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

$f_0(500)$ or σ was $f_0(600)$

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

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NODE=M014

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

NODE=M014PP

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

NODE=M014PP

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*	
					NODE=M014PP
(400–550)−*i*(200–350) OUR ESTIMATE					NEW;→ NOT CHECKED ←
[(400–1200)−i(250–500) MeV OUR 2011 ESTIMATE]					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$(445 \pm 25)-i(278^{+22}_{-18})$	[1,2] GARCIA-MAR..	11	RVUE	Compilation	
$(457^{+14}_{-13})-i(279^{+11}_{-7})$	[1,3] GARCIA-MAR..	11	RVUE	Compilation	OCCUR=2
$(442^{+5}_{-8})-i(274^{+6}_{-5})$	[4] MOUSSALLAM	11	RVUE	Compilation	
$(452 \pm 13)-i(259 \pm 16)$	[5] MENNESSIER	10	RVUE	Compilation	
$(448 \pm 43)-i(266 \pm 43)$	[6] MENNESSIER	10	RVUE	Compilation	OCCUR=2
$(455 \pm 6^{+31}_{-13})-i(278 \pm 6^{+34}_{-43})$	[7] CAPRINI	08	RVUE	Compilation	
$(463 \pm 6^{+31}_{-17})-i(259 \pm 6^{+33}_{-34})$	[8] CAPRINI	08	RVUE	Compilation	OCCUR=2
$(552^{+84}_{-106})-i(232^{+81}_{-72})$	[9] ABLIKIM	07A	BES2	$\psi(2S) \rightarrow \pi^+\pi^- J/\psi$	
$(466 \pm 18)-i(223 \pm 28)$	[10] BONVICINI	07	CLEO	$D^+ \rightarrow \pi^-\pi^+\pi^+$	
$(472 \pm 30)-i(271 \pm 30)$	[11] BUGG	07A	RVUE	Compilation	
$(484 \pm 17)-i(255 \pm 10)$	GARCIA-MAR..	07	RVUE	Compilation	
$(430)-i(325)$	[12] ANISOVICH	06	RVUE	Compilation	
$(441^{+16}_{-8})-i(272^{+9}_{-12.5})$	[13] CAPRINI	06	RVUE	$\pi\pi \rightarrow \pi\pi$	
$(470 \pm 50)-i(285 \pm 25)$	[14] ZHOU	05	RVUE		
$(541 \pm 39)-i(252 \pm 42)$	[15] ABLIKIM	04A	BES2	$J/\psi \rightarrow \omega\pi^+\pi^-$	
$(528 \pm 32)-i(207 \pm 23)$	[16] GALLEGOS	04	RVUE	Compilation	
$(440 \pm 8)-i(212 \pm 15)$	[17] PELAEZ	04A	RVUE	$\pi\pi \rightarrow \pi\pi$	
$(533 \pm 25)-i(249 \pm 25)$	[18] BUGG	03	RVUE		
$517 - i240$	BLACK	01	RVUE	$\pi^0\pi^0 \rightarrow \pi^0\pi^0$	
$(470 \pm 30)-i(295 \pm 20)$	[13] COLANGELO	01	RVUE	$\pi\pi \rightarrow \pi\pi$	
$(535^{+48}_{-36})-i(155^{+76}_{-53})$	[19] ISHIDA	01		$\Upsilon(3S) \rightarrow \Upsilon\pi\pi$	
$610 \pm 14 - i620 \pm 26$	[20] SUROVTSEV	01	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$	
$(540^{+36}_{-29})-i(193^{+32}_{-40})$	ISHIDA	00B		$p\overline{p} \rightarrow \pi^0\pi^0\pi^0$	
$445 - i235$	HANNAH	99	RVUE	π scalar form factor	
$(523 \pm 12)-i(259 \pm 7)$	KAMINSKI	99	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$, $\sigma\sigma$	
$442 - i\ 227$	OLLER	99	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$	
$469 - i203$	OLLER	99B	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$	
$445 - i221$	OLLER	99C	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$, $\eta\eta$	
$(1530^{+90}_{-250})-i(560 \pm 40)$	ANISOVICH	98B	RVUE	Compilation	
$420 - i\ 212$	LOCHER	98	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$	
$440 - i245$	[21] DOBADO	97	RVUE	Compilation	
$(602 \pm 26)-i(196 \pm 27)$	[22] ISHIDA	97		$\pi\pi \rightarrow \pi\pi$	
$(537 \pm 20)-i(250 \pm 17)$	[23] KAMINSKI	97B	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$, 4π	
$470 - i250$	[24,25] TORNQVIST	96	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$, $K\pi$, $\eta\pi$	
$387 - i305$	[25,26] JANSSEN	95	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$	
$420 - i370$	[27] ACHASOV	94	RVUE	$\pi\pi \rightarrow \pi\pi$	
$(506 \pm 10)-i(247 \pm 3)$	KAMINSKI	94	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$	
$370 - i356$	[28] ZOU	94B	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$	
$408 - i342$	[25,28] ZOU	93	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$	

$470-i208$	[29] VANBEVEREN 86	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$, $\eta\eta$, ...
$(750 \pm 50)-i(450 \pm 50)$	[30] ESTABROOKS 79	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$
$(660 \pm 100)-i(320 \pm 70)$	PROTOPOP... 73	HBC	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$
$650-i370$	[31] BASDEVANT 72	RVUE	$\pi\pi \rightarrow \pi\pi$

[1] Uses the K_{e4} data of BATLEY 10C and the $\pi N \rightarrow \pi\pi N$ data of HYAMS 73, GRAYER 74, and PROTOPOPESCU 73. NODE=M014PP;LINKAGE=GM
[2] Analytic continuation using Roy equations. NODE=M014PP;LINKAGE=GR
[3] Analytic continuation using GKPY equations. NODE=M014PP;LINKAGE=GC
[4] Using Roy equations. NODE=M014PP;LINKAGE=MO
[5] Average of three variants of the analytic K-matrix model. Uses the K_{e4} data of BATLEY 08A and the $\pi N \rightarrow \pi\pi N$ data of HYAMS 73 and GRAYER 74. NODE=M014PP;LINKAGE=ME
[6] 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
[7] From the K_{e4} data of BATLEY 08A and $\pi N \rightarrow \pi\pi N$ data of HYAMS 73. NODE=M014PP;LINKAGE=CA
[8] From the K_{e4} data of BATLEY 08A and $\pi N \rightarrow \pi\pi N$ data of PROTOPOPESCU 73, GRAYER 74, and ESTABROOKS 74. NODE=M014PP;LINKAGE=AP
[9] From a mean of three different $f_0(500)$ parametrizations. Uses 40k events. NODE=M014PP;LINKAGE=AL
[10] From an isobar model using 2.6k events. NODE=M014PP;LINKAGE=BO
[11] Reanalysis of ABLIKIM 04A, PISLAK 01, and HYAMS 73 data. NODE=M014PP;LINKAGE=BU
[12] Using the N/D method. NODE=M014PP;LINKAGE=AN
[13] 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
[14] Reanalysis of the data from PROTOPOPESCU 73, ESTABROOKS 74, GRAYER 74, ROSSELET 77, PISLAK 03, and AKHMETSHIN 04. NODE=M014PP;LINKAGE=ZH
[15] From a mean of six different analyses and $f_0(500)$ parameterizations. NODE=M014PP;LINKAGE=AB
[16] Using data on $\psi(2S) \rightarrow J/\psi\pi\pi$ from BAI 00E and on $\Upsilon(\mathrm{nS}) \rightarrow \Upsilon(\mathrm{mS})\pi\pi$ from BUTLER 94B and ALEXANDER 98. NODE=M014PP;LINKAGE=GA
[17] Reanalysis of data from PROTOPOPESCU 73, ESTABROOKS 74, GRAYER 74, and COHEN 80 in the unitarized ChPT model. NODE=M014PP;LINKAGE=PE
[18] From a combined analysis of HYAMS 73, AUGUSTIN 89, AITALA 01B, and PISLAK 01. NODE=M014PP;LINKAGE=PS
[19] A similar analysis (KOMADA 01) finds $(580^{+79}_{-30})-i(190^{+107}_{-49})$ MeV. NODE=M014PP;LINKAGE=KI
[20] 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
[21] Using the inverse amplitude method and data of ESTABROOKS 73, GRAYER 74, and PROTOPOPESCU 73. NODE=M014PP;LINKAGE=DO
[22] Reanalysis of data from HYAMS 73, GRAYER 74, SRINIVASAN 75, and ROSSELET 77 using the interfering amplitude method. NODE=M014PP;LINKAGE=AA
[23] Average and spread of 4 variants ("up" and "down") of KAMINSKI 97B 3-channel model. NODE=M014PP;LINKAGE=E
[24] 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
[25] Demonstrates explicitly that $f_0(500)$ and $f_0(1370)$ are two different poles. NODE=M014PP;LINKAGE=G
[26] Analysis of data from FALVARD 88. NODE=M014PP;LINKAGE=C
[27] Analysis of data from OCHS 73, ESTABROOKS 75, ROSSELET 77, and MUKHIN 80. NODE=M014PP;LINKAGE=D
[28] Analysis of data from OCHS 73, GRAYER 74, and ROSSELET 77. NODE=M014PP;LINKAGE=F
[29] 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
[30] Analysis of data from APEL 73, GRAYER 74, CASON 76, PAWLICKI 77. Includes spread and errors of 4 solutions. NODE=M014PP;LINKAGE=A
[31] 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 OR K-MATRIX POLE PARAMETERS

NODE=M014M

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
(400–1200) OUR ESTIMATE				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
513 ± 32	[32] MURAMATSU	02	CLEO	$e^+e^- \approx$ 10 GeV
$478^{+24}_{-23} \pm 17$	AITALA	01B	E791	$D^+ \rightarrow \pi^-\pi^+\pi^+$
563^{+58}_{-29}	[33] ISHIDA	01		$\Upsilon(3S) \rightarrow \Upsilon\pi\pi$
555	[34] ASNER	00	CLE2	$\tau^- \rightarrow \pi^-\pi^0\pi^0\nu_\tau$
540 ± 36	ISHIDA	00B		$p\overline{p} \rightarrow \pi^0\pi^0\pi^0$
750 ± 4	ALEKSEEV	99	SPEC	1.78 $\pi^- p_{\mathrm{polar}} \rightarrow \pi^-\pi^+ n$
744 ± 5	ALEKSEEV	98	SPEC	1.78 $\pi^- p_{\mathrm{polar}} \rightarrow \pi^-\pi^+ n$
759 ± 5	[35] TROYAN	98		5.2 $np \rightarrow np\pi^+\pi^-$

NODE=M014M
→ NOT CHECKED ←

780±30	ALDE	97	GAM2	450 $pp \to pp\pi^0\pi^0$
585±20	[36] ISHIDA	97		$\pi\pi \to \pi\pi$
761±12	[37] SVEC	96	RVUE	6–17 $\pi N_{polar} \to \pi^+\pi^- N$
∼ 860	[38,39] TORNQVIST	96	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$, $K\pi$, $\eta\pi$
1165±50	[40,41] ANISOVICH	95	RVUE	$\pi^- p \to \pi^0\pi^0 n$, $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\pi^0\eta$, $\pi^0\eta\eta$
∼ 1000	[42] ACHASOV	94	RVUE	$\pi\pi \to \pi\pi$
414±20	[37] AUGUSTIN	89	DM2	

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

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

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

[35] 6σ effect, no PWA. NODE=M014M;LINKAGE=TN

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

[37] 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

[38] 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

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

[40] 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

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

[42] Analysis of data from OCHS 73, ESTABROOKS 75, ROSSELET 77, and MUKHIN 80. NODE=M014M;LINKAGE=D

$f_0(500)$ BREIT-WIGNER WIDTH

NODE=M014W

NODE=M014W

→ NOT CHECKED ←

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
(600–1000) 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
$324^{+42}_{-40}\pm21$	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	$\pi^- p \to \pi^0\pi^0 n$, $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\pi^0\eta$, $\pi^0\eta\eta$
∼ 3200	[53] ACHASOV	94	RVUE	$\pi\pi \to \pi\pi$
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

[53] Analysis of data from OCHS 73, ESTABROOKS 75, ROSSELET 77, and MUKHIN 80. NODE=M014W;LINKAGE=D1

$f_0(500)$ DECAY MODES

NODE=M014215;NODE=M014

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\pi\pi$	dominant	DESIG=1;OUR EST;→ NOT CHECKED ←
Γ_2	$\gamma\gamma$	seen	DESIG=5;OUR EST;→ NOT CHECKED ←

$f_0(500)$ 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
1.7 ± 0.4	[54] HOFERICHTER	11	RVUE	Compilation
3.08 ± 0.82	[55] MENNESSIER	11	RVUE	Compilation
$2.08 \pm 0.2 \,{}^{+0.07}_{-0.04}$	[56] MOUSSALLAM	11	RVUE	Compilation
2.08	[57] MAO	09	RVUE	Compilation
1.2 ± 0.4	[58] BERNABEU	08	RVUE	
3.9 ± 0.6	[55] MENNESSIER	08	RVUE	$\gamma\gamma \to \pi^+\pi^-, \pi^0\pi^0$
1.8 ± 0.4	[59] OLLER	08	RVUE	Compilation
1.68 ± 0.15	[59,60] OLLER	08A	RVUE	Compilation
3.1 ± 0.5	[61,62] PENNINGTON	08	RVUE	Compilation
2.4 ± 0.4	[62,63] PENNINGTON	08	RVUE	Compilation
4.1 ± 0.3	[64] PENNINGTON	06	RVUE	$\gamma\gamma \to \pi^0\pi^0$
3.8 ± 1.5	[65,66] BOGLIONE	99	RVUE	$\gamma\gamma \to \pi^+\pi^-, \pi^0\pi^0$
5.4 ± 2.3	[65] MORGAN	90	RVUE	$\gamma\gamma \to \pi^+\pi^-, \pi^0\pi^0$
10 ± 6	COURAU	86	DM1	$e^+e^- \to \pi^+\pi^-e^+e^-$

OCCUR=2

[54] Using Roy-Steiner equations with $\pi\pi$ phase shifts from an update of COLANGELO 01 and from GARCIA-MARTIN 11. 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] Spersedes 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

GARCIA-MAR...	11	PRL 107 072001	R. Garcia-Martin *et al.*	(MADR, CRAC)	REFID=16761
HOFERICHTER	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	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	JPG 34 151	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 051101R	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	JPG 33 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
GALLEGOS	04	PR D69 074033	A. Gallegos *et al.*		REFID=49769
PELAEZ	04A	MPL A19 2879	J.R. Pelaez		REFID=50347

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 (erratum)	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
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
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 R3948	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	K.N. Mukhin *et al.*	(KIAE)	REFID=44528
		Translated from ZETFP 32 616.			
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
APEL	73	PL 41B 542	W.D. Apel *et al.*	(KARL, PISA)	REFID=44532
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
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

$\rho(770)$ $I^G(J^{PC}) = 1^+(1^{--})$

A REVIEW GOES HERE – Check our WWW List of Reviews

NODE=M009

$\rho(770)$ 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	
775.49±0.34 OUR AVERAGE						
775.97±0.46±0.70	900k	[1] AKHMETSHIN	07		$e^+e^- \to \pi^+\pi^-$	
774.6 ±0.4 ±0.5	800k	[2,3] ACHASOV	06	SND	$e^+e^- \to \pi^+\pi^-$	
775.65±0.64±0.50	114k	[4,5] AKHMETSHIN	04	CMD2	$e^+e^- \to \pi^+\pi^-$	
775.9 ±0.5 ±0.5	1.98M	[6] ALOISIO	03	KLOE	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	
775.8 ±0.9 ±2.0	500k	[6] ACHASOV	02	SND	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	
775.9 ±1.1		[7] BARKOV	85	OLYA	$e^+e^- \to \pi^+\pi^-$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
775.8 ±0.5 ±0.3	1.98M	[8] ALOISIO	03	KLOE	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	OCCUR=2
775.9 ±0.6 ±0.5	1.98M	[9] ALOISIO	03	KLOE	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	OCCUR=3
775.0 ±0.6 ±1.1	500k	[10] ACHASOV	02	SND	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	OCCUR=3
775.1 ±0.7 ±5.3		[11] BENAYOUN	98	RVUE	$e^+e^- \to \pi^+\pi^-$, $\mu^+\mu^-$	
770.5 ±1.9 ±5.1		[12] GARDNER	98	RVUE	0.28–0.92 $e^+e^- \to \pi^+\pi^-$	
764.1 ±0.7		[13] O'CONNELL	97	RVUE	$e^+e^- \to \pi^+\pi^-$	
757.5 ±1.5		[14] BERNICHA	94	RVUE	$e^+e^- \to \pi^+\pi^-$	
768 ±1		[15] GESHKEN...	89	RVUE	$e^+e^- \to \pi^+\pi^-$	

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	[16,17] FUJIKAWA	08	BELL	±	$\tau^- \to \pi^-\pi^0\nu_\tau$	
775.5 ±0.7		[17,18] SCHAEL	05C	ALEP		$\tau^- \to \pi^-\pi^0\nu_\tau$	
775.5 ±0.5 ±0.4	1.98M	[6] ALOISIO	03	KLOE		1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	
775.1 ±1.1 ±0.5	87k	[19,20] ANDERSON	00A	CLE2		$\tau^- \to \pi^-\pi^0\nu_\tau$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
774.8 ±0.6 ±0.4	1.98M	[9] ALOISIO	03	KLOE	−	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	OCCUR=2
776.3 ±0.6 ±0.7	1.98M	[9] ALOISIO	03	KLOE	+	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	OCCUR=3
773.9 ±2.0 $^{+0.3}_{-1.0}$		[21] SANZ-CILLERO	03	RVUE		$\tau^- \to \pi^-\pi^0\nu_\tau$	
774.5 ±0.7 ±1.5	500k	[6] ACHASOV	02	SND	±	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	OCCUR=2
775.1 ±0.5		[22] PICH	01	RVUE		$\tau^- \to \pi^-\pi^0\nu_\tau$	

MIXED CHARGES, OTHER REACTIONS

NODE=M009M7
NODE=M009M7

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
763.0±0.3±1.2	600k	[23] ABELE	99E	CBAR	0±	0.0 $\bar{p}p \to \pi^+\pi^-\pi^0$

NODE=M009M3

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		$\bar{p}n \to \pi^-\pi^0\pi^0$	
768 ±9		AGUILAR-...	91	EHS		400 pp	
767 ±3	2935	[24] CAPRARO	87	SPEC	−	200 π^- Cu $\to \pi^-\pi^0$ Cu	
761 ±5	967	[24] CAPRARO	87	SPEC	−	200 π^- Pb $\to \pi^-\pi^0$ Pb	OCCUR=2
771 ±4		HUSTON	86	SPEC	+	202 π^+ A $\to \pi^+\pi^0$ A	
766 ±7	6500	[25] BYERLY	73	OSPK	−	5 $\pi^- p$	
766.8±1.5	9650	[26] PISUT	68	RVUE	−	1.7–3.2 $\pi^- p$, t <10	
767 ±6	900	[24] EISNER	67	HBC	−	4.2 $\pi^- p$, t <10	

NEUTRAL ONLY, PHOTOPRODUCED

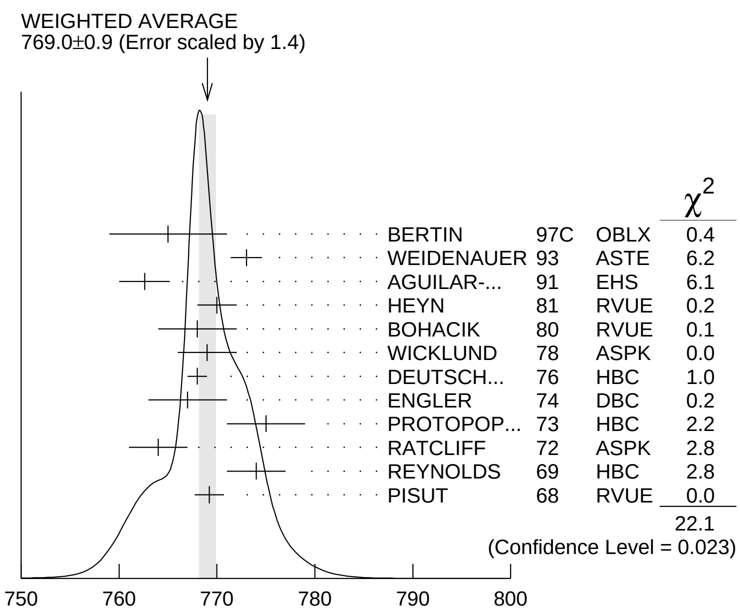
NODE=M009M0P

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT	
768.5± 1.1 OUR AVERAGE							
770 ± 2 ±1	79k	[27] BREITWEG	98B	ZEUS	0	50–100 γp	
767.6± 2.7		BARTALUCCI	78	CNTR	0	$\gamma p \rightarrow e^+ e^- p$	
775 ± 5		GLADDING	73	CNTR	0	2.9–4.7 γp	
767 ± 4	1930	BALLAM	72	HBC	0	2.8 γp	
770 ± 4	2430	BALLAM	72	HBC	0	4.7 γp	OCCUR=2
765 ±10		ALVENSLEB...	70	CNTR	0	γA, t <0.01	
767.7± 1.9	140k	BIGGS	70	CNTR	0	<4.1 γC $\rightarrow \pi^+ \pi^-$ C	
765 ± 5	4000	ASBURY	67B	CNTR	0	$\gamma +$ Pb	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
771 ± 2	79k	[28] BREITWEG	98B	ZEUS	0	50–100 γp	OCCUR=2

NEUTRAL ONLY, OTHER REACTIONS

NODE=M009M0R

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	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 pp	
770 ±2		[29] HEYN	81	RVUE		Pion form factor	
768 ±4		[30,31] BOHACIK	80	RVUE	0		
769 ±3		[25] WICKLUND	78	ASPK	0	3,4,6 $\pi^\pm N$	
768 ±1	76000	DEUTSCH...	76	HBC	0	16 $\pi^+ p$	
767 ±4	4100	ENGLER	74	DBC	0	6 $\pi^+ n \rightarrow \pi^+ \pi^- p$	
775 ±4	32000	[30] PROTOPOP...	73	HBC	0	7.1 $\pi^+ p$, t <0.4	
764 ±3	6800	RATCLIFF	72	ASPK	0	15 $\pi^- p$, t <0.3	
774 ±3	1700	REYNOLDS	69	HBC	0	2.26 $\pi^- p$	
769.2±1.5	13300	[32] PISUT	68	RVUE	0	1.7–3.2 $\pi^- p$, t <10	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
773.5±2.5		[33] COLANGELO	01	RVUE		$\pi\pi \rightarrow \pi\pi$	
762.3±0.5±1.2	600k	[34] ABELE	99E	CBAR	0	0.0 $\overline{p}p \rightarrow \pi^+ \pi^- \pi^0$	
777 ±2	4943	[35] ADAMS	97	E665		470 $\mu p \rightarrow \mu XB$	
770 ±2		[36] BOGOLYUB...	97	MIRA		32 $\overline{p}p \rightarrow \pi^+ \pi^-$ X	
768 ±8		[36] BOGOLYUB...	97	MIRA		32 $pp \rightarrow \pi^+ \pi^-$ X	OCCUR=2
761.1±2.9		DUBNICKA	89	RVUE		π form factor	
777.4±2.0		[37] CHABAUD	83	ASPK	0	17 $\pi^- p$ polarized	
769.5±0.7		[30,31] LANG	79	RVUE	0		
770 ±9		[31] ESTABROOKS	74	RVUE	0	17 $\pi^- p \rightarrow \pi^+ \pi^- n$	
773.5±1.7	11200	[24] JACOBS	72	HBC	0	2.8 $\pi^- p$	
775 ±3	2250	HYAMS	68	OSPK	0	11.2 $\pi^- p$	



$\rho(770)^0$ mass (MeV)

[1] A combined fit of AKHMETSHIN 07, AULCHENKO 06, and AULCHENKO 05. NODE=M009M0;LINKAGE=AK
[2] Supersedes ACHASOV 05A. NODE=M009M0;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=M009M0;LINKAGE=SN
[4] Using the GOUNARIS 68 parametrization with the complex phase of the ρ-ω interference. NODE=M009M5;LINKAGE=GS
[5] Update of AKHMETSHIN 02. NODE=M009M5;LINKAGE=PT
[6] Assuming $m_{\rho^+} = m_{\rho^-}$, $\Gamma_{\rho^+} = \Gamma_{\rho^-}$. NODE=M009M0;LINKAGE=CH
[7] From the GOUNARIS 68 parametrization of the pion form factor. NODE=M009M;LINKAGE=K
[8] Assuming $m_{\rho^+} = m_{\rho^-} = m_{\rho^0}$, $\Gamma_{\rho^+} = \Gamma_{\rho^-} = \Gamma_{\rho^0}$. NODE=M009M;LINKAGE=DF
[9] Without limitations on masses and widths. NODE=M009M;LINKAGE=WO
[10] Assuming $m_{\rho^0} = m_{\rho^\pm}$, $g_{\rho^0\pi\pi} = g_{\rho^\pm\pi\pi}$. NODE=M009M;LINKAGE=HC
[11] Using the data of BARKOV 85 in the hidden local symmetry model. NODE=M009M;LINKAGE=K2
[12] 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=M009M;LINKAGE=G8
[13] A fit of BARKOV 85 data assuming the direct $\omega\pi\pi$ coupling. NODE=M009M;LINKAGE=AB
[14] Applying the S-matrix formalism to the BARKOV 85 data. NODE=M009M;LINKAGE=AA
[15] Includes BARKOV 85 data. Model-dependent width definition. NODE=M009M;LINKAGE=F
[16] $|F_\pi(0)|^2$ fixed to 1. NODE=M009M5;LINKAGE=FU
[17] From the GOUNARIS 68 parametrization of the pion form factor. NODE=M009M5;LINKAGE=GO
[18] The error combines statistical and systematic uncertainties. Supersedes BARATE 97M. NODE=M009M5;LINKAGE=SC
[19] $\rho(1700)$ mass and width fixed at 1700 MeV and 235 MeV respectively. NODE=M009M;LINKAGE=A6
[20] 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=M009M;LINKAGE=K1
[21] Using the data of BARATE 97M and the effective chiral Lagrangian. NODE=M009M5;LINKAGE=Z
[22] From a fit of the model-independent parameterization of the pion form factor to the data of BARATE 97M. NODE=M009M;LINKAGE=PC
[23] Assuming the equality of ρ^+ and ρ^- masses and widths. NODE=M009M;LINKAGE=LB
[24] Mass errors enlarged by us to $\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M009M;LINKAGE=Z
[25] Phase shift analysis. Systematic errors added corresponding to spread of different fits. NODE=M009M;LINKAGE=X
[26] 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=M009M;LINKAGE=A
[27] From the parametrization according to SOEDING 66. NODE=M009M;LINKAGE=B5
[28] From the parametrization according to ROSS 66. NODE=M009M;LINKAGE=B6
[29] HEYN 81 includes all spacelike and timelike F_π values until 1978. NODE=M009M;LINKAGE=B
[30] From pole extrapolation. NODE=M009M;LINKAGE=C
[31] From phase shift analysis of GRAYER 74 data. NODE=M009M;LINKAGE=H
[32] 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=M009M;LINKAGE=R
[33] Breit-Wigner mass from a phase-shift analysis of HYAMS 73 and PROTOPOPESCU 73 data. NODE=M009M;LINKAGE=CL
[34] Using relativistic Breit-Wigner and taking into account ρ-ω interference. NODE=M009M;LINKAGE=BL
[35] Systematic errors not evaluated. NODE=M009M;LINKAGE=A1
[36] Systematic effects not studied. NODE=M009M;LINKAGE=QQ
[37] From fit of 3-parameter relativistic Breit-Wigner to helicity-zero part of P-wave intensity. CHABAUD 83 includes data of GRAYER 74. NODE=M009M;LINKAGE=G

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

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		[38] SCHAEL	05C	ALEP		$\tau^- \rightarrow \pi^-\pi^0\nu_\tau$
0.4±0.7±0.6	1.98M	[39] ALOISIO	03	KLOE		$1.02\ e^+e^- \rightarrow \pi^+\pi^-\pi^0$
1.3±1.1±2.0	500k	[39] ACHASOV	02	SND		$1.02\ e^+e^- \rightarrow \pi^+\pi^-\pi^0$
1.6±0.6±1.7	600k	ABELE	99E	CBAR	0±	$0.0\ \overline{p}p \rightarrow \pi^+\pi^-\pi^0$
−4 ±4	3000	[40] REYNOLDS	69	HBC	−0	$2.26\ \pi^- p$
−5 ±5	3600	[40] FOSTER	68	HBC	±0	$0.0\ \overline{p}p$
2.4±2.1	22950	[41] PISUT	68	RVUE		$\pi N \rightarrow \rho N$

[38] 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

[39] Assuming $m_{\rho^+} = m_{\rho^-}$, $\Gamma_{\rho^+} = \Gamma_{\rho^-}$.

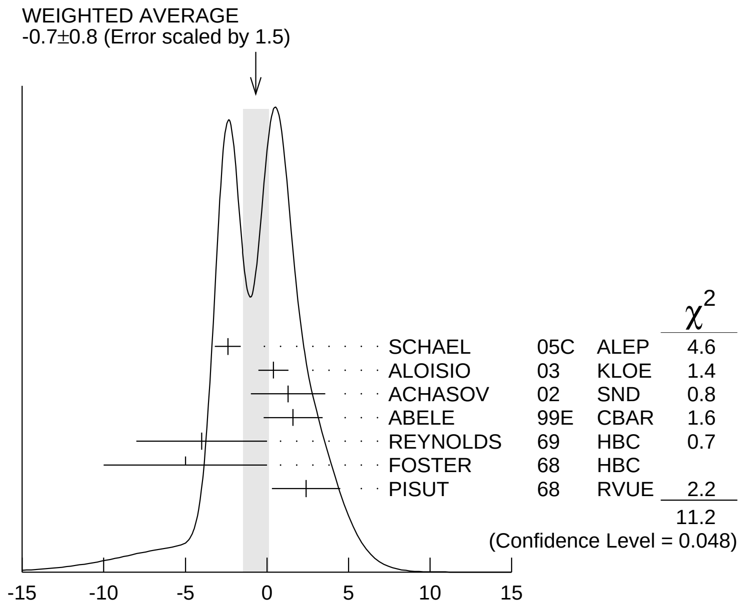
NODE=M009D;LINKAGE=CH

[40] From quoted masses of charged and neutral modes.

NODE=M009D;LINKAGE=A

[41] 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



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

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

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	[42] ALOISIO	03	KLOE	1.02 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$

NODE=M009D1

[42] 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
$5.3^{+0.9}_{-0.7}$	CHABAUD	83	ASPK	0	17 $\pi^- p$ polarized

NODE=M009R

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	CHG	COMMENT
146.2 ±0.7 OUR AVERAGE		Error includes scale factor of 1.1.				
145.98±0.75±0.50	900k	[43] AKHMETSHIN	07			$e^+e^- \rightarrow \pi^+\pi^-$
146.1 ±0.8 ±1.5	800k	[44,45] ACHASOV	06	SND		$e^+e^- \rightarrow \pi^+\pi^-$
143.85±1.33±0.80	114k	[46,47] AKHMETSHIN	04	CMD2		$e^+e^- \rightarrow \pi^+\pi^-$
147.3 ±1.5 ±0.7	1.98M	[48] ALOISIO	03	KLOE		1.02 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$
151.1 ±2.6 ±3.0	500k	[48] ACHASOV	02	SND	0	1.02 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$
150.5 ±3.0		[49] BARKOV	85	OLYA	0	$e^+e^- \rightarrow \pi^+\pi^-$

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

143.9 ±1.3 ±1.1	1.98M	[50] ALOISIO	03	KLOE		1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	OCCUR=2
147.4 ±1.5 ±0.7	1.98M	[51] ALOISIO	03	KLOE		1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	OCCUR=3
149.8 ±2.2 ±2.0	500k	[52] ACHASOV	02	SND		1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	OCCUR=3
147.9 ±1.5 ±7.5		[53] BENAYOUN	98	RVUE		$e^+e^- \to \pi^+\pi^-$, $\mu^+\mu^-$	
153.5 ±1.3 ±4.6		[54] GARDNER	98	RVUE		0.28–0.92 $e^+e^- \to \pi^+\pi^-$	
145.0 ±1.7		[55] O'CONNELL	97	RVUE		$e^+e^- \to \pi^+\pi^-$	
142.5 ±3.5		[56] BERNICHA	94	RVUE		$e^+e^- \to \pi^+\pi^-$	
138 ±1		[57] GESHKEN...	89	RVUE		$e^+e^- \to \pi^+\pi^-$	

CHARGED ONLY, τ DECAYS and e^+e^-

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	[58,59] FUJIKAWA	08	BELL	±	$\tau^- \to \pi^-\pi^0\nu_\tau$	
149.0±1.2		[59,60] SCHAEL	05C	ALEP		$\tau^- \to \pi^-\pi^0\nu_\tau$	
149.9±2.3±2.0	500k	[48] ACHASOV	02	SND	±	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	OCCUR=2
150.4±1.4±1.4	87k	[61,62] ANDERSON	00A	CLE2		$\tau^- \to \pi^-\pi^0\nu_\tau$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
143.7±1.3±1.2	1.98M	[48] ALOISIO	03	KLOE	±	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	
142.9±1.3±1.4	1.98M	[51] ALOISIO	03	KLOE	−	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	OCCUR=2
144.7±1.4±1.2	1.98M	[51] ALOISIO	03	KLOE	+	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	OCCUR=3
$150.2\pm2.0^{+0.7}_{-1.6}$		[63] SANZ-CILLERO	03	RVUE		$\tau^- \to \pi^-\pi^0\nu_\tau$	
150.9±2.2±2.0	500k	[52] ACHASOV	02	SND		1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	OCCUR=4

MIXED CHARGES, OTHER REACTIONS

NODE=M009W7

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
149.5±1.3	600k	[64] ABELE	99E	CBAR	0±	0.0 $\bar{p}p \to \pi^+\pi^-\pi^0$

CHARGED ONLY, HADROPRODUCED

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		$\bar{p}n \to \pi^-\pi^0\pi^0$	
155 ±11	2935	[65] CAPRARO	87	SPEC	−	200 π^- Cu $\to \pi^-\pi^0$ Cu	
154 ±20	967	[65] CAPRARO	87	SPEC	−	200 π^- Pb $\to \pi^-\pi^0$ Pb	OCCUR=2
150 ± 5		HUSTON	86	SPEC	+	202 π^+ A $\to \pi^+\pi^0$ A	
146 ±12	6500	[66] BYERLY	73	OSPK	−	5 $\pi^- p$	
148.2± 4.1	9650	[67] PISUT	68	RVUE	−	1.7–3.2 $\pi^- p$, $t<10$	
146 ±13	900	EISNER	67	HBC	−	4.2 $\pi^- p$, $t<10$	

NEUTRAL ONLY, PHOTOPRODUCED

NODE=M009W0P

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*	
150.7± 2.9 OUR AVERAGE							
146 ± 3 ±13	79k	[68] BREITWEG	98B	ZEUS	0	50–100 γp	
150.9± 3.0		BARTALUCCI	78	CNTR	0	$\gamma p \to e^+e^- p$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
138 ± 3	79k	[69] BREITWEG	98B	ZEUS	0	50–100 γp	OCCUR=2
147 ±11		GLADDING	73	CNTR	0	2.9–4.7 γp	
155 ±12	2430	BALLAM	72	HBC	0	4.7 γp	
145 ±13	1930	BALLAM	72	HBC	0	2.8 γp	OCCUR=2
140 ± 5		ALVENSLEB...	70	CNTR	0	γA, $t<0.01$	
146.1± 2.9	140k	BIGGS	70	CNTR	0	<4.1 γC $\to \pi^+\pi^-$ C	
160 ±10		LANZEROTTI	68	CNTR	0	γp	
130 ± 5	4000	ASBURY	67B	CNTR	0	$\gamma +$ Pb	

NEUTRAL ONLY, OTHER REACTIONS

NODE=M009W0R
NODE=M009W0R

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	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		[70,71] BOHACIK	80	RVUE	0	
152 ± 9		[66] WICKLUND	78	ASPK	0	3,4,6 $\pi^\pm pN$
154 ± 2	76000	DEUTSCH...	76	HBC	0	16 $\pi^+ p$
157 ± 8	6800	RATCLIFF	72	ASPK	0	15 $\pi^- p$, t <0.3
143 ± 8	1700	REYNOLDS	69	HBC	0	2.26 $\pi^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
147.0± 2.5	600k	[72] ABELE	99E	CBAR	0	0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$
146 ± 3	4943	[73] ADAMS	97	E665		470 $\mu p \to \mu XB$
160.0$^{+4.1}_{-4.0}$		[74] CHABAUD	83	ASPK	0	17 $\pi^- p$ polarized
155 ± 1		[75] HEYN	81	RVUE	0	π form factor
148.0± 1.3		[70,71] LANG	79	RVUE	0	
146 ±14	4100	ENGLER	74	DBC	0	6 $\pi^+ n \to \pi^+\pi^- p$
143 ±13		[71] ESTABROOKS	74	RVUE	0	17 $\pi^- p \to \pi^+\pi^- n$
160 ±10	32000	[70] PROTOPOP...	73	HBC	0	7.1 $\pi^+ p$, t <0.4
145 ±12	2250	[65] HYAMS	68	OSPK	0	11.2 $\pi^- p$
163 ±15	13300	[76] PISUT	68	RVUE	0	1.7–3.2 $\pi^- p$, t <10

[43] A combined fit of AKHMETSHIN 07, AULCHENKO 06, and AULCHENKO 05.
[44] Supersedes ACHASOV 05A.
[45] 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.
[46] Using the GOUNARIS 68 parametrization with the complex phase of the ρ-ω interference.
[47] From a fit in the energy range 0.61 to 0.96 GeV. Update of AKHMETSHIN 02.
[48] Assuming $m_{\rho^+} = m_{\rho^-}$, $\Gamma_{\rho^+} = \Gamma_{\rho^-}$.
[49] From the GOUNARIS 68 parametrization of the pion form factor.
[50] Assuming $m_{\rho^+} = m_{\rho^-} = m_{\rho^0}$, $\Gamma_{\rho^+} = \Gamma_{\rho^-} = \Gamma_{\rho^0}$.
[51] Without limitations on masses and widths.
[52] Assuming $m_{\rho^0} = m_{\rho^\pm}$, $g_{\rho^0\pi\pi} = g_{\rho^\pm\pi\pi}$.
[53] Using the data of BARKOV 85 in the hidden local symmetry model.
[54] 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.
[55] A fit of BARKOV 85 data assuming the direct $\omega\pi\pi$ coupling.
[56] Applying the S-matrix formalism to the BARKOV 85 data.
[57] Includes BARKOV 85 data. Model-dependent width definition.
[58] $|F_\pi(0)|^2$ fixed to 1.
[59] From the GOUNARIS 68 parametrization of the pion form factor.
[60] The error combines statistical and systematic uncertainties. Supersedes BARATE 97M.
[61] $\rho(1700)$ mass and width fixed at 1700 MeV and 235 MeV respectively.
[62] 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.
[63] Using the data of BARATE 97M and the effective chiral Lagrangian.
[64] Assuming the equality of ρ^+ and ρ^- masses and widths.
[65] Width errors enlarged by us to $4\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass.
[66] Phase shift analysis. Systematic errors added corresponding to spread of different fits.
[67] 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.
[68] From the parametrization according to SOEDING 66.
[69] From the parametrization according to ROSS 66.
[70] From pole extrapolation.
[71] From phase shift analysis of GRAYER 74 data.
[72] Using relativistic Breit-Wigner and taking into account ρ-ω interference.
[73] Systematic errors not evaluated.
[74] From fit of 3-parameter relativistic Breit-Wigner to helicity-zero part of P-wave intensity. CHABAUD 83 includes data of GRAYER 74.
[75] HEYN 81 includes all spacelike and timelike F_π values until 1978.
[76] 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=AK
NODE=M009W0;LINKAGE=AC
NODE=M009W0;LINKAGE=SN
NODE=M009W5;LINKAGE=GS
NODE=M009W5;LINKAGE=P2
NODE=M009W;LINKAGE=CH
NODE=M009W;LINKAGE=K
NODE=M009W;LINKAGE=DF
NODE=M009W;LINKAGE=WO
NODE=M009W;LINKAGE=HC
NODE=M009W;LINKAGE=K2
NODE=M009W;LINKAGE=G8
NODE=M009W;LINKAGE=AB
NODE=M009W;LINKAGE=AA
NODE=M009W;LINKAGE=F
NODE=M009W5;LINKAGE=FU
NODE=M009W5;LINKAGE=GO
NODE=M009W5;LINKAGE=SC
NODE=M009W;LINKAGE=A6
NODE=M009W;LINKAGE=K1
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NODE=M009W;LINKAGE=B6
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NODE=M009W;LINKAGE=H
NODE=M009W;LINKAGE=BL
NODE=M009W;LINKAGE=A1
NODE=M009W;LINKAGE=G
NODE=M009W;LINKAGE=B
NODE=M009W;LINKAGE=R

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

NODE=M009W6
NODE=M009W6

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.3±1.3 OUR AVERAGE		Error includes scale factor of 1.4.			
−0.2±1.0		[77] SCHAEL	05C	ALEP	$\tau^- \to \pi^-\pi^0\nu_\tau$
3.6±1.8±1.7	1.98M	[78] ALOISIO	03	KLOE	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$

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

NODE=M009W16
NODE=M009W16

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
1.8±2.0±0.5	1.98M	[79] ALOISIO	03	KLOE	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$

[77] 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

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

[79] 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;→ NOT CHECKED ←
	$\rho(770)^{\pm}$ decays				NODE=M009;CLUMP=A
Γ_2	$\pi^{\pm}\pi^0$		$\sim$ 100 %		DESIG=11;OUR EVAL; → NOT CHECKED ←
Γ_3	$\pi^{\pm}\gamma$		$(4.5 \pm 0.5) \times 10^{-4}$	S=2.2	DESIG=3
Γ_4	$\pi^{\pm}\eta$		$< 6 \times 10^{-3}$	CL=84%	DESIG=5
Γ_5	$\pi^{\pm}\pi^+\pi^-\pi^0$		$< 2.0 \times 10^{-3}$	CL=84%	DESIG=21
	$\rho(770)^0$ decays				NODE=M009;CLUMP=B
Γ_6	$\pi^+\pi^-$		$\sim$ 100 %		DESIG=12;OUR EVAL; → NOT CHECKED ←
Γ_7	$\pi^+\pi^-\gamma$		$(9.9 \pm 1.6) \times 10^{-3}$		DESIG=60
Γ_8	$\pi^0\gamma$		$(6.0 \pm 0.8) \times 10^{-4}$		DESIG=40
Γ_9	$\eta\gamma$		$(3.00 \pm 0.20) \times 10^{-4}$		DESIG=8
Γ_{10}	$\pi^0\pi^0\gamma$		$(4.5 \pm 0.8) \times 10^{-5}$		DESIG=80
Γ_{11}	$\mu^+\mu^-$	[a]	$(4.55 \pm 0.28) \times 10^{-5}$		DESIG=6
Γ_{12}	e^+e^-	[a]	$(4.72 \pm 0.05) \times 10^{-5}$		DESIG=4
Γ_{13}	$\pi^+\pi^-\pi^0$		$(1.01^{+0.54}_{-0.36} \pm 0.34) \times 10^{-4}$		DESIG=7;OUR EVAL;→ NOT CHECKED ←
Γ_{14}	$\pi^+\pi^-\pi^+\pi^-$		$(1.8 \pm 0.9) \times 10^{-5}$		DESIG=22
Γ_{15}	$\pi^+\pi^-\pi^0\pi^0$		$(1.6 \pm 0.8) \times 10^{-5}$		DESIG=30
Γ_{16}	$\pi^0e^+e^-$		$< 1.2 \times 10^{-5}$	CL=90%	DESIG=9
Γ_{17}	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, $x_i \equiv \Gamma_i/\Gamma_{\rm total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_3	−100	
Γ	15	−15
	x_2	x_3

	Mode	Rate (MeV)	Scale factor	
Γ_2	$\pi^{\pm}\pi^0$	150.2 ± 2.4		DESIG=11
Γ_3	$\pi^{\pm}\gamma$	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 $\chi^2 = 6.0$ for 13 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_7	−100							
x_8	−5	0						
x_9	−1	0	1					
x_{10}	−1	0	0	0				
x_{11}	2	−3	0	0	0			
x_{12}	0	0	−8	−9	0	0		
x_{14}	−1	0	0	0	0	0	0	
Γ	0	0	4	5	0	0	−54	0
	x_6	x_7	x_8	x_9	x_{10}	x_{11}	x_{12}	x_{14}

	Mode		Rate (MeV)	
Γ_6	$\pi^+\pi^-$		147.5 ±0.9	DESIG=12
Γ_7	$\pi^+\pi^-\gamma$		1.48 ±0.24	DESIG=60
Γ_8	$\pi^0\gamma$		0.089 ±0.012	DESIG=40
Γ_9	$\eta\gamma$		0.0447 ±0.0031	DESIG=8
Γ_{10}	$\pi^0\pi^0\gamma$		0.0066 ±0.0012	DESIG=80
Γ_{11}	$\mu^+\mu^-$	[a]	0.0068 ±0.0004	DESIG=6
Γ_{12}	e^+e^-	[a]	0.00704±0.00006	DESIG=4
Γ_{14}	$\pi^+\pi^-\pi^+\pi^-$		0.0027 ±0.0014	DESIG=22

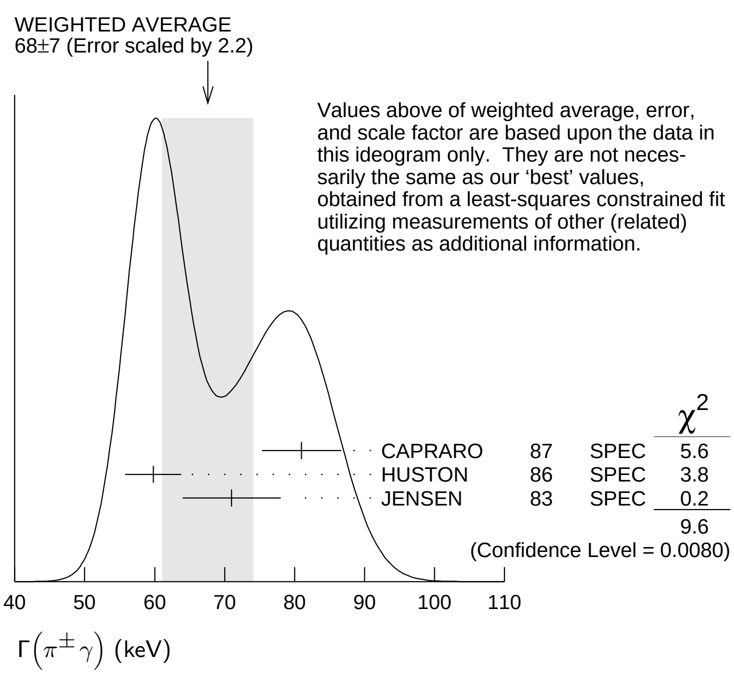
ρ(770) PARTIAL WIDTHS

NODE=M009230

$\Gamma(\pi^{\pm}\gamma)$ Γ_3

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 $\pi^- A \to \pi^-\pi^0 A$
59.8±4.0	HUSTON	86	SPEC	+	202 $\pi^+ A \to \pi^+\pi^0 A$
71 ±7	JENSEN	83	SPEC	−	156–260 $\pi^- A \to \pi^-\pi^0 A$



$\Gamma(e^+e^-)$ Γ_{12}

NODE=M009W4

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
7.04 ±0.06 OUR FIT				
7.04 ±0.06 OUR AVERAGE				
7.048±0.057±0.050	900k	[80] AKHMETSHIN 07		$e^+e^- \rightarrow \pi^+\pi^-$
7.06 ±0.11 ±0.05	114k	[81,82] AKHMETSHIN 04	CMD2	$e^+e^- \rightarrow \pi^+\pi^-$
6.77 ±0.10 ±0.30		BARKOV 85	OLYA	$e^+e^- \rightarrow \pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
7.12 ±0.02 ±0.11	800k	[83] ACHASOV 06	SND	$e^+e^- \rightarrow \pi^+\pi^-$
6.3 ±0.1		[84] BENAYOUN 98	RVUE	$e^+e^- \rightarrow \pi^+\pi^-$, $\mu^+\mu^-$

OCCUR=2

$\Gamma(\pi^0\gamma)$ Γ_8

NODE=M009W31

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
77±17±11	36500	[85] ACHASOV 03	SND	0.60–0.97 $e^+e^- \rightarrow \pi^0\gamma$
121±31		DOLINSKY 89	ND	$e^+e^- \rightarrow \pi^0\gamma$

$\Gamma(\eta\gamma)$ Γ_9

NODE=M009W32

VALUE (keV)	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
62±17	[86] DOLINSKY 89	ND	$e^+e^- \rightarrow \eta\gamma$

$\Gamma(\pi^+\pi^-\pi^+\pi^-)$ Γ_{14}

NODE=M009W33

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.8±1.4±0.5	153	AKHMETSHIN 00	CMD2	0.6–0.97 $e^+e^- \rightarrow \pi^+\pi^-\pi^+\pi^-$

[80] A combined fit of AKHMETSHIN 07, AULCHENKO 06, and AULCHENKO 05. NODE=M009W4;LINKAGE=AK

[81] Using the GOUNARIS 68 parametrization with the complex phase of the ρ-ω interference. NODE=M009W4;LINKAGE=GS

[82] From a fit in the energy range 0.61 to 0.96 GeV. Update of AKHMETSHIN 02. NODE=M009W4;LINKAGE=P2

[83] Supersedes ACHASOV 05A. NODE=M009W4;LINKAGE=AC

[84] Using the data of BARKOV 85 in the hidden local symmetry model. NODE=M009W4;LINKAGE=K2

[85] Using Γ_{total}= 147.9 ± 1.3 MeV and B($\rho \rightarrow \pi^0\gamma$) from ACHASOV 03. NODE=M009W31;LINKAGE=AV

[86] Solution corresponding to constructive ω-ρ interference. NODE=M009W32;LINKAGE=L

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

NODE=M009233

$\Gamma(e^+e^-)/\Gamma_{total} \times \Gamma(\pi^+\pi^-)/\Gamma_{total}$ $\Gamma_{12}/\Gamma \times \Gamma_6/\Gamma$

NODE=M009G4

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
4.876±0.023±0.064	800k	[87,88] ACHASOV 06	SND	$e^+e^- \rightarrow \pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
4.72 ±0.02		[89] BENAYOUN 10	RVUE	0.4–1.05 e^+e^-

[87] Supersedes ACHASOV 05A. NODE=M009G4;LINKAGE=AC

[88] 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

[89] A simultaneous fit of $e^+e^- \rightarrow \pi^+\pi^-$, $\pi^+\pi^-\pi^0$, $\pi^0\gamma$, $\eta\gamma$ data. NODE=M009G4;LINKAGE=BE

$\Gamma(e^+e^-)/\Gamma_{total} \times \Gamma(\eta\gamma)/\Gamma_{total}$ $\Gamma_{12}/\Gamma \times \Gamma_9/\Gamma$

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±0.14±0.08	33k	[90] ACHASOV 07B	SND	0.6–1.38 $e^+e^- \rightarrow \eta\gamma$
1.50±0.65±0.09	17.4k	[91] AKHMETSHIN 05	CMD2	0.60-1.38 $e^+e^- \rightarrow \eta\gamma$
1.61±0.20±0.11	23k	[92,93] AKHMETSHIN 01B	CMD2	$e^+e^- \rightarrow \eta\gamma$
1.85±0.49		[94] DOLINSKY 89	ND	$e^+e^- \rightarrow \eta\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.05±0.02		[95] BENAYOUN 10	RVUE	0.4–1.05 e^+e^-

[90] From a combined fit of $\sigma(e^+e^- \rightarrow \eta\gamma)$ with $\eta \rightarrow 3\pi^0$ and $\eta \rightarrow \pi^+\pi^-\pi^0$, and fixing B($\eta \rightarrow 3\pi^0$) / B($\eta \rightarrow \pi^+\pi^-\pi^0$) = 1.44 ± 0.04. Recalculated by us from the cross section at the peak. Supersedes ACHASOV 00D and ACHASOV 06A. NODE=M009G1;LINKAGE=AH

[91] From the $\eta \rightarrow 2\gamma$ decay and using B($\eta \rightarrow \gamma\gamma$)= 39.43 ± 0.26%. NODE=M009G;LINKAGE=AH

[92] From the $\eta \rightarrow 3\pi^0$ decay and using B($\eta \rightarrow 3\pi^0$)= (32.24 ± 0.29) × 10^{-2}. NODE=M009G;LINKAGE=AK

[93] 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

[94] Recalculated by us from the cross section in the peak. NODE=M009G;LINKAGE=LP

[95] A simultaneous fit of $e^+e^- \rightarrow \pi^+\pi^-$, $\pi^+\pi^-\pi^0$, $\pi^0\gamma$, $\eta\gamma$ data. NODE=M009G1;LINKAGE=BE

$\Gamma(e^+e^-)/\Gamma_{total} \times \Gamma(\pi^0\gamma)/\Gamma_{total}$ — $\Gamma_{12}/\Gamma \times \Gamma_8/\Gamma$

NODE=M009G2
NODE=M009G2

VALUE (units 10^{-8})	EVTS	DOCUMENT ID		TECN	COMMENT
2.8 ±0.4 OUR FIT					
2.8 ±0.4 OUR AVERAGE					
$2.90^{+0.60}_{-0.55} \pm 0.18$	18680	AKHMETSHIN	05	CMD2	0.60-1.38 $e^+e^- \to \pi^0\gamma$
$2.37 \pm 0.53 \pm 0.33$	36500	[96] ACHASOV	03	SND	0.60–0.97 $e^+e^- \to \pi^0\gamma$
$3.61 \pm 0.74 \pm 0.49$	10625	[97] 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		[98] BENAYOUN	10	RVUE	0.4–1.05 e^+e^-

[96] 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 interference equal to $(-10.2 \pm 7.0)^\circ$. NODE=M009G;LINKAGE=SH

[97] Recalculated by us from the cross section in the peak. NODE=M009G2;LINKAGE=LP

[98] A simultaneous fit of $e^+e^- \to \pi^+\pi^-$, $\pi^+\pi^-\pi^0$, $\pi^0\gamma$, $\eta\gamma$ data. NODE=M009G2;LINKAGE=BE

$\Gamma(e^+e^-)/\Gamma_{total} \times \Gamma(\pi^+\pi^-\pi^0)/\Gamma_{total}$ — $\Gamma_{12}/\Gamma \times \Gamma_{13}/\Gamma$

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		[99] BENAYOUN	10	RVUE	0.4–1.05 e^+e^-
$4.58^{+2.46}_{-1.64} \pm 1.56$	1.2M	[100] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$

[99] A simultaneous fit of $e^+e^- \to \pi^+\pi^-$, $\pi^+\pi^-\pi^0$, $\pi^0\gamma$, $\eta\gamma$ data. NODE=M009G3;LINKAGE=BE

[100] Statistical significance is less than $3\,\sigma$. NODE=M009G3;LINKAGE=AC

ρ(770) BRANCHING RATIOS

NODE=M009235

$\Gamma(\pi^\pm\eta)/\Gamma(\pi\pi)$ — Γ_4/Γ_1

NODE=M009R4
NODE=M009R4

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

$\Gamma(\pi^\pm\pi^+\pi^-\pi^0)/\Gamma(\pi\pi)$ — Γ_5/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 $\pi^+ p$

$\Gamma(\mu^+\mu^-)/\Gamma(\pi^+\pi^-)$ — Γ_{11}/Γ_6

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. • • •				
$8.2^{+1.6}_{-3.6}$	[101] ROTHWELL	69	CNTR	Photoproduction
5.6 ± 1.5	[102] WEHMANN	69	OSPK	12 π^- C, Fe
$9.7^{+3.1}_{-3.3}$	[103] HYAMS	67	OSPK	11 π^- Li, H

$\Gamma(e^+e^-)/\Gamma(\pi\pi)$ — Γ_{12}/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	[104] BENAKSAS	72	OSPK	$e^+e^- \to \pi^+\pi^-$

$\Gamma(\eta\gamma)/\Gamma_{total}$ — Γ_9/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						
$2.79 \pm 0.34 \pm 0.03$	33k	[105] ACHASOV	07B	SND		0.6–1.38 $e^+e^- \to \eta\gamma$
3.6 ± 0.9		[106] ANDREWS	77	CNTR	0	6.7–10 γCu
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$3.21 \pm 1.39 \pm 0.20$	17.4k	[107,108] AKHMETSHIN	05	CMD2		0.60-1.38 $e^+e^- \to \eta\gamma$
$3.39 \pm 0.42 \pm 0.23$		[106,109,110] AKHMETSHIN	01B	CMD2		$e^+e^- \to \eta\gamma$
$1.9^{+0.6}_{-0.8}$		[111] BENAYOUN	96	RVUE		0.54-1.04 $e^+e^- \to \eta\gamma$
4.0 ± 1.1		[106,108] DOLINSKY	89	ND		$e^+e^- \to \eta\gamma$

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

NODE=M009R13
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_{14}/Γ_1

NODE=M009R11
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 $\pi^+ p$

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

NODE=M009R10
NODE=M009R10

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$1.01^{+0.54}_{-0.36}\pm0.34$		1.2M	[112] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
<1.2	90		VASSERMAN	88B	ND	$e^+e^- \to \pi^+\pi^-\pi^0$

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma(\pi\pi)$ — Γ_{13}/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	[113] ABRAMS	71	HBC	0	3.7 $\pi^+ p$

$\Gamma(\pi^+\pi^-\pi^0\pi^0)/\Gamma_{total}$ — Γ_{15}/Γ

NODE=M009R8
NODE=M009R8

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
1.60±0.74±0.18		[114] 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	$e^+e^- \to \pi^+\pi^-\pi^0\pi^0$

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

NODE=M009R12
NODE=M009R12

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
0.0099±0.0016 OUR FIT					
0.0099±0.0016		[115] DOLINSKY	91	ND	$e^+e^- \to \pi^+\pi^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.0111±0.0014		[116] VASSERMAN	88	ND	$e^+e^- \to \pi^+\pi^-\gamma$
<0.005	90	[117] VASSERMAN	88	ND	$e^+e^- \to \pi^+\pi^-\gamma$

OCCUR=2

$\Gamma(\pi^0\gamma)/\Gamma_{total}$ — Γ_8/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. • • •					
$6.21^{+1.28}_{-1.18}\pm0.39$	18680	[118,119] AKHMETSHIN	05	CMD2	0.60-1.38 $e^+e^- \to \pi^0\gamma$
5.22±1.17±0.75	36500	[119,120] ACHASOV	03	SND	0.60–0.97 $e^+e^- \to \pi^0\gamma$
6.8 ±1.7		[121] BENAYOUN	96	RVUE	0.54-1.04 $e^+e^- \to \pi^0\gamma$
7.9 ±2.0		[119] DOLINSKY	89	ND	$e^+e^- \to \pi^0\gamma$

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

NODE=M009R15
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_{17}/Γ

NODE=M009R16
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 $e^+ e^-$

$\Gamma(\pi^0 \pi^0 \gamma)/\Gamma_{total}$ Γ_{10}/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	[122] AKHMETSHIN 04B	CMD2	0.6–0.97 $e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$
$4.1^{+1.0}_{-0.9}\pm0.3$	295	[123] ACHASOV 02F	SND	0.36–0.97 $e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$4.8^{+3.4}_{-1.8}\pm0.5$	63	[124] ACHASOV 00G	SND	$e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$

OCCUR=2

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

[102] 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 $\omega \rightarrow \mu^+ \mu^-$ from this experiment. NODE=M009R5;LINKAGE=W

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

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

[105] 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

[106] Solution corresponding to constructive ω-ρ interference. NODE=M009R7;LINKAGE=A

[107] Using $B(\rho \rightarrow e^+ e^-) = (4.67 \pm 0.09) \times 10^{-5}$ and $B(\eta \rightarrow \gamma\gamma) = 39.43 \pm 0.26\%$. NODE=M009R;LINKAGE=AK

[108] Not independent of the corresponding $\Gamma(e^+ e^-) \times \Gamma(\eta\gamma)/\Gamma^2_{total}$. NODE=M009R7;LINKAGE=AZ

[109] 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

[110] 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

[111] 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

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

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

[114] Assuming no interference between the ρ and ω contributions. NODE=M009R8;LINKAGE=AC

[115] Bremsstrahlung from a decay pion and for photon energy above 50 MeV. NODE=M009R12;LINKAGE=J

[116] Superseded by DOLINSKY 91. NODE=M009R12;LINKAGE=I

[117] Structure radiation due to quark rearrangement in the decay. NODE=M009R12;LINKAGE=N

[118] Using $B(\rho \rightarrow e^+ e^-) = (4.67 \pm 0.09) \times 10^{-5}$. NODE=M009R9;LINKAGE=AK

[119] Not independent of the corresponding $\Gamma(e^+ e^-) \times \Gamma(\pi^0 \gamma)/\Gamma^2_{total}$. NODE=M009R9;LINKAGE=BZ

[120] Using $B(\rho \rightarrow e^+ e^-) = (4.54 \pm 0.10) \times 10^{-5}$. NODE=M009R9;LINKAGE=AS

[121] Reanalysis of DRUZHININ 84, DOLINSKY 89, and DOLINSKY 91 taking into account a triangle anomaly contribution. NODE=M009R9;LINKAGE=A

[122] This branching ratio includes the conventional VMD mechanism $\rho \rightarrow \omega\pi^0$, $\omega \rightarrow \pi^0\gamma$, and the new decay mode $\rho \rightarrow f_0(500)\gamma$, $f_0(500) \rightarrow \pi^0\pi^0$ 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

[123] This branching ratio includes the conventional VMD mechanism $\rho \rightarrow \omega\pi^0$, $\omega \rightarrow \pi^0\gamma$ and the new decay mode $\rho \rightarrow f_0(500)\gamma$, $f_0(500) \rightarrow \pi^0\pi^0$ 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

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

$\rho(770)$ REFERENCES

NODE=M009

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.			
ACHASOV	08	JETP 107 61	M.N. Achasov *et al.*	(SND Collab.)	REFID=52258
		Translated from ZETF 134 80.			
FUJIKAWA	08	PR D78 072006	M. Fujikawa *et al.*	(BELLE Collab.)	REFID=52536
ACHASOV	07B	PR D76 077101	M.N. Achasov *et al.*	(SND Collab.)	REFID=51942
AKHMETSHIN	07	PL B648 28	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
ALOISIO	05	PL B606 12	A. Aloisio *et al.*	(KLOE Collab.)	REFID=51112
AULCHENKO	05	JETPL 82 743	V.M. Aulchenko *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=51060
		Translated from ZETFP 82 841.			
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
AKHMETSHIN	04B	PL B580 119	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=49610
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
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
AKHMETSHIN	01B	PL B509 217	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=48167
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
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	00	PL B475 190	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=47421
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
Also		PR D62 019903 (erratum)	S. Gardner, H.B. O'Connell		REFID=47981
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
		Translated from YAF 60 53.			
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
BERNICHA	94	PR D50 4454	A. Bernicha, G. Lopez Castro, J. Pestieau	(LOUV+)	REFID=44097
WEIDENAUER	93	ZPHY C59 387	P. Weidenauer *et al.*	(ASTERIX Collab.)	REFID=43585
AGUILAR-...	91	ZPHY C50 405	M. Aguilar-Benitez *et al.*	(LEBC-EHS Collab.)	REFID=41637
DOLINSKY	91	PRPL 202 99	S.I. Dolinsky *et al.*	(NOVO)	REFID=41369
ANTIPOV	89	ZPHY C42 185	Y.M. Antipov *et al.*	(SERP, JINR, BGNA+)	REFID=40739
BISELLO	89	PL B220 321	D. Bisello *et al.*	(DM2 Collab.)	REFID=40740
DOLINSKY	89	ZPHY C42 511	S.I. Dolinsky *et al.*	(NOVO)	REFID=41003
DUBNICKA	89	JPG 15 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
		Translated from ZETFP 47 432.			
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
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
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
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
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

$\omega(782)$

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

$\omega(782)$ MASS

NODE=M001M

NODE=M001M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*	
782.65±0.12 OUR AVERAGE	Error includes scale factor of 1.9. See the ideogram below.					
783.20±0.13±0.16	18680	AKHMETSHIN	05	CMD2	0.60–1.38 $e^+e^- \to \pi^0\gamma$	
782.68±0.09±0.04	11200	[1] AKHMETSHIN	04	CMD2	$e^+e^- \to \pi^+\pi^-\pi^0$	
782.79±0.08±0.09	1.2M	[2] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$	
782.7 ±0.1 ±1.5	19500	WURZINGER	95	SPEC	1.33 $pd \to {}^3\mathrm{He}\omega$	
781.96±0.17±0.80	11k	[3] AMSLER	94C	CBAR	0.0 $\overline{p}p \to \omega\eta\pi^0$	
782.08±0.36±0.82	3463	[4] AMSLER	94C	CBAR	0.0 $\overline{p}p \to \omega\eta\pi^0$	OCCUR=2
781.96±0.13±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	$\overline{p}p \to 2\pi^+2\pi^-\pi^0$	
782.2 ±0.4	1488	KURDADZE	83B	OLYA	$e^+e^- \to \pi^+\pi^-\pi^0$	
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. • • •						
781.78±0.10		[6] BARKOV	87	CMD	$e^+e^- \to \pi^+\pi^-\pi^0$	
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 $p\overline{p} \to K_1K_1\omega$	OCCUR=2
783.7 ±1.0	3583	[7] 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 π^-p	
783.2 ±1.6		[8] BIGGS	70B	CNTR	<4.1 $\gamma\mathrm{C} \to \pi^+\pi^-\mathrm{C}$	
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 $\eta \rightarrow \gamma\gamma$ decay. NODE=M001M;LINKAGE=S1

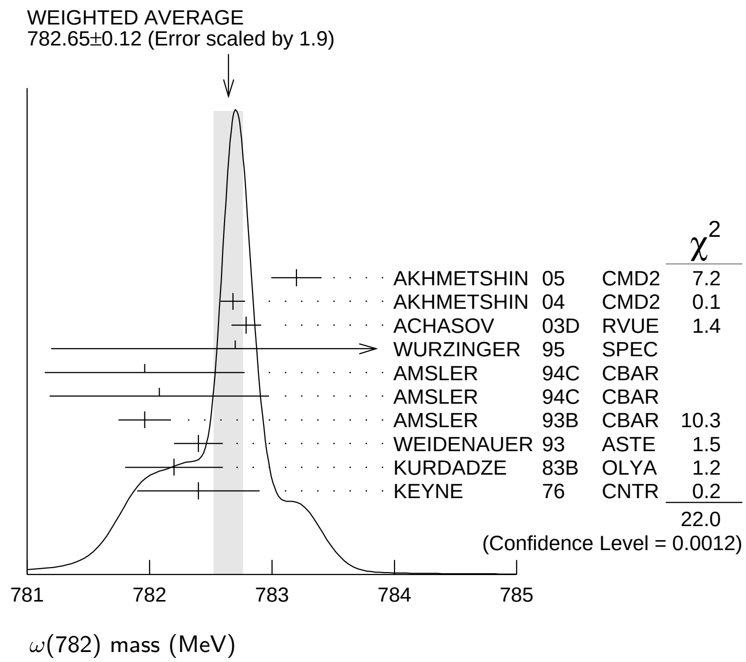
[4] From the $\eta \rightarrow 3\pi^0$ decay. NODE=M001M;LINKAGE=S2

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

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

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

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



$\omega(782)$ WIDTH

NODE=M001W

NODE=M001W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
8.49±0.08 OUR AVERAGE					
8.68±0.23±0.10	11200	[9] AKHMETSHIN	04	CMD2	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
8.68±0.04±0.15	1.2M	[10] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$
8.2 ±0.3	19500	WURZINGER	95	SPEC	1.33 $pd \rightarrow {}^3\mathrm{He}\omega$
8.4 ±0.1		[11] AULCHENKO	87	ND	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
8.30±0.40		BARKOV	87	CMD	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
9.8 ±0.9	1488	KURDADZE	83B	OLYA	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
9.0 ±0.8	433	CORDIER	80	DM1	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
9.1 ±0.8	451	BENAKSAS	72B	OSPK	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
12 ±2	1430	COOPER	78B	HBC	0.7–0.8 $\overline{p}p \rightarrow 5\pi$
9.4 ±2.5	2100	GESSAROLI	77	HBC	11 $\pi^- p \rightarrow \omega n$
10.22±0.43	20000	[12] KEYNE	76	CNTR	$\pi^- p \rightarrow \omega n$
13.3 ±2	418	AGUILAR-...	72B	HBC	3.9,4.6 $K^- p$
10.5 ±1.5		BORENSTEIN	72	HBC	2.18 $K^- p$
7.70±0.9 ±1.15	940	BROWN	72	MMS	2.5 $\pi^- p \rightarrow n$MM
10.3 ±1.4	510	BIZZARRI	71	HBC	0.0 $p\overline{p} \rightarrow K_1 K_1 \omega$
12.8 ±3.0	248	BIZZARRI	71	HBC	0.0 $p\overline{p} \rightarrow K^+K^-\omega$
9.5 ±1.0	3583	COYNE	71	HBC	3.7 $\pi^+ p \rightarrow p\pi^+\pi^+\pi^-\pi^0$

OCCUR=2

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

[10] 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

[11] Relativistic Breit-Wigner includes radiative corrections. NODE=M001W;LINKAGE=D

[12] 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	$\pi^0\gamma$		(8.28 ± 0.28) %	S=2.1	DESIG=3
Γ_3	$\pi^+\pi^-$		$(1.53^{+0.11}_{-0.13})$ %	S=1.2	DESIG=2
Γ_4	neutrals (excluding $\pi^0\gamma$)		$(8 \; {}^{+8}_{-5}) \times 10^{-3}$	S=1.1	DESIG=13
Γ_5	$\eta\gamma$		$(4.6 \pm 0.4) \times 10^{-4}$	S=1.1	DESIG=6
Γ_6	$\pi^0 e^+ e^-$		$(7.7 \pm 0.6) \times 10^{-4}$		DESIG=14
Γ_7	$\pi^0 \mu^+ \mu^-$		$(1.3 \pm 0.4) \times 10^{-4}$	S=2.1	DESIG=11
Γ_8	$\eta e^+ e^-$				DESIG=18
Γ_9	$e^+ e^-$		$(7.28 \pm 0.14) \times 10^{-5}$	S=1.3	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}	$\pi^0\pi^0\gamma$		$(6.6 \pm 1.1) \times 10^{-5}$		DESIG=5
Γ_{14}	$\eta\pi^0\gamma$		$< 3.3 \times 10^{-5}$	CL=90%	DESIG=17
Γ_{15}	$\mu^+\mu^-$		$(9.0 \pm 3.1) \times 10^{-5}$		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	$< 2.1 \times 10^{-4}$	CL=90%	DESIG=193
Γ_{19}	$3\pi^0$	C	$< 2.3 \times 10^{-4}$	CL=90%	DESIG=16

CONSTRAINED FIT INFORMATION

An overall fit to 15 branching ratios uses 51 measurements and one constraint to determine 10 parameters. The overall fit has a $\chi^2 = 51.8$ for 42 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	22								
x_3	−18	−4							
x_4	−92	−56	1						
x_5	7	7	−1	−9					
x_6	−1	0	0	0	0				
x_7	−1	0	0	0	0	0			
x_9	−38	−33	7	44	−21	0	0		
x_{13}	1	4	0	−2	0	0	0	−1	
x_{15}	0	0	0	0	0	0	0	0	0
	x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_9	x_{13}

$\omega(782)$ 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. • • •					
$788 \pm 12 \pm 27$	36500	[13] ACHASOV	03	SND	0.60–0.97 $e^+e^- \to \pi^0\gamma$
764 ± 51	10625	DOLINSKY	89	ND	$e^+e^- \to \pi^0\gamma$

[13] 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	[14] DOLINSKY	89	ND	$e^+e^- \to \eta\gamma$

[14] 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	[15,16] AKHMETSHIN 04	CMD2	$e^+e^- \to \pi^+\pi^-\pi^0$
0.653±0.003±0.021	1.2M	[17] ACHASOV 03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
0.600±0.031	10625	DOLINSKY 89	ND	$e^+e^- \to \pi^0\gamma$

→ NOT CHECKED ←

[15] Using B($\omega \to \pi^+\pi^-\pi^0$) = 0.891 ± 0.007 and Γ_{total} = 8.44 ± 0.09 MeV.
[16] Update of AKHMETSHIN 00C.
[17] 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

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

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

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
6.49±0.11 OUR FIT Error includes scale factor of 1.3.				
6.38±0.10 OUR AVERAGE Error includes scale factor of 1.1.				
6.24±0.11±0.08	11.2k	[18] AKHMETSHIN 04	CMD2	$e^+e^- \to \pi^+\pi^-\pi^0$
6.70±0.06±0.27		AUBERT,B 04N	BABR	10.6 $e^+e^- \to \pi^+\pi^-\pi^0\gamma$
6.74±0.04±0.24	1.2M	[19,20] ACHASOV 03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
6.37±0.35		[19] DOLINSKY 89	ND	$e^+e^- \to \pi^+\pi^-\pi^0$
6.45±0.24		[19] BARKOV 87	CMD	$e^+e^- \to \pi^+\pi^-\pi^0$
5.79±0.42	1488	[19] KURDADZE 83B	OLYA	$e^+e^- \to \pi^+\pi^-\pi^0$
5.89±0.54	433	[19] CORDIER 80	DM1	$e^+e^- \to \pi^+\pi^-\pi^0$
7.54±0.84	451	[19] BENAKSAS 72B	OSPK	$e^+e^- \to \pi^+\pi^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
6.20±0.13		[21] BENAYOUN 10	RVUE	0.4–1.05 e^+e^-

[18] Update of AKHMETSHIN 00C.
[19] Recalculated by us from the cross section in the peak.
[20] 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.
[21] A simultaneous fit of $e^+e^- \to \pi^+\pi^-$, $\pi^+\pi^-\pi^0$, $\pi^0\gamma$, $\eta\gamma$ data.

NODE=M001G;LINKAGE=PT
NODE=M001G;LINKAGE=LP
NODE=M001G;LINKAGE=VH
NODE=M001G2;LINKAGE=BE

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

NODE=M001G4
NODE=M001G4

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
6.02±0.20 OUR FIT Error includes scale factor of 1.9.				
6.45±0.17 OUR AVERAGE				
6.47±0.14±0.39	18680	AKHMETSHIN 05	CMD2	0.60-1.38 $e^+e^- \to \pi^0\gamma$
6.50±0.11±0.20	36500	[22] ACHASOV 03	SND	0.60–0.97 $e^+e^- \to \pi^0\gamma$
6.34±0.21±0.21	10625	[23] 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		[24] BENAYOUN 10	RVUE	0.4–1.05 e^+e^-

[22] 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 interference equal to $(-10.2 \pm 7.0)^\circ$.
[23] Recalculated by us from the cross section in the peak.
[24] A simultaneous fit of $e^+e^- \to \pi^+\pi^-$, $\pi^+\pi^-\pi^0$, $\pi^0\gamma$, $\eta\gamma$ data.

NODE=M001G;LINKAGE=SH
NODE=M001G4;LINKAGE=LP
NODE=M001G4;LINKAGE=BE

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

NODE=M001G5
NODE=M001G5

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
1.225±0.058±0.041	800k	[25] ACHASOV 06	SND	$e^+e^- \to \pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.146±0.057		[26] BENAYOUN 10	RVUE	0.4–1.05 e^+e^-

[25] Supersedes ACHASOV 05A.
[26] A simultaneous fit of $e^+e^- \to \pi^+\pi^-$, $\pi^+\pi^-\pi^0$, $\pi^0\gamma$, $\eta\gamma$ data.

NODE=M001G5;LINKAGE=AC
NODE=M001G5;LINKAGE=BE

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

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					
$3.10\pm0.31\pm0.11$	33k	[27] ACHASOV	07B	SND	0.6–1.38 $e^+e^- \rightarrow \eta\gamma$
$3.17^{+1.85}_{-1.31}\pm0.21$	17.4k	[28] AKHMETSHIN	05	CMD2	0.60-1.38 $e^+e^- \rightarrow \eta\gamma$
$3.41\pm0.52\pm0.21$	23k	[29,30] AKHMETSHIN	01B	CMD2	$e^+e^- \rightarrow \eta\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
4.50 ± 0.10		[31] BENAYOUN	10	RVUE	0.4–1.05 e^+e^-

[27] From a combined fit of $\sigma(e^+e^- \rightarrow \eta\gamma)$ with $\eta \rightarrow 3\pi^0$ and $\eta \rightarrow \pi^+\pi^-\pi^0$, and fixing B($\eta \rightarrow 3\pi^0$) / B($\eta \rightarrow \pi^+\pi^-\pi^0$) = 1.44 ± 0.04. Recalculated by us from the cross section at the peak. Supersedes ACHASOV 00D and ACHASOV 06A. NODE=M001G3;LINKAGE=AH

[28] From the $\eta \rightarrow 2\gamma$ decay and using B($\eta \rightarrow \gamma\gamma$)= 39.43 ± 0.26%. NODE=M001G;LINKAGE=AH

[29] From the $\eta \rightarrow 3\pi^0$ decay and using B($\eta \rightarrow 3\pi^0$)= (32.24 ± 0.29) × 10^{-2}. NODE=M001G;LINKAGE=AK

[30] 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=M001G;LINKAGE=BQ

[31] A simultaneous fit of $e^+e^- \rightarrow \pi^+\pi^-$, $\pi^+\pi^-\pi^0$, $\pi^0\gamma$, $\eta\gamma$ data. NODE=M001G3;LINKAGE=BE

ω(782) BRANCHING RATIOS

NODE=M001220

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

NODE=M001R21
NODE=M001R21

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.9024 ± 0.0019		[32] AMBROSINO	08G	KLOE	1.0–1.03 $e^+e^- \rightarrow \pi^+\pi^-2\pi^0$, $2\pi^0\gamma$
$0.8965\pm0.0016\pm0.0048$	1.2M	[33,34] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$
$0.880\ \pm0.020\ \pm0.032$	11200	[34,35] AKHMETSHIN	00C	CMD2	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
0.8942 ± 0.0062		[34] DOLINSKY	89	ND	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$

[32] Not independent of $\Gamma(\pi^0\gamma)$ / $\Gamma(\pi^+\pi^-\pi^0)$ from AMBROSINO 08G. NODE=M001R21;LINKAGE=AM

[33] Using ACHASOV 03, ACHASOV 03D and B($\omega \rightarrow \pi^+\pi^-$) = (1.70 ± 0.28)%. NODE=M001R;LINKAGE=VF

[34] Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\pi^+\pi^-\pi^0)/\Gamma^2_{total}$. NODE=M001R;LINKAGE=ZL

[35] Using $\Gamma(e^+e^-)$=0.60 ± 0.02 keV. 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. • • •					
8.09 ± 0.14		[36] AMBROSINO	08G	KLOE	$e^+e^- \rightarrow \pi^+\pi^-2\pi^0$, $2\pi^0\gamma$
$9.06\pm0.20\pm0.57$	18680	[37,38] AKHMETSHIN	05	CMD2	0.60-1.38 $e^+e^- \rightarrow \pi^0\gamma$
$9.34\pm0.15\pm0.31$	36500	[38] ACHASOV	03	SND	0.60–0.97 $e^+e^- \rightarrow \pi^0\gamma$
$8.65\pm0.16\pm0.42$	1.2M	[39,40] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$
8.39 ± 0.24	9975	[41] BENAYOUN	96	RVUE	$e^+e^- \rightarrow \pi^0\gamma$
8.88 ± 0.62	10625	[38] DOLINSKY	89	ND	$e^+e^- \rightarrow \pi^0\gamma$

[36] Not independent of $\Gamma(\pi^0\gamma)$ / $\Gamma(\pi^+\pi^-\pi^0)$ from AMBROSINO 08G. NODE=M001R28;LINKAGE=AM

[37] Using B($\omega \rightarrow e^+e^-$)= (7.14 ± 0.13) × 10^{-5}. NODE=M001R;LINKAGE=AH

[38] Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\pi^0\gamma)/\Gamma^2_{total}$. NODE=M001R;LINKAGE=VL

[39] Using ACHASOV 03, ACHASOV 03D and B($\omega \rightarrow \pi^+\pi^-$) = (1.70 ± 0.28)%. NODE=M001R28;LINKAGE=VF

[40] Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\pi^+\pi^-\pi^0)/\Gamma^2_{total}$. NODE=M001R28;LINKAGE=ZL

[41] Reanalysis of DRUZHININ 84, DOLINSKY 89, DOLINSKY 91 taking into account the triangle anomaly contributions. 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
9.28±0.31 OUR FIT Error includes scale factor of 2.3.				
9.05±0.27 OUR AVERAGE Error includes scale factor of 1.8.				
8.97 ± 0.16	AMBROSINO	08G	KLOE	$e^+e^- \rightarrow \pi^+\pi^-2\pi^0$, $2\pi^0\gamma$
$9.94\pm0.36\pm0.38$	[42] AULCHENKO	00A	SND	$e^+e^- \rightarrow \pi^+\pi^-2\pi^0$, $2\pi^0\gamma$
$8.4\ \pm1.3$	KEYNE	76	CNTR	$\pi^-p \rightarrow \omega n$
$10.9\ \pm2.5$	BENAKSAS	72C	OSPK	$e^+e^- \rightarrow \pi^0\gamma$
$8.1\ \pm2.0$	BALDIN	71	HLBC	2.9 π^+p
$13\ \ \pm4$	JACQUET	69B	HLBC	2.05 $\pi^+p \rightarrow \pi^+p\omega$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$9.7\ \pm0.2\ \pm0.5$	[43,44] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$
$9.9\ \pm0.7$	[43] DOLINSKY	89	ND	$e^+e^- \rightarrow \pi^0\gamma$

[42] 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
[43] Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\pi^0\gamma)/\Gamma^2_{\text{total}}$. NODE=M001R3;LINKAGE=VL
[44] Using ACHASOV 03. Based on 1.2M events. NODE=M001R3;LINKAGE=VW

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

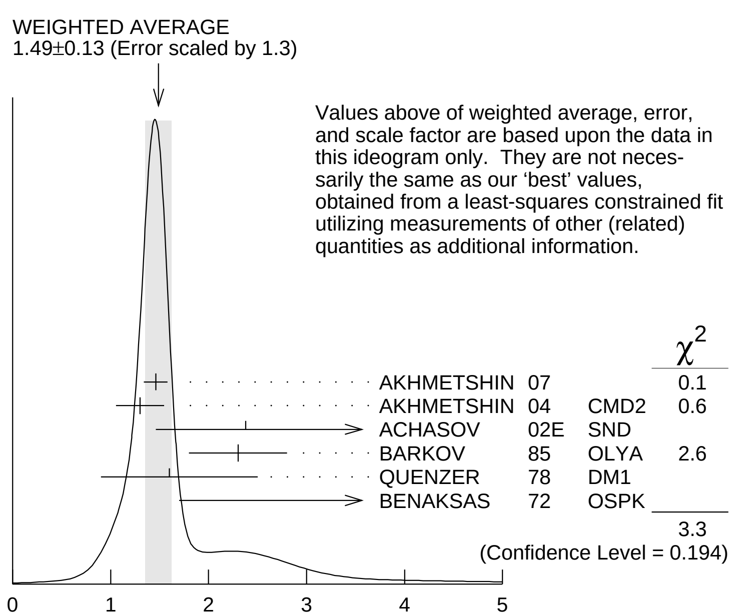
NODE=M001R15

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.					
$1.46\pm0.12\pm0.02$	900k	[45] AKHMETSHIN	07		$e^+e^- \to \pi^+\pi^-$
$1.30\pm0.24\pm0.05$	11.2k	[46] AKHMETSHIN	04	CMD2	$e^+e^- \to \pi^+\pi^-$
$2.38^{+1.77}_{-0.90}\pm0.18$	5.4k	[47] ACHASOV	02E	SND	1.1–1.38 $e^+e^- \to \pi^+\pi^-\pi^0$
$2.3\ \pm0.5$		BARKOV	85	OLYA	$e^+e^- \to \pi^+\pi^-$
$1.6\ ^{+0.9}_{-0.7}$		QUENZER	78	DM1	$e^+e^- \to \pi^+\pi^-$
$3.6\ \pm1.9$		BENAKSAS	72	OSPK	$e^+e^- \to \pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.75 ± 0.11	4.5M	[48] ACHASOV	05A	SND	$e^+e^- \to \pi^+\pi^-$
2.01 ± 0.29		[49] BENAYOUN	03	RVUE	$e^+e^- \to \pi^+\pi^-$
$1.9\ \pm0.3$		[50] GARDNER	99	RVUE	$e^+e^- \to \pi^+\pi^-$
$2.3\ \pm0.4$		[51] BENAYOUN	98	RVUE	$e^+e^- \to \pi^+\pi^-$, $\mu^+\mu^-$
$1.0\ \pm0.11$		[52] 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
$0.80^{+0.28}_{-0.20}$		[53] BIGGS	70B	CNTR	$4.2\gamma C \to \pi^+\pi^- C$

[45] A combined fit of AKHMETSHIN 07, AULCHENKO 06, and AULCHENKO 05. NODE=M001R15;LINKAGE=AK
[46] Update of AKHMETSHIN 02. NODE=M001R15;LINKAGE=PT
[47] From the $m_{\pi^+\pi^-}$ spectrum taking into account the interference of the $\rho\pi$ and $\omega\pi$ amplitudes. NODE=M001R;LINKAGE=VE
[48] Using $\Gamma(\omega \to e^+e^-)$ from the 2004 Edition of this Review (PDG 04). NODE=M001R;LINKAGE=SN
[49] Using the data of AKHMETSHIN 02 in the hidden local symmetry model. NODE=M001R;LINKAGE=BY
[50] Using the data of BARKOV 85. NODE=M001R15;LINKAGE=H4
[51] Using the data of BARKOV 85 in the hidden local symmetry model. NODE=M001R15;LINKAGE=Q
[52] From a model-dependent analysis assuming complete coherence. NODE=M001R15;LINKAGE=F
[53] 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



$\Gamma(\pi^+\pi^-)/\Gamma_{\text{total}}$ (units 10^{-2})

$\Gamma(\pi^+\pi^-)/\Gamma(\pi^+\pi^-\pi^0)$ 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 $^{+0.028}_{-0.009}$	[54,55] RATCLIFF 72	ASPK	15 $\pi^- p \to n 2\pi$
0.028 ±0.006	[54] BEHREND 71	ASPK	Photoproduction
0.022 $^{+0.009}_{-0.01}$	[56] ROOS 70	RVUE	

[54] 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

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

[56] 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	[57] ALOISIO 03	KLOE	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$

[57] 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		[58] DAKIN 72	OSPK	1.4 $\pi^- p \to n$MM
>0.81	90	DEINET 69B	OSPK	

[58] 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
4.6 ±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		[59] 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 $^{+2.5}_{-1.8}$		[60] ANDREWS 77	CNTR	6.7–10 γCu

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

4.3 $\pm$0.5 $\pm$0.1	33k	[61] ACHASOV	07B	SND	0.6–1.38 $e^+ e^- \to \eta\gamma$
4.44$^{+2.59}_{-1.83}$$\pm$0.28	17.4k	[62,63] AKHMETSHIN	05	CMD2	0.60-1.38 $e^+ e^- \to \eta\gamma$
5.10$\pm$0.72$\pm$0.34	23k	[64] AKHMETSHIN	01B	CMD2	$e^+ e^- \to \eta\gamma$
0.7 to 5.5		[65] CASE	00	CBAR	0.0 $p\overline{p} \to \eta\eta\gamma$
6.56$^{+2.41}_{-2.55}$	3525	[60,66] BENAYOUN	96	RVUE	$e^+ e^- \to \eta\gamma$
7.3 $\pm$2.9		[60,62] DOLINSKY	89	ND	$e^+ e^- \to \eta\gamma$

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

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

[61] ACHASOV 07B reports $[\Gamma(\omega(782) \to \eta\gamma)/\Gamma_{\rm total}] \times [B(\omega(782) \to e^+ e^-)] = (3.10 \pm 0.31 \pm 0.11) \times 10^{-8}$ which we divide by our best value $B(\omega(782) \to e^+ e^-) = (7.28 \pm 0.14) \times 10^{-5}$. 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

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

[63] 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

[64] 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 $\Gamma(e^+ e^-) \times \Gamma(\eta\gamma)/\Gamma^2_{\rm total}$. NODE=M001R19;LINKAGE=TS

[65] 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

[66] 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$\pm$0.0024	[67] ALDE	93	GAM2	$38\pi^- p \to \omega n$
0.0082$\pm$0.0033	[68] DOLINSKY	89	ND	$e^+ e^- \to \eta\gamma$
0.010 $\pm$0.045	APEL	72B	OSPK	4–8 $\pi^- p \to n 3\gamma$

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

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

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

NODE=M001R23
NODE=M001R23

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

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

NODE=M001R12
NODE=M001R12

VALUE (units 10^{-4})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1.3 $\pm$0.4 OUR FIT Error includes scale factor of 2.1.					
1.3 $\pm$0.4 OUR AVERAGE Error includes scale factor of 2.1.					
1.72$\pm$0.25$\pm$0.14	3k	ARNALDI	09	NA60	158*A* In−In collisions
0.96$\pm$0.23		DZHELYADIN	81B	CNTR	25–33 $\pi^- p \to \omega n$

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

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

NODE=M001R13
NODE=M001R13

VALUE (units 10^{-4})	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
0.728$\pm$0.014 OUR FIT Error includes scale factor of 1.3.				
• • • We do not use the following data for averages, fits, limits, etc. • • •				

0.700±0.016	11200	[69,70] AKHMETSHIN	04	CMD2	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
0.752±0.004±0.024	1.2M	[70,71] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$
0.714±0.036		[70] DOLINSKY	89	ND	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
0.72 ±0.03		[70] BARKOV	87	CMD	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
0.64 ±0.04	1488	[70] KURDADZE	83B	OLYA	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
0.675±0.069	433	[70] CORDIER	80	DM1	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
0.83 ±0.10	451	[70] BENAKSAS	72B	OSPK	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
0.77 ±0.06		[72] AUGUSTIN	69D	OSPK	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
0.65 ±0.13	33	[73] ASTVACAT...	68	OSPK	Assume SU(3)+mixing

[69] Using B($\omega \rightarrow \pi^+\pi^-\pi^0$) = 0.891 ± 0.007. Update of AKHMETSHIN 00C. NODE=M001R13;LINKAGE=4P

[70] Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\pi^+\pi^-\pi^0)/\Gamma^2_{total}$. NODE=M001R13;LINKAGE=ZL

[71] Using ACHASOV 03, ACHASOV 03D and B($\omega \rightarrow \pi^+\pi^-$) = (1.70 ± 0.28)%. NODE=M001R13;LINKAGE=VF

[72] Rescaled by us to correspond to ω width 8.4 MeV. Systematic errors underestimated. NODE=M001R13;LINKAGE=E

[73] 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	$e^+e^- \rightarrow \pi^+\pi^-\pi^0\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<200	90	KURDADZE	86	OLYA	$e^+e^- \rightarrow \pi^+\pi^-\pi^0\pi^0$

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

NODE=M001R22
NODE=M001R22

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

$\Gamma(\pi^+\pi^-\gamma)/\Gamma(\pi^+\pi^-\pi^0)$ — 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 $K^- p \rightarrow \Lambda\pi^+\pi^-\gamma$
<0.05	90	FLATTE	66	HBC	1.2 – 1.7 $K^- p \rightarrow \Lambda\pi^+\pi^-\gamma$

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

NODE=M001R24
NODE=M001R24

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

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

NODE=M001R29
NODE=M001R29

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
6.6±1.1 OUR FIT					
6.5±1.2 OUR AVERAGE					
$6.4^{+2.4}_{-2.0}$±0.8	190	[74] AKHMETSHIN	04B	CMD2	0.6–0.97 $e^+e^- \rightarrow \pi^0\pi^0\gamma$
$6.6^{+1.4}_{-1.3}$±0.6	295	ACHASOV	02F	SND	0.36–0.97 $e^+e^- \rightarrow \pi^0\pi^0\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$11.8^{+2.1}_{-1.9}$±1.4	190	[75] AKHMETSHIN	04B	CMD2	0.6–0.97 $e^+e^- \rightarrow \pi^0\pi^0\gamma$ OCCUR=2
7.8±2.7±2.0	63	[74,76] ACHASOV	00G	SND	$e^+e^- \rightarrow \pi^0\pi^0\gamma$
12.7±2.3±2.5	63	[75,76] ACHASOV	00G	SND	$e^+e^- \rightarrow \pi^0\pi^0\gamma$ OCCUR=2

[74] In the model assuming the $\rho \rightarrow \pi^0\pi^0\gamma$ decay via the $\omega\pi$ and $f_0(500)\gamma$ mechanisms. NODE=M001R29;LINKAGE=A

[75] In the model assuming the $\rho \rightarrow \pi^0\pi^0\gamma$ decay via the $\omega\pi$ mechanism only. NODE=M001R29;LINKAGE=B

[76] Superseded by ACHASOV 02F. 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	$e^+e^- \rightarrow \pi^0\pi^0\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.08	95	JACQUET	69B	HLBC	2.05 $\pi^+ p \rightarrow \pi^+ p\omega$

$\Gamma(\pi^0\pi^0\gamma)/\Gamma(\pi^0\gamma)$ 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		[77] DAKIN	72	OSPK	1.4 $\pi^- p \to n$ MM
<0.19	90	DEINET	69B	OSPK	

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

NODE=M001R17;LINKAGE=D

$\Gamma(\eta\pi^0\gamma)/\Gamma_{\text{total}}$ 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 $e^+e^- \to \eta\pi^0\gamma$

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

NODE=M001R30
NODE=M001R30

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
9.0±3.1 OUR FIT					
9.0±2.9±1.1	18	HEISTER	02C	ALEP	$Z \to \mu^+\mu^- + X$

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

NODE=M001R6
NODE=M001R6

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.2	90	WILSON	69	OSPK	12 π^- C $\to$ 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
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	[78] DZHELYADIN	79	CNTR	25–33 $\pi^- p$

[78] Superseded by DZHELYADIN 81B result above.

NODE=M001R20;LINKAGE=S

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

NODE=M001R27
NODE=M001R27

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.9	95	[79] ABELE	97E	CBAR	0.0 $\overline{p}p \to 5\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<2	90	[79] PROKOSHKIN	95	GAM2	38 $\pi^- p \to 3\gamma n$

[79] From direct 3γ decay search.

NODE=M001R27;LINKAGE=A

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

NODE=M001R25

Violates C conservation.

NODE=M001R25
NODE=M001R25

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
NODE=M001R8

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.016	90	[80] 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 $\pi^+ p \to \pi^+ p\omega$

[80] 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.

NODE=M001R35
NODE=M001R35

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<2.6	90	[81] STAROSTIN	09	CRYM	$\gamma p \rightarrow \eta\pi^0 p$

[81] STAROSTIN 09 reports $[\Gamma(\omega(782) \rightarrow \eta\pi^0)/\Gamma(\omega(782) \rightarrow \pi^0\gamma)] \times [B(\eta \rightarrow 2\gamma)] < 1.01 \times 10^{-3}$ which we divide by our best value $B(\eta \rightarrow 2\gamma) = 39.31 \times 10^{-2}$.

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.

NODE=M001R36
NODE=M001R36

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

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

NODE=M001R26

Violates C conservation.

NODE=M001R26
NODE=M001R26

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 $\pi^- p \rightarrow 3\pi^0 n$

$\Gamma(3\pi^0)/\Gamma(\pi^0\gamma)$ 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	$\gamma p \rightarrow 3\pi^0 p$

$\Gamma(3\pi^0)/\Gamma(\pi^+\pi^-\pi^0)$ 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 $pp \rightarrow p_f 3\pi^0 p_s$

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

NODE=M001LAM

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

NODE=M001LAM

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

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 $\eta \rightarrow \mu^+\mu^-\gamma$ decay ARNALDI 09 and DZHELYADIN 80 obtain the value of Λ consistent with vector dominance.

