.5	90	[1] DEL-AMO-SA...	11J	BABR	$e^+e^-\to\gamma+X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<30	90	[2] BALEST	95	CLEO	$e^+e^-\to\gamma+X$

[1] For a noninteracting scalar X with mass $m<8.0$ GeV.
[2] For a noninteracting pseudoscalar X with mass <7.2 GeV.

NODE=M049R60;LINKAGE=DA
NODE=M049R60;LINKAGE=A

$\Gamma(\gamma X\overline{X}(m_X < 3.1\text{ GeV}))/\Gamma_{total}$ Γ_{120}/Γ

NODE=M049R61

($X\overline{X}$ = vectors with $m<$ 3.1 GeV)

NODE=M049R61
NODE=M049R61

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<1	90	[1] BALEST	95	CLEO	$e^+e^- \to \gamma + X\overline{X}$

[1] For a noninteracting vector X with mass $<$ 3.1 GeV.

NODE=M049R61;LINKAGE=A

$\Gamma(\gamma X\overline{X}(m_X < 4.5\text{ GeV}))/\Gamma_{total}$ Γ_{121}/Γ

NODE=M049R01

X and $\overline{X}$ = zero spin with $m <$ 4.5 GeV

NODE=M049R01
NODE=M049R01

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<24	90	[1] DEL-AMO-SA...	11J	BABR	$e^+e^- \to \gamma + X\overline{X}$

[1] For a noninteracting scalar X with mass $m <$ 4.5 GeV.

NODE=M049R01;LINKAGE=DA

$\Gamma(\gamma X \to \gamma + \geq 4\text{ prongs})/\Gamma_{total}$ Γ_{122}/Γ

NODE=M049R64

(1.5 GeV $< m_X <$ 5.0 GeV)

NODE=M049R64
NODE=M049R64

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.78	95	ROSNER	07A	CLEO	$e^+e^- \to \gamma X$

$\Gamma(\gamma a_1^0 \to \gamma\mu^+\mu^-)/\Gamma_{total}$ Γ_{123}/Γ

NODE=M049R65

(201 $<$ M($\mu^+\mu^-$) $<$ 3565 MeV)

NODE=M049R65
NODE=M049R65

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<9	90	[1] LOVE	08	CLEO	$e^+e^- \to \gamma a_1^0 \to \gamma\mu^+\mu^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<9.7	90	[2] LEES	13C	BABR	$e^+e^- \to \gamma a_1^0 \to \gamma\mu^+\mu^-$

[1] For a narrow scalar or pseudoscalar a_1^0 with 201 $<$ M($\mu^+\mu^-$) $<$ 3565 MeV, excluding J/ψ. Measured 90% CL limits as a function of M($\mu^+\mu^-$) range from 1–9 $\times 10^{-6}$.

NODE=M049R65;LINKAGE=LO

[2] For a narrow scalar or pseudoscalar a_1^0 with mass in the range 212–9200 MeV, excluding J/ψ and $\psi(2S)$. Measured 90% CL limits as a function of $m_{a_1^0}$ range from 0.28–9.7 $\times 10^{-6}$.

NODE=M049R65;LINKAGE=LE

$\Gamma(\gamma a_1^0 \to \gamma\tau^+\tau^-)/\Gamma_{total}$ Γ_{124}/Γ

NODE=M049R66

($2m_\tau <$ M($\tau^+\tau^-$) $<$ 9.2 GeV)

NODE=M049R66
NODE=M049R66

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<130	90	[1] LEES	13R	BABR	$\Upsilon(2S) \to \gamma\tau^+\tau^-\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 50	90	[2] LOVE	08	CLEO	$e^+e^- \to \gamma a_1^0 \to \gamma\tau^+\tau^-$

[1] For a narrow scalar a_1^0 with $2m_\tau <$ M(a_1^0) $<$ 9.2 GeV, which result in a 90% CL upper limits of 0.9×10^{-5} at M(a_1^0) = $2m_\tau$, $\approx 1.5\times10^{-5}$ at M(a_1^0) = 7.5 GeV, and 13×10^{-5} at M(a_1^0) = 9.2 GeV.

NODE=M049R66;LINKAGE=A

[2] For a narrow scalar or pseudoscalar a_1^0 with $2m_\tau <$ M(a_1^0) $<$ 7.5 GeV, which result in a 90% CL limits ranging from 1×10^{-5} at M(a_1^0)=$2m_\tau$ to 5×10^{-5} at M(a_1^0)=7.5 GeV.

NODE=M049R66;LINKAGE=LO

$\Gamma(\gamma a_1^0 \to \gamma g g)/\Gamma_{total}$ Γ_{125}/Γ

NODE=M049R03

(0.5 GeV $< m <$ 9.0 GeV)

NODE=M049R03
NODE=M049R03

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1 × 10^{-2}	90	[1] LEES	13L	BABR	$\Upsilon(1S) \to \gamma X$

[1] For a narrow, CP-odd pseudoscalar a_1^0 searched for in 26 hadronic decay modes with invariant mass 0.5 GeV $< m_X <$ 9.0 GeV. Measured 90% CL limit as a function of m_X range from 10^{-6} to 10^{-2}.

NODE=M049R03;LINKAGE=A

$\Gamma(\gamma a_1^0 \to \gamma s\overline{s})/\Gamma_{total}$ Γ_{126}/Γ

NODE=M049R04

(0.5 GeV $< m <$ 9.0 GeV)

NODE=M049R04
NODE=M049R04

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1 × 10^{-3}	90	[1] LEES	13L	BABR	$\Upsilon(1S) \to \gamma X$

[1] For a narrow, CP-odd pseudoscalar a_1^0 searched for in 14 hadronic decay modes with invariant mass 1.5 GeV $< m_X <$ 9.0 GeV. Measured 90% CL limit as a function of m_X range from 10^{-5} to 10^{-3}.

NODE=M049R04;LINKAGE=A

LEPTON FAMILY NUMBER (*LF*) VIOLATING MODES

NODE=M049230

$\Gamma(\mu^{\pm}\tau^{\mp})/\Gamma_{total}$ — Γ_{127}/Γ

NODE=M049R67
NODE=M049R67

VALUE (units 10^{-6})	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<6.0	95	LOVE	08A	CLEO	$e^+e^- \rightarrow \mu^{\pm}\tau^{\mp}$

OTHER DECAYS

NODE=M049235

$\Gamma(\text{invisible})/\Gamma_{total}$ — Γ_{128}/Γ

NODE=M049R10
NODE=M049R10

VALUE (units 10^{-4})	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
< 3.0	90	AUBERT	09AX	BABR	$\Upsilon(3S) \rightarrow \pi^+\pi^-\Upsilon(1S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<39	90	RUBIN	07	CLEO	$\Upsilon(2S) \rightarrow \pi^+\pi^-\Upsilon(1S)$
<25	90	TAJIMA	07	BELL	$\Upsilon(3S) \rightarrow \pi^+\pi^-\Upsilon(1S)$

$\Upsilon(1S)$ REFERENCES

NODE=M049

KATRENKO	20	PRL 124 122001	P. Katrenko *et al.*	(BELLE Collab.)	REFID=60544
JIA	18	PR D97 112004	S. Jia *et al.*	(BELLE Collab.)	REFID=58949
LEES	18A	PR D97 112006	J.P. Lees *et al.*	(BABAR Collab.)	REFID=58950
JIA	17	PR D95 012001	S. Jia *et al.*	(BELLE Collab.)	REFID=57635
JIA	17A	PR D96 112002	S. Jia *et al.*	(BELLE Collab.)	REFID=58318
SHEN	16	PR D93 112013	C.P. Shen *et al.*	(BELLE Collab.)	REFID=57515
LEES	14G	PR D89 111102	J.P. Lees *et al.*	(BABAR Collab.)	REFID=55939
YANG	14	PR D90 112008	S.D. Yang *et al.*	(BELLE Collab.)	REFID=56345
LEES	13C	PR D87 031102	J.P. Lees *et al.*	(BABAR Collab.)	REFID=54949
LEES	13L	PR D88 031701	J.P. Lees *et al.*	(BABAR Collab.)	REFID=55167
LEES	13R	PR D88 071102	J.P. Lees *et al.*	(BABAR Collab.)	REFID=55451
SHEN	13	PR D88 011102	C.P. Shen *et al.*	(BELLE Collab.)	REFID=55395
DOBBS	12A	PR D86 052003	S. Dobbs *et al.*		REFID=54746
SHEN	12A	PR D86 031102	C.P. Shen *et al.*	(BELLE Collab.)	REFID=54314
BESSON	11	PR D83 037101	D. Besson *et al.*	(CLEO Collab.)	REFID=16737
DEL-AMO-SA...	11J	PRL 107 021804	P. del Amo Sanchez *et al.*	(BABAR Collab.)	REFID=16495
AUBERT	10C	PR D81 011102	B. Aubert *et al.*	(BABAR Collab.)	REFID=53211
DEL-AMO-SA...	10C	PRL 104 191801	P. del Amo Sanchez *et al.*	(BABAR Collab.)	REFID=53354
SHEN	10A	PR D82 051504	C.P. Shen *et al.*	(BELLE Collab.)	REFID=53545
AUBERT	09AX	PRL 103 251801	B. Aubert *et al.*	(BABAR Collab.)	REFID=53201
LOVE	08	PRL 101 151802	W. Love *et al.*	(CLEO Collab.)	REFID=52565
LOVE	08A	PRL 101 201601	W. Love *et al.*	(CLEO Collab.)	REFID=52592
PDG	08	PL B667 1	C. Amsler *et al.*	(PDG Collab.)	REFID=52166
ASNER	07	PR D75 012009	D.M. Asner *et al.*	(CLEO Collab.)	REFID=51617
ATHAR	07A	PR D76 072003	S.B. Athar *et al.*	(CLEO Collab.)	REFID=51945
BESSON	07	PRL 98 052002	D. Besson *et al.*	(CLEO Collab.)	REFID=51620
BESSON	07A	PR D75 072001	D. Besson *et al.*	(CLEO Collab.)	REFID=51638
ROSNER	07A	PR D76 117102	J.L. Rosner *et al.*	(CLEO Collab.)	REFID=52079
RUBIN	07	PR D75 031104	P. Rubin *et al.*	(CLEO Collab.)	REFID=51629
TAJIMA	07	PRL 98 132001	O. Tajima *et al.*	(BELLE Collab.)	REFID=51645
AQUINES	06A	PR D74 092006	O. Aquines *et al.*	(CLEO Collab.)	REFID=51510
ATHAR	06	PR D73 032001	S.B. Athar *et al.*	(CLEO Collab.)	REFID=50993
BESSON	06A	PR D74 012003	D. Besson *et al.*	(CLEO Collab.)	REFID=51147
ROSNER	06	PRL 96 092003	J.L. Rosner *et al.*	(CLEO Collab.)	REFID=51035
ADAMS	05	PRL 94 012001	G.S. Adams *et al.*	(CLEO Collab.)	REFID=50452
BRIERE	04	PR D70 072001	R.A. Briere *et al.*	(CLEO Collab.)	REFID=50183
ARTUSO	03	PR D67 052003	M. Artuso *et al.*	(CLEO Collab.)	REFID=49395
MASEK	02	PR D65 072002	G. Masek *et al.*	(CLEO Collab.)	REFID=48846
RICHICHI	01B	PRL 87 141801	S.J. Richichi *et al.*	(CLEO Collab.)	REFID=48345
ARTAMONOV	00	PL B474 427	A.S. Artamonov *et al.*		REFID=47424
ANASTASSOV	99	PRL 82 286	A. Anastassov *et al.*	(CLEO Collab.)	REFID=46609
ALEXANDER	98	PR D58 052004	J.P. Alexander *et al.*	(CLEO Collab.)	REFID=46329
BARU	96	PRPL 267 71	S.E. Baru *et al.*	(NOVO)	REFID=44651
BALEST	95	PR D51 2053	R. Balest *et al.*	(CLEO Collab.)	REFID=44146
CINABRO	94B	PL B340 129	D. Cinabro *et al.*	(CLEO Collab.)	REFID=44102
ALBRECHT	92J	ZPHY C55 25	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=42167
BARU	92	ZPHY C54 229	S.E. Baru *et al.*	(NOVO)	REFID=41860
BARU	92B	ZPHY C56 547	S.E. Baru *et al.*	(NOVO)	REFID=42168
KOBEL	92	ZPHY C53 193	M. Kobel *et al.*	(Crystal Ball Collab.)	REFID=41861
BLINOV	90	PL B245 311	A.E. Blinov *et al.*	(NOVO)	REFID=41361
FULTON	90B	PR D41 1401	R. Fulton *et al.*	(CLEO Collab.)	REFID=41012
MASCHMANN	90	ZPHY C46 555	W.S. Maschmann *et al.*	(Crystal Ball Collab.)	REFID=41224
ALBRECHT	89	ZPHY C42 349	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=40731
ALEXANDER	89	NP B320 45	J.P. Alexander *et al.*	(LBL, MICH, SLAC)	REFID=40345
BARU	89	ZPHY C42 505	S.E. Baru *et al.*	(NOVO)	REFID=40917
CHEN	89B	PR D39 3528	W.Y. Chen *et al.*	(CLEO Collab.)	REFID=40919
FULTON	89	PL B224 445	R. Fulton *et al.*	(CLEO Collab.)	REFID=40918
KAARSBERG	89	PRL 62 2077	T.M. Kaarsberg *et al.*	(CUSB Collab.)	REFID=40733
BUCHMUEL...	88	HE e^+e^- Physics 412	W. Buchmueller, S. Cooper	(HANN, DESY, MIT)	REFID=40034
		Editors: A. Ali and P. Soeding, World Scientific, Singapore			
JAKUBOWSKI	88	ZPHY C40 49	Z. Jakubowski *et al.*	(Crystal Ball Collab.) IGJPC	REFID=40742
SCHMITT	88	ZPHY C40 199	P. Schmitt *et al.*	(Crystal Ball Collab.)	REFID=40582
ALBRECHT	87	ZPHY C35 283	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=40016
COHEN	87	RMP 59 1121	E.R. Cohen, B.N. Taylor	(RISC, NBS)	REFID=11616
BARU	86	ZPHY C30 551	S.E. Baru *et al.*	(NOVO)	REFID=22284
ALBRECHT	85C	PL 154B 452	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=22282
KURAEV	85	SJNP 41 466	E.A. Kuraev, V.S. Fadin	(NOVO)	REFID=40033
		Translated from YAF 41 733.			
ARTAMONOV	84	PL 137B 272	A.S. Artamonov *et al.*	(NOVO)	REFID=22278
BESSON	84	PR D30 1433	D. Besson *et al.*	(CLEO Collab.)	REFID=22279
GILES	84B	PR D29 1285	R. Giles *et al.*	(CLEO Collab.)	REFID=22280
MACKAY	84	PR D29 2483	W.W. MacKay *et al.*	(CUSB Collab.)	REFID=22281
ANDREWS	83	PRL 50 807	D.E. Andrews *et al.*	(CLEO Collab.)	REFID=22273
GILES	83	PRL 50 877	R. Giles *et al.*	(HARV, OSU, ROCH, RUTG+)	REFID=22274
NICZYPORUK	83	ZPHY C17 197	B. Niczyporuk *et al.*	(LENA Collab.)	REFID=12488
ALBRECHT	82	PL 116B 383	H. Albrecht *et al.*	(DESY, DORT, HEIDH+)	REFID=22270
ARTAMONOV	82	PL 118B 225	A.S. Artamonov *et al.*	(NOVO)	REFID=22271
NICZYPORUK	82	ZPHY C15 299	B. Niczyporuk *et al.*	(LENA Collab.)	REFID=22272
BERGER	80C	PL 93B 497	C. Berger *et al.*	(PLUTO Collab.)	REFID=22263
BOCK	80	ZPHY C6 125	P. Bock *et al.*	(HEIDP, MPIM, DESY, HAMB)	REFID=22264
BERGER	79	ZPHY C1 343	C. Berger *et al.*	(PLUTO Collab.)	REFID=22259

NODE=M076

$\chi_{b0}(1P)$

$I^G(J^{PC}) = 0^+(0^{++})$
J needs confirmation.

NODE=M076

Observed in radiative decay of the $\Upsilon(2S)$, therefore $C = +$. Branching ratio requires E1 transition, M1 is strongly disfavored, therefore $P = +$.

$\chi_{b0}(1P)$ MASS

NODE=M076M

NODE=M076M

VALUE (MeV)	DOCUMENT ID
9859.44±0.42±0.31 OUR EVALUATION	From average γ energy below, using $\Upsilon(2S)$ mass = 10023.26 ± 0.31 MeV

→ UNCHECKED ←

$m_{\chi_{b1}(1P)} - m_{\chi_{b0}(1P)}$

NODE=M076M2
NODE=M076M2

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
32.49±0.93	LEES	14M	BABR	$\Upsilon(2S) \to \gamma\gamma\mu^+\mu^-$

γ ENERGY IN $\Upsilon(2S)$ DECAY

NODE=M076DM

NODE=M076DM

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
162.5 ±0.4 OUR AVERAGE				
162.56±0.19±0.42	ARTUSO	05	CLEO	$\Upsilon(2S) \to \gamma X$
162.0 ±0.8 ±1.2	EDWARDS	99	CLE2	$\Upsilon(2S) \to \gamma\chi(1P)$
162.1 ±0.5 ±1.4	ALBRECHT	85E	ARG	$\Upsilon(2S) \to$ conv.γX
163.8 ±1.6 ±2.7	NERNST	85	CBAL	$\Upsilon(2S) \to \gamma$X
158.0 ±7 ±1	HAAS	84	CLEO	$\Upsilon(2S) \to$ conv.γX
• • • We do not use the following data for averages, fits, limits, etc. • • •				
149.4 ±0.7 ±5.0	KLOPFEN...	83	CUSB	$\Upsilon(2S) \to \gamma$X

$\chi_{b0}(1P)$ DECAY MODES

NODE=M076215;NODE=M076

	Mode	Fraction (Γ_i/Γ)	Confidence level	
Γ_1	$\gamma\,\Upsilon(1S)$	(1.94±0.27) %		DESIG=1
Γ_2	$D^0 X$	< 10.4 %	90%	DESIG=2
Γ_3	$\pi^+\pi^- K^+ K^- \pi^0$	< 1.6 $\times 10^{-4}$	90%	DESIG=3
Γ_4	$2\pi^+\pi^- K^- K^0_S$	< 5 $\times 10^{-5}$	90%	DESIG=4
Γ_5	$2\pi^+\pi^- K^- K^0_S 2\pi^0$	< 5 $\times 10^{-4}$	90%	DESIG=5
Γ_6	$2\pi^+ 2\pi^- 2\pi^0$	< 2.1 $\times 10^{-4}$	90%	DESIG=6
Γ_7	$2\pi^+ 2\pi^- K^+ K^-$	(1.1 ±0.6) $\times 10^{-4}$		DESIG=7
Γ_8	$2\pi^+ 2\pi^- K^+ K^- \pi^0$	< 2.7 $\times 10^{-4}$	90%	DESIG=8
Γ_9	$2\pi^+ 2\pi^- K^+ K^- 2\pi^0$	< 5 $\times 10^{-4}$	90%	DESIG=9
Γ_{10}	$3\pi^+ 2\pi^- K^- K^0_S \pi^0$	< 1.6 $\times 10^{-4}$	90%	DESIG=10
Γ_{11}	$3\pi^+ 3\pi^-$	< 8 $\times 10^{-5}$	90%	DESIG=11
Γ_{12}	$3\pi^+ 3\pi^- 2\pi^0$	< 6 $\times 10^{-4}$	90%	DESIG=12
Γ_{13}	$3\pi^+ 3\pi^- K^+ K^-$	(2.4 ±1.2) $\times 10^{-4}$		DESIG=13
Γ_{14}	$3\pi^+ 3\pi^- K^+ K^- \pi^0$	< 1.0 $\times 10^{-3}$	90%	DESIG=14
Γ_{15}	$4\pi^+ 4\pi^-$	< 8 $\times 10^{-5}$	90%	DESIG=15
Γ_{16}	$4\pi^+ 4\pi^- 2\pi^0$	< 2.1 $\times 10^{-3}$	90%	DESIG=16
Γ_{17}	$J/\psi J/\psi$	< 7 $\times 10^{-5}$	90%	DESIG=17
Γ_{18}	$J/\psi\,\psi(2S)$	< 1.2 $\times 10^{-4}$	90%	DESIG=18
Γ_{19}	$\psi(2S)\,\psi(2S)$	< 3.1 $\times 10^{-5}$	90%	DESIG=19
Γ_{20}	$J/\psi(1S)$ anything	< 2.3 $\times 10^{-3}$	90%	DESIG=20

$\chi_{b0}(1P)$ BRANCHING RATIOS

NODE=M076220

$\Gamma(\gamma\,\Upsilon(1S))/\Gamma_{total}$ Γ_1/Γ

NODE=M076R1
NODE=M076R1

VALUE (%)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
1.94±0.27 OUR AVERAGE						
2.07±0.24±0.21			[1,2] LEES	14M	BABR	$\Upsilon(2S) \to \gamma\gamma\mu^+\mu^-$
1.76±0.30±0.18		87	[3,4] KORNICER	11	CLEO	$e^+e^- \to \gamma\gamma\ell^+\ell^-$

• • • We do not use the following data for averages, fits, limits, etc. • • •

< 4.6	90	[5] LEES	11J	BABR	$\Upsilon(2S) \to X\gamma$
< 6	90	WALK	86	CBAL	$\Upsilon(2S) \to \gamma\gamma\ell^+\ell^-$
<11	90	PAUSS	83	CUSB	$\Upsilon(2S) \to \gamma\gamma\ell^+\ell^-$

[1] LEES 14M quotes $\Gamma(\chi_{b0}(1P) \to \gamma\Upsilon(1S))/\Gamma_{total} \times \Gamma(\Upsilon(2S) \to \gamma\chi_{b0}(1P))/\Gamma_{total} = (7.75 \pm 0.91) \times 10^{-4}$ combining the results from samples of $\Upsilon(2S) \to \gamma\gamma\mu^+\mu^-$ with and without converted photons. Assumes $B(\Upsilon(1S) \to \mu^+\mu^-) = (2.48 \pm 0.05)\%$. NODE=M076R1;LINKAGE=A

[2] LEES 14M reports $[\Gamma(\chi_{b0}(1P) \to \gamma\Upsilon(1S))/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b0}(1P))] = (7.75 \pm 0.91) \times 10^{-4}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b0}(1P)) = (3.8 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M076R1;LINKAGE=B

[3] Assuming $B(\Upsilon(1S) \to \ell^+\ell^-) = (2.48 \pm 0.05)\%$. NODE=M076R1;LINKAGE=KA

[4] KORNICER 11 reports $[\Gamma(\chi_{b0}(1P) \to \gamma\Upsilon(1S))/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b0}(1P))] = (6.59 \pm 0.96 \pm 0.60) \times 10^{-4}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b0}(1P)) = (3.8 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M076R1;LINKAGE=KR

[5] LEES 11J quotes a central value of $\Gamma(\chi_{b0}(1P) \to \gamma\Upsilon(1S))/\Gamma_{total} \times \Gamma(\Upsilon(2S) \to \gamma\chi_{b0}(1P))/\Gamma_{total} = (8.3 \pm 5.6^{+3.7}_{-2.6}) \times 10^{-4}$. NODE=M076R1;LINKAGE=LE

$\Gamma(D^0 X)/\Gamma_{total}$ — Γ_2/Γ

NODE=M076R01
NODE=M076R01

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<10.4 × 10^−2	90	[6,7] BRIERE	08	CLEO	$\Upsilon(2S) \to \gamma D^0 X$

[6] For $p_{D^0} > 2.5$ GeV/c. NODE=M076R01;LINKAGE=BR

[7] The authors also present their result as $(5.6 \pm 3.6 \pm 0.5) \times 10^{-2}$. NODE=M076R01;LINKAGE=RI

$\Gamma(\pi^+\pi^-K^+K^-\pi^0)/\Gamma_{total}$ — Γ_3/Γ

NODE=M076R02
NODE=M076R02

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.6	90	[8] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma\pi^+\pi^-K^+K^-\pi^0$

[8] ASNER 08A reports $[\Gamma(\chi_{b0}(1P) \to \pi^+\pi^-K^+K^-\pi^0)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b0}(1P))] < 6 \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b0}(1P)) = 3.8 \times 10^{-2}$. NODE=M076R02;LINKAGE=AS

$\Gamma(2\pi^+\pi^-K^-K^0_S)/\Gamma_{total}$ — Γ_4/Γ

NODE=M076R03
NODE=M076R03

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.5	90	[9] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 2\pi^+\pi^-K^-K^0_S$

[9] ASNER 08A reports $[\Gamma(\chi_{b0}(1P) \to 2\pi^+\pi^-K^-K^0_S)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b0}(1P))] < 2 \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b0}(1P)) = 3.8 \times 10^{-2}$. NODE=M076R03;LINKAGE=AS

$\Gamma(2\pi^+\pi^-K^-K^0_S 2\pi^0)/\Gamma_{total}$ — Γ_5/Γ

NODE=M076R04
NODE=M076R04

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<5	90	[10] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 2\pi^+\pi^-K^-2\pi^0$

[10] ASNER 08A reports $[\Gamma(\chi_{b0}(1P) \to 2\pi^+\pi^-K^-K^0_S 2\pi^0)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b0}(1P))] < 18 \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b0}(1P)) = 3.8 \times 10^{-2}$. NODE=M076R04;LINKAGE=AS

$\Gamma(2\pi^+2\pi^-2\pi^0)/\Gamma_{total}$ — Γ_6/Γ

NODE=M076R05
NODE=M076R05

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<2.1	90	[11] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 2\pi^+2\pi^-2\pi^0$

[11] ASNER 08A reports $[\Gamma(\chi_{b0}(1P) \to 2\pi^+2\pi^-2\pi^0)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b0}(1P))] < 8 \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b0}(1P)) = 3.8 \times 10^{-2}$. NODE=M076R05;LINKAGE=AS

$\Gamma(2\pi^+2\pi^-K^+K^-)/\Gamma_{total}$ — Γ_7/Γ

NODE=M076R06
NODE=M076R06

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.1±0.6±0.1	7	[12] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 2\pi^+2\pi^-K^+K^-$

[12] ASNER 08A reports $[\Gamma(\chi_{b0}(1P) \to 2\pi^+2\pi^-K^+K^-)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b0}(1P))] = (4 \pm 2 \pm 1) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b0}(1P)) = (3.8 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M076R06;LINKAGE=AS

$\Gamma(2\pi^+ 2\pi^- K^+ K^- \pi^0)/\Gamma_{total}$ — Γ_8/Γ

NODE=M076R07

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<2.7	90	[13] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 2\pi^+ 2\pi^- K^+ K^- \pi^0$

[13] ASNER 08A reports $[\Gamma(\chi_{b0}(1P) \to 2\pi^+ 2\pi^- K^+ K^- \pi^0)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b0}(1P))] < 10 \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b0}(1P)) = 3.8 \times 10^{-2}$.

NODE=M076R07;LINKAGE=AS

$\Gamma(2\pi^+ 2\pi^- K^+ K^- 2\pi^0)/\Gamma_{total}$ — Γ_9/Γ

NODE=M076R08

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<5	90	[14] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 2\pi^+ 2\pi^- K^+ K^- 2\pi^0$

[14] ASNER 08A reports $[\Gamma(\chi_{b0}(1P) \to 2\pi^+ 2\pi^- K^+ K^- 2\pi^0)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b0}(1P))] < 20 \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b0}(1P)) = 3.8 \times 10^{-2}$.

NODE=M076R08;LINKAGE=AS

$\Gamma(3\pi^+ 2\pi^- K^- K^0_S \pi^0)/\Gamma_{total}$ — Γ_{10}/Γ

NODE=M076R09

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.6	90	[15] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 3\pi^+ 2\pi^- K^- K^0_S \pi^0$

[15] ASNER 08A reports $[\Gamma(\chi_{b0}(1P) \to 3\pi^+ 2\pi^- K^- K^0_S \pi^0)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b0}(1P))] < 6 \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b0}(1P)) = 3.8 \times 10^{-2}$.

NODE=M076R09;LINKAGE=AS

$\Gamma(3\pi^+ 3\pi^-)/\Gamma_{total}$ — Γ_{11}/Γ

NODE=M076R10

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.8	90	[16] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 3\pi^+ 3\pi^-$

[16] ASNER 08A reports $[\Gamma(\chi_{b0}(1P) \to 3\pi^+ 3\pi^-)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b0}(1P))] < 3 \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b0}(1P)) = 3.8 \times 10^{-2}$.

NODE=M076R10;LINKAGE=AS

$\Gamma(3\pi^+ 3\pi^- 2\pi^0)/\Gamma_{total}$ — Γ_{12}/Γ

NODE=M076R11

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<6	90	[17] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 3\pi^+ 3\pi^- 2\pi^0$

[17] ASNER 08A reports $[\Gamma(\chi_{b0}(1P) \to 3\pi^+ 3\pi^- 2\pi^0)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b0}(1P))] < 22 \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b0}(1P)) = 3.8 \times 10^{-2}$.

NODE=M076R11;LINKAGE=AS

$\Gamma(3\pi^+ 3\pi^- K^+ K^-)/\Gamma_{total}$ — Γ_{13}/Γ

NODE=M076R12

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.4±1.2±0.2	9	[18] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 3\pi^+ 3\pi^- K^+ K^-$

[18] ASNER 08A reports $[\Gamma(\chi_{b0}(1P) \to 3\pi^+ 3\pi^- K^+ K^-)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b0}(1P))] = (9 \pm 4 \pm 2) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b0}(1P)) = (3.8 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M076R12;LINKAGE=AS

$\Gamma(3\pi^+ 3\pi^- K^+ K^- \pi^0)/\Gamma_{total}$ — Γ_{14}/Γ

NODE=M076R13

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<10	90	[19] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 3\pi^+ 3\pi^- K^+ K^- \pi^0$

[19] ASNER 08A reports $[\Gamma(\chi_{b0}(1P) \to 3\pi^+ 3\pi^- K^+ K^- \pi^0)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b0}(1P))] < 37 \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b0}(1P)) = 3.8 \times 10^{-2}$.

NODE=M076R13;LINKAGE=AS

$\Gamma(4\pi^+ 4\pi^-)/\Gamma_{total}$ — Γ_{15}/Γ

NODE=M076R14

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.8	90	[20] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 4\pi^+ 4\pi^-$

[20] ASNER 08A reports $[\Gamma(\chi_{b0}(1P) \to 4\pi^+ 4\pi^-)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b0}(1P))] < 3 \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b0}(1P)) = 3.8 \times 10^{-2}$.

NODE=M076R14;LINKAGE=AS

$\Gamma(4\pi^+ 4\pi^- 2\pi^0)/\Gamma_{total}$ — Γ_{16}/Γ

NODE=M076R15

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<21	90	[21] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 4\pi^+ 4\pi^- 2\pi^0$

[21] ASNER 08A reports $[\Gamma(\chi_{b0}(1P) \to 4\pi^+ 4\pi^- 2\pi^0)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b0}(1P))] < 77 \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b0}(1P)) = 3.8 \times 10^{-2}$.

NODE=M076R15;LINKAGE=AS

$\Gamma(J/\psi J/\psi)/\Gamma_{total}$ Γ_{17}/Γ

NODE=M076R16

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<7	90	[22] SHEN	12	BELL	$\Upsilon(2S) \to \gamma\psi X$

[22] SHEN 12 reports $< 7.1\times10^{-5}$ from a measurement of $[\Gamma(\chi_{b0}(1P) \to J/\psi J/\psi)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b0}(1P))]$ assuming $B(\Upsilon(2S) \to \gamma\chi_{b0}(1P)) = (3.8 \pm 0.4) \times 10^{-2}$.

NODE=M076R16;LINKAGE=SH

$\Gamma(J/\psi\psi(2S))/\Gamma_{total}$ Γ_{18}/Γ

NODE=M076R17

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<12	90	[23] SHEN	12	BELL	$\Upsilon(2S) \to \gamma\psi X$

[23] SHEN 12 reports $< 12 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{b0}(1P) \to J/\psi\psi(2S))/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b0}(1P))]$ assuming $B(\Upsilon(2S) \to \gamma\chi_{b0}(1P)) = (3.8 \pm 0.4) \times 10^{-2}$.

NODE=M076R17;LINKAGE=SH

$\Gamma(\psi(2S)\psi(2S))/\Gamma_{total}$ Γ_{19}/Γ

NODE=M076R18

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<3.1	90	[24] SHEN	12	BELL	$\Upsilon(2S) \to \gamma\psi X$

[24] SHEN 12 reports $< 3.1 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{b0}(1P) \to \psi(2S)\psi(2S))/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b0}(1P))]$ assuming $B(\Upsilon(2S) \to \gamma\chi_{b0}(1P)) = (3.8 \pm 0.4) \times 10^{-2}$.

NODE=M076R18;LINKAGE=SH

$\Gamma(J/\psi(1S)\,\text{anything})/\Gamma_{total}$ Γ_{20}/Γ

NODE=M076R00

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.3 \times 10^{-3}$	90	JIA	17A	BELL	$e^+e^- \to$ hadrons

$\chi_{b0}(1P)$ CROSS-PARTICLE BRANCHING RATIOS

NODE=M076230

$\Gamma(\chi_{b0}(1P) \to \gamma\Upsilon(1S))/\Gamma_{total} \times \Gamma(\Upsilon(2S) \to \gamma\chi_{b0}(1P))/\Gamma_{total}$ $\Gamma_1/\Gamma \times \Gamma_{61}^{\Upsilon(2S)}/\Gamma^{\Upsilon(2S)}$

NODE=M076B02

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.7 \times 10^{-3}$	90	[25] LEES	11J	BABR	$\Upsilon(2S) \to X\gamma$

[25] LEES 11J quotes a central value of $\Gamma(\chi_{b0}(1P) \to \gamma\Upsilon(1S))/\Gamma_{total} \times \Gamma(\Upsilon(2S) \to \gamma\chi_{b0}(1P))/\Gamma_{total} = (8.3 \pm 5.6^{+3.7}_{-2.6}) \times 10^{-4}$ and derives a 90% CL upper limit of $\Gamma(\gamma\Upsilon(1S))/\Gamma_{total} < 4.6\%$ using $B(\Upsilon(2S) \to \gamma\chi_{b0}(1P)) = (3.8 \pm 0.4)\%$.

NODE=M076B02;LINKAGE=LE

$B(\chi_{b0}(1P) \to \gamma\Upsilon(1S)) \times B(\Upsilon(2S) \to \gamma\chi_{b0}(1P)) \times B(\Upsilon(1S) \to \ell^+\ell^-)$

NODE=M076B01

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
1.67±0.28 OUR AVERAGE					
$2.9\ ^{+1.7}_{-1.4}\ ^{+0.1}_{-0.8}$		[26] LEES	14M	BABR	$\Upsilon(2S) \to \gamma\gamma\mu^+\mu^-$
1.63±0.24±0.15	87	KORNICER	11	CLEO	$e^+e^- \to \gamma\gamma\ell^+\ell^-$

[26] From a sample of $\Upsilon(2S) \to \gamma\gamma\mu^+\mu^-$ with one converted photon.

NODE=M076B01;LINKAGE=A

$[B(\chi_{b0}(1P) \to \gamma\Upsilon(1S)) \times B(\Upsilon(2S) \to \gamma\chi_{b0}(1P))] / [B(\chi_{b1}(1P) \to \gamma\Upsilon(1S)) \times B(\Upsilon(2S) \to \gamma\chi_{b1}(1P))]$

NODE=M076A01

VALUE (%)	DOCUMENT ID		TECN	COMMENT
3.28±0.37	[27] LEES	14M	BABR	$\Upsilon(2S) \to \gamma\gamma\mu^+\mu^-$

[27] From a sample of $\Upsilon(2S) \to \gamma\gamma\mu^+\mu^-$ without converted photons.

NODE=M076A01;LINKAGE=A

$\chi_{b0}(1P)$ REFERENCES

NODE=M076

JIA	17A	PR D96 112002	S. Jia *et al.*	(BELLE Collab.)	REFID=58318
LEES	14M	PR D90 112010	J.P. Lees *et al.*	(BABAR Collab.)	REFID=56343
SHEN	12	PR D85 071102	C.P. Shen *et al.*	(BELLE Collab.)	REFID=54313
KORNICER	11	PR D83 054003	M. Kornicer *et al.*	(CLEO Collab.)	REFID=16769
LEES	11J	PR D84 072002	J.P. Lees *et al.*	(BABAR Collab.)	REFID=53936
ASNER	08A	PR D78 091103	D.M. Asner *et al.*	(CLEO Collab.)	REFID=52574
BRIERE	08	PR D78 092007	R.A. Briere *et al.*	(CLEO Collab.)	REFID=52577
ARTUSO	05	PRL 94 032001	M. Artuso *et al.*	(CLEO Collab.)	REFID=50454
EDWARDS	99	PR D59 032003	K.W. Edwards *et al.*	(CLEO Collab.)	REFID=46612
WALK	86	PR D34 2611	W.S. Walk *et al.*	(Crystal Ball Collab.)	REFID=22290
ALBRECHT	85E	PL 160B 331	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=22288
NERNST	85	PRL 54 2195	R. Nernst *et al.*	(Crystal Ball Collab.)	REFID=22289
HAAS	84	PRL 52 799	J. Haas *et al.*	(CLEO Collab.)	REFID=22287
KLOPFEN...	83	PRL 51 160	C. Klopfenstein *et al.*	(CUSB Collab.)	REFID=22285
PAUSS	83	PL 130B 439	F. Pauss *et al.*	(MPIM, COLU, CORN, LSU+)	REFID=22286

NODE=M077

$\chi_{b1}(1P)$

$I^G(J^{PC}) = 0^+(1^{++})$
J needs confirmation.

NODE=M077

Observed in radiative decay of the $\Upsilon(2S)$, therefore $C = +$. Branching ratio requires E1 transition, M1 is strongly disfavored, therefore $P = +$. $J = 1$ from SKWARNICKI 87.

$\chi_{b1}(1P)$ MASS

NODE=M077M

VALUE (MeV)	DOCUMENT ID
9892.78±0.26±0.31 OUR EVALUATION	From average γ energy below, using $\Upsilon(2S)$ mass = 10023.26 ± 0.31 MeV

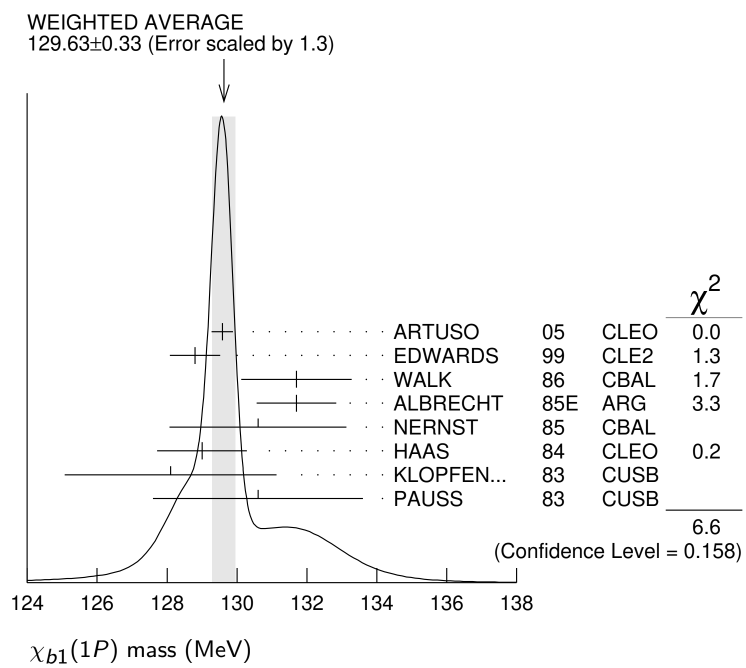
NODE=M077M
→ UNCHECKED ←

γ ENERGY IN $\Upsilon(2S)$ DECAY

NODE=M077DM

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
129.63±0.33 OUR AVERAGE	Error includes scale factor of 1.3. See the ideogram below.			
129.58±0.09±0.29	ARTUSO	05	CLEO	$\Upsilon(2S) \to \gamma X$
128.8 ±0.4 ±0.6	EDWARDS	99	CLE2	$\Upsilon(2S) \to \gamma\chi(1P)$
131.7 ±0.9 ±1.3	WALK	86	CBAL	$\Upsilon(2S) \to \gamma\gamma\ell^+\ell^-$
131.7 ±0.3 ±1.1	ALBRECHT	85E	ARG	$\Upsilon(2S) \to$ conv. γX
130.6 ±0.8 ±2.4	NERNST	85	CBAL	$\Upsilon(2S) \to \gamma X$
129 ±0.8 ±1	HAAS	84	CLEO	$\Upsilon(2S) \to$ conv. γX
128.1 ±0.4 ±3.0	KLOPFEN...	83	CUSB	$\Upsilon(2S) \to \gamma X$
130.6 ±3.0	PAUSS	83	CUSB	$\Upsilon(2S) \to \gamma\gamma\ell^+\ell^-$

NODE=M077DM



$\chi_{b1}(1P)$ DECAY MODES

NODE=M077215;NODE=M077

	Mode	Fraction (Γ_i/Γ)	Confidence level	
Γ_1	$\gamma\,\Upsilon(1S)$	(35.2 ±2.0) %		DESIG=1
Γ_2	$D^0 X$	(12.6 ±2.2) %		DESIG=2
Γ_3	$\pi^+\pi^- K^+ K^- \pi^0$	(2.0 ±0.6) $\times 10^{-4}$		DESIG=3
Γ_4	$2\pi^+\pi^- K^- K^0_S$	(1.3 ±0.5) $\times 10^{-4}$		DESIG=4
Γ_5	$2\pi^+\pi^- K^- K^0_S 2\pi^0$	< 6 $\times 10^{-4}$	90%	DESIG=5
Γ_6	$2\pi^+ 2\pi^- 2\pi^0$	(8.0 ±2.5) $\times 10^{-4}$		DESIG=6
Γ_7	$2\pi^+ 2\pi^- K^+ K^-$	(1.5 ±0.5) $\times 10^{-4}$		DESIG=7
Γ_8	$2\pi^+ 2\pi^- K^+ K^- \pi^0$	(3.5 ±1.2) $\times 10^{-4}$		DESIG=8
Γ_9	$2\pi^+ 2\pi^- K^+ K^- 2\pi^0$	(8.6 ±3.2) $\times 10^{-4}$		DESIG=9
Γ_{10}	$3\pi^+ 2\pi^- K^- K^0_S \pi^0$	(9.3 ±3.3) $\times 10^{-4}$		DESIG=10
Γ_{11}	$3\pi^+ 3\pi^-$	(1.9 ±0.6) $\times 10^{-4}$		DESIG=11

Γ_{12}	$3\pi^+ 3\pi^- 2\pi^0$	$(1.7 \pm 0.5) \times 10^{-3}$		DESIG=12
Γ_{13}	$3\pi^+ 3\pi^- K^+ K^-$	$(2.6 \pm 0.8) \times 10^{-4}$		DESIG=13
Γ_{14}	$3\pi^+ 3\pi^- K^+ K^- \pi^0$	$(7.5 \pm 2.6) \times 10^{-4}$		DESIG=14
Γ_{15}	$4\pi^+ 4\pi^-$	$(2.6 \pm 0.9) \times 10^{-4}$		DESIG=15
Γ_{16}	$4\pi^+ 4\pi^- 2\pi^0$	$(1.4 \pm 0.6) \times 10^{-3}$		DESIG=16
Γ_{17}	ω anything	(4.9 ± 1.4) %		DESIG=21
Γ_{18}	ωX_{tetra}	$< 4.44 \times 10^{-4}$	90%	DESIG=22
Γ_{19}	$J/\psi J/\psi$	$< 2.7 \times 10^{-5}$	90%	DESIG=17
Γ_{20}	$J/\psi \psi(2S)$	$< 1.7 \times 10^{-5}$	90%	DESIG=18
Γ_{21}	$\psi(2S) \psi(2S)$	$< 6 \times 10^{-5}$	90%	DESIG=19
Γ_{22}	$J/\psi(1S)$ anything	$< 1.1 \times 10^{-3}$	90%	DESIG=20
Γ_{23}	$J/\psi(1S) X_{tetra}$	$< 2.27 \times 10^{-4}$	90%	DESIG=23

$\chi_{b1}(1P)$ BRANCHING RATIOS

NODE=M077220

$\Gamma(\gamma \Upsilon(1S))/\Gamma_{total}$ — Γ_1/Γ

NODE=M077R1
NODE=M077R1

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.352±0.020 OUR AVERAGE					
$0.356^{+0.016}_{-0.022} \pm 0.019$	964k	[1] FULSOM	18	BELL	$\Upsilon(2S) \to \gamma X$
$0.364 \pm 0.017 \pm 0.019$		[2,3,4] LEES	14M	BABR	$\Upsilon(2S) \to \gamma\gamma\mu^+\mu^-$
$0.331 \pm 0.018 \pm 0.017$	3222	[4,5] KORNICER	11	CLEO	$e^+e^- \to \gamma\gamma\ell^+\ell^-$
$0.350 \pm 0.023 \pm 0.018$	13k	[6] LEES	11J	BABR	$\Upsilon(2S) \to X\gamma$
$0.34 \pm 0.07 \pm 0.02$	53	[4,7,8] WALK	86	CBAL	$\Upsilon(2S) \to \gamma\gamma\ell^+\ell^-$
0.47 ± 0.18		KLOPFEN...	83	CUSB	$\Upsilon(2S) \to \gamma\gamma\ell^+\ell^-$

OCCUR=4

[1] FULSOM 18 reports $[\Gamma(\chi_{b1}(1P) \to \gamma \Upsilon(1S))/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma \chi_{b1}(1P))] = (2.45 \pm 0.02^{+0.11}_{-0.15}) \times 10^{-2}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma \chi_{b1}(1P)) = (6.9 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M077R1;LINKAGE=J

[2] LEES 14M quotes $\Gamma(\chi_{b1}(1P) \to \gamma \Upsilon(1S))/\Gamma_{total} \times \Gamma(\Upsilon(2S) \to \gamma \chi_{b1}(1P))/\Gamma_{total} = (2.51 \pm 0.12)$ % combining the results from samples of $\Upsilon(2S) \to \gamma\gamma\mu^+\mu^-$ with and without converted photons. NODE=M077R1;LINKAGE=B

[3] LEES 14M reports $[\Gamma(\chi_{b1}(1P) \to \gamma \Upsilon(1S))/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma \chi_{b1}(1P))] = (2.51 \pm 0.12) \times 10^{-2}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma \chi_{b1}(1P)) = (6.9 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M077R1;LINKAGE=D

[4] Assuming $B(\Upsilon(1S) \to \mu^+\mu^-) = (2.48 \pm 0.05)$%. NODE=M077R1;LINKAGE=KA

[5] KORNICER 11 reports $[\Gamma(\chi_{b1}(1P) \to \gamma \Upsilon(1S))/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma \chi_{b1}(1P))] = (22.8 \pm 0.4 \pm 1.2) \times 10^{-3}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma \chi_{b1}(1P)) = (6.9 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M077R1;LINKAGE=KR

[6] LEES 11J reports $[\Gamma(\chi_{b1}(1P) \to \gamma \Upsilon(1S))/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma \chi_{b1}(1P))] = (24.1 \pm 0.6 \pm 1.5) \times 10^{-3}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma \chi_{b1}(1P)) = (6.9 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M077R1;LINKAGE=LE

[7] WALK 86 quotes $B(\Upsilon(2S) \to \gamma \chi_{b1}(1P)) \times B(\chi_{b1}(1P) \to \gamma \Upsilon(1S)) \times B(\Upsilon(1S) \to \ell^+\ell^-) = (5.8 \pm 0.9 \pm 0.7)$ %. NODE=M077R1;LINKAGE=A

[8] WALK 86 reports $[\Gamma(\chi_{b1}(1P) \to \gamma \Upsilon(1S))/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma \chi_{b1}(1P))] = (23.4 \pm 3.63 \pm 2.82) \times 10^{-3}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma \chi_{b1}(1P)) = (6.9 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M077R1;LINKAGE=C

$\Gamma(D^0 X)/\Gamma_{total}$ — Γ_2/Γ

NODE=M077R01
NODE=M077R01

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
12.6±1.9±1.1	2310	[1] BRIERE	08	CLEO	$\Upsilon(2S) \to \gamma D^0 X$

[1] For $p_{D^0} > 2.5$ GeV/c. NODE=M077R01;LINKAGE=BR

$\Gamma(\pi^+\pi^- K^+ K^- \pi^0)/\Gamma_{total}$ — Γ_3/Γ

NODE=M077R02
NODE=M077R02

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.0±0.6±0.1	18	[1] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma\pi^+\pi^- K^+ K^- \pi^0$

[1] ASNER 08A reports $[\Gamma(\chi_{b1}(1P) \to \pi^+\pi^- K^+ K^- \pi^0)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma \chi_{b1}(1P))] = (14 \pm 3 \pm 3) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma \chi_{b1}(1P)) = (6.9 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M077R02;LINKAGE=AS

$\Gamma(2\pi^+\pi^-K^-K^0_S)/\Gamma_{total}$ Γ_4/Γ

NODE=M077R03

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.3±0.5±0.1	11	[1] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 2\pi^+\pi^-K^-K^0_S$

[1] ASNER 08A reports $[\Gamma(\chi_{b1}(1P) \to 2\pi^+\pi^-K^-K^0_S)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b1}(1P))] = (9 \pm 3 \pm 2) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b1}(1P)) = (6.9 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M077R03;LINKAGE=AS

$\Gamma(2\pi^+\pi^-K^-K^0_S 2\pi^0)/\Gamma_{total}$ Γ_5/Γ

NODE=M077R04

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<6	90	[1] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 2\pi^+\pi^-K^-2\pi^0$

[1] ASNER 08A reports $[\Gamma(\chi_{b1}(1P) \to 2\pi^+\pi^-K^-K^0_S 2\pi^0)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b1}(1P))] < 42 \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b1}(1P)) = 6.9 \times 10^{-2}$.

NODE=M077R04;LINKAGE=AS

$\Gamma(2\pi^+2\pi^-2\pi^0)/\Gamma_{total}$ Γ_6/Γ

NODE=M077R05

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
8.0±2.4±0.4	46	[1] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 2\pi^+2\pi^-2\pi^0$

[1] ASNER 08A reports $[\Gamma(\chi_{b1}(1P) \to 2\pi^+2\pi^-2\pi^0)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b1}(1P))] = (55 \pm 9 \pm 14) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b1}(1P)) = (6.9 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M077R05;LINKAGE=AS

$\Gamma(2\pi^+2\pi^-K^+K^-)/\Gamma_{total}$ Γ_7/Γ

NODE=M077R06

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.5±0.5±0.1	18	[1] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 2\pi^+2\pi^-K^+K^-$

[1] ASNER 08A reports $[\Gamma(\chi_{b1}(1P) \to 2\pi^+2\pi^-K^+K^-)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b1}(1P))] = (10 \pm 3 \pm 2) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b1}(1P)) = (6.9 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M077R06;LINKAGE=AS

$\Gamma(2\pi^+2\pi^-K^+K^-\pi^0)/\Gamma_{total}$ Γ_8/Γ

NODE=M077R07

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.5±1.2±0.2	22	[1] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 2\pi^+2\pi^-K^+K^-\pi^0$

[1] ASNER 08A reports $[\Gamma(\chi_{b1}(1P) \to 2\pi^+2\pi^-K^+K^-\pi^0)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b1}(1P))] = (24 \pm 6 \pm 6) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b1}(1P)) = (6.9 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M077R07;LINKAGE=AS

$\Gamma(2\pi^+2\pi^-K^+K^-2\pi^0)/\Gamma_{total}$ Γ_9/Γ

NODE=M077R08

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
8.6±3.2±0.4	26	[1] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 2\pi^+2\pi^-K^+K^-2\pi^0$

[1] ASNER 08A reports $[\Gamma(\chi_{b1}(1P) \to 2\pi^+2\pi^-K^+K^-2\pi^0)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b1}(1P))] = (59 \pm 14 \pm 17) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b1}(1P)) = (6.9 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M077R08;LINKAGE=AS

$\Gamma(3\pi^+2\pi^-K^-K^0_S\pi^0)/\Gamma_{total}$ Γ_{10}/Γ

NODE=M077R09

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
9.3±3.3±0.5	21	[1] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 3\pi^+2\pi^-K^-K^0_S\pi^0$

[1] ASNER 08A reports $[\Gamma(\chi_{b1}(1P) \to 3\pi^+2\pi^-K^-K^0_S\pi^0)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b1}(1P))] = (64 \pm 16 \pm 16) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b1}(1P)) = (6.9 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M077R09;LINKAGE=AS

$\Gamma(3\pi^+3\pi^-)/\Gamma_{total}$ Γ_{11}/Γ

NODE=M077R10

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.9±0.6±0.1	25	[1] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 3\pi^+3\pi^-$

[1] ASNER 08A reports $[\Gamma(\chi_{b1}(1P) \to 3\pi^+3\pi^-)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b1}(1P))] = (13 \pm 3 \pm 3) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b1}(1P)) = (6.9 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M077R10;LINKAGE=AS

$\Gamma(3\pi^+3\pi^-2\pi^0)/\Gamma_{total}$ Γ_{12}/Γ

NODE=M077R11
NODE=M077R11

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
17±5±1	56	[1] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 3\pi^+ 3\pi^- 2\pi^0$

[1] ASNER 08A reports $[\Gamma(\chi_{b1}(1P) \to 3\pi^+3\pi^-2\pi^0)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b1}(1P))] = (119 \pm 18 \pm 32) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b1}(1P)) = (6.9 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M077R11;LINKAGE=AS

$\Gamma(3\pi^+3\pi^-K^+K^-)/\Gamma_{total}$ Γ_{13}/Γ

NODE=M077R12
NODE=M077R12

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.6±0.8±0.1	21	[1] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 3\pi^+ 3\pi^- K^+ K^-$

[1] ASNER 08A reports $[\Gamma(\chi_{b1}(1P) \to 3\pi^+3\pi^-K^+K^-)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b1}(1P))] = (18 \pm 4 \pm 4) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b1}(1P)) = (6.9 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M077R12;LINKAGE=AS

$\Gamma(3\pi^+3\pi^-K^+K^-\pi^0)/\Gamma_{total}$ Γ_{14}/Γ

NODE=M077R13
NODE=M077R13

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
7.5±2.6±0.4	28	[1] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 3\pi^+ 3\pi^- K^+ K^- \pi^0$

[1] ASNER 08A reports $[\Gamma(\chi_{b1}(1P) \to 3\pi^+3\pi^-K^+K^-\pi^0)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b1}(1P))] = (52 \pm 11 \pm 14) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b1}(1P)) = (6.9 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M077R13;LINKAGE=AS

$\Gamma(4\pi^+4\pi^-)/\Gamma_{total}$ Γ_{15}/Γ

NODE=M077R14
NODE=M077R14

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.6±0.9±0.1	24	[1] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 4\pi^+ 4\pi^-$

[1] ASNER 08A reports $[\Gamma(\chi_{b1}(1P) \to 4\pi^+4\pi^-)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b1}(1P))] = (18 \pm 4 \pm 5) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b1}(1P)) = (6.9 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M077R14;LINKAGE=AS

$\Gamma(4\pi^+4\pi^-2\pi^0)/\Gamma_{total}$ Γ_{16}/Γ

NODE=M077R15
NODE=M077R15

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
14±5±1	26	[1] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 4\pi^+ 4\pi^- 2\pi^0$

[1] ASNER 08A reports $[\Gamma(\chi_{b1}(1P) \to 4\pi^+4\pi^-2\pi^0)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b1}(1P))] = (96 \pm 24 \pm 29) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b1}(1P)) = (6.9 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M077R15;LINKAGE=AS

$\Gamma(\omega\,\text{anything})/\Gamma_{total}$ Γ_{17}/Γ

NODE=M077R19
NODE=M077R19

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
4.9±1.3±0.6	51k	JIA	17A	BELL	$e^+e^- \to$ hadrons

$\Gamma(\omega X_{tetra})/\Gamma_{total}$ Γ_{18}/Γ

NODE=M077R23
NODE=M077R23

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<44.4 × 10⁻⁵	90	[1] JIA	17A	BELL	$e^+e^- \to$ hadrons

[1] For a tetraquark state X_{tetra}, with mass in the range 1.16–2.46 GeV and width in the range 0–0.3 GeV. Measured 90% CL limits as a function of X_{tetra} mass and width range from 3.3×10^{-5} to 44.4×10^{-5}.

NODE=M077R23;LINKAGE=A

$\Gamma(J/\psi J/\psi)/\Gamma_{total}$ Γ_{19}/Γ

NODE=M077R16
NODE=M077R16

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<2.7	90	[1] SHEN	12	BELL	$\Upsilon(2S) \to \gamma\psi X$

[1] SHEN 12 reports $< 2.7 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{b1}(1P) \to J/\psi J/\psi)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b1}(1P))]$ assuming $B(\Upsilon(2S) \to \gamma\chi_{b1}(1P)) = (6.9 \pm 0.4) \times 10^{-2}$.

NODE=M077R16;LINKAGE=SH

$\Gamma(J/\psi\psi(2S))/\Gamma_{total}$ Γ_{20}/Γ

NODE=M077R17
NODE=M077R17

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<1.7	90	[1] SHEN	12	BELL	$\Upsilon(2S) \to \gamma\psi X$

[1] SHEN 12 reports $< 1.7 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{b1}(1P) \to J/\psi\psi(2S))/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b1}(1P))]$ assuming $B(\Upsilon(2S) \to \gamma\chi_{b1}(1P)) = (6.9 \pm 0.4) \times 10^{-2}$.

NODE=M077R17;LINKAGE=SH

$\Gamma(\psi(2S)\psi(2S))/\Gamma_{total}$ Γ_{21}/Γ

NODE=M077R18

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<6	90	[1] SHEN	12	BELL	$\Upsilon(2S) \to \gamma\psi X$

[1] SHEN 12 reports $< 6.2 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{b1}(1P) \to \psi(2S)\psi(2S))/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b1}(1P))]$ assuming $B(\Upsilon(2S) \to \gamma\chi_{b1}(1P)) = (6.9 \pm 0.4) \times 10^{-2}$.

NODE=M077R18;LINKAGE=SH

$\Gamma(J/\psi(1S)\,\text{anything})/\Gamma_{total}$ Γ_{22}/Γ

NODE=M077R00

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.1 \times 10^{-3}$	90	JIA	17A	BELL	$e^+e^- \to$ hadrons

$\Gamma(J/\psi(1S)X_{tetra})/\Gamma_{total}$ Γ_{23}/Γ

NODE=M077R22

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<22.7 \times 10^{-5}$	90	[1] JIA	17A	BELL	$e^+e^- \to$ hadrons

[1] For a tetraquark state X_{tetra}, with mass in the range 1.16–2.46 GeV and width in the range 0–0.3 GeV. Measured 90% CL limits as a function of X_{tetra} mass and width range from 1.8×10^{-5} to 22.7×10^{-5}.

NODE=M077R22;LINKAGE=A

$\chi_{b1}(1P)$ Cross-Particle Branching Ratios

NODE=M077230

$\Gamma(\chi_{b1}(1P) \to \gamma\Upsilon(1S))/\Gamma_{total} \times \Gamma(\Upsilon(2S) \to \gamma\chi_{b1}(1P))/\Gamma_{total}$ $\Gamma_1/\Gamma \times \Gamma_{59}^{\Upsilon(2S)}/\Gamma^{\Upsilon(2S)}$

NODE=M077B03

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
24.1±0.6±1.5	13k	LEES	11J	BABR	$\Upsilon(2S) \to X\gamma$

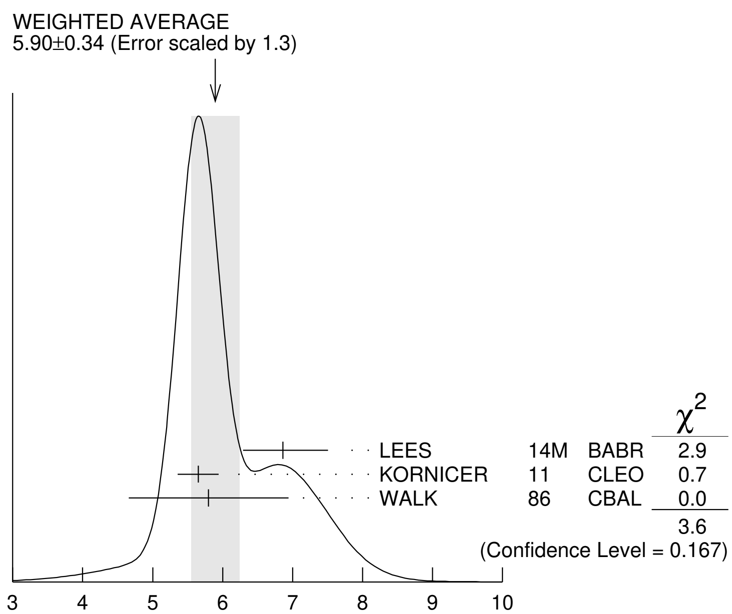
$B(\chi_{b1}(1P) \to \gamma\Upsilon(1S)) \times B(\Upsilon(2S) \to \gamma\chi_{b1}(1P)) \times B(\Upsilon(1S) \to \ell^+\ell^-)$

NODE=M077B01

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
5.90±0.34 OUR AVERAGE	Error includes scale factor of 1.3. See the ideogram below.				
$6.86^{+0.47+0.44}_{-0.45-0.35}$		[1] LEES	14M	BABR	$\Upsilon(2S) \to \gamma\gamma\mu^+\mu^-$
$5.65 \pm 0.11 \pm 0.27$	3222	KORNICER	11	CLEO	$e^+e^- \to \gamma\gamma\ell^+\ell^-$
$5.8 \pm 0.9 \pm 0.7$	53	WALK	86	CBAL	$\Upsilon(2S) \to \gamma\gamma\ell^+\ell^-$

[1] From a sample of $\Upsilon(2S) \to \gamma\gamma\mu^+\mu^-$ with one converted photon.

NODE=M077B01;LINKAGE=A



$B(\chi_{b1}(1P) \to \gamma\Upsilon(1S)) \times B(\Upsilon(2S) \to \gamma\chi_{b1}(1P)) \times B(\Upsilon(1S) \to \ell^+\ell^-)$ (units 10^{-4})

$B(\chi_{b1}(1P) \to \gamma\Upsilon(1S)) \times B(\Upsilon(3S) \to \gamma\chi_{b1}(1P)) \times B(\Upsilon(1S) \to \ell^+\ell^-)$

NODE=M077B02

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
1.30±0.34 OUR AVERAGE					
$1.16^{+0.78+0.14}_{-0.67-0.16}$		[1] LEES	14M	BABR	$\Upsilon(3S) \to \gamma\gamma\mu^+\mu^-$
$1.33 \pm 0.30 \pm 0.23$	50	KORNICER	11	CLEO	$e^+e^- \to \gamma\gamma\ell^+\ell^-$

[1] From a sample of $\Upsilon(3S) \to \gamma\gamma\mu^+\mu^-$ with converted photons.