NODE=M001LAM

VALUE (GeV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.668±0.009±0.003	3k	ARNALDI	09	NA60	158A In−In collisions
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.65 ±0.03		DZHELYADIN	81B	CNTR	25–33 $\pi^- p \rightarrow \omega n$

ω(782) REFERENCES

NODE=M001

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
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. 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
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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
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AKHMETSHIN 02 PL B527 161 R.R. Akhmetshin *et al.* (Novosibirsk CMD-2 Collab.) REFID=48565
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HEISTER 02C PL B528 19 A. Heister *et al.* (ALEPH Collab.) REFID=48564
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ACHASOV 00D JETPL 72 282 M.N. Achasov *et al.* (Novosibirsk SND Collab.) REFID=47882
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ACHASOV 00G JETPL 71 355 M.N. Achasov *et al.* (Novosibirsk SND Collab.) REFID=47929
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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
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CASE 00 PR D61 032002 T. Case *et al.* (Crystal Barrel Collab.) REFID=47409
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GARDNER 99 PR D59 076002 S. Gardner, H.B. O'Connell REFID=46919
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ANTONELLI 92 ZPHY C56 15 A. Antonelli *et al.* (DM2 Collab.) REFID=43168
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KEYNE 76 PR D14 28 J. Keyne *et al.* (LOIC, SHMP) REFID=20226
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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
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 $pd \to {}^3\mathrm{He}\eta'$
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
0.199±0.009 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 $pd \to {}^3\mathrm{He}\eta'$
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	$\pi^+\pi^-\eta$	(43.4 ±0.7) %		DESIG=1
Γ_2	$\rho^0\gamma$ (including non-resonant $\pi^+\pi^-\gamma$)	(29.3 ±0.6) %		DESIG=9
Γ_3	$\pi^0\pi^0\eta$	(21.6 ±0.8) %		DESIG=2
Γ_4	$\omega\gamma$	(2.75±0.22) %		DESIG=7
Γ_5	$\gamma\gamma$	(2.18±0.08) %		DESIG=6
Γ_6	$3\pi^0$	(1.68±0.22) $\times 10^{-3}$		DESIG=8
Γ_7	$\mu^+\mu^-\gamma$	(1.07±0.26) $\times 10^{-4}$		DESIG=20
Γ_8	$\pi^+\pi^-\mu^+\mu^-$	< 2.2 $\times 10^{-4}$	90%	DESIG=201
Γ_9	$\pi^+\pi^-\pi^0$	(3.6 $^{+1.1}_{-0.9}$) $\times 10^{-3}$		DESIG=121
Γ_{10}	$\pi^0\rho^0$	< 4 %	90%	DESIG=18
Γ_{11}	$2(\pi^+\pi^-)$	< 2.4 $\times 10^{-4}$	90%	DESIG=131
Γ_{12}	$\pi^+\pi^-2\pi^0$	< 2.6 $\times 10^{-3}$	90%	DESIG=202
Γ_{13}	$2(\pi^+\pi^-)$ neutrals	< 1 %	95%	DESIG=132
Γ_{14}	$2(\pi^+\pi^-)\pi^0$	< 1.9 $\times 10^{-3}$	90%	DESIG=141
Γ_{15}	$2(\pi^+\pi^-)2\pi^0$	< 1 %	95%	DESIG=15
Γ_{16}	$3(\pi^+\pi^-)$	< 5 $\times 10^{-4}$	90%	DESIG=203
Γ_{17}	$\pi^+\pi^-e^+e^-$	(2.4 $^{+1.3}_{-1.0}$) $\times 10^{-3}$		DESIG=10
Γ_{18}	γe^+e^-	< 9 $\times 10^{-4}$	90%	DESIG=28
Γ_{19}	$\pi^0\gamma\gamma$	< 8 $\times 10^{-4}$	90%	DESIG=24
Γ_{20}	$4\pi^0$	< 5 $\times 10^{-4}$	90%	DESIG=26
Γ_{21}	e^+e^-	< 2.1 $\times 10^{-7}$	90%	DESIG=150
Γ_{22}	invisible	< 9 $\times 10^{-4}$	90%	DESIG=200

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

NODE=M002;CLUMP=B

Γ_{23}	$\pi^+\pi^-$	P,CP		< 6	$\times 10^{-5}$	90%	DESIG=111
Γ_{24}	$\pi^0\pi^0$	P,CP		< 4	$\times 10^{-4}$	90%	DESIG=25
Γ_{25}	$\pi^0 e^+ e^-$	C	[a]	< 1.4	$\times 10^{-3}$	90%	DESIG=16
Γ_{26}	$\eta e^+ e^-$	C	[a]	< 2.4	$\times 10^{-3}$	90%	DESIG=17
Γ_{27}	3γ	C		< 1.0	$\times 10^{-4}$	90%	DESIG=23
Γ_{28}	$\mu^+\mu^-\pi^0$	C	[a]	< 6.0	$\times 10^{-5}$	90%	DESIG=22
Γ_{29}	$\mu^+\mu^-\eta$	C	[a]	< 1.5	$\times 10^{-5}$	90%	DESIG=21
Γ_{30}	$e\mu$	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 13 branching ratios uses 40 measurements and one constraint to determine 9 parameters. The overall fit has a $\chi^2 = 31.5$ for 32 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_1	x_2	x_3	x_4	x_5	x_6	x_9	x_{17}
x_2	1							
x_3	−76	−57						
x_4	−20	−24	6					
x_5	−31	−26	35	0				
x_6	−23	−17	28	1	10			
x_9	−1	−5	−7	−3	−4	−2		
x_{17}	−4	−6	−5	−2	−3	−2	−1	
Γ	26	5	−21	4	−72	−6	4	3

	Mode	Rate (MeV)	
Γ_1	$\pi^+\pi^-\eta$	0.086 ± 0.004	DESIG=1
Γ_2	$\rho^0\gamma$ (including non-resonant $\pi^+\pi^-\gamma$)	0.0583 ± 0.0028	DESIG=9
Γ_3	$\pi^0\pi^0\eta$	0.0430 ± 0.0022	DESIG=2
Γ_4	$\omega\gamma$	0.0055 ± 0.0005	DESIG=7
Γ_5	$\gamma\gamma$	0.00434 ± 0.00013	DESIG=6
Γ_6	$3\pi^0$	$(3.3 \pm 0.5) \times 10^{-4}$	DESIG=8
Γ_9	$\pi^+\pi^-\pi^0$	$(7.2 {}^{+2.2}_{-1.9}) \times 10^{-4}$	DESIG=121
Γ_{17}	$\pi^+\pi^- e^+ e^-$	$(4.8 {}^{+2.6}_{-1.9}) \times 10^{-4}$	DESIG=10

$\eta'(958)$ PARTIAL WIDTHS

NODE=M002220

$\Gamma(\gamma\gamma)$ Γ_5

NODE=M002W4
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	[4] 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		[5] 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	[6] 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	[7] 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	[8] GIDAL	87	MRK2	$e^+e^- \rightarrow e^+e^-\eta\pi^+\pi^-$
4.0 ±0.9		[9] BARTEL	85E	JADE	$e^+e^- \rightarrow e^+e^-2\gamma$

[4] No non-resonant $\pi^+\pi^-$ contribution found. NODE=M002W4;LINKAGE=AC
[5] Reevaluated by us using B($\eta' \rightarrow \rho(770)\gamma$) = (30.2 ± 1.3)%. NODE=M002W4;LINKAGE=K1
[6] Reevaluated by us using B($\eta' \rightarrow \gamma\gamma$) = (2.11 ± 0.13)%. NODE=M002W4;LINKAGE=K2
[7] Reevaluated by us using B($\eta' \rightarrow \gamma\gamma$) = (2.11 ± 0.13)%. NODE=M002W4;LINKAGE=K3
[8] Superseded by BUTLER 90. NODE=M002W4;LINKAGE=C
[9] Systematic error not evaluated. NODE=M002W4;LINKAGE=A

η'(958) Γ(i)Γ($\gamma\gamma$)/Γ(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

Γ($\gamma\gamma$) × Γ($\rho^0\gamma$(including non-resonant $\pi^+\pi^-\gamma$))/Γ$_{total}$ — Γ$_5$Γ$_2$/Γ NODE=M002G1

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

Γ($\gamma\gamma$) × Γ($\pi^0\pi^0\eta$)/Γ$_{total}$ — Γ$_5$Γ$_3$/Γ NODE=M002G2

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
0.94±0.05 OUR FIT				
0.92±0.06±0.11	[10] KARCH	92	CBAL	$e^+e^- \rightarrow e^+e^-\eta\pi^0\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.95±0.05±0.08	[11] KARCH	90	CBAL	$e^+e^- \rightarrow e^+e^-\eta\pi^0\pi^0$
1.00±0.08±0.10	[11,12] ANTREASYAN	87	CBAL	$e^+e^- \rightarrow e^+e^-\eta\pi^0\pi^0$

[10] Reevaluated by us using B($\eta \rightarrow \gamma\gamma$) = (39.21 ± 0.34)%. Supersedes ANTREASYAN 87 and KARCH 90. NODE=M002G2;LINKAGE=K4
[11] Superseded by KARCH 92. NODE=M002G2;LINKAGE=A
[12] Using BR($\eta \rightarrow 2\gamma$)=(38.9 ± 0.5)%. NODE=M002G2;LINKAGE=D

η'(958) → $\eta\pi\pi$ DECAY PARAMETERS NODE=M002225

|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 $\eta'(958) \rightarrow \eta\pi^+\pi^-$ and $\eta'(958) \rightarrow \eta\pi^0\pi^0$ 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(α) decay parameter NODE=M002A0

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
−0.033±0.005±0.003	44k	[13] ABLIKIM	11	BES3	$J/\psi \rightarrow \gamma\eta\pi^+\pi^-$
−0.072±0.012±0.006	7k	[14] AMELIN	05A	VES	28 $\pi^- A \rightarrow \eta\pi^+\pi^-\pi^- A^*$
−0.021±0.018±0.017	6.7k	[15] BRIERE	00	CLEO	10.6 $e^+e^- \rightarrow \eta\pi^+\pi^- X$
−0.058±0.013±0.003	5.4k	[16] ALDE	86	GAM2	38 $\pi^- p \rightarrow n\eta\pi^0\pi^0$
−0.08 ±0.03		[16,17] KALBFLEISCH	74	RVUE	$\eta' \rightarrow \eta\pi^+\pi^-$

[13] See ABLIKIM 11 for the full correlation matrix. NODE=M002A0;LINKAGE=AB
[14] Superseded by DOROFEEV 07, which found this parameterization unacceptable. See below. NODE=M002A0;LINKAGE=AM
[15] Assuming Im(α) = 0, C = 0, and D = 0. NODE=M002A0;LINKAGE=BR
[16] Assuming C = 0. NODE=M002A0;LINKAGE=A
[17] 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. • • •				
$0.000 \pm 0.049 \pm 0.001$	44k	[18] ABLIKIM 11	BES3	$J/\psi \to \gamma\eta\pi^+\pi^-$
$0.0 \pm 0.1 \pm 0.0$	7k	[19] AMELIN 05A	VES	$28\ \pi^- A \to \eta\pi^+\pi^-\pi^- A^*$
$-0.00 \pm 0.13 \pm 0.00$	5.4k	[20] ALDE 86	GAM2	$38\ \pi^- p \to n\eta\pi^0\pi^0$
0.0 ± 0.3		[20,21] KALBFLEISCH 74	RVUE	$\eta' \to \eta\pi^+\pi^-$

[18] See ABLIKIM 11 for the full correlation matrix. NODE=M002IA0;LINKAGE=AB
[19] Superseded by DOROFEEV 07, which found this parameterization unacceptable. See below. NODE=M002IA0;LINKAGE=AM
[20] Assuming $C = 0$. NODE=M002IA0;LINKAGE=A
[21] 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

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$+0.018 \pm 0.009 \pm 0.003$	44k	[22] ABLIKIM 11	BES3	$J/\psi \to \gamma\eta\pi^+\pi^-$
$0.020 \pm 0.018 \pm 0.004$	7k	[23] AMELIN 05A	VES	$28\ \pi^- A \to \eta\pi^+\pi^-\pi^- A^*$

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

D decay parameter

NODE=M002D0

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$-0.059 \pm 0.012 \pm 0.004$	44k	[24] ABLIKIM 11	BES3	$J/\psi \to \gamma\eta\pi^+\pi^-$
$-0.066 \pm 0.030 \pm 0.015$	7k	[25] AMELIN 05A	VES	$28\ \pi^- A \to \eta\pi^+\pi^-\pi^- A^*$
$0.00 \pm 0.03 \pm 0.00$	5.4k	[26] ALDE 86	GAM2	$38\ \pi^- p \to n\eta\pi^0\pi^0$
0		[26,27] KALBFLEISCH 74	RVUE	$\eta' \to \eta\pi^+\pi^-$

[24] See ABLIKIM 11 for the full correlation matrix. NODE=M002D0;LINKAGE=AB
[25] Superseded by DOROFEEV 07, which found this parameterization unacceptable. See below. NODE=M002D0;LINKAGE=AM
[26] Assuming $C = 0$. NODE=M002D0;LINKAGE=AL
[27] 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

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$-0.047 \pm 0.011 \pm 0.003$	44k	[28] ABLIKIM 11	BES3	$J/\psi \to \gamma\eta\pi^+\pi^-$
$-0.066 \pm 0.016 \pm 0.003$	15k	[29] BLIK 09	GAM4	$32.5\ \pi^- p \to \eta' n$
$-0.127 \pm 0.016 \pm 0.008$	20k	[30] DOROFEEV 07	VES	$27\ \pi^- p \to \eta' n$, $\pi^- A \to \eta'\pi^- A^*$

[28] See ABLIKIM 11 for the full correlation matrix. NODE=M002DPA;LINKAGE=AB
[29] From $\eta' \to \eta\pi^0\pi^0$ decay. NODE=M002DPA;LINKAGE=BL
[30] From $\eta' \to \eta\pi^+\pi^-$ decay. NODE=M002DPA;LINKAGE=DO

b decay parameter

NODE=M002DPB

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$-0.069 \pm 0.019 \pm 0.009$	44k	[31] ABLIKIM 11	BES3	$J/\psi \to \gamma\eta\pi^+\pi^-$
$-0.063 \pm 0.028 \pm 0.004$	15k	[32] BLIK 09	GAM4	$32.5\ \pi^- p \to \eta' n$
$-0.106 \pm 0.028 \pm 0.014$	20k	[33] DOROFEEV 07	VES	$27\ \pi^- p \to \eta' n$, $\pi^- A \to \eta'\pi^- A^*$

[31] See ABLIKIM 11 for the full correlation matrix. NODE=M002DPB;LINKAGE=AB
[32] From $\eta' \to \eta\pi^0\pi^0$ decay. NODE=M002DPB;LINKAGE=BL
[33] 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. • • •					
$+0.019\pm0.011\pm0.003$	44k	[34] ABLIKIM	11	BES3	$J/\psi \to \gamma\eta\pi^+\pi^-$
$-0.107\pm0.096\pm0.003$	15k	[35] BLIK	09	GAM4	32.5 $\pi^- p \to \eta' n$
$0.015\pm0.011\pm0.014$	20k	[36] DOROFEEV	07	VES	27 $\pi^- p \to \eta' n$, $\pi^- A \to \eta'\pi^- A^*$

[34] See ABLIKIM 11 for the full correlation matrix. NODE=M002DPC;LINKAGE=AB
[35] From $\eta' \to \eta\pi^0\pi^0$ decay. NODE=M002DPC;LINKAGE=BL
[36] 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. • • •					
$-0.073\pm0.012\pm0.003$	44k	[37] ABLIKIM	11	BES3	$J/\psi \to \gamma\eta\pi^+\pi^-$
$0.018\pm0.078\pm0.006$	15k	[38] BLIK	09	GAM4	32.5 $\pi^- p \to \eta' n$
$-0.082\pm0.017\pm0.008$	20k	[39] DOROFEEV	07	VES	27 $\pi^- p \to \eta' n$, $\pi^- A \to \eta'\pi^- A^*$

[37] See ABLIKIM 11 for the full correlation matrix. NODE=M002DPD;LINKAGE=AB
[38] 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
[39] 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
-0.46 ± 0.22 OUR AVERAGE	Error includes scale factor of 1.4.				
-0.59 ± 0.18	235	BLIK	08	GAMS	32 $\pi^- p \to \eta' n$
$-0.1\ \pm0.3$		ALDE	87B	GAM2	38 $\pi^- p \to n3\pi^0$

$\eta'(958)$ BRANCHING RATIOS

NODE=M002230

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

NODE=M002R47
NODE=M002R47

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.434 ± 0.007 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.424\pm0.011\pm0.004$	1.2k	[40] PEDLAR	09	CLEO	$J/\psi \to \gamma\eta'$

[40] Not independent of other η' branching fractions and ratios in PEDLAR 09. NODE=M002R47;LINKAGE=PE

$\Gamma(\pi^+\pi^-\eta(\text{charged decay}))/\Gamma_{total}$ — $0.286\Gamma_1/\Gamma$

NODE=M002R3
NODE=M002R3

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.1240 ± 0.0020 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.123\ \pm0.014$	107	RITTENBERG	69	HBC	1.7–2.7 $K^- p$
$0.10\ \ \pm0.04$	10	LONDON	66	HBC	2.24 $K^- p \to \Lambda 2\pi^+ 2\pi^- \pi^0$
$0.07\ \ \pm0.04$	7	BADIER	65B	HBC	3 $K^- p$

$\Gamma(\pi^+\pi^-\eta(\text{neutral decay}))/\Gamma_{total}$ — $0.714\Gamma_1/\Gamma$

NODE=M002R1
NODE=M002R1

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.310 ± 0.005 OUR FIT					
• • • 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
NODE=M002R6

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.293 ± 0.006 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.287\pm0.007\pm0.004$	0.2k	[41] PEDLAR	09	CLEO	$J/\psi \to \gamma\eta'$
0.329 ± 0.033	298	RITTENBERG	69	HBC	1.7–2.7 $K^- p$
$0.2\ \ \ \pm0.1$	20	LONDON	66	HBC	2.24 $K^- p \to \Lambda\pi^+\pi^-\gamma$
$0.34\ \ \pm0.09$	35	BADIER	65B	HBC	3 $K^- p$

[41] Not independent of other η' branching fractions and ratios in PEDLAR 09. NODE=M002R6;LINKAGE=PE

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

NODE=M002R43

VALUE	DOCUMENT ID		TECN	COMMENT
0.676±0.017 OUR FIT				
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
0.947±0.024 OUR FIT					
0.97 ±0.09 OUR AVERAGE					
0.70 ±0.22		AMSLER	04B	CBAR	$0\ \overline{p}p \to \pi^+\pi^-\eta$
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	$2.9\ K^-p \to \Lambda X^0$

$\Gamma(\pi^0\pi^0\eta)/\Gamma_{\text{total}}$ Γ_3/Γ

NODE=M002R48

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.216±0.008 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.235±0.013±0.004	3.2k	[42] PEDLAR	09	CLEO	$J/\psi \to \gamma\eta'$

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

NODE=M002R48;LINKAGE=PE

$\Gamma(\pi^0\pi^0\eta(3\pi^0\text{ decay}))/\Gamma_{\text{total}}$ $0.321\Gamma_3/\Gamma$

NODE=M002R26

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0694±0.0026 OUR FIT					
• • • 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_3/Γ_1

NODE=M002R45

VALUE	DOCUMENT ID		TECN	COMMENT
0.498±0.025 OUR FIT				
0.555±0.043±0.013	PEDLAR	09	CLE3	$J/\psi \to \eta'\gamma$

$\Gamma(\rho^0\gamma(\text{including non-resonant } \pi^+\pi^-\gamma))/\Gamma(\pi\pi\eta)$ $\Gamma_2/(\Gamma_1+\Gamma_3)$

NODE=M002R7

VALUE	DOCUMENT ID		TECN	COMMENT
0.451±0.012 OUR FIT				
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	$5.5\ K^-p$

$\Gamma(\omega\gamma)/\Gamma_{\text{total}}$ Γ_4/Γ

NODE=M002R49

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0275±0.0022 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.0234±0.0030±0.0004	70	[43] PEDLAR	09	CLEO	$J/\psi \to \gamma\eta'$

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

NODE=M002R49;LINKAGE=PE

$\Gamma(\omega\gamma)/\Gamma(\pi^+\pi^-\eta)$ Γ_4/Γ_1

NODE=M002R17

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.063±0.005 OUR FIT					
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_4/Γ_3

NODE=M002R33

VALUE	DOCUMENT ID		TECN	COMMENT
0.127±0.011 OUR FIT				
0.147±0.016	ALDE	87B	GAM2	$38\ \pi^-p \to n4\gamma$

$\Gamma(\rho^0\gamma(\text{including non-resonant } \pi^+\pi^-\gamma))/[\Gamma(\pi^+\pi^-\eta)+\Gamma(\pi^0\pi^0\eta)+\Gamma(\omega\gamma)]$ $\Gamma_2/(\Gamma_1+\Gamma_3+\Gamma_4)$

NODE=M002R18

VALUE	DOCUMENT ID		TECN	COMMENT
0.433±0.012 OUR FIT				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.25 ±0.14	DAUBER	64	HBC	$1.95\ K^-p$

$\left[\Gamma(\pi^0\pi^0\eta(\text{charged decay})) + \Gamma(\omega(\text{charged decay})\gamma)\right]/\Gamma_{\text{total}}$ $(0.286\Gamma_3+0.89\Gamma_4)/\Gamma$

NODE=M002R4

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0863±0.0032 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.045 ±0.029	42	RITTENBERG	69	HBC	1.7–2.7 $K^- p$

$\Gamma(\pi^+\pi^-\text{neutrals})/\Gamma_{\text{total}}$ $(0.714\Gamma_1+0.286\Gamma_3+0.89\Gamma_4)/\Gamma$

NODE=M002R2

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.396±0.004 OUR FIT					
• • • 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 $K^- p$

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

NODE=M002R19

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
2.18±0.08 OUR FIT					
2.00±0.15 OUR AVERAGE					
$1.98^{+0.31}_{-0.27}\pm0.07$	114	[44] WICHT	08	BELL	$B^\pm \to K^\pm\gamma\gamma$
2.00±0.18		[45] 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	[46] PEDLAR	09	CLEO	$J/\psi \to \gamma\eta'$
1.8 ±0.2	6000	[47] APEL	79	NICE	15–40 $\pi^- p \to n2\gamma$
2.5 ±0.7		DUANE	74	MMS	$\pi^- p \to n$MM
1.71±0.33	68	DALPIAZ	72	CNTR	1.6 $\pi^- p \to nX^0$
$2.0\ ^{+0.8}_{-0.6}$	31	HARVEY	71	OSPK	3.65 $\pi^- p \to nX^0$

[44] WICHT 08 reports $[\Gamma(\eta'(958) \to \gamma\gamma)/\Gamma_{\text{total}}] \times [B(B^+ \to \eta' K^+)] = (1.40^{+0.16}_{-0.15}{}^{+0.15}_{-0.12}) \times 10^{-6}$ which we divide by our best value $B(B^+ \to \eta' K^+) = (7.06 \pm 0.25) \times 10^{-5}$. 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

[45] Includes APEL 79 result. NODE=M002R19;LINKAGE=S

[46] Not independent of other η' branching fractions and ratios in PEDLAR 09. NODE=M002R19;LINKAGE=PE

[47] Data is included in STANTON 80 evaluation. NODE=M002R19;LINKAGE=A

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

NODE=M002R46

VALUE	DOCUMENT ID		TECN	COMMENT
0.0503±0.0022 OUR FIT				
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_5/Γ_2

NODE=M002R42

VALUE	DOCUMENT ID		TECN	COMMENT
0.0744±0.0033 OUR FIT				
0.080 ±0.008	ABLIKIM	06E	BES2	$J/\psi \to \eta'\gamma$

$\Gamma(\gamma\gamma)/\Gamma(\pi^0\pi^0\eta)$ Γ_5/Γ_3

NODE=M002R38

VALUE	DOCUMENT ID		TECN	COMMENT
0.101±0.004 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 $\pi^- p \to n2\gamma$

$\Gamma(\gamma\gamma)/\Gamma(\pi^0\pi^0\eta(\text{neutral decay}))$ $\Gamma_5/0.714\Gamma_3$

NODE=M002R28

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.141±0.006 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.188±0.058	16	APEL	72	OSPK	3.8 $\pi^- p \to nX^0$

$\Gamma(\text{neutrals})/\Gamma_{\text{total}}$ $(0.714\Gamma_3+0.09\Gamma_4+\Gamma_5)/\Gamma$

NODE=M002R5

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.179±0.006 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.185±0.022	535	BASILE	71	CNTR	1.6 $\pi^- p \to nX^0$
0.189±0.026	123	RITTENBERG	69	HBC	1.7–2.7 $K^- p$

$\Gamma(3\pi^0)/\Gamma(\pi^0\pi^0\eta)$ — Γ_6/Γ_3

NODE=M002R32
NODE=M002R32

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
78±10 OUR FIT					
78±10 OUR AVERAGE					
86±19	235	BLIK	08	GAMS	32 $\pi^- p \to \eta' n$
74±15		ALDE	87B	GAM2	38 $\pi^- p \to n 6\gamma$
75±18		BINON	84	GAM2	30–40 $\pi^- p \to n 6\gamma$

$\Gamma(\mu^+\mu^-\gamma)/\Gamma(\gamma\gamma)$ — Γ_7/Γ_5

NODE=M002R29
NODE=M002R29

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

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

NODE=M002R50
NODE=M002R50

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<2.4	90	[48] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$

[48] Not independent of measured value of Γ_8/Γ_1 from NAIK 09.

NODE=M002R50;LINKAGE=NA

$\Gamma(\pi^+\pi^-\mu^+\mu^-)/\Gamma(\pi^+\pi^-\eta)$ — Γ_8/Γ_1

NODE=M002R03
NODE=M002R03

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.5	90	[49] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$

[49] NAIK 09 reports $[\Gamma(\eta'(958) \to \pi^+\pi^-\mu^+\mu^-)/\Gamma(\eta'(958) \to \pi^+\pi^-\eta)]$ / $[B(\eta \to 2\gamma)] < 1.3 \times 10^{-3}$ which we multiply by our best value $B(\eta \to 2\gamma) = 39.31 \times 10^{-2}$.

NODE=M002R03;LINKAGE=NA

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

NODE=M002R21
NODE=M002R21

VALUE (units 10^{-2})	CL%	DOCUMENT ID		TECN	COMMENT
$0.36^{+0.11}_{-0.09}$ OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.37^{+0.11}_{-0.09}\pm0.04$		[50] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$
<9	95	DANBURG	73	HBC	2.2 $K^- p \to \Lambda X^0$
<5	90	RITTENBERG	69	HBC	1.7–2.7 $K^- p$

[50] Not independent of measured value of Γ_9/Γ_1 from NAIK 09.

NODE=M002R21;LINKAGE=NA

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma(\pi^+\pi^-\eta)$ — Γ_9/Γ_1

NODE=M002R01
NODE=M002R01

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
$8.3^{+2.5}_{-2.1}$ OUR FIT					
$8.26^{+2.49}_{-2.12}\pm0.04$	20	[51] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$

[51] 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 $B(\eta \to 2\gamma) = (39.31 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M002R01;LINKAGE=NA

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

NODE=M002R10
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_{11}/Γ

NODE=M002R24
NODE=M002R24

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 2.4	90	[52] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$
<100	90	RITTENBERG	69	HBC	1.7–2.7 $K^- p$

[52] Not independent of measured value of Γ_{11}/Γ_1 from NAIK 09.

NODE=M002R24;LINKAGE=NA

$\Gamma(2(\pi^+\pi^-))/\Gamma(\pi^+\pi^-\eta)$ — Γ_{11}/Γ_1

NODE=M002R04
NODE=M002R04

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.6	90	[53] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$

[53] 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 $B(\eta \to 2\gamma) = 39.31 \times 10^{-2}$.

NODE=M002R04;LINKAGE=NA

$\Gamma(\pi^+\pi^-2\pi^0)/\Gamma_{total}$ — Γ_{12}/Γ

NODE=M002R51

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<27	90	[54] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$

[54] Not independent of measured value of Γ_{12}/Γ_1 from NAIK 09. NODE=M002R51;LINKAGE=NA

$\Gamma(\pi^+\pi^-2\pi^0)/\Gamma(\pi^+\pi^-\eta)$ — Γ_{12}/Γ_1

NODE=M002R05

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<6	90	[55] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$

[55] 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 $B(\eta \to 2\gamma) = 39.31 \times 10^{-2}$. NODE=M002R05;LINKAGE=NA

$\Gamma(2(\pi^+\pi^-)\text{ neutrals})/\Gamma_{total}$ — Γ_{13}/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_{14}/Γ

NODE=M002R23

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.002	90	[56] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$
<0.01	90	RITTENBERG	69	HBC	1.7–2.7 $K^- p$

[56] Not independent of measured value of Γ_{14}/Γ_1 from NAIK 09. NODE=M002R23;LINKAGE=NA

$\Gamma(2(\pi^+\pi^-)\pi^0)/\Gamma(\pi^+\pi^-\eta)$ — Γ_{14}/Γ_1

NODE=M002R06

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<4	90	[57] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$

[57] 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 $B(\eta \to 2\gamma) = 39.31 \times 10^{-2}$. NODE=M002R06;LINKAGE=NA

$\Gamma(2(\pi^+\pi^-)2\pi^0)/\Gamma_{total}$ — Γ_{15}/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_{16}/Γ

NODE=M002R07

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.53	90	[58] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$
<5	95	KALBFLEISCH	64B	HBC	$K^- p \to \Lambda 2(\pi^+\pi^-)$

[58] Not independent of measured value of Γ_{16}/Γ_1 from NAIK 09. NODE=M002R07;LINKAGE=NA

$\Gamma(3(\pi^+\pi^-))/\Gamma(\pi^+\pi^-\eta)$ — Γ_{16}/Γ_1

NODE=M002R08

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<1.2	90	[59] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$

[59] 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 $B(\eta \to 2\gamma) = 39.31 \times 10^{-2}$. NODE=M002R08;LINKAGE=NA

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

NODE=M002R12

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
$2.4^{+1.3}_{-1.0}$ OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$2.5^{+1.2}_{-0.9}\pm0.5$		[60] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$
<6	90	RITTENBERG	65	HBC	2.7 $K^- p$

[60] Not independent of measured value of Γ_{17}/Γ_1 from NAIK 09. NODE=M002R12;LINKAGE=NA

$\Gamma(\pi^+\pi^- e^+ e^-)/\Gamma(\pi^+\pi^-\eta)$ — Γ_{17}/Γ_1

NODE=M002R02

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
$5.6\ ^{+3.0}_{-2.2}$ OUR FIT				
$5.50^{+2.99}_{-2.29}\pm0.03$	8	[61] NAIK 09	CLEO	$J/\psi \to \gamma\eta'$

[61] 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 $B(\eta \to 2\gamma) = (39.31 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M002R02;LINKAGE=NA

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

NODE=M002R40

VALUE (units 10^{-3})	CL%	DOCUMENT ID	TECN	COMMENT
<0.9	90	BRIERE 00	CLEO	10.6 e^+e^-

$\Gamma(\pi^0\gamma\gamma)/\Gamma(\pi^0\pi^0\eta)$ — Γ_{19}/Γ_3

NODE=M002R35

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT
<37	90	ALDE 87B	GAM2	38 $\pi^- p \to n4\gamma$

$\Gamma(4\pi^0)/\Gamma(\pi^0\pi^0\eta)$ — Γ_{20}/Γ_3

NODE=M002R37

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT
<23	90	ALDE 87B	GAM2	38 $\pi^- p \to n8\gamma$

$\Gamma(e^+e^-)/\Gamma_{\rm total}$ — Γ_{21}/Γ

NODE=M002R39

VALUE (units 10^{-7})	CL%	DOCUMENT ID	TECN	COMMENT
<2.1	90	VOROBYEV 88	ND	$e^+e^- \to \pi^+\pi^-\eta$

$\Gamma(\text{invisible})/\Gamma_{\rm total}$ — Γ_{22}/Γ

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	[62] NAIK 09	CLEO	$J/\psi \to \gamma\eta'$

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

NODE=M002R52;LINKAGE=NA

$\Gamma(\text{invisible})/\Gamma(\gamma\gamma)$ — Γ_{22}/Γ_5

NODE=M002R44

VALUE (units 10^{-2})	CL%	DOCUMENT ID	TECN	COMMENT
• • • 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_{22}/Γ_1

NODE=M002R09

VALUE (units 10^{-3})	CL%	DOCUMENT ID	TECN	COMMENT
<2.1	90	[63] NAIK 09	CLEO	$J/\psi \to \gamma\eta'$

[63] 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 $B(\eta \to 2\gamma) = 39.31 \times 10^{-2}$.

NODE=M002R09;LINKAGE=NA

$\Gamma(\pi^+\pi^-)/\Gamma_{\rm total}$ — Γ_{23}/Γ

NODE=M002R20

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT
< 0.6 (CL = 90%) [$<29 \times 10^{-4}$ (CL = 90%) OUR 2011 BEST LIMIT]				
< 0.6	90	[64] ABLIKIM 11G	BES3	$J/\psi \to \gamma\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
< 29	90	[65] MORI 07A	BELL	$\gamma\gamma \to \pi^+\pi^-$
< 3.3	90	[66] 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

[64] ABLIKIM 11G reports $[\Gamma(\eta'(958) \to \pi^+\pi^-)/\Gamma_{\rm total}] \times [B(J/\psi(1S) \to \gamma\eta'(958))] < 2.84 \times 10^{-7}$ which we divide by our best value $B(J/\psi(1S) \to \gamma\eta'(958)) = 5.16 \times 10^{-3}$.

NODE=M002R20;LINKAGE=AL

[65] Taking into account interference with the $\gamma\gamma \to \pi^+\pi^-$ continuum.

NODE=M002R20;LINKAGE=MO

[66] Without interference with the $\gamma\gamma \to \pi^+\pi^-$ continuum.

NODE=M002R20;LINKAGE=MR

$\Gamma(\pi^0\pi^0)/\Gamma_{\rm total}$ — Γ_{24}/Γ

NODE=M002R53

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<4 \times 10^{-4}$	90	[67] ABLIKIM 11G	BES3	$J/\psi \to \gamma\pi^0\pi^0$

[67] ABLIKIM 11G reports $[\Gamma(\eta'(958) \to \pi^+\pi^-)/\Gamma_{\rm total}] \times [B(J/\psi(1S) \to \gamma\eta'(958))] < 2.84 \times 10^{-7}$ which we divide by our best value $B(J/\psi(1S) \to \gamma\eta'(958)) = 5.16 \times 10^{-3}$.

NODE=M002R53;LINKAGE=AL

$\Gamma(\pi^0\pi^0)/\Gamma(\pi^0\pi^0\eta)$ — Γ_{24}/Γ_3

NODE=M002R36
NODE=M002R36

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

$\Gamma(\pi^0 e^+ e^-)/\Gamma_{\text{total}}$ — Γ_{25}/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 $K^- p$

$\Gamma(\eta e^+ e^-)/\Gamma_{\text{total}}$ — Γ_{26}/Γ

NODE=M002R9
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_{27}/Γ_3

NODE=M002R34
NODE=M002R34

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

$\Gamma(\mu^+\mu^-\pi^0)/\Gamma_{\text{total}}$ — Γ_{28}/Γ

NODE=M002R31
NODE=M002R31

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

$\Gamma(\mu^+\mu^-\eta)/\Gamma_{\text{total}}$ — Γ_{29}/Γ

NODE=M002R30
NODE=M002R30

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

$\Gamma(e\mu)/\Gamma_{\text{total}}$ — Γ_{30}/Γ

NODE=M002R41
NODE=M002R41

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

η'(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	2.1–2.7 $K^- p$

η'(958) REFERENCES

NODE=M002

ABLIKIM	11	PR D83 012003	M. Ablikim *et al.*	(BES III Collab.)	REFID=53646
ABLIKIM	11G	PR D84 032006	M. Ablikim *et al.*	(BES-III Collab.)	REFID=53711
CZERWINSKI	10	PRL 105 122001	E. Czerwinski *et al.*	(COSY-11 Collab.)	REFID=53364
BLIK	09	PAN 72 231	A.M. Blik *et al.*	(IHEP (Protvino))	REFID=52727
		Translated from YAF 72 258.			
NAIK	09	PRL 102 061801	P. Naik *et al.*	(CLEO Collab.)	REFID=52678
PEDLAR	09	PR D79 111101	T.K. Pedlar *et al.*	(CLEO Collab.)	REFID=52998
BLIK	08	PAN 71 2124	A. Blik *et al.*	(GAMS-4π Collab.)	REFID=52663
		Translated from YAF 71 2161.			
LIBBY	08	PRL 101 182002	J. Libby *et al.*	(CLEO Collab.)	REFID=52591
WICHT	08	PL B662 323	J. Wicht *et al.*	(BELLE Collab.)	REFID=52204
DOROFEEV	07	PL B651 22	V. Dorofeev *et al.*	(VES Collab.)	REFID=51711
MORI	07A	JPSJ 76 074102	T. Mori *et al.*	(BELLE Collab.)	REFID=51691
ABLIKIM	06E	PR D73 052008	M. Ablikim *et al.*	(BES Collab.)	REFID=51057
ABLIKIM	06Q	PRL 97 202002	M. Ablikim *et al.*	(BES Collab.)	REFID=51487
AMELIN	05A	PAN 68 372	D.V. Amelin *et al.*	(VES Collab.)	REFID=50766
		Translated from YAF 68 401.			

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
BRIERE	00	PRL 84 26	R. Briere *et al.*	(CLEO Collab.)	REFID=47410
ACCIARRI	98Q	PL B418 399	M. Acciarri *et al.*	(L3 Collab.)	REFID=46316
BARBERIS	98C	PL B440 225	D. Barberis *et al.*	(WA 102 Collab.)	REFID=46346
WURZINGER	96	PL B374 283	R. Wurzinger *et al.*	(BONN, ORSAY, SACL+)	REFID=44992
PDG	94	PR D50 1173	L. Montanet *et al.*	(CERN, LBL, BOST+)	REFID=43653
AMSLER	93	ZPHY C58 175	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=43311
BELADIDZE	92C	SJNP 55 1535	G.M. Beladidze, S.I. Bityukov, G.V. Borisov	(SERP+)	REFID=43175
		Translated from YAF 55 2748.			
KARCH	92	ZPHY C54 33	K. Karch *et al.*	(Crystal Ball Collab.)	REFID=42170
ARMSTRONG	91B	ZPHY C52 389	T.A. Armstrong *et al.*	(ATHU, BARI, BIRM+)	REFID=41862
BEHREND	91	ZPHY C49 401	H.J. Behrend *et al.*	(CELLO Collab.)	REFID=41497
AUGUSTIN	90	PR D42 10	J.E. Augustin *et al.*	(DM2 Collab.)	REFID=41352
BARU	90	ZPHY C48 581	S.E. Baru *et al.*	(MD-1 Collab.)	REFID=41366
BUTLER	90	PR D42 1368	F. Butler *et al.*	(Mark II Collab.)	REFID=41363
KARCH	90	PL B249 353	K. Karch *et al.*	(Crystal Ball Collab.)	REFID=41377
ROE	90	PR D41 17	N.A. Roe *et al.*	(ASP Collab.)	REFID=41014
AIHARA	88C	PR D38 1	H. Aihara *et al.*	(TPC-2γ Collab.)	REFID=40564
VOROBYEV	88	SJNP 48 273	P.V. Vorobiev *et al.*	(NOVO)	REFID=41023
		Translated from YAF 48 436.			
WILLIAMS	88	PR D38 1365	D.A. Williams *et al.*	(Crystal Ball Collab.)	REFID=40567
AIHARA	87	PR D35 2650	H. Aihara *et al.*	(TPC-2γ Collab.) JP	REFID=40009
ALBRECHT	87B	PL B199 457	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=40265
ALDE	87B	ZPHY C36 603	D.M. Alde *et al.*	(LANL, BELG, SERP, LAPP)	REFID=40236
ANTREASYAN	87	PR D36 2633	D. Antreasyan *et al.*	(Crystal Ball Collab.)	REFID=40008
GIDAL	87	PRL 59 2012	G. Gidal *et al.*	(LBL, SLAC, HARV)	REFID=40223
ALDE	86	PL B177 115	D.M. Alde *et al.*	(SERP, BELG, LANL, LAPP)	REFID=20310
BARTEL	85E	PL 160B 421	W. Bartel *et al.*	(JADE Collab.)	REFID=10843
ALTHOFF	84E	PL 147B 487	M. Althoff *et al.*	(TASSO Collab.)	REFID=20305
BERGER	84B	PL 142B 125	C. Berger	(PLUTO Collab.)	REFID=20306
BINON	84	PL 140B 264	F.G. Binon *et al.*	(SERP, BELG, LAPP+)	REFID=20307
BEHREND	83B	PL 125B 518 (erratum)	H.J. Behrend *et al.*	(CELLO Collab.)	REFID=20302
Also		PL 114B 378	H.J. Behrend *et al.*	(CELLO Collab.)	REFID=20303
JENNI	83	PR D27 1031	P. Jenni *et al.*	(SLAC, LBL)	REFID=20304
BARTEL	82B	PL 113B 190	W. Bartel *et al.*	(JADE Collab.)	REFID=20300
DZHELYADIN	81	PL 105B 239	R.I. Dzhelyadin *et al.*	(SERP)	REFID=10836
STANTON	80	PL B92 353	N.R. Stanton *et al.*	(OSU, CARL, MCGI+)	REFID=40294
VIKTOROV	80	SJNP 32 520	V.A. Viktorov *et al.*	(SERP)	REFID=20298
		Translated from YAF 32 1005.			
APEL	79	PL 83B 131	W.D. Apel, K.H. Augenstein, E. Bertolucci	(KARLK+)	REFID=20295
BINNIE	79	PL 83B 141	D.M. Binnie *et al.*	(LOIC)	REFID=20296
ZANFINO	77	PRL 38 930	C. Zanfino *et al.*	(CARL, MCGI, OHIO+)	REFID=20293
GRIGORIAN	75	NP B91 232	A. Grigorian *et al.*	(+)	REFID=20287
KALBFLEISCH	75	PR D11 987	G.R. Kalbfleisch, R.C. Strand, J.W. Chapman	(BNL+)	REFID=20223
DUANE	74	PRL 32 425	A. Duane *et al.*	(LOIC, SHMP)	REFID=20284
KALBFLEISCH	74	PR D10 916	G.R. Kalbfleisch	(BNL)	REFID=20286
DANBURG	73	PR D8 3744	J.S. Danburg *et al.*	(BNL, MICH) JP	REFID=20280
JACOBS	73	PR D8 18	S.M. Jacobs *et al.*	(BRAN, UMD, SYRA+) JP	REFID=20281
AGUILAR-...	72B	PR D6 29	M. Aguilar-Benitez *et al.*	(BNL)	REFID=20205
APEL	72	PL 40B 680	W.D. Apel *et al.*	(KARLK, KARLE, PISA)	REFID=20275
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 also the minireview on scalar mesons under $f_0(500)$. (See the index for the page number.)

NODE=M003

$f_0(980)$ MASS

NODE=M003M1

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
990 ±20 OUR ESTIMATE				
[980 ± 10 MeV OUR 2011 ESTIMATE]				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1003 $^{+5}_{-27}$		[1,2] GARCIA-MAR..11	RVUE	Compilation
996 ± 7		[1,3] GARCIA-MAR..11	RVUE	Compilation
996 $^{+4}_{-14}$		[4] MOUSSALLAM11	RVUE	Compilation
981 ±43		[5] MENNESSIER 10	RVUE	Compilation
1030 $^{+30}_{-10}$		[6] ANISOVICH 09	RVUE	0.0 $\overline{p}p$, πN
977 $^{+11}_{-9}$ ± 1	44	[7] ECKLUND 09	CLEO	4.17 $e^+e^- \rightarrow D_s^- D_s^{*+}$ + c.c.
982.2± 1.0$^{+8.1}_{-8.0}$		[8] UEHARA 08A	BELL	10.6 $e^+e^- \rightarrow e^+e^-\pi^0\pi^0$
976.8± 0.3$^{+10.1}_{-0.6}$	64k	[9] AMBROSINO 07	KLOE	1.02 $e^+e^- \rightarrow \pi^0\pi^0\gamma$
984.7± 0.4$^{+2.4}_{-3.7}$	64k	[10] AMBROSINO 07	KLOE	1.02 $e^+e^- \rightarrow \pi^0\pi^0\gamma$
973 ± 3	262 ± 30	[11] AUBERT 07AK	BABR	10.6 $e^+e^- \rightarrow \phi\pi^+\pi^-\gamma$
970 ± 7	54 ± 9	[11] AUBERT 07AK	BABR	10.6 $e^+e^- \rightarrow \phi\pi^0\pi^0\gamma$
953 ±20	2.6k	[12] BONVICINI 07	CLEO	$D^+ \rightarrow \pi^-\pi^+\pi^+$
985.6$^{+1.2}_{-1.5}$$^{+1.1}_{-1.6}$		[13] MORI 07	BELL	10.6 $e^+e^- \rightarrow e^+e^-\pi^+\pi^-$
983.0± 0.6$^{+4.0}_{-3.0}$		[14] AMBROSINO 06B	KLOE	1.02 $e^+e^- \rightarrow \pi^+\pi^-\gamma$
977.3± 0.9$^{+3.7}_{-4.3}$		[15] AMBROSINO 06B	KLOE	1.02 $e^+e^- \rightarrow \pi^+\pi^-\gamma$
950 ± 9	4286	[16] GARMASH 06	BELL	$B^+ \rightarrow K^+\pi^+\pi^-$
965 ±10		[17] ABLIKIM 05	BES2	$J/\psi \rightarrow \phi\pi^+\pi^-$, ϕK^+K^-
1031 ± 8		[18] ANISOVICH 03	RVUE	
1037 ±31		TIKHOMIROV 03	SPEC	40.0 $\pi^- C \rightarrow K_S^0 K_S^0 K_L^0 X$
973 ± 1	2438	[19] ALOISIO 02D	KLOE	$e^+e^- \rightarrow \pi^0\pi^0\gamma$
977 ± 3 ± 2	848	[20] AITALA 01A	E791	$D_s^+ \rightarrow \pi^-\pi^+\pi^+$
969.8± 4.5	419	[21] ACHASOV 00H	SND	$e^+e^- \rightarrow \pi^0\pi^0\gamma$
985 $^{+16}_{-12}$	419	[22,23] ACHASOV 00H	SND	$e^+e^- \rightarrow \pi^0\pi^0\gamma$
976 ± 5 ± 6		[24] AKHMETSHIN 99B	CMD2	$e^+e^- \rightarrow \pi^+\pi^-\gamma$
977 ± 3 ± 6	268	[24] AKHMETSHIN 99C	CMD2	$e^+e^- \rightarrow \pi^0\pi^0\gamma$
975 ± 4 ± 6		[25] AKHMETSHIN 99C	CMD2	$e^+e^- \rightarrow \pi^0\pi^0\gamma$
975 ± 4 ± 6		[26] AKHMETSHIN 99C	CMD2	$e^+e^- \rightarrow \pi^+\pi^-\gamma$, $\pi^0\pi^0\gamma$
985 ±10		BARBERIS 99	OMEG	450 $pp \rightarrow p_s p_f K^+K^-$
982 ± 3		BARBERIS 99B	OMEG	450 $pp \rightarrow p_s p_f \pi^+\pi^-$
982 ± 3		BARBERIS 99C	OMEG	450 $pp \rightarrow p_s p_f \pi^0\pi^0$
987 ± 6 ± 6		[27] BARBERIS 99D	OMEG	450 $pp \rightarrow K^+K^-$, $\pi^+\pi^-$
989 ±15		BELLAZZINI 99	GAM4	450 $pp \rightarrow pp\pi^0\pi^0$
991 ± 3		[28] KAMINSKI 99	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$, $\sigma\sigma$
∼ 980		[28] OLLER 99	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$
∼ 993.5		OLLER 99B	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$
∼ 987		[28] OLLER 99C	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$, $\eta\eta$
957 ± 6		[29] ACKERSTAFF 98Q	OPAL	$Z \rightarrow f_0 X$
960 ±10		ALDE 98	GAM4	
1015 ±15		[28] ANISOVICH 98B	RVUE	Compilation

NODE=M003M1
NEW;→ NOT CHECKED ←
OCCUR=2
OCCUR=2
OCCUR=2
OCCUR=2
OCCUR=2
OCCUR=2
OCCUR=3

1008		[30] LOCHER	98	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$	
955 $\pm$10		[29] ALDE	97	GAM2	450 $pp \to pp\pi^0\pi^0$	
994 $\pm$ 9		[31] BERTIN	97C	OBLX	0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$	
993.2$\pm$ 6.5$\pm$ 6.9		[32] 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 $\pm$ 5	3k	[33] ALDE	95B	GAM2	38 $\pi^- p \to \pi^0\pi^0 n$	
960 $\pm$10	10k	[34] ALDE	95B	GAM2	38 $\pi^- p \to \pi^0\pi^0 n$	OCCUR=2
994 $\pm$ 5		AMSLER	95B	CBAR	0.0 $\overline{p}p \to 3\pi^0$	
$\sim$ 996		[35] 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 $\pm$ 6		[36] ANISOVICH	95	RVUE		
1015		JANSSEN	95	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$	
983		[37] BUGG	94	RVUE	$\overline{p}p \to \eta 2\pi^0$	
973 $\pm$ 2		[38] KAMINSKI	94	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$	
988		[39] ZOU	94B	RVUE		
988 $\pm$10		[40] 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$\pm$ 4.0		[29] AGUILAR-...	91	EHS	400 pp	
979 $\pm$ 4		[41] ARMSTRONG	91	OMEG	300 $pp \to pp\pi\pi$, $ppK\overline{K}$	
956 $\pm$12		BREAKSTONE	90	SFM	$pp \to pp\pi^+\pi^-$	
959.4$\pm$ 6.5		[29] AUGUSTIN	89	DM2	$J/\psi \to \omega\pi^+\pi^-$	
978 $\pm$ 9		[29] 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 $\pm$ 4		[41] GIDAL	81	MRK2	$J/\psi \to \pi^+\pi^- X$	
975		[42] ACHASOV	80	RVUE		
986 $\pm$10		[41] AGUILAR-...	78	HBC	0.7 $\overline{p}p \to K^0_S K^0_S$	
969 $\pm$ 5		[41] LEEPER	77	ASPK	2–2.4 $\pi^- p \to \pi^+\pi^- n$, $K^+K^- n$	
987 $\pm$ 7		[41] BINNIE	73	CNTR	$\pi^- p \to n$MM	
1012 $\pm$ 6		[43] GRAYER	73	ASPK	17 $\pi^- p \to \pi^+\pi^- n$	
1007 $\pm$20		[43] HYAMS	73	ASPK	17 $\pi^- p \to \pi^+\pi^- n$	
997 $\pm$ 6		[43] PROTOPOP...	73	HBC	7 $\pi^+ p \to \pi^+ p\pi^+\pi^-$	

[1] Quoted number refers to real part of pole position. NODE=M003M1;LINKAGE=GC

[2] Analytic continuation using Roy equations. 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=M003M1;LINKAGE=GM

[3] Analytic continuation using GKPY equations. 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=M003M1;LINKAGE=GI

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

[5] 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

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

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

[8] Breit-Wigner mass. Using finite width corrections according to FLATTE 76 and ACHASOV 05, and the ratio $g^2_{f_0 KK}/g^2_{f_0\pi\pi} = 0$. NODE=M003M1;LINKAGE=UE

[9] In the kaon-loop fit. NODE=M003M1;LINKAGE=AK

[10] In the no-structure fit. NODE=M003M1;LINKAGE=AS

[11] Systematic errors not estimated. NODE=M003M1;LINKAGE=NS

[12] 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

[13] Breit-Wigner mass. Using finite width corrections according to FLATTE 76 and ACHASOV 05, and the ratio $g^2_{f_0 KK}/g^2_{f_0\pi\pi} = 4.21 \pm 0.25 \pm 0.21$ from ABLIKIM 05. NODE=M003M1;LINKAGE=MO

[14] In the kaon-loop fit following formalism of ACHASOV 89. NODE=M003M1;LINKAGE=AB

[15] In the no-structure fit assuming a direct coupling of ϕ to $f_0\gamma$. NODE=M003M1;LINKAGE=AM

[16] FLATTE 76 parameterization. Supersedes GARMASH 05. NODE=M003M1;LINKAGE=GR

[17] FLATTE 76 parameterization, $g^2_{f_0 K\overline{K}}/g^2_{f_0\pi\pi} = 4.21 \pm 0.25 \pm 0.21$. NODE=M003M1;LINKAGE=AL

[18] 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

[19] 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

[20] Coupled-channel Breit-Wigner, couplings g_π=0.09$\pm$0.01$\pm$0.01, g_K=0.02$\pm$0.04$\pm$0.03. NODE=M003M;LINKAGE=TL

[21] Supersedes ACHASOV 98I. Using the model of ACHASOV 89. NODE=M003M;LINKAGE=V9

[22] Supersedes ACHASOV 98I. NODE=M003M;LINKAGE=V8

[23] In the "narrow resonance" approximation. NODE=M003M1;LINKAGE=AI
[24] Assuming $\Gamma(f_0)$= 40 MeV. NODE=M003M;LINKAGE=SM
[25] From a narrow pole fit taking into account $f_0(980)$ and $f_0(1200)$ intermediate mechanisms. NODE=M003M;LINKAGE=ST
[26] 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
[27] Supersedes BARBERIS 99 and BARBERIS 99B NODE=M003M1;LINKAGE=BD
[28] T-matrix pole. NODE=M003M1;LINKAGE=AN
[29] From invariant mass fit. NODE=M003M1;LINKAGE=A
[30] On sheet II in a 2 pole solution. The other pole is found on sheet III at (1039−93i) MeV. NODE=M003M1;LINKAGE=LC
[31] On sheet II in a 2 pole solution. The other pole is found on sheet III at (963-29i) MeV. NODE=M003M1;LINKAGE=X
[32] Reanalysis of data from HYAMS 73, GRAYER 74, SRINIVASAN 75, and ROSSELET 77 using the interfering amplitude method. NODE=M003M1;LINKAGE=AA
[33] At high $|t|$. NODE=M003M1;LINKAGE=LA
[34] At low $|t|$. NODE=M003M1;LINKAGE=LB
[35] 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
[36] Combined fit of ALDE 95B, ANISOVICH 94, AMSLER 94D. NODE=M003M1;LINKAGE=CF
[37] On sheet II in a 2 pole solution. The other pole is found on sheet III at (996−103i) MeV. NODE=M003M1;LINKAGE=C2
[38] From sheet II pole position. NODE=M003M1;LINKAGE=KM
[39] 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
[40] On sheet II in a 2 pole solution. The other pole is found on sheet III at (978−28i) MeV. NODE=M003M1;LINKAGE=K
[41] From coupled channel analysis. NODE=M003M1;LINKAGE=B
[42] Coupled channel analysis with finite width corrections. NODE=M003M;LINKAGE=B
[43] 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

NODE=M003W1

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT	
40 to 100 OUR ESTIMATE					→ NOT CHECKED ←
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$42\ ^{+20}_{-16}$		[44,45] GARCIA-MAR..11	RVUE	Compilation	
$50\ ^{+20}_{-12}$		[45,46] GARCIA-MAR..11	RVUE	Compilation	OCCUR=2
$48\ ^{+22}_{-6}$		[47] MOUSSALLAM11	RVUE	Compilation	
36 ± 22		[48] MENNESSIER 10	RVUE	Compilation	
$70\ ^{+20}_{-32}$		[49] ANISOVICH 09	RVUE	0.0 $\overline{p}p$, πN	
$91\ ^{+30}_{-22} \pm 3$	44	[50] ECKLUND 09	CLEO	4.17 $e^+e^- \to D_s^- D_s^{*+}$ + c.c.	
$66.9 \pm 2.2 ^{+17.6}_{-12.5}$		[51] UEHARA 08A	BELL	10.6 $e^+e^- \to e^+e^-\pi^0\pi^0$	
65 ± 13	262 ± 30	[52] AUBERT 07AK	BABR	10.6 $e^+e^- \to \phi\pi^+\pi^-\gamma$	
81 ± 21	54 ± 9	[52] AUBERT 07AK	BABR	10.6 $e^+e^- \to \phi\pi^0\pi^0\gamma$	OCCUR=2
$51.3 ^{+20.8}_{-17.7} {}^{+13.2}_{-3.8}$		[53] MORI 07	BELL	10.6 $e^+e^- \to e^+e^-\pi^+\pi^-$	
$61 \pm 9 ^{+14}_{-8}$	2584	[54] GARMASH 05	BELL	$B^+ \to K^+\pi^+\pi^-$	
64 ± 16		[55] ANISOVICH 03	RVUE		
121 ± 23		TIKHOMIROV 03	SPEC	40.0 $\pi^- C \to K_S^0 K_S^0 K_L^0 X$	
~ 70		[56] BRAMON 02	RVUE	1.02 $e^+e^- \to \pi^0\pi^0\gamma$	
$44 \pm 2 \pm 2$	848	[57] AITALA 01A	E791	$D_s^+ \to \pi^-\pi^+\pi^+$	
201 ± 28	419	[58] ACHASOV 00H	SND	$e^+e^- \to \pi^0\pi^0\gamma$	
122 ± 13	419	[59,60] ACHASOV 00H	SND	$e^+e^- \to \pi^0\pi^0\gamma$	OCCUR=2
56 ± 20		[61] 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		[62] BARBERIS	99D	OMEG	450 $p p \rightarrow K^+ K^-$, $\pi^+ \pi^-$	
65 ± 25		BELLAZZINI	99	GAM4	450 $p p \rightarrow p p \pi^0 \pi^0$	
71 ± 14		[63] KAMINSKI	99	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$, $\sigma\sigma$	
∼ 28		[63] OLLER	99	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$	
∼ 25		OLLER	99B	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$	
∼ 14		[63] OLLER	99C	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$, $\eta\eta$	
70 ± 20		ALDE	98	GAM4		
86 ± 16		[63] ANISOVICH	98B	RVUE	Compilation	
54		[64] LOCHER	98	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$	
69 ± 15		[65] ALDE	97	GAM2	450 $p p \rightarrow p p \pi^0 \pi^0$	
38 ± 20		[66] BERTIN	97C	OBLX	0.0 $\overline{p} p \rightarrow \pi^+ \pi^- \pi^0$	
∼ 100		[67] ISHIDA	96	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$	
34		TORNQVIST	96	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$, $K\pi$, $\eta\pi$	
48 ± 10	3k	[68] ALDE	95B	GAM2	38 $\pi^- p \rightarrow \pi^0 \pi^0 n$	
95 ± 20	10k	[69] ALDE	95B	GAM2	38 $\pi^- p \rightarrow \pi^0 \pi^0 n$	OCCUR=2
26 ± 10		AMSLER	95B	CBAR	0.0 $\overline{p} p \rightarrow 3\pi^0$	
∼ 112		[70] AMSLER	95D	CBAR	0.0 $\overline{p} p \rightarrow \pi^0 \pi^0 \pi^0$, $\pi^0 \eta\eta$, $\pi^0 \pi^0 \eta$	
80 ± 12		[71] ANISOVICH	95	RVUE		
30		JANSSEN	95	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$	
74		[72] BUGG	94	RVUE	$\overline{p} p \rightarrow \eta 2\pi^0$	
29 ± 2		[73] KAMINSKI	94	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$	
46		[74] ZOU	94B	RVUE		
48 ± 12		[75] MORGAN	93	RVUE	$\pi\pi(K\overline{K}) \rightarrow \pi\pi(K\overline{K})$, $J/\psi \rightarrow \phi\pi\pi(K\overline{K})$, $D_s \rightarrow \pi(\pi\pi)$	
37.4± 10.6		[65] AGUILAR-...	91	EHS	400 $p p$	
72 ± 8		[76] ARMSTRONG	91	OMEG	300 $p p \rightarrow p p \pi\pi$, $p p K\overline{K}$	
110 ± 30		BREAKSTONE	90	SFM	$p p \rightarrow p p \pi^+ \pi^-$	
29 ± 13		[65] ABACHI	86B	HRS	$e^+ e^- \rightarrow \pi^+ \pi^- X$	
120 ±281 ±20		ETKIN	82B	MPS	23 $\pi^- p \rightarrow n 2K^0_S$	
28 ± 10		[76] GIDAL	81	MRK2	$J/\psi \rightarrow \pi^+ \pi^- X$	
70 to 300		[77] ACHASOV	80	RVUE		
100 ± 80		[78] AGUILAR-...	78	HBC	0.7 $\overline{p} p \rightarrow K^0_S K^0_S$	
30 ± 8		[76] LEEPER	77	ASPK	2–2.4 $\pi^- p \rightarrow \pi^+ \pi^- n$, $K^+ K^- n$	
48 ± 14		[76] BINNIE	73	CNTR	$\pi^- p \rightarrow n$MM	
32 ± 10		[79] GRAYER	73	ASPK	17 $\pi^- p \rightarrow \pi^+ \pi^- n$	
30 ± 10		[79] HYAMS	73	ASPK	17 $\pi^- p \rightarrow \pi^+ \pi^- n$	
54 ± 16		[79] PROTOPOP...	73	HBC	7 $\pi^+ p \rightarrow \pi^+ p \pi^+ \pi^-$	

[44] Analytic continuation using Roy equations. Uses the K_{e4} data of BATLEY 10C and the $\pi N \rightarrow \pi\pi N$ data of HYAMS 73, GRAYER 74, and PROTOPOPESCU 73. NODE=M003W1;LINKAGE=GC

[45] Quoted number refers to twice imaginary part of pole position. NODE=M003W1;LINKAGE=GI

[46] Analytic continuation using GKPY equations. Uses the K_{e4} data of BATLEY 10C and the $\pi N \rightarrow \pi\pi N$ data of HYAMS 73, GRAYER 74, and PROTOPOPESCU 73. NODE=M003W1;LINKAGE=GM

[47] Pole position. Used Roy equations. NODE=M003W1;LINKAGE=MU

[48] 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=M003W1;LINKAGE=ME

[49] On sheet II in a 2-pole solution. The other pole is found on sheet III at (850−100i) MeV NODE=M003W1;LINKAGE=AO

[50] Using a relativistic Breit-Wigner function and taking into account the finite D_s mass. NODE=M003W1;LINKAGE=EC

[51] Breit-Wigner $\pi\pi$ width. Using finite width corrections according to FLATTE 76 and ACHASOV 05, and the ratio $g^2_{f_0 K K} / g^2_{f_0 \pi\pi} = 0$. NODE=M003W1;LINKAGE=UE

[52] Systematic errors not estimated. NODE=M003W1;LINKAGE=NS

[53] Breit-Wigner $\pi\pi$ width. Using finite width corrections according to FLATTE 76 and ACHASOV 05, and the ratio $g^2_{f_0 K K} / g^2_{f_0 \pi\pi} = 4.21 \pm 0.25 \pm 0.21$ from ABLIKIM 05. NODE=M003W1;LINKAGE=MO

[54] Breit-Wigner, solution 1, PWA ambiguous. NODE=M003W1;LINKAGE=GA

[55] K-matrix pole 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=M003W;LINKAGE=KM

[56] Using the data of AKHMETSHIN 99C, ACHASOV 00H, and ALOISIO 02D. NODE=M003W;LINKAGE=BR

[57] Breit-Wigner width. NODE=M003W;LINKAGE=TL

[58] Supersedes ACHASOV 98I. Using the model of ACHASOV 89. NODE=M003W;LINKAGE=V9

[59] Supersedes ACHASOV 98I. NODE=M003W;LINKAGE=V8

[60] In the "narrow resonance" approximation. NODE=M003W1;LINKAGE=AI
[61] From the combined fit of the photon spectra in the reactions $e^+ e^- \rightarrow \pi^+ \pi^- \gamma$, $\pi^0 \pi^0 \gamma$. NODE=M003W;LINKAGE=SL
[62] Supersedes BARBERIS 99 and BARBERIS 99B NODE=M003W1;LINKAGE=BD
[63] T-matrix pole. NODE=M003W1;LINKAGE=AN
[64] On sheet II in a 2 pole solution. The other pole is found on sheet III at (1039−93i) MeV. NODE=M003W1;LINKAGE=LO
[65] From invariant mass fit. NODE=M003W1;LINKAGE=A
[66] On sheet II in a 2 pole solution. The other pole is found on sheet III at (963-29i) MeV. NODE=M003W1;LINKAGE=X
[67] Reanalysis of data from HYAMS 73, GRAYER 74, SRINIVASAN 75, and ROSSELET 77 using the interfering amplitude method. NODE=M003W1;LINKAGE=AA
[68] At high $|t|$. NODE=M003W1;LINKAGE=LA
[69] At low $|t|$. NODE=M003W1;LINKAGE=LB
[70] 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=M003W1;LINKAGE=KL
[71] Combined fit of ALDE 95B, ANISOVICH 94, NODE=M003W1;LINKAGE=CF
[72] On sheet II in a 2 pole solution. The other pole is found on sheet III at (996−103i) MeV. NODE=M003W1;LINKAGE=C2
[73] From sheet II pole position. NODE=M003W1;LINKAGE=KM
[74] 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=M003W1;LINKAGE=L
[75] On sheet II in a 2 pole solution. The other pole is found on sheet III at (978−28i) MeV. NODE=M003W1;LINKAGE=K
[76] From coupled channel analysis. NODE=M003W1;LINKAGE=B
[77] Coupled channel analysis with finite width corrections. NODE=M003W;LINKAGE=B
[78] 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. NODE=M003W;LINKAGE=C
[79] Included in AGUILAR-BENITEZ 78 fit. NODE=M003W;LINKAGE=R

$f_0(980)$ DECAY MODES

NODE=M003215;NODE=M003

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\pi\pi$	dominant	DESIG=2;OUR EVAL;→ NOT CHECKED ←
Γ_2	$K\overline{K}$	seen	DESIG=1;OUR EVAL;→ NOT CHECKED ←
Γ_3	$\gamma\gamma$	seen	DESIG=5;OUR EVAL;→ NOT CHECKED ←
Γ_4	$e^+ e^-$		DESIG=4

$f_0(980)$ PARTIAL WIDTHS

NODE=M003220

$\Gamma(\gamma\gamma)$ Γ_3

NODE=M003W4
NODE=M003W4

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
0.29 $^{+0.07}_{-0.06}$ OUR AVERAGE				
0.286±0.017$^{+0.211}_{-0.070}$	[80] UEHARA	08A	BELL	10.6 $e^+ e^- \rightarrow e^+ e^- \pi^0 \pi^0$
0.205$^{+0.095}_{-0.083}$$^{+0.147}_{-0.117}$	[81] MORI	07	BELL	10.6 $e^+ e^- \rightarrow e^+ e^- \pi^+ \pi^-$
0.28 $^{+0.09}_{-0.13}$	[82] BOGLIONE	99	RVUE	$\gamma\gamma \rightarrow \pi^+ \pi^-$, $\pi^0 \pi^0$
0.42 ±0.06 ±0.18	[83] OEST	90	JADE	$e^+ e^- \rightarrow e^+ e^- \pi^0 \pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.16 ±0.01	[84] MENNESSIER	11	RVUE	
0.29 ±0.21 $^{+0.02}_{-0.07}$	[85] MOUSSALLAM	11	RVUE	Compilation
0.42	[86,87] PENNINGTON	08	RVUE	Compilation
0.10	[87,88] PENNINGTON	08	RVUE	Compilation OCCUR=2
0.29 ±0.07 ±0.12	[89,90] BOYER	90	MRK2	$e^+ e^- \rightarrow e^+ e^- \pi^+ \pi^-$
0.31 ±0.14 ±0.09	[89,90] MARSISKE	90	CBAL	$e^+ e^- \rightarrow e^+ e^- \pi^0 \pi^0$
0.63 ±0.14	[91] MORGAN	90	RVUE	$\gamma\gamma \rightarrow \pi^+ \pi^-$, $\pi^0 \pi^0$

[80] Using finite width corrections according to FLATTE 76 and ACHASOV 05, and the ratio $g^2_{f_0 K K}/g^2_{f_0 \pi\pi} = 0$. NODE=M003W4;LINKAGE=UE
[81] Using finite width corrections according to FLATTE 76 and ACHASOV 05, and the ratio $g^2_{f_0 K K}/g^2_{f_0 \pi\pi} = 4.21 \pm 0.25 \pm 0.21$ from ABLIKIM 05. NODE=M003W4;LINKAGE=MO
[82] Supersedes MORGAN 90. NODE=M003W4;LINKAGE=BL
[83] OEST 90 quote systematic errors $^{+0.08}_{-0.18}$. We use ±0.18. Observed 60 events. NODE=M003W4;LINKAGE=H
[84] Uses an analytic K-matrix model. Compilation. NODE=M003W4;LINKAGE=ME
[85] 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
[86] Solution A (preferred solution based on χ^2-analysis). NODE=M003W4;LINKAGE=P1

[87] Dispersion theory based amplitude analysis of BOYER 90, MARSISKE 90, BEHREND 92, and MORI 07. NODE=M003W4;LINKAGE=P3
[88] Solution B (worse than solution A; still acceptable when systematic uncertainties are included). NODE=M003W4;LINKAGE=P2
[89] From analysis allowing arbitrary background unconstrained by unitarity. NODE=M003W4;LINKAGE=B
[90] Data included in MORGAN 90, BOGLIONE 99 analyses. NODE=M003W4;LINKAGE=C
[91] 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	[92] AUBERT	06O	BABR	$B^\pm \to K^\pm\pi^\pm\pi^\mp$
$0.75^{+0.11}_{-0.13}$		[93] ABLIKIM	05Q	BES2	$\chi_{c0} \to 2\pi^+2\pi^-$, $\pi^+\pi^-K^+K^-$
0.84 ± 0.02		[94] ANISOVICH	02D	SPEC	Combined fit
~ 0.68		OLLER	99B	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$
0.67 ± 0.09		[95] LOVERRE	80	HBC	$4\ \pi^-p \to n2K^0_S$
$0.81^{+0.09}_{-0.04}$		[95] CASON	78	STRC	$7\ \pi^-p \to n2K^0_S$
0.78 ± 0.03		[95] WETZEL	76	OSPK	$8.9\ \pi^-p \to n2K^0_S$

[92] Recalculated by us using $\Gamma(K^+K^-)$ / $\Gamma(\pi^+\pi^-) = 0.69 \pm 0.32$ from AUBERT 06O and isospin relations. NODE=M003R1;LINKAGE=AU
[93] Using data from ABLIKIM 04G. NODE=M003R1;LINKAGE=AB
[94] 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=M003R;LINKAGE=CH
[95] 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

GARCIA-MAR...	11	PRL 107 072001	R. Garcia-Martin *et al.*	(MADR, CRAC)	REFID=16761
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 051101R	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
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
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
SRINIVASAN	75	PR D12 681	V. Srinivasan *et al.*	(NDAM, ANL)	REFID=21062
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 our minireview on scalar mesons under $f_0(500)$. (See the index for the page number.)

NODE=M036

$a_0(980)$ MASS

NODE=M036205

VALUE (MeV)	DOCUMENT ID
980±20 OUR ESTIMATE	Mass determination very model dependent

NODE=M036MX
→ NOT CHECKED ←

$\eta\pi$ FINAL STATE ONLY

NODE=M036M1
NODE=M036M1

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

OCCUR=2 (BUGG 08A, second entry)
OCCUR=2 (ACHASOV 00F, second entry)
OCCUR=2 (BARBERIS 00H, second entry)
OCCUR=2 (WELLS 75)

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

$K\overline{K}$ ONLY

NODE=M036M2
NODE=M036M2

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$\sim$ 1053		[12] OLLER 99C	RVUE		$\pi\pi \to \pi\pi$, $K\overline{K}$
982 $\pm$ 3		[13] ABELE 98	CBAR		0.0 $\overline{p}p \to K^0_L K^{\pm}\pi^{\mp}$
975 $\pm$15		BERTIN 98B	OBLX	$\pm$	0.0 $\overline{p}p \to K^{\pm}K_S\pi^{\mp}$
976 $\pm$ 6	316	DEBILLY 80	HBC	$\pm$	1.2–2 $\overline{p}p \to f_1(1285)\omega$
1016 $\pm$10	100	[14] ASTIER 67	HBC	$\pm$	0.0 $\overline{p}p$
1003.3$\pm$ 7.0	143	[15] ROSENFELD 65	RVUE	$\pm$	

[12] T-matrix pole. NODE=M036M2;LINKAGE=AN

[13] T-matrix pole on sheet II, the pole on sheet III is at 1006-i49 MeV. NODE=M036M2;LINKAGE=Q

[14] ASTIER 67 includes data of BARLOW 67, CONFORTO 67, ARMENTEROS 65. NODE=M036M2;LINKAGE=A

[15] Plus systematic errors. NODE=M036M2;LINKAGE=S

$a_0(980)$ WIDTH

NODE=M036210

NODE=M036W1

→ NOT CHECKED ←

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. • • •					
75.6 $\pm$ 1.6 $^{+17.4}_{-10.0}$		[16] UEHARA 09A	BELL		$\gamma\gamma \to \pi^0\eta$
80.2 $\pm$ 3.8 $\pm$ 5.4		[17] BUGG 08A	RVUE	0	$\overline{p}p \to \pi^0\pi^0\eta$
50 $\pm$13 $\pm$ 4	318	ACHARD 02B	L3		183–209 $e^+e^- \to e^+e^-\eta\pi^+\pi^-$
72 $\pm$16		BARBERIS 00H			450 $pp \to p_f\eta\pi^0 p_s$
61 $\pm$19		BARBERIS 00H			450 $pp \to \Delta^{++}_f\eta\pi^- p_s$ (OCCUR=2)
$\sim$ 42		[18] OLLER 99	RVUE		$\eta\pi$, $K\overline{K}$
$\sim$ 112		[18] OLLER 99B	RVUE		$\pi\pi \to \eta\pi$, $K\overline{K}$
71 $\pm$ 7		TEIGE 99	B852		18.3 $\pi^- p \to \eta\pi^+\pi^- n$
92 $\pm$20		[18] ANISOVICH 98B	RVUE		Compilation
65 $\pm$10		[19] BERTIN 98B	OBLX	$\pm$	0.0 $\overline{p}p \to K^{\pm}K_S\pi^{\mp}$
$\sim$ 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$\pm$ 0.34$\pm$ 0.12		AMSLER 94C	CBAR		0.0 $\overline{p}p \to \omega\eta\pi^0$
54 $\pm$10		[20] AMSLER 92	CBAR		0.0 $\overline{p}p \to \eta\eta\pi^0$
95 $\pm$14	1040	[20] ARMSTRONG 91B	OMEG	$\pm$	300 $pp \to pp\eta\pi^+\pi^-$
62 $\pm$15	500	[21] EVANGELIS... 81	OMEG	$\pm$	12 $\pi^- p \to \eta\pi^+\pi^-\pi^- p$
60 $\pm$20	145	[21] GURTU 79	HBC	$\pm$	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	$\pm$	12–15 $\pi^- p \to n\eta 2\pi$
44 $\pm$22		GRASSLER 77	HBC	$-$	16 $\pi^{\mp}p \to p\eta 3\pi$
80 to 300		[22] FLATTE 76	RVUE	$-$	4.2 $K^- p \to \Lambda\eta 2\pi$
16.0 $^{+25.0}_{-16.0}$	70	WELLS 75	HBC	$-$	3.1–6 $K^- p \to \Lambda\eta 2\pi$
30 $\pm$ 5	150	DEFOIX 72	HBC	$\pm$	0.7 $\overline{p}p \to 7\pi$
40 $\pm$15		CAMPBELL 69	DBC	$\pm$	2.7 $\pi^+ d$
60 $\pm$30	15	MILLER 69B	HBC	$-$	4.5 $K^- N \to \eta\pi\Lambda$
80 $\pm$30	30	AMMAR 68	HBC	$\pm$	5.5 $K^- p \to \Lambda\eta 2\pi$

[16] From a fit with the S-wave amplitude including two interfering Breit-Wigners plus a background term. NODE=M036W1;LINKAGE=UE

[17] From the T-matrix pole on sheet II, using AMSLER 94D and ABELE 98. NODE=M036W1;LINKAGE=BU

[18] T-matrix pole. NODE=M036W1;LINKAGE=AN

[19] The $\eta\pi$ width. NODE=M036W1;LINKAGE=BE

[20] From a single Breit-Wigner fit. NODE=M036W1;LINKAGE=A

[21] From $f_1(1285)$ decay. NODE=M036W1;LINKAGE=R

[22] Using a two-channel resonance parametrization of GAY 76B data. NODE=M036W1;LINKAGE=F

$K\overline{K}$ ONLY

NODE=M036W2

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
92± 8		[23] 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. • • •						
∼ 24		[24] OLLER	99C	RVUE		$\pi\pi \to \pi\pi, K\overline{K}$
∼ 25	100	[25] ASTIER	67	HBC	±	
57±13	143	[26] ROSENFELD	65	RVUE	±	

[23] T-matrix pole on sheet II, the pole on sheet III is at 1006-i49 MeV.
[24] T-matrix pole.
[25] ASTIER 67 includes data of BARLOW 67, CONFORTO 67, ARMENTEROS 65.
[26] Plus systematic errors.

NODE=M036W2;LINKAGE=Q
NODE=M036W2;LINKAGE=AN
NODE=M036W2;LINKAGE=A
NODE=M036W2;LINKAGE=S

$a_0(980)$ DECAY MODES

NODE=M036215;NODE=M036

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

$a_0(980)$ PARTIAL WIDTHS

NODE=M036217

$\Gamma(\gamma\gamma)$ Γ_4

NODE=M036W4

VALUE (keV)	DOCUMENT ID		TECN
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.30±0.10	[27] AMSLER	98	RVUE

[27] 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

$\Gamma(\eta\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_1\Gamma_4/\Gamma$

NODE=M036G1

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.21 $^{+0.08}_{-0.04}$ OUR AVERAGE					
$0.128^{+0.003}_{-0.002}{}^{+0.502}_{-0.043}$		[28] UEHARA	09A	BELL	$\gamma\gamma \to \pi^0\eta$
0.28 ±0.04 ±0.10	44	OEST	90	JADE	$e^+e^- \to e^+e^-\pi^0\eta$
0.19 ±0.07 $^{+0.10}_{-0.07}$		ANTREASYAN	86	CBAL	$e^+e^- \to e^+e^-\pi^0\eta$

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

NODE=M036G1;LINKAGE=UE

$\Gamma(\eta\pi) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_1\Gamma_5/\Gamma$

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
0.183±0.024 OUR AVERAGE Error includes scale factor of 1.2.					
0.57 ±0.16	[29] BARGIOTTI	03	OBLX		$\overline{p}p$
0.23 ±0.05	[30] ABELE	98	CBAR		0.0 $\overline{p}p \to K^0_L K^\pm\pi^\mp$
0.166±0.01 ±0.02	[31] 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. • • •					
1.20 ±0.15	[32] ANISOVICH	09	RVUE		0.0 $\overline{p}p$, πN
1.05 ±0.07 ±0.05	[33] BUGG	08A	RVUE	0	$\overline{p}p \to \pi^0\pi^0\eta$
∼ 0.60	OLLER	99B	RVUE		$\pi\pi \to \eta\pi, K\overline{K}$
0.7 ±0.3	[31] CORDEN	78	OMEG		12–15 $\pi^- p \to n\eta 2\pi$
0.25 ±0.08	[31] DEFOIX	72	HBC	±	0.7 $\overline{p} \to 7\pi$

$\Gamma(\rho\pi)/\Gamma(\eta\pi)$ Γ_3/Γ_1

NODE=M036R1

$\rho\pi$ forbidden.

NODE=M036R1

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

NODE=M036R1

[29] Coupled channel analysis of $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, and $K^\pm K^0_S\pi^\mp$. NODE=M036R;LINKAGE=BG

[30] Using $\pi^0\pi^0\eta$ from AMSLER 94D. NODE=M036R2;LINKAGE=Q

[31] From the decay of $f_1(1285)$. NODE=M036R2;LINKAGE=L

[32] This is a ratio of couplings. NODE=M036R2;LINKAGE=AN

[33] A ratio of couplings, using AMSLER 94D and ABELE 98. Supersedes BUGG 94. NODE=M036R2;LINKAGE=BU

$a_0(980)$ REFERENCES

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BUGG 08A PR D78 074023 D.V. Bugg (LOQM) REFID=52578
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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
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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
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BERTIN 98B PL B434 180 A. Bertin et al. (OBELIX Collab.) REFID=46351
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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
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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
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CORDEN 78 NP B144 253 M.J. Corden et al. (BIRM, RHEL, TELA+) REFID=20452
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JAFFE 77 PR D15 267,281 R. Jaffe (MIT) REFID=43673
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WELLS 75 NP B101 333 J. Wells et al. (OXF) REFID=20444
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
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ARMENTEROS 65 PL 17 344 R. Armenteros et al. (CERN, CDEF) REFID=20396
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NODE=M004

$\phi(1020)$ $\quad I^G(J^{PC}) = 0^-(1^{--})$

$\phi(1020)$ MASS

NODE=M004M

NODE=M004M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1019.455±0.020 OUR AVERAGE		Error includes scale factor of 1.1.			
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	[1] AKHMETSHIN	04	CMD2	$e^+e^- \to K^0_L K^0_S$
1019.42 ±0.05	1900k	[2] 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		[3] ACHASOV	00B	SND	$e^+e^- \to \eta\gamma$
1019.38 ±0.07 ±0.08	2200	[4] 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	[5] 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. • • •					
1019.441±0.008±0.080	542k	[6] AKHMETSHIN	08	CMD2	1.02 $e^+e^- \to K^+K^-$
1019.63 ±0.07	12540	[7] 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	[7] ATKINSON	86	OMEG	20–70 γp
1019.7 ±1.0		BEBEK	86	CLEO	$e^+e^- \to \Upsilon(4S)$
1019.411±0.008	642k	[8] DIJKSTRA	86	SPEC	100–200 $\pi^\pm$, $\overline{p}$, p, $K^\pm$, on Be
1020.9 ±0.2		[7] FRAME	86	OMEG	13 $K^+p \to \phi K^+p$
1021.0 ±0.2		[7] ARMSTRONG	83B	OMEG	18.5 $K^-p \to K^-K^+\Lambda$
1020.0 ±0.5		[7] ARMSTRONG	83B	OMEG	18.5 $K^-p \to K^-K^+\Lambda$ OCCUR=2
1019.7 ±0.3		[7] 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	[7] 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	[9] AGUILAR-...	72B	HBC	3.9,4.6 $K^-p \to \Lambda K^+K^-$
1019.9 ±0.5	100	[9] AGUILAR-...	72B	HBC	3.9,4.6 $K^-p \to K^-pK^+K^-$ 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] Update of AKHMETSHIN 99D NODE=M004M;LINKAGE=GS

[2] 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

[3] Using a total width of 4.43 ± 0.05 MeV. Systematic uncertainty included. NODE=M004M;LINKAGE=G2

[4] Using a total width of 4.43 ± 0.05 MeV. NODE=M004M;LINKAGE=F2

[5] PELLINEN 82 review includes AKERLOF 77, DAUM 81, BALDI 77, AYRES 74, DEGROOT 74. NODE=M004M;LINKAGE=R
[6] Strongly correlated with AKHMETSHIN 04. NODE=M004M;LINKAGE=AH
[7] Systematic errors not evaluated. NODE=M004M;LINKAGE=A
[8] Weighted and scaled average of 12 measurements of DIJKSTRA 86. NODE=M004M;LINKAGE=B
[9] Mass errors enlarged by us to $\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M004M;LINKAGE=D

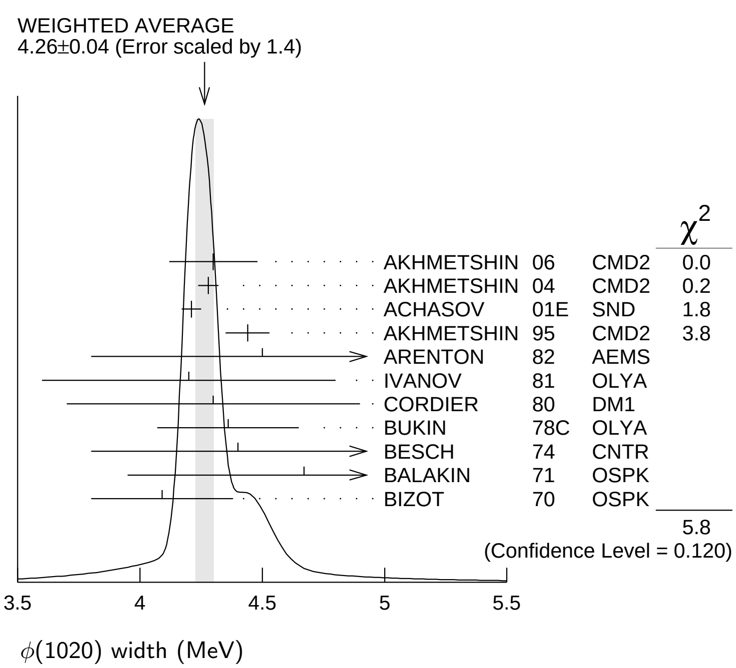
ϕ(1020) WIDTH

NODE=M004W

NODE=M004W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
4.26 ±0.04 OUR AVERAGE		Error includes scale factor of 1.4. See the ideogram below.			
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	[10] AKHMETSHIN	04	CMD2	$e^+e^- \to K_L^0 K_S^0$
4.21 ±0.04	1900k	[11] 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. $pp \to KK$
4.2 ±0.6	766	[12] IVANOV	81	OLYA	1–1.4 $e^+e^- \to K^+K^-$
4.3 ±0.6		[12] CORDIER	80	DM1	$e^+e^- \to \pi^+\pi^-\pi^0$
4.36 ±0.29	3681	[12] BUKIN	78C	OLYA	$e^+e^- \to$ hadrons
4.4 ±0.6	984	[12] BESCH	74	CNTR	2 $\gamma p \to pK^+K^-$
4.67 ±0.72	681	[12] 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. • • •					
4.24 ±0.02 ±0.03	542k	[13] AKHMETSHIN	08	CMD2	1.02 $e^+e^- \to K^+K^-$
4.28 ±0.13	12540	[14] 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	[12] COOPER	78B	HBC	0.7–0.8 $\overline{p}p \to K_S^0 K_L^0 \pi^+\pi^-$
4.5 ±0.50	1300	[12,14] AKERLOF	77	SPEC	400 $pA \to K^+K^-X$
4.5 ±0.8	500	[12,14] 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	$e^+e^- \to K_L^0 K_S^0$
3.8 ±0.7	454	[12] BORENSTEIN	72	HBC	2.18 $K^-p \to K\overline{K}n$

[10] Update of AKHMETSHIN 99D NODE=M004W;LINKAGE=GS
[11] From the combined fit assuming that the total ϕ(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
[12] Width errors enlarged by us to $4\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M004W;LINKAGE=D
[13] Strongly correlated with AKHMETSHIN 04. NODE=M004W;LINKAGE=AH
[14] 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^-		(48.9 ± 0.5) %	S=1.1	DESIG=1
Γ_2	$K^0_L K^0_S$		(34.2 ± 0.4) %	S=1.1	DESIG=2
Γ_3	$\rho\pi + \pi^+\pi^-\pi^0$		(15.32 ± 0.32) %	S=1.1	DESIG=24
Γ_4	$\rho\pi$				DESIG=16
Γ_5	$\pi^+\pi^-\pi^0$				DESIG=3
Γ_6	$\eta\gamma$		(1.309 ± 0.024) %	S=1.2	DESIG=4
Γ_7	$\pi^0\gamma$		$(1.27 \pm 0.06) \times 10^{-3}$		DESIG=7
Γ_8	$\ell^+\ell^-$		—		DESIG=256;OUR EVAL; → NOT CHECKED ←
Γ_9	e^+e^-		$(2.954 \pm 0.030) \times 10^{-4}$	S=1.1	DESIG=5
Γ_{10}	$\mu^+\mu^-$		$(2.87 \pm 0.19) \times 10^{-4}$		DESIG=6
Γ_{11}	ηe^+e^-		$(1.15 \pm 0.10) \times 10^{-4}$		DESIG=17
Γ_{12}	$\pi^+\pi^-$		$(7.4 \pm 1.3) \times 10^{-5}$		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}	$\pi^0\pi^0\gamma$		$(1.13 \pm 0.06) \times 10^{-4}$		DESIG=19
Γ_{19}	$\pi^+\pi^-\pi^+\pi^-$		$(4.0 {}^{+2.8}_{-2.2}) \times 10^{-6}$		DESIG=15
Γ_{20}	$\pi^+\pi^+\pi^-\pi^-\pi^0$		$< 4.6 \times 10^{-6}$	CL=90%	DESIG=14
Γ_{21}	$\pi^0 e^+e^-$		$(1.12 \pm 0.28) \times 10^{-5}$		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}	$\eta'(958)\gamma$		$(6.25 \pm 0.21) \times 10^{-5}$		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
	Lepton Faminly number (LF) violating modes				NODE=M004;CLUMP=A
Γ_{31}	$e^\pm\mu^\mp$	*LF*	$< 2 \times 10^{-6}$	CL=90%	DESIG=258

CONSTRAINED FIT INFORMATION

An overall fit to 30 branching ratios uses 79 measurements and one constraint to determine 14 parameters. The overall fit has a $\chi^2 = 57.4$ for 66 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_6	x_7	x_9	x_{10}	x_{12}	x_{13}	x_{17}
x_2	−72									
x_3	−53	−21								
x_6	−13	7	2							
x_7	−5	3	1	5						
x_9	30	−25	−10	−32	−15					
x_{10}	−4	3	1	3	2	−11				
x_{12}	−2	1	0	2	1	−5	1			
x_{13}	−2	2	1	2	1	−7	1	0		
x_{17}	0	0	0	0	0	0	0	0	0	
x_{18}	−6	4	2	17	3	−17	2	1	1	0
x_{19}	0	0	0	0	0	−1	0	0	0	0
x_{23}	0	0	0	0	0	0	0	0	0	0
x_{25}	−4	2	1	32	2	−10	1	1	1	0

x_{19}	0		
x_{23}	0	0	
x_{25}	5	0	0
	x_{18}	x_{19}	x_{23}

$\phi(1020)$ 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. • • •				
$58.9\pm0.5\pm2.4$	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. • • •				
$1.320\pm0.017\pm0.015$	[15] AMBROSINO	05	KLOE	1.02 $e^+e^- \to \mu^+\mu^-$

$\Gamma(e^+e^-)$ Γ_9

NODE=M004W8
NODE=M004W8
→ NOT CHECKED ←

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.				
$1.235\pm0.006\pm0.022$	[16] AKHMETSHIN	11	CMD2	1.02 $e^+e^- \to \phi$
$1.32\pm0.05\pm0.03$	[17] AMBROSINO	05	KLOE	1.02 $e^+e^- \to e^+e^-$
1.28 ± 0.05	AKHMETSHIN	95	CMD2	1.02 $e^+e^- \to \phi$

$\left(\Gamma(e^+e^-)\times\Gamma(\mu^+\mu^-)\right)^{1/2}$ $(\Gamma_9\Gamma_{10})^{1/2}$

NODE=M004W9
NODE=M004W9

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
$1.320\pm0.018\pm0.017$	AMBROSINO	05	KLOE	1.02 $e^+e^- \to \mu^+\mu^-$

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

NODE=M004W5;LINKAGE=AM

[16] 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

[17] From forward-backward asymmetry and using $\Gamma_{total} = 4.26 \pm 0.05$ MeV from the 2004 edition of this Review.