NODE=M077B02;LINKAGE=A

B($\chi_{b2}(1P) \to pX + \overline{p}X$)/B($\chi_{b1}(1P) \to pX + \overline{p}X$)

NODE=M077R20

VALUE	DOCUMENT ID		TECN	COMMENT
1.068±0.010±0.040	BRIERE	07	CLEO	$\Upsilon(2S) \to \gamma \chi_{bJ}(1P)$

B($\chi_{b0}(1P) \to pX + \overline{p}X$)/B($\chi_{b1}(1P) \to pX + \overline{p}X$)

NODE=M077R21

VALUE	DOCUMENT ID		TECN	COMMENT
1.11±0.15±0.20	BRIERE	07	CLEO	$\Upsilon(2S) \to \gamma \chi_{bJ}(1P)$

$\chi_{b1}(1P)$ REFERENCES

NODE=M077

FULSOM	18	PRL 121 232001	B.G. Fulsom *et al.*	(BELLE Collab.)	REFID=59535
JIA	17A	PR D96 112002	S. Jia *et al.*	(BELLE Collab.)	REFID=58318
LEES	14M	PR D90 112010	J.P. Lees *et al.*	(BABAR Collab.)	REFID=56343
SHEN	12	PR D85 071102	C.P. Shen *et al.*	(BELLE Collab.)	REFID=54313
KORNICER	11	PR D83 054003	M. Kornicer *et al.*	(CLEO Collab.)	REFID=16769
LEES	11J	PR D84 072002	J.P. Lees *et al.*	(BABAR Collab.)	REFID=53936
ASNER	08A	PR D78 091103	D.M. Asner *et al.*	(CLEO Collab.)	REFID=52574
BRIERE	08	PR D78 092007	R.A. Briere *et al.*	(CLEO Collab.)	REFID=52577
BRIERE	07	PR D76 012005	R.A. Briere *et al.*	(CLEO Collab.)	REFID=51887
ARTUSO	05	PRL 94 032001	M. Artuso *et al.*	(CLEO Collab.)	REFID=50454
EDWARDS	99	PR D59 032003	K.W. Edwards *et al.*	(CLEO Collab.)	REFID=46612
SKWARNICKI	87	PRL 58 972	T. Skwarnicki *et al.*	(Crystal Ball Collab.) J	REFID=40019
WALK	86	PR D34 2611	W.S. Walk *et al.*	(Crystal Ball Collab.)	REFID=22290
ALBRECHT	85E	PL 160B 331	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=22288
NERNST	85	PRL 54 2195	R. Nernst *et al.*	(Crystal Ball Collab.)	REFID=22289
HAAS	84	PRL 52 799	J. Haas *et al.*	(CLEO Collab.)	REFID=22287
KLOPFEN...	83	PRL 51 160	C. Klopfenstein *et al.*	(CUSB Collab.)	REFID=22285
PAUSS	83	PL 130B 439	F. Pauss *et al.*	(MPIM, COLU, CORN, LSU+)	REFID=22286

NODE=M204

$h_b(1P)$

$I^G(J^{PC}) = 0^-(1^{+-})$

Quantum numbers are quark model predictions, $C = -$ established by $\eta_b \gamma$ decay.

NODE=M204

$h_b(1P)$ MASS

NODE=M204M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
9899.3±0.8 OUR AVERAGE					
9899.3±0.4±1.0	112k	TAMPONI	15	BELL	$e^+e^- \to \gamma\eta +$ hadrons
9899.1±0.4±1.0	70k	MIZUK	12	BELL	$e^+e^- \to \pi^+\pi^-$ hadrons
9902 ±4 ±2	10.8k	LEES	11K	BABR	$\Upsilon(3S) \to \eta_b \gamma \pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$9898.2^{+1.1}_{-1.0}{}^{+1.0}_{-1.1}$	50.0k	[1] ADACHI	12	BELL	10.86 $e^+e^- \to \pi^+\pi^-$ MM

[1] Superseded by MIZUK 12.

NODE=M204M;LINKAGE=AD

$h_b(1P)$ DECAY MODES

NODE=M204215;NODE=M204

	Mode	Fraction (Γ_i/Γ)
Γ_1	$\eta_b(1S)\gamma$	(52^{+6}_{-5}) %

DESIG=1

$h_b(1P)$ BRANCHING RATIOS

NODE=M204225

$\Gamma(\eta_b(1S)\gamma)/\Gamma_{total}$ — Γ_1/Γ

NODE=M204R01

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
52^{+6}_{-5} OUR AVERAGE					
56 ±8 ±4	33.1k	[1] TAMPONI	15	BELL	$e^+e^- \to \gamma\eta +$ hadrons
$49.2 \pm 5.7^{+5.6}_{-3.3}$	24k	MIZUK	12	BELL	$e^+e^- \to (\gamma)\pi^+\pi^-$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	10.8k	LEES	11K	BABR	$\Upsilon(3S) \to \eta_b \gamma \pi^0$

[1] Using B($\eta \to 2\gamma$) = (39.41 ± 0.20)%.

NODE=M204R01;LINKAGE=A

$h_b(1P)$ REFERENCES

NODE=M204

TAMPONI	15	PRL 115 142001	U. Tamponi *et al.*	(BELLE Collab.)	REFID=56996
ADACHI	12	PRL 108 032001	I. Adachi *et al.*	(BELLE Collab.)	REFID=53962
MIZUK	12	PRL 109 232002	R. Mizuk *et al.*	(BELLE Collab.)	REFID=54718
LEES	11K	PR D84 091101	J.P. Lees *et al.*	(BABAR Collab.)	REFID=53937

NODE=M078

$\chi_{b2}(1P)$

$I^G(J^{PC}) = 0^+(2^{++})$
J needs confirmation.

NODE=M078

Observed in radiative decay of the $\Upsilon(2S)$, therefore $C = +$. Branching ratio requires E1 transition, M1 is strongly disfavored, therefore $P = +$. $J = 2$ from SKWARNICKI 87.

$\chi_{b2}(1P)$ MASS

NODE=M078M

NODE=M078M

→ UNCHECKED ←

VALUE (MeV)	DOCUMENT ID
9912.21±0.26±0.31 OUR EVALUATION	From average γ energy below, using $\Upsilon(2S)$ mass = 10023.26 ± 0.31 MeV

$m_{\chi_{b2}(1P)} - m_{\chi_{b1}(1P)}$

NODE=M078DM2

NODE=M078DM2

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
19.10±0.25 OUR AVERAGE	Error includes scale factor of 1.1.			
19.81±0.65±0.20	[1] AAIJ	14BG	LHCB	$p p \to \gamma \mu^+ \mu^- X$
19.01±0.24	LEES	14M	BABR	$\Upsilon(2S) \to \gamma\gamma\mu^+\mu^-$

[1] From the $\chi_{bj}(1P) \to \Upsilon(1S)\gamma$ transition.

NODE=M078DM2;LINKAGE=A

γ ENERGY IN $\Upsilon(2S)$ DECAY

NODE=M078DM

NODE=M078DM

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
110.44±0.29 OUR AVERAGE	Error includes scale factor of 1.1.			
110.58±0.08±0.30	ARTUSO	05	CLEO	$\Upsilon(2S) \to \gamma X$
110.8 ±0.3 ±0.6	EDWARDS	99	CLE2	$\Upsilon(2S) \to \gamma\chi(1P)$
107.0 ±1.1 ±1.3	WALK	86	CBAL	$\Upsilon(2S) \to \gamma\gamma\ell^+\ell^-$
110.6 ±0.3 ±0.9	ALBRECHT	85E	ARG	$\Upsilon(2S) \to$ conv. γX
110.4 ±0.8 ±2.2	NERNST	85	CBAL	$\Upsilon(2S) \to \gamma$X
109.5 ±0.7 ±1.0	HAAS	84	CLEO	$\Upsilon(2S) \to$ conv. γX
108.2 ±0.3 ±2.0	KLOPFEN...	83	CUSB	$\Upsilon(2S) \to \gamma$X
108.8 ±4.0	PAUSS	83	CUSB	$\Upsilon(2S) \to \gamma\gamma\ell^+\ell^-$

$\chi_{b2}(1P)$ DECAY MODES

NODE=M078215;NODE=M078

	Mode	Fraction (Γ_i/Γ)	Confidence level	
Γ_1	$\gamma\,\Upsilon(1S)$	(18.0±1.0) %		DESIG=1
Γ_2	$D^0 X$	< 7.9 %	90%	DESIG=2
Γ_3	$\pi^+\pi^-K^+K^-\pi^0$	(8 ±5) × 10^{-5}		DESIG=3
Γ_4	$2\pi^+\pi^-K^-K^0_S$	< 1.0 × 10^{-4}	90%	DESIG=4
Γ_5	$2\pi^+\pi^-K^-K^0_S 2\pi^0$	(5.3±2.4) × 10^{-4}		DESIG=5
Γ_6	$2\pi^+2\pi^-2\pi^0$	(3.5±1.4) × 10^{-4}		DESIG=6
Γ_7	$2\pi^+2\pi^-K^+K^-$	(1.1±0.4) × 10^{-4}		DESIG=7
Γ_8	$2\pi^+2\pi^-K^+K^-\pi^0$	(2.1±0.9) × 10^{-4}		DESIG=8
Γ_9	$2\pi^+2\pi^-K^+K^-2\pi^0$	(3.9±1.8) × 10^{-4}		DESIG=9
Γ_{10}	$3\pi^+2\pi^-K^-K^0_S\pi^0$	< 5 × 10^{-4}	90%	DESIG=10
Γ_{11}	$3\pi^+3\pi^-$	(7.0±3.1) × 10^{-5}		DESIG=11
Γ_{12}	$3\pi^+3\pi^-2\pi^0$	(1.0±0.4) × 10^{-3}		DESIG=12
Γ_{13}	$3\pi^+3\pi^-K^+K^-$	< 8 × 10^{-5}	90%	DESIG=13
Γ_{14}	$3\pi^+3\pi^-K^+K^-\pi^0$	(3.6±1.5) × 10^{-4}		DESIG=14
Γ_{15}	$4\pi^+4\pi^-$	(8 ±4) × 10^{-5}		DESIG=15
Γ_{16}	$4\pi^+4\pi^-2\pi^0$	(1.8±0.7) × 10^{-3}		DESIG=16
Γ_{17}	$J/\psi J/\psi$	< 4 × 10^{-5}	90%	DESIG=17
Γ_{18}	$J/\psi\,\psi(2S)$	< 5 × 10^{-5}	90%	DESIG=18
Γ_{19}	$\psi(2S)\,\psi(2S)$	< 1.6 × 10^{-5}	90%	DESIG=19
Γ_{20}	$J/\psi(1S)$ anything	(1.5±0.4) × 10^{-3}		DESIG=20

$\chi_{b2}(1P)$ BRANCHING RATIOS

NODE=M078220

$\Gamma(\gamma\Upsilon(1S))/\Gamma_{total}$ Γ_1/Γ

NODE=M078R1
NODE=M078R1

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.180±0.010 OUR AVERAGE					
$0.164^{+0.009}_{-0.010}\pm0.008$	503k	[1] FULSOM	18	BELL	$\Upsilon(2S)\to\gamma X$
$0.185\pm0.008\pm0.009$		[2,3,4] LEES	14M	BABR	$\Upsilon(2S)\to\gamma\gamma\mu^+\mu^-$
$0.186\pm0.011\pm0.009$	1770	[4,5] KORNICER	11	CLEO	$e^+e^-\to\gamma\gamma\ell^+\ell^-$
$0.194^{+0.014}_{-0.017}\pm0.009$	8k	[6] LEES	11J	BABR	$\Upsilon(2S)\to X\gamma$
$0.25\pm0.06\pm0.01$	35	[4,7,8] WALK	86	CBAL	$\Upsilon(2S)\to\gamma\gamma\ell^+\ell^-$
0.20 ± 0.05		KLOPFEN...	83	CUSB	$\Upsilon(2S)\to\gamma\gamma\ell^+\ell^-$

OCCUR=2

[1] FULSOM 18 reports $[\Gamma(\chi_{b2}(1P)\to\gamma\Upsilon(1S))/\Gamma_{total}]\times[B(\Upsilon(2S)\to\gamma\chi_{b2}(1P))] = (1.17\pm0.01^{+0.06}_{-0.07})\times10^{-2}$ which we divide by our best value $B(\Upsilon(2S)\to\gamma\chi_{b2}(1P)) = (7.15\pm0.35)\times10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M078R1;LINKAGE=H

[2] LEES 14M quotes $\Gamma(\chi_{b2}(1P)\to\gamma\Upsilon(1S))/\Gamma_{total}\times\Gamma(\Upsilon(2S)\to\gamma\chi_{b2}(1P))/\Gamma_{total} = (1.32\pm0.06)\%$ combining the results from samples of $\Upsilon(2S)\to\gamma\gamma\mu^+\mu^-$ with and without converted photons.

NODE=M078R1;LINKAGE=B

[3] LEES 14M reports $[\Gamma(\chi_{b2}(1P)\to\gamma\Upsilon(1S))/\Gamma_{total}]\times[B(\Upsilon(2S)\to\gamma\chi_{b2}(1P))] = (1.32\pm0.06)\times10^{-2}$ which we divide by our best value $B(\Upsilon(2S)\to\gamma\chi_{b2}(1P)) = (7.15\pm0.35)\times10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M078R1;LINKAGE=F

[4] Assuming $B(\Upsilon(1S)\to\mu^+\mu^-) = (2.48\pm0.05)\%$.

NODE=M078R1;LINKAGE=KA

[5] KORNICER 11 reports $[\Gamma(\chi_{b2}(1P)\to\gamma\Upsilon(1S))/\Gamma_{total}]\times[B(\Upsilon(2S)\to\gamma\chi_{b2}(1P))] = (1.33\pm0.04\pm0.07)\times10^{-2}$ which we divide by our best value $B(\Upsilon(2S)\to\gamma\chi_{b2}(1P)) = (7.15\pm0.35)\times10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M078R1;LINKAGE=KR

[6] LEES 11J reports $[\Gamma(\chi_{b2}(1P)\to\gamma\Upsilon(1S))/\Gamma_{total}]\times[B(\Upsilon(2S)\to\gamma\chi_{b2}(1P))] = (13.9\pm0.5^{+0.9}_{-1.1})\times10^{-3}$ which we divide by our best value $B(\Upsilon(2S)\to\gamma\chi_{b2}(1P)) = (7.15\pm0.35)\times10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M078R1;LINKAGE=LE

[7] WALK 86 quotes $B(\Upsilon(2S)\to\gamma\chi_{b2}(1P))\times B(\chi_{b2}(1P)\to\gamma\Upsilon(1S))\times B(\Upsilon(1S)\to\ell^+\ell^-) = (4.4\pm0.9\pm0.5)$ %.

NODE=M078R1;LINKAGE=A

[8] WALK 86 reports $[\Gamma(\chi_{b2}(1P)\to\gamma\Upsilon(1S))/\Gamma_{total}]\times[B(\Upsilon(2S)\to\gamma\chi_{b2}(1P))] = (17.7\pm3.6\pm2.0)\times10^{-3}$ which we divide by our best value $B(\Upsilon(2S)\to\gamma\chi_{b2}(1P)) = (7.15\pm0.35)\times10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M078R1;LINKAGE=E

$\Gamma(D^0X)/\Gamma_{total}$ Γ_2/Γ

NODE=M078R01
NODE=M078R01

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<7.9\times10^{-2}$	90	[1,2] BRIERE	08	CLEO	$\Upsilon(2S)\to\gamma D^0X$

[1] For $p_{D^0} > 2.5$ GeV/c.

NODE=M078R01;LINKAGE=BR

[2] The authors also present their result as $(5.4\pm1.9\pm0.5)\times10^{-2}$.

NODE=M078R01;LINKAGE=RI

$\Gamma(\pi^+\pi^-K^+K^-\pi^0)/\Gamma_{total}$ Γ_3/Γ

NODE=M078R02
NODE=M078R02

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.84±0.50±0.04	8	[1] ASNER	08A	CLEO	$\Upsilon(2S)\to\gamma\pi^+\pi^-K^+K^-\pi^0$

[1] ASNER 08A reports $[\Gamma(\chi_{b2}(1P)\to\pi^+\pi^-K^+K^-\pi^0)/\Gamma_{total}]\times[B(\Upsilon(2S)\to\gamma\chi_{b2}(1P))] = (6\pm3\pm2)\times10^{-6}$ which we divide by our best value $B(\Upsilon(2S)\to\gamma\chi_{b2}(1P)) = (7.15\pm0.35)\times10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M078R02;LINKAGE=AS

$\Gamma(2\pi^+\pi^-K^-K^0_S)/\Gamma_{total}$ Γ_4/Γ

NODE=M078R03
NODE=M078R03

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.0	90	[1] ASNER	08A	CLEO	$\Upsilon(2S)\to\gamma2\pi^+\pi^-K^-K^0_S$

[1] ASNER 08A reports $[\Gamma(\chi_{b2}(1P)\to2\pi^+\pi^-K^-K^0_S)/\Gamma_{total}]\times[B(\Upsilon(2S)\to\gamma\chi_{b2}(1P))] < 7\times10^{-6}$ which we divide by our best value $B(\Upsilon(2S)\to\gamma\chi_{b2}(1P)) = 7.15\times10^{-2}$.

NODE=M078R03;LINKAGE=AS

$\Gamma(2\pi^+\pi^-K^-K^0_S2\pi^0)/\Gamma_{total}$ Γ_5/Γ

NODE=M078R04

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
5.3±2.4±0.3	11	[1] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 2\pi^+\pi^-K^-2\pi^0$

[1] ASNER 08A reports $[\Gamma(\chi_{b2}(1P) \to 2\pi^+\pi^-K^-K^0_S2\pi^0)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b2}(1P))] = (38 \pm 14 \pm 10) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b2}(1P)) = (7.15 \pm 0.35) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M078R04;LINKAGE=AS

$\Gamma(2\pi^+2\pi^-2\pi^0)/\Gamma_{total}$ Γ_6/Γ

NODE=M078R05

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.5±1.4±0.2	19	[1] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 2\pi^+2\pi^-2\pi^0$

[1] ASNER 08A reports $[\Gamma(\chi_{b2}(1P) \to 2\pi^+2\pi^-2\pi^0)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b2}(1P))] = (25 \pm 8 \pm 6) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b2}(1P)) = (7.15 \pm 0.35) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M078R05;LINKAGE=AS

$\Gamma(2\pi^+2\pi^-K^+K^-)/\Gamma_{total}$ Γ_7/Γ

NODE=M078R06

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.1±0.4±0.1	14	[1] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 2\pi^+2\pi^-K^+K^-$

[1] ASNER 08A reports $[\Gamma(\chi_{b2}(1P) \to 2\pi^+2\pi^-K^+K^-)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b2}(1P))] = (8 \pm 2 \pm 2) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b2}(1P)) = (7.15 \pm 0.35) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M078R06;LINKAGE=AS

$\Gamma(2\pi^+2\pi^-K^+K^-\pi^0)/\Gamma_{total}$ Γ_8/Γ

NODE=M078R07

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.1±0.9±0.1	13	[1] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 2\pi^+2\pi^-K^+K^-\pi^0$

[1] ASNER 08A reports $[\Gamma(\chi_{b2}(1P) \to 2\pi^+2\pi^-K^+K^-\pi^0)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b2}(1P))] = (15 \pm 5 \pm 4) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b2}(1P)) = (7.15 \pm 0.35) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M078R07;LINKAGE=AS

$\Gamma(2\pi^+2\pi^-K^+K^-2\pi^0)/\Gamma_{total}$ Γ_9/Γ

NODE=M078R08

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.9±1.8±0.2	11	[1] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 2\pi^+2\pi^-K^+K^-2\pi^0$

[1] ASNER 08A reports $[\Gamma(\chi_{b2}(1P) \to 2\pi^+2\pi^-K^+K^-2\pi^0)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b2}(1P))] = (28 \pm 11 \pm 7) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b2}(1P)) = (7.15 \pm 0.35) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M078R08;LINKAGE=AS

$\Gamma(3\pi^+2\pi^-K^-K^0_S\pi^0)/\Gamma_{total}$ Γ_{10}/Γ

NODE=M078R09

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<5	90	[1] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 3\pi^+2\pi^-K^-K^0_S\pi^0$

[1] ASNER 08A reports $[\Gamma(\chi_{b2}(1P) \to 3\pi^+2\pi^-K^-K^0_S\pi^0)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b2}(1P))] < 36 \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b2}(1P)) = 7.15 \times 10^{-2}$.

NODE=M078R09;LINKAGE=AS

$\Gamma(3\pi^+3\pi^-)/\Gamma_{total}$ Γ_{11}/Γ

NODE=M078R10

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.70±0.31±0.03	9	[1] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 3\pi^+3\pi^-$

[1] ASNER 08A reports $[\Gamma(\chi_{b2}(1P) \to 3\pi^+3\pi^-)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b2}(1P))] = (5 \pm 2 \pm 1) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b2}(1P)) = (7.15 \pm 0.35) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M078R10;LINKAGE=AS

$\Gamma(3\pi^+3\pi^-2\pi^0)/\Gamma_{total}$ Γ_{12}/Γ

NODE=M078R11

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
10.2±3.6±0.5	34	[1] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 3\pi^+3\pi^-2\pi^0$

[1] ASNER 08A reports $[\Gamma(\chi_{b2}(1P) \to 3\pi^+3\pi^-2\pi^0)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b2}(1P))] = (73 \pm 16 \pm 20) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b2}(1P)) = (7.15 \pm 0.35) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M078R11;LINKAGE=AS

$\Gamma(3\pi^+3\pi^-K^+K^-)/\Gamma_{total}$ Γ_{13}/Γ

NODE=M078R12

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.8	90	[1] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 3\pi^+ 3\pi^- K^+ K^-$

[1] ASNER 08A reports $[\Gamma(\chi_{b2}(1P) \to 3\pi^+3\pi^-K^+K^-)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b2}(1P))] < 6 \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b2}(1P)) = 7.15 \times 10^{-2}$.

NODE=M078R12;LINKAGE=AS

$\Gamma(3\pi^+3\pi^-K^+K^-\pi^0)/\Gamma_{total}$ Γ_{14}/Γ

NODE=M078R13

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.6±1.5±0.2	14	[1] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 3\pi^+ 3\pi^- K^+ K^- \pi^0$

[1] ASNER 08A reports $[\Gamma(\chi_{b2}(1P) \to 3\pi^+3\pi^-K^+K^-\pi^0)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b2}(1P))] = (26 \pm 8 \pm 7) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b2}(1P)) = (7.15 \pm 0.35) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M078R13;LINKAGE=AS

$\Gamma(4\pi^+4\pi^-)/\Gamma_{total}$ Γ_{15}/Γ

NODE=M078R14

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.84±0.40±0.04	7	[1] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 4\pi^+ 4\pi^-$

[1] ASNER 08A reports $[\Gamma(\chi_{b2}(1P) \to 4\pi^+4\pi^-)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b2}(1P))] = (6 \pm 2 \pm 2) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b2}(1P)) = (7.15 \pm 0.35) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M078R14;LINKAGE=AS

$\Gamma(4\pi^+4\pi^-2\pi^0)/\Gamma_{total}$ Γ_{16}/Γ

NODE=M078R15

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
18±7±1	29	[1] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 4\pi^+ 4\pi^- 2\pi^0$

[1] ASNER 08A reports $[\Gamma(\chi_{b2}(1P) \to 4\pi^+4\pi^-2\pi^0)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b2}(1P))] = (132 \pm 31 \pm 40) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b2}(1P)) = (7.15 \pm 0.35) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M078R15;LINKAGE=AS

$\Gamma(J/\psi J/\psi)/\Gamma_{total}$ Γ_{17}/Γ

NODE=M078R16

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<5	90	[1] SHEN	12	BELL	$\Upsilon(2S) \to \gamma\psi X$

[1] SHEN 12 reports $< 4.5 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{b2}(1P) \to J/\psi J/\psi)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b2}(1P))]$ assuming $B(\Upsilon(2S) \to \gamma\chi_{b2}(1P)) = (7.15 \pm 0.35) \times 10^{-2}$.

NODE=M078R16;LINKAGE=SH

$\Gamma(J/\psi\psi(2S))/\Gamma_{total}$ Γ_{18}/Γ

NODE=M078R17

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<5	90	[1] SHEN	12	BELL	$\Upsilon(2S) \to \gamma\psi X$

[1] SHEN 12 reports $< 4.9 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{b2}(1P) \to J/\psi\psi(2S))/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b2}(1P))]$ assuming $B(\Upsilon(2S) \to \gamma\chi_{b2}(1P)) = (7.15 \pm 0.35) \times 10^{-2}$.

NODE=M078R17;LINKAGE=SH

$\Gamma(\psi(2S)\psi(2S))/\Gamma_{total}$ Γ_{19}/Γ

NODE=M078R18

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<1.6	90	[1] SHEN	12	BELL	$\Upsilon(2S) \to \gamma\psi X$

[1] SHEN 12 reports $< 1.6 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{b2}(1P) \to \psi(2S)\psi(2S))/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b2}(1P))]$ assuming $B(\Upsilon(2S) \to \gamma\chi_{b2}(1P)) = (7.15 \pm 0.35) \times 10^{-2}$.

NODE=M078R18;LINKAGE=SH

$\Gamma(J/\psi(1S)\,\text{anything})/\Gamma_{total}$ Γ_{20}/Γ

NODE=M078R00

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.50±0.34±0.22	462	JIA	17A	BELL	$e^+e^- \to$ hadrons

$\chi_{b2}(1P)$ Cross-Particle Branching Ratios

NODE=M078230

$\Gamma(\chi_{b2}(1P) \to \gamma\Upsilon(1S))/\Gamma_{total} \times \Gamma(\Upsilon(2S) \to \gamma\chi_{b2}(1P))/\Gamma_{total}$ $\Gamma_1/\Gamma \times \Gamma_{60}^{\Upsilon(2S)}/\Gamma^{\Upsilon(2S)}$

NODE=M078B03

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
$13.9 \pm 0.5^{+0.9}_{-1.1}$	8k	LEES	11J	BABR	$\Upsilon(2S) \to X\gamma$

$B(\chi_{b2}(1P) \to \gamma \Upsilon(1S)) \times B(\Upsilon(2S) \to \gamma \chi_{b2}(1P)) \times B(\Upsilon(1S) \to \ell^+ \ell^-)$

NODE=M078B01

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.38±0.16 OUR AVERAGE					
$3.63^{+0.36}_{-0.34}{}^{+0.18}_{-0.19}$		[1] LEES	14M	BABR	$\Upsilon(2S) \to \gamma\gamma\mu^+\mu^-$
3.29±0.09±0.16	1770	KORNICER	11	CLEO	$e^+e^- \to \gamma\gamma\ell^+\ell^-$
4.4 ±0.9 ±0.5	35	WALK	86	CBAL	$\Upsilon(2S) \to \gamma\gamma\ell^+\ell^-$

[1] From a sample of $\Upsilon(2S) \to \gamma\gamma\mu^+\mu^-$ with converted photons.

NODE=M078B01;LINKAGE=A

$[B(\chi_{b2}(1P) \to \gamma \Upsilon(1S)) \times B(\Upsilon(2S) \to \gamma \chi_{b2}(1P))] / [B(\chi_{b1}(1P) \to \gamma \Upsilon(1S)) \times B(\Upsilon(2S) \to \gamma \chi_{b1}(1P))]$

NODE=M078A00

VALUE (%)	DOCUMENT ID		TECN	COMMENT
55.6±1.6	[1] LEES	14M	BABR	$\Upsilon(2S) \to \gamma\gamma\mu^+\mu^-$

[1] From a sample of $\Upsilon(2S) \to \gamma\gamma\mu^+\mu^-$ events without converted photons.

NODE=M078A00;LINKAGE=A

$B(\chi_{b2}(1P) \to \gamma \Upsilon(1S)) \times B(\Upsilon(3S) \to \gamma \chi_{b2}(1P)) \times B(\Upsilon(1S) \to \ell^+ \ell^-)$

NODE=M078B02

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
3.8 ±0.5 OUR AVERAGE					
$4.68^{+0.99}_{-0.92}\pm0.37$		[1] LEES	14M	BABR	$\Upsilon(3S) \to \gamma\gamma\mu^+\mu^-$
3.56±0.40±0.41	126	KORNICER	11	CLEO	$e^+e^- \to \gamma\gamma\ell^+\ell^-$

[1] From a sample of $\Upsilon(3S) \to \gamma\gamma\mu^+\mu^-$ with converted photons.

NODE=M078B02;LINKAGE=A

$\chi_{b2}(1P)$ REFERENCES

NODE=M078

FULSOM	18	PRL 121 232001	B.G. Fulsom *et al.*	(BELLE Collab.)	REFID=59535
JIA	17A	PR D96 112002	S. Jia *et al.*	(BELLE Collab.)	REFID=58318
AAIJ	14BG	JHEP 1410 088	R. Aaij *et al.*	(LHCb Collab.)	REFID=56199
LEES	14M	PR D90 112010	J.P. Lees *et al.*	(BABAR Collab.)	REFID=56343
SHEN	12	PR D85 071102	C.P. Shen *et al.*	(BELLE Collab.)	REFID=54313
KORNICER	11	PR D83 054003	M. Kornicer *et al.*	(CLEO Collab.)	REFID=16769
LEES	11J	PR D84 072002	J.P. Lees *et al.*	(BABAR Collab.)	REFID=53936
ASNER	08A	PR D78 091103	D.M. Asner *et al.*	(CLEO Collab.)	REFID=52574
BRIERE	08	PR D78 092007	R.A. Briere *et al.*	(CLEO Collab.)	REFID=52577
ARTUSO	05	PRL 94 032001	M. Artuso *et al.*	(CLEO Collab.)	REFID=50454
EDWARDS	99	PR D59 032003	K.W. Edwards *et al.*	(CLEO Collab.)	REFID=46612
SKWARNICKI	87	PRL 58 972	T. Skwarnicki *et al.*	(Crystal Ball Collab.) J	REFID=40019
WALK	86	PR D34 2611	W.S. Walk *et al.*	(Crystal Ball Collab.)	REFID=22290
ALBRECHT	85E	PL 160B 331	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=22288
NERNST	85	PRL 54 2195	R. Nernst *et al.*	(Crystal Ball Collab.)	REFID=22289
HAAS	84	PRL 52 799	J. Haas *et al.*	(CLEO Collab.)	REFID=22287
KLOPFEN...	83	PRL 51 160	C. Klopfenstein *et al.*	(CUSB Collab.)	REFID=22285
PAUSS	83	PL 130B 439	F. Pauss *et al.*	(MPIM, COLU, CORN, LSU+)	REFID=22286

NODE=M200

$\eta_b(2S)$

$I^G(J^{PC}) = 0^+(0^{-+})$

OMITTED FROM SUMMARY TABLE

Quantum numbers shown are quark-model predictions.

NODE=M200

$\eta_b(2S)$ MASS

NODE=M200M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{9999.0\pm3.5^{+2.8}_{-1.9}}$	26k	[1] MIZUK	12	BELL	$e^+e^- \to \gamma\pi^+\pi^-$ + hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
9974.6±2.3±2.1	11 ± 4	[2,3,4] DOBBS	12		$\Upsilon(2S) \to \gamma$ hadrons

[1] Assuming $\Gamma_{\eta_b(2S)}$ = 4.9 MeV. Not independent of the corresponding mass difference measurement.

NODE=M200M;LINKAGE=MI

[2] SANDILYA 13 (Belle Collab.) search for such a state reconstructed in the same 26 exclusive hadronic final states as DOBBS 12 using a sample of $(157.8\pm3.6)\times10^6$ $\Upsilon(2S)$ decays or about 17 times larger and find no evidence for a signal. Their 90% C.L. upper limit on the branching fraction $B(\Upsilon(2S) \to \eta_b(2S)\gamma) \times \sum_i B(\eta_b(2S) \to X_i) < 4.9\times10^{-6}$, summed over the exclusive hadronic final states X_i, is an order of magnitude smaller than that reported by DOBBS 12.

NODE=M200M;LINKAGE=A

[3] Obtained by analyzing CLEO III data but not authored by the CLEO Collaboration.

NODE=M200M;LINKAGE=DO

[4] Assuming $\Gamma_{\eta_b(2S)}$ = 5 MeV. Not independent of the corresponding mass difference measurement.

NODE=M200M;LINKAGE=NI

$m_{\Upsilon(2S)} - m_{\eta_b(2S)}$

NODE=M200DM

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*	
$\mathbf{24.3 \pm 3.5^{+2.8}_{-1.9}}$	26k	[5] MIZUK	12	BELL	$e^+ e^- \to \gamma \pi^+ \pi^- +$ hadrons	NODE=M200DM
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$48.7 \pm 2.3 \pm 2.1$	11 ± 4	[6,7,8] DOBBS	12		$\Upsilon(2S) \to \gamma$ hadrons	

[5] Assuming $\Gamma_{\eta_b(2S)} = 4.9$ MeV. Not independent of the corresponding mass measurement. NODE=M200DM;LINKAGE=MI

[6] SANDILYA 13 (Belle Collab.) search for such a state reconstructed in the same 26 exclusive hadronic final states as DOBBS 12 using a sample of $(157.8 \pm 3.6) \times 10^6$ $\Upsilon(2S)$ decays or about 17 times larger and find no evidence for a signal. Their 90% C.L. upper limit on the branching fraction $B(\Upsilon(2S) \to \eta_b(2S)\gamma) \times \sum_i B(\eta_b(2S) \to X_i) < 4.9 \times 10^{-6}$, summed over the exclusive hadronic final states X_i, is an order of magnitude smaller than that reported by DOBBS 12. NODE=M200DM;LINKAGE=A

[7] Obtained by analyzing CLEO III data but not authored by the CLEO Collaboration. NODE=M200DM;LINKAGE=DO

[8] Assuming $\Gamma_{\eta_b(2S)} = 5$ MeV. Not independent of the corresponding mass measurement. NODE=M200DM;LINKAGE=NI

$\eta_b(2S)$ WIDTH

NODE=M200W

VALUE (MeV)	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*	
<24	90	MIZUK	12	BELL	$e^+ e^- \to \gamma \pi^+ \pi^-$ hadrons	NODE=M200W

$\eta_b(2S)$ DECAY MODES

NODE=M200215;NODE=M200

	Mode	Fraction (Γ_i/Γ)	
Γ_1	hadrons	seen	DESIG=1

$\eta_b(2S)$ BRANCHING RATIOS

NODE=M200225

$\Gamma(\text{hadrons})/\Gamma_{\text{total}}$ — Γ_1/Γ

NODE=M200R01

VALUE	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*	
seen	26k	MIZUK	12	BELL	$e^+ e^- \to \gamma \pi^+ \pi^-$ hadrons	NODE=M200R01
• • • We do not use the following data for averages, fits, limits, etc. • • •						
seen		[9,10] DOBBS	12		$\Upsilon(2S) \to \gamma$ hadrons	

[9] SANDILYA 13 (Belle Collab.) search for such a state reconstructed in the same 26 exclusive hadronic final states as DOBBS 12 using a sample of $(157.8 \pm 3.6) \times 10^6$ $\Upsilon(2S)$ decays or about 17 times larger and find no evidence for a signal. Their 90% C.L. upper limit on the branching fraction $B(\Upsilon(2S) \to \eta_b(2S)\gamma) \times \sum_i B(\eta_b(2S) \to X_i) < 4.9 \times 10^{-6}$, summed over the exclusive hadronic final states X_i, is an order of magnitude smaller than that reported by DOBBS 12. NODE=M200R01;LINKAGE=A

[10] Obtained by analyzing CLEO III data but not authored by the CLEO Collaboration. NODE=M200R01;LINKAGE=DO

$\eta_b(2S)$ REFERENCES

NODE=M200

SANDILYA	13	PRL 111 112001	S. Sandilya *et al.*	(BELLE Collab.)	REFID=55590
DOBBS	12	PRL 109 082001	S. Dobbs *et al.*		REFID=54288
MIZUK	12	PRL 109 232002	R. Mizuk *et al.*	(BELLE Collab.)	REFID=54718

NODE=M052

$\Upsilon(2S)$

$I^G(J^{PC}) = 0^-(1^{--})$

$\Upsilon(2S)$ MASS

NODE=M052M

NODE=M052M

VALUE (MeV)		DOCUMENT ID		TECN	COMMENT
10023.26±0.31 OUR AVERAGE					
10023.5 ±0.5	[1]	ARTAMONOV	00	MD1	$e^+e^- \to$ hadrons
10023.1 ±0.4		BARBER	84	REDE	$e^+e^- \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
10023.6 ±0.5	[2,3]	BARU	86B	REDE	$e^+e^- \to$ hadrons

[1] Reanalysis of BARU 86B using new electron mass (COHEN 87). NODE=M052M;LINKAGE=AR
[2] Reanalysis of ARTAMONOV 84. NODE=M052M;LINKAGE=C
[3] Superseded by ARTAMONOV 00. NODE=M052M;LINKAGE=RZ

$m_{\Upsilon(3S)} - m_{\Upsilon(2S)}$

NODE=M052DM3

NODE=M052DM3

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
331.50±0.02±0.13	LEES	11C	BABR	$e^+e^- \to \pi^+\pi^- X$

$\Upsilon(2S)$ WIDTH

NODE=M052W

NODE=M052W

VALUE (keV)	DOCUMENT ID
31.98±2.63 OUR EVALUATION	See the Note on "Width Determinations of the Υ States"

→ UNCHECKED ←

$\Upsilon(2S)$ DECAY MODES

NODE=M052215;NODE=M052

	Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	
Γ_1	$\Upsilon(1S)\pi^+\pi^-$	(17.85± 0.26) %		DESIG=4
Γ_2	$\Upsilon(1S)\pi^0\pi^0$	(8.6 ± 0.4) %		DESIG=5
Γ_3	$\tau^+\tau^-$	(2.00± 0.21) %		DESIG=3
Γ_4	$\mu^+\mu^-$	(1.93± 0.17) %	S=2.2	DESIG=1
Γ_5	e^+e^-	(1.91± 0.16) %		DESIG=2
Γ_6	$\Upsilon(1S)\pi^0$	< 4 $\times 10^{-5}$	CL=90%	DESIG=10
Γ_7	$\Upsilon(1S)\eta$	(2.9 ± 0.4) $\times 10^{-4}$	S=2.0	DESIG=6
Γ_8	$J/\psi(1S)$ anything	< 6 $\times 10^{-3}$	CL=90%	DESIG=20
Γ_9	$J/\psi(1S)\eta_c$	< 5.4 $\times 10^{-6}$	CL=90%	DESIG=143
Γ_{10}	$J/\psi(1S)\chi_{c0}$	< 3.4 $\times 10^{-6}$	CL=90%	DESIG=144
Γ_{11}	$J/\psi(1S)\chi_{c1}$	< 1.2 $\times 10^{-6}$	CL=90%	DESIG=145
Γ_{12}	$J/\psi(1S)\chi_{c2}$	< 2.0 $\times 10^{-6}$	CL=90%	DESIG=146
Γ_{13}	$J/\psi(1S)\eta_c(2S)$	< 2.5 $\times 10^{-6}$	CL=90%	DESIG=147
Γ_{14}	$J/\psi(1S)X(3940)$	< 2.0 $\times 10^{-6}$	CL=90%	DESIG=148
Γ_{15}	$J/\psi(1S)X(4160)$	< 2.0 $\times 10^{-6}$	CL=90%	DESIG=149
Γ_{16}	χ_{c1} anything	(2.2 ± 0.5) $\times 10^{-4}$		DESIG=157
Γ_{17}	$\chi_{c1}(1P)^0 X_{tetra}$	< 3.67 $\times 10^{-5}$	CL=90%	DESIG=160
Γ_{18}	χ_{c2} anything	(2.3 ± 0.8) $\times 10^{-4}$		DESIG=158
Γ_{19}	$\psi(2S)\eta_c$	< 5.1 $\times 10^{-6}$	CL=90%	DESIG=150
Γ_{20}	$\psi(2S)\chi_{c0}$	< 4.7 $\times 10^{-6}$	CL=90%	DESIG=151
Γ_{21}	$\psi(2S)\chi_{c1}$	< 2.5 $\times 10^{-6}$	CL=90%	DESIG=152
Γ_{22}	$\psi(2S)\chi_{c2}$	< 1.9 $\times 10^{-6}$	CL=90%	DESIG=153
Γ_{23}	$\psi(2S)\eta_c(2S)$	< 3.3 $\times 10^{-6}$	CL=90%	DESIG=154
Γ_{24}	$\psi(2S)X(3940)$	< 3.9 $\times 10^{-6}$	CL=90%	DESIG=155
Γ_{25}	$\psi(2S)X(4160)$	< 3.9 $\times 10^{-6}$	CL=90%	DESIG=156
Γ_{26}	$Z_c(3900)^+ Z_c(3900)^-$	< 1.0 $\times 10^{-6}$	CL=90%	DESIG=162
Γ_{27}	$Z_c(4200)^+ Z_c(4200)^-$	< 1.67 $\times 10^{-5}$	CL=90%	DESIG=163
Γ_{28}	$Z_c(3900)^\pm Z_c(4200)^\mp$	< 7.3 $\times 10^{-6}$	CL=90%	DESIG=164
Γ_{29}	$X(4050)^+ X(4050)^-$	< 1.35 $\times 10^{-5}$	CL=90%	DESIG=165

Γ_{30}	$X(4250)^+ X(4250)^-$	< 2.67	$\times 10^{-5}$	CL=90%	DESIG=166
Γ_{31}	$X(4050)^{\pm} X(4250)^{\mp}$	< 2.72	$\times 10^{-5}$	CL=90%	DESIG=167
Γ_{32}	$Z_c(4430)^+ Z_c(4430)^-$	< 2.03	$\times 10^{-5}$	CL=90%	DESIG=168
Γ_{33}	$X(4055)^{\pm} X(4055)^{\mp}$	< 1.11	$\times 10^{-5}$	CL=90%	DESIG=170
Γ_{34}	$X(4055)^{\pm} Z_c(4430)^{\mp}$	< 2.11	$\times 10^{-5}$	CL=90%	DESIG=171
Γ_{35}	$\overline{^2H}$ anything	$(2.78^{+0.30}_{-0.26})$	$\times 10^{-5}$	S=1.2	DESIG=16
Γ_{36}	hadrons	(94 ± 11)	%		DESIG=101
Γ_{37}	ggg	(58.8 ± 1.2)	%		DESIG=105
Γ_{38}	γgg	(1.87 ± 0.28)	%		DESIG=106
Γ_{39}	$\phi K^+ K^-$	(1.6 ± 0.4)	$\times 10^{-6}$		DESIG=133
Γ_{40}	$\omega \pi^+ \pi^-$	< 2.58	$\times 10^{-6}$	CL=90%	DESIG=134
Γ_{41}	$K^*(892)^0 K^- \pi^+ +$ c.c.	(2.3 ± 0.7)	$\times 10^{-6}$		DESIG=135
Γ_{42}	$\phi f_2'(1525)$	< 1.33	$\times 10^{-6}$	CL=90%	DESIG=136
Γ_{43}	$\omega f_2(1270)$	< 5.7	$\times 10^{-7}$	CL=90%	DESIG=137
Γ_{44}	$\rho(770) a_2(1320)$	< 8.8	$\times 10^{-7}$	CL=90%	DESIG=138
Γ_{45}	$K^*(892)^0 \overline{K}{}^*_2(1430)^0 +$ c.c.	(1.5 ± 0.6)	$\times 10^{-6}$		DESIG=139
Γ_{46}	$K_1(1270)^{\pm} K^{\mp}$	< 3.22	$\times 10^{-6}$	CL=90%	DESIG=140
Γ_{47}	$K_1(1400)^{\pm} K^{\mp}$	< 8.3	$\times 10^{-7}$	CL=90%	DESIG=141
Γ_{48}	$b_1(1235)^{\pm} \pi^{\mp}$	< 4.0	$\times 10^{-7}$	CL=90%	DESIG=142
Γ_{49}	$\rho \pi$	< 1.16	$\times 10^{-6}$	CL=90%	DESIG=126
Γ_{50}	$\pi^+ \pi^- \pi^0$	< 8.0	$\times 10^{-7}$	CL=90%	DESIG=127
Γ_{51}	$\omega \pi^0$	< 1.63	$\times 10^{-6}$	CL=90%	DESIG=128
Γ_{52}	$\pi^+ \pi^- \pi^0 \pi^0$	(1.30 ± 0.28)	$\times 10^{-5}$		DESIG=129
Γ_{53}	$K^0_S K^+ \pi^- +$ c.c.	(1.14 ± 0.33)	$\times 10^{-6}$		DESIG=130
Γ_{54}	$K^*(892)^0 \overline{K}{}^0 +$ c.c.	< 4.22	$\times 10^{-6}$	CL=90%	DESIG=131
Γ_{55}	$K^*(892)^- K^+ +$ c.c.	< 1.45	$\times 10^{-6}$	CL=90%	DESIG=132
Γ_{56}	$f_1(1285)$ anything	(2.2 ± 1.6)	$\times 10^{-3}$		DESIG=159
Γ_{57}	$f_1(1285) X_{tetra}$	< 6.47	$\times 10^{-5}$	CL=90%	DESIG=161
Γ_{58}	Sum of 100 exclusive modes	(2.90 ± 0.30)	$\times 10^{-3}$		DESIG=121

Radiative decays

NODE=M052;CLUMP=A

Γ_{59}	$\gamma \chi_{b1}(1P)$	(6.9 ± 0.4)	%		DESIG=8
Γ_{60}	$\gamma \chi_{b2}(1P)$	(7.15 ± 0.35)	%		DESIG=7
Γ_{61}	$\gamma \chi_{b0}(1P)$	(3.8 ± 0.4)	%		DESIG=9
Γ_{62}	$\gamma f_0(1710)$	< 5.9	$\times 10^{-4}$	CL=90%	DESIG=13
Γ_{63}	$\gamma f_2'(1525)$	< 5.3	$\times 10^{-4}$	CL=90%	DESIG=12
Γ_{64}	$\gamma f_2(1270)$	< 2.41	$\times 10^{-4}$	CL=90%	DESIG=11
Γ_{65}	$\gamma f_J(2220)$				DESIG=14
Γ_{66}	$\gamma \eta_c(1S)$	< 2.7	$\times 10^{-5}$	CL=90%	DESIG=111
Γ_{67}	$\gamma \chi_{c0}$	< 1.0	$\times 10^{-4}$	CL=90%	DESIG=112
Γ_{68}	$\gamma \chi_{c1}$	< 3.6	$\times 10^{-6}$	CL=90%	DESIG=113
Γ_{69}	$\gamma \chi_{c2}$	< 1.5	$\times 10^{-5}$	CL=90%	DESIG=114
Γ_{70}	$\gamma \chi_{c1}(3872)$	< 2.1	$\times 10^{-5}$	CL=90%	DESIG=172
Γ_{71}	$\gamma \chi_{c1}(3872)$, $\chi_{c1} \to \pi^+ \pi^- \pi^0 J/\psi$	< 2.4	$\times 10^{-6}$	CL=90%	DESIG=116
Γ_{72}	$\gamma X(3915) \to \omega J/\psi$	< 2.8	$\times 10^{-6}$	CL=90%	DESIG=117
Γ_{73}	$\gamma \chi_{c1}(4140) \to \phi J/\psi$	< 1.2	$\times 10^{-6}$	CL=90%	DESIG=118
Γ_{74}	$\gamma X(4350) \to \phi J/\psi$	< 1.3	$\times 10^{-6}$	CL=90%	DESIG=119
Γ_{75}	$\gamma \eta_b(1S)$	$(5.5^{+1.1}_{-0.9})$	$\times 10^{-4}$	S=1.2	DESIG=102
Γ_{76}	$\gamma \eta_b(1S) \to \gamma$ Sum of 26 exclusive modes	< 3.7	$\times 10^{-6}$	CL=90%	DESIG=124
Γ_{77}	$\gamma X_{b\overline{b}} \to \gamma$ Sum of 26 exclusive modes	< 4.9	$\times 10^{-6}$	CL=90%	DESIG=125
Γ_{78}	$\gamma X \to \gamma + \geq 4$ prongs	[a] < 1.95	$\times 10^{-4}$	CL=95%	DESIG=103
Γ_{79}	$\gamma A^0 \to \gamma$ hadrons	< 8	$\times 10^{-5}$	CL=90%	DESIG=108
Γ_{80}	$\gamma a_1^0 \to \gamma \mu^+ \mu^-$	< 8.3	$\times 10^{-6}$	CL=90%	DESIG=123

Lepton Family number (*LF*) violating modes

Γ_{81}	$e^{\pm}\tau^{\mp}$	*LF*	$<$ 3.2	$\times 10^{-6}$	CL=90%
Γ_{82}	$\mu^{\pm}\tau^{\mp}$	*LF*	$<$ 3.3	$\times 10^{-6}$	CL=90%

NODE=M052;CLUMP=B
DESIG=107
DESIG=104

[*a*] 1.5 GeV $< m_X <$ 5.0 GeV

LINKAGE=C52

CONSTRAINED FIT INFORMATION

An overall fit to 3 branching ratios uses 13 measurements and one constraint to determine 3 parameters. The overall fit has a $\chi^2 =$ 11.8 for 11 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\left\langle\delta x_i \delta x_j\right\rangle/(\delta x_i \cdot \delta x_j)$, in percent, from the fit to the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_7	2
	x_1

$\Upsilon(2S)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma(\text{total})$

NODE=M052218

$\Gamma(\mu^+\mu^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_4\Gamma_5/\Gamma$

NODE=M052G1
NODE=M052G1

VALUE (eV)	*DOCUMENT ID*		*TECN*	*COMMENT*
6.5±1.5±1.0	KOBEL	92	CBAL	$e^+e^- \to \mu^+\mu^-$

$\Gamma(\Upsilon(1S)\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_1\Gamma_5/\Gamma$

NODE=M052G03
NODE=M052G03

VALUE (eV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
105.4±1.0±4.2	11.8k	[1] AUBERT	08BP	BABR	10.58 $e^+e^- \to \gamma\pi^+\pi^-\ell^+\ell^-$

[1] Using B($\Upsilon(1S) \to e^+e^-$) = (2.38 ± 0.11)% and B($\Upsilon(1S) \to \mu^+\mu^-$) = (2.48 ± 0.05)%.

NODE=M052G03;LINKAGE=AU

$\Gamma(\text{hadrons}) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{36}\Gamma_5/\Gamma$

NODE=M052G2
NODE=M052G2

VALUE (keV)	*DOCUMENT ID*		*TECN*	*COMMENT*
0.577±0.009 OUR AVERAGE				
0.581±0.004±0.009	[1] ROSNER	06	CLEO	10.0 $e^+e^- \to$ hadrons
0.552±0.031±0.017	[1] BARU	96	MD1	$e^+e^- \to$ hadrons
0.54 ±0.04 ±0.02	[1] JAKUBOWSKI	88	CBAL	$e^+e^- \to$ hadrons
0.58 ±0.03 ±0.04	[2] GILES	84B	CLEO	$e^+e^- \to$ hadrons
0.60 ±0.12 ±0.07	[2] ALBRECHT	82	DASP	$e^+e^- \to$ hadrons
0.54 ±0.07 $^{+0.09}_{-0.05}$	[2] NICZYPORUK	81C	LENA	$e^+e^- \to$ hadrons
0.41 ±0.18	[2] BOCK	80	CNTR	$e^+e^- \to$ hadrons

[1] Radiative corrections evaluated following KURAEV 85.
[2] Radiative corrections reevaluated by BUCHMUELLER 88 following KURAEV 85.

NODE=M052G2;LINKAGE=P
NODE=M052G2;LINKAGE=R

$\Upsilon(2S)$ PARTIAL WIDTHS

NODE=M052220

$\Gamma(e^+e^-)$ — Γ_5

NODE=M052W2
NODE=M052W2

VALUE (keV)	*DOCUMENT ID*
0.612±0.011 OUR EVALUATION	

→ UNCHECKED ←

$\Upsilon(2S)$ BRANCHING RATIOS

NODE=M052225

$\Gamma(\Upsilon(1S)\pi^+\pi^-)/\Gamma_{total}$ — Γ_1/Γ

NODE=M052R4

Abbreviation MM in the *COMMENT* field below stands for missing mass.

NODE=M052R4
NODE=M052R4

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
17.85±0.26 OUR FIT					
17.92±0.26 OUR AVERAGE					
16.8 ±1.1 ±1.3	906k	[1] LEES	11C	BABR	$e^+e^- \to \pi^+\pi^- X$
17.80±0.05±0.37	170k	[2] LEES	11L	BABR	$\Upsilon(2S) \to \pi^+\pi^-\mu^+\mu^-$
18.02±0.02±0.61	851k	[3] BHARI	09	CLEO	$e^+e^- \to \pi^+\pi^-$ MM
17.22±0.17±0.75	11.8k	[4] AUBERT	08BP	BABR	$e^+e^- \to \gamma\pi^+\pi^-\ell^+\ell^-$
19.2 ±0.2 ±1.0	52.6k	[5] ALEXANDER	98	CLE2	$\pi^+\pi^-\ell^+\ell^-$, $\pi^+\pi^-$ MM

18.1 ±0.5 ±1.0	11.6k	ALBRECHT	87	ARG	$e^+e^- \rightarrow \pi^+\pi^-$ MM
16.9 ±4.0		GELPHMAN	85	CBAL	$e^+e^- \rightarrow e^+e^-\pi^+\pi^-$
19.1 ±1.2 ±0.6		BESSON	84	CLEO	$\pi^+\pi^-$ MM
18.9 ±2.6		FONSECA	84	CUSB	$e^+e^- \rightarrow \ell^+\ell^-\pi^+\pi^-$
21 ±7	7	NICZYPORUK	81B	LENA	$e^+e^- \rightarrow \ell^+\ell^-\pi^+\pi^-$

[1] LEES 11C reports $[\Gamma(\Upsilon(2S) \rightarrow \Upsilon(1S)\pi^+\pi^-)/\Gamma_{total}] \times [B(\Upsilon(3S) \rightarrow \Upsilon(2S)\text{anything})] = (1.78 \pm 0.02 \pm 0.11) \times 10^{-2}$ which we divide by our best value $B(\Upsilon(3S) \rightarrow \Upsilon(2S)\text{anything}) = (10.6 \pm 0.8) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M052R4;LINKAGE=ES

[2] Using $B(\Upsilon(1S) \rightarrow \mu^+\mu^-) = (2.48 \pm 0.05)\%$. NODE=M052R4;LINKAGE=LE

[3] A weighted average of the inclusive and exclusive results. NODE=M052R4;LINKAGE=BH

[4] Using $B(\Upsilon(2S) \rightarrow e^+e^-) = (1.91 \pm 0.16)\%$, $B(\Upsilon(2S) \rightarrow \mu^+\mu^-) = (1.93 \pm 0.17)\%$ and, $\Gamma_{ee}(\Upsilon(2S)) = 0.612 \pm 0.011$ keV. NODE=M052R4;LINKAGE=AU

[5] Using $B(\Upsilon(1S) \rightarrow e^+e^-) = (2.52 \pm 0.17)\%$ and $B(\Upsilon(1S) \rightarrow \mu^+\mu^-) = (2.48 \pm 0.07)\%$. NODE=M052R4;LINKAGE=T

$\Gamma(\Upsilon(1S)\pi^0\pi^0)/\Gamma_{total}$ Γ_2/Γ

NODE=M052R5
NODE=M052R5

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
8.6 ±0.4 OUR AVERAGE					
8.43±0.16±0.42	38k	[1] BHARI	09	CLEO	$e^+e^- \rightarrow \pi^0\pi^0\ell^+\ell^-$
9.2 ±0.6 ±0.8	275	[2] ALEXANDER	98	CLE2	$e^+e^- \rightarrow \pi^0\pi^0\ell^+\ell^-$
9.5 ±1.9 ±1.9	25	ALBRECHT	87	ARG	$e^+e^- \rightarrow \pi^0\pi^0\ell^+\ell^-$
8.0 ±1.5		GELPHMAN	85	CBAL	$e^+e^- \rightarrow \pi^0\pi^0\ell^+\ell^-$
10.3 ±2.3		FONSECA	84	CUSB	$e^+e^- \rightarrow \pi^0\pi^0\ell^+\ell^-$

[1] Authors assume $B(\Upsilon(1S) \rightarrow e^+e^-) + B(\Upsilon(1S) \rightarrow \mu^+\mu^-) = 4.96\%$. NODE=M052R5;LINKAGE=BH

[2] Using $B(\Upsilon(1S) \rightarrow e^+e^-) = (2.52 \pm 0.17)\%$ and $B(\Upsilon(1S) \rightarrow \mu^+\mu^-) = (2.48 \pm 0.07)\%$. NODE=M052R5;LINKAGE=T

$\Gamma(\Upsilon(1S)\pi^0\pi^0)/\Gamma(\Upsilon(1S)\pi^+\pi^-)$ Γ_2/Γ_1

NODE=M052R21
NODE=M052R21

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.462±0.037	[1] BHARI	09	CLEO	$e^+e^- \rightarrow \Upsilon(2S)$

[1] Not independent of other values reported by BHARI 09. NODE=M052R21;LINKAGE=BH

$\Gamma(\tau^+\tau^-)/\Gamma_{total}$ Γ_3/Γ

NODE=M052R3
NODE=M052R3

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
2.00±0.21 OUR AVERAGE					
2.00±0.12±0.18	22k	[1] BESSON	07	CLEO	$e^+e^- \rightarrow \Upsilon(2S) \rightarrow \tau^+\tau^-$
1.7 ±1.5 ±0.6		HAAS	84B	CLEO	$e^+e^- \rightarrow \tau^+\tau^-$

[1] BESSON 07 reports $[\Gamma(\Upsilon(2S) \rightarrow \tau^+\tau^-)/\Gamma_{total}] / [B(\Upsilon(2S) \rightarrow \mu^+\mu^-)] = 1.04 \pm 0.04 \pm 0.05$ which we multiply by our best value $B(\Upsilon(2S) \rightarrow \mu^+\mu^-) = (1.93 \pm 0.17) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M052R3;LINKAGE=BE

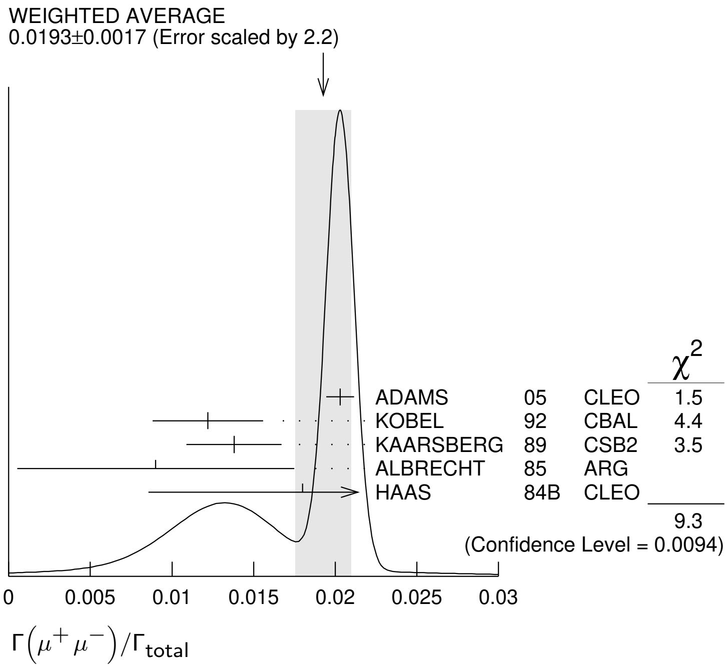
$\Gamma(\mu^+\mu^-)/\Gamma_{total}$ Γ_4/Γ

NODE=M052R1
NODE=M052R1

VALUE	*CL%*	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.0193±0.0017 OUR AVERAGE Error includes scale factor of 2.2. See the ideogram below.						
0.0203±0.0003±0.0008		120k	ADAMS	05	CLEO	$e^+e^- \rightarrow \mu^+\mu^-$
0.0122±0.0028±0.0019			[1] KOBEL	92	CBAL	$e^+e^- \rightarrow \mu^+\mu^-$
0.0138±0.0025±0.0015			KAARSBERG	89	CSB2	$e^+e^- \rightarrow \mu^+\mu^-$
0.009 ±0.006 ±0.006			[2] ALBRECHT	85	ARG	$e^+e^- \rightarrow \mu^+\mu^-$
0.018 ±0.008 ±0.005			HAAS	84B	CLEO	$e^+e^- \rightarrow \mu^+\mu^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.038	90		NICZYPORUK	81C	LENA	$e^+e^- \rightarrow \mu^+\mu^-$

[1] Taking into account interference between the resonance and continuum. NODE=M052R1;LINKAGE=A

[2] Re-evaluated using $B(\Upsilon(1S) \rightarrow \mu^+\mu^-) = 0.026$. NODE=M052R1;LINKAGE=R



$\Gamma(\tau^+\tau^-)/\Gamma(\mu^+\mu^-)$ Γ_3/Γ_4

NODE=M052R17

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
1.04±0.04±0.05	22k	BESSON	07	CLEO	$e^+e^- \to \Upsilon(2S)$

$\Gamma(\Upsilon(1S)\pi^0)/\Gamma_{total}$ Γ_6/Γ

NODE=M052R10

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 4	90	[1] TAMPONI	13	BELL	$e^+e^- \to \Upsilon(1S)\pi^0$
< 18	90	[2] HE	08A	CLEO	$e^+e^- \to \ell^+\ell^-\gamma\gamma$
<110	90	ALEXANDER	98	CLE2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$
<800	90	LURZ	87	CBAL	$e^+e^- \to \ell^+\ell^-\gamma\gamma$

[1] TAMPONI 13 reports $[\Gamma(\Upsilon(2S) \to \Upsilon(1S)\pi^0)/\Gamma_{total}]$ / $[B(\Upsilon(2S) \to \Upsilon(1S)\pi^+\pi^-)]$ $< 2.3 \times 10^{-4}$ which we multiply by our best value $B(\Upsilon(2S) \to \Upsilon(1S)\pi^+\pi^-) = 17.85 \times 10^{-2}$. NODE=M052R10;LINKAGE=TA

[2] Authors assume $B(\Upsilon(1S) \to e^+e^-) + B(\Upsilon(1S) \to \mu^+\mu^-) = 4.96\%$. NODE=M052R10;LINKAGE=HE

$\Gamma(\Upsilon(1S)\pi^0)/\Gamma(\Upsilon(1S)\pi^+\pi^-)$ Γ_6/Γ_1

NODE=M052R09

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<2.3	90	TAMPONI	13	BELL	$e^+e^- \to \Upsilon(1S)\pi^0$

$\Gamma(\Upsilon(1S)\eta)/\Gamma_{total}$ Γ_7/Γ

NODE=M052R6

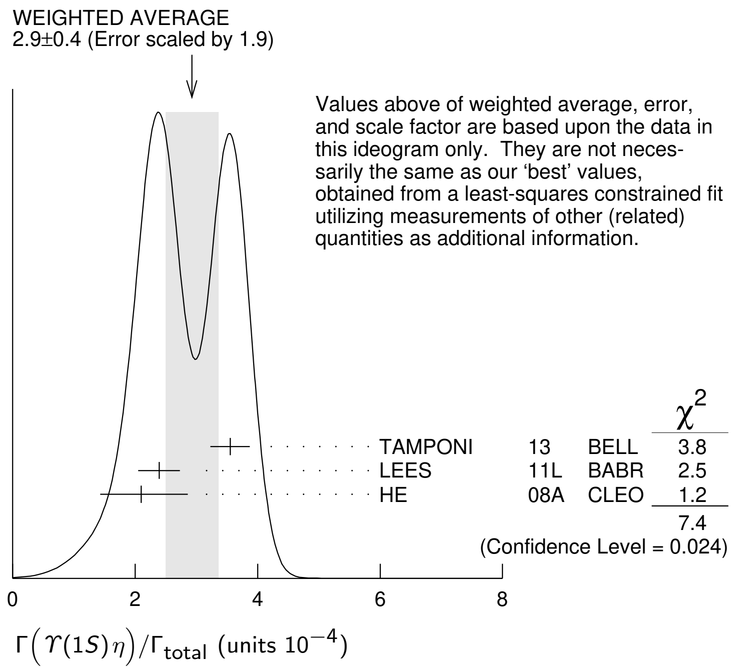
VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
2.9 ±0.4 OUR FIT Error includes scale factor of 2.0.						
2.9 ±0.4 OUR AVERAGE Error includes scale factor of 1.9. See the ideogram below.						
2.39±0.31±0.14		112	[1] LEES	11L	BABR	$\Upsilon(2S) \to \ell^+\ell^-\eta$
2.1 $^{+0.7}_{-0.6}$ ±0.3		14	[2] HE	08A	CLEO	$e^+e^- \to \ell^+\ell^-\eta$
• • • We use the following data for averages but not for fits. • • •						
3.55±0.32±0.05		241	[3] TAMPONI	13	BELL	$e^+e^- \to \Upsilon(1S)\eta$ NOTFITTED
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 9	90		[1,4] AUBERT	08BP	BABR	$e^+e^- \to \gamma\pi^+\pi^-\pi^0\ell^+\ell^-$
< 28	90		ALEXANDER	98	CLE2	$e^+e^- \to \ell^+\ell^-\eta$
< 50	90		ALBRECHT	87	ARG	$e^+e^- \to \pi^+\pi^-\ell^+\ell^-$ MM
< 70	90		LURZ	87	CBAL	$e^+e^- \to \ell^+\ell^-(\gamma\gamma,\ 3\pi^0)$
< 100	90		BESSON	84	CLEO	$e^+e^- \to \pi^+\pi^-\ell^+\ell^-$ MM
< 20	90		FONSECA	84	CUSB	$e^+e^- \to \ell^+\ell^-(\gamma\gamma,\pi^+\pi^-\pi^0)$

[1] Using B($\Upsilon(1S) \to e^+e^-$) = (2.38 ± 0.11)% and B($\Upsilon(1S) \to \mu^+\mu^-$) = (2.48 ± 0.05)%. NODE=M052R6;LINKAGE=AU

[2] Authors assume B($\Upsilon(1S) \to e^+e^-$) + B($\Upsilon(1S) \to \mu^+\mu^-$) = 4.96%. NODE=M052R6;LINKAGE=HE

[3] TAMPONI 13 reports [$\Gamma(\Upsilon(2S) \to \Upsilon(1S)\eta)/\Gamma_{total}$] / [B($\Upsilon(2S) \to \Upsilon(1S)\pi^+\pi^-$)] = (1.99 ± 0.14 ± 0.11) × 10^{-3} which we multiply by our best value B($\Upsilon(2S) \to \Upsilon(1S)\pi^+\pi^-$) = (17.85 ± 0.26) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M052R6;LINKAGE=TA

[4] Using $\Gamma_{ee}(\Upsilon(2S))$ = 0.612 ± 0.011 keV. NODE=M052R6;LINKAGE=UB



$\Gamma(\Upsilon(1S)\eta)/\Gamma(\Upsilon(1S)\pi^+\pi^-)$ — Γ_7/Γ_1

NODE=M052R22
NODE=M052R22

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
1.64±0.25 OUR FIT Error includes scale factor of 2.0.						
1.99±0.14±0.11		241	TAMPONI	13	BELL	$e^+e^- \to \Upsilon(1S)\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1.35±0.17±0.08			[1] LEES	11L	BABR	$\Upsilon(2S) \to (\pi^+\pi^-)(\gamma\gamma)\mu^+\mu^-$
< 5.2	90		[2] AUBERT	08BP	BABR	$e^+e^- \to \gamma\pi^+\pi^-(\pi^0)\ell^+\ell^-$

[1] Not independent of other values reported by LEES 11L. NODE=M052R22;LINKAGE=LE

[2] Not independent of other values reported by AUBERT 08BP. NODE=M052R22;LINKAGE=AU

$\Gamma(\Upsilon(1S)\pi^0)/\Gamma(\Upsilon(1S)\eta)$ — Γ_6/Γ_7

NODE=M052R23
NODE=M052R23

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.13	90	TAMPONI	13	BELL	$e^+e^- \to \Upsilon(1S)\pi^0$

$\Gamma(J/\psi(1S)\text{ anything})/\Gamma_{total}$ — Γ_8/Γ

NODE=M052R16
NODE=M052R16

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.006	90	MASCHMANN	90	CBAL	$e^+e^- \to$ hadrons

$\Gamma(J/\psi(1S)\eta_c)/\Gamma_{total}$ — Γ_9/Γ

NODE=M052R53
NODE=M052R53

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<5.4 × 10^{-6}	90	YANG	14	BELL	$e^+e^- \to J/\psi X$

$\Gamma(J/\psi(1S)\chi_{c0})/\Gamma_{total}$ — Γ_{10}/Γ

NODE=M052R54
NODE=M052R54

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<3.4 × 10^{-6}	90	YANG	14	BELL	$e^+e^- \to J/\psi X$

$\Gamma(J/\psi(1S)\chi_{c1})/\Gamma_{total}$ — Γ_{11}/Γ

NODE=M052R55
NODE=M052R55

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.2 × 10^{-6}	90	YANG	14	BELL	$e^+e^- \to J/\psi X$

$\Gamma(J/\psi(1S)\chi_{c2})/\Gamma_{total}$ — Γ_{12}/Γ

NODE=M052R56
NODE=M052R56

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<2.0 × 10^{-6}	90	YANG	14	BELL	$e^+e^- \to J/\psi X$

$\Gamma(J/\psi(1S)\eta_c(2S))/\Gamma_{total}$ — Γ_{13}/Γ

NODE=M052R57
NODE=M052R57

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<2.5 × 10^{-6}	90	YANG	14	BELL	$e^+e^- \to J/\psi X$

$\Gamma(J/\psi(1S)X(3940))/\Gamma_{total}$ — Γ_{14}/Γ

NODE=M052R58
NODE=M052R58

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<2.0 × 10^{-6}	90	YANG	14	BELL	$e^+e^- \to J/\psi X$

$\Gamma(J/\psi(1S)X(4160))/\Gamma_{total}$ — Γ_{15}/Γ

NODE=M052R59
NODE=M052R59

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<2.0 × 10^{-6}	90	YANG	14	BELL	$e^+e^- \to J/\psi X$

$\Gamma(\chi_{c1}\text{ anything})/\Gamma_{total}$ — Γ_{16}/Γ

NODE=M052R00
NODE=M052R00

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.24±0.44±0.20	376	JIA	17	BELL	$\Upsilon(2S) \to \gamma J/\psi(1S)$

$\Gamma(\chi_{c1}(1P)^0 X_{tetra})/\Gamma_{total}$ — Γ_{17}/Γ

NODE=M052R69
NODE=M052R69

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<36.7 × 10^{-6}	90	[1] JIA	17A	BELL	$e^+e^- \to$ hadrons

[1] For a tetraquark state X_{tetra}, with mass in the range 1.16–2.46 GeV and width in the range 0–0.3 GeV. Measured 90% CL limits as a function of X_{tetra} mass and width range from 4.4×10^{-6} to 36.7×10^{-6}.