NODE=M004W8;LINKAGE=AM

$\phi(1020)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma^2(\text{total})$

NODE=M004224

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

NODE=M004G10
NODE=M004G10

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
14.46±0.23 OUR FIT Error includes scale factor of 1.1.					
14.24±0.30 OUR AVERAGE					
$14.27\pm0.05\pm0.31$	542k	AKHMETSHIN	08	CMD2	1.02 $e^+e^- \to K^+K^-$
$13.93\pm0.14\pm0.99$	1000k	[18] ACHASOV	01E	SND	$e^+e^- \to K^+K^-$, $K_S K_L$, $\pi^+\pi^-\pi^0$

$\Gamma(K^0_L K^0_S)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_2/\Gamma \times \Gamma_9/\Gamma$

NODE=M004G6
NODE=M004G6

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
10.10±0.13 OUR FIT					
10.06±0.16 OUR AVERAGE					
$10.01\pm0.04\pm0.17$	272k	[19] AKHMETSHIN	04	CMD2	$e^+e^- \to K^0_L K^0_S$
$10.27\pm0.07\pm0.34$	500k	[18] ACHASOV	01E	SND	$e^+e^- \to K^+K^-$, $K_S K_L$, $\pi^+\pi^-\pi^0$

$[\Gamma(\rho\pi)+\Gamma(\pi^+\pi^-\pi^0)]/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_3/\Gamma \times \Gamma_9/\Gamma$

NODE=M004G7

NODE=M004G7

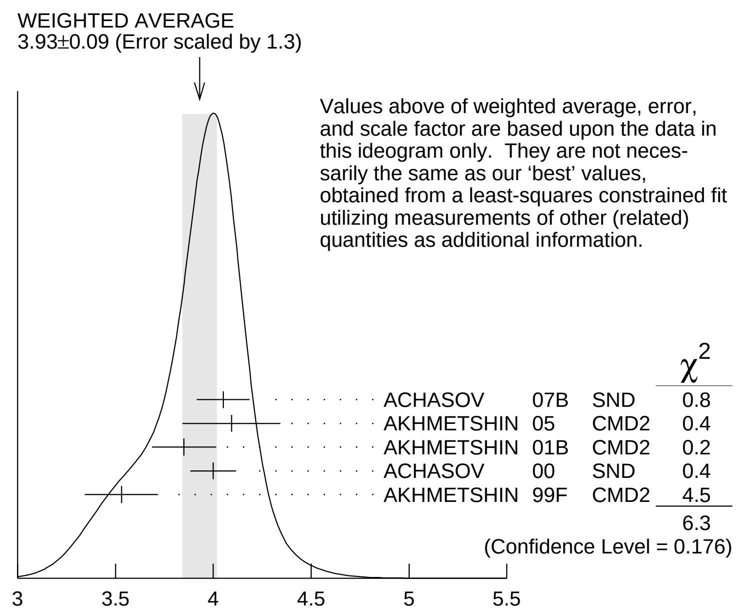
VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
4.53 ±0.10 OUR FIT Error includes scale factor of 1.1.				
4.46 ±0.12 OUR AVERAGE				
4.51 ±0.16 ±0.11	105k	AKHMETSHIN 06	CMD2	0.98–1.06 $e^+e^- \to \pi^+\pi^-\pi^0$
4.30 ±0.08 ±0.21		AUBERT,B 04N	BABR	10.6 $e^+e^- \to \pi^+\pi^-\pi^0\gamma$
4.665±0.042±0.261	400k	[18] ACHASOV 01E	SND	$e^+e^- \to K^+K^-$, $K_S K_L$, $\pi^+\pi^-\pi^0$
4.35 ±0.27 ±0.08	11169	[20] 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^-

$\Gamma(\eta\gamma)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_6/\Gamma \times \Gamma_9/\Gamma$

NODE=M004G2

NODE=M004G2

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
3.87 ±0.07 OUR FIT Error includes scale factor of 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	[21] ACHASOV 07B	SND	0.6–1.38 $e^+e^- \to \eta\gamma$
$4.093^{+0.040}_{-0.043}$±0.247	17.4k	[22] AKHMETSHIN 05	CMD2	0.60-1.38 $e^+e^- \to \eta\gamma$
3.850±0.041±0.159	23k	[23,24] AKHMETSHIN 01B	CMD2	$e^+e^- \to \eta\gamma$
4.00 ±0.04 ±0.11		[25] ACHASOV 00	SND	$e^+e^- \to \eta\gamma$
3.53 ±0.08 ±0.17	2200	[26,27] AKHMETSHIN 99F	CMD2	$e^+e^- \to \eta\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
4.19 ±0.06		[28] BENAYOUN 10	RVUE	0.4–1.05 e^+e^-



$\Gamma(\eta\gamma)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_6/\Gamma \times \Gamma_9/\Gamma$

$\Gamma(\pi^0\gamma)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_7/\Gamma \times \Gamma_9/\Gamma$

NODE=M004G3

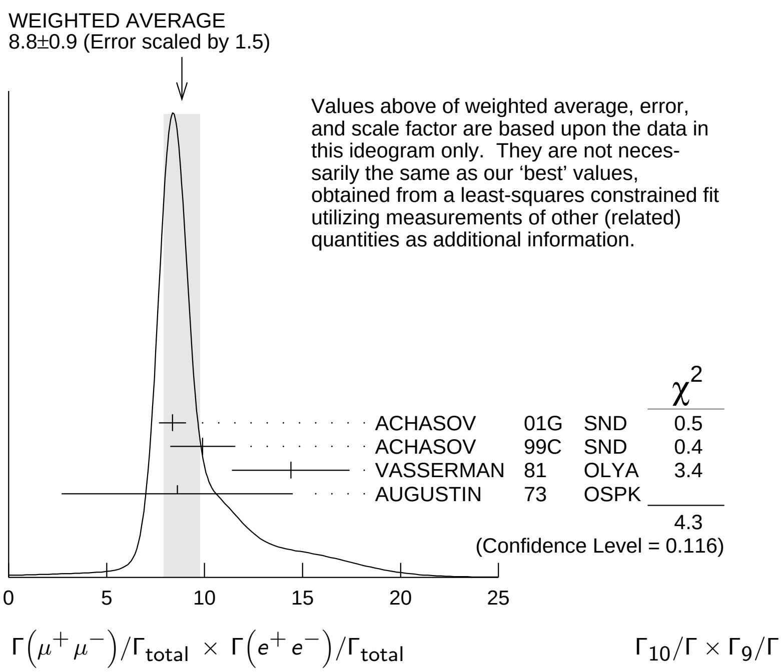
NODE=M004G3

VALUE (units 10^{-7})	EVTS	DOCUMENT ID	TECN	COMMENT
3.74±0.18 OUR FIT				
3.71±0.21 OUR AVERAGE				
3.75±0.11±0.29	18680	AKHMETSHIN 05	CMD2	0.60-1.38 $e^+e^- \to \pi^0\gamma$
3.67±0.10$^{+0.27}_{-0.25}$		[29] ACHASOV 00	SND	$e^+e^- \to \pi^0\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
4.29±0.11		[28] BENAYOUN 10	RVUE	0.4–1.05 e^+e^-

$\Gamma(\mu^+\mu^-)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\qquad \Gamma_{10}/\Gamma \times \Gamma_9/\Gamma$

NODE=M004G5
NODE=M004G5

VALUE (units 10^{-8})	DOCUMENT ID	TECN	COMMENT
8.5 $^{+0.5}_{-0.6}$ 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	$e^+e^- \rightarrow \mu^+\mu^-$
9.9 ±1.4 ±0.9	[26] ACHASOV 99C	SND	$e^+e^- \rightarrow \mu^+\mu^-$
14.4 ±3.0	[20] VASSERMAN 81	OLYA	$e^+e^- \rightarrow \mu^+\mu^-$
8.6 ±5.9	[20] AUGUSTIN 73	OSPK	$e^+e^- \rightarrow \mu^+\mu^-$



$\Gamma(\pi^+\pi^-)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\qquad \Gamma_{12}/\Gamma \times \Gamma_9/\Gamma$

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	[26] ACHASOV 00C	SND	$e^+e^- \rightarrow \pi^+\pi^-$
$1.95^{+1.15}_{-0.87}$	[20] GOLUBEV 86	ND	$e^+e^- \rightarrow \pi^+\pi^-$
$6.01^{+3.19}_{-2.51}$	[20] VASSERMAN 81	OLYA	$e^+e^- \rightarrow \pi^+\pi^-$

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

NODE=M004G11
NODE=M004G11

VALUE (units 10^{-8})	DOCUMENT ID	TECN	COMMENT
1.40±0.15 OUR FIT			
1.37±0.17±0.01	[30,31] AMBROSINO 08G	KLOE	$e^+e^- \rightarrow \pi^+\pi^-2\pi^0$, $2\pi^0\gamma$

$\Gamma(\pi^0\pi^0\gamma)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\qquad \Gamma_{18}/\Gamma \times \Gamma_9/\Gamma$

NODE=M004G9
NODE=M004G9

VALUE (units 10^{-8})	DOCUMENT ID	TECN	COMMENT
3.34±0.17 OUR FIT			
$3.33^{+0.04}_{-0.09}{}^{+0.19}_{-0.20}$	[32] AMBROSINO 07	KLOE	$e^+e^- \rightarrow \pi^0\pi^0\gamma$

$\Gamma(\pi^+\pi^-\pi^+\pi^-)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\qquad \Gamma_{19}/\Gamma \times \Gamma_9/\Gamma$

NODE=M004G8
NODE=M004G8

VALUE (units 10^{-9})	EVTS	DOCUMENT ID	TECN	COMMENT
1.2 $^{+0.8}_{-0.7}$ OUR FIT				
1.17±0.52±0.64	3285	[26] AKHMETSHIN 00E	CMD2	$e^+e^- \rightarrow \pi^+\pi^-\pi^+\pi^-$

[18] 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=M004G;LINKAGE=AE

[19] Update of AKHMETSHIN 99D NODE=M004G;LINKAGE=GS

[20] Recalculated by us from the cross section in the peak. NODE=M004G;LINKAGE=B

[21] 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=M004G2;LINKAGE=AH

[22] From the $\eta \to 2\gamma$ decay and using $B(\eta \to \gamma\gamma) = 39.43 \pm 0.26\%$. NODE=M004G2;LINKAGE=AK

[23] 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=M004G;LINKAGE=AK

[24] 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

[25] From the $\eta \to 2\gamma$ decay and using $B(\eta \to 2\gamma) = (39.21 \pm 0.34) \times 10^{-2}$. NODE=M004G2;LINKAGE=A

[26] Recalculated by the authors from the cross section in the peak. NODE=M004G;LINKAGE=A

[27] From the $\eta \to \pi^+\pi^-\pi^0$ decay and using $B(\eta \to \pi^+\pi^-\pi^0) = (23.1 \pm 0.5) \times 10^{-2}$. NODE=M004G2;LINKAGE=C

[28] A simultaneous fit of $e^+e^- \to \pi^+\pi^-$, $\pi^+\pi^-\pi^0$, $\pi^0\gamma$, $\eta\gamma$ data. NODE=M004G7;LINKAGE=BE

[29] From the $\pi^0 \to 2\gamma$ decay and using $B(\pi^0 \to 2\gamma) = (98.798 \pm 0.032) \times 10^{-2}$. NODE=M004G3;LINKAGE=A

[30] Recalculated by the authors from the cross section at the peak. NODE=M004G11;LINKAGE=AB

[31] 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

[32] Calculated by the authors from the cross section at the peak. NODE=M004G9;LINKAGE=AM

ϕ(1020) BRANCHING RATIOS

NODE=M004220

$\Gamma(K^+K^-)/\Gamma_{total}$ Γ_1/Γ

NODE=M004R1
NODE=M004R1

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.489±0.005 OUR FIT Error includes scale factor of 1.1.					
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		[33] AKHMETSHIN	11	CMD2	1.02 $e^+e^- \to K^+K^-$
0.476±0.017	1000k	[34] ACHASOV	01E	SND	$e^+e^- \to K^+K^-$, $K_S K_L$, $\pi^+\pi^-\pi^0$

$\Gamma(K^0_L K^0_S)/\Gamma_{total}$ Γ_2/Γ

NODE=M004R2
NODE=M004R2

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.342±0.004 OUR FIT Error includes scale factor of 1.1.					
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		[33] AKHMETSHIN	11	CMD2	1.02 $e^+e^- \to K^0_S K^0_L$
0.351±0.013	500k	[34] 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	BALAKIN	71	OSPK	$e^+e^- \to K^0_L K^0_S$
0.40 ±0.04	167	LINDSEY	66	HBC	2.1–2.7 $K^-p \to \Lambda K^0_L K^0_S$

$\Gamma(K^0_L K^0_S)/\Gamma(K^+K^-)$ Γ_2/Γ_1

NODE=M004R19
NODE=M004R19

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.698±0.014 OUR FIT Error includes scale factor of 1.1.					
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. • • •					
0.68 ±0.03		[35] AKHMETSHIN	95	CMD2	$e^+e^- \to K^0_L K^0_S$, K^+K^-

$\Gamma(K^0_L K^0_S)/\Gamma(K\overline{K})$ — $\Gamma_2/(\Gamma_1+\Gamma_2)$

NODE=M004R5

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.411±0.005 OUR FIT Error includes scale factor of 1.1.					
0.45 ±0.04 OUR AVERAGE					
0.44 ±0.07		LONDON	66	HBC	2.24 $K^- p \to \Lambda K \overline{K}$
0.48 ±0.07	52	BADIER	65B	HBC	3 $K^- p$
0.40 ±0.10	34	SCHLEIN	63	HBC	1.95 $K^- p \to \Lambda K \overline{K}$

$[\Gamma(\rho\pi)+\Gamma(\pi^+\pi^-\pi^0)]/\Gamma_{\text{total}}$ — Γ_3/Γ

NODE=M004R3

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.1532±0.0032 OUR FIT Error includes scale factor of 1.1.					
0.151 ±0.009 OUR AVERAGE Error includes scale factor of 1.7.					
0.161 ±0.008	11761	AKHMETSHIN	95	CMD2	$e^+e^- \to \pi^+\pi^-\pi^0$
0.143 ±0.007		DOLINSKY	91	ND	$e^+e^- \to \pi^+\pi^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.155 ±0.002 ±0.005		[33] AKHMETSHIN	11	CMD2	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$
0.159 ±0.008	400k	[34] ACHASOV	01E	SND	$e^+e^- \to K^+K^-$, $K_S K_L$, $\pi^+\pi^-\pi^0$
0.145 ±0.009 ±0.003	11169	[36] AKHMETSHIN	98	CMD2	$e^+e^- \to \pi^+\pi^-\pi^0$
0.139 ±0.007		[37] PARROUR	76B	OSPK	e^+e^-

$[\Gamma(\rho\pi)+\Gamma(\pi^+\pi^-\pi^0)]/\Gamma(K^+K^-)$ — Γ_3/Γ_1

NODE=M004R20

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.313±0.009 OUR FIT Error includes scale factor of 1.1.					
0.28 ±0.09	34	AGUILAR-...	72B	HBC	3.9,4.6 $K^- p$

$[\Gamma(\rho\pi)+\Gamma(\pi^+\pi^-\pi^0)]/\Gamma(K\overline{K})$ — $\Gamma_3/(\Gamma_1+\Gamma_2)$

NODE=M004R6

VALUE	DOCUMENT ID		TECN	COMMENT
0.184±0.005 OUR FIT Error includes scale factor of 1.1.				
0.24 ±0.04 OUR AVERAGE				
0.237±0.039	CERRADA	77B	HBC	4.2 $K^- p \to \Lambda 3\pi$
0.30 ±0.15	LONDON	66	HBC	2.24 $K^- p \to \Lambda \pi^+\pi^-\pi^0$

$[\Gamma(\rho\pi)+\Gamma(\pi^+\pi^-\pi^0)]/\Gamma(K^0_L K^0_S)$ — Γ_3/Γ_2

NODE=M004R7

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.448±0.012 OUR FIT Error includes scale factor of 1.1.					
0.51 ±0.05 OUR AVERAGE					
0.56 ±0.07	3681	BUKIN	78C	OLYA	$e^+e^- \to K^0_L K^0_S$, $\pi^+\pi^-\pi^0$
0.47 ±0.06	516	COSME	74	OSPK	$e^+e^- \to \pi^+\pi^-\pi^0$

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}$ — Γ_5/Γ

NODE=M004R46

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$\simeq$ 0.0087		1.98M	[38,39] ALOISIO	03	KLOE	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$
<0.0006	90		[40] ACHASOV	02	SND	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$
<0.23	90		[40] CORDIER	80	DM1	$e^+e^- \to \pi^+\pi^-\pi^0$
<0.20	90		[40] PARROUR	76B	OSPK	$e^+e^- \to \pi^+\pi^-\pi^0$

$\Gamma(\eta\gamma)/\Gamma_{\text{total}}$ — Γ_6/Γ

NODE=M004R11

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
1.309±0.024 OUR FIT Error includes scale factor of 1.2.					
1.26 ±0.04 OUR AVERAGE					
1.246±0.025±0.057	10k	[41] ACHASOV	98F	SND	$e^+e^- \to 7\gamma$
1.18 ±0.11	279	[42] AKHMETSHIN	95	CMD2	$e^+e^- \to \pi^+\pi^- 3\gamma$
1.30 ±0.06		[43] DRUZHININ	84	ND	$e^+e^- \to 3\gamma$
1.4 ±0.2		[44] 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 γ Cu
1.5 ±0.4	54	[43] COSME	76	OSPK	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.38 ±0.02 ±0.02		[33] AKHMETSHIN	11	CMD2	1.02 $e^+e^- \to \eta\gamma$
1.37 ±0.05 ±0.01	33k	[45] ACHASOV	07B	SND	0.6–1.38 $e^+e^- \to \eta\gamma$
1.373±0.014±0.085	17.4k	[46,47] AKHMETSHIN	05	CMD2	0.60-1.38 $e^+e^- \to \eta\gamma$
1.287±0.013±0.063		[48,49] AKHMETSHIN	01B	CMD2	$e^+e^- \to \eta\gamma$
1.338±0.012±0.052		[50] ACHASOV	00	SND	$e^+e^- \to \eta\gamma$
1.18 ±0.03 ±0.06	2200	[51] AKHMETSHIN	99F	CMD2	$e^+e^- \to \eta\gamma$
1.21 ±0.07		[52] BENAYOUN	96	RVUE	0.54-1.04 $e^+e^- \to \eta\gamma$

OCCUR=2

$\Gamma(\pi^0\gamma)/\Gamma_{total}$ — Γ_7/Γ

NODE=M004R17
NODE=M004R17

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.27 ±0.06 OUR 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. • • •					
1.258±0.037±0.077	18680	[53,54] AKHMETSHIN	05	CMD2	0.60-1.38 $e^+e^- \to \pi^0\gamma$
$1.226\pm0.036^{+0.096}_{-0.089}$		[55] ACHASOV	00	SND	$e^+e^- \to \pi^0\gamma$
1.26 ±0.17		[52] BENAYOUN	96	RVUE	0.54-1.04 $e^+e^- \to \pi^0\gamma$

$\Gamma(\eta\gamma)/\Gamma(\pi^0\gamma)$ — 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. • • •				
$10.9\pm0.3^{+0.7}_{-0.8}$	ACHASOV	00	SND	$e^+e^- \to \eta\gamma, \pi^0\gamma$

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

NODE=M004R16
NODE=M004R16

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.954±0.030 OUR FIT Error includes scale factor of 1.1.					
2.98 ±0.07 OUR AVERAGE Error includes scale factor of 1.1.					
2.93 ±0.14	1900k	[56] 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		[57] 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^-

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

NODE=M004R10
NODE=M004R10

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
2.87±0.19 OUR FIT				
2.5 ±0.4 OUR AVERAGE				
2.69±0.46	[58] HAYES	71	CNTR	8.3,9.8 $\gamma C \to \mu^+\mu^- X$
2.17±0.60	[58] 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	[59] ACHASOV	01G	SND	$e^+e^- \to \mu^+\mu^-$
3.30±0.45±0.32	[36] ACHASOV	99C	SND	$e^+e^- \to \mu^+\mu^-$
4.83±1.02	[60] VASSERMAN	81	OLYA	$e^+e^- \to \mu^+\mu^-$
2.87±1.98	[60] AUGUSTIN	73	OSPK	$e^+e^- \to \mu^+\mu^-$

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

NODE=M004R24
NODE=M004R24

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT	
1.15±0.10 OUR AVERAGE						
1.19±0.19±0.12	213	[61] ACHASOV	01B	SND	$e^+e^- \to \gamma\gamma e^+e^-$	
1.14±0.10±0.06	355	[62] AKHMETSHIN	01	CMD2	$e^+e^- \to \eta e^+e^-$	
$1.3\ ^{+0.8}_{-0.6}$	7	GOLUBEV	85	ND	$e^+e^- \to \gamma\gamma e^+e^-$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1.13±0.14±0.07	183	[63] AKHMETSHIN	01	CMD2	$e^+e^- \to \eta e^+e^-$	OCCUR=2
1.21±0.14±0.09	130	[64] AKHMETSHIN	01	CMD2	$e^+e^- \to \eta e^+e^-$	OCCUR=3
1.04±0.20±0.08	42	[65] AKHMETSHIN	01	CMD2	$e^+e^- \to \eta e^+e^-$	OCCUR=4

$\Gamma(\pi^+\pi^-)/\Gamma_{total}$ — 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±0.11±0.09		[36] ACHASOV	00C	SND	$e^+e^- \to \pi^+\pi^-$
$0.65^{+0.38}_{-0.29}$		[36] GOLUBEV	86	ND	$e^+e^- \to \pi^+\pi^-$
$2.01^{+1.07}_{-0.84}$		[36] 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 $\gamma C \to C\pi^+\pi^-$

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

NODE=M004R28

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
4.7±0.5 OUR FIT			
$\mathbf{5.2^{+1.3}_{-1.1}}$	[66,67] 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	[68] AMBROSINO 08G	KLOE	$e^+e^- \to \pi^+\pi^- 2\pi^0$, $2\pi^0\gamma$
∼ 5.4	[69] ACHASOV 00E	SND	$e^+e^- \to \pi^0\pi^0\gamma$
$5.5^{+1.6}_{-1.4}\pm0.3$	[67,70] AULCHENKO 00A	SND	$e^+e^- \to \pi^+\pi^-\pi^0\pi^0$
$4.8^{+1.9}_{-1.7}\pm0.8$	[69] ACHASOV 99	SND	$e^+e^- \to \pi^+\pi^-\pi^0\pi^0$

OCCUR=2

$\Gamma(\omega\gamma)/\Gamma_{total}$ Γ_{14}/Γ

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

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT
< 0.12	90	[71] 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

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

NODE=M004R12

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
0.41±0.12±0.04		30175	[72] AKHMETSHIN 99B	CMD2	$e^+e^- \to \pi^+\pi^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 0.3	90		[73] 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

$\Gamma(f_0(980)\gamma)/\Gamma_{total}$ Γ_{17}/Γ

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					
$3.21^{+0.03}_{-0.09}\pm0.18$			[74] AMBROSINO 07	KLOE	$e^+e^- \to \pi^0\pi^0\gamma$
2.90±0.21±1.54			[75] AKHMETSHIN 99C	CMD2	$e^+e^- \to \pi^+\pi^-\gamma$, $\pi^0\pi^0\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
4.47±0.21		2438	[76] ALOISIO 02D	KLOE	$e^+e^- \to \pi^0\pi^0\gamma$
$3.5\ \pm0.3\ ^{+1.3}_{-0.5}$		419	[77,78] ACHASOV 00H	SND	$e^+e^- \to \pi^0\pi^0\gamma$
1.93±0.46±0.50		27188	[79] AKHMETSHIN 99B	CMD2	$e^+e^- \to \pi^+\pi^-\gamma$
3.05±0.25±0.72		268	[80] AKHMETSHIN 99C	CMD2	$e^+e^- \to \pi^0\pi^0\gamma$
1.5 ±0.5		268	[81] AKHMETSHIN 99C	CMD2	$e^+e^- \to \pi^0\pi^0\gamma$
3.42±0.30±0.36		164	[77] ACHASOV 98I	SND	$e^+e^- \to 5\gamma$
< 1	90		[82] AKHMETSHIN 97C	CMD2	$e^+e^- \to \pi^+\pi^-\gamma$
< 7	90		[83] AKHMETSHIN 97C	CMD2	$e^+e^- \to \pi^+\pi^-\gamma$
< 20	90		DRUZHININ 87	ND	$e^+e^- \to \pi^0\pi^0\gamma$

OCCUR=3

OCCUR=2

OCCUR=2

$\Gamma(f_0(980)\gamma)/\Gamma(\eta\gamma)$ Γ_{17}/Γ_6

NODE=M004R44

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
2.46±0.15 OUR FIT Error includes scale factor of 1.1.				
$\mathbf{2.6\ \pm0.2\ ^{+0.8}_{-0.3}}$	419	[77] ACHASOV 00H	SND	$e^+e^- \to \pi^0\pi^0\gamma$

$\Gamma(\pi^0\pi^0\gamma)/\Gamma_{total}$ — Γ_{18}/Γ

NODE=M004R26
NODE=M004R26

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
1.07 ±0.06 OUR AVERAGE					
$1.07\ ^{+0.01}_{-0.03}\ ^{+0.06}_{-0.06}$			[84] 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	[78,85] ACHASOV 00H	SND	$e^+e^- \to \pi^0\pi^0\gamma$
<10	90		DRUZHININ 87	ND	$e^+e^- \to 5\gamma$

$\Gamma(\pi^0\pi^0\gamma)/\Gamma(\eta\gamma)$ — 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	[85] 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	$e^+e^- \to 5\gamma$

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

NODE=M004R22
NODE=M004R22

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3.93±1.74±2.14		3285	AKHMETSHIN 00E	CMD2	$e^+e^- \to \pi^+\pi^-\pi^+\pi^-$
< 870	90		CORDIER 79	WIRE	$e^+e^- \to \pi^+\pi^-\pi^+\pi^-$

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

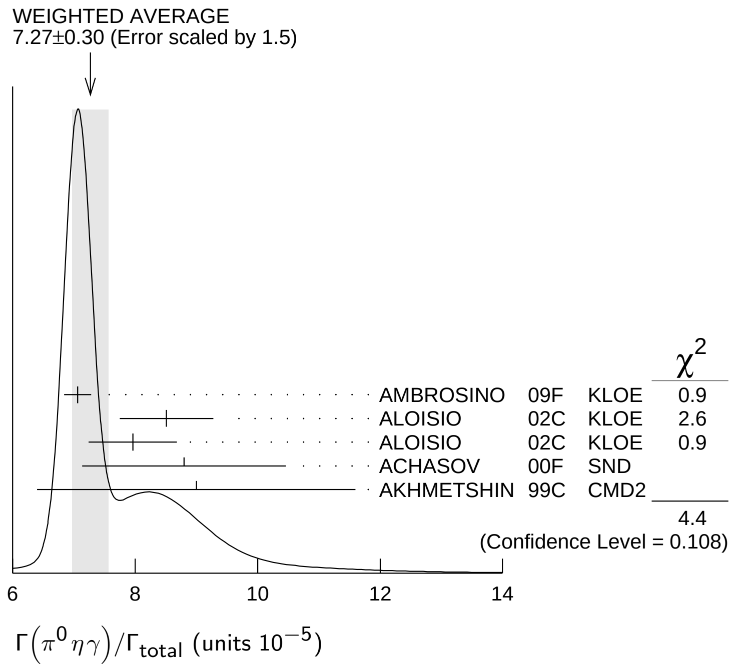
NODE=M004R31
NODE=M004R31

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
1.12±0.28 OUR AVERAGE					
1.01±0.28±0.29		52	[86] ACHASOV 02D	SND	$e^+e^- \to \pi^0e^+e^-$
1.22±0.34±0.21		46	[87] AKHMETSHIN 01C	CMD2	$e^+e^- \to \pi^0e^+e^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<12	90		DOLINSKY 88	ND	$e^+e^- \to \pi^0e^+e^-$

$\Gamma(\pi^0\eta\gamma)/\Gamma_{total}$ — 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	[88] AMBROSINO 09F	KLOE	$1.02\ e^+e^- \to \eta\pi^0\gamma$	
8.51±0.51±0.57		607	[89] ALOISIO 02C	KLOE	$e^+e^- \to \eta\pi^0\gamma$	
7.96±0.60±0.40		197	[90] ALOISIO 02C	KLOE	$e^+e^- \to \eta\pi^0\gamma$	OCCUR=2
8.8 ±1.4 ±0.9		36	[91] ACHASOV 00F	SND	$e^+e^- \to \eta\pi^0\gamma$	
9.0 ±2.4 ±1.0		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±0.10±0.20		13.3k	[89,92] AMBROSINO 09F	KLOE	$1.02\ e^+e^- \to \eta\pi^0\gamma$	OCCUR=2
7.12±0.13±0.22		3.6k	[90,93] AMBROSINO 09F	KLOE	$1.02\ e^+e^- \to \eta\pi^0\gamma$	OCCUR=3
8.3 ±2.3 ±1.2		20	ACHASOV 98B	SND	$e^+e^- \to 5\gamma$	
<250	90		DOLINSKY 91	ND	$e^+e^- \to \pi^0\eta\gamma$	



$\Gamma(a_0(980)\gamma)/\Gamma_{total}$ 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			[94] ALOISIO	02C	KLOE	$e^+e^- \to \eta\pi^0\gamma$
8.8±1.7		36	[95] ACHASOV	00F	SND	$e^+e^- \to \eta\pi^0\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
11 ±2			[96] GOKALP	02	RVUE	$e^+e^- \to \eta\pi^0\gamma$
<500	90		DOLINSKY	91	ND	$e^+e^- \to \pi^0\eta\gamma$

$\Gamma(f_0(980)\gamma)/\Gamma(a_0(980)\gamma)$ Γ_{17}/Γ_{23}

NODE=M004R47
NODE=M004R47

VALUE	DOCUMENT ID		TECN	COMMENT
6.1±0.6	[97] ALOISIO	02C	KLOE	$e^+e^- \to \eta\pi^0\gamma$

$\Gamma(K^0\overline{K}^0\gamma)/\Gamma_{total}$ 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	
6.25±0.21 OUR FIT							
6.25±0.30 OUR AVERAGE							
6.25±0.28±0.11		3407	[98] AMBROSINO	07A	KLOE	$1.02\ e^+e^- \to \pi^+\pi^-7\gamma$	
$6.7\ ^{+2.8}_{-2.4}\ \pm0.8$		12	[99] AULCHENKO	03B	SND	$e^+e^- \to \eta'\gamma$	OCCUR=2
• • • We do not use the following data for averages, fits, limits, etc. • • •							
$6.7\ ^{+5.0}_{-4.2}\ \pm1.5$		7	AULCHENKO	03B	SND	$e^+e^- \to 7\gamma$	
6.10±0.61±0.43		120	[100] ALOISIO	02E	KLOE	$1.02\ e^+e^- \to \pi^+\pi^-3\gamma$	
$8.2\ ^{+2.1}_{-1.9}\ \pm1.1$		21	[101] AKHMETSHIN	00B	CMD2	$e^+e^- \to \pi^+\pi^-3\gamma$	
$4.9\ ^{+2.2}_{-1.8}\ \pm0.6$		9	[102] AKHMETSHIN	00F	CMD2	$e^+e^- \to \pi^+\pi^-\pi^+\pi^- \geq 2\gamma$	
6.4 ±1.6		30	[103] AKHMETSHIN	00F	CMD2	$e^+e^- \to \eta'(958)\gamma$	OCCUR=2
$6.7\ ^{+3.4}_{-2.9}\ \pm1.0$		5	[104] AULCHENKO	99	SND	$e^+e^- \to \pi^+\pi^-3\gamma$	
<11	90		AULCHENKO	98	SND	$e^+e^- \to 7\gamma$	
$12\ ^{+7}_{-5}\ \pm2$		6	[101] AKHMETSHIN	97B	CMD2	$e^+e^- \to \pi^+\pi^-\ 3\gamma$	
<41	90		DRUZHININ	87	ND	$e^+e^- \to \gamma\eta\pi^+\pi^-$	

$\Gamma(\eta'(958)\gamma)/\Gamma(K^0_L K^0_S)$ Γ_{25}/Γ_2

NODE=M004R43
NODE=M004R43

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
1.83±0.06 OUR FIT				
$\mathbf{1.46^{+0.64}_{-0.54}\pm0.18}$	9	[105] AKHMETSHIN 00F	CMD2	$e^+e^- \to \pi^+\pi^-\pi^+\pi^- \geq 2\gamma$

$\Gamma(\eta'(958)\gamma)/\Gamma(\eta\gamma)$ Γ_{25}/Γ_6

NODE=M004R34
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	[106] 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	[107] AKHMETSHIN 97B	CMD2	$e^+e^- \to \pi^+\pi^- 3\gamma$

$\Gamma(\eta\pi^0\pi^0\gamma)/\Gamma_{total}$ Γ_{26}/Γ

NODE=M004R36
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
NODE=M004R35

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
1.43±0.45±0.14	27188	[79] 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	[108] AKHMETSHIN 97C	CMD2	$e^+e^- \to \mu^+\mu^-\gamma$

$\Gamma(\rho\gamma\gamma)/\Gamma_{total}$ Γ_{28}/Γ

NODE=M004R37
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
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
NODE=M004R45

VALUE (units 10^{-6})	CL%	DOCUMENT ID	TECN	COMMENT
<9.4	90	AKHMETSHIN 01	CMD2	$e^+e^- \to \eta e^+e^-$

[33] 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

[34] Using B($\phi \to e^+e^-$)= $(2.93 \pm 0.14) \times 10^{-4}$. NODE=M004R;LINKAGE=B2

[35] 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. NODE=M004R19;LINKAGE=KH

[36] Using B($\phi \to e^+e^-$)=$(2.99 \pm 0.08) \times 10^{-4}$. NODE=M004R;LINKAGE=8D

[37] 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

[38] From a fit without limitations on charged and neutral ρ masses and widths. NODE=M004R;LINKAGE=L1

[39] Adding the direct and $\omega\pi$ contributions and considering the interference between the $\rho\pi$ and $\pi^+\pi^-\pi^0$. NODE=M004R;LINKAGE=L2

[40] Neglecting the interference between the $\rho\pi$ and $\pi^+\pi^-\pi^0$. NODE=M004R;LINKAGE=46

[41] Using B($\phi \to e^+e^-$) = $(2.99 \pm 0.08) \times 10^{-4}$ and B($\eta \to 3\pi^0$)= $(32.2 \pm 0.4) \times 10^{-2}$. NODE=M004R11;LINKAGE=AC

[42] From $\pi^+\pi^-\pi^0$ decay mode of η. NODE=M004R11;LINKAGE=Z3

[43] From 2γ decay mode of η. NODE=M004R11;LINKAGE=A

[44] From $3\pi^0$ decay mode of η. NODE=M004R11;LINKAGE=C

[45] 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($\phi(1020) \to e^+e^-$) NODE=M004R11;LINKAGE=AO

$= (2.954 \pm 0.030) \times 10^{-4}$. 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.

46 Using $B(\phi \to e^+e^-) = (2.98 \pm 0.04) \times 10^{-4}$ and $B(\eta \to \gamma\gamma) = 39.43 \pm 0.26\%$. NODE=M004R11;LINKAGE=AH

47 Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\eta\gamma)/\Gamma^2_{total}$. NODE=M004R11;LINKAGE=AK

48 Using $B(\phi \to e^+e^-) = (2.99 \pm 0.08) \times 10^{-4}$ and $B(\eta \to 3\pi^0) = (32.24 \pm 0.29) \times 10^{-2}$. NODE=M004R;LINKAGE=AK

49 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=M004R;LINKAGE=BQ

50 From the $\eta \to 2\gamma$ decay and using $B(\phi \to e^+e^-) = (2.99 \pm 0.08) \times 10^{-4}$. NODE=M004R;LINKAGE=GA

51 From $\pi^+\pi^-\pi^0$ decay mode of η and using $B(\phi \to e^+e^-) = (2.99 \pm 0.08) \times 10^{-4}$. NODE=M004R;LINKAGE=FF

52 Reanalysis of DRUZHININ 84, DOLINSKY 89, and DOLINSKY 91 taking into account a triangle anomaly contribution. NODE=M004R;LINKAGE=TS

53 Using $B(\phi \to e^+e^-) = (2.98 \pm 0.04) \times 10^{-4}$. NODE=M004R17;LINKAGE=AH

54 Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\pi^0\gamma)/\Gamma^2_{total}$. NODE=M004R17;LINKAGE=AK

55 From the $\pi^0 \to 2\gamma$ decay and using $B(\phi \to e^+e^-) = (2.99 \pm 0.08) \times 10^{-4}$. NODE=M004R;LINKAGE=3G

56 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=M004R;LINKAGE=AE

57 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

58 Neglecting interference between resonance and continuum. NODE=M004R10;LINKAGE=A

59 Using $B(\phi \to e^+e^-) = (2.91 \pm 0.07) \times 10^{-4}$. NODE=M004R;LINKAGE=GZ

60 Recalculated by us using $B(\phi \to e^+e^-) = (2.99 \pm 0.08) \times 10^{-4}$. NODE=M004R;LINKAGE=VA

61 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

62 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

63 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

64 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

65 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

66 Using the 1996 and 1998 data. NODE=M004R28;LINKAGE=K2

67 $(2.3 \pm 0.3)\%$ correction for other decay modes of the $\omega(782)$ applied. NODE=M004R28;LINKAGE=K3

68 Not independent of the corresponding $\Gamma(\omega\pi^0) \times \Gamma(e^+e^-) / \Gamma^2(\text{total})$. NODE=M004R28;LINKAGE=AM

69 Using the 1996 data. NODE=M004R28;LINKAGE=VS

70 Using the 1998 data. NODE=M004R28;LINKAGE=K1

71 Supersedes AKHMETSHIN 97C. NODE=M004R;LINKAGE=1N

72 For $E_\gamma > 20$ MeV and assuming that $B(\phi(1020) \to f_0(980)\gamma)$ is negligible. Supersedes AKHMETSHIN 97C. NODE=M004R;LINKAGE=2N

73 For $E_\gamma > 20$ MeV and assuming that $B(\phi(1020) \to f_0(980)\gamma)$ is negligible. NODE=M004R12;LINKAGE=Z3

74 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

75 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

76 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

77 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

78 Using the value $B(\phi \to \eta\gamma) = (1.338 \pm 0.053) \times 10^{-2}$. NODE=M004R;LINKAGE=U8

79 For $E_\gamma > 20$ MeV. Supersedes AKHMETSHIN 97C. NODE=M004R;LINKAGE=3N

80 Neglecting other intermediate mechanisms ($\rho\pi$, $\sigma\gamma$). NODE=M004R;LINKAGE=SM

81 A narrow pole fit taking into account $f_0(980)$ and $f_0(1200)$ intermediate mechanisms. NODE=M004R;LINKAGE=ST

82 For destructive interference with the Bremsstrahlung process NODE=M004R30;LINKAGE=A

83 For constructive interference with the Bremsstrahlung process NODE=M004R30;LINKAGE=B

84 Supersedes ALOISIO 02D. NODE=M004R26;LINKAGE=MB

85 Supersedes ACHASOV 98I. Excluding $\omega\pi^0$. NODE=M004R;LINKAGE=V8

86 Using various branching ratios from the 2000 Edition of this Review (PDG 00). NODE=M004R;LINKAGE=DS

87 Using $B(\pi^0 \to \gamma\gamma) = 0.98798 \pm 0.00032$, $B(\phi \to \eta\gamma) = (1.297 \pm 0.033) \times 10^{-2}$, and $B(\eta \to \pi^+\pi^-\gamma) = (4.75 \pm 0.11) \times 10^{-2}$. NODE=M004R;LINKAGE=5H

88 Combined results of $\eta \to \gamma\gamma$ and $\eta \to \pi^+\pi^-\pi^0$ decay modes measurements. NODE=M004R32;LINKAGE=AM

89 From the decay mode $\eta \to \gamma\gamma$. NODE=M004R;LINKAGE=C1

90 From the decay mode $\eta \to \pi^+\pi^-\pi^0$. NODE=M004R;LINKAGE=C2

91 Supersedes ACHASOV 98B. NODE=M004R32;LINKAGE=AF

92 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

93 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

94 Using $M_{a_0(980)}$=984.8 MeV and assuming $a_0(980)\gamma$ dominance. NODE=M004R;LINKAGE=C3

95 Assuming $a_0(980)\gamma$ dominance in the $\eta\pi^0\gamma$ final state. NODE=M004R33;LINKAGE=AF

96 Using data of ACHASOV 00F. NODE=M004R;LINKAGE=GK

97 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

98 AMBROSINO 07A reports [$\Gamma(\phi(1020) \to \eta'(958)\gamma)/\Gamma_{total}$] / [B($\phi(1020) \to \eta\gamma$)] = (4.77 ± 0.09 ± 0.19) × 10^{-3} which we multiply by our best value B($\phi(1020) \to \eta\gamma$) = (1.309 ± 0.024) × 10^{-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

99 Averaging AULCHENKO 03B with AULCHENKO 99. NODE=M004R25;LINKAGE=BK

100 Using B($\phi \to \eta\gamma$)= (1.297 ± 0.033)%. NODE=M004R;LINKAGE=E2

101 Using the value B($\phi \to \eta\gamma$) = (1.26 ± 0.06) × 10^{-2}. NODE=M004R25;LINKAGE=Q

102 Using B($\phi \to K^0_L K^0_S$) = (33.8 ± 0.6)%. NODE=M004R;LINKAGE=T2

103 Averaging AKHMETSHIN 00B with AKHMETSHIN 00F. NODE=M004R;LINKAGE=T3

104 Using the value B($\eta' \to \eta\pi^+\pi^-$)= (43.7 ± 1.5) × 10^{-2} and B($\eta \to \gamma\gamma$)= (39.25 ± 0.31) × 10^{-2}. NODE=M004R25;LINKAGE=AU

105 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

106 From the decay mode $\eta' \to \eta\pi^+\pi^-$, $\eta \to \gamma\gamma$. NODE=M004R;LINKAGE=E1

107 Superseded by AKHMETSHIN 00B. NODE=M004R;LINKAGE=KS

108 For E_γ > 20 MeV. NODE=M004R35;LINKAGE=A

Lepton Faminly number (LF) violating modes

NODE=M00422A

$\Gamma(e^\pm\mu^\mp)/\Gamma_{total}$ Γ_{31}/Γ

NODE=M004R29
NODE=M004R29

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<2 × 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

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	[109] AKHMETSHIN	06	CMD2	1.017–1.021 $e^+e^- \to \pi^+\pi^-\pi^0$
9.0±1.1±0.6		1.98M	[110,111] 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	[111] ACHASOV	02	SND	$e^+e^- \to \pi^+\pi^-\pi^0$
$-16 < a_1 < 11$	90	9.8k	[109,112] AKHMETSHIN	98	CMD2	$e^+e^- \to \pi^+\pi^-\gamma\gamma$

109 Dalitz plot analysis taking into account interference between the contact and $\rho\pi$ amplitudes. NODE=M004D1;LINKAGE=AK

110 From a fit without limitations on charged and neutral ρ masses and widths. NODE=M004D;LINKAGE=L1

111 Recalculated by us to match the notations of AKHMETSHIN 98. NODE=M004D;LINKAGE=L3

112 Assuming zero phase for the contact term. NODE=M004D1;LINKAGE=KL

$\phi(1020)$ REFERENCES

NODE=M004

AKHMETSHIN	11	PL B695 412	R. Akhmetshin *et al.*	(CMD2 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	V. Aulchenko *et al.*	(CMD-2 Collab.)	REFID=52268
		Translated from ZETFP 88 93.			
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	JPG 28 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
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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
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BRAMON	00	PL B486 406	A. Bramon *et al.*		REFID=47969
PDG	00	EPJ C15 1	D.E. Groom *et al.*		REFID=47469
ACHASOV	99	PL B449 122	M.N. Achasov *et al.*		REFID=46896
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AKHMETSHIN	99B	PL B462 371	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=47392
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AKHMETSHIN	99D	PL B466 385	R.R. Akhmetshin *et al.*		REFID=47397
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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
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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
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BARKOV	88	SJNP 47 248	L.M. Barkov *et al.*	(NOVO)	REFID=41024
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DOLINSKY	88	SJNP 48 277	S.I. Dolinsky *et al.*	(NOVO)	REFID=41022
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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
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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
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GOLUBEV	86	SJNP 44 409	V.B. Golubev *et al.*	(NOVO)	REFID=40449
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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
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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*
1170±20 OUR ESTIMATE					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1168± 4	ANDO	92	SPEC		8 $\pi^- p \to \pi^+\pi^-\pi^0 n$
1166± 5±3	[1] 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
→ NOT CHECKED ←
OCCUR=2

[1] Average and spread of values using 2 variants of the model of BOWLER 75.
[2] Uses the model of BOWLER 75.

NODE=M030M;LINKAGE=B
NODE=M030M;LINKAGE=C

$h_1(1170)$ WIDTH

NODE=M030W

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
360±40 OUR ESTIMATE					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
345± 6	ANDO	92	SPEC		8 $\pi^- p \to \pi^+\pi^-\pi^0 n$
375± 6±34	[3] 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
→ NOT CHECKED ←
OCCUR=2

[3] Average and spread of values using 2 variants of the model of BOWLER 75.
[4] Uses the model of BOWLER 75.

NODE=M030W;LINKAGE=B
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;→ NOT CHECKED ←

$h_1(1170)$ 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	$8\ \pi^- p \to \pi^+\pi^-\pi^0 n$
seen	ATKINSON	84	OMEG	$20–70\ \gamma p \to \pi^+\pi^-\pi^0 p$
seen	DANKOWY...	81	SPEC	$8\ \pi p \to 3\pi n$

$h_1(1170)$ 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

$b_1(1235)$

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

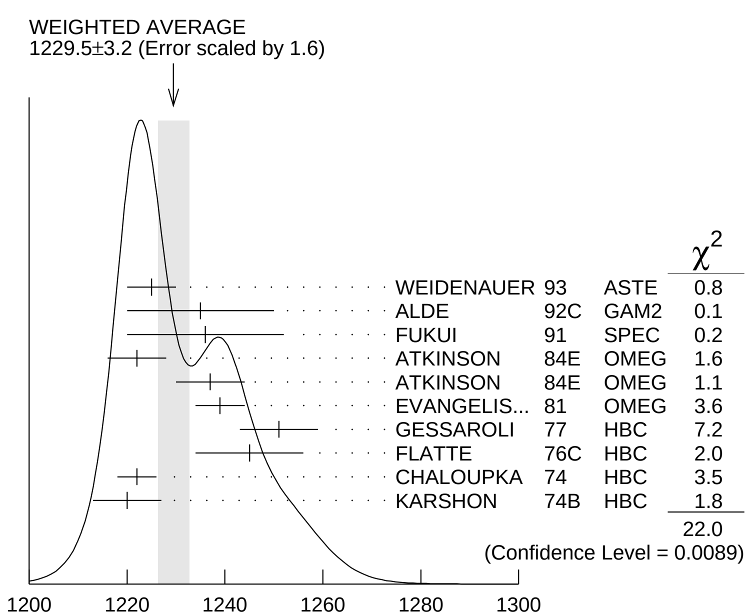
$b_1(1235)$ MASS

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		$\overline{p}p \to 2\pi^+ 2\pi^- \pi^0$
1235 ±15		ALDE	92C	GAM2		$38{,}100\ \pi^- p \to \omega\pi^0 n$
1236 ±16		FUKUI	91	SPEC		$8.95\ \pi^- p \to \omega\pi^0 n$
1222 ± 6		ATKINSON	84E	OMEG	±	$25–55\ \gamma p \to \omega\pi X$
1237 ± 7		ATKINSON	84E	OMEG	0	$25–55\ \gamma p \to \omega\pi X$
1239 ± 5		EVANGELIS...	81	OMEG	−	$12\ \pi^- p \to \omega\pi p$
1251 ± 8	450	GESSAROLI	77	HBC	−	$11\ \pi^- p \to \pi^-\omega p$
1245 ±11	890	FLATTE	76C	HBC	−	$4.2\ K^- p \to \pi^-\omega\Sigma^+$
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	±	$e^+e^- \to 5\pi$
1213 ± 5		ATKINSON	84C	OMEG	0	$20–70\ \gamma p$
1271 ±11		COLLICK	84	SPEC	+	$200\ \pi^+ Z \to Z\pi\omega$

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	$\omega \pi$	dominant		DESIG=1;OUR EST;→ NOT CHECKED ←
	[D/S amplitude ratio = 0.277 ± 0.027]			
Γ_2	$\pi^\pm \gamma$	(1.6±0.4) × 10^{-3}		DESIG=9
Γ_3	$\eta \rho$	seen		DESIG=8;OUR EST;→ NOT CHECKED ←
Γ_4	$\pi^+ \pi^+ \pi^- \pi^0$	< 50 %	84%	DESIG=2;OUR EST;→ NOT CHECKED ←
Γ_5	$K^*(892)^\pm K^\mp$	seen		DESIG=74
Γ_6	$(K\overline{K})^\pm \pi^0$	< 8 %	90%	DESIG=71;OUR EST;→ NOT CHECKED ←
Γ_7	$K^0_S K^0_L \pi^\pm$	< 6 %	90%	DESIG=73;OUR EST;→ NOT CHECKED ←
Γ_8	$K^0_S K^0_S \pi^\pm$	< 2 %	90%	DESIG=72;OUR EST;→ NOT CHECKED ←
Γ_9	$\phi \pi$	< 1.5 %	84%	DESIG=5;OUR EST;→ NOT CHECKED ←

$b_1(1235)$ PARTIAL WIDTHS

NODE=M011220

$\Gamma(\pi^\pm \gamma)$ Γ_2

NODE=M011W3

NODE=M011W3

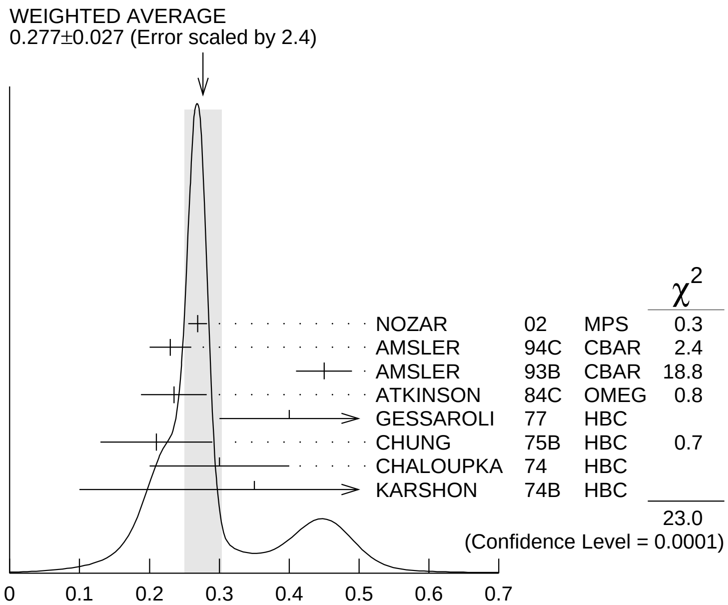
VALUE (keV)	DOCUMENT ID		TECN	CHG	COMMENT
230±60	COLLICK	84	SPEC	+	200 $\pi^+ Z \to Z \pi \omega$

$b_1(1235)$ 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 $b_1(1235) \rightarrow \omega\pi$

$b_1(1235)$ D-wave/S-wave AMPLITUDE PHASE DIFFERENCE IN DECAY OF $b_1(1235) \rightarrow \omega\pi$

NODE=M011PH

NODE=M011PH

VALUE (°)	DOCUMENT ID		TECN	CHG	COMMENT
10.5±2.4±3.9	NOZAR	02	MPS	–	18 $\pi^- p \rightarrow \omega\pi^- p$

$b_1(1235)$ 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	$J/\psi \rightarrow K^\pm K^0_S \pi^\mp \pi^0$

[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 $\pi^- p \rightarrow K^+ K^- \pi^0 n$
• • • 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 225	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, G **33** 1 (2006).

NODE=M010

$a_1(1260)$ MASS

NODE=M010M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*	
						NODE=M010M
1230±40 OUR ESTIMATE						→ NOT CHECKED ←
$1255\pm\ 6^{+7}_{-17}$	420k	ALEKSEEV	10	COMP	$190\ \pi^- Pb \to \pi^-\pi^-\pi^+ Pb'$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1243±12±20		[1] AUBERT	07AU	BABR	$10.6\ e^+e^- \to \rho^0\rho^\pm\pi^\mp\gamma$	
1230–1270	6360	[2] LINK	07A	FOCS	$D^0 \to \pi^-\pi^+\pi^-\pi^+$	
1203± 3		[3] 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	[4] ASNER	00	CLE2	$10.6\ e^+e^- \to \tau^+\tau^-$, $\tau^- \to \pi^-\pi^0\pi^0\nu_\tau$	
1255± 7± 6	5904	[5] ABREU	98G	DLPH	e^+e^-	
1207± 5± 8	5904	[6] ABREU	98G	DLPH	e^+e^-	OCCUR=2
1196± 4± 5	5904	[7,8] 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		[5,9] ACKERSTAFF	97R	OPAL	E^{ee}_{cm}= 88–94, $\tau \to 3\pi\nu$	
1210± 7± 2		[6,9] ACKERSTAFF	97R	OPAL	E^{ee}_{cm}= 88–94, $\tau \to 3\pi\nu$	OCCUR=2
$1211\pm\ 7^{+50}_{-\ 0}$		[6] ALBRECHT	93C	ARG	$\tau^+ \to \pi^+\pi^+\pi^-\nu$	
1121± 8		[10] ANDO	92	SPEC	$8\ \pi^- p \to \pi^+\pi^-\pi^0 n$	
1242±37		[11] IVANOV	91	RVUE	$\tau \to \pi^+\pi^+\pi^-\nu$	
1260±14		[12] IVANOV	91	RVUE	$\tau \to \pi^+\pi^+\pi^-\nu$	OCCUR=2
1250± 9		[13] 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		[14] ISGUR	89	RVUE	$\tau^+ \to \pi^+\pi^+\pi^-\nu$	
1260±25		[15] 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		[14] 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		[16] DANKOWY...	81	SPEC	$8.45\ \pi^- p \to n 3\pi$	
1280±30		[16] DAUM	81B	CNTR	$63{,}94\ \pi^- p \to p 3\pi$	
1041±13		[17] GAVILLET	77	HBC	$4.2\ K^- p \to \Sigma 3\pi$	

[1] The $\rho^{\pm}\pi^{\mp}$ state can be also due to the $\pi(1300)$. NODE=M010M;LINKAGE=AU
[2] Using the Breit-Wigner parameterization; strong correlation between mass and width. NODE=M010M;LINKAGE=LI
[3] Using the data of BARATE 98R. NODE=M010M;LINKAGE=GO
[4] From a fit to the 3π mass spectrum including the $K\overline{K}^*(892)$ threshold. NODE=M010M;LINKAGE=B6
[5] Uses the model of KUHN 90. NODE=M010M;LINKAGE=KS
[6] Uses the model of ISGUR 89. NODE=M010M;LINKAGE=IM
[7] Includes the effect of a possible a_1' state. NODE=M010M;LINKAGE=A1
[8] Uses the model of FEINDT 90. NODE=M010M;LINKAGE=F1
[9] Supersedes AKERS 95P. NODE=M010M;LINKAGE=X
[10] Average and spread of values using 2 variants of the model of BOWLER 75. NODE=M010M;LINKAGE=P
[11] Reanalysis of RUCKSTUHL 86. NODE=M010M;LINKAGE=I
[12] Reanalysis of SCHMIDKE 86. NODE=M010M;LINKAGE=L
[13] Reanalysis of ALBRECHT 86B. NODE=M010M;LINKAGE=M
[14] From a combined reanalysis of ALBRECHT 86B, SCHMIDKE 86, and RUCKSTUHL 86. NODE=M010M;LINKAGE=K
[15] From a combined reanalysis of ALBRECHT 86B and DAUM 81B. NODE=M010M;LINKAGE=G
[16] Uses the model of BOWLER 75. NODE=M010M;LINKAGE=D
[17] Produced in K^- backward scattering. NODE=M010M;LINKAGE=F

a_1(1260) WIDTH

NODE=M010W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
						NODE=M010W
250 to 600 OUR ESTIMATE						→ NOT CHECKED ←
$367\pm 9^{+28}_{-25}$	420k	ALEKSEEV	10	COMP	$190\ \pi^- Pb \to \pi^-\pi^-\pi^+ Pb'$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$410\pm 31\pm 30$		[18] AUBERT	07AU	BABR	$10.6\ e^+e^- \to \rho^0\rho^{\pm}\pi^{\mp}\gamma$	
520–680	6360	[19] LINK	07A	FOCS	$D^0 \to \pi^-\pi^+\pi^-\pi^+$	
480 ± 20		[20] 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	[21] DRUTSKOY	02	BELL	$B \to D^{(*)}K^-K^{*0}$	
$814\pm 36\pm 13$	37k	[22] ASNER	00	CLE2	$10.6\ e^+e^- \to \tau^+\tau^-$, $\tau^- \to \pi^-\pi^0\pi^0\nu_\tau$	
450 ± 50	22k	[23] AKHMETSHIN	99E	CMD2	1.05–1.38 $e^+e^- \to \pi^+\pi^-\pi^0\pi^0$	
570 ± 10		[24] BONDAR	99	RVUE	$e^+e^- \to 4\pi$, $\tau \to 3\pi\nu_\tau$	
$587\pm 27\pm 21$	5904	[25] ABREU	98G	DLPH	e^+e^-	
$478\pm 3\pm 15$	5904	[26] ABREU	98G	DLPH	e^+e^-	OCCUR=2
$425\pm 14\pm 8$	5904	[27,28] ABREU	98G	DLPH	e^+e^-	OCCUR=3
400 ± 35		BARBERIS	98B		$450\ pp \to p_f\pi^+\pi^-\pi^0 p_s$	
$621\pm 32\pm 58$		[25,29] ACKERSTAFF	97R	OPAL	E^{ee}_{cm}= 88–94, $\tau \to 3\pi\nu$	
$457\pm 15\pm 17$		[26,29] ACKERSTAFF	97R	OPAL	E^{ee}_{cm}= 88–94, $\tau \to 3\pi\nu$	OCCUR=2
$446\pm 21^{+140}_{-0}$		[26] ALBRECHT	93C	ARG	$\tau^+ \to \pi^+\pi^+\pi^-\nu$	
239 ± 11		ANDO	92	SPEC	$8\ \pi^-p \to \pi^+\pi^-\pi^0 n$	
$266\pm 13\pm 4$		[30] ANDO	92	SPEC	$8\ \pi^-p \to \pi^+\pi^-\pi^0 n$	OCCUR=3
465^{+228}_{-143}		[31] IVANOV	91	RVUE	$\tau \to \pi^+\pi^+\pi^-\nu$	
298^{+40}_{-34}		[32] IVANOV	91	RVUE	$\tau \to \pi^+\pi^+\pi^-\nu$	OCCUR=2
488 ± 32		[33] 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		[34] ISGUR	89	RVUE	$\tau^+ \to \pi^+\pi^+\pi^-\nu$	
396 ± 43		[35] BOWLER	88	RVUE		
$405\pm 75\pm 25$		BAND	87	MAC	$\tau^+ \to \pi^+\pi^+\pi^-\nu$	
$419\pm 108\pm 57$		BAND	87	MAC	$\tau^+ \to \pi^+\pi^0\pi^0\nu$	OCCUR=2
521 ± 27		ALBRECHT	86B	ARG	$\tau^+ \to \pi^+\pi^+\pi^-\nu$	
$476^{+132}_{-120}\pm 54$		RUCKSTUHL	86	DLCO	$\tau^+ \to \pi^+\pi^+\pi^-\nu$	
$462\pm 56\pm 30$		SCHMIDKE	86	MRK2	$\tau^+ \to \pi^+\pi^+\pi^-\nu$	
292 ± 40		BELLINI	85	SPEC	$40\ \pi^-A \to \pi^-\pi^+\pi^-A$	
380 ± 100		[36] DANKOWY...	81	SPEC	$8.45\ \pi^-p \to n3\pi$	
300 ± 50		[36] DAUM	81B	CNTR	$63,94\ \pi^-p \to p3\pi$	
230 ± 50		[37] GAVILLET	77	HBC	$4.2\ K^-p \to \Sigma 3\pi$	

[18] The $\rho^{\pm}\pi^{\mp}$ state can be also due to the $\pi(1300)$. NODE=M010W;LINKAGE=AU
[19] Using the Breit-Wigner parameterization; strong correlation between mass and width. NODE=M010W;LINKAGE=LI
[20] Using the data of BARATE 98R. NODE=M010W;LINKAGE=GO
[21] 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
[22] From a fit to the 3π mass spectrum including the $K\overline{K}^*(892)$ threshold. NODE=M010W;LINKAGE=B6
[23] Using the $a_1(1260)$ mass of 1230 MeV. NODE=M010W;LINKAGE=WE
[24] From AKHMETSHIN 99E and ASNER 00 data using the $a_1(1260)$ mass of 1230 MeV. NODE=M010W;LINKAGE=WB
[25] Uses the model of KUHN 90. NODE=M010W;LINKAGE=KS
[26] Uses the model of ISGUR 89. NODE=M010W;LINKAGE=IM
[27] Includes the effect of a possible a_1' state. NODE=M010W;LINKAGE=A1
[28] Uses the model of FEINDT 90. NODE=M010W;LINKAGE=F1
[29] Supersedes AKERS 95P. NODE=M010W;LINKAGE=X
[30] Average and spread of values using 2 variants of the model of BOWLER 75. NODE=M010W;LINKAGE=P
[31] Reanalysis of RUCKSTUHL 86. NODE=M010W;LINKAGE=I
[32] Reanalysis of SCHMIDKE 86. NODE=M010W;LINKAGE=L
[33] Reanalysis of ALBRECHT 86B. NODE=M010W;LINKAGE=M
[34] From a combined reanalysis of ALBRECHT 86B, SCHMIDKE 86, and RUCKSTUHL 86. NODE=M010W;LINKAGE=K
[35] From a combined reanalysis of ALBRECHT 86B and DAUM 81B. NODE=M010W;LINKAGE=G
[36] Uses the model of BOWLER 75. NODE=M010W;LINKAGE=D
[37] 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	$\pi^+\pi^-\pi^0$		DESIG=22
Γ_2	$\pi^0\pi^0\pi^0$		DESIG=23
Γ_3	$(\rho\pi)_{S-\text{wave}}$	seen	DESIG=7;OUR EST;→ NOT CHECKED ←
Γ_4	$(\rho\pi)_{D-\text{wave}}$	seen	DESIG=8;OUR EST;→ NOT CHECKED ←
Γ_5	$(\rho(1450)\pi)_{S-\text{wave}}$	seen	DESIG=9;OUR EST;→ NOT CHECKED ←
Γ_6	$(\rho(1450)\pi)_{D-\text{wave}}$	seen	DESIG=10;OUR EST;→ NOT CHECKED ←
Γ_7	$\sigma\pi$	seen	DESIG=16;OUR EST;→ NOT CHECKED ←
Γ_8	$f_0(980)\pi$	not seen	DESIG=11;OUR EST;→ NOT CHECKED ←
Γ_9	$f_0(1370)\pi$	seen	DESIG=12;OUR EST;→ NOT CHECKED ←
Γ_{10}	$f_2(1270)\pi$	seen	DESIG=13;OUR EST;→ NOT CHECKED ←
Γ_{11}	$K\overline{K}^*(892)+$ c.c.	seen	DESIG=14;OUR EST;→ NOT CHECKED ←
Γ_{12}	$\pi\gamma$	seen	DESIG=4;OUR EST;→ NOT CHECKED ←

$a_1(1260)$ PARTIAL WIDTHS

NODE=M010220

$\Gamma(\pi\gamma)$ Γ_{12}

NODE=M010W4
NODE=M010W4

VALUE (keV)	*DOCUMENT ID*		*TECN*	*COMMENT*
640±246	ZIELINSKI	84C	SPEC	200 $\pi^+ Z \to Z 3\pi$

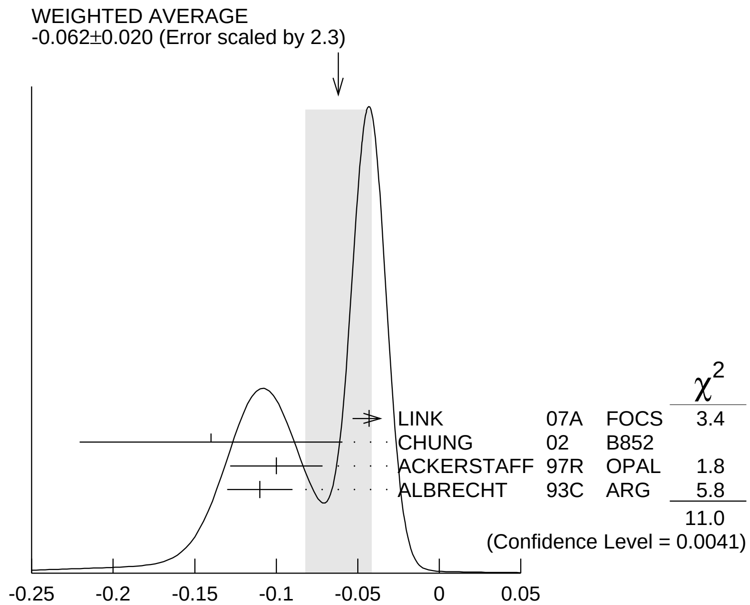
D-wave/S-wave AMPLITUDE RATIO IN DECAY OF $a_1(1260) \to \rho\pi$

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	$D^0 \to \pi^-\pi^+\pi^-\pi^+$
−0.14 ±0.04 ±0.07	[38]	CHUNG	02	B852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$
−0.10 ±0.02 ±0.02	[39,40]	ACKERSTAFF	97R	OPAL	E^{ee}_{cm}= 88–94, $\tau \to 3\pi\nu$
−0.11 ±0.02	[39]	ALBRECHT	93C	ARG	$\tau^+ \to \pi^+\pi^+\pi^-\nu$

[38] Deck-type background not subtracted. NODE=M010DS;LINKAGE=C
[39] Uses the model of ISGUR 89. NODE=M010DS;LINKAGE=IM
[40] Supersedes AKERS 95P. 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

$\Gamma((\rho\pi)_{S-\mathrm{wave}})/\Gamma_{\mathrm{total}}$ — Γ_3/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	[41] ASNER	00	CLE2	10.6 $e^+e^- \rightarrow \tau^+\tau^-$, $\tau^- \rightarrow \pi^-\pi^0\pi^0\nu_\tau$

$\Gamma((\rho\pi)_{D-\mathrm{wave}})/\Gamma_{\mathrm{total}}$ — Γ_4/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. • • •					
$1.30\pm0.60\pm0.22$	37k	[41] ASNER	00	CLE2	10.6 $e^+e^- \rightarrow \tau^+\tau^-$, $\tau^- \rightarrow \pi^-\pi^0\pi^0\nu_\tau$

$\Gamma((\rho(1450)\pi)_{S-\mathrm{wave}})/\Gamma_{\mathrm{total}}$ — Γ_5/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. • • •					
$0.56\pm0.84\pm0.32$	37k	[41,42] ASNER	00	CLE2	10.6 $e^+e^- \rightarrow \tau^+\tau^-$, $\tau^- \rightarrow \pi^-\pi^0\pi^0\nu_\tau$

$\Gamma((\rho(1450)\pi)_{D-\mathrm{wave}})/\Gamma_{\mathrm{total}}$ — Γ_6/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	[41,42] ASNER	00	CLE2	10.6 $e^+e^- \rightarrow \tau^+\tau^-$, $\tau^- \rightarrow \pi^-\pi^0\pi^0\nu_\tau$

$\Gamma(\sigma\pi)/\Gamma_{\mathrm{total}}$ — Γ_7/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 $\pi^- p \rightarrow \pi^+\pi^-\pi^- p$
$18.76\pm4.29\pm1.48$	37k	[41,43] ASNER	00	CLE2	10.6 $e^+e^- \rightarrow \tau^+\tau^-$, $\tau^- \rightarrow \pi^-\pi^0\pi^0\nu_\tau$

$\Gamma(f_0(980)\pi)/\Gamma_{\mathrm{total}}$ — Γ_8/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 $e^+e^- \rightarrow \tau^+\tau^-$, $\tau^- \rightarrow \pi^-\pi^0\pi^0\nu_\tau$

$\Gamma(f_0(1370)\pi)/\Gamma_{total}$ — Γ_9/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	[41,44] ASNER	00	CLE2	$10.6\ e^+e^- \rightarrow \tau^+\tau^-$, $\tau^- \rightarrow \pi^-\pi^0\pi^0\nu_\tau$

$\Gamma(f_2(1270)\pi)/\Gamma_{total}$ — Γ_{10}/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	[41,45] ASNER	00	CLE2	$10.6\ e^+e^- \rightarrow \tau^+\tau^-$, $\tau^- \rightarrow \pi^-\pi^0\pi^0\nu_\tau$

$\Gamma(K\overline{K}^*(892)+\text{c.c.})/\Gamma_{total}$ — Γ_{11}/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	[46] COAN	04	CLEO	$\tau^- \rightarrow K^-\pi^-K^+\nu_\tau$
8 to 15	205	[47] DRUTSKOY	02	BELL	$B \rightarrow D^{(*)}K^-K^{*0}$
$3.3\pm0.5\pm0.1$	37k	[48] ASNER	00	CLE2	$10.6\ e^+e^- \rightarrow \tau^+\tau^-$, $\tau^- \rightarrow \pi^-\pi^0\pi^0\nu_\tau$
2.6 ± 0.3		[49] BARATE	99R	ALEP	$\tau \rightarrow K\overline{K}\pi\nu_\tau$

$\Gamma(\sigma\pi)/\Gamma((\rho\pi)_{S-wave})$ — Γ_7/Γ_3

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	$\overline{p}p \rightarrow 2\pi^+2\pi^-$
~ 0.3	28k	AKHMETSHIN	99E	CMD2	1.05–1.38 $e^+e^- \rightarrow \pi^+\pi^-\pi^+\pi^-$
0.003 ± 0.003		[50] LONGACRE	82	RVUE	

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

NODE=M010R15
NODE=M010R15

VALUE	CL%	DOCUMENT ID		COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.008	90	[51] BARBERIS	01	$450\ pp \rightarrow p_f 3\pi^0 p_s$

[41] From a fit to the Dalitz plot. NODE=M010R;LINKAGE=B1
[42] Assuming for $\rho(1450)$ mass and width of 1370 and 386 MeV respectively. NODE=M010R;LINKAGE=B2
[43] Assuming for σ mass and width of 860 and 880 MeV respectively. NODE=M010R;LINKAGE=B3
[44] Assuming for $f_0(1370)$ mass and width of 1186 and 350 MeV respectively. NODE=M010R;LINKAGE=B4
[45] Assuming for $f_2(1270)$ mass and width of 1275 and 185 MeV respectively. NODE=M010R;LINKAGE=B5
[46] Using structure functions from KUHN 92 and DECKER 93A and B($\tau^- \rightarrow K^-\pi^-K^+\nu_\tau$) = $(0.155\pm0.006\pm0.009)$% from BRIERE 03. NODE=M010R13;LINKAGE=CO
[47] From a comparison to ALAM 94 assuming purely resonant production of the K^-K^{*0} system. NODE=M010R;LINKAGE=DR
[48] From a fit to the 3π mass spectrum including the $K\overline{K}^*(892)$ threshold. NODE=M010R;LINKAGE=B6
[49] Assuming $a_1(1260)$ dominance and taking B($\tau \rightarrow a_1(1260)\nu_\tau$) from BUSKULIC 96. NODE=M010R13;LINKAGE=BA
[50] Uses multichannel Aitchison-Bowler model (BOWLER 75). Uses data from GAVILLET 77, DAUM 80, and DANKOWYCH 81. NODE=M010R4;LINKAGE=E
[51] Inconsistent with observations of $\sigma\pi$, $f_0(1370)\pi$, and $f_2(1270)\pi$ decay modes. NODE=M010R;LINKAGE=RB

$a_1(1260)$ REFERENCES

NODE=M010

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	JPG 33 1	W.-M. Yao *et al.*	(PDG Collab.)	REFID=51004
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*	
1275.1 ± 1.2 OUR AVERAGE		Error includes scale factor of 1.1.				
1262 $^{+1}_{-2}$ ± 8		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		[1] 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	[2] ALDE	87	GAM4	100 $\pi^- p \to 4\pi^0 n$	
1274 ± 5		[2] AUGUSTIN	87	DM2	$J/\psi \to \gamma\pi^+\pi^-$	
1283 ± 6		[3] 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		[4] CHABAUD	83	ASPK	17 $\pi^- p$ polarized	
1280 ± 4		[5] CASON	82	STRC	8 $\pi^+ p \to \Delta^{++}\pi^0\pi^0$	
1281 ± 7	11600	GIDAL	81	MRK2	J/ψ decay	
1282 ± 5		[6] 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		[2] 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. • • •						
1270 ± 8		[7] ANISOVICH	09	RVUE	0.0 $\overline{p}p$, πN	
1277 ± 6	870	[8] SCHEGELSKY	06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$	
1251 ± 10		TIKHOMIROV	03	SPEC	40.0 π^- C $\to K^0_S K^0_S K^0_L X$	
1260 ± 10		[9] ALDE	97	GAM2	450 $pp \to pp\pi^0\pi^0$	
1278 ± 6		[9] 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	[2] ARMENISE	68	DBC	5.1 $\pi^+ n \to p\pi^+ MM^-$	
1270 ± 10	360	[2] ARMENISE	68	DBC	5.1 $\pi^+ n \to p\pi^0 MM$	OCCUR=2
1268 ± 6		[10] JOHNSON	68	HBC	3.7–4.2 $\pi^- p$	

[1] T-matrix pole. NODE=M005M;LINKAGE=A
[2] Mass errors enlarged by us to $\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M005M;LINKAGE=T
[3] From a partial-wave analysis of data using a K-matrix formalism with 5 poles. NODE=M005M;LINKAGE=L
[4] From an energy-independent partial-wave analysis. NODE=M005M;LINKAGE=O
[5] From an amplitude analysis of the reaction $\pi^+\pi^- \rightarrow 2\pi^0$. NODE=M005M;LINKAGE=P
[6] From an amplitude analysis of $\pi^+\pi^- \rightarrow \pi^+\pi^-$ scattering data. NODE=M005M;LINKAGE=S
[7] 4-poles, 5-channel K matrix fit. NODE=M005M;LINKAGE=AN
[8] From analysis of L3 data at 91 and 183–209 GeV. NODE=M005M;LINKAGE=SC
[9] Systematic uncertainties not estimated. NODE=M005M;LINKAGE=QQ
[10] JOHNSON 68 includes BONDAR 63, LEE 64, DERADO 65, EISNER 67. NODE=M005M;LINKAGE=J

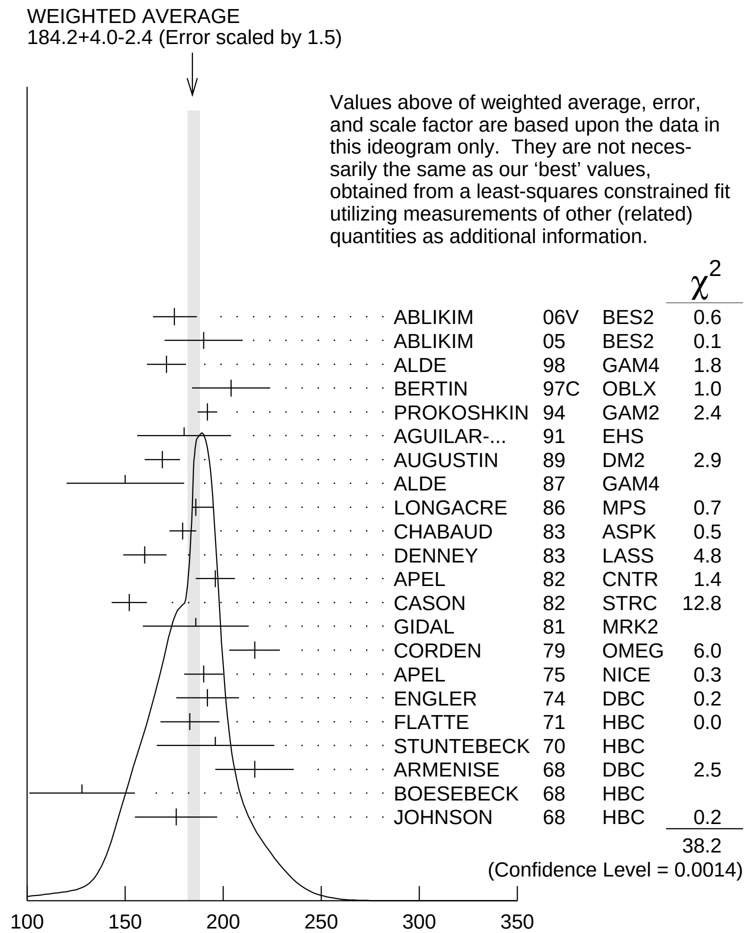
$f_2(1270)$ WIDTH

NODE=M005W

NODE=M005W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
$185.1^{+2.9}_{-2.4}$ OUR FIT		Error includes scale factor of 1.5.				
$184.2^{+4.0}_{-2.4}$ OUR AVERAGE		Error includes scale factor of 1.5. See the ideogram below.				
$175\ ^{+6}_{-4}\ \pm 10$		ABLIKIM	06V	BES2	$e^+e^- \rightarrow J/\psi \rightarrow \gamma\pi^+\pi^-$	
190 ± 20		ABLIKIM	05	BES2	$J/\psi \rightarrow \phi\pi^+\pi^-$	
171 ± 10		ALDE	98	GAM4	$100\ \pi^- p \rightarrow \pi^0\pi^0 n$	
204 ± 20		[11] BERTIN	97C	OBLX	$0.0\ \overline{p}p \rightarrow \pi^+\pi^-\pi^0$	
192 ± 5	200k	PROKOSHKIN	94	GAM2	$38\ \pi^- p \rightarrow \pi^0\pi^0 n$	
180 ± 24		AGUILAR-...	91	EHS	$400\ pp$	
169 ± 9	5730	[12] AUGUSTIN	89	DM2	$e^+e^- \rightarrow 5\pi$	
150 ± 30	400	[12] ALDE	87	GAM4	$100\ \pi^- p \rightarrow 4\pi^0 n$	
$186\ ^{+9}_{-2}$		[13] LONGACRE	86	MPS	$22\ \pi^- p \rightarrow n2K^0_S$	
$179.2^{+6.9}_{-6.6}$		[14] CHABAUD	83	ASPK	$17\ \pi^- p$ polarized	
160 ± 11		DENNEY	83	LASS	$10\ \pi^+ N$	
196 ± 10	3k	APEL	82	CNTR	$25\ \pi^- p \rightarrow n2\pi^0$	
152 ± 9		[15] CASON	82	STRC	$8\ \pi^+ p \rightarrow \Delta^{++}\pi^0\pi^0$	
186 ± 27	11600	GIDAL	81	MRK2	J/ψ decay	
216 ± 13		[16] CORDEN	79	OMEG	12–15 $\pi^- p \rightarrow n2\pi$	
190 ± 10	10k	APEL	75	NICE	$40\ \pi^- p \rightarrow n2\pi^0$	
192 ± 16	4600	ENGLER	74	DBC	$6\ \pi^+ n \rightarrow \pi^+\pi^- p$	
183 ± 15	5300	FLATTE	71	HBC	$7\ \pi^+ p \rightarrow \Delta^{++} f_2$	
196 ± 30		[12] STUNTEBECK	70	HBC	$8\ \pi^- p$, $5.4\ \pi^+ d$	
216 ± 20	1960	[12] ARMENISE	68	DBC	$5.1\ \pi^+ n \rightarrow p\pi^+ \mathrm{MM}^-$	OCCUR=2
128 ± 27		[12] BOESEBECK	68	HBC	$8\ \pi^+ p$	
176 ± 21		[12,17] JOHNSON	68	HBC	3.7–4.2 $\pi^- p$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
194 ± 36		[18] ANISOVICH	09	RVUE	$0.0\ \overline{p}p$, πN	
195 ± 15	870	[19] SCHEGELSKY	06A	RVUE	$\gamma\gamma \rightarrow K^0_S K^0_S$	
121 ± 26		TIKHOMIROV	03	SPEC	$40.0\ \pi^- \mathrm{C} \rightarrow K^0_S K^0_S K^0_L X$	
187 ± 20		[20] ALDE	97	GAM2	$450\ pp \rightarrow pp\pi^0\pi^0$	
184 ± 10		[20] GRYGOREV	96	SPEC	$40\ \pi^- N \rightarrow K^0_S K^0_S X$	
200 ± 10		AKER	91	CBAR	$0.0\ \overline{p}p \rightarrow 3\pi^0$	
240 ± 40	3k	BINON	83	GAM2	$38\ \pi^- p \rightarrow n2\eta$	
187 ± 30	650	[12] ANTIPOV	77	CIBS	$25\ \pi^- p \rightarrow p3\pi$	
225 ± 38	16000	DEUTSCH...	76	HBC	$16\ \pi^+ p$	
166 ± 28	600	[12] TAKAHASHI	72	HBC	$8\ \pi^- p \rightarrow n2\pi$	
173 ± 53		[12] ARMENISE	70	HBC	$9\ \pi^+ n \rightarrow p\pi^+\pi^-$	OCCUR=2

[11] T-matrix pole. NODE=M005W;LINKAGE=QA
[12] Width errors enlarged by us to $4\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M005W;LINKAGE=T
[13] From a partial-wave analysis of data using a K-matrix formalism with 5 poles. NODE=M005W;LINKAGE=L
[14] From an energy-independent partial-wave analysis. NODE=M005W;LINKAGE=R
[15] From an amplitude analysis of the reaction $\pi^+\pi^- \rightarrow 2\pi^0$. NODE=M005W;LINKAGE=Q
[16] From an amplitude analysis of $\pi^+\pi^- \rightarrow \pi^+\pi^-$ scattering data. NODE=M005W;LINKAGE=U
[17] JOHNSON 68 includes BONDAR 63, LEE 64, DERADO 65, EISNER 67. NODE=M005W;LINKAGE=J
[18] 4-poles, 5-channel K matrix fit. NODE=M005W;LINKAGE=AN
[19] From analysis of L3 data at 91 and 183–209 GeV. NODE=M005W;LINKAGE=SC
[20] Systematic uncertainties not estimated. NODE=M005W;LINKAGE=QQ



$f_2(1270)$ width (MeV)

$f_2(1270)$ DECAY MODES

NODE=M005215;NODE=M005

	Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	
Γ_1	$\pi\pi$	$(84.8\ ^{+2.4}_{-1.2})$ %	S=1.2	DESIG=1
Γ_2	$\pi^+\pi^-2\pi^0$	$(\ 7.1\ ^{+1.4}_{-2.7})$ %	S=1.3	DESIG=3
Γ_3	$K\overline{K}$	$(\ 4.6\ \pm 0.4\ )$ %	S=2.8	DESIG=4
Γ_4	$2\pi^+2\pi^-$	$(\ 2.8\ \pm 0.4\ )$ %	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	$\gamma\gamma$	$(\ 1.64 \pm 0.19) \times 10^{-5}$	S=1.9	DESIG=8
Γ_8	$\eta\pi\pi$	$< 8 \times 10^{-3}$	CL=95%	DESIG=6
Γ_9	$K^0K^-\pi^+ +$ 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 44 measurements and one constraint to determine 8 parameters. The overall fit has a $\chi^2 = 81.8$ for 37 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	−91						
x_3	11	−39					
x_4	10	−37	1				
x_5	1	−6	0	0			
x_6	0	−7	0	0	0		
x_7	8	−5	−6	1	0	0	
Γ	−78	71	−11	−8	−1	0	−11
	x_1	x_2	x_3	x_4	x_5	x_6	x_7

	Mode	Rate (MeV)	Scale factor	
Γ_1	$\pi\pi$	$156.9\ ^{+4.0}_{-1.2}$		DESIG=1
Γ_2	$\pi^+\pi^-2\pi^0$	$13.2\ ^{+2.8}_{-5.0}$	1.3	DESIG=3
Γ_3	$K\overline{K}$	8.5 ± 0.8	2.9	DESIG=4
Γ_4	$2\pi^+2\pi^-$	5.2 ± 0.7	1.2	DESIG=2
Γ_5	$\eta\eta$	0.74 ± 0.14	2.1	DESIG=7
Γ_6	$4\pi^0$	0.55 ± 0.18		DESIG=9
Γ_7	$\gamma\gamma$	0.00303 ± 0.00035	1.9	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
$156.9^{+4.0}_{-1.2}$ OUR FIT					
$157.0^{+6.0}_{-1.0}$		[21] LONGACRE	86	MPS	$22\ \pi^- p \rightarrow n 2K^0_S$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
152 ±8	870	[22] SCHEGELSKY	06A	RVUE	$\gamma\gamma \rightarrow K^0_S K^0_S$

$\Gamma(K\overline{K})$ — Γ_3

NODE=M005W4

NODE=M005W4

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
8.5±0.8 OUR FIT Error includes scale factor of 2.9.					
$9.0^{+0.7}_{-0.3}$		[21] LONGACRE	86	MPS	$22\ \pi^- p \rightarrow n 2K^0_S$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
7.5±2.0	870	[22] SCHEGELSKY	06A	RVUE	$\gamma\gamma \rightarrow K^0_S K^0_S$

$\Gamma(\eta\eta)$ — Γ_5

NODE=M005W7

NODE=M005W7

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.74±0.14 OUR FIT Error includes scale factor of 2.1.					
1.0 ±0.1		[21] LONGACRE	86	MPS	$22\ \pi^- p \rightarrow n 2K^0_S$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.8 ±0.4	870	[22] SCHEGELSKY	06A	RVUE	$\gamma\gamma \rightarrow K^0_S K^0_S$

$\Gamma(\gamma\gamma)$ — 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
3.03±0.35 OUR FIT Error includes scale factor of 1.9.					
3.14±0.20		[23,24] PENNINGTON	08	RVUE	Compilation

NODE=M005W8

OCCUR=2

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

3.82 ± 0.30		[24,25] PENNINGTON 08	RVUE	Compilation
2.55 ± 0.15	870	[22] SCHEGELSKY 06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$
2.84 ± 0.35		BOGLIONE 99	RVUE	$\gamma\gamma \to \pi^+\pi^-$, $\pi^0\pi^0$
$2.93 \pm 0.23 \pm 0.32$		[26] YABUKI 95	VNS	
$2.58 \pm 0.13 {}^{+0.36}_{-0.27}$		[27] BEHREND 92	CELL	$e^+e^- \to e^+e^-\pi^+\pi^-$
$3.10 \pm 0.35 \pm 0.35$		[28] BLINOV 92	MD1	$e^+e^- \to e^+e^-\pi^+\pi^-$
$2.27 \pm 0.47 \pm 0.11$		ADACHI 90D	TOPZ	$e^+e^- \to e^+e^-\pi^+\pi^-$
$3.15 \pm 0.04 \pm 0.39$		BOYER 90	MRK2	$e^+e^- \to e^+e^-\pi^+\pi^-$
$3.19 \pm 0.16 {}^{+0.29}_{-0.28}$		MARSISKE 90	CBAL	$e^+e^- \to e^+e^-\pi^0\pi^0$
2.35 ± 0.65		[29] MORGAN 90	RVUE	$\gamma\gamma \to \pi^+\pi^-$, $\pi^0\pi^0$
$3.19 \pm 0.09 {}^{+0.22}_{-0.38}$	2177	OEST 90	JADE	$e^+e^- \to e^+e^-\pi^0\pi^0$
$3.2 \pm 0.1 \pm 0.4$		[30] AIHARA 86B	TPC	$e^+e^- \to e^+e^-\pi^+\pi^-$
$2.5 \pm 0.1 \pm 0.5$		BEHREND 84B	CELL	$e^+e^- \to e^+e^-\pi^+\pi^-$
$2.85 \pm 0.25 \pm 0.5$		[31] BERGER 84	PLUT	$e^+e^- \to e^+e^- 2\pi$
$2.70 \pm 0.05 \pm 0.20$		COURAU 84	DLCO	$e^+e^- \to e^+e^-\pi^+\pi^-$
$2.52 \pm 0.13 \pm 0.38$		[32] SMITH 84C	MRK2	$e^+e^- \to e^+e^-\pi^+\pi^-$
$2.7 \pm 0.2 \pm 0.6$		EDWARDS 82F	CBAL	$e^+e^- \to e^+e^- 2\pi^0$
$2.9 {}^{+0.6}_{-0.4} \pm 0.6$		[33] EDWARDS 82F	CBAL	$e^+e^- \to e^+e^- 2\pi^0$
$3.2 \pm 0.2 \pm 0.6$		BRANDELIK 81B	TASS	$e^+e^- \to e^+e^-\pi^+\pi^-$
$3.6 \pm 0.3 \pm 0.5$		ROUSSARIE 81	MRK2	$e^+e^- \to e^+e^-\pi^+\pi^-$
2.3 ± 0.8		[34] BERGER 80B	PLUT	e^+e^-

OCCUR=3
OCCUR=2

$\Gamma(e^+e^-)$ Γ_{10}

NODE=M005W9
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	$e^+e^- \to \pi^0\pi^0$

[21] From a partial-wave analysis of data using a K-matrix formalism with 5 poles.
[22] From analysis of L3 data at 91 and 183–209 GeV and using SU(3) relations.
[23] Solution A (preferred solution based on χ^2-analysis).
[24] Dispersion theory based amplitude analysis of BOYER 90, MARSISKE 90, BEHREND 92, and MORI 07.
[25] Solution B (worse than solution A; still acceptable when systematic uncertainties are included).
[26] With a narrow scalar state around 1220 MeV.
[27] Using a unitarized model with a 300 - 500 keV wide scalar at 1100 MeV.
[28] Using the unitarized model of LYTH 85.
[29] 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 $\Gamma(f^0) = 3.6 \pm 0.3$ KeV.
[30] Radiative corrections modify the partial widths; for instance the COURAU 84 value becomes 2.66 ± 0.21 in the calculation of LANDRO 86.
[31] Using the MENNESSIER 83 model.
[32] Superseded by BOYER 90.
[33] If helicity = 2 assumption is not made.
[34] Using mass, width and B($f_2(1270) \to 2\pi$) from PDG 78.

NODE=M005PW;LINKAGE=L
NODE=M005W1;LINKAGE=SC
NODE=M005W8;LINKAGE=P1
NODE=M005W8;LINKAGE=P3
NODE=M005W8;LINKAGE=P2
NODE=M005W8;LINKAGE=YA
NODE=M005W;LINKAGE=B
NODE=M005W;LINKAGE=A
NODE=M005PW;LINKAGE=C
NODE=M005PW;LINKAGE=B
NODE=M005PW;LINKAGE=X
NODE=M005PW;LINKAGE=V
NODE=M005PW;LINKAGE=H
NODE=M005PW;LINKAGE=A

$f_2(1270)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M005223

$\Gamma(K\overline{K}) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_3\Gamma_7/\Gamma$

NODE=M005G1
NODE=M005G1

VALUE (keV)	DOCUMENT ID	TECN	COMMENT
0.139±0.019 OUR FIT Error includes scale factor of 1.9.			
0.091±0.007±0.027	[35] ALBRECHT 90G	ARG	$e^+e^- \to e^+e^-K^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.104 \pm 0.007 \pm 0.072$	[36] ALBRECHT 90G	ARG	$e^+e^- \to e^+e^-K^+K^-$

OCCUR=2

[35] Using an incoherent background.
[36] Using a coherent background.

NODE=M005G1;LINKAGE=A
NODE=M005G1;LINKAGE=K

$\Gamma(\eta\eta) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_5\Gamma_7/\Gamma$

NODE=M005G02
NODE=M005G02

VALUE (eV)	DOCUMENT ID	TECN	COMMENT
$\mathbf{11.5^{+1.8+4.5}_{-2.0-3.7}}$	[37] UEHARA 10A	BELL	10.6 $e^+e^- \to e^+e^-\eta\eta$

[37] 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 $\gamma\gamma \to f_2(1270) \to \pi\pi$

NODE=M005HR0
NODE=M005HR0

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
$3.7\pm0.3^{+15.9}_{-2.9}$	UEHARA	08A	BELL	10.6 $e^+e^- \to e^+e^-\pi^0\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
13	[38,39] PENNINGTON	08	RVUE	Compilation
26	[39,40] PENNINGTON	08	RVUE	Compilation

OCCUR=2
OCCUR=3

[38] Solution A (preferred solution based on χ^2-analysis). NODE=M005HR0;LINKAGE=P1

[39] Dispersion theory based amplitude analysis of BOYER 90, MARSISKE 90, BEHREND 92, and MORI 07. NODE=M005HR0;LINKAGE=P3

[40] 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
$0.848^{+0.024}_{-0.012}$ OUR FIT Error includes scale factor of 1.2.					
0.837 ± 0.020 OUR AVERAGE					
0.849 ± 0.025		CHABAUD	83	ASPK	17 $\pi^- p$ polarized
0.85 ± 0.05	250	BEAUPRE	71	HBC	8 $\pi^+ p \to \Delta^{++} f_2$
0.8 ± 0.04	600	OH	70	HBC	1.26 $\pi^- p \to \pi^+\pi^- n$

$\Gamma(\pi^+\pi^- 2\pi^0)/\Gamma(\pi\pi)$ — 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
$0.084^{+0.018}_{-0.033}$ OUR FIT Error includes scale factor of 1.3.					
0.15 ± 0.06	600	EISENBERG	74	HBC	4.9 $\pi^+ p \to \Delta^{++} f_2$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.07		EMMS	75D	DBC	4 $\pi^+ n \to p f_2$

$\Gamma(K\overline{K})/\Gamma(\pi\pi)$ — 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
NODE=M005R3

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$0.054^{+0.005}_{-0.006}$ OUR FIT Error includes scale factor of 2.8.					
$0.041^{+0.004}_{-0.005}$ OUR AVERAGE					
0.045 ± 0.01		[41] 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		[42] COSTA...	80	OMEG	1–2.2 $\pi^- p \to K^+ K^- n$
0.030 ± 0.005		[43] MARTIN	79	RVUE	
0.027 ± 0.009		[44] 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 $\pi^+ p \to K^+ K^- \pi^+ p$

$\Gamma(2\pi^+ 2\pi^-)/\Gamma(\pi\pi)$ — 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	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 $\pi^- p \to \pi^+\pi^- n$

$\Gamma(\eta\eta)/\Gamma_{total}$ 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	$38\ \pi^- p \to 2\eta n$

$\Gamma(\eta\eta)/\Gamma(\pi\pi)$ 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 ±0.001	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	$10.6\ e^+ e^- \to e^+ e^- \pi^0 \pi^0$

$\Gamma(\eta\pi\pi)/\Gamma(\pi\pi)$ Γ_8/Γ_1

NODE=M005R5
NODE=M005R5

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.010	95	EMMS	75D	DBC	$4\ \pi^+ n \to p f_2$

$\Gamma(K^0 K^- \pi^+ + c.c.)/\Gamma(\pi\pi)$ Γ_9/Γ_1

NODE=M005R4
NODE=M005R4

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.004	95	EMMS	75D	DBC	$4\ \pi^+ n \to p f_2$

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

NODE=M005R12
NODE=M005R12

VALUE (units 10^{-10})	CL%	DOCUMENT ID		TECN	COMMENT
<6	90	ACHASOV	00K	SND	$e^+ e^- \to \pi^0 \pi^0$

[41] Coupled channel analysis of $\pi^+ \pi^- \pi^0$, $K^+ K^- \pi^0$, and $K^\pm K^0_S \pi^\mp$. NODE=M005R;LINKAGE=BG

[42] Re-evaluated by CHABAUD 83. NODE=M005R3;LINKAGE=D

[43] Includes PAWLICKI 77 data. NODE=M005R3;LINKAGE=F

[44] Takes into account the $f_2(1270)$-$f'_2(1525)$ interference. NODE=M005R3;LINKAGE=M

$f_2(1270)$ REFERENCES

NODE=M005

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
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 051101R 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 SPD 39 420 Y.D. Prokoshkin, A.A. Kondashov (SERP) REFID=44094
Translated from DANS 336 613.

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
		Translated from YAF 48 436.			
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	JPG 11 459	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
		Translated from YAF 38 934.			
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 de Beauregard *et al.*	(BARI, BONN+)	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
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
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

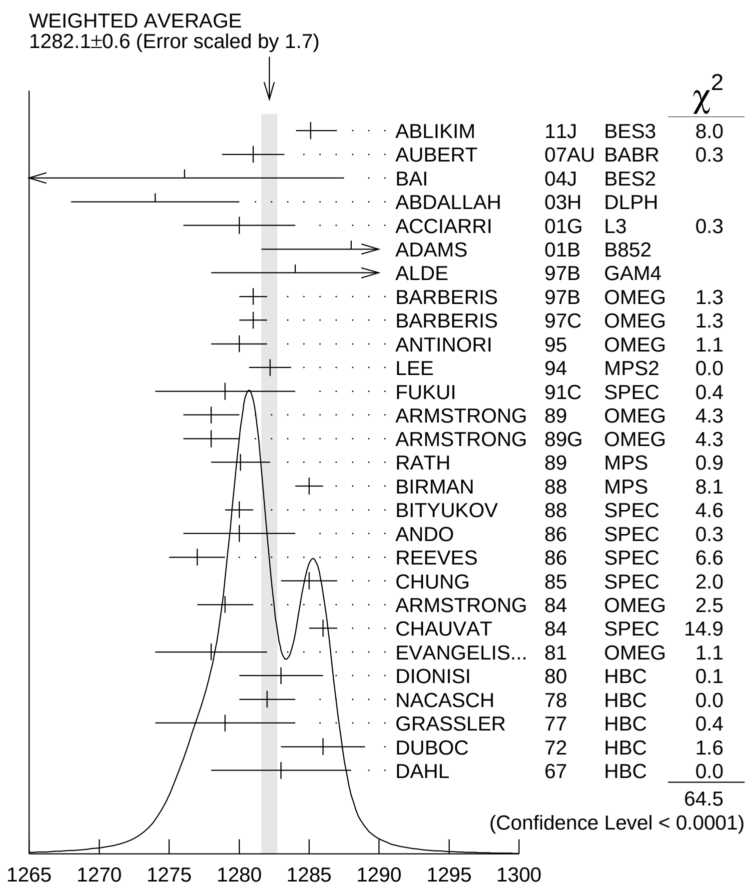
NODE=M008M

NODE=M008M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1282.1± 0.6 OUR AVERAGE Error includes scale factor of 1.7. See the ideogram below. [1281.8 ± 0.6 MeV OUR 2011 AVERAGE Scale factor = 1.6] NEW					
$1285.1 \pm 1.0^{+1.6}_{-0.3}$		[1] 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 $pp \to pp2(\pi^+\pi^-)$
1281 ± 1		BARBERIS	97C	OMEG	450 $pp \to ppK^0_S K^\pm \pi^\mp$
1280 ± 2		[2] ANTINORI	95	OMEG	300,450 $pp \to pp2(\pi^+\pi^-)$
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 $pp \to K\overline{K}\pi pp$
1278 ± 2		ARMSTRONG	89G	OMEG	85 $\pi^+ p \to 4\pi\pi p$, $pp \to 4\pi pp$
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	[3] 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 $p\overline{p} \to KK\pi X$
1285 ± 2		CHUNG	85	SPEC	8 $\pi^- p \to NK\overline{K}\pi$
1279 ± 2	604	ARMSTRONG	84	OMEG	85 $\pi^+ p \to K\overline{K}\pi\pi p$, $pp \to K\overline{K}\pi pp$
1286 ± 1		CHAUVAT	84	SPEC	ISR 31.5 pp
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 $\overline{p}p \to 2K4\pi$
1283 ± 5		DAHL	67	HBC	1.6–4.2 $\pi^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1281.9± 0.5		[4] SOSA	99	SPEC	$pp \to p_{slow}(K^0_S K^+ \pi^-) p_{fast}$
1282.8± 0.6		[4] SOSA	99	SPEC	$pp \to p_{slow}(K^0_S K^- \pi^+) p_{fast}$ OCCUR=2
1270 ±10		AMELIN	95	VES	37 $\pi^- N \to \pi^-\pi^+\pi^-\gamma N$
1280 ± 2		ABATZIS	94	OMEG	450 $pp \to pp2(\pi^+\pi^-)$
1282 ± 4		ARMSTRONG	93C	E760	$\overline{p}p \to \pi^0\eta\eta \to 6\gamma$
1270 ± 6 ±10		ARMSTRONG	92C	OMEG	300 $pp \to pp\pi^+\pi^-\gamma$
1281 ± 1		ARMSTRONG	89E	OMEG	300 $pp \to pp2(\pi^+\pi^-)$
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		[5] 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	[6] STANTON	79	CNTR	8.5 $\pi^- p \to n2\gamma 2\pi$
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	[7] 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] The selected process is $J/\psi \to \omega a_0(980)\pi$. NODE=M008M;LINKAGE=BL
[2] Supersedes ABATZIS 94, ARMSTRONG 89E. NODE=M008M;LINKAGE=B
[3] From partial wave analysis of $K^+ \overline{K}^0 \pi^-$ system. NODE=M008M;LINKAGE=A
[4] No systematic error given. NODE=M008M;LINKAGE=N1
[5] From a unitarized quark-model calculation. NODE=M008M;LINKAGE=T
[6] From phase shift analysis of $\eta \pi^+ \pi^-$ system. NODE=M008M;LINKAGE=P
[7] 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

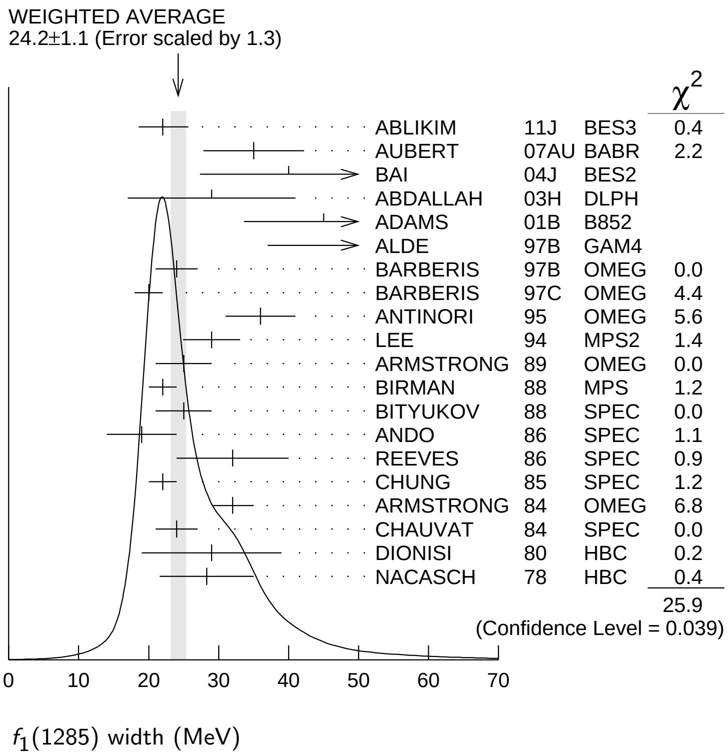
NODE=M008W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
24.2± 1.1 OUR AVERAGE		Error includes scale factor of 1.3. See the ideogram below.			
[24.3 ± 1.1 MeV OUR 2011 AVERAGE Scale factor = 1.4]					
$22.0 \pm 3.1^{+2.0}_{-1.5}$		[8] 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 $\pi^- p \to K^+ K^- \pi^0 n$

NEW

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		[9] 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	[10] 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. • • •						
18.2± 1.2		[11] SOSA	99	SPEC	$p p \to p_{slow} (K^0_S K^+ \pi^-) p_{fast}$	
19.4± 1.5		[11] 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		[12] 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	[13] DEFOIX	72	HBC	0.7 $\overline{p} p \to 7\pi$	
46 ± 9	180	[13] DUBOC	72	HBC	1.2 $\overline{p} p \to 2K 4\pi$	
37 ± 5	500	[14] 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		[13] LORSTAD	69	HBC	0.7 $\overline{p} p$, 4,5-body	
35 ±10		[13] DAHL	67	HBC	1.6–4.2 $\pi^- p$	

[8] The selected process is $J/\psi \to \omega a_0(980) \pi$. NODE=M008W;LINKAGE=BL
[9] Supersedes ABATZIS 94, ARMSTRONG 89E. NODE=M008W;LINKAGE=B
[10] From partial wave analysis of $K^+ \overline{K}^0 \pi^-$ system. NODE=M008W;LINKAGE=A
[11] No systematic error given. NODE=M008W;LINKAGE=N1
[12] From phase shift analysis of $\eta \pi^+ \pi^-$ system. NODE=M008W;LINKAGE=P
[13] Resolution is not unfolded. NODE=M008W;LINKAGE=R
[14] 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	$(33.1^{+2.1}_{-1.8})$ %	S=1.3	DESIG=21
Γ_2	$\pi^0\pi^0\pi^+\pi^-$	$(22.0^{+1.4}_{-1.2})$ %	S=1.3	DESIG=22
Γ_3	$2\pi^+2\pi^-$	$(11.0^{+0.7}_{-0.6})$ %	S=1.3	DESIG=20
Γ_4	$\rho^0\pi^+\pi^-$	$(11.0^{+0.7}_{-0.6})$ %	S=1.3	DESIG=191
Γ_5	$\rho^0\rho^0$	seen		DESIG=23;OUR EST;→ NOT CHECKED ←
Γ_6	$4\pi^0$	$< 7 \times 10^{-4}$	CL=90%	DESIG=7
Γ_7	$\eta\pi^+\pi^-$	(35 ± 15) %		DESIG=198
Γ_8	$\eta\pi\pi$	$(52.4^{+1.9}_{-2.2})$ %	S=1.2	DESIG=3
Γ_9	$a_0(980)\pi$ [ignoring $a_0(980) \to K\overline{K}$]	(36 ± 7) %		DESIG=4
Γ_{10}	$\eta\pi\pi$ [excluding $a_0(980)\pi$]	(16 ± 7) %		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}	$\gamma\rho^0$	(5.5 ± 1.3) %	S=2.8	DESIG=13
Γ_{16}	$\phi\gamma$	$(7.4 \pm 2.6) \times 10^{-4}$		DESIG=10
Γ_{17}	$\gamma\gamma^*$			DESIG=9
Γ_{18}	$\gamma\gamma$			DESIG=8

CONSTRAINED FIT INFORMATION

An overall fit to 7 branching ratios uses 16 measurements and one constraint to determine 5 parameters. The overall fit has a $\chi^2 =$ 24.7 for 12 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	−17			
x_{10}	−8	−95		
x_{11}	46	−9	−4	
x_{15}	−36	−4	−2	−34
	x_1	x_9	x_{10}	x_{11}

$f_1(1285)$ Γ(i)Γ(γγ)/Γ(total)

NODE=M008217

$\Gamma(\eta\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_8\Gamma_{18}/\Gamma = (\Gamma_9+\Gamma_{10})\Gamma_{18}/\Gamma$

NODE=M008G2
NODE=M008G2

VALUE (keV)	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<0.62	95	GIDAL	87	MRK2	$e^+e^- \rightarrow e^+e^-\eta\pi^+\pi^-$

$\Gamma(\eta\pi\pi) \times \Gamma(\gamma\gamma^*)/\Gamma_{total}$ $\Gamma_8\Gamma_{17}/\Gamma = (\Gamma_9+\Gamma_{10})\Gamma_{17}/\Gamma$

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	[15,16] AIHARA	88B	TPC	$e^+e^- \rightarrow e^+e^-\eta\pi^+\pi^-$
2.30±0.61±0.42		[15,17] GIDAL	87	MRK2	$e^+e^- \rightarrow e^+e^-\eta\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.8 ±0.3 ±0.3	420	[18] ACHARD	02B	L3	183–209 $e^+e^- \rightarrow e^+e^-\eta\pi^+\pi^-$

[15] Assuming a ρ-pole form factor. NODE=M008G3;LINKAGE=A
[16] Published value multiplied by $\eta\pi\pi$ branching ratio 0.49. NODE=M008G3;LINKAGE=F
[17] Published value divided by 2 and multiplied by the $\eta\pi\pi$ branching ratio 0.49. NODE=M008G3;LINKAGE=B
[18] 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
NODE=M008R1

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
0.271±0.016 OUR FIT Error includes scale factor of 1.3.				
0.271±0.016 OUR AVERAGE Error includes scale factor of 1.2.				
0.265±0.014	[19] BARBERIS	97C	OMEG	450 $pp \rightarrow ppK^0_S K^\pm\pi^\mp$
0.28 ±0.05	[20] ARMSTRONG	89E	OMEG	300 $pp \rightarrow ppf_1(1285)$
0.37 ±0.03 ±0.05	[21] ARMSTRONG	89G	OMEG	85 $\pi p \rightarrow 4\pi X$

[19] Using $2(\pi^+\pi^-)$ data from BARBERIS 97B. NODE=M008R1;LINKAGE=B
[20] Assuming $\rho\pi\pi$ and $a_0(980)\pi$ intermediate states. NODE=M008R1;LINKAGE=M
[21] 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
NODE=M008R18

VALUE	*DOCUMENT ID*
$0.220^{+0.014}_{-0.012}$ OUR FIT Error includes scale factor of 1.3.	