NODE=M052R69;LINKAGE=A

$\Gamma(\chi_{c2}\text{ anything})/\Gamma_{total}$ — Γ_{18}/Γ

NODE=M052R67
NODE=M052R67

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
2.28±0.73±0.34	JIA	17	BELL	$\Upsilon(2S) \to \gamma J/\psi(1S)$

$\Gamma(\psi(2S)\eta_c)/\Gamma_{total}$ — Γ_{19}/Γ

NODE=M052R60
NODE=M052R60

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<5.1 × 10^{-6}	90	YANG	14	BELL	$e^+e^- \to \psi(2S)X$

$\Gamma(\psi(2S)\chi_{c0})/\Gamma_{total}$ — Γ_{20}/Γ

NODE=M052R61
NODE=M052R61

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<4.7 × 10^{-6}	90	YANG	14	BELL	$e^+e^- \to \psi(2S)X$

$\Gamma(\psi(2S)\chi_{c1})/\Gamma_{total}$ — Γ_{21}/Γ

NODE=M052R62
NODE=M052R62

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<2.5 × 10^{-6}	90	YANG	14	BELL	$e^+e^- \to \psi(2S)X$

$\Gamma(\psi(2S)\chi_{c2})/\Gamma_{total}$ — Γ_{22}/Γ

NODE=M052R63
NODE=M052R63

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.9 × 10^{-6}	90	YANG	14	BELL	$e^+e^- \to \psi(2S)X$

$\Gamma(\psi(2S)\eta_c(2S))/\Gamma_{total}$ — Γ_{23}/Γ

NODE=M052R64
NODE=M052R64

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<3.3 × 10^{-6}	90	YANG	14	BELL	$e^+e^- \to \psi(2S)X$

$\Gamma(\psi(2S)X(3940))/\Gamma_{total}$ — Γ_{24}/Γ

NODE=M052R65
NODE=M052R65

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<3.9 × 10^{-6}	90	YANG	14	BELL	$e^+e^- \to \psi(2S)X$

$\Gamma(\psi(2S)X(4160))/\Gamma_{total}$ — Γ_{25}/Γ

NODE=M052R66
NODE=M052R66

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<3.9 × 10^{-6}	90	YANG	14	BELL	$e^+e^- \to \psi(2S)X$

$\Gamma(Z_c(3900)^+ Z_c(3900)^-)/\Gamma_{total}$ — Γ_{26}/Γ

NODE=M052R71
NODE=M052R71

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.0 × 10^{-6}	90	[1] JIA	18	BELL	$\Upsilon(2S) \to J/\psi\pi^\pm X$

[1] Assuming $B(Z_c(3900)^\pm \to J/\psi\pi^\pm) = 1$.

NODE=M052R71;LINKAGE=A

$\Gamma(Z_c(4200)^+ Z_c(4200)^-)/\Gamma_{total}$ — Γ_{27}/Γ

NODE=M052R72

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<16.7 × 10^{-6}	90	[1] JIA	18	BELL	$\Upsilon(1S) \to J/\psi \pi^\pm X$

[1] Assuming B($Z_c(4200)^\pm \to J/\psi \pi^\pm$) = 1

NODE=M052R72;LINKAGE=A

$\Gamma(Z_c(3900)^\pm Z_c(4200)^\mp)/\Gamma_{total}$ — Γ_{28}/Γ

NODE=M052R73

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<7.3 × 10^{-6}	90	[1] JIA	18	BELL	$\Upsilon(2S) \to J/\psi \pi^\pm X$

[1] Assuming B($Z_c(4200)^\pm \to J/\psi \pi^\pm$) = 1 = B($Z_c(3900)^\pm \to J/\psi \pi^\pm$).

NODE=M052R73;LINKAGE=A

$\Gamma(X(4050)^+ X(4050)^-)/\Gamma_{total}$ — Γ_{29}/Γ

NODE=M052R74

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<13.5 × 10^{-6}	90	[1] JIA	18	BELL	$\Upsilon(2S) \to \chi_{c1}(1P) \pi^\pm X$

[1] Assuming B($X(4050)^\pm \to \chi_{c1}(1P) \pi^\pm$)

NODE=M052R74;LINKAGE=A

$\Gamma(X(4250)^+ X(4250)^-)/\Gamma_{total}$ — Γ_{30}/Γ

NODE=M052R75

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<26.7 × 10^{-6}	90	[1] JIA	18	BELL	$\Upsilon(2S) \to \chi_{c1}(1P) \pi^\pm X$

[1] Assuming B($X(4250)^\pm \to \chi_{c1}(1P) \pi^\pm$) = 1

NODE=M052R75;LINKAGE=A

$\Gamma(X(4050)^\pm X(4250)^\mp)/\Gamma_{total}$ — Γ_{31}/Γ

NODE=M052R76

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<27.2 × 10^{-6}	90	[1] JIA	18	BELL	$\Upsilon(2S) \to \chi_{c1}(1P) \pi^\pm X$

[1] Assuming B($X(4050)^\pm \to \chi_{c1}(1P) \pi^\pm$) = 1 = B($X(4250)^\pm \to \chi_{c1}(1P) \pi^\pm$)

NODE=M052R76;LINKAGE=A

$\Gamma(Z_c(4430)^+ Z_c(4430)^-)/\Gamma_{total}$ — Γ_{32}/Γ

NODE=M052R77

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<20.3 × 10^{-6}	90	[1] JIA	18	BELL	$\Upsilon(2S) \to \psi(2S) \pi^\pm X$

[1] Assuming B($Z_c(4430)^\pm \to \psi(2P) \pi^\pm$) = 1

NODE=M052R77;LINKAGE=A

$\Gamma(X(4055)^\pm X(4055)^\mp)/\Gamma_{total}$ — Γ_{33}/Γ

NODE=M052R79

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<11.1 × 10^{-6}	90	[1] JIA	18	BELL	$\Upsilon(2S) \to \psi(2S) \pi^\pm X$

[1] Assuming B($X(4055)^\pm \to \psi(2S) \pi^\pm$) = 1

NODE=M052R79;LINKAGE=A

$\Gamma(X(4055)^\pm Z_c(4430)^\mp)/\Gamma_{total}$ — Γ_{34}/Γ

NODE=M052R80

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<21.1 × 10^{-6}	90	[1] JIA	18	BELL	$\Upsilon(2S) \to \psi(2S) \pi^\pm X$

[1] Assuming B($X(4055)^\pm \to \psi(2S) \pi^\pm$) = 1 = B($Z_c(4430)^\pm \to \psi(2S) \pi^\pm$)

NODE=M052R80;LINKAGE=A

$\Gamma(\overline{^2H}$ anything$)/\Gamma_{total}$ — Γ_{35}/Γ

NODE=M052R18

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$2.78^{+0.30}_{-0.26}$ OUR AVERAGE Error includes scale factor of 1.2.					
$2.64 \pm 0.11 {}^{+0.26}_{-0.21}$		LEES	14G	BABR	$e^+ e^- \to \overline{^2H}\, X$
$3.37 \pm 0.50 \pm 0.25$	58	ASNER	07	CLEO	$e^+ e^- \to \overline{^2H}\, X$

$\Gamma(g g g)/\Gamma_{total}$ — Γ_{37}/Γ

NODE=M052R01

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
58.8±1.2	6M	[1] BESSON	06A	CLEO	$\Upsilon(2S) \to$ hadrons

[1] Calculated using the value $\Gamma(\gamma g g)/\Gamma(g g g)$ = (3.18 ± 0.04 ± 0.22 ± 0.41)% from BESSON 06A and PDG 08 values of B($\pi^+ \pi^- \Upsilon(1S)$) = (18.1 ± 0.4)%, B($\pi^0 \pi^0 \Upsilon(1S)$) = (8.6 ± 0.4)%, B($\mu^+ \mu^-$) = (1.93 ± 0.17)%, and $R_{hadrons}$ = 3.51. The statistical error is negligible and the systematic error is partially correlated with that of $\Gamma(\gamma g g)/\Gamma_{total}$ measurement of BESSON 06A.

NODE=M052R01;LINKAGE=BE

$\Gamma(\gamma g g)/\Gamma(g g g)$ — Γ_{38}/Γ_{37}

NODE=M052R03

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
3.18±0.04±0.47	6M	BESSON	06A	CLEO	$\Upsilon(2S) \to (\gamma +)$ hadrons

$\Gamma(\phi K^+ K^-)/\Gamma_{total}$ — Γ_{39}/Γ

NODE=M052R43

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
1.58±0.33±0.18	58	SHEN	12A	BELL	$\Upsilon(1S) \to 2(K^+ K^-)$

$\Gamma(\omega\pi^+\pi^-)/\Gamma_{total}$ — Γ_{40}/Γ

NODE=M052R44

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<2.58	90	SHEN	12A	BELL	$\Upsilon(1S) \rightarrow 2(\pi^+\pi^-)\pi^0$

$\Gamma(K^*(892)^0 K^-\pi^+ + c.c.)/\Gamma_{total}$ — Γ_{41}/Γ

NODE=M052R45

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
2.32±0.40±0.54	135	SHEN	12A	BELL	$\Upsilon(1S) \rightarrow K^+K^-\pi^+\pi^-$

$\Gamma(\phi f_2'(1525))/\Gamma_{total}$ — Γ_{42}/Γ

NODE=M052R46

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<1.33	90	SHEN	12A	BELL	$\Upsilon(1S) \rightarrow 2(K^+K^-)$

$\Gamma(\omega f_2(1270))/\Gamma_{total}$ — Γ_{43}/Γ

NODE=M052R47

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<0.57	90	SHEN	12A	BELL	$\Upsilon(1S) \rightarrow 2(\pi^+\pi^-)\pi^0$

$\Gamma(\rho(770) a_2(1320))/\Gamma_{total}$ — Γ_{44}/Γ

NODE=M052R48

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<0.88	90	SHEN	12A	BELL	$\Upsilon(1S) \rightarrow 2(\pi^+\pi^-)\pi^0$

$\Gamma(K^*(892)^0 \overline{K}_2^*(1430)^0 + c.c.)/\Gamma_{total}$ — Γ_{45}/Γ

NODE=M052R49

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
1.53±0.52±0.19	32	SHEN	12A	BELL	$\Upsilon(1S) \rightarrow K^+K^-\pi^+\pi^-$

$\Gamma(K_1(1270)^\pm K^\mp)/\Gamma_{total}$ — Γ_{46}/Γ

NODE=M052R50

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<3.22	90	SHEN	12A	BELL	$\Upsilon(1S) \rightarrow K^+K^-\pi^+\pi^-$

$\Gamma(K_1(1400)^\pm K^\mp)/\Gamma_{total}$ — Γ_{47}/Γ

NODE=M052R51

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<0.83	90	SHEN	12A	BELL	$\Upsilon(1S) \rightarrow K^+K^-\pi^+\pi^-$

$\Gamma(b_1(1235)^\pm\pi^\mp)/\Gamma_{total}$ — Γ_{48}/Γ

NODE=M052R52

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<0.40	90	SHEN	12A	BELL	$\Upsilon(1S) \rightarrow 2(\pi^+\pi^-)\pi^0$

$\Gamma(\rho\pi)/\Gamma_{total}$ — Γ_{49}/Γ

NODE=M052R27

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<1.16	90	SHEN	13	BELL	$\Upsilon(2S) \rightarrow \pi^+\pi^-\pi^0$

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{50}/Γ

NODE=M052R28

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<0.80	90	SHEN	13	BELL	$\Upsilon(2S) \rightarrow \pi^+\pi^-\pi^0$

$\Gamma(\omega\pi^0)/\Gamma_{total}$ — Γ_{51}/Γ

NODE=M052R29

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<1.63	90	SHEN	13	BELL	$\Upsilon(2S) \rightarrow \pi^+\pi^-\pi^0\pi^0$

$\Gamma(\pi^+\pi^-\pi^0\pi^0)/\Gamma_{total}$ — Γ_{52}/Γ

NODE=M052R30

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
13.0±1.9±2.1	261 ± 37	SHEN	13	BELL	$\Upsilon(2S) \rightarrow \pi^+\pi^-\pi^0\pi^0$

$\Gamma(K_S^0 K^+\pi^- + c.c.)/\Gamma_{total}$ — Γ_{53}/Γ

NODE=M052R40

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
1.14±0.30±0.13		40 ± 10	SHEN	13	BELL	$\Upsilon(2S) \rightarrow K_S^0 K^-\pi^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<3.2	90		[1] DOBBS	12A		$\Upsilon(2S) \rightarrow K_S^0 K^-\pi^+$

[1] Obtained by analyzing CLEO III data but not authored by the CLEO Collaboration.

NODE=M052R40;LINKAGE=DO

$\Gamma(K^*(892)^0 \overline{K}^0 + c.c.)/\Gamma_{total}$ — Γ_{54}/Γ

NODE=M052R41

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<4.22	90	SHEN	13	BELL	$\Upsilon(2S) \rightarrow K_S^0 K^-\pi^+$

$\Gamma(K^*(892)^- K^+ + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_{55}/Γ

NODE=M052R42

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<1.45	90	SHEN	13	BELL	$\Upsilon(2S) \to K^0_S K^- \pi^+$

$\Gamma(f_1(1285)\,\text{anything})/\Gamma_{\text{total}}$ — Γ_{56}/Γ

NODE=M052R68

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
2.20±1.50±0.63	2.9k	JIA	17A	BELL	$e^+ e^- \to$ hadrons

$\Gamma(f_1(1285) X_{tetra})/\Gamma_{\text{total}}$ — Γ_{57}/Γ

NODE=M052R70

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<64.7 × 10⁻⁶	90	[1] JIA	17A	BELL	$e^+ e^- \to$ hadrons

[1] For a tetraquark state X_{tetra}, with mass in the range 1.16–2.46 GeV and width in the range 0–0.3 GeV. Measured 90% CL limits as a function of X_{tetra} mass and width range from 7.8×10^{-6} to 64.7×10^{-6}. NODE=M052R70;LINKAGE=A

$\Gamma(\text{Sum of 100 exclusive modes})/\Gamma_{\text{total}}$ — Γ_{58}/Γ

NODE=M052R08

VALUE (units 10^{-2})	DOCUMENT ID		COMMENT
0.29±0.03	[1,2] DOBBS	12A	$\Upsilon(2S) \to$ hadrons

[1] DOBBS 12A presents individual exclusive branching fractions or upper limits for 100 modes of four to ten pions, kaons, or protons. NODE=M052R08;LINKAGE=DO

[2] Obtained by analyzing CLEO III data but not authored by the CLEO Collaboration. NODE=M052R08;LINKAGE=NC

$\Gamma(\gamma \chi_{b1}(1P))/\Gamma_{\text{total}}$ — Γ_{59}/Γ

NODE=M052R8

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.069 ±0.004 OUR AVERAGE					
0.0693±0.0012±0.0041	407k	ARTUSO	05	CLEO	$e^+ e^- \to \gamma X$
0.069 ±0.005 ±0.009		EDWARDS	99	CLE2	$\Upsilon(2S) \to \gamma \chi(1P)$
0.091 ±0.018 ±0.022		ALBRECHT	85E	ARG	$e^+ e^- \to \gamma$conv. X
0.065 ±0.007 ±0.012		NERNST	85	CBAL	$e^+ e^- \to \gamma$X
0.080 ±0.017 ±0.016		HAAS	84	CLEO	$e^+ e^- \to \gamma$conv. X
0.059 ±0.014		KLOPFEN...	83	CUSB	$e^+ e^- \to \gamma$X

$\Gamma(\gamma \chi_{b2}(1P))/\Gamma_{\text{total}}$ — Γ_{60}/Γ

NODE=M052R7

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0715±0.0035 OUR AVERAGE					
0.0724±0.0011±0.0040	410k	ARTUSO	05	CLEO	$e^+ e^- \to \gamma X$
0.074 ±0.005 ±0.008		EDWARDS	99	CLE2	$\Upsilon(2S) \to \gamma \chi(1P)$
0.098 ±0.021 ±0.024		ALBRECHT	85E	ARG	$e^+ e^- \to \gamma$conv. X
0.058 ±0.007 ±0.010		NERNST	85	CBAL	$e^+ e^- \to \gamma$X
0.102 ±0.018 ±0.021		HAAS	84	CLEO	$e^+ e^- \to \gamma$conv. X
0.061 ±0.014		KLOPFEN...	83	CUSB	$e^+ e^- \to \gamma$X

$\Gamma(\gamma \chi_{b0}(1P))/\Gamma_{\text{total}}$ — Γ_{61}/Γ

NODE=M052R9

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.038 ±0.004 OUR AVERAGE					
0.0375±0.0012±0.0047	198k	ARTUSO	05	CLEO	$e^+ e^- \to \gamma X$
0.034 ±0.005 ±0.006		EDWARDS	99	CLE2	$\Upsilon(2S) \to \gamma \chi(1P)$
0.064 ±0.014 ±0.016		ALBRECHT	85E	ARG	$e^+ e^- \to \gamma$conv. X
0.036 ±0.008 ±0.009		NERNST	85	CBAL	$e^+ e^- \to \gamma$X
0.044 ±0.023 ±0.009		HAAS	84	CLEO	$e^+ e^- \to \gamma$conv. X
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.035 ±0.014		KLOPFEN...	83	CUSB	$e^+ e^- \to \gamma$X

$\Gamma(\gamma f_0(1710))/\Gamma_{\text{total}}$ — Γ_{62}/Γ

NODE=M052R13

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<59	90	[1] ALBRECHT	89	ARG	$\Upsilon(2S) \to \gamma K^+ K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 5.9	90	[2] ALBRECHT	89	ARG	$\Upsilon(2S) \to \gamma \pi^+ \pi^-$

OCCUR=2

[1] Re-evaluated assuming $\text{B}(f_0(1710) \to K^+ K^-) = 0.19$. NODE=M052R13;LINKAGE=M

[2] Includes unknown branching ratio of $f_0(1710) \to \pi^+ \pi^-$. NODE=M052R13;LINKAGE=N

$\Gamma(\gamma f'_2(1525))/\Gamma_{\text{total}}$ — Γ_{63}/Γ

NODE=M052R12

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<53	90	[1] ALBRECHT	89	ARG	$\Upsilon(2S) \to \gamma K^+ K^-$

[1] Re-evaluated assuming $\text{B}(f'_2(1525) \to K\overline{K}) = 0.71$. NODE=M052R12;LINKAGE=L

$\Gamma(\gamma f_2(1270))/\Gamma_{total}$ — Γ_{64}/Γ

NODE=M052R11

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<24.1	90	[1] ALBRECHT	89	ARG	$\Upsilon(2S) \to \gamma\pi^+\pi^-$

[1] Using B($f_2(1270) \to \pi\pi$) = 0.84.

NODE=M052R11;LINKAGE=K

$\Gamma(\gamma f_J(2220))/\Gamma_{total}$ — Γ_{65}/Γ

NODE=M052R14

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<6.8	90	[1] ALBRECHT	89	ARG	$\Upsilon(2S) \to \gamma K^+K^-$

[1] Includes unknown branching ratio of $f_J(2220) \to K^+K^-$.

NODE=M052R14;LINKAGE=S

$\Gamma(\gamma\eta_c(1S))/\Gamma_{total}$ — Γ_{66}/Γ

NODE=M052R31

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.7 \times 10^{-5}$	90	WANG	11B	BELL	$\Upsilon(2S) \to \gamma X$

$\Gamma(\gamma\chi_{c0})/\Gamma_{total}$ — Γ_{67}/Γ

NODE=M052R32

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.0 \times 10^{-4}$	90	WANG	11B	BELL	$\Upsilon(2S) \to \gamma X$

$\Gamma(\gamma\chi_{c1})/\Gamma_{total}$ — Γ_{68}/Γ

NODE=M052R33

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<3.6 \times 10^{-6}$	90	WANG	11B	BELL	$\Upsilon(2S) \to \gamma X$

$\Gamma(\gamma\chi_{c2})/\Gamma_{total}$ — Γ_{69}/Γ

NODE=M052R34

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.5 \times 10^{-5}$	90	WANG	11B	BELL	$\Upsilon(2S) \to \gamma X$

$\Gamma(\gamma\chi_{c1}(3872))/\Gamma_{total}$ — Γ_{70}/Γ

NODE=M052R81

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.1 \times 10^{-5}$	90	[1] WANG	11B	BELL	$\Upsilon(2S) \to \gamma X$

[1] WANG 11B reports $[\Gamma(\Upsilon(2S) \to \gamma\chi_{c1}(3872))/\Gamma_{total}] \times [B(\chi_{c1}(3872) \to \pi^+\pi^- J/\psi(1S))] < 0.8 \times 10^{-6}$ which we divide by our best value $B(\chi_{c1}(3872) \to \pi^+\pi^- J/\psi(1S)) = 3.8 \times 10^{-2}$.

NODE=M052R81;LINKAGE=A

$\Gamma(\gamma\chi_{c1}(3872),\ \chi_{c1} \to \pi^+\pi^-\pi^0 J/\psi)/\Gamma_{total}$ — Γ_{71}/Γ

NODE=M052R36

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.4 \times 10^{-6}$	90	WANG	11B	BELL	$\Upsilon(2S) \to \gamma X$

$\Gamma(\gamma X(3915) \to \omega J/\psi)/\Gamma_{total}$ — Γ_{72}/Γ

NODE=M052R37

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.8 \times 10^{-6}$	90	WANG	11B	BELL	$\Upsilon(2S) \to \gamma X$

$\Gamma(\gamma\chi_{c1}(4140) \to \phi J/\psi)/\Gamma_{total}$ — Γ_{73}/Γ

NODE=M052R38

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.2 \times 10^{-6}$	90	WANG	11B	BELL	$\Upsilon(2S) \to \gamma X$

$\Gamma(\gamma X(4350) \to \phi J/\psi)/\Gamma_{total}$ — Γ_{74}/Γ

NODE=M052R39

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.3 \times 10^{-6}$	90	WANG	11B	BELL	$\Upsilon(2S) \to \gamma X$

$\Gamma(\gamma\eta_b(1S))/\Gamma_{total}$ — Γ_{75}/Γ

NODE=M052R15

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$5.5^{+1.1}_{-0.9}$ OUR AVERAGE Error includes scale factor of 1.2.						
$6.1^{+0.6}_{-0.7}{}^{+0.9}_{-0.6}$		29k	FULSOM	18	BELL	$\Upsilon(2S) \to \gamma X$
$3.9 \pm 1.1^{+1.1}_{-0.9}$		13 ± 5k	[1] AUBERT	09AQ	BABR	$\Upsilon(2S) \to \gamma X$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<21	90		LEES	11J	BABR	$\Upsilon(2S) \to X\gamma$
< 8.4	90		[1] BONVICINI	10	CLEO	$\Upsilon(2S) \to \gamma X$
< 5.1	90		[2] ARTUSO	05	CLEO	$e^+e^- \to \gamma X$

[1] Assuming $\Gamma_{\eta_b(1S)}$ = 10 MeV.

[2] Superseded by BONVICINI 10.

NODE=M052R15;LINKAGE=BO

NODE=M052R15;LINKAGE=SU

$\Gamma(\gamma \eta_b(1S) \to \gamma$ Sum of 26 exclusive modes$)/\Gamma_{total}$ — Γ_{76}/Γ

NODE=M052R25
NODE=M052R25

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<3.7 × 10^{-6}	90	SANDILYA	13	BELL	$\Upsilon(2S) \to \gamma$ hadrons

$\Gamma(\gamma X_{b\bar{b}} \to \gamma$ Sum of 26 exclusive modes$)/\Gamma_{total}$ — Γ_{77}/Γ

NODE=M052R26
NODE=M052R26

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
< 4.9	90		SANDILYA	13	BELL	$\Upsilon(2S) \to \gamma$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$46.2^{+29.7}_{-14.2} \pm 10.6$		10	[1] DOBBS	12		$\Upsilon(2S) \to \gamma$ hadrons

[1] Obtained by analyzing CLEO III data but not authored by the CLEO Collaboration.

NODE=M052R26;LINKAGE=DO

$\Gamma(\gamma X \to \gamma + \geq 4$ prongs$)/\Gamma_{total}$ — Γ_{78}/Γ

NODE=M052R19

(1.5 GeV $< m_X <$ 5.0 GeV)

NODE=M052R19
NODE=M052R19

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.95	95	ROSNER	07A	CLEO	$e^+ e^- \to \gamma X$

$\Gamma(\gamma A^0 \to \gamma$ hadrons$)/\Gamma_{total}$ — Γ_{79}/Γ

NODE=M052R06

(0.3 GeV $< m_{A^0} <$ 7 GeV)

NODE=M052R06
NODE=M052R06

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<8 × 10^{-5}	90	[1] LEES	11H	BABR	$\Upsilon(2S) \to \gamma$ hadrons

[1] For a narrow scalar or pseudoscalar A^0, excluding known resonances, with mass in the range 0.3–7 GeV. Measured 90% CL limits as a function of m_{A^0} range from 1×10^{-6} to 8×10^{-5}.

NODE=M052R06;LINKAGE=LE

$\Gamma(\gamma a_1^0 \to \gamma \mu^+ \mu^-)/\Gamma_{total}$ — Γ_{80}/Γ

NODE=M052R24
NODE=M052R24

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<8.3	90	[1] AUBERT	09Z	BABR	$e^+ e^- \to \gamma a_1^0 \to \gamma \mu^+ \mu^-$

[1] For a narrow scalar or pseudoscalar a_1^0 with mass in the range 212–9300 MeV, excluding J/ψ and $\psi(2S)$. Measured 90% CL limits as a function of $m_{a_1^0}$ range from $0.26–8.3 \times 10^{-6}$.

NODE=M052R24;LINKAGE=AU

LEPTON FAMILY NUMBER (LF) VIOLATING MODES

NODE=M052230

$\Gamma(e^\pm \tau^\mp)/\Gamma_{total}$ — Γ_{81}/Γ

NODE=M052R04
NODE=M052R04

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<3.2	90	LEES	10B	BABR	$e^+ e^- \to e^\pm \tau^\mp$

$\Gamma(\mu^\pm \tau^\mp)/\Gamma_{total}$ — Γ_{82}/Γ

NODE=M052R20
NODE=M052R20

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
< 3.3	90	LEES	10B	BABR	$e^+ e^- \to \mu^\pm \tau^\mp$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<14.4	95	LOVE	08A	CLEO	$e^+ e^- \to \mu^\pm \tau^\mp$

$\Upsilon(2S)$ Cross-Particle Branching Ratios

NODE=M052240

$B(\Upsilon(2S) \to \pi^+ \pi^-) \times B(\Upsilon(3S) \to \Upsilon(2S) X)$

NODE=M052R05
NODE=M052R05

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
1.78±0.02±0.11	906k	LEES	11C	BABR	$e^+ e^- \to \pi^+ \pi^- X$

$\Upsilon(2S)$ REFERENCES

NODE=M052

FULSOM	18	PRL 121 232001	B.G. Fulsom *et al.*	(BELLE Collab.)	REFID=59535
JIA	18	PR D97 112004	S. Jia *et al.*	(BELLE Collab.)	REFID=58949
JIA	17	PR D95 012001	S. Jia *et al.*	(BELLE Collab.)	REFID=57635
JIA	17A	PR D96 112002	S. Jia *et al.*	(BELLE Collab.)	REFID=58318
LEES	14G	PR D89 111102	J.P. Lees *et al.*	(BABAR Collab.)	REFID=55939
YANG	14	PR D90 112008	S.D. Yang *et al.*	(BELLE Collab.)	REFID=56345
SANDILYA	13	PRL 111 112001	S. Sandilya *et al.*	(BELLE Collab.)	REFID=55590
SHEN	13	PR D88 011102	C.P. Shen *et al.*	(BELLE Collab.)	REFID=55395
TAMPONI	13	PR D87 011104	U. Tamponi *et al.*	(BELLE Collab.)	REFID=54919
DOBBS	12	PRL 109 082001	S. Dobbs *et al.*		REFID=54288
DOBBS	12A	PR D86 052003	S. Dobbs *et al.*		REFID=54746
SHEN	12A	PR D86 031102	C.P. Shen *et al.*	(BELLE Collab.)	REFID=54314
LEES	11C	PR D84 011104	J.P. Lees *et al.*	(BABAR Collab.)	REFID=16775
LEES	11H	PRL 107 221803	J.P. Lees *et al.*	(BABAR Collab.)	REFID=53877
LEES	11J	PR D84 072002	J.P. Lees *et al.*	(BABAR Collab.)	REFID=53936
LEES	11L	PR D84 092003	J.P. Lees *et al.*	(BABAR Collab.)	REFID=53938
WANG	11B	PR D84 071107	X.L. Wang *et al.*	(BELLE Collab.)	REFID=53939

BONVICINI	10	PR D81 031104	G. Bonvicini *et al.*	(CLEO Collab.)	REFID=53231
LEES	10B	PRL 104 151802	J.P. Lees *et al.*	(BABAR Collab.)	REFID=53355
AUBERT	09AQ	PRL 103 161801	B. Aubert *et al.*	(BABAR Collab.)	REFID=53106
AUBERT	09Z	PRL 103 081803	B. Aubert *et al.*	(BABAR Collab.)	REFID=52930
BHARI	09	PR D79 011103	S.R. Bhari *et al.*	(CLEO Collab.)	REFID=52662
AUBERT	08BP	PR D78 112002	B. Aubert *et al.*	(BABAR Collab.)	REFID=52660
HE	08A	PRL 101 192001	Q. He *et al.*	(CLEO Collab.)	REFID=52587
LOVE	08A	PRL 101 201601	W. Love *et al.*	(CLEO Collab.)	REFID=52592
PDG	08	PL B667 1	C. Amsler *et al.*	(PDG Collab.)	REFID=52166
ASNER	07	PR D75 012009	D.M. Asner *et al.*	(CLEO Collab.)	REFID=51617
BESSON	07	PRL 98 052002	D. Besson *et al.*	(CLEO Collab.)	REFID=51620
ROSNER	07A	PR D76 117102	J.L. Rosner *et al.*	(CLEO Collab.)	REFID=52079
BESSON	06A	PR D74 012003	D. Besson *et al.*	(CLEO Collab.)	REFID=51147
ROSNER	06	PRL 96 092003	J.L. Rosner *et al.*	(CLEO Collab.)	REFID=51035
ADAMS	05	PRL 94 012001	G.S. Adams *et al.*	(CLEO Collab.)	REFID=50452
ARTUSO	05	PRL 94 032001	M. Artuso *et al.*	(CLEO Collab.)	REFID=50454
ARTAMONOV	00	PL B474 427	A.S. Artamonov *et al.*		REFID=47424
EDWARDS	99	PR D59 032003	K.W. Edwards *et al.*	(CLEO Collab.)	REFID=46612
ALEXANDER	98	PR D58 052004	J.P. Alexander *et al.*	(CLEO Collab.)	REFID=46329
BARU	96	PRPL 267 71	S.E. Baru *et al.*	(NOVO)	REFID=44651
KOBEL	92	ZPHY C53 193	M. Kobel *et al.*	(Crystal Ball Collab.)	REFID=41861
MASCHMANN	90	ZPHY C46 555	W.S. Maschmann *et al.*	(Crystal Ball Collab.)	REFID=41224
ALBRECHT	89	ZPHY C42 349	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=40731
KAARSBERG	89	PRL 62 2077	T.M. Kaarsberg *et al.*	(CUSB Collab.)	REFID=40733
BUCHMUEL...	88	HE e^+e^- Physics 412	W. Buchmueller, S. Cooper	(HANN, DESY, MIT)	REFID=40034
Editors: A. Ali and P. Soeding, World Scientific, Singapore					
JAKUBOWSKI	88	ZPHY C40 49	Z. Jakubowski *et al.*	(Crystal Ball Collab.) IGJPC	REFID=40742
ALBRECHT	87	ZPHY C35 283	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=40016
COHEN	87	RMP 59 1121	E.R. Cohen, B.N. Taylor	(RISC, NBS)	REFID=11616
LURZ	87	ZPHY C36 383	B. Lurz *et al.*	(Crystal Ball Collab.)	REFID=40021
BARU	86B	ZPHY C32 622 (erratum)	S.E. Baru *et al.*	(NOVO)	REFID=22338
ALBRECHT	85	ZPHY C28 45	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=22334
ALBRECHT	85E	PL 160B 331	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=22288
GELPHMAN	85	PR D32 2893	D. Gelphman *et al.*	(Crystal Ball Collab.)	REFID=22336
KURAEV	85	SJNP 41 466	E.A. Kuraev, V.S. Fadin	(NOVO)	REFID=40033
		Translated from YAF 41 733.			
NERNST	85	PRL 54 2195	R. Nernst *et al.*	(Crystal Ball Collab.)	REFID=22289
ARTAMONOV	84	PL 137B 272	A.S. Artamonov *et al.*	(NOVO)	REFID=22278
BARBER	84	PL 135B 498	D.P. Barber *et al.*		REFID=22327;ERROR=11
BESSON	84	PR D30 1433	D. Besson *et al.*	(CLEO Collab.)	REFID=22279
FONSECA	84	NP B242 31	V. Fonseca *et al.*	(CUSB Collab.)	REFID=22329
GILES	84B	PR D29 1285	R. Giles *et al.*	(CLEO Collab.)	REFID=22280
HAAS	84	PRL 52 799	J. Haas *et al.*	(CLEO Collab.)	REFID=22287
HAAS	84B	PR D30 1996	J. Haas *et al.*	(CLEO Collab.)	REFID=22332
KLOPFEN...	83	PRL 51 160	C. Klopfenstein *et al.*	(CUSB Collab.)	REFID=22285
ALBRECHT	82	PL 116B 383	H. Albrecht *et al.*	(DESY, DORT, HEIDH+)	REFID=22270
NICZYPORUK	81B	PL 100B 95	B. Niczyporuk *et al.*	(LENA Collab.)	REFID=22319
NICZYPORUK	81C	PL 99B 169	B. Niczyporuk *et al.*	(LENA Collab.)	REFID=22318
BOCK	80	ZPHY C6 125	P. Bock *et al.*	(HEIDP, MPIM, DESY, HAMB)	REFID=22264

NODE=M177

$\Upsilon_2(1D)$ $I^G(J^{PC}) = 0^-(2^{--})$

was $\Upsilon(1D)$

NODE=M177

First observed by BONVICINI 04 in the decay to $\gamma\gamma\Upsilon(1S)$ and confirmed by DEL-AMO-SANCHEZ 10R in the decay to $\pi^+\pi^-\Upsilon(1S)$. Data consistent with $J^P = 2^-$. The states with $J = 1$ and 3 also possibly seen, but need confirmation.

$\Upsilon_2(1D)$ MASS

NODE=M177M

NODE=M177M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
10163.7±1.4 OUR AVERAGE		Error includes scale factor of 1.7.			
10164.5±0.8±0.5		DEL-AMO-SA...	10R	BABR	$\Upsilon(3S) \to \gamma\gamma\pi^+\pi^-\ell^+\ell^-$
10161.1±0.6±1.6	38	BONVICINI	04	CLE3	$\Upsilon(3S) \to 4\gamma\ell^+\ell^-$

$\Upsilon_2(1D)$ DECAY MODES

NODE=M177215;NODE=M177

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\gamma\gamma\Upsilon(1S)$	seen	DESIG=1;OUR EVAL;→ UNCHECKED ←
Γ_2	$\gamma\chi_{bJ}(1P)$	seen	DESIG=2;OUR EVAL;→ UNCHECKED ←
Γ_3	$\eta\Upsilon(1S)$	not seen	DESIG=3;OUR EVAL;→ UNCHECKED ←
Γ_4	$\pi^+\pi^-\Upsilon(1S)$	$(6.6\pm1.6)\times10^{-3}$	DESIG=4

$\Upsilon_2(1D)$ BRANCHING RATIOS

NODE=M177225

$\Gamma(\eta\Upsilon(1S))/\Gamma(\gamma\gamma\Upsilon(1S))$ Γ_3/Γ_1

NODE=M177R01
NODE=M177R01

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.25	90	BONVICINI	04	CLE3	$\Upsilon(3S) \to 4\gamma\ell^+\ell^-$

$\Gamma(\pi^+\pi^-\Upsilon(1S))/\Gamma_{total}$ Γ_4/Γ

NODE=M177R03
NODE=M177R03

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.66^{+0.15}_{-0.14}\pm0.06}$	[1] DEL-AMO-SA...	10R	BABR	$\Upsilon(3S) \to \gamma\gamma\pi^+\pi^-\ell^+\ell^-$

[1] Using theoretical predictions for B($\chi_{bJ}(2P) \to \gamma\Upsilon_2(1D)$).

NODE=M177R03;LINKAGE=DE

$\Gamma(\pi^+\pi^-\Upsilon(1S))/\Gamma(\gamma\gamma\Upsilon(1S))$ Γ_4/Γ_1

NODE=M177R02
NODE=M177R02

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.2	90	[2] BONVICINI	04	CLE3	$\Upsilon(3S) \to 4\gamma\ell^+\ell^-$

[2] Assuming $J = 2$.

NODE=M177R02;LINKAGE=BO

$\Upsilon_2(1D)$ REFERENCES

NODE=M177

DEL-AMO-SA... 10R PR D82 111102 P. del Amo Sanchez *et al.* (BABAR Collab.) REFID=53634
BONVICINI 04 PR D70 032001 G. Bonvicini *et al.* (CLEO Collab.) REFID=49759

NODE=M079

$\chi_{b0}(2P)$

$I^G(J^{PC}) = 0^+(0^{++})$
J needs confirmation.

Observed in radiative decay of the $\Upsilon(3S)$, therefore $C = +$. Branching ratio requires E1 transition, M1 is strongly disfavored, therefore $P = +$.

NODE=M079

$\chi_{b0}(2P)$ MASS

NODE=M079M

VALUE (MeV)	DOCUMENT ID
10232.5±0.4±0.5 OUR EVALUATION	From γ energy below, using $\Upsilon(3S)$ mass = 10355.2 ± 0.5 MeV

NODE=M079M
→ UNCHECKED ←

$m_{\chi_{b1}(2P)} - m_{\chi_{b0}(2P)}$

NODE=M079M2
NODE=M079M2

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
23.8±1.7	LEES	14M	BABR	$\Upsilon(3S) \to \gamma\gamma\mu^+\mu^-$

γ ENERGY IN $\Upsilon(3S)$ DECAY

NODE=M079DM

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
121.9 ±0.4 OUR EVALUATION		Treating systematic errors as correlated			
122.2 ±0.5 OUR AVERAGE		Error includes scale factor of 1.4. See the ideogram below.			
121.55±0.16±0.46		ARTUSO	05	CLEO	$\Upsilon(3S) \to \gamma X$
123.0 ±0.8	4959	[1] HEINTZ	92	CSB2	$e^+e^- \to \gamma X$
124.6 ±1.4	17	[2] HEINTZ	92	CSB2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$
122.3 ±0.3 ±0.6	9903	MORRISON	91	CLE2	$e^+e^- \to \gamma X$

NODE=M079DM
→ UNCHECKED ←

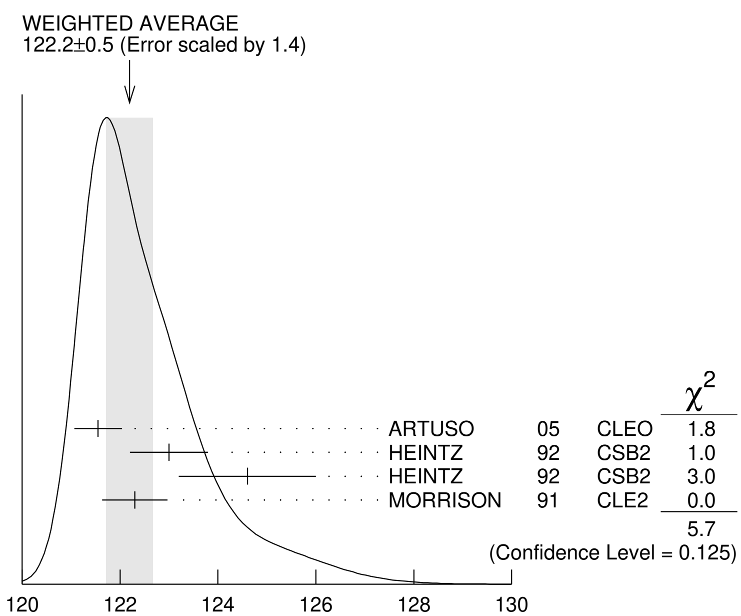
OCCUR=2

[1] A systematic uncertainty on the energy scale of 0.9% not included. Supersedes NARAIN 91.

NODE=M079DM;LINKAGE=A

[2] A systematic uncertainty on the energy scale of 0.9% not included. Supersedes HEINTZ 91.

NODE=M079DM;LINKAGE=B



γ energy in $\Upsilon(3S)$ decay (MeV)

$\chi_{b0}(2P)$ DECAY MODES

NODE=M079215;NODE=M079

	Mode	Fraction (Γ_i/Γ)		Confidence level	
Γ_1	$\gamma\,\Upsilon(2S)$	(1.38±0.30) %			DESIG=2
Γ_2	$\gamma\,\Upsilon(1S)$	(3.8 ±1.7) $\times 10^{-3}$			DESIG=1
Γ_3	$D^0 X$	< 8.2	%	90%	DESIG=3
Γ_4	$\pi^+\pi^-K^+K^-\pi^0$	< 3.4	$\times 10^{-5}$	90%	DESIG=4
Γ_5	$2\pi^+\pi^-K^-K^0_S$	< 5	$\times 10^{-5}$	90%	DESIG=5
Γ_6	$2\pi^+\pi^-K^-K^0_S2\pi^0$	< 2.2	$\times 10^{-4}$	90%	DESIG=6
Γ_7	$2\pi^+2\pi^-2\pi^0$	< 2.4	$\times 10^{-4}$	90%	DESIG=7
Γ_8	$2\pi^+2\pi^-K^+K^-$	< 1.5	$\times 10^{-4}$	90%	DESIG=8

Γ_9	$2\pi^+ 2\pi^- K^+ K^- \pi^0$	< 2.2	$\times 10^{-4}$	90%	DESIG=9
Γ_{10}	$2\pi^+ 2\pi^- K^+ K^- 2\pi^0$	< 1.1	$\times 10^{-3}$	90%	DESIG=10
Γ_{11}	$3\pi^+ 2\pi^- K^- K^0_S \pi^0$	< 7	$\times 10^{-4}$	90%	DESIG=11
Γ_{12}	$3\pi^+ 3\pi^-$	< 7	$\times 10^{-5}$	90%	DESIG=12
Γ_{13}	$3\pi^+ 3\pi^- 2\pi^0$	< 1.2	$\times 10^{-3}$	90%	DESIG=13
Γ_{14}	$3\pi^+ 3\pi^- K^+ K^-$	< 1.5	$\times 10^{-4}$	90%	DESIG=14
Γ_{15}	$3\pi^+ 3\pi^- K^+ K^- \pi^0$	< 7	$\times 10^{-4}$	90%	DESIG=15
Γ_{16}	$4\pi^+ 4\pi^-$	< 1.7	$\times 10^{-4}$	90%	DESIG=16
Γ_{17}	$4\pi^+ 4\pi^- 2\pi^0$	< 6	$\times 10^{-4}$	90%	DESIG=17

$\chi_{b0}(2P)$ BRANCHING RATIOS

NODE=M079220

$\Gamma(\gamma\Upsilon(2S))/\Gamma_{\text{total}}$ — Γ_1/Γ

NODE=M079R2
NODE=M079R2

VALUE (%)	CL%	DOCUMENT ID	TECN	COMMENT
1.38±0.30 OUR AVERAGE				
$1.31\pm0.27^{+0.13}_{-0.12}$		[3,4] LEES 14M	BABR	$\Upsilon(3S) \to \gamma\gamma\mu^+\mu^-$
$3.6 \pm1.6 \pm0.3$		[3,5] HEINTZ 92	CSB2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<2.8	90	[6] LEES 11J	BABR	$\Upsilon(3S) \to X\gamma$
<8.9	90	[7] CRAWFORD 92B	CLE2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$

[3] Assuming B($\Upsilon(2S) \to \mu^+\mu^-$) = (1.93 ± 0.17)%. NODE=M079R2;LINKAGE=D

[4] LEES 14M reports [$\Gamma(\chi_{b0}(2P) \to \gamma\Upsilon(2S))/\Gamma_{\text{total}}$] × [B($\Upsilon(3S) \to \gamma\chi_{b0}(2P)$)] = (7.7 ± 1.6) × 10^{-4} which we divide by our best value B($\Upsilon(3S) \to \gamma\chi_{b0}(2P)$) = (5.9 ± 0.6) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M079R2;LINKAGE=E

[5] Recalculated by us. HEINTZ 92 quotes B($\Upsilon(3S) \to \gamma\chi_{b0}(2P)$) × B($\chi_{b0}(2P) \to \gamma\Upsilon(2S)$) = (0.28 ± 0.12 ± 0.03)% using B($\Upsilon(2S) \to \mu^+\mu^-$) = (1.44 ± 0.10)%. Supersedes HEINTZ 91. NODE=M079R2;LINKAGE=C

[6] LEES 11J quotes a central value of $\Gamma(\chi_{b0}(2P) \to \gamma\Upsilon(2S))/\Gamma_{\text{total}}$ × $\Gamma(\Upsilon(3S) \to \gamma\chi_{b0}(2P))/\Gamma_{\text{total}}$ = $(-0.3 \pm 0.2^{+0.5}_{-0.4})$%. NODE=M079R2;LINKAGE=LE

[7] Using B($\Upsilon(2S) \to \mu^+\mu^-$) = (1.37 ± 0.26)%, B($\Upsilon(3S) \to \gamma\gamma\Upsilon(2S)$)×2 B($\Upsilon(2S) \to \mu^+\mu^-$) < 1.19×10^{-4}, and B($\Upsilon(3S) \to \chi_{b0}(2P)\gamma$) = 0.049. NODE=M079R2;LINKAGE=B

$\Gamma(\gamma\Upsilon(1S))/\Gamma_{\text{total}}$ — Γ_2/Γ

NODE=M079R1
NODE=M079R1

VALUE (%)	CL%	DOCUMENT ID	TECN	COMMENT
0.38±0.17 OUR AVERAGE				
$0.36\pm0.17\pm0.03$		[8,9,10] LEES 14M	BABR	$\Upsilon(3S) \to \gamma\gamma\mu^+\mu^-$
$0.9 \pm0.7 \pm0.1$		[9,11] HEINTZ 92	CSB2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<1.2	90	[12] LEES 11J	BABR	$\Upsilon(3S) \to X\gamma$
<2.5	90	[13] CRAWFORD 92B	CLE2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$

[8] LEES 14M quotes $\Gamma(\chi_{b0}(2P) \to \gamma\Upsilon(1S))/\Gamma_{\text{total}}$ × $\Gamma(\Upsilon(3S) \to \gamma\chi_{b0}(2P))/\Gamma_{\text{total}}$ = (2.1 ± 1.0) × 10^{-4} combining the results from $\Upsilon(3S) \to \gamma\gamma\mu^+\mu^-$ samples with and without photon conversions. NODE=M079R1;LINKAGE=D

[9] Assuming B($\Upsilon(1S) \to \mu^+\mu^-$) = (2.48 ± 0.05)%. NODE=M079R1;LINKAGE=E

[10] LEES 14M reports [$\Gamma(\chi_{b0}(2P) \to \gamma\Upsilon(1S))/\Gamma_{\text{total}}$] × [B($\Upsilon(3S) \to \gamma\chi_{b0}(2P)$)] = (2.1 ± 1.0) × 10^{-4} which we divide by our best value B($\Upsilon(3S) \to \gamma\chi_{b0}(2P)$) = (5.9 ± 0.6) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M079R1;LINKAGE=F

[11] Recalculated by us. HEINTZ 92 quotes B($\Upsilon(3S) \to \gamma\chi_{b0}(2P)$) × B($\chi_{b0}(2P) \to \gamma\Upsilon(1S)$) = (0.05 ± 0.04 ± 0.01)% using B($\Upsilon(1S) \to \mu^+\mu^-$) = (2.57 ± 0.05)%. Supersedes HEINTZ 91. NODE=M079R1;LINKAGE=C

[12] LEES 11J quotes a central value of $\Gamma(\chi_{b0}(2P) \to \gamma\Upsilon(1S))/\Gamma_{\text{total}}$ × $\Gamma(\Upsilon(3S) \to \gamma\chi_{b0}(2P))/\Gamma_{\text{total}}$ = $(3.9 \pm 2.2^{+1.2}_{-0.6}) \times 10^{-4}$. NODE=M079R1;LINKAGE=LE

[13] Using B($\Upsilon(1S) \to \mu^+\mu^-$) = (2.57 ± 0.07)%, B($\Upsilon(3S) \to \gamma\gamma\Upsilon(1S)$)×2 B($\Upsilon(1S) \to \mu^+\mu^-$) < 0.63×10^{-4}, and B($\Upsilon(3S) \to \chi_{b0}(2P)\gamma$) = 0.049. NODE=M079R1;LINKAGE=B

$\Gamma(D^0 X)/\Gamma_{\text{total}}$ — Γ_3/Γ

NODE=M079R01
NODE=M079R01

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<8.2 \times 10^{-2}$	90	[14,15] BRIERE 08	CLEO	$\Upsilon(3S) \to \gamma D^0 X$

[14] For $p_{D^0} > 2.5$ GeV/c. NODE=M079R01;LINKAGE=BR

[15] The authors also present their result as (4.1 ± 3.0 ± 0.4) × 10^{-2}. NODE=M079R01;LINKAGE=RI

$\Gamma(\pi^+\pi^- K^+ K^- \pi^0)/\Gamma_{total}$ Γ_4/Γ

NODE=M079R02
NODE=M079R02

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.34	90	[16] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma\pi^+\pi^- K^+ K^- \pi^0$

[16] ASNER 08A reports $[\Gamma(\chi_{b0}(2P) \to \pi^+\pi^- K^+ K^- \pi^0)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b0}(2P))] < 2 \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b0}(2P)) = 5.9 \times 10^{-2}$.

NODE=M079R02;LINKAGE=AS

$\Gamma(2\pi^+\pi^- K^- K^0_S)/\Gamma_{total}$ Γ_5/Γ

NODE=M079R03
NODE=M079R03

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.5	90	[17] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 2\pi^+\pi^- K^- K^0_S$

[17] ASNER 08A reports $[\Gamma(\chi_{b0}(2P) \to 2\pi^+\pi^- K^- K^0_S)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b0}(2P))] < 3 \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b0}(2P)) = 5.9 \times 10^{-2}$.

NODE=M079R03;LINKAGE=AS

$\Gamma(2\pi^+\pi^- K^- K^0_S 2\pi^0)/\Gamma_{total}$ Γ_6/Γ

NODE=M079R04
NODE=M079R04

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<2.2	90	[18] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 2\pi^+\pi^- K^- 2\pi^0$

[18] ASNER 08A reports $[\Gamma(\chi_{b0}(2P) \to 2\pi^+\pi^- K^- K^0_S 2\pi^0)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b0}(2P))] < 13 \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b0}(2P)) = 5.9 \times 10^{-2}$.

NODE=M079R04;LINKAGE=AS

$\Gamma(2\pi^+ 2\pi^- 2\pi^0)/\Gamma_{total}$ Γ_7/Γ

NODE=M079R05
NODE=M079R05

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<2.4	90	[19] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 2\pi^+ 2\pi^- 2\pi^0$

[19] ASNER 08A reports $[\Gamma(\chi_{b0}(2P) \to 2\pi^+ 2\pi^- 2\pi^0)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b0}(2P))] < 14 \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b0}(2P)) = 5.9 \times 10^{-2}$.

NODE=M079R05;LINKAGE=AS

$\Gamma(2\pi^+ 2\pi^- K^+ K^-)/\Gamma_{total}$ Γ_8/Γ

NODE=M079R06
NODE=M079R06

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.5	90	[20] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 2\pi^+ 2\pi^- K^+ K^-$

[20] ASNER 08A reports $[\Gamma(\chi_{b0}(2P) \to 2\pi^+ 2\pi^- K^+ K^-)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b0}(2P))] < 9 \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b0}(2P)) = 5.9 \times 10^{-2}$.

NODE=M079R06;LINKAGE=AS

$\Gamma(2\pi^+ 2\pi^- K^+ K^- \pi^0)/\Gamma_{total}$ Γ_9/Γ

NODE=M079R07
NODE=M079R07

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<2.2	90	[21] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 2\pi^+ 2\pi^- K^+ K^- \pi^0$

[21] ASNER 08A reports $[\Gamma(\chi_{b0}(2P) \to 2\pi^+ 2\pi^- K^+ K^- \pi^0)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b0}(2P))] < 13 \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b0}(2P)) = 5.9 \times 10^{-2}$.

NODE=M079R07;LINKAGE=AS

$\Gamma(2\pi^+ 2\pi^- K^+ K^- 2\pi^0)/\Gamma_{total}$ Γ_{10}/Γ

NODE=M079R08
NODE=M079R08

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<11	90	[22] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 2\pi^+ 2\pi^- K^+ K^- 2\pi^0$

[22] ASNER 08A reports $[\Gamma(\chi_{b0}(2P) \to 2\pi^+ 2\pi^- K^+ K^- 2\pi^0)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b0}(2P))] < 63 \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b0}(2P)) = 5.9 \times 10^{-2}$.

NODE=M079R08;LINKAGE=AS

$\Gamma(3\pi^+ 2\pi^- K^- K^0_S \pi^0)/\Gamma_{total}$ Γ_{11}/Γ

NODE=M079R09
NODE=M079R09

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<7	90	[23] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 3\pi^+ 2\pi^- K^- K^0_S \pi^0$

[23] ASNER 08A reports $[\Gamma(\chi_{b0}(2P) \to 3\pi^+ 2\pi^- K^- K^0_S \pi^0)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b0}(2P))] < 39 \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b0}(2P)) = 5.9 \times 10^{-2}$.

NODE=M079R09;LINKAGE=AS

$\Gamma(3\pi^+ 3\pi^-)/\Gamma_{total}$ Γ_{12}/Γ

NODE=M079R10
NODE=M079R10

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.7	90	[24] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 3\pi^+ 3\pi^-$

[24] ASNER 08A reports $[\Gamma(\chi_{b0}(2P) \to 3\pi^+ 3\pi^-)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b0}(2P))] < 4 \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b0}(2P)) = 5.9 \times 10^{-2}$.