$\Gamma(2\pi^+2\pi^-)/\Gamma_{total}$ $\Gamma_3/\Gamma = \frac{1}{3}\Gamma_1/\Gamma$

NODE=M008R17
NODE=M008R17

VALUE	*DOCUMENT ID*
$0.110^{+0.007}_{-0.006}$ OUR FIT Error includes scale factor of 1.3.	

$\Gamma(\rho^0\pi^+\pi^-)/\Gamma_{total}$ $\Gamma_4/\Gamma = \frac{1}{3}\Gamma_1/\Gamma$

NODE=M008R19
NODE=M008R19

VALUE	*DOCUMENT ID*
$0.110^{+0.007}_{-0.006}$ OUR FIT Error includes scale factor of 1.3.	

$\Gamma(\rho^0\pi^+\pi^-)/\Gamma(2\pi^+2\pi^-)$ Γ_4/Γ_3

NODE=M008R6
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
NODE=M008R21

VALUE	DOCUMENT ID		COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
seen	BARBERIS	00C	450 $pp \rightarrow p_f 4\pi p_s$

$\Gamma(4\pi^0)/\Gamma_{total}$ Γ_6/Γ

NODE=M008R8
NODE=M008R8

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<7	90	ALDE	87	GAM4	100 $\pi^- p \rightarrow 4\pi^0 n$

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma(\eta\pi^+\pi^-)$ Γ_{13}/Γ_7

NODE=M008R02
NODE=M008R02

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.86±0.16±0.20	2.3k	[22] DOROFEEV	11	VES	$\pi^- N \rightarrow \pi^- f_1(1285) N$

[22] 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
NODE=M008R22

VALUE	DOCUMENT ID
$0.524^{+0.019}_{-0.022}$ 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
NODE=M008R4

VALUE	DOCUMENT ID		TECN	COMMENT
0.63±0.06 OUR FIT Error includes scale factor of 1.2.				
0.41±0.14 OUR AVERAGE				
$0.37\pm0.11\pm0.11$	BOLTON	92	MRK3	$J/\psi \rightarrow \gamma f_1(1285)$
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	[23] GRASSLER	77	HBC	16 $\pi^\mp p$

[23] Assuming $\rho\pi\pi$ and $a_0(980)\pi$ intermediate states.

NODE=M008R4;LINKAGE=M

$\Gamma(a_0(980)\pi$ [ignoring $a_0(980) \rightarrow K\overline{K}$]$)/\Gamma(\eta\pi\pi)$ $\Gamma_9/\Gamma_8 = \Gamma_9/(\Gamma_9+\Gamma_{10})$

NODE=M008R3
NODE=M008R3

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.69±0.13 OUR FIT						
$0.69^{+0.13}_{-0.12}$ OUR AVERAGE						
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	318	ACHARD	02B	L3	183–209 $e^+e^- \rightarrow e^+e^-\eta\pi^+\pi^-$
0.28 ± 0.07		1400	ALDE	97B	GAM4	100 $\pi^- p \rightarrow \eta\pi^0\pi^0 n$
$1.0\ \pm0.3$			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
0.171±0.013 OUR FIT Error includes scale factor of 1.1.				
0.170±0.012 OUR AVERAGE				
$0.166\pm0.01\ \pm0.008$	BARBERIS	98C	OMEG	450 $pp \rightarrow p_f f_1(1285) p_s$
$0.42\ \pm0.15$	GURTU	79	HBC	4.2 $K^- p$
$0.5\ \ \pm0.2$	[24] CORDEN	78	OMEG	12–15 $\pi^- p$
$0.20\ \pm0.08$	[25] DEFOIX	72	HBC	0.7 $\overline{p}p \rightarrow 7\pi$
$0.16\ \pm0.08$	CAMPBELL	69	DBC	2.7 $\pi^+ d$

[24] CORDEN 78 assumes low-mass $\eta\pi\pi$ region is dominantly 1^{++}. See BARBERIS 98C and MANAK 00A for discussion.

NODE=M008R2;LINKAGE=CD

[25] $K\overline{K}$ 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

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	[26] ACHARD	07	L3	183–209 $e^+e^- \to e^+e^- K^0_S K^\pm \pi^\mp$

[26] 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

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.30±0.055±0.074	2.3k	[27] DOROFEEV	11	VES	$\pi^- N \to \pi^- f_1(1285) N$

[27] 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

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

VALUE (units 10^{-2})	CL%	DOCUMENT ID		TECN	COMMENT
5.5±1.3 OUR FIT Error includes scale factor of 2.8.					
2.8±0.7±0.6		AMELIN	95	VES	37 $\pi^- N \to \pi^-\pi^+\pi^-\gamma N$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<5	95	BITYUKOV	91B	SPEC	32 $\pi^- p \to \pi^+\pi^-\gamma n$

$\Gamma(\gamma\rho^0)/\Gamma(2\pi^+2\pi^-)$ $\Gamma_{15}/\Gamma_3 = \Gamma_{15}/\frac{1}{3}\Gamma_1$

NODE=M008R13

VALUE	DOCUMENT ID		TECN	COMMENT
0.50±0.13 OUR FIT Error includes scale factor of 2.5.				
0.45±0.18	[28] COFFMAN	90	MRK3	$J/\psi \to \gamma\gamma\pi^+\pi^-$

[28] 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

VALUE	DOCUMENT ID		TECN	COMMENT
9.5±2.0 OUR FIT Error includes scale factor of 2.5.				
7.9±0.9 OUR AVERAGE				
10.0±1.0±2.0	BARBERIS	98C	OMEG	450 $pp \to p_f f_1(1285) p_s$
7.5±1.0	[29] ARMSTRONG	92C	OMEG	300 $pp \to pp\pi^+\pi^-\gamma$, $pp\eta\pi^+\pi^-$

[29] 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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
>0.035	90	[30] COFFMAN	90	MRK3	$J/\psi \to \gamma\gamma\pi^+\pi^-$

[30] 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

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 $\pi^- N \to \pi^-\pi^+\pi^-\gamma N$

$f_1(1285)$ REFERENCES

NODE=M008

ABLIKIM	11J	PRL 107 182001	M. Ablikim *et al.*	(BES III Collab.)	REFID=53931
DOROFEEV	11	EPJ A47 68	V. Dorofeev *et al.*	(SERP, MIPT)	REFID=16755
PDG	10	JPG 37 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 also the mini-review under $\eta(1405)$

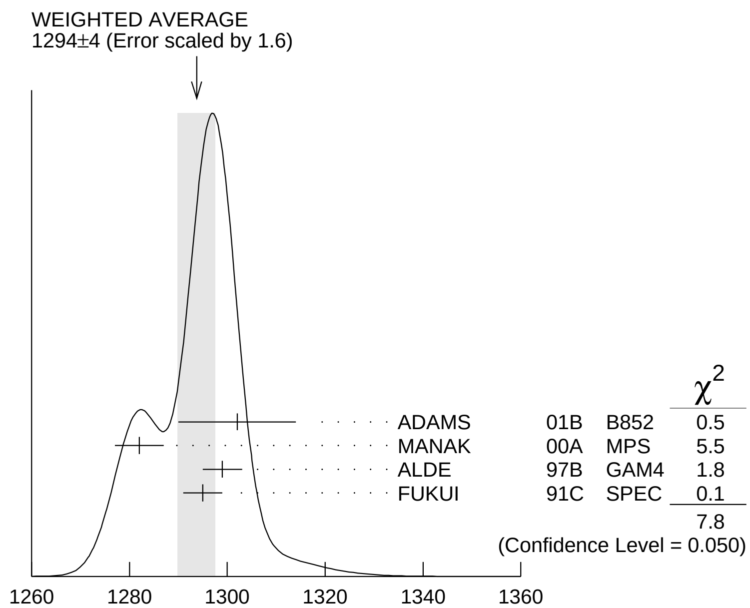
NODE=M037

$\eta(1295)$ 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;→ NOT CHECKED ←
Γ_2	$a_0(980)\pi$	seen	DESIG=1;OUR EST;→ NOT CHECKED ←
Γ_3	$\gamma\gamma$		DESIG=3
Γ_4	$\eta\pi^0\pi^0$	seen	DESIG=4;OUR EST;→ NOT CHECKED ←
Γ_5	$\eta(\pi\pi)_{S\text{-wave}}$	seen	DESIG=5;OUR EST;→ NOT CHECKED ←
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

$\Gamma(\eta\pi^+\pi^-) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_1\Gamma_3/\Gamma$

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	$e^+e^- \to e^+e^-\eta\pi\pi$

$\Gamma(K\overline{K}\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_7\Gamma_3/\Gamma$

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

$\Gamma(a_0(980)\pi)/\Gamma_{\text{total}}$ 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 $\pi^-p \to n\eta 2\pi$

$\Gamma(a_0(980)\pi)/\Gamma(\eta\pi^0\pi^0)$ Γ_2/Γ_4

NODE=M037R2
NODE=M037R2

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
0.65±0.10	[5] ALDE	97B	GAM4	100 $\pi^-p \to \eta\pi^0\pi^0n$

[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 $\pi^-p \to \eta\pi^0\pi^0n$

$\Gamma(a_0(980)\pi)/\Gamma(\sigma\eta)$ 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	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
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

→ NOT CHECKED ←

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1300±100 OUR ESTIMATE					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
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

→ NOT CHECKED ←

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
200 to 600 OUR ESTIMATE					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
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;→ NOT CHECKED ←
Γ_2	$\pi(\pi\pi)_{S\text{-wave}}$	seen	DESIG=3;OUR EST;→ NOT CHECKED ←
Γ_3	$\gamma\gamma$		DESIG=4

$\pi(1300)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M058218

$\Gamma(\rho\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_1\Gamma_3/\Gamma$

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
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	$\overline{p}p \rightarrow 2\pi^+2\pi^-$
seen			CHUNG	02	B852	18.3 $\pi^- p \rightarrow \pi^+ 2\pi^- p$
<0.15	90		ABELE	01	CBAR	0.0 $\overline{p}d \rightarrow \pi^- 4\pi^0 p$
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

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=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=M012205

VALUE (MeV)	DOCUMENT ID

NODE=M012M0

$1318.3^{+0.5}_{-0.6}$ OUR AVERAGE Includes data from the 4 datablocks that follow this one. Error includes scale factor of 1.2.

3π MODE

NODE=M012M1
NODE=M012M1

The data in this block is included in the average printed for a previous datablock.

$1319.0^{+\ 1.0}_{-\ 1.3}$ OUR AVERAGE Error includes scale factor of 1.4. See the ideogram below.

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1321 ± 1 $^{+0}_{-7}$	420k	ALEKSEEV	10	COMP		190 $\pi^- Pb \rightarrow \pi^-\pi^-\pi^+ Pb'$
1326 ± 2 ±2		CHUNG	02	B852		18.3 $\pi^- p \rightarrow \pi^+\pi^-\pi^- p$
1317 ± 3		BARBERIS	98B			450 $pp \rightarrow p_f \pi^+\pi^-\pi^0 p_s$
1323 ± 4 ±3		ACCIARRI	97T	L3		$e^+e^- \rightarrow e^+e^-\pi^+\pi^-\pi^0$
1320 ± 7		ALBRECHT	97B	ARG		$e^+e^- \rightarrow e^+e^-\pi^+\pi^-\pi^0$
1311.3± 1.6±3.0	72.4k	AMELIN	96	VES		36 $\pi^- p \rightarrow \pi^+\pi^-\pi^0 n$
1310 ± 5		ARMSTRONG	90	OMEG	0	300.0$pp \rightarrow pp\pi^+\pi^-\pi^0$
1323.8± 2.3	4022	AUGUSTIN	89	DM2	±	$J/\psi \rightarrow \rho^\pm a_2^\mp$
1320.6± 3.1	3562	AUGUSTIN	89	DM2	0	$J/\psi \rightarrow \rho^0 a_2^0$
1317 ± 2	25k	[1] DAUM	80C	SPEC	−	63,94 $\pi^- p \rightarrow 3\pi p$
1320 ±10	1097	[1] BALTAY	78B	HBC	+0	15 $\pi^+ p \rightarrow p 4\pi$
1306 ± 8		FERRERSORIA	78	OMEG	−	9 $\pi^- p \rightarrow p 3\pi$
1318 ± 7	1.6k	[1] EMMS	75	DBC	0	4 $\pi^+ n \rightarrow p(3\pi)^0$
1315 ± 5		[1] ANTIPOV	73C	CNTR	−	25,40 $\pi^- p \rightarrow p\eta\pi^-$
1306 ± 9	1580	CHALOUPKA	73	HBC	−	3.9 $\pi^- p$

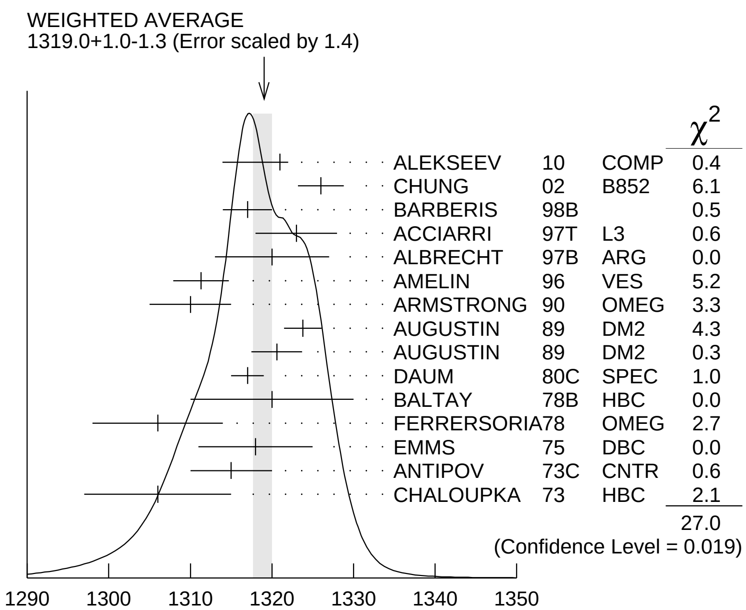
OCCUR=2

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

1300 ± 2 ± 4	18k	[2] SCHEGELSKY	06	RVUE	0	$\gamma\gamma \rightarrow \pi^+\pi^-\pi^0$	
1305 ± 14		CONDO	93	SHF		$\gamma p \rightarrow \eta\pi^+\pi^+\pi^-$	
1310 ± 2		[1] EVANGELIS...	81	OMEG	−	$12\ \pi^- p \rightarrow 3\pi p$	
1343 ± 11	490	BALTAY	78B	HBC	0	$15\ \pi^+ p \rightarrow \Delta 3\pi$	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	+	$7.0\ \pi^+ p \rightarrow 3\pi p$	

[1] From a fit to $J^P = 2^+$ $\rho\pi$ partial wave. NODE=M012M1;LINKAGE=P

[2] 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

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT	
The data in this block is included in the average printed for a previous datablock.							NODE=M012M2
1318.1 ± 0.7 OUR AVERAGE							
1319 ± 5	4700	[3,4] CLELAND	82B	SPEC	+	$50\ \pi^+ p \rightarrow K^0_S K^+ p$	OCCUR=2
1324 ± 6	5200	[3,4] CLELAND	82B	SPEC	−	$50\ \pi^- p \rightarrow K^0_S K^- p$	OCCUR=3
1320 ± 2	4000	CHABAUD	80	SPEC	−	$17\ \pi^- A \rightarrow K^0_S K^- A$	
1312 ± 4	11000	CHABAUD	78	SPEC	−	$9.8\ \pi^- p \rightarrow K^- K^0_S p$	
1316 ± 2	4730	CHABAUD	78	SPEC	−	$18.8\ \pi^- p \rightarrow K^- K^0_S p$	OCCUR=2
1318 ± 1		[3,5] MARTIN	78D	SPEC	−	$10\ \pi^- p \rightarrow K^0_S K^- p$	
1320 ± 2	2724	MARGULIE	76	SPEC	−	$23\ \pi^- p \rightarrow K^- K^0_S p$	
1313 ± 4	730	FOLEY	72	CNTR	−	$20.3\ \pi^- p \rightarrow K^- K^0_S p$	
1319 ± 3	1500	[5] GRAYER	71	ASPK	−	$17.2\ \pi^- p \rightarrow K^- K^0_S p$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
1304 ± 10	870	[6] SCHEGELSKY	06A	RVUE	0	$\gamma\gamma \rightarrow K^0_S K^0_S$	
1330 ± 11	1000	[3,4] CLELAND	82B	SPEC	+	$30\ \pi^+ p \rightarrow K^0_S K^+ p$	
1324 ± 5	350	HYAMS	78	ASPK	+	$12.7\ \pi^+ p \rightarrow K^+ K^0_S p$	

[3] From a fit to $J^P = 2^+$ partial wave. NODE=M012M2;LINKAGE=P

[4] Number of events evaluated by us. NODE=M012M2;LINKAGE=W

[5] Systematic error in mass scale subtracted. NODE=M012M2;LINKAGE=S

[6] 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.					
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		[7] AMSLER	94D	CBAR		0.0 $\bar{p}p \to \pi^0\pi^0\eta$
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	[8] KEY	73	OSPK	−	6 $\pi^- p \to p\pi^-\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1309 ±4		ANISOVICH	09	RVUE		$\bar{p}p$, πN
1324 ±5		ARMSTRONG	93C	E760	0	$\bar{p}p \to \pi^0\eta\eta \to 6\gamma$
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	[8,9] CONFORTO	73	OSPK	−	6 $\pi^- p \to p MM^-$

OCCUR=2 (BARBERIS 1316); OCCUR=2 (DELFOSSE 1330.7)

[7] The systematic error of 2 MeV corresponds to the spread of solutions. NODE=M012M3;LINKAGE=DD

[8] Error includes 5 MeV systematic mass-scale error. NODE=M012M3;LINKAGE=E

[9] Missing mass with enriched MMS $= \eta\pi^-$, $\eta = 2\gamma$. NODE=M012M3;LINKAGE=M

$\eta'\pi$ MODE

NODE=M012M4

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
The data in this block is included in the average printed for a previous datablock.			
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
$105.0^{+1.6}_{-1.9}$ OUR AVERAGE					
110 ± 2 $^{+2}_{-15}$	420k	ALEKSEEV	10	COMP		190 $\pi^- Pb \to \pi^-\pi^-\pi^+ Pb'$
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	$J/\psi \to \rho^0 a_2^0$
97 ± 5		[10] EVANGELIS...	81	OMEG	−	12 $\pi^- p \to 3\pi p$
96 ± 9	25k	[10] DAUM	80C	SPEC	−	63,94 $\pi^- p \to 3\pi p$
110 ±15	1097	[10] BALTAY	78B	HBC	+0	15 $\pi^+ p \to p 4\pi$
112 ±18	1.6k	[10] EMMS	75	DBC	0	4 $\pi^+ n \to p(3\pi)^0$
122 ±14	1.2k	[10,11] WAGNER	75	HBC	0	7 $\pi^+ p \to \Delta^{++}(3\pi)^0$
115 ±15		[10] 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 $\pi^+ p$
103 ± 5	17k	BOWEN	71	MMS	−	7 $\pi^- p$

OCCUR=2 (AUGUSTIN 118.5); OCCUR=2 (BOWEN 99); OCCUR=3 (BOWEN 103)

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

117 ±6 ±20	18k	[12] SCHEGELSKY	06	RVUE	0	$\gamma\gamma \rightarrow \pi^+\pi^-\pi^0$	
120 ±40		CONDO	93	SHF		$\gamma p \rightarrow \eta\pi^+\pi^+\pi^-$	
115 ±14	490	BALTAY	78B	HBC	0	15 $\pi^+ p \rightarrow \Delta 3\pi$	OCCUR=2
72 ±16	5k	BINNIE	71	MMS	−	$\pi^- p$ near a_2 threshold	OCCUR=2
79 ±12	941	ALSTON-...	70	HBC	+	7.0 $\pi^+ p \rightarrow 3\pi p$	

[10] From a fit to $J^P = 2^+$ $\rho\pi$ partial wave. NODE=M012W1;LINKAGE=P

[11] Width errors enlarged by us to $4\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M012W1;LINKAGE=S

[12] 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	→ NOT CHECKED ←
110.4±1.7 OUR AVERAGE	Includes data from the 2 datablocks that follow this one.

$K\overline{K}$ 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	[13,14] CLELAND	82B	SPEC	+	50 $\pi^+ p \rightarrow K^0_S K^+ p$	OCCUR=2
120 ±25	5200	[13,14] CLELAND	82B	SPEC	−	50 $\pi^- p \rightarrow K^0_S K^- p$	OCCUR=3
106 ± 4	4000	CHABAUD	80	SPEC	−	17 $\pi^- A \rightarrow K^0_S K^- A$	
126 ±11	11000	CHABAUD	78	SPEC	−	9.8 $\pi^- p \rightarrow K^- K^0_S p$	
101 ± 8	4730	CHABAUD	78	SPEC	−	18.8 $\pi^- p \rightarrow K^- K^0_S p$	OCCUR=2
113 ± 4		[13,15] MARTIN	78D	SPEC	−	10 $\pi^- p \rightarrow K^0_S K^- p$	
105 ± 8	2724	[15] MARGULIE	76	SPEC	−	23 $\pi^- p \rightarrow K^- K^0_S p$	
113 ±19	730	FOLEY	72	CNTR	−	20.3 $\pi^- p \rightarrow K^- K^0_S p$	
123 ±13	1500	[15] GRAYER	71	ASPK	−	17.2 $\pi^- p \rightarrow K^- K^0_S p$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
120 ±15	870	[16] SCHEGELSKY	06A	RVUE	0	$\gamma\gamma \rightarrow K^0_S K^0_S$	
121 ±51	1000	[13,14] CLELAND	82B	SPEC	+	30 $\pi^+ p \rightarrow K^0_S K^+ p$	
110 ±18	350	HYAMS	78	ASPK	+	12.7 $\pi^+ p \rightarrow K^+ K^0_S p$	

[13] From a fit to $J^P = 2^+$ partial wave. NODE=M012W2;LINKAGE=P

[14] Number of events evaluated by us. NODE=M012W2;LINKAGE=W

[15] Width errors enlarged by us to $4\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M012W2;LINKAGE=S

[16] From analysis of L3 data at 91 and 183–209 GeV. NODE=M012W2;LINKAGE=SC

$\eta\pi$ MODE

NODE=M012W3
NODE=M012W3

The data in this block is included in the average printed for a previous datablock.

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*	
111.1± 2.4 OUR AVERAGE							
115 ±20		BARBERIS	00H			450 $pp \rightarrow p_f \eta\pi^0 p_s$	
112 ±14		BARBERIS	00H			450 $pp \rightarrow \Delta^{++}_f \eta\pi^- p_s$	OCCUR=2
112 ± 3 ±2		[17] AMSLER	94D	CBAR		0.0 $\overline{p}p \rightarrow \pi^0\pi^0\eta$	
103 ± 6 ±3		BELADIDZE	93	VES		37$\pi^- N \rightarrow \eta\pi^- N$	
112.2± 5.7	2561	DELFOSSE	81	SPEC	+	$\pi^\pm p \rightarrow p\pi^\pm\eta$	
116.6± 7.7	1653	DELFOSSE	81	SPEC	−	$\pi^\pm p \rightarrow p\pi^\pm\eta$	OCCUR=2
108 ± 9	1000	KEY	73	OSPK	−	6 $\pi^- p \rightarrow p\pi^-\eta$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
110 ± 4		ANISOVICH	09	RVUE		$\overline{p}p$, πN	
127 ± 2 ±2		[18] THOMPSON	97	MPS		18 $\pi^- p \rightarrow \eta\pi^- p$	
118 ±10		ARMSTRONG	93C	E760	0	$\overline{p}p \rightarrow \pi^0\eta\eta \rightarrow 6\gamma$	
104 ± 9	6200	[19] CONFORTO	73	OSPK	−	6 $\pi^- p \rightarrow p MM^-$	

[17] The systematic error of 2 MeV corresponds to the spread of solutions. NODE=M012W3;LINKAGE=DD

[18] Resolution is not unfolded. NODE=M012W3;LINKAGE=A

[19] 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 $\pi^- p \rightarrow \eta'\pi^- p$
106±32	BELADIDZE	93	VES	37$\pi^- N \rightarrow \eta'\pi^- N$

$a_2(1320)$ 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	$\eta'(958)\pi$	$(5.3 \pm 0.9) \times 10^{-3}$		DESIG=8
Γ_9	$\pi^\pm\gamma$	$(2.68 \pm 0.31) \times 10^{-3}$		DESIG=7
Γ_{10}	$\gamma\gamma$	$(9.4 \pm 0.7) \times 10^{-6}$		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 $\left\langle \delta x_i \delta x_j \right\rangle / (\delta x_i \cdot \delta x_j)$, 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	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	[20] SCHEGELSKY	06A	RVUE	0	$\gamma\gamma \to K^0_S K^0_S$

[20] 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	[21] SCHEGELSKY	06A	RVUE	0	$\gamma\gamma \to K^0_S K^0_S$

[21] 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
287± 30 OUR AVERAGE						
$284 \pm 25 \pm 25$	7100	MOLCHANOV	01	SELX		$600\ \pi^- A \to \pi^+\pi^-\pi^- A$
295 ± 60		CIHANGIR	82	SPEC	+	$200\ \pi^+$ A
• • • We do not use the following data for averages, fits, limits, etc. • • •						
461 ± 110		[22] MAY	77	SPEC	±	$9.7\ \gamma$A

[22] Assuming one-pion exchange.

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	[23] ALTHOFF	86	TASS	0	$e^+e^- \to e^+e^-3\pi$
1.14±0.20±0.26		[24] 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	[23] BEHREND	83B	CELL	0	$e^+e^- \to e^+e^-3\pi$
0.77±0.18±0.27	22	[24] EDWARDS	82F	CBAL	0	$e^+e^- \to e^+e^-\pi^0\eta$

[23] From $\rho\pi$ decay mode. NODE=M012W;LINKAGE=F

[24] From $\eta\pi^0$ decay mode. 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

$\Gamma(3\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_1\Gamma_{10}/\Gamma$

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±0.02±0.02	18k	[25] SCHEGELSKY	06	RVUE	$\gamma\gamma \to \pi^+\pi^-\pi^0$

[25] From analysis of L3 data at 183–209 GeV. NODE=M012G2;LINKAGE=SC

$\Gamma(\eta\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_5\Gamma_{10}/\Gamma$

NODE=M012G01
NODE=M012G01

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.145^{+0.097}_{-0.034}$	[26] UEHARA	09A	BELL	$e^+e^- \to e^+e^-\eta\pi^0$

[26] From the D_2-wave. The fraction of the D_0-wave is $3.4^{+2.3}_{-1.1}$%. NODE=M012G01;LINKAGE=UE

$\Gamma(K\overline{K}) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_7\Gamma_{10}/\Gamma$

NODE=M012G1
NODE=M012G1

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
0.126±0.007±0.028	[27] ALBRECHT	90G	ARG	$e^+e^- \to e^+e^-K^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.081±0.006±0.027	[28] ALBRECHT	90G	ARG	$e^+e^- \to e^+e^-K^+K^-$

OCCUR=2

[27] Using an incoherent background. NODE=M012G1;LINKAGE=A

[28] Using a coherent background. 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

$\Gamma(\eta\pi)/\Gamma(3\pi)$ 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 $\pi^- p$
0.22 ±0.05	52	ANTIPOV	73	CNTR	−	40 $\pi^- p$
0.211±0.044	149	CHALOUPKA	73	HBC	−	3.9 $\pi^- p$
0.246±0.042	167	ALSTON-...	71	HBC	+	7.0 $\pi^+ p$
0.25 ±0.09	15	BOECKMANN	70	HBC	+	5.0 $\pi^+ p$
0.23 ±0.08	22	ASCOLI	68	HBC	−	5 $\pi^- p$
0.12 ±0.08		CHUNG	68	HBC	−	3.2 $\pi^- p$
0.22 ±0.09		CONTE	67	HBC	−	11.0 $\pi^- p$

$\Gamma(\omega\pi\pi)/\Gamma(3\pi)$ Γ_6/Γ_1

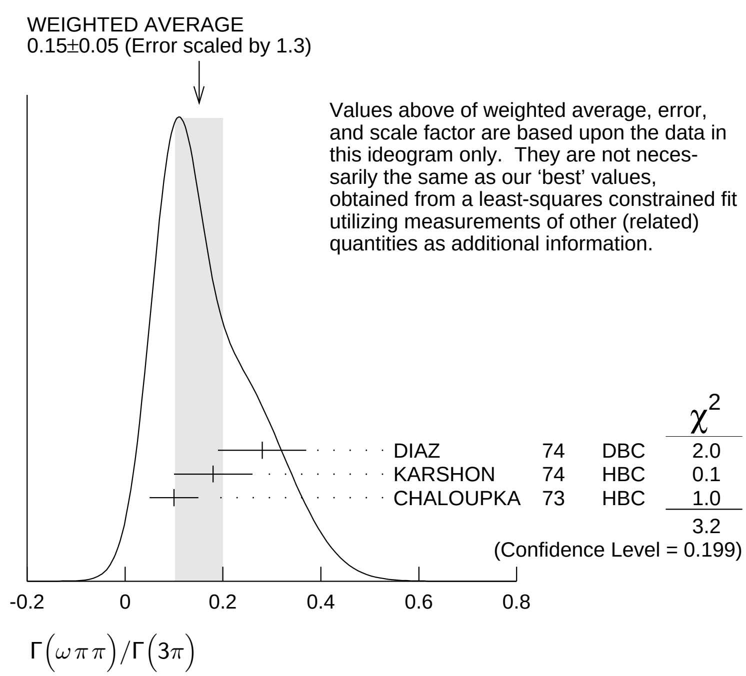
NODE=M012R12
NODE=M012R12

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 $\pi^+ n$
0.18±0.08		[29] KARSHON	74	HBC		Avg. of above two
0.10±0.05	279	CHALOUPKA	73	HBC	−	3.9 $\pi^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
0.29±0.08	140	[29] KARSHON	74	HBC	0	4.9 $\pi^+ p$
0.10±0.04	60	[29] KARSHON	74	HBC	+	4.9 $\pi^+ p$
0.19±0.08		DEFOIX	73	HBC	0	0.7 $\overline{p}p$

OCCUR=3
OCCUR=2

[29] 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



$\Gamma(K\overline{K})/\Gamma(3\pi)$ Γ_7/Γ_1

NODE=M012R1
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		[30] BERTIN	98B	OBLX		0.0 $\overline{p}p \rightarrow K^{\pm} K_S \pi^{\mp}$
0.056±0.014	50	[31] CHALOUPKA	73	HBC	−	3.9 $\pi^- p$
0.097±0.018	113	[31] ALSTON-...	71	HBC	+	7.0 $\pi^+ p$
0.06 ±0.03		[31] ABRAMOVI...	70B	HBC	−	3.93 $\pi^- p$
0.054±0.022		[31] CHUNG	68	HBC	−	3.2 $\pi^- p$

[30] Using 4π data from BERTIN 97D.
[31] Included in CHABAUD 78 review.

NODE=M012R1;LINKAGE=BE
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. • • •			
0.08 ± 0.02	[32] BERTIN 98B	OBLX	$0.0\ \overline{p}p \rightarrow K^{\pm}K_S\pi^{\mp}$

[32] 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					
$0.13\ \pm0.04$		ESPIGAT 72	HBC	$\pm$	$0.0\ \overline{p}p$
$0.15\ \pm0.04$	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					
$0.05\ \pm0.02$		TOET 73	HBC	$+$	$5\ \pi^+ p$
$0.09\ \pm0.04$		TOET 73	HBC	0	$5\ \pi^+ p$
$0.03\ \pm0.02$	8	DAMERI 72	HBC	$-$	$11\ \pi^- p$
$0.06\ \pm0.03$	17	BARNHAM 71	HBC	$+$	$3.7\ \pi^+ p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.020 ± 0.004		[33] ESPIGAT 72	HBC	$\pm$	$0.0\ \overline{p}p$

OCCUR=2

[33] Not averaged because of discrepancy between masses from $K\overline{K}$ and $\rho\pi$ modes.

NODE=M012R8;LINKAGE=A

$\Gamma(\eta'(958)\pi)/\Gamma_{\text{total}}$ — 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		$38{,}100\ \pi^- p \rightarrow \eta'\pi^0 n$
<0.02	97	BARNHAM 71	HBC	$+$	$3.7\ \pi^+ p$
0.004 ± 0.004		BOESEBECK 68	HBC	$+$	$8\ \pi^+ p$

$\Gamma(\eta'(958)\pi)/\Gamma(3\pi)$ — 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
0.037±0.006 OUR AVERAGE			
0.032 ± 0.009	ABELE 97C	CBAR	$0.0\ \overline{p}p \rightarrow \pi^0\pi^0\eta'$
$0.047\pm0.010\pm0.004$	[34] BELADIDZE 93	VES	$37\pi^- N \rightarrow a_2^- N$
$0.034\pm0.008\pm0.005$	BELADIDZE 92	VES	$36\pi^- C \rightarrow a_2^- C$

[34] Using $B(\eta' \rightarrow \pi^+\pi^-\eta) = 0.441$, $B(\eta \rightarrow \gamma\gamma) = 0.389$ and $B(\eta \rightarrow \pi^+\pi^-\pi^0) = 0.236$.

NODE=M012R13;LINKAGE=A

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

NODE=M012R11

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.005^{+0.005}_{-0.003}$	[35] EISENBERG 72	HBC	$4.3,5.25,7.5\ \gamma p$

[35] Pion-exchange model used in this estimation.

NODE=M012R11;LINKAGE=R

$\Gamma(e^+e^-)/\Gamma_{\text{total}}$ — 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	$e^+e^- \rightarrow \pi^0\pi^0$

$a_2(1320)$ REFERENCES

NODE=M012

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	83B	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

$f_0(1370)$ $\quad I^G(J^{PC}) = 0^+(0^{++})$

See also the mini-reviews on scalar mesons under $f_0(500)$ (see the index for the page number) and on non-$q\overline{q}$ candidates in PDG 06, Journal of Physics, G **33** 1 (2006). NODE=M147

$f_0(1370)$ 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				→ NOT CHECKED ←
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$(1290 \pm 50){-}i(170^{+20}_{-40})$	[1] ANISOVICH 09	RVUE	0.0 $\overline{p}p$, πN	
$(1373 \pm 15){-}i(137 \pm 10)$	[2] BARGIOTTI 03	OBLX	$\overline{p}p$	
$(1302 \pm 17){-}i(166 \pm 18)$	[3] BARBERIS 00C		450 $pp \rightarrow p_f 4\pi p_s$	
$(1312 \pm 25 \pm 10){-}i(109 \pm 22 \pm 15)$	BARBERIS 99D	OMEG	450 $pp \rightarrow K^+K^-$, $\pi^+\pi^-$	
$(1406 \pm 19){-}i(80 \pm 6)$	[4] KAMINSKI 99	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$, $\sigma\sigma$	OCCUR=2
$(1300 \pm 20){-}i(120 \pm 20)$	ANISOVICH 98B	RVUE	Compilation	
$(1290 \pm 15){-}i(145 \pm 15)$	BARBERIS 97B	OMEG	450 $pp \rightarrow pp2(\pi^+\pi^-)$	
$(1548 \pm 40){-}i(560 \pm 40)$	BERTIN 97C	OBLX	0.0 $\overline{p}p \rightarrow \pi^+\pi^-\pi^0$	
$(1380 \pm 40){-}i(180 \pm 25)$	ABELE 96B	CBAR	0.0 $\overline{p}p \rightarrow \pi^0 K^0_L K^0_L$	
$(1300 \pm 15){-}i(115 \pm 8)$	BUGG 96	RVUE		
$(1330 \pm 50){-}i(150 \pm 40)$	[5] AMSLER 95B	CBAR	$\overline{p}p \rightarrow 3\pi^0$	
$(1360 \pm 35){-}i(150\text{–}300)$	[5] AMSLER 95C	CBAR	$\overline{p}p \rightarrow \pi^0\eta\eta$	
$(1390 \pm 30){-}i(190 \pm 40)$	[6] AMSLER 95D	CBAR	$\overline{p}p \rightarrow 3\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$	OCCUR=2
$1346 - i249$	[7,8] JANSSEN 95	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$	OCCUR=2
$1214 - i168$	[8,9] TORNQVIST 95	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$, $K\pi$, $\eta\pi$	
$1364 - i139$	AMSLER 94D	CBAR	$\overline{p}p \rightarrow \pi^0\pi^0\eta$	
$(1365^{+20}_{-55}){-}i(134 \pm 35)$	ANISOVICH 94	CBAR	$\overline{p}p \rightarrow 3\pi^0$, $\pi^0\eta\eta$	
$(1340 \pm 40){-}i(127^{+30}_{-20})$	[10] BUGG 94	RVUE	$\overline{p}p \rightarrow 3\pi^0$, $\eta\eta\pi^0$, $\eta\pi^0\pi^0$	OCCUR=2
$(1430 \pm 5){-}i(73 \pm 13)$	[11] KAMINSKI 94	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$	
$1420 - i220$	[12] AU 87	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$	

[1] Another pole is found at $(1510 \pm 130) - i\,(800^{+100}_{-150})$ MeV. NODE=M147PP;LINKAGE=AO

[2] Coupled channel analysis of $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, and $K^\pm K^0_S \pi^\mp$. NODE=M147PP;LINKAGE=BG

[3] Average between $\pi^+\pi^-2\pi^0$ and $2(\pi^+\pi^-)$. NODE=M147PP;LINKAGE=PC

[4] T-matrix pole on sheet $---$. NODE=M147PP;LINKAGE=TK

[5] Supersedes ANISOVICH 94. NODE=M147PP;LINKAGE=K

[6] Coupled-channel analysis of $\overline{p}p \rightarrow 3\pi^0$, $\pi^0\eta\eta$, 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

[7] Analysis of data from FALVARD 88. NODE=M147PP;LINKAGE=C

[8] The pole is on Sheet III. Demonstrates explicitly that $f_0(500)$ and $f_0(1370)$ are two different poles. NODE=M147PP;LINKAGE=DD

[9] 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

[10] Reanalysis of ANISOVICH 94 data. NODE=M147PP;LINKAGE=C1

[11] T-matrix pole on sheet III. NODE=M147PP;LINKAGE=KM

[12] Analysis of data from OCHS 73,GRAYER 74, BECKER 79, and CASON 83. NODE=M147PP;LINKAGE=H

$f_0(1370)$ BREIT-WIGNER MASS OR K-MATRIX POLE PARAMETER

NODE=M147205

NODE=M147M

VALUE (MeV)	*DOCUMENT ID*	
1200 to 1500 OUR ESTIMATE		→ NOT CHECKED ←

$\pi\pi$ MODE

NODE=M147M1

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1400 ± 40		[13] AUBERT	09L	BABR	$B^{\pm} \rightarrow \pi^{\pm}\pi^{\pm}\pi^{\mp}$
$1470^{+\ 6}_{-\ 7}{}^{+\ 72}_{-255}$		[14] UEHARA	08A	BELL	$10.6\ e^+e^- \rightarrow e^+e^-\pi^0\pi^0$
1259 ± 55	2.6k	BONVICINI	07	CLEO	$D^+ \rightarrow \pi^-\pi^+\pi^+$
$1309\pm\ 1\pm\ 15$		[15] BUGG	07A	RVUE	$0.0\ p\overline{p} \rightarrow 3\pi^0$
1449 ± 13	4286	[16] GARMASH	06	BELL	$B^+ \rightarrow K^+\pi^+\pi^-$
1350 ± 50		ABLIKIM	05	BES2	$J/\psi \rightarrow \phi\pi^+\pi^-$
$1265\pm30^{+\ 20}_{-\ 35}$		ABLIKIM	05Q	BES2	$\psi(2S) \rightarrow \gamma\pi^+\pi^-K^+K^-$
$1434\pm18\pm\ 9$	848	AITALA	01A	E791	$D_s^+ \rightarrow \pi^-\pi^+\pi^+$
1308 ± 10		BARBERIS	99B	OMEG	$450\ pp \rightarrow p_s p_f \pi^+\pi^-$
1315 ± 50		BELLAZZINI	99	GAM4	$450\ pp \rightarrow pp\pi^0\pi^0$
1315 ± 30		ALDE	98	GAM4	$100\ \pi^-p \rightarrow \pi^0\pi^0 n$
1280 ± 55		BERTIN	98	OBLX	$0.05–0.405\ \overline{n}p \rightarrow \pi^+\pi^+\pi^-$
1186		[17,18] TORNQVIST	95	RVUE	$\pi\pi \rightarrow \pi\pi, K\overline{K}, K\pi, \eta\pi$
1472 ± 12		ARMSTRONG	91	OMEG	$300\ pp \rightarrow pp\pi\pi,\ ppK\overline{K}$
1275 ± 20		BREAKSTONE	90	SFM	$62\ pp \rightarrow pp\pi^+\pi^-$
1420 ± 20		AKESSON	86	SPEC	$63\ pp \rightarrow pp\pi^+\pi^-$
1256		FROGGATT	77	RVUE	$\pi^+\pi^-$ channel

[13] Breit-Wigner mass. NODE=M147M1;LINKAGE=BW

[14] Breit-Wigner mass. May also be the $f_0(1500)$. NODE=M147M1;LINKAGE=UE

[15] Reanalysis of ABELE 96C data. NODE=M147M1;LINKAGE=BU

[16] Also observed by GARMASH 07 in $B^0 \rightarrow K_S^0\pi^+\pi^-$ decays. Supersedes GARMASH 05. NODE=M147M1;LINKAGE=GR

[17] 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

[18] Also observed by ASNER 00 in $\tau^- \rightarrow \pi^-\pi^0\pi^0\nu_\tau$ decays NODE=M147M1;LINKAGE=FF

$K\overline{K}$ MODE

NODE=M147M2

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$1440\pm\ 6$	VLADIMIRSK...	06	SPEC	$40\ \pi^-p \rightarrow K_S^0K_S^0n$
1391 ± 10	TIKHOMIROV	03	SPEC	$40.0\ \pi^-C \rightarrow K_S^0K_S^0K_L^0X$
1440 ± 50	BOLONKIN	88	SPEC	$40\ \pi^-p \rightarrow K_S^0K_S^0n$
$1463\pm\ 9$	ETKIN	82B	MPS	$23\ \pi^-p \rightarrow n2K_S^0$
1425 ± 15	WICKLUND	80	SPEC	$6\ \pi N \rightarrow K^+K^-N$
~ 1300	POLYCHRO...	79	STRC	$7\ \pi^-p \rightarrow n2K_S^0$

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	$0.0\ \overline{p}d \rightarrow \pi^-4\pi^0p$
1374 ± 38		AMSLER	94	CBAR	$0.0\ \overline{p}p \rightarrow \pi^+\pi^-3\pi^0$
1345 ± 12		ADAMO	93	OBLX	$\overline{n}p \rightarrow 3\pi^+2\pi^-$
1386 ± 30		GASPERO	93	DBC	$0.0\ \overline{p}n \rightarrow 2\pi^+3\pi^-$
~ 1410	5751	[19] BETTINI	66	DBC	$0.0\ \overline{p}n \rightarrow 2\pi^+3\pi^-$

[19] $\rho\rho$ 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. • • •				
$1262^{+51}_{-78}{}^{+\ 82}_{-103}$	[20] UEHARA	10A	BELL	$10.6\ e^+e^- \rightarrow e^+e^-\eta\eta$
1430	AMSLER	92	CBAR	$0.0\ \overline{p}p \rightarrow \pi^0\eta\eta$
1220 ± 40	ALDE	86D	GAM4	$100\ \pi^-p \rightarrow n2\eta$

[20] Breit-Wigner mass. May also be the $f_0(1500)$. NODE=M147M4;LINKAGE=UE

COUPLED CHANNEL MODE

NODE=M147M5

VALUE (MeV)	DOCUMENT ID	TECN
• • • We do not use the following data for averages, fits, limits, etc. • • •		
1306±20	[21] ANISOVICH 03	RVUE

[21] 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

→ NOT CHECKED ←

$\pi\pi$ MODE

NODE=M147W1

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
300± 80		[22] AUBERT 09L	BABR	$B^\pm \to \pi^\pm\pi^\pm\pi^\mp$
$90^{+\ 2+\ 50}_{-\ 1-\ 22}$		[23] 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	[24] 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± 32± 6	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		[25,26] 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		[27] FROGGATT 77	RVUE	$\pi^+\pi^-$ channel

[22] The systematic errors are not reported. NODE=M147W1;LINKAGE=NS

[23] Breit-Wigner width. May also be the $f_0(1500)$. NODE=M147W1;LINKAGE=UE

[24] Also observed by GARMASH 07 in $B^0 \to K^0_S \pi^+\pi^-$ decays. Supersedes GARMASH 05. NODE=M147W1;LINKAGE=GR

[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=M147W1;LINKAGE=BB

[26] Also observed by ASNER 00 in $\tau^- \to \pi^-\pi^0\pi^0\nu_\tau$ decays NODE=M147W1;LINKAGE=FF

[27] 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. • • •			
121± 15	VLADIMIRSK...06	SPEC	40 $\pi^- p \to K^0_S K^0_S n$
55± 26	TIKHOMIROV 03	SPEC	40.0 π^- 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 $\pi^- p \to n2K^0_S$

4π MODE $2(\pi\pi)_S+\rho\rho$

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 $\overline{p}n \to 2\pi^+ 3\pi^-$
~ 90	5751	[28] BETTINI 66	DBC	0.0 $\overline{p}n \to 2\pi^+ 3\pi^-$

[28] $\rho\rho$ 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. • • •				
$484^{+246}_{-170}{}^{+246}_{-263}$	[29] UEHARA	10A	BELL	10.6 $e^+e^- \rightarrow e^+e^-\eta\eta$
250	AMSLER	92	CBAR	0.0 $\overline{p}p \rightarrow \pi^0\eta\eta$
320 ± 40	ALDE	86D	GAM4	100 $\pi^- p \rightarrow n2\eta$

[29] 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}	[30] ANISOVICH	03	RVUE

[30] K-matrix pole 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=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;→ NOT CHECKED ←
Γ_2	4π	seen	DESIG=10;OUR EST;→ NOT CHECKED ←
Γ_3	$4\pi^0$	seen	DESIG=4;OUR EST;→ NOT CHECKED ←
Γ_4	$2\pi^+2\pi^-$	seen	DESIG=5;OUR EST;→ NOT CHECKED ←
Γ_5	$\pi^+\pi^-2\pi^0$	seen	DESIG=6;OUR EST;→ NOT CHECKED ←
Γ_6	$\rho\rho$	dominant	DESIG=14;OUR EST;→ NOT CHECKED ←
Γ_7	$2(\pi\pi)_{S\text{-wave}}$	seen	DESIG=15;OUR EST;→ NOT CHECKED ←
Γ_8	$\pi(1300)\pi$	seen	DESIG=16;OUR EVAL; → NOT CHECKED ←
Γ_9	$a_1(1260)\pi$	seen	DESIG=17;OUR EVAL; → NOT CHECKED ←
Γ_{10}	$\eta\eta$	seen	DESIG=2;OUR EST;→ NOT CHECKED ←
Γ_{11}	$K\overline{K}$	seen	DESIG=11;OUR EST;→ NOT CHECKED ←
Γ_{12}	$K\overline{K}n\pi$	not seen	DESIG=18;OUR EVAL; → NOT CHECKED ←
Γ_{13}	6π	not seen	DESIG=19;OUR EVAL; → NOT CHECKED ←
Γ_{14}	$\omega\omega$	not seen	DESIG=20;OUR EVAL; → NOT CHECKED ←
Γ_{15}	$\gamma\gamma$	seen	DESIG=12;OUR EST;→ NOT CHECKED ←
Γ_{16}	e^+e^-	not seen	DESIG=13;OUR EST;→ NOT CHECKED ←

$f_0(1370)$ 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	$e^+e^- \rightarrow \pi^0\pi^0$

$f_0(1370)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

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. • • •				
$121^{+133}_{-\ 53}{}^{+169}_{-106}$	[31] UEHARA	10A	BELL	10.6 $e^+e^- \rightarrow e^+e^-\eta\eta$

[31] 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

$\Gamma(\pi\pi)/\Gamma_{total}$ — Γ_1/Γ

NODE=M147R3

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.26 ± 0.09	BUGG 96	RVUE	
<0.15	[32] AMSLER 94	CBAR	$\overline{p}p \to \pi^+\pi^- 3\pi^0$
<0.06	GASPERO 93	DBC	0.0 $\overline{p}n \to$ hadrons

[32] Using AMSLER 95B ($3\pi^0$).

NODE=M147R3;LINKAGE=B

$\Gamma(4\pi)/\Gamma_{total}$ — $\Gamma_2/\Gamma = (\Gamma_3+\Gamma_4+\Gamma_5)/\Gamma$

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 $\overline{p}n \to$ hadrons

$\Gamma(4\pi^0)/\Gamma(4\pi)$ — Γ_3/Γ_2

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 $\overline{p}p \to 5\pi^0$
0.068 ± 0.005	[33] GASPERO 93	DBC	0.0 $\overline{p}n \to$ hadrons

[33] 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

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.420 ± 0.014	[34] GASPERO 93	DBC	0.0 $\overline{p}n \to 2\pi^+ 3\pi^-$

[34] 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

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.512 ± 0.019	[35] GASPERO 93	DBC	0.0 $\overline{p}n \to$ hadrons

[35] Model-dependent evaluation.

NODE=M147R6;LINKAGE=A

$\Gamma(\rho\rho)/\Gamma(4\pi)$ — Γ_6/Γ_2

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 $\overline{p}d \to 5\pi p$

$\Gamma(2(\pi\pi)_{S\text{-wave}})/\Gamma(\pi\pi)$ — Γ_7/Γ_1

NODE=M147R15

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
5.6 ± 2.6	[36] ABELE 01	CBAR	0.0 $\overline{p}d \to \pi^- 4\pi^0 p$

[36] 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

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 $\overline{p}d \to 5\pi p$

$\Gamma(\rho\rho)/\Gamma(2(\pi\pi)_{S\text{-wave}})$ — Γ_6/Γ_7

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

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

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

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$(28\ \pm11\ )\times10^{-3}$	[37] ANISOVICH	02D	SPEC	Combined fit
$(\ 4.7\pm\ 2.0)\times10^{-3}$	BARBERIS	00E		$450\ pp \to p_f \eta\eta p_s$

[37] 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

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

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.08 ± 0.08	ABLIKIM	05	BES2	$J/\psi \to \phi\pi^+\pi^-$, ϕK^+K^-
0.91 ± 0.20	[38] BARGIOTTI	03	OBLX	$\overline{p}p$
0.12 ± 0.06	[39] ANISOVICH	02D	SPEC	Combined fit
$0.46\pm0.15\pm0.11$	BARBERIS	99D	OMEG	$450\ pp \to K^+K^-$, $\pi^+\pi^-$

[38] Coupled channel analysis of $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, and $K^\pm K^0_S\pi^\mp$. NODE=M147R;LINKAGE=BG

[39] 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

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

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

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

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	JPG 34 151	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	JPG 33 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
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
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=M109

$h_1(1380)$

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

OMITTED FROM SUMMARY TABLE

Seen in partial-wave analysis of the $K\overline{K}\pi$ system. Needs confirmation.

NODE=M109

$h_1(1380)$ MASS

NODE=M109M

NODE=M109M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1386±19 OUR AVERAGE				
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 $K^- p \to K^0_S K^\pm \pi^\mp \Lambda$

$h_1(1380)$ WIDTH

NODE=M109W

NODE=M109W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
91±30 OUR AVERAGE Error includes scale factor of 1.1.				
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 $K^- p \to K^0_S K^\pm \pi^\mp \Lambda$

$h_1(1380)$ DECAY MODES

NODE=M109215;NODE=M109

	Mode
Γ_1	$K\overline{K}^*(892)$+ c.c.

DESIG=1

$h_1(1380)$ REFERENCES

NODE=M109

ABELE	97H	PL B415 280	A. Abele *et al.*	(Crystal Barrel Collab.)
ASTON	88C	PL B201 573	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)

REFID=45765
REFID=40282

NODE=M111

$\pi_1(1400)$

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

NODE=M111

See also the mini-review under non-$q\overline{q}$ candidates in PDG 06, Journal of Physics, G **33** 1 (2006).

$\pi_1(1400)$ MASS

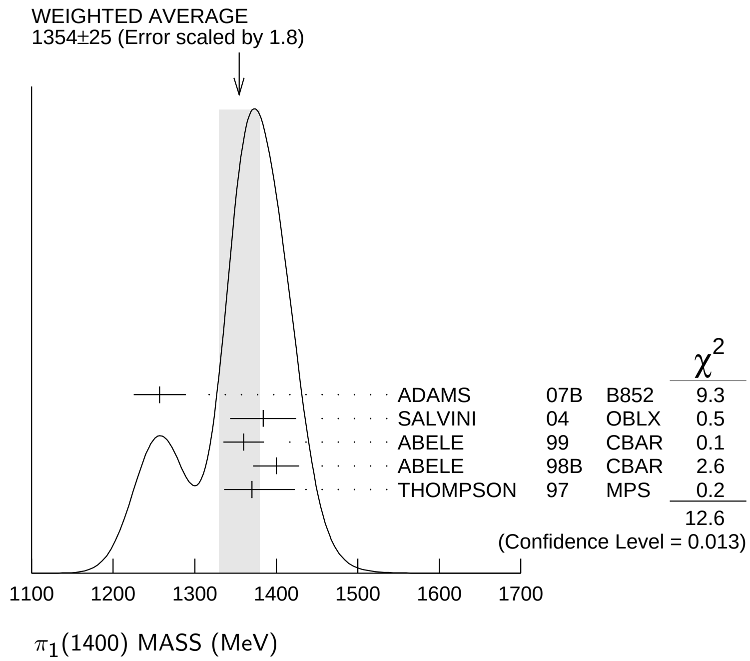
NODE=M111M

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. • • •								
1323.1±	4.6			[2] AOYAGI	93	BKEI		$\pi^- p \to \eta\pi^- p$
1406	±20			[3] ALDE	88B	GAM4	0	100 $\pi^- p \to \eta\pi^0 n$

[1] Natural parity exchange, questioned by DZIERBA 03.
[2] Unnatural parity exchange.
[3] Seen in the P_0-wave intensity of the $\eta\pi^0$ system, unnatural parity exchange.

NODE=M111M;LINKAGE=B
NODE=M111M;LINKAGE=C
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 $^{+65}_{-105}$		[4] THOMPSON	97	MPS		18 $\pi^- p \to \eta\pi^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
143.2±12.5		[5] AOYAGI	93	BKEI		$\pi^- p \to \eta\pi^- p$
180 ±20		[6] ALDE	88B	GAM4	0	100 $\pi^- p \to \eta\pi^0 n$

[4] Resolution is not unfolded, natural parity exchange, questioned by DZIERBA 03.
[5] Unnatural parity exchange.
[6] Seen in the P_0-wave intensity of the $\eta\pi^0$ system, unnatural parity exchange.

NODE=M111W;LINKAGE=QQ
NODE=M111W;LINKAGE=C
NODE=M111W;LINKAGE=A

$\pi_1(1400)$ DECAY MODES

NODE=M111215;NODE=M111

	Mode	Fraction (Γ_i/Γ)
Γ_1	$\eta\pi^0$	seen
Γ_2	$\eta\pi^-$	seen
Γ_3	$\eta'\pi$	

DESIG=1;OUR EST;→ NOT CHECKED ←
DESIG=4;OUR EST;→ NOT CHECKED ←
DESIG=3

$\pi_1(1400)$ 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	[7] BUGG	94	RVUE		$\overline{p}p \to \eta 2\pi^0$
not seen	[8] APEL	81	NICE	0	40 $\pi^- p \to \eta\pi^0 n$

[7] Using Crystal Barrel data.
[8] A general fit allowing S, D, and P waves (including m=0) is not done because of limited statistics.

NODE=M111R1;LINKAGE=C
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	$100\ \pi^- p \to 4\gamma n$

π_1(1400) REFERENCES

NODE=M111

ADAMS	07B	PL B657 27	G.S. Adams *et al.*	(BNL E852 Collab.)	REFID=52048
PDG	06	JPG 33 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	Y.D. Prokoshkin, S.A. Sadovsky	(SERP)	REFID=44619
		Translated from YAF 58 662.			
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

$\eta(1405)$

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

A REVIEW GOES HERE – Check our WWW List of Reviews

NODE=M027

η(1405) MASS

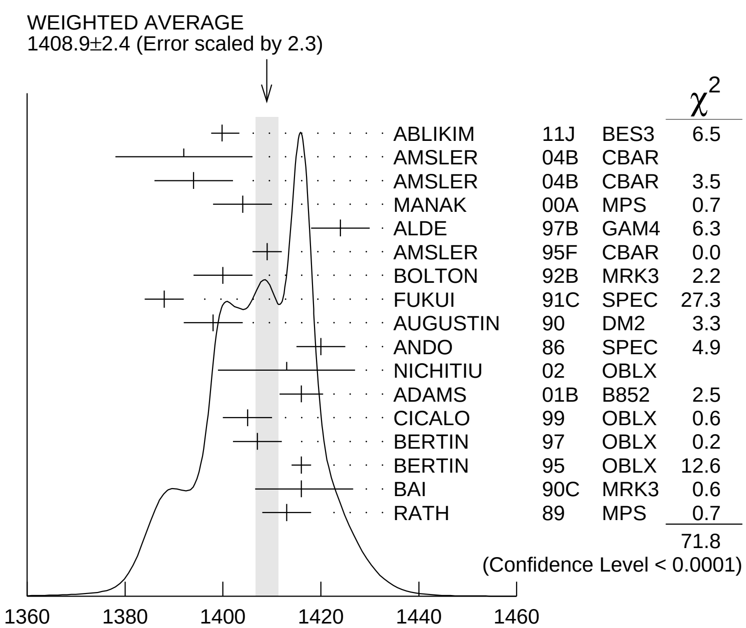
NODE=M027205

VALUE (MeV)	DOCUMENT ID

NODE=M027MX

1408.9±2.4 OUR AVERAGE Includes data from the 2 datablocks that follow this one. Error includes scale factor of 2.3. See the ideogram below. [1409.8 ± 2.5 MeV OUR 2011 AVERAGE Scale factor = 2.2]

NEW



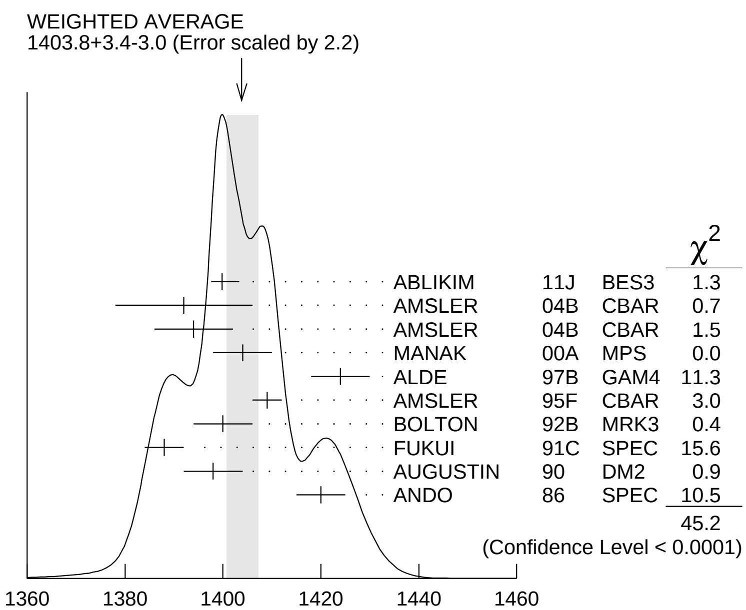
η(1405) mass (MeV)

$\eta\pi\pi$ MODE

NODE=M027M1
NODE=M027M1

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
The data in this block is included in the average printed for a previous datablock.					
$1403.8^{+3.4}_{-3.0}$ OUR AVERAGE Error includes scale factor of 2.2. See the ideogram below. [1405 ± 4 MeV OUR 2011 AVERAGE Scale factor = 2.3]					
$1399.8 \pm 2.2^{+2.8}_{-0.1}$		[1] ABLIKIM	11J	BES3	$J/\psi \rightarrow \omega(\eta\pi^+\pi^-)$
1392 ±14	900 ± 375	AMSLER	04B	CBAR	$0\ \overline{p}p \rightarrow \pi^+\pi^-\pi^+\pi^-\eta$
1394 ± 8	6.6 ± 2.0k	AMSLER	04B	CBAR	$0\ \overline{p}p \rightarrow \pi^+\pi^-\pi^0\pi^0\eta$
1404 ± 6	9082	MANAK	00A	MPS	$18\ \pi^- p \rightarrow \eta\pi^+\pi^- n$
1424 ± 6	2200	ALDE	97B	GAM4	$100\ \pi^- p \rightarrow \eta\pi^0\pi^0 n$
1409 ± 3		AMSLER	95F	CBAR	$0\ \overline{p}p \rightarrow \pi^+\pi^-\pi^0\pi^0\eta$
1400 ± 6		[2] BOLTON	92B	MRK3	$J/\psi \rightarrow \gamma\eta\pi^+\pi^-$
1388 ± 4		FUKUI	91C	SPEC	$8.95\ \pi^- p \rightarrow \eta\pi^+\pi^- n$
1398 ± 6	261	[3] AUGUSTIN	90	DM2	$J/\psi \rightarrow \gamma\eta\pi^+\pi^-$
1420 ± 5		ANDO	86	SPEC	$8\ \pi^- p \rightarrow \eta\pi^+\pi^- n$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1385 ± 7		BAI	99	BES	$J/\psi \rightarrow \gamma\eta\pi^+\pi^-$

NEW
OCCUR=2



$\eta(1405)$ 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	[4] NICHITIU	02	OBLX	
1416 ± 4 ±2	20k	ADAMS	01B	B852	$18\ \text{GeV}\ \pi^- p \rightarrow K^+K^-\pi^0 n$
1405 ± 5		[5] CICALO	99	OBLX	$0\ \overline{p}p \rightarrow K^\pm K^0_S \pi^\mp\pi^+\pi^-$
1407 ± 5		[5] BERTIN	97	OBLX	$0\ \overline{p}p \rightarrow K^\pm(K^0)\pi^\mp\pi^+\pi^-$
1416 ± 2		[5] BERTIN	95	OBLX	$0\ \overline{p}p \rightarrow K\overline{K}\pi\pi\pi$
$1416 \pm 8^{+7}_{-5}$	700	[6] BAI	90C	MRK3	$J/\psi \rightarrow \gamma K^0_S K^\pm\pi^\mp$
1413 ± 5		[6] 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		[7] AUGUSTIN	92	DM2	$J/\psi \rightarrow \gamma K\overline{K}\pi$

OCCUR=2
OCCUR=3

$\pi\pi\gamma$ MODE

NODE=M027M2
NODE=M027M2

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1390±12	235 ± 91	AMSLER	04B	CBAR	$0\ \overline{p}p \rightarrow \pi^+\pi^-\pi^+\pi^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1424±10±11	547	BAI	04J	BES2	$J/\psi \rightarrow \gamma\gamma\pi^+\pi^-$
1401±18		[8,9] AUGUSTIN	90	DM2	$J/\psi \rightarrow \pi^+\pi^-\gamma\gamma$
1432± 8		[9] COFFMAN	90	MRK3	$J/\psi \rightarrow \pi^+\pi^- 2\gamma$

OCCUR=4

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	$J/\psi \to \gamma\pi^+\pi^-\pi^+\pi^-$
1489±12	3270	[10] BISELLO	89B	DM2	$J/\psi \to 4\pi\gamma$

$K\overline{K}\pi$ 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. • • •						
1437.6± 3.2	249 ± 35	[11,12] ABLIKIM	08E	BES2	$J/\psi \to \omega K^0_S K^+\pi^-$ + c.c.	
1445.9± 5.7	62 ± 18	[11,12] ABLIKIM	08E	BES2	$J/\psi \to \omega K^+K^-\pi^0$	OCCUR=2
1442 ±10	410	[11] BAI	98C	BES	$J/\psi \to \gamma K^+K^-\pi^0$	
1445 ± 8	693	[11] AUGUSTIN	90	DM2	$J/\psi \to \gamma K^0_S K^\pm\pi^\mp$	
1433 ± 8	296	[11] AUGUSTIN	90	DM2	$J/\psi \to \gamma K^+K^-\pi^0$	OCCUR=2
1413 ± 8	500	[11] DUCH	89	ASTE	$\overline{p}p \to \pi^+\pi^-K^\pm\pi^\mp K^0$	
1453 ± 7	170	[11] RATH	89	MPS	21.4 $\pi^-p \to K^0_S K^0_S \pi^0 n$	OCCUR=2
1419 ± 1	8800	[11] BIRMAN	88	MPS	8 $\pi^-p \to K^+\overline{K}^0\pi^-n$	
1424 ± 3	620	[11] REEVES	86	SPEC	6.6 $p\overline{p} \to K\overline{K}\pi X$	
1421 ± 2		[11] CHUNG	85	SPEC	8 $\pi^-p \to K\overline{K}\pi n$	
1440 $^{+20}_{-15}$	174	[11] EDWARDS	82E	CBAL	$J/\psi \to \gamma K^+K^-\pi^0$	
1440 $^{+10}_{-15}$		[11] SCHARRE	80	MRK2	$J/\psi \to \gamma K^0_S K^\pm\pi^\mp$	
1425 ± 7	800	[11,13] BAILLON	67	HBC	0 $\overline{p}p \to K\overline{K}\pi\pi\pi$	

[1] The selected process is $J/\psi \to \omega a_0(980)\pi$. NODE=M027M1;LINKAGE=BL
[2] From fit to the $a_0(980)\pi$ 0^{-+} partial wave. NODE=M027M1;LINKAGE=J1
[3] Best fit with a single Breit Wigner. NODE=M027M1;LINKAGE=A1
[4] Decaying dominantly directly to $K^+K^-\pi^0$. NODE=M027M;LINKAGE=NC
[5] Decaying into $(K\overline{K})_S\pi$, $(K\pi)_S\overline{K}$, and $a_0(980)\pi$. NODE=M027M4;LINKAGE=FX
[6] 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
[7] Excluded from averaging because averaging would be meaningless. NODE=M027M4;LINKAGE=AA
[8] Best fit with a single Breit Wigner. NODE=M027M2;LINKAGE=E
[9] This peak in the $\gamma\rho$ channel may not be related to the $\eta(1405)$. NODE=M027M2;LINKAGE=X
[10] Estimated by us from various fits. NODE=M027M3;LINKAGE=E
[11] These experiments identify only one pseudoscalar in the 1400–1500 range. Data could also refer to $\eta(1475)$. NODE=M027M;LINKAGE=NP
[12] Systematic uncertainty not evaluated. NODE=M027M;LINKAGE=NS
[13] From best fit of 0^{-+} partial wave , 50% $K^*(892)K$, 50% $a_0(980)\pi$. NODE=M027M6;LINKAGE=H

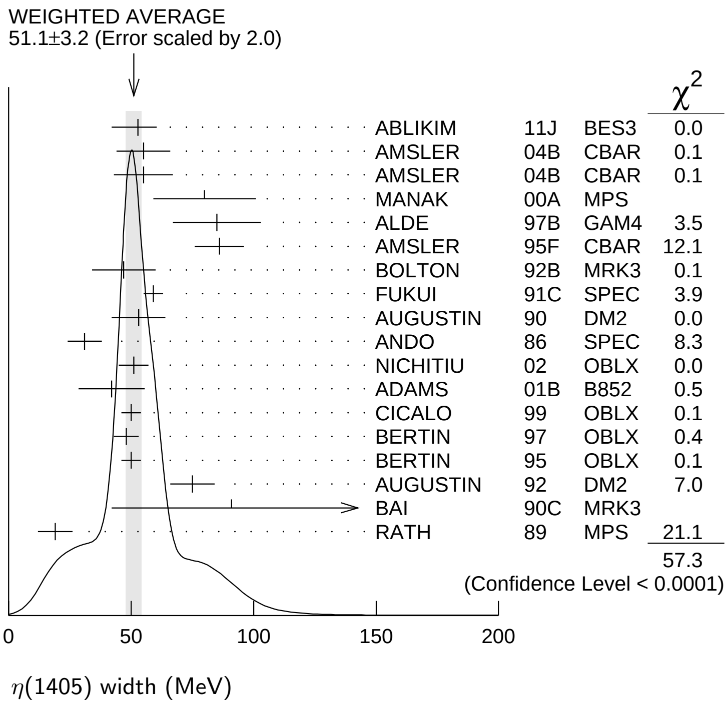
η(1405) WIDTH

NODE=M027210

VALUE (MeV) — DOCUMENT ID

NODE=M027WX
NEW

51.1±3.2 OUR AVERAGE Includes data from the 2 datablocks that follow this one. Error includes scale factor of 2.0. See the ideogram below. [51.1 ± 3.4 MeV OUR 2011 AVERAGE Scale factor = 2.0]



$\eta\pi\pi$ MODE

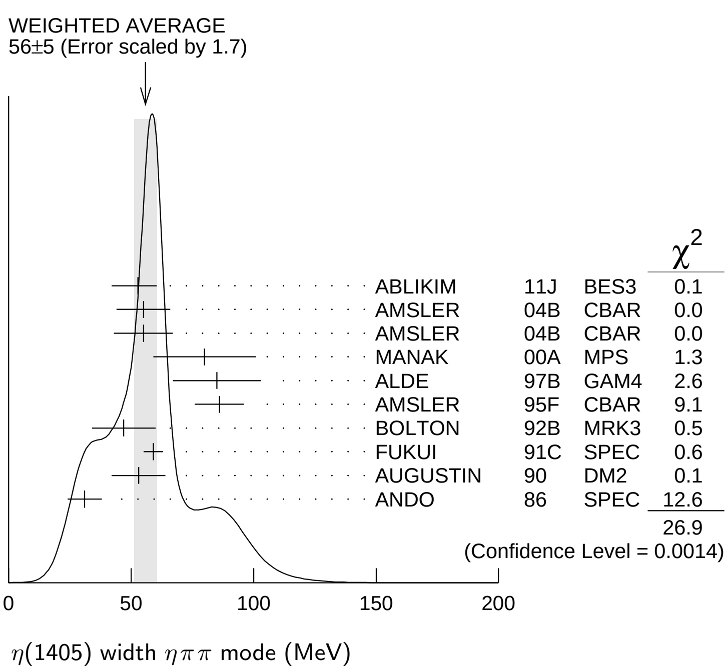
NODE=M027W1
NODE=M027W1

The data in this block is included in the average printed for a previous datablock.

56 ± 5 OUR AVERAGE Error includes scale factor of 1.7. See the ideogram below. NEW
[56 ± 5 MeV OUR 2011 AVERAGE Scale factor = 1.8]

VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
$52.8\pm 7.6^{+0.1}_{-7.6}$		[14] ABLIKIM	11J	BES3 $J/\psi \to \omega(\eta\pi^+\pi^-)$
55 ±11	900 ± 375	AMSLER	04B	CBAR 0 $\overline{p}p \to \pi^+\pi^-\pi^+\pi^-\eta$
55 ±12	6.6 ± 2.0k	AMSLER	04B	CBAR 0 $\overline{p}p \to \pi^+\pi^-\pi^0\pi^0\gamma$
80 ±21	9082	MANAK	00A	MPS 18 $\pi^- p \to \eta\pi^+\pi^- n$
85 ±18	2200	ALDE	97B	GAM4 100 $\pi^- p \to \eta\pi^0\pi^0 n$
86 ±10		AMSLER	95F	CBAR 0 $\overline{p}p \to \pi^+\pi^-\pi^0\pi^0\eta$
47 ±13		[15] 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		[16] AUGUSTIN	90	DM2 $J/\psi \to \gamma\eta\pi^+\pi^-$
31 ± 7		ANDO	86	SPEC 8 $\pi^- p \to \eta\pi^+\pi^- n$

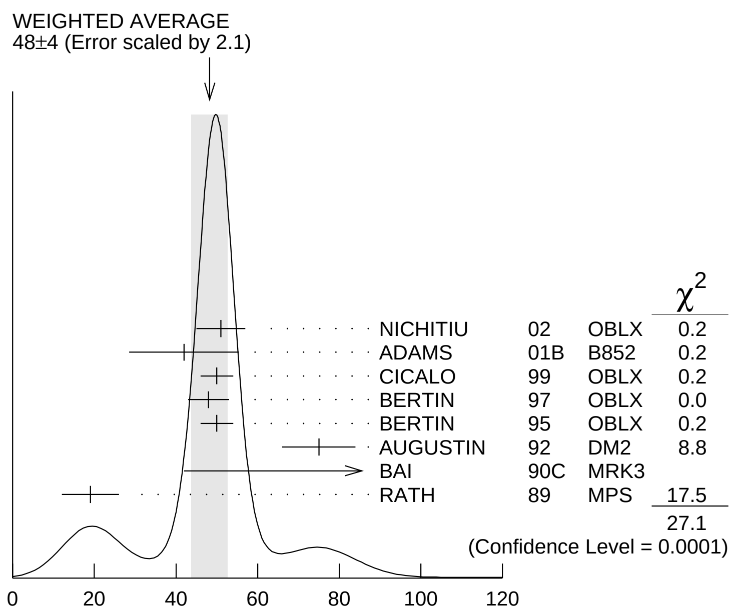
OCCUR=2



$K\overline{K}\pi$ MODE ($a_0(980)\pi$ or direct $K\overline{K}\pi$)

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	[17] NICHITIU	02	OBLX		
42±10± 9	20k	ADAMS	01B	B852	18 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		[18] BERTIN	97	OBLX	0.0 $\overline{p}p \to K^\pm (K^0) \pi^\mp \pi^+ \pi^-$	
50± 4		[18] 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+15}_{-31-38}		[19] BAI	90C	MRK3	$J/\psi \to \gamma K^0_S K^\pm \pi^\mp$	OCCUR=2
19± 7		[19] RATH	89	MPS	21.4 $\pi^- p \to n K^0_S K^0_S \pi^0$	OCCUR=3



$\eta(1405)$ width $K\overline{K}\pi$ mode ($a_0(980)\,\pi$ dominant)

$\pi\pi\gamma$ MODE

NODE=M027W2

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
64 ±18	235 ± 91	AMSLER	04B	CBAR	0 $\overline{p}p \to \pi^+\pi^-\pi^+\pi^-\gamma$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
101.0± 8.8±8.8	547	BAI	04J	BES2	$J/\psi \to \gamma\gamma\pi^+\pi^-$	OCCUR=2
174 ±44		AUGUSTIN	90	DM2	$J/\psi \to \pi^+\pi^-\gamma\gamma$	
90 ±26		[20] COFFMAN	90	MRK3	$J/\psi \to \pi^+\pi^- 2\gamma$	

4π MODE

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	[21] BISELLO	89B	DM2	$J/\psi \to 4\pi\gamma$

$K\overline{K}\pi$ MODE (unresolved)

NODE=M027W6

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
48.9± 9.0	249 ± 35	[22,23] ABLIKIM	08E	BES2	$J/\psi \to \omega K^0_S K^+\pi^-$ + c.c.	
34.2±18.5	62 ± 18	[22,23] ABLIKIM	08E	BES2	$J/\psi \to \omega K^+ K^- \pi^0$	OCCUR=2
93 ±14	296	[22] AUGUSTIN	90	DM2	$J/\psi \to \gamma K^+ K^- \pi^0$	OCCUR=2
105 ±10	693	[22] AUGUSTIN	90	DM2	$J/\psi \to \gamma K^0_S K^\pm \pi^\mp$	OCCUR=3
62 ±16	500	[22] DUCH	89	ASTE	$\overline{p}p \to K\overline{K}\pi\pi\pi$	
100 ±11	170	[22] RATH	89	MPS	21.4 $\pi^- p \to K^0_S K^0_S \pi^0 n$	OCCUR=2
66 ± 2	8800	[22] BIRMAN	88	MPS	8 $\pi^- p \to K^+ \overline{K}^0 \pi^- n$	
60 ±10	620	[22] REEVES	86	SPEC	6.6 $p\overline{p} \to KK\pi X$	
60 ±10		[22] CHUNG	85	SPEC	8 $\pi^- p \to K\overline{K}\pi n$	
55^{+20}_{-30}	174	[22] EDWARDS	82E	CBAL	$J/\psi \to \gamma K^+ K^- \pi^0$	
50^{+30}_{-20}		[22] SCHARRE	80	MRK2	$J/\psi \to \gamma K^0_S K^\pm \pi^\mp$	
80 ±10	800	[22,24] BAILLON	67	HBC	0.0 $\overline{p}p \to K\overline{K}\pi\pi\pi$	

[14] The selected process is $J/\psi \to \omega a_0(980)\pi$.
[15] From fit to the $a_0(980)\pi$ 0^{-+} partial wave.
[16] From $\eta\pi^+\pi^-$ mass distribution - mainly $a_0(980)\pi$ - no spin–parity determination available.
[17] Decaying dominantly directly to $K^+K^-\pi^0$.
[18] Decaying into $(K\overline{K})_S\pi$, $(K\pi)_S\overline{K}$, and $a_0(980)\pi$.
[19] From fit to the $a_0(980)\pi$ 0^{-+} partial wave , but $a_0(980)\pi$ 1^{++} cannot be excluded.
[20] This peak in the $\gamma\rho$ channel may not be related to the $\eta(1405)$.
[21] Estimated by us from various fits.
[22] These experiments identify only one pseudoscalar in the 1400–1500 range. Data could also refer to $\eta(1475)$.
[23] Systematic uncertainty not evaluated.
[24] From best fit to 0^{-+} partial wave , 50% $K^*(892)K$, 50% $a_0(980)\pi$.

NODE=M027W1;LINKAGE=BL
NODE=M027W1;LINKAGE=A1
NODE=M027W1;LINKAGE=D1
NODE=M027W;LINKAGE=NC
NODE=M027W4;LINKAGE=FX
NODE=M027W4;LINKAGE=C
NODE=M027W2;LINKAGE=X
NODE=M027W3;LINKAGE=F2
NODE=M027W;LINKAGE=NP
NODE=M027W;LINKAGE=NS
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;→ NOT CHECKED ←
Γ_2	$\eta\pi\pi$	seen		DESIG=5;OUR EST;→ NOT CHECKED ←
Γ_3	$a_0(980)\pi$	seen		DESIG=4;OUR EST;→ NOT CHECKED ←
Γ_4	$\eta(\pi\pi)_{S\text{-wave}}$	seen		DESIG=9;OUR EST;→ NOT CHECKED ←
Γ_5	$f_0(980)\eta$	seen		DESIG=10;OUR EST;→ NOT CHECKED ←
Γ_6	4π	seen		DESIG=6;OUR EST;→ NOT CHECKED ←
Γ_7	$\rho\rho$	<58 %	99.85%	DESIG=12
Γ_8	$\gamma\gamma$			DESIG=7
Γ_9	$\rho^0\gamma$	seen		DESIG=8;OUR EST;→ NOT CHECKED ←
Γ_{10}	$\phi\gamma$			DESIG=13
Γ_{11}	$K^*(892)K$	seen		DESIG=11;OUR EST;→ NOT CHECKED ←

$\eta(1405)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M027220

$\Gamma(K\overline{K}\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_1\Gamma_8/\Gamma$

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	[25,26] AHOHE	05	CLE2	10.6 $e^+e^- \to e^+e^-K^0_S K^\pm\pi^\mp$

$\Gamma(\eta\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_2\Gamma_8/\Gamma$

NODE=M027G5
NODE=M027G5

VALUE (keV)	CL%	DOCUMENT ID		TECN	COMMENT
<0.095	95	ACCIARRI	01G	L3	183–202 $e^+e^- \to e^+e^-\eta\pi^+\pi^-$

$\Gamma(\rho^0\gamma) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_9\Gamma_8/\Gamma$

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	$e^+e^- \to e^+e^-\pi^+\pi^-\gamma$

[25] Using $\eta(1405)$ mass and width 1410 MeV and 51 MeV, respectively.
[26] Assuming three-body phase-space decay to $K^0_S K^\pm\pi^\mp$.

NODE=M027G3;LINKAGE=AH
NODE=M027G3;LINKAGE=B3

$\eta(1405)$ 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
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.09±0.48		[27] AMSLER	04B	CBAR	0 $\overline{p}p \to \pi^+\pi^-\pi^+\pi^-\eta$
<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 $\overline{p}p$

$\Gamma(\rho^0\gamma)/\Gamma(\eta\pi\pi)$ Γ_9/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

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
~ 0.15		[28] BERTIN	95	OBLX	$0\ \overline{p}p \to K\overline{K}\pi\pi\pi$
~ 0.8	500	[28] DUCH	89	ASTE	$\overline{p}p \to \pi^+\pi^-K^\pm\pi^\mp K^0$
~ 0.75		[28] REEVES	86	SPEC	$6.6\ p\overline{p} \to KK\pi X$

$\Gamma(a_0(980)\pi)/\Gamma(\eta\pi\pi)$ Γ_3/Γ_2

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	[29] ALDE	97B	GAM4	$100\ \pi^-p \to \eta\pi^0\pi^0 n$
$0.56\pm0.04\pm0.03$		[29] AMSLER	95F	CBAR	$0\ \overline{p}p \to \pi^+\pi^-\pi^0\pi^0\eta$

$\Gamma(a_0(980)\pi)/\Gamma(\eta(\pi\pi)_{S\text{-wave}})$ 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	[30] MANAK	00A	MPS	$18\ \pi^-p \to \eta\pi^+\pi^- n$
$0.70\pm0.12\pm0.20$		[31] BAI	99	BES	$J/\psi \to \gamma\eta\pi^+\pi^-$

$\Gamma(\rho^0\gamma)/\Gamma(K\overline{K}\pi)$ Γ_9/Γ_1

NODE=M027R7

VALUE	DOCUMENT ID		TECN	COMMENT
0.0152±0.0038	[32] COFFMAN	90	MRK3	$J/\psi \to \gamma\gamma\pi^+\pi^-$

$\Gamma(\eta(\pi\pi)_{S\text{-wave}})/\Gamma(\eta\pi\pi)$ 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_5/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	[33] ANISOVICH	00	SPEC	$0.9\text{–}1.2\ \overline{p}p \to \eta 3\pi^0$

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

NODE=M027R13

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.58	99.85	[27,34] AMSLER	04B	CBAR	$0\ \overline{p}p$

$\Gamma(K^*(892)K)/\Gamma(a_0(980)\pi)$ Γ_{11}/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	[30] ADAMS	01B	B852	18 GeV $\pi^-p \to K^+K^-\pi^0 n$

$\Gamma(\phi\gamma)/\Gamma(\rho^0\gamma)$ Γ_{10}/Γ_9

NODE=M027R14

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.77	95	[35] BAI	04J	BES2	$J/\psi \to \gamma\gamma K^+K^-$

[27] Using the data of BAILLON 67 on $\overline{p}p \to K\overline{K}\pi$. NODE=M027R3;LINKAGE=AM

[28] Assuming that the $a_0(980)$ decays only into $K\overline{K}$. NODE=M027R4;LINKAGE=C

[29] Assuming that the $a_0(980)$ decays only into $\eta\pi$. NODE=M027R2;LINKAGE=A

[30] Statistical error only. NODE=M027R;LINKAGE=K3

[31] Assuming that the $a_0(980)$ decays only into $\eta\pi$. NODE=M027R9;LINKAGE=BK

[32] Using $B(J/\psi \to \gamma\eta(1405) \to \gamma K\overline{K}\pi)=4.2\times10^{-3}$ and $B(J/\psi \to \gamma\eta(1405) \to \gamma\gamma\rho^0)=6.4\times10^{-5}$ and assuming that the $\gamma\rho^0$ signal does not come from the $f_1(1420)$. NODE=M027R7;LINKAGE=D

[33] Using preliminary Crystal Barrel data. NODE=M027R10;LINKAGE=D

[34] Assuming that the $\eta(1405)$ decays are saturated by the $\pi\pi\eta$, $K\overline{K}\pi$ and $\rho\rho$ modes. NODE=M027R13;LINKAGE=AM

[35] Calculated by us from $B(J/\psi \to \eta(1405)\gamma \to \phi\gamma\gamma) < 0.82\times10^{-4}$ and $B(J/\psi \to \eta(1405)\gamma \to \rho^0\gamma\gamma) = (1.07\pm0.17\pm0.11)\times10^{-4}$. NODE=M027R14;LINKAGE=BA

$\eta(1405)$ REFERENCES

NODE=M027

ABLIKIM	11J	PRL 107 182001	M. Ablikim *et al.*	(BES III 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
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=M006

$f_1(1420)$

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

See the minireview under $\eta(1405)$.

NODE=M006

$f_1(1420)$ MASS

NODE=M006M2

NODE=M006M2

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1426.4± 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	
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 $\overline{p}p \to K^\pm (K^0) \pi^\mp \pi^+ \pi^-$
1435 ± 9		PROKOSHKIN	97B	GAM4	100 $\pi^- p \to \eta \pi^0 \pi^0 n$
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	$pp \to p_{slow} (K^0_S K^- \pi^+) p_{fast}$	OCCUR=2
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 $K^- p \to K^+ K^- \pi^0 Y$	

[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

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
54.9± 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	
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 $\overline{p}p \to K^\pm (K^0) \pi^\mp \pi^+ \pi^-$
90 ±25		PROKOSHKIN	97B	GAM4	100 $\pi^- p \to \eta \pi^0 \pi^0 n$
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 pp
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± 2.9		[8] SOSA	99	SPEC	$pp \to p_{slow} (K^0_S K^+ \pi^-) p_{fast}$	
58.8± 3.3		[8] SOSA	99	SPEC	$pp \to p_{slow} (K^0_S K^- \pi^+) p_{fast}$	OCCUR=2
58 ± 8	389	ARMSTRONG	89	OMEG	300 $pp \to K\overline{K}\pi pp$	
62 ± 5	1520	ARMSTRONG	84	OMEG	85 $\pi^+ p$, $pp \to (\pi^+, p)(K\overline{K}\pi)p$	
∼ 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	$K\overline{K}\pi$	dominant	DESIG=2;OUR EST;→ NOT CHECKED ←
Γ_2	$K\overline{K}^*(892)+$ c.c.	dominant	DESIG=1;OUR EST;→ NOT CHECKED ←
Γ_3	$\eta\pi\pi$	possibly seen	DESIG=5;OUR EST;→ NOT CHECKED ←
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;→ NOT CHECKED ←

$f_1(1420)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M006220

$\Gamma(K\overline{K}\pi) \times \Gamma(\gamma\gamma^*)/\Gamma_{\text{total}}$

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 ±0.8		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
>0.1	90	PROKOSHKIN	97B	GAM4	100 $\pi^- p \to \eta\pi^0\pi^0 n$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$0.04\pm0.01\pm0.01$		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
$0.003\pm0.001\pm0.001$	BARBERIS	98C	OMEG	450 $pp \to p_f f_1(1420) p_s$

$f_1(1420)$ REFERENCES

NODE=M006

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	SPD 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

$\omega(1420)$ $I^G(J^{PC}) = 0^-(1^{--})$

$\omega(1420)$ MASS

NODE=M125M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
(1400–1450) OUR ESTIMATE					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1382 \pm 23 \pm 70$		AUBERT	07AU	BABR	$10.6\ e^+e^- \rightarrow \omega\pi^+\pi^-\gamma$
$1350 \pm 20 \pm 20$		AUBERT,B	04N	BABR	$10.6\ e^+e^- \rightarrow \pi^+\pi^-\pi^0\gamma$
$1400 \pm 50 \pm 130$	1.2M	[1] ACHASOV	03D	RVUE	$0.44–2.00\ e^+e^- \rightarrow \pi^+\pi^-\pi^0$
1450 ± 10		[2] HENNER	02	RVUE	$1.2–2.0\ e^+e^- \rightarrow \rho\pi, \omega\pi\pi$
1373 ± 70	177	[3] AKHMETSHIN	00D	CMD2	$1.2–1.38\ e^+e^- \rightarrow \omega\pi^+\pi^-$
1370 ± 25	5095	ANISOVICH	00H	SPEC	$0.0\ p\overline{p} \rightarrow \omega\pi^0\pi^0\pi^0$
1400^{+100}_{-200}		[4] ACHASOV	98H	RVUE	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
~ 1400		[5] ACHASOV	98H	RVUE	$e^+e^- \rightarrow \omega\pi^+\pi^-$
~ 1460		[6] ACHASOV	98H	RVUE	$e^+e^- \rightarrow K^+K^-$
1440 ± 70		[7] CLEGG	94	RVUE	
1419 ± 31	315	[8] ANTONELLI	92	DM2	$1.34–2.4 e^+e^- \rightarrow \rho\pi$

NODE=M125M
→ NOT CHECKED ←
OCCUR=2
OCCUR=3

[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=M125M;LINKAGE=VH

[2] Using results of CORDIER 81 and preliminary data of DOLINSKY 91 and ANTONELLI 92. NODE=M125M;LINKAGE=AB

[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=M125M;LINKAGE=KL

[4] Using data from BARKOV 87, DOLINSKY 91, and ANTONELLI 92. NODE=M125M;LINKAGE=L1

[5] Using the data from ANTONELLI 92. NODE=M125M;LINKAGE=L2

[6] Using the data from IVANOV 81 and BISELLO 88B. NODE=M125M;LINKAGE=L3

[7] From a fit to two Breit-Wigner functions and using the data of DOLINSKY 91 and ANTONELLI 92. NODE=M125M;LINKAGE=AD

[8] 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

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
(180–250) OUR ESTIMATE					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$130 \pm 50 \pm 100$		AUBERT	07AU	BABR	$10.6\ e^+e^- \rightarrow \omega\pi^+\pi^-\gamma$
$450 \pm 70 \pm 70$		AUBERT,B	04N	BABR	$10.6\ e^+e^- \rightarrow \pi^+\pi^-\pi^0\gamma$
$870^{+500}_{-300} \pm 450$	1.2M	[9] ACHASOV	03D	RVUE	$0.44–2.00\ e^+e^- \rightarrow \pi^+\pi^-\pi^0$
199 ± 15		[10] HENNER	02	RVUE	$1.2–2.0\ e^+e^- \rightarrow \rho\pi, \omega\pi\pi$
188 ± 45	177	[11] AKHMETSHIN	00D	CMD2	$1.2–1.38\ e^+e^- \rightarrow \omega\pi^+\pi^-$
360^{+100}_{-60}	5095	ANISOVICH	00H	SPEC	$0.0\ p\overline{p} \rightarrow \omega\pi^0\pi^0\pi^0$
240 ± 70		[12] CLEGG	94	RVUE	
174 ± 59	315	[13] ANTONELLI	92	DM2	$1.34–2.4 e^+e^- \rightarrow \rho\pi$

NODE=M125W
→ NOT CHECKED ←

[9] 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

[10] Using results of CORDIER 81 and preliminary data of DOLINSKY 91 and ANTONELLI 92. NODE=M125W;LINKAGE=AB

[11] 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

[12] From a fit to two Breit-Wigner functions and using the data of DOLINSKY 91 and ANTONELLI 92. NODE=M125W;LINKAGE=AD

[13] 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	$\rho\pi$	dominant	DESIG=1;OUR EST;→ NOT CHECKED ←
Γ_2	$\omega\pi\pi$	seen	DESIG=4;OUR EST;→ NOT CHECKED ←
Γ_3	$b_1(1235)\pi$	seen	DESIG=5;OUR EST;→ NOT CHECKED ←
Γ_4	e^+e^-	seen	DESIG=3;OUR EST;→ NOT CHECKED ←
Γ_5	$\pi^0\gamma$		DESIG=6

$\omega(1420)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma^2(\text{total})$

NODE=M125230

$\Gamma(\rho\pi)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_1/\Gamma \times \Gamma_4/\Gamma$

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. • • •					
$0.82 \pm0.05 \pm0.06$		AUBERT,B	04N	BABR	10.6 $e^+e^- \to \pi^+\pi^-\pi^0\gamma$
$0.65 \pm0.13 \pm0.21$	1.2M	[14,15] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
0.625 ± 0.160		[16,17] CLEGG	94	RVUE	
0.466 ± 0.178		[18,19] ANTONELLI	92	DM2	1.34–2.4$e^+e^- \to \rho\pi$

[14] Calculated by us from the cross section at the peak. NODE=M125G;LINKAGE=AW

[15] 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

[16] From a fit to two Breit-Wigner functions and using the data of DOLINSKY 91 and ANTONELLI 92. NODE=M125G;LINKAGE=AD

[17] From the partial and leptonic width given by the authors. NODE=M125G;LINKAGE=SE

[18] From a fit to two Breit-Wigner functions interfering between them and with the ω,ϕ tails with fixed (+,−,+) phases. NODE=M125G;LINKAGE=A

[19] From the product of the leptonic width and partial branching ratio given by the authors. NODE=M125G;LINKAGE=ES

$\Gamma(\omega\pi\pi)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_2/\Gamma \times \Gamma_4/\Gamma$

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	[20] AKHMETSHIN	00D	CMD2	1.2–2.4 $e^+e^- \to \omega\pi^+\pi^-$

[20] 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

$\Gamma(\pi^0\gamma)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_5/\Gamma \times \Gamma_4/\Gamma$

NODE=M125G5
NODE=M125G5

VALUE (units 10^{-8})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$2.03^{+0.70}_{-0.75}$	[21] AKHMETSHIN	05	CMD2	0.60-1.38 $e^+e^- \to \pi^0\gamma$

[21] 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
NODE=M125R2

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.301 ± 0.029	[22] HENNER	02	RVUE	1.2–2.0 $e^+e^- \to \rho\pi$, $\omega\pi\pi$
possibly seen	AKHMETSHIN	00D	CMD2	$e^+e^- \to \omega\pi^+\pi^-$

$\Gamma(\omega\pi\pi)/\Gamma(b_1(1235)\pi)$ — Γ_2/Γ_3

NODE=M125R1
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 $p\overline{p} \to \omega\pi^0\pi^0\pi^0$

$\Gamma(\rho\pi)/\Gamma_{total}$ — Γ_1/Γ

NODE=M125R3
NODE=M125R3

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.699 ± 0.029	[22] HENNER	02	RVUE	1.2–2.0 $e^+e^- \to \rho\pi$, $\omega\pi\pi$

$\Gamma(e^+e^-)/\Gamma_{total}$ — Γ_4/Γ

NODE=M125R4

VALUE (units 10^{-7})	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
∼ 6.6	1.2M	[23,24] ACHASOV 03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
23 ±1		[22] HENNER 02	RVUE	1.2–2.0 $e^+e^- \to \rho\pi, \omega\pi\pi$

[22] Assuming that the $\omega(1420)$ decays into $\rho\pi$ and $\omega\pi\pi$ only. NODE=M125R;LINKAGE=AC
[23] Calculated by us from the cross section at the peak. NODE=M125R;LINKAGE=AW
[24] Assuming that the $\omega(1420)$ decays into $\rho\pi$ only. NODE=M125R;LINKAGE=GS

$\omega(1420)$ REFERENCES

NODE=M125

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				→ NOT CHECKED ←
• • • We do not use the following data for averages, fits, limits, etc. • • •				
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 $\pi^-p \to K^0_S K^0_S n, K^+K^-n$	OCCUR=2
1439^{+5}_{-6}	[2] BEUSCH 67	OSPK	5,7,12 $\pi^-p \to K^0_S K^0_S n$	

[1] $J^{PC} = 0^{++}$ or 2^{++}. NODE=M066M;LINKAGE=AC
[2] Not seen by WETZEL 76. 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. • • •				
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 $\pi^-p \to K^0_S K^0_S n, K^+K^-n$	OCCUR=2
43^{+17}_{-18}	[4] BEUSCH 67	OSPK	5,7,12 $\pi^-p \to K^0_S K^0_S n$	

[3] $J^{PC} = 0^{++}$ or 2^{++}. NODE=M066W;LINKAGE=AC
[4] Not seen by WETZEL 76. NODE=M066W;LINKAGE=C

$f_2(1430)$ DECAY MODES

NODE=M066215;NODE=M066

	Mode	
Γ_1	$K\overline{K}$	DESIG=1
Γ_2	$\pi\pi$	DESIG=2

$f_2(1430)$ REFERENCES

NODE=M066

VLADIMIRSK...	01	PAN 64 1895	V.V. Vladmirsky *et al.*		REFID=48571
		Translated from YAF 64 1979.			
AUGUSTIN	87	ZPHY C36 369	J.E. Augustin *et al.*	(LALO, CLER, FRAS+)	REFID=40268
AKESSON	86	NP B264 154	T. Akesson *et al.*	(Axial Field Spec. Collab.)	REFID=21123
DAUM	84	ZPHY C23 339	C. Daum *et al.*	(AMST, CERN, CRAC, MPIM+) JP	REFID=21372
WETZEL	76	NP B115 208	W. Wetzel *et al.*	(ETH, CERN, LOIC)	REFID=20362
BEUSCH	67	PL 25B 357	W. Beusch *et al.*	(ETH, CERN)	REFID=20320

NODE=M149

$a_0(1450)$

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

See minireview on scalar mesons under $f_0(500)$.

NODE=M149

$a_0(1450)$ MASS

NODE=M149M

NODE=M149M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1474 ±19 OUR AVERAGE					
1480 ±30		ABELE	98	CBAR	0.0 $\overline{p}p \rightarrow K^0_L K^\pm \pi^\mp$
1470 ±25		[1] AMSLER	95D	CBAR	0.0 $\overline{p}p \rightarrow \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1515 ±30		[2] ANISOVICH	09	RVUE	0.0 $\overline{p}p$, πN
$1316.8^{+0.7}_{-1.0}{}^{+24.7}_{-4.6}$		[3] UEHARA	09A	BELL	$\gamma\gamma \rightarrow \pi^0\eta$
1432 ±13 ±25		[4] BUGG	08A	RVUE	$\overline{p}p$
1477 ±10	80k	[5] UMAN	06	E835	5.2 $\overline{p}p \rightarrow \eta\eta\pi^0$
1441^{+40}_{-15}	35280	[2] BAKER	03	SPEC	$\overline{p}p \rightarrow \omega\pi^+\pi^-\pi^0$
1303 ±16		[6] BARGIOTTI	03	OBLX	$\overline{p}p$
1296 ±10		[7] AMSLER	02	CBAR	0.9 $\overline{p}p \rightarrow \pi^0\pi^0\eta$
1565 ±30		[7] ANISOVICH	98B	RVUE	Compilation
1290 ±10		[8] BERTIN	98B	OBLX	0.0 $\overline{p}p \rightarrow K^\pm K_S \pi^\mp$
1450 ±40		AMSLER	94D	CBAR	0.0 $\overline{p}p \rightarrow \pi^0\pi^0\eta$
1410 ±25		ETKIN	82C	MPS	23 $\pi^- p \rightarrow n 2K^0_S$
~ 1300		MARTIN	78	SPEC	10 $K^\pm p \rightarrow K^0_S \pi p$
1255 ± 5		[9] CASON	76		

[1] Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D. NODE=M149M;LINKAGE=AB
[2] From the pole position. NODE=M149M;LINKAGE=PP
[3] May be a different state. NODE=M149M;LINKAGE=UE
[4] Using data from AMSLER 94D, ABELE 98, and BAKER 03. Supersedes BUGG 94. NODE=M149M;LINKAGE=BU
[5] Statistical error only. NODE=M149M;LINKAGE=ST
[6] Coupled channel analysis of $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, and $K^\pm K^0_S\pi^\mp$. NODE=M149M;LINKAGE=BG
[7] T-matrix pole. NODE=M149M;LINKAGE=AN
[8] Not confirmed by BUGG 08A. NODE=M149M;LINKAGE=BE
[9] Isospin 0 not excluded. NODE=M149M;LINKAGE=CC

$a_0(1450)$ WIDTH

NODE=M149W

NODE=M149W

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
265 ±13 OUR AVERAGE					
265 ±15		ABELE	98	CBAR	0.0 $\overline{p}p \rightarrow K^0_L K^\pm \pi^\mp$
265 ±30		[10] AMSLER	95D	CBAR	0.0 $\overline{p}p \rightarrow \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$

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

230 ±36		[11] ANISOVICH	09	RVUE	0.0 $\overline{p}p$, πN
$65.0^{+\ 2.1+99.1}_{-\ 5.4-32.6}$		[12] UEHARA	09A	BELL	$\gamma\gamma \to \pi^0\eta$
196 ±10 ±10		[13] BUGG	08A	RVUE	$\overline{p}p$
267 ±11	80k	[14] UMAN	06	E835	5.2 $\overline{p}p \to \eta\eta\pi^0$
110 ±14	35280	[11] BAKER	03	SPEC	$\overline{p}p \to \omega\pi^+\pi^-\pi^0$
92 ±16		[15] BARGIOTTI	03	OBLX	$\overline{p}p$
81 ±21		[16] AMSLER	02	CBAR	0.9 $\overline{p}p \to \pi^0\pi^0\eta$
292 ±40		[16] ANISOVICH	98B	RVUE	Compilation
80 ± 5		[17] 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		[18] CASON	76		

[10] Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D.
[11] From the pole position.
[12] May be a different state.
[13] Using data from AMSLER 94D, ABELE 98, and BAKER 03. Supersedes BUGG 94.
[14] Statistical error only.
[15] Coupled channel analysis of $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, and $K^\pm K^0_S \pi^\mp$.
[16] T-matrix pole.
[17] Not confirmed by BUGG 08A.
[18] Isospin 0 not excluded.

NODE=M149W;LINKAGE=AB
NODE=M149W;LINKAGE=PP
NODE=M149W;LINKAGE=UE
NODE=M149W;LINKAGE=BU
NODE=M149W;LINKAGE=ST
NODE=M149W;LINKAGE=BG
NODE=M149W;LINKAGE=AN
NODE=M149W;LINKAGE=BE
NODE=M149W;LINKAGE=CC

$a_0(1450)$ DECAY MODES

NODE=M149215;NODE=M149

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\pi\eta$	seen	DESIG=1;OUR EST;→ NOT CHECKED ←
Γ_2	$\pi\eta'(958)$	seen	DESIG=2;OUR EST;→ NOT CHECKED ←
Γ_3	$K\overline{K}$	seen	DESIG=3;OUR EST;→ NOT CHECKED ←
Γ_4	$\omega\pi\pi$	seen	DESIG=4;OUR EST;→ NOT CHECKED ←
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

$\Gamma(\pi\eta) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_1\Gamma_6/\Gamma$

NODE=M149G01
NODE=M149G01

VALUE (eV)	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$432\pm6^{+1073}_{-\ 256}$	[19] UEHARA	09A	BELL	$\gamma\gamma \to \pi^0\eta$

[19] 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	[20] 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 $\overline{p}p \to \pi^0\pi^0\eta'$

[20] 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	[21] ABELE	98	CBAR	0.0 $\overline{p}p \to K^0_L K^\pm \pi^\mp$

[21] Using $\pi^0\eta$ from AMSLER 94D.

NODE=M149R2;LINKAGE=A

$\Gamma(\omega\pi\pi)/\Gamma(\pi\eta)$ Γ_4/Γ_1

NODE=M149R3
NODE=M149R3

VALUE	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
10.7±2.3	35280	[22] BAKER	03	SPEC	$\overline{p}p \to \omega\pi^+\pi^-\pi^0$

[22] 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	$\bar{p}p$

$\Gamma(a_0(980)\pi\pi)/\Gamma(\pi\eta)$ — 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	$\bar{p}p \to \eta 2\pi^+ 2\pi^-$

$\Gamma(\gamma\gamma)/\Gamma_{total}$ — Γ_6/Γ

NODE=M149R03
NODE=M149R03

VALUE	DOCUMENT ID	TECN	COMMENT
seen	[23] UEHARA 09A	BELL	$\gamma\gamma \to \pi^0\eta$

[23] May be a different state.

NODE=M149R03;LINKAGE=UE

$a_0(1450)$ REFERENCES

NODE=M149

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

$\rho(1450)$

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

See our mini-review under the $\rho(1700)$.

NODE=M105

$\rho(1450)$ MASS

NODE=M105205

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.	

→ NOT CHECKED ←

$\eta\rho^0$ MODE

NODE=M105M1
NODE=M105M1

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1497 ± 14	[1] AKHMETSHIN 01B	CMD2	$e^+e^- \to \eta\gamma$
1421 ± 15	[2] 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] 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

[2] 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. • • •				
$1582 \pm 17 \pm 25$	2382	[3] AKHMETSHIN 03B	CMD2	$e^+e \to \pi^0\pi^0\gamma$
$1349 \pm 25 ^{+10}_{-5}$	341	[4] ALEXANDER 01B	CLE2	$B \to D^{(*)}\omega\pi^-$
1523 ± 10		[5] EDWARDS 00A	CLE2	$\tau^- \to \omega\pi^-\nu_\tau$
1463 ± 25		[6] CLEGG 94	RVUE	
1250		[7] ASTON 80C	OMEG	$20–70\ \gamma p \to \omega\pi^0 p$
1290 ± 40		[7] BARBER 80C	SPEC	$3–5\ \gamma p \to \omega\pi^0 p$

[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=M105M3;LINKAGE=HK
[4] Using Breit-Wigner parameterization of the $\rho(1450)$ and assuming the $\omega\pi^-$ mass dependence for the total width. NODE=M105M3;LINKAGE=3Z
[5] Mass-independent width parameterization. $\rho(1700)$ mass and width fixed at 1700 MeV and 235 MeV respectively. NODE=M105M;LINKAGE=E1
[6] Using data from BISELLO 91B, DOLINSKY 86 and ALBRECHT 87L. NODE=M105M3;LINKAGE=B
[7] 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	[8] ARMSTRONG	89E	OMEG	300 $pp \to pp2(\pi^+\pi^-)$

[8] 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. • • •					
1446 ± 7 ±28	5.4M	[9,10] FUJIKAWA	08	BELL	$\tau^- \to \pi^-\pi^0\nu_\tau$
1328 ±15		[11] SCHAEL	05C	ALEP	$\tau^- \to \pi^-\pi^0\nu_\tau$
1406 ±15	87k	[9,12] ANDERSON	00A	CLE2	$\tau^- \to \pi^-\pi^0\nu_\tau$
∼ 1368		[13] 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		[14] 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		[12] 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		[15] KURDADZE	83	OLYA	0.64–1.4 $e^+e^- \to \pi^+\pi^-$

[9] From the GOUNARIS 68 parametrization of the pion form factor. NODE=M105M;LINKAGE=1K
[10] $|F_\pi(0)|^2$ fixed to 1. NODE=M105M5;LINKAGE=FU
[11] 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
[12] $\rho(1700)$ mass and width fixed at 1700 MeV and 235 MeV, respectively. NODE=M105M5;LINKAGE=A
[13] $\rho(1700)$ mass and width fixed at 1780 MeV and 275 MeV respectively. NODE=M105M5;LINKAGE=C5
[14] T-matrix pole. NODE=M105M5;LINKAGE=QQ
[15] 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. • • •						
1422.8±6.5	27k	[16] ABELE	99D	CBAR	±	0.0 $\overline{p}p \to K^+K^-\pi^0$

[16] 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 $e^+e^- \to K\overline{K}^*(892)\gamma$

$\rho(1450)$ WIDTH

NODE=M105210

VALUE (MeV)	DOCUMENT ID

NODE=M105W0

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. → NOT CHECKED ←

$\eta\rho^0$ MODE

NODE=M105W1
NODE=M105W1

VALUE (MeV)		DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
226 ± 44	[17]	AKHMETSHIN	01B	CMD2	$e^+e^- \rightarrow \eta\gamma$
211 ± 31	[18]	AKHMETSHIN	00D	CMD2	$e^+e^- \rightarrow \eta\pi^+\pi^-$
230 ± 30		ANTONELLI	88	DM2	$e^+e^- \rightarrow \eta\pi^+\pi^-$
60 ± 15		FUKUI	88	SPEC	$8.95\ \pi^- p \rightarrow \eta\pi^+\pi^- n$

[17] Using the data of AKHMETSHIN 01B on $e^+e^- \rightarrow \eta\gamma$, AKHMETSHIN 00D and ANTONELLI 88 on $e^+e^- \rightarrow \eta\pi^+\pi^-$. NODE=M105W;LINKAGE=SW

[18] 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. • • •						
$429\pm\ 42\pm10$	2382	[19]	AKHMETSHIN	03B	CMD2	$e^+e \rightarrow \pi^0\pi^0\gamma$
$547\pm\ 86^{+46}_{-45}$	341	[20]	ALEXANDER	01B	CLE2	$B \rightarrow D^{(*)}\omega\pi^-$
$400\pm\ 35$		[21]	EDWARDS	00A	CLE2	$\tau^- \rightarrow \omega\pi^-\nu_\tau$
$311\pm\ 62$		[22]	CLEGG	94	RVUE	
300		[23]	ASTON	80C	OMEG	$20–70\ \gamma p \rightarrow \omega\pi^0 p$
320 ± 100		[23]	BARBER	80C	SPEC	$3–5\ \gamma p \rightarrow \omega\pi^0 p$

[19] 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

[20] Using Breit-Wigner parameterization of the $\rho(1450)$ and assuming the $\omega\pi^-$ mass dependence for the total width. NODE=M105W3;LINKAGE=3Z

[21] Mass-independent width parameterization. $\rho(1700)$ mass and width fixed at 1700 MeV and 235 MeV respectively. NODE=M105W;LINKAGE=E1

[22] Using data from BISELLO 91B, DOLINSKY 86 and ALBRECHT 87L. NODE=M105W3;LINKAGE=B

[23] 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	$0.0\ \overline{p}n \rightarrow 2\pi^- 2\pi^0\pi^+$

$\pi\pi$ MODE

NODE=M105W5
NODE=M105W5

VALUE (MeV)	EVTS		DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$434\pm16\pm60$	5.4M	[24,25]	FUJIKAWA	08	BELL	$\tau^- \rightarrow \pi^-\pi^0\nu_\tau$
468 ± 41		[26]	SCHAEL	05C	ALEP	$\tau^- \rightarrow \pi^-\pi^0\nu_\tau$
455 ± 41	87k	[24,27]	ANDERSON	00A	CLE2	$\tau^- \rightarrow \pi^-\pi^0\nu_\tau$
~ 374		[28]	ABELE	99C	CBAR	$0.0\ \overline{p}d \rightarrow \pi^+\pi^-\pi^- p$
275 ± 10			BERTIN	98	OBLX	$0.05–0.405\ \overline{n}p \rightarrow \pi^+\pi^+\pi^-$
343 ± 20		[29]	ABELE	97	CBAR	$\overline{p}n \rightarrow \pi^-\pi^0\pi^0$
310 ± 40		[27]	BERTIN	97C	OBLX	$0.0\ \overline{p}p \rightarrow \pi^+\pi^-\pi^0$
236 ± 36			BERTIN	97D	OBLX	$0.05\ \overline{p}p \rightarrow 2\pi^+2\pi^-$
269 ± 31			BISELLO	89	DM2	$e^+e^- \rightarrow \pi^+\pi^-$
391 ± 70			DUBNICKA	89	RVUE	$e^+e^- \rightarrow \pi^+\pi^-$
218 ± 46		[30]	KURDADZE	83	OLYA	$0.64–1.4\ e^+e^- \rightarrow \pi^+\pi^-$

[24] From the GOUNARIS 68 parametrization of the pion form factor. NODE=M105W;LINKAGE=1K

[25] $|F_\pi(0)|^2$ fixed to 1. NODE=M105W5;LINKAGE=FU

[26] 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=M105W5;LINKAGE=SC

[27] $\rho(1700)$ mass and width fixed at 1700 MeV and 235 MeV, respectively. NODE=M105W5;LINKAGE=A

[28] $\rho(1700)$ mass and width fixed at 1780 MeV and 275 MeV respectively. NODE=M105W5;LINKAGE=C5

[29] T-matrix pole. NODE=M105W5;LINKAGE=QQ

[30] Using for $\rho(1700)$ mass and width 1600 ± 20 and 300 ± 10 MeV respectively. NODE=M105W5;LINKAGE=KD

$K\overline{K}$ MODE

NODE=M105W7
NODE=M105W7

VALUE (MeV)	EVTS		DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •							
146.5 ± 10.5	27k	[31]	ABELE	99D	CBAR	$\pm$	$0.0\ \overline{p}p \rightarrow K^+K^-\pi^0$

[31] K-matrix pole. Isospin not determined, could be $\omega(1420)$. NODE=M105W7;LINKAGE=AN

$K\overline{K}^*(892)$ + c.c. MODE

NODE=M105W8
NODE=M105W8

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$418\pm25\pm4$	AUBERT	08S	BABR	10.6 $e^+e^- \to K\overline{K}^*(892)\gamma$

ρ(1450) DECAY MODES

NODE=M105215;NODE=M105

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\pi\pi$	seen	DESIG=1;OUR EST;→ NOT CHECKED ←
Γ_2	4π	seen	DESIG=2;OUR EST;→ NOT CHECKED ←
Γ_3	$\omega\pi$		DESIG=6
Γ_4	$a_1(1260)\pi$		DESIG=10
Γ_5	$h_1(1170)\pi$		DESIG=11
Γ_6	$\pi(1300)\pi$		DESIG=12
Γ_7	$\rho\rho$		DESIG=13
Γ_8	$\rho(\pi\pi)_{S\text{-wave}}$		DESIG=14
Γ_9	e^+e^-	seen	DESIG=4;OUR EST;→ NOT CHECKED ←
Γ_{10}	$\eta\rho$	possibly seen	DESIG=3;OUR EVAL;→ NOT CHECKED ←
Γ_{11}	$a_2(1320)\pi$	not seen	DESIG=8;OUR EST;→ NOT CHECKED ←
Γ_{12}	$K\overline{K}$	not seen	DESIG=7;OUR EVAL;→ NOT CHECKED ←
Γ_{13}	$K\overline{K}^*(892)+$ c.c.	possibly seen	DESIG=15;OUR EST;→ NOT CHECKED ←
Γ_{14}	$\eta\gamma$	possibly seen	DESIG=9;OUR EST;→ NOT CHECKED ←
Γ_{15}	$f_0(500)\gamma$	not seen	DESIG=16;OUR EST;→ NOT CHECKED ←
Γ_{16}	$f_0(980)\gamma$	not seen	DESIG=17;OUR EST;→ NOT CHECKED ←
Γ_{17}	$f_0(1370)\gamma$	not seen	DESIG=18;OUR EST;→ NOT CHECKED ←
Γ_{18}	$f_2(1270)\gamma$	not seen	DESIG=19;OUR EST;→ NOT CHECKED ←

ρ(1450) $\Gamma(i)\Gamma(e^+e^-)/\Gamma(\text{total})$

NODE=M105220

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

NODE=M105G3
NODE=M105G3

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.12	[32] DIEKMAN	88	RVUE	$e^+e^- \to \pi^+\pi^-$
$0.027^{+0.015}_{-0.010}$	[33] KURDADZE	83	OLYA	0.64–1.4 $e^+e^- \to \pi^+\pi^-$

$\Gamma(\eta\rho) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_{10}\Gamma_9/\Gamma$

NODE=M105G4
NODE=M105G4

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
74 ± 20	[34] AKHMETSHIN	00D	CMD2	$e^+e^- \to \eta\pi^+\pi^-$
91 ± 19	ANTONELLI	88	DM2	$e^+e^- \to \eta\pi^+\pi^-$

$\Gamma(\eta\gamma) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_{14}\Gamma_9/\Gamma$

NODE=M105G6
NODE=M105G6

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<16.4	[35] AKHMETSHIN	05	CMD2	0.60-1.38 $e^+e^- \to \eta\gamma$
$2.2\pm0.5\pm0.3$	[36] AKHMETSHIN	01B	CMD2	$e^+e^- \to \eta\gamma$

$\Gamma(K\overline{K}^*(892)+\text{c.c.}) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_{13}\Gamma_9/\Gamma$

NODE=M105G8
NODE=M105G8

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$127\pm15\pm6$	AUBERT	08S	BABR	10.6 $e^+e^- \to K\overline{K}^*(892)\gamma$

[32] Using total width = 235 MeV. NODE=M105G3;LINKAGE=B

[33] Using for ρ(1700) mass and width 1600 ± 20 and 300 ± 10 MeV respectively. NODE=M105G3;LINKAGE=KD

[34] Using the data of ANTONELLI 88, DOLINSKY 91, and AKHMETSHIN 00D. The energy-independent width of the ρ(1450) and ρ(1700) mesons assumed. NODE=M105G4;LINKAGE=KL

[35] From 2γ decay mode of η using 1465 MeV and 310 MeV for the ρ(1450) mass and width. Recalculated by us. NODE=M105G6;LINKAGE=AK

[36] 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

$\rho(1450)$ $\Gamma(i)/\Gamma(total) \times \Gamma(e^+e^-)/\Gamma(total)$

NODE=M105230

$\Gamma(f_0(500)\gamma)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{15}/\Gamma \times \Gamma_9/\Gamma$

NODE=M105R01
NODE=M105R01

VALUE (units 10^{-9})	CL%	DOCUMENT ID		TECN	COMMENT
<4.0	90	ACHASOV	11	SND	$e^+e^- \rightarrow \pi^0\pi^0\gamma$

$\Gamma(f_0(980)\gamma)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{16}/\Gamma \times \Gamma_9/\Gamma$

NODE=M105R02
NODE=M105R02

VALUE (units 10^{-9})	CL%	DOCUMENT ID		TECN	COMMENT
<2.6	90	ACHASOV	11	SND	$e^+e^- \rightarrow \pi^0\pi^0\gamma$

$\Gamma(f_0(1370)\gamma)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{17}/\Gamma \times \Gamma_9/\Gamma$

NODE=M105R03
NODE=M105R03

VALUE (units 10^{-9})	CL%	DOCUMENT ID		TECN	COMMENT
<3.5	90	ACHASOV	11	SND	$e^+e^- \rightarrow \pi^0\pi^0\gamma$

$\Gamma(f_2(1270)\gamma)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{18}/\Gamma \times \Gamma_9/\Gamma$

NODE=M105R04
NODE=M105R04

VALUE (units 10^{-9})	CL%	DOCUMENT ID		TECN	COMMENT
<0.8	90	[37] ACHASOV	11	SND	$e^+e^- \rightarrow \pi^0\pi^0\gamma$

[37] 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_2

NODE=M105R15
NODE=M105R15

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.37±0.10	[38,39] ABELE	01B	CBAR	0.0 $\overline{p}n \rightarrow 5\pi$

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

NODE=M105R5
NODE=M105R5

VALUE	DOCUMENT ID		TECN
• • • We do not use the following data for averages, fits, limits, etc. • • •			
∼ 0.21	CLEGG	94	RVUE

$\Gamma(\pi\pi)/\Gamma(\omega\pi)$ — Γ_1/Γ_3

NODE=M105R6
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_3/Γ_2

NODE=M105R3
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_4/Γ_2

NODE=M105R10
NODE=M105R10

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.27±0.08	[38] ABELE	01B	CBAR	0.0 $\overline{p}n \rightarrow 5\pi$

$\Gamma(h_1(1170)\pi)/\Gamma(4\pi)$ — Γ_5/Γ_2

NODE=M105R11
NODE=M105R11

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.08±0.04	[38] ABELE	01B	CBAR	0.0 $\overline{p}n \rightarrow 5\pi$

$\Gamma(\pi(1300)\pi)/\Gamma(4\pi)$ — Γ_6/Γ_2

NODE=M105R12
NODE=M105R12

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.37±0.13	[38] ABELE	01B	CBAR	0.0 $\overline{p}n \rightarrow 5\pi$

$\Gamma(\rho\rho)/\Gamma(4\pi)$ — Γ_7/Γ_2

NODE=M105R13
NODE=M105R13

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.11±0.05	[38] ABELE	01B	CBAR	0.0 $\overline{p}n \rightarrow 5\pi$

$\Gamma(\rho(\pi\pi)_{S\text{-wave}})/\Gamma(4\pi)$ — Γ_8/Γ_2

NODE=M105R14
NODE=M105R14

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.17 ± 0.09	[38] ABELE	01B	CBAR	0.0 $\overline{p}n \rightarrow 5\pi$

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

NODE=M105R2
NODE=M105R2

VALUE	DOCUMENT ID		TECN
• • • We do not use the following data for averages, fits, limits, etc. • • •			
<0.04	DONNACHIE	87B	RVUE

$\Gamma(\eta\rho)/\Gamma(\omega\pi)$ — Γ_{10}/Γ_3

NODE=M105R4
NODE=M105R4

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
~ 0.24	[40] DONNACHIE	91	RVUE	
>2	FUKUI	91	SPEC	8.95 $\pi^- p \rightarrow \omega\pi^0 n$

$\Gamma(a_2(1320)\pi)/\Gamma_{\text{total}}$ — Γ_{11}/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 $\pi^- p \rightarrow \eta\pi^+\pi^- n$

$\Gamma(K\overline{K})/\Gamma(\omega\pi)$ — Γ_{12}/Γ_3

NODE=M105R8
NODE=M105R8

VALUE	DOCUMENT ID		TECN
• • • We do not use the following data for averages, fits, limits, etc. • • •			
<0.08	[40] DONNACHIE	91	RVUE

$\Gamma(K\overline{K}^*(892)+\text{c.c.})/\Gamma_{\text{total}}$ — Γ_{13}/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	$\tau^- \rightarrow K^-\pi^-K^+\nu_\tau$

[38] $\omega\pi$ not included. NODE=M105R;LINKAGE=BL
[39] Using ABELE 97. NODE=M105R;LINKAGE=LK
[40] Using data from BISELLO 91B, DOLINSKY 86 and ALBRECHT 87L. NODE=M105R;LINKAGE=A

ρ(1450) REFERENCES

NODE=M105

ACHASOV	11	JETP 113 75	M.N. Achasov *et al.*	(SND Collab.)	REFID=16721
		Translated from ZETF 140 87.			
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	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
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	JPG 15 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 also the $\eta(1405)$.

NODE=M175

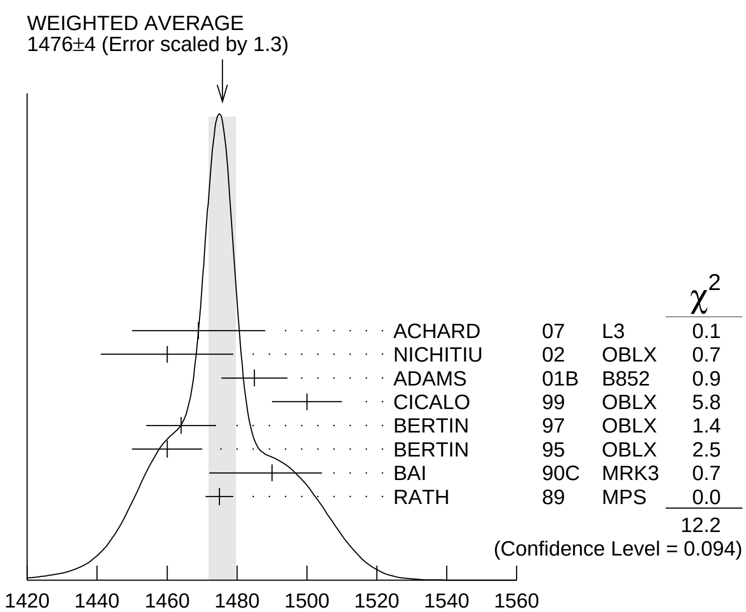
$\eta(1475)$ MASS

NODE=M175205

$K\overline{K}\pi$ MODE ($K^*(892)$ K dominant)

NODE=M175M5
NODE=M175M5

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
1476± 4 OUR AVERAGE		Error includes scale factor of 1.3. See the ideogram below.				
$1469 \pm 14 \pm 13$	74	ACHARD	07	L3	183–209 $e^+e^- \rightarrow e^+e^- K^0_S K^\pm \pi^\mp$	
1460 ± 19	3651	NICHITIU	02	OBLX		
$1485 \pm 8 \pm 5$	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. • • •						
1421 ± 14		AUGUSTIN	92	DM2	$J/\psi \rightarrow \gamma K\overline{K}\pi$	OCCUR=2



$\eta(1475)$ mass, $K\overline{K}\pi$ mode ($K^*(892)$ K dominant) (MeV)

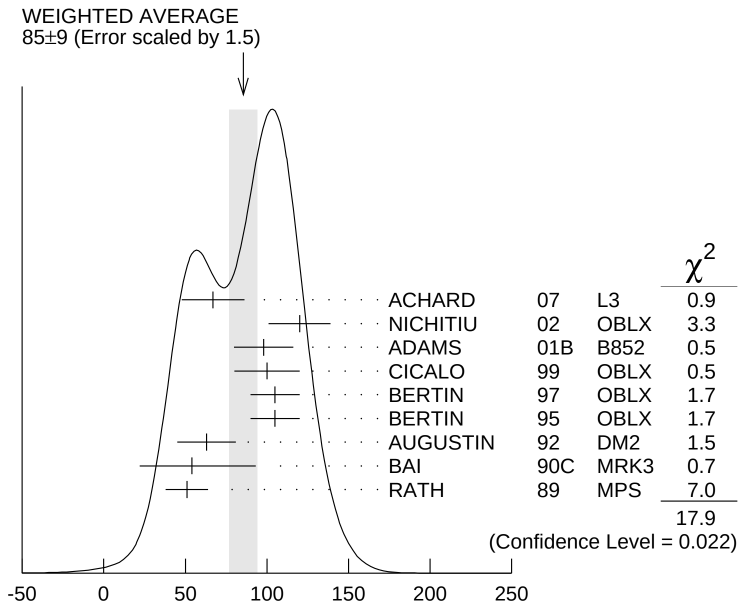
$\eta(1475)$ WIDTH

NODE=M175210

$K\overline{K}\pi$ MODE ($K^*(892)$ K dominant)

NODE=M175W5
NODE=M175W5

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
85± 9 OUR AVERAGE		Error includes scale factor of 1.5. See the ideogram below.				
$67 \pm 18 \pm 7$	74	ACHARD	07	L3	183–209 $e^+e^- \rightarrow e^+e^- K^0_S K^\pm \pi^\mp$	
120 ± 19	3651	NICHITIU	02	OBLX		
$98 \pm 18 \pm 3$	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
63 ± 18		AUGUSTIN	92	DM2	$J/\psi \rightarrow \gamma K\overline{K}\pi$	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 $\pi^- p \rightarrow n K^0_S K^0_S \pi^0$	



$\eta(1475)$ width $K\overline{K}\pi$ mode ($K^*(892)$ K dominant)

$\eta(1475)$ DECAY MODES

NODE=M175215;NODE=M175

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$K\overline{K}\pi$	dominant	DESIG=2;OUR EST;→ NOT CHECKED ←
Γ_2	$K\overline{K}^*(892)+$ c.c.	seen	DESIG=1;OUR EST;→ NOT CHECKED ←
Γ_3	$a_0(980)\pi$	seen	DESIG=4;OUR EST;→ NOT CHECKED ←
Γ_4	$\gamma\gamma$	seen	DESIG=7;OUR EST;→ NOT CHECKED ←

$\eta(1475)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M175220

$\Gamma(K\overline{K}\pi)$ × $\Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_1\Gamma_4/\Gamma$

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 $e^+e^- \rightarrow e^+e^- K^0_S K^\pm \pi^\mp$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.089	90		[2,3] AHOHE	05	CLE2	10.6 $e^+e^- \rightarrow e^+e^- K^0_S K^\pm \pi^\mp$

[1] Supersedes ACCIARRI 01G. Compatible with K^*K decay. Using B($K^0_S \rightarrow \pi^+\pi^-$)= 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	[4] BAILLON	67	HBC	0.0 $\overline{p}p \rightarrow K\overline{K}\pi\pi\pi$

$\Gamma(K\overline{K}^*(892)+\text{c.c.})/[\Gamma(K\overline{K}^*(892)+\text{c.c.})+\Gamma(a_0(980)\pi)]$ $\Gamma_2/(\Gamma_2+\Gamma_3)$

NODE=M175R6
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	$J/\psi \rightarrow K^+K^-\pi^0\gamma$

[4] Data could also refer to $\eta(1405)$.
NODE=M175R;LINKAGE=BL

$\eta(1475)$ REFERENCES

NODE=M175

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
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 also the mini-reviews on scalar mesons under $f_0(500)$ (see the index for the page number) and on non-$q\overline{q}$ candidates in PDG 06, Journal of Physics, G **33** 1 (2006).

NODE=M152

$f_0(1500)$ MASS

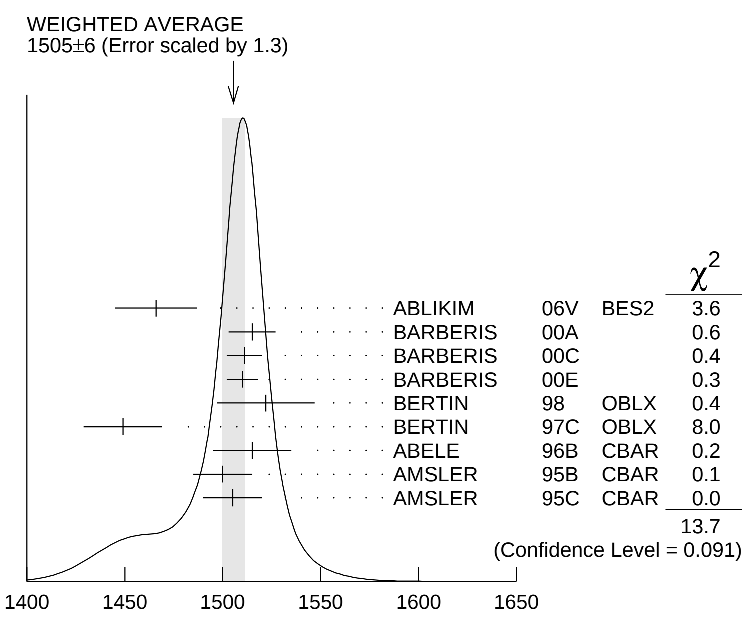
NODE=M152M

NODE=M152M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1505± 6 OUR AVERAGE		Error includes scale factor of 1.3. See the ideogram below.			
1466± 6± 20		ABLIKIM	06V	BES2	$e^+e^- \rightarrow J/\psi \rightarrow \gamma\pi^+\pi^-$
1515±12		[1] BARBERIS	00A		450 $pp \rightarrow p_f\eta\eta p_s$
1511± 9		[1,2] BARBERIS	00C		450 $pp \rightarrow p_f 4\pi p_s$
1510± 8		[1] BARBERIS	00E		450 $pp \rightarrow p_f\eta\eta p_s$
1522±25		BERTIN	98	OBLX	0.05–0.405 $\overline{n}p \rightarrow \pi^+\pi^+\pi^-$
1449±20		[1] BERTIN	97C	OBLX	0.0 $\overline{p}p \rightarrow \pi^+\pi^-\pi^0$
1515±20		ABELE	96B	CBAR	0.0 $\overline{p}p \rightarrow \pi^0 K^0_L K^0_L$
1500±15		[3] AMSLER	95B	CBAR	0.0 $\overline{p}p \rightarrow 3\pi^0$
1505±15		[4] AMSLER	95C	CBAR	0.0 $\overline{p}p \rightarrow \eta\eta\pi^0$ OCCUR=2
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1486±10		[1] ANISOVICH	09	RVUE	0.0 $\overline{p}p$, πN
1470±60	568	[5] KLEMPT	08	E791	$D^+_s \rightarrow \pi^-\pi^+\pi^+$
$1470^{+6}_{-7}{}^{+72}_{-255}$		[6] UEHARA	08A	BELL	10.6 $e^+e^- \rightarrow e^+e^-\pi^0\pi^0$
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	[7,8] 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		[7] BINON	05	GAMS	33 $\pi^-p \rightarrow \eta\eta n$
1524±14	1400	[9] GARMASH	05	BELL	$B^+ \rightarrow K^+K^+K^-$
1489^{+8}_{-4}		[10] ANISOVICH	03	RVUE	
1490±30		[7] ABELE	01	CBAR	0.0 $\overline{p}d \rightarrow \pi^-4\pi^0 p$
1497±10		[7] BARBERIS	99	OMEG	450 $pp \rightarrow p_s p_f K^+K^-$
1502±10		[7] BARBERIS	99B	OMEG	450 $pp \rightarrow p_s p_f \pi^+\pi^-$
1502±12± 10		[11] BARBERIS	99D	OMEG	450 $pp \rightarrow K^+K^-$, $\pi^+\pi^-$
1530±45		[7] BELLAZZINI	99	GAM4	450 $pp \rightarrow pp\pi^0\pi^0$
1505±18		[7] FRENCH	99		300 $pp \rightarrow p_f(K^+K^-)p_s$
1447±27		[12] KAMINSKI	99	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$, $\sigma\sigma$
1580±80		[7] 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 $\overline{p}p \rightarrow 5\pi^0$
1500± 8		[1] ABELE	96C	RVUE	Compilation
1460±20	120	[7] AMELIN	96B	VES	37 $\pi^-A \rightarrow \eta\eta\pi^-A$
1500± 8		BUGG	96	RVUE	
1500±10		[13] AMSLER	95D	CBAR	0.0 $\overline{p}p \rightarrow \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$
1445± 5		[14] ANTINORI	95	OMEG	300,450 $pp \rightarrow pp2(\pi^+\pi^-)$

1497±30		[7] ANTINORI	95	OMEG	300,450 $pp \to pp\pi^+\pi^-$	OCCUR=2
∼ 1505		BUGG	95	MRK3	$J/\psi \to \gamma\pi^+\pi^-\pi^+\pi^-$	
1446± 5		[7] ABATZIS	94	OMEG	450 $pp \to pp2(\pi^+\pi^-)$	
1545±25		[7] AMSLER	94E	CBAR	0.0 $\overline{p}p \to \pi^0\eta\eta'$	
1520±25		[1,15] ANISOVICH	94	CBAR	0.0 $\overline{p}p \to 3\pi^0, \pi^0\eta\eta$	
1505±20		[1,16] BUGG	94	RVUE	$\overline{p}p \to 3\pi^0, \eta\eta\pi^0, \eta\pi^0\pi^0$	
1560±25		[7] AMSLER	92	CBAR	0.0 $\overline{p}p \to \pi^0\eta\eta$	
1550±45± 30		[7] BELADIDZE	92C	VES	36 π^- Be $\to \pi^-\eta'\eta$ Be	
1449± 4		[7] ARMSTRONG	89E	OMEG	300 $pp \to pp2(\pi^+\pi^-)$	
1610±20		[7] ALDE	88	GAM4	300 $\pi^- N \to \pi^- N 2\eta$	
∼ 1525		ASTON	88D	LASS	11 $K^- p \to K^0_S K^0_S \Lambda$	
1570±20	600	[7] ALDE	87	GAM4	100 $\pi^- p \to 4\pi^0 n$	
1575±45		[17] ALDE	86D	GAM4	100 $\pi^- p \to 2\eta n$	
1568±33		[7] BINON	84C	GAM2	38 $\pi^- p \to \eta\eta' n$	
1592±25		[7] BINON	83	GAM2	38 $\pi^- p \to 2\eta n$	
1525± 5		[7] GRAY	83	DBC	0.0 $\overline{p}N \to 3\pi$	

[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, supersedes ANISOVICH 94. NODE=M152M;LINKAGE=D
[4] T-matrix pole, supersedes ANISOVICH 94 and AMSLER 92. NODE=M152M;LINKAGE=D1
[5] Reanalysis of AITALA 01A data. This state could also be $f_0(1370)$. NODE=M152M;LINKAGE=KL
[6] Breit-Wigner mass. May also be the $f_0(1370)$. NODE=M152M;LINKAGE=UE
[7] Breit-Wigner mass. NODE=M152M;LINKAGE=E
[8] Statistical error only. NODE=M152M;LINKAGE=ST
[9] Breit-Wigner, solution 1, PWA ambiguous. NODE=M152M;LINKAGE=GA
[10] 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
[11] Supersedes BARBERIS 99 and BARBERIS 99B. NODE=M152M;LINKAGE=BD
[12] T-matrix pole on sheet $--+$. NODE=M152M;LINKAGE=TK
[13] T-matrix pole. Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D. NODE=M152M;LINKAGE=AB
[14] Supersedes ABATZIS 94, ARMSTRONG 89E. Breit-Wigner mass. NODE=M152M;LINKAGE=B
[15] From a simultaneous analysis of the annihilations $\overline{p}p \to 3\pi^0, \pi^0\eta\eta$. NODE=M152M;LINKAGE=A
[16] Reanalysis of ANISOVICH 94 data. NODE=M152M;LINKAGE=C1
[17] From central value and spread of two solutions. Breit-Wigner mass. NODE=M152M;LINKAGE=AZ



$f_0(1500)$ mass (MeV)

$f_0(1500)$ WIDTH

NODE=M152W

NODE=M152W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
109± 7 OUR AVERAGE					
$108^{+14}_{-11}\pm25$		ABLIKIM	06V	BES2	$e^+e^- \rightarrow J/\psi \rightarrow \gamma\pi^+\pi^-$
110± 24		[18] BARBERIS	00A		450 $pp \rightarrow p_f \eta\eta p_s$
102± 18		[18,19] BARBERIS	00C		450 $pp \rightarrow p_f 4\pi p_s$
110± 16		[18] BARBERIS	00E		450 $pp \rightarrow p_f \eta\eta p_s$
108± 33		BERTIN	98	OBLX	0.05–0.405 $\overline{n}p \rightarrow \pi^+\pi^+\pi^-$
114± 30		[18] BERTIN	97C	OBLX	0.0 $\overline{p}p \rightarrow \pi^+\pi^-\pi^0$
105± 15		ABELE	96B	CBAR	0.0 $\overline{p}p \rightarrow \pi^0 K^0_L K^0_L$
120± 25		[20] AMSLER	95B	CBAR	0.0 $\overline{p}p \rightarrow 3\pi^0$
120± 30		[21] AMSLER	95C	CBAR	0.0 $\overline{p}p \rightarrow \eta\eta\pi^0$

OCCUR=2

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

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
114± 10		[18] ANISOVICH	09	RVUE	0.0 $\overline{p}p$, πN
90^{+2+50}_{-1-22}		[22] UEHARA	08A	BELL	10.6 $e^+e^- \rightarrow e^+e^-\pi^0\pi^0$
121± 8		AMSLER	06	CBAR	0.9 $\overline{p}p \rightarrow K^+K^-\pi^0$
257± 33	9.9k	AUBERT	06O	BABR	$B^+ \rightarrow K^+K^+K^-$
108± 9	80k	[23,24] UMAN	06	E835	5.2 $\overline{p}p \rightarrow \eta\eta\pi^0$
119± 10		VLADIMIRSK...	06	SPEC	40 $\pi^- p \rightarrow K^0_S K^0_S n$
90± 15		[23] BINON	05	GAMS	33 $\pi^- p \rightarrow \eta\eta n$
136± 23	1400	[25] GARMASH	05	BELL	$B^+ \rightarrow K^+K^+K^-$
102± 10		[26] ANISOVICH	03	RVUE	
140± 40		[23] ABELE	01	CBAR	0.0 $\overline{p}d \rightarrow \pi^- 4\pi^0 p$
104± 25		[23] BARBERIS	99	OMEG	450 $pp \rightarrow p_s p_f K^+K^-$
131± 15		[23] BARBERIS	99B	OMEG	450 $pp \rightarrow p_s p_f \pi^+\pi^-$
98± 18±16		[27] BARBERIS	99D	OMEG	450 $pp \rightarrow K^+K^-$, $\pi^+\pi^-$
160± 50		[23] BELLAZZINI	99	GAM4	450 $pp \rightarrow pp\pi^0\pi^0$
100± 33		[23] FRENCH	99		300 $pp \rightarrow p_f(K^+K^-)p_s$
108± 46		[28] KAMINSKI	99	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$, $\sigma\sigma$
280±100		[23] ALDE	98	GAM4	100 $\pi^- p \rightarrow \pi^0\pi^0 n$
130± 20		[18] ANISOVICH	98B	RVUE	Compilation
120± 35		[18] BARBERIS	97B	OMEG	450 $pp \rightarrow pp2(\pi^+\pi^-)$
∼ 100		FRABETTI	97D	E687	$D^\pm_s \rightarrow \pi^\mp\pi^\pm\pi^\pm$
∼ 169		ABELE	96	CBAR	0.0 $\overline{p}p \rightarrow 5\pi^0$
100± 30	120	[23] AMELIN	96B	VES	37 $\pi^- A \rightarrow \eta\eta\pi^- A$
132± 15		BUGG	96	RVUE	
154± 30		[29] AMSLER	95D	CBAR	0.0 $\overline{p}p \rightarrow \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$
65± 10		[30] ANTINORI	95	OMEG	300,450 $pp \rightarrow pp2(\pi^+\pi^-)$
199± 30		[23] ANTINORI	95	OMEG	300,450 $pp \rightarrow pp\pi^+\pi^-$
56± 12		[23] ABATZIS	94	OMEG	450 $pp \rightarrow pp2(\pi^+\pi^-)$
100± 40		[23] AMSLER	94E	CBAR	0.0 $\overline{p}p \rightarrow \pi^0\eta\eta'$
148^{+20}_{-25}		[18,31] ANISOVICH	94	CBAR	0.0 $\overline{p}p \rightarrow 3\pi^0$, $\pi^0\eta\eta$
150± 20		[18,32] BUGG	94	RVUE	$\overline{p}p \rightarrow 3\pi^0$, $\eta\eta\pi^0$, $\eta\pi^0\pi^0$
245± 50		[23] AMSLER	92	CBAR	0.0 $\overline{p}p \rightarrow \pi^0\eta\eta$
153± 67±50		[23] BELADIDZE	92C	VES	36 π^-Be $\rightarrow \pi^-\eta'\eta$Be
78± 18		[23] ARMSTRONG	89E	OMEG	300 $pp \rightarrow pp2(\pi^+\pi^-)$
170± 40		[23] ALDE	88	GAM4	300 $\pi^- N \rightarrow \pi^- N 2\eta$
150± 20	600	[23] ALDE	87	GAM4	100 $\pi^- p \rightarrow 4\pi^0 n$
265± 65		[33] ALDE	86D	GAM4	100 $\pi^- p \rightarrow 2\eta n$
260± 60		[23] BINON	84C	GAM2	38 $\pi^- p \rightarrow \eta\eta' n$
210± 40		[23] BINON	83	GAM2	38 $\pi^- p \rightarrow 2\eta n$
101± 13		[23] GRAY	83	DBC	0.0 $\overline{p}N \rightarrow 3\pi$

OCCUR=2

[18] T-matrix pole. NODE=M152W;LINKAGE=PP

[19] Average between $\pi^+\pi^-2\pi^0$ and $2(\pi^+\pi^-)$. NODE=M152W;LINKAGE=PC

[20] T-matrix pole, supersedes ANISOVICH 94. NODE=M152W;LINKAGE=D

[21] T-matrix pole, supersedes ANISOVICH 94 and AMSLER 92. NODE=M152W;LINKAGE=D1

[22] Breit-Wigner width. May also be the $f_0(1370)$. NODE=M152W;LINKAGE=UE

[23] Breit-Wigner width. NODE=M152W;LINKAGE=E

[24] Statistical error only. NODE=M152W;LINKAGE=ST

[25] Breit-Wigner, solution 1, PWA ambiguous. NODE=M152W;LINKAGE=GA

[26] K-matrix pole 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=M152W;LINKAGE=KM

[27] Supersedes BARBERIS 99 and BARBERIS 99B. NODE=M152W;LINKAGE=BD
[28] T-matrix pole on sheet $--+$. NODE=M152W;LINKAGE=TK
[29] T-matrix pole. Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D. NODE=M152W;LINKAGE=AB
[30] Supersedes ABATZIS 94, ARMSTRONG 89E. Breit-Wigner mass. NODE=M152W;LINKAGE=B
[31] From a simultaneous analysis of the annihilations $\overline{p}p \rightarrow 3\pi^0, \pi^0\eta\eta$. NODE=M152W;LINKAGE=A
[32] Reanalysis of ANISOVICH 94 data. NODE=M152W;LINKAGE=C1
[33] 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	$\pi\pi$	(34.9±2.3) %	1.2	DESIG=8
Γ_2	$\pi^+\pi^-$	seen		DESIG=9
Γ_3	$2\pi^0$	seen		DESIG=3;OUR EST;→ NOT CHECKED ←
Γ_4	4π	(49.5±3.3) %	1.2	DESIG=7
Γ_5	$4\pi^0$	seen		DESIG=5;OUR EST;→ NOT CHECKED ←
Γ_6	$2\pi^+2\pi^-$	seen		DESIG=6;OUR EST;→ NOT CHECKED ←
Γ_7	$2(\pi\pi)_{S\text{-wave}}$	seen		DESIG=11;OUR EST;→ NOT CHECKED ←
Γ_8	$\rho\rho$	seen		DESIG=12;OUR EST;→ NOT CHECKED ←
Γ_9	$\pi(1300)\pi$	seen		DESIG=13;OUR EST;→ NOT CHECKED ←
Γ_{10}	$a_1(1260)\pi$	seen		DESIG=14;OUR EST;→ NOT CHECKED ←
Γ_{11}	$\eta\eta$	(5.1±0.9) %	1.4	DESIG=1
Γ_{12}	$\eta\eta'(958)$	(1.9±0.8) %	1.7	DESIG=2
Γ_{13}	$K\overline{K}$	(8.6±1.0) %	1.1	DESIG=4
Γ_{14}	$\gamma\gamma$	not seen		DESIG=10;OUR EST;→ NOT CHECKED ←

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 $\chi^2 =$ 11.4 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, $x_i \equiv \Gamma_i/\Gamma_{\rm total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_4	−83			
x_{11}	11	−52		
x_{12}	−5	−31	29	
x_{13}	39	−67	33	6
	x_1	x_4	x_{11}	x_{12}

f_0(1500) $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M152217

$\Gamma(\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\rm total}$ — $\Gamma_1\Gamma_{14}/\Gamma$

NODE=M152G1
NODE=M152G1

VALUE (eV)	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$33^{+12}_{-6}{}^{+1809}_{-21}$		[34] UEHARA	08A	BELL	10.6 $e^+e^- \rightarrow e^+e^-\pi^0\pi^0$
not seen		ACCIARRI	01H	L3	$\gamma\gamma \rightarrow K^0_S K^0_S$, $E^{ee}_{\rm cm}$= 91, 183–209 GeV
<460	95	BARATE	00E	ALEP	$\gamma\gamma \rightarrow \pi^+\pi^-$

[34] 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

$\Gamma(\pi\pi)/\Gamma_{\rm total}$ — 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

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	$D_s^\pm \to \pi^\mp\pi^\pm\pi^\pm$

$\Gamma(4\pi)/\Gamma(\pi\pi)$ — Γ_4/Γ_1

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	[35] AMSLER	98	RVUE	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.1 ±0.2	[36] ANISOVICH	02D	SPEC	Combined fit
3.4 ±0.8	[35] ABELE	96	CBAR	0.0 $\overline{p}p \to 5\pi^0$

$\Gamma(2(\pi\pi)_{S\text{-wave}})/\Gamma(\pi\pi)$ — Γ_7/Γ_1

NODE=M152R14

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.42±0.26	[37] ABELE	01	CBAR	0.0 $\overline{p}d \to \pi^- 4\pi^0 p$

$\Gamma(2(\pi\pi)_{S\text{-wave}})/\Gamma(4\pi)$ — Γ_7/Γ_4

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

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

VALUE	DOCUMENT ID		COMMENT	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
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

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 $\pi^- p \to 2\eta n$

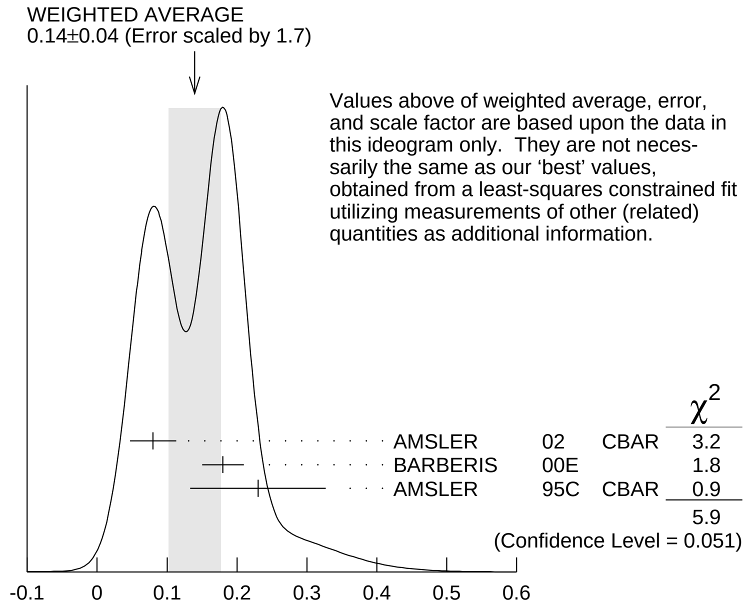
$\Gamma(\eta\eta)/\Gamma(\pi\pi)$ — Γ_{11}/Γ_1

NODE=M152R13

VALUE	DOCUMENT ID		TECN	COMMENT
0.145±0.027 OUR FIT Error includes scale factor of 1.5.				
0.14 ±0.04 OUR AVERAGE Error includes scale factor of 1.7. See the ideogram below.				
0.080±0.033	AMSLER	02	CBAR	0.9 $\overline{p}p \to \pi^0\eta\eta,\ \pi^0\pi^0\pi^0$
0.18 ±0.03	BARBERIS	00E		450 $pp \to p_f \eta\eta p_s$
0.230±0.097	[38] 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. • • •

0.11 ±0.03	[36] ANISOVICH	02D	SPEC	Combined fit
0.078±0.013	[39] ABELE	96C	RVUE	Compilation
0.157±0.060	[40] AMSLER	95D	CBAR	0.0 $\overline{p}p \rightarrow \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$



$\Gamma(\eta\eta)/\Gamma(\pi\pi)$ Γ_{11}/Γ_1

$\Gamma(4\pi^0)/\Gamma(\eta\eta)$ 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 $\pi^- p \rightarrow 4\pi^0 n$

$\Gamma(\eta\eta'(958))/\Gamma(\pi\pi)$ Γ_{12}/Γ_1

NODE=M152R12

VALUE	DOCUMENT ID		TECN	COMMENT
0.055±0.024 OUR FIT Error includes scale factor of 1.8.				
0.095±0.026	BARBERIS	00A		450 $pp \rightarrow p_f \eta\eta p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.005±0.003	[36] ANISOVICH	02D	SPEC	Combined fit

$\Gamma(\eta\eta'(958))/\Gamma(\eta\eta)$ Γ_{12}/Γ_{11}

NODE=M152R2

VALUE	DOCUMENT ID		TECN	COMMENT
0.38±0.16 OUR FIT Error includes scale factor of 1.9.				
0.29±0.10	[41] AMSLER	95C	CBAR	0.0 $\overline{p}p \rightarrow \eta\eta\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.05±0.03	[36] ANISOVICH	02D	SPEC	Combined fit
0.84±0.23	ABELE	96C	RVUE	Compilation
2.7 ±0.8	BINON	84C	GAM2	38 $\pi^- p \rightarrow \eta\eta' n$

$\Gamma(K\overline{K})/\Gamma_{total}$ 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±0.026 OUR FIT				
0.241±0.028 OUR AVERAGE				
0.25 ±0.03	[42] BARGIOTTI	03	OBLX	$\overline{p}p$
0.19 ±0.07	[43] ABELE	98	CBAR	0.0 $\overline{p}p \rightarrow K^0_L K^\pm \pi^\mp$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.16 ±0.05	[36] ANISOVICH	02D	SPEC	Combined fit
0.33 ±0.03 ±0.07	BARBERIS	99D	OMEG	450 $pp \rightarrow K^+K^-$, $\pi^+\pi^-$
0.20 ±0.08	[44] ABELE	96B	CBAR	0.0 $\overline{p}p \rightarrow \pi^0 K^0_L K^0_L$

$\Gamma(K\overline{K})/\Gamma(\eta\eta)$ Γ_{13}/Γ_{11}

NODE=M152R4
NODE=M152R4

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
1.69±0.33 OUR FIT	Error includes scale factor of 1.4.			
1.85±0.41		BARBERIS	00E	450 $pp \to p_f \eta\eta p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.5 ±0.6		[36] ANISOVICH	02D	SPEC Combined fit
<0.4	90	[45] PROKOSHKIN	91	GAM4 300 $\pi^- p \to \pi^- p\eta\eta$
<0.6		[46] BINON	83	GAM2 38 $\pi^- p \to 2\eta n$

[35] Excluding $\rho\rho$ contribution to 4π. NODE=M152R6;LINKAGE=C

[36] 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

[37] From the combined data of ABELE 96 and ABELE 96C. NODE=M152R;LINKAGE=KZ

[38] Using AMSLER 95B ($3\pi^0$). NODE=M152R3;LINKAGE=A

[39] 2π width determined to be 60 ± 12 MeV. NODE=M152R3;LINKAGE=CM

[40] Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D. NODE=M152R3;LINKAGE=AB

[41] Using AMSLER 94E ($\eta\eta'\pi^0$). NODE=M152R2;LINKAGE=A

[42] Coupled channel analysis of $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, and $K^\pm K^0_S\pi^\mp$. NODE=M152R;LINKAGE=BG

[43] Using $\pi^0\pi^0$ from AMSLER 95B. NODE=M152R7;LINKAGE=A

[44] Using AMSLER 95B ($3\pi^0$), AMSLER 94C ($2\pi^0\eta$) and SU(3). NODE=M152R7;LINKAGE=D

[45] Combining results of GAM4 with those of WA76 on $K\overline{K}$ central production. NODE=M152R4;LINKAGE=BZ

[46] Using ETKIN 82B and COHEN 80. NODE=M152R4;LINKAGE=A

$f_0(1500)$ REFERENCES

NODE=M152

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.*	(CBAR Collab.)	REFID=51136
AUBERT	06O	PR D74 032003	B. Aubert *et al.*	(BABAR Collab.)	REFID=51141
PDG	06	JPG 33 1	W.-M. Yao *et al.*	(PDG Collab.)	REFID=51004
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.			
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
		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
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
BARBERIS	99D	PL B462 462	D. Barberis *et al.*	(Omega Expt.)	REFID=47395
BELLAZZINI	99	PL B467 296	R. Bellazzini *et al.*		REFID=47400
FRENCH	99	PL B460 213	B. French *et al.*	(WA76 Collab.)	REFID=47491
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
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.			
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.			
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, 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
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

NODE=M084

$f_1(1510)$

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

OMITTED FROM SUMMARY TABLE

See the minireview under $\eta(1405)$.

NODE=M084

$f_1(1510)$ MASS

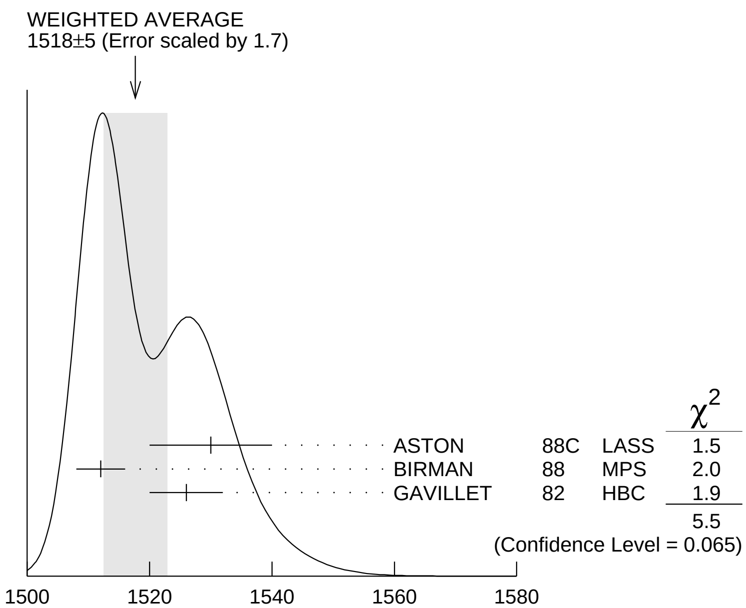
NODE=M084M

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 $K^- p \to K^0_S K^\pm \pi^\mp \Lambda$
1512± 4	600	[1] BIRMAN	88	MPS	8 $\pi^- p \to K^+ \overline{K}^0 \pi^- n$
1526± 6	271	GAVILLET	82	HBC	4.2 $K^- p \to \Lambda K K \pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
∼ 1525		[2] BAUER	93B		$\gamma\gamma^* \to \pi^+ \pi^- \pi^0 \pi^0$

[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



$f_1(1510)$ mass (MeV)

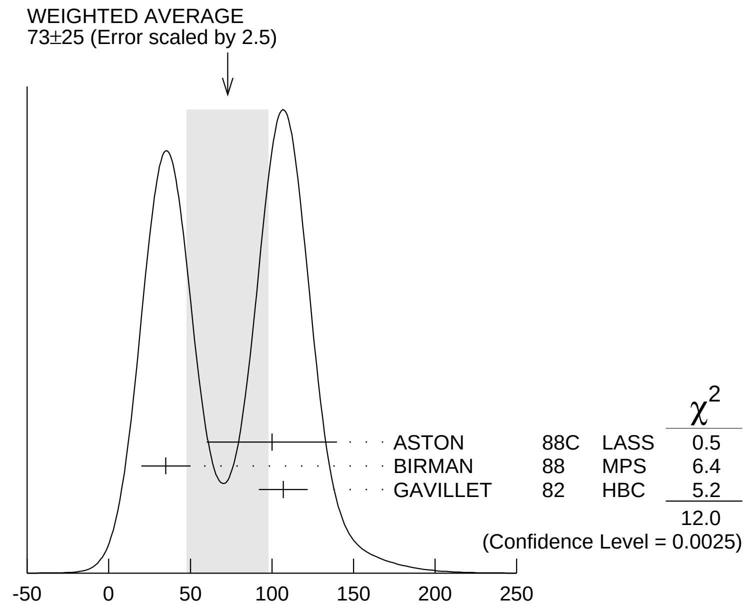
$f_1(1510)$ WIDTH

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;→ NOT CHECKED ←
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	$J/\psi \rightarrow \gamma\pi^+\pi^-\eta'$

$f_1(1510)$ REFERENCES

NODE=M084

ABLIKIM 11C PRL 106 072002 M. Ablikim *et al.* (BES III Collab.) REFID=53684
BAUER 93B PR D48 3976 D.A. Bauer *et al.* (SLAC) REFID=43678
AIHARA 88C PR D38 1 H. Aihara *et al.* (TPC-2γ Collab.) REFID=40564
ASTON 88C PL B201 573 D. Aston *et al.* (SLAC, NAGO, CINC, INUS) JP REFID=40282
BIRMAN 88 PRL 61 1557 A. Birman *et al.* (BNL, FSU, IND, MASD) JP REFID=40568
GAVILLET 82 ZPHY C16 119 P. Gavillet *et al.* (CERN, CDEF, PADO+) REFID=20877

NODE=M013

$f'_2(1525)$

$I^G(J^{PC}) = 0^+(2^{++})$

$f'_2(1525)$ MASS

NODE=M013205

NODE=M013MX

VALUE (MeV)	DOCUMENT ID
1525±5 OUR ESTIMATE This is only an educated guess; the error given is larger than the error on the average of the published values.	

→ NOT CHECKED ←

PRODUCED BY PION BEAM

NODE=M013M1

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1521 ± 13		TIKHOMIROV	03	SPEC	$40.0\ \pi^- C \to K^0_S K^0_S K^0_L X$
1547^{+10}_{-2}		[1] LONGACRE	86	MPS	$22\ \pi^- p \to K^0_S K^0_S n$
1496^{+9}_{-8}		[2] CHABAUD	81	ASPK	$6\ \pi^- p \to K^+ K^- n$
1497^{+8}_{-9}		CHABAUD	81	ASPK	$18.4\ \pi^- p \to K^+ K^- n$
1492 ± 29		GORLICH	80	ASPK	$17\ \pi^- p$ polarized $\to K^+ K^- n$
1502 ± 25		[3] CORDEN	79	OMEG	$12\text{–}15\ \pi^- p \to \pi^+ \pi^- n$
1480	14	CRENNELL	66	HBC	$6.0\ \pi^- p \to K^0_S K^0_S n$

OCCUR=2

PRODUCED BY $K^\pm$ BEAM

NODE=M013M2

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1523.4± 1.3 OUR AVERAGE Includes data from the datablock that follows this one. Error includes scale factor of 1.1.					
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		[4] BARKOV	99	SPEC	$40\ K^- p \to K^0_S K^0_S y$

PRODUCED IN $e^+ e^-$ ANNIHILATION

NODE=M013M3

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
The data in this block is included in the average printed for a previous datablock.					
1520.7± 2.0 OUR AVERAGE					
1521 ± 5		ABLIKIM	05	BES2	$J/\psi \to \phi K^+ K^-$
$1518 \pm 1 \pm 3$		ABE	04	BELL	$10.6\ e^+ e^- \to e^+ e^- K^+ K^-$
$1519 \pm 2 ^{+15}_{-5}$		BAI	03G	BES	$J/\psi \to \gamma K \overline{K}$
1523 ± 6	331	[5] ACCIARRI	01H	L3	$91, 183\text{–}209\ e^+ e^- \to e^+ e^- K^0_S K^0_S$
$1535 \pm 5 \pm 4$		ABREU	96C	DLPH	$Z^0 \to K^+ K^- + X$
$1516 \pm 5 ^{+9}_{-15}$		BAI	96C	BES	$J/\psi \to \gamma K^+ K^-$
1531.6 ± 10.0		AUGUSTIN	88	DM2	$J/\psi \to \gamma K^+ K^-$
1515 ± 5		[6] FALVARD	88	DM2	$J/\psi \to \phi K^+ K^-$
$1525 \pm 10 \pm 10$		BALTRUSAIT...	87	MRK3	$J/\psi \to \gamma K^+ K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1523 ± 5	870	[7] SCHEGELSKY	06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$
1496 ± 2		[8] FALVARD	88	DM2	$J/\psi \to \phi K^+ K^-$

OCCUR=2

PRODUCED IN $\overline{p}p$ ANNIHILATION

NODE=M013M9

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1530 ± 12	[9] ANISOVICH	09	RVUE	$0.0\ \overline{p}p, \pi N$
1513 ± 4	AMSLER	06	CBAR	$0.9\ \overline{p}p \to K^+ K^- \pi^0$
1508 ± 9	[10] AMSLER	02	CBAR	$0.9\ \overline{p}p \to \pi^0 \eta\eta, \pi^0\pi^0\pi^0$

CENTRAL PRODUCTION

NODE=M013M4

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1515±15	BARBERIS	99	OMEG	450 $pp \rightarrow p_s p_f K^+ K^-$

PRODUCED IN ep COLLISIONS

NODE=M013M10

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{1512 \pm 3^{+1.4}_{-0.5}}$		[11] CHEKANOV	08	ZEUS	$ep \rightarrow K^0_S K^0_S X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1537^{+9}_{-8}	84	[12] CHEKANOV	04	ZEUS	$ep \rightarrow K^0_S K^0_S X$

[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
[4] Systematic errors not estimated. NODE=M013M2;LINKAGE=SK
[5] Supersedes ACCIARRI 95J. NODE=M013M;LINKAGE=HA
[6] From an analysis ignoring interference with $f_0(1710)$. NODE=M013M;LINKAGE=F1
[7] From analysis of L3 data at 91 and 183–209 GeV. NODE=M013M3;LINKAGE=SC
[8] From an analysis including interference with $f_0(1710)$. NODE=M013M;LINKAGE=F2
[9] 4-poles, 5-channel K matrix fit. NODE=M013M9;LINKAGE=AN
[10] T-matrix pole. NODE=M013M;LINKAGE=TT
[11] 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
[12] Systematic errors not estimated. NODE=M013M10;LINKAGE=CH

$f'_2(1525)$ WIDTH

NODE=M013210

NODE=M013WX

VALUE (MeV)	DOCUMENT ID		COMMENT
$\mathbf{73^{+6}_{-5}}$ **OUR FIT**			
76±10	PDG	90	For fitting

PRODUCED BY PION BEAM

NODE=M013W1

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
102±42	TIKHOMIROV	03	SPEC	40.0 $\pi^- C \rightarrow K^0_S K^0_S K^0_L X$
108^{+5}_{-2}	[13] LONGACRE	86	MPS	22 $\pi^- p \rightarrow K^0_S K^0_S n$
69^{+22}_{-16}	[14] CHABAUD	81	ASPK	6 $\pi^- p \rightarrow K^+ K^- n$
137^{+23}_{-21}	CHABAUD	81	ASPK	18.4 $\pi^- p \rightarrow K^+ K^- n$ OCCUR=2
150^{+83}_{-50}	GORLICH	80	ASPK	17 $\pi^- p$polarized $\rightarrow K^+ K^- n$
165±42	[15] CORDEN	79	OMEG	12–15 $\pi^- p \rightarrow \pi^+ \pi^- n$
92^{+39}_{-22}	[16] POLYCHRO...	79	STRC	7 $\pi^- p \rightarrow n K^0_S K^0_S$

PRODUCED BY $K^\pm$ BEAM

NODE=M013W2

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
80.2± 2.6 OUR AVERAGE	Includes data from the datablock that follows this one.				
90 ±12		ASTON	88D	LASS	11 $K^- p \rightarrow K^0_S K^0_S \Lambda$
73 ±18		BOLONKIN	86	SPEC	40 $K^- p \rightarrow K^0_S K^0_S Y$
83 ±15		ARMSTRONG	83B	OMEG	18.5 $K^- p \rightarrow K^- K^+ \Lambda$
85 ±16	650	AGUILAR-...	81B	HBC	4.2 $K^- p \rightarrow \Lambda K^+ K^-$
80^{+14}_{-11}	572	ALHARRAN	81	HBC	8.25 $K^- p \rightarrow \Lambda K \overline{K}$
72 ±25	166	EVANGELIS...	77	OMEG	10 $K^- p \rightarrow K^+ K^- (\Lambda, \Sigma)$
69 ±22	100	AGUILAR-...	72B	HBC	3.9,4.6 $K^- p \rightarrow K \overline{K} (\Lambda, \Sigma)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
92^{+25}_{-16}	61	BINON	07	GAMS	32.5 $K^- p \rightarrow \eta\eta(\Lambda/\Sigma^0)$
75 ±20		[17] BARKOV	99	SPEC	40 $K^- p \rightarrow K^0_S K^0_S y$
62^{+19}_{-14}	123	BARREIRO	77	HBC	4.15 $K^- p \rightarrow \Lambda K^0_S K^0_S$
61 ± 8	120	BRANDENB...	76C	ASPK	13 $K^- p \rightarrow K^+ K^- (\Lambda, \Sigma)$

PRODUCED IN e^+e^- ANNIHILATION

NODE=M013W3
NODE=M013W3

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
The data in this block is included in the average printed for a previous datablock.				
79.9± 3.3 OUR AVERAGE Error includes scale factor of 1.1.				
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 ± 4 $^{+15}_{-5}$		BAI 03G	BES	$J/\psi \to \gamma K \overline{K}$
100 ±15	331	[18] 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	$J/\psi \to \gamma K^+ K^-$
62 ±10		[19] FALVARD 88	DM2	$J/\psi \to \phi K^+ K^-$
85 ±35		BALTRUSAIT...87	MRK3	$J/\psi \to \gamma K^+ K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
104 ±10	870	[20] SCHEGELSKY 06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$
100 ± 3		[21] FALVARD 88	DM2	$J/\psi \to \phi K^+ K^-$

OCCUR=2

PRODUCED IN $\overline{p}p$ ANNIHILATION

NODE=M013W9
NODE=M013W9

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
79± 8	[22] 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. • • •			
128±20	[23] ANISOVICH 09	RVUE	0.0 $\overline{p}p$, πN
76± 6	AMSLER 06	CBAR	0.9 $\overline{p}p \to K^+K^-\pi^0$

CENTRAL PRODUCTION

NODE=M013W4
NODE=M013W4

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
70±25	BARBERIS 99	OMEG	450 $pp \to p_s p_f K^+ K^-$

PRODUCED IN ep COLLISIONS

NODE=M013W10
NODE=M013W10

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
83± 9$^{+5}_{-4}$		[24] 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	[25] CHEKANOV 04	ZEUS	$ep \to K^0_S K^0_S X$

[13] From a partial-wave analysis of data using a K-matrix formalism with 5 poles. NODE=M013W;LINKAGE=L

[14] CHABAUD 81 is a reanalysis of PAWLICKI 77 data. NODE=M013W;LINKAGE=D

[15] 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

[16] From a fit to the D with $f_2(1270)$-$f'_2(1525)$ interference. Mass fixed at 1516 MeV. NODE=M013W;LINKAGE=M

[17] Systematic errors not estimated. NODE=M013W2;LINKAGE=SK

[18] Supersedes ACCIARRI 95J. NODE=M013W;LINKAGE=HA

[19] From an analysis ignoring interference with $f_0(1710)$. NODE=M013W;LINKAGE=F1

[20] From analysis of L3 data at 91 and 183–209 GeV. NODE=M013W3;LINKAGE=SC

[21] From an analysis including interference with $f_0(1710)$. NODE=M013W;LINKAGE=F2

[22] T-matrix pole. NODE=M013W;LINKAGE=TT

[23] 4-poles, 5-channel K matrix fit. NODE=M013W9;LINKAGE=AN

[24] 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

[25] Systematic errors not estimated. NODE=M013W10;LINKAGE=CH

$f'_2(1525)$ DECAY MODES

NODE=M013215;NODE=M013

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$K\overline{K}$	(88.7 ±2.2) %	DESIG=2
Γ_2	$\eta\eta$	(10.4 ±2.2) %	DESIG=4
Γ_3	$\pi\pi$	(8.2 ±1.5) $\times 10^{-3}$	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	$\gamma\gamma$	(1.11±0.14) $\times 10^{-6}$	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 16 measurements and one constraint to determine 5 parameters. The overall fit has a $\chi^2 = 14.0$ 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, $x_i \equiv \Gamma_i/\Gamma_{\rm total}$. 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	−6	6	1	
Γ	−23	23	−1	−55
	x_1	x_2	x_3	x_8

	Mode	Rate (MeV)	
Γ_1	$K\overline{K}$	$65\ ^{+5}_{-4}$	DESIG=2
Γ_2	$\eta\eta$	$7.6\ \pm 1.8$	DESIG=4
Γ_3	$\pi\pi$	0.60 ± 0.12	DESIG=1
Γ_8	$\gamma\gamma$	$(8.1\ \pm 0.9\ ) \times 10^{-5}$	DESIG=8

$f'_2(1525)$ PARTIAL WIDTHS

NODE=M013220

$\Gamma(K\overline{K})$ Γ_1

NODE=M013W6

NODE=M013W6

VALUE (MeV)	*DOCUMENT ID*	*TECN*	*COMMENT*
$\mathbf{65^{+5}_{-4}}$ **OUR FIT**			
$\mathbf{63^{+6}_{-5}}$	[26] LONGACRE 86	MPS	$22\ \pi^- p \rightarrow K^0_S K^0_S n$

$\Gamma(\eta\eta)$ Γ_2

NODE=M013W7

NODE=M013W7

VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
7.6±1.8 OUR FIT				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
5.0±0.8	870	[27] SCHEGELSKY 06A	RVUE	$\gamma\gamma \rightarrow K^0_S K^0_S$
$24\ ^{+3}_{-1}$		[26] LONGACRE 86	MPS	$22\ \pi^- p \rightarrow K^0_S K^0_S n$

$\Gamma(\pi\pi)$ Γ_3

NODE=M013W5

NODE=M013W5

VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
0.60±0.12 OUR FIT				
$\mathbf{1.4\ ^{+1.0}_{-0.5}}$		[26] LONGACRE 86	MPS	$22\ \pi^- p \rightarrow K^0_S K^0_S n$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.2\ ^{+1.0}_{-0.2}$	870	[27] SCHEGELSKY 06A	RVUE	$\gamma\gamma \rightarrow K^0_S K^0_S$

$\Gamma(\gamma\gamma)$ Γ_8

NODE=M013W8

NODE=M013W8

VALUE (keV)	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
0.081±0.009 OUR FIT				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.13 ±0.03	870	[27] SCHEGELSKY 06A	RVUE	$\gamma\gamma \rightarrow K^0_S K^0_S$

[26] From a partial-wave analysis of data using a K-matrix formalism with 5 poles. NODE=M013PW;LINKAGE=L

[27] From analysis of L3 data at 91 and 183–209 GeV, using $\Gamma(f'_2(1525) \rightarrow K\overline{K}) = 68$ MeV and SU(3) relations. NODE=M013W8;LINKAGE=SC

$f_2'(1525)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(total)$

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					
0.0564±0.0048±0.0116		ABE	04	BELL	10.6 $e^+e^- \to e^+e^- K^+K^-$
0.076 ±0.006 ±0.011	331	[28] ACCIARRI	01H	L3	$e^+e^- \to e^+e^- K_S^0 K_S^0$
0.067 ±0.008 ±0.015		[29] ALBRECHT	90G	ARG	$e^+e^- \to e^+e^- K^+K^-$
0.11 $^{+0.03}_{-0.02}$ ±0.02		BEHREND	89C	CELL	$e^+e^- \to e^+e^- K_S^0 K_S^0$
0.10 $^{+0.04}_{-0.03}$ $^{+0.03}_{-0.02}$		BERGER	88	PLUT	$e^+e^- \to e^+e^- K_S^0 K_S^0$
0.12 ±0.07 ±0.04		[29] AIHARA	86B	TPC	$e^+e^- \to e^+e^- K^+K^-$
0.11 ±0.02 ±0.04		[29] 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±0.0050±0.0077		[30] ALBRECHT	90G	ARG	$e^+e^- \to e^+e^- K^+K^-$

OCCUR=2

[28] Supersedes ACCIARRI 95J. From analysis of L3 data at 91 and 183–209 GeV,
NODE=M013G;LINKAGE=HA

[29] Using an incoherent background.
NODE=M013G1;LINKAGE=A

[30] 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
NODE=M013R8

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	UEHARA	10A	BELL	10.6 $e^+e^- \to e^+e^- \eta\eta$
0.10±0.03	[31] PROKOSHKIN	91	GAM4	300 $\pi^- p \to \pi^- p \eta\eta$

[31] 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
NODE=M013R3

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.118±0.028 OUR FIT						
0.115±0.028 OUR AVERAGE						
0.119±0.015±0.036		61	[32] BINON	07	GAMS	32.5 $K^- p \to \eta\eta(\Lambda/\Sigma^0)$
0.11 ±0.04			[33] 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 $K^- p$

[32] Using the compilation of the cross sections for $f_2'(1525)$ production in $K^- p$ collisions from ASTON 88D.
NODE=M013R3;LINKAGE=BI

[33] 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
NODE=M013R1

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
0.0082±0.0016 OUR FIT					
0.0075±0.0016 OUR AVERAGE					
0.007 ±0.002		COSTA...	80	OMEG	10 $\pi^- p \to K^+K^- n$
0.027 $^{+0.071}_{-0.013}$		[34] GORLICH	80	ASPK	17,18 $\pi^- p$
0.0075±0.0025		[34,35] MARTIN	79	RVUE	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.06	95	AGUILAR-...	81B	HBC	4.2 $K^- p \to \Lambda K^+ K^-$
0.19 ±0.03		CORDEN	79	OMEG	12–15 $\pi^- p \to \pi^+\pi^- n$
<0.045	95	BARREIRO	77	HBC	4.15 $K^- p \to \Lambda K_S^0 K_S^0$
0.012 ±0.004		[34] PAWLICKI	77	SPEC	6 $\pi N \to K^+K^- N$
<0.063	90	BRANDENB...	76C	ASPK	13 $K^- p \to K^+K^-(\Lambda,\Sigma)$
<0.0086		[34] BEUSCH	75B	OSPK	8.9 $\pi^- p \to K^0\overline{K}^0 n$

[34] Assuming that the $f_2'(1525)$ is produced by an one-pion exchange production mechanism.
NODE=M013R1;LINKAGE=C

[35] 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

$\Gamma(\pi\pi)/\Gamma(K\overline{K})$ — Γ_3/Γ_1

NODE=M013R7

VALUE	DOCUMENT ID		TECN	COMMENT
0.0092±0.0018 OUR FIT				
0.075 ±0.035	AUGUSTIN	87	DM2	$J/\psi \to \gamma\pi^+\pi^-$

$\left[\Gamma(K\overline{K}^*(892)+\text{c.c.}) + \Gamma(\pi K\overline{K})\right]/\Gamma(K\overline{K})$ — $(\Gamma_4+\Gamma_5)/\Gamma_1$

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

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

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

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 F. Binon *et al.* (GAMS Collab.) REFID=52057
Translated from YAF 70 1758.
AMSLER 06 PL B639 165 C. Amsler *et al.* (CBAR 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 G.D. Tikhomirov *et al.* REFID=49423
Translated from YAF 66 860.
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 B.P. Barkov *et al.* REFID=47379
Translated from ZETFP 70 242.
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 Y.D. Prokoshkin (GAM2, GAM4 Collab.) REFID=41719
Translated from DANS 316 900.
ALBRECHT 90G ZPHY C48 183 H. Albrecht *et al.* (ARGUS Collab.) REFID=41374
PDG 90 PL B239 1 J.J. Hernandez *et al.* (IFIC, BOST, CIT+) REFID=40744
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 B.V. Bolonkin *et al.* (ITEP) JP REFID=44646
Translated from YAF 43 1211.
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
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 de Beauregard *et al.* (BARI, BONN+) 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
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.

NODE=M123

$f_2(1565)$ MASS

NODE=M123M

NODE=M123M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1562±13 OUR AVERAGE	Error includes scale factor of 2.1. See the ideogram below.			
1590±10	[1] AMELIN	06	VES	36 $\pi^- p \to \omega\omega n$
1552±13	[2] AMSLER	02	CBAR	0.9 $\overline{p}p \to \pi^0\eta\eta$, $\pi^0\pi^0\pi^0$
1550±10±20	AMELIN	00	VES	37 $\pi^- p \to \eta\pi^+\pi^- n$
1575±18	BERTIN	98	OBLX	0.05–0.405 $\overline{n}p \to \pi^+\pi^+\pi^-$
1507±15	[2] BERTIN	97C	OBLX	0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$
1565±20	MAY	90	ASTE	0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1560±15	[3] ANISOVICH	09	RVUE	0.0 $\overline{p}p$, πN
1598±11± 9	BAKER	99B	SPEC	0 $\overline{p}p \to \omega\omega\pi^0$
1534±20	[4] ABELE	96C	RVUE	Compilation
∼ 1552	[5] 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}	[6] 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	[7] ARMSTRONG	93C	E760	$\overline{p}p \to \pi^0\eta\eta \to 6\gamma$
1508±10	[7] ARMSTRONG	93D	E760	$\overline{p}p \to 3\pi^0 \to 6\gamma$
1525±10	[7] ARMSTRONG	93D	E760	$\overline{p}p \to \eta\pi^0\pi^0 \to 6\gamma$
∼ 1504	[8] WEIDENAUER	93	ASTE	0.0 $\overline{p}N \to 3\pi^- 2\pi^+$
1540±15	[7] ADAMO	92	OBLX	$\overline{n}p \to \pi^+\pi^+\pi^-$
1515±10	[9] AKER	91	CBAR	0.0 $\overline{p}p \to 3\pi^0$
1477± 5	BRIDGES	86C	DBC	0.0 $\overline{p}N \to 3\pi^- 2\pi^+$

OCCUR=2

[1] Supersedes the $\omega\omega$ state of BELADIDZE 92B earlier assigned to the $f_2(1640)$. NODE=M123M;LINKAGE=AM

[2] T-matrix pole. NODE=M123M;LINKAGE=G

[3] On sheet II in a two-pole solution. NODE=M123M;LINKAGE=AN

[4] T-matrix pole, large coupling to $\rho\rho$ and $\omega\omega$, could be $f_2(1640)$. NODE=M123M;LINKAGE=AA

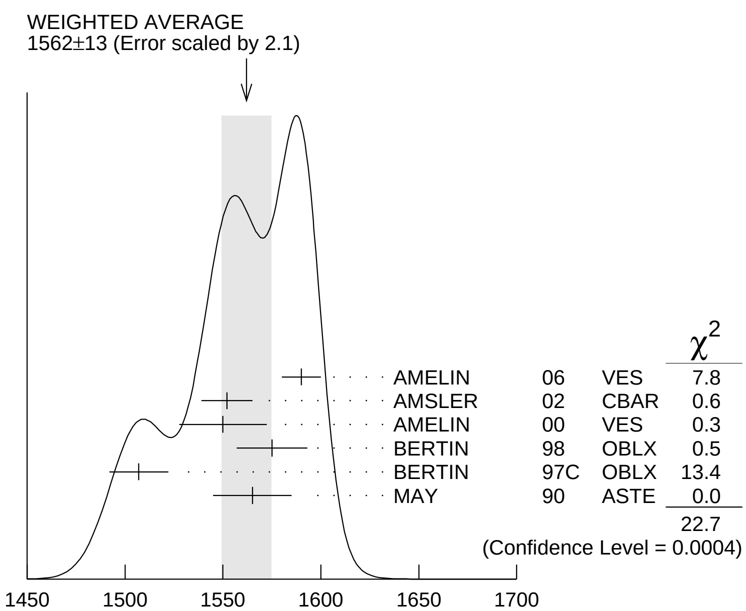
[5] Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D. NODE=M123M;LINKAGE=AB

[6] 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

[7] J^P not determined, could be partly $f_0(1500)$. NODE=M123M;LINKAGE=E

[8] J^P not determined. NODE=M123M;LINKAGE=F

[9] Superseded by AMSLER 95B. NODE=M123M;LINKAGE=BA



$f_2(1565)$ mass (MeV)

$f_2(1565)$ WIDTH

NODE=M123W

NODE=M123W

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
134± 8 OUR AVERAGE			
140± 11	[10] AMELIN 06	VES	36 $\pi^- p \to \omega\omega n$
113± 23	[11] AMSLER 02	CBAR	0.9 $\overline{p}p \to \pi^0\eta\eta$, $\pi^0\pi^0\pi^0$
130± 20±40	AMELIN 00	VES	37 $\pi^- p \to \eta\pi^+\pi^- n$
119± 24	BERTIN 98	OBLX	0.05–0.405 $\overline{n}p \to \pi^+\pi^+\pi^-$
130± 20	[11] BERTIN 97C	OBLX	0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$
170± 40	MAY 90	ASTE	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
180± 60	[13] ABELE 96C	RVUE	Compilation
∼ 142	[14] 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 $\pi^- C \to K^0_S K^0_S X$
166^{+80}_{-20}	[15] ANISOVICH 94	CBAR	0.0 $\overline{p}p \to 3\pi^0, \eta\eta\pi^0$
130± 10	[16] ADAMO 93	OBLX	$\overline{n}p \to \pi^+\pi^+\pi^-$
148± 27	[17] ARMSTRONG 93C	E760	$\overline{p}p \to \pi^0\eta\eta \to 6\gamma$
103± 15	[17] ARMSTRONG 93D	E760	$\overline{p}p \to 3\pi^0 \to 6\gamma$
111± 10	[17] ARMSTRONG 93D	E760	$\overline{p}p \to \eta\pi^0\pi^0 \to 6\gamma$
∼ 206	[18] WEIDENAUER 93	ASTE	0.0 $\overline{p}N \to 3\pi^- 2\pi^+$
132± 37	[17] ADAMO 92	OBLX	$\overline{n}p \to \pi^+\pi^+\pi^-$
120± 10	[19] AKER 91	CBAR	0.0 $\overline{p}p \to 3\pi^0$
116± 9	BRIDGES 86C	DBC	0.0 $\overline{p}N \to 3\pi^- 2\pi^+$

OCCUR=2

[10] Supersedes the $\omega\omega$ state of BELADIDZE 92B earlier assigned to the $f_2(1640)$. NODE=M123W;LINKAGE=AM

[11] T-matrix pole. NODE=M123W;LINKAGE=G

[12] On sheet II in a two-pole solution. NODE=M123W;LINKAGE=AN

[13] T-matrix pole, large coupling to $\rho\rho$ and $\omega\omega$, could be $f_2(1640)$. NODE=M123W;LINKAGE=CC

[14] Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D. NODE=M123W;LINKAGE=AB

[15] From a simultaneous analysis of the annihilations $\overline{p}p \to 3\pi^0, \pi^0\eta\eta$ including AKER 91 data. NODE=M123W;LINKAGE=D

[16] Supersedes ADAMO 92. NODE=M123W;LINKAGE=C

[17] J^P not determined, could be partly $f_0(1500)$. NODE=M123W;LINKAGE=E

[18] J^P not determined. NODE=M123W;LINKAGE=F

[19] Superseded by AMSLER 95B. 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;→ NOT CHECKED ←
Γ_2	$\pi^+\pi^-$	seen	DESIG=1;OUR EST;→ NOT CHECKED ←
Γ_3	$\pi^0\pi^0$	seen	DESIG=3;OUR EST;→ NOT CHECKED ←
Γ_4	$\rho^0\rho^0$	seen	DESIG=2;OUR EST;→ NOT CHECKED ←
Γ_5	$2\pi^+ 2\pi^-$	seen	DESIG=5;OUR EST;→ NOT CHECKED ←
Γ_6	$\eta\eta$	seen	DESIG=4;OUR EST;→ NOT CHECKED ←
Γ_7	$a_2(1320)\pi$		DESIG=8
Γ_8	$\omega\omega$	seen	DESIG=7;OUR EST;→ NOT CHECKED ←
Γ_9	$K\overline{K}$		DESIG=9
Γ_{10}	$\gamma\gamma$		DESIG=10

$f_2(1565)$ 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	[20] SCHEGELSKY 06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$

$\Gamma(K\overline{K})$ Γ_9

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	[20] SCHEGELSKY 06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$

$\Gamma(\gamma\gamma)$ Γ_{10}

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	[20] SCHEGELSKY	06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$

[20] 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	[21] ANISOVICH	94B	RVUE	$\overline{p}p \to \pi^+\pi^-\pi^0$
seen	MAY	89	ASTE	$\overline{p}p \to \pi^+\pi^-\pi^0$

[21] 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. • • •				
$0.024\pm0.005\pm0.012$	[22] ARMSTRONG	93C	E760	$\overline{p}p \to \pi^0\eta\eta \to 6\gamma$

[22] J^P not determined, could be partly $f_0(1500)$.

NODE=M123R4;LINKAGE=E

$\Gamma(\omega\omega)/\Gamma_{total}$ Γ_8/Γ

NODE=M123R6
NODE=M123R6

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	BAKER	99B	SPEC	$0\ \overline{p}p \to \omega\omega\pi^0$

$f_2(1565)$ 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 our mini-review under the $\rho(1700)$.

NODE=M188

$\rho(1570)$ MASS

NODE=M188M

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. • • •					
1480±40		[2] BITYUKOV	87	SPEC	32.5 $\pi^- p \to \phi\pi^0 n$

[1] From the fit with two resonances.
[2] Systematic errors not estimated.

NODE=M188M;LINKAGE=AU
NODE=M188M;LINKAGE=BI

$\rho(1570)$ WIDTH

NODE=M188W

NODE=M188W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
144±75±43	54	[3] AUBERT	08S	BABR	10.6 $e^+e^- \to \phi\pi^0\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
130±60		[4] BITYUKOV	87	SPEC	32.5 $\pi^- p \to \phi\pi^0 n$

[3] From the fit with two resonances.
[4] Systematic errors not estimated.

NODE=M188W;LINKAGE=AU
NODE=M188W;LINKAGE=BI

$\rho(1570)$ DECAY MODES

NODE=M188215;NODE=M188

	Mode	Fraction (Γ_i/Γ)
Γ_1	e^+e^-	
Γ_2	$\phi\pi$	not seen
Γ_3	$\omega\pi$	

DESIG=1
DESIG=2
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
NODE=M188G01

VALUE (eV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
3.5±0.9±0.3		54	[5] 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		[6] AULCHENKO	87B	ND	$e^+e^- \to K_S^0 K_L^0 \pi^0$

[5] From the fit with two resonances.
[6] 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
NODE=M188R01

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	ABELE	97H	CBAR	$\bar{p}p \to K_L^0 K_S^0 \pi^0\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.01	[7] DONNACHIE	91	RVUE	

[7] 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
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

AUBERT 08S PR D77 092002 B. Aubert *et al.* (BABAR Collab.) REFID=52242
ABELE 97H PL B415 280 A. Abele *et al.* (Crystal Barrel Collab.) REFID=45765
BISELLO 91B NPBPS B21 111 D. Bisello (DM2 Collab.) REFID=41752
DONNACHIE 91 ZPHY C51 689 A. Donnachie, A.B. Clegg (MCHS, LANC) REFID=41632
ALBRECHT 87L PL B185 223 H. Albrecht *et al.* (ARGUS Collab.) REFID=40418
AULCHENKO 87B JETPL 45 145 V.M. Aulchenko *et al.* (NOVO) REFID=41373
Translated from ZETFP 45 118.
BITYUKOV 87 PL B188 383 S.I. Bityukov *et al.* (SERP) REFID=40011
DOLINSKY 86 PL B174 453 S.I. Dolinsky *et al.* (NOVO) 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;→ NOT CHECKED ←

$h_1(1595)$ REFERENCES

NODE=M166

EUGENIO 01 PL B497 190 P. Eugenio *et al.*

REFID=48010

NODE=M164

$\pi_1(1600)$

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

$\pi_1(1600)$ MASS

NODE=M164M

NODE=M164M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
$\mathbf{1662^{+\ 8}_{-\ 9}}$ **OUR AVERAGE**					
$1660 \pm 10^{+\ 0}_{-64}$	420k	ALEKSEEV	10	COMP	190 $\pi^- Pb \to \pi^-\pi^-\pi^+ Pb'$
$1664 \pm\ 8 \pm 10$	145k	[1] LU	05	B852	18 $\pi^- p \to \omega\pi^-\pi^0 p$
$1709 \pm 24 \pm 41$	69k	[2] KUHN	04	B852	18 $\pi^- p \to \eta\pi^+\pi^-\pi^- p$
$1597 \pm 10^{+45}_{-10}$		[2] IVANOV	01	B852	18 $\pi^- p \to \eta'\pi^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1593 \pm\ 8^{+29}_{-47}$		[2,3] ADAMS	98B	B852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$

[1] May be a different state: natural and unnatural parity exchanges.
NODE=M164M;LINKAGE=LU

[2] Natural parity exchange.
NODE=M164M;LINKAGE=A

[3] 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

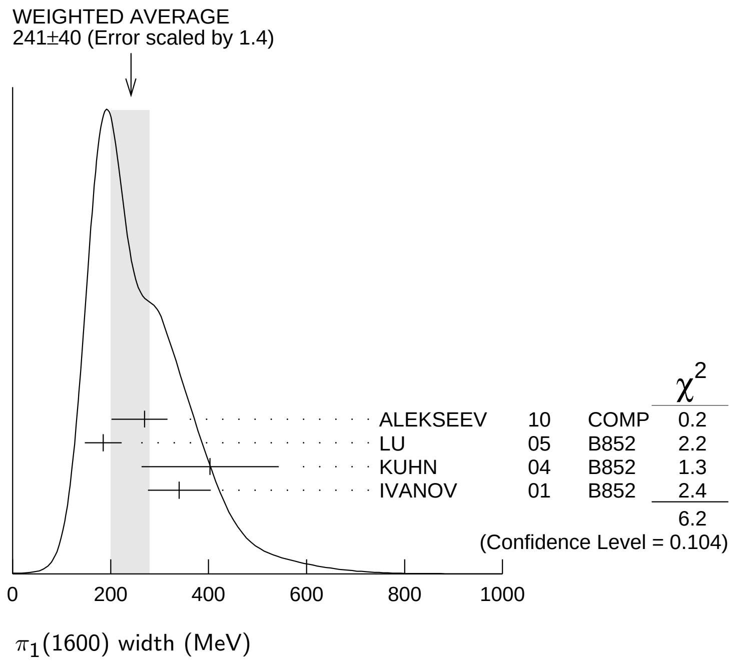
$\pi_1(1600)$ WIDTH

NODE=M164W

NODE=M164W

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
$\mathbf{241 \pm 40}$ **OUR AVERAGE**	Error includes scale factor of 1.4. See the ideogram below.				
$269 \pm 21^{+\ 42}_{-\ 64}$	420k	ALEKSEEV	10	COMP	190 $\pi^- Pb \to \pi^-\pi^-\pi^+ Pb'$
$185 \pm 25 \pm\ 28$	145k	[4] LU	05	B852	18 $\pi^- p \to \omega\pi^-\pi^0 p$
$403 \pm 80 \pm 115$	69k	[5] KUHN	04	B852	18 $\pi^- p \to \eta\pi^+\pi^-\pi^- p$
$340 \pm 40 \pm\ 50$		[5] IVANOV	01	B852	18 $\pi^- p \to \eta'\pi^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$168 \pm 20^{+150}_{-\ 12}$		[5,6] ADAMS	98B	B852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$

[4] May be a different state: natural and unnatural parity exchanges. NODE=M164W;LINKAGE=LU
[5] Natural parity exchange. NODE=M164W;LINKAGE=A
[6] 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



$\pi_1(1600)$ DECAY MODES

NODE=M164215;NODE=M164

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\pi\pi\pi$	not seen	DESIG=1;OUR EST;→ NOT CHECKED ←
Γ_2	$\rho^0\pi^-$	not 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	$f_1(1285)\pi$	seen	DESIG=6;OUR EST;→ NOT CHECKED ←

$\pi_1(1600)$ BRANCHING RATIOS

NODE=M164220

$\Gamma(\rho^0\pi^-)/\Gamma_{total}$ — Γ_2/Γ

NODE=M164R1
NODE=M164R1

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	NOZAR	09	CLAS	$\gamma p \to 2\pi^+\pi^- n$
not seen	[7] DZIERBA	06	B852	18 $\pi^- p$

[7] 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	[8] DZIERBA	06	B852	18 $\pi^- p$

[8] 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	[9] 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 $\pi^- p \to \omega\pi^-\pi^0 p$

[9] $B((b_1\pi)_{D-wave})/B((b_1\pi)_{S\text{-wave}})=0.3 \pm 0.1$. 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 $\pi^- p \to \eta'\pi^- p$

$\Gamma(f_1(1285)\pi)/\Gamma(\eta'(958)\pi^-)$ Γ_6/Γ_5

NODE=M164R5
NODE=M164R5

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
3.80±0.78	69k	[10] KUHN 04	B852	18 $\pi^- p \rightarrow \eta\pi^+\pi^-\pi^- p$

[10] Using $\eta'(958)\pi$ data from IVANOV 01.

NODE=M164R;LINKAGE=KU

$\pi_1(1600)$ REFERENCES

NODE=M164

ALEKSEEV	10	PRL 104 241803	M.G. Alekseev *et al.*	(COMPASS Collab.)	REFID=53356
NOZAR	09	PRL 102 102002	M. Nozar *et al.*	(CLAS Collab.)	REFID=52758
DZIERBA	06	PR D73 072001	A.R. Dzierba *et al.*	(BNL E852 Collab.)	REFID=51077
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
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
IVANOV	01	PRL 86 3977	E.I. Ivanov *et al.*	(BNL E852 Collab.)	REFID=48317
ADAMS	98B	PRL 81 5760	G.S. Adams *et al.*	(BNL E852 Collab.)	REFID=46610

NODE=M161

$a_1(1640)$

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

OMITTED FROM SUMMARY TABLE

Seen in the amplitude analysis of the $3\pi^0$ system produced in $\overline{p}p \rightarrow 4\pi^0$. Possibly seen in the study of the hadronic structure in decay $\tau \rightarrow 3\pi\nu_\tau$ (ABREU 98G and ASNER 00). Needs confirmation.