NODE=M079R10;LINKAGE=AS

$\Gamma(3\pi^+3\pi^-2\pi^0)/\Gamma_{total}$ — Γ_{13}/Γ

NODE=M079R11
NODE=M079R11

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<12	90	[25] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 3\pi^+3\pi^-2\pi^0$

[25] ASNER 08A reports $[\Gamma(\chi_{b0}(2P) \to 3\pi^+3\pi^-2\pi^0)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b0}(2P))] < 72 \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b0}(2P)) = 5.9 \times 10^{-2}$. NODE=M079R11;LINKAGE=AS

$\Gamma(3\pi^+3\pi^-K^+K^-)/\Gamma_{total}$ — Γ_{14}/Γ

NODE=M079R12
NODE=M079R12

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.5	90	[26] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 3\pi^+3\pi^-K^+K^-$

[26] ASNER 08A reports $[\Gamma(\chi_{b0}(2P) \to 3\pi^+3\pi^-K^+K^-)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b0}(2P))] < 9 \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b0}(2P)) = 5.9 \times 10^{-2}$. NODE=M079R12;LINKAGE=AS

$\Gamma(3\pi^+3\pi^-K^+K^-\pi^0)/\Gamma_{total}$ — Γ_{15}/Γ

NODE=M079R13
NODE=M079R13

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<7	90	[27] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 3\pi^+3\pi^-K^+K^-\pi^0$

[27] ASNER 08A reports $[\Gamma(\chi_{b0}(2P) \to 3\pi^+3\pi^-K^+K^-\pi^0)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b0}(2P))] < 43 \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b0}(2P)) = 5.9 \times 10^{-2}$. NODE=M079R13;LINKAGE=AS

$\Gamma(4\pi^+4\pi^-)/\Gamma_{total}$ — Γ_{16}/Γ

NODE=M079R14
NODE=M079R14

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.7	90	[28] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 4\pi^+4\pi^-$

[28] ASNER 08A reports $[\Gamma(\chi_{b0}(2P) \to 4\pi^+4\pi^-)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b0}(2P))] < 10 \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b0}(2P)) = 5.9 \times 10^{-2}$. NODE=M079R14;LINKAGE=AS

$\Gamma(4\pi^+4\pi^-2\pi^0)/\Gamma_{total}$ — Γ_{17}/Γ

NODE=M079R15
NODE=M079R15

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<6	90	[29] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 4\pi^+4\pi^-2\pi^0$

[29] ASNER 08A reports $[\Gamma(\chi_{b0}(2P) \to 4\pi^+4\pi^-2\pi^0)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b0}(2P))] < 38 \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b0}(2P)) = 5.9 \times 10^{-2}$. NODE=M079R15;LINKAGE=AS

$\Gamma(\chi_{b0}(2P) \to \gamma\Upsilon(1S))/\Gamma_{total} \times \Gamma(\Upsilon(3S) \to \gamma\chi_{b0}(2P))/\Gamma_{total}$ — $\Gamma_2/\Gamma \times \Gamma_{22}^{\Upsilon(3S)}/\Gamma^{\Upsilon(3S)}$

NODE=M079B01
NODE=M079B01

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<8.2	90	[30] LEES	11J	BABR	$\Upsilon(3S) \to X\gamma$

[30] LEES 11J quotes a central value of $\Gamma(\chi_{b0}(2P) \to \gamma\Upsilon(1S))/\Gamma_{total} \times \Gamma(\Upsilon(3S) \to \gamma\chi_{b0}(2P))/\Gamma_{total} = (3.9 \pm 2.2^{+1.2}_{-0.6}) \times 10^{-4}$ and derives a 90% CL upper limit of $B(\chi_{b0}(2P) \to \gamma\Upsilon(1S)) < 1.2\%$ using $B(\Upsilon(3S) \to \gamma\chi_{b0}(2P)) = (5.9 \pm 0.6)\%$. NODE=M079B01;LINKAGE=LE

$B(\chi_{b0}(2P) \to \gamma\Upsilon(1S)) \times B(\Upsilon(3S) \to \gamma\chi_{b0}(2P)) \times B(\Upsilon(1S) \to \ell^+\ell^-)$

NODE=M079A02
NODE=M079A02

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
1.4±0.9 OUR AVERAGE				
$1.7^{+1.5}_{-1.4}{}^{+0.1}_{-1.2}$	[31] LEES	14M	BABR	$\Upsilon(3S) \to \gamma\gamma\mu^+\mu^-$
$1.3 \pm 1.0 \pm 0.3$	[32] HEINTZ	92	CSB2	$\Upsilon(3S) \to \gamma\gamma\ell^+\ell^-$

[31] From a sample of $\Upsilon(3S) \to \gamma\gamma\mu^+\mu^-$ with one converted photon. NODE=M079A02;LINKAGE=A

[32] Calculated by us. HEINTZ 92 quotes $B(\Upsilon(3S) \to \gamma\chi_{b0}(2P)) \times B(\chi_{b0}(2P) \to \gamma\Upsilon(1S)) = (0.05 \pm 0.04 \pm 0.01)\%$ using $B(\Upsilon(1S) \to \mu^+\mu^-) = (2.57 \pm 0.05)\%$. NODE=M079A02;LINKAGE=K

$[B(\chi_{b0}(2P) \to \gamma\Upsilon(1S)) \times B(\Upsilon(3S) \to \gamma\chi_{b0}(2P))] / [B(\chi_{b1}(2P) \to \gamma\Upsilon(1S)) \times B(\Upsilon(3S) \to \gamma\chi_{b1}(2P))]$

NODE=M079A00
NODE=M079A00

VALUE (%)	DOCUMENT ID		TECN	COMMENT
1.71±0.80	[33] LEES	14M	BABR	$\Upsilon(3S) \to \gamma\gamma\mu^+\mu^-$

[33] From a sample of $\Upsilon(3S) \to \gamma\gamma\mu^+\mu^-$ without converted photons. NODE=M079A00;LINKAGE=A

$\Gamma(\chi_{b0}(2P) \to \gamma\Upsilon(2S))/\Gamma_{total} \times \Gamma(\Upsilon(3S) \to \gamma\chi_{b0}(2P))/\Gamma_{total}$ — $\Gamma_1/\Gamma \times \Gamma_{22}^{\Upsilon(3S)}/\Gamma^{\Upsilon(3S)}$

NODE=M079B02
NODE=M079B02

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<1.6	90	[34] LEES	11J	BABR	$\Upsilon(3S) \to X\gamma$

[34] LEES 11J quotes a central value of $\Gamma(\chi_{b0}(2P) \to \gamma\Upsilon(2S))/\Gamma_{total} \times \Gamma(\Upsilon(3S) \to \gamma\chi_{b0}(2P))/\Gamma_{total} = (-0.3 \pm 0.2^{+0.5}_{-0.4})\%$ and derives a 90% CL upper limit of $B(\chi_{b0}(2P) \to \gamma\Upsilon(2S)) < 2.8\%$ using $B(\Upsilon(3S) \to \gamma\chi_{b0}(2P)) = (5.9 \pm 0.6)\%$. NODE=M079B02;LINKAGE=LE

$B(\chi_{b0}(2P) \to \gamma \Upsilon(2S)) \times B(\Upsilon(3S) \to \gamma \chi_{b0}(2P)) \times B(\Upsilon(2S) \to \ell^+ \ell^-)$

NODE=M079A03

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
4.4±1.6 OUR AVERAGE				
$6.6^{+4.9}_{-4.0}{}^{+2.0}_{-0.3}$	[35] LEES	14M	BABR	$\Upsilon(3S) \to \gamma\gamma\mu^+\mu^-$
4.0±1.7±0.3	[36] HEINTZ	92	CSB2	$\Upsilon(3S) \to \gamma\gamma\ell^+\ell^-$

[35] From a sample of $\Upsilon(3S) \to \gamma\gamma\mu^+\mu^-$ with one converted photon.

[36] Calculated by us. HEINTZ 92 quotes $B(\Upsilon(3S) \to \gamma\chi_{b0}(2P)) \times B(\chi_{b0}(2P) \to \gamma\Upsilon(2S)) = (0.28 \pm 0.12 \pm 0.03)\%$ using $B(\Upsilon(2S) \to \mu^+\mu^-) = (1.44 \pm 0.10)\%$.

NODE=M079A03;LINKAGE=A
NODE=M079A03;LINKAGE=B

$[B(\chi_{b0}(2P) \to \gamma \Upsilon(2S)) \times B(\Upsilon(3S) \to \gamma\chi_{b0}(2P))] / [B(\chi_{b1}(2P) \to \gamma \Upsilon(2S)) \times B(\Upsilon(3S) \to \gamma\chi_{b1}(2P))]$

NODE=M079A01

VALUE (%)	DOCUMENT ID		TECN	COMMENT
3.31±0.56	[37] LEES	14M	BABR	$\Upsilon(3S) \to \gamma\gamma\mu^+\mu^-$

[37] From a sample of $\Upsilon(3S) \to \gamma\gamma\mu^+\mu^-$ without converted photons.

NODE=M079A01;LINKAGE=A

$\chi_{b0}(2P)$ REFERENCES

NODE=M079

LEES	14M	PR D90 112010	J.P. Lees *et al.*	(BABAR Collab.)	REFID=56343
LEES	11J	PR D84 072002	J.P. Lees *et al.*	(BABAR Collab.)	REFID=53936
ASNER	08A	PR D78 091103	D.M. Asner *et al.*	(CLEO Collab.)	REFID=52574
BRIERE	08	PR D78 092007	R.A. Briere *et al.*	(CLEO Collab.)	REFID=52577
ARTUSO	05	PRL 94 032001	M. Artuso *et al.*	(CLEO Collab.)	REFID=50454
CRAWFORD	92B	PL B294 139	G. Crawford *et al.*	(CLEO Collab.)	REFID=43177
HEINTZ	92	PR D46 1928	U. Heintz *et al.*	(CUSB II Collab.)	REFID=43604
HEINTZ	91	PRL 66 1563	U. Heintz *et al.*	(CUSB Collab.)	REFID=41580
MORRISON	91	PRL 67 1696	R.J. Morrison *et al.*	(CLEO Collab.)	REFID=41634
NARAIN	91	PRL 66 3113	M. Narain *et al.*	(CUSB Collab.)	REFID=41586

NODE=M080

$\chi_{b1}(2P)$

$I^G(J^{PC}) = 0^+(1^{++})$
J needs confirmation.

Observed in radiative decay of the $\Upsilon(3S)$, therefore $C = +$. Branching ratio requires E1 transition, M1 is strongly disfavored, therefore $P = +$.

NODE=M080

$\chi_{b1}(2P)$ MASS

NODE=M080M

VALUE (MeV)	DOCUMENT ID
10255.46±0.22±0.50 OUR EVALUATION From γ energy below, using $\Upsilon(3S)$ mass = 10355.2 ± 0.5 MeV	

NODE=M080M
→ UNCHECKED ←

$m_{\chi_{b1}(2P)} - m_{\chi_{b0}(2P)}$

NODE=M080M2

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
23.5±0.7±0.7	[1] HEINTZ	92	CSB2	$e^+e^- \to \gamma X, \ell^+\ell^-\gamma\gamma$

NODE=M080M2

[1] From the average photon energy for inclusive and exclusive events. Supersedes NARAIN 91.

NODE=M080M2;LINKAGE=A

γ ENERGY IN $\Upsilon(3S)$ DECAY

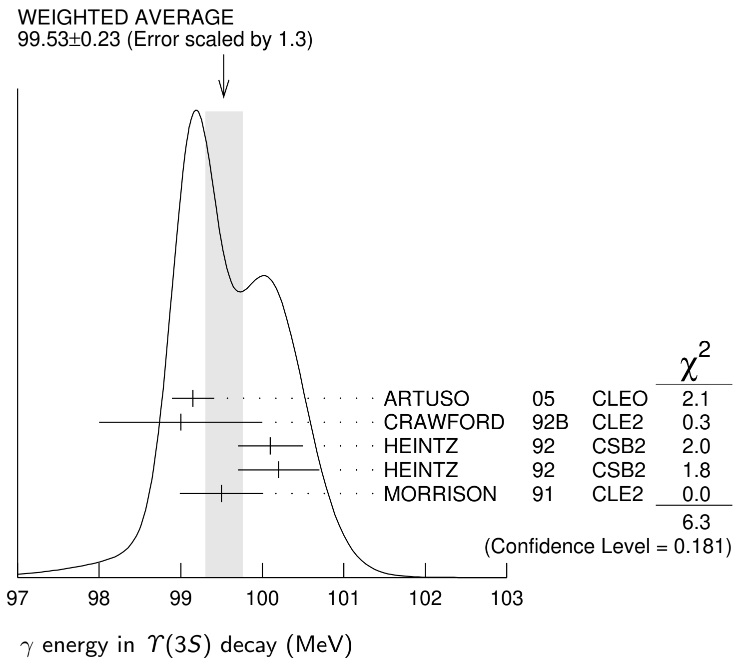
NODE=M080DM

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
99.26±0.22 OUR EVALUATION Treating systematic errors as correlated					
99.53±0.23 OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below.					
99.15±0.07±0.25		ARTUSO	05	CLEO	$\Upsilon(3S) \to \gamma X$
99 ±1	169	CRAWFORD	92B	CLE2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$
100.1 ±0.4	11147	[2] HEINTZ	92	CSB2	$e^+e^- \to \gamma X$
100.2 ±0.5	223	[3] HEINTZ	92	CSB2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$
99.5 ±0.1 ±0.5	25759	MORRISON	91	CLE2	$e^+e^- \to \gamma X$

NODE=M080DM
→ UNCHECKED ←
OCCUR=2

[2] A systematic uncertainty on the energy scale of 0.9% not included. Supersedes NARAIN 91. NODE=M080DM;LINKAGE=A

[3] A systematic uncertainty on the energy scale of 0.9% not included. Supersedes HEINTZ 91. NODE=M080DM;LINKAGE=B



$\chi_{b1}(2P)$ DECAY MODES

NODE=M080215;NODE=M080

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\omega\Upsilon(1S)$	$(1.63^{+0.40}_{-0.34})$ %	DESIG=3
Γ_2	$\gamma\Upsilon(2S)$	(18.1 ± 1.9) %	DESIG=2
Γ_3	$\gamma\Upsilon(1S)$	(9.9 ± 1.0) %	DESIG=1
Γ_4	$\pi\pi\chi_{b1}(1P)$	$(9.1 \pm 1.3) \times 10^{-3}$	DESIG=4
Γ_5	$D^0 X$	(8.8 ± 1.7) %	DESIG=5
Γ_6	$\pi^+\pi^- K^+ K^- \pi^0$	$(3.1 \pm 1.0) \times 10^{-4}$	DESIG=6
Γ_7	$2\pi^+\pi^- K^- K^0_S$	$(1.1 \pm 0.5) \times 10^{-4}$	DESIG=7
Γ_8	$2\pi^+\pi^- K^- K^0_S 2\pi^0$	$(7.7 \pm 3.2) \times 10^{-4}$	DESIG=8
Γ_9	$2\pi^+ 2\pi^- 2\pi^0$	$(5.9 \pm 2.0) \times 10^{-4}$	DESIG=9
Γ_{10}	$2\pi^+ 2\pi^- K^+ K^-$	$(10 \pm 4) \times 10^{-5}$	DESIG=10
Γ_{11}	$2\pi^+ 2\pi^- K^+ K^- \pi^0$	$(5.5 \pm 1.8) \times 10^{-4}$	DESIG=11
Γ_{12}	$2\pi^+ 2\pi^- K^+ K^- 2\pi^0$	$(10 \pm 4) \times 10^{-4}$	DESIG=12
Γ_{13}	$3\pi^+ 2\pi^- K^- K^0_S \pi^0$	$(6.7 \pm 2.6) \times 10^{-4}$	DESIG=13
Γ_{14}	$3\pi^+ 3\pi^-$	$(1.2 \pm 0.4) \times 10^{-4}$	DESIG=14
Γ_{15}	$3\pi^+ 3\pi^- 2\pi^0$	$(1.2 \pm 0.4) \times 10^{-3}$	DESIG=15
Γ_{16}	$3\pi^+ 3\pi^- K^+ K^-$	$(2.0 \pm 0.8) \times 10^{-4}$	DESIG=16
Γ_{17}	$3\pi^+ 3\pi^- K^+ K^- \pi^0$	$(6.1 \pm 2.2) \times 10^{-4}$	DESIG=17
Γ_{18}	$4\pi^+ 4\pi^-$	$(1.7 \pm 0.6) \times 10^{-4}$	DESIG=18
Γ_{19}	$4\pi^+ 4\pi^- 2\pi^0$	$(1.9 \pm 0.7) \times 10^{-3}$	DESIG=19

$\chi_{b1}(2P)$ BRANCHING RATIOS

NODE=M080220

$\Gamma(\omega\Upsilon(1S))/\Gamma_{total}$ — Γ_1/Γ

NODE=M080R3
NODE=M080R3

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
$\mathbf{1.63^{+0.35+0.16}_{-0.31-0.15}}$	$32.6^{+6.9}_{-6.1}$	[4] CRONIN-HEN..04	CLE3	$\Upsilon(3S) \to \gamma\omega\Upsilon(1S)$

[4] Using $B(\Upsilon(3S) \to \gamma\chi_{b1}(2P)) = (11.3 \pm 0.6)\%$ and $B(\Upsilon(1S) \to \ell^+\ell^-) = 2\,B(\Upsilon(1S) \to \mu^+\mu^-) = 2\,(2.48 \pm 0.06)\%$. NODE=M080R3;LINKAGE=CR

$\Gamma(\gamma\Upsilon(2S))/\Gamma_{total}$ — Γ_2/Γ

NODE=M080R2
NODE=M080R2

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.181±0.019 OUR AVERAGE					
0.211±0.017±0.019		[5,6,7] LEES	14M	BABR	$\Upsilon(3S) \rightarrow \gamma\gamma\mu^+\mu^-$
0.190±0.018±0.017	4.3k	[8] LEES	11J	BABR	$\Upsilon(3S) \rightarrow X\gamma$
0.206±0.035±0.019		[5,9] CRAWFORD	92B	CLE2	$e^+e^- \rightarrow \ell^+\ell^-\gamma\gamma$
0.132±0.018±0.012		[5,10] HEINTZ	92	CSB2	$e^+e^- \rightarrow \ell^+\ell^-\gamma\gamma$

[5] Assuming B($\Upsilon(2S) \rightarrow \mu^+\mu^-$) = (1.93 ± 0.17)%. NODE=M080R2;LINKAGE=D

[6] LEES 14M quotes $\Gamma(\chi_{b1}(2P) \rightarrow \gamma\Upsilon(2S))/\Gamma_{total} \times \Gamma(\Upsilon(3S) \rightarrow \gamma\chi_{b1}(2P))/\Gamma_{total}$ = (2.66 ± 0.22)% combining the results from $\Upsilon(3S) \rightarrow \gamma\gamma\mu^+\mu^-$ samples with and without photon conversions. NODE=M080R2;LINKAGE=E

[7] LEES 14M reports $[\Gamma(\chi_{b1}(2P) \rightarrow \gamma\Upsilon(2S))/\Gamma_{total}] \times [B(\Upsilon(3S) \rightarrow \gamma\chi_{b1}(2P))]$ = $(2.66 \pm 0.22) \times 10^{-2}$ which we divide by our best value B($\Upsilon(3S) \rightarrow \gamma\chi_{b1}(2P)$) = $(12.6 \pm 1.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M080R2;LINKAGE=F

[8] LEES 11J reports $[\Gamma(\chi_{b1}(2P) \rightarrow \gamma\Upsilon(2S))/\Gamma_{total}] \times [B(\Upsilon(3S) \rightarrow \gamma\chi_{b1}(2P))]$ = $(2.4 \pm 0.1 \pm 0.2) \times 10^{-2}$ which we divide by our best value B($\Upsilon(3S) \rightarrow \gamma\chi_{b1}(2P)$) = $(12.6 \pm 1.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M080R2;LINKAGE=LE

[9] CRAWFORD 92B quotes B($\Upsilon(3S) \rightarrow \gamma\chi_{b1}(2P)$) ×B($\chi_{b1}(2P) \rightarrow \gamma\Upsilon(2S)$) × 2 B($\Upsilon(2S) \rightarrow \ell^+\ell^-$) = (10.23 ± 1.20 ± 1.26) 10^{-4}. NODE=M080R2;LINKAGE=B

[10] Recalculated by us. HEINTZ 92 quotes B($\Upsilon(3S) \rightarrow \gamma\chi_{b1}(2P)$) ×B($\chi_{b1}(2P) \rightarrow \gamma\Upsilon(2S)$) = (2.29 ± 0.23 ± 0.21) % using B($\Upsilon(2S) \rightarrow \mu^+\mu^-$) = (1.44 ± 0.10)%. Supersedes HEINTZ 91. NODE=M080R2;LINKAGE=C

$\Gamma(\gamma\Upsilon(1S))/\Gamma_{total}$ — Γ_3/Γ

NODE=M080R1
NODE=M080R1

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.099±0.010 OUR AVERAGE					
0.107±0.006±0.010		[11,12,13] LEES	14M	BABR	$\Upsilon(3S) \rightarrow \gamma\gamma\mu^+\mu^-$
0.098±0.005±0.009	15k	[14] LEES	11J	BABR	$\Upsilon(3S) \rightarrow X\gamma$
0.103±0.023±0.009		[11,15] CRAWFORD	92B	CLE2	$e^+e^- \rightarrow \ell^+\ell^-\gamma\gamma$
0.075±0.010±0.007		[11,16] HEINTZ	92	CSB2	$e^+e^- \rightarrow \ell^+\ell^-\gamma\gamma$

[11] Assuming B($\Upsilon(1S) \rightarrow \mu^+\mu^-$) = (2.48 ± 0.05)%. NODE=M080R1;LINKAGE=D

[12] LEES 14M quotes $\Gamma(\chi_{b1}(2P) \rightarrow \gamma\Upsilon(1S))/\Gamma_{total} \times \Gamma(\Upsilon(3S) \rightarrow \gamma\chi_{b1}(2P))/\Gamma_{total}$ = $(13.48 \pm 0.72) \times 10^{-3}$ combining the results from samples of $\Upsilon(3S) \rightarrow \gamma\gamma\mu^+\mu^-$ with and without converted photons. NODE=M080R1;LINKAGE=E

[13] LEES 14M reports $[\Gamma(\chi_{b1}(2P) \rightarrow \gamma\Upsilon(1S))/\Gamma_{total}] \times [B(\Upsilon(3S) \rightarrow \gamma\chi_{b1}(2P))]$ = $(13.48 \pm 0.72) \times 10^{-3}$ which we divide by our best value B($\Upsilon(3S) \rightarrow \gamma\chi_{b1}(2P)$) = $(12.6 \pm 1.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M080R1;LINKAGE=G

[14] LEES 11J reports $[\Gamma(\chi_{b1}(2P) \rightarrow \gamma\Upsilon(1S))/\Gamma_{total}] \times [B(\Upsilon(3S) \rightarrow \gamma\chi_{b1}(2P))]$ = $(12.4 \pm 0.3 \pm 0.6) \times 10^{-3}$ which we divide by our best value B($\Upsilon(3S) \rightarrow \gamma\chi_{b1}(2P)$) = $(12.6 \pm 1.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M080R1;LINKAGE=LE

[15] CRAWFORD 92B quotes B($\Upsilon(3S) \rightarrow \gamma\chi_{b1}(2P)$) ×B($\chi_{b1}(2P) \rightarrow \gamma\Upsilon(1S)$) × 2 B($\Upsilon(1S) \rightarrow \ell^+\ell^-$) = (6.47 ± 1.12 ± 0.82) 10^{-4}. NODE=M080R1;LINKAGE=B

[16] Recalculated by us. HEINTZ 92 quotes B($\Upsilon(3S) \rightarrow \gamma\chi_{b1}(2P)$) × B($\chi_{b1}(2P) \rightarrow \gamma\Upsilon(1S)$) = (0.91 ± 0.11 ± 0.06)% using B($\Upsilon(1S) \rightarrow \mu^+\mu^-$) = (2.57 ± 0.05)%. Supersedes HEINTZ 91. NODE=M080R1;LINKAGE=F

$\Gamma(\pi\pi\chi_{b1}(1P))/\Gamma_{total}$ — Γ_4/Γ

NODE=M080R4
NODE=M080R4

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
9.1±1.3 OUR AVERAGE					
9.2±1.1±0.8	31k	[17] LEES	11C	BABR	$e^+e^- \rightarrow \pi^+\pi^- X$
8.6±2.3±2.1		[18] CAWLFIELD	06	CLE3	$\Upsilon(3S) \rightarrow 2(\gamma\pi\ell)$

[17] LEES 11C measures B($\Upsilon(3S) \rightarrow \chi_{b1}(2P)X$) × B($\chi_{b1}(2P) \rightarrow \chi_{b1}(1P)\pi^+\pi^-$) = $(1.16 \pm 0.07 \pm 0.12) \times 10^{-3}$. We derive the value assuming B($\Upsilon(3S) \rightarrow \chi_{b1}(2P)X$) = B($\Upsilon(3S) \rightarrow \chi_{b1}(2P)\gamma$) = $(12.6 \pm 1.2) \times 10^{-2}$. NODE=M080R4;LINKAGE=LE

[18] CAWLFIELD 06 quote $\Gamma(\chi_b(2P) \rightarrow \pi\pi\chi_b(1P))$ = 0.83 ± 0.22 ± 0.08 ± 0.19 keV assuming I-spin conservation, no *D*-wave contribution, $\Gamma(\chi_{b1}(2P))$ = 96 ± 16keV, and $\Gamma(\chi_{b2}(2P))$ = 138 ± 19 keV. NODE=M080R4;LINKAGE=CA

$\Gamma(D^0 X)/\Gamma_{total}$ — Γ_5/Γ

NODE=M080R01
NODE=M080R01

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
8.8±1.5±0.8	2243	[19] BRIERE	08	CLEO	$\Upsilon(3S) \rightarrow \gamma D^0 X$

[19] For $p_{D^0} > 2.5$ GeV/c. NODE=M080R01;LINKAGE=BR

$\Gamma(\pi^+\pi^-K^+K^-\pi^0)/\Gamma_{total}$ Γ_6/Γ

NODE=M080R02
NODE=M080R02

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.1±1.0±0.3	30	[20] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma\pi^+\pi^-K^+K^-\pi^0$

[20] ASNER 08A reports $[\Gamma(\chi_{b1}(2P) \to \pi^+\pi^-K^+K^-\pi^0)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b1}(2P))] = (39 \pm 8 \pm 9) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b1}(2P)) = (12.6 \pm 1.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M080R02;LINKAGE=AS

$\Gamma(2\pi^+\pi^-K^-K^0_S)/\Gamma_{total}$ Γ_7/Γ

NODE=M080R03
NODE=M080R03

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.1±0.5±0.1	10	[21] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 2\pi^+\pi^-K^-K^0_S$

[21] ASNER 08A reports $[\Gamma(\chi_{b1}(2P) \to 2\pi^+\pi^-K^-K^0_S)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b1}(2P))] = (14 \pm 5 \pm 3) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b1}(2P)) = (12.6 \pm 1.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M080R03;LINKAGE=AS

$\Gamma(2\pi^+\pi^-K^-K^0_S 2\pi^0)/\Gamma_{total}$ Γ_8/Γ

NODE=M080R04
NODE=M080R04

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
7.7±3.1±0.7	15	[22] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 2\pi^+\pi^-K^-2\pi^0$

[22] ASNER 08A reports $[\Gamma(\chi_{b1}(2P) \to 2\pi^+\pi^-K^-K^0_S 2\pi^0)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b1}(2P))] = (97 \pm 30 \pm 26) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b1}(2P)) = (12.6 \pm 1.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M080R04;LINKAGE=AS

$\Gamma(2\pi^+2\pi^-2\pi^0)/\Gamma_{total}$ Γ_9/Γ

NODE=M080R05
NODE=M080R05

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
5.9±2.0±0.5	36	[23] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 2\pi^+2\pi^-2\pi^0$

[23] ASNER 08A reports $[\Gamma(\chi_{b1}(2P) \to 2\pi^+2\pi^-2\pi^0)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b1}(2P))] = (74 \pm 16 \pm 19) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b1}(2P)) = (12.6 \pm 1.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M080R05;LINKAGE=AS

$\Gamma(2\pi^+2\pi^-K^+K^-)/\Gamma_{total}$ Γ_{10}/Γ

NODE=M080R06
NODE=M080R06

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.0±0.4±0.1	12	[24] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 2\pi^+2\pi^-K^+K^-$

[24] ASNER 08A reports $[\Gamma(\chi_{b1}(2P) \to 2\pi^+2\pi^-K^+K^-)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b1}(2P))] = (12 \pm 4 \pm 3) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b1}(2P)) = (12.6 \pm 1.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M080R06;LINKAGE=AS

$\Gamma(2\pi^+2\pi^-K^+K^-\pi^0)/\Gamma_{total}$ Γ_{11}/Γ

NODE=M080R07
NODE=M080R07

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
5.5±1.7±0.5	38	[25] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 2\pi^+2\pi^-K^+K^-\pi^0$

[25] ASNER 08A reports $[\Gamma(\chi_{b1}(2P) \to 2\pi^+2\pi^-K^+K^-\pi^0)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b1}(2P))] = (69 \pm 13 \pm 17) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b1}(2P)) = (12.6 \pm 1.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M080R07;LINKAGE=AS

$\Gamma(2\pi^+2\pi^-K^+K^-2\pi^0)/\Gamma_{total}$ Γ_{12}/Γ

NODE=M080R08
NODE=M080R08

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
9.6±3.5±0.9	27	[26] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 2\pi^+2\pi^-K^+K^-2\pi^0$

[26] ASNER 08A reports $[\Gamma(\chi_{b1}(2P) \to 2\pi^+2\pi^-K^+K^-2\pi^0)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b1}(2P))] = (121 \pm 29 \pm 33) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b1}(2P)) = (12.6 \pm 1.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M080R08;LINKAGE=AS

$\Gamma(3\pi^+2\pi^-K^-K^0_S\pi^0)/\Gamma_{total}$ Γ_{13}/Γ

NODE=M080R09
NODE=M080R09

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
6.7±2.5±0.6	17	[27] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 3\pi^+2\pi^-K^-K^0_S\pi^0$

[27] ASNER 08A reports $[\Gamma(\chi_{b1}(2P) \to 3\pi^+2\pi^-K^-K^0_S\pi^0)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b1}(2P))] = (85 \pm 23 \pm 22) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b1}(2P)) = (12.6 \pm 1.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M080R09;LINKAGE=AS

$\Gamma(3\pi^+3\pi^-)/\Gamma_{total}$ Γ_{14}/Γ

NODE=M080R10

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.2±0.4±0.1	18	[28] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 3\pi^+ 3\pi^-$

[28] ASNER 08A reports $[\Gamma(\chi_{b1}(2P) \to 3\pi^+3\pi^-)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b1}(2P))] = (15 \pm 4 \pm 3) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b1}(2P)) = (12.6 \pm 1.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M080R10;LINKAGE=AS

$\Gamma(3\pi^+3\pi^-2\pi^0)/\Gamma_{total}$ Γ_{15}/Γ

NODE=M080R11

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
12±4±1	44	[29] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 3\pi^+ 3\pi^- 2\pi^0$

[29] ASNER 08A reports $[\Gamma(\chi_{b1}(2P) \to 3\pi^+3\pi^-2\pi^0)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b1}(2P))] = (150 \pm 30 \pm 40) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b1}(2P)) = (12.6 \pm 1.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M080R11;LINKAGE=AS

$\Gamma(3\pi^+3\pi^-K^+K^-)/\Gamma_{total}$ Γ_{16}/Γ

NODE=M080R12

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.0±0.7±0.2	16	[30] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 3\pi^+ 3\pi^- K^+ K^-$

[30] ASNER 08A reports $[\Gamma(\chi_{b1}(2P) \to 3\pi^+3\pi^-K^+K^-)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b1}(2P))] = (25 \pm 7 \pm 6) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b1}(2P)) = (12.6 \pm 1.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M080R12;LINKAGE=AS

$\Gamma(3\pi^+3\pi^-K^+K^-\pi^0)/\Gamma_{total}$ Γ_{17}/Γ

NODE=M080R13

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
6.1±2.1±0.6	25	[31] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 3\pi^+ 3\pi^- K^+ K^- \pi^0$

[31] ASNER 08A reports $[\Gamma(\chi_{b1}(2P) \to 3\pi^+3\pi^-K^+K^-\pi^0)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b1}(2P))] = (77 \pm 17 \pm 21) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b1}(2P)) = (12.6 \pm 1.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M080R13;LINKAGE=AS

$\Gamma(4\pi^+4\pi^-)/\Gamma_{total}$ Γ_{18}/Γ

NODE=M080R14

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.7±0.6±0.2	16	[32] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 4\pi^+ 4\pi^-$

[32] ASNER 08A reports $[\Gamma(\chi_{b1}(2P) \to 4\pi^+4\pi^-)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b1}(2P))] = (22 \pm 6 \pm 5) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b1}(2P)) = (12.6 \pm 1.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M080R14;LINKAGE=AS

$\Gamma(4\pi^+4\pi^-2\pi^0)/\Gamma_{total}$ Γ_{19}/Γ

NODE=M080R15

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
19±7±2	41	[33] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 4\pi^+ 4\pi^- 2\pi^0$

[33] ASNER 08A reports $[\Gamma(\chi_{b1}(2P) \to 4\pi^+4\pi^-2\pi^0)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b1}(2P))] = (241 \pm 47 \pm 72) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b1}(2P)) = (12.6 \pm 1.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M080R15;LINKAGE=AS

$\chi_{b1}(2P)$ Cross-Particle Branching Ratios

NODE=M080230

$\Gamma(\chi_{b1}(2P) \to \gamma\Upsilon(1S))/\Gamma_{total} \times \Gamma(\Upsilon(3S) \to \gamma\chi_{b1}(2P))/\Gamma_{total}$ $\Gamma_3/\Gamma \times \Gamma_{21}^{\Upsilon(3S)}/\Gamma^{\Upsilon(3S)}$

NODE=M080B01

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
12.4±0.3±0.6	15k	LEES	11J	BABR	$\Upsilon(3S) \to X\gamma$

$B(\chi_{b1}(2P) \to \gamma\Upsilon(1S)) \times B(\Upsilon(3S) \to \gamma\chi_{b1}(2P)) \times B(\Upsilon(1S) \to \ell^+\ell^-)$

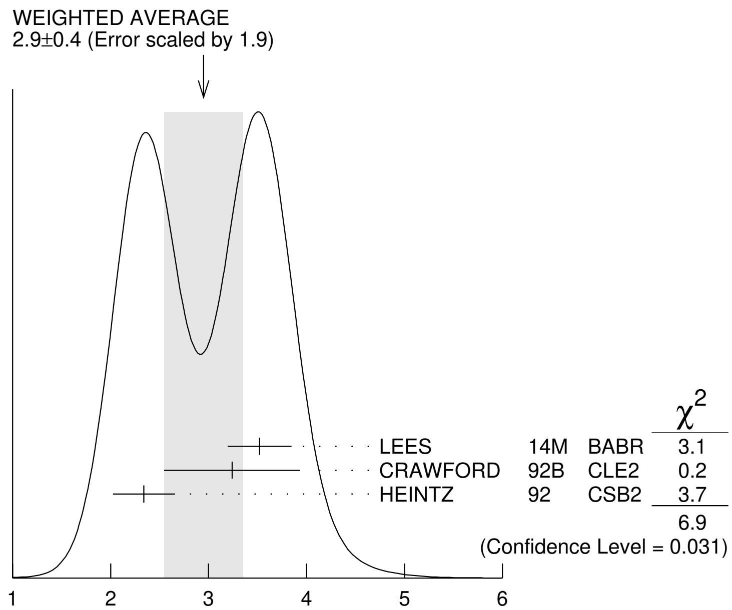
NODE=M080A00

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.9 ±0.4 OUR AVERAGE	Error includes scale factor of 1.9. See the ideogram below.				
$3.52^{+0.28}_{-0.27}{}^{+0.17}_{-0.18}$		[34] LEES	14M	BABR	$\Upsilon(3S) \to \gamma\gamma\mu^+\mu^-$
3.24±0.56±0.41	58	[35] CRAWFORD	92B	CLE2	$\Upsilon(3S) \to \gamma\gamma\ell^+\ell^-$
2.34±0.28±0.15		[36] HEINTZ	92	CSB2	$\Upsilon(3S) \to \gamma\gamma\ell^+\ell^-$

[34] From a sample of $\Upsilon(3S) \to \gamma\gamma\mu^+\mu^-$ with one converted photon. NODE=M080A00;LINKAGE=A

[35] CRAWFORD 92B quotes $2\times$B($\Upsilon(3S) \to \gamma\chi_{bJ}(2P)$) B($\chi_{bJ}(2P) \to \gamma\Upsilon$(nS)) B($\Upsilon$(nS) $\to \ell^+\ell^-$). NODE=M080A00;LINKAGE=C

[36] Calculated by us. HEINTZ 92 quotes B($\Upsilon(3S) \to \gamma\chi_{b1}(2P)$) $\times$B($\chi_{b1}(2P) \to \gamma\Upsilon(1S)$) = $(0.91 \pm 0.11 \pm 0.06)\%$ using B($\Upsilon(1S) \to \mu^+\mu^-$) =$(2.57 \pm 0.05)\%$. NODE=M080A00;LINKAGE=B



B($\chi_{b1}(2P) \to \gamma\Upsilon(1S)$) $\times$ B($\Upsilon(3S) \to \gamma\chi_{b1}(2P)$) $\times$ B($\Upsilon(1S) \to \ell^+\ell^-$) (units 10^{-4})

$\Gamma(\chi_{b1}(2P) \to \gamma\Upsilon(2S))/\Gamma_{total} \times \Gamma(\Upsilon(3S) \to \gamma\chi_{b1}(2P))/\Gamma_{total}$ — $\Gamma_2/\Gamma \times \Gamma_{21}^{\Upsilon(3S)}/\Gamma^{\Upsilon(3S)}$

NODE=M080B02
NODE=M080B02

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
2.4±0.1±0.2	4.3k	LEES	11J	BABR	$\Upsilon(3S) \to X\gamma$

B($\chi_{b1}(2P) \to \gamma\Upsilon(2S)$) × B($\Upsilon(3S) \to \gamma\chi_{b1}(2P)$) × B($\Upsilon(2S) \to \ell^+\ell^-$)

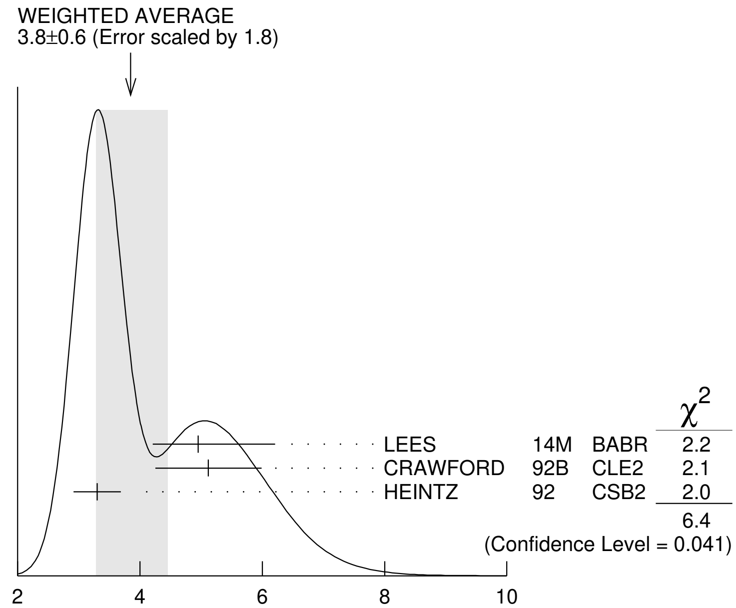
NODE=M080A01
NODE=M080A01

VALUE (units 10^{-4})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
3.8 ±0.6 OUR AVERAGE Error includes scale factor of 1.8. See the ideogram below.					
$4.95^{+0.75}_{-0.70}{}^{+1.01}_{-0.24}$		[37] LEES	14M	BABR	$\Upsilon(3S) \to \gamma\gamma\mu^+\mu^-$
5.12±0.60±0.63	111	[38] CRAWFORD	92B	CLE2	$\Upsilon(3S) \to \gamma\gamma\ell^+\ell^-$
3.30±0.33±0.20		[39] HEINTZ	92	CSB2	$\Upsilon(3S) \to \gamma\gamma\ell^+\ell^-$

[37] From a sample of $\Upsilon(3S) \to \gamma\gamma\mu^+\mu^-$ with one converted photon. NODE=M080A01;LINKAGE=A

[38] CRAWFORD 92B quotes $2\times$B($\Upsilon(3S) \to \gamma\chi_{bJ}(2P)$) B($\chi_{bJ}(2P) \to \gamma\Upsilon$(nS)) B($\Upsilon$(nS) $\to \ell^+\ell^-$). NODE=M080A01;LINKAGE=C

[39] Calculated by us. HEINTZ 92 quotes B($\Upsilon(3S) \to \gamma\chi_{b1}(2P)$)$\times$B($\chi_{b1}(2P) \to \gamma\Upsilon(2S)$) = $(2.29 \pm 0.23 \pm 0.21)$ % usingB($\Upsilon(2S) \to \mu^+\mu^-$) = $(1.44 \pm 0.10)\%$. NODE=M080A01;LINKAGE=B



$B(\chi_{b1}(2P) \to \gamma \Upsilon(2S)) \times B(\Upsilon(3S) \to \gamma \chi_{b1}(2P)) \times B(\Upsilon(2S) \to \ell^+ \ell^-)$ (units 10^{-4})

$B(\chi_{b1}(2P) \to \chi_{b1}(1P)\pi^+\pi^-) \times B(\Upsilon(3S) \to \chi_{b1}(2P)X)$

NODE=M080R16
NODE=M080R16

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.16±0.07±0.12	31k	LEES	11C	BABR	$e^+e^- \to \pi^+\pi^- X$

$B(\chi_{b2}(2P) \to pX + \overline{p}X)/B(\chi_{b1}(2P) \to pX + \overline{p}X)$

NODE=M080R20
NODE=M080R20

VALUE	DOCUMENT ID		TECN	COMMENT
1.109±0.007±0.040	BRIERE	07	CLEO	$\Upsilon(3S) \to \gamma\chi_{bJ}(2P)$

$B(\chi_{b0}(2P) \to pX + \overline{p}X)/B(\chi_{b1}(2P) \to pX + \overline{p}X)$

NODE=M080R21
NODE=M080R21

VALUE	DOCUMENT ID		TECN	COMMENT
1.082±0.025±0.060	BRIERE	07	CLEO	$\Upsilon(3S) \to \gamma\chi_{bJ}(2P)$

$\chi_{b1}(2P)$ REFERENCES

NODE=M080

LEES	14M	PR D90 112010	J.P. Lees *et al.*	(BABAR Collab.)	REFID=56343
LEES	11C	PR D84 011104	J.P. Lees *et al.*	(BABAR Collab.)	REFID=16775
LEES	11J	PR D84 072002	J.P. Lees *et al.*	(BABAR Collab.)	REFID=53936
ASNER	08A	PR D78 091103	D.M. Asner *et al.*	(CLEO Collab.)	REFID=52574
BRIERE	08	PR D78 092007	R.A. Briere *et al.*	(CLEO Collab.)	REFID=52577
BRIERE	07	PR D76 012005	R.A. Briere *et al.*	(CLEO Collab.)	REFID=51887
CAWLFIELD	06	PR D73 012003	C. Cawlfield *et al.*	(CLEO Collab.)	REFID=50997
ARTUSO	05	PRL 94 032001	M. Artuso *et al.*	(CLEO Collab.)	REFID=50454
CRONIN-HEN...	04	PRL 92 222002	D. Cronin-Hennessy *et al.*	(CLEO Collab.)	REFID=49766
CRAWFORD	92B	PL B294 139	G. Crawford *et al.*	(CLEO Collab.)	REFID=43177
HEINTZ	92	PR D46 1928	U. Heintz *et al.*	(CUSB II Collab.)	REFID=43604
HEINTZ	91	PRL 66 1563	U. Heintz *et al.*	(CUSB Collab.)	REFID=41580
MORRISON	91	PRL 67 1696	R.J. Morrison *et al.*	(CLEO Collab.)	REFID=41634
NARAIN	91	PRL 66 3113	M. Narain *et al.*	(CUSB Collab.)	REFID=41586

NODE=M205

$h_b(2P)$

$I^G(J^{PC}) = 0^-(1^{+-})$

Quantum numbers are quark model predictions. $C = -$ established by $\eta_b \gamma$ decay.

NODE=M205

$h_b(2P)$ MASS

NODE=M205M

NODE=M205M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
10259.8±0.5±1.1	90k	[1] MIZUK	12	BELL	$e^+e^- \to \pi^+\pi^-$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$10259.8 \pm 0.6^{+1.4}_{-1.0}$	83.9k	[2] ADACHI	12	BELL	10.86 $e^+e^- \to \pi^+\pi^-$ MM

[1] Observed with 9 standard deviations significance.
[2] Superseded by MIZUK 12.

NODE=M205M;LINKAGE=A
NODE=M205M;LINKAGE=AD

$h_b(2P)$ DECAY MODES

NODE=M205215;NODE=M205

	Mode	Fraction (Γ_i/Γ)	
Γ_1	hadrons	not seen	DESIG=1
Γ_2	$\eta_b(1S)\gamma$	(22± 5) %	DESIG=2
Γ_3	$\eta_b(2S)\gamma$	(48±13) %	DESIG=3

$h_b(2P)$ BRANCHING RATIOS

NODE=M205225

$\Gamma(\text{hadrons})/\Gamma_{\text{total}}$ — Γ_1/Γ

NODE=M205R01
NODE=M205R01

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
not seen	83.9k	ADACHI	12	BELL	10.86 $e^+e^- \to \pi^+\pi^-$ MM

$\Gamma(\eta_b(1S)\gamma)/\Gamma_{\text{total}}$ — Γ_2/Γ

NODE=M205R02
NODE=M205R02

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{22.3 \pm 3.8^{+3.1}_{-3.3}}$	10k	MIZUK	12	BELL	$e^+e^- \to (\gamma)\pi^+\pi^-$ hadrons

$\Gamma(\eta_b(2S)\gamma)/\Gamma_{\text{total}}$ — Γ_3/Γ

NODE=M205R03
NODE=M205R03

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{47.5 \pm 10.5^{+6.8}_{-7.7}}$	26k	MIZUK	12	BELL	$e^+e^- \to (\gamma)\pi^+\pi^-$ hadrons

$h_b(2P)$ REFERENCES

NODE=M205

ADACHI 12 PRL 108 032001 I. Adachi *et al.* (BELLE Collab.) REFID=53962
MIZUK 12 PRL 109 232002 R. Mizuk *et al.* (BELLE Collab.) REFID=54718

NODE=M081

$\chi_{b2}(2P)$

$I^G(J^{PC}) = 0^+(2^{++})$
J needs confirmation.

NODE=M081

Observed in radiative decay of the $\Upsilon(3S)$, therefore $C = +$. Branching ratio requires E1 transition, M1 is strongly disfavored, therefore $P = +$.

$\chi_{b2}(2P)$ MASS

NODE=M081M

NODE=M081M

VALUE (MeV)	DOCUMENT ID
10268.65±0.22±0.50 OUR EVALUATION	From γ energy below, using $\Upsilon(3S)$ mass = 10355.2 ± 0.5 MeV

→ UNCHECKED ←

$m_{\chi_{b2}(2P)} - m_{\chi_{b1}(2P)}$

NODE=M081M2

NODE=M081M2

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
13.10±0.24 OUR AVERAGE				
12.3 ±2.6 ±0.6	[1] AAIJ	14BG	LHCB	$pp \to \gamma\mu^+\mu^- X$
13.04±0.26	LEES	14M	BABR	$\Upsilon(3S) \to \gamma\gamma\mu^+\mu^-$
13.5 ±0.4 ±0.5	[2] HEINTZ	92	CSB2	$e^+e^- \to \gamma X, \ell^+\ell^-\gamma\gamma$

[1] From the $\chi_{bj}(2P) \to \Upsilon(1S)\gamma$ transition. NODE=M081M2;LINKAGE=B

[2] From the average photon energy for inclusive and exclusive events. Supersedes NARAIN 91. NODE=M081M2;LINKAGE=A

γ ENERGY IN $\Upsilon(3S)$ DECAY

NODE=M081DM

NODE=M081DM

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
86.19±0.22 OUR EVALUATION		Treating systematic errors as correlated			
86.40±0.18 OUR AVERAGE					
86.04±0.06±0.27		ARTUSO	05	CLEO	$\Upsilon(3S) \to \gamma X$
86 ±1	101	CRAWFORD	92B	CLE2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$
86.7 ±0.4	10319	[3] HEINTZ	92	CSB2	$e^+e^- \to \gamma X$
86.9 ±0.4	157	[4] HEINTZ	92	CSB2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$
86.4 ±0.1 ±0.4	30741	MORRISON	91	CLE2	$e^+e^- \to \gamma X$

→ UNCHECKED ←

OCCUR=2

[3] A systematic uncertainty on the energy scale of 0.9% not included. Supersedes NARAIN 91. NODE=M081DM;LINKAGE=A

[4] A systematic uncertainty on the energy scale of 0.9% not included. Supersedes HEINTZ 91. NODE=M081DM;LINKAGE=B

$\chi_{b2}(2P)$ DECAY MODES

NODE=M081215;NODE=M081

	Mode	Fraction (Γ_i/Γ)	Confidence level	
Γ_1	$\omega\,\Upsilon(1S)$	$(1.10^{+0.34}_{-0.30})$ %		DESIG=3
Γ_2	$\gamma\,\Upsilon(2S)$	(8.9 ±1.2) %		DESIG=2
Γ_3	$\gamma\,\Upsilon(1S)$	(6.6 ±0.8) %		DESIG=1
Γ_4	$\pi\pi\chi_{b2}(1P)$	(5.1 ±0.9) $\times 10^{-3}$		DESIG=4
Γ_5	$D^0 X$	< 2.4 %	90%	DESIG=5
Γ_6	$\pi^+\pi^- K^+ K^- \pi^0$	< 1.1 $\times 10^{-4}$	90%	DESIG=6
Γ_7	$2\pi^+\pi^- K^- K^0_S$	< 9 $\times 10^{-5}$	90%	DESIG=7
Γ_8	$2\pi^+\pi^- K^- K^0_S 2\pi^0$	< 7 $\times 10^{-4}$	90%	DESIG=8
Γ_9	$2\pi^+ 2\pi^- 2\pi^0$	(3.9 ±1.6) $\times 10^{-4}$		DESIG=9
Γ_{10}	$2\pi^+ 2\pi^- K^+ K^-$	(9 ±4) $\times 10^{-5}$		DESIG=10
Γ_{11}	$2\pi^+ 2\pi^- K^+ K^- \pi^0$	(2.4 ±1.1) $\times 10^{-4}$		DESIG=11
Γ_{12}	$2\pi^+ 2\pi^- K^+ K^- 2\pi^0$	(4.7 ±2.3) $\times 10^{-4}$		DESIG=12
Γ_{13}	$3\pi^+ 2\pi^- K^- K^0_S \pi^0$	< 4 $\times 10^{-4}$	90%	DESIG=13
Γ_{14}	$3\pi^+ 3\pi^-$	(9 ±4) $\times 10^{-5}$		DESIG=14
Γ_{15}	$3\pi^+ 3\pi^- 2\pi^0$	(1.2 ±0.4) $\times 10^{-3}$		DESIG=15
Γ_{16}	$3\pi^+ 3\pi^- K^+ K^-$	(1.4 ±0.7) $\times 10^{-4}$		DESIG=16
Γ_{17}	$3\pi^+ 3\pi^- K^+ K^- \pi^0$	(4.2 ±1.7) $\times 10^{-4}$		DESIG=17
Γ_{18}	$4\pi^+ 4\pi^-$	(9 ±5) $\times 10^{-5}$		DESIG=18
Γ_{19}	$4\pi^+ 4\pi^- 2\pi^0$	(1.3 ±0.5) $\times 10^{-3}$		DESIG=19

$\chi_{b2}(2P)$ BRANCHING RATIOS

NODE=M081220

$\Gamma(\omega\Upsilon(1S))/\Gamma_{total}$ Γ_1/Γ

NODE=M081R3
NODE=M081R3

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
$1.10^{+0.32+0.11}_{-0.28-0.10}$	$20.1^{+5.8}_{-5.1}$	[5] CRONIN-HEN..04	CLE3	$\Upsilon(3S) \to \gamma\omega\Upsilon(1S)$

[5] Using B($\Upsilon(3S) \to \gamma\chi_{b2}(2P)$) = (11.4 ± 0.8)% and B($\Upsilon(1S) \to \ell^+\ell^-$) = 2 B($\Upsilon(1S) \to \mu^+\mu^-$) = 2 (2.48 ± 0.06)%.

NODE=M081R3;LINKAGE=CR

$\Gamma(\gamma\Upsilon(2S))/\Gamma_{total}$ Γ_2/Γ

NODE=M081R2
NODE=M081R2

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.089±0.012 OUR AVERAGE				
0.085±0.010±0.010		[6,7,8] LEES 14M	BABR	$\Upsilon(3S) \to \gamma\gamma\mu^+\mu^-$
0.084±0.011±0.010	2.5k	[9] LEES 11J	BABR	$\Upsilon(3S) \to X\gamma$
0.096±0.022±0.012		[7,10] CRAWFORD 92B	CLE2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$
0.106±0.016±0.013		[7,11] HEINTZ 92	CSB2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$

[6] LEES 14M quotes $\Gamma(\chi_{b2}(2P) \to \gamma\Upsilon(2S))/\Gamma_{total} \times \Gamma(\Upsilon(3S) \to \gamma\chi_{b2}(2P))/\Gamma_{total}$ = (1.12 ± 0.13)% combining the results from samples of $\Upsilon(3S) \to \gamma\gamma\mu^+\mu^-$ with and without converted photons.

NODE=M081R2;LINKAGE=D

[7] Assuming B($\Upsilon(2S) \to \mu^+\mu^-$) = (1.93 ± 0.17)%.

NODE=M081R2;LINKAGE=E

[8] LEES 14M reports $[\Gamma(\chi_{b2}(2P) \to \gamma\Upsilon(2S))/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b2}(2P))]$ = (1.12 ± 0.13) × 10^{-2} which we divide by our best value B($\Upsilon(3S) \to \gamma\chi_{b2}(2P)$) = (13.1 ± 1.6) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M081R2;LINKAGE=F

[9] LEES 11J reports $[\Gamma(\chi_{b2}(2P) \to \gamma\Upsilon(2S))/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b2}(2P))]$ = (1.1 ± 0.1 ± 0.1) × 10^{-2} which we divide by our best value B($\Upsilon(3S) \to \gamma\chi_{b2}(2P)$) = (13.1 ± 1.6) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M081R2;LINKAGE=LE

[10] CRAWFORD 92B quotes B($\Upsilon(3S) \to \gamma\chi_{b1}(2P)$) ×B($\chi_{b2}(2P) \to \gamma\Upsilon(2S)$) × 2 B($\Upsilon(2S) \to \ell^+\ell^-$) = (4.98 ± 0.94 ± 0.62) 10^{-4}.

NODE=M081R2;LINKAGE=B

[11] Recalculated by us. HEINTZ 92 quotes B($\Upsilon(3S) \to \gamma\chi_{b2}(2P)$) ×B($\chi_{b2}(2P) \to \gamma\Upsilon(2S)$) = (1.90 ± 0.23 ± 0.18) % using B($\Upsilon(2S) \to \mu^+\mu^-$) = (1.44 ± 0.10)%. Supersedes HEINTZ 91.

NODE=M081R2;LINKAGE=C

$\Gamma(\gamma\Upsilon(1S))/\Gamma_{total}$ Γ_3/Γ

NODE=M081R1
NODE=M081R1

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.066±0.008 OUR AVERAGE				
0.061±0.004±0.007		[12,13,14] LEES 14M	BABR	$\Upsilon(3S) \to \gamma\gamma\mu^+\mu^-$
0.070±0.004±0.008	11k	[15] LEES 11J	BABR	$\Upsilon(3S) \to X\gamma$
0.077±0.018±0.009		[13,16] CRAWFORD 92B	CLE2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$
0.061±0.009±0.007		[13,17] HEINTZ 92	CSB2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$

[12] LEES 14M quotes $\Gamma(\chi_{b2}(2P) \to \gamma\Upsilon(1S))/\Gamma_{total} \times \Gamma(\Upsilon(3S) \to \gamma\chi_{b2}(2P))/\Gamma_{total}$ = (8.03 ± 0.50) × 10^{-3} combining the results from samples of $\Upsilon(3S) \to \gamma\gamma\mu^+\mu^-$ with and without converted photons.

NODE=M081R1;LINKAGE=D

[13] Assuming B($\Upsilon(1S) \to \mu^+\mu^-$) = (2.48 ± 0.05)%.

NODE=M081R1;LINKAGE=E

[14] LEES 14M reports $[\Gamma(\chi_{b2}(2P) \to \gamma\Upsilon(1S))/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b2}(2P))]$ = (8.03 ± 0.50) × 10^{-3} which we divide by our best value B($\Upsilon(3S) \to \gamma\chi_{b2}(2P)$) = (13.1 ± 1.6) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M081R1;LINKAGE=F

[15] LEES 11J reports $[\Gamma(\chi_{b2}(2P) \to \gamma\Upsilon(1S))/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b2}(2P))]$ = (9.2 ± 0.3 ± 0.4) × 10^{-3} which we divide by our best value B($\Upsilon(3S) \to \gamma\chi_{b2}(2P)$) = (13.1 ± 1.6) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M081R1;LINKAGE=LE

[16] CRAWFORD 92B quotes B($\Upsilon(3S) \to \gamma\chi_{b2}(2P)$) ×B($\chi_{b2}(2P) \to \gamma\Upsilon(1S)$) × 2 B($\Upsilon(1S) \to \ell^+\ell^-$) = (5.03 ± 0.94 ± 0.63) 10^{-4}.

NODE=M081R1;LINKAGE=B

[17] Recalculated by us. HEINTZ 92 quotes B($\Upsilon(3S) \to \gamma\chi_{b2}(2P)$) ×B($\chi_{b2}(2P) \to \gamma\Upsilon(1S)$) =(0.77 ± 0.11 ± 0.05)% using B($\Upsilon(1S) \to \mu^+\mu^-$) = (2.57 ± 0.05)%. Supersedes HEINTZ 91.

NODE=M081R1;LINKAGE=C

$\Gamma(\pi\pi\chi_{b2}(1P))/\Gamma_{total}$ Γ_4/Γ

NODE=M081R4
NODE=M081R4

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
5.1±0.9 OUR AVERAGE				
4.9±0.7±0.6	17k	[18] LEES 11C	BABR	$e^+e^- \to \pi^+\pi^- X$
6.0±1.6±1.4		[19] CAWLFIELD 06	CLE3	$\Upsilon(3S) \to 2(\gamma\pi\ell)$

[18] (0.64 ± 0.05 ± 0.08) × 10^{-3}. We derive the value assuming B($\Upsilon(3S) \to \chi_{b2}(2P)X$) = B($\Upsilon(3S) \to \chi_{b2}(2P)\gamma$) = (13.1 ± 1.6) × 10^{-2}.

NODE=M081R4;LINKAGE=LE

[19] CAWLFIELD 06 quote $\Gamma(\chi_b(2P) \to \pi\pi\chi_b(1P))$ = 0.83 ± 0.22 ± 0.08 ± 0.19 keV assuming I-spin conservation, no *D*-wave contribution, $\Gamma(\chi_{b1}(2P))$ = 96 ± 16keV, and $\Gamma(\chi_{b2}(2P))$ = 138 ± 19 keV.

NODE=M081R4;LINKAGE=CA

$\Gamma(D^0 X)/\Gamma_{total}$ Γ_5/Γ

NODE=M081R01

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<2.4 × 10^{-2}	90	[20,21] BRIERE	08	CLEO	$\Upsilon(3S) \to \gamma D^0 X$

[20] For $p_{D^0} > 2.5$ GeV/c.

[21] The authors also present their result as $(0.2 \pm 1.4 \pm 0.1) \times 10^{-2}$.

NODE=M081R01;LINKAGE=BR
NODE=M081R01;LINKAGE=RI

$\Gamma(\pi^+\pi^- K^+ K^- \pi^0)/\Gamma_{total}$ Γ_6/Γ

NODE=M081R02

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.1	90	[22] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma\pi^+\pi^- K^+ K^- \pi^0$

[22] ASNER 08A reports $[\Gamma(\chi_{b2}(2P) \to \pi^+\pi^- K^+ K^- \pi^0)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b2}(2P))] < 14 \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b2}(2P)) = 13.1 \times 10^{-2}$.

NODE=M081R02;LINKAGE=AS

$\Gamma(2\pi^+\pi^- K^- K^0_S)/\Gamma_{total}$ Γ_7/Γ

NODE=M081R03

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.9	90	[23] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 2\pi^+\pi^- K^- K^0_S$

[23] ASNER 08A reports $[\Gamma(\chi_{b2}(2P) \to 2\pi^+\pi^- K^- K^0_S)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b2}(2P))] < 12 \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b2}(2P)) = 13.1 \times 10^{-2}$.

NODE=M081R03;LINKAGE=AS

$\Gamma(2\pi^+\pi^- K^- K^0_S 2\pi^0)/\Gamma_{total}$ Γ_8/Γ

NODE=M081R04

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<7	90	[24] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 2\pi^+\pi^- K^- 2\pi^0$

[24] ASNER 08A reports $[\Gamma(\chi_{b2}(2P) \to 2\pi^+\pi^- K^- K^0_S 2\pi^0)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b2}(2P))] < 87 \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b2}(2P)) = 13.1 \times 10^{-2}$.

NODE=M081R04;LINKAGE=AS

$\Gamma(2\pi^+ 2\pi^- 2\pi^0)/\Gamma_{total}$ Γ_9/Γ

NODE=M081R05

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.9±1.6±0.5	23	[25] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 2\pi^+ 2\pi^- 2\pi^0$

[25] ASNER 08A reports $[\Gamma(\chi_{b2}(2P) \to 2\pi^+ 2\pi^- 2\pi^0)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b2}(2P))] = (51 \pm 16 \pm 13) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b2}(2P)) = (13.1 \pm 1.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M081R05;LINKAGE=AS

$\Gamma(2\pi^+ 2\pi^- K^+ K^-)/\Gamma_{total}$ Γ_{10}/Γ

NODE=M081R06

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.9±0.4±0.1	11	[26] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 2\pi^+ 2\pi^- K^+ K^-$

[26] ASNER 08A reports $[\Gamma(\chi_{b2}(2P) \to 2\pi^+ 2\pi^- K^+ K^-)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b2}(2P))] = (12 \pm 4 \pm 3) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b2}(2P)) = (13.1 \pm 1.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M081R06;LINKAGE=AS

$\Gamma(2\pi^+ 2\pi^- K^+ K^- \pi^0)/\Gamma_{total}$ Γ_{11}/Γ

NODE=M081R07

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.4±1.0±0.3	16	[27] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 2\pi^+ 2\pi^- K^+ K^- \pi^0$

[27] ASNER 08A reports $[\Gamma(\chi_{b2}(2P) \to 2\pi^+ 2\pi^- K^+ K^- \pi^0)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b2}(2P))] = (32 \pm 11 \pm 8) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b2}(2P)) = (13.1 \pm 1.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M081R07;LINKAGE=AS

$\Gamma(2\pi^+ 2\pi^- K^+ K^- 2\pi^0)/\Gamma_{total}$ Γ_{12}/Γ

NODE=M081R08

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
4.7±2.2±0.6	14	[28] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 2\pi^+ 2\pi^- K^+ K^- 2\pi^0$

[28] ASNER 08A reports $[\Gamma(\chi_{b2}(2P) \to 2\pi^+ 2\pi^- K^+ K^- 2\pi^0)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b2}(2P))] = (62 \pm 23 \pm 17) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b2}(2P)) = (13.1 \pm 1.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M081R08;LINKAGE=AS

$\Gamma(3\pi^+ 2\pi^- K^- K^0_S \pi^0)/\Gamma_{total}$ Γ_{13}/Γ

NODE=M081R09
NODE=M081R09

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<4	90	[29] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 3\pi^+ 2\pi^- K^- K^0_S \pi^0$

[29] ASNER 08A reports $[\Gamma(\chi_{b2}(2P) \to 3\pi^+ 2\pi^- K^- K^0_S \pi^0)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma \chi_{b2}(2P))] < 58 \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma \chi_{b2}(2P)) = 13.1 \times 10^{-2}$.