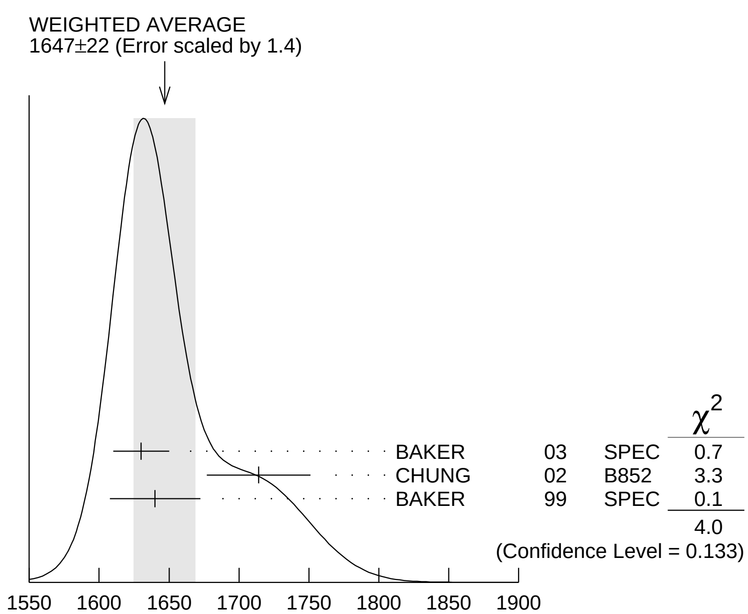
NODE=M161

$a_1(1640)$ MASS

NODE=M161M

NODE=M161M

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
1647±22 OUR AVERAGE		Error includes scale factor of 1.4. See the ideogram below.		
1630±20	35280	[1] BAKER 03	SPEC	$\overline{p}p \rightarrow \omega\pi^+\pi^-\pi^0$
1714± 9±36		CHUNG 02	B852	18.3 $\pi^- p \rightarrow \pi^+\pi^-\pi^- p$
1640±12±30		BAKER 99	SPEC	1.94 $\overline{p}p \rightarrow 4\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1670±90		BELLINI 85	SPEC	40 $\pi^- A \rightarrow \pi^-\pi^+\pi^- A$



$a_1(1640)$ mass (MeV)

[1] 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± 27 OUR AVERAGE		Error includes scale factor of 1.1.		
225± 30	35280	[2] BAKER 03	SPEC	$\overline{p}p \rightarrow \omega\pi^+\pi^-\pi^0$
308± 37±62		CHUNG 02	B852	18.3 $\pi^- p \rightarrow \pi^+\pi^-\pi^- p$
300± 22±40		BAKER 99	SPEC	1.94 $\overline{p}p \rightarrow 4\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
300±100		BELLINI 85	SPEC	40 $\pi^- A \rightarrow \pi^-\pi^+\pi^- A$

[2] Using the $a_1(1260)$ mass and width results of BOWLER 88. 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;→ NOT CHECKED ←
Γ_2	$f_2(1270)\pi$	seen	DESIG=1;OUR EST;→ NOT CHECKED ←
Γ_3	$\sigma\pi$	seen	DESIG=2;OUR EST;→ NOT CHECKED ←
Γ_4	$\rho\pi_{S-wave}$	seen	DESIG=7;OUR EST;→ NOT CHECKED ←
Γ_5	$\rho\pi_{D-wave}$	seen	DESIG=4;OUR EST;→ NOT CHECKED ←
Γ_6	$\omega\pi\pi$	seen	DESIG=5;OUR EST;→ NOT CHECKED ←
Γ_7	$f_1(1285)\pi$	seen	DESIG=6;OUR EST;→ NOT CHECKED ←
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
• • • We do not use the following data for averages, fits, limits, etc. • • •				
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

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	CHUNG	02	B852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$
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

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	35280	[3] BAKER	03	SPEC	$\overline{p}p \to \omega\pi^+\pi^-\pi^0$

$\Gamma(f_1(1285)\pi)/\Gamma_{total}$ — Γ_7/Γ

NODE=M161R4
NODE=M161R4

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
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
NODE=M161R5

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	KUHN	04	B852	18 $\pi^- p \to \eta\pi^+\pi^-\pi^- p$

[3] Assuming the $\omega\rho$ mechanism for the $\omega\pi\pi$ state. NODE=M161R;LINKAGE=KB

$a_1(1640)$ REFERENCES

NODE=M161

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

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

NODE=M117W

VALUE (MeV)	CL%	DOCUMENT ID		TECN	COMMENT
$\mathbf{99^{+60}_{-40}}$ **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;→ NOT CHECKED ←
Γ_2	4π	seen	DESIG=2;OUR EST;→ NOT CHECKED ←
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
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.*	(CBAR 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 $pp \to pp 2(\pi^+ \pi^-)$
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 $pp \to pp 2(\pi^+ \pi^-)$
$180^{+40}_{-21}\pm25$	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;→ NOT CHECKED ←
Γ_2	$K\overline{K}\pi$	seen	DESIG=2;OUR EST;→ NOT CHECKED ←
Γ_3	$K^*\overline{K}$	seen	DESIG=3;OUR EST;→ NOT CHECKED ←
Γ_4	$\eta\pi^+\pi^-$	seen	DESIG=4;OUR EST;→ NOT CHECKED ←
Γ_5	$a_0(980)\pi$	seen	DESIG=5;OUR EST;→ NOT CHECKED ←
Γ_6	$f_2(1270)\eta$	not seen	DESIG=6;OUR EST;→ NOT CHECKED ←

$\eta_2(1645)$ 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

$\omega(1650)$ $I^G(J^{PC}) = 0^-(1^{--})$

$\omega(1650)$ MASS

NODE=M126M

NODE=M126M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
1670± 30 OUR ESTIMATE						→ NOT CHECKED ←
• • • We do not use the following data for averages, fits, limits, etc. • • •						
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	[1] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$	
1619± 5		[2] 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	[3] AKHMETSHIN	00D	CMD2	$e^+e^- \to \omega\pi^+\pi^-$	OCCUR=2
1820^{+190}_{-150}		[4] ACHASOV	98H	RVUE	$e^+e^- \to \pi^+\pi^-\pi^0$	
1840^{+100}_{-70}		[5] ACHASOV	98H	RVUE	$e^+e^- \to \omega\pi^+\pi^-$	OCCUR=2
1780^{+170}_{-300}		[6] ACHASOV	98H	RVUE	$e^+e^- \to K^+K^-$	OCCUR=3
∼ 2100		[7] ACHASOV	98H	RVUE	$e^+e^- \to K^0_S K^\pm\pi^\mp$	OCCUR=4
1606± 9		[8] CLEGG	94	RVUE		OCCUR=5
1662± 13	750	[9] 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 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

[2] Using results of CORDIER 81 and preliminary data of DOLINSKY 91 and ANTONELLI 92. NODE=M126M;LINKAGE=AB

[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=M126M;LINKAGE=KI

[4] Using data from BARKOV 87, DOLINSKY 91, and ANTONELLI 92. NODE=M126M;LINKAGE=L1

[5] Using the data from ANTONELLI 92. NODE=M126M;LINKAGE=L2

[6] Using the data from IVANOV 81 and BISELLO 88B. NODE=M126M;LINKAGE=L3

[7] Using the data from BISELLO 91C. NODE=M126M;LINKAGE=L4

[8] From a fit to two Breit-Wigner functions and using the data of DOLINSKY 91 and ANTONELLI 92. NODE=M126M;LINKAGE=AD

[9] From the combined fit of the $\rho\pi$ and $\omega\pi\pi$ final states. NODE=M126M;LINKAGE=AE

$\omega(1650)$ WIDTH

NODE=M126W

NODE=M126W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
315± 35 OUR ESTIMATE						→ NOT CHECKED ←
• • • We do not use the following data for averages, fits, limits, etc. • • •						
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 $e^+e^- \to \pi^+\pi^-\pi^0\gamma$	
$490^{+200}_{-150}\pm130$	1.2M	[10] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$	
250± 14		[11] 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	[12] AKHMETSHIN	00D	CMD2	$e^+e^- \to \omega\pi^+\pi^-$	OCCUR=2
113± 20		[13] CLEGG	94	RVUE		OCCUR=5
280± 24	750	[14] ANTONELLI	92	DM2	1.34–2.4$e^+e^- \to \rho\pi, \omega\pi\pi$	OCCUR=4
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	$e^+e^- \to 3\pi$	

[10] 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
[11] Using results of CORDIER 81 and preliminary data of DOLINSKY 91 and ANTONELLI 92. NODE=M126W;LINKAGE=AB
[12] 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
[13] From a fit to two Breit-Wigner functions and using the data of DOLINSKY 91 and ANTONELLI 92. NODE=M126W;LINKAGE=AD
[14] 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;→ NOT CHECKED ←
Γ_2	$\omega\pi\pi$	seen	DESIG=2;OUR EST;→ NOT CHECKED ←
Γ_3	$\omega\eta$	seen	DESIG=4;OUR EST;→ NOT CHECKED ←
Γ_4	e^+e^-	seen	DESIG=3;OUR EST;→ NOT CHECKED ←

$\omega(1650)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma^2(\text{total})$

NODE=M126230

$\Gamma(\rho\pi)/\Gamma_{\text{total}} \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_1/\Gamma \times \Gamma_4/\Gamma$

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. • • •					
1.3 ±0.1 ±0.1		AUBERT,B	04N	BABR	10.6 $e^+e^- \rightarrow \pi^+\pi^-\pi^0\gamma$
1.2 $^{+0.4}_{-0.1}$ ±0.8	1.2M	[15,16] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$
0.921±0.230		[17,18] CLEGG	94	RVUE	
0.479±0.050	750	[19,20] ANTONELLI	92	DM2	1.34–2.4$e^+e^- \rightarrow \rho\pi, \omega\pi\pi$

$\Gamma(\omega\pi\pi)/\Gamma_{\text{total}} \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_2/\Gamma \times \Gamma_4/\Gamma$

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 $e^+e^- \rightarrow \omega\pi^+\pi^-\gamma$
4.1 ±0.9 ±1.3	1.2M	[15,16] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$
5.40±0.95		[21] AKHMETSHIN	00D	CMD2	1.2–1.38 $e^+e^- \rightarrow \omega\pi^+\pi^-$
3.18±0.80		[17,18] CLEGG	94	RVUE	
6.07±0.61	750	[19,20] ANTONELLI	92	DM2	1.34–2.4 $e^+e^- \rightarrow \rho\pi, \omega\pi\pi$

$\Gamma(\omega\eta)/\Gamma_{\text{total}} \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_3/\Gamma \times \Gamma_4/\Gamma$

NODE=M126G5
NODE=M126G5

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
0.57±0.06		13	AUBERT	06D	BABR	10.6 $e^+e^- \rightarrow \omega\eta\gamma$
<6	90		[22] AKHMETSHIN	03B	CMD2	$e^+e \rightarrow \eta\pi^0\gamma$

[15] Calculated by us from the cross section at the peak. NODE=M126G;LINKAGE=AW
[16] 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
[17] From a fit to two Breit-Wigner functions and using the data of DOLINSKY 91 and ANTONELLI 92. NODE=M126G;LINKAGE=AD
[18] From the partial and leptonic width given by the authors. NODE=M126G;LINKAGE=SE
[19] From the combined fit of the $\rho\pi$ and $\omega\pi\pi$ final states. NODE=M126G;LINKAGE=AE
[20] From the product of the leptonic width and partial branching ratio given by the authors. NODE=M126G;LINKAGE=ES
[21] 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=M126G;LINKAGE=KL
[22] $\omega(1650)$ mass and width fixed at 1700 MeV and 250 MeV, respectively. NODE=M126G5;LINKAGE=KH

$\omega(1650)$ BRANCHING RATIOS

NODE=M126225

$\Gamma(\omega\pi\pi)/\Gamma_{\text{total}}$ — Γ_2/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	[23] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$
0.620±0.014		[24] HENNER	02	RVUE	1.2–2.0 $e^+e^- \rightarrow \rho\pi, \omega\pi\pi$

$\Gamma(\rho\pi)/\Gamma_{total}$ Γ_1/Γ

NODE=M126R3

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$\sim$ 0.65	1.2M	[23] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
0.380 ± 0.014		[24] HENNER	02	RVUE	1.2–2.0 $e^+e^- \to \rho\pi, \omega\pi\pi$

$\Gamma(e^+e^-)/\Gamma_{total}$ Γ_4/Γ

NODE=M126R4

VALUE (units 10^{-7})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$\sim$ 18	1.2M	[24,25] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
32 ± 1		[24] HENNER	02	RVUE	1.2–2.0 $e^+e^- \to \rho\pi, \omega\pi\pi$

[23] 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

[24] Assuming that the $\omega(1650)$ decays into $\rho\pi$ and $\omega\pi\pi$ only. NODE=M126R;LINKAGE=AC

[25] Calculated by us from the cross section at the peak. NODE=M126R;LINKAGE=AW

$\omega(1650)$ REFERENCES

NODE=M126

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

$\omega_3(1670)$

$I^G(J^{PC}) = 0^-(3^{--})$

ω_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 $\pi^- p \rightarrow \pi^+\pi^-\pi^0 n$
1685 ±20	60	BAUBILLIER	79	HBC	8.2 $K^- p$ backward
1673 ±12	430	[1,2] BALTAY	78E	HBC	15 $\pi^+ p \rightarrow \Delta 3\pi$
1650 ±12		CORDEN	78B	OMEG	8–12 $\pi^- p \rightarrow N 3\pi$
1669 ±11	600	[2] WAGNER	75	HBC	7 $\pi^+ p \rightarrow \Delta^{++} 3\pi$
1678 ±14	500	DIAZ	74	DBC	6 $\pi^+ n \rightarrow p 3\pi^0$
1660 ±13	200	DIAZ	74	DBC	6 $\pi^+ n \rightarrow p\omega\pi^0\pi^0$
1679 ±17	200	MATTHEWS	71D	DBC	7.0 $\pi^+ n \rightarrow p 3\pi^0$
1670 ±20		KENYON	69	DBC	8 $\pi^+ n \rightarrow p 3\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
~ 1700	110	[1] CERRADA	77B	HBC	4.2 $K^- p \rightarrow \Lambda 3\pi$
1695 ±20		BARNES	69B	HBC	4.6 $K^- p \rightarrow \omega 2\pi X$
1636 ±20		ARMENISE	68B	DBC	5.1 $\pi^+ n \rightarrow p 3\pi^0$

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

ω_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 $\pi^- p \rightarrow \pi^+\pi^-\pi^0 n$
160±80	60	[3] BAUBILLIER	79	HBC	8.2 $K^- p$ backward
173±16	430	[4,5] BALTAY	78E	HBC	15 $\pi^+ p \rightarrow \Delta 3\pi$
253±39		CORDEN	78B	OMEG	8–12 $\pi^- p \rightarrow N 3\pi$
173±28	600	[3,5] WAGNER	75	HBC	7 $\pi^+ p \rightarrow \Delta^{++} 3\pi$
167±40	500	DIAZ	74	DBC	6 $\pi^+ n \rightarrow p 3\pi^0$
122±39	200	DIAZ	74	DBC	6 $\pi^+ n \rightarrow p\omega\pi^0\pi^0$
155±40	200	[3] MATTHEWS	71D	DBC	7.0 $\pi^+ n \rightarrow p 3\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
90±20		BARNES	69B	HBC	4.6 $K^- p \rightarrow \omega 2\pi$
100±40		KENYON	69	DBC	8 $\pi^+ n \rightarrow p 3\pi^0$
112±60		ARMENISE	68B	DBC	5.1 $\pi^+ n \rightarrow p 3\pi^0$

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

ω_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;→ NOT CHECKED ←
DESIG=2;OUR EST;→ NOT CHECKED ←
DESIG=3;OUR EST;→ NOT CHECKED ←

ω_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 $\pi^+ n \rightarrow p 5\pi^0$

$\Gamma(b_1(1235)\pi)/\Gamma(\rho\pi)$ Γ_3/Γ_1

NODE=M045R4
NODE=M045R4

VALUE	DOCUMENT ID		TECN	COMMENT
possibly seen	DIAZ	74	DBC	6 $\pi^+ n \rightarrow p 5\pi^0$

$\Gamma(b_1(1235)\pi)/\Gamma(\omega\pi\pi)$ — Γ_3/Γ_2

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

$\omega_3(1670)$ 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

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT	
1672.2± 3.0 OUR AVERAGE		Error includes scale factor of 1.4. See the ideogram below.					
1658 ± 3 $^{+24}_{-8}$	420k	ALEKSEEV	10	COMP		190 $\pi^- Pb \to \pi^-\pi^-\pi^+ Pb'$	
1749 ±10 ±100	145k	LU	05	B852		18 $\pi^- p \to \omega\pi^-\pi^0 p$	
1676 ± 3 ± 8		[1] CHUNG	02	B852		18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$	
1685 ±10 ± 30		[2] 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
1730 ±20		[3] AMELIN	95B	VES		36 $\pi^- A \to \pi^+\pi^-\pi^- A$	
1690 ±14		[4] 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		[4] EVANGELIS...	81	OMEG	−	12 $\pi^- p \to 3\pi p$	
1657 ±14		[4,5] DAUM	80D	SPEC	−	63–94 $\pi p \to 3\pi X$	
1662 ±10	2000	[4] BALTAY	77	HBC	+	15 $\pi^+ p \to p 3\pi$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
1742 ±31 ± 49		ANTREASYAN	90	CBAL		$e^+e^- \to e^+e^-\pi^0\pi^0\pi^0$	
1624 ±21		[1] BELLINI	85	SPEC		40 $\pi^- A \to \pi^-\pi^+\pi^- A$	
1622 ±35		[6] BELLINI	85	SPEC		40 $\pi^- A \to \pi^-\pi^+\pi^- A$	OCCUR=2
1693 ±28		[7] BELLINI	85	SPEC		40 $\pi^- A \to \pi^-\pi^+\pi^- A$	OCCUR=3
1710 ±20		[8] DAUM	81B	SPEC	−	63,94 $\pi^- p$	
1660 ±10		[4] ASCOLI	73	HBC	−	5–25 $\pi^- p \to p\pi_2$	

[1] From $f_2(1270)\pi$ decay. NODE=M034M;LINKAGE=F2

[2] From a fit to the invariant mass distribution. NODE=M034M;LINKAGE=BR

[3] From a fit to $J^{PC} = 2^{-+}$ $f_2(1270)\pi$, $f_0(1370)\pi$ waves. NODE=M034M;LINKAGE=AX

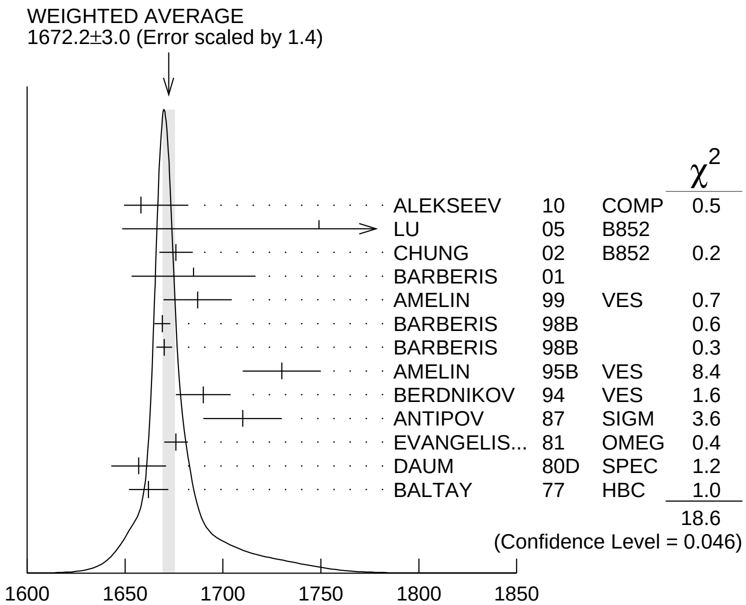
[4] From a fit to $J^P = 2^-$ S-wave $f_2(1270)\pi$ partial wave. NODE=M034M;LINKAGE=P

[5] 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

[6] From $\rho\pi$ decay. NODE=M034M;LINKAGE=R2

[7] From $\sigma\pi$ decay. NODE=M034M;LINKAGE=S2

[8] 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



$\pi_2(1670)$ mass (MeV)

π_2(1670) WIDTH

NODE=M034W

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
260± 9 OUR AVERAGE		Error includes scale factor of 1.2.			
$271\pm 9^{+22}_{-24}$	420k	ALEKSEEV 10	COMP		$190\ \pi^- Pb \to \pi^-\pi^-\pi^+ Pb'$
408± 60±250	145k	LU 05	B852		$18\ \pi^- p \to \omega\pi^-\pi^0 p$
254± 3± 31		[9] CHUNG 02	B852		$18.3\ \pi^- p \to \pi^+\pi^-\pi^- p$
265± 30± 40		[10] BARBERIS 01			$450\ pp \to p_f 3\pi^0 p_s$
168± 43± 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			$450\ pp \to p_f f_2(1270)\pi p_s$
310± 20		[11] AMELIN 95B	VES		$36\ \pi^- A \to \pi^+\pi^-\pi^- A$
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. • • •					
236± 49± 36		ANTREASYAN 90	CBAL		$e^+e^- \to e^+e^-\pi^0\pi^0\pi^0$
304± 22		[9] BELLINI 85	SPEC		$40\ \pi^- A \to \pi^-\pi^+\pi^- A$
404±108		[14] BELLINI 85	SPEC		$40\ \pi^- A \to \pi^-\pi^+\pi^- A$
330± 90		[15] BELLINI 85	SPEC		$40\ \pi^- A \to \pi^-\pi^+\pi^- A$
312± 50		[16] DAUM 81B	SPEC	−	$63,94\ \pi^- p$
270± 60		[12] ASCOLI 73	HBC	−	$5–25\ \pi^- p \to p\pi_2$

NODE=M034W

OCCUR=2 (BARBERIS 98B, 256± 15)

OCCUR=2 (BELLINI 85, 404±108)

OCCUR=3 (BELLINI 85, 330± 90)

[9] From $f_2(1270)\pi$ decay. NODE=M034W;LINKAGE=F2

[10] From a fit to the invariant mass distribution. NODE=M034W;LINKAGE=BR

[11] From a fit to $J^{PC} = 2^{-+}$ $f_2(1270)\pi$, $f_0(1370)\pi$ waves. NODE=M034W;LINKAGE=AX

[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] From $\rho\pi$ decay. NODE=M034W;LINKAGE=R2

[15] From $\sigma\pi$ decay. NODE=M034W;LINKAGE=S2

[16] 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 ±4) %		DESIG=2
Γ_6	$\sigma\pi$	(10.9±3.4) %		DESIG=13
Γ_7	$(\pi\pi)_{S\text{-wave}}$	(8.7±3.4) %		DESIG=11
Γ_8	$K\overline{K}^*(892)+$ c.c.	(4.2±1.4) %		DESIG=5
Γ_9	$\omega\rho$	(2.7±1.1) %		DESIG=14
Γ_{10}	$\gamma\gamma$	$< 2.8 \times 10^{-7}$	90%	DESIG=12
Γ_{11}	$\eta\pi$			DESIG=3
Γ_{12}	$\pi^\pm 2\pi^+ 2\pi^-$			DESIG=4
Γ_{13}	$\rho(1450)\pi$	$< 3.6 \times 10^{-3}$	97.7%	DESIG=15
Γ_{14}	$b_1(1235)\pi$	$< 1.9 \times 10^{-3}$	97.7%	DESIG=16
Γ_{15}	$\eta 3\pi$			DESIG=24
Γ_{16}	$f_1(1285)\pi$	possibly seen		DESIG=25
Γ_{17}	$a_2(1320)\pi$	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, $x_i \equiv \Gamma_i/\Gamma_{\rm total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_5	−53		
x_7	−29	−59	
x_8	−8	−21	−9
	x_4	x_5	x_7

$\pi_2(1670)$ PARTIAL WIDTHS

NODE=M034217

$\Gamma(\gamma\gamma)$ — Γ_{10}

NODE=M034W1
NODE=M034W1

VALUE (keV)	CL%	DOCUMENT ID		TECN	CHG	COMMENT	
<0.072	90	[17] 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	[17] 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		[18] BEHREND	90C	CELL	0	$e^+e^- \to e^+e^-\pi^+\pi^-\pi^0$	
1.3 ±0.3 ±0.2		[19] BEHREND	90C	CELL	0	$e^+e^- \to e^+e^-\pi^+\pi^-\pi^0$	OCCUR=2

[17] Decaying into $f_2(1270)\pi$ and $\rho\pi$. NODE=M034W1;LINKAGE=QQ

[18] Constructive interference between $f_2(1270)\pi$,$\rho\pi$ and background. NODE=M034W1;LINKAGE=C

[19] Incoherent Ansatz. NODE=M034W1;LINKAGE=G

$\pi_2(1670)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M034230

$\Gamma(\pi^+\pi^-\pi^0) \times \Gamma(\gamma\gamma)/\Gamma_{\rm total}$ — $\Gamma_2\Gamma_{10}/\Gamma$

NODE=M034G01
NODE=M034G01

VALUE (keV)	CL%	DOCUMENT ID		TECN	COMMENT
<0.1	95	[20] SCHEGELSKY	06	RVUE	$\gamma\gamma \to \pi^+\pi^-\pi^0$

[20] 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

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

VALUE	DOCUMENT ID		COMMENT
0.29±0.03±0.05	[21] BARBERIS	01	450 $pp \to p_f 3\pi^0 p_s$

$\Gamma(\rho\pi)/0.565\Gamma(f_2(1270)\pi)$ — $\Gamma_5/0.565\Gamma_4$

(With $f_2(1270) \to \pi^+\pi^-$.)

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.19±0.06 OUR AVERAGE				
0.17±0.02±0.07	CHUNG	02	B852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$
0.24±0.10	[22,23] BAKER	99	SPEC	1.94 $\overline{p}p \to 4\pi^0$

$\frac{1}{2}\Gamma(\rho\pi)/\Gamma(\pi^\pm\pi^+\pi^-)$ — $\frac{1}{2}\Gamma_5/(0.565\Gamma_4+\frac{1}{2}\Gamma_5+0.624\Gamma_7)$

NODE=M034R2

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.29±0.04 OUR FIT					
0.29±0.05	[24] 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 $\pi^+ p \to 3\pi p$

$0.565\Gamma(f_2(1270)\pi)/\Gamma(\pi^\pm\pi^+\pi^-)$ — $0.565\Gamma_4/(0.565\Gamma_4+\frac{1}{2}\Gamma_5+0.624\Gamma_7)$

(With $f_2(1270) \to \pi^+\pi^-$.)

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	[24] 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 $\pi^+ p \to 3\pi p$

$0.624\Gamma((\pi\pi)_{S\text{-wave}})/\Gamma(\pi^\pm\pi^+\pi^-)$ — $0.624\Gamma_7/(0.565\Gamma_4+\frac{1}{2}\Gamma_5+0.624\Gamma_7)$

(With $(\pi\pi)_{S\text{-wave}} \to \pi^+\pi^-$.)

NODE=M034R11

VALUE	DOCUMENT ID		TECN	COMMENT
0.10±0.04 OUR FIT				
0.10±0.05	[24] DAUM	81B	SPEC	63,94 $\pi^- p$

$\Gamma(K\overline{K}^*(892)+\text{c.c.})/\Gamma(f_2(1270)\pi)$ — Γ_8/Γ_4

NODE=M034R13

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.075±0.025 OUR FIT					
0.075±0.025	[25] ARMSTRONG	82B	OMEG	−	16 $\pi^- p \to K^+ K^- \pi^- p$

$\Gamma(\omega\rho)/\Gamma_{total}$ — Γ_9/Γ

NODE=M034R17

VALUE	DOCUMENT ID		TECN	COMMENT
0.027±0.004±0.010	[26] AMELIN	99	VES	37 $\pi^- A \to \omega\pi^-\pi^0 A^*$

$\Gamma(\eta\pi)/\Gamma(\pi^\pm\pi^+\pi^-)$ — $\Gamma_{11}/(0.565\Gamma_4+\frac{1}{2}\Gamma_5+0.624\Gamma_7)$

(All η decays.)

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 $\pi^- p \to f_2 \pi^- N$

$\Gamma(\pi^{\pm}2\pi^{+}2\pi^{-})/\Gamma(\pi^{\pm}\pi^{+}\pi^{-})$ — $\Gamma_{12}/(0.565\Gamma_4+\frac{1}{2}\Gamma_5+0.624\Gamma_7)$

NODE=M034R6
NODE=M034R6;CHECK LIMITS

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
<0.10	CRENNELL	70	HBC	$-$	6 $\pi^- p \to f_2\pi^- N$
<0.1	BALTAY	68	HBC	$+$	7,8.5 $\pi^+ p$

$\Gamma(\rho(1450)\pi)/\Gamma_{total}$ — Γ_{13}/Γ

NODE=M034R18
NODE=M034R18

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0036	97.7	AMELIN	99	VES	37 $\pi^- A \to \omega\pi^-\pi^0 A^*$

$\Gamma(b_1(1235)\pi)/\Gamma_{total}$ — Γ_{14}/Γ

NODE=M034R19
NODE=M034R19

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0019	97.7	AMELIN	99	VES	37 $\pi^- A \to \omega\pi^-\pi^0 A^*$

$\Gamma(f_1(1285)\pi)/\Gamma_{total}$ — Γ_{16}/Γ

NODE=M034R23
NODE=M034R23

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
possibly seen	69k	KUHN	04	B852	18 $\pi^- p \to \eta\pi^+\pi^-\pi^- p$

$\Gamma(a_2(1320)\pi)/\Gamma_{total}$ — Γ_{17}/Γ

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	[22] BAKER	99	SPEC	1.94 $\bar{p}p \to 4\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.22 ± 0.10	[24] 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
$-0.72\pm0.07\pm0.14$	CHUNG	02	B852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$

[21] Using BARBERIS 98B. NODE=M034R;LINKAGE=RB
[22] Using preliminary CBAR data. NODE=M034R;LINKAGE=BK
[23] With the $\sigma\pi$ in L=2 and the $f_2(1270)\pi$ in L=0. NODE=M034R15;LINKAGE=A
[24] From a two-resonance fit to four 2^-0^+ waves. NODE=M034R;LINKAGE=L
[25] From a partial-wave analysis of $K^+K^-\pi^-$ system. NODE=M034R13;LINKAGE=M
[26] Normalized to the B($\pi_2(1670) \to f_2\pi$). NODE=M034R;LINKAGE=DM

$\pi_2(1670)$ REFERENCES

NODE=M034

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

$\phi(1680)$

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

ϕ(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. • • •					
1689± 7±10	4.8k	[1] SHEN	09	BELL	10.6 $e^+e^- \rightarrow K^+K^-\pi^+\pi^-\gamma$
1709±20±43		[2] AUBERT	08S	BABR	10.6 $e^+e^- \rightarrow$ hadrons
1623±20	948	[3] AKHMETSHIN	03	CMD2	1.05–1.38 $e^+e^- \rightarrow K^0_L K^0_S$
~ 1500		[4] ACHASOV	98H	RVUE	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$, $\omega\pi^+\pi^-$, K^+K^-
~ 1900		[5] ACHASOV	98H	RVUE	$e^+e^- \rightarrow K^0_S K^\pm\pi^\mp$
1700±20		[6] CLEGG	94	RVUE	$e^+e^- \rightarrow K^+K^-$, $K^0_S K\pi$
1657±27	367	BISELLO	91C	DM2	$e^+e^- \rightarrow K^0_S K^\pm\pi^\mp$
1655±17		[7] BISELLO	88B	DM2	$e^+e^- \rightarrow K^+K^-$
1680±10		[8] BUON	82	DM1	$e^+e^- \rightarrow$ hadrons
1677±12		[9] MANE	82	DM1	$e^+e^- \rightarrow K^0_S K\pi$

→ NOT CHECKED ←

OCCUR=4

[1] From a fit with two incoherent Breit-Wigners. NODE=M067M1;LINKAGE=SH

[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=M067M1;LINKAGE=AU

[3] 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

[4] Using data from IVANOV 81, BARKOV 87, BISELLO 88B, DOLINSKY 91, and ANTONELLI 92. NODE=M067M1;LINKAGE=L1

[5] Using the data from BISELLO 91C. NODE=M067M1;LINKAGE=L4

[6] Using BISELLO 88B and MANE 82 data. NODE=M067M;LINKAGE=A

[7] 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

[8] 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

[9] Fit to one channel only, neglecting interference with ω, $\rho(1700)$. NODE=M067M;LINKAGE=D

PHOTOPRODUCTION

NODE=M067M2
NODE=M067M2

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1753± 3	[10] LINK	02K	FOCS	20–160 $\gamma p \rightarrow K^+K^-p$
1726±22	[10] BUSENITZ	89	TPS	$\gamma p \rightarrow K^+K^-X$
1760±20	[10] ATKINSON	85C	OMEG	20–70 $\gamma p \rightarrow K\overline{K}X$
1690±10	[10] ASTON	81F	OMEG	25–70 $\gamma p \rightarrow K^+K^-X$

[10] We list here a state decaying into K^+K^- possibly different from $\phi(1680)$. NODE=M067M2;LINKAGE=LK

$p\overline{p}$ 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	[11] AMSLER	06	CBAR	0.9 $\overline{p}p \rightarrow K^+K^-\pi^0$

[11] Could also be $\rho(1700)$. NODE=M067M3;LINKAGE=AM

ϕ(1680) WIDTH

NODE=M067210

e^+e^- PRODUCTION

NODE=M067W1
NODE=M067W1

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.

→ NOT CHECKED ←

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
211±14± 19	4.8k	[12] SHEN	09	BELL	10.6 $e^+e^- \rightarrow K^+K^-\pi^+\pi^-\gamma$
322±77±160		[13] AUBERT	08S	BABR	10.6 $e^+e^- \rightarrow$ hadrons
139±60	948	[14] AKHMETSHIN	03	CMD2	1.05–1.38 $e^+e^- \rightarrow K^0_L K^0_S$
300±60		[15] CLEGG	94	RVUE	$e^+e^- \rightarrow K^+K^-$, $K^0_S K\pi$
146±55	367	BISELLO	91C	DM2	$e^+e^- \rightarrow K^0_S K^\pm\pi^\mp$
207±45		[16] BISELLO	88B	DM2	$e^+e^- \rightarrow K^+K^-$
185±22		[17] BUON	82	DM1	$e^+e^- \rightarrow$ hadrons
102±36		[18] MANE	82	DM1	$e^+e^- \rightarrow K^0_S K\pi$

[12] From a fit with two incoherent Breit-Wigners. NODE=M067W1;LINKAGE=SH

[13] 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

[14] 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

[15] Using BISELLO 88B and MANE 82 data. NODE=M067W;LINKAGE=A

[16] From global fit including ρ, ω, ϕ and $\rho(1700)$ NODE=M067W;LINKAGE=E

[17] 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

[18] Fit to one channel only, neglecting interference with ω, $\rho(1700)$. NODE=M067W;LINKAGE=D

PHOTOPRODUCTION

NODE=M067W2
NODE=M067W2

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
122 ± 63	[19] LINK	02K	FOCS	20–160 $\gamma p \to K^+K^-p$
121 ± 47	[19] BUSENITZ	89	TPS	$\gamma p \to K^+K^-X$
80 ± 40	[19] ATKINSON	85C	OMEG	20–70 $\gamma p \to K\overline{K}X$
100 ± 40	[19] ASTON	81F	OMEG	25–70 $\gamma p \to K^+K^-X$

[19] We list here a state decaying into K^+K^- possibly different from $\phi(1680)$. NODE=M067W2;LINKAGE=LK

$p\overline{p}$ 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	[20] AMSLER	06	CBAR	0.9 $\overline{p}p \to K^+K^-\pi^0$

[20] Could also be $\rho(1700)$. NODE=M067W3;LINKAGE=AM

$\phi(1680)$ DECAY MODES

NODE=M067215;NODE=M067

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$K\overline{K}^*(892)+$ c.c.	dominant	DESIG=4;OUR EST;→ NOT CHECKED ←
Γ_2	$K^0_S K\pi$	seen	DESIG=5;OUR EST;→ NOT CHECKED ←
Γ_3	$K\overline{K}$	seen	DESIG=3;OUR EST;→ NOT CHECKED ←
Γ_4	$K^0_L K^0_S$		DESIG=9
Γ_5	e^+e^-	seen	DESIG=6;OUR EST;→ NOT CHECKED ←
Γ_6	$\omega\pi\pi$	not seen	DESIG=1;OUR EST;→ NOT CHECKED ←
Γ_7	$\phi\pi\pi$		DESIG=11
Γ_8	$K^+K^-\pi^+\pi^-$	seen	DESIG=12;OUR EVAL; → NOT CHECKED ←
Γ_9	$\phi\eta$		DESIG=10
Γ_{10}	$K^+K^-\pi^0$		DESIG=2

$\phi(1680)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma^2(\text{total})$

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	[21] AKHMETSHIN	03	CMD2	1.05–1.38 $e^+e^- \to K^0_L K^0_S$

[21] 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
NODE=M067G6

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1.15\pm0.16\pm0.01$		[22] AUBERT	08S	BABR	10.6 $e^+e^- \to K\overline{K}^*(892)\gamma +$ c.c.
3.29 ± 1.57	367	[23] BISELLO	91C	DM2	1.35–2.40 $e^+e^- \to K^0_S K^\pm\pi^\mp$

[22] 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=M067G6;LINKAGE=AU

[23] Recalculated by us with the published value of B($K\overline{K}^*(892)+$ c.c.) $\times$ $\Gamma(e^+e^-)$. NODE=M067G;LINKAGE=GL

$\Gamma(\phi\pi\pi)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_7/\Gamma \times \Gamma_5/\Gamma$

NODE=M067G01

VALUE (units 10^{-7})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1.86\pm0.14\pm0.21$	4.8k	[24] SHEN	09	BELL	$10.6\ e^+e^- \rightarrow K^+K^-\pi^+\pi^-\gamma$

[24] Multiplied by 3/2 to take into account the $\phi\pi^0\pi^0$ mode. Using B($\phi \rightarrow K^+K^-$) = (49.2 ± 0.6)%.

NODE=M067G01;LINKAGE=SH

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

NODE=M067G7

VALUE (units 10^{-6})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.43\pm0.10\pm0.09$	[25] AUBERT	08S	BABR	$10.6\ e^+e^- \rightarrow \phi\eta\gamma$

[25] 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=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^-

$\Gamma(\phi\eta)/\Gamma(K\overline{K}^*(892)+\text{c.c.})$ — 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	[26] AUBERT	08S	BABR	$10.6\ e^+e^- \rightarrow$ hadrons

[26] From the fit including data from AUBERT 07AK.

NODE=M067R5;LINKAGE=AU

$\phi(1680)$ REFERENCES

NODE=M067

SHEN	09	PR D80 031101R	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.*	(CBAR 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.			
LINK	02K	PL B545 50	J.M. Link *et al.*	(FNAL FOCUS Collab.)	REFID=48845
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
BUSENITZ	89	PR D40 1	J.K. Busenitz *et al.*	(ILL, FNAL)	REFID=40927
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	85C	ZPHY C27 233	M. Atkinson *et al.*	(BONN, CERN, GLAS+)	REFID=21596
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
ASTON	81F	PL 104B 231	D. Aston	(BONN, CERN, EPOL, GLAS, LANC+)	REFID=21585
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

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 $\pi^- p \rightarrow 2\pi p$
1679±11	476	BALTAY	78B	HBC	0	15 $\pi^+ p \rightarrow \pi^+\pi^- n$
1678±12	175	[1] ANTIPOV	77	CIBS	0	25 $\pi^- p \rightarrow p 3\pi$
1690± 7	600	[1] ENGLER	74	DBC	0	6 $\pi^+ n \rightarrow \pi^+\pi^- p$
1693± 8		[2] GRAYER	74	ASPK	0	17 $\pi^- p \rightarrow \pi^+\pi^- n$
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 $\pi^- p \rightarrow n 2\pi$
1692±12		[2,4] ESTABROOKS	75	RVUE		17 $\pi^- p \rightarrow \pi^+\pi^- n$
1737±23		ARMENISE	70	DBC	0	9 $\pi^+ N$
1650±35	122	BARTSCH	70B	HBC	+	8 $\pi^+ p \rightarrow N 2\pi$
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

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 $\pi^- p \rightarrow K^+ K^- n$
1698±12	6k	[5,6] MARTIN	78D	SPEC		10 $\pi p \rightarrow K_S^0 K^- p$
1692± 6		BLUM	75	ASPK	0	18.4 $\pi^- p \rightarrow n K^+ K^-$
1690±16		ADERHOLZ	69	HBC	+	8 $\pi^+ p \rightarrow K\overline{K}\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1694± 8		[7] COSTA...	80	OMEG		10 $\pi^- p \rightarrow K^+ K^- n$

[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 $\pi^- p \to p 4\pi$	OCCUR=2
1673± 9		[11] EVANGELIS...	81	OMEG	−	12 $\pi^- p \to p 4\pi$	OCCUR=3
1733± 9	66	[9] KLIGER	74	HBC	−	4.5 $\pi^- p \to p 4\pi$	
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
NODE=M015M5

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
The data in this block is included in the average printed for a previous datablock.					
1681± 7 OUR AVERAGE					
1670±25	[12] ALDE	95	GAM2		38 $\pi^- p \to \omega\pi^0 n$
1690±15	EVANGELIS...	81	OMEG	−	12 $\pi^- p \to \omega\pi p$
1666±14	GESSAROLI	77	HBC		11 $\pi^- p \to \omega\pi p$
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 $K^+ p \to \omega\pi X$

[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.) NODE=M015M6

NODE=M015M6

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT	
The data in this block is included in the average printed for a previous datablock.						
1682±12 OUR AVERAGE						
1685±10±20	AMELIN	00	VES		37 $\pi^- p \to \eta\pi^+\pi^- n$	
1680±15	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. • • •						
1700±47	[13] ANDERSON	69	MMS	−	16 $\pi^- p$ backward	
1632±15	[13,14] FOCACCI	66	MMS	−	7–12 $\pi^- p \to p$MM	
1700±15	[13,14] FOCACCI	66	MMS	−	7–12 $\pi^- p \to p$MM	OCCUR=2
1748±15	[13,14] FOCACCI	66	MMS	−	7–12 $\pi^- p \to p$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

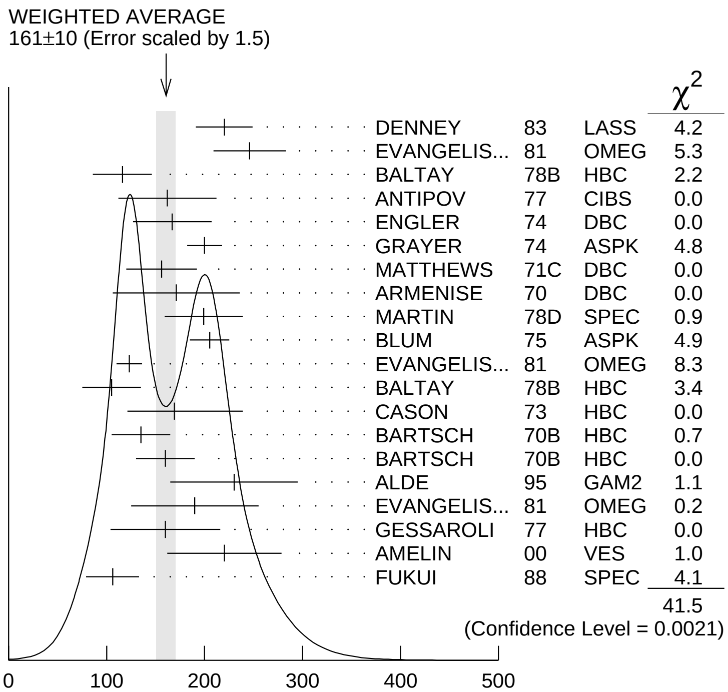
NODE=M015210

2π, $K\overline{K}$, AND $K\overline{K}\pi$ MODES

NODE=M015W
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
NODE=M015W1

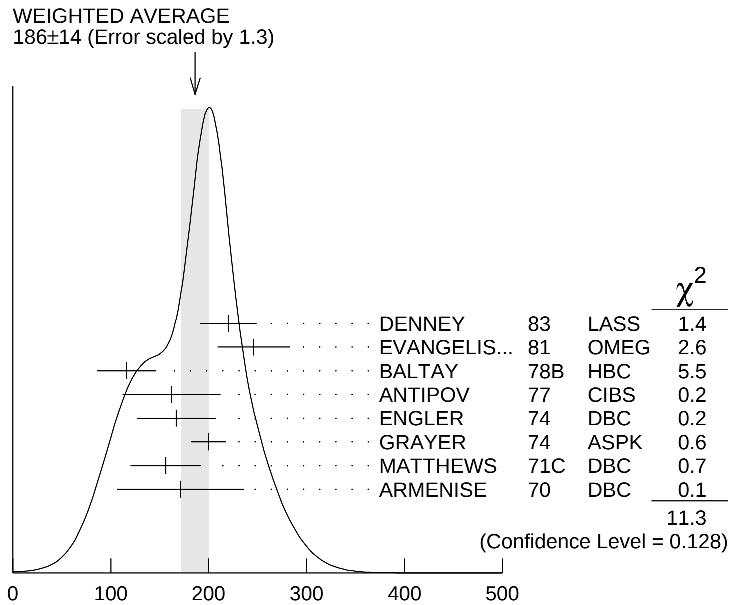
VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
The data in this block is included in the average printed for a previous datablock.						
186±14 OUR AVERAGE	Error includes scale factor of 1.3. See the ideogram below.					
220±29		DENNEY	83	LASS		10 $\pi^+ N$
246±37		EVANGELIS...	81	OMEG	−	12 $\pi^- p \to 2\pi p$
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	+	$10\text{–}12\ K^+ p$	
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;→ NOT CHECKED ←
Γ_9	$\pi\pi\rho$ Excluding 2ρ and $a_2(1320)\pi$.	seen		DESIG=5;OUR EST;→ NOT CHECKED ←
Γ_{10}	$a_2(1320)\pi$	seen		DESIG=6;OUR EST;→ NOT CHECKED ←
Γ_{11}	$\rho\rho$	seen		DESIG=8;OUR EST;→ NOT CHECKED ←
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, $x_i \equiv \Gamma_i/\Gamma_{\text{total}}$. 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

$\Gamma(\pi\pi)/\Gamma_{\text{total}}$ Γ_4/Γ

NODE=M015R1
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
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

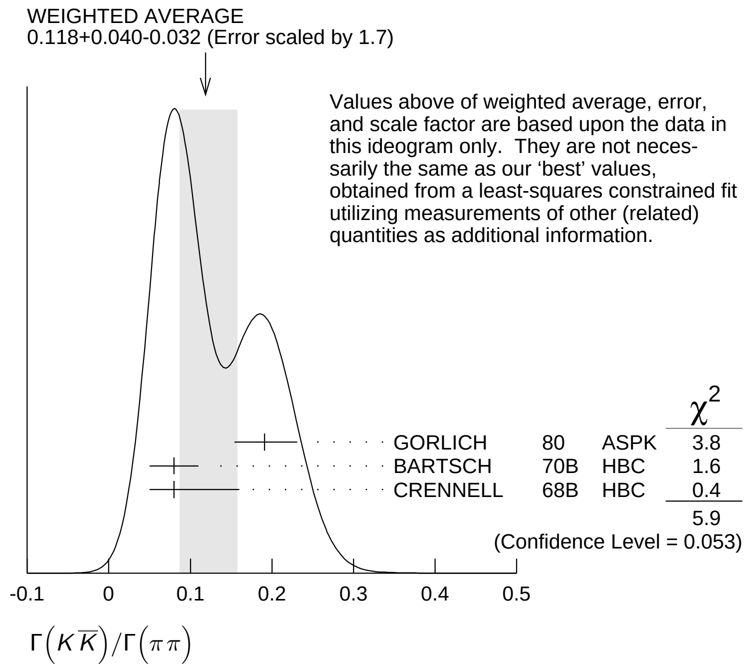
NODE=M015R3
NODE=M015R3

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
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
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

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

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

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

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

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 $\pi^- p \to \eta\pi^+\pi^- n$

ρ_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 de Beauregard *et al.*	(BARI, BONN+)	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

$\rho(1700)$

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

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NODE=M065

$\rho(1700)$ MASS

NODE=M065205

$\eta\rho^0$ AND $\pi^+\pi^-$ MODES

NODE=M065M0

NODE=M065M0

VALUE (MeV)	DOCUMENT ID
1720±20 OUR ESTIMATE	

→ NOT CHECKED ←

$\eta\rho^0$ 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)	DOCUMENT ID		TECN	COMMENT
1740±20	ANTONELLI	88	DM2	$e^+e^- \rightarrow \eta\pi^+\pi^-$
1701±15	[1] FUKUI	88	SPEC	8.95 $\pi^- p \rightarrow \eta\pi^+\pi^- n$

[1] 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

NODE=M065M1

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
1728 ±17 ±89	5.4M	[2,3] FUJIKAWA	08	BELL	$\tau^- \rightarrow \pi^-\pi^0\nu_\tau$
1780 $^{+37}_{-29}$		[4] ABELE	97	CBAR	$\overline{p}n \rightarrow \pi^-\pi^0\pi^0$
1719 ±15		[4] 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		[5] ERKAL	85	RVUE	20–70 $\gamma p \rightarrow \gamma\pi$
1550 ±70		ABE	84B	HYBR	20 $\gamma p \rightarrow \pi^+\pi^- p$
1590 ±20		[6] ASTON	80	OMEG	20–70 $\gamma p \rightarrow p 2\pi$
1600 ±10		[7] ATIYA	79B	SPEC	50 $\gamma C \rightarrow C 2\pi$
1598 $^{+24}_{-22}$		BECKER	79	ASPK	17 $\pi^- p$ polarized
1659 ±25		[5] LANG	79	RVUE	
1575		[5] MARTIN	78C	RVUE	17 $\pi^- p \rightarrow \pi^+\pi^- n$
1610 ±30		[5] FROGGATT	77	RVUE	17 $\pi^- p \rightarrow \pi^+\pi^- n$
1590 ±20		[8] HYAMS	73	ASPK	17 $\pi^- p \rightarrow \pi^+\pi^- n$

[2] $|F_\pi(0)|^2$ fixed to 1.

NODE=M065M1;LINKAGE=FU

[3] From the GOUNARIS 68 parametrization of the pion form factor.

NODE=M065M1;LINKAGE=GO

[4] T-matrix pole.

NODE=M065M;LINKAGE=QQ

[5] From phase shift analysis of HYAMS 73 data.

NODE=M065M;LINKAGE=P

[6] Simple relativistic Breit-Wigner fit with constant width.

NODE=M065M;LINKAGE=M

[7] 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

[8] Included in BECKER 79 analysis.

NODE=M065M;LINKAGE=H

$\pi\omega$ MODE

NODE=M065M8
NODE=M065M8

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1550 to 1620	[9] ACHASOV	00I	SND	$e^+e^- \to \pi^0\pi^0\gamma$
1580 to 1710	[10] ACHASOV	00I	SND	$e^+e^- \to \pi^0\pi^0\gamma$
1710 ± 90	ACHASOV	97	RVUE	$e^+e^- \to \omega\pi^0$

OCCUR=2

[9] 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=M065M;LINKAGE=I1

[10] 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=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. • • •						
1740.8 ± 22.2	27k	[11] ABELE	99D	CBAR	$\pm$	0.0 $\overline{p}p \to K^+K^-\pi^0$
$1582\ \pm36$	1600	CLELAND	82B	SPEC	$\pm$	50 $\pi p \to K^0_S K^\pm p$

[11] 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	$e^+e^- \to 2(\pi^+\pi^-)$
$1570\pm\ 20$		[12] CORDIER	82	DM1	$e^+e^- \to 2(\pi^+\pi^-)$
$1520\pm\ 30$		[13] ASTON	81E	OMEG	20–70 $\gamma p \to p4\pi$
$1654\pm\ 25$		[14] DIBIANCA	81	DBC	$\pi^+d \to pp2(\pi^+\pi^-)$
$1666\pm\ 39$		[12] BACCI	80	FRAG	$e^+e^- \to 2(\pi^+\pi^-)$
1780	34	KILLIAN	80	SPEC	11 $e^-p \to 2(\pi^+\pi^-)$
1500		[15] ATIYA	79B	SPEC	50 $\gamma C \to C4\pi^\pm$
$1570\pm\ 60$	65	[16] ALEXANDER	75	HBC	7.5 $\gamma p \to p4\pi$
$1550\pm\ 60$		[13] CONVERSI	74	OSPK	$e^+e^- \to 2(\pi^+\pi^-)$
$1550\pm\ 50$	160	SCHACHT	74	STRC	5.5–9 $\gamma p \to p4\pi$
1450 ± 100	340	SCHACHT	74	STRC	9–18 $\gamma p \to p4\pi$
$1430\pm\ 50$	400	BINGHAM	72B	HBC	9.3 $\gamma p \to p4\pi$

OCCUR=2

[12] Simple relativistic Breit-Wigner fit with model dependent width. NODE=M065M;LINKAGE=A
[13] Simple relativistic Breit-Wigner fit with constant width. NODE=M065M4;LINKAGE=M
[14] One peak fit result. NODE=M065M;LINKAGE=O
[15] Parameters roughly estimated, not from a fit. NODE=M065M;LINKAGE=C
[16] 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	[17] FRABETTI	04	E687	$\gamma p \to 3\pi^+3\pi^-p$
1783 ± 15	CLEGG	90	RVUE	$e^+e^- \to 3(\pi^+\pi^-)2(\pi^+\pi^-\pi^0)$

[17] From a fit with two resonances with the JACOB 72 continuum. NODE=M065M;LINKAGE=PI

$\rho(1700)$ WIDTH

NODE=M065210

$\eta\rho^0$ AND $\pi^+\pi^-$ MODES

NODE=M065W0
NODE=M065W0

VALUE (MeV)	DOCUMENT ID
250 ± 100 OUR ESTIMATE	

→ NOT CHECKED ←

$\eta\rho^0$ MODE

NODE=M065W6
NODE=M065W6

The data in this block is included in the average printed for a previous datablock.

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
150 ± 30	ANTONELLI	88	DM2	$e^+e^- \to \eta\pi^+\pi^-$
282 ± 44	[18] FUKUI	88	SPEC	8.95 $\pi^-p \to \eta\pi^+\pi^-n$

[18] 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
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. • • •				
$164 \pm 21\ ^{+89}_{-26}$	5.4M	[19,20] FUJIKAWA 08	BELL	$\tau^- \rightarrow \pi^- \pi^0 \nu_\tau$
275 ± 45		[21] ABELE 97	CBAR	$\overline{p} n \rightarrow \pi^- \pi^0 \pi^0$
310 ± 40		[21] BERTIN 97C	OBLX	$0.0\ \overline{p} p \rightarrow \pi^+ \pi^- \pi^0$
400 ± 100		CLEGG 94	RVUE	$e^+ e^- \rightarrow \pi^+ \pi^-$
224 ± 22		BISELLO 89	DM2	$e^+ e^- \rightarrow \pi^+ \pi^-$
242.5 ± 163.0		DUBNICKA 89	RVUE	$e^+ e^- \rightarrow \pi^+ \pi^-$
620 ± 60		GESHKEN... 89	RVUE	
<315		[22] ERKAL 85	RVUE	20–70 $\gamma p \rightarrow \gamma \pi$
$280\ ^{+30}_{-80}$		ABE 84B	HYBR	20 $\gamma p \rightarrow \pi^+ \pi^- p$
230 ± 80		[23] ASTON 80	OMEG	20–70 $\gamma p \rightarrow p 2\pi$
283 ± 14		[24] ATIYA 79B	SPEC	50 γC $\rightarrow$ C2π
$175\ ^{+98}_{-53}$		BECKER 79	ASPK	17 $\pi^- p$ polarized
232 ± 34		[22] LANG 79	RVUE	
340		[22] MARTIN 78C	RVUE	17 $\pi^- p \rightarrow \pi^+ \pi^- n$
300 ± 100		[22] FROGGATT 77	RVUE	17 $\pi^- p \rightarrow \pi^+ \pi^- n$
180 ± 50		[25] HYAMS 73	ASPK	17 $\pi^- p \rightarrow \pi^+ \pi^- n$

[19] $|F_\pi(0)|^2$ fixed to 1. NODE=M065W1;LINKAGE=FU

[20] From the GOUNARIS 68 parametrization of the pion form factor. NODE=M065W1;LINKAGE=GO

[21] T-matrix pole. NODE=M065W;LINKAGE=QQ

[22] From phase shift analysis of HYAMS 73 data. NODE=M065W;LINKAGE=P

[23] Simple relativistic Breit-Wigner fit with constant width. NODE=M065W;LINKAGE=M

[24] 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

[25] Included in BECKER 79 analysis. NODE=M065W;LINKAGE=H

$K\overline{K}$ MODE

NODE=M065W2
NODE=M065W2

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
187.2 ± 26.7	27k	[26] ABELE 99D	CBAR	$\pm$	$0.0\ \overline{p} p \rightarrow K^+ K^- \pi^0$
265 ± 120	1600	CLELAND 82B	SPEC	$\pm$	50 $\pi p \rightarrow K^0_S K^\pm p$

[26] K-matrix pole. Isospin not determined, could be $\omega(1650)$ or $\phi(1680)$. NODE=M065W2;LINKAGE=AN

$2(\pi^+\pi^-)$ MODE

NODE=M065W4
NODE=M065W4

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
510 ± 40		[27] CORDIER 82	DM1	$e^+ e^- \rightarrow 2(\pi^+ \pi^-)$
400 ± 50		[28] ASTON 81E	OMEG	20–70 $\gamma p \rightarrow p 4\pi$
400 ± 146		[29] DIBIANCA 81	DBC	$\pi^+ d \rightarrow p p 2(\pi^+ \pi^-)$
700 ± 160		[27] BACCI 80	FRAG	$e^+ e^- \rightarrow 2(\pi^+ \pi^-)$
100	34	KILLIAN 80	SPEC	11 $e^- p \rightarrow 2(\pi^+ \pi^-)$
600		[30] ATIYA 79B	SPEC	50 γC $\rightarrow$ C$4\pi^\pm$
340 ± 160	65	[31] ALEXANDER 75	HBC	7.5 $\gamma p \rightarrow p 4\pi$
360 ± 100		[28] CONVERSI 74	OSPK	$e^+ e^- \rightarrow 2(\pi^+ \pi^-)$
400 ± 120	160	[32] SCHACHT 74	STRC	5.5–9 $\gamma p \rightarrow p 4\pi$
850 ± 200	340	[32] SCHACHT 74	STRC	9–18 $\gamma p \rightarrow p 4\pi$ OCCUR=2
650 ± 100	400	BINGHAM 72B	HBC	9.3 $\gamma p \rightarrow p 4\pi$

[27] Simple relativistic Breit-Wigner fit with model-dependent width. NODE=M065W;LINKAGE=A

[28] Simple relativistic Breit-Wigner fit with constant width. NODE=M065W4;LINKAGE=M

[29] One peak fit result. NODE=M065W;LINKAGE=O

[30] Parameters roughly estimated, not from a fit. NODE=M065W;LINKAGE=C

[31] Skew mass distribution compensated by Ross-Stodolsky factor. NODE=M065W;LINKAGE=D

[32] 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
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
NODE=M065W9

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
350 to 580	[33] ACHASOV	00I	SND	$e^+e^- \to \pi^0\pi^0\gamma$
490 to 1040	[34] ACHASOV	00I	SND	$e^+e^- \to \pi^0\pi^0\gamma$

OCCUR=2

[33] 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

[34] 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
NODE=M065W7

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
315 ± 100	[35] FRABETTI	04	E687	$\gamma p \to 3\pi^+3\pi^- p$
285 ± 20	CLEGG	90	RVUE	$e^+e^- \to 3(\pi^+\pi^-)2(\pi^+\pi^-\pi^0)$

[35] From a fit with two resonances with the JACOB 72 continuum.

NODE=M065W;LINKAGE=PI

$\rho(1700)$ DECAY MODES

NODE=M065215;NODE=M065

	Mode	Fraction (Γ_i/Γ)	
Γ_1	4π		DESIG=20
Γ_2	$2(\pi^+\pi^-)$	large	DESIG=2;OUR EST;→ NOT CHECKED ←
Γ_3	$\rho\pi\pi$	dominant	DESIG=12;OUR EST;→ NOT CHECKED ←
Γ_4	$\rho^0\pi^+\pi^-$	large	DESIG=1;OUR EST;→ NOT CHECKED ←
Γ_5	$\rho^0\pi^0\pi^0$		DESIG=7
Γ_6	$\rho^\pm\pi^\mp\pi^0$	large	DESIG=9;OUR EST;→ NOT CHECKED ←
Γ_7	$a_1(1260)\pi$	seen	DESIG=15;OUR EST;→ NOT CHECKED ←
Γ_8	$h_1(1170)\pi$	seen	DESIG=16;OUR EST;→ NOT CHECKED ←
Γ_9	$\pi(1300)\pi$	seen	DESIG=17;OUR EST;→ NOT CHECKED ←
Γ_{10}	$\rho\rho$	seen	DESIG=18;OUR EST;→ NOT CHECKED ←
Γ_{11}	$\pi^+\pi^-$	seen	DESIG=4;OUR EST;→ NOT CHECKED ←
Γ_{12}	$\pi\pi$	seen	DESIG=13;OUR EST;→ NOT CHECKED ←
Γ_{13}	$K\overline{K}^*(892)+$ c.c.	seen	DESIG=10;OUR EST;→ NOT CHECKED ←
Γ_{14}	$\eta\rho$	seen	DESIG=11;OUR EST;→ NOT CHECKED ←
Γ_{15}	$a_2(1320)\pi$	not seen	DESIG=14;OUR EST;→ NOT CHECKED ←
Γ_{16}	$K\overline{K}$	seen	DESIG=5;OUR EST;→ NOT CHECKED ←
Γ_{17}	e^+e^-	seen	DESIG=8;OUR EST;→ NOT CHECKED ←
Γ_{18}	$\pi^0\omega$	seen	DESIG=6;OUR EST;→ NOT CHECKED ←

$\rho(1700)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma(\text{total})$

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

$\Gamma(2(\pi^+\pi^-)) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_2\Gamma_{17}/\Gamma$

NODE=M065G2
NODE=M065G2

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$2.6\ \pm0.2$	DELCOURT	81B	DM1	$e^+e^- \to 2(\pi^+\pi^-)$
2.83 ± 0.42	BACCI	80	FRAG	$e^+e^- \to 2(\pi^+\pi^-)$

$\Gamma(\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{11}\Gamma_{17}/\Gamma$

NODE=M065G4
NODE=M065G4

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.13	[36] DIEKMAN	88	RVUE	$e^+e^- \to \pi^+\pi^-$
$0.029^{+0.016}_{-0.012}$	KURDADZE	83	OLYA	0.64–1.4 $e^+e^- \to \pi^+\pi^-$

[36] Using total width = 220 MeV.

NODE=M065G4;LINKAGE=B

$\Gamma(K\overline{K}^*(892)+\text{c.c.}) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{13}\Gamma_{17}/\Gamma$

NODE=M065G10

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.305 ± 0.071	[37] BIZOT	80	DM1	e^+e^-

[37] Model dependent.

NODE=M065G;LINKAGE=M

$\Gamma(\eta\rho) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{14}\Gamma_{17}/\Gamma$

NODE=M065G11

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
7 ± 3	ANTONELLI	88	DM2	$e^+e^- \rightarrow \eta\pi^+\pi^-$

$\Gamma(K\overline{K}) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{16}\Gamma_{17}/\Gamma$

NODE=M065G5

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.035 ± 0.029	[38] BIZOT	80	DM1	e^+e^-

[38] Model dependent.

NODE=M065G5;LINKAGE=M

$\Gamma(\rho\pi\pi) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_3\Gamma_{17}/\Gamma$

NODE=M065G12

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
3.510 ± 0.090	[39] BIZOT	80	DM1	e^+e^-

[39] Model dependent.

NODE=M065G12;LINKAGE=M

$\rho(1700)$ 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	[40] ABELE	01B	CBAR	$0.0\ \overline{p}n \rightarrow 5\pi$

[40] $\omega\pi$ 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		[41] BINGHAM	72B	HBC	$9.3\ \gamma p \rightarrow p4\pi$

[41] 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		$20–70\ \gamma p$
<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	[42] ABELE	01B	CBAR	$0.0\ \overline{p}n \rightarrow 5\pi$

[42] $\omega\pi$ 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	[43] ABELE	01B	CBAR	$0.0\ \overline{p}n \rightarrow 5\pi$

[43] $\omega\pi$ 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	[44] ABELE	01B	CBAR	$0.0\ \overline{p}n \rightarrow 5\pi$

[44] $\omega\pi$ not included.

NODE=M065R17;LINKAGE=BL

$\Gamma(\rho\rho)/\Gamma(4\pi)$ Γ_{10}/Γ_1

NODE=M065R18
NODE=M065R18

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.09 ± 0.03	[45] ABELE 01B	CBAR	$0.0\ \overline{p}n \to 5\pi$

[45] $\omega\pi$ not included.

NODE=M065R18;LINKAGE=BL

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

NODE=M065R5
NODE=M065R5

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.287^{+0.043}_{-0.042}$	BECKER 79	ASPK	$17\ \pi^- p$ polarized
0.15 to 0.30	[46] MARTIN 78C	RVUE	$17\ \pi^- p \to \pi^+\pi^- n$
<0.20	[47] COSTA... 77B	RVUE	$e^+e^- \to 2\pi,\ 4\pi$
$0.30\ \pm0.05$	[46] FROGGATT 77	RVUE	$17\ \pi^- p \to \pi^+\pi^- n$
<0.15	[48] EISENBERG 73	HBC	$5\ \pi^+ p \to \Delta^{++} 2\pi$
$0.25\ \pm0.05$	[49] HYAMS 73	ASPK	$17\ \pi^- p \to \pi^+\pi^- n$

[46] From phase shift analysis of HYAMS 73 data.
[47] Estimate using unitarity, time reversal invariance, Breit-Wigner.
[48] Estimated using one-pion-exchange model.
[49] Included in BECKER 79 analysis.

NODE=M065R5;LINKAGE=P
NODE=M065R5;LINKAGE=C
NODE=M065R5;LINKAGE=E
NODE=M065R5;LINKAGE=H

$\Gamma(\pi^+\pi^-)/\Gamma(2(\pi^+\pi^-))$ Γ_{11}/Γ_2

NODE=M065R3
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 $\gamma p \to p 2\pi$
<0.14	[50] DAVIER 73	STRC	6–18 $\gamma p \to p 4\pi$
<0.2	[51] BINGHAM 72B	HBC	9.3 $\gamma p \to p 2\pi$

[50] Upper limit is estimate.
[51] 2σ upper limit.

NODE=M065R3;LINKAGE=E
NODE=M065R3;LINKAGE=S

$\Gamma(\pi\pi)/\Gamma(4\pi)$ Γ_{12}/Γ_1

NODE=M065R20
NODE=M065R20

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.16 ± 0.04	[52,53] ABELE 01B	CBAR	$0.0\ \overline{p}n \to 5\pi$

[52] Using ABELE 97.
[53] $\omega\pi$ not included.

NODE=M065R;LINKAGE=LK
NODE=M065R20;LINKAGE=BL

$\Gamma(K\overline{K}^*(892)+c.c.)/\Gamma_{total}$ Γ_{13}/Γ

NODE=M065R21
NODE=M065R21

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
possibly seen	COAN 04	CLEO	$\tau^- \to K^-\pi^- K^+\nu_\tau$

$\Gamma(K\overline{K}^*(892)+c.c.)/\Gamma(2(\pi^+\pi^-))$ Γ_{13}/Γ_2

NODE=M065R9
NODE=M065R9

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.15 ± 0.03	[54] DELCOURT 81B	DM1	$e^+e^- \to \overline{K}K\pi$

[54] Assuming $\rho(1700)$ and ω radial excitations to be degenerate in mass.

NODE=M065R9;LINKAGE=D

$\Gamma(\eta\rho)/\Gamma_{total}$ Γ_{14}/Γ

NODE=M065R12
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
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	[55] BALLAM	74	HBC	9.3 γp

[55] Upper limit. Background not subtracted.

NODE=M065R7;LINKAGE=U

$\Gamma(a_2(1320)\pi)/\Gamma_{total}$ 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		[56] DELCOURT	81B	DM1		$e^+e^- \to \overline{K}K$
<0.04	95	BINGHAM	72B	HBC	0	9.3 γp

[56] 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

$\Gamma(\pi^0\omega)/\Gamma_{total}$ 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	2382	AKHMETSHIN	03B	CMD2	$e^+e \to \pi^0\pi^0\gamma$
seen		ACHASOV	97	RVUE	$e^+e^- \to \omega\pi^0$

$\rho(1700)$ REFERENCES

NODE=M065

FUJIKAWA	08	PR D78 072006	M. Fujikawa *et al.*	(BELLE Collab.)	REFID=52536
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
BISELLO	89	PL B220 321	D. Bisello *et al.*	(DM2 Collab.)	REFID=40740
DUBNICKA	89	JPG 15 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
DONNACHIE	87B	ZPHY C34 257	A. Donnachie, A.B. Clegg	(MCHS, LANC)	REFID=40920
ATKINSON	86B	ZPHY C30 531	M. Atkinson *et al.*	(BONN, CERN, GLAS+)	REFID=21508
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.*		REFID=21503;ERROR=1
KURDADZE	83	JETPL 37 733	L.M. Kurdadze *et al.*	(NOVO)	REFID=20133
		Translated from ZETFP 37 613.			
ATKINSON	82	PL 108B 55	M. Atkinson *et al.*	(BONN, CERN, GLAS+)	REFID=21493
BUON	82	PL 118B 221	J. Buon *et al.*	(LALO, MONP)	REFID=21494
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
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

$a_2(1700)$

$I^G(J^{PC}) = 1^-(2^{++})$

OMITTED FROM SUMMARY TABLE

$a_2(1700)$ MASS

NODE=M162M

NODE=M162M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1732±16 OUR AVERAGE	Error includes scale factor of 1.9.					
1737± 5± 7		ABE	04	BELL		10.6 $e^+e^- \to e^+e^-K^+K^-$
1698±44		[1] AMSLER	02	CBAR		0.9 $\overline{p}p \to \pi^0\eta\eta$
1660±40		ABELE	99B	CBAR		1.94 $\overline{p}p \to \pi^0\eta\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1675±25		ANISOVICH	09	RVUE		0.0 $\overline{p}p$, πN
1722± 9±15	18k	[2] SCHEGELSKY	06	RVUE	0	$\gamma\gamma \to \pi^+\pi^-\pi^0$
1702± 7	80k	[3] UMAN	06	E835		5.2 $\overline{p}p \to \eta\eta\pi^0$
1721±13±44	145k	LU	05	B852		18 $\pi^-p \to \omega\pi^-\pi^0p$
1767±14	221	[4] ACCIARRI	01H	L3		$\gamma\gamma \to K^0_SK^0_S$, E^{ee}_{cm}= 91, 183–209 GeV
∼ 1775		[5] 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 analysis of L3 data at 183–209 GeV. NODE=M162M;LINKAGE=SC
[3] Statistical error only. NODE=M162M;LINKAGE=ST
[4] Spin 2 dominant, isospin not determined, could also be I=1. NODE=M162M;LINKAGE=HA
[5] Possibly two $J^P = 2^+$ resonances with isospins 0 and 1. NODE=M162M;LINKAGE=GR

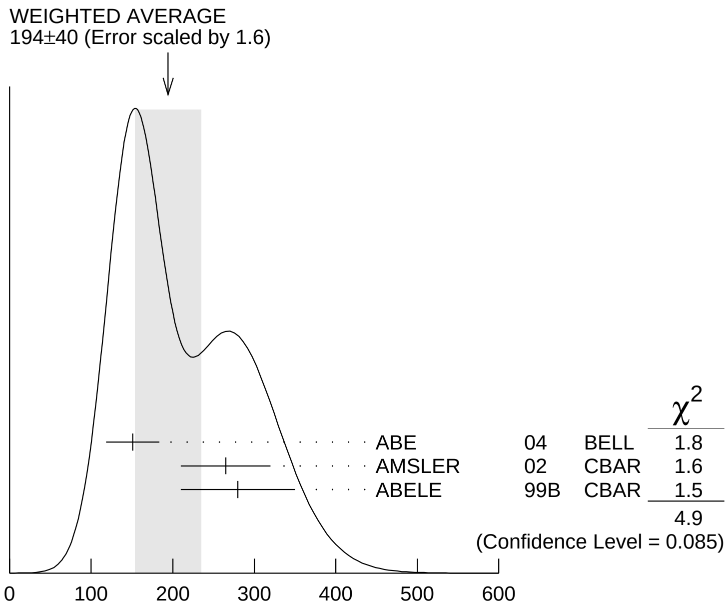
$a_2(1700)$ WIDTH

NODE=M162W

NODE=M162W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
194± 40 OUR AVERAGE	Error includes scale factor of 1.6. See the ideogram below.					
151± 22±24		ABE	04	BELL		10.6 $e^+e^- \to e^+e^-K^+K^-$
265± 55		[6] AMSLER	02	CBAR		0.9 $\overline{p}p \to \pi^0\eta\eta$
280± 70		ABELE	99B	CBAR		1.94 $\overline{p}p \to \pi^0\eta\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
270^{+50}_{-20}		ANISOVICH	09	RVUE		0.0 $\overline{p}p$, πN
336± 20±20	18k	[7] SCHEGELSKY	06	RVUE	0	$\gamma\gamma \to \pi^+\pi^-\pi^0$
417± 19	80k	[8] UMAN	06	E835		5.2 $\overline{p}p \to \eta\eta\pi^0$
279± 49±66	145k	LU	05	B852		18 $\pi^-p \to \omega\pi^-\pi^0p$
187± 60	221	[9] ACCIARRI	01H	L3		$\gamma\gamma \to K^0_SK^0_S$, E^{ee}_{cm}= 91, 183–209 GeV
150±110±34		ACCIARRI	97T	L3		$\gamma\gamma \to \pi^+\pi^-\pi^0$

[6] T-matrix pole. NODE=M162W;LINKAGE=TT
[7] From analysis of L3 data at 183–209 GeV. NODE=M162W;LINKAGE=SC
[8] Statistical error only. NODE=M162W;LINKAGE=ST
[9] Spin 2 dominant, isospin not determined, could also be I=1. NODE=M162W;LINKAGE=HA



$a_2(1700)$ width

$a_2(1700)$ DECAY MODES

NODE=M162215;NODE=M162

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\eta\pi$	seen	DESIG=4;OUR EST;→ NOT CHECKED ←
Γ_2	$\gamma\gamma$		DESIG=1
Γ_3	$\rho\pi$		DESIG=2
Γ_4	$f_2(1270)\pi$		DESIG=3
Γ_5	$K\overline{K}$	seen	DESIG=5;OUR EST;→ NOT CHECKED ←
Γ_6	$\omega\pi^-\pi^0$	seen	DESIG=6;OUR EVAL;→ NOT CHECKED ←
Γ_7	$\omega\rho$	seen	DESIG=7;OUR EVAL;→ NOT CHECKED ←

$a_2(1700)$ PARTIAL WIDTHS

NODE=M162220

$\Gamma(\eta\pi)$ Γ_1

NODE=M162W3
NODE=M162W3

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
9.5 ± 2.0	870	[10] SCHEGELSKY	06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$

$\Gamma(\gamma\gamma)$ Γ_2

NODE=M162W2
NODE=M162W2

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.30 ± 0.05	870	[10] SCHEGELSKY	06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$

$\Gamma(K\overline{K})$ Γ_5

NODE=M162W1
NODE=M162W1

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
5.0 ± 3.0	870	[10] SCHEGELSKY	06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$

[10] 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

$\left[\Gamma(\rho\pi)+\Gamma(f_2(1270)\pi)\right] \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $(\Gamma_3+\Gamma_4)\Gamma_2/\Gamma$

NODE=M162G1
NODE=M162G1

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
$0.29\pm0.04\pm0.02$		ACCIARRI	97T	L3	$\gamma\gamma \to \pi^+\pi^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.37^{+0.12}_{-0.08}\pm0.10$	18k	[11] SCHEGELSKY	06	RVUE	$\gamma\gamma \to \pi^+\pi^-\pi^0$

$\Gamma(K\overline{K}) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_5\Gamma_2/\Gamma$

NODE=M162G2

NODE=M162G2

VALUE (eV)	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
20.6± 4.2± 4.6	[12] ABE 04	BELL	10.6 $e^+e^- \rightarrow e^+e^-K^+K^-$
49 ±11 ±13	[13] ACCIARRI 01H	L3	$\gamma\gamma \rightarrow K^0_S K^0_S$, E^{ee}_{cm}= 91, 183–209 GeV

[11] From analysis of L3 data at 183–209 GeV.
[12] Assuming spin 2.
[13] Spin 2 dominant, isospin not determined, could also be I=1.

NODE=M162G1;LINKAGE=SC
NODE=M162G2;LINKAGE=AB
NODE=M162G;LINKAGE=HA

a_2(1700) BRANCHING RATIOS

NODE=M162235

$\Gamma(\rho\pi)/\Gamma(f_2(1270)\pi)$ — Γ_3/Γ_4

NODE=M162R01

NODE=M162R01

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
3.4±0.4±0.1	18k	[14] SCHEGELSKY 06	RVUE	$\gamma\gamma \rightarrow \pi^+\pi^-\pi^0$

[14] From analysis of L3 data at 183–209 GeV.

NODE=M162R01;LINKAGE=SC

a_2(1700) REFERENCES

NODE=M162

ANISOVICH	09	IJMP A24 2481	V.V. Anisovich, A.V. Sarantsev	
SCHEGELSKY	06	EPJ A27 199	V.A. Schegelsky *et al.*	
SCHEGELSKY	06A	EPJ A27 207	V.A. Schegelsky *et al.*	
UMAN	06	PR D73 052009	I. Uman *et al.*	(FNAL E835)
LU	05	PRL 94 032002	M. Lu *et al.*	(BNL E852 Collab.)
ABE	04	EPJ C32 323	K. Abe *et al.*	(BELLE Collab.)
AMSLER	02	EPJ C23 29	C. Amsler *et al.*	
ACCIARRI	01H	PL B501 173	M. Acciarri *et al.*	(L3 Collab.)
ABELE	99B	EPJ C8 67	A. Abele *et al.*	(Crystal Barrel Collab.)
GRYGOREV	99	PAN 62 470 (Translated from YAF 62 513.)	V.K. Grygorev *et al.*	
ACCIARRI	97T	PL B413 147	M. Acciarri *et al.*	(L3 Collab.)

REFID=52719
REFID=51186
REFID=51185
REFID=51063
REFID=50459
REFID=49650
REFID=48580
REFID=48321
REFID=46904
REFID=46909
REFID=45761

NODE=M068

f_0(1710)

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

See our mini-review in the 2004 edition of this *Review*, Physics Letters **B592** 1 (2004). See also the mini-review on scalar mesons under f_0(500) (see the index for the page number).

NODE=M068

f_0(1710) MASS

NODE=M068M

NODE=M068M

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
1720± 6	**OUR AVERAGE**	Error includes scale factor of 1.6. See the ideogram below.		
1701± 5 $^{+9}_{-2}$	4k	[1] CHEKANOV 08	ZEUS	$ep \rightarrow K^0_S K^0_S X$
1765$^{+4}_{-3}$ ±13		ABLIKIM 06V	BES2	$e^+e^- \rightarrow J/\psi \rightarrow \gamma\pi^+\pi^-$
1760±15 $^{+15}_{-10}$		[2] ABLIKIM 05Q	BES2	$\psi(2S) \rightarrow \gamma\pi^+\pi^-K^+K^-$
1738±30		ABLIKIM 04E	BES2	$J/\psi \rightarrow \omega K^+K^-$
1740± 4 $^{+10}_{-25}$		[3] BAI 03G	BES	$J/\psi \rightarrow \gamma K\overline{K}$
1740$^{+30}_{-25}$		[3] BAI 00A	BES	$J/\psi \rightarrow \gamma(\pi^+\pi^-\pi^+\pi^-)$
1698±18		[4] BARBERIS 00E		450 $pp \rightarrow p_f\eta\eta p_s$
1710±12 ±11		[5] BARBERIS 99D	OMEG	450 $pp \rightarrow K^+K^-, \pi^+\pi^-$
1710±25		[6] FRENCH 99		300 $pp \rightarrow p_f(K^+K^-)p_s$
1707±10		[7] AUGUSTIN 88	DM2	$J/\psi \rightarrow \gamma K^+K^-, K^0_S K^0_S$
1698±15		[7] AUGUSTIN 87	DM2	$J/\psi \rightarrow \gamma\pi^+\pi^-$
1720±10 ±10		[8] BALTRUSAIT...87	MRK3	$J/\psi \rightarrow \gamma K^+K^-$
1742±15		[7] WILLIAMS 84	MPSF	200 $\pi^-N \rightarrow 2K^0_S X$
1670±50		BLOOM 83	CBAL	$J/\psi \rightarrow \gamma 2\eta$

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

1750 ± 13		AMSLER	06	CBAR	$1.64\ \overline{p}p \rightarrow K^+ K^- \pi^0$	
1747 ± 5	80k	[9,10] UMAN	06	E835	$5.2\ \overline{p}p \rightarrow \eta\eta\pi^0$	
1776 ± 15		VLADIMIRSK...06		SPEC	$40\ \pi^- p \rightarrow K^0_S K^0_S n$	
1790^{+40}_{-30}		[2] ABLIKIM	05	BES2	$J/\psi \rightarrow \phi\pi^+\pi^-$	
1670 ± 20		[9] BINON	05	GAMS	$33\ \pi^- p \rightarrow \eta\eta n$	
1726 ± 7	74	[10] CHEKANOV	04	ZEUS	$ep \rightarrow K^0_S K^0_S X$	
$1732 + 15$		[11] ANISOVICH	03	RVUE		
1682 ± 16		TIKHOMIROV	03	SPEC	$40.0\ \pi^- \mathrm{C} \rightarrow K^0_S K^0_S K^0_L X$	
1670 ± 26	3651	[3,12] NICHITIU	02	OBLX		
1770 ± 12		[13,14] ANISOVICH	99B	SPEC	$0.6\text{–}1.2\ p\overline{p} \rightarrow \eta\eta\pi^0$	
1730 ± 15		[3] BARBERIS	99	OMEG	$450\ pp \rightarrow p_s p_f K^+ K^-$	
1750 ± 20		[3] BARBERIS	99B	OMEG	$450\ pp \rightarrow p_s p_f \pi^+\pi^-$	
1750 ± 30		[15] ANISOVICH	98B	RVUE	Compilation	
1720 ± 39		BAI	98H	BES	$J/\psi \rightarrow \gamma\pi^0\pi^0$	
1775 ± 1.5	57	[16] BARKOV	98		$\pi^- p \rightarrow K^0_S K^0_S n$	
1690 ± 11		[17] ABREU	96C	DLPH	$Z^0 \rightarrow K^+ K^- + X$	
$1696 \pm 5\ {}^{+9}_{-34}$		[8] BAI	96C	BES	$J/\psi \rightarrow \gamma K^+ K^-$	
$1781 \pm 8\ {}^{+10}_{-31}$		[3] BAI	96C	BES	$J/\psi \rightarrow \gamma K^+ K^-$	OCCUR=2
1768 ± 14		BALOSHIN	95	SPEC	$40\ \pi^- \mathrm{C} \rightarrow K^0_S K^0_S X$	
1750 ± 15		[18] BUGG	95	MRK3	$J/\psi \rightarrow \gamma\pi^+\pi^-\pi^+\pi^-$	
1620 ± 16		[8] BUGG	95	MRK3	$J/\psi \rightarrow \gamma\pi^+\pi^-\pi^+\pi^-$	OCCUR=2
1748 ± 10		[7] ARMSTRONG	93C	E760	$\overline{p}p \rightarrow \pi^0\eta\eta \rightarrow 6\gamma$	
~ 1750		BREAKSTONE	93	SFM	$pp \rightarrow pp\pi^+\pi^-\pi^+\pi^-$	
1744 ± 15		[19] ALDE	92D	GAM2	$38\ \pi^- p \rightarrow \eta\eta n$	
1713 ± 10		[20] ARMSTRONG	89D	OMEG	$300\ pp \rightarrow ppK^+K^-$	
1706 ± 10		[20] ARMSTRONG	89D	OMEG	$300\ pp \rightarrow ppK^0_S K^0_S$	OCCUR=2
1700 ± 15		[8] BOLONKIN	88	SPEC	$40\ \pi^- p \rightarrow K^0_S K^0_S n$	
1720 ± 60		[3] BOLONKIN	88	SPEC	$40\ \pi^- p \rightarrow K^0_S K^0_S n$	OCCUR=2
1638 ± 10		[21] FALVARD	88	DM2	$J/\psi \rightarrow \phi K^+ K^-, K^0_S K^0_S$	
1690 ± 4		[22] FALVARD	88	DM2	$J/\psi \rightarrow \phi K^+ K^-, K^0_S K^0_S$	OCCUR=2
1755 ± 8		[23] ALDE	86C	GAM2	$38\ \pi^- p \rightarrow n2\eta$	
1730^{+2}_{-10}		[24] LONGACRE	86	RVUE	$22\ \pi^- p \rightarrow n2K^0_S$	
1650 ± 50		BURKE	82	MRK2	$J/\psi \rightarrow \gamma 2\rho$	
1640 ± 50		[25,26] EDWARDS	82D	CBAL	$J/\psi \rightarrow \gamma 2\eta$	
$1730 \pm 10\ \pm 20$		[27] ETKIN	82C	MPS	$23\ \pi^- p \rightarrow n2K^0_S$	

[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=M068M;LINKAGE=HE

[2] This state may be different from $f_0(1710)$, see CLOSE 05. NODE=M068M;LINKAGE=AB

[3] $J^P = 0^+$. NODE=M068M;LINKAGE=A8

[4] T-matrix pole. NODE=M068M;LINKAGE=TP

[5] Supersedes BARBERIS 99 and BARBERIS 99B. NODE=M068M;LINKAGE=BD

[6] $J^P = 0^+$, supersedes by ARMSTRONG 89D. NODE=M068M;LINKAGE=C3

[7] No J^{PC} determination. NODE=M068M;LINKAGE=A1

[8] $J^P = 2^+$. NODE=M068M;LINKAGE=A3

[9] Breit-Wigner mass. NODE=M068M;LINKAGE=BW

[10] Systematic errors not estimated. NODE=M068M;LINKAGE=CH

[11] 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=M068M;LINKAGE=KM

[12] Decaying to $f_0(1370)\pi\pi$. NODE=M068M;LINKAGE=NC

[13] $J^P = 0^+$. NODE=M068M;LINKAGE=AV

[14] Not seen by AMSLER 02. NODE=M068M;LINKAGE=NS

[15] T-matrix pole, assuming $J^P = 0^+$ NODE=M068M;LINKAGE=AN

[16] No J^{PC} determination. NODE=M068M;LINKAGE=4A

[17] No J^{PC} determination, width not determined. NODE=M068M;LINKAGE=A4

[18] From a fit to the 0^+ partial wave. NODE=M068M;LINKAGE=Q0

[19] ALDE 92D combines all the GAMS-2000 data. NODE=M068M;LINKAGE=AA

[20] $J^P = 2^+$, superseded by FRENCH 99. NODE=M068M;LINKAGE=C

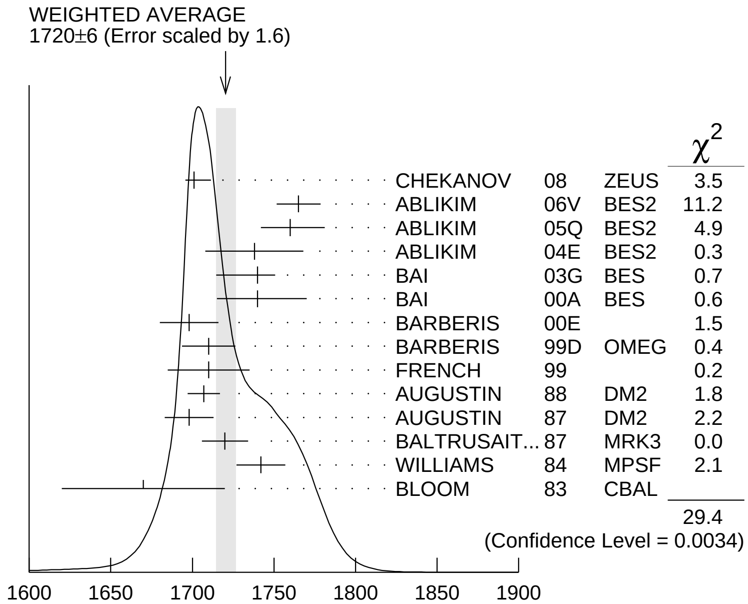
[21] From an analysis ignoring interference with $f'_2(1525)$. NODE=M068M;LINKAGE=A

[22] From an analysis including interference with $f'_2(1525)$. NODE=M068M;LINKAGE=B

[23] Superseded by ALDE 92D. NODE=M068M;LINKAGE=BB

[24] 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.
[25] $J^P = 2^+$ preferred.
[26] From fit neglecting nearby $f'_2(1525)$. Replaced by BLOOM 83.
[27] Superseded by LONGACRE 86.

NODE=M068M;LINKAGE=A9
NODE=M068M;LINKAGE=B2
NODE=M068M;LINKAGE=E
NODE=M068M;LINKAGE=B1



$f_0(1710)$ mass (MeV)

$f_0(1710)$ WIDTH

NODE=M068W

NODE=M068W

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
135 ± 8 OUR AVERAGE		Error includes scale factor of 1.1.		
100 ± 24 $^{+7}_{-22}$	4k	[28] CHEKANOV 08	ZEUS	$e p \to K^0_S K^0_S X$
145 ± 8 ±69		ABLIKIM 06V	BES2	$e^+ e^- \to J/\psi \to \gamma \pi^+ \pi^-$
125 ± 25 $^{+10}_{-15}$		[29] ABLIKIM 05Q	BES2	$\psi(2S) \to \gamma \pi^+ \pi^- K^+ K^-$
125 ± 20		ABLIKIM 04E	BES2	$J/\psi \to \omega K^+ K^-$
166 $^{+5}_{-8}$ $^{+15}_{-10}$		[30] BAI 03G	BES	$J/\psi \to \gamma K \overline{K}$
120 $^{+50}_{-40}$		[30] BAI 00A	BES	$J/\psi \to \gamma(\pi^+ \pi^- \pi^+ \pi^-)$
120 ± 26		[31] BARBERIS 00E		450 $p p \to p_f \eta \eta p_s$
126 ± 16 ±18		[32] BARBERIS 99D	OMEG	450 $p p \to K^+ K^-, \pi^+ \pi^-$
105 ± 34		[33] FRENCH 99		300 $p p \to p_f (K^+ K^-) p_s$
166.4 ± 33.2		[34] AUGUSTIN 88	DM2	$J/\psi \to \gamma K^+ K^-, K^0_S K^0_S$
136 ± 28		[34] AUGUSTIN 87	DM2	$J/\psi \to \gamma \pi^+ \pi^-$
130 ± 20		[35] BALTRUSAIT...87	MRK3	$J/\psi \to \gamma K^+ K^-$
57 ± 38		[36] WILLIAMS 84	MPSF	200 $\pi^- N \to 2 K^0_S X$
160 ± 80		BLOOM 83	CBAL	$J/\psi \to \gamma 2\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
148 $^{+40}_{-30}$		AMSLER 06	CBAR	1.64 $\overline{p} p \to K^+ K^- \pi^0$
188 ± 13	80k	[29,37] 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 $^{+60}_{-30}$		[38] ABLIKIM 05	BES2	$J/\psi \to \phi \pi^+ \pi^-$
260 ± 50		[29] BINON 05	GAMS	33 $\pi^- p \to \eta \eta n$
38 $^{+20}_{-14}$	74	[37] CHEKANOV 04	ZEUS	$e p \to K^0_S K^0_S X$
144 ± 30		[39,40] ANISOVICH 03	RVUE	
320 $^{+50}_{-20}$		[40,41] ANISOVICH 03	RVUE	
102 ± 26		TIKHOMIROV 03	SPEC	40.0 $\pi^- C \to K^0_S K^0_S K^0_L X$
267 ± 44	3651	[30,42] NICHITIU 02	OBLX	
220 ± 40		[43,44] ANISOVICH 99B	SPEC	0.6–1.2 $p \overline{p} \to \eta \eta \pi^0$
100 ± 25		[30] BARBERIS 99	OMEG	450 $p p \to p_s p_f K^+ K^-$

OCCUR=2

160 ± 30			[30] BARBERIS	99B	OMEG	450 $pp \to p_s p_f \pi^+\pi^-$	
250 ±140			[45] ANISOVICH	98B	RVUE	Compilation	
30 ± 7		57	[46] BARKOV	98		$\pi^- p \to K^0_S K^0_S n$	
103 ± 18	$^{+30}_{-11}$		[35] BAI	96C	BES	$J/\psi \to \gamma K^+ K^-$	
85 ± 24	$^{+22}_{-19}$		[30] BAI	96C	BES	$J/\psi \to \gamma K^+ K^-$	OCCUR=2
56 ± 19			BALOSHIN	95	SPEC	40 $\pi^- C \to K^0_S K^0_S X$	
160 ± 40			[47] BUGG	95	MRK3	$J/\psi \to \gamma \pi^+\pi^-\pi^+\pi^-$	
160 $^{+60}_{-20}$			[35] BUGG	95	MRK3	$J/\psi \to \gamma \pi^+\pi^-\pi^+\pi^-$	OCCUR=2
264 ± 25			[34] ARMSTRONG	93C	E760	$\overline{p}p \to \pi^0\eta\eta \to 6\gamma$	
200 to 300			BREAKSTONE	93	SFM	$pp \to pp\pi^+\pi^-\pi^+\pi^-$	
< 80 90% CL			[48] ALDE	92D	GAM2	38 $\pi^- p \to \eta\eta N^*$	
181 ± 30			[49] ARMSTRONG	89D	OMEG	300 $pp \to ppK^+K^-$	
104 ± 30			[49] ARMSTRONG	89D	OMEG	300 $pp \to ppK^0_S K^0_S$	OCCUR=2
30 ± 20			[35] BOLONKIN	88	SPEC	40 $\pi^- p \to K^0_S K^0_S n$	
350 ±150			[30] BOLONKIN	88	SPEC	40 $\pi^- p \to K^0_S K^0_S n$	OCCUR=2
148 ± 17			[50] FALVARD	88	DM2	$J/\psi \to \phi K^+K^-, K^0_S K^0_S$	
184 ± 6			[51] FALVARD	88	DM2	$J/\psi \to \phi K^+K^-, K^0_S K^0_S$	OCCUR=2
122 $^{+74}_{-15}$			[52] LONGACRE	86	RVUE	22 $\pi^- p \to n 2K^0_S$	
200 ±100			BURKE	82	MRK2	$J/\psi \to \gamma 2\rho$	
220 $^{+100}_{-70}$			[53,54] EDWARDS	82D	CBAL	$J/\psi \to \gamma 2\eta$	
200 $^{+156}_{-9}$			[55] ETKIN	82B	MPS	23 $\pi^- p \to n 2K^0_S$	

[28] 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
[29] Breit-Wigner width. NODE=M068W;LINKAGE=BW
[30] $J^P = 0^+$. NODE=M068W;LINKAGE=A8
[31] T-matrix pole. NODE=M068W;LINKAGE=TP
[32] Supersedes BARBERIS 99 and BARBERIS 99B. NODE=M068W;LINKAGE=BD
[33] $J^P = 0^+$, supersedes by ARMSTRONG 89D. NODE=M068W;LINKAGE=C3
[34] No J^{PC} determination. NODE=M068W;LINKAGE=A1
[35] $J^P = 2^+$. NODE=M068W;LINKAGE=A3
[36] No J^{PC} determination. NODE=M068M;LINKAGE=WI
[37] Systematic errors not estimated. NODE=M068W;LINKAGE=CH
[38] This state may be different from $f_0(1710)$, see CLOSE 05. NODE=M068W;LINKAGE=AB
[39] (Solution I) NODE=M068W;LINKAGE=K1
[40] 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=M068W;LINKAGE=KM
[41] (Solution I) NODE=M068W;LINKAGE=K2
[42] Decaying to $f_0(1370)\pi\pi$. NODE=M068W;LINKAGE=NC
[43] $J^P = 0^+$. NODE=M068W;LINKAGE=AV
[44] Not seen by AMSLER 02. NODE=M068W;LINKAGE=NS
[45] T-matrix pole, assuming $J^P = 0^+$ NODE=M068W;LINKAGE=AN
[46] No J^{PC} determination. NODE=M068W;LINKAGE=4A
[47] From a fit to the 0^+ partial wave. NODE=M068W;LINKAGE=Q0
[48] ALDE 92D combines all the GAMS-2000 data. NODE=M068W;LINKAGE=AA
[49] $J^P = 2^+$, (0^+ excluded). NODE=M068W;LINKAGE=B
[50] From an analysis ignoring interference with $f'_2(1525)$. NODE=M068W;LINKAGE=C
[51] From an analysis including interference with $f'_2(1525)$. NODE=M068W;LINKAGE=D
[52] 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
[53] $J^P = 2^+$ preferred. NODE=M068W;LINKAGE=B2
[54] From fit neglecting nearby $f'_2(1525)$. Replaced by BLOOM 83. NODE=M068W;LINKAGE=E
[55] 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;→ NOT CHECKED ←
Γ_2	$\eta\eta$	seen	DESIG=1;OUR EST;→ NOT CHECKED ←
Γ_3	$\pi\pi$	seen	DESIG=5;OUR EST;→ NOT CHECKED ←
Γ_4	$\gamma\gamma$		DESIG=6
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
<110	95	[56] BEHREND	89C	CELL	$\gamma\gamma \rightarrow K^0_S K^0_S$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<480	95	ALBRECHT	90G	ARG	$\gamma\gamma \rightarrow K^+ K^-$
<280	95	[56] ALTHOFF	85B	TASS	$\gamma\gamma \rightarrow K\overline{K}\pi$

[56] Assuming helicity 2.