NODE=M081R09;LINKAGE=AS

$\Gamma(3\pi^+ 3\pi^-)/\Gamma_{total}$ Γ_{14}/Γ

NODE=M081R10
NODE=M081R10

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.9±0.4±0.1	14	[30] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 3\pi^+ 3\pi^-$

[30] ASNER 08A reports $[\Gamma(\chi_{b2}(2P) \to 3\pi^+ 3\pi^-)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma \chi_{b2}(2P))] = (12 \pm 4 \pm 3) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma \chi_{b2}(2P)) = (13.1 \pm 1.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M081R10;LINKAGE=AS

$\Gamma(3\pi^+ 3\pi^- 2\pi^0)/\Gamma_{total}$ Γ_{15}/Γ

NODE=M081R11
NODE=M081R11

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
12±4±1	45	[31] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 3\pi^+ 3\pi^- 2\pi^0$

[31] ASNER 08A reports $[\Gamma(\chi_{b2}(2P) \to 3\pi^+ 3\pi^- 2\pi^0)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma \chi_{b2}(2P))] = (159 \pm 33 \pm 43) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma \chi_{b2}(2P)) = (13.1 \pm 1.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M081R11;LINKAGE=AS

$\Gamma(3\pi^+ 3\pi^- K^+ K^-)/\Gamma_{total}$ Γ_{16}/Γ

NODE=M081R12
NODE=M081R12

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.4±0.7±0.2	12	[32] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 3\pi^+ 3\pi^- K^+ K^-$

[32] ASNER 08A reports $[\Gamma(\chi_{b2}(2P) \to 3\pi^+ 3\pi^- K^+ K^-)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma \chi_{b2}(2P))] = (19 \pm 7 \pm 5) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma \chi_{b2}(2P)) = (13.1 \pm 1.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M081R12;LINKAGE=AS

$\Gamma(3\pi^+ 3\pi^- K^+ K^- \pi^0)/\Gamma_{total}$ Γ_{17}/Γ

NODE=M081R13
NODE=M081R13

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
4.2±1.7±0.5	16	[33] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 3\pi^+ 3\pi^- K^+ K^- \pi^0$

[33] ASNER 08A reports $[\Gamma(\chi_{b2}(2P) \to 3\pi^+ 3\pi^- K^+ K^- \pi^0)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma \chi_{b2}(2P))] = (55 \pm 16 \pm 15) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma \chi_{b2}(2P)) = (13.1 \pm 1.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M081R13;LINKAGE=AS

$\Gamma(4\pi^+ 4\pi^-)/\Gamma_{total}$ Γ_{18}/Γ

NODE=M081R14
NODE=M081R14

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.9±0.4±0.1	9	[34] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 4\pi^+ 4\pi^-$

[34] ASNER 08A reports $[\Gamma(\chi_{b2}(2P) \to 4\pi^+ 4\pi^-)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma \chi_{b2}(2P))] = (12 \pm 5 \pm 3) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma \chi_{b2}(2P)) = (13.1 \pm 1.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M081R14;LINKAGE=AS

$\Gamma(4\pi^+ 4\pi^- 2\pi^0)/\Gamma_{total}$ Γ_{19}/Γ

NODE=M081R15
NODE=M081R15

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
13±5±2	27	[35] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 4\pi^+ 4\pi^- 2\pi^0$

[35] ASNER 08A reports $[\Gamma(\chi_{b2}(2P) \to 4\pi^+ 4\pi^- 2\pi^0)/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma \chi_{b2}(2P))] = (165 \pm 46 \pm 50) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma \chi_{b2}(2P)) = (13.1 \pm 1.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M081R15;LINKAGE=AS

$\chi_{b2}(2P)$ Cross-Particle Branching Ratios

NODE=M081230

$\Gamma(\chi_{b2}(2P) \to \gamma \Upsilon(1S))/\Gamma_{total} \times \Gamma(\Upsilon(3S) \to \gamma \chi_{b2}(2P))/\Gamma_{total}$ $\Gamma_3/\Gamma \times \Gamma^{\Upsilon(3S)}_{20}/\Gamma^{\Upsilon(3S)}$

NODE=M081B01
NODE=M081B01

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
9.2±0.3±0.4	11k	LEES	11J	BABR	$\Upsilon(3S) \to X\gamma$

$\Gamma(\chi_{b2}(2P) \to \gamma \Upsilon(2S))/\Gamma_{total} \times \Gamma(\Upsilon(3S) \to \gamma \chi_{b2}(2P))/\Gamma_{total}$ — $\Gamma_2/\Gamma \times \Gamma_{20}^{\Upsilon(3S)}/\Gamma^{\Upsilon(3S)}$

NODE=M081B02
NODE=M081B02

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
1.1±0.1±0.1	2.5k	LEES	11J	BABR	$\Upsilon(3S) \to X\gamma$

$B(\chi_{b2}(2P) \to \chi_{b2}(1P)\pi^+\pi^-) \times B(\Upsilon(3S) \to \chi_{b2}(2P)X)$

NODE=M081R16
NODE=M081R16

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.64±0.05±0.08	17k	LEES	11C	BABR	$e^+e^- \to \pi^+\pi^- X$

$B(\chi_{b2}(2P) \to \gamma \Upsilon(1S)) \times B(\Upsilon(3S) \to \gamma \chi_{b2}(2P)) \times B(\Upsilon(1S) \to \ell^+\ell^-)$

NODE=M081A01
NODE=M081A01

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.02±0.18 OUR AVERAGE					
$1.95^{+0.22+0.10}_{-0.21-0.16}$		[36] LEES	14M	BABR	$\Upsilon(3S) \to \gamma\gamma\mu^+\mu^-$
2.52±0.47±0.32	48	[37] CRAWFORD	92B	CLE2	$\Upsilon(3S) \to \gamma\gamma\ell^+\ell^-$
1.98±0.28±0.12		[38] HEINTZ	92	CSB2	$\Upsilon(3S) \to \gamma\gamma\ell^+\ell^-$

[36] From a sample of $\Upsilon(3S) \to \gamma\gamma\mu^+\mu^-$ with converted photons. NODE=M081A01;LINKAGE=A

[37] CRAWFORD 92B quotes $2\times B(\Upsilon(3S) \to \gamma\chi_{bJ}(2P))$ $B(\chi_{bJ}(2P) \to \gamma\Upsilon(\text{nS}))$ $B(\Upsilon(\text{nS}) \to \ell^+\ell^-)$. NODE=M081A01;LINKAGE=C

[38] Calculated by us. HEINTZ 92 quotes $B(\Upsilon(3S) \to \gamma\chi_{b2}(2P))\times B(\chi_{b2}(2P) \to \gamma\Upsilon(1S)) = (0.77 \pm 0.11 \pm 0.05)\%$ using $B(\Upsilon(1S) \to \mu^+\mu^-) = (2.57 \pm 0.05)\%$. NODE=M081A01;LINKAGE=B

$[B(\chi_{b2}(2P) \to \gamma \Upsilon(1S)) \times B(\Upsilon(3S) \to \gamma \chi_{b2}(2P))] / [B(\chi_{b1}(2P) \to \gamma \Upsilon(1S)) \times B(\Upsilon(3S) \to \gamma \chi_{b1}(2P))]$

NODE=M081A00
NODE=M081A00

VALUE (%)	DOCUMENT ID		TECN	COMMENT
66.6±3.0	[39] LEES	14M	BABR	$\Upsilon(3S) \to \gamma\gamma\mu^+\mu^-$

[39] From a sample of $\Upsilon(3S) \to \gamma\gamma\mu^+\mu^-$ events without converted photons. NODE=M081A00;LINKAGE=A

$B(\chi_{b2}(2P) \to \gamma \Upsilon(2S)) \times B(\Upsilon(3S) \to \gamma \chi_{b2}(2P)) \times B(\Upsilon(2S) \to \ell^+\ell^-)$

NODE=M081A02
NODE=M081A02

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.74±0.29 OUR AVERAGE					
$3.22^{+0.58+0.16}_{-0.53-0.71}$		[40] LEES	14M	BABR	$\Upsilon(3S) \to \gamma\gamma\mu^+\mu^-$
2.49±0.47±0.31	53	[41] CRAWFORD	92B	CLE2	$\Upsilon(3S) \to \gamma\gamma\ell^+\ell^-$
2.74±0.33±0.18		[42] HEINTZ	92	CSB2	$\Upsilon(3S) \to \gamma\gamma\ell^+\ell^-$

[40] From a sample of $\Upsilon(3S) \to \gamma\gamma\mu^+\mu^-$ with converted photons. NODE=M081A02;LINKAGE=A

[41] CRAWFORD 92B quotes $2\times B(\Upsilon(3S) \to \gamma\chi_{bJ}(2P))$ $B(\chi_{bJ}(2P) \to \gamma\Upsilon(\text{nS}))$ $B(\Upsilon(\text{nS}) \to \ell^+\ell^-)$. NODE=M081A02;LINKAGE=C

[42] Calculated by us. HEINTZ 92 quotes $B(\Upsilon(3S) \to \gamma\chi_{b2}(2P))$ $\times B(\chi_{b2}(2P) \to \gamma\Upsilon(2S)) = (1.90 \pm 0.23 \pm 0.18)$ % using $B(\Upsilon(2S) \to \mu^+\mu^-) = (1.44 \pm 0.10)\%$. NODE=M081A02;LINKAGE=B

$[B(\chi_{b2}(2P) \to \gamma \Upsilon(2S)) \times B(\Upsilon(3S) \to \gamma \chi_{b2}(2P))] / [B(\chi_{b1}(2P) \to \gamma \Upsilon(2S)) \times B(\Upsilon(3S) \to \gamma \chi_{b1}(2P))]$

NODE=M081A03
NODE=M081A03

VALUE (%)	DOCUMENT ID		TECN	COMMENT
46.9±2.0	[43] LEES	14M	BABR	$\Upsilon(3S) \to \gamma\gamma\mu^+\mu^-$

[43] From a sample of $\Upsilon(3S) \to \gamma\gamma\mu^+\mu^-$ without converted photons. NODE=M081A03;LINKAGE=A

$\chi_{b2}(2P)$ REFERENCES

NODE=M081

AAIJ	14BG	JHEP 1410 088	R. Aaij *et al.*	(LHCb Collab.)	REFID=56199
LEES	14M	PR D90 112010	J.P. Lees *et al.*	(BABAR Collab.)	REFID=56343
LEES	11C	PR D84 011104	J.P. Lees *et al.*	(BABAR Collab.)	REFID=16775
LEES	11J	PR D84 072002	J.P. Lees *et al.*	(BABAR Collab.)	REFID=53936
ASNER	08A	PR D78 091103	D.M. Asner *et al.*	(CLEO Collab.)	REFID=52574
BRIERE	08	PR D78 092007	R.A. Briere *et al.*	(CLEO Collab.)	REFID=52577
CAWLFIELD	06	PR D73 012003	C. Cawlfield *et al.*	(CLEO Collab.)	REFID=50997
ARTUSO	05	PRL 94 032001	M. Artuso *et al.*	(CLEO Collab.)	REFID=50454
CRONIN-HEN...	04	PRL 92 222002	D. Cronin-Hennessy *et al.*	(CLEO Collab.)	REFID=49766
CRAWFORD	92B	PL B294 139	G. Crawford *et al.*	(CLEO Collab.)	REFID=43177
HEINTZ	92	PR D46 1928	U. Heintz *et al.*	(CUSB II Collab.)	REFID=43604
HEINTZ	91	PRL 66 1563	U. Heintz *et al.*	(CUSB Collab.)	REFID=41580
MORRISON	91	PRL 67 1696	R.J. Morrison *et al.*	(CLEO Collab.)	REFID=41634
NARAIN	91	PRL 66 3113	M. Narain *et al.*	(CUSB Collab.)	REFID=41586

NODE=M048

$\Upsilon(3S)$

$I^G(J^{PC}) = 0^-(1^{--})$

$\Upsilon(3S)$ MASS

NODE=M048M

NODE=M048M

VALUE (MeV)		DOCUMENT ID	TECN	COMMENT
10355.2±0.5	[1]	ARTAMONOV 00	MD1	$e^+e^- \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •				
10355.3±0.5	[2,3]	BARU 86B	REDE	$e^+e^- \to$ hadrons

[1] Reanalysis of BARU 86B using new electron mass (COHEN 87). NODE=M048M;LINKAGE=AR
[2] Reanalysis of ARTAMONOV 84. NODE=M048M;LINKAGE=C
[3] Superseded by ARTAMONOV 00. NODE=M048M;LINKAGE=RZ

$m_{\Upsilon(3S)} - m_{\Upsilon(2S)}$

NODE=M048DM2

NODE=M048DM2

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
331.50±0.02±0.13	LEES	11C	BABR	$e^+e^- \to \pi^+\pi^- X$

$\Upsilon(3S)$ WIDTH

NODE=M048W

NODE=M048W

VALUE (keV)	DOCUMENT ID
20.32±1.85 OUR EVALUATION	See the Note on "Width Determinations of the Υ States"

→ UNCHECKED ←

$\Upsilon(3S)$ DECAY MODES

NODE=M048215;NODE=M048

	Mode		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	
Γ_1	$\Upsilon(2S)$ anything		(10.6 ± 0.8) %		DESIG=8
Γ_2	$\Upsilon(2S)\pi^+\pi^-$		(2.82± 0.18) %	S=1.6	DESIG=4
Γ_3	$\Upsilon(2S)\pi^0\pi^0$		(1.85± 0.14) %		DESIG=10
Γ_4	$\Upsilon(2S)\gamma\gamma$		(5.0 ± 0.7) %		DESIG=12
Γ_5	$\Upsilon(2S)\pi^0$		< 5.1 $\times 10^{-4}$	CL=90%	DESIG=107
Γ_6	$\Upsilon(1S)\pi^+\pi^-$		(4.37± 0.08) %		DESIG=3
Γ_7	$\Upsilon(1S)\pi^0\pi^0$		(2.20± 0.13) %		DESIG=11
Γ_8	$\Upsilon(1S)\eta$		< 1 $\times 10^{-4}$	CL=90%	DESIG=9
Γ_9	$\Upsilon(1S)\pi^0$		< 7 $\times 10^{-5}$	CL=90%	DESIG=106
Γ_{10}	$h_b(1P)\pi^0$		< 1.2 $\times 10^{-3}$	CL=90%	DESIG=112
Γ_{11}	$h_b(1P)\pi^0 \to \gamma\eta_b(1S)\pi^0$		(4.3 ± 1.4) $\times 10^{-4}$		DESIG=113
Γ_{12}	$h_b(1P)\pi^+\pi^-$		< 1.2 $\times 10^{-4}$	CL=90%	DESIG=114
Γ_{13}	$\tau^+\tau^-$		(2.29± 0.30) %		DESIG=16
Γ_{14}	$\mu^+\mu^-$		(2.18± 0.21) %	S=2.1	DESIG=1
Γ_{15}	e^+e^-		(2.18± 0.20) %		DESIG=2
Γ_{16}	hadrons		(93 ±12) %		DESIG=101
Γ_{17}	ggg		(35.7 ± 2.6) %		DESIG=109
Γ_{18}	γgg		(9.7 ± 1.8) $\times 10^{-3}$		DESIG=110
Γ_{19}	^2H anything		(2.33± 0.33) $\times 10^{-5}$		DESIG=117
	Radiative decays				NODE=M048;CLUMP=B
Γ_{20}	$\gamma\chi_{b2}(2P)$		(13.1 ± 1.6) %	S=3.4	DESIG=5
Γ_{21}	$\gamma\chi_{b1}(2P)$		(12.6 ± 1.2) %	S=2.4	DESIG=6
Γ_{22}	$\gamma\chi_{b0}(2P)$		(5.9 ± 0.6) %	S=1.4	DESIG=7
Γ_{23}	$\gamma\chi_{b2}(1P)$		(10.0 ± 1.0) $\times 10^{-3}$	S=1.7	DESIG=103
Γ_{24}	$\gamma\chi_{b1}(1P)$		(9 ± 5) $\times 10^{-4}$	S=1.8	DESIG=104
Γ_{25}	$\gamma\chi_{b0}(1P)$		(2.7 ± 0.4) $\times 10^{-3}$		DESIG=13
Γ_{26}	$\gamma\eta_b(2S)$		< 6.2 $\times 10^{-4}$	CL=90%	DESIG=14
Γ_{27}	$\gamma\eta_b(1S)$		(5.1 ± 0.7) $\times 10^{-4}$		DESIG=15
Γ_{28}	$\gamma A^0 \to \gamma$ hadrons		< 8 $\times 10^{-5}$	CL=90%	DESIG=115
Γ_{29}	$\gamma X \to \gamma + \geq 4$ prongs	[a]	< 2.2 $\times 10^{-4}$	CL=95%	DESIG=102
Γ_{30}	$\gamma a_1^0 \to \gamma\mu^+\mu^-$		< 5.5 $\times 10^{-6}$	CL=90%	DESIG=116
Γ_{31}	$\gamma a_1^0 \to \gamma\tau^+\tau^-$	[b]	< 1.6 $\times 10^{-4}$	CL=90%	DESIG=108

Lepton Family number (*LF*) violating modes

Γ_{32}	$e^{\pm}\tau^{\mp}$	*LF*	<	4.2	$\times 10^{-6}$	CL=90%	NODE=M048;CLUMP=C DESIG=111
Γ_{33}	$\mu^{\pm}\tau^{\mp}$	*LF*	<	3.1	$\times 10^{-6}$	CL=90%	DESIG=105

[*a*] 1.5 GeV $< m_X <$ 5.0 GeV LINKAGE=C48

[*b*] For $m_{\tau^+\tau^-}$ in the ranges 4.03–9.52 and 9.61–10.10 GeV. LINKAGE=MRG

$\Upsilon(3S)$ Γ(i)Γ(e^+e^-)/Γ(total)

NODE=M048218

Γ(hadrons) × Γ(e^+e^-)/Γ$_{total}$ — $\Gamma_{16}\Gamma_{15}/\Gamma$

NODE=M048G2
NODE=M048G2

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
0.414±0.007 OUR AVERAGE				
0.413±0.004±0.006	ROSNER	06	CLEO	10.4 $e^+e^- \rightarrow$ hadrons
0.45 ±0.03 ±0.03	[4] GILES	84B	CLEO	$e^+e^- \rightarrow$ hadrons

[4] Radiative corrections reevaluated by BUCHMUELLER 88 following KURAEV 85. NODE=M048G2;LINKAGE=R

Γ($\Upsilon(1S)\pi^+\pi^-$) × Γ(e^+e^-)/Γ$_{total}$ — $\Gamma_6\Gamma_{15}/\Gamma$

NODE=M048G01
NODE=M048G01

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
18.46±0.27±0.77	6.4k	[5] AUBERT	08BP	BABR	$e^+e^- \rightarrow \gamma\pi^+\pi^-\ell^+\ell^-$

[5] Using B($\Upsilon(1S) \rightarrow e^+e^-$) = (2.38 ± 0.11)% and B($\Upsilon(1S) \rightarrow \mu^+\mu^-$) = (2.48 ± 0.05)%. NODE=M048G01;LINKAGE=AU

$\Upsilon(3S)$ PARTIAL WIDTHS

NODE=M048220

Γ(e^+e^-) — Γ_{15}

NODE=M048W2
NODE=M048W2

VALUE (keV)	DOCUMENT ID
0.443±0.008 OUR EVALUATION	

→ UNCHECKED ←

$\Upsilon(3S)$ BRANCHING RATIOS

NODE=M048225

Γ($\Upsilon(2S)$anything)/Γ$_{total}$ — Γ_1/Γ

NODE=M048R8
NODE=M048R8

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.106 ±0.008 OUR AVERAGE					
0.1023±0.0105	4625	[6,7,8] BUTLER	94B	CLE2	$e^+e^- \rightarrow \ell^+\ell^- X$
0.111 ±0.012	4891	[7,8,9] BROCK	91	CLEO	$e^+e^- \rightarrow \pi^+\pi^- X$, $\pi^+\pi^-\ell^+\ell^-$

[6] Using B($\Upsilon(2S) \rightarrow \Upsilon(1S)\gamma\gamma$) = (0.038 ± 0.007)%, and B($\Upsilon(2S) \rightarrow \Upsilon(1S)\pi^0\pi^0$) = (1/2)B($\Upsilon(2S) \rightarrow \Upsilon(1S)\pi^+\pi^-$). NODE=M048R;LINKAGE=A

[7] Using B($\Upsilon(1S) \rightarrow \mu^+\mu^-$) = (2.48 ± 0.06)%. With the assumption of $e\mu$ universality. NODE=M048R;LINKAGE=B

[8] Using B($\Upsilon(2S) \rightarrow \Upsilon(1S)\pi^+\pi^-$) = (18.5 ± 0.8)%. NODE=M048R;LINKAGE=D

[9] Using B($\Upsilon(2S) \rightarrow \mu^+\mu^-$) = (1.31 ± 0.21)%, B($\Upsilon(2S) \rightarrow \Upsilon(1S)\gamma\gamma$)×2B($\Upsilon(1S) \rightarrow \mu^+\mu^-$) = (0.188 ± 0.035)%, and B($\Upsilon(2S) \rightarrow \Upsilon(1S)\pi^0\pi^0$)×2B($\Upsilon(1S) \rightarrow \mu^+\mu^-$) = (0.436 ± 0.056)%. With the assumption of $e\mu$ universality. NODE=M048R;LINKAGE=C

Γ($\Upsilon(2S)\pi^+\pi^-$)/Γ$_{total}$ — Γ_2/Γ

NODE=M048R4
NODE=M048R4

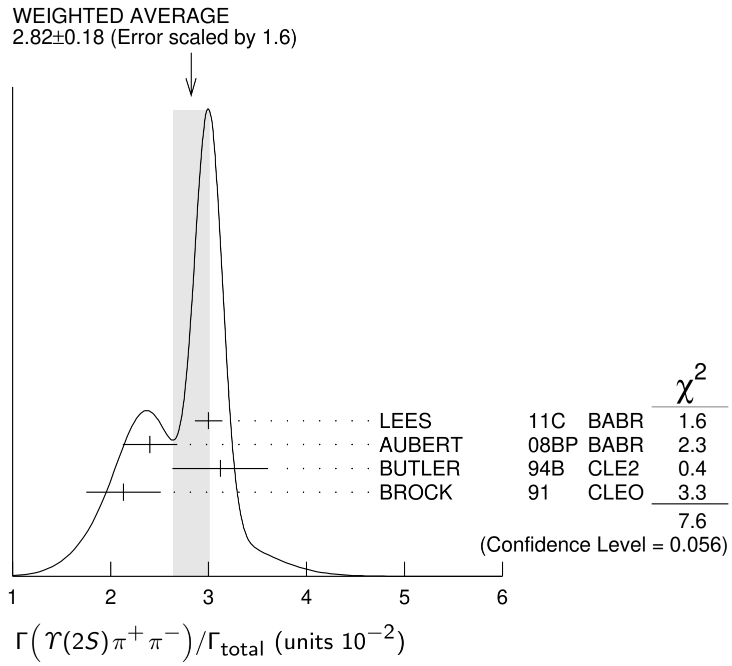
VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
2.82±0.18 OUR AVERAGE	Error includes scale factor of 1.6. See the ideogram below.				
3.00±0.02±0.14	543k	LEES	11C	BABR	$e^+e^- \rightarrow \pi^+\pi^- X$
2.40±0.10±0.26	800	[10] AUBERT	08BP	BABR	$e^+e^- \rightarrow \gamma\pi^+\pi^- e^+e^-$
3.12±0.49	980	[11,12] BUTLER	94B	CLE2	$e^+e^- \rightarrow \pi^+\pi^-\ell^+\ell^-$
2.13±0.38	974	[13] BROCK	91	CLEO	$e^+e^- \rightarrow \pi^+\pi^- X$, $\pi^+\pi^-\ell^+\ell^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
4.82±0.65±0.53	138	[13] WU	93	CUSB	$\Upsilon(3S) \rightarrow \pi^+\pi^-\ell^+\ell^-$
3.1 ±2.0	5	MAGERAS	82	CUSB	$\Upsilon(3S) \rightarrow \pi^+\pi^-\ell^+\ell^-$

[10] Using B($\Upsilon(1S) \rightarrow e^+e^-$) = (2.38 ± 0.11)%, B($\Upsilon(1S) \rightarrow \mu^+\mu^-$) = (2.48 ± 0.05)%, and $\Gamma_{ee}(\Upsilon(3S))$ = 0.443 ± 0.008 keV. NODE=M048R4;LINKAGE=AU

[11] From the exclusive mode. NODE=M048R;LINKAGE=M

[12] Using B($\Upsilon(2S) \rightarrow \Upsilon(1S)\gamma\gamma$) = (0.038 ± 0.007)%, and B($\Upsilon(2S) \rightarrow \Upsilon(1S)\pi^0\pi^0$) = (1/2)B($\Upsilon(2S) \rightarrow \Upsilon(1S)\pi^+\pi^-$). NODE=M048R4;LINKAGE=A

[13] Using B($\Upsilon(2S) \rightarrow \mu^+\mu^-$) = (1.31 ± 0.21)%, B($\Upsilon(2S) \rightarrow \Upsilon(1S)\gamma\gamma$)×2B($\Upsilon(1S) \rightarrow \mu^+\mu^-$) = (0.188 ± 0.035)%, and B($\Upsilon(2S) \rightarrow \Upsilon(1S)\pi^0\pi^0$)×2B($\Upsilon(1S) \rightarrow \mu^+\mu^-$) = (0.436 ± 0.056)%. With the assumption of $e\mu$ universality. NODE=M048R4;LINKAGE=C



$\Gamma(\Upsilon(2S)\pi^0\pi^0)/\Gamma_{total}$ Γ_3/Γ

NODE=M048R10
NODE=M048R10

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1.85±0.14 OUR AVERAGE					
1.82±0.09±0.12	4391	[14] BHARI	09	CLEO	$e^+e^- \to \pi^0\pi^0\ell^+\ell^-$
2.16±0.39		[15,16] BUTLER	94B	CLE2	$e^+e^- \to \pi^0\pi^0\ell^+\ell^-$
1.7 ±0.5 ±0.2	10	[17] HEINTZ	92	CSB2	$e^+e^- \to \pi^0\pi^0\ell^+\ell^-$

[14] Authors assume B($\Upsilon(1S) \to e^+e^-$) + B($\Upsilon(1S) \to \mu^+\mu^-$) = 4.06%. NODE=M048R10;LINKAGE=BH

[15] B($\Upsilon(2S) \to \mu^+\mu^-$) = (1.31 ± 0.21)% and assuming $e\mu$ universality. NODE=M048R;LINKAGE=K

[16] From the exclusive mode. NODE=M048R10;LINKAGE=M

[17] B($\Upsilon(2S) \to \mu^+\mu^-$) = (1.44 ± 0.10)% and assuming $e\mu$ universality. Supersedes HEINTZ 91. NODE=M048R;LINKAGE=G

$\Gamma(\Upsilon(2S)\gamma\gamma)/\Gamma_{total}$ Γ_4/Γ

NODE=M048R12
NODE=M048R12

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
0.0502±0.0069	[18] BUTLER	94B	CLE2	$e^+e^- \to \ell^+\ell^- 2\gamma$

[18] From the exclusive mode. NODE=M048R12;LINKAGE=M

$\Gamma(\Upsilon(2S)\pi^0)/\Gamma_{total}$ Γ_5/Γ

NODE=M048R25
NODE=M048R25

VALUE (units 10^{-3})	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<0.51	90	[19] HE	08A	CLEO	$e^+e^- \to \ell^+\ell^-\gamma\gamma$

[19] Authors assume B($\Upsilon(2S) \to e^+e^-$) + B($\Upsilon(1S) \to \mu^+\mu^-$) = 4.06%. NODE=M048R25;LINKAGE=HE

$\Gamma(\Upsilon(1S)\pi^+\pi^-)/\Gamma_{total}$ Γ_6/Γ

NODE=M048R3

Abbreviation MM in the *COMMENT* field below stands for missing mass.

NODE=M048R3
NODE=M048R3

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
4.37±0.08 OUR AVERAGE					
4.32±0.07±0.13	90k	[20] LEES	11L	BABR	$\Upsilon(3S) \to \pi^+\pi^-\ell^+\ell^-$
4.46±0.01±0.13	190k	[21] BHARI	09	CLEO	$e^+e^- \to \pi^+\pi^-$ MM
4.17±0.06±0.19	6.4k	[22] AUBERT	08BP	BABR	10.58 $e^+e^- \to \gamma\pi^+\pi^-\ell^+\ell^-$
4.52±0.35	11830	[23] BUTLER	94B	CLE2	$e^+e^- \to \pi^+\pi^-$ X, $\pi^+\pi^-\ell^+\ell^-$
4.46±0.34±0.50	451	[23] WU	93	CUSB	$\Upsilon(3S) \to \pi^+\pi^-\ell^+\ell^-$
4.46±0.30	11221	[23] BROCK	91	CLEO	$e^+e^- \to \pi^+\pi^-$ X, $\pi^+\pi^-\ell^+\ell^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
4.9 ±1.0	22	GREEN	82	CLEO	$\Upsilon(3S) \to \pi^+\pi^-\ell^+\ell^-$
3.9 ±1.3	26	MAGERAS	82	CUSB	$\Upsilon(3S) \to \pi^+\pi^-\ell^+\ell^-$

[20] Using B($\Upsilon(1S) \to e^+e^-$) = (2.38 ± 0.11)% and B($\Upsilon(1S) \to \mu^+\mu^-$) = (2.48 ± 0.05)%. NODE=M048R3;LINKAGE=LE

[21] A weighted average of the inclusive and exclusive results. NODE=M048R3;LINKAGE=BH

[22] Using B($\Upsilon(2S) \to e^+e^-$) = (1.91 ± 0.16)%, B($\Upsilon(2S) \to \mu^+\mu^-$) = (1.93 ± 0.17)%, and $\Gamma_{ee}(\Upsilon(3S))$ = 0.443 ± 0.008 keV. NODE=M048R3;LINKAGE=AU

[23] Using B($\Upsilon(1S) \to \mu^+\mu^-$) = (2.48 ± 0.06)%. With the assumption of $e\mu$ universality. NODE=M048R3;LINKAGE=B

$\Gamma(\Upsilon(2S)\pi^+\pi^-)/\Gamma(\Upsilon(1S)\pi^+\pi^-)$ — Γ_2/Γ_6

NODE=M048R28

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.577\pm0.026\pm0.060$	800	[24] AUBERT 08BP	BABR	$e^+e^- \to \gamma\pi^+\pi^-\ell^+\ell^-$

[24] Using B($\Upsilon(1S) \to e^+e^-$) = (2.38 ± 0.11)%, B($\Upsilon(1S) \to \mu^+\mu^-$) = (2.48 ± 0.05)%, B($\Upsilon(2S) \to e^+e^-$) = (1.91 ± 0.16)%, and B($\Upsilon(2S) \to \mu^+\mu^-$) = (1.93 ± 0.17)%. Not independent of other values reported by AUBERT 08BP. NODE=M048R28;LINKAGE=AU

$\Gamma(\Upsilon(1S)\pi^0\pi^0)/\Gamma_{total}$ — Γ_7/Γ

NODE=M048R11

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
2.20±0.13 OUR AVERAGE				
$2.24\pm0.09\pm0.11$	6584	[25] BHARI 09	CLEO	$e^+e^- \to \pi^0\pi^0\ell^+\ell^-$
1.99 ± 0.34	56	[26] BUTLER 94B	CLE2	$e^+e^- \to \pi^0\pi^0\ell^+\ell^-$
$2.2\pm0.4\pm0.3$	33	[27] HEINTZ 92	CSB2	$e^+e^- \to \pi^0\pi^0\ell^+\ell^-$

[25] Authors assume B($\Upsilon(1S) \to e^+e^-$) + B($\Upsilon(1S) \to \mu^+\mu^-$) = 4.96%. NODE=M048R11;LINKAGE=BH

[26] Using B($\Upsilon(1S) \to \mu^+\mu^-$) = (2.48 ± 0.06)% and assuming $e\mu$ universality. NODE=M048R11;LINKAGE=B

[27] Using B($\Upsilon(1S) \to \mu^+\mu^-$) = (2.57 ± 0.07)% and assuming $e\mu$ universality. Supersedes HEINTZ 91. NODE=M048R;LINKAGE=I

$\Gamma(\Upsilon(1S)\pi^0\pi^0)/\Gamma(\Upsilon(1S)\pi^+\pi^-)$ — Γ_7/Γ_6

NODE=M048R26

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.501 ± 0.043	[28] BHARI 09	CLEO	$e^+e^- \to \Upsilon(3S)$

[28] Not independent of other values reported by BHARI 09. NODE=M048R26;LINKAGE=BH

$\Gamma(\Upsilon(1S)\eta)/\Gamma_{total}$ — Γ_8/Γ

NODE=M048R9

VALUE (units 10^{-3})	CL%	DOCUMENT ID	TECN	COMMENT
<0.1	90	[29] LEES 11L	BABR	$\Upsilon(3S) \to (\pi^+\pi^-)(\gamma\gamma)\ell^+\ell^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.8	90	[29,30] AUBERT 08BP	BABR	$e^+e^- \to \gamma\pi^+\pi^-\pi^0\ell^+\ell^-$
<0.18	90	[31] HE 08A	CLEO	$e^+e^- \to \ell^+\ell^-\eta$
<2.2	90	BROCK 91	CLEO	$e^+e^- \to \ell^+\ell^-\eta$

[29] Using B($\Upsilon(1S) \to e^+e^-$) = (2.38 ± 0.11)%, B($\Upsilon(1S) \to \mu^+\mu^-$) = (2.48 ± 0.05)%. NODE=M048R9;LINKAGE=LE

[30] Using $\Gamma_{ee}(\Upsilon(3S))$ = 0.443 ± 0.008 keV. NODE=M048R9;LINKAGE=AU

[31] Authors assume B($\Upsilon(1S) \to e^+e^-$) + B($\Upsilon(1S) \to \mu^+\mu^-$) = 4.96%. NODE=M048R9;LINKAGE=HE

$\Gamma(\Upsilon(1S)\eta)/\Gamma(\Upsilon(1S)\pi^+\pi^-)$ — Γ_8/Γ_6

NODE=M048R27

VALUE (units 10^{-2})	CL%	DOCUMENT ID	TECN	COMMENT
<0.23	90	[32] LEES 11L	BABR	$\Upsilon(3S) \to (\pi^+\pi^-)(\gamma\gamma)\ell^+\ell^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<1.9	90	[33] AUBERT 08BP	BABR	$e^+e^- \to \gamma\pi^+\pi^-(\pi^0)\ell^+\ell^-$

[32] Not independent of other values reported by LEES 11L. NODE=M048R27;LINKAGE=LE

[33] Not independent of other values reported by AUBERT 08BP. NODE=M048R27;LINKAGE=AU

$\Gamma(\Upsilon(1S)\pi^0)/\Gamma_{total}$ — Γ_9/Γ

NODE=M048R24

VALUE (units 10^{-3})	CL%	DOCUMENT ID	TECN	COMMENT
<0.07	90	[34] HE 08A	CLEO	$e^+e^- \to \ell^+\ell^-\gamma\gamma$

[34] Authors assume B($\Upsilon(1S) \to e^+e^-$) + B($\Upsilon(1S) \to \mu^+\mu^-$) = 4.96%. NODE=M048R24;LINKAGE=HE

$\Gamma(h_b(1P)\pi^0)/\Gamma_{total}$ — Γ_{10}/Γ

NODE=M048R03

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<1.2\times10^{-3}$	90	[35] GE 11	CLEO	$\Upsilon(3S) \to \pi^0$ anything

[35] Assuming $M(h_b(1P))$ = 9900 MeV and $\Gamma(h_b(1P))$ = 0 MeV, and allowing B($h_b(1P) \to \gamma\eta_b(1S)$) to vary from 0–100%. NODE=M048R03;LINKAGE=GE

$\Gamma(h_b(1P)\pi^0 \to \gamma\eta_b(1S)\pi^0)/\Gamma_{total}$ — Γ_{11}/Γ

NODE=M048R33

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
4.3±1.1±0.9	LEES 11K	BABR	$\Upsilon(3S) \to \eta_b\gamma\pi^0$

$\Gamma(h_b(1P)\pi^+\pi^-)/\Gamma_{total}$ — Γ_{12}/Γ

NODE=M048R34

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 1.2	90	[36] LEES	11C	BABR	$e^+e^- \to \pi^+\pi^- X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<18		[36] BUTLER	94B	CLE2	$e^+e^- \to \pi^+\pi^- X$
<15		[36] BROCK	91	CLEO	$e^+e^- \to \pi^+\pi^- X$

[36] For $M(h_b(1P)) = 9900$ MeV.

NODE=M048R34;LINKAGE=MH

$\Gamma(\tau^+\tau^-)/\Gamma_{total}$ — Γ_{13}/Γ

NODE=M048R18

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
2.29±0.21±0.22	15k	[37] BESSON	07	CLEO	$e^+e^- \to \Upsilon(3S) \to \tau^+\tau^-$

[37] BESSON 07 reports $[\Gamma(\Upsilon(3S) \to \tau^+\tau^-)/\Gamma_{total}]$ / $[B(\Upsilon(3S) \to \mu^+\mu^-)] = 1.05 \pm 0.08 \pm 0.05$ which we multiply by our best value $B(\Upsilon(3S) \to \mu^+\mu^-) = (2.18 \pm 0.21) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M048R18;LINKAGE=BE

$\Gamma(\tau^+\tau^-)/\Gamma(\mu^+\mu^-)$ — Γ_{13}/Γ_{14}

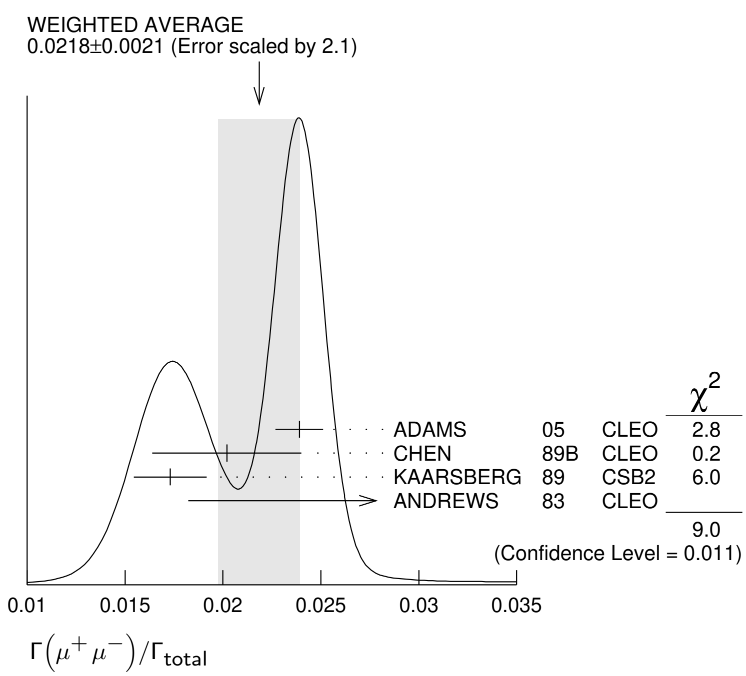
NODE=M048R19

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.968±0.016 OUR AVERAGE					
0.966±0.008±0.014	2.2M	LEES	20E	BABR	$e^+e^- \to \Upsilon(3S)$
1.05 ±0.08 ±0.05	15k	BESSON	07	CLEO	$e^+e^- \to \Upsilon(3S)$

$\Gamma(\mu^+\mu^-)/\Gamma_{total}$ — Γ_{14}/Γ

NODE=M048R1

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0218±0.0021 OUR AVERAGE Error includes scale factor of 2.1. See the ideogram below.					
0.0239±0.0007±0.0010	81k	ADAMS	05	CLEO	$e^+e^- \to \mu^+\mu^-$
0.0202±0.0019±0.0033		CHEN	89B	CLEO	$e^+e^- \to \mu^+\mu^-$
0.0173±0.0015±0.0011		KAARSBERG	89	CSB2	$e^+e^- \to \mu^+\mu^-$
0.033 ±0.013 ±0.007	1096	ANDREWS	83	CLEO	$e^+e^- \to \mu^+\mu^-$



$\Gamma(ggg)/\Gamma_{total}$ — Γ_{17}/Γ

NODE=M048R30

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
35.7±2.6	3M	[38] BESSON	06A	CLEO	$\Upsilon(3S) \to$ hadrons

[38] Calculated using BESSON 06A value of $\Gamma(\gamma gg)/\Gamma(ggg) = (2.72 \pm 0.06 \pm 0.32 \pm 0.37)\%$ and the PDG 08 values of $B(\Upsilon(2S) + \text{anything}) = (10.6 \pm 0.8)\%$, $B(\pi^+\pi^-\Upsilon(1S)) = (4.40 \pm 0.10)\%$, $B(\pi^0\pi^0\Upsilon(1S)) = (2.20 \pm 0.13)\%$, $B(\gamma\chi_{b2}(2P)) = (13.1 \pm 1.6)\%$, $B(\gamma\chi_{b1}(2P)) = (12.6 \pm 1.2)\%$, $B(\gamma\chi_{b0}(2P)) = (5.9 \pm 0.6)\%$, $B(\gamma\chi_{b0}(1P)) = (0.30 \pm 0.11)\%$,$B(\mu^+\mu^-) = (2.18 \pm 0.21)\%$, and $R_{hadrons} = 3.51$. The statistical error is negligible and the systematic error is partially correlated with $\Gamma(\gamma gg)/\Gamma_{total}$ BESSON 06A value.

NODE=M048R30;LINKAGE=BE

$\Gamma(\gamma g g)/\Gamma_{total}$ Γ_{18}/Γ

NODE=M048R31
NODE=M048R31

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.97±0.18	60k	[39] BESSON	06A	CLEO	$\Upsilon(3S) \to \gamma +$ hadrons

[39] Calculated using BESSON 06A values of $\Gamma(\gamma g g)/\Gamma(g g g) = (2.72 \pm 0.06 \pm 0.32 \pm 0.37)\%$ and $\Gamma(g g g)/\Gamma_{total}$. The statistical error is negligible and the systematic error is partially correlated with $\Gamma(g g g)/\Gamma_{total}$ BESSON 06A value.

NODE=M048R31;LINKAGE=BE

$\Gamma(\gamma g g)/\Gamma(g g g)$ Γ_{18}/Γ_{17}

NODE=M048R32
NODE=M048R32

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
2.72±0.06±0.49	3M	BESSON	06A	CLEO	$\Upsilon(3S) \to (\gamma +)$ hadrons

$\Gamma(\overline{^2H}$ anything$)/\Gamma_{total}$ Γ_{19}/Γ

NODE=M048R00
NODE=M048R00

VALUE (units 10^{-5})	*DOCUMENT ID*		*TECN*	*COMMENT*
$\mathbf{2.33 \pm 0.15^{+0.31}_{-0.28}}$	LEES	14G	BABR	$e^+ e^- \to \overline{^2H}\, X$

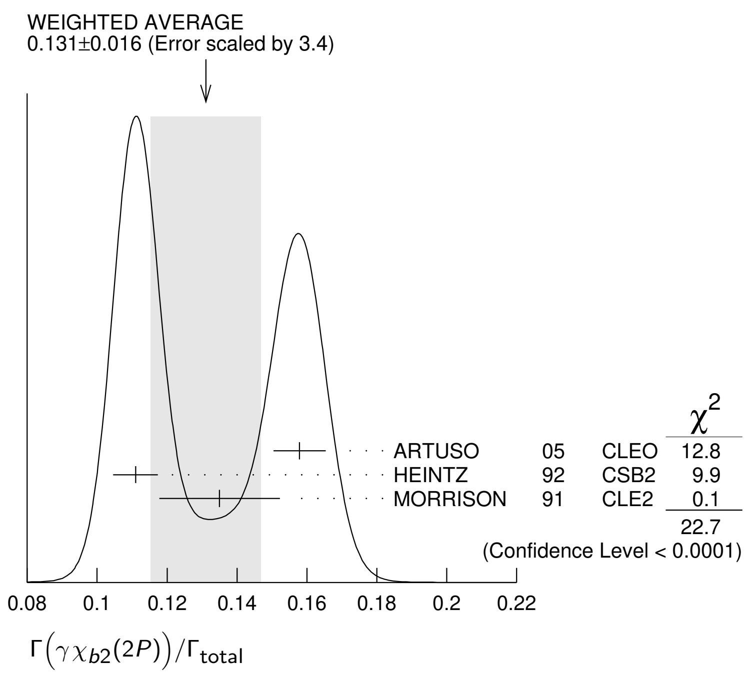
$\Gamma(\gamma \chi_{b2}(2P))/\Gamma_{total}$ Γ_{20}/Γ

NODE=M048R5
NODE=M048R5

VALUE	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.131 ±0.016 OUR AVERAGE Error includes scale factor of 3.4. See the ideogram below.					
0.1579±0.0017±0.0073	568k	ARTUSO	05	CLEO	$e^+ e^- \to \gamma X$
0.111 ±0.005 ±0.004	10319	[40] HEINTZ	92	CSB2	$e^+ e^- \to \gamma X$
0.135 ±0.003 ±0.017	30741	MORRISON	91	CLE2	$e^+ e^- \to \gamma X$

[40] Supersedes NARAIN 91.

NODE=M048R;LINKAGE=H



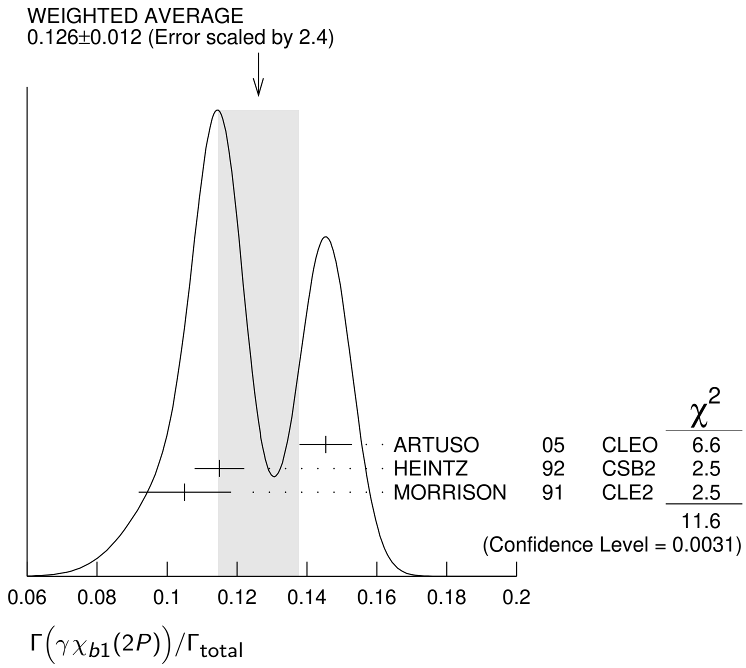
$\Gamma(\gamma \chi_{b1}(2P))/\Gamma_{total}$ Γ_{21}/Γ

NODE=M048R6
NODE=M048R6

VALUE	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.126 ±0.012 OUR AVERAGE Error includes scale factor of 2.4. See the ideogram below.					
0.1454±0.0018±0.0073	537k	ARTUSO	05	CLEO	$e^+ e^- \to \gamma X$
0.115 ±0.005 ±0.005	11147	[41] HEINTZ	92	CSB2	$e^+ e^- \to \gamma X$
0.105 $^{+0.003}_{-0.002}$ ±0.013	25759	MORRISON	91	CLE2	$e^+ e^- \to \gamma X$

[41] Supersedes NARAIN 91.

NODE=M048R6;LINKAGE=H



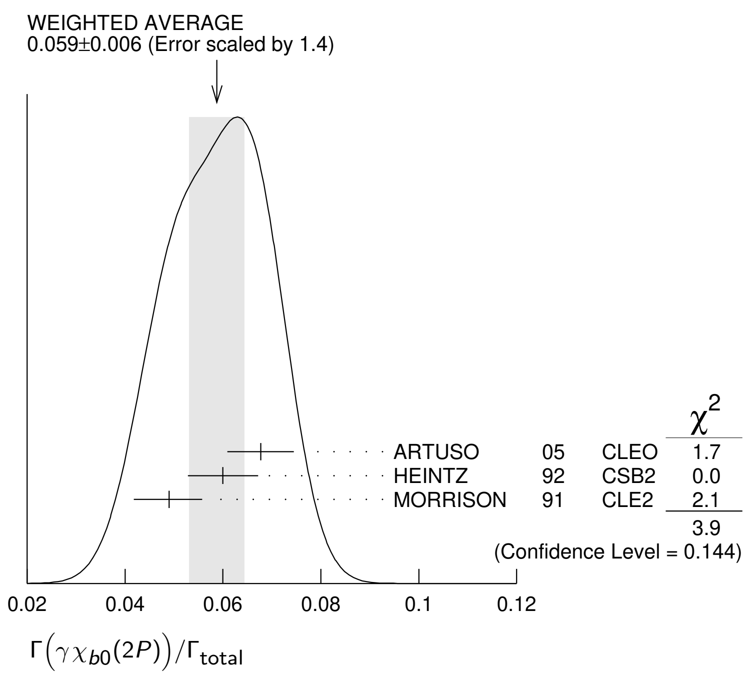
$\Gamma(\gamma\chi_{b0}(2P))/\Gamma_{\text{total}}$ — Γ_{22}/Γ

NODE=M048R7
NODE=M048R7

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.059 ±0.006 OUR AVERAGE Error includes scale factor of 1.4. See the ideogram below.				
0.0677±0.0020±0.0065	225k	ARTUSO 05	CLEO	$e^+e^- \to \gamma X$
0.060 ±0.004 ±0.006	4959	[42] HEINTZ 92	CSB2	$e^+e^- \to \gamma$X
0.049 $^{+0.003}_{-0.004}$ ±0.006	9903	MORRISON 91	CLE2	$e^+e^- \to \gamma$X

[42] Supersedes NARAIN 91.

NODE=M048R7;LINKAGE=H



$\Gamma(\gamma\chi_{b2}(1P))/\Gamma_{\text{total}}$ — Γ_{23}/Γ

NODE=M048R21
NODE=M048R21

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
10.0±1.0 OUR AVERAGE Error includes scale factor of 1.7.					
8.0±1.3±0.4		126	[43,44] KORNICER 11	CLEO	$e^+e^- \to \gamma\gamma\ell^+\ell^-$
10.5±0.3$^{+0.7}_{-0.6}$		9.7k	LEES 11J	BABR	$\Upsilon(3S) \to X\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<19	90		[45] ASNER 08A	CLEO	$\Upsilon(3S) \to \gamma +$ hadrons
seen			[46] HEINTZ 92	CSB2	$e^+e^- \to \gamma\gamma\ell^+\ell^-$

[43] Assuming B($\Upsilon(1S) \to \ell^+\ell^-$) = (2.48 ± 0.05)%. NODE=M048R21;LINKAGE=KA

[44] KORNICER 11 reports [$\Gamma(\Upsilon(3S) \to \gamma\chi_{b2}(1P))/\Gamma_{total}$] × [B($\chi_{b2}(1P) \to \gamma\Upsilon(1S)$)] = (1.435 ± 0.162 ± 0.169) × 10^{-3} which we divide by our best value B($\chi_{b2}(1P) \to \gamma\Upsilon(1S)$) = (18.0 ± 1.0) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M048R21;LINKAGE=KR

[45] ASNER 08A reports [$\Gamma(\Upsilon(3S) \to \gamma\chi_{b2}(1P))/\Gamma_{total}$] / [B($\Upsilon(2S) \to \gamma\chi_{b2}(1P)$)] < 27.1 × 10^{-2} which we multiply by our best value B($\Upsilon(2S) \to \gamma\chi_{b2}(1P)$) = 7.15 × 10^{-2}. NODE=M048R21;LINKAGE=AS

[46] HEINTZ 92, while unable to distinguish between different J states, measures $\sum_J$B($\Upsilon(3S) \to \gamma\chi_{bJ}$) × B($\chi_{bJ} \to \gamma\Upsilon(1S)$) = (1.7 ± 0.4 ± 0.6) × 10^{-3} for J = 0,1,2 using inclusive $\Upsilon(1S)$ decays and ($1.2^{+0.4}_{-0.3}$ ± 0.09) × 10^{-3} for J = 1,2 using $\Upsilon(1S) \to \ell^+\ell^-$. NODE=M048R21;LINKAGE=HE

$\Gamma(\gamma\chi_{b1}(1P))/\Gamma_{total}$ — Γ_{24}/Γ

NODE=M048R22
NODE=M048R22

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.9±0.5 OUR AVERAGE			Error includes scale factor of 1.8.			
1.5±0.4±0.1		50	[47,48] KORNICER	11	CLEO	$e^+e^- \to \gamma\gamma\ell^+\ell^-$
$0.5\pm0.3^{+0.2}_{-0.1}$			LEES	11J	BABR	$\Upsilon(3S) \to X\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<1.7	90		[49] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma$+ hadrons
seen			[50] HEINTZ	92	CSB2	$e^+e^- \to \gamma\gamma\ell^+\ell^-$

[47] Assuming B($\Upsilon(1S) \to \ell^+\ell^-$) = (2.48 ± 0.05)%. NODE=M048R22;LINKAGE=KA

[48] KORNICER 11 reports [$\Gamma(\Upsilon(3S) \to \gamma\chi_{b1}(1P))/\Gamma_{total}$] × [B($\chi_{b1}(1P) \to \gamma\Upsilon(1S)$)] = (5.38 ± 1.20 ± 0.95) × 10^{-4} which we divide by our best value B($\chi_{b1}(1P) \to \gamma\Upsilon(1S)$) = (35.2 ± 2.0) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M048R22;LINKAGE=KR

[49] ASNER 08A reports [$\Gamma(\Upsilon(3S) \to \gamma\chi_{b1}(1P))/\Gamma_{total}$] / [B($\Upsilon(2S) \to \gamma\chi_{b1}(1P)$)] < 2.5 × 10^{-2} which we multiply by our best value B($\Upsilon(2S) \to \gamma\chi_{b1}(1P)$) = 6.9 × 10^{-2}. NODE=M048R22;LINKAGE=AS

[50] HEINTZ 92, while unable to distinguish between different J states, measures $\sum_J$B($\Upsilon(3S) \to \gamma\chi_{bJ}$) × B($\chi_{bJ} \to \gamma\Upsilon(1S)$) = (1.7 ± 0.4 ± 0.6) × 10^{-3} for J = 0,1,2 using inclusive $\Upsilon(1S)$ decays and ($1.2^{+0.4}_{-0.3}$ ± 0.09) × 10^{-3} for J = 1,2 using $\Upsilon(1S) \to \ell^+\ell^-$. NODE=M048R22;LINKAGE=HE

$\Gamma(\gamma\chi_{b0}(1P))/\Gamma_{total}$ — Γ_{25}/Γ

NODE=M048R15
NODE=M048R15

VALUE (units 10^{-2})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.27±0.04 OUR AVERAGE						
0.27±0.04±0.02		2.3k	LEES	11J	BABR	$\Upsilon(3S) \to X\gamma$
0.30±0.04±0.10		8.7k	ARTUSO	05	CLEO	$e^+e^- \to \gamma X$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.8	90		[51] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma$ + hadrons

[51] ASNER 08A reports [$\Gamma(\Upsilon(3S) \to \gamma\chi_{b0}(1P))/\Gamma_{total}$] / [B($\Upsilon(2S) \to \gamma\chi_{b0}(1P)$)] < 21.9 × 10^{-2} which we multiply by our best value B($\Upsilon(2S) \to \gamma\chi_{b0}(1P)$) = 3.8 × 10^{-2}. NODE=M048R15;LINKAGE=AS

$\Gamma(\gamma\eta_b(2S))/\Gamma_{total}$ — Γ_{26}/Γ

NODE=M048R16
NODE=M048R16

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 6.2	90	ARTUSO	05	CLEO	$e^+e^- \to \gamma X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<19	90	LEES	11J	BABR	$\Upsilon(3S) \to X\gamma$

$\Gamma(\gamma\eta_b(1S))/\Gamma_{total}$ — Γ_{27}/Γ

NODE=M048R17
NODE=M048R17

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
5.1±0.7 OUR AVERAGE						
7.1±1.8±1.3		2.3 ± 0.5k	[52] BONVICINI	10	CLEO	$\Upsilon(3S) \to \gamma X$
4.8±0.5±0.6		19 ± 3k	[52] AUBERT	09AQ	BABR	$\Upsilon(3S) \to \gamma X$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<8.5	90		LEES	11J	BABR	$\Upsilon(3S) \to X\gamma$
4.8±0.5±1.2		19 ± 3k	[52,53] AUBERT	08V	BABR	$\Upsilon(3S) \to \gamma X$
<4.3	90		[54] ARTUSO	05	CLEO	$e^+e^- \to \gamma X$

[52] Assuming $\Gamma_{\eta_b(1S)}$ = 10 MeV. NODE=M048R17;LINKAGE=BO

[53] Systematic error re-evaluated by AUBERT 09AQ. NODE=M048R17;LINKAGE=AU

[54] Superseded by BONVICINI 10. NODE=M048R17;LINKAGE=SU

$\Gamma(\gamma A^0 \to \gamma \text{hadrons})/\Gamma_{total}$ Γ_{28}/Γ

NODE=M048R02

(0.3 GeV $< m_{A^0} <$ 7 GeV)

NODE=M048R02
NODE=M048R02

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<8 × 10^{-5}	90	[55] LEES	11H	BABR	$\Upsilon(3S) \to \gamma$ hadrons

[55] For a narrow scalar or pseudoscalar A^0, excluding known resonances, with mass in the range 0.3–7 GeV. Measured 90% CL limits as a function of m_{A^0} range from 1×10^{-6} to 8×10^{-5}.

NODE=M048R02;LINKAGE=LE

$\Gamma(\gamma X \to \gamma + \geq 4 \text{ prongs})/\Gamma_{total}$ Γ_{29}/Γ

NODE=M048R20

(1.5 GeV $< m_X <$ 5.0 GeV)

NODE=M048R20
NODE=M048R20

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<2.2	95	ROSNER	07A	CLEO	$e^+ e^- \to \gamma X$

$\Gamma(\gamma a_1^0 \to \gamma \mu^+ \mu^-)/\Gamma_{total}$ Γ_{30}/Γ

NODE=M048R04
NODE=M048R04

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<5.5	90	[56] AUBERT	09Z	BABR	$e^+ e^- \to \gamma a_1^0 \to \gamma \mu^+ \mu^-$

[56] For a narrow scalar or pseudoscalar a_1^0 with mass in the range 212–9300 MeV, excluding J/ψ and $\psi(2S)$. Measured 90% CL limits as a function of $m_{a_1^0}$ range from $0.27–5.5 \times 10^{-6}$.

NODE=M048R04;LINKAGE=AU

$\Gamma(\gamma a_1^0 \to \gamma \tau^+ \tau^-)/\Gamma_{total}$ Γ_{31}/Γ

NODE=M048R29
NODE=M048R29

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.6 × 10^{-4}	90	[57] AUBERT	09P	BABR	$e^+ e^- \to \gamma a_1^0 \to \gamma \tau^+ \tau^-$

[57] For a narrow scalar or pseudoscalar a_1^0 with $M(\tau^+ \tau^-)$ in the ranges 4.03–9.52 and 9.61–10.10 GeV. Measured 90% CL limits as a function of $M(\tau^+ \tau^-)$ range from $1.5–16 \times 10^{-5}$.

NODE=M048R29;LINKAGE=AU

LEPTON FAMILY NUMBER (*LF*) VIOLATING MODES

NODE=M048230

$\Gamma(e^\pm \tau^\mp)/\Gamma_{total}$ Γ_{32}/Γ

NODE=M048R01
NODE=M048R01

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<4.2	90	LEES	10B	BABR	$e^+ e^- \to e^\pm \tau^\mp$

$\Gamma(\mu^\pm \tau^\mp)/\Gamma_{total}$ Γ_{33}/Γ

NODE=M048R23
NODE=M048R23

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
< 3.1	90	LEES	10B	BABR	$e^+ e^- \to \mu^\pm \tau^\mp$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<20.3	95	LOVE	08A	CLEO	$e^+ e^- \to \mu^\pm \tau^\mp$

$\Upsilon(3S)$ REFERENCES

NODE=M048

LEES	20E	PRL 125 241801	J.P. Lees *et al.*	(BABAR Collab.)	REFID=60700
LEES	14G	PR D89 111102	J.P. Lees *et al.*	(BABAR Collab.)	REFID=55939
GE	11	PR D84 032008	J.Y. Ge *et al.*	(CLEO Collab.)	REFID=53960
KORNICER	11	PR D83 054003	M. Kornicer *et al.*	(CLEO Collab.)	REFID=16769
LEES	11C	PR D84 011104	J.P. Lees *et al.*	(BABAR Collab.)	REFID=16775
LEES	11H	PRL 107 221803	J.P. Lees *et al.*	(BABAR Collab.)	REFID=53877
LEES	11J	PR D84 072002	J.P. Lees *et al.*	(BABAR Collab.)	REFID=53936
LEES	11K	PR D84 091101	J.P. Lees *et al.*	(BABAR Collab.)	REFID=53937
LEES	11L	PR D84 092003	J.P. Lees *et al.*	(BABAR Collab.)	REFID=53938
BONVICINI	10	PR D81 031104	G. Bonvicini *et al.*	(CLEO Collab.)	REFID=53231
LEES	10B	PRL 104 151802	J.P. Lees *et al.*	(BABAR Collab.)	REFID=53355
AUBERT	09AQ	PRL 103 161801	B. Aubert *et al.*	(BABAR Collab.)	REFID=53106
AUBERT	09P	PRL 103 181801	B. Aubert *et al.*	(BABAR Collab.)	REFID=53062
AUBERT	09Z	PRL 103 081803	B. Aubert *et al.*	(BABAR Collab.)	REFID=52930
BHARI	09	PR D79 011103	S.R. Bhari *et al.*	(CLEO Collab.)	REFID=52662
ASNER	08A	PR D78 091103	D.M. Asner *et al.*	(CLEO Collab.)	REFID=52574
AUBERT	08BP	PR D78 112002	B. Aubert *et al.*	(BABAR Collab.)	REFID=52660
AUBERT	08V	PRL 101 071801	B. Aubert *et al.*	(BABAR Collab.)	REFID=52262
HE	08A	PRL 101 192001	Q. He *et al.*	(CLEO Collab.)	REFID=52587
LOVE	08A	PRL 101 201601	W. Love *et al.*	(CLEO Collab.)	REFID=52592
PDG	08	PL B667 1	C. Amsler *et al.*	(PDG Collab.)	REFID=52166
BESSON	07	PRL 98 052002	D. Besson *et al.*	(CLEO Collab.)	REFID=51620
ROSNER	07A	PR D76 117102	J.L. Rosner *et al.*	(CLEO Collab.)	REFID=52079
BESSON	06A	PR D74 012003	D. Besson *et al.*	(CLEO Collab.)	REFID=51147
ROSNER	06	PRL 96 092003	J.L. Rosner *et al.*	(CLEO Collab.)	REFID=51035
ADAMS	05	PRL 94 012001	G.S. Adams *et al.*	(CLEO Collab.)	REFID=50452
ARTUSO	05	PRL 94 032001	M. Artuso *et al.*	(CLEO Collab.)	REFID=50454

ARTAMONOV	00	PL B474 427	A.S. Artamonov *et al.*		REFID=47424
BUTLER	94B	PR D49 40	F. Butler *et al.*	(CLEO Collab.)	REFID=43799
WU	93	PL B301 307	Q.W. Wu *et al.*	(CUSB Collab.)	REFID=43313
HEINTZ	92	PR D46 1928	U. Heintz *et al.*	(CUSB II Collab.)	REFID=43604
BROCK	91	PR D43 1448	I.C. Brock *et al.*	(CLEO Collab.)	REFID=41579
HEINTZ	91	PRL 66 1563	U. Heintz *et al.*	(CUSB Collab.)	REFID=41580
MORRISON	91	PRL 67 1696	R.J. Morrison *et al.*	(CLEO Collab.)	REFID=41634
NARAIN	91	PRL 66 3113	M. Narain *et al.*	(CUSB Collab.)	REFID=41586
CHEN	89B	PR D39 3528	W.Y. Chen *et al.*	(CLEO Collab.)	REFID=40919
KAARSBERG	89	PRL 62 2077	T.M. Kaarsberg *et al.*	(CUSB Collab.)	REFID=40733
BUCHMUEL...	88	HE e^+e^- Physics 412	W. Buchmueller, S. Cooper	(HANN, DESY, MIT)	REFID=40034
		Editors: A. Ali and P. Soeding, World Scientific, Singapore			
COHEN	87	RMP 59 1121	E.R. Cohen, B.N. Taylor	(RISC, NBS)	REFID=11616
BARU	86B	ZPHY C32 622 (erratum)	S.E. Baru *et al.*	(NOVO)	REFID=22338
KURAEV	85	SJNP 41 466	E.A. Kuraev, V.S. Fadin	(NOVO)	REFID=40033
		Translated from YAF 41 733.			
ARTAMONOV	84	PL 137B 272	A.S. Artamonov *et al.*	(NOVO)	REFID=22278
GILES	84B	PR D29 1285	R. Giles *et al.*	(CLEO Collab.)	REFID=22280
ANDREWS	83	PRL 50 807	D.E. Andrews *et al.*	(CLEO Collab.)	REFID=22273
GREEN	82	PRL 49 617	J. Green *et al.*	(CLEO Collab.)	REFID=22321
MAGERAS	82	PL 118B 453	G. Mageras *et al.*	(COLU, CORN, LSU+)	REFID=22359

NODE=M206

$\chi_{b1}(3P)$

$I^G(J^{PC}) = 0^+(1^{++})$

Needs confirmation. NODE=M206

Observed in the radiative decay to $\Upsilon(1S,2S,3S)$, therefore $C = +$. J needs confirmation.