NODE=M068G2;LINKAGE=F

$\Gamma(\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_3\Gamma_4/\Gamma$

NODE=M068G3
NODE=M068G3

VALUE (keV)	CL%	DOCUMENT ID		TECN	COMMENT
<0.82	95	[57] BARATE	00E	ALEP	$\gamma\gamma \rightarrow \pi^+\pi^-$

[57] Assuming spin 0.

NODE=M068G;LINKAGE=Z

$f_0(1710)$ BRANCHING RATIOS

NODE=M068225

$\Gamma(K\overline{K})/\Gamma_{\text{total}}$ — Γ_1/Γ

NODE=M068R2
NODE=M068R2

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.36 ± 0.12	ALBALADEJO	08	RVUE	
$0.38^{+0.09}_{-0.19}$	[58,59] LONGACRE	86	MPS	$22\ \pi^- p \rightarrow n 2K^0_S$

$\Gamma(\eta\eta)/\Gamma_{\text{total}}$ — 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
$0.18^{+0.03}_{-0.13}$	[58,59] LONGACRE	86	RVUE

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

NODE=M068R5
NODE=M068R5

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	AMSLER	02	CBAR	$0.9\ \overline{p}p \rightarrow \pi^0\eta\eta,\ \pi^0\pi^0\pi^0$
$0.039^{+0.002}_{-0.024}$	[58,59] LONGACRE	86	RVUE	

$\Gamma(\pi\pi)/\Gamma(K\overline{K})$ — Γ_3/Γ_1

NODE=M068R6
NODE=M068R6

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.41^{+0.11}_{-0.17}}$		ABLIKIM	06V	BES2	$e^+e^- \rightarrow J/\psi \rightarrow \gamma\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.32 ± 0.14		ALBALADEJO	08	RVUE	
< 0.11	95	[60] ABLIKIM	04E	BES2	$J/\psi \rightarrow \omega K^+ K^-$
$5.8\ ^{+9.1}_{-5.5}$		[61] ANISOVICH	02D	SPEC	Combined fit
$0.2\ \pm0.024\pm0.036$		BARBERIS	99D	OMEG	$450\ pp \rightarrow K^+K^-,\ \pi^+\pi^-$
0.39 ± 0.14		ARMSTRONG	91	OMEG	$300\ pp \rightarrow pp\pi\pi,\ ppK\overline{K}$

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

NODE=M068R7
NODE=M068R7

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.48\pm0.15}$		BARBERIS	00E		$450\ pp \rightarrow p_f \eta\eta p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.46^{+0.70}_{-0.38}$		[61] ANISOVICH	02D	SPEC	Combined fit
<0.02	90	[62] PROKOSHKIN	91	GA24	$300\ \pi^- p \rightarrow \pi^- p\eta\eta$

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

NODE=M068R3
NODE=M068R3

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	180	ABLIKIM	06H	BES	$J/\psi \rightarrow \gamma\omega\omega$

[58] From a partial-wave analysis of data using a K-matrix formalism with 5 poles, but assuming spin 2.

NODE=M068R;LINKAGE=L

[59] Fit with constrained inelasticity.

NODE=M068R;LINKAGE=M

[60] Using data from ABLIKIM 04A.

NODE=M068R;LINKAGE=AB

[61] 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=M068R;LINKAGE=CH

[62] Combining results of GAM4 with those of ARMSTRONG 89D.

NODE=M068R;LINKAGE=A

$f_0(1710)$ REFERENCES

NODE=M068

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	06V	PL B642 441	M. Ablikim *et al.*	(BES Collab.)	REFID=51507
AMSLER	06	PL B639 165	C. Amsler *et al.*	(CBAR 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
CHEKANOV	04	PL B578 33	S. Chekanov *et al.*	(ZEUS Collab.)	REFID=49672
PDG	04	PL B592 1	S. Eidelman *et al.*	(PDG Collab.)	REFID=49653
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, 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
WILLIAMS	84	PR D30 877	E.G.H. Williams *et al.*	(VAND, NDAM, TUFTS+)	REFID=21693
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

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

NODE=M114M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1756± 9 OUR AVERAGE					
1744±10±15	1045	[1] ABLIKIM	06H	BES	$J/\psi \rightarrow \gamma\omega\omega$
1760±11	320	[2] BISELLO	89B	DM2	$J/\psi \rightarrow 4\pi\gamma$

[1] From a partial wave analysis including $\eta(1760)$, $f_0(1710)$, $f_2(1640)$, and $f_2(1910)$. NODE=M114M;LINKAGE=MA

[2] Estimated by us from various fits. NODE=M114M;LINKAGE=A

$\eta(1760)$ WIDTH

NODE=M114W

NODE=M114W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
96±70 OUR AVERAGE Error includes scale factor of 5.1.					
$244^{+24}_{-21}\pm25$	1045	[3] ABLIKIM	06H	BES	$J/\psi \rightarrow \gamma\omega\omega$
60±16	320	[4] BISELLO	89B	DM2	$J/\psi \rightarrow 4\pi\gamma$

[3] From a partial wave analysis including $\eta(1760)$, $f_0(1710)$, $f_2(1640)$, and $f_2(1910)$. NODE=M114W;LINKAGE=MA

[4] Estimated by us from various fits. NODE=M114W;LINKAGE=B

$\eta(1760)$ REFERENCES

NODE=M114

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...	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 also minireview under non-$q\overline{q}$ candidates in PDG 06, Journal of Physics, G **33** 1 (2006).

NODE=M075

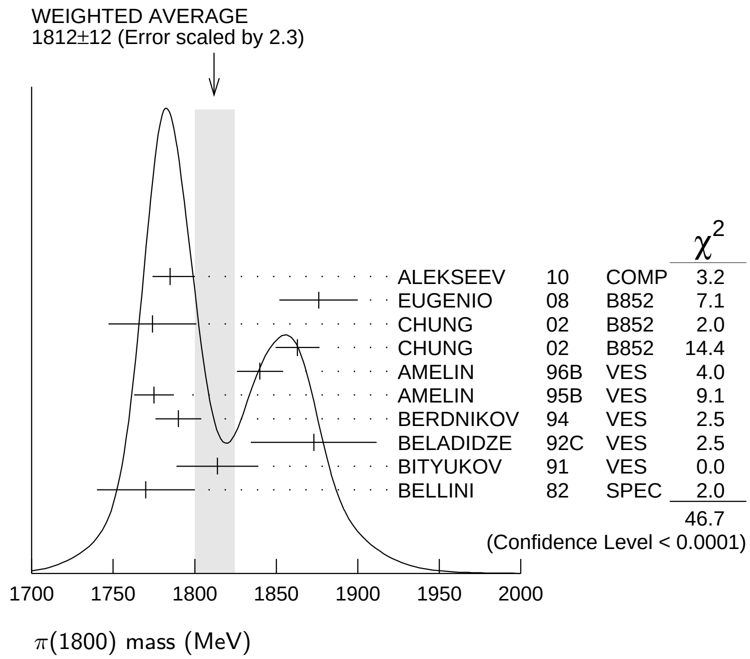
$\pi(1800)$ MASS

NODE=M075M

NODE=M075M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1812±12 OUR AVERAGE Error includes scale factor of 2.3. See the ideogram below.						
$1785\pm\ 9^{+12}_{-\ 6}$	420k	ALEKSEEV	10	COMP		190 $\pi^- Pb \rightarrow \pi^-\pi^-\pi^+ Pb'$
1876±18±16	4k	[1] EUGENIO	08	B852	–	18 $\pi^- p \rightarrow \eta\eta\pi^- p$
1774±18±20		[2] CHUNG	02	B852		18.3 $\pi^- p \rightarrow \pi^+\pi^-\pi^- p$
1863± 9±10		[3] CHUNG	02	B852		18.3 $\pi^- p \rightarrow \pi^+\pi^-\pi^- p$ OCCUR=2
1840±10±10	1200	AMELIN	96B	VES	–	37 $\pi^- A \rightarrow \eta\eta\pi^- A$
1775± 7±10		[4] AMELIN	95B	VES	–	36 $\pi^- A \rightarrow \pi^+\pi^-\pi^- A$
1790±14		[5] BERDNIKOV	94	VES	–	37 $\pi^- A \rightarrow K^+ K^- \pi^- A$
1873±33±20		BELADIDZE	92C	VES	–	36 π^- Be $\rightarrow \pi^-\eta'\eta$ Be
1814±10±23	426 ± 57	BITYUKOV	91	VES	–	36 π^- C $\rightarrow \pi^-\eta\eta$ C
1770±30	1100	BELLINI	82	SPEC	–	40 π^- A $\rightarrow 3\pi$ A
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1737± 5±15		AMELIN	99	VES		37 $\pi^- A \rightarrow \omega\pi^-\pi^0 A^*$

[1] From a single-pole fit. NODE=M075M;LINKAGE=SP
[2] In the $f_0(980)\pi$ wave. NODE=M075M;LINKAGE=C1
[3] In the $f_0(500)\pi$ wave. NODE=M075M;LINKAGE=C2
[4] From a fit to $J^{PC} = 0^{-+}$ $f_0(980)\pi$, $f_0(1370)\pi$ waves. NODE=M075M;LINKAGE=AX
[5] From a fit to $J^{PC} = 0^{-+}$ $K_0^*(1430)K^-$ and $f_0(980)\pi^-$ waves. NODE=M075M;LINKAGE=A



$\pi(1800)$ WIDTH

NODE=M075W

NODE=M075W

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
208±12 OUR AVERAGE						
$208 \pm 22 ^{+21}_{-37}$	420k	ALEKSEEV	10	COMP		190 $\pi^- Pb \to \pi^-\pi^-\pi^+ Pb'$
$221 \pm 26 \pm 38$	4k	[6] EUGENIO	08	B852	−	18 $\pi^- p \to \eta\eta\pi^- p$
$223 \pm 48 \pm 50$		[7] CHUNG	02	B852		18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$
$191 \pm 21 \pm 20$		[8] CHUNG	02	B852		18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$
$210 \pm 30 \pm 30$	1200	AMELIN	96B	VES	−	37 $\pi^- A \to \eta\eta\pi^- A$
$190 \pm 15 \pm 15$		[9] AMELIN	95B	VES	−	36 $\pi^- A \to \pi^+\pi^-\pi^- A$
210 ± 70		[10] BERDNIKOV	94	VES	−	37 $\pi^- A \to K^+ K^- \pi^- A$
$225 \pm 35 \pm 20$		BELADIDZE	92C	VES	−	36 π^- Be $\to \pi^- \eta' \eta$ Be
$205 \pm 18 \pm 32$	426 ± 57	BITYUKOV	91	VES	−	36 π^- C $\to \pi^- \eta\eta$ C
310 ± 50	1100	BELLINI	82	SPEC	−	40 π^- A $\to 3\pi$ A
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$259 \pm 19 \pm 6$		AMELIN	99	VES		37 $\pi^- A \to \omega\pi^-\pi^0 A^*$

OCCUR=2

[6] From a single-pole fit. NODE=M075W;LINKAGE=SP
[7] In the $f_0(980)\pi$ wave. NODE=M075W;LINKAGE=C1
[8] In the $f_0(500)\pi$ wave. NODE=M075W;LINKAGE=C2
[9] From a fit to $J^{PC} = 0^{-+}$ $f_0(980)\pi$, $f_0(1370)\pi$ waves. NODE=M075W;LINKAGE=AX
[10] From a fit to $J^{PC} = 0^{-+}$ $K_0^*(1430)K^-$ and $f_0(980)\pi^-$ waves. NODE=M075W;LINKAGE=A

$\pi(1800)$ DECAY MODES

NODE=M075215;NODE=M075

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\pi^+\pi^-\pi^-$	seen	DESIG=10;OUR EST;→ NOT CHECKED ←
Γ_2	$f_0(500)\pi^-$	seen	DESIG=11;OUR EST;→ NOT CHECKED ←
Γ_3	$f_0(980)\pi^-$	seen	DESIG=3;OUR EST;→ NOT CHECKED ←
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;→ NOT CHECKED ←

Γ_8	$a_0(980)\eta$	seen	DESIG=5;OUR EST;→ NOT CHECKED ←
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;→ NOT CHECKED ←
Γ_{13}	$\eta\eta'(958)\pi^-$	seen	DESIG=8;OUR EST;→ NOT CHECKED ←
Γ_{14}	$K_0^*(1430)K^-$	seen	DESIG=4
Γ_{15}	$K^*(892)K^-$	not seen	DESIG=9

$\pi(1800)$ 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	[11] 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	[12] 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	[12] 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
NODE=M075R7

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

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
0.48 ±0.17	4k	[12,13] EUGENIO	08	B852	−	18 $\pi^- p \to \eta\eta\pi^- p$
$0.030^{+0.014}_{-0.011}$		[12] ANISOVICH	01B	SPEC	0	0.6–1.94 $p\overline{p} \to \eta\eta\pi^0\pi^0$
0.08 ±0.03	1200	[12,14] 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		[12] BELADIDZE	92C	VES	−	$36\ \pi^- \mathrm{Be} \to \pi^- \eta' \eta \mathrm{Be}$
$0.3\ \pm0.1$	426 ± 57	[12] BITYUKOV	91	VES	−	$36\ \pi^- \mathrm{C} \to \pi^- \eta\eta \mathrm{C}$

$\Gamma(K_0^*(1430)K^-)/\Gamma_{\text{total}}$ — Γ_{14}/Γ

NODE=M075R4

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
seen	BERDNIKOV	94	VES	−	$37\ \pi^- A \to K^+ K^- \pi^- A$

$\Gamma(K^*(892)K^-)/\Gamma_{\text{total}}$ — Γ_{15}/Γ

NODE=M075R9

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
not seen	BERDNIKOV	94	VES	−	$37\ \pi^- A \to K^+ K^- \pi^- A$

[11] Assuming that $f_0(980)$ decays only to $\pi\pi$. NODE=M075R;LINKAGE=CK

[12] Systematic errors not estimated. NODE=M075R5;LINKAGE=NS

[13] From a single-pole fit. NODE=M075R7;LINKAGE=SP

[14] 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

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
PDG	06	JPG 33 1	W.-M. Yao *et al.*	(PDG Collab.)	REFID=51004
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	D.V. Amelin *et al.*	(VES Collab.)	REFID=46910
		Translated from YAF 62 487.			
AMELIN	96B	PAN 59 976	D.V. Amelin *et al.*	(SERP, TBIL) IGJPC	REFID=44725
		Translated from YAF 59 1021.			
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	G.M. Beladidze, S.I. Bityukov, G.V. Borisov	(SERP+)	REFID=43175
		Translated from YAF 55 2748.			
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

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1815±12 OUR AVERAGE		Error includes scale factor of 1.4. See the ideogram below.			
$1737\pm\ 9^{+198}_{-\ 65}$		[1] 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		[2] ALDE	86D	GAM4	$100\ \pi^- p \to \eta\eta n$
1857^{+35}_{-24}		[3] COSTA...	80	OMEG	$10\ \pi^- p \to K^+K^- n$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1858^{+18}_{-71}		[4] LONGACRE	86	RVUE	Compilation
1799 ± 15		[5] CASON	82	STRC	$8\ \pi^+ p \to \Delta^{++}\pi^0\pi^0$

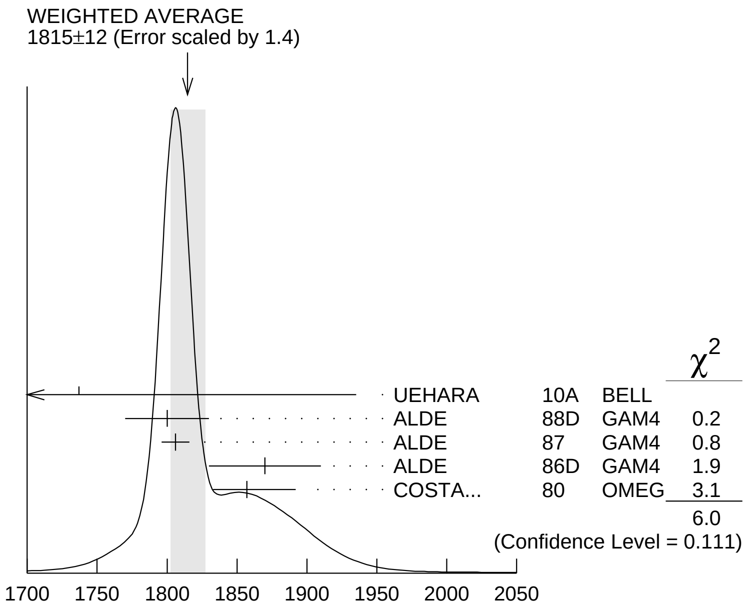
[1] Breit-Wigner mass. NODE=M038M;LINKAGE=UE

[2] Seen in only one solution. NODE=M038M;LINKAGE=F

[3] Error increased by spread of two solutions. Included in LONGACRE 86 global analysis. NODE=M038M;LINKAGE=A

[4] 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

[5] 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



$f_2(1810)$ mass (MeV)

$f_2(1810)$ 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.				
$228^{+21+234}_{-20-153}$		[6] UEHARA	10A	BELL	10.6 $e^+e^- \to e^+e^-\eta\eta$
160± 30	40	ALDE	88D	GAM4	300 $\pi^- p \to \pi^- p 4\pi^0$
190± 20	1600	ALDE	87	GAM4	100 $\pi^- p \to 4\pi^0 n$
250± 30		[7] ALDE	86D	GAM4	100 $\pi^- p \to \eta\eta n$
185^{+102}_{-139}		[8] COSTA...	80	OMEG	10 $\pi^- p \to K^+K^- n$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
388^{+15}_{-21}		[9] LONGACRE	86	RVUE	Compilation
280^{+42}_{-35}		[10] CASON	82	STRC	8 $\pi^+ p \to \Delta^{++}\pi^0\pi^0$

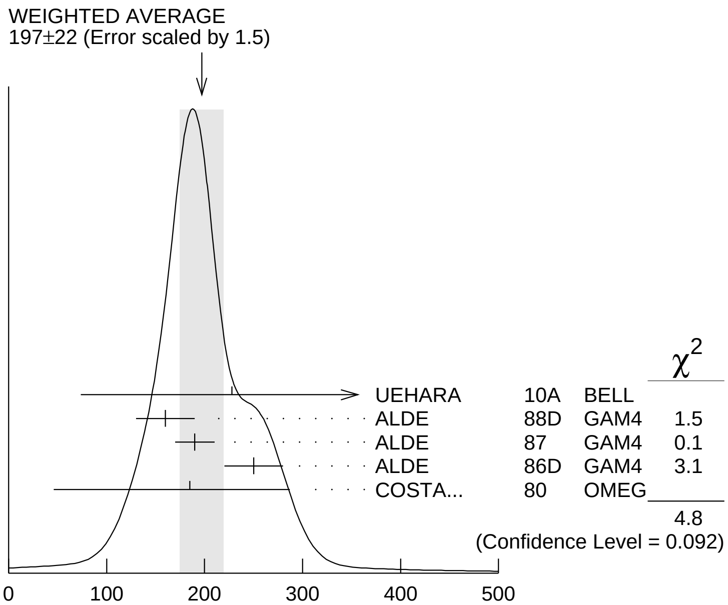
[6] Breit-Wigner width. NODE=M038W;LINKAGE=UE

[7] Seen in only one solution. NODE=M038W;LINKAGE=F

[8] Error increased by spread of two solutions. Included in LONGACRE 86 global analysis. NODE=M038W;LINKAGE=A

[9] 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

[10] 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=M038W;LINKAGE=P1



$f_2(1810)$ width (MeV)

$f_2(1810)$ DECAY MODES

NODE=M038215;NODE=M038

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\pi\pi$		DESIG=2
Γ_2	$\eta\eta$		DESIG=3
Γ_3	$4\pi^0$	seen	DESIG=4;OUR EST;→ NOT CHECKED ←
Γ_4	K^+K^-		DESIG=1
Γ_5	$\gamma\gamma$	seen	DESIG=5;OUR EST;→ NOT CHECKED ←

$f_2(1810)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M038225

$\Gamma(\eta\eta) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\qquad\Gamma_2\Gamma_5/\Gamma$

NODE=M038G01
NODE=M038G01

VALUE (eV)	*DOCUMENT ID*		*TECN*	*COMMENT*
$\mathbf{5.2^{+0.9}_{-0.8}{}^{+37.3}_{-\ 4.5}}$	[11] UEHARA	10A	BELL	$10.6\ e^+e^- \to e^+e^-\eta\eta$

[11] 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

$\Gamma(\pi\pi)/\Gamma_{\text{total}}$ $\qquad\Gamma_1/\Gamma$

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	$38\ \pi^- p \to \pi^0\pi^0 n$
$0.21^{+0.02}_{-0.03}$	[12] LONGACRE	86	RVUE	Compilation
0.44 ± 0.03	[13] CASON	82	STRC	$8\ \pi^+ p \to \Delta^{++}\pi^0\pi^0$

[12] 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

[13] Included in LONGACRE 86 global analysis.

NODE=M038R;LINKAGE=C

$\Gamma(\eta\eta)/\Gamma_{\text{total}}$ $\qquad\Gamma_2/\Gamma$

NODE=M038R3
NODE=M038R3

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.008^{+0.028}_{-0.003}$	[14] LONGACRE	86	RVUE	Compilation

[14] 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

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

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.8 ± 0.3	ALDE	87	GAM4	$100\ \pi^- p \to 4\pi^0 n$

$\Gamma(K^+K^-)/\Gamma_{total}$ — Γ_4/Γ

NODE=M038R1

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.003^{+0.019}_{-0.002}$	[15] LONGACRE	86	RVUE	Compilation
seen	COSTA...	80	OMEG	$10\ \pi^- p \to K^+K^- n$

[15] 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

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	SPD 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
CASON	82	PRL 48 1316	N.M. Cason *et al.*	(NDAM, ANL)	REFID=20746
COSTA...	80	NP B175 402	G. Costa de Beauregard *et al.*	(BARI, BONN+)	REFID=20737

NODE=M085

$X(1835)$

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

OMITTED FROM SUMMARY TABLE

Could be a superposition of several states. NODE=M085

$X(1835)$ MASS

NODE=M085M

NODE=M085M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$1835.7^{+\ 5.0}_{-\ 3.2}$ OUR AVERAGE					
[$1835.7^{+4.0}_{-3.1}$ MeV OUR 2011 AVERAGE]					
$1836.5\pm\ 3.0^{+\ 5.6}_{-\ 2.1}$	4265	[1] ABLIKIM	11C	BES3	$J/\psi \to \gamma\pi^+\pi^-\eta'$
$1833.7\pm\ 6.1\pm\ 2.7$	264	ABLIKIM	05R	BES2	$J/\psi \to \gamma\pi^+\pi^-\eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1877.3\pm\ 6.3^{+\ 3.4}_{-\ 7.4}$		[2] ABLIKIM	11J	BES3	$J/\psi \to \omega(\eta\pi^+\pi^-)$
$1837\ {}^{+10}_{-12}\ {}^{+\ 9}_{-\ 7}$	231	[3,4] ALEXANDER	10	CLEO	$J/\psi \to \gamma p\overline{p}$
$1831\ \pm\ 7$		[4,5] ABLIKIM	05R	BES2	$J/\psi \to \gamma p\overline{p}$
$1859\ {}^{+\ 3}_{-10}\ {}^{+\ 5}_{-25}$		[4] BAI	03F	BES2	$J/\psi \to \gamma p\overline{p}$

NEW

OCCUR=2

[1] From a fit of the $\pi^+\pi^-\eta'$ mass distribution to a combination of $\gamma f_1(1510)$, $\gamma X(1835)$, and two unconfirmed states $\gamma X(2120)$, and $\gamma X(2370)$, for $M(p\overline{p}) < 2.8$ GeV, and accounting for backgrounds from non-η' events and $J/\psi \to \pi^0\pi^+\pi^-\eta'$. NODE=M085M;LINKAGE=AI

[2] 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

[3] 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

[4] 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 $\overline{B}^0 \to p\overline{p}D^0$, 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

[5] 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
99 ±50 OUR AVERAGE Error includes scale factor of 2.8.						
$190 \pm 9 {}^{+38}_{-36}$		4265	[6] ABLIKIM	11C	BES3	$J/\psi \to \gamma\pi^+\pi^-\eta'$
$67.7\pm20.3\pm 7.7$		264	ABLIKIM	05R	BES2	$J/\psi \to \gamma\pi^+\pi^-\eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$57 \pm12 {}^{+19}_{-4}$			[7] ABLIKIM	11J	BES3	$J/\psi \to \omega(\eta\pi^+\pi^-)$
$0 {}^{+44}_{-0}$		231	[8,9] ALEXANDER	10	CLEO	$J/\psi \to \gamma p\overline{p}$
< 153	90		[9,10] ABLIKIM	05R	BES2	$J/\psi \to \gamma p\overline{p}$
< 30			[9] BAI	03F	BES2	$J/\psi \to \gamma p\overline{p}$

OCCUR=2

[6] From a fit of the $\pi^+\pi^-\eta'$ mass distribution to a combination of $\gamma f_1(1510)$, $\gamma X(1835)$, and two unconfirmed states $\gamma X(2120)$, and $\gamma X(2370)$, for $M(p\overline{p}) < 2.8$ GeV, and accounting for backgrounds from non-η' events and $J/\psi \to \pi^0\pi^+\pi^-\eta'$.

NODE=M085W;LINKAGE=AI

[7] 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

[8] 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

[9] 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 $\overline{B}^0 \to p\overline{p}D^0$, 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

[10] 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
Γ_2	$\pi^+\pi^-\eta'$	seen

DESIG=1;OUR EVAL;→ NOT CHECKED ←
DESIG=2;OUR EVAL;→ NOT CHECKED ←

$X(1835)$ BRANCHING RATIOS

NODE=M085220

$\Gamma(p\overline{p})/\Gamma(\pi^+\pi^-\eta')$ Γ_1/Γ_2

NODE=M085R01
NODE=M085R01

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.333	ABLIKIM	05R	BES2	$J/\psi \to \gamma\pi^+\pi^-\eta'$

$X(1835)$ REFERENCES

NODE=M085

ABLIKIM	11C	PRL 106 072002	M. Ablikim *et al.*	(BES III Collab.)	REFID=53684
ABLIKIM	11J	PRL 107 182001	M. Ablikim *et al.*	(BES III Collab.)	REFID=53931
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 051101R	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

$\phi_3(1850)$

$I^G(J^{PC}) = 0^-(3^{--})$

$\phi_3(1850)$ 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
$\mathbf{87^{+28}_{-23}}$ **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
Γ_2	$K \overline{K}^*(892)+$ c.c.	seen

DESIG=1;OUR EST;→ NOT CHECKED ←

DESIG=2;OUR EST;→ NOT CHECKED ←

$\phi_3(1850)$ BRANCHING RATIOS

NODE=M054220

$\Gamma(K \overline{K}^*(892)+\text{c.c.})/\Gamma(K \overline{K})$ Γ_2/Γ_1

NODE=M054R1

NODE=M054R1

VALUE	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.55^{+0.85}_{-0.45}}$	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

$\eta_2(1870)$

$I^G(J^{PC}) = 0^+(2^{-+})$

OMITTED FROM SUMMARY TABLE

Needs confirmation.

NODE=M101

$\eta_2(1870)$ 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. • • •					
$250 \pm 25 ^{+50}_{-35}$		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	[2] ANISOVICH	11	SPEC	0.9–1.94 $p\overline{p}$

[2] Reanalysis of ADOMEIT 96 and ANISOVICH 00E.

NODE=M101R01;LINKAGE=AN

$\Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — 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

$\pi_2(1880)$

$I^G(J^{PC}) = 1^-(2^{-+})$

$\pi(1880)$ MASS

NODE=M185M

NODE=M185M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1895±16 OUR AVERAGE						
1929±24± 18	4k	EUGENIO	08	B852	−	18 $\pi^- p \to \eta\eta\pi^- p$
1876±11± 67	145k	LU	05	B852	−	18 $\pi^- p \to \omega\pi^-\pi^0 p$
2003±88±148	69k	KUHN	04	B852	−	18 $\pi^- p \to \eta\pi^+\pi^-\pi^- p$
1880±20		ANISOVICH	01B	SPEC	0	0.6–1.94 $\bar{p}p \to \eta\eta\pi^0\pi^0$

$\pi(1880)$ WIDTH

NODE=M185W

NODE=M185W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
235± 34 OUR AVERAGE						
323± 87± 43	4k	EUGENIO	08	B852	−	18 $\pi^- p \to \eta\eta\pi^- p$
146± 17± 62	145k	LU	05	B852	−	18 $\pi^- p \to \omega\pi^-\pi^0 p$
306±132±121	69k	KUHN	04	B852	−	18 $\pi^- p \to \eta\pi^+\pi^-\pi^- p$
255± 45		ANISOVICH	01B	SPEC	0	0.6–1.94 $\bar{p}p \to \eta\eta\pi^0\pi^0$

$\pi_2(1880)$ 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. • • •					
$0.28^{+0.20}_{-0.15}$	[1] ANISOVICH	01B	SPEC	0	0.6–1.94 $\bar{p}p \to \eta\eta\pi^0\pi^0$

[1] Systematic errors not estimated.

NODE=M185R02;LINKAGE=NS

$\pi_2(1880)$ REFERENCES

NODE=M185

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 our mini-review under the $\rho(1700)$.

NODE=M170

$\rho(1900)$ MASS

NODE=M170M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1909 \pm 17 \pm 25$	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	$10.6\ e^+e^- \to 2(\pi^+\pi^-\pi^0)\gamma$
1910 ± 10		[2,3] FRABETTI	04	E687	$\gamma p \to 3\pi^+3\pi^- p$
1870 ± 10		ANTONELLI	96	SPEC	$e^+e^- \to$ hadrons

NODE=M170M OCCUR=2

[1] From the fit with two resonances.
[2] From a fit with two resonances with the JACOB 72 continuum.
[3] Supersedes FRABETTI 01.

NODE=M170M;LINKAGE=AU NODE=M170M;LINKAGE=PI NODE=M170M;LINKAGE=RS

$\rho(1900)$ WIDTH

NODE=M170W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$48 \pm 17 \pm 2$	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	$10.6\ e^+e^- \to 2(\pi^+\pi^-\pi^0)\gamma$
37 ± 13		[5,6] FRABETTI	04	E687	$\gamma p \to 3\pi^+3\pi^- p$
10 ± 5		ANTONELLI	96	SPEC	$e^+e^- \to$ hadrons

NODE=M170W OCCUR=2

[4] From the fit with two resonances.
[5] From a fit with two resonances with the JACOB 72 continuum.
[6] Supersedes FRABETTI 01.

NODE=M170W;LINKAGE=AU NODE=M170W;LINKAGE=PI 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. • • •					
$4.2 \pm 1.2 \pm 0.8$	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;→ NOT CHECKED ←
Γ_2	$3\pi^+3\pi^-$	seen	DESIG=1;OUR EST;→ NOT CHECKED ←
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;→ NOT CHECKED ←
Γ_6	e^+e^-	seen	DESIG=3;OUR EST;→ NOT CHECKED ←
Γ_7	$\overline{N}N$	not seen	DESIG=4;OUR EST;→ NOT CHECKED ←

$\rho(1900)$ BRANCHING RATIOS

NODE=M170230

$\Gamma(6\pi)/\Gamma_{total}$ Γ_1/Γ

NODE=M170R1

VALUE	DOCUMENT ID		TECN	COMMENT
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

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

$f_2(1910)$ $\quad I^G(J^{PC}) = 0^+(2^{++})$

OMITTED FROM SUMMARY TABLE

NODE=M142

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.

$f_2(1910)$ MASS

NODE=M142205

NODE=M142MX

$f_2(1910)$ $\omega\omega$ MODE

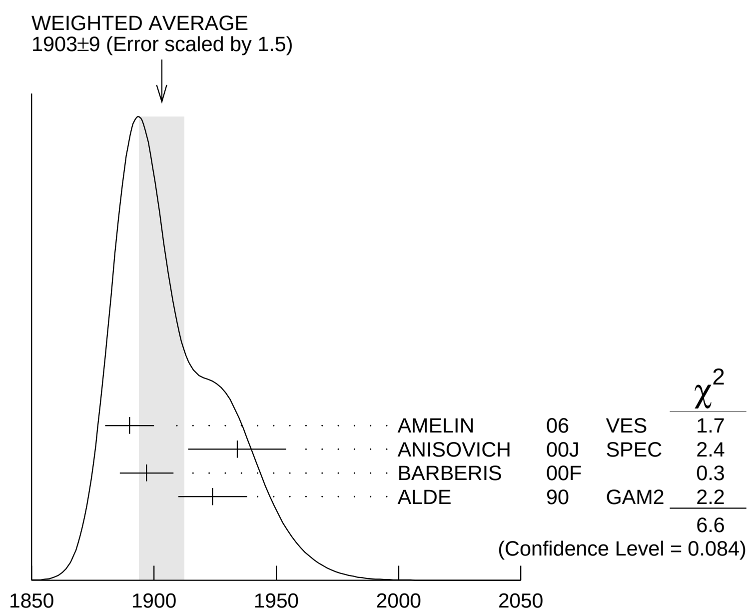
NODE=M142M2

NODE=M142M2

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1903± 9 OUR AVERAGE	Error includes scale factor of 1.5. See the ideogram below.			
1890±10	[1] AMELIN	06	VES	36 $\pi^- p \to \omega\omega n$
1934±20	ANISOVICH	00J	SPEC	
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	[2] BARBERIS	00A		450 $pp \to p_f \eta\eta' p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1911±10	ALDE	91B	GAM2	38 $\pi^- p \to \eta\eta' n$

[2] Also compatible with $J^{PC}=1^{-+}$.

NODE=M142M3;LINKAGE=KS

$f_2(1910)$ 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	AMSLER	06	CBAR	1.64 $\bar{p}p \to K^+K^-\pi^0$

$f_2(1910)$ WIDTH

NODE=M142210

NODE=M142WX

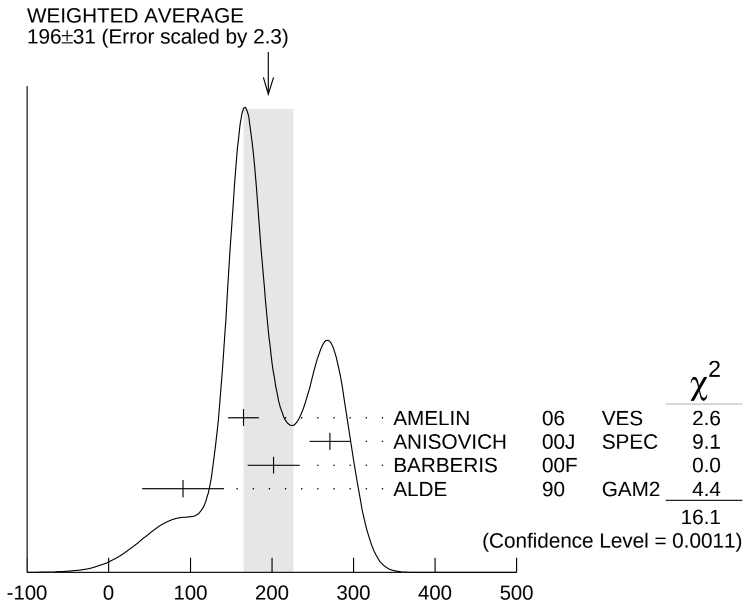
$f_2(1910)$ $\omega\omega$ MODE

NODE=M142W2

NODE=M142W2

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
196±31 OUR AVERAGE	Error includes scale factor of 2.3. See the ideogram below.			
165±19	[3] AMELIN	06	VES	36 $\pi^- p \to \omega\omega n$
271±25	ANISOVICH	00J	SPEC	
202±32	BARBERIS	00F		450 $pp \to p_f \omega\omega p_s$
91±50	ALDE	90	GAM2	38 $\pi^- p \to \omega\omega n$

[3] Supersedes BELADIDZE 92B. NODE=M142W2;LINKAGE=AM



$f_2(1910)$ $\omega\omega$ MODE WIDTH(MeV)

$f_2(1910)$ $\eta\eta'$ MODE

NODE=M142W3

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
141±41	[4] BARBERIS	00A		450 $pp \rightarrow p_f \eta\eta' p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
90±35	ALDE	91B	GAM2	38 $\pi^- p \rightarrow \eta\eta' n$

[4] Also compatible with $J^{PC}=1^{-+}$. NODE=M142W3;LINKAGE=KS

$f_2(1910)$ 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 $\bar{p}p \rightarrow K^+K^-\pi^0$

$f_2(1910)$ 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;→ NOT CHECKED ←
Γ_5	$\omega\omega$	seen	DESIG=4;OUR EST;→ NOT CHECKED ←
Γ_6	$\eta\eta'$	seen	DESIG=5;OUR EST;→ NOT CHECKED ←
Γ_7	$\eta'\eta'$		DESIG=9
Γ_8	$\rho\rho$	seen	DESIG=10;OUR EST;→ NOT CHECKED ←
Γ_9	$a_2(1320)\pi$	seen	DESIG=12;OUR EST;→ NOT CHECKED ←
Γ_{10}	$f_2(1270)\eta$	seen	DESIG=13;OUR EST;→ NOT CHECKED ←

$f_2(1910)$ BRANCHING RATIOS

NODE=M142225

$\Gamma(K^+K^-)/\Gamma_{total}$ Γ_2/Γ

NODE=M142R11

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
seen	AMSLER	06	CBAR	1.64 $\bar{p}p \rightarrow K^+K^-\pi^0$

$\Gamma(\pi^0\pi^0)/\Gamma(\eta\eta')$ 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$\pi^- p \rightarrow \eta\eta' n$

$\Gamma(K^0_S K^0_S)/\Gamma(\eta\eta')$ Γ_3/Γ_6

NODE=M142R7
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	$40\pi p \to K^0_S K^0_S n$

$\Gamma(\eta\eta)/\Gamma(\eta\eta')$ Γ_4/Γ_6

NODE=M142R6
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	$38\ \pi^- p \to \eta\eta' n$

$\Gamma(\omega\omega)/\Gamma(\eta\eta')$ Γ_5/Γ_6

NODE=M142R10
NODE=M142R10

VALUE	DOCUMENT ID		COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
2.6±0.6	BARBERIS	00F	$450\ pp \to p_f \omega\omega p_s$

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

NODE=M142R8
NODE=M142R8

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
probably not seen	BARBERIS	00A		$450\ pp \to p_f \eta'\eta' p_s$
possibly seen	BELADIDZE	92D	VES	$37\ \pi^- p \to \eta'\eta' n$

$\Gamma(\rho\rho)/\Gamma(\omega\omega)$ Γ_8/Γ_5

NODE=M142R9
NODE=M142R9

VALUE	DOCUMENT ID		COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
2.6±0.4	BARBERIS	00F	$450\ pp \to p_f \omega\omega p_s$

$\Gamma(f_2(1270)\eta)/\Gamma(a_2(1320)\pi)$ Γ_{10}/Γ_9

NODE=M142R12
NODE=M142R12

VALUE	DOCUMENT ID		TECN	COMMENT
0.09±0.05	[5] ANISOVICH	11	SPEC	0.9–1.94 $p\bar{p}$

[5] 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.*	(CBAR 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.*		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=M135

$f_2(1950)$

$I^G(J^{PC}) = 0^+(2^{++})$

$f_2(1950)$ MASS

NODE=M135M

NODE=M135M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1944±12 OUR AVERAGE	Error includes scale factor of 1.5. See the ideogram below.			
1930±25	[1] BINON	05	GAMS	33 $\pi^- p \to \eta\eta n$
2010±25	ANISOVICH	00J	SPEC	
1940±50	BAI	00A	BES	$J/\psi \to \gamma(\pi^+\pi^-\pi^+\pi^-)$
1980±22	[2] BARBERIS	00C		450 $pp \to pp4\pi$
1940±22	[3] BARBERIS	00C		450 $pp \to pp2\pi2\pi^0$
1980±50	ANISOVICH	99B	SPEC	1.35–1.94 $p\overline{p} \to \eta\eta\pi^0$
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. • • •				
$2038^{+13}_{-11}{}^{+12}_{-73}$	[4] UEHARA	09	BELL	10.6 $e^+e^- \to e^+e^-\pi^0\pi^0$
1980± 2±14	ABE	04	BELL	10.6 $e^+e^- \to e^+e^-K^+K^-$
1867±46	[5] AMSLER	02	CBAR	0.9 $\overline{p}p \to \pi^0\eta\eta$, $\pi^0\pi^0\pi^0$
~ 1990	[6] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \to \pi\pi$
1950±15	[7] ASTON	91	LASS	11 $K^- p \to \Lambda K\overline{K}\pi\pi$

OCCUR=2

[1] First solution, PWA is ambiguous. NODE=M135M;LINKAGE=BI

[2] Decaying into $\pi^+\pi^-2\pi^0$. NODE=M135M;LINKAGE=A4

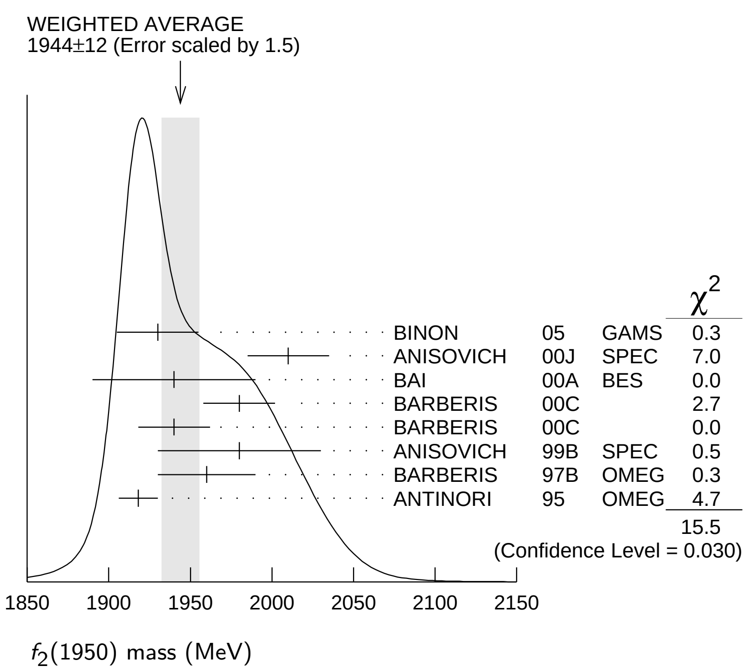
[3] Decaying into $2(\pi^+\pi^-)$. NODE=M135M;LINKAGE=B4

[4] Taking into account $f_4(2050)$. NODE=M135M;LINKAGE=UE

[5] T-matrix pole. NODE=M135M;LINKAGE=TT

[6] 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=M135M;LINKAGE=BB

[7] Cannot determine spin to be 2. NODE=M135M;LINKAGE=A



$f_2(1950)$ WIDTH

NODE=M135W

NODE=M135W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
472± 18 OUR AVERAGE				
450± 50	[8] BINON	05	GAMS	33 $\pi^- p \to \eta\eta n$
495± 35	ANISOVICH	00J	SPEC	
$380^{+120}_{-\ 90}$	BAI	00A	BES	$J/\psi \to \gamma(\pi^+\pi^-\pi^+\pi^-)$
520± 50	[9] BARBERIS	00C		450 $pp \to pp4\pi$

485 ± 55	[10] BARBERIS	00C		450 $pp \to pp4\pi$	OCCUR=2
500 ± 100	ANISOVICH	99B	SPEC	1.35–1.94 $p\overline{p} \to \eta\eta\pi^0$	
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. • • •

$441^{+27}_{-25}{}^{+28}_{-192}$	[11] UEHARA	09	BELL	10.6 $e^+e^- \to e^+e^-\pi^0\pi^0$
297 ± 12 ± 6	ABE	04	BELL	10.6 $e^+e^- \to e^+e^-K^+K^-$
385 ± 58	[12] AMSLER	02	CBAR	0.9 $\overline{p}p \to \pi^0\eta\eta$, $\pi^0\pi^0\pi^0$
~ 100	[13] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \to \pi\pi$
250 ± 50	[14] ASTON	91	LASS	11 $K^-p \to \Lambda K\overline{K}\pi\pi$

[8] First solution, PWA is ambiguous. NODE=M135W;LINKAGE=BI
[9] Decaying into $\pi^+\pi^-2\pi^0$. NODE=M135W;LINKAGE=A4
[10] Decaying into $2(\pi^+\pi^-)$. NODE=M135W;LINKAGE=B4
[11] Taking into account $f_4(2050)$. NODE=M135W;LINKAGE=UE
[12] T-matrix pole. NODE=M135W;LINKAGE=TT
[13] 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
[14] 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;→ NOT CHECKED ←
Γ_4	$\pi^0\pi^0$	seen	DESIG=10;OUR EST;→ NOT CHECKED ←
Γ_5	4π	seen	DESIG=7;OUR EST;→ NOT CHECKED ←
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;→ NOT CHECKED ←
Γ_{10}	$K\overline{K}$	seen	DESIG=8;OUR EST;→ NOT CHECKED ←
Γ_{11}	$\gamma\gamma$	seen	DESIG=9;OUR EST;→ NOT CHECKED ←
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	[15] ABE	04	BELL	10.6 $e^+e^- \to e^+e^-K^+K^-$

[15] Assuming spin 2. NODE=M135G1;LINKAGE=AB

$\Gamma(\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_2\Gamma_{11}/\Gamma$

NODE=M135G2
NODE=M135G2

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$162^{+69}_{-42}{}^{+1137}_{-204}$	[16] UEHARA	09	BELL	10.6 $e^+e^- \to e^+e^-\pi^0\pi^0$

[16] 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
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
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 $pp \to p_f4\pi p_s$
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 $\overline{p}p \to \pi^0\eta\eta,\ \pi^0\pi^0\pi^0$

$\Gamma(p\overline{p})/\Gamma_{total}$ — 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

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.*		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

NODE=M167

$\rho_3(1990)$

$I^G(J^{PC}) = 1^+(3^{--})$

OMITTED FROM SUMMARY TABLE

$\rho_3(1990)$ MASS

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 $p\overline{p} \to \omega\pi^0,\ \omega\eta\pi^0,\ \pi^+\pi^-$
~ 2007	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=M167M;LINKAGE=AY

$\rho_3(1990)$ WIDTH

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 $p\overline{p} \to \omega\pi^0,\ \omega\eta\pi^0,\ \pi^+\pi^-$
~ 287	HASAN	94	RVUE	$\overline{p}p \to \pi\pi$

[2] From the combined analysis of ANISOVICH 00J, ANISOVICH 01D, ANISOVICH 01E, and ANISOVICH 02.

NODE=M167W;LINKAGE=AY

$\rho_3(1990)$ 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.*		REFID=47950
HASAN	94	PL B334 215	A. Hasan, D.V. Bugg	(LOQM)	REFID=44103

NODE=M106

$f_2(2010)$

$I^G(J^{PC}) = 0^+(2^{++})$

$f_2(2010)$ MASS

NODE=M106M

NODE=M106M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
2011^{+62}_{-76}	[1] ETKIN	88	MPS	$22\ \pi^- p \rightarrow \phi\phi n$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2005 ± 12	VLADIMIRSK...	06	SPEC	$40\ \pi^- p \rightarrow K^0_S K^0_S n$
1980 ± 20	[2] BOLONKIN	88	SPEC	$40\ \pi^- p \rightarrow K^0_S K^0_S n$
2050^{+90}_{-50}	ETKIN	85	MPS	$22\ \pi^- p \rightarrow 2\phi n$
2120^{+20}_{-120}	LINDENBAUM	84	RVUE	
2160 ± 50	ETKIN	82	MPS	$22\ \pi^- p \rightarrow 2\phi n$

[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.

NODE=M106M;LINKAGE=C

[2] Statistically very weak, only 1.4 s.d.

NODE=M106M;LINKAGE=E

$f_2(2010)$ WIDTH

NODE=M106W

NODE=M106W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
202^{+67}_{-62}	[3] ETKIN	88	MPS	$22\ \pi^- p \rightarrow \phi\phi n$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
209 ± 32	VLADIMIRSK...	06	SPEC	$40\ \pi^- p \rightarrow K^0_S K^0_S n$
145 ± 50	[4] BOLONKIN	88	SPEC	$40\ \pi^- p \rightarrow K^0_S K^0_S n$
200^{+160}_{-50}	ETKIN	85	MPS	$22\ \pi^- p \rightarrow 2\phi n$
300^{+150}_{-50}	LINDENBAUM	84	RVUE	
310 ± 70	ETKIN	82	MPS	$22\ \pi^- p \rightarrow 2\phi n$

[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;→ NOT CHECKED ←
DESIG=2

$f_2(2010)$ BRANCHING RATIOS

NODE=M106230

$\Gamma(K\overline{K})/\Gamma_{total}$ Γ_2/Γ

NODE=M106R01
NODE=M106R01

VALUE	DOCUMENT ID		TECN	COMMENT
seen	VLADIMIRSK...	06	SPEC	$40\ \pi^- p \rightarrow K^0_S K^0_S n$

$f_2(2010)$ 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 $p p \rightarrow p_f 4\pi p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2037± 8	80k	[3] UMAN	06	E835	5.2 $\overline{p} p \rightarrow \eta \eta \pi^0$
2040±38		ANISOVICH	00J	SPEC	
2010±60		ALDE	98	GAM4	100 $\pi^- p \rightarrow \pi^0 \pi^0 n$
2020±35		BARBERIS	97B	OMEG	450 $p p \rightarrow p p 2(\pi^+ \pi^-)$

[1] Average between $\pi^+ \pi^- 2\pi^0$ and $2(\pi^+ \pi^-)$. NODE=M156M;LINKAGE=PC
[2] T-matrix pole. NODE=M156M;LINKAGE=PP
[3] Statistical error only. NODE=M156M;LINKAGE=ST

$f_0(2020)$ WIDTH

NODE=M156W

NODE=M156W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
442± 60		[4,5] BARBERIS	00C		450 $p p \rightarrow p_f 4\pi p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
296± 17	80k	[6] UMAN	06	E835	5.2 $\overline{p} p \rightarrow \eta \eta \pi^0$
405± 40		ANISOVICH	00J	SPEC	
240±100		ALDE	98	GAM4	100 $\pi^- p \rightarrow \pi^0 \pi^0 n$
410± 50		BARBERIS	97B	OMEG	450 $p p \rightarrow p p 2(\pi^+ \pi^-)$

[4] Average between $\pi^+ \pi^- 2\pi^0$ and $2(\pi^+ \pi^-)$. NODE=M156W;LINKAGE=PC
[5] T-matrix pole. NODE=M156W;LINKAGE=PP
[6] Statistical error only. 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;→ NOT CHECKED ←
Γ_2	$\pi^0 \pi^0$	seen	DESIG=2;OUR EST;→ NOT CHECKED ←
Γ_3	$\rho \rho$	seen	DESIG=3;OUR EST;→ NOT CHECKED ←
Γ_4	$\omega \omega$	seen	DESIG=4;OUR EST;→ NOT CHECKED ←
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 $p p \rightarrow p_f \omega \omega p_s$

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

NODE=M156R01
NODE=M156R01

VALUE	DOCUMENT ID		TECN	COMMENT
seen	UMAN	06	E835	5.2 $\overline{p} p \rightarrow \eta \eta \pi^0$

$f_0(2020)$ REFERENCES

NODE=M156

UMAN	06	PR D73 052009	I. Uman *et al.*	(FNAL E835)	REFID=51063
ANISOVICH	00J	PL B491 47	A.V. Anisovich *et al.*		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=M017

$a_4(2040)$ $\quad I^G(J^{PC}) = 1^-(4^{++})$

a_4(2040) MASS

NODE=M017M

NODE=M017M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1996^{+10}_{-9} OUR AVERAGE		Error includes scale factor of 1.1.				
$1885 \pm 13 ^{+50}_{-2}$	420k	ALEKSEEV	10	COMP		190 $\pi^- Pb \to \pi^-\pi^-\pi^+ Pb'$
$1985 \pm 10 \pm 13$	145k	LU	05	B852		18 $\pi^- p \to \omega\pi^-\pi^0 p$
$1996 \pm 25 \pm 43$		CHUNG	02	B852		18.3 $\pi^- p \to 3\pi p$
2005^{+25}_{-45}		[1] ANISOVICH	01F	SPEC		2.0 $\overline{p}p \to 3\pi^0$, $\pi^0\eta$, $\pi^0\eta'$
$2000 \pm 40^{+60}_{-20}$		IVANOV	01	B852		18 $\pi^- p \to \eta'\pi^- p$
$1944 \pm 8 \pm 50$		[2] AMELIN	99	VES		37 $\pi^- A \to \omega\pi^-\pi^0 A^*$
2010 ± 20		[3] DONSKOV	96	GAM2	0	38 $\pi^- p \to \eta\pi^0 n$
2040 ± 30		[4] CLELAND	82B	SPEC	$\pm$	50 $\pi p \to K^0_S K^\pm p$
2030 ± 50		[5] CORDEN	78C	OMEG	0	15 $\pi^- p \to 3\pi n$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
2004 ± 6	80k	[6] UMAN	06	E835		5.2 $\overline{p}p \to \eta\eta\pi^0$
1903 ± 10		[7] BALDI	78	SPEC	$-$	10 $\pi^- p \to p K^0_S K^-$

[1] From the combined analysis of ANISOVICH 99C, ANISOVICH 99E, and ANISOVICH 01F. NODE=M017M;LINKAGE=AN
[2] May be a different state. NODE=M017M;LINKAGE=DM
[3] From a simultaneous fit to the G_+ and G_0 wave intensities. NODE=M017M;LINKAGE=A
[4] From an amplitude analysis. NODE=M017M;LINKAGE=C
[5] $J^P = 4^+$ is favored, though $J^P = 2^+$ cannot be excluded. NODE=M017M;LINKAGE=M
[6] Statistical error only. NODE=M017M;LINKAGE=ST
[7] From a fit to the Y^0_8 moment. Limited by phase space. NODE=M017M;LINKAGE=Y

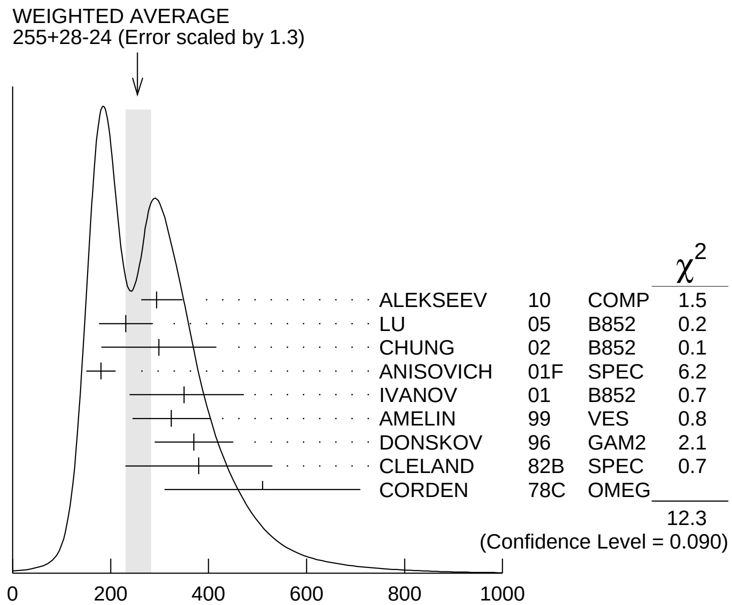
a_4(2040) WIDTH

NODE=M017W

NODE=M017W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
255^{+28}_{-24} OUR AVERAGE		Error includes scale factor of 1.3. See the ideogram below.				
$294 \pm 25^{+46}_{-19}$	420k	ALEKSEEV	10	COMP		190 $\pi^- Pb \to \pi^-\pi^-\pi^+ Pb'$
$231 \pm 30 \pm 46$	145k	LU	05	B852		18 $\pi^- p \to \omega\pi^-\pi^0 p$
$298 \pm 81 \pm 85$		CHUNG	02	B852		18.3 $\pi^- p \to 3\pi p$
180 ± 30		[8] ANISOVICH	01F	SPEC		2.0 $\overline{p}p \to 3\pi^0$, $\pi^0\eta$, $\pi^0\eta'$
$350 \pm 100^{+70}_{-50}$		IVANOV	01	B852		18 $\pi^- p \to \eta'\pi^- p$
$324 \pm 26 \pm 75$		[9] AMELIN	99	VES		37 $\pi^- A \to \omega\pi^-\pi^0 A^*$
370 ± 80		[10] DONSKOV	96	GAM2	0	38 $\pi^- p \to \eta\pi^0 n$
380 ± 150		[11] CLELAND	82B	SPEC	$\pm$	50 $\pi p \to K^0_S K^\pm p$
510 ± 200		[12] CORDEN	78C	OMEG	0	15 $\pi^- p \to 3\pi n$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
401 ± 16	80k	[13] UMAN	06	E835		5.2 $\overline{p}p \to \eta\eta\pi^0$
166 ± 43		[14] BALDI	78	SPEC	$-$	10 $\pi^- p \to p K^0_S K^-$

[8] From the combined analysis of ANISOVICH 99C, ANISOVICH 99E, and ANISOVICH 01F. NODE=M017W;LINKAGE=AN
[9] May be a different state. NODE=M017W;LINKAGE=DM
[10] From a simultaneous fit to the G_+ and G_0 wave intensities. NODE=M017W;LINKAGE=A
[11] From an amplitude analysis. NODE=M017W;LINKAGE=C
[12] $J^P = 4^+$ is favored, though $J^P = 2^+$ cannot be excluded. NODE=M017W;LINKAGE=M
[13] Statistical error only. NODE=M017W;LINKAGE=ST
[14] From a fit to the Y^0_8 moment. Limited by phase space. NODE=M017W;LINKAGE=Y



$a_4(2040)$ MASS

$a_4(2040)$ 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;→ NOT CHECKED ←
Γ_4	$f_2(1270)\pi$	seen	DESIG=6;OUR EST;→ NOT CHECKED ←
Γ_5	$\omega\pi^-\pi^0$	seen	DESIG=7;OUR EST;→ NOT CHECKED ←
Γ_6	$\omega\rho$	seen	DESIG=8
Γ_7	$\eta\pi^0$	seen	DESIG=3
Γ_8	$\eta'(958)\pi$	seen	DESIG=4;OUR EST;→ NOT CHECKED ←

$a_4(2040)$ 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	$\pm$	$10\ \pi^- p \rightarrow K^0_S K^- p$

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

NODE=M017R2
NODE=M017R2

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
seen	CORDEN	78C	OMEG	0	$15\ \pi^- p \rightarrow 3\pi n$

$\Gamma(\rho\pi)/\Gamma(f_2(1270)\pi)$ Γ_3/Γ_4

NODE=M017R4
NODE=M017R4

VALUE	DOCUMENT ID		TECN	COMMENT
1.1±0.2±0.2	CHUNG	02	B852	$18.3\ \pi^- p \rightarrow 3\pi p$

$\Gamma(\eta\pi^0)/\Gamma_{total}$ Γ_7/Γ

NODE=M017R3
NODE=M017R3

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
seen	DONSKOV	96	GAM2	0	$38\ \pi^- p \rightarrow \eta\pi^0 n$

$\Gamma(\omega\rho)/\Gamma_{total}$ Γ_6/Γ

NODE=M017R5
NODE=M017R5

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	145k	LU	05	B852	$18\ \pi^- p \rightarrow \omega\pi^-\pi^0 p$

a_4(2040) REFERENCES

NODE=M017

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=M016

$f_4(2050)$

$I^G(J^{PC}) = 0^+(4^{++})$

f_4(2050) MASS

NODE=M016M

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 $\overline{p}p \to \pi\pi$
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 $\pi^- p \to p3\pi$

OCCUR=2

[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

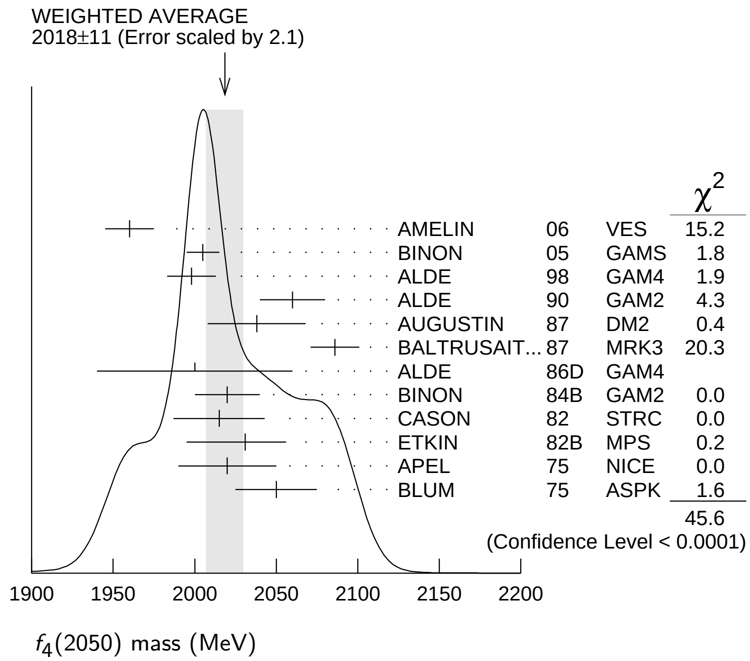
[7] Single energy analysis. NODE=M016M;LINKAGE=BR

[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 $\pi^- p \to n 2\eta$
240± 40	40k	[13] BINON	84B	GAM2	38 $\pi^- p \to n 2\pi^0$
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 $\pi^- p \to n 2 K^0_S$
180± 60	700	APEL	75	NICE	40 $\pi^- p \to n 2\pi^0$
225^{+120}_{-70}		BLUM	75	ASPK	18.4 $\pi^- p \to n K^+ K^-$
• • • 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 $\pi^- p \to n 2\pi$
100± 28		EVANGELIS...	79B	OMEG	10 $\pi^- p \to K^+K^- n$
107± 56		[22] ANTIPOV	77	CIBS	25 $\pi^- p \to p 3\pi$

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

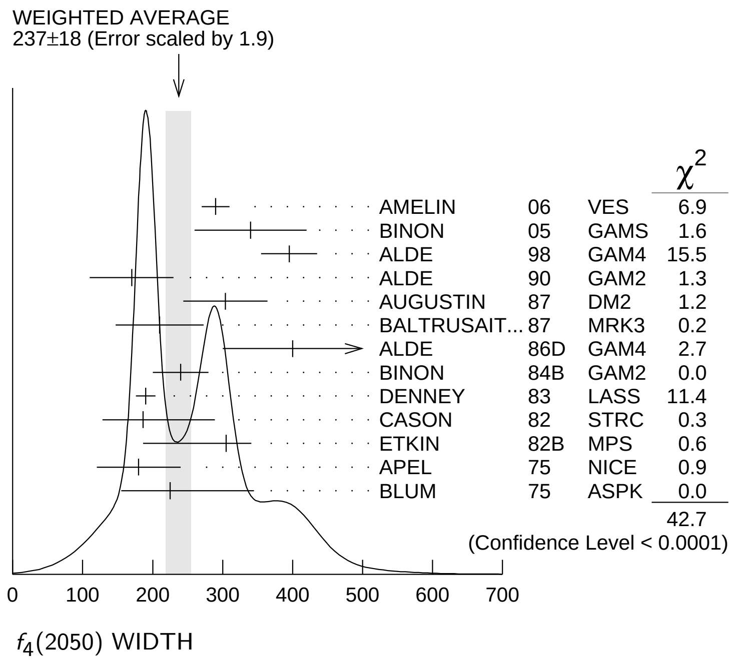
[15] K matrix pole. NODE=M016W;LINKAGE=KM

[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



$f_4(2050)$ 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

$\Gamma(K\overline{K}) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\qquad\Gamma_3\Gamma_6/\Gamma$

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	$\gamma\gamma \to K\overline{K}\pi$

$\Gamma(\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\qquad\Gamma_2\Gamma_6/\Gamma$

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

$\Gamma(\omega\omega)/\Gamma_{\text{total}}$ $\qquad\Gamma_1/\Gamma$

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 $\pi^- p \rightarrow \omega\omega n$

$\Gamma(\pi\pi)/\Gamma_{total}$ — 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 $\pi^- p \rightarrow n4\gamma$
0.16 ±0.03	[24] CASON	82	STRC	8 $\pi^+ p \rightarrow \Delta^{++}\pi^0\pi^0$
0.17 ±0.02	[24] CORDEN	79	OMEG	12–15 $\pi^- p \rightarrow n2\pi$

[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 $\pi^- p \rightarrow n2K^0_S$

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

NODE=M016R3

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
2.1±0.8	ALDE	86D	GAM4	100 $\pi^- p \rightarrow n4\gamma$

$\Gamma(4\pi^0)/\Gamma_{total}$ — Γ_5/Γ

NODE=M016R4

VALUE	DOCUMENT ID		TECN	COMMENT
<0.012	ALDE	87	GAM4	100 $\pi^- p \rightarrow 4\pi^0 n$

$\Gamma(a_2(1320)\pi)/\Gamma_{total}$ — Γ_7/Γ

NODE=M016R6

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AMELIN	00	VES	37 $\pi^- p \rightarrow \eta\pi^+\pi^- n$

$f_4(2050)$ 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.*		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	DESIG=1;OUR EST;→ NOT CHECKED ←
Γ_2	$\rho\pi$	seen	DESIG=2;OUR EST;→ NOT CHECKED ←
Γ_3	$f_2(1270)\pi$	seen	DESIG=3;OUR EST;→ NOT CHECKED ←
Γ_4	$(\pi\pi)_S\pi$	seen	DESIG=4;OUR EST;→ NOT CHECKED ←

$\pi_2(2100)$ 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) REFID=44433
DAUM 81B NP B182 269 C. Daum *et al.* (AMST, CERN, CRAC, MPIM+) 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

NODE=M168M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2103± 8 OUR AVERAGE					
2102±13		[1] ANISOVICH	00J	SPEC	2.0 $\bar{p}p \to \eta\pi^0\pi^0, \pi^0\pi^0, \eta\eta, \eta\eta', \pi^+\pi^-$
2090±30		BAI	00A	BES	$J/\psi \to \gamma(\pi^+\pi^-\pi^+\pi^-)$
2105±10		ANISOVICH	99K	SPEC	0.6–1.94 $\bar{p}p \to \eta\eta, \eta\eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2105± 8	80k	[2] UMAN	06	E835	5.2 $\bar{p}p \to \eta\eta\pi^0$
~ 2104		BUGG	95		$J/\psi \to \gamma\pi^+\pi^-\pi^+\pi^-$
~ 2122		HASAN	94	RVUE	$\bar{p}p \to \pi\pi$

[1] Includes the data of ANISOVICH 00B indicating to exotic decay pattern. NODE=M168M;LINKAGE=AN

[2] Statistical error only. NODE=M168M;LINKAGE=ST

$f_0(2100)$ WIDTH

NODE=M168W

NODE=M168W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
209± 19 OUR AVERAGE					
211± 29		[3] ANISOVICH	00J	SPEC	2.0 $\bar{p}p \to \eta\pi^0\pi^0, \pi^0\pi^0, \eta\eta, \eta\eta', \pi^+\pi^-$
330±100		BAI	00A	BES	$J/\psi \to \gamma(\pi^+\pi^-\pi^+\pi^-)$
200± 25		ANISOVICH	99K	SPEC	0.6–1.94 $\bar{p}p \to \eta\eta, \eta\eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
236± 14	80k	[4] UMAN	06	E835	5.2 $\bar{p}p \to \eta\eta\pi^0$
~ 203		BUGG	95		$J/\psi \to \gamma\pi^+\pi^-\pi^+\pi^-$
~ 273		HASAN	94	RVUE	$\bar{p}p \to \pi\pi$

[3] Includes the data of ANISOVICH 00B indicating to exotic decay pattern. NODE=M168W;LINKAGE=AN

[4] Statistical error only. NODE=M168W;LINKAGE=ST

$f_0(2100)$ REFERENCES

NODE=M168

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.*		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 2 datablocks that follow 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	
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
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. • • •					
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 $\overline{p}p \to \pi\pi$
~ 2170	[7] MARTIN	80B	RVUE	
~ 2150	[7] MARTIN	80C	RVUE	
~ 2150	[8] DULUDE	78B	OSPK	1–2 $\overline{p}p \to \pi^0\pi^0$

OCCUR=2

[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 $\pi^- p \to K^0_S K^0_S n$
2150±20	ABLIKIM	04E	BES2	$J/\psi \to \omega K^+ K^-$
2130±35	BARBERIS	99	OMEG	450 $p p \to p_s p_f K^+ K^-$

$f_2(2150)$ WIDTH

NODE=M042210

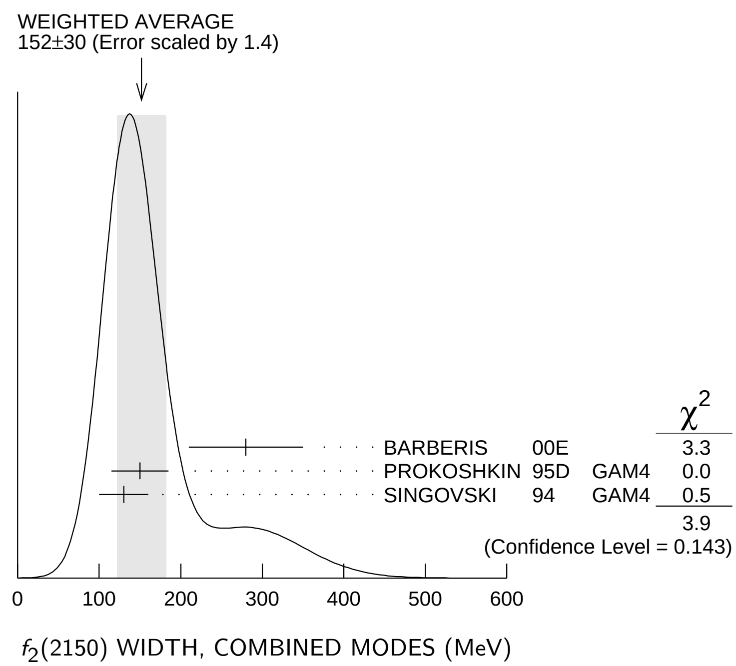
$f_2(2150)$ WIDTH, COMBINED MODES (MeV)

NODE=M042W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
152±30 OUR AVERAGE Includes data from the 2 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. • • •					
182±11	80k	[12] UMAN	06	E835	5.2 $\overline{p} p \to \eta\eta\pi^0$

[12] Statistical error only.

NODE=M042W;LINKAGE=ST



$\eta\eta$ MODE

NODE=M042W3

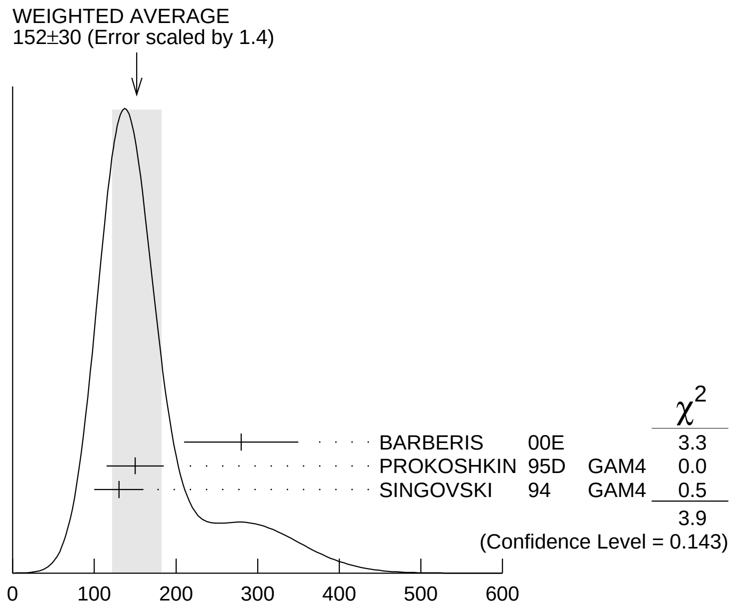
VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
The data in this block is included in the average printed for a previous datablock.				
152±30 OUR AVERAGE Error includes scale factor of 1.4. See the ideogram below.				
280±70	BARBERIS	00E		450 $p p \to p_f \eta\eta p_s$
150±35	PROKOSHKIN	95D	GAM4	300 $\pi^- N \to \pi^- N 2\eta$, 450 $p p \to p p 2\eta$
130±30	SINGOVSKI	94	GAM4	450 $p p \to p p 2\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
310±50	[13] ABELE	99B	CBAR	
203±10	[14] ARMSTRONG	93C	E760	$\overline{p} p \to \pi^0 \eta\eta \to 6\gamma$

[13] Spin not determined.

[14] No J^{PC} determination.

NODE=M042W3;LINKAGE=K3

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
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. • • •					
$250\pm25\pm45$	[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 $\overline{p}p \to \pi^0\pi^0$

→ NOT CHECKED ←

[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;→ NOT CHECKED ←
Γ_3	$K\overline{K}$	seen	DESIG=3;OUR EST;→ NOT CHECKED ←
Γ_4	$f_2(1270)\eta$	seen	DESIG=4;OUR EST;→ NOT CHECKED ←
Γ_5	$a_2(1320)\pi$	seen	DESIG=5;OUR EST;→ NOT CHECKED ←
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. • • •

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<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

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<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	SPD 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 107A 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 our mini-review under the $\rho(1700)$. NODE=M032

$\rho(2150)$ MASS

NODE=M032205

e^+e^- PRODUCED

NODE=M032M3

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
2149±17 OUR AVERAGE	Includes data from the datablock that follows this one.			
2150±40±50	AUBERT	07AU	BABR	10.6 $e^+e^- \to f_1(1285)\pi^+\pi^-\gamma$
2153±37	BIAGINI	91	RVUE	$e^+e^- \to \pi^+\pi^-$, K^+K^-
2110±50	[1] CLEGG	90	RVUE	$e^+e^- \to 3(\pi^+\pi^-)$, $2(\pi^+\pi^-\pi^0)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1990±80	AUBERT	07AU	BABR	10.6 $e^+e^- \to \eta'\pi^+\pi^-\gamma$

OCCUR=2

$\overline{p}p \to \pi\pi$

NODE=M032M1

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
~ 2191	HASAN	94	RVUE	$\overline{p}p \to \pi\pi$
~ 2070	[2] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \to \pi\pi$
~ 2170	[3] MARTIN	80B	RVUE	
~ 2100	[3] MARTIN	80C	RVUE	

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±35	[4] ANISOVICH	02	SPEC	0.6–1.9 $p\overline{p} \to \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$
~ 2190	[5] CUTTS	78B	CNTR	0.97–3 $\overline{p}p \to \overline{N}N$
2155±15	[5,6] COUPLAND	77	CNTR	0.7–2.4 $\overline{p}p \to \overline{p}p$
2193± 2	[5,7] ALSPECTOR	73	CNTR	$\overline{p}p$ S channel
2190±10	[8] ABRAMS	70	CNTR	S channel $\overline{p}N$

$\pi^-p \to \omega\pi^0 n$

NODE=M032M4

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
The data in this block is included in the average printed for a previous datablock.				
2155±21 OUR AVERAGE				
2140±30	ALDE	95	GAM2	38 $\pi^-p \to \omega\pi^0 n$
2170±30	ALDE	92C	GAM4	100 $\pi^-p \to \omega\pi^0 n$

[1] Includes ATKINSON 85. NODE=M032M3;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=M032M1;LINKAGE=CC

[3] $I(J^P) = 1(1^-)$ from simultaneous analysis of $p\overline{p} \to \pi^-\pi^+$ and $\pi^0\pi^0$. NODE=M032M;LINKAGE=P

[4] From the combined analysis of ANISOVICH 00J, ANISOVICH 01D, ANISOVICH 01E, and ANISOVICH 02. NODE=M032M;LINKAGE=AY

[5] Isospins 0 and 1 not separated. NODE=M032M;LINKAGE=I

[6] From a fit to the total elastic cross section. NODE=M032M;LINKAGE=E

[7] Referred to as T or T region by ALSPECTOR 73. NODE=M032M;LINKAGE=M

[8] 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

$\rho(2150)$ WIDTH

NODE=M032210

e^+e^- PRODUCED

NODE=M032W3

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
359± 40 OUR AVERAGE	Includes data from the datablock that follows this one.			
350± 40±50	AUBERT	07AU	BABR	10.6 $e^+e^- \to f_1(1285)\pi^+\pi^-\gamma$
389± 79	BIAGINI	91	RVUE	$e^+e^- \to \pi^+\pi^-$, K^+K^-
410±100	[9] CLEGG	90	RVUE	$e^+e^- \to 3(\pi^+\pi^-)$, $2(\pi^+\pi^-\pi^0)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
310±140	AUBERT	07AU	BABR	10.6 $e^+e^- \to \eta'\pi^+\pi^-\gamma$

OCCUR=2

$\overline{p}p \rightarrow \pi\pi$

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	[10] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \rightarrow \pi\pi$
~ 250	[11] MARTIN	80B	RVUE	
~ 200	[11] MARTIN	80C	RVUE	

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	[12] ANISOVICH	02	SPEC	0.6–1.9 $p\overline{p} \rightarrow \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$
135±75	[13,14] COUPLAND	77	CNTR	0.7–2.4 $\overline{p}p \rightarrow \overline{p}p$
98± 8	[14] ALSPECTOR	73	CNTR	$\overline{p}p$ S channel
~ 85	[15] ABRAMS	70	CNTR	S channel $\overline{p}N$

$\pi^- p \rightarrow \omega\pi^0 n$

NODE=M032W4

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
The data in this block is included in the average printed for a previous datablock.				
320±70	ALDE	95	GAM2	38 $\pi^- p \rightarrow \omega\pi^0 n$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
~ 300	ALDE	92C	GAM4	100 $\pi^- p \rightarrow \omega\pi^0 n$

[9] Includes ATKINSON 85. NODE=M032W3;LINKAGE=A

[10] 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

[11] $I(J^P) = 1(1^-)$ from simultaneous analysis of $p\overline{p} \rightarrow \pi^-\pi^+$ and $\pi^0\pi^0$. NODE=M032W;LINKAGE=P

[12] From the combined analysis of ANISOVICH 00J, ANISOVICH 01D, ANISOVICH 01E, and ANISOVICH 02. NODE=M032W;LINKAGE=AY

[13] From a fit to the total elastic cross section. NODE=M032W;LINKAGE=E

[14] Isospins 0 and 1 not separated. NODE=M032W;LINKAGE=I

[15] 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

$\rho(2150)$ 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;→ NOT CHECKED ←
Γ_3	K^+K^-	seen	DESIG=3;OUR EVAL;→ NOT CHECKED ←
Γ_4	$3(\pi^+\pi^-)$	seen	DESIG=4;OUR EVAL;→ NOT CHECKED ←
Γ_5	$2(\pi^+\pi^-\pi^0)$	seen	DESIG=5;OUR EVAL;→ NOT CHECKED ←
Γ_6	$\eta'\pi^+\pi^-$	seen	DESIG=6;OUR EVAL;→ NOT CHECKED ←
Γ_7	$f_1(1285)\pi^+\pi^-$	seen	DESIG=7;OUR EVAL;→ NOT CHECKED ←
Γ_8	$\omega\pi^0$	seen	DESIG=8;OUR EVAL;→ NOT CHECKED ←
Γ_9	$\omega\pi^0\eta$	seen	DESIG=9;OUR EVAL;→ NOT CHECKED ←
Γ_{10}	$p\overline{p}$		DESIG=10

$\rho(2150)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma^2(\text{total})$

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	[16] AUBERT	07AU	BABR	10.6 $e^+e^- \rightarrow f_1(1285)\pi^+\pi^-\gamma$

[16] 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	[17] AUBERT	07AU	BABR	10.6 $e^+e^- \rightarrow \eta'\pi^+\pi^-\gamma$

[17] Calculated by us from the reported value of cross section at the peak. NODE=M032G02;LINKAGE=AU

$\rho(2150)$ REFERENCES

NODE=M032

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.*		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

NODE=M103

$\phi(2170)$

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

Observed by AUBERT,BE 06D in the initial-state radiation process $e^+e^- \to \phi f_0(980)\gamma$.

NODE=M103

$\phi(2170)$ MASS

NODE=M103M

NODE=M103M

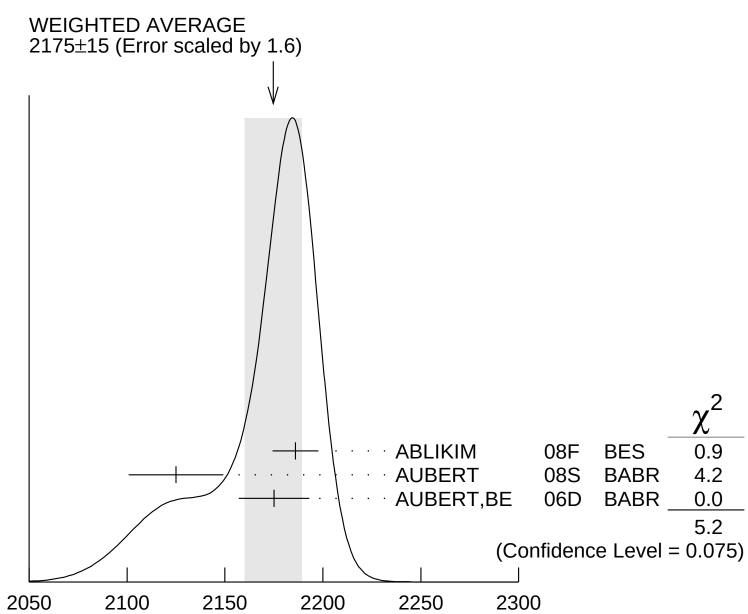
VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
2175±15 OUR AVERAGE		Error includes scale factor of 1.6. See the ideogram below.			
2186±10± 6	52	ABLIKIM	08F	BES	$J/\psi \to \eta\phi f_0(980)$
2125±22±10	483	AUBERT	08S	BABR	10.6 $e^+e^- \to \phi\eta\gamma$
2175±10±15	201	[1] AUBERT,BE	06D	BABR	10.6 $e^+e^- \to K^+K^-\pi\pi\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$2079\pm13^{+79}_{-28}$	4.8k	[2] SHEN	09	BELL	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\gamma$
2192±14	116 ± 95	[3] AUBERT	07AK	BABR	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\gamma$
2169±20	149 ± 36	[3] AUBERT	07AK	BABR	10.6 $e^+e^- \to K^+K^-\pi^0\pi^0\gamma$

OCCUR=2

[1] From the $\phi f_0(980)$ component. NODE=M103M;LINKAGE=AB

[2] From a fit with two incoherent Breit-Wigners. NODE=M103M;LINKAGE=SH

[3] From the $K^+K^- f_0(980)$ component. NODE=M103M;LINKAGE=AU



$\phi(2170)$ MASS (MeV)

$\phi(2170)$ WIDTH

NODE=M103W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
61±18 OUR AVERAGE					
65±23±17	52	ABLIKIM	08F	BES	$J/\psi \rightarrow \eta\phi f_0(980)$
61±50±13	483	AUBERT	08S	BABR	10.6 $e^+e^- \rightarrow \phi\eta\gamma$
58±16±20	201	[4] AUBERT,BE	06D	BABR	10.6 $e^+e^- \rightarrow K^+K^-\pi\pi\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$192\pm23^{+25}_{-61}$	4.8k	[5] SHEN	09	BELL	10.6 $e^+e^- \rightarrow K^+K^-\pi^+\pi^-\gamma$
71±21	116 ± 95	[6] AUBERT	07AK	BABR	10.6 $e^+e^- \rightarrow K^+K^-\pi^+\pi^-\gamma$
102±27	149 ± 36	[6] AUBERT	07AK	BABR	10.6 $e^+e^- \rightarrow K^+K^-\pi^0\pi^0\gamma$

[4] From the $\phi f_0(980)$ component.
[5] From a fit with two incoherent Breit-Wigners.
[6] From the $K^+K^- f_0(980)$ component.

NODE=M103W
OCCUR=2
NODE=M103W;LINKAGE=AB
NODE=M103W;LINKAGE=SH
NODE=M103W;LINKAGE=AU

ϕ(2170) DECAY MODES

NODE=M103215;NODE=M103

	Mode	Fraction (Γ_i/Γ)	
Γ_1	e^+e^-	seen	DESIG=1;OUR EVAL;→ NOT CHECKED ←
Γ_2	$\phi\eta$		DESIG=5
Γ_3	$\phi\pi\pi$		DESIG=9
Γ_4	$\phi f_0(980)$	seen	DESIG=2;OUR EVAL;→ NOT CHECKED ←
Γ_5	$K^+K^-\pi^+\pi^-$		DESIG=3
Γ_6	$K^+K^- f_0(980) \rightarrow K^+K^-\pi^+\pi^-$	seen	DESIG=6
Γ_7	$K^+K^-\pi^0\pi^0$		DESIG=4
Γ_8	$K^+K^- f_0(980) \rightarrow K^+K^-\pi^0\pi^0$	seen	DESIG=7
Γ_9	$K^{*0}K^\pm\pi^\mp$	not seen	DESIG=8
Γ_{10}	$K^*(892)^0\overline{K}^*(892)^0$	not seen	DESIG=10

ϕ(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. • • •					
1.7±0.7±1.3	483	AUBERT	08S	BABR	10.6 $e^+e^- \rightarrow \phi\eta\gamma$

$\Gamma(\phi f_0(980)) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_4\Gamma_1/\Gamma$

NODE=M103G1
NODE=M103G1

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
2.5±0.8±0.4	201	[7] AUBERT,BE	06D	BABR	10.6 $e^+e^- \rightarrow K^+K^-\pi\pi\gamma$

[7] From the $\phi f_0(980)$ component.

NODE=M103G1;LINKAGE=AB

ϕ(2170) $\Gamma(i)\Gamma(e^+e^-)/\Gamma^2(\text{total})$

NODE=M103220

$\Gamma(\phi\pi\pi)/\Gamma_{\text{total}} \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_3/\Gamma \times \Gamma_1/\Gamma$

NODE=M103G01
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	[8] SHEN	09	BELL	10.6 $e^+e^- \rightarrow K^+K^-\pi^+\pi^-\gamma$

[8] Multiplied by 3/2 to take into account the $\phi\pi^0\pi^0$ mode. Using B($\phi \rightarrow K^+K^-$) = (49.2 ± 0.6)%.

NODE=M103G01;LINKAGE=SH

ϕ(2170) BRANCHING RATIOS

NODE=M103225

$\Gamma(K^+K^- f_0(980) \rightarrow K^+K^-\pi^+\pi^-)/\Gamma_{\text{total}}$ — Γ_6/Γ

NODE=M103R01
NODE=M103R01

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AUBERT	07AK	BABR	10.6 $e^+e^- \rightarrow K^+K^-\pi^+\pi^-\gamma$

$\Gamma(K^+K^- f_0(980) \rightarrow K^+K^-\pi^0\pi^0)/\Gamma_{\text{total}}$ — Γ_8/Γ

NODE=M103R02
NODE=M103R02

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AUBERT	07AK	BABR	10.6 $e^+e^- \rightarrow K^+K^-\pi^0\pi^0\gamma$

$\Gamma(K^{*0}K^\pm\pi^\mp)/\Gamma_{\text{total}}$ — Γ_9/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_{10}/Γ

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	10C	PL B685 27	M. Ablikim *et al.*	(BES II Collab.)	REFID=53349
SHEN	09	PR D80 031101R	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 091103R	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

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT	
2189±13 OUR AVERAGE					NODE=M112M
$2170 \pm 20^{+10}_{-15}$	ABLIKIM	05Q	BES2	$\psi(2S) \to \gamma \pi^+ \pi^- K^+ K^-$	
2210 ± 50	[1] BINON	05	GAMS	$33\ \pi^- p \to \eta\eta n$	
2197 ± 17	[2] 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. • • •					
~ 2122	HASAN	94	RVUE	$\overline{p} p \to \pi\pi$	
~ 2321	HASAN	94	RVUE	$\overline{p} p \to \pi\pi$	OCCUR=2

[1] First solution, PWA is ambiguous. NODE=M112M;LINKAGE=BI

[2] Cannot determine spin to be 0. NODE=M112M;LINKAGE=A

f_0(2200) WIDTH

NODE=M112W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT	
238±50 OUR AVERAGE	Error includes scale factor of 1.2.				NODE=M112W
$220 \pm 60^{+40}_{-45}$	ABLIKIM	05Q	BES2	$\psi(2S) \to \gamma \pi^+ \pi^- K^+ K^-$	
380 ± 90	[3] BINON	05	GAMS	$33\ \pi^- p \to \eta\eta n$	
201 ± 51	[4] 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. • • •					
~ 273	HASAN	94	RVUE	$\overline{p} p \to \pi\pi$	
~ 223	HASAN	94	RVUE	$\overline{p} p \to \pi\pi$	OCCUR=2

[3] First solution, PWA is ambiguous. NODE=M112W;LINKAGE=BI

[4] Cannot determine spin to be 0. NODE=M112W;LINKAGE=A

f_0(2200) REFERENCES

NODE=M112

ABLIKIM	05Q	PR D72 092002	M. Ablikim *et al.*	(BES Collab.)	REFID=50958
BINON	05	PAN 68 960 Translated from YAF 68 998.	F. Binon *et al.*		REFID=50780
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

$f_J(2220)$

$I^G(J^{PC}) = 0^+(2^{++} \text{ or } 4^{++})$

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

NODE=M082M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
2231.1±3.5 OUR AVERAGE						
2235 ± 4 ± 6	74	BAI	96B	BES	$e^+e^- \rightarrow J/\psi \rightarrow \gamma\pi^+\pi^-$	
2230 $^{+6}_{-7}$ ±16	46	BAI	96B	BES	$e^+e^- \rightarrow J/\psi \rightarrow \gamma K^+K^-$	OCCUR=2
2232 $^{+8}_{-7}$ ±15	23	BAI	96B	BES	$e^+e^- \rightarrow J/\psi \rightarrow \gamma K^0_S K^0_S$	OCCUR=3
2235 ± 4 ± 5	32	BAI	96B	BES	$e^+e^- \rightarrow J/\psi \rightarrow \gamma p\overline{p}$	OCCUR=4
2209 $^{+17}_{-15}$ ±10		ASTON	88F	LASS	$11\ K^-p \rightarrow K^+K^-\Lambda$	
2230 ±20		BOLONKIN	88	SPEC	$40\ \pi^-p \rightarrow K^0_S K^0_S n$	
2220 ±10	41	[1] ALDE	86B	GA24	$38–100\ \pi p \rightarrow n\eta\eta'$	
2230 ± 6 ±14	93	BALTRUSAIT...	86D	MRK3	$e^+e^- \rightarrow \gamma K^+K^-$	
2232 ± 7 ± 7	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. • • •						
2223.9± 2.5		[2] VLADIMIRSK...	08	SPEC	$40\ \pi^-p \rightarrow K^0_S K^0_S n + m\pi^0$	
2246 ±36		BAI	98H	BES	$J/\psi \rightarrow \gamma\pi^0\pi^0$	

[1] ALDE 86B uses data from both the GAMS-2000 and GAMS-4000 detectors. NODE=M082M;LINKAGE=A

[2] $J^{PC} = 2^{++}$. Systematic uncertaities not evaluated NODE=M082M;LINKAGE=VL

$f_J(2220)$ WIDTH

NODE=M082W

NODE=M082W

VALUE (MeV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT	
23^{+8}_{-7} OUR AVERAGE							
19^{+13}_{-11}±12		74	BAI	96B	BES	$e^+e^- \rightarrow J/\psi \rightarrow \gamma\pi^+\pi^-$	
20^{+20}_{-15}±17		46	BAI	96B	BES	$e^+e^- \rightarrow J/\psi \rightarrow \gamma K^+K^-$	OCCUR=2
20^{+25}_{-16}±14		23	BAI	96B	BES	$e^+e^- \rightarrow J/\psi \rightarrow \gamma K^0_S K^0_S$	OCCUR=3
15^{+12}_{-9}± 9		32	BAI	96B	BES	$e^+e^- \rightarrow J/\psi \rightarrow \gamma p\overline{p}$	OCCUR=4
60^{+107}_{-57}			ASTON	88F	LASS	$11\ K^-p \rightarrow K^+K^-\Lambda$	
80± 30			BOLONKIN	88	SPEC	$40\ \pi^-p \rightarrow K^0_S K^0_S n$	
26^{+20}_{-16}±17		93	BALTRUSAIT...	86D	MRK3	$e^+e^- \rightarrow \gamma K^+K^-$	
18^{+23}_{-15}±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			[3] VLADIMIRSK...	08	SPEC	$40\ \pi^-p \rightarrow K^0_S K^0_S n + m\pi^0$	
<80	90		ALDE	87C	GAM2	$38\ \pi^-p \rightarrow \eta'\eta n$	

[3] $J^{PC} = 2^{++}$. Systematic uncertaities not evaluated NODE=M082W;LINKAGE=VL

$f_J(2220)$ DECAY MODES

NODE=M082215;NODE=M082

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\pi\pi$	seen	DESIG=5;OUR EST;→ NOT CHECKED ←
Γ_2	$\pi^+\pi^-$	seen	DESIG=6;OUR EST;→ NOT CHECKED ←
Γ_3	$K\overline{K}$	seen	DESIG=1;OUR EST;→ NOT CHECKED ←
Γ_4	$p\overline{p}$		DESIG=4
Γ_5	$\gamma\gamma$	not seen	DESIG=2;OUR EST;→ NOT CHECKED ←
Γ_6	$\eta\eta'(958)$	seen	DESIG=3;OUR EST;→ NOT CHECKED ←
Γ_7	$\phi\phi$	not seen	DESIG=7;OUR EST;→ NOT CHECKED ←
Γ_8	$\eta\eta$	not seen	DESIG=8;OUR EST;→ NOT CHECKED ←

$f_J(2220)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(total)$

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	[4] 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	[4] GODANG	97	CLE2	$\gamma\gamma \rightarrow K^0_S K^0_S$
$<$ 86	95	[4] ALBRECHT	90G	ARG	$\gamma\gamma \rightarrow K^+ K^-$
$<$1000	95	[5] 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	$\gamma\gamma \rightarrow \pi^+\pi^-$

[4] Assuming $J^P = 2^+$.
[5] True for $J^P = 0^+$ and $J^P = 2^+$.

NODE=M082G1;LINKAGE=D
NODE=M082G1;LINKAGE=C

$f_J(2220)$ $\Gamma(i)\Gamma(p\overline{p})/\Gamma^2(total)$

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	[6] 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	[7] 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	[8] 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	[6] AMSLER	01	CBAR	1.4–1.5 $p\overline{p} \rightarrow \eta\eta$

[6] For $J^P = 2^+$ in the mass range 2222–2240 MeV and the total width between 10 and 20 MeV.
[7] For $J^P = 2^+$ and $J^P = 4^+$ in the mass range 2220–2245 MeV and the total width of 15 MeV.
[8] For $J^P = 2^+$, the mass of 2235 MeV and the total width of 15 MeV.

NODE=M082GG;LINKAGE=A
NODE=M082GG;LINKAGE=B
NODE=M082GG;LINKAGE=C

$f_J(2220)$ BRANCHING RATIOS

NODE=M082225

$\Gamma(p\overline{p})/\Gamma_{total}$ — Γ_4/Γ

NODE=M082R1
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		[9] AUBERT	07AV	BABR	$B \rightarrow p\overline{p}K^{(*)}$
not seen		WANG	05A	BELL	$B^+ \rightarrow \overline{p}pK^+$
<3.0	95	[10] EVANGELIS...	97	SPEC	1.96-2.40 $\overline{p}p \rightarrow K^0_S K^0_S$
<1.1	99.7	[11] BARNES	93	SPEC	1.3-1.57 $\overline{p}p \rightarrow K^0_S K^0_S$
<2.6	99.7	[11] BARDIN	87	CNTR	1.3-1.5 $\overline{p}p \rightarrow K^+K^-$
<3.6	99.7	[11] SCULLI	87	CNTR	1.29-1.55 $\overline{p}p \rightarrow K^+K^-$

[9] Assuming $\Gamma < 30$ MeV.
[10] Assuming $\Gamma \sim 20$ MeV, $J^P = 2^+$ and B($f_J(2220) \rightarrow K\overline{K}$) = 100%.
[11] Assuming Γ = 30-35 MeV, $J^P = 2^+$ and B($f_J(2220) \rightarrow K\overline{K}$) = 100%.