$\chi_{b1}(3P)$ MASS

NODE=M206M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*	
10513.42± 0.41± 0.53		[1] SIRUNYAN	18N	CMS	$pp \to \gamma\mu^+\mu^- X$	NODE=M206M
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$10515.7\ ^{+2.2}_{-3.9}\ ^{+1.5}_{-2.1}$	169	[2] AAIJ	14BG	LHCB	$pp \to \gamma\mu^+\mu^- X$	
10512.1 ± 2.1 ± 0.9	351	[3] AAIJ	14BG	LHCB	$pp \to \gamma\mu^+\mu^- X$	OCCUR=2
10511.3 ± 1.7 ± 2.5	182	[4] AAIJ	14BI	LHCB	$pp \to \gamma\mu^+\mu^- X$	
10530 ± 5 ± 9		[5] AAD	12A	ATLS	$pp \to \gamma\mu^+\mu^- X$	
10551 ±14 ±17		[5] ABAZOV	12Q	D0	$p\overline{p} \to \gamma\mu^+\mu^- X$	

[1] Systematic error includes an additional 0.5 MeV for the uncertainty on the $\Upsilon(3S)$ mass. Also measures $m_{\chi_{b2}(3P)} - m_{\chi_{b1}(3P)} = 10.60 \pm 0.64 \pm 0.17$ MeV. A total of 372 $\chi_{b1}(3P)$ and $\chi_{b2}(3P)$ events was observed. NODE=M206M;LINKAGE=D

[2] From $\chi_{b1}(3P) \to \Upsilon(1S,2S)\gamma$ transitions assuming $m_{\chi_{b2}(3P)} - m_{\chi_{b1}(3P)} = 10.5 \pm 1.5$ MeV and allowing for ±30% variation in the $\chi_{b2}(3P)$ production rate relative to that of $\chi_{b1}(3P)$. NODE=M206M;LINKAGE=A

[3] The mass of the $\chi_{b1}(3P)$ state obtained by combining the results of AAIJ 14BG with that of AAIJ 14BI. The first uncertainty is experimental and the second attributable to the unknown mass splitting, assumed to be $m_{\chi_{b2}(3P)} - m_{\chi_{b1}(3P)} = 10.5 \pm 1.5$ MeV. NODE=M206M;LINKAGE=B

[4] From $\chi_{b1}(3P) \to \Upsilon(3S)\gamma$ transition assuming $m_{\chi_{b2}(3P)} - m_{\chi_{b1}(3P)} = 10.5 \pm 1.5$ MeV. NODE=M206M;LINKAGE=C

[5] The mass barycenter of the merged lineshapes from the $J = 1$ and 2 states. NODE=M206M;LINKAGE=AA

$\chi_{b1}(3P)$ DECAY MODES

NODE=M206215;NODE=M206

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\Upsilon(1S)\gamma$	seen	DESIG=1
Γ_2	$\Upsilon(2S)\gamma$	seen	DESIG=2
Γ_3	$\Upsilon(3S)\gamma$	seen	DESIG=3

$\chi_{b1}(3P)$ BRANCHING RATIOS

NODE=M206225

$\Gamma(\Upsilon(1S)\gamma)/\Gamma_{total}$ — Γ_1/Γ

NODE=M206R01
NODE=M206R01

VALUE	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
seen	169	[1] AAIJ	14BG	LHCB	$pp \to \gamma\mu^+\mu^- X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen		AAD	12A	ATLS	$pp \to \gamma\mu^+\mu^- X$
seen		ABAZOV	12Q	D0	$p\overline{p} \to \gamma\mu^+\mu^- X$

[1] From $\chi_{b1}(3P) \to \Upsilon(1S,2S)\gamma$ transitions assuming $m_{\chi_{b2}(3P)} - m_{\chi_{b1}(3P)} = 10.5 \pm 1.5$ MeV and allowing for ±30% variation in the $\chi_{b2}(3P)$ production rate relative to that of $\chi_{b1}(3P)$. NODE=M206R01;LINKAGE=A

$\Gamma(\Upsilon(2S)\gamma)/\Gamma_{total}$ — Γ_2/Γ

NODE=M206R02

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	169	[1] AAIJ	14BG	LHCB	$p p \to \gamma \mu^+ \mu^- X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen		AAD	12A	ATLS	$p p \to \gamma \mu^+ \mu^- X$

[1] From $\chi_{b1}(3P) \to \Upsilon(1S, 2S)\gamma$ transitions assuming $m_{\chi_{b2}(3P)} - m_{\chi_{b1}(3P)} = 10.5 \pm 1.5$ MeV and allowing for $\pm30\%$ variation in the $\chi_{b2}(3P)$ production rate relative to that of $\chi_{b1}(3P)$.

NODE=M206R02;LINKAGE=A

$\Gamma(\Upsilon(3S)\gamma)/\Gamma_{total}$ — Γ_3/Γ

NODE=M206R03

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen		SIRUNYAN	18N	CMS	$p p \to \gamma \mu^+ \mu^- X$
seen	182	AAIJ	14BI	LHCB	$p p \to \gamma \mu^+ \mu^- X$

$\chi_{b1}(3P)$ REFERENCES

NODE=M206

SIRUNYAN	18N	PRL 121 092002	A.M. Sirunyan *et al.*	(CMS Collab.)
AAIJ	14BG	JHEP 1410 088	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	14BI	EPJ C74 3092	R. Aaij *et al.*	(LHCb Collab.)
AAD	12A	PRL 108 152001	G. Aad *et al.*	(ATLAS Collab.)
ABAZOV	12Q	PR D86 031103	V.M. Abazov *et al.*	(D0 Collab.)

REFID=58873
REFID=56199
REFID=56235
REFID=54037
REFID=54264

NODE=M238

$\chi_{b2}(3P)$

$I^G(J^{PC}) = 0^+(2^{++})$

Needs confirmation.

NODE=M238

Observed in the radiative decay to $\Upsilon(3S)$, therefore $C = +$. J needs confirmation.

$\chi_{b2}(3P)$ MASS

NODE=M238M

NODE=M238M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
10524.02±0.57±0.53	[1] SIRUNYAN	18N	CMS	$p p \to \gamma \mu^+ \mu^- X$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
10530 ±5 ±9	[2] AAD	12A	ATLS	$p p \to \gamma \mu^+ \mu^- X$

[1] Systematic error includes an additional 0.5 MeV for the uncertainty on the $\Upsilon(3S)$ mass. Also measures $m_{\chi_{b2}(3P)} - m_{\chi_{b1}(3P)} = 10.60 \pm 0.64 \pm 0.17$ MeV. A total of 372 $\chi_{b1}(3P)$ and $\chi_{b2}(3P)$ events was observed.

NODE=M238M;LINKAGE=A

[2] The mass barycenter of the merged lineshapes from the $J = 1$ and 2 states.

NODE=M238M;LINKAGE=AA

$\chi_{b2}(3P)$ DECAY MODES

NODE=M238215;NODE=M238

	Mode	Fraction (Γ_i/Γ)
Γ_1	$\Upsilon(3S)\gamma$	seen

DESIG=1

$\chi_{b2}(3P)$ BRANCHING RATIOS

NODE=M238225

$\Gamma(\Upsilon(3S)\gamma)/\Gamma_{total}$ — Γ_1/Γ

NODE=M238R01

VALUE	DOCUMENT ID		TECN	COMMENT
seen	SIRUNYAN	18N	CMS	$p p \to \gamma \mu^+ \mu^- X$

$\chi_{b2}(3P)$ REFERENCES

NODE=M238

SIRUNYAN	18N	PRL 121 092002	A.M. Sirunyan *et al.*	(CMS Collab.)
AAD	12A	PRL 108 152001	G. Aad *et al.*	(ATLAS Collab.)

REFID=58873
REFID=54037

NODE=M047

$\Upsilon(4S)$

$I^G(J^{PC}) = 0^-(1^{--})$

also known as $\Upsilon(10580)$

$\Upsilon(4S)$ MASS

NODE=M047M

NODE=M047M

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
10579.4±1.2 OUR AVERAGE				
10579.3±0.4±1.2	AUBERT	05Q	BABR	$e^+e^- \rightarrow$ hadrons
10580.0±3.5	[1] BEBEK	87	CLEO	$e^+e^- \rightarrow$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •				
10577.4±1.0	[2] LOVELOCK	85	CUSB	$e^+e^- \rightarrow$ hadrons

[1] Reanalysis of BESSON 85. NODE=M047M;LINKAGE=C

[2] No systematic error given. NODE=M047M;LINKAGE=B

$\Upsilon(4S)$ WIDTH

NODE=M047W

NODE=M047W

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
20.5±2.5 OUR AVERAGE				
20.7±1.6±2.5	AUBERT	05Q	BABR	$e^+e^- \rightarrow$ hadrons
20 ±2 ±4	BESSON	85	CLEO	$e^+e^- \rightarrow$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •				
25 ±2.5	LOVELOCK	85	CUSB	$e^+e^- \rightarrow$ hadrons

$\Upsilon(4S)$ DECAY MODES

NODE=M047215;NODE=M047

	Mode	Fraction (Γ_i/Γ)	Confidence level	
Γ_1	$B\overline{B}$	> 96 %	95%	DESIG=8;OUR EST;→ UNCHECKED ←
Γ_2	B^+B^-	(51.4 ±0.6) %		DESIG=10
Γ_3	D_s^+ anything + c.c.	(17.8 ±2.6) %		DESIG=12
Γ_4	$B^0\overline{B}^0$	(48.6 ±0.6) %		DESIG=11
Γ_5	$J/\psi K_S^0 + (J/\psi, \eta_c) K_S^0$	< 4 $\times 10^{-7}$	90%	DESIG=15
Γ_6	non-$B\overline{B}$	< 4 %	95%	DESIG=6
Γ_7	e^+e^-	(1.57±0.08) $\times 10^{-5}$		DESIG=1
Γ_8	$\rho^+\rho^-$	< 5.7 $\times 10^{-6}$	90%	DESIG=16
Γ_9	$K^*(892)^0\overline{K}^0$	< 2.0 $\times 10^{-6}$	90%	DESIG=22
Γ_{10}	$J/\psi(1S)$ anything	< 1.9 $\times 10^{-4}$	95%	DESIG=2
Γ_{11}	D^{*+} anything + c.c.	< 7.4 %	90%	DESIG=3
Γ_{12}	ϕ anything	(7.1 ±0.6) %		DESIG=4
Γ_{13}	$\phi\eta$	< 1.8 $\times 10^{-6}$	90%	DESIG=13
Γ_{14}	$\phi\eta'$	< 4.3 $\times 10^{-6}$	90%	DESIG=18
Γ_{15}	$\rho\eta$	< 1.3 $\times 10^{-6}$	90%	DESIG=19
Γ_{16}	$\rho\eta'$	< 2.5 $\times 10^{-6}$	90%	DESIG=20
Γ_{17}	$\Upsilon(1S)$ anything	< 4 $\times 10^{-3}$	90%	DESIG=5
Γ_{18}	$\Upsilon(1S)\pi^+\pi^-$	(8.2 ±0.4) $\times 10^{-5}$		DESIG=7
Γ_{19}	$\Upsilon(1S)\eta$	(1.81±0.18) $\times 10^{-4}$		DESIG=17
Γ_{20}	$\Upsilon(1S)\eta'$	(3.4 ±0.9) $\times 10^{-5}$		DESIG=26
Γ_{21}	$\Upsilon(2S)\pi^+\pi^-$	(8.2 ±0.8) $\times 10^{-5}$		DESIG=9
Γ_{22}	$h_b(1P)\pi^+\pi^-$	not seen		DESIG=21
Γ_{23}	$h_b(1P)\eta$	(2.18±0.21) $\times 10^{-3}$		DESIG=23
Γ_{24}	$\eta_b(1S)\omega$	< 1.8 $\times 10^{-4}$	90%	DESIG=27
Γ_{25}	${}^2H$ anything	< 1.3 $\times 10^{-5}$	90%	DESIG=14
	Double Radiative Decays			NODE=M047;CLUMP=B
Γ_{26}	$\gamma\gamma\Upsilon(D) \rightarrow \gamma\gamma\eta\Upsilon(1S)$	< 2.3 $\times 10^{-5}$	90%	DESIG=24

NODE=M047220

$\Upsilon(4S)$ PARTIAL WIDTHS

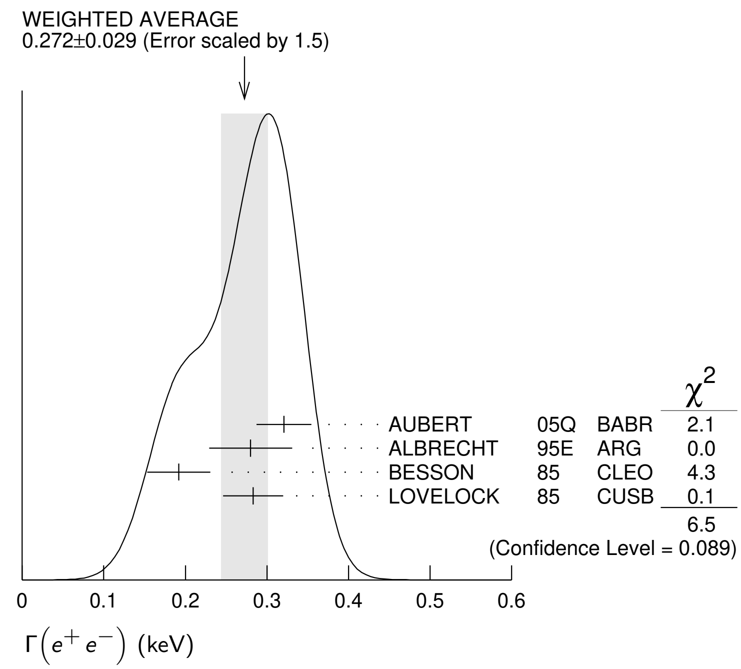
NODE=M047W1
NODE=M047W1

$\Gamma(e^+e^-)$ Γ_7

VALUE (keV)		DOCUMENT ID	TECN	COMMENT
0.272±0.029 OUR AVERAGE	Error includes scale factor of 1.5. See the ideogram below.			
0.321±0.017±0.029		AUBERT 05Q	BABR	$e^+e^- \to$ hadrons
0.28 ±0.05 ±0.01	[1]	ALBRECHT 95E	ARG	$e^+e^- \to$ hadrons
0.192±0.007±0.038		BESSON 85	CLEO	$e^+e^- \to$ hadrons
0.283±0.037		LOVELOCK 85	CUSB	$e^+e^- \to$ hadrons

[1] Using LEYAOUANC 77 parametrization of $\Gamma(s)$.

NODE=M047W1;LINKAGE=A



$\Upsilon(4S)$ BRANCHING RATIOS

NODE=M047230

$B\overline{B}$ DECAYS

NODE=M047BBD

NODE=M047BBD

The ratio of branching fraction to charged and neutral B mesons is often derived assuming isospin invariance in the decays, and relies on the knowledge of the B^+/B^0 lifetime ratio. "OUR EVALUATION" is obtained based on averages of rescaled data listed below. The average and rescaling were performed by the Heavy Flavor Averaging Group (HFLAV) and are described at https://hflav.web.cern.ch/. The averaging/rescaling procedure takes into account the common dependence of the measurement on the value of the lifetime ratio.

NODE=M047R11
NODE=M047R11

$\Gamma(B^+B^-)/\Gamma_{total}$ Γ_2/Γ

VALUE	DOCUMENT ID
0.514±0.006 OUR EVALUATION	Assuming $B(\Upsilon(4S) \to B\overline{B}) = 1$

→ UNCHECKED ←

NODE=M047R13
NODE=M047R13

$\Gamma(D_s^+ \text{ anything} + \text{c.c.})/\Gamma_{total}$ Γ_3/Γ

VALUE		DOCUMENT ID	TECN	COMMENT
0.178±0.021±0.016	[1]	ARTUSO 05B	CLE3	$e^+e^- \to D_X X$

[1] ARTUSO 05B reports $[\Gamma(\Upsilon(4S) \to D_s^+ \text{ anything} + \text{ c.c.})/\Gamma_{total}] \times [B(D_s^+ \to \phi\pi^+)] = (8.0 \pm 0.2 \pm 0.9) \times 10^{-3}$ which we divide by our best value $B(D_s^+ \to \phi\pi^+) = (4.5 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M047R13;LINKAGE=AR

NODE=M047R12
NODE=M047R12

$\Gamma(B^0\overline{B}^0)/\Gamma_{total}$ Γ_4/Γ

VALUE		DOCUMENT ID	TECN	COMMENT
0.486±0.006 OUR EVALUATION	Assuming $B(\Upsilon(4S) \to B\overline{B}) = 1$			
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.487±0.010±0.008	[1]	AUBERT,B 05H	BABR	$\Upsilon(4S) \to \overline{B}B \to D^*\ell\nu_\ell$

→ UNCHECKED ←

[1] Direct measurement. This value is averaged with the value extracted from the $\Gamma(B^+B^-) / \Gamma(B^0\overline{B}^0)$ measurements.

NODE=M047R12;LINKAGE=AU

$\Gamma(B^+B^-)/\Gamma(B^0\overline{B}^0)$ Γ_2/Γ_4

NODE=M047R10
NODE=M047R10

VALUE	DOCUMENT ID		TECN	COMMENT
1.058±0.024 OUR EVALUATION				
1.006±0.036±0.031	[1] AUBERT	04F	BABR	$\Upsilon(4S) \to B\overline{B} \to J/\psi K$
1.01 ±0.03 ±0.09	[1] HASTINGS	03	BELL	$\Upsilon(4S) \to B\overline{B} \to$ dileptons
1.058±0.084±0.136	[2] ATHAR	02	CLEO	$\Upsilon(4S) \to B\overline{B} \to D^*\ell\nu$
1.10 ±0.06 ±0.05	[3] AUBERT	02	BABR	$\Upsilon(4S) \to B\overline{B} \to (c\overline{c})K^*$
1.04 ±0.07 ±0.04	[4] ALEXANDER	01	CLEO	$\Upsilon(4S) \to B\overline{B} \to J/\psi K^*$

→ UNCHECKED ←

[1] HASTINGS 03 and AUBERT 04F assume $\tau(B^+) / \tau(B^0) = 1.083 \pm 0.017$.
[2] ATHAR 02 assumes $\tau(B^+) / \tau(B^0) = 1.074 \pm 0.028$. Supersedes BARISH 95.
[3] AUBERT 02 assumes $\tau(B^+) / \tau(B^0) = 1.062 \pm 0.029$.
[4] ALEXANDER 01 assumes $\tau(B^+) / \tau(B^0) = 1.066 \pm 0.024$.

NODE=M047R10;LINKAGE=F
NODE=M047R10;LINKAGE=D
NODE=M047R10;LINKAGE=E
NODE=M047R10;LINKAGE=C

$\left[\Gamma(J/\psi K^0_S) + \Gamma((J/\psi,\ \eta_c)K^0_S)\right]/\Gamma_{total}$ Γ_5/Γ

NODE=M047R16

Forbidden by *CP* invariance.

NODE=M047R16
NODE=M047R16

VALUE (units 10^{-7})	CL%	DOCUMENT ID		TECN	COMMENT
<4	90	[1] TAJIMA	07A	BELL	$\Upsilon(4S) \to B^0\overline{B}^0$

[1] $\Upsilon(4S)$ with $CP = +1$ decays to the final state with $CP = -1$.

NODE=M047R16;LINKAGE=TA

non-$B\overline{B}$ DECAYS

NODE=M047NBB

$\Gamma(\text{non-}B\overline{B})/\Gamma_{total}$ Γ_6/Γ

NODE=M047R6
NODE=M047R6

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.04	95	BARISH	96B	CLEO	e^+e^-

$\Gamma(e^+e^-)/\Gamma_{total}$ Γ_7/Γ

NODE=M047R5
NODE=M047R5

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
1.57±0.08 OUR AVERAGE				
1.55±0.04±0.07	AUBERT	05Q	BABR	$e^+e^- \to$ hadrons
2.77±0.50±0.49	[1] ALBRECHT	95E	ARG	$e^+e^- \to$ hadrons

[1] Using LEYAOUANC 77 parametrization of $\Gamma(s)$.

NODE=M047R5;LINKAGE=A

$\Gamma(\rho^+\rho^-)/\Gamma_{total}$ Γ_8/Γ

NODE=M047R17
NODE=M047R17

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<5.7 \times 10^{-6}$	90	AUBERT	08BO	BABR	$e^+e^- \to \pi^+\pi^-2\pi^0$

$\Gamma(K^*(892)^0\overline{K}^0)/\Gamma_{total}$ Γ_9/Γ

NODE=M047R02
NODE=M047R02

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.0 \times 10^{-6}$	90	SHEN	13A	BELL	$e^+e^- \to K^*(892)^0\overline{K}^0$

$\Gamma(J/\psi(1S)\text{ anything})/\Gamma_{total}$ Γ_{10}/Γ

NODE=M047R1
NODE=M047R1

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.9	95	[1] ABE	02D	BELL	$e^+e^- \to J/\psi X \to \ell^+\ell^- X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<4.7	90	[1] AUBERT	01C	BABR	$e^+e^- \to J/\psi X \to \ell^+\ell^- X$

[1] Uses $B(J/\psi \to e^+e^-) = 0.0593 \pm 0.0010$ and $B(J/\psi \to \mu^+\mu^-) = 0.0588 \pm 0.0010$.

NODE=M047R;LINKAGE=AC

$\Gamma(D^{*+}\text{ anything} + \text{c.c.})/\Gamma_{total}$ Γ_{11}/Γ

NODE=M047R2
NODE=M047R2

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.074	90	[1] ALEXANDER	90C	CLEO	e^+e^-

[1] For $x >$ 0.473.

NODE=M047R2;LINKAGE=A

$\Gamma(\phi\text{ anything})/\Gamma_{total}$ Γ_{12}/Γ

NODE=M047R3
NODE=M047R3

VALUE (units 10^{-2})	CL%	DOCUMENT ID		TECN	COMMENT
7.1 ±0.1±0.6		HUANG	07	CLEO	$\Upsilon(4S) \to \phi X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.23	90	[1] ALEXANDER	90C	CLEO	e^+e^-

[1] For $x >$ 0.52.

NODE=M047R3;LINKAGE=A

$\Gamma(\phi\eta)/\Gamma_{total}$ Γ_{13}/Γ

NODE=M047R14
NODE=M047R14

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<1.8	90	[1] BELOUS	09	BELL	$e^+e^- \to \phi\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<2.5	90	AUBERT,BE	06F	BABR	$e^+e^- \to \phi\eta$

[1] Using all intermedite branching fraction values from PDG 08.

NODE=M047R14;LINKAGE=BE

NODE=M047R21

$\Gamma(\phi\eta')/\Gamma_{total}$ Γ_{14}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<4.3	90	[1] BELOUS	09	BELL	$e^+e^- \to \phi\eta'$

[1] Using all intermedite branching fraction values from PDG 08.

NODE=M047R21;LINKAGE=BE

NODE=M047R22

$\Gamma(\rho\eta)/\Gamma_{total}$ Γ_{15}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<1.3	90	[1] BELOUS	09	BELL	$e^+e^- \to \rho\eta$

[1] Using all intermedite branching fraction values from PDG 08.

NODE=M047R22;LINKAGE=BE

NODE=M047R23

$\Gamma(\rho\eta')/\Gamma_{total}$ Γ_{16}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<2.5	90	[1] BELOUS	09	BELL	$e^+e^- \to \rho\eta'$

[1] Using all intermedite branching fraction values from PDG 08.

NODE=M047R23;LINKAGE=BE

NODE=M047R4

$\Gamma(\Upsilon(1S)$ anything$)/\Gamma_{total}$ Γ_{17}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.004	90	ALEXANDER	90C	CLEO	e^+e^-

NODE=M047R7

$\Gamma(\Upsilon(1S)\pi^+\pi^-)/\Gamma_{total}$ Γ_{18}/Γ

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
8.2 ±0.4 OUR AVERAGE						
8.2 ±0.5 ±0.4		515	GUIDO	17	BELL	$\Upsilon(4S) \to \pi^+\pi^-\mu^+\mu^-$
8.5 ±1.3 ±0.2		113 ± 16	[1] SOKOLOV	09	BELL	$e^+e^- \to \pi^+\pi^-\mu^+\mu^-$
8.00±0.64±0.27		430	[2] AUBERT	08BP	BABR	$\Upsilon(4S) \to \pi^+\pi^-\ell^+\ell^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
17.8 ±4.0 ±0.3			[3,4] SOKOLOV	07	BELL	$e^+e^- \to \pi^+\pi^-\mu^+\mu^-$
9.0 ±1.5 ±0.2		167 ± 19	[5] AUBERT	06R	BABR	$e^+e^- \to \pi^+\pi^-\mu^+\mu^-$
<12	90		GLENN	99	CLE2	e^+e^-

[1] SOKOLOV 09 reports $[\Gamma(\Upsilon(4S) \to \Upsilon(1S)\pi^+\pi^-)/\Gamma_{total}] \times [B(\Upsilon(1S) \to \mu^+\mu^-)] = (0.211 \pm 0.030 \pm 0.014) \times 10^{-5}$ which we divide by our best value $B(\Upsilon(1S) \to \mu^+\mu^-) = (2.48 \pm 0.05) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M047R7;LINKAGE=SK

[2] Using $B(\Upsilon(1S) \to e^+e^-) = (2.38 \pm 0.11)\%$ and $B(\Upsilon(1S) \to \mu^+\mu^-) = (2.48 \pm 0.05)\%$.

NODE=M047R7;LINKAGE=UB

[3] SOKOLOV 07 reports $[\Gamma(\Upsilon(4S) \to \Upsilon(1S)\pi^+\pi^-)/\Gamma_{total}] \times [B(\Upsilon(1S) \to \mu^+\mu^-)] = (4.42 \pm 0.81 \pm 0.56) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(1S) \to \mu^+\mu^-) = (2.48 \pm 0.05) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M047R7;LINKAGE=SO

[4] According to the authors, systematic errors were underestimated.

NODE=M047R7;LINKAGE=US

[5] Superseded by AUBERT 08BP. AUBERT 06R reports $[\Gamma(\Upsilon(4S) \to \Upsilon(1S)\pi^+\pi^-)/\Gamma_{total}] \times [B(\Upsilon(1S) \to \mu^+\mu^-)] = (2.23 \pm 0.25 \pm 0.27) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(1S) \to \mu^+\mu^-) = (2.48 \pm 0.05) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M047R7;LINKAGE=AU

NODE=M047R18

$\Gamma(\Upsilon(1S)\eta)/\Gamma_{total}$ Γ_{19}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
1.81±0.18 OUR AVERAGE						
1.70±0.23±0.08		49	GUIDO	17	BELL	$\Upsilon(4S) \to \pi^+\pi^-\pi^0\mu^+\mu^-$
1.96±0.26±0.09		56	[1] AUBERT	08BP	BABR	$\Upsilon(4S) \to \pi^+\pi^-\pi^0\ell^+\ell^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<2.7	90		[2] TAMPONI	15	BELL	$e^+e^- \to \gamma\eta+$ hadrons

[1] Using $B(\Upsilon(1S) \to e^+e^-) = (2.38 \pm 0.11)\%$ and $B(\Upsilon(1S) \to \mu^+\mu^-) = (2.48 \pm 0.05)\%$.

NODE=M047R18;LINKAGE=UB

[2] Using $B(\eta \to 2\gamma) = (39.41 \pm 0.20)\%$.

NODE=M047R18;LINKAGE=A

NODE=M047R03

$\Gamma(\Upsilon(1S)\eta')/\Gamma_{total}$ Γ_{20}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
3.43±0.88±0.21	27	GUIDO	18	BELL	$\Upsilon(4S) \to (\rho^0\gamma, \pi^+\pi^-\eta)\mu^+\mu^-$

$\Gamma(\Upsilon(1S)\eta)/\Gamma(\Upsilon(1S)\pi^+\pi^-)$ Γ_{19}/Γ_{18}

NODE=M047R19
NODE=M047R19

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$2.41\pm0.40\pm0.12$	56	[1] AUBERT	08BP	BABR	$\Upsilon(4S) \to \pi^+\pi^-(\pi^0)\ell^+\ell^-$

[1] Not independent of other values reported by AUBERT 08BP.

NODE=M047R19;LINKAGE=UB

$\Gamma(\Upsilon(2S)\pi^+\pi^-)/\Gamma_{total}$ Γ_{21}/Γ

NODE=M047R9
NODE=M047R9

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
8.2±0.8 OUR AVERAGE						
$7.9\pm1.0\pm0.4$		181	GUIDO	17	BELL	$\Upsilon(4S) \to \pi^+\pi^-\mu^+\mu^-$
$8.6\pm1.1\pm0.7$		220	[1] AUBERT	08BP	BABR	$\Upsilon(4S) \to \pi^+\pi^-\ell^+\ell^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$8.8\pm1.7\pm0.8$		97 ± 15	[2] AUBERT	06R	BABR	$e^+e^- \to \pi^+\pi^-\mu^+\mu^-$
<3.9	90		GLENN	99	CLE2	e^+e^-

[1] Using $B(\Upsilon(2S) \to e^+e^-) = (1.91 \pm 0.16)\%$ and $B(\Upsilon(2S) \to \mu^+\mu^-) = (1.93 \pm 0.17)\%$.

NODE=M047R9;LINKAGE=UB

[2] Superseded by AUBERT 08BP. AUBERT 06R reports $[\Gamma(\Upsilon(4S) \to \Upsilon(2S)\pi^+\pi^-)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \mu^+\mu^-)] = (1.69 \pm 0.26 \pm 0.20) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \mu^+\mu^-) = (1.93 \pm 0.17) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M047R9;LINKAGE=AU

$\Gamma(\Upsilon(2S)\pi^+\pi^-)/\Gamma(\Upsilon(1S)\pi^+\pi^-)$ Γ_{21}/Γ_{18}

NODE=M047R20
NODE=M047R20

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1.16\pm0.16\pm0.14$	220	[1] AUBERT	08BP	BABR	$\Upsilon(4S) \to \pi^+\pi^-\ell^+\ell^-$

[1] Using $B(\Upsilon(1S) \to e^+e^-) = (2.38\pm0.11)\%$, $B(\Upsilon(1S) \to \mu^+\mu^-) = (2.48\pm0.05)\%$, $B(\Upsilon(2S) \to e^+e^-) = (1.91 \pm 0.16)\%$, and $B(\Upsilon(2S) \to \mu^+\mu^-) = (1.93 \pm 0.17)\%$. Not independent of other values reported by AUBERT 08BP.

NODE=M047R20;LINKAGE=UB

$\Gamma(h_b(1P)\pi^+\pi^-)/\Gamma_{total}$ Γ_{22}/Γ

NODE=M047R01
NODE=M047R01

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
not seen	(35^{+32}_{-26})k	[1] ADACHI	12	BELL	$10.58\ e^+e^- \to h_b(1P)\pi^+\pi^-$

[1] From the upper limit on the ratio of $\sigma(e^+e^- \to h_b(1P)\pi^+\pi^-)$ at the $\Upsilon(4S)$ to that at the $\Upsilon(5S)$ of 0.27.

NODE=M047R01;LINKAGE=AD

$\Gamma(h_b(1P)\eta)/\Gamma_{total}$ Γ_{23}/Γ

NODE=M047R00
NODE=M047R00

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
2.18±0.11±0.18	112k	[1] TAMPONI	15	BELL	$e^+e^- \to h_b(1P)\eta$

[1] Using $B(\eta \to 2\gamma) = (39.41 \pm 0.20)\%$.

NODE=M047R00;LINKAGE=A

$\Gamma(\eta_b(1S)\omega)/\Gamma_{total}$ Γ_{24}/Γ

NODE=M047R04
NODE=M047R04

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.8\times10^{-4}$	90	OSKIN	20	BELL	$e^+e^- \to \omega X$

$\Gamma(\eta_b(1S)\omega)/\Gamma(h_b(1P)\eta)$ Γ_{24}/Γ_{23}

NODE=M047R05
NODE=M047R05

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<8.4\times10^{-2}$	90	[1] OSKIN	20	BELL	$e^+e^- \to \omega X$

[1] Using $B(\Upsilon(4S) \to h_b(1P)\eta) = (2.18 \pm 0.11 \pm 0.18) \times 10^{-3}$ from TAMPONI 15.

NODE=M047R05;LINKAGE=A

$\Gamma(\overline{^2H}$ anything$)/\Gamma_{total}$ Γ_{25}/Γ

NODE=M047R15
NODE=M047R15

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<1.3	90	ASNER	07	CLEO	$e^+e^- \to \overline{d}X$

Double Radiative Decays

NODE=M047240

$\Gamma(\gamma\gamma\Upsilon(D) \to \gamma\gamma\eta\Upsilon(1S))/\Gamma_{total}$ Γ_{26}/Γ

NODE=M047R24
NODE=M047R24

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.3\times10^{-5}$	90	GUIDO	17	BELL	$\Upsilon(4S) \to \gamma\gamma\pi^+\pi^-\pi^0\mu^+\mu^-$

$\Upsilon(4S)$ REFERENCES

NODE=M047

OSKIN	20	PR D102 092011	P. Oskin *et al.*	(BELLE Collab.)	REFID=60735
GUIDO	18	PRL 121 062001	E. Guido *et al.*	(BELLE Collab.)	REFID=58860
GUIDO	17	PR D96 052005	E. Guido *et al.*	(BELLE Collab.)	REFID=58218
TAMPONI	15	PRL 115 142001	U. Tamponi *et al.*	(BELLE Collab.)	REFID=56996
SHEN	13A	PR D88 052019	C.P. Shen *et al.*	(BELLE Collab.)	REFID=55591
ADACHI	12	PRL 108 032001	I. Adachi *et al.*	(BELLE Collab.)	REFID=53962
BELOUS	09	PL B681 400	K. Belous *et al.*	(BELLE Collab.)	REFID=53107
SOKOLOV	09	PR D79 051103	A. Sokolov *et al.*	(BELLE Collab.)	REFID=52760
AUBERT	08BO	PR D78 071103	B. Aubert *et al.*	(BABAR Collab.)	REFID=52659
AUBERT	08BP	PR D78 112002	B. Aubert *et al.*	(BABAR Collab.)	REFID=52660
PDG	08	PL B667 1	C. Amsler *et al.*	(PDG Collab.)	REFID=52166
ASNER	07	PR D75 012009	D.M. Asner *et al.*	(CLEO Collab.)	REFID=51617
HUANG	07	PR D75 012002	G.S. Huang *et al.*	(CLEO Collab.)	REFID=51624
SOKOLOV	07	PR D75 071103	A. Sokolov *et al.*	(BELLE Collab.)	REFID=51715
TAJIMA	07A	PRL 99 211601	O. Tajima *et al.*	(BELLE Collab.)	REFID=52066
AUBERT	06R	PRL 96 232001	B. Aubert *et al.*	(BABAR Collab.)	REFID=51143
AUBERT,BE	06F	PR D74 111103	B. Aubert *et al.*	(BABAR Collab.)	REFID=51563
ARTUSO	05B	PRL 95 261801	M. Artuso *et al.*	(CLEO Collab.)	REFID=50992
AUBERT	05Q	PR D72 032005	B. Aubert *et al.*	(BABAR Collab.)	REFID=50774
AUBERT,B	05H	PRL 95 042001	B. Aubert *et al.*	(BABAR Collab.)	REFID=50777
AUBERT	04F	PR D69 071101	B.Aubert *et al.*		REFID=49748
HASTINGS	03	PR D67 052004	N.C. Hastings *et al.*	(BELLE Collab.)	REFID=49209
ABE	02D	PRL 88 052001	K. Abe *et al.*	(BELLE Collab.)	REFID=48557
ATHAR	02	PR D66 052003	S.B. Athar *et al.*	(CLEO Collab.)	REFID=48832
AUBERT	02	PR D65 032001	B. Aubert *et al.*	(BABAR Collab.)	REFID=48514
ALEXANDER	01	PRL 86 2737	J.P. Alexander *et al.*	(CLEO Collab.)	REFID=48316
AUBERT	01C	PRL 87 162002	B. Aubert *et al.*	(BABAR Collab.)	REFID=48346
GLENN	99	PR D59 052003	S. Glenn *et al.*		REFID=46890
BARISH	96B	PRL 76 1570	B.C. Barish *et al.*	(CLEO Collab.)	REFID=44693
ALBRECHT	95E	ZPHY C65 619	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=44372
BARISH	95	PR D51 1014	B.C. Barish *et al.*	(CLEO Collab.)	REFID=44139
ALEXANDER	90C	PRL 64 2226	J. Alexander *et al.*	(CLEO Collab.)	REFID=41346
BEBEK	87	PR D36 1289	C. Bebek *et al.*	(CLEO Collab.)	REFID=40270
BESSON	85	PRL 54 381	D. Besson *et al.*	(CLEO Collab.)	REFID=22368
LOVELOCK	85	PRL 54 377	D.M.J. Lovelock *et al.*	(CUSB Collab.)	REFID=22369
LEYAOUANC	77	PL B71 397	A. Le Yaouanc *et al.*	(ORSAY)	REFID=44695

NODE=M207

$Z_b(10610)$

$I^G(J^{PC}) = 1^+(1^{+-})$

was $X(10610)$

NODE=M207

Properties incompatible with a $q\overline{q}$ structure (exotic state). See the review on non-$q\overline{q}$ states.

Observed by BONDAR 12 in $\Upsilon(5S)$ decays to $\Upsilon(\text{nS})\pi^+\pi^-$ (n = 1, 2, 3) and $h_b(\text{mP})\pi^+\pi^-$ (m = 1, 2). $J^P = 1^+$ is favored from angular analyses.

$Z_b(10610)^\pm$ MASS

NODE=M207M

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*	
10607.2±2.0	[1] BONDAR	12	BELL	$e^+e^- \to$ hadrons	NODE=M207M
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$10608.5\pm3.4^{+3.7}_{-1.4}$	[2] GARMASH	15	BELL	$e^+e^- \to \Upsilon(1S)\pi^+\pi^-$	
$10608.1\pm1.2^{+1.5}_{-0.2}$	[2] GARMASH	15	BELL	$e^+e^- \to \Upsilon(2S)\pi^+\pi^-$	OCCUR=2
$10607.4\pm1.5^{+0.8}_{-0.2}$	[2] GARMASH	15	BELL	$e^+e^- \to \Upsilon(3S)\pi^+\pi^-$	OCCUR=3
$10611\ \pm4\ \pm3$	[3] BONDAR	12	BELL	$e^+e^- \to \Upsilon(1S)\pi^+\pi^-$	OCCUR=2
$10609\ \pm2\ \pm3$	[3] BONDAR	12	BELL	$e^+e^- \to \Upsilon(2S)\pi^+\pi^-$	OCCUR=3
$10608\ \pm2\ \pm3$	[3] BONDAR	12	BELL	$e^+e^- \to \Upsilon(3S)\pi^+\pi^-$	OCCUR=4
$10605\ \pm2\ ^{+3}_{-1}$	[3] BONDAR	12	BELL	$e^+e^- \to h_b(1P)\pi^+\pi^-$	OCCUR=5
$10599\ ^{+6}_{-3}\ ^{+5}_{-4}$	[3] BONDAR	12	BELL	$e^+e^- \to h_b(2P)\pi^+\pi^-$	OCCUR=6

[1] Average of the BONDAR 12 measurements in separate channels. NODE=M207M;LINKAGE=BO

[2] Correlated with the corresponding result from BONDAR 12. NODE=M207M;LINKAGE=A

[3] Superseded by the average measurement of BONDAR 12. NODE=M207M;LINKAGE=BN

$Z_b(10610)^0$ MASS

NODE=M207M0

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
10609±4±4	[1] KROKOVNY	13	BELL	$e^+e^- \to \Upsilon(2S)/\Upsilon(3S)\pi^0\pi^0$

NODE=M207M0

[1] From a simultaneous fit to the KROKOVNY 13 Dalitz analysis of $e^+e^- \to \Upsilon(2S)/\Upsilon(3S)\pi^0\pi^0$ decays with fixed width $\Gamma(Z_b(10610)^0)$ = 18.4 MeV.

NODE=M207M0;LINKAGE=A

$Z_b(10610)^{\pm}$ WIDTH

NODE=M207W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
18.4± 2.4	[1] BONDAR	12	BELL	$e^+e^- \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$18.5 \pm 5.3^{+6.1}_{-2.3}$	[2] GARMASH	15	BELL	$e^+e^- \to \Upsilon(1S)\pi^+\pi^-$
$20.8 \pm 2.5^{+0.3}_{-2.1}$	[2] GARMASH	15	BELL	$e^+e^- \to \Upsilon(2S)\pi^+\pi^-$
$18.7 \pm 3.4^{+2.5}_{-1.3}$	[2] GARMASH	15	BELL	$e^+e^- \to \Upsilon(3S)\pi^+\pi^-$
$22.3 \pm 7.7^{+3.0}_{-4.0}$	[3] BONDAR	12	BELL	$e^+e^- \to \Upsilon(1S)\pi^+\pi^-$
$24.2 \pm 3.1^{+2.0}_{-3.0}$	[3] BONDAR	12	BELL	$e^+e^- \to \Upsilon(2S)\pi^+\pi^-$
$17.6 \pm 3.0 \pm 3.0$	[3] BONDAR	12	BELL	$e^+e^- \to \Upsilon(3S)\pi^+\pi^-$
$11.4^{+4.5+2.1}_{-3.9-1.2}$	[3] BONDAR	12	BELL	$e^+e^- \to h_b(1P)\pi^+\pi^-$
$13^{+10}_{-8}{}^{+9}_{-7}$	[3] BONDAR	12	BELL	$e^+e^- \to h_b(2P)\pi^+\pi^-$

NODE=M207W
OCCUR=2
OCCUR=3
OCCUR=2
OCCUR=3
OCCUR=4
OCCUR=5
OCCUR=6

[1] Average of the BONDAR 12 measurements in separate channels.
[2] Correlated with the corresponding result from BONDAR 12.
[3] Superseded by the average measurement of BONDAR 12.

NODE=M207W;LINKAGE=BO
NODE=M207W;LINKAGE=A
NODE=M207W;LINKAGE=BN

$Z_b(10610)$ DECAY MODES

NODE=M207215;NODE=M207

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\Upsilon(1S)\pi^+$	$(5.4^{+1.9}_{-1.5}) \times 10^{-3}$	DESIG=1
Γ_2	$\Upsilon(1S)\pi^0$	not seen	DESIG=9
Γ_3	$\Upsilon(2S)\pi^+$	$(3.6^{+1.1}_{-0.8})$ %	DESIG=2
Γ_4	$\Upsilon(2S)\pi^0$	seen	DESIG=10
Γ_5	$\Upsilon(3S)\pi^+$	$(2.1^{+0.8}_{-0.6})$ %	DESIG=3
Γ_6	$\Upsilon(3S)\pi^0$	seen	DESIG=11
Γ_7	$h_b(1P)\pi^+$	$(3.5^{+1.2}_{-0.9})$ %	DESIG=4
Γ_8	$h_b(2P)\pi^+$	$(4.7^{+1.7}_{-1.3})$ %	DESIG=5
Γ_9	$B^+\overline{B}^0$	not seen	DESIG=8
Γ_{10}	$B^+\overline{B}^{*0} + B^{*+}\overline{B}^0$	$(85.6^{+2.1}_{-2.9})$ %	DESIG=6

$Z_b(10610)$ BRANCHING RATIOS

NODE=M207225

$\Gamma(\Upsilon(1S)\pi^+)/\Gamma_{total}$ — Γ_1/Γ

NODE=M207R01
NODE=M207R01

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
$\mathbf{5.4^{+1.6+1.1}_{-1.3-0.8}}$	[1] GARMASH	16	BELL	$e^+e^- \to \pi^- B^+\overline{B}^{*0}, \pi^-\overline{B}^0 B^{*+}$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	GARMASH	15	BELL	$e^+e^- \to \Upsilon(1S)\pi^+\pi^-$
seen	BONDAR	12	BELL	$e^+e^- \to \Upsilon(1S)\pi^+\pi^-$

[1] Assuming the $Z_b(10610)$ decay width is saturated by the channels $\pi^+\Upsilon$(1S, 2S, 3S), $\pi^+ h_b$(1P, 2P), and $B^+\overline{B}^{*0} + \overline{B}^0 B^{*+}$, and using the results from BONDAR 12 and MIZUK 16.

NODE=M207R01;LINKAGE=A

$\Gamma(\Upsilon(1S)\pi^0)/\Gamma_{total}$ — Γ_2/Γ

NODE=M207R09
NODE=M207R09

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	KROKOVNY	13	BELL	$e^+e^- \to \Upsilon(1S)\pi^0\pi^0$

$\Gamma(\Upsilon(2S)\pi^+)/\Gamma_{total}$ Γ_3/Γ

NODE=M207R02

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
$\mathbf{3.62^{+0.76}_{-0.59}{}^{+0.79}_{-0.53}}$	[1] GARMASH	16	BELL	$e^+e^- \to \pi^- B^+ \overline{B}^{*0}$, $\pi^- \overline{B}^0 B^{*+}$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	GARMASH	15	BELL	$e^+e^- \to \Upsilon(2S)\pi^+\pi^-$
seen	BONDAR	12	BELL	$e^+e^- \to \Upsilon(2S)\pi^+\pi^-$

[1] Assuming the $Z_b(10610)$ decay width is saturated by the channels $\pi^+\Upsilon(1S,2S,3S)$, $\pi^+ h_b(1P,2P)$, and $B^+\overline{B}^{*0} + \overline{B}^0 B^{*+}$, and using the results from BONDAR 12 and MIZUK 16.

NODE=M207R02;LINKAGE=A

$\Gamma(\Upsilon(2S)\pi^0)/\Gamma_{total}$ Γ_4/Γ

NODE=M207R10

VALUE	DOCUMENT ID		TECN	COMMENT
seen	[1] KROKOVNY	13	BELL	$e^+e^- \to \Upsilon(2S)\pi^0\pi^0$

[1] Combined significance in $e^+e^- \to \Upsilon(2S)/\Upsilon(3S)\pi^0\pi^0$, including systematics, of 6.5σ.

NODE=M207R10;LINKAGE=A

$\Gamma(\Upsilon(3S)\pi^+)/\Gamma_{total}$ Γ_5/Γ

NODE=M207R03

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
$\mathbf{2.15^{+0.55}_{-0.42}{}^{+0.60}_{-0.43}}$	[1] GARMASH	16	BELL	$e^+e^- \to \pi^- B^+ \overline{B}^{*0}$, $\pi^- \overline{B}^0 B^{*+}$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	GARMASH	15	BELL	$e^+e^- \to \Upsilon(3S)\pi^+\pi^-$
seen	BONDAR	12	BELL	$e^+e^- \to \Upsilon(3S)\pi^+\pi^-$

[1] Assuming the $Z_b(10610)$ decay width is saturated by the channels $\pi^+\Upsilon(1S,2S,3S)$, $\pi^+ h_b(1P,2P)$, and $B^+\overline{B}^{*0} + \overline{B}^0 B^{*+}$, and using the results from BONDAR 12 and MIZUK 16.

NODE=M207R03;LINKAGE=A

$\Gamma(\Upsilon(3S)\pi^0)/\Gamma_{total}$ Γ_6/Γ

NODE=M207R11

VALUE	DOCUMENT ID		TECN	COMMENT
seen	[1] KROKOVNY	13	BELL	$e^+e^- \to \Upsilon(3S)\pi^0\pi^0$

[1] Combined significance in $e^+e^- \to \Upsilon(2S)/\Upsilon(3S)\pi^0\pi^0$, including systematics, of 6.5σ.

NODE=M207R11;LINKAGE=A

$\Gamma(h_b(1P)\pi^+)/\Gamma_{total}$ Γ_7/Γ

NODE=M207R04

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
$\mathbf{3.45^{+0.87}_{-0.71}{}^{+0.86}_{-0.63}}$	[1] GARMASH	16	BELL	$e^+e^- \to \pi^- B^+ \overline{B}^{*0}$, $\pi^- \overline{B}^0 B^{*+}$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
possibly seen	[2] MIZUK	16	BELL	$e^+e^- \to h_b(1P)\pi^+\pi^-$
seen	[3] BONDAR	12	BELL	$e^+e^- \to h_b(1P)\pi^+\pi^-$

[1] Assuming the $Z_b(10610)$ decay width is saturated by the channels $\pi^+\Upsilon(1S,2S,3S)$, $\pi^+ h_b(1P,2P)$, and $B^+\overline{B}^{*0} + \overline{B}^0 B^{*+}$, and using the results from BONDAR 12 and MIZUK 16.

NODE=M207R04;LINKAGE=C

[2] Using e^+e^- energies near the $\Upsilon(11020)$.

NODE=M207R04;LINKAGE=A

[3] Using e^+e^- energies near the $\Upsilon(10860)$.

NODE=M207R04;LINKAGE=B

$\Gamma(h_b(2P)\pi^+)/\Gamma_{total}$ Γ_8/Γ

NODE=M207R05

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
$\mathbf{4.67^{+1.24}_{-1.00}{}^{+1.18}_{-0.89}}$	[1] GARMASH	16	BELL	$e^+e^- \to \pi^- B^+ \overline{B}^{*0}$, $\pi^- \overline{B}^0 B^{*+}$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
possibly seen	[2] MIZUK	16	BELL	$e^+e^- \to h_b(2P)\pi^+\pi^-$
seen	[3] BONDAR	12	BELL	$e^+e^- \to h_b(2P)\pi^+\pi^-$

[1] Assuming the $Z_b(10610)$ decay width is saturated by the channels $\pi^+\Upsilon(1S,2S,3S)$, $\pi^+ h_b(1P,2P)$, and $B^+\overline{B}^{*0} + \overline{B}^0 B^{*+}$, and using the results from BONDAR 12 and MIZUK 16.

NODE=M207R05;LINKAGE=C

[2] Using e^+e^- energies near the $\Upsilon(11020)$.

NODE=M207R05;LINKAGE=A

[3] Using e^+e^- energies near the $\Upsilon(10860)$.

NODE=M207R05;LINKAGE=B

$\Gamma(B^+\overline{B}^0)/\Gamma_{total}$ Γ_9/Γ

NODE=M207R08

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	GARMASH	16	BELL	$e^+e^- \to \pi^- B^+ \overline{B}^0$

$[\Gamma(B^+\overline{B}^{*0})+\Gamma(B^{*+}\overline{B}^0)]/\Gamma_{total}$ Γ_{10}/Γ

NODE=M207R00

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
$85.6^{+1.5+1.5}_{-2.0-2.1}$	357	[1] GARMASH	16	BELL	$e^+e^-\to\pi^-B^+\overline{B}^{*0}$, $\pi^-B^{*+}\overline{B}^0$

[1] Assuming the $Z_b(10610)$ decay width is saturated by the channels $\pi^+\Upsilon(1S,2S,3S)$, $\pi^+h_b(1P,2P)$, and $B^+\overline{B}^{*0}+B^{*+}\overline{B}^0$, and using the results from BONDAR 12 and MIZUK 16. Using the mass and width of the $Z_b(10610)$ from BONDAR 12.

NODE=M207R00;LINKAGE=A

$[\Gamma(B^+\overline{B}^{*0})+\Gamma(B^{*+}\overline{B}^0)]/[\Gamma(\Upsilon(1S)\pi^+)+\Gamma(\Upsilon(2S)\pi^+)+\Gamma(\Upsilon(3S)\pi^+)+\Gamma(h_b(1P)\pi^+)+\Gamma(h_b(2P)\pi^+)]$ $\Gamma_{10}/(\Gamma_1+\Gamma_3+\Gamma_5+\Gamma_7+\Gamma_8)$

NODE=M207R07

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$5.93^{+0.99+1.01}_{-0.69-0.73}$	357	[1] GARMASH	16	BELL	$e^+e^-\to\pi^-B^+\overline{B}^{*0}$, $\pi^-\overline{B}^0B^{*+}$

[1] Combined with the results of BONDAR 12 and MIZUK 16. Not independent from $Z_b(10610)$ branching fractions to $\pi^+\Upsilon(1S,2S,3S)$, $\pi^+h_b(1P,2P)$, and $B^+\overline{B}^{*0}+\overline{B}^0B^{*+}$.

NODE=M207R07;LINKAGE=A

$Z_b(10610)$ REFERENCES

NODE=M207

GARMASH	16	PRL 116 212001	A. Garmash *et al.*	(BELLE Collab.)
MIZUK	16	PRL 117 142001	R. Mizuk *et al.*	(BELLE Collab.)
GARMASH	15	PR D91 072003	A. Garmash *et al.*	(BELLE Collab.)
KROKOVNY	13	PR D88 052016	P. Krokovny *et al.*	(BELLE Collab.)
BONDAR	12	PRL 108 122001	A. Bondar *et al.*	(BELLE Collab.)

REFID=57446
REFID=57465
REFID=56811
REFID=55588
REFID=53963

NODE=M208

$Z_b(10650)$

$I^G(J^{PC}) = 1^+(1^{+-})$
I, G, C need confirmation.

was $X(10650)^{\pm}$

Properties incompatible with a $q\overline{q}$ structure (exotic state). See the review on non-$q\overline{q}$ states.

NODE=M208

Observed by BONDAR 12 in $\Upsilon(5S)$ decays to $\Upsilon(nS)\pi^+\pi^-$ (n = 1, 2, 3) and $h_b(mP)\pi^+\pi^-$ (m = 1, 2). $J^P=1^+$ is favored from angular analyses.

$Z_b(10650)$ MASS

NODE=M208M

NODE=M208M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT	
10652.2±1.5	[1] BONDAR	12	BELL	$e^+e^-\to$ hadrons	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$10656.7\pm5.0^{+1.1}_{-3.1}$	[2] GARMASH	15	BELL	$e^+e^-\to\Upsilon(1S)\pi^+\pi^-$	
$10650.7\pm1.5^{+0.5}_{-0.2}$	[2] GARMASH	15	BELL	$e^+e^-\to\Upsilon(2S)\pi^+\pi^-$	OCCUR=2
$10651.2\pm1.0^{+0.4}_{-0.3}$	[2] GARMASH	15	BELL	$e^+e^-\to\Upsilon(3S)\pi^+\pi^-$	OCCUR=3
10657 ±6 ±3	[3] BONDAR	12	BELL	$e^+e^-\to\Upsilon(1S)\pi^+\pi^-$	OCCUR=2
10651 ±2 ±3	[3] BONDAR	12	BELL	$e^+e^-\to\Upsilon(2S)\pi^+\pi^-$	OCCUR=3
10652 ±1 ±2	[3] BONDAR	12	BELL	$e^+e^-\to\Upsilon(3S)\pi^+\pi^-$	OCCUR=4
$10654\pm3^{+1}_{-2}$	[3] BONDAR	12	BELL	$e^+e^-\to h_b(1P)\pi^+\pi^-$	OCCUR=5
$10651^{+2}_{-3}{}^{+3}_{-2}$	[3] BONDAR	12	BELL	$e^+e^-\to h_b(2P)\pi^+\pi^-$	OCCUR=6

[1] Average of the BONDAR 12 measurements in separate channels. NODE=M208M;LINKAGE=BO
[2] Correlated with the corresponding result from BONDAR 12. NODE=M208M;LINKAGE=A
[3] Superseded by the average measurement of BONDAR 12. NODE=M208M;LINKAGE=BN

$Z_b(10650)$ WIDTH

NODE=M208W

NODE=M208W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
11.5± 2.2	[4] BONDAR	12	BELL	$e^+e^-\to$ hadrons

• • • We do not use the following data for averages, fits, limits, etc. • • •

$12.1^{+11.3}_{-4.8}{}^{+2.7}_{-0.6}$	[5] GARMASH	15	BELL	$e^+e^- \to \Upsilon(1S)\pi^+\pi^-$	
$14.2\pm 3.7^{+0.9}_{-0.4}$	[5] GARMASH	15	BELL	$e^+e^- \to \Upsilon(2S)\pi^+\pi^-$	OCCUR=2
$9.3\pm 2.2^{+0.3}_{-0.5}$	[5] GARMASH	15	BELL	$e^+e^- \to \Upsilon(3S)\pi^+\pi^-$	OCCUR=3
$16.3\pm 9.8^{+6.0}_{-2.0}$	[6] BONDAR	12	BELL	$e^+e^- \to \Upsilon(1S)\pi^+\pi^-$	OCCUR=2
$13.3\pm 3.3^{+4.0}_{-3.0}$	[6] BONDAR	12	BELL	$e^+e^- \to \Upsilon(2S)\pi^+\pi^-$	OCCUR=3
$8.4\pm 2.0\pm 2.0$	[6] BONDAR	12	BELL	$e^+e^- \to \Upsilon(3S)\pi^+\pi^-$	OCCUR=4
$20.9^{+5.4}_{-4.7}{}^{+2.1}_{-5.7}$	[6] BONDAR	12	BELL	$e^+e^- \to h_b(1P)\pi^+\pi^-$	OCCUR=5
$19\pm 7^{+11}_{-7}$	[6] BONDAR	12	BELL	$e^+e^- \to h_b(2P)\pi^+\pi^-$	OCCUR=6

[4] Average of the BONDAR 12 measurements in separate channels. NODE=M208W;LINKAGE=BO
[5] Correlated with the corresponding result from BONDAR 12. NODE=M208W;LINKAGE=A
[6] Superseded by the average measurement of BONDAR 12. NODE=M208W;LINKAGE=BN

$Z_b(10650)^+$ DECAY MODES

NODE=M208215;NODE=M208

$Z_b(10650)^-$ decay modes are charge conjugates of the modes below. NODE=M208

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\Upsilon(1S)\pi^+$	$(1.7^{+0.8}_{-0.6})\times 10^{-3}$	DESIG=1
Γ_2	$\Upsilon(2S)\pi^+$	$(1.4^{+0.6}_{-0.4})$ %	DESIG=2
Γ_3	$\Upsilon(3S)\pi^+$	$(1.6^{+0.7}_{-0.5})$ %	DESIG=3
Γ_4	$h_b(1P)\pi^+$	$(8.4^{+2.9}_{-2.4})$ %	DESIG=4
Γ_5	$h_b(2P)\pi^+$	(15 ± 4) %	DESIG=5
Γ_6	$B^+\overline{B}^0$	not seen	DESIG=8
Γ_7	$B^+\overline{B}^{*0} + B^{*+}\overline{B}^0$	not seen	DESIG=6
Γ_8	$B^{*+}\overline{B}^{*0}$	(74^{+4}_{-6}) %	DESIG=7

$Z_b(10650)$ BRANCHING RATIOS

NODE=M208225

$\Gamma(\Upsilon(1S)\pi^+)/\Gamma_{total}$ — Γ_1/Γ

NODE=M208R01
NODE=M208R01

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
$\mathbf{1.7^{+0.7}_{-0.6}{}^{+0.3}_{-0.2}}$	[7] GARMASH	16	BELL	$e^+e^- \to \pi^- B^{*+}\overline{B}^{*0}$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	GARMASH	15	BELL	$e^+e^- \to \Upsilon(1S)\pi^+\pi^-$
seen	BONDAR	12	BELL	$e^+e^- \to \Upsilon(1S)\pi^+\pi^-$

[7] Assuming the $Z_b(10650)$ decay width is saturated by the channels $\pi^+\Upsilon(1S, 2S, 3S)$, $\pi^+ h_b(1P, 2P)$, and $B^{*+}\overline{B}^{*0}$, and using the results from BONDAR 12 and MIZUK 16. NODE=M208R01;LINKAGE=A

$\Gamma(\Upsilon(2S)\pi^+)/\Gamma_{total}$ — Γ_2/Γ

NODE=M208R02
NODE=M208R02

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
$\mathbf{1.39^{+0.48}_{-0.38}{}^{+0.34}_{-0.23}}$	[8] GARMASH	16		$e^+e^- \to \pi^- B^{*+}\overline{B}^{*0}$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	GARMASH	15	BELL	$e^+e^- \to \Upsilon(2S)\pi^+\pi^-$
seen	BONDAR	12	BELL	$e^+e^- \to \Upsilon(2S)\pi^+\pi^-$

[8] Assuming the $Z_b(10650)$ decay width is saturated by the channels $\pi^+\Upsilon(1S, 2S, 3S)$, $\pi^+ h_b(1P, 2P)$, and $B^{*+}\overline{B}^{*0}$, and using the results from BONDAR 12 and MIZUK 16. NODE=M208R02;LINKAGE=A

$\Gamma(\Upsilon(3S)\pi^+)/\Gamma_{total}$ — Γ_3/Γ

NODE=M208R03

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
$\mathbf{1.63^{+0.53+0.39}_{-0.42-0.28}}$	[9] GARMASH	16	BELL	$e^+e^- \to \pi^- B^{*+}\overline{B}^{*0}$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	GARMASH	15	BELL	$e^+e^- \to \Upsilon(3S)\pi^+\pi^-$
seen	BONDAR	12	BELL	$e^+e^- \to \Upsilon(3S)\pi^+\pi^-$

[9] Assuming the $Z_b(10650)$ decay width is saturated by the channels $\pi^+\Upsilon(1S,2S,3S)$, $\pi^+ h_b(1P,2P)$, and $B^{*+}\overline{B}^{*0}$, and using the results from BONDAR 12 and MIZUK 16.

NODE=M208R03;LINKAGE=A

$\Gamma(h_b(1P)\pi^+)/\Gamma_{total}$ — Γ_4/Γ

NODE=M208R04

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
$\mathbf{8.41^{+2.43+1.49}_{-2.12-1.06}}$	[10] GARMASH	16	BELL	$e^+e^- \to \pi^- B^{*+}\overline{B}^{*0}$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	[11] MIZUK	16	BELL	$e^+e^- \to h_b(1P)\pi^+\pi^-$
seen	[12] BONDAR	12	BELL	$e^+e^- \to h_b(1P)\pi^+\pi^-$

[10] Assuming the $Z_b(10650)$ decay width is saturated by the channels $\pi^+\Upsilon(1S,2S,3S)$, $\pi^+ h_b(1P,2P)$, and $B^{*+}\overline{B}^{*0}$, and using the results from BONDAR 12 and MIZUK 16.

NODE=M208R04;LINKAGE=C

[11] Using e^+e^- energies near the $\Upsilon(11020)$.

NODE=M208R04;LINKAGE=A

[12] Using e^+e^- energies near the $\Upsilon(10860)$.

NODE=M208R04;LINKAGE=B

$\Gamma(h_b(2P)\pi^+)/\Gamma_{total}$ — Γ_5/Γ

NODE=M208R05

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
$\mathbf{14.7^{+3.2+2.8}_{-2.8-2.3}}$	[13] GARMASH	16	BELL	$e^+e^- \to \pi^- B^{*+}\overline{B}^{*0}$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
possibly seen	[14] MIZUK	16	BELL	$e^+e^- \to h_b(2P)\pi^+\pi^-$
seen	[15] BONDAR	12	BELL	$e^+e^- \to h_b(2P)\pi^+\pi^-$

[13] Assuming the $Z_b(10650)$ decay width is saturated by the channels $\pi^+\Upsilon(1S,2S,3S)$, $\pi^+ h_b(1P,2P)$, and $B^{*+}\overline{B}^{*0}$, and using the results from BONDAR 12 and MIZUK 16.

NODE=M208R05;LINKAGE=C

[14] Using e^+e^- energies near the $\Upsilon(11020)$.

NODE=M208R05;LINKAGE=A

[15] Using e^+e^- energies near the $\Upsilon(10860)$.

NODE=M208R05;LINKAGE=B

$\Gamma(B^+\overline{B}^0)/\Gamma_{total}$ — Γ_6/Γ

NODE=M208R08

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	GARMASH	16	BELL	$e^+e^- \to \pi^- B^+\overline{B}^0$

$[\Gamma(B^+\overline{B}^{*0})+\Gamma(B^{*+}\overline{B}^0)]/\Gamma_{total}$ — Γ_7/Γ

NODE=M208R00

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	GARMASH	16	BELL	$e^+e^- \to \pi^- B^+\overline{B}^{*0}$, $\pi^-\overline{B}^0 B^{*+}$

$\Gamma(B^{*+}\overline{B}^{*0})/\Gamma_{total}$ — Γ_8/Γ

NODE=M208R06

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{73.7^{+3.4+2.7}_{-4.4-3.5}}$	161	[16] GARMASH	16	BELL	$e^+e^- \to \pi^- B^{*+}\overline{B}^{*0}$

[16] Assuming the $Z_b(10650)$ decay width is saturated by the channels $\pi^+\Upsilon(1S,2S,3S)$, $\pi^+ h_b(1P,2P)$, and $B^{*+}\overline{B}^{*0}$, and using the results from BONDAR 12 and MIZUK 16. Using the mass and width of the $Z_b(10650)$ from BONDAR 12.

NODE=M208R06;LINKAGE=A

$\Gamma(B^{*+}\overline{B}^{*0})/[\Gamma(\Upsilon(1S)\pi^+)+\Gamma(\Upsilon(2S)\pi^+)+\Gamma(\Upsilon(3S)\pi^+)+\Gamma(h_b(1P)\pi^+)+\Gamma(h_b(2P)\pi^+)]$ — $\Gamma_8/(\Gamma_1+\Gamma_2+\Gamma_3+\Gamma_4+\Gamma_5)$

NODE=M208R07

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$2.80^{+0.69+0.54}_{-0.40-0.36}$	161	[17] GARMASH	16	BELL	$e^+e^- \to \pi^- B^{*+}\overline{B}^{*0}$

[17] Combined with the results of BONDAR 12 and MIZUK 16. Not independent from $Z_b(10650)$ branching fractions to $\pi^+\Upsilon(1S,2S,3S)$, $\pi^+ h_b(1P,2P)$, and $B^{*+}\overline{B}^{*0}$.

NODE=M208R07;LINKAGE=A

$Z_b(10650)$ REFERENCES

NODE=M208

GARMASH	16	PRL 116 212001	A. Garmash *et al.*	(BELLE Collab.)	REFID=57446
MIZUK	16	PRL 117 142001	R. Mizuk *et al.*	(BELLE Collab.)	REFID=57465
GARMASH	15	PR D91 072003	A. Garmash *et al.*	(BELLE Collab.)	REFID=56811
BONDAR	12	PRL 108 122001	A. Bondar *et al.*	(BELLE Collab.)	REFID=53963

NODE=M243

$\Upsilon(10753)$

$I^G(J^{PC}) = ?^?(1^{--})$

OMITTED FROM SUMMARY TABLE

A candidate for $\Upsilon(3D)$ state or an exotic structure.

NODE=M243

Seen by MIZUK 19 in $e^+ e^- \rightarrow \Upsilon(\text{nS})\pi^+\pi^-$ (n=1,2,3) with a significance of 5.2 σ.

$\Upsilon(10753)$ MASS

NODE=M243M

NODE=M243M

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
$10752.7 \pm 5.9^{+0.7}_{-1.1}$	[1] MIZUK	19	BELL	$e^+ e^- \rightarrow \Upsilon(\text{nS})\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
10761 ± 2	[2] DONG	20A		$e^+ e^- \rightarrow b\overline{b}$

[1] From a simultaneous fit to the $\Upsilon(\text{nS})\pi^+\pi^-$, $n = 1, 2, 3$, cross sections at 28 energy points within $\sqrt{s} = 10.63$–11.02 GeV, including the initial-state radiation at $\Upsilon(10860)$.

NODE=M243M;LINKAGE=A

[2] From a fit to the dressed cross sections of AUBERT 09E by BaBar and SANTEL 16 by Belle above 10.68 GeV with a coherent sum of a continuum amplitude and three Breit-Wigner functions with constant widths.

NODE=M243M;LINKAGE=B

$\Upsilon(10753)$ WIDTH

NODE=M243W

NODE=M243W

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
$35.5^{+17.6}_{-11.3}{}^{+3.9}_{-3.3}$	[1] MIZUK	19	BELL	$e^+ e^- \rightarrow \Upsilon(\text{nS})\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
48.5 ± 3.0	[2] DONG	20A		$e^+ e^- \rightarrow b\overline{b}$

[1] From a simultaneous fit to the $\Upsilon(\text{nS})\pi^+\pi^-$, $n = 1, 2, 3$, cross sections at 28 energy points within $\sqrt{s} = 10.63$–11.02 GeV, including the initial-state radiation at $\Upsilon(10860)$.

NODE=M243W;LINKAGE=A

[2] From a fit to the dressed cross sections of AUBERT 09E by BaBar and SANTEL 16 by Belle above 10.68 GeV with a coherent sum of a continuum amplitude and three Breit-Wigner functions with constant widths.

NODE=M243W;LINKAGE=B

$\Upsilon(10753)$ DECAY MODES

NODE=M243215;NODE=M243

	Mode	
Γ_1	$\Upsilon(1S)\pi^+\pi^-$	DESIG=3
Γ_2	$\Upsilon(2S)\pi^+\pi^-$	DESIG=4
Γ_3	$\Upsilon(3S)\pi^+\pi^-$	DESIG=5
Γ_4	$e^+ e^-$	DESIG=2

$\Upsilon(10753)$ $\Gamma(i)\Gamma(e^+ e^-)/\Gamma(\text{total})$

NODE=M243225

$\Gamma(\Upsilon(1S)\pi^+\pi^-) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}}$ $\Gamma_1\Gamma_4/\Gamma$

NODE=M243R00

NODE=M243R00

VALUE (eV)	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.295 ± 0.175	[1,2] MIZUK	19	BELL	$e^+ e^- \rightarrow \Upsilon(\text{nS})\pi^+\pi^-$

[1] From a simultaneous fit to the $\Upsilon(\text{nS})\pi^+\pi^-$, $n = 1, 2, 3$, cross sections at 28 energy points within $\sqrt{s} = 10.63$–11.02 GeV, including the initial-state radiation at $\Upsilon(10860)$.

NODE=M243R00;LINKAGE=A

[2] Reported as the range 0.12–0.47 eV obtained from multiple solutions of an amplitude fit within a model composed as a sum of Breit-Wigner functions.

NODE=M243R00;LINKAGE=B

$\Gamma(\Upsilon(2S)\pi^+\pi^-) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}}$ $\Gamma_2\Gamma_4/\Gamma$

NODE=M243R02

NODE=M243R02

VALUE (eV)	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.875 ± 0.345	[1,2] MIZUK	19	BELL	$e^+ e^- \rightarrow \Upsilon(\text{nS})\pi^+\pi^-$

[1] From a simultaneous fit to the $\Upsilon(\text{nS})\pi^+\pi^-$, $n = 1, 2, 3$, cross sections at 28 energy points within $\sqrt{s} = 10.63$–11.02 GeV, including the initial-state radiation at $\Upsilon(10860)$.

NODE=M243R02;LINKAGE=A

[2] Reported as the range 0.53–1.22 eV obtained from multiple solutions of an amplitude fit within a model composed as a sum of Breit-Wigner functions.

NODE=M243R02;LINKAGE=B

$\Gamma(\Upsilon(3S)\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_3\Gamma_4/\Gamma$

NODE=M243R03

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.235 ± 0.025	[1,2] MIZUK	19	BELL	$e^+e^- \to \Upsilon(nS)\pi^+\pi^-$

[1] From a simultaneous fit to the $\Upsilon(nS)\pi^+\pi^-$, n = 1, 2, 3, cross sections at 28 energy points within $\sqrt{s}$ = 10.63–11.02 GeV, including the initial-state radiation at $\Upsilon(10860)$. NODE=M243R03;LINKAGE=A

[2] Reported as the range 0.21–0.26 eV obtained from multiple solutions of an amplitude fit within a model composed as a sum of Breit-Wigner functions. NODE=M243R03;LINKAGE=B

$\Upsilon(10753)$ REFERENCES

NODE=M243

DONG	20A	CP C44 083001	X.-K. Dong *et al.*		REFID=60595
MIZUK	19	JHEP 1910 220	R. Mizuk *et al.*	(BELLE Collab.)	REFID=60090
SANTEL	16	PR D93 011101	D. Santel *et al.*	(BELLE Collab.)	REFID=57121
AUBERT	09E	PRL 102 012001	B. Aubert *et al.*	(BABAR Collab.)	REFID=52661

NODE=M092

$\Upsilon(10860)$

$I^G(J^{PC}) = 0^-(1^{--})$

$\Upsilon(10860)$ MASS

NODE=M092M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT	
$10885.2^{+2.6}_{-1.6}$ OUR AVERAGE					
$10885.3\pm 1.5^{+2.2}_{-0.9}$	[1] MIZUK	19	BELL	$e^+e^- \to \Upsilon(nS)\pi^+\pi^-$	
$10884.7^{+3.6}_{-3.4}{}^{+8.9}_{-1.0}$	[2] MIZUK	16	BELL	$e^+e^- \to h_b(1P,2P)\pi^+\pi^-$	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
10882 ± 1	[3] DONG	20A		$e^+e^- \to b\bar{b}$	
$10881.8^{+1.0}_{-1.1}\pm1.2$	[4,5] SANTEL	16	BELL	$e^+e^- \to$ hadrons	
$10891.1\pm 3.2^{+1.2}_{-2.0}$	[6,7] SANTEL	16	BELL	$e^+e^- \to \Upsilon(1S,2S,3S)\pi^+\pi^-$	OCCUR=2
10879 ± 3	[8,9] CHEN	10	BELL	$e^+e^- \to$ hadrons	
$10888.4^{+2.7}_{-2.6}\pm1.2$	[10] CHEN	10	BELL	$e^+e^- \to \Upsilon(1S,2S,3S)\pi^+\pi^-$	OCCUR=2
10876 ± 2	[8] AUBERT	09E	BABR	$e^+e^- \to$ hadrons	
10869 ± 2	[11] AUBERT	09E	BABR	$e^+e^- \to$ hadrons	OCCUR=2
$10868 \pm 6 \pm 5$	[12] BESSON	85	CLEO	$e^+e^- \to$ hadrons	
10845 ± 20	[13] LOVELOCK	85	CUSB	$e^+e^- \to$ hadrons	

[1] From a simultaneous fit to the $\Upsilon(nS)\pi^+\pi^-$, n = 1, 2, 3, cross sections at 28 energy points within $\sqrt{s}$ = 10.6–11.05 GeV, including the initial-state radiation at $\Upsilon(10860)$. NODE=M092M;LINKAGE=E

[2] From a simultaneous fit to the $h_b(nP)\pi^+\pi^-$, n = 1, 2 cross sections at 22 energy points within $\sqrt{s}$ = 10.77–11.02 GeV to a pair of interfering Breit-Wigner amplitudes modified by phase space factors, with eight resonance parameters (a mass and width for each of $\Upsilon(10860)$ and $\Upsilon(11020)$, a single relative phase, a single relative amplitude, and two overall normalization factors, one for each n). The systematic error estimate is dominated by possible interference with a small nonresonant continuum amplitude. NODE=M092M;LINKAGE=D

[3] From a fit to the dressed cross sections of AUBERT 09E by BaBar and SANTEL 16 by Belle above 10.68 GeV with a coherent sum of a continuum amplitude and three Breit-Wigner functions with constant widths. NODE=M092M;LINKAGE=H

[4] From a fit to the total hadronic cross sections measured at 60 energy points within $\sqrt{s}$ = 10.82–11.05 GeV to a pair of interfering Breit-Wigner amplitudes and two floating continuum amplitudes with $1/\sqrt{s}$ dependence, one coherent with the resonances and one incoherent, with six resonance parameters (a mass, width, and an amplitude for each of $\Upsilon(10860)$ and $\Upsilon(11020)$, one relative phase, and one decoherence coefficient). NODE=M092M;LINKAGE=A

[5] Not including uncertain and potentially large systematic errors due to assumed continuum amplitude $1/\sqrt{s}$ dependence and related interference contributions. NODE=M092M;LINKAGE=B

[6] From a simultaneous fit to the $\Upsilon(nS)\pi^+\pi^-$, n = 1, 2, 3, cross sections at 25energy points within $\sqrt{s}$ = 10.6–11.05 GeV to a pair of interfering Breit-Wigner amplitudesmodified by phase space factors, with fourteen resonance parameters (a mass, width, and threeamplitudes for each of $\Upsilon(10860)$ and $\Upsilon(11020)$, a single universal relativephase, and three decoherence coefficients, one for each n). Continuum contributions weremeasured (and therefore fixed) to be zero. NODE=M092M;LINKAGE=C

[7] Superseded by MIZUK 19. NODE=M092M;LINKAGE=F

[8] In a model where a flat non-resonant $b\bar{b}$-continuum is incoherently added to a second flat component interfering with two Breit-Wigner resonances. Systematic uncertainties not estimated. NODE=M092M;LINKAGE=AU

[9] The parameters of the $\Upsilon(11020)$ are fixed to those in AUBERT 09E. NODE=M092M;LINKAGE=CH

[10] In a model where a flat nonresonant $\Upsilon(1S,2S,3S)\pi^+\pi^-$ continuum interferes with a single Breit-Wigner resonance. NODE=M092M;LINKAGE=CE

[11] In a model where a non-resonant $b\overline{b}$-continuum represented by a threshold function at $\sqrt{s}=2m_B$ is incoherently added to a flat component interfering with two Breit-Wigner resonances. Not independent of other AUBERT 09E results. Systematic uncertainties not estimated. NODE=M092M;LINKAGE=UB

[12] Assuming four Gaussians with radiative tails and a single step in R. NODE=M092M;LINKAGE=BE

[13] In a coupled-channel model with three resonances and a smooth step in R. NODE=M092M;LINKAGE=LO

$\Upsilon(10860)$ WIDTH

NODE=M092W

NODE=M092W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT	
37 ± 4 OUR AVERAGE					
$36.6^{+4.5+0.5}_{-3.9-1.1}$	[1] MIZUK	19	BELL	$e^+e^- \to \Upsilon(nS)\pi^+\pi^-$	
$40.6^{+12.7+1.1}_{-8.0-19.1}$	[2] MIZUK	16	BELL	$e^+e^- \to h_b(1P,2P)\pi^+\pi^-$	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
49.5 ± 1.5	[3] DONG	20A		$e^+e^- \to b\overline{b}$	
$48.5^{+1.9+2.0}_{-1.8-2.8}$	[4,5] SANTEL	16	BELL	$e^+e^- \to$ hadrons	
$53.7^{+7.1+1.3}_{-5.6-5.4}$	[6,7] SANTEL	16	BELL	$e^+e^- \to \Upsilon(1S,2S,3S)\pi^+\pi^-$	OCCUR=2
46^{+9}_{-7}	[8,9] CHEN	10	BELL	$e^+e^- \to$ hadrons	
$30.7^{+8.3}_{-7.0}\pm3.1$	[10] CHEN	10	BELL	$e^+e^- \to \Upsilon(1S,2S,3S)\pi^+\pi^-$	OCCUR=2
43 ± 4	[8] AUBERT	09E	BABR	$e^+e^- \to$ hadrons	
74 ± 4	[11] AUBERT	09E	BABR	$e^+e^- \to$ hadrons	OCCUR=2
$112\pm17\pm23$	[12] BESSON	85	CLEO	$e^+e^- \to$ hadrons	
110 ± 15	[13] LOVELOCK	85	CUSB	$e^+e^- \to$ hadrons	

[1] From a simultaneous fit to the $\Upsilon(nS)\pi^+\pi^-$, $n=1$, 2, 3, cross sections at 28 energy points within $\sqrt{s}=10.6$–11.05 GeV, including the initial-state radiation at $\Upsilon(10860)$. NODE=M092W;LINKAGE=F

[2] From a simultaneous fit to the $h_b(nP)\pi^+\pi^-$, $n=1$, 2 cross sections at 22 energy points within $\sqrt{s}=10.77$–11.02 GeV to a pair of interfering Breit-Wigner amplitudes modified by phase space factors, with eight resonance parameters (a mass and width for each of $\Upsilon(10860)$ and $\Upsilon(11020)$, a single relative phase, a single relative amplitude, and two overall normalization factors, one for each n). The systematic error estimate is dominated by possible interference with a small nonresonant continuum amplitude. NODE=M092W;LINKAGE=D

[3] From a fit to the dressed cross sections of AUBERT 09E by BaBar and SANTEL 16 by Belle above 10.68 GeV with a coherent sum of a continuum amplitude and three Breit-Wigner functions with constant widths. NODE=M092W;LINKAGE=G

[4] From a fit to the total hadronic cross sections measured at 60 energy points within $\sqrt{s}=10.82$–11.05 GeV to a pair of interfering Breit-Wigner amplitudes and two floating continuum amplitudes with $1/\sqrt{s}$ dependence, one coherent with the resonances and one incoherent, with six resonance parameters (a mass, width, and an amplitude for each of $\Upsilon(10860)$ and $\Upsilon(11020)$, one relative phase, and one decoherence coefficient). NODE=M092W;LINKAGE=A

[5] Not including uncertain and potentially large systematic errors due to assumed continuum amplitude $1/\sqrt{s}$ dependence and related interference contributions. NODE=M092W;LINKAGE=B

[6] From a simultaneous fit to the $\Upsilon(nS)\pi^+\pi^-$, $n=1$, 2, 3, cross sections at 25energy points within $\sqrt{s}=10.6$–11.05 GeV to a pair of interfering Breit-Wigner amplitudesmodified by phase space factors, with fourteen resonance parameters (a mass, width, and threeamplitudes for each of $\Upsilon(10860)$ and $\Upsilon(11020)$, a single universal relativephase, and three decoherence coefficients, one for each n). Continuum contributions weremeasured (and therefore fixed) to be zero. NODE=M092W;LINKAGE=C

[7] Superseded by MIZUK 19. NODE=M092W;LINKAGE=E

[8] In a model where a flat non-resonant $b\overline{b}$-continuum is incoherently added to a second flat component interfering with two Breit-Wigner resonances. Systematic uncertainties not estimated. NODE=M092W;LINKAGE=AU

[9] The parameters of the $\Upsilon(11020)$ are fixed to those in AUBERT 09E. NODE=M092W;LINKAGE=CH

[10] In a model where a flat nonresonant $\Upsilon(1S,2S,3S)\pi^+\pi^-$ continuum interferes with a single Breit-Wigner resonance. NODE=M092W;LINKAGE=CE

[11] In a model where a non-resonant $b\overline{b}$-continuum represented by a threshold function at $\sqrt{s}=2m_B$ is incoherently added to a flat component interfering with two Breit-Wigner resonances. Not independent of other AUBERT 09E results. Systematic uncertainties not estimated. NODE=M092W;LINKAGE=UB

[12] Assuming four Gaussians with radiative tails and a single step in R. NODE=M092W;LINKAGE=BE

[13] In a coupled-channel model with three resonances and a smooth step in R. NODE=M092W;LINKAGE=LO

$\Upsilon(10860)$ DECAY MODES

NODE=M092215;NODE=M092

	Mode	Fraction (Γ_i/Γ)	Confidence level	
Γ_1	$B\overline{B}X$	$(76.2\ ^{+2.7}_{-4.0})\ \%$		DESIG=9
Γ_2	$B\overline{B}$	$(5.5\ \pm1.0)\ \%$		DESIG=2
Γ_3	$B\overline{B}^*$ + c.c.	$(13.7\ \pm1.6)\ \%$		DESIG=3
Γ_4	$B^*\overline{B}^*$	$(38.1\ \pm3.4)\ \%$		DESIG=4
Γ_5	$B\overline{B}^{(*)}\pi$	$<19.7\ \%$	90%	DESIG=10
Γ_6	$B\overline{B}\pi$	$(0.0\ \pm1.2)\ \%$		DESIG=23
Γ_7	$B^*\overline{B}\pi + B\overline{B}^*\pi$	$(7.3\ \pm2.3)\ \%$		DESIG=24
Γ_8	$B^*\overline{B}^*\pi$	$(1.0\ \pm1.4)\ \%$		DESIG=25
Γ_9	$B\overline{B}\pi\pi$	$<8.9\ \%$	90%	DESIG=11
Γ_{10}	$B_s^{(*)}\overline{B}_s^{(*)}$	$(20.1\ \pm3.1)\ \%$		DESIG=16
Γ_{11}	$B_s\overline{B}_s$	$(5\ \pm5)\times10^{-3}$		DESIG=5
Γ_{12}	$B_s\overline{B}_s^*$ + c.c.	$(1.35\pm0.32)\ \%$		DESIG=7
Γ_{13}	$B_s^*\overline{B}_s^*$	$(17.6\ \pm2.7)\ \%$		DESIG=8
Γ_{14}	no open-bottom	$(3.8\ ^{+5.0}_{-0.5})\ \%$		DESIG=28
Γ_{15}	e^+e^-	$(8.3\ \pm2.1)\times10^{-6}$		DESIG=1
Γ_{16}	$K^*(892)^0\overline{K}^0$	$<1.0\times10^{-5}$	90%	DESIG=29
Γ_{17}	$\Upsilon(1S)\pi^+\pi^-$	$(5.3\ \pm0.6)\times10^{-3}$		DESIG=17
Γ_{18}	$\Upsilon(1S)\eta$	$(8.5\ \pm1.7)\times10^{-4}$		DESIG=44
Γ_{19}	$\Upsilon(1S)\eta'$	$<6.9\times10^{-5}$	90%	DESIG=45
Γ_{20}	$\Upsilon(2S)\pi^+\pi^-$	$(7.8\ \pm1.3)\times10^{-3}$		DESIG=18
Γ_{21}	$\Upsilon(2S)\eta$	$(4.1\ \pm0.6)\times10^{-3}$		DESIG=46
Γ_{22}	$\Upsilon(3S)\pi^+\pi^-$	$(4.8\ ^{+1.9}_{-1.7})\times10^{-3}$		DESIG=19
Γ_{23}	$\Upsilon(1S)K^+K^-$	$(6.1\ \pm1.8)\times10^{-4}$		DESIG=20
Γ_{24}	$\eta\Upsilon_J(1D)$	$(4.8\ \pm1.1)\times10^{-3}$		DESIG=40
Γ_{25}	$h_b(1P)\pi^+\pi^-$	$(3.5\ ^{+1.0}_{-1.3})\times10^{-3}$		DESIG=26
Γ_{26}	$h_b(2P)\pi^+\pi^-$	$(5.7\ ^{+1.7}_{-2.1})\times10^{-3}$		DESIG=27
Γ_{27}	$\chi_{bJ}(1P)\pi^+\pi^-\pi^0$	$(2.5\ \pm2.3)\times10^{-3}$		DESIG=41
Γ_{28}	$\chi_{b0}(1P)\pi^+\pi^-\pi^0$	$<6.3\times10^{-3}$	90%	DESIG=30
Γ_{29}	$\chi_{b0}(1P)\omega$	$<3.9\times10^{-3}$	90%	DESIG=31
Γ_{30}	$\chi_{b0}(1P)(\pi^+\pi^-\pi^0)_{\text{non}-\omega}$	$<4.8\times10^{-3}$	90%	DESIG=32
Γ_{31}	$\chi_{b1}(1P)\pi^+\pi^-\pi^0$	$(1.85\pm0.33)\times10^{-3}$		DESIG=33
Γ_{32}	$\chi_{b1}(1P)\omega$	$(1.57\pm0.30)\times10^{-3}$		DESIG=34
Γ_{33}	$\chi_{b1}(1P)(\pi^+\pi^-\pi^0)_{\text{non}-\omega}$	$(5.2\ \pm1.9)\times10^{-4}$		DESIG=35
Γ_{34}	$\chi_{b2}(1P)\pi^+\pi^-\pi^0$	$(1.17\pm0.30)\times10^{-3}$		DESIG=36
Γ_{35}	$\chi_{b2}(1P)\omega$	$(6.0\ \pm2.7)\times10^{-4}$		DESIG=37
Γ_{36}	$\chi_{b2}(1P)(\pi^+\pi^-\pi^0)_{\text{non}-\omega}$	$(6\ \pm4)\times10^{-4}$		DESIG=38
Γ_{37}	$\gamma X_b \to \gamma\Upsilon(1S)\omega$	$<3.8\times10^{-5}$	90%	DESIG=39
Γ_{38}	$\eta_b(1S)\omega$	$<1.3\times10^{-3}$	90%	DESIG=42
Γ_{39}	$\eta_b(2S)\omega$	$<5.6\times10^{-3}$	90%	DESIG=43

Inclusive Decays.

NODE=M092;CLUMP=I

These decay modes are submodes of one or more of the decay modes above.

NODE=M092

	Mode	Fraction (Γ_i/Γ)	Confidence level	
Γ_{40}	ϕ anything	$(13.8\ ^{+2.4}_{-1.7})\ \%$		DESIG=12
Γ_{41}	D^0 anything + c.c.	$(108\ \pm8)\ \%$		DESIG=13
Γ_{42}	D_s anything + c.c.	$(46\ \pm6)\ \%$		DESIG=6
Γ_{43}	J/ψ anything	$(2.06\pm0.21)\ \%$		DESIG=14
Γ_{44}	B^0 anything + c.c.	$(77\ \pm8)\ \%$		DESIG=21
Γ_{45}	B^+ anything + c.c.	$(72\ \pm6)\ \%$		DESIG=22

$\Upsilon(10860)$ PARTIAL WIDTHS

NODE=M092220

$\Gamma(e^+e^-)$ Γ_{15}

NODE=M092W1

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
0.31 ±0.07 OUR AVERAGE	Error includes scale factor of 1.3.			
0.22 ±0.05 ±0.07	BESSON	85	CLEO	$e^+e^- \to$ hadrons
0.365±0.070	LOVELOCK	85	CUSB	$e^+e^- \to$ hadrons

$\Gamma(e^+e^-) \times \Gamma(\Upsilon(1S)\pi^+\pi^-)/\Gamma_{total}$ $\Gamma_{15}\Gamma_{17}/\Gamma$

NODE=M092R50

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.09±0.34	[1,2] MIZUK	19	BELL	$e^+e^- \to \Upsilon(nS)\pi^+\pi^-$

[1] From a simultaneous fit to the $\Upsilon(nS)\pi^+\pi^-$, n = 1, 2, 3, cross sections at 28 energy points within $\sqrt{s}$ = 10.6–11.05 GeV, including the initial-state radiation at $\Upsilon(10860)$.

NODE=M092R50;LINKAGE=A

[2] Reported as the range 0.75–1.43 eV obtained from multiple solutions of an amplitude fit within a model composed as a sum of Breit-Wigner functions.

NODE=M092R50;LINKAGE=B

$\Gamma(e^+e^-) \times \Gamma(\Upsilon(2S)\pi^+\pi^-)/\Gamma_{total}$ $\Gamma_{15}\Gamma_{20}/\Gamma$

NODE=M092R51

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.58±1.22	[1,2] MIZUK	19	BELL	$e^+e^- \to \Upsilon(nS)\pi^+\pi^-$

[1] From a simultaneous fit to the $\Upsilon(nS)\pi^+\pi^-$, n = 1, 2, 3, cross sections at 28 energy points within $\sqrt{s}$ = 10.6–11.05 GeV, including the initial-state radiation at $\Upsilon(10860)$.

NODE=M092R51;LINKAGE=A

[2] Reported as the range 1.35–3.80 eV obtained from multiple solutions of an amplitude fit within a model composed as a sum of Breit-Wigner functions.

NODE=M092R51;LINKAGE=B

$\Gamma(e^+e^-) \times \Gamma(\Upsilon(3S)\pi^+\pi^-)/\Gamma_{total}$ $\Gamma_{15}\Gamma_{22}/\Gamma$

NODE=M092R52

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.73±0.30	[1,2] MIZUK	19	BELL	$e^+e^- \to \Upsilon(nS)\pi^+\pi^-$

[1] From a simultaneous fit to the $\Upsilon(nS)\pi^+\pi^-$, n = 1, 2, 3, cross sections at 28 energy points within $\sqrt{s}$ = 10.6–11.05 GeV, including the initial-state radiation at $\Upsilon(10860)$.

NODE=M092R52;LINKAGE=A

[2] Reported as the range 0.43–1.03 eV obtained from multiple solutions of an amplitude fit within a model composed as a sum of Breit-Wigner functions.

NODE=M092R52;LINKAGE=B

$\Upsilon(10860)$ BRANCHING RATIOS

NODE=M092230

"OUR EVALUATION" is obtained based on averages of rescaled data listed below. The averages and rescaling were performed by the Heavy Flavor Averaging Group (HFLAV) and are described at https://hflav.web.cern.ch/.

NODE=M092230

$\Gamma(B\overline{B}X)/\Gamma_{total}$ Γ_1/Γ

NODE=M092R13

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$0.762^{+0.027}_{-0.043}$ OUR EVALUATION					
0.71 ±0.06 OUR AVERAGE					
0.737±0.032±0.051	1063	[1] DRUTSKOY	10	BELL	$\Upsilon(5S) \to B^+X, B^0X$
0.589±0.100±0.092		[2] HUANG	07	CLEO	$\Upsilon(5S) \to$ hadrons

→ UNCHECKED ←

[1] Not independent of DRUTSKOY 10 values for $\Upsilon(5S) \to B^{\pm,0}$ anything.

NODE=M092R13;LINKAGE=DR

[2] Using measurements or limits from AQUINES 06.

NODE=M092R13;LINKAGE=HU

$\Gamma(B\overline{B})/\Gamma_{total}$ Γ_2/Γ

NODE=M092R16

VALUE (units 10^{-2})	CL%	DOCUMENT ID		TECN	COMMENT
$5.5^{+1.0}_{-0.9}\pm0.4$		[1] DRUTSKOY	10	BELL	$\Upsilon(5S) \to B^+X, B^0X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<13.8	90	[2] HUANG	07	CLEO	$\Upsilon(5S) \to$ hadrons

[1] Assuming isospin conservation.

NODE=M092R16;LINKAGE=DR

[2] Using measurements or limits from AQUINES 06.

NODE=M092R16;LINKAGE=HU

$\Gamma(B\overline{B})/\Gamma(B\overline{B}X)$ Γ_2/Γ_1

NODE=M092R05

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.22	90	AQUINES	06	CLE3	$\Upsilon(5S) \to$ hadrons

$\Gamma(B\overline{B}^* + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_3/Γ

NODE=M092R15

VALUE	DOCUMENT ID		TECN	COMMENT
0.137±0.016 OUR AVERAGE				
0.137±0.013±0.011	[1] DRUTSKOY	10	BELL	$\Upsilon(5S) \to B^+ X,\ B^0 X$
0.143±0.053±0.027	[2] HUANG	07	CLEO	$\Upsilon(5S) \to$ hadrons

[1] Assuming isospin conservation. NODE=M092R15;LINKAGE=DR
[2] Using measurements or limits from AQUINES 06. NODE=M092R15;LINKAGE=HU

$\Gamma(B\overline{B}^* + \text{c.c.})/\Gamma(B\overline{B}X)$ — Γ_3/Γ_1

NODE=M092R06

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.24±0.09±0.03	10	AQUINES	06	CLE3	$\Upsilon(5S) \to$ hadrons

$\Gamma(B^*\overline{B}^*)/\Gamma_{\text{total}}$ — Γ_4/Γ

NODE=M092R14

VALUE	DOCUMENT ID		TECN	COMMENT
0.381±0.034 OUR AVERAGE				
$0.375^{+0.021}_{-0.019}\pm0.030$	[1] DRUTSKOY	10	BELL	$\Upsilon(5S) \to B^+ X,\ B^0 X$
0.436±0.083±0.072	[2] HUANG	07	CLEO	$\Upsilon(5S) \to$ hadrons

[1] Assuming isospin conservation. NODE=M092R14;LINKAGE=DR
[2] Using measurements or limits from AQUINES 06. NODE=M092R14;LINKAGE=HU

$\Gamma(B^*\overline{B}^*)/\Gamma(B\overline{B}X)$ — Γ_4/Γ_1

NODE=M092R07

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.74±0.15±0.08	31	AQUINES	06	CLE3	$\Upsilon(5S) \to$ hadrons

$\Gamma(B\overline{B}^{(*)}\pi)/\Gamma_{\text{total}}$ — Γ_5/Γ

NODE=M092R17

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.197	90	[1] HUANG	07	CLEO	$\Upsilon(5S) \to$ hadrons

[1] Using measurements or limits from AQUINES 06. NODE=M092R17;LINKAGE=HU

$\Gamma(B\overline{B}^{(*)}\pi)/\Gamma(B\overline{B}X)$ — Γ_5/Γ_1

NODE=M092R08

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.32	90	AQUINES	06	CLE3	$\Upsilon(5S) \to$ hadrons

$\Gamma(B\overline{B}\pi)/\Gamma_{\text{total}}$ — Γ_6/Γ

NODE=M092R28

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
0.0±1.2±0.3	0	[1] DRUTSKOY	10	BELL	$\Upsilon(5S) \to B^{+,0}\pi^- X$

[1] Assuming isospin conservation. NODE=M092R28;LINKAGE=DR

$[\Gamma(B^*\overline{B}\pi) + \Gamma(B\overline{B}^*\pi)]/\Gamma_{\text{total}}$ — Γ_7/Γ

NODE=M092R29

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{7.3^{+2.3}_{-2.1}\pm0.8}$	38	[1] DRUTSKOY	10	BELL	$\Upsilon(5S) \to B^{+,0}\pi^- X$

[1] Assuming isospin conservation. NODE=M092R29;LINKAGE=DR

$\Gamma(B^*\overline{B}^*\pi)/\Gamma_{\text{total}}$ — Γ_8/Γ

NODE=M092R30

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{1.0^{+1.4}_{-1.3}\pm0.4}$	5	[1] DRUTSKOY	10	BELL	$\Upsilon(5S) \to B^{+,0}\pi^- X$

[1] Assuming isospin conservation. NODE=M092R30;LINKAGE=DR

$\Gamma(B\overline{B}\pi\pi)/\Gamma_{\text{total}}$ — Γ_9/Γ

NODE=M092R18

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.089	90	[1] HUANG	07	CLEO	$\Upsilon(5S) \to$ hadrons

[1] Using measurements or limits from AQUINES 06. NODE=M092R18;LINKAGE=HU

$\Gamma(B\overline{B}\pi\pi)/\Gamma(B\overline{B}X)$ — Γ_9/Γ_1

NODE=M092R09

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.14	90	AQUINES	06	CLE3	$\Upsilon(5S) \to$ hadrons

$\Gamma(B_s^{(*)}\overline{B}_s^{(*)})/\Gamma_{total}$ — $\Gamma_{10}/\Gamma = (\Gamma_{11}+\Gamma_{12}+\Gamma_{13})/\Gamma$

NODE=M092R01

VALUE	DOCUMENT ID		TECN	COMMENT
$0.201^{+0.030}_{-0.031}$ OUR EVALUATION				
$0.189^{+0.027}_{-0.021}$ OUR AVERAGE				
0.172 ± 0.030	[1] ESEN	13	BELL	$\Upsilon(5S) \to D^0 X, D_s X$
$0.21\ ^{+0.06}_{-0.03}$	[2] HUANG	07	CLEO	$\Upsilon(5S) \to D_s X$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.180\pm0.013\pm0.032$	[3] DRUTSKOY	07	BELL	$\Upsilon(5S) \to D^0 X, D_s X$
$0.160\pm0.026\pm0.058$	[4] ARTUSO	05B	CLEO	$e^+e^- \to D_x X$

→ UNCHECKED ←

[1] Supersedes DRUTSKOY 07.
[2] Supersedes ARTUSO 05B. Combining inclusive ϕ, D_s, and B measurements. Using B($D_s^+ \to \phi\pi^+$) = 4.4 ± 0.6% from PDG 06.
[3] Using B($D_s^+ \to \phi\pi^+$) = (4.4 ± 0.6)% from PDG 06.
[4] Uses a model-dependent estimate B($B_s \to D_s X$) = (92 ± 11)%.

NODE=M092R01;LINKAGE=ES
NODE=M092R01;LINKAGE=HU
NODE=M092R01;LINKAGE=DR
NODE=M092R01;LINKAGE=AR

$\Gamma(B_s^{(*)}\overline{B}_s^{(*)})/\Gamma(B\overline{B}X)$ — Γ_{10}/Γ_1

NODE=M092R34

VALUE	DOCUMENT ID
$0.264^{+0.052}_{-0.045}$ OUR EVALUATION	

→ UNCHECKED ←

$\Gamma(B_s^*\overline{B}_s^*)/\Gamma(B_s^{(*)}\overline{B}_s^{(*)})$ — $\Gamma_{13}/\Gamma_{10} = \Gamma_{13}/(\Gamma_{11}+\Gamma_{12}+\Gamma_{13})$

NODE=M092R19

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
87.8±1.5 OUR AVERAGE					
87.0 ± 1.7		[1,2] ESEN	13	BELL	$B_s^0 \to D_s^- \pi^+$
$90.5\pm3.2\pm0.1$	227	[2,3] LI	12	BELL	$B_s^0 \to J/\psi\eta^{(\prime)}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$90.1^{+3.8}_{-4.0}\pm0.2$		[4] LOUVOT	09	BELL	10.86 $e^+e^- \to B_s^{(*)}\overline{B}_s^{(*)}$
$93\ ^{+7}_{-9}\ \pm1$		[4] DRUTSKOY	07A	BELL	Superseded by LOUVOT 09

[1] Supersedes LOUVOT 09.
[2] With N($B_s^{(*)}\overline{B}_s^{(*)}$) = (7.11 ± 1.30) × 10^6.
[3] The ratios N($B_s^*\overline{B}_s^*$) / N($B_s^{(*)}\overline{B}_s^{(*)}$) and N($B_s^*\overline{B}_s^0$) / N($B_s^{(*)}\overline{B}_s^{(*)}$) are measured with a correlation coefficient of −0.72.
[4] From a measurement of $\sigma(e^+e^- \to B_s^*\overline{B}_s^*)$ / $\sigma(e^+e^- \to B_s^{(*)}\overline{B}_s^{(*)})$ at $\sqrt{s}$ = 10.86 GeV.

NODE=M092R19;LINKAGE=ES
NODE=M092R19;LINKAGE=IL
NODE=M092R19;LINKAGE=LI
NODE=M092R19;LINKAGE=DR

$\Gamma(B_s\overline{B}_s)/\Gamma(B_s^{(*)}\overline{B}_s^{(*)})$ — $\Gamma_{11}/\Gamma_{10} = \Gamma_{11}/(\Gamma_{11}+\Gamma_{12}+\Gamma_{13})$

NODE=M092R24

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
$2.6^{+2.6}_{-2.5}$	LOUVOT	09	BELL	10.86 $e^+e^- \to B_s^{(*)}\overline{B}_s^{(*)}$

$\Gamma(B_s\overline{B}_s)/\Gamma(B_s^*\overline{B}_s^*)$ — Γ_{11}/Γ_{13}

NODE=M092R03

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.16	90	BONVICINI	06	CLE3	e^+e^-

$\Gamma(B_s\overline{B}_s^* + \text{c.c.})/\Gamma(B_s^{(*)}\overline{B}_s^{(*)})$ — $\Gamma_{12}/\Gamma_{10} = \Gamma_{12}/(\Gamma_{11}+\Gamma_{12}+\Gamma_{13})$

NODE=M092R25

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
6.7±1.2 OUR AVERAGE					
7.3 ± 1.4		[1,2] ESEN	13	BELL	$B_s^0 \to D_s^- \pi^+$
$4.9\pm2.5\pm0.0$	227	[2,3] LI	12	BELL	$B_s^0 \to J/\psi\eta^{(\prime)}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$7.3^{+3.3}_{-3.0}\pm0.1$		LOUVOT	09	BELL	10.86 $e^+e^- \to B_s^{(*)}\overline{B}_s^{(*)}$

[1] Supersedes LOUVOT 09.
[2] With N($B_s^{(*)}\overline{B}_s^{(*)}$) = (7.11 ± 1.30) × 10^6.
[3] The ratios N($B_s^*\overline{B}_s^*$) / N($B_s^{(*)}\overline{B}_s^{(*)}$) and N($B_s^*\overline{B}_s^0$) / N($B_s^{(*)}\overline{B}_s^{(*)}$) are measured with a correlation coefficient of −0.72.

NODE=M092R25;LINKAGE=ES
NODE=M092R25;LINKAGE=IL
NODE=M092R25;LINKAGE=LI

$\Gamma(B_s \overline{B}{}^*_s + \text{c.c.})/\Gamma(B^*_s \overline{B}{}^*_s)$ — Γ_{12}/Γ_{13}

NODE=M092R04

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.16	90	BONVICINI	06	CLE3	$e^+ e^-$

$\Gamma(\text{no open-bottom})/\Gamma_{\text{total}}$ — Γ_{14}/Γ

NODE=M092R33

VALUE	DOCUMENT ID
$0.038^{+0.051}_{-0.005}$ OUR EVALUATION	

→ UNCHECKED ←

$\Gamma(K^*(892)^0 \overline{K}{}^0)/\Gamma_{\text{total}}$ — Γ_{16}/Γ

NODE=M092R35

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.0 \times 10^{-5}$	90	SHEN	13A	BELL	$e^+ e^- \to K^*(892)^0 \overline{K}{}^0$

$\Gamma(\eta \Upsilon_J(1D))/\Gamma_{\text{total}}$ — Γ_{24}/Γ

NODE=M092R48

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
4.82±0.92±0.67	[1] TAMPONI	18	BELL	$e^+ e^- \to \Upsilon(5S) \to \eta X$

[1] Mainly $J = 2$, assumes no continuum contribution under $\Upsilon(5S)$.

NODE=M092R48;LINKAGE=A

$\Gamma(\Upsilon(1S)\pi^+\pi^-)/\Gamma_{\text{total}}$ — Γ_{17}/Γ

NODE=M092R20

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
5.3±0.3±0.5	325	[1] CHEN	08	BELL	10.87 $e^+ e^- \to \Upsilon(1S)\pi^+\pi^-$

[1] Assuming that the observed events are solely due to the $\Upsilon(5S)$ resonance.

NODE=M092R20;LINKAGE=CH

$\Gamma(\Upsilon(1S)\eta)/\Gamma_{\text{total}}$ — Γ_{18}/Γ

NODE=M092R55

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.85±0.15±0.08	[1,2] KOVALENKO	21	BELL	$e^+ e^- \to \Upsilon(5S)$

[1] Assuming that the observed events are solely due to the $\Upsilon(5S)$ resonance.

NODE=M092R55;LINKAGE=A

[2] Using a data sample of 118.3 fb^{-1} of $e^+ e^-$ collisions at $\sqrt{s} = 10.866$ GeV.

NODE=M092R55;LINKAGE=B

$\Gamma(\Upsilon(1S)\eta')/\Gamma_{\text{total}}$ — Γ_{19}/Γ

NODE=M092R56

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<6.9 \times 10^{-5}$	90	[1,2] KOVALENKO	21	BELL	$e^+ e^- \to \Upsilon(5S)$

[1] Assuming that the observed events are solely due to the $\Upsilon(5S)$ resonance.

NODE=M092R56;LINKAGE=A

[2] Using a data sample of 118.3 fb^{-1} of $e^+ e^-$ collisions at $\sqrt{s} = 10.866$ GeV.

NODE=M092R56;LINKAGE=B

$\Gamma(\Upsilon(2S)\pi^+\pi^-)/\Gamma_{\text{total}}$ — Γ_{20}/Γ

NODE=M092R21

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
7.8±0.6±1.1	186	[1] CHEN	08	BELL	10.87 $e^+ e^- \to \Upsilon(2S)\pi^+\pi^-$

[1] Assuming that the observed events are solely due to the $\Upsilon(5S)$ resonance.

NODE=M092R21;LINKAGE=CH

$\Gamma(\Upsilon(2S)\eta)/\Gamma_{\text{total}}$ — Γ_{21}/Γ

NODE=M092R57

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
4.13±0.41±0.37	[1,2] KOVALENKO	21	BELL	$e^+ e^- \to \Upsilon(5S)$

[1] Assuming that the observed events are solely due to the $\Upsilon(5S)$ resonance.

NODE=M092R57;LINKAGE=A

[2] Using a data sample of 118.3 fb^{-1} of $e^+ e^-$ collisions at $\sqrt{s} = 10.866$ GeV.

NODE=M092R57;LINKAGE=B

$\Gamma(\Upsilon(3S)\pi^+\pi^-)/\Gamma_{\text{total}}$ — Γ_{22}/Γ

NODE=M092R22

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
$4.8^{+1.8}_{-1.5}\pm0.7$	10	[1] CHEN	08	BELL	10.87 $e^+ e^- \to \Upsilon(3S)\pi^+\pi^-$

[1] Assuming that the observed events are solely due to the $\Upsilon(5S)$ resonance.

NODE=M092R22;LINKAGE=CH

$\Gamma(\Upsilon(1S)K^+K^-)/\Gamma_{\text{total}}$ — Γ_{23}/Γ

NODE=M092R23

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
$6.1^{+1.6}_{-1.4}\pm1.0$	20	[1] CHEN	08	BELL	10.87 $e^+ e^- \to \Upsilon(1S)K^+K^-$

[1] Assuming that the observed events are solely due to the $\Upsilon(5S)$ resonance.

NODE=M092R23;LINKAGE=CH

$\Gamma(h_b(1P)\pi^+\pi^-)/\Gamma(\Upsilon(2S)\pi^+\pi^-)$ — Γ_{25}/Γ_{20}

NODE=M092R31

VALUE	DOCUMENT ID		TECN	COMMENT
$0.45\pm0.08^{+0.07}_{-0.12}$	ADACHI	12	BELL	10.86 $e^+ e^- \to$ hadrons

$\Gamma(h_b(2P)\pi^+\pi^-)/\Gamma(\Upsilon(2S)\pi^+\pi^-)$ — Γ_{26}/Γ_{20}

NODE=M092R32

VALUE	DOCUMENT ID		TECN	COMMENT
$0.77\pm0.08^{+0.22}_{-0.17}$	ADACHI	12	BELL	10.86 $e^+e^-\to$ hadrons

$\Gamma(h_b(1P)\pi^+\pi^-)/\Gamma(h_b(2P)\pi^+\pi^-)$ — Γ_{25}/Γ_{26}

NODE=M092R00

VALUE	DOCUMENT ID		TECN	COMMENT
$0.616\pm0.052\pm0.017$	MIZUK	16	BELL	$e^+e^-\to h_b(1P,2P)\pi^+\pi^-$

$\Gamma(\chi_{bJ}(1P)\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{27}/Γ

NODE=M092R49

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
$2.5\pm0.6\pm2.2$	YIN	18	BELL	$e^+e^-\to$ hadrons

$\Gamma(\chi_{b0}(1P)\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{28}/Γ

NODE=M092R36

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<6.3\times10^{-3}$	90	[1] HE	14	BELL	$\Upsilon(5S)\to\pi^+\pi^-\pi^0\gamma\Upsilon(1S)$

[1] Assuming that all the $b\overline{b}$ events are from $\Upsilon(5S)$ resonance decays and using $\sigma(e^+e^-\to b\overline{b})=0.340\pm0.016$ nb from ESEN 13. Correlated with other results from HE 14.

NODE=M092R36;LINKAGE=A

$\Gamma(\chi_{b0}(1P)\omega)/\Gamma_{total}$ — Γ_{29}/Γ

NODE=M092R37

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<3.9\times10^{-3}$	90	[1] HE	14	BELL	$\Upsilon(5S)\to\pi^+\pi^-\pi^0\gamma\Upsilon(1S)$

[1] Assuming that all the $b\overline{b}$ events are from $\Upsilon(5S)$ resonance decays and using $\sigma(e^+e^-\to b\overline{b})=0.340\pm0.016$ nb from ESEN 13. Correlated with other results from HE 14.

NODE=M092R37;LINKAGE=A

$\Gamma(\chi_{b0}(1P)(\pi^+\pi^-\pi^0)_{non-\omega})/\Gamma_{total}$ — Γ_{30}/Γ

NODE=M092R38

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<4.8\times10^{-3}$	90	[1] HE	14	BELL	$\Upsilon(5S)\to\pi^+\pi^-\pi^0\gamma\Upsilon(1S)$

[1] Assuming that all the $b\overline{b}$ events are from $\Upsilon(5S)$ resonance decays and using $\sigma(e^+e^-\to b\overline{b})=0.340\pm0.016$ nb from ESEN 13. Correlated with other results from HE 14.

NODE=M092R38;LINKAGE=A

$\Gamma(\chi_{b1}(1P)\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{31}/Γ

NODE=M092R39

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
$1.85\pm0.23\pm0.23$	80	[1] HE	14	BELL	$\Upsilon(5S)\to\pi^+\pi^-\pi^0\gamma\Upsilon(1S)$

[1] Assuming that all the $b\overline{b}$ events are from $\Upsilon(5S)$ resonance decays and using $\sigma(e^+e^-\to b\overline{b})=0.340\pm0.016$ nb from ESEN 13. Correlated with other results from HE 14.

NODE=M092R39;LINKAGE=A

$\Gamma(\chi_{b1}(1P)\omega)/\Gamma_{total}$ — Γ_{32}/Γ

NODE=M092R40

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
$1.57\pm0.22\pm0.21$	60	[1] HE	14	BELL	$\Upsilon(5S)\to\pi^+\pi^-\pi^0\gamma\Upsilon(1S)$

[1] Assuming that all the $b\overline{b}$ events are from $\Upsilon(5S)$ resonance decays and using $\sigma(e^+e^-\to b\overline{b})=0.340\pm0.016$ nb from ESEN 13. Correlated with other results from HE 14.

NODE=M092R40;LINKAGE=A

$\Gamma(\chi_{b1}(1P)(\pi^+\pi^-\pi^0)_{non-\omega})/\Gamma_{total}$ — Γ_{33}/Γ

NODE=M092R41

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
$0.52\pm0.15\pm0.11$	24	[1] HE	14	BELL	$\Upsilon(5S)\to\pi^+\pi^-\pi^0\gamma\Upsilon(1S)$

[1] Assuming that all the $b\overline{b}$ events are from $\Upsilon(5S)$ resonance decays and using $\sigma(e^+e^-\to b\overline{b})=0.340\pm0.016$ nb from ESEN 13. Correlated with other results from HE 14.

NODE=M092R41;LINKAGE=A

$\Gamma(\chi_{b2}(1P)\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{34}/Γ

NODE=M092R42

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
$1.17\pm0.27\pm0.14$	29	[1] HE	14	BELL	$\Upsilon(5S)\to\pi^+\pi^-\pi^0\gamma\Upsilon(1S)$

[1] Assuming that all the $b\overline{b}$ events are from $\Upsilon(5S)$ resonance decays and using $\sigma(e^+e^-\to b\overline{b})=0.340\pm0.016$ nb from ESEN 13. Correlated with other results from HE 14.

NODE=M092R42;LINKAGE=A

$\Gamma(\chi_{b2}(1P)\omega)/\Gamma_{total}$ — Γ_{35}/Γ

NODE=M092R43

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
$0.60\pm0.23\pm0.15$	13	[1] HE	14	BELL	$\Upsilon(5S)\to\pi^+\pi^-\pi^0\gamma\Upsilon(1S)$

[1] Assuming that all the $b\overline{b}$ events are from $\Upsilon(5S)$ resonance decays and using $\sigma(e^+e^-\to b\overline{b})=0.340\pm0.016$ nb from ESEN 13. Correlated with other results from HE 14.

NODE=M092R43;LINKAGE=A

$\Gamma(\chi_{b2}(1P)\omega)/\Gamma(\chi_{b1}(1P)\omega)$ — Γ_{35}/Γ_{32}

NODE=M092R44

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.38\pm0.16\pm0.09$	[1] HE	14	BELL	$\Upsilon(5S)\to\pi^+\pi^-\pi^0\gamma\Upsilon(1S)$

[1] Accounting for correlated systematics.

NODE=M092R44;LINKAGE=A

$\Gamma(\chi_{b2}(1P)(\pi^+\pi^-\pi^0)_{\text{non}-\omega})/\Gamma_{\text{total}}$ — Γ_{36}/Γ

NODE=M092R45

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
$0.61\pm0.22\pm0.28$	16	[1] HE	14	BELL	$\Upsilon(5S)\to\pi^+\pi^-\pi^0\gamma\Upsilon(1S)$

[1] Assuming that all the $b\bar{b}$ events are from $\Upsilon(5S)$ resonance decays and using $\sigma(e^+e^-\to b\bar{b}) = 0.340\pm0.016$ nb from ESEN 13. Correlated with other results from HE 14.

NODE=M092R45;LINKAGE=A

$\Gamma(\chi_{b2}(1P)(\pi^+\pi^-\pi^0)_{\text{non}-\omega})/\Gamma(\chi_{b1}(1P)(\pi^+\pi^-\pi^0)_{\text{non}-\omega})$ — Γ_{36}/Γ_{33}

NODE=M092R46

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$1.20\pm0.55\pm0.65$	[1] HE	14	BELL	$\Upsilon(5S)\to\pi^+\pi^-\pi^0\gamma\Upsilon(1S)$

[1] Accounting for correlated systematics.

NODE=M092R46;LINKAGE=A

$\Gamma(\eta_b(1S)\omega)/\Gamma_{\text{total}}$ — Γ_{38}/Γ

NODE=M092R53

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.3\times10^{-3}$	90	[1] OSKIN	20	BELL	$e^+e^-\to\omega X$

[1] Using $\sigma_{b\bar{b}} = 0.340\pm0.016$ nb from TAMPONI 15.

NODE=M092R53;LINKAGE=A

$\Gamma(\eta_b(2S)\omega)/\Gamma_{\text{total}}$ — Γ_{39}/Γ

NODE=M092R54

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<5.6\times10^{-3}$	90	[1] OSKIN	20	BELL	$e^+e^-\to\omega X$

[1] Using $\sigma_{b\bar{b}} = 0.340\pm0.016$ nb from TAMPONI 15.

NODE=M092R54;LINKAGE=A

$\Gamma(\gamma X_b\to\gamma\Upsilon(1S)\omega)/\Gamma_{\text{total}}$ — Γ_{37}/Γ

NODE=M092R47

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<3.8\times10^{-5}$	90	[1] HE	14	BELL	$\Upsilon(5S)\to\pi^+\pi^-\pi^0\gamma\Upsilon(1S)$

[1] Assuming that all the $b\bar{b}$ events are from $\Upsilon(5S)$ resonance decays and using $\sigma(e^+e^-\to b\bar{b}) = 0.340\pm0.016$ nb from ESEN 13. Correlated with other results from HE 14. For a state X_b with mass between 10.55 GeV/c^2 and 10.65 GeV/c^2, the obtained 90% upper limit as a function of m_{X_b} varies from 2.6×10^{-5} to 3.8×10^{-5}.

NODE=M092R47;LINKAGE=A

$\Gamma(\phi\text{ anything})/\Gamma_{\text{total}}$ — Γ_{40}/Γ

NODE=M092R12

VALUE	DOCUMENT ID		TECN	COMMENT
$0.138\pm0.007^{+0.023}_{-0.015}$	HUANG	07	CLEO	$\Upsilon(5S)\to\phi X$

$\Gamma(D^0\text{ anything + c.c.})/\Gamma_{\text{total}}$ — Γ_{41}/Γ

NODE=M092R10

VALUE	DOCUMENT ID		TECN	COMMENT
$1.076\pm0.040\pm0.068$	DRUTSKOY	07	BELL	$\Upsilon(5S)\to D^0X$

$\Gamma(D_s\text{ anything + c.c.})/\Gamma_{\text{total}}$ — Γ_{42}/Γ

NODE=M092R02

VALUE	DOCUMENT ID		TECN	COMMENT
0.46 ± 0.06 OUR AVERAGE				
$0.472\pm0.024\pm0.072$	[1] DRUTSKOY	07	BELL	$\Upsilon(5S)\to D_sX$
$0.44\pm0.09\pm0.04$	[2] ARTUSO	05B	CLE3	$e^+e^-\to D_xX$

[1] Using B($D_s^+\to\phi\pi^+$) = (4.4 ± 0.6)% from PDG 06.

NODE=M092R02;LINKAGE=DR

[2] ARTUSO 05B reports $[\Gamma(\Upsilon(10860)\to D_s\text{ anything + c.c.})/\Gamma_{\text{total}}]\times[B(D_s^+\to\phi\pi^+)] = 0.0198\pm0.0019\pm0.0038$ which we divide by our best value $B(D_s^+\to\phi\pi^+) = (4.5\pm0.4)\times10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M092R02;LINKAGE=AR

$\Gamma(J/\psi\text{ anything})/\Gamma_{\text{total}}$ — Γ_{43}/Γ

NODE=M092R11

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
$2.060\pm0.160\pm0.134$	DRUTSKOY	07	BELL	$\Upsilon(5S)\to J/\psi X$

$\Gamma(B^0\text{ anything + c.c.})/\Gamma_{\text{total}}$ — Γ_{44}/Γ

NODE=M092R26

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$0.770^{+0.058}_{-0.056}\pm0.061$	352	DRUTSKOY	10	BELL	$\Upsilon(5S)\to B^0X$

$\Gamma(B^+ \text{ anything} + \text{c.c.})/\Gamma_{total}$ Γ_{45}/Γ

NODE=M092R27
NODE=M092R27

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$0.721^{+0.039}_{-0.038}\pm0.050$	711	DRUTSKOY	10	BELL	$\Upsilon(5S) \to B^+ X$

Υ(10860) REFERENCES

NODE=M092

KOVALENKO	21	PR D104 112006	E. Kovalenko *et al.*	(BELLE Collab.)	REFID=61452
DONG	20A	CP C44 083001	X.-K. Dong *et al.*		REFID=60595
OSKIN	20	PR D102 092011	P. Oskin *et al.*	(BELLE Collab.)	REFID=60735
MIZUK	19	JHEP 1910 220	R. Mizuk *et al.*	(BELLE Collab.)	REFID=60090
TAMPONI	18	EPJ C78 633	U. Tamponi *et al.*	(BELLE Collab.)	REFID=59195
YIN	18	PR D98 091102	J.H. Yin *et al.*	(BELLE Collab.)	REFID=59468
MIZUK	16	PRL 117 142001	R. Mizuk *et al.*	(BELLE Collab.)	REFID=57465
SANTEL	16	PR D93 011101	D. Santel *et al.*	(BELLE Collab.)	REFID=57121
TAMPONI	15	PRL 115 142001	U. Tamponi *et al.*	(BELLE Collab.)	REFID=56996
HE	14	PRL 113 142001	X.H. He *et al.*	(BELLE Collab.)	REFID=55927
ESEN	13	PR D87 031101	S. Esen *et al.*	(BELLE Collab.)	REFID=54894
SHEN	13A	PR D88 052019	C.P. Shen *et al.*	(BELLE Collab.)	REFID=55591
ADACHI	12	PRL 108 032001	I. Adachi *et al.*	(BELLE Collab.)	REFID=53962
LI	12	PRL 108 181808	J. Li *et al.*	(BELLE Collab.)	REFID=54116
CHEN	10	PR D82 091106	K.-F. Chen *et al.*	(BELLE Collab.)	REFID=53531
DRUTSKOY	10	PR D81 112003	A. Drutskoy *et al.*	(BELLE Collab.)	REFID=53358
AUBERT	09E	PRL 102 012001	B. Aubert *et al.*	(BABAR Collab.)	REFID=52661
LOUVOT	09	PRL 102 021801	R. Louvot *et al.*	(BELLE Collab.)	REFID=52646
CHEN	08	PRL 100 112001	K.-F. Chen *et al.*	(BELLE Collab.)	REFID=52153
DRUTSKOY	07	PRL 98 052001	A. Drutskoy *et al.*	(BELLE Collab.)	REFID=51621
DRUTSKOY	07A	PR D76 012002	A. Drutskoy *et al.*	(BELLE Collab.)	REFID=51852
HUANG	07	PR D75 012002	G.S. Huang *et al.*	(CLEO Collab.)	REFID=51624
AQUINES	06	PRL 96 152001	O. Aquines *et al.*	(CLEO Collab.)	REFID=51106
BONVICINI	06	PRL 96 022002	G. Bonvicini *et al.*	(CLEO Collab.)	REFID=50995
PDG	06	JP G33 1	W.-M. Yao *et al.*	(PDG Collab.)	REFID=51004
ARTUSO	05B	PRL 95 261801	M. Artuso *et al.*	(CLEO Collab.)	REFID=50992
BESSON	85	PRL 54 381	D. Besson *et al.*	(CLEO Collab.)	REFID=22368
LOVELOCK	85	PRL 54 377	D.M.J. Lovelock *et al.*	(CUSB Collab.)	REFID=22369

NODE=M093

$\Upsilon(11020)$

$I^G(J^{PC}) = 0^-(1^{--})$

Υ(11020) MASS

NODE=M093M

NODE=M093M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
11000 ± 4 OUR AVERAGE				
$11000.0^{+\ 4.0+\ 1.0}_{-\ 4.5-\ 1.3}$	[1] MIZUK	19	BELL	$e^+e^- \to \Upsilon(1S,2S,3S)\pi^+\pi^-$
$10999.0^{+\ 7.3+16.9}_{-\ 7.8-\ 1.0}$	[2] MIZUK	16	BELL	$e^+e^- \to h_b(1P,2P)\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
11001 ± 1	[3] DONG	20A		$e^+e^- \to b\overline{b}$
$11003.0\pm\ 1.1^{+\ 0.9}_{-\ 1.0}$	[4,5] SANTEL	16	BELL	$e^+e^- \to$ hadrons
$10987.5^{+\ 6.4+\ 9.1}_{-\ 2.5-\ 2.3}$	[6,7] SANTEL	16	BELL	$e^+e^- \to \Upsilon(1S,2S,3S)\pi^+\pi^-$
10996 ± 2	[8] AUBERT	09E	BABR	$e^+e^- \to$ hadrons
11019 ± 5 ± 7	BESSON	85	CLEO	$e^+e^- \to$ hadrons
11020 ±30	LOVELOCK	85	CUSB	$e^+e^- \to$ hadrons

OCCUR=2

[1] From a simultaneous fit to the $\Upsilon(nS)\pi^+\pi^-$, $n = 1, 2, 3$, cross sections at 28 energy points within $\sqrt{s} = 10.6$–11.05 GeV, including the initial-state radiation at $\Upsilon(10860)$. NODE=M093M;LINKAGE=E

[2] From a simultaneous fit to the $h_b(nP)\pi^+\pi^-$, $n = 1, 2$ cross sections at 22 energy points within $\sqrt{s} = 10.77$–11.02 GeV to a pair of interfering Breit-Wigner amplitudes modified by phase space factors, with eight resonance parameters (a mass and width for each of $\Upsilon(10860)$ and $\Upsilon(11020)$, a single relative phase, a single relative amplitude, and two overall normalization factors, one for each n). The systematic error estimate is dominated by possible interference with a small nonresonant continuum amplitude. NODE=M093M;LINKAGE=D

[3] From a fit to the dressed cross sections of AUBERT 09E by BaBar and SANTEL 16 by Belle above 10.68 GeV with a coherent sum of a continuum amplitude and three Breit-Wigner functions with constant widths. NODE=M093M;LINKAGE=G

[4] From a fit to the total hadronic cross sections measured at 60 energy points within $\sqrt{s}$ = 10.82–11.05 GeV to a pair of interfering Breit-Wigner amplitudes and two floating continuum amplitudes with $1/\sqrt{s}$ dependence, one coherent with the resonances and one incoherent, with six resonance parameters (a mass, width, and an amplitude for each of $\Upsilon(10860)$ and $\Upsilon(11020)$, one relative phase, and one decoherence coefficient). NODE=M093M;LINKAGE=A

[5] Not including uncertain and potentially large systematic errors due to assumed continuum amplitude $1/\sqrt{s}$ dependence and related interference contributions. NODE=M093M;LINKAGE=B

[6] From a simultaneous fit to the $\Upsilon(nS)\pi^+\pi^-$, $n = 1, 2, 3$, cross sections at 25energy points within $\sqrt{s} = 10.6$–11.05 GeV to a pair of interfering Breit-Wigner amplitudesmodified by phase space factors, with fourteen resonance parameters (a mass, width, and threeamplitudes for each of $\Upsilon(10860)$ and $\Upsilon(11020)$, a single universal relativephase, NODE=M093M;LINKAGE=C

and three decoherence coefficients, one for each n). Continuum contributions weremeasured (and therefore fixed) to be zero.

[7] Superseded by MIZUK 19.

[8] In a model where a flat non-resonant $b\overline{b}$-continuum is incoherently added to a second flat component interfering with two Breit-Wigner resonances. Systematic uncertainties not estimated.

NODE=M093M;LINKAGE=F
NODE=M093M;LINKAGE=AU

Υ(11020) WIDTH

NODE=M093W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
$24 {}^{+8}_{-6}$ OUR AVERAGE				
$23.8^{+8.0}_{-6.8}{}^{+0.7}_{-1.8}$	[1] MIZUK	19	BELL	$e^+e^- \rightarrow \Upsilon(\mathrm{nS})\pi^+\pi^-$
$27 {}^{+27}_{-11} {}^{+5}_{-12}$	[2] MIZUK	16	BELL	$e^+e^- \rightarrow h_b(1\mathrm{P},2\mathrm{P})\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
35.1 ± 1.2	[3] DONG	20A		$e^+e^- \rightarrow b\overline{b}$
$39.3^{+1.7}_{-1.6}{}^{+1.3}_{-2.4}$	[4,5] SANTEL	16	BELL	$e^+e^- \rightarrow$ hadrons
$61 {}^{+9}_{-19} {}^{+2}_{-20}$	[6,7] SANTEL	16	BELL	$e^+e^- \rightarrow \Upsilon(1\mathrm{S},2\mathrm{S},3\mathrm{S})\pi^+\pi^-$
37 ± 3	[8] AUBERT	09E	BABR	$e^+e^- \rightarrow$ hadrons
$61 \pm 13 \pm 22$	BESSON	85	CLEO	$e^+e^- \rightarrow$ hadrons
90 ± 20	LOVELOCK	85	CUSB	$e^+e^- \rightarrow$ hadrons

NODE=M093W

OCCUR=2

[1] From a simultaneous fit to the $\Upsilon(\mathrm{nS})\pi^+\pi^-$, n = 1, 2, 3, cross sections at 28 energy points within $\sqrt{s}$ = 10.6–11.05 GeV, including the initial-state radiation at Υ(10860).

NODE=M093W;LINKAGE=E

[2] From a simultaneous fit to the $h_b(\mathrm{nP})\pi^+\pi^-$, n = 1, 2 cross sections at 22 energy points within $\sqrt{s}$ = 10.77–11.02 GeV to a pair of interfering Breit-Wigner amplitudes modified by phase space factors, with eight resonance parameters (a mass and width for each of Υ(10860) and Υ(11020), a single relative phase, a single relative amplitude, and two overall normalization factors, one for each n). The systematic error estimate is dominated by possible interference with a small nonresonant continuum amplitude.

NODE=M093W;LINKAGE=D

[3] From a fit to the dressed cross sections of AUBERT 09E by BaBar and SANTEL 16 by Belle above 10.68 GeV with a coherent sum of a continuum amplitude and three Breit-Wigner functions with constant widths.

NODE=M093W;LINKAGE=G

[4] From a fit to the total hadronic cross sections measured at 60 energy points within $\sqrt{s}$ = 10.82–11.05 GeV to a pair of interfering Breit-Wigner amplitudes and two floating continuum amplitudes with $1/\sqrt{s}$ dependence, one coherent with the resonances and one incoherent, with six resonance parameters (a mass, width, and an amplitude for each of Υ(10860) and Υ(11020), one relative phase, and one decoherence coefficient).

NODE=M093W;LINKAGE=A

[5] Not including uncertain and potentially large systematic errors due to assumed continuum amplitude $1/\sqrt{s}$ dependence and related interference contributions.

NODE=M093W;LINKAGE=B

[6] From a simultaneous fit to the $\Upsilon(\mathrm{nS})\pi^+\pi^-$, n=1, 2, 3, cross sections at 25energy points within $\sqrt{s}$ = 10.6–11.05 GeV to a pair of interfering Breit-Wigner amplitudesmodified by phase space factors, with fourteen resonance parameters (a mass, width, and threeamplitudes for each of Υ(10860) and Υ(11020), a single universal relativephase, and three decoherence coefficients, one for each n). Continuum contributions weremeasured (and therefore fixed) to be zero.

NODE=M093W;LINKAGE=C

[7] Superseded by MIZUK 19.

[8] In a model where a flat non-resonant $b\overline{b}$-continuum is incoherently added to a second flat component interfering with two Breit-Wigner resonances. Systematic uncertainties not estimated.

NODE=M093W;LINKAGE=F
NODE=M093W;LINKAGE=AU

Υ(11020) DECAY MODES

NODE=M093215;NODE=M093

	Mode	Fraction (Γ_i/Γ)	
Γ_1	e^+e^-	$(5.4^{+1.9}_{-2.1}) \times 10^{-6}$	DESIG=1
Γ_2	$\Upsilon(1S)\pi^+\pi^-$		DESIG=5
Γ_3	$\Upsilon(2S)\pi^+\pi^-$		DESIG=6
Γ_4	$\Upsilon(3S)\pi^+\pi^-$		DESIG=7
Γ_5	$\chi_{bJ}(1P)\pi^+\pi^-\pi^0$	$(9 {}^{+9}_{-8}) \times 10^{-3}$	DESIG=2
Γ_6	$\chi_{b1}(1P)\pi^+\pi^-\pi^0$	seen	DESIG=3
Γ_7	$\chi_{b2}(1P)\pi^+\pi^-\pi^0$	seen	DESIG=4

$\Upsilon(11020)$ PARTIAL WIDTHS

NODE=M093220

$\Gamma(e^+e^-)$ Γ_1

NODE=M093W1

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
0.130±0.030 OUR AVERAGE				
0.095±0.03 ±0.035	BESSON	85	CLEO	$e^+e^- \to$ hadrons
0.156±0.040	LOVELOCK	85	CUSB	$e^+e^- \to$ hadrons

$\Gamma(e^+e^-) \times \Gamma(\Upsilon(1S)\pi^+\pi^-)/\Gamma_{total}$ $\Gamma_1\Gamma_2/\Gamma$

NODE=M093R04

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.46±0.08	[1,2] MIZUK	19	BELL	$e^+e^- \to \Upsilon(nS)\pi^+\pi^-$

[1] From a simultaneous fit to the $\Upsilon(nS)\pi^+\pi^-$, n = 1, 2, 3, cross sections at 28 energy points within $\sqrt{s}$ = 10.6–11.05 GeV, including the initial-state radiation at $\Upsilon(10860)$. NODE=M093R04;LINKAGE=A

[2] Reported as the range 0.38–0.54 eV obtained from multiple solutions of an amplitude fit within a model composed as a sum of Breit-Wigner functions. NODE=M093R04;LINKAGE=B

$\Gamma(e^+e^-) \times \Gamma(\Upsilon(2S)\pi^+\pi^-)/\Gamma_{total}$ $\Gamma_1\Gamma_3/\Gamma$

NODE=M093R05

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.65±0.52	[1,2] MIZUK	19	BELL	$e^+e^- \to \Upsilon(nS)\pi^+\pi^-$

[1] From a simultaneous fit to the $\Upsilon(nS)\pi^+\pi^-$, n = 1, 2, 3, cross sections at 28 energy points within $\sqrt{s}$ = 10.6–11.05 GeV, including the initial-state radiation at $\Upsilon(10860)$. NODE=M093R05;LINKAGE=A

[2] Reported as the range 0.13–1.16 eV obtained from multiple solutions of an amplitude fit within a model composed as a sum of Breit-Wigner functions. NODE=M093R05;LINKAGE=B

$\Gamma(e^+e^-) \times \Gamma(\Upsilon(3S)\pi^+\pi^-)/\Gamma_{total}$ $\Gamma_1\Gamma_4/\Gamma$

NODE=M093R06

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.33±0.16	[1,2] MIZUK	19	BELL	$e^+e^- \to \Upsilon(nS)\pi^+\pi^-$

[1] From a simultaneous fit to the $\Upsilon(nS)\pi^+\pi^-$, n = 1, 2, 3, cross sections at 28 energy points within $\sqrt{s}$ = 10.6–11.05 GeV, including the initial-state radiation at $\Upsilon(10860)$. NODE=M093R06;LINKAGE=A

[2] Reported as the range 0.17–0.49 eV obtained from multiple solutions of an amplitude fit within a model composed as a sum of Breit-Wigner functions. NODE=M093R06;LINKAGE=B

$\Gamma(\chi_{bJ}(1P)\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_5/Γ

NODE=M093R00

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
$\mathbf{8.7\pm4.3^{+7.6}_{-6.6}}$	YIN	18	BELL	$e^+e^- \to$ hadrons

$\Gamma(\chi_{b1}(1P)\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_6/Γ

NODE=M093R01

VALUE	DOCUMENT ID		TECN	COMMENT
seen	YIN	18	BELL	$e^+e^- \to$ hadrons

$\Gamma(\chi_{b2}(1P)\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_7/Γ

NODE=M093R02

VALUE	DOCUMENT ID		TECN	COMMENT
seen	YIN	18	BELL	$e^+e^- \to$ hadrons

$\Gamma(\chi_{b2}(1P)\pi^+\pi^-\pi^0)/\Gamma(\chi_{b1}(1P)\pi^+\pi^-\pi^0)$ Γ_7/Γ_6

NODE=M093R03

VALUE	DOCUMENT ID		TECN	COMMENT
0.4±0.2	YIN	18	BELL	$e^+e^- \to$ hadrons

$\Upsilon(11020)$ REFERENCES

NODE=M093

DONG	20A	CP C44 083001	X.-K. Dong *et al.*		REFID=60595
MIZUK	19	JHEP 1910 220	R. Mizuk *et al.*	(BELLE Collab.)	REFID=60090
YIN	18	PR D98 091102	J.H. Yin *et al.*	(BELLE Collab.)	REFID=59468
MIZUK	16	PRL 117 142001	R. Mizuk *et al.*	(BELLE Collab.)	REFID=57465
SANTEL	16	PR D93 011101	D. Santel *et al.*	(BELLE Collab.)	REFID=57121
AUBERT	09E	PRL 102 012001	B. Aubert *et al.*	(BABAR Collab.)	REFID=52661
BESSON	85	PRL 54 381	D. Besson *et al.*	(CLEO Collab.)	REFID=22368
LOVELOCK	85	PRL 54 377	D.M.J. Lovelock *et al.*	(CUSB Collab.)	REFID=22369

OTHER MESONS

NODE=MXXX015

Further States

NODE=M300

OMITTED FROM SUMMARY TABLE

This section contains states observed by a single group or states poorly established that thus need confirmation.

NODE=M300

QUANTUM NUMBERS, MASSES, WIDTHS, AND BRANCHING RATIOS

X(360) $I^G(J^{PC}) = ?^?(?^{?+})$

NODE=M300K08
NODE=M300K08

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
360±7±9	64 ± 18	2.3k	[1] ABRAAMYAN	09	CNTR	2.75 $d C \to \gamma\gamma X$

[1] Not seen in $p C \to \gamma\gamma X$ at 5.5 GeV/c.

NODE=M300K08;LINKAGE=AB

X(1070) $I^G(J^{PC}) = ?^?(0^{++})$

NODE=M300J07
NODE=M300J07

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID	COMMENT
1072±1	3.5 ± 0.5	[1] VLADIMIRSK...08	40 $\pi^- p \to K^0_S K^0_S n + m\pi^0$

[1] Supersedes GRIGOR'EV 05.

NODE=M300J07;LINKAGE=VL

X(1110) $I^G(J^{PC}) = 0^+(\text{even}^{++})$

NODE=M300J30
NODE=M300J30

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1107±4	111 ± 8 ± 15	DAFTARI	87	DBC	0. $\overline{p} n \to \rho^- \pi^+ \pi^-$

f_0(1200–1600) $I^G(J^{PC}) = 0^+(0^{++})$

NODE=M300J98
NODE=M300J98

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1323± 8	237 ± 20	VLADIMIRSK...06		SPEC	40 $\pi^- p \to K^0_S K^0_S n$
1480^{+100}_{-150}	1030^{+80}_{-170}	[1] ANISOVICH	03	SPEC	
1530^{+90}_{-250}	560 ± 40	[2] ANISOVICH	03	SPEC	

OCCUR=2

[1] K-matrix pole from combined analysis of $\pi^- p \to \pi^0 \pi^0 n$, $\pi^- p \to K \overline{K} n$, $\pi^+ \pi^- \to \pi^+ \pi^-$, $\overline{p} p \to \pi^0 \pi^0 \pi^0$, $\pi^0 \eta \eta$, $\pi^0 \pi^0 \eta$, $\pi^+ \pi^- \pi^0$, $K^+ K^- \pi^0$, $K^0_S K^0_S \pi^0$, $K^+ K^0_S \pi^-$ at rest, $\overline{p} n \to \pi^- \pi^- \pi^+$, $K^0_S K^- \pi^0$, $K^0_S K^0_S \pi^-$ at rest.

NODE=M300;LINKAGE=KM

[2] K-matrix pole from combined analysis of $\pi^- p \to \pi^0 \pi^0 n$, $\pi^- p \to K \overline{K} n$, $\overline{p} p \to \pi^0 \pi^0 \pi^0$, $\pi^0 \eta \eta$, $\pi^0 \pi^0 \eta$ at rest.

NODE=M300;LINKAGE=MK

X(1420) $I^G(J^{PC}) = 2^+(0^{++})$

NODE=M300J61
NODE=M300J61

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1420±20	160 ± 10	FILIPPI	00	OBLX	0 $\overline{n} p \to \pi^+ \pi^+ \pi^-$

X(1545) $I^G(J^{PC}) = ?^?(?^{++})$

NODE=M300K07
NODE=M300K07

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID	COMMENT
1545±3	6.0 ± 2.5	[1] VLADIMIRSK...08	40 $\pi^- p \to K^0_S K^0_S n + m\pi^0$

[1] Supersedes VLADIMIRSKII 00.

NODE=M300K07;LINKAGE=VL

X(1575) $I^G(J^{PC}) = ?^?(1^{--})$

NODE=M300J08
NODE=M300J08

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1576^{+49+98}_{-55-91}	$818^{+22+64}_{-23-133}$	[1] ABLIKIM	06S	BES	$J/\psi \to K^+ K^- \pi^0$

[1] A broad peak observed at K^+K^- invariant mass. Mass and width above are its pole position. The observed branching ratio is $B(J/\psi \to X\pi^0)\, B(X \to K^+K^-) = (8.5 \pm 0.6^{+2.7}_{-3.6}) \times 10^{-4}$. NODE=M300J08;LINKAGE=AB

X(1600) $I^G(J^{PC}) = 2^+(2^{++})$

NODE=M300J99
NODE=M300J99

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1600±100	400 ± 200	[1] ALBRECHT	91F	ARG	10.2 $e^+e^- \to e^+e^- 2(\pi^+\pi^-)$

[1] Our estimate. NODE=M300J99;LINKAGE=A

X(1650) $I^G(J^{PC}) = 0^-(?^{?-})$

NODE=M300J62
NODE=M300J62

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
1652±7	<50	100	PROKOSHKIN 96	GAM2	32,38 $\pi p \to \omega\eta n$

a_0(1700) $I^G(J^{PC}) = 1^-(0^{++})$

NODE=M300K31
NODE=M300K31

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		COMMENT
1704±5±2	110 ± 15 ± 11	LEES	21A	$\eta_c(1S) \to \pi^+\pi^-\eta$

X(1730) $I^G(J^{PC}) = ?^?(?^{?+})$

NODE=M300K06
NODE=M300K06

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
1731.0±1.2±2.0	3.2 ± 0.8 ± 1.3	58	VLADIMIRSK...07	SPEC	40 $\pi^- p \to K^0_S K^0_S X$

f_2(1750) $I^G(J^{PC}) = 0^+(2^{++})$

NODE=M300JAM
NODE=M300JAM

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1755±10	67 ± 12	870	[1] SCHEGELSKY	06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$

$\Gamma(K\overline{K})$

NODE=M300JA1
NODE=M300JA1

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
17±5	870	[2] SCHEGELSKY	06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$

$\Gamma(\gamma\gamma)$

NODE=M300JA2
NODE=M300JA2

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.13±0.04	870	[2] SCHEGELSKY	06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$

$\Gamma(\pi\pi)$

NODE=M300JA3
NODE=M300JA3

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1.3±1.0	870	[2] SCHEGELSKY	06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$

$\Gamma(\eta\eta)$

NODE=M300JA4
NODE=M300JA4

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2.0±0.5	870	[2] SCHEGELSKY	06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$

[1] From analysis of L3 data at 91 and 183–209 GeV. NODE=M300JAM;LINKAGE=SC
[2] From analysis of L3 data at 91 and 183–209 GeV and using SU(3) relations. NODE=M300JA;LINKAGE=SC

X(1775) $I^G(J^{PC}) = 1^-(?^{-+})$

NODE=M300J60
NODE=M300J60

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1763±20	192 ± 60	CONDO	91	SHF	$\gamma p \to (p\pi^+)(\pi^+\pi^-\pi^-)$
1787±18	118 ± 60	CONDO	91	SHF	$\gamma p \to n\pi^+\pi^+\pi^-$

OCCUR=2

X(1850 - 3100) $I^G(J^{PC}) = ?^?(1^{--})$

NODE=M300K28
NODE=M300K28

$\Gamma(e^+e^-)\cdot B(X \to \text{hadrons})$ (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<120	90	[1] ANASHIN	11	KEDR	$e^+e^- \to$ hadrons

[1] This limit is center-of-mass energy dependent. We quote the most stringent one. NODE=M300K28;LINKAGE=AN

X(1855) $I^G(J^{PC}) = ?^?(?^{??})$ NODE=M300J31

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1856.6±5	20 ± 5	BRIDGES	86D	SPEC	0. $\overline{p}d \to \pi\pi N$

X(1870) $I^G(J^{PC}) = ?^?(2^{??})$ NODE=M300J45

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1870±40	250 ± 30	ALDE	86D	GAM4	100 $\pi^- p \to 2\eta X$

a_3(1875) $I^G(J^{PC}) = 1^-(3^{++})$ NODE=M300J95

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1874±43±96	385 ± 121 ± 114	CHUNG	02	B852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$

B(a_3(1875) → f_2(1270)π)/B(a_3(1875) → ρπ) NODE=M300B7

VALUE	DOCUMENT ID		TECN	COMMENT
0.8±0.2	[1] CHUNG	02	B852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$

[1] Using the observable fractions of 50.0% $\rho\pi$, 56.5% $f_2\pi$, and 11.8% $\rho_3\pi$. NODE=M300B;LINKAGE=C1

B(a_3(1875) → ρ_3(1690)π)/B(a_3(1875) → ρπ) NODE=M300B8

VALUE	DOCUMENT ID		TECN	COMMENT
0.9±0.3	[1] CHUNG	02	B852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$

[1] Using the observable fractions of 50.0% $\rho\pi$, 56.5% $f_2\pi$, and 11.8% $\rho_3\pi$. NODE=M300B8;LINKAGE=C1

a_1(1930) $I^G(J^{PC}) = 1^-(1^{++})$ NODE=M300J92

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1930^{+30}_{-70}	155 ± 45	ANISOVICH	01F	SPEC	2.0 $\overline{p}p \to 3\pi^0, \pi^0\eta, \pi^0\eta'$

X(1935) $I^G(J^{PC}) = 1^+(1^{-?})$ NODE=M300J33

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1935±20	215 ± 30	EVANGELIS...	79	OMEG	10,16 $\pi^- p \to \overline{p}pn$

ρ_2(1940) $I^G(J^{PC}) = 1^+(2^{--})$ NODE=M300J85

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1940±40	155 ± 40	[1] ANISOVICH	02	SPEC	0.6–1.9 $p\overline{p} \to \omega\pi^0, \omega\eta\pi^0, \pi^+\pi^-$

[1] From the combined analysis of ANISOVICH 00J, ANISOVICH 01D, ANISOVICH 01E, and ANISOVICH 02. NODE=M300J85;LINKAGE=AY

ω_3(1945) $I^G(J^{PC}) = 0^-(3^{--})$ NODE=M300J65

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1945±20	115 ± 22	[1] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \to \omega\eta, \omega\pi^0\pi^0$

[1] From the combined analysis of ANISOVICH 00D, ANISOVICH 01C, and ANISOVICH 02B. NODE=M300J65;LINKAGE=AZ

a_2(1950) $I^G(J^{PC}) = 1^-(2^{++})$ NODE=M300K24

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1950^{+30}_{-70}	180^{+30}_{-70}	[1] ANISOVICH	01F	SPEC	1.96–2.41 $\overline{p}p$

[1] From the combined analysis of ANISOVICH 99C, ANISOVICH 99E, and ANISOVICH 01F. NODE=M300K24;LINKAGE=AN

ω(1960) $I^G(J^{PC}) = 0^-(1^{--})$ NODE=M300J79

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1960±25	195 ± 60	[1] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \to \omega\eta, \omega\pi^0\pi^0$

[1] From the combined analysis of ANISOVICH 00D, ANISOVICH 01C, and ANISOVICH 02B. NODE=M300J79;LINKAGE=AZ

b_1(1960) $I^G(J^{PC}) = 1^+(1^{+-})$ NODE=M300J67

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1960±35	230 ± 50	[1] ANISOVICH	02	SPEC	0.6–1.9 $p\overline{p} \to \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$

[1] From the combined analysis of ANISOVICH 00J, ANISOVICH 01D, ANISOVICH 01E, and ANISOVICH 02. NODE=M300J67;LINKAGE=AY

h_1(1965) $I^G(J^{PC}) = 0^-(1^{+-})$ NODE=M300J64

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1965±45	345 ± 75	[1] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \to \omega\eta$, $\omega\pi^0\pi^0$

[1] From the combined analysis of ANISOVICH 00D, ANISOVICH 01C, and ANISOVICH 02B. NODE=M300J64;LINKAGE=AZ

f_1(1970) $I^G(J^{PC}) = 0^+(1^{++})$ NODE=M300J1

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
1971±15	240 ± 45	ANISOVICH	00J	SPEC

X(1970) $I^G(J^{PC}) = ?^?(?^{??})$ NODE=M300J46

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1970±10	40 ± 20	CHLIAPNIK...	80	HBC	32 $K^+ p \to 2K^0_S 2\pi X$

X(1975) $I^G(J^{PC}) = ?^?(?^{??})$ NODE=M300J47

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1973±15	80	30	CASO	70	HBC	11.2 $\pi^- p \to \rho 2\pi$

ω_2(1975) $I^G(J^{PC}) = 0^-(2^{--})$ NODE=M300J81

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1975±20	175 ± 25	[1] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \to \omega\eta$, $\omega\pi^0\pi^0$

[1] From the combined analysis of ANISOVICH 00D, ANISOVICH 01C, and ANISOVICH 02B. NODE=M300J81;LINKAGE=AZ

a_2(1990) $I^G(J^{PC}) = 1^-(2^{++})$ NODE=M300J2

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2050±10±40	190 ± 22 ± 100	18k	[1] SCHEGELSKY	06	RVUE	$\gamma\gamma \to \pi^+\pi^-\pi^0$
2003±10±19	249 ± 23 ± 32		LU	05	B852	18 $\pi^- p \to \omega\pi^-\pi^0 p$

[1] From analysis of L3 data at 183–209 GeV. NODE=M300J2;LINKAGE=SC

$\Gamma(\gamma\gamma)\,\Gamma(\pi^+\pi^-\pi^0)$ / Γ(total) NODE=M300J2G

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.11±0.04±0.05	18k	[1] SCHEGELSKY	06	RVUE	$\gamma\gamma \to \pi^+\pi^-\pi^0$

[1] From analysis of L3 data at 183–209 GeV. NODE=M300J2G;LINKAGE=SC

ρ(2000) $I^G(J^{PC}) = 1^+(1^{--})$ NODE=M300J77

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2000±30	260 ± 45	[1] BUGG	04C	RVUE	Compilation
∼ 1988	∼ 244	HASAN	94	RVUE	$\overline{p}p \to \pi\pi$

[1] From the combined analysis of ANISOVICH 00J, ANISOVICH 01D, ANISOVICH 01E, and ANISOVICH 02. NODE=M300;LINKAGE=AY

f_2(2000) $I^G(J^{PC}) = 0^+(2^{++})$ NODE=M300J25

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2001±10	312 ± 32	ANISOVICH	00J	SPEC	
∼ 1996	∼ 134	HASAN	94	RVUE	$\overline{p}p \to \pi\pi$

X(2000) $I^G(J^{PC}) = 1^-(?^{?+})$ NODE=M300K01

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
1964±35	225 ± 50	[1] ARMSTRONG	93D	E760		$\overline{p}p \to 3\pi^0 \to 6\gamma$
~ 2100	~ 500	[1] ANTIPOV	77	CIBS	−	$25\ \pi^- p \to p\pi^-\rho_3$
2214±15	355 ± 21	[2] BALTAY	77	HBC	0	$15\ \pi^- p \to \Delta^{++} 3\pi$
2080±40	340 ± 80	KALELKAR	75	HBC	+	$15\ \pi^+ p \to p\pi^+\rho_3$

[1] Cannot determine spin to be 3. NODE=M300K01;LINKAGE=AA
[2] BALTAY 77 favors $J^P = ,3^+$. NODE=M300K01;LINKAGE=B

X(2000) $I^G(J^{PC}) = ?^?(4^{++})$ NODE=M300J97

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID	TECN	COMMENT
1998±3±5	<15	VLADIMIRSK...03	SPEC	$\pi^- p \to K^0_S K^0_S MM$

η(2010) $I^G(J^{PC}) = 0^+(0^{-+})$ NODE=M300J5

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2010^{+35}_{-60}	270 ± 60	ANISOVICH	00J	SPEC

π_1(2015) $I^G(J^{PC}) = 1^-(1^{-+})$ NODE=M300J05

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2014±20±16	230 ± 32 ± 73	145k	LU	05	B852	$18\ \pi^- p \to \omega\pi^-\pi^0 p$
2001±30±92	333 ± 52 ± 49	69k	KUHN	04	B852	$18\ \pi^- p \to \eta\pi^+\pi^-\pi^- p$

a_0(2020) $I^G(J^{PC}) = 1^-(0^{++})$ NODE=M300J6

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2025±30	330 ± 75	ANISOVICH	99C	SPEC

X(2020) $I^G(J^{PC}) = ?^?(?^{??})$ NODE=M300J34

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2015±3	10 ± 4	FERRER	99	RVUE	$\pi p \to p p \overline{p} \pi(\pi)$

h_3(2025) $I^G(J^{PC}) = 0^-(3^{+-})$ NODE=M300J78

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2025±20	145 ± 30	[1] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \to \omega\eta, \omega\pi^0\pi^0$

[1] From the combined analysis of ANISOVICH 00D, ANISOVICH 01C, and ANISOVICH 02B. NODE=M300J78;LINKAGE=AZ

b_3(2030) $I^G(J^{PC}) = 1^+(3^{+-})$ NODE=M300J69

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2032±12	117 ± 11	[1] ANISOVICH	02	SPEC	0.6–1.9 $p\overline{p} \to \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$

[1] From the combined analysis of ANISOVICH 00J, ANISOVICH 01D, ANISOVICH 01E, and ANISOVICH 02. NODE=M300J69;LINKAGE=AY

a_2(2030) $I^G(J^{PC}) = 1^-(2^{++})$ NODE=M300K23

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2030±20	205 ± 30	[1] ANISOVICH	01F	SPEC	1.96–2.41 $\overline{p}p$

[1] From the combined analysis of ANISOVICH 99C, ANISOVICH 99E, and ANISOVICH 01F. NODE=M300K23;LINKAGE=AN

a_3(2030) $I^G(J^{PC}) = 1^-(3^{++})$ NODE=M300K20

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2031±12	150 ± 18	[1] ANISOVICH	01F	SPEC	1.96–2.41 $\overline{p}p$

[1] From the combined analysis of ANISOVICH 99C, ANISOVICH 99E, and ANISOVICH 01F. NODE=M300K20;LINKAGE=AN

η_2(2030) $I^G(J^{PC}) = 0^+(2^{-+})$ NODE=M300J8

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2030±5±15	205 ± 10 ± 15	ANISOVICH	00E	SPEC

$B(a_2\pi)_{L=0}/B(a_2\pi)_{L=2}$

NODE=M300B1
NODE=M300B1

VALUE	DOCUMENT ID		TECN	COMMENT
0.05±0.03	[1] ANISOVICH	11	SPEC	0.9–1.94 $p\overline{p}$

[1] Reanalysis of ADOMEIT 96 and ANISOVICH 00E.

NODE=M300B1;LINKAGE=AN

$B(a_0\pi)/B(a_2\pi)_{L=2}$

NODE=M300B2
NODE=M300B2

VALUE	DOCUMENT ID		TECN	COMMENT
0.10±0.08	[1] ANISOVICH	11	SPEC	0.9–1.94 $p\overline{p}$

[1] Reanalysis of ADOMEIT 96 and ANISOVICH 00E.

NODE=M300B2;LINKAGE=AN

$B(f_2\eta)/B(a_2\pi)_{L=2}$

NODE=M300B3
NODE=M300B3

VALUE	DOCUMENT ID		TECN	COMMENT
0.13±0.06	[1] ANISOVICH	11	SPEC	0.9–1.94 $p\overline{p}$

[1] Reanalysis of ADOMEIT 96 and ANISOVICH 00E.

NODE=M300B3;LINKAGE=AN

f_3(2050) $I^G(J^{PC}) = 0^+(3^{++})$

NODE=M300J7
NODE=M300J7

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2048±8	213 ± 34	ANISOVICH	00J	SPEC	2.0 $p\overline{p} \to \eta\pi^0\pi^0$

f_0(2060) $I^G(J^{PC}) = 0^+(0^{++})$

NODE=M300J59
NODE=M300J59

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
~ 2050	~ 120	[1] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \to \pi\pi$
~ 2060	~ 50	[1] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \to \pi\pi$

OCCUR=2

[1] See SEMENOV 99 and KLOET 96.

NODE=M300J;LINKAGE=A

π(2070) $I^G(J^{PC}) = 1^-(0^{-+})$

NODE=M300J91
NODE=M300J91

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2070±35	$310^{+100}_{-\ 50}$	ANISOVICH	01F	SPEC	2.0 $\overline{p}p \to 3\pi^0$, $\pi^0\eta$, $\pi^0\eta'$

X(2075) $I^G(J^{PC}) = ?^?(?^{??})$

NODE=M300J01
NODE=M300J01

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2075±12±5	90 ± 35 ± 9	[1] ABLIKIM	04J	BES2	$J/\psi \to K^- p\overline{\Lambda}$

[1] From a fit in the region $M_{p\overline{\Lambda}} - M_p - M_\Lambda < 150$ MeV. S-wave in the $p\overline{\Lambda}$ system preferred. A similar near-threshold enhancement in the $p\overline{\Lambda}$ system is observed in $B^+ \to p\overline{\Lambda}\overline{D}^0$ by CHEN 11F.

NODE=M300J01;LINKAGE=AB

X(2080) $I^G(J^{PC}) = ?^?(?^{??})$

NODE=M300J35
NODE=M300J35

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2080±10	110 ± 20	KREYMER	80	STRC	13 $\pi^- d \to p\overline{p}n(n_s)$

X(2080) $I^G(J^{PC}) = ?^?(3^{-?})$

NODE=M300J37
NODE=M300J37

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2080±10	190 ± 15	ROZANSKA	80	SPRK	18 $\pi^- p \to p\overline{p}n$

a_1(2095) $I^G(J^{PC}) = 1^-(1^{++})$

NODE=M300J04
NODE=M300J04

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2096±17±121	451 ± 41 ± 81	69k	KUHN	04	B852	18 $\pi^- p \to \eta\pi^+\pi^-\pi^- p$

$B(a_1(2095) \to f_1(1285)\pi) / B(a_1(2095) \to a_1(1260))$

NODE=M300B03
NODE=M300B03

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
3.18±0.64	69k	KUHN	04	B852	18 $\pi^- p \to \eta\pi^+\pi^-\pi^- p$

η(2100) $I^G(J^{PC}) = 0^+(0^{-+})$

NODE=M300J48
NODE=M300J48

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2050^{+30+75}_{-24-26}	$250^{+36+181}_{-30-164}$		[1] ABLIKIM	16N	BES3	$J/\psi \to \gamma K^+ K^- K^+ K^-$
2103±50	187 ± 75	586	[2] BISELLO	89B	DM2	$J/\psi \to 4\pi\gamma$

[1] From a partial wave analysis of $J/\psi \rightarrow \gamma\phi\phi$, for which the primary signal is $\eta(2225) \rightarrow \phi\phi$, and that also finds significant signals for for 0^{-+} phase space, $f_0(2100)$, $f_2(2010)$, $f_2(2300)$, $f_2(2340)$, and a previously unseen 0^{-+} state $X(2500)$ (M = $2470^{+15}_{-19}{}^{+101}_{-23}$ MeV, $\Gamma = 230^{+64}_{-35}{}^{+56}_{-33}$ MeV). NODE=M300J48;LINKAGE=A

[2] ASTON 81B sees no peak, has 850 events in Ajinenko+Barth bins. ARESTOV 80 sees no peak. NODE=M300J;LINKAGE=A1

X(2100) $I^G(J^{PC}) = ?^?(0^{??})$ NODE=M300J49

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2100±40	250 ± 40	ALDE	86D	GAM4	100 $\pi^- p \rightarrow 2\eta X$

NODE=M300J49

X(2110) $I^G(J^{PC}) = 1^+(3^{-?})$ NODE=M300J36

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2110±10	330 ± 20	EVANGELIS...	79	OMEG	10,16 $\pi^- p \rightarrow \overline{p} p n$

NODE=M300J36

f_2(2140) $I^G(J^{PC}) = 0^+(2^{++})$ NODE=M300J50

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2141±12	49 ± 28	389	GREEN	86	MPSF	400 $p A \rightarrow 4K X$

NODE=M300J50

X(2150) $I^G(J^{PC}) = ?^?(2^{+?})$ NODE=M300J38

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2150±10	260 ± 10	ROZANSKA	80	SPRK	18 $\pi^- p \rightarrow p \overline{p} n$

NODE=M300J38

a_2(2175) $I^G(J^{PC}) = 1^-(2^{++})$ NODE=M300J88

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2175±40	310^{+90}_{-45}	ANISOVICH	01F	SPEC	2.0 $\overline{p} p \rightarrow 3\pi^0, \pi^0\eta, \pi^0\eta'$

NODE=M300J88

η(2190) $I^G(J^{PC}) = 0^+(0^{-+})$ NODE=M300J13

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2190±50	850 ± 100	BUGG	99	BES

NODE=M300J13

ω_2(2195) $I^G(J^{PC}) = 0^-(2^{--})$ NODE=M300J82

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2195±30	225 ± 40	[1] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \rightarrow \omega\eta, \omega\pi^0\pi^0$

NODE=M300J82

[1] From the combined analysis of ANISOVICH 00D, ANISOVICH 01C, and ANISOVICH 02B. NODE=M300J82;LINKAGE=AZ

ω(2205) $I^G(J^{PC}) = 0^-(1^{--})$ NODE=M300J80

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2205±30	350 ± 90	[1] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \rightarrow \omega\eta, \omega\pi^0\pi^0$

NODE=M300J80

[1] From the combined analysis of ANISOVICH 00D, ANISOVICH 01C, and ANISOVICH 02B. NODE=M300J80;LINKAGE=AZ

X(2210) $I^G(J^{PC}) = ?^?(?^{??})$ NODE=M300J39

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2210^{+79}_{-21}	203^{+437}_{-87}	EVANGELIS...	79B	OMEG	10 $\pi^- p \rightarrow K^+ K^- n$

NODE=M300J39

X(2210) $I^G(J^{PC}) = ?^?(?^{??})$ NODE=M300J51

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2207±22	130	CASO	70	HBC	11.2 $\pi^- p$

NODE=M300J51

h_1(2215) $I^G(J^{PC}) = 0^-(1^{+-})$ NODE=M300J27

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2215±40	325 ± 55	[1] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \rightarrow \omega\eta, \omega\pi^0\pi^0$

NODE=M300J27

[1] From the combined analysis of ANISOVICH 00D, ANISOVICH 01C, and ANISOVICH 02B. NODE=M300J27;LINKAGE=AZ

$\rho_2(2225)$ $I^G(J^{PC}) = 1^+(2^{--})$

NODE=M300J70
NODE=M300J70

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2225±35	$335^{+100}_{-\ 50}$	[1] ANISOVICH	02	SPEC	0.6–1.9 $p\overline{p} \to \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$

[1] From the combined analysis of ANISOVICH 00J, ANISOVICH 01D, ANISOVICH 01E, and ANISOVICH 02. NODE=M300J70;LINKAGE=AY

$\rho_4(2230)$ $I^G(J^{PC}) = 1^+(4^{--})$

NODE=M300J74
NODE=M300J74

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2230±25	210 ± 30	[1] ANISOVICH	02	SPEC	0.6–1.9 $p\overline{p} \to \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$

[1] From the combined analysis of ANISOVICH 00J, ANISOVICH 01D, ANISOVICH 01E, and ANISOVICH 02. NODE=M300J74;LINKAGE=AY

$b_1(2240)$ $I^G(J^{PC}) = 1^+(1^{+-})$

NODE=M300J87
NODE=M300J87

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2240±35	320 ± 85	[1] ANISOVICH	02	SPEC	0.6–1.9 $p\overline{p} \to \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$

[1] From the combined analysis of ANISOVICH 00J, ANISOVICH 01D, ANISOVICH 01E, and ANISOVICH 02. NODE=M300J87;LINKAGE=AY

$f_2(2240)$ $I^G(J^{PC}) = 0^+(2^{++})$

NODE=M300K26
NODE=M300K26

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2240±15	241 ± 30	[1] ANISOVICH	00J	SPEC	1.92–2.41 $p\overline{p}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
~ 2226	~ 226	HASAN	94	RVUE	$p\overline{p} \to \pi\pi$

[1] From the combined analysis of ANISOVICH 99C, ANISOVICH 99F, ANISOVICH 99J, ANISOVICH 99K, and ANISOVICH 00B. See also ANISOVICH 12. NODE=M300K26;LINKAGE=AN

$b_3(2245)$ $I^G(J^{PC}) = 1^+(3^{+-})$

NODE=M300K10
NODE=M300K10

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2245±50	320 ± 70	[1] BUGG	04C	RVUE

[1] From the combined analysis of ANISOVICH 00J, ANISOVICH 01D, ANISOVICH 01E, and ANISOVICH 02. NODE=M300K10;LINKAGE=AY

$\eta_2(2250)$ $I^G(J^{PC}) = 0^+(2^{-+})$

NODE=M300J17
NODE=M300J17

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2248±20	280 ± 20	ANISOVICH	00I	SPEC
2267±14	290 ± 50	ANISOVICH	00J	SPEC

$\pi_4(2250)$ $I^G(J^{PC}) = 1^-(4^{-+})$

NODE=M300J73
NODE=M300J73

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2250±15	215 ± 25	ANISOVICH	01F	SPEC	2.0 $\overline{p}p \to 3\pi^0$, $\pi^0\eta$, $\pi^0\eta'$

$\omega_4(2250)$ $I^G(J^{PC}) = 0^-(4^{--})$

NODE=M300J84
NODE=M300J84

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2250±30	150 ± 50	[1] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \to \omega\eta$, $\omega\pi^0\pi^0$

[1] From the combined analysis of ANISOVICH 00D, ANISOVICH 01C, and ANISOVICH 02B. NODE=M300J84;LINKAGE=AZ

$\omega_5(2250)$ $I^G(J^{PC}) = 0^-(5^{--})$

NODE=M300K11
NODE=M300K11

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2250±70	320 ± 95	[1] BUGG	04	RVUE

[1] From the combined analysis of ANISOVICH 00D, ANISOVICH 01C, and ANISOVICH 02B.

NODE=M300;LINKAGE=AZ

ω_3(2255) $I^G(J^{PC}) = 0^-(3^{--})$

NODE=M300J66
NODE=M300J66

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2255±15	175 ± 30	[1] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \rightarrow \omega\eta, \omega\pi^0\pi^0$

[1] From the combined analysis of ANISOVICH 00D, ANISOVICH 01C, and ANISOVICH 02B.

NODE=M300J66;LINKAGE=AZ

a_4(2255) $I^G(J^{PC}) = 1^-(4^{++})$

NODE=M300K21
NODE=M300K21

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2237± 5	291 ± 12	UMAN	06	E835	5.2 $\overline{p}p \rightarrow \eta\eta\pi^0$
2255±40	330^{+110}_{-50}	[1] ANISOVICH	01F	SPEC	1.96–2.41 $\overline{p}p$

[1] From the combined analysis of ANISOVICH 99C, ANISOVICH 99E, and ANISOVICH 01F.

NODE=M300K21;LINKAGE=AN

a_2(2255) $I^G(J^{PC}) = 1^-(2^{++})$

NODE=M300K22
NODE=M300K22

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2255±20	230 ± 15	[1] ANISOVICH	01G	SPEC	1.96–2.41 $\overline{p}p$

[1] From the combined analysis of ANISOVICH 99C, ANISOVICH 99E, ANISOVICH 01F, and ANISOVICH 01G.

NODE=M300K22;LINKAGE=AN

X(2260) $I^G(J^{PC}) = 0^+(4^{+?})$

NODE=M300J40
NODE=M300J40

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2260±20	400 ± 100	EVANGELIS...	79	OMEG	10,16 $\pi^- p \rightarrow \overline{p}pn$

ρ(2270) $I^G(J^{PC}) = 1^+(1^{--})$

NODE=M300J86
NODE=M300J86

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2265±40	325 ± 80	[1] ANISOVICH	02	SPEC	0.6–1.9 $p\overline{p} \rightarrow \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$
2280±50	440 ± 110	ATKINSON	85	OMEG	20–70 $\gamma p \rightarrow p\omega\pi^+\pi^-\pi^0$

[1] From the combined analysis of ANISOVICH 00J, ANISOVICH 01D, ANISOVICH 01E, and ANISOVICH 02.

NODE=M300J86;LINKAGE=AY

a_1(2270) $I^G(J^{PC}) = 1^-(1^{++})$

NODE=M300J72
NODE=M300J72

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2270^{+55}_{-40}	305^{+70}_{-40}	ANISOVICH	01F	SPEC	2.0 $\overline{p}p \rightarrow 3\pi^0, \pi^0\eta, \pi^0\eta'$

h_3(2275) $I^G(J^{PC}) = 0^-(3^{+-})$

NODE=M300J28
NODE=M300J28

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2275±25	190 ± 45	[1] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \rightarrow \omega\eta, \omega\pi^0\pi^0$

[1] From the combined analysis of ANISOVICH 00D, ANISOVICH 01C, and ANISOVICH 02B.

NODE=M300J28;LINKAGE=AZ

a_3(2275) $I^G(J^{PC}) = 1^-(3^{++})$

NODE=M300K19
NODE=M300K19

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2275±35	350^{+100}_{-50}	[1] ANISOVICH	01G	SPEC	1.96–2.41 $\overline{p}p$

[1] From the combined analysis of ANISOVICH 99C, ANISOVICH 99E, ANISOVICH 01F, and ANISOVICH 01G.

NODE=M300K19;LINKAGE=AN

π_2(2285) $I^G(J^{PC}) = 1^-(2^{-+})$

NODE=M300K25
NODE=M300K25

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2285±20±25	250 ± 20 ± 25	[1] ANISOVICH	11	SPEC	0.9–1.94 $p\overline{p}$

[1] Reanalysis of ADOMEIT 96 and ANISOVICH 00E.

NODE=M300K25;LINKAGE=AN

ω_3(2285) $I^G(J^{PC}) = 0^-(3^{--})$

NODE=M300J83
NODE=M300J83

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2278±28	224 ± 50	[1] BUGG	04A	RVUE	
2285±60	230 ± 40	[2] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \rightarrow \omega\eta, \omega\pi^0\pi^0$

[1] Partial wave analysis of the data on $p\overline{p} \to \overline{\Lambda}\Lambda$ from BARNES 00. NODE=M300J83;LINKAGE=BU
[2] From the combined analysis of ANISOVICH 00D, ANISOVICH 01C, and ANISOVICH 02B. NODE=M300J83;LINKAGE=AZ

$\omega(2290)$ $I^G(J^{PC}) = 0^-(1^{--})$

NODE=M300J02
NODE=M300J02

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2290 ± 20	275 ± 35	[1] BUGG	04A	RVUE

[1] Partial wave analysis of the data on $p\overline{p} \to \overline{\Lambda}\Lambda$ from BARNES 00. NODE=M300J02;LINKAGE=BU

$f_2(2295)$ $I^G(J^{PC}) = 0^+(2^{++})$

NODE=M300K27
NODE=M300K27

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2293 ± 13	216 ± 37	[1] ANISOVICH	00J	SPEC	1.92–2.41 $p\overline{p}$

[1] From the combined analysis of ANISOVICH 99C, ANISOVICH 99F, ANISOVICH 99J, ANISOVICH 99K, and ANISOVICH 00B. See also ANISOVICH 12. NODE=M300K27;LINKAGE=AN

$f_3(2300)$ $I^G(J^{PC}) = 0^+(3^{++})$

NODE=M300J19
NODE=M300J19

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2334 ± 25	200 ± 20	[1] BUGG	04A	RVUE

[1] Partial wave analysis of the data on $p\overline{p} \to \overline{\Lambda}\Lambda$ from BARNES 00. NODE=M300J19;LINKAGE=BU

$f_1(2310)$ $I^G(J^{PC}) = 0^+(1^{++})$

NODE=M300J23
NODE=M300J23

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2310 ± 60	255 ± 70	ANISOVICH	00J	SPEC

$\eta(2320)$ $I^G(J^{PC}) = 0^+(0^{-+})$

NODE=M300J18
NODE=M300J18

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2320 ± 15	230 ± 35	[1] ANISOVICH	00M	SPEC

[1] From the combined analysis of $\overline{p}p \to \eta\eta\eta$ from ANISOVICH 00M and $\overline{p}p \to \eta\pi^0\pi^0$ from ANISOVICH 00J. NODE=M300;LINKAGE=B

$\eta_4(2330)$ $I^G(J^{PC}) = 0^+(4^{-+})$

NODE=M300J22
NODE=M300J22

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2328 ± 38	240 ± 90	ANISOVICH	00J	SPEC	2.0 $p\overline{p} \to \eta\pi^0\pi^0$

$\omega(2330)$ $I^G(J^{PC}) = 0^-(1^{--})$

NODE=M300J53
NODE=M300J53

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2330 ± 30	435 ± 75	ATKINSON	88	OMEG	25–50 $\gamma p \to \rho^\pm\rho^0\pi^\mp$

$X(2340)$ $I^G(J^{PC}) = ?^?(?^{??})$

NODE=M300J54
NODE=M300J54

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2340 ± 20	180 ± 60	126	[1] BALTAY	75	HBC	15 $\pi^+ p \to p5\pi$

[1] Dominant decay into $\rho^0\rho^0\pi^+$. BALTAY 78 finds confirmation in $2\pi^+\pi^-2\pi^0$ events which contain $\rho^+\rho^0\pi^0$ and $2\rho^+\pi^-$. NODE=M300J;LINKAGE=B1

$\pi(2360)$ $I^G(J^{PC}) = 1^-(0^{-+})$

NODE=M300J90
NODE=M300J90

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2360 ± 25	$300^{+100}_{-\ 50}$	ANISOVICH	01F	SPEC	2.0 $\overline{p}p \to 3\pi^0, \pi^0\eta, \pi^0\eta'$

$X(2360)$ $I^G(J^{PC}) = ?^?(4^{+?})$

NODE=M300J42
NODE=M300J42

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2360 ± 10	430 ± 30	ROZANSKA	80	SPRK	18 $\pi^- p \to p\overline{p}n$

$X(2440)$ $I^G(J^{PC}) = ?^?(5^{-?})$

NODE=M300J43
NODE=M300J43

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2440 ± 10	310 ± 20	ROZANSKA	80	SPRK	18 $\pi^- p \to p\overline{p}n$

a_6(2450) $I^G(J^{PC}) = 1^-(6^{++})$ NODE=M300K12

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2450±130	400 ± 250	CLELAND	82B	SPEC	$50\ \pi p \to K^0_S K^{\pm} p$

NODE=M300K12

X(2540) $I^G(J^{PC}) = 0^+(0^{++})$ NODE=M300K30

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
$2539\pm14^{+38}_{-14}$	$274^{+77}_{-61}{}^{+126}_{-163}$	UEHARA	13	BELL	$\gamma\gamma \to K^0_S K^0_S$

NODE=M300K30

$\Gamma(\gamma\gamma) \times B(K\overline{K})$ NODE=M300K3G

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
$40^{+9}_{-7}{}^{+17}_{-40}$	UEHARA	13	BELL	$\gamma\gamma \to K^0_S K^0_S$

NODE=M300K3G

X(2632) $I^G(J^{PC}) = ?^?(?^{??})$ NODE=M300J03

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2635.2±3.3		[1] EVDOKIMOV	04	SELX	$X(2632) \to D^+_s \eta$
2631.6±2.1	< 17	[2] EVDOKIMOV	04	SELX	$X(2632) \to D^0 K^+$

NODE=M300J03

OCCUR=2

[1] From a mass difference to D^+_s of 666.9 ± 3.3 MeV. NODE=M300J03;LINKAGE=EV

[2] From a mass difference to D^0 of 767.0 ± 2.0 MeV. NODE=M300J03;LINKAGE=ED

$B(X(2632) \to D^0 K^+)/B(X(2632) \to D^+_s \eta)$ NODE=M300B01

VALUE	DOCUMENT ID		TECN
0.14±0.06	[1] EVDOKIMOV	04	SELX

NODE=M300B01

[1] Possible interpretation of this decay pattern is discussed by YASUI 07. NODE=M300B01;LINKAGE=YA

X(2680) $I^G(J^{PC}) = ?^?(?^{??})$ NODE=M300J55

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2676±27	150	CASO	70	HBC	$11.2\ \pi^- p \to \rho^- \pi^+ \pi^- p$

NODE=M300J55

X(2710) $I^G(J^{PC}) = ?^?(6^{+?})$ NODE=M300J44

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2710±20	170 ± 40	ROZANSKA	80	SPRK	$18\ \pi^- p \to p\overline{p}n$

NODE=M300J44

X(2750) $I^G(J^{PC}) = ?^?(7^{-?})$ NODE=M300J56

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2747±32	195 ± 75	DENNEY	83	LASS	$10\ \pi^+ p \to K^+ K^- \pi^+ p$

NODE=M300J56

f_6(3100) $I^G(J^{PC}) = 0^+(6^{++})$ NODE=M300J06

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
3100±100	700 ± 130	BINON	05	GAMS	$33\ \pi^- p \to \eta\eta n$

NODE=M300J06

X(3250) $I^G(J^{PC}) = ?^?(?^{??})$ 3-Body Decays NODE=M300J57

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
3250±8±20	45 ± 18	ALEEV	93	BIS2	$X(3250) \to \Lambda\overline{p}K^+$
3265±7±20	40 ± 18	ALEEV	93	BIS2	$X(3250) \to \overline{\Lambda}pK^-$

NODE=M300J57

OCCUR=2

X(3250) $I^G(J^{PC}) = ?^?(?^{??})$ 4-Body Decays NODE=M300J58

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
3245±8±20	25 ± 11	ALEEV	93	BIS2	$X(3250) \to \Lambda\overline{p}K^+\pi^{\pm}$
3250±9±20	50 ± 20	ALEEV	93	BIS2	$X(3250) \to \overline{\Lambda}pK^-\pi^{\mp}$
3270±8±20	25 ± 11	ALEEV	93	BIS2	$X(3250) \to K^0_S p\overline{p}K^{\pm}$

NODE=M300J58

OCCUR=2

OCCUR=3

X(3350) $I^G(J^{PC}) = ?^?(?^{??})$ NODE=M300J09

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$3350^{+10}_{-20}\pm20$	$70^{+40}_{-30}\pm40$	50 ± 10	[1] GABYSHEV	06A	BELL	$B^- \to \Lambda^+_c \overline{p}\pi^-$

NODE=M300J09

[1] A similar enhancement in the $\Lambda^+_c\overline{p}$ final state is also reported by BABAR collaboration in AUBERT 10H. NODE=M300J09;LINKAGE=AU

REFERENCES for Further States

NODE=M300

LEES	21A	PR D104 072002	J.P. Lees *et al.*	(BABAR Collab.)	REFID=61442
ABLIKIM	16N	PR D93 112011	M. Ablikim	(BESIII Collab.)	REFID=57512
UEHARA	13	PTEP 2013 123C01	S. Uehara *et al.*	(BELLE Collab.)	REFID=55592
ANISOVICH	12	PR D85 014001	A.V. Anisovich *et al.*		REFID=53961
ANASHIN	11	PL B703 543	V.V. Anashin *et al.*	(KEDR Collab.)	REFID=53932
ANISOVICH	11	EPJ C71 1511	A.V. Anisovich *et al.*	(LOQM, RAL, PNPI)	REFID=53631
CHEN	11F	PR D84 071501	P. Chen *et al.*	(BELLE Collab.)	REFID=53814
AUBERT	10H	PR D82 031102	B. Aubert *et al.*	(BABAR Collab.)	REFID=53363
ABRAAMYAN	09	PR C80 034001	Kh.U. Abraamyan *et al.*		REFID=53100
VLADIMIRSK...	08	PAN 71 2129	V.V. Vladimirsky *et al.*	(ITEP)	REFID=52681
		Translated from YAF 71 2166.			
VLADIMIRSK...	07	PAN 70 1706	V. Vladimirsky *et al.*		REFID=52058
		Translated from YAF 70 1751.			
YASUI	07	PR D76 034009	S. Yasui, M. Oka		REFID=51907
ABLIKIM	06S	PRL 97 142002	M. Ablikim *et al.*	(BES Collab.)	REFID=51451
GABYSHEV	06A	PRL 97 242001	N. Gabyshev *et al.*	(BELLE Collab.)	REFID=51565
SCHEGELSKY	06	EPJ A27 199	V.A. Schegelsky *et al.*		REFID=51186
SCHEGELSKY	06A	EPJ A27 207	V.A. Schegelsky *et al.*		REFID=51185
UMAN	06	PR D73 052009	I. Uman *et al.*	(FNAL E835)	REFID=51063
VLADIMIRSK...	06	PAN 69 493	V.V. Vladimirsky *et al.*	(ITEP, Moscow)	REFID=51191
		Translated from YAF 69 515.			
BINON	05	PAN 68 960	F. Binon *et al.*		REFID=50780
		Translated from YAF 68 998.			
GRIGOR'EV	05	PAN 68 1271	V.K. Grigor'ev *et al.*	(ITEP)	REFID=50844
		Translated from YAF 68 1324.			
LU	05	PRL 94 032002	M. Lu *et al.*	(BNL E852 Collab.)	REFID=50459
ABLIKIM	04J	PRL 93 112002	M. Ablikim *et al.*	(BES Collab.)	REFID=50196
BUGG	04	PL B595 556 (errat.)	D.V. Bugg		REFID=49763
BUGG	04A	EPJ C36 161	D.V. Bugg		REFID=50158
BUGG	04C	PRPL 397 257	D.V. Bugg		REFID=50203
EVDOKIMOV	04	PRL 93 242001	A.V. Evdokimov *et al.*	(SELEX Collab.)	REFID=50337
KUHN	04	PL B595 109	J. Kuhn *et al.*	(BNL E852 Collab.)	REFID=49773
ANISOVICH	03	EPJ A16 229	V.V. Anisovich *et al.*		REFID=49401
VLADIMIRSK...	03	PAN 66 700	V.V. Vladimirsky *et al.*		REFID=49419
		Translated from YAF 66 729.			
ANISOVICH	02	PL B542 8	A.V. Anisovich *et al.*		REFID=48828
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CHUNG	02	PR D65 072001	S.U. Chung *et al.*	(BNL E852 Collab.)	REFID=48837
ANISOVICH	01C	PL B507 23	A.V. Anisovich *et al.*		REFID=48325
ANISOVICH	01D	PL B508 6	A.V. Anisovich *et al.*		REFID=48327
ANISOVICH	01E	PL B513 281	A.V. Anisovich *et al.*		REFID=48349
ANISOVICH	01F	PL B517 261	A.V. Anisovich *et al.*		REFID=48352
ANISOVICH	01G	PL B517 273	A.V. Anisovich *et al.*		REFID=48353
ANISOVICH	00B	NP A662 319	A.V. Anisovich *et al.*		REFID=47942
ANISOVICH	00D	PL B476 15	A.V. Anisovich *et al.*		REFID=47944
ANISOVICH	00E	PL B477 19	A.V. Anisovich *et al.*		REFID=47945
ANISOVICH	00I	PL B491 40	A.V. Anisovich *et al.*		REFID=47949
ANISOVICH	00J	PL B491 47	A.V. Anisovich *et al.*	(RAL, LOQM, PNPI+)	REFID=47950
ANISOVICH	00M	PL B496 145	A.V. Anisovich *et al.*		REFID=48009
BARNES	00	PR C62 055203	P.D. Barnes *et al.*		REFID=47965
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		Translated from ZETFP 72 698.			
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ANISOVICH	99E	PL B452 187	A.V. Anisovich *et al.*		REFID=46902
ANISOVICH	99F	NP A651 253	A.V. Anisovich *et al.*		REFID=46926
ANISOVICH	99J	PL B471 271	A.V. Anisovich *et al.*		REFID=47416
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KLOET	96	PR D53 6120	W.M. Kloet, F. Myhrer	(RUTG, NORD)	REFID=45212
PROKOSHKIN	96	PD 41 247	Y.D. Prokoshkin, V.D. Samoilenko	(SERP)	REFID=45182
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HASAN	94	PL B334 215	A. Hasan, D.V. Bugg	(LOQM)	REFID=44103
OAKDEN	94	NP A574 731	M.N. Oakden, M.R. Pennington	(DURH)	REFID=45210
ALEEV	93	PAN 56 1358	A.N. Aleev *et al.*	(BIS-2 Collab.)	REFID=43668
		Translated from YAF 56 100.			
ARMSTRONG	93D	PL B307 399	T.A. Armstrong *et al.*	(FNAL, FERR, GENO+)	REFID=43596
ALBRECHT	91F	ZPHY C50 1	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=41658
CONDO	91	PR D43 2787	G.T. Condo *et al.*	(SLAC Hybrid Collab.)	REFID=41588
BISELLO	89B	PR D39 701	G. Busetto *et al.*	(DM2 Collab.)	REFID=40575
ATKINSON	88	ZPHY C38 535	M. Atkinson *et al.*	(BONN, CERN, GLAS+)	REFID=40556
DAFTARI	87	PRL 58 859	I.K. Daftari *et al.*	(SYRA)	REFID=40412
ALDE	86D	NP B269 485	D.M. Alde *et al.*	(BELG, LAPP, SERP, CERN+)	REFID=20765
BRIDGES	86D	PL B180 313	D.L. Bridges *et al.*	(SYRA, BNL, CASE+)	REFID=21984
GREEN	86	PRL 56 1639	D.R. Green *et al.*	(FNAL, ARIZ, FSU+)	REFID=21872
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DENNEY	83	PR D28 2726	D.L. Denney *et al.*	(IOWA, MICH)	REFID=20754
CLELAND	82B	NP B208 228	W.E. Cleland *et al.*	(DURH, GEVA, LAUS+)	REFID=21281
ASTON	81B	NP B189 205	D. Aston *et al.*	(BONN, CERN, EPOL, GLAS+)	REFID=11553
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KREYMER	80	PR D22 36	A.E. Kreymer *et al.*	(IND, PURD, SLAC+)	REFID=21970
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