NODE=M082R1;LINKAGE=AU
NODE=M082R1;LINKAGE=C
NODE=M082R1;LINKAGE=B

$\Gamma(\pi\pi)/\Gamma(K\overline{K})$ — Γ_1/Γ_3

NODE=M082R2
NODE=M082R2

VALUE	DOCUMENT ID		TECN	COMMENT
1.0±0.5	BAI	96B	BES	$e^+e^- \rightarrow J/\psi \rightarrow \gamma 2\pi, K\overline{K}$

$\Gamma(p\overline{p})/\Gamma(K\overline{K})$ — Γ_4/Γ_3

NODE=M082R3
NODE=M082R3

VALUE	DOCUMENT ID		TECN	COMMENT
0.17±0.09	BAI	96B	BES	$e^+e^- \rightarrow J/\psi \rightarrow \gamma p\overline{p}, K\overline{K}$

$f_J(2220)$ REFERENCES

NODE=M082

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*	
2226±16 OUR AVERAGE						
$2240^{+30}_{-20}{}^{+30}_{-20}$	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	$J/\psi \to \gamma K^+ K^- K^0_S K^0_L$	OCCUR=2
• • • We do not use the following data for averages, fits, limits, etc. • • •						
~ 2220		BISELLO	86B	DM2	$J/\psi \to \gamma K^+ K^- K^+ K^-$	

$\eta(2225)$ WIDTH

NODE=M115W

NODE=M115W

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
185^{+70}_{-40} OUR AVERAGE					
$190 \pm 30^{+60}_{-40}$	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	$J/\psi \to \gamma K^+ K^- K^+ K^-$

$\eta(2225)$ REFERENCES

NODE=M115

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

$\overline{p}p \rightarrow \pi\pi$ or $K\overline{K}$

NODE=M044M1

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
∼ 2232	HASAN	94	RVUE		$\overline{p}p \rightarrow \pi\pi$
∼ 2090	[1] OAKDEN	94	RVUE		0.36–1.55 $\overline{p}p \rightarrow \pi\pi$
∼ 2250	[2] MARTIN	80B	RVUE		
∼ 2300	[2] MARTIN	80C	RVUE		
∼ 2140	[3] CARTER	78B	CNTR	0	0.7–2.4 $\overline{p}p \rightarrow K^- K^+$
∼ 2150	[4] CARTER	77	CNTR	0	0.7–2.4 $\overline{p}p \rightarrow \pi\pi$

[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=M044M1;LINKAGE=CC

[2] $I(J^P) = 1(3^-)$ from simultaneous analysis of $p\overline{p} \rightarrow \pi^-\pi^+$ and $\pi^0\pi^0$.
NODE=M044M1;LINKAGE=P

[3] $I = 0, 1$. $J^P = 3^-$ from Barrelet-zero analysis.
NODE=M044M1;LINKAGE=K

[4] $I(J^P) = 1(3^-)$ 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	[5] ANISOVICH	02	SPEC		0.6–1.9 $p\overline{p} \rightarrow \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$
∼ 2190	[6] CUTTS	78B	CNTR		0.97–3 $\overline{p}p \rightarrow \overline{N}N$
2155±15	[6,7] COUPLAND	77	CNTR	0	0.7–2.4 $\overline{p}p \rightarrow \overline{p}p$
2193± 2	[6,8] ALSPECTOR	73	CNTR		$\overline{p}p$ S channel
2190±10	[9] ABRAMS	70	CNTR		S channel $\overline{p}N$

[5] From the combined analysis of ANISOVICH 00J, ANISOVICH 01D, ANISOVICH 01E, and ANISOVICH 02.
NODE=M044M;LINKAGE=AY

[6] Isospins 0 and 1 not separated.
NODE=M044M2;LINKAGE=I

[7] From a fit to the total elastic cross section.
NODE=M044M2;LINKAGE=E

[8] Referred to as T or T region by ALSPECTOR 73.
NODE=M044M2;LINKAGE=M

[9] 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

$\pi^- p \rightarrow \eta\pi\pi$

NODE=M044M3

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2290±20±30	AMELIN	00	VES	37 $\pi^- p \rightarrow \eta\pi^+\pi^- n$

$\rho_3(2250)$ WIDTH

NODE=M044210

$\overline{p}p \rightarrow \pi\pi$ or $K\overline{K}$

NODE=M044W1

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
∼ 220	HASAN	94	RVUE		$\overline{p}p \rightarrow \pi\pi$
∼ 60	[10] OAKDEN	94	RVUE		0.36–1.55 $\overline{p}p \rightarrow \pi\pi$
∼ 250	[11] MARTIN	80B	RVUE		
∼ 200	[11] MARTIN	80C	RVUE		
∼ 150	[12] CARTER	78B	CNTR	0	0.7–2.4 $\overline{p}p \rightarrow K^- K^+$
∼ 200	[13] CARTER	77	CNTR	0	0.7–2.4 $\overline{p}p \rightarrow \pi\pi$

[10] 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

[11] $I(J^P) = 1(3^-)$ from simultaneous analysis of $p\overline{p} \rightarrow \pi^-\pi^+$ and $\pi^0\pi^0$.
NODE=M044W1;LINKAGE=P

[12] $I = 0, 1$. $J^P = 3^-$ from Barrelet-zero analysis.
NODE=M044W1;LINKAGE=K

[13] $I(J^P) = 1(3^-)$ from amplitude analysis.
NODE=M044W1;LINKAGE=J

S-CHANNEL $\overline{N}N$

NODE=M044W2

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
160±25	[14] ANISOVICH	02	SPEC		0.6–1.9 $p\overline{p} \to \omega\pi^0, \omega\eta\pi^0, \pi^+\pi^-$
135±75	[15,16] COUPLAND	77	CNTR	0	0.7–2.4 $\overline{p}p \to \overline{p}p$
98± 8	[16] ALSPECTOR	73	CNTR		$\overline{p}p$ S channel
∼ 85	[17] ABRAMS	70	CNTR		S channel $\overline{p}N$

[14] From the combined analysis of ANISOVICH 00J, ANISOVICH 01D, ANISOVICH 01E, and ANISOVICH 02. NODE=M044W;LINKAGE=AY

[15] From a fit to the total elastic cross section. NODE=M044W2;LINKAGE=E

[16] Isospins 0 and 1 not separated. NODE=M044W2;LINKAGE=I

[17] 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

$\pi^- p \to \eta\pi\pi$

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 $\pi^- p \to \eta\pi^+\pi^- n$

$\rho_3(2250)$ REFERENCES

NODE=M044

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.*		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. • • •				
2270±12	VLADIMIRSK...	06	SPEC	40 $\pi^- p \to K_S^0 K_S^0 n$
2327± 9±6	ABE	04	BELL	10.6 $e^+e^- \to e^+e^- K^+K^-$
2231±10	BOOTH	86	OMEG	85 π^- 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

$f_2(2300)$ WIDTH

NODE=M107W

NODE=M107W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
149±41	[2] ETKIN	88	MPS	22 $\pi^- p \to \phi\phi n$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
90±29	VLADIMIRSK...	06	SPEC	40 $\pi^- p \to K_S^0 K_S^0 n$
275±36±20	ABE	04	BELL	10.6 $e^+e^- \to e^+e^- K^+K^-$
133±50	BOOTH	86	OMEG	85 π^- Be $\to 2\phi$ Be
200±50	LINDENBAUM	84	RVUE	
220±70	ETKIN	82	MPS	22 $\pi^- p \to 2\phi n$

[2] Includes data of ETKIN 85. NODE=M107W;LINKAGE=C

f_2(2300) DECAY MODES

NODE=M107215;NODE=M107

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\phi\phi$	seen	DESIG=1;OUR EST;→ NOT CHECKED ←
Γ_2	$K\overline{K}$	seen	DESIG=2;OUR EST;→ NOT CHECKED ←
Γ_3	$\gamma\gamma$	seen	DESIG=3;OUR EST;→ NOT CHECKED ←

f_2(2300) Γ(i)Γ(γγ)/Γ(total)

NODE=M107225

$\Gamma(K\overline{K}) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_2\Gamma_3/\Gamma$

NODE=M107G1
NODE=M107G1

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$44\pm6\pm12$	[3] ABE	04	BELL	10.6 $e^+e^- \rightarrow e^+e^-K^+K^-$

[3] Assuming spin 2.

NODE=M107G1;LINKAGE=AB

f_2(2300) REFERENCES

NODE=M107

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
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 $\pi^0\pi^0$. NODE=M041M1;LINKAGE=P

[2] $I(J^P) = 0(4^+)$ from Barrelet-zero analysis. NODE=M041M1;LINKAGE=K

[3] $I(J^P) = 0(4^+)$ from amplitude analysis. NODE=M041M1;LINKAGE=J

S-CHANNEL $\overline{p}p$ or $\overline{N}N$

NODE=M041M2
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 $\overline{p}p \rightarrow \overline{p}p$
$2359\pm\ 2$	[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 $pp \rightarrow p_f \omega\omega p_s$

→ NOT CHECKED ←

$f_4(2300)$ 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 $pp \rightarrow p_f \omega\omega p_s$

→ NOT CHECKED ←

$f_4(2300)$ DECAY MODES

NODE=M041215;NODE=M041

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\rho\rho$	seen	DESIG=1;OUR EST;→ NOT CHECKED ←
Γ_2	$\omega\omega$	seen	DESIG=2;OUR EST;→ NOT CHECKED ←
Γ_3	$\eta\pi\pi$	seen	DESIG=3;OUR EST;→ NOT CHECKED ←
Γ_4	$\pi\pi$	seen	DESIG=4;OUR EST;→ NOT CHECKED ←
Γ_5	$K\overline{K}$	seen	DESIG=5;OUR EST;→ NOT CHECKED ←
Γ_6	$N\overline{N}$	seen	DESIG=6;OUR EST;→ NOT CHECKED ←

$f_4(2300)$ BRANCHING RATIOS

NODE=M041220

$\Gamma(\rho\rho)/\Gamma(\omega\omega)$ Γ_1/Γ_2

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 $pp \rightarrow p_f \omega\omega p_s$

$f_4(2300)$ 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.*		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. • • •			
2314±25	[1] BUGG 04A	RVUE	
2337±14	ANISOVICH 00J	SPEC	2.0 $\overline{p}p \rightarrow \pi\pi, \eta\eta$
~ 2321	HASAN 94	RVUE	$\overline{p}p \rightarrow \pi\pi$

[1] Partial wave analysis of the data on $p\overline{p} \rightarrow \overline{\Lambda}\Lambda$ 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. • • •			
144±20	[2] BUGG 04A	RVUE	
217±33	ANISOVICH 00J	SPEC	2.0 $\overline{p}p \rightarrow \pi\pi, \eta\eta$
~ 223	HASAN 94	RVUE	$\overline{p}p \rightarrow \pi\pi$

[2] Partial wave analysis of the data on $p\overline{p} \rightarrow \overline{\Lambda}\Lambda$ from BARNES 00.

NODE=M169W;LINKAGE=BU

$f_0(2330)$ REFERENCES

NODE=M169

BUGG	04A	EPJ C36 161	D.V. Bugg		REFID=50158
ANISOVICH	00J	PL B491 47	A.V. Anisovich *et al.*		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
2339±55		[1] 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	[2] 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] 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

[2] Statistical error only.

NODE=M108M;LINKAGE=ST

$f_2(2340)$ WIDTH

NODE=M108W

NODE=M108W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{319^{+81}_{-69}}$		[3] 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	[4] 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	

[3] Includes data of ETKIN 85.

[4] Statistical error only.

NODE=M108W;LINKAGE=C

NODE=M108W;LINKAGE=ST

$f_2(2340)$ DECAY MODES

NODE=M108215;NODE=M108

	Mode	Fraction (Γ_i/Γ)
Γ_1	$\phi\phi$	seen
Γ_2	$\eta\eta$	seen

DESIG=1;OUR EST;→ NOT CHECKED ←

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

UMAN	06	PR D73 052009	I. Uman *et al.*	(FNAL E835)
ETKIN	88	PL B201 568	A. Etkin *et al.*	(BNL, CUNY)
BOOTH	86	NP B273 677	P.S.L. Booth *et al.*	(LIVP, GLAS, CERN)
ETKIN	85	PL 165B 217	A. Etkin *et al.*	(BNL, CUNY)
LINDENBAUM	84	CNPP 13 285	S.J. Lindenbaum	(CUNY)

REFID=51063
REFID=40285
REFID=21870
REFID=21871
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

$\pi^- p \rightarrow \omega\pi^0 n$

NODE=M033M3

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
2330±35	ALDE	95	GAM2	38 $\pi^- p \rightarrow \omega\pi^0 n$

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		$\overline{p}p \rightarrow \pi\pi$
~ 2300	[1] MARTIN	80B	RVUE		
~ 2250	[1] MARTIN	80C	RVUE		
~ 2500	[2] CARTER	78B	CNTR	0	0.7–2.4 $\overline{p}p \rightarrow K^- K^+$
~ 2480	[3] CARTER	77	CNTR	0	0.7–2.4 $\overline{p}p \rightarrow \pi\pi$

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 $p\overline{p} \rightarrow \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$
2295±30	ANISOVICH	00J	SPEC		
~ 2380	[5] CUTTS	78B	CNTR		0.97–3 $\overline{p}p \rightarrow \overline{N}N$
2345±15	[5,6] COUPLAND	77	CNTR	0	0.7–2.4 $\overline{p}p \rightarrow \overline{p}p$
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	$\overline{p}(pn)$, $K^* K 2\pi$

$\pi^- p \rightarrow K^+ K^- n$

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 $\pi^- p \rightarrow K^+ K^- n$

[1] $I(J^P) = 1(5^-)$ from simultaneous analysis of $p\overline{p} \rightarrow \pi^-\pi^+$ 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

$\pi^- p \rightarrow \omega\pi^0 n$

NODE=M033W3

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
400±100	ALDE	95	GAM2	38 $\pi^- p \rightarrow \omega\pi^0 n$

$\overline{p}p \to \pi\pi$ 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	$\overline{p}(pn)$, $K^* K 2\pi$
~ 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.*		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=M024

$a_6(2450)$

$I^G(J^{PC}) = 1^-(6^{++})$

OMITTED FROM SUMMARY TABLE

Needs confirmation. NODE=M024

$a_6(2450)$ MASS

NODE=M024M

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
2450±130	[1] CLELAND	82B	SPEC	±	50 $\pi p \rightarrow K^0_S K^\pm p$

NODE=M024M

[1] From an amplitude analysis. NODE=M024M;LINKAGE=C

$a_6(2450)$ WIDTH

NODE=M024W

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
400±250	[2] CLELAND	82B	SPEC	±	50 $\pi p \rightarrow K^0_S K^\pm p$

NODE=M024W

[2] From an amplitude analysis. NODE=M024W;LINKAGE=C

$a_6(2450)$ DECAY MODES

NODE=M024215;NODE=M024

	Mode
Γ_1	$K\overline{K}$

DESIG=1

$a_6(2450)$ REFERENCES

NODE=M024

CLELAND 82B NP B208 228 W.E. Cleland *et al.* (DURH, GEVA, LAUS+) REFID=21281

NODE=M089

$f_6(2510)$

$I^G(J^{PC}) = 0^+(6^{++})$

OMITTED FROM SUMMARY TABLE

Needs confirmation. NODE=M089

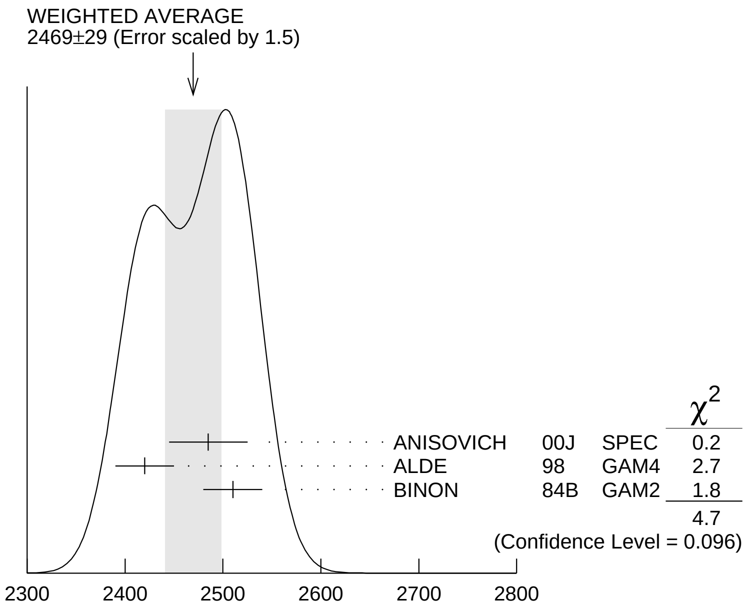
$f_6(2510)$ MASS

NODE=M089M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
2469±29 OUR AVERAGE	Error includes scale factor of 1.5. See the ideogram below.			
2485±40	[1] ANISOVICH	00J	SPEC	1.92–2.41 $p\overline{p}$
2420±30	ALDE	98	GAM4	100 $\pi^- p \rightarrow \pi^0 \pi^0 n$
2510±30	BINON	84B	GAM2	38 $\pi^- p \rightarrow n 2\pi^0$

NODE=M089M

[1] From the combined analysis of ANISOVICH 99C, ANISOVICH 99F, ANISOVICH 99J, ANISOVICH 99K, and ANISOVICH 00B. NODE=M089M;LINKAGE=AN



$f_6(2510)$ MASS (MeV)

$f_6(2510)$ WIDTH

NODE=M089W

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
283±40 OUR AVERAGE	Error includes scale factor of 1.1.			
410±90	[2] ANISOVICH	00J	SPEC	1.92–2.41 $p\overline{p}$
270±60	ALDE	98	GAM4	100 $\pi^- p \rightarrow \pi^0\pi^0 n$
240±60	BINON	84B	GAM2	38 $\pi^- p \rightarrow n 2\pi^0$

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 $\pi^- p \rightarrow n 4\gamma$

[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.*		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

OTHER LIGHT 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
$360\pm7\pm9$	64 ± 18	2.3k	[1] ABRAAMYAN 09	CNTR	2.75 $dC \to \gamma\gamma X$

[1] Not seen in $pC \to \gamma\gamma X$ 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	[2] VLADIMIRSK...08	40 $\pi^- p \to K^0_S K^0_S n + m\pi^0$

[2] 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	$111\pm8\pm15$	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}	[3] ANISOVICH 03	SPEC	
1530^{+90}_{-250}	560 ± 40	[4] ANISOVICH 03	SPEC	

OCCUR=2

[3] 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

[4] 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	[5] VLADIMIRSK...08	40 $\pi^- p \to K^0_S K^0_S n + m\pi^0$

[5] 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
$1576^{+49}_{-55}{}^{+98}_{-91}$	$818^{+22}_{-23}{}^{+64}_{-133}$	[6] ABLIKIM 06S	BES	$J/\psi \to K^+K^-\pi^0$

[6] 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

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID	TECN	COMMENT
1600±100	400 ± 200	[7] ALBRECHT 91F	ARG	10.2 $e^+e^- \to e^+e^- 2(\pi^+\pi^-)$

[7] Our estimate. NODE=M300J99;LINKAGE=A

X(1650) $I^G(J^{PC}) = 0^-(?^{?-})$

NODE=M300J62

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
1652±7	<50	100	PROKOSHKIN 96	GAM2	32,38 $\pi p \to \omega\eta n$

X(1730) $I^G(J^{PC}) = ?^?(?^{?+})$

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 $\pi^- p \to K^0_S K^0_S X$

X(1750) $I^G(J^{PC}) = ?^?(1^{--})$

NODE=M300J94

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID	TECN	COMMENT
1753.5±1.5±2.3	122.2 ± 6.2 ± 8.0	LINK 02K	FOCS	20–160 $\gamma p \to K^+K^-p$

B($X(1750) \to \overline{K}^*(892)^0 K^0 \to K^\pm\pi^\mp K^0_S$)/B($X(1750) \to K^+K^-$)

NODE=M300B5

VALUE	CL%	DOCUMENT ID	TECN
<0.065	90	LINK 02K	FOCS

B($X(1750) \to \overline{K}^*(892)^\pm K^\mp \to K^\pm\pi^\mp K^0_S$)/B($X(1750) \to K^+K^-$)

NODE=M300B6

VALUE	CL%	DOCUMENT ID	TECN
<0.183	90	LINK 02K	FOCS

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f_2(1750) $I^G(J^{PC}) = 0^+(2^{++})$

NODE=M300JAM

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
1755±10	67 ± 12	870	[8] SCHEGELSKY 06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$

$\Gamma(K\overline{K})$

NODE=M300JA1

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
17±5	870	[9] SCHEGELSKY 06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$

$\Gamma(\gamma\gamma)$

NODE=M300JA2

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
0.13±0.04	870	[9] SCHEGELSKY 06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$

$\Gamma(\pi\pi)$

NODE=M300JA3

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
1.3±1.0	870	[9] SCHEGELSKY 06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$

$\Gamma(\eta\eta)$

NODE=M300JA4

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
2.0±0.5	870	[9] SCHEGELSKY 06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$

[8] From analysis of L3 data at 91 and 183–209 GeV. NODE=M300JAM;LINKAGE=SC
[9] 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

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(1812) $I^G(J^{PC}) = ?^?(?^{?+})$

NODE=M300K29

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID	TECN	COMMENT
1812^{+19}_{-26}±18	105 ± 20 ± 28	[10] ABLIKIM 06J	BES2	$J/\psi \to \gamma\omega\phi$

[10] Favors $J^{PC} = 0^{++}$. Not seen by LIU 09 in $B^{\pm} \to K^{\pm} \omega \phi$. NODE=M300K29;LINKAGE=AB

X(1850 - 3100) $I^G(J^{PC}) = ?^?(1^{--})$

NODE=M300K28
NODE=M300K28

$\Gamma(e^+e^-) \cdot B(X \to$ hadrons) (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<120	90	[11] ANASHIN	11	KEDR	$e^+e^- \to$ hadrons

[11] 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
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
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
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) → $\rho\pi$)

NODE=M300B7
NODE=M300B7

VALUE	DOCUMENT ID		TECN	COMMENT
0.8±0.2	[12] CHUNG	02	B852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$

[12] 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) → $\rho\pi$)

NODE=M300B8
NODE=M300B8

VALUE	DOCUMENT ID		TECN	COMMENT
0.9±0.3	[13] CHUNG	02	B852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$

[13] 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
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
NODE=M300J33

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1935±20	215 ± 30	EVANGELIS...	79	OMEG	10,16 $\pi^- p \to \overline{p} p n$

ρ_2(1940) $I^G(J^{PC}) = 1^+(2^{--})$

NODE=M300J85
NODE=M300J85

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1940±40	155 ± 40	[14] ANISOVICH	02	SPEC	0.6–1.9 $p\overline{p} \to \omega\pi^0, \omega\eta\pi^0, \pi^+\pi^-$

[14] 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
NODE=M300J65

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1945±20	115 ± 22	[15] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \to \omega\eta, \omega\pi^0\pi^0$

[15] 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
NODE=M300K24

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1950^{+30}_{-70}	180^{+30}_{-70}	[16] ANISOVICH	01F	SPEC	1.96–2.41 $\overline{p} p$

[16] From the combined analysis of ANISOVICH 99C, ANISOVICH 99E, and ANISOVICH 01F. NODE=M300K24;LINKAGE=AN

$\omega(1960)$ $I^G(J^{PC}) = 0^-(1^{--})$ NODE=M300J79

NODE=M300J79

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1960 ± 25	195 ± 60	[17] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \rightarrow \omega\eta, \omega\pi^0\pi^0$

[17] 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

NODE=M300J67

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1960 ± 35	230 ± 50	[18] ANISOVICH	02	SPEC	0.6–1.9 $p\overline{p} \rightarrow \omega\pi^0, \omega\eta\pi^0, \pi^+\pi^-$

[18] 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

NODE=M300J64

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1965 ± 45	345 ± 75	[19] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \rightarrow \omega\eta, \omega\pi^0\pi^0$

[19] 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

NODE=M300J1

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
1971 ± 15	240 ± 45	ANISOVICH	00J	SPEC

$X(1970)$ $I^G(J^{PC}) = ?^?(?^{??})$ NODE=M300J46

NODE=M300J46

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1970 ± 10	40 ± 20	CHLIAPNIK...	80	HBC	32 $K^+ p \rightarrow 2K^0_S 2\pi X$

$X(1975)$ $I^G(J^{PC}) = ?^?(?^{??})$ NODE=M300J47

NODE=M300J47

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1973 ± 15	80	30	CASO	70	HBC	11.2 $\pi^- p \rightarrow \rho 2\pi$

$\omega_2(1975)$ $I^G(J^{PC}) = 0^-(2^{--})$ NODE=M300J81

NODE=M300J81

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1975 ± 20	175 ± 25	[20] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \rightarrow \omega\eta, \omega\pi^0\pi^0$

[20] 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

NODE=M300J2

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$2050 \pm 10 \pm 40$	$190 \pm 22 \pm 100$	18k	[21] SCHEGELSKY	06	RVUE	$\gamma\gamma \rightarrow \pi^+\pi^-\pi^0$
$2003 \pm 10 \pm 19$	$249 \pm 23 \pm 32$		LU	05	B852	18 $\pi^- p \rightarrow \omega\pi^-\pi^0 p$

[21] From analysis of L3 data at 183–209 GeV. NODE=M300J2;LINKAGE=SC

$\Gamma(\gamma\gamma)\,\Gamma(\pi^+\pi^-\pi^0)\,/\,\Gamma(\text{total})$ NODE=M300J2G

NODE=M300J2G

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
$0.11 \pm 0.04 \pm 0.05$	18k	[22] SCHEGELSKY	06	RVUE	$\gamma\gamma \rightarrow \pi^+\pi^-\pi^0$

[22] From analysis of L3 data at 183–209 GeV. NODE=M300J2G;LINKAGE=SC

$\rho(2000)$ $I^G(J^{PC}) = 1^+(1^{--})$ NODE=M300J77

NODE=M300J77

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2000 ± 30	260 ± 45	[23] BUGG	04C	RVUE	Compilation
~ 1988	~ 244	HASAN	94	RVUE	$\overline{p}p \rightarrow \pi\pi$

[23] 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
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
NODE=M300K01

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
1964±35	225 ± 50	[24] ARMSTRONG	93D	E760		$\overline{p}p \to 3\pi^0 \to 6\gamma$
∼ 2100	∼ 500	[24] ANTIPOV	77	CIBS	−	25 $\pi^- p \to p\pi^-\rho_3$
2214±15	355 ± 21	[25] BALTAY	77	HBC	0	15 $\pi^- p \to \Delta^{++}3\pi$
2080±40	340 ± 80	KALELKAR	75	HBC	+	15 $\pi^+ p \to p\pi^+\rho_3$

[24] Cannot determine spin to be 3.

NODE=M300K01;LINKAGE=AA

[25] BALTAY 77 favors $J^P = ,3^+$.

NODE=M300K01;LINKAGE=B

$X(2000)$ $I^G(J^{PC}) = ?^?(4^{++})$

NODE=M300J97
NODE=M300J97

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID	TECN	COMMENT
1998±3±5	<15	VLADIMIRSK...03	SPEC	$\pi^- p \to K^0_S K^0_S MM$

$\pi_2(2005)$ $I^G(J^{PC}) = 1^-(2^{-+})$

NODE=M300J71
NODE=M300J71

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1974±14±83	341 ± 61 ± 139	145k	LU	05	B852	18 $\pi^- p \to \omega\pi^-\pi^0 p$
2005±15	200 ± 40		ANISOVICH	01F	SPEC	2.0 $\overline{p}p \to 3\pi^0$, $\pi^0\eta$, $\pi^0\eta'$

$\eta(2010)$ $I^G(J^{PC}) = 0^+(0^{-+})$

NODE=M300J5
NODE=M300J5

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2010^{+35}_{-60}	270 ± 60	ANISOVICH	00J	SPEC

$\pi_1(2015)$ $I^G(J^{PC}) = 1^-(1^{-+})$

NODE=M300J05
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
NODE=M300J6

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2025±30	330 ± 75	ANISOVICH	99C	SPEC

$X(2020)$ $I^G(J^{PC}) = ?^?(?^{??})$

NODE=M300J34
NODE=M300J34

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2015±3	10 ± 4	FERRER	99	RVUE	$\pi p \to pp\overline{p}\pi(\pi)$

$h_3(2025)$ $I^G(J^{PC}) = 0^-(3^{+-})$

NODE=M300J78
NODE=M300J78

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2025±20	145 ± 30	[26] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \to \omega\eta$, $\omega\pi^0\pi^0$

[26] 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
NODE=M300J69

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2032±12	117 ± 11	[27] ANISOVICH	02	SPEC	0.6–1.9 $p\overline{p} \to \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$

[27] 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
NODE=M300K23

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2030±20	205 ± 30	[28] ANISOVICH	01F	SPEC	1.96–2.41 $\overline{p}p$

[28] 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
NODE=M300K20

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2031±12	150 ± 18	[29] ANISOVICH	01F	SPEC	1.96–2.41 $\overline{p}p$

[29] From the combined analysis of ANISOVICH 99C, ANISOVICH 99E, and ANISOVICH 01F. NODE=M300K20;LINKAGE=AN

$\eta_2(2030)$ $I^G(J^{PC}) = 0^+(2^{-+})$

NODE=M300J8
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	[30] ANISOVICH	11	SPEC	0.9–1.94 $p\overline{p}$

[30] 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	[31] ANISOVICH	11	SPEC	0.9–1.94 $p\overline{p}$

[31] 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	[32] ANISOVICH	11	SPEC	0.9–1.94 $p\overline{p}$

[32] 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 $p\overline{p} \rightarrow \eta\pi^0\pi^0$

$f_0(2060)$ $I^G(J^{PC}) = 0^+(0^{++})$

NODE=M300J59
NODE=M300J59

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
∼ 2050	∼ 120	[33] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \rightarrow \pi\pi$
∼ 2060	∼ 50	[33] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \rightarrow \pi\pi$ OCCUR=2

[33] See SEMENOV 99 and KLOET 96. NODE=M300J;LINKAGE=A

$\pi(2070)$ $I^G(J^{PC}) = 1^-(0^{-+})$

NODE=M300J91
NODE=M300J91

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2070±35	310^{+100}_{-50}	ANISOVICH	01F	SPEC	2.0 $\overline{p}p \rightarrow 3\pi^0, \pi^0\eta, \pi^0\eta'$

$X(2075)$ $I^G(J^{PC}) = ?^?(?^{??})$

NODE=M300J01
NODE=M300J01

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2075±12±5	90 ± 35 ± 9	[34] ABLIKIM	04J	BES2	$J/\psi \rightarrow K^- p\overline{\Lambda}$

[34] 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 $B^+ \rightarrow p\overline{\Lambda}\overline{D}^0$ 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 $\pi^- d \rightarrow p\overline{p}n(n_s)$

$X(2080)$ $I^G(J^{PC}) = ?^?(3^{-?})$

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
$2096 \pm 17 \pm 121$	$451 \pm 41 \pm 81$	69k	KUHN 04	B852	$18\ \pi^- p \to \eta\pi^+\pi^-\pi^- p$

$\mathrm{B}(a_1(2095) \to f_1(1285)\pi)$ / $\mathrm{B}(a_1(2095) \to a_1(1260))$

NODE=M300B03
NODE=M300B03

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
3.18 ± 0.64	69k	KUHN 04	B852	$18\ \pi^- p \to \eta\pi^+\pi^-\pi^- p$

$\eta(2100)$ $I^G(J^{PC}) = 0^+(0^{-+})$

NODE=M300J48
NODE=M300J48

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
2103 ± 50	187 ± 75	586	[35] BISELLO 89B	DM2	$J/\psi \to 4\pi\gamma$

[35] 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
NODE=M300J49

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID	TECN	COMMENT
2100 ± 40	250 ± 40	ALDE 86D	GAM4	$100\ \pi^- p \to 2\eta X$

$X(2110)$ $I^G(J^{PC}) = 1^+(3^{-?})$

NODE=M300J36
NODE=M300J36

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID	TECN	COMMENT
2110 ± 10	330 ± 20	EVANGELIS... 79	OMEG	$10,16\ \pi^- p \to \overline{p}pn$

$f_2(2140)$ $I^G(J^{PC}) = 0^+(2^{++})$

NODE=M300J50
NODE=M300J50

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
2141 ± 12	49 ± 28	389	GREEN 86	MPSF	$400\ pA \to 4KX$

$X(2150)$ $I^G(J^{PC}) = ?^?(2^{+?})$

NODE=M300J38
NODE=M300J38

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID	TECN	COMMENT
2150 ± 10	260 ± 10	ROZANSKA 80	SPRK	$18\ \pi^- p \to p\overline{p}n$

$a_2(2175)$ $I^G(J^{PC}) = 1^-(2^{++})$

NODE=M300J88
NODE=M300J88

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID	TECN	COMMENT
2175 ± 40	310^{+90}_{-45}	ANISOVICH 01F	SPEC	$2.0\ \overline{p}p \to 3\pi^0,\ \pi^0\eta,\ \pi^0\eta'$

$\eta(2190)$ $I^G(J^{PC}) = 0^+(0^{-+})$

NODE=M300J13
NODE=M300J13

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID	TECN
2190 ± 50	850 ± 100	BUGG 99	BES

$\omega_2(2195)$ $I^G(J^{PC}) = 0^-(2^{--})$

NODE=M300J82
NODE=M300J82

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID	TECN	COMMENT
2195 ± 30	225 ± 40	[36] ANISOVICH 02B	SPEC	$0.6–1.9\ p\overline{p} \to \omega\eta,\ \omega\pi^0\pi^0$

[36] From the combined analysis of ANISOVICH 00D, ANISOVICH 01C, and ANISOVICH 02B.

NODE=M300J82;LINKAGE=AZ

$\omega(2205)$ $I^G(J^{PC}) = 0^-(1^{--})$

NODE=M300J80
NODE=M300J80

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID	TECN	COMMENT
2205 ± 30	350 ± 90	[37] ANISOVICH 02B	SPEC	$0.6–1.9\ p\overline{p} \to \omega\eta,\ \omega\pi^0\pi^0$

[37] From the combined analysis of ANISOVICH 00D, ANISOVICH 01C, and ANISOVICH 02B. NODE=M300J80;LINKAGE=AZ

$X(2210)$ $I^G(J^{PC}) = ?^?(?^{??})$

NODE=M300J39
NODE=M300J39

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2210^{+79}_{-21}	203^{+437}_{-87}	EVANGELIS...	79B	OMEG	$10\ \pi^- p \to K^+ K^- n$

$X(2210)$ $I^G(J^{PC}) = ?^?(?^{??})$

NODE=M300J51
NODE=M300J51

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2207 ± 22	130	CASO	70	HBC	$11.2\ \pi^- p$

$h_1(2215)$ $I^G(J^{PC}) = 0^-(1^{+-})$

NODE=M300J27
NODE=M300J27

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2215 ± 40	325 ± 55	[38] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \to \omega\eta$, $\omega\pi^0\pi^0$

[38] 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}	[39] ANISOVICH	02	SPEC	0.6–1.9 $p\overline{p} \to \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$

[39] 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	[40] ANISOVICH	02	SPEC	0.6–1.9 $p\overline{p} \to \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$

[40] 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	[41] ANISOVICH	02	SPEC	0.6–1.9 $p\overline{p} \to \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$

[41] 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**	[42] 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	$p\overline{p} \to \pi\pi$

[42] 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	[43] BUGG	04C	RVUE

[43] 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 $\overline{p}p \rightarrow 3\pi^0, \pi^0\eta, \pi^0\eta'$

$\omega_4(2250)$ $I^G(J^{PC}) = 0^-(4^{--})$

NODE=M300J84
NODE=M300J84

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2250±30	150 ± 50	[44] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \rightarrow \omega\eta, \omega\pi^0\pi^0$

[44] 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	[45] BUGG	04	RVUE

[45] From the combined analysis of ANISOVICH 00D, ANISOVICH 01C, and ANISOVICH 02B.

NODE=M300;LINKAGE=AZ

$\omega_3(2255)$ $I^G(J^{PC}) = 0^-(3^{--})$

NODE=M300J66
NODE=M300J66

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2255±15	175 ± 30	[46] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \rightarrow \omega\eta, \omega\pi^0\pi^0$

[46] 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 OUR AVERAGE					
2237± 5	291 ± 12	UMAN	06	E835	5.2 $\overline{p}p \rightarrow \eta\eta\pi^0$
2255±40	330^{+110}_{-50}	[47] ANISOVICH	01F	SPEC	1.96–2.41 $\overline{p}p$

[47] 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	[48] ANISOVICH	01G	SPEC	1.96–2.41 $\overline{p}p$

[48] 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 $\pi^- p \rightarrow \overline{p}pn$

$\rho(2270)$ $I^G(J^{PC}) = 1^+(1^{--})$

NODE=M300J86
NODE=M300J86

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2265±40	325 ± 80	[49] 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 $\gamma p \rightarrow p\omega\pi^+\pi^-\pi^0$

[49] 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	[50] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \rightarrow \omega\eta, \omega\pi^0\pi^0$

[50] 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}	[51] ANISOVICH	01G	SPEC	1.96–2.41 $\overline{p}p$

[51] From the combined analysis of ANISOVICH 99C, ANISOVICH 99E, ANISOVICH 01F, and ANISOVICH 01G. NODE=M300K19;LINKAGE=AN

$\pi_2(2285)$ $I^G(J^{PC}) = 1^-(2^{-+})$

NODE=M300K25
NODE=M300K25

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2285±20±25	**250 ± 20 ± 25**	[52] ANISOVICH	11	SPEC	0.9–1.94 $p\overline{p}$

[52] Reanalysis of ADOMEIT 96 and ANISOVICH 00E. NODE=M300K25;LINKAGE=AN

$\omega_3(2285)$ $I^G(J^{PC}) = 0^-(3^{--})$

NODE=M300J83
NODE=M300J83

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2278±28	224 ± 50	[53] BUGG	04A	RVUE	
2285±60	230 ± 40	[54] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \to \omega\eta$, $\omega\pi^0\pi^0$

[53] Partial wave analysis of the data on $p\overline{p} \to \overline{\Lambda}\Lambda$ from BARNES 00. NODE=M300J83;LINKAGE=BU
[54] 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	[55] BUGG	04A	RVUE

[55] 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**	[56] ANISOVICH	00J	SPEC	1.92–2.41 $p\overline{p}$

[56] 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	[57] BUGG	04A	RVUE

[57] 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	[58] ANISOVICH	00M	SPEC

[58] 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	[59] BALTAY	75	HBC	15 $\pi^+p \to p5\pi$

[59] 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

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2360±25	$300^{+100}_{-\ 50}$	ANISOVICH	01F	SPEC	2.0 $\overline{p}p \rightarrow 3\pi^0, \pi^0\eta, \pi^0\eta'$

NODE=M300J90

$X(2360)$ $I^G(J^{PC}) = ?^?(4^{+?})$ NODE=M300J42

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2360±10	430 ± 30	ROZANSKA	80	SPRK	18 $\pi^- p \rightarrow p\overline{p}n$

NODE=M300J42

$X(2440)$ $I^G(J^{PC}) = ?^?(5^{-?})$ NODE=M300J43

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2440±10	310 ± 20	ROZANSKA	80	SPRK	18 $\pi^- p \rightarrow p\overline{p}n$

NODE=M300J43

$X(2632)$ $I^G(J^{PC}) = ?^?(?^{??})$ NODE=M300J03

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2635.2±3.3		[60] EVDOKIMOV	04	SELX	$X(2632) \rightarrow D_s^+ \eta$
2631.6±2.1	< 17	[61] EVDOKIMOV	04	SELX	$X(2632) \rightarrow D^0 K^+$

NODE=M300J03

OCCUR=2

[60] From a mass difference to D_s^+ of 666.9 ± 3.3 MeV. NODE=M300J03;LINKAGE=EV

[61] From a mass difference to D^0 of 767.0 ± 2.0 MeV. NODE=M300J03;LINKAGE=ED

$B(X(2632) \rightarrow D^0 K^+)/B(X(2632) \rightarrow D_s^+ \eta)$ NODE=M300B01

VALUE	DOCUMENT ID		TECN
0.14±0.06	[62] EVDOKIMOV	04	SELX

NODE=M300B01

[62] 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 $\pi^- p \rightarrow \rho^- \pi^+ \pi^- p$

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 $\pi^- p \rightarrow p\overline{p}n$

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 $\pi^+ p \rightarrow K^+ K^- \pi^+ p$

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 $\pi^- p \rightarrow \eta\eta n$

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	$X(3250) \rightarrow \Lambda\overline{p}K^+$
3265±7±20	40 ± 18	ALEEV	93	BIS2	$X(3250) \rightarrow \overline{\Lambda}pK^-$

NODE=M300J57

OCCUR=2

$X(3250)$ $I^G(J^{PC}) = ?^?(?^{??})$ 4-Body Decays

NODE=M300J58
NODE=M300J58

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT	
$3245 \pm 8 \pm 20$	25 ± 11	ALEEV	93	BIS2	$X(3250) \to \Lambda \overline{p} K^+ \pi^\pm$	
$3250 \pm 9 \pm 20$	50 ± 20	ALEEV	93	BIS2	$X(3250) \to \overline{\Lambda} p K^- \pi^\mp$	OCCUR=2
$3270 \pm 8 \pm 20$	25 ± 11	ALEEV	93	BIS2	$X(3250) \to K^0_S p \overline{p} K^\pm$	OCCUR=3

$X(3350)$ $I^G(J^{PC}) = ?^?(?^{??})$

NODE=M300J09
NODE=M300J09

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$3350^{+10}_{-20} \pm 20$	$70^{+40}_{-30} \pm 40$	50 ± 10	[63] GABYSHEV	06A	BELL	$B^- \to \Lambda_c^+ \overline{p} \pi^-$

[63] 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

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 031102R	B. AUBERT *et al.*	(BABAR Collab.)	REFID=53363
ABRAAMYAN	09	PR C80 034001	Kh.U. Abraamyan *et al.*		REFID=53100
LIU	09	PR D79 071102R	C. Liu *et al.*	(BELLE Collab.)	REFID=52752
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	06J	PRL 96 162002	M. Ablikim *et al.*	(BES Collab.)	REFID=51127
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 (erratum)	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
ANISOVICH	02B	PL B542 19	A.V. Anisovich *et al.*		REFID=48829
CHUNG	02	PR D65 072001	S.U. Chung *et al.*	(BNL E852 Collab.)	REFID=48837
LINK	02K	PL B545 50	J.M. Link *et al.*	(FNAL FOCUS Collab.)	REFID=48845
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.*		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
FILIPPI	00	PL B495 284	A. Filippi *et al.*	(OBELIX Experiment)	REFID=48006
VLADIMIRSKII	00	JETPL 72 486	V.V. Vladimirskii *et al.*		REFID=47997
		Translated from ZETFP 72 698.			
ANISOVICH	99C	PL B452 173	A.V. Anisovich *et al.*		REFID=46903
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
ANISOVICH	99K	PL B468 309	A.V. Anisovich *et al.*		REFID=47472
BUGG	99	PL B458 511	D.V. Bugg *et al.*		REFID=46938
FERRER	99	EPJ C10 249	A. Ferrer *et al.*		REFID=47404
SEMENOV	99	SPU 42 847	S.V. Semenov		REFID=47363
		Translated from UFN 42 937.			
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	96	SPD 41 247	Y.D. Prokoshkin, V.D. Samoilenko	(SERP)	REFID=45182
		Translated from DANS 348 481.			
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
ATKINSON	85	ZPHY C29 333	M. Atkinson *et al.*	(BONN, CERN, GLAS+)	REFID=22000
DENNEY	83	PR D28 2726	D.L. Denney *et al.*	(IOWA, MICH)	REFID=20754
ASTON	81B	NP B189 205	D. Aston *et al.*	(BONN, CERN, EPOL, GLAS+)	REFID=11553
ARESTOV	80	IHEP 80-165	Y.I. Arestov *et al.*	(SERP)	REFID=22312
CHLIAPNIK...	80	ZPHY C3 285	P.V. Chliapnikov *et al.*	(SERP, BRUX, MONS)	REFID=21996
KREYMER	80	PR D22 36	A.E. Kreymer *et al.*	(IND, PURD, SLAC+)	REFID=21970
ROZANSKA	80	NP B162 505	M. Rozanska *et al.*	(MPIM, CERN)	REFID=21774
EVANGELIS...	79	NP B153 253	C. Evangelista *et al.*	(BARI, BONN, CERN+)	REFID=21966
EVANGELIS...	79B	NP B154 381	C. Evangelista *et al.*	(BARI, BONN, CERN+)	REFID=21967
BALTAY	78	PR D17 52	C. Baltay *et al.*	(COLU, BING)	REFID=21569
ANTIPOV	77	NP B119 45	Y.M. Antipov *et al.*	(SERP, GEVA)	REFID=20728
BALTAY	77	PRL 39 591	C. Baltay, C.V. Cautis, M. Kalelkar	(COLU)	REFID=20847
BALTAY	75	PRL 35 891	C. Baltay *et al.*	(COLU, BING)	REFID=21994
KALELKAR	75	Thesis Nevis 207	M.S. Kalelkar	(COLU)	REFID=21564
CASO	70	LNC 3 707	C. Caso *et al.*	(GENO, HAMB, MILA, SACL)	REFID=20590

STRANGE MESONS
$(S = \pm 1, C = B = 0)$

NODE=MXXX020

$K^+ = u\overline{s}$, $K^0 = d\overline{s}$, $\overline{K}^0 = \overline{d}s$, $K^- = \overline{u}s$, similarly for K^*'s

NODE=MXXX020

NODE=M174

$K_0^*(800)$ or κ

$I(J^P) = \frac{1}{2}(0^+)$

OMITTED FROM SUMMARY TABLE

Needs confirmation. See the mini-review on scalar mesons under $f_0(500)$ (see the index for the page number).

NODE=M174

$K_0^*(800)$ MASS

NODE=M174M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
682 ±29 OUR AVERAGE		Error includes scale factor of 2.4. See the ideogram below.		
[676 ± 40 MeV OUR 2011 AVERAGE Scale factor = 2.9]				
826 ±49 $^{+49}_{-34}$	1338	[1] ABLIKIM 11B	BES2	$J/\psi \to K^0_S K^0_S \pi^+ \pi^-$
849 ±77 $^{+18}_{-14}$	1421	[2,3] ABLIKIM 10E	BES2	$J/\psi \to K^\pm K^0_S \pi^\mp \pi^0$
841 ±30 $^{+81}_{-73}$	25k	[4,5] ABLIKIM 06C	BES2	$J/\psi \to \overline{K}^*(892)^0 K^+ \pi^-$
658 ±13		[6] DESCOTES-G..06	RVUE	$\pi K \to \pi K$
797 ±19 ±43	15k	[7,8] AITALA 02	E791	$D^+ \to K^- \pi^+ \pi^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
663 ± 8 ±34		[9] BUGG 10	RVUE	S-matrix pole
706.0± 1.8±22.8	141k	[10] BONVICINI 08A	CLEO	$D^+ \to K^- \pi^+ \pi^+$
856 ±17 ±13	54k	[11] LINK 07B	FOCS	$D^+ \to K^- \pi^+ \pi^+$
750 $^{+30}_{-55}$		[12] BUGG 06	RVUE	
855 ±15	0.6k	[13] CAWLFIELD 06A	CLEO	$D^0 \to K^+ K^- \pi^0$
694 ±53		[3,14] ZHOU 06	RVUE	$K p \to K^- \pi^+ n$
753 ±52		[15] PELAEZ 04A	RVUE	$K \pi \to K \pi$
594 ±79		[14] ZHENG 04	RVUE	$K^- p \to K^- \pi^+ n$
722 ±60		[16] BUGG 03	RVUE	11 $K^- p \to K^- \pi^+ n$
905 $^{+65}_{-30}$		[17] ISHIDA 97B	RVUE	11 $K^- p \to K^- \pi^+ n$

NODE=M174M
NEW

[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] S-matrix pole. NODE=M174M;LINKAGE=SM

[4] S-matrix pole. GUO 06 in a chiral unitary approach report a mass of 757 ± 33 MeV and a width of 558 ± 82 MeV. NODE=M174M;LINKAGE=AB

[5] A fit in the $K_0^*(800) + K^*(892) + K^*(1410)$ model with mass and width of the $K_0^*(800)$ 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. NODE=M174M;LINKAGE=EP

[6] S-matrix pole. Using Roy-Steiner equations (ROY 71) as well as unitarity, analyticity and crossing symmetry constraints. NODE=M174M;LINKAGE=DE

[7] 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 $K_0^*(800)$ in their high statistics analysis of $D^+ \to K^- \pi^+ \mu^+ \nu_\mu$. NODE=M174M;LINKAGE=A

[8] AUBERT 07T does not find evidence for the charged $K_0^*(800)$ using 11k events of $D^0 \to K^- K^+ \pi^0$. NODE=M174M;LINKAGE=AU

[9] 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=M174M;LINKAGE=BG

[10] T-matrix pole. NODE=M174M;LINKAGE=TM

[11] A Breit-Wigner mass and width. NODE=M174M;LINKAGE=BW

[12] S-matrix pole. Reanalysis of ASTON 88, AITALA 02, and ABLIKIM 06C using for the κ an s-dependent width with an Adler zero near threshold. NODE=M174M;LINKAGE=BU

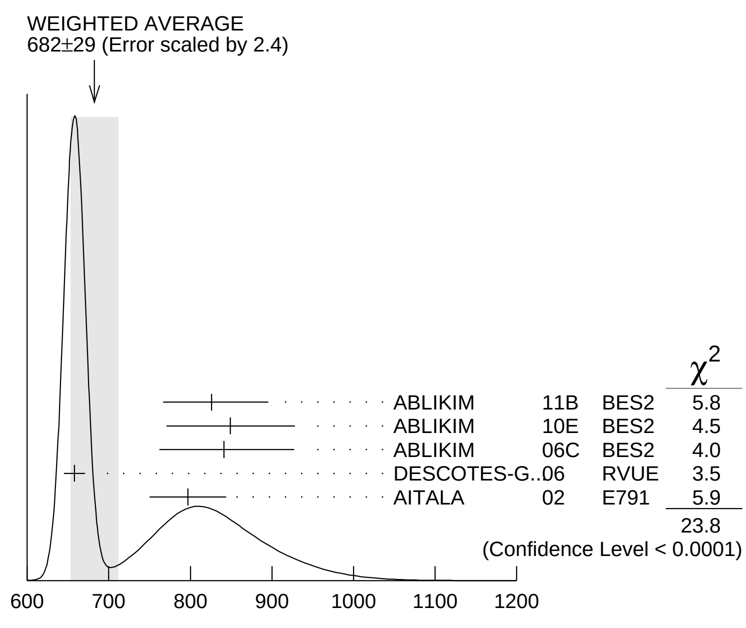
[13] Breit-Wigner parameters. A significant S-wave can be also modeled as a non-resonant contribution. NODE=M174M;LINKAGE=CA

[14] Using ASTON 88. NODE=M174M;LINKAGE=ZH

[15] T-matrix pole. Reanalysis of data from LINGLIN 73, ESTABROOKS 78, and ASTON 88 in the unitarized ChPT model. NODE=M174M;LINKAGE=PE

[16] T-matrix pole. Reanalysis of ASTON 88 data. NODE=M174M;LINKAGE=A1

[17] Reanalysis of ASTON 88 using interfering Breit-Wigner amplitudes. NODE=M174M;LINKAGE=IS



$K_0^*(800)$ MASS (MeV)

$K_0^*(800)$ WIDTH

NODE=M174W

NODE=M174W

VALUE (MeV)			EVTS	DOCUMENT ID	TECN	COMMENT
547	**± 24**	**OUR AVERAGE**		Error includes scale factor of 1.1. [548 ± 24 MeV OUR 2011 AVERAGE Scale factor = 1.1]		
449	±156	$^{+144}_{-\ 81}$	1338	[18] ABLIKIM 11B	BES2	$J/\psi \to K_S^0 K_S^0 \pi^+ \pi^-$
512	± 80	$^{+\ 92}_{-\ 44}$	1421	[19,20] ABLIKIM 10E	BES2	$J/\psi \to K^\pm K_S^0 \pi^\mp \pi^0$
618	± 90	$^{+\ 96}_{-144}$	25k	[19,21] ABLIKIM 06C	BES2	$J/\psi \to \overline{K}^*(892)^0 K^+ \pi^-$
557	± 24			[22] DESCOTES-G..06	RVUE	$\pi K \to \pi K$
410	± 43	± 87	15k	[23,24] AITALA 02	E791	$D^+ \to K^- \pi^+ \pi^+$

NEW

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

658 ± 10 ± 44		[25] BUGG	10	RVUE	S-matrix pole
638.8± 4.4± 40.4	141k	[26] BONVICINI	08A	CLEO	$D^+ \to K^- \pi^+ \pi^+$
464 ± 28 ± 22	54k	[27] LINK	07B	FOCS	$D^+ \to K^- \pi^+ \pi^+$
684 ±120		[28] BUGG	06	RVUE	
251 ± 48	0.6k	[29] CAWLFIELD	06A	CLEO	$D^0 \to K^+ K^- \pi^0$
606 ± 59		[19,30] ZHOU	06	RVUE	$K p \to K^- \pi^+ n$
470 ± 66		[31] PELAEZ	04A	RVUE	$K\pi \to K\pi$
724 ±332		[30] ZHENG	04	RVUE	$K^- p \to K^- \pi^+ n$
772 ±100		[32] BUGG	03	RVUE	11 $K^- p \to K^- \pi^+ n$
545 $^{+235}_{-110}$		[33] ISHIDA	97B	RVUE	11 $K^- p \to K^- \pi^+ n$

[18] 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

[19] S-matrix pole. NODE=M174W;LINKAGE=AB

[20] From a fit including ten additional resonances and energy-independent Breit-Wigner width. NODE=M174W;LINKAGE=BL

[21] A fit in the $K_0^*(800)$ + $K^*(892)$ + $K^*(1410)$ model with mass and width of the $K_0^*(800)$ 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. NODE=M174W;LINKAGE=EP

[22] S-matrix pole. Using Roy-Steiner equations (ROY 71) as well as unitarity, analyticity and crossing symmetry constraints. NODE=M174W;LINKAGE=DE

[23] 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 $K_0^*(800)$ in their high statistics analysis of $D^+ \to K^- \pi^+ \mu^+ \nu_\mu$. NODE=M174W;LINKAGE=A

[24] AUBERT 07T does not find evidence for the charged $K_0^*(800)$ using 11k events of $D^0 \to K^- K^+ \pi^0$. NODE=M174W;LINKAGE=AU

[25] 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=M174W;LINKAGE=BG

[26] T-matrix pole. NODE=M174W;LINKAGE=TM

[27] A Breit-Wigner mass and width. NODE=M174W;LINKAGE=BW

[28] S-matrix pole. Reanalysis of ASTON 88, AITALA 02, and ABLIKIM 06C using for the κ an *s*-dependent width with an Adler zero near threshold. NODE=M174W;LINKAGE=BU

[29] Statistical error only. A fit to the Dalitz plot including the $K_0^*(800)^\pm$, $K^*(892)^\pm$, and ϕ resonances modeled as Breit-Wigners. A significant *S*-wave can be also modeled as a non-resonant contribution. NODE=M174W;LINKAGE=CA

[30] Using ASTON 88. NODE=M174W;LINKAGE=ZH

[31] T-matrix pole. Reanalysis of data from LINGLIN 73, ESTABROOKS 78, and ASTON 88 in the unitarized ChPT model. NODE=M174W;LINKAGE=PE

[32] T-matrix pole. Reanalysis of ASTON 88 data. NODE=M174W;LINKAGE=A1

[33] Reanalysis of ASTON 88 using interfering Breit-Wigner amplitudes. NODE=M174W;LINKAGE=IS

$K_0^*(800)$ REFERENCES

NODE=M174

ABLIKIM	11B	PL B698 183	M. Ablikim *et al.*	(BES II Collab.)	REFID=53683
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 011102R	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 031108R	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
PELAEZ	04A	MPL A19 2879	J.R. Pelaez		REFID=50347
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
ESTABROOKS	78	NP B133 490	P.G. Estabrooks *et al.*	(MCGI, CARL, DURH+)	REFID=22443
LINGLIN	73	NP B55 408	D. Linglin	(CERN)	REFID=22428
ROY	71	PL 36B 353	S.M. Roy		REFID=51107

NODE=M018

$K^*(892)$

$I(J^P) = \frac{1}{2}(1^-)$

$K^*(892)$ MASS

NODE=M018205

CHARGED ONLY, HADROPRODUCED

NODE=M018M1
NODE=M018M1

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
891.66±0.26 OUR AVERAGE					
892.6 ±0.5	5840	BAUBILLIER 84B	HBC	−	8.25 $K^- p \rightarrow \overline{K}^0 \pi^- p$
888 ±3		NAPIER 84	SPEC	+	200 $\pi^- p \rightarrow 2K^0_S X$
891 ±1		NAPIER 84	SPEC	−	200 $\pi^- p \rightarrow 2K^0_S X$ (OCCUR=2)
891.7 ±2.1	3700	BARTH 83	HBC	+	70 $K^+ p \rightarrow K^0 \pi^+ X$
891 ±1	4100	TOAFF 81	HBC	−	6.5 $K^- p \rightarrow \overline{K}^0 \pi^- p$
892.8 ±1.6		AJINENKO 80	HBC	+	32 $K^+ p \rightarrow K^0 \pi^+ X$
890.7 ±0.9	1800	AGUILAR-... 78B	HBC	±	0.76 $\overline{p} p \rightarrow K^\mp K^0_S \pi^\pm$
886.6 ±2.4	1225	BALAND 78	HBC	±	12 $\overline{p} p \rightarrow (K\pi)^\pm X$
891.7 ±0.6	6706	COOPER 78	HBC	±	0.76 $\overline{p} p \rightarrow (K\pi)^\pm X$
891.9 ±0.7	9000	[1] PALER 75	HBC	−	14.3 $K^- p \rightarrow (K\pi)^- X$
892.2 ±1.5	4404	AGUILAR-... 71B	HBC	−	3.9,4.6 $K^- p \rightarrow (K\pi)^- p$
891 ±2	1000	CRENNELL 69D	DBC	−	3.9 $K^- N \rightarrow K^0 \pi^- X$
890 ±3.0	720	BARLOW 67	HBC	±	1.2 $\overline{p} p \rightarrow (K^0 \pi)^\pm K^\mp$
889 ±3.0	600	BARLOW 67	HBC	±	1.2 $\overline{p} p \rightarrow (K^0 \pi)^\pm K \pi$ (OCCUR=2)
891 ±2.3	620	[2] DEBAERE 67B	HBC	+	3.5 $K^+ p \rightarrow K^0 \pi^+ p$
891.0 ±1.2	1700	[3] WOJCICKI 64	HBC	−	1.7 $K^- p \rightarrow \overline{K}^0 \pi^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
893.5 ±1.1	27k	[4] ABELE 99D	CBAR	±	0.0 $\overline{p} p \rightarrow K^+ K^- \pi^0$
890.4 ±0.2 ±0.5	80±0.8k	[5] BIRD 89	LASS	−	11 $K^- p \rightarrow \overline{K}^0 \pi^- p$
890.0 ±2.3	800	[2,3] CLELAND 82	SPEC	+	30 $K^+ p \rightarrow K^0_S \pi^+ p$
896.0 ±1.1	3200	[2,3] CLELAND 82	SPEC	+	50 $K^+ p \rightarrow K^0_S \pi^+ p$ (OCCUR=2)
893 ±1	3600	[2,3] CLELAND 82	SPEC	−	50 $K^+ p \rightarrow K^0_S \pi^- p$ (OCCUR=3)
896.0 ±1.9	380	DELFOSSE 81	SPEC	+	50 $K^\pm p \rightarrow K^\pm \pi^0 p$
886.0 ±2.3	187	DELFOSSE 81	SPEC	−	50 $K^\pm p \rightarrow K^\pm \pi^0 p$ (OCCUR=2)
894.2 ±2.0	765	[2] CLARK 73	HBC	−	3.13 $K^- p \rightarrow \overline{K}^0 \pi^- p$
894.3 ±1.5	1150	[2,3] CLARK 73	HBC	−	3.3 $K^- p \rightarrow \overline{K}^0 \pi^- p$ (OCCUR=2)
892.0 ±2.6	341	[2] SCHWEING...68	HBC	−	5.5 $K^- p \rightarrow \overline{K}^0 \pi^- p$ (OCCUR=2)

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NODE=M018MCT
NODE=M018MCT

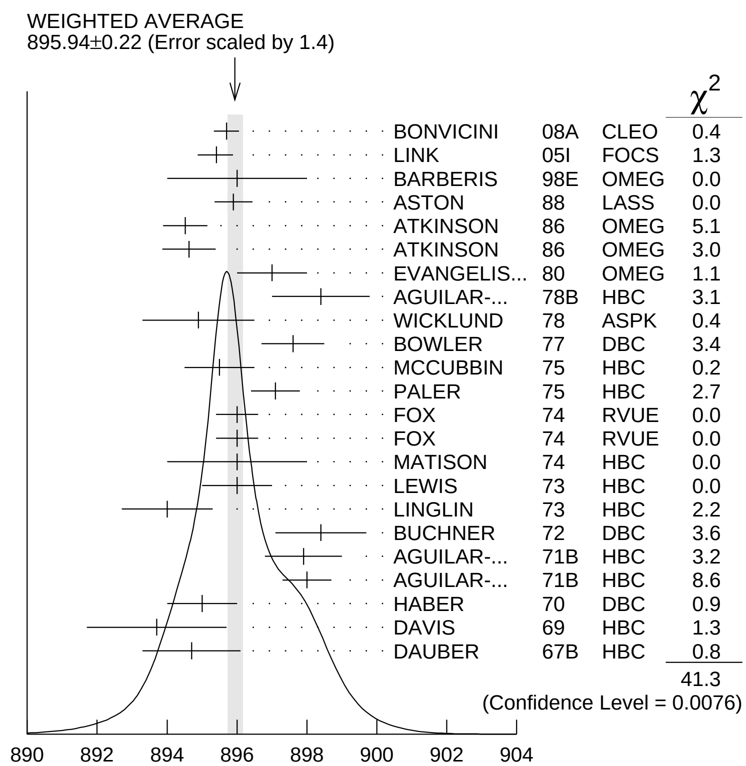
VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
895.47±0.20±0.74	53k	[6] EPIFANOV 07	BELL	$\tau^- \rightarrow K^0_S \pi^- \nu_\tau$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
892.0 ±0.5		[7] BOITO 10	RVUE	$\tau^- \rightarrow K^0_S \pi^- \nu_\tau$
892.0 ±0.9		[8,9] BOITO 09	RVUE	$\tau^- \rightarrow K^0_S \pi^- \nu_\tau$
895.3 ±0.2		[8,10] JAMIN 08	RVUE	$\tau^- \rightarrow K^0_S \pi^- \nu_\tau$
896.4 ±0.9	11970	[11] BONVICINI 02	CLEO	$\tau^- \rightarrow K^- \pi^0 \nu_\tau$
895 ±2		[12] BARATE 99R	ALEP	$\tau^- \rightarrow K^- \pi^0 \nu_\tau$

NEUTRAL ONLY

NODE=M018M2
NODE=M018M2

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
895.94±0.22 OUR AVERAGE		Error includes scale factor of 1.4. See the ideogram below.		
895.7 ±0.2 ±0.3	141k	[13] BONVICINI 08A	CLEO	$D^+ \rightarrow K^- \pi^+ \pi^+$
895.41±0.32$^{+0.35}_{-0.43}$	18k	[14] LINK 05I	FOCS	$D^+ \rightarrow K^- \pi^+ \mu^+ \nu_\mu$
896 ±2		BARBERIS 98E	OMEG	450 $p p \rightarrow p_f p_s K^* \overline{K}^*$
895.9 ±0.5 ±0.2		ASTON 88	LASS	11 $K^- p \rightarrow K^- \pi^+ n$
894.52±0.63	25k	[1] ATKINSON 86	OMEG	20–70 γp
894.63±0.76	20k	[1] ATKINSON 86	OMEG	20–70 γp (OCCUR=2)
897 ±1	28k	EVANGELIS... 80	OMEG	10 $\pi^- p \rightarrow K^+ \pi^- (\Lambda, \Sigma)$
898.4 ±1.4	1180	AGUILAR-... 78B	HBC	0.76 $\overline{p} p \rightarrow K^\mp K^0_S \pi^\pm$
894.9 ±1.6		WICKLUND 78	ASPK	3,4,6 $K^\pm N \rightarrow (K\pi)^0 N$
897.6 ±0.9		BOWLER 77	DBC	5.4 $K^+ d \rightarrow K^+ \pi^- p p$
895.5 ±1.0	3600	MCCUBBIN 75	HBC	3.6 $K^- p \rightarrow K^- \pi^+ n$
897.1 ±0.7	22k	[1] PALER 75	HBC	14.3 $K^- p \rightarrow (K\pi)^0 X$
896.0 ±0.6	10k	FOX 74	RVUE	2 $K^- p \rightarrow K^- \pi^+ n$

896.0	±0.6		FOX	74	RVUE	$2\ K^+ n \to K^+ \pi^- p$	OCCUR=2
896	±2		[15] 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		[15] LINGLIN	73	HBC	$2–13\ K^+ p \to K^+ \pi^- \pi^+ p$	
898.4	±1.3	1700	[2] BUCHNER	72	DBC	$4.6\ K^+ n \to K^+ \pi^- p$	
897.9	±1.1	2934	[2] AGUILAR-...	71B	HBC	$3.9,4.6\ K^- p \to K^- \pi^+ n$	
898.0	±0.7	5362	[2] AGUILAR-...	71B	HBC	$3.9,4.6\ K^- p \to K^- \pi^+ \pi^- p$	OCCUR=2
895	±1	4300	[3] 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	[2] DAUBER	67B	HBC	$2.0\ K^- p \to K^- \pi^+ \pi^- p$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
894.9	±0.5 ±0.7	14.4k	[16] MITCHELL	09A	CLEO	$D_s^+ \to K^+ K^- \pi^+$	
896.2	±0.3	20k	[8] AUBERT	07AK	BABR	$10.6\ e^+ e^- \to K^{*0} K^\pm \pi^\mp \gamma$	
900.7	±1.1	5900	BARTH	83	HBC	$70\ K^+ p \to K^+ \pi^- X$	



$K^*(892)^0$ mass (MeV)

[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] K-matrix pole. NODE=M018M1;LINKAGE=AN
[5] From a partial wave amplitude analysis. NODE=M018M1;LINKAGE=F
[6] From a fit in the $K_0^*(800) + K^*(892) + K^*(1410)$ model. NODE=M018MCT;LINKAGE=EF
[7] 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
[8] Systematic uncertainties not estimated. NODE=M018M2;LINKAGE=NS
[9] 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
[10] Reanalysis of EPIFANOV 07 using resonance chiral theory. NODE=M018MCT;LINKAGE=JA
[11] 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
[12] With mass and width of the $K^*(1410)$ fixed at 1412 MeV and 227 MeV, respectively. NODE=M018MCT;LINKAGE=BA
[13] From the isobar model with a complex pole for the κ. NODE=M018M2;LINKAGE=BO
[14] Fit to $K\pi$ mass spectrum includes a non-resonant scalar component. NODE=M018W2;LINKAGE=LI
[15] From pole extrapolation. NODE=M018M;LINKAGE=C
[16] This value comes from a fit with χ^2 of 178/117. NODE=M018M2;LINKAGE=MI

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NODE=M018209

$m_{K^*(892)^0} - m_{K^*(892)^\pm}$

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 $\overline{p}p \rightarrow K^\mp K^0_S \pi^\pm$
5.7±1.7	7338	AGUILAR-...	71B	HBC	−0	3.9,4.6 $K^- p$
6.3±4.1	283	[17] BARASH	67B	HBC		0.0 $\overline{p}p$

NODE=M018D

[17] 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

VALUE (GeV^{-1})	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
$3.96\pm0.54^{+1.31}_{-0.90}$	18k	[18] LINK	05I	FOCS	0	$D^+ \rightarrow K^- \pi^+ \mu^+ \nu_\mu$
3.4 ±0.7		ASTON	88	LASS	0	11 $K^- p \rightarrow K^- \pi^+ n$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
12.1 ±3.2 ±3.0		BIRD	89	LASS	−	11 $K^- p \rightarrow \overline{K}^0 \pi^- p$

NODE=M018R

[18] Fit to $K\pi$ mass spectrum includes a non-resonant scalar component.

NODE=M018R;LINKAGE=LI

$K^*(892)$ WIDTH

NODE=M018215

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NODE=M018W1

NODE=M018W1

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT	
50.8±0.9 OUR FIT							
50.8±0.9 OUR AVERAGE							
49 ±2	5840	BAUBILLIER	84B	HBC	−	8.25 $K^- p \rightarrow \overline{K}^0 \pi^- p$	
56 ±4		NAPIER	84	SPEC	−	200 $\pi^- p \rightarrow 2K^0_S X$	OCCUR=2
51 ±2	4100	TOAFF	81	HBC	−	6.5 $K^- p \rightarrow \overline{K}^0 \pi^- p$	
50.5±5.6		AJINENKO	80	HBC	+	32 $K^+ p \rightarrow K^0 \pi^+ X$	
45.8±3.6	1800	AGUILAR-...	78B	HBC	±	0.76 $\overline{p}p \rightarrow K^\mp K^0_S \pi^\pm$	
52.0±2.5	6706	[19] COOPER	78	HBC	±	0.76 $\overline{p}p \rightarrow (K\pi)^\pm X$	
52.1±2.2	9000	[20] PALER	75	HBC	−	14.3 $K^- p \rightarrow (K\pi)^- X$	
46.3±6.7	765	[19] CLARK	73	HBC	−	3.13 $K^- p \rightarrow \overline{K}^0 \pi^- p$	
48.2±5.7	1150	[19,21] CLARK	73	HBC	−	3.3 $K^- p \rightarrow \overline{K}^0 \pi^- p$	OCCUR=2
54.3±3.3	4404	[19] AGUILAR-...	71B	HBC	−	3.9,4.6 $K^- p \rightarrow (K\pi)^- p$	
46 ±5	1700	[19,21] WOJCICKI	64	HBC	−	1.7 $K^- p \rightarrow \overline{K}^0 \pi^- p$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
54.8±1.7	27k	[22] ABELE	99D	CBAR	±	0.0 $\overline{p}p \rightarrow K^+ K^- \pi^0$	
45.2±1 ±2	79.7±0.8k	[23] BIRD	89	LASS	−	11 $K^- p \rightarrow \overline{K}^0 \pi^- p$	
42.8±7.1	3700	BARTH	83	HBC	+	70 $K^+ p \rightarrow K^0 \pi^+ X$	
64.0±9.2	800	[19,21] CLELAND	82	SPEC	+	30 $K^+ p \rightarrow K^0_S \pi^+ p$	
62.0±4.4	3200	[19,21] CLELAND	82	SPEC	+	50 $K^+ p \rightarrow K^0_S \pi^+ p$	OCCUR=2
55 ±4	3600	[19,21] CLELAND	82	SPEC	−	50 $K^+ p \rightarrow K^0_S \pi^- p$	OCCUR=3
62.6±3.8	380	DELFOSSE	81	SPEC	+	50 $K^\pm p \rightarrow K^\pm \pi^0 p$	
50.5±3.9	187	DELFOSSE	81	SPEC	−	50 $K^\pm p \rightarrow K^\pm \pi^0 p$	OCCUR=2

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NODE=M018W5

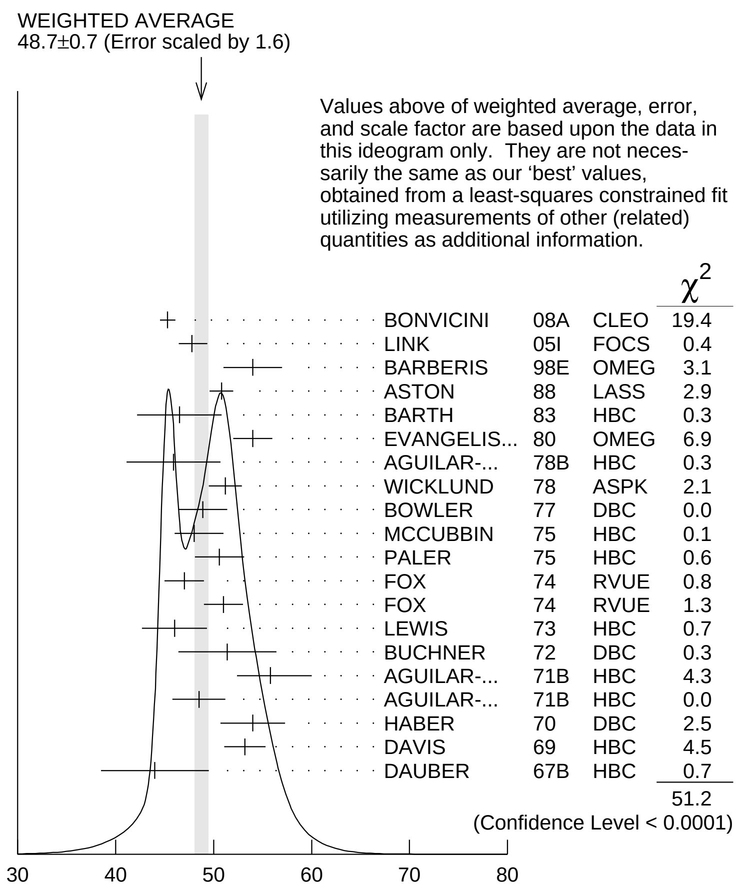
NODE=M018W5

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
46.2±0.6±1.2	53k	[24] EPIFANOV	07	BELL	$\tau^- \rightarrow K^0_S \pi^- \nu_\tau$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
46.5±1.1		[25] BOITO	10	RVUE	$\tau^- \rightarrow K^0_S \pi^- \nu_\tau$
46.2±0.4		[26,27] BOITO	09	RVUE	$\tau^- \rightarrow K^0_S \pi^- \nu_\tau$
47.5±0.4		[26,28] JAMIN	08	RVUE	$\tau^- \rightarrow K^0_S \pi^- \nu_\tau$
55 ±8		[29] BARATE	99R	ALEP	$\tau^- \rightarrow K^- \pi^0 \nu_\tau$

NEUTRAL ONLY

NODE=M018W2
NODE=M018W2

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT	
48.7 ±0.8 OUR FIT Error includes scale factor of 1.7.							
48.7 ±0.7 OUR AVERAGE Error includes scale factor of 1.6. See the ideogram below.							
45.3 ±0.5 ±0.6	141k	[30] BONVICINI	08A	CLEO		$D^+ \to K^- \pi^+ \pi^+$	
$47.79 \pm 0.86 ^{+1.32}_{-1.06}$	18k	[31] LINK	05I	FOCS	0	$D^+ \to K^- \pi^+ \mu^+ \nu_\mu$	
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	0	11 $K^- p \to K^- \pi^+ n$	
46.5 ±4.3	5900	BARTH	83	HBC	0	70 $K^+ p \to K^+ \pi^- X$	
54 ±2	28k	EVANGELIS...	80	OMEG	0	10 $\pi^- p \to K^+ \pi^- (\Lambda, \Sigma)$	
45.9 ±4.8	1180	AGUILAR-...	78B	HBC	0	0.76 $\overline{p} p \to K^\mp K^0_S \pi^\pm$	
51.2 ±1.7		WICKLUND	78	ASPK	0	3,4,6 $K^\pm N \to (K\pi)^0 N$	
48.9 ±2.5		BOWLER	77	DBC	0	5.4 $K^+ d \to K^+ \pi^- p p$	
$48 ^{+3}_{-2}$	3600	MCCUBBIN	75	HBC	0	3.6 $K^- p \to K^- \pi^+ n$	
50.6 ±2.5	22k	[20] PALER	75	HBC	0	14.3 $K^- p \to (K\pi)^0 X$	
47 ±2	10k	FOX	74	RVUE	0	2 $K^- p \to K^- \pi^+ n$	
51 ±2		FOX	74	RVUE	0	2 $K^+ n \to K^+ \pi^- p$	OCCUR=2
46.0 ±3.3	3186	[19] LEWIS	73	HBC	0	2.1–2.7 $K^+ p \to K \pi \pi p$	
51.4 ±5.0	1700	[19] BUCHNER	72	DBC	0	4.6 $K^+ n \to K^+ \pi^- p$	
$55.8 ^{+4.2}_{-3.4}$	2934	[19] AGUILAR-...	71B	HBC	0	3.9,4.6 $K^- p \to K^- \pi^+ n$	
48.5 ±2.7	5362	AGUILAR-...	71B	HBC	0	3.9,4.6 $K^- p \to K^- \pi^+ \pi^- p$	OCCUR=2
54.0 ±3.3	4300	[19,21] HABER	70	DBC	0	3 $K^- N \to K^- \pi^+ X$	
53.2 ±2.1	10k	[19] DAVIS	69	HBC	0	12 $K^+ p \to K^+ \pi^- \pi^+ p$	
44 ±5.5	1040	[19] DAUBER	67B	HBC	0	2.0 $K^- p \to K^- \pi^+ \pi^- p$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
45.7 ±1.1 ±0.5	14.4k	[32] MITCHELL	09A	CLEO		$D_s^+ \to K^+ K^- \pi^+$	
50.6 ±0.9	20k	[26] AUBERT	07AK	BABR		10.6 $e^+ e^- \to K^{*0} K^\pm \pi^\mp \gamma$	



NEUTRAL ONLY (MeV)

[19] Width errors enlarged by us to $4 \times \Gamma/\sqrt{N}$; see note. NODE=M018W;LINKAGE=D
[20] Inclusive reaction. Complicated background and phase-space effects. NODE=M018W;LINKAGE=I
[21] Number of events in peak reevaluated by us. NODE=M018W;LINKAGE=W
[22] K-matrix pole. NODE=M018W1;LINKAGE=AN
[23] From a partial wave amplitude analysis. NODE=M018W1;LINKAGE=F
[24] From a fit in the $K_0^*(800)$ + $K^*(892)$ + $K^*(1410)$ model. NODE=M018W5;LINKAGE=EF
[25] 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
[26] Systematic uncertainties not estimated. NODE=M018W2;LINKAGE=NS
[27] 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
[28] Reanalysis of EPIFANOV 07 using resonance chiral theory. NODE=M018W2;LINKAGE=JA
[29] With mass and width of the $K^*(1410)$ fixed at 1412 MeV and 227 MeV, respectively. NODE=M018W5;LINKAGE=BA
[30] From the isobar model with a complex pole for the κ. NODE=M018W2;LINKAGE=BO
[31] Fit to $K\pi$ mass spectrum includes a non-resonant scalar component. NODE=M018M2;LINKAGE=LI
[32] This value comes from a fit with χ^2 of 178/117. NODE=M018W2;LINKAGE=MI

$K^*(892)$ DECAY MODES

NODE=M018220;NODE=M018

	Mode	Fraction (Γ_i/Γ)	Confidence level	
Γ_1	$K\pi$	$\sim$ 100 %		DESIG=1;OUR EVAL;→ NOT CHECKED ←
Γ_2	$(K\pi)^{\pm}$	(99.901±0.009) %		DESIG=11
Γ_3	$(K\pi)^0$	(99.761±0.021) %		DESIG=12
Γ_4	$K^0\gamma$	(2.39 ±0.21) $\times 10^{-3}$		DESIG=4
Γ_5	$K^{\pm}\gamma$	(9.9 ±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 13 measurements and one constraint to determine 3 parameters. The overall fit has a $\chi^2 = 7.8$ for 11 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	19	−19
	x_2	x_5

	Mode	Rate (MeV)	
Γ_2	$(K\pi)^{\pm}$	50.7 ±0.9	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 21 measurements and one constraint to determine 3 parameters. The overall fit has a $\chi^2 = 51.2$ 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, $x_i \equiv \Gamma_i/\Gamma_{total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_4	−100	
Γ	18	−18
	x_3	x_4

	Mode	Rate (MeV)	Scale factor	
Γ_3	$(K\pi)^0$	48.6 ±0.8	1.7	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
117 ±10 OUR FIT						
116.5± 9.9	584	CARLSMITH	86	SPEC	0	$K^0_L A \rightarrow K^0_S \pi^0 A$

$\Gamma(K^\pm\gamma)$ 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 $K^- A \rightarrow \overline{K}\pi A$
51± 5	CHANDLEE	83	SPEC	+	200 $K^+ A \rightarrow K\pi A$

$K^*(892)$ BRANCHING RATIOS

NODE=M018230

$\Gamma(K^0\gamma)/\Gamma_{total}$ Γ_4/Γ

NODE=M018R3
NODE=M018R3

VALUE (units 10^{-3})	DOCUMENT ID		TECN	CHG	COMMENT
2.39±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 $\overline{K}^0 A$

$\Gamma(K^\pm\gamma)/\Gamma_{total}$ Γ_5/Γ

NODE=M018R2
NODE=M018R2

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	CHG	COMMENT
0.99±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
$< 7 \times 10^{-4}$	95	JONGEJANS	78	HBC		4 $K^- p \rightarrow p\overline{K}^0 2\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$<20 \times 10^{-4}$		WOJCICKI	64	HBC	−	1.7 $K^- p \rightarrow \overline{K}^0 \pi^- p$

$K^*(892)$ REFERENCES

NODE=M018

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
BONVICINI	02	PRL 88 111803	G. Bonvicini *et al.*	(CLEO Collab.)	REFID=48701
PDG	00	EPJ C15 1	D.E. Groom *et al.*		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
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

$K_1(1270)$ $\quad I(J^P) = \frac{1}{2}(1^+)$

$K_1(1270)$ MASS

NODE=M028205

NODE=M028MX

VALUE (MeV)	DOCUMENT ID
1272±7 OUR AVERAGE	Includes data from the 2 datablocks that follow this one.

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

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	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. • • •						
1279 ±10	25k	[4] 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	0	4.5 $\pi^- p \to \Lambda K 2\pi$
1242 $^{+9}_{-10}$		[5] ASTIER	69	HBC	0	$\overline{p} p$
1300	45	CRENNELL	67	HBC	0	6 $\pi^- p \to \Lambda K 2\pi$

[4] Systematic errors not estimated. NODE=M028M1;LINKAGE=AB

[5] 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
1254±33±34	7k	ASNER	00B	CLEO	±	$\tau^- \to K^- \pi^+ \pi^- \nu_\tau$

$K_1(1270)$ WIDTH

NODE=M028210

NODE=M028WX

→ NOT CHECKED ←

VALUE (MeV)	DOCUMENT ID
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.
87± 7 OUR AVERAGE	Includes data from the 2 datablocks that follow this one.

PRODUCED BY K^-, BACKWARD SCATTERING, HYPERON EXCHANGE

NODE=M028W2
NODE=M028W2

The data in this block is included in the average printed for a previous datablock.

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
75±15	700	GAVILLET	78	HBC	+	4.2 $K^- p \to \Xi^- K\pi\pi$

PRODUCED BY K BEAMS

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	[6]	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	[7]	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 $K^+ d$

[6] 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

[7] 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

VALUE (MeV)	EVTS		DOCUMENT ID		TECN	CHG	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. • • •							
131 ±21	25k	[8]	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	0	4.5 $\pi^- p \to \Lambda K 2\pi$
127 $^{+7}_{-25}$			ASTIER	69	HBC	0	$\overline{p} p$
60	45		CRENNELL	67	HBC	0	6 $\pi^- p \to \Lambda K 2\pi$

[8] Systematic errors not estimated. NODE=M028W1;LINKAGE=AB

PRODUCED IN τ LEPTON DECAYS

NODE=M028WT

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
$260^{+90}_{-70}\pm80$	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)	
Γ_1	$K\rho$	(42 ±6) %	DESIG=2
Γ_2	$K_0^*(1430)\pi$	(28 ±4) %	DESIG=7
Γ_3	$K^*(892)\pi$	(16 ±5) %	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;→ NOT CHECKED ←

$K_1(1270)$ PARTIAL WIDTHS

NODE=M028220

$\Gamma(K\rho)$ Γ_1

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

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

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

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	$\pm$	13 $K^\pm p \to (K\pi\pi)^\pm p$

$\Gamma(K f_0(1370))$ Γ_5

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	$\pm$	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
0.42 ±0.06	[9] 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	[10] 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	[9] 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	[10] 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
0.16 ±0.05	[9] 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	[10] GULER	11	BELL	$B^+ \to J/\psi K^+ \pi^+ \pi^-$

$\Gamma(K\omega)/\Gamma_{total}$ Γ_4/Γ

NODE=M028R3

VALUE	DOCUMENT ID		TECN	COMMENT
0.11 ±0.02	[9] 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	[10] 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	[9] 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	[9] DAUM	81C	CNTR	63 $K^- p \to K^- 2\pi p$

[9] Average from low and high t data.

NODE=M028R;LINKAGE=F

[10] 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

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

NODE=M064

$K_1(1400)$

$I(J^P) = \frac{1}{2}(1^+)$

$K_1(1400)$ MASS

NODE=M064M

NODE=M064M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
1403± 7 OUR AVERAGE						
1463±64±68	7k	ASNER	00B	CLEO	±	$\tau^- \to K^- \pi^+ \pi^- \nu_\tau$
1373±14±18		[1] ASTON	87	LASS	0	11 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$
1392±18		BAUBILLIER	82B	HBC	0	8.25 $K^- p \to K^0_S \pi^+ \pi^- n$
1410±25		DAUM	81C	CNTR	−	63 $K^- p \to K^- 2\pi p$
1415±15		ETKIN	80	MPS	0	6 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$
1404±10		[2] CARNEGIE	77	ASPK	±	13 $K^\pm p \to (K\pi\pi)^\pm p$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1418± 8	25k	[3] ABLIKIM	06C	BES2		$J/\psi \to \overline{K}^*(892)^0 K^+ \pi^-$
∼ 1350		[4] TORNQVIST	82B	RVUE		
∼ 1400		VERGEEST	79	HBC	−	4.2 $K^- p \to (\overline{K}\pi\pi)^- p$
∼ 1400		BRANDENB...	76	ASPK	±	13 $K^\pm p \to (K\pi\pi)^\pm p$
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

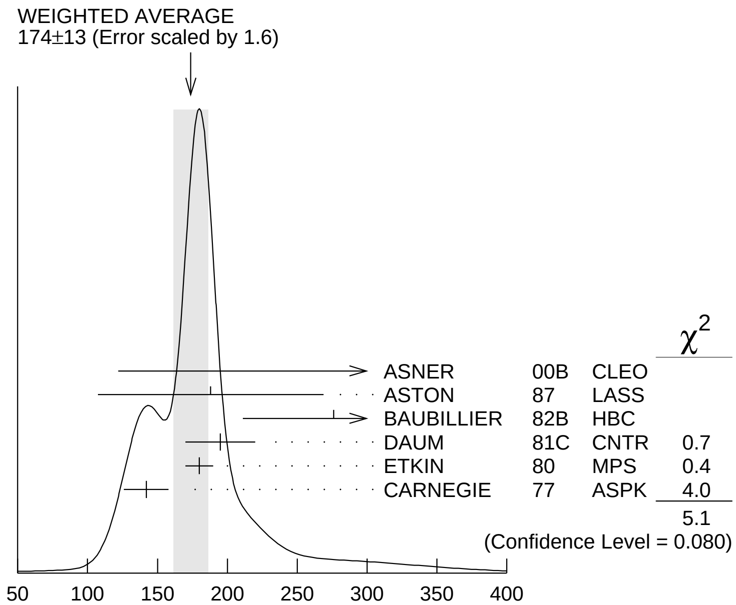
$K_1(1400)$ WIDTH

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}±140	7k	ASNER	00B	CLEO	±	$\tau^- \to K^- \pi^+ \pi^- \nu_\tau$
188± 54± 60		[5] ASTON	87	LASS	0	11 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$
276± 65		BAUBILLIER	82B	HBC	0	8.25 $K^- p \to K^0_S \pi^+ \pi^- n$
195± 25		DAUM	81C	CNTR	−	63 $K^- p \to K^- 2\pi p$
180± 10		ETKIN	80	MPS	0	6 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$
142± 16		[6] CARNEGIE	77	ASPK	±	13 $K^\pm p \to (K\pi\pi)^\pm p$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
152± 16	25k	[7] ABLIKIM	06C	BES2		$J/\psi \to \overline{K}^*(892)^0 K^+ \pi^-$
∼ 200		VERGEEST	79	HBC	−	4.2 $K^- p \to (\overline{K}\pi\pi)^- p$
∼ 160		BRANDENB...	76	ASPK	±	13 $K^\pm p \to (K\pi\pi)^\pm p$
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



$K_1(1400)$ width (MeV)

$K_1(1400)$ 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;→ NOT CHECKED ←
Γ_6	γK^0	seen	DESIG=9;OUR EST;→ NOT CHECKED ←

$K_1(1400)$ PARTIAL WIDTHS

NODE=M064220

$\Gamma(K^*(892)\pi)$ Γ_1

NODE=M064W1
NODE=M064W1

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
117±10	CARNEGIE	77	ASPK	±	13 $K^{\pm}p \rightarrow (K\pi\pi)^{\pm}p$

$\Gamma(K\rho)$ Γ_2

NODE=M064W2
NODE=M064W2

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
2±1	CARNEGIE	77	ASPK	±	13 $K^{\pm}p \rightarrow (K\pi\pi)^{\pm}p$

$\Gamma(K\omega)$ Γ_4

NODE=M064W5
NODE=M064W5

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
23±12	CARNEGIE	77	ASPK	±	13 $K^{\pm}p \rightarrow (K\pi\pi)^{\pm}p$

$\Gamma(\gamma K^0)$ Γ_6

NODE=M064W6
NODE=M064W6

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
280.8±23.2±40.4	ALAVI-HARATI	02B	KTEV	$K + A \rightarrow K^* + A$

$K_1(1400)$ BRANCHING RATIOS

NODE=M064225

$\Gamma(K^*(892)\pi)/\Gamma_{total}$ Γ_1/Γ

NODE=M064R1
NODE=M064R1

VALUE	DOCUMENT ID		TECN	COMMENT
0.94±0.06	[8] DAUM	81C	CNTR	63 $K^-p \rightarrow K^-2\pi p$

$\Gamma(K\rho)/\Gamma_{total}$ Γ_2/Γ

NODE=M064R2
NODE=M064R2

VALUE	DOCUMENT ID		TECN	COMMENT
0.03±0.03	[8] DAUM	81C	CNTR	63 $K^-p \rightarrow K^-2\pi p$

$\Gamma(K f_0(1370))/\Gamma_{total}$ Γ_3/Γ

NODE=M064R5

VALUE	DOCUMENT ID		TECN	COMMENT
0.02±0.02	[8] 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	[8] DAUM	81C	CNTR	63 $K^- p \to K^- 2\pi p$

$\Gamma(K_0^*(1430)\pi)/\Gamma_{total}$ Γ_5/Γ

NODE=M064R4

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	[8] 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	[8] DAUM	81C	CNTR	63 $K^- p \to K^- 2\pi p$

[8] Average from low and high t data.

NODE=M064R;LINKAGE=F

$K_1(1400)$ REFERENCES

NODE=M064

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

$K^*(1410)$

$I(J^P) = \frac{1}{2}(1^-)$

$K^*(1410)$ MASS

NODE=M094M

VALUE (MeV)	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. • • •					
1276^{+72}_{-77}	[1,2] BOITO	09	RVUE		$\tau^- \to K_S^0 \pi^- \nu_\tau$
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 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$

[1] 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

[2] Systematic uncertainties not estimated.

NODE=M094M;LINKAGE=NS

$K^*(1410)$ WIDTH

NODE=M094W

VALUE (MeV)	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. • • •					
198^{+61}_{-87}	[3,4] BOITO	09	RVUE		$\tau^- \to K_S^0 \pi^- \nu_\tau$
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 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$

[3] 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

[4] 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;OUR EST;→ NOT CHECKED ←
Γ_2	$K\pi$	(6.6±1.3) %		DESIG=1
Γ_3	$K\rho$	<7 %	95%	DESIG=3;OUR EST;→ NOT CHECKED ←
Γ_4	γK^0	seen		DESIG=4;OUR EST;→ NOT CHECKED ←

$K^*(1410)$ 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 $K^- p \to K^- \pi^+ n$

$K^*(1410)$ REFERENCES

NODE=M094

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

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

$K_0^*(1430)$ MASS

NODE=M019M

NODE=M019M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1425 ±50 OUR ESTIMATE						→ NOT CHECKED ←
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1427 ± 4 ±13		[1] BUGG	10	RVUE		S-matrix pole
1466.6± 0.7± 3.4	141k	[2] BONVICINI	08A	CLEO		$D^+ \to K^- \pi^+ \pi^+$
~ 1412		[3] LINK	07	FOCS	0	$D^+ \to K^- K^+ \pi^+$
1461.0± 4.0± 2.1	54k	[4] LINK	07B	FOCS		$D^+ \to K^- \pi^+ \pi^+$
1406 ±29		[5] BUGG	06	RVUE		
1435 ± 6		[6] 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		[7] ZHENG	04	RVUE		$K^- p \to K^- \pi^+ n$
~ 1419		[8] BUGG	03	RVUE		11 $K^- p \to K^- \pi^+ n$
~ 1440		[9] LI	03	RVUE		11 $K^- p \to K^- \pi^+ n$

1459 ± 9	15k	[10] AITALA	02	E791		$D^+ \to K^- \pi^+ \pi^+$	NODE=M019M
∼ 1440		[11] JAMIN	00	RVUE		$K p \to K p$	
1436 ± 8		[12] BARBERIS	98E	OMEG		$450\ p p \to p_f p_s K^+ K^- \pi^+ \pi^-$	
1415 ±25		[8] ANISOVICH	97C	RVUE		$11\ K^- p \to K^- \pi^+ n$	
∼ 1450		[13] TORNQVIST	96	RVUE		$\pi\pi \to \pi\pi, K\overline{K}, K\pi$	
1412 ± 6		[14] ASTON	88	LASS	0	$11\ K^- p \to K^- \pi^+ n$	
∼ 1430		BAUBILLIER	84B	HBC	−	$8.25\ K^- p \to \overline{K}^0 \pi^- p$	
∼ 1425		[15,16] ESTABROOKS	78	ASPK		$13\ K^\pm p \to K^\pm \pi^\pm (n, \Delta)$	
∼ 1450.0		MARTIN	78	SPEC		$10\ K^\pm p \to K^0_S \pi p$	

[1] 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
[2] From the isobar model with a complex pole for the κ. NODE=M019M;LINKAGE=BO
[3] From a non-parametric analysis. NODE=M019M;LINKAGE=LI
[4] A Breit-Wigner mass and width. NODE=M019M;LINKAGE=BW
[5] 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
[6] S-matrix pole. Using ASTON 88 and assuming $K_0^*(800)$, $K_0^*(1950)$. NODE=M019M;LINKAGE=ZU
[7] Using ASTON 88 and assuming $K_0^*(800)$. NODE=M019M;LINKAGE=ZH
[8] T-matrix pole. Reanalysis of ASTON 88 data. NODE=M019M;LINKAGE=A1
[9] Breit-Wigner fit. Using ASTON 88. NODE=M019M;LINKAGE=E
[10] Assuming a low-mass scalar $K\pi$ resonance, $\kappa(800)$. NODE=M019M;LINKAGE=A0
[11] T-matrix pole. Using data from ESTABROOKS 78 and ASTON 88. NODE=M019M;LINKAGE=JM
[12] J^P not determined, could be $K_2^*(1430)$. NODE=M019M;LINKAGE=JP
[13] T-matrix pole. NODE=M019M;LINKAGE=TT
[14] 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
[15] Mass defined by pole position. NODE=M019M;LINKAGE=A
[16] From elastic $K\pi$ partial-wave analysis. NODE=M019M;LINKAGE=C

$K_0^*(1430)$ WIDTH

NODE=M019W

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
270 ±80 OUR ESTIMATE					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
270 ±10 ±40		[17] BUGG	10	RVUE		S-matrix pole
174.2± 1.9± 3.2	141k	[18] BONVICINI	08A	CLEO		$D^+ \to K^- \pi^+ \pi^+$
∼ 500		[19] LINK	07	FOCS	0	$D^+ \to K^- K^+ \pi^+$
177.0± 8.0± 3.4	54k	[20] LINK	07B	FOCS		$D^+ \to K^- \pi^+ \pi^+$
350 ±40		[21] BUGG	06	RVUE		
288 ±22		[22] ZHOU	06	RVUE		$K p \to K^- \pi^+ n$
270 ±45 $^{+30}_{-35}$		ABLIKIM	05Q	BES2		$\psi(2S) \to \gamma \pi^+ \pi^- K^+ K^-$
217 ±31		[23] ZHENG	04	RVUE		$K^- p \to K^- \pi^+ n$
∼ 316		[24] BUGG	03	RVUE		$11\ K^- p \to K^- \pi^+ n$
∼ 350		[25] LI	03	RVUE		$11\ K^- p \to K^- \pi^+ n$
175 ±17	15k	[26] AITALA	02	E791		$D^+ \to K^- \pi^+ \pi^+$
∼ 300		[27] JAMIN	00	RVUE		$K p \to K p$
196 ±45		[28] BARBERIS	98E	OMEG		$450\ p p \to p_f p_s K^+ K^- \pi^+ \pi^-$
330 ±50		[24] ANISOVICH	97C	RVUE		$11\ K^- p \to K^- \pi^+ n$
∼ 320		[29] TORNQVIST	96	RVUE		$\pi\pi \to \pi\pi, K\overline{K}, K\pi$
294 ±23		ASTON	88	LASS	0	$11\ K^- p \to K^- \pi^+ n$
∼ 200		BAUBILLIER	84B	HBC	−	$8.25\ K^- p \to \overline{K}^0 \pi^- p$
200 to 300		[30] ESTABROOKS	78	ASPK		$13\ K^\pm p \to K^\pm \pi^\pm (n, \Delta)$

NODE=M019W
→ NOT CHECKED ←

[17] 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
[18] From the isobar model with a complex pole for the κ. NODE=M019W;LINKAGE=BO
[19] From a non-parametric analysis. NODE=M019W;LINKAGE=LI
[20] A Breit-Wigner mass and width. NODE=M019W;LINKAGE=BW
[21] 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

[22] S-matrix pole. Using ASTON 88 and assuming $K_0^*(800)$, $K_0^*(1950)$. NODE=M019W;LINKAGE=ZU
[23] Using ASTON 88 and assuming $K_0^*(800)$. NODE=M019W;LINKAGE=ZH
[24] T-matrix pole. Reanalysis of ASTON 88 data. NODE=M019W;LINKAGE=A1
[25] Breit-Wigner fit. Using ASTON 88. NODE=M019W;LINKAGE=E
[26] Assuming a low-mass scalar $K\pi$ resonance, $\kappa(800)$. NODE=M019W;LINKAGE=A0
[27] T-matrix pole. Using data from ESTABROOKS 78 and ASTON 88. NODE=M019W;LINKAGE=JM
[28] J^P not determined, could be $K_2^*(1430)$. NODE=M019W;LINKAGE=JP
[29] T-matrix pole. NODE=M019W;LINKAGE=TT
[30] 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

$K_0^*(1430)$ 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 $K^- p \to K^- \pi^+ n$

$K_0^*(1430)$ REFERENCES

NODE=M019

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

$K_2^*(1430)$ MASS

NODE=M022205

CHARGED ONLY, WITH FINAL STATE $K\pi$

NODE=M022M1
NODE=M022M1

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT	
1425.6± 1.5 OUR AVERAGE		Error includes scale factor of 1.1.					
1420 ± 4	1587	BAUBILLIER	84B	HBC	−	8.25 $K^- p \to \overline{K}^0 \pi^- p$	
1436 ± 5.5	400	[1,2] CLELAND	82	SPEC	+	30 $K^+ p \to K_S^0 \pi^+ p$	
1430 ± 3.2	1500	[1,2] CLELAND	82	SPEC	+	50 $K^+ p \to K_S^0 \pi^+ p$	OCCUR=2
1430 ± 3.2	1200	[1,2] 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		[3] MARTIN	78	SPEC	+	10 $K^\pm p \to K_S^0 \pi p$	
1423.8± 4.6		[3] 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	[1,2] 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	[1] LIND	69	HBC	+	9 $K^+ p \to K^0 \pi^+ p$	
1427 ±12	63	[1] SCHWEING...	68	HBC	−	5.5 $K^- p \to \overline{K} \pi N$	OCCUR=2
1423 ±11.0	39	[1] BASSANO	67	HBC	−	4.6–5.0 $K^- p \to \overline{K}^0 \pi^- p$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
1423.4± 2 ±3	24809± 820	[4] BIRD	89	LASS	−	11 $K^- p \to \overline{K}^0 \pi^- p$	

NEUTRAL ONLY

NODE=M022M4
NODE=M022M4

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1432.4± 1.3 OUR AVERAGE					
1431.2± 1.8± 0.7		[5] ASTON	88	LASS	11 $K^- p \to K^- \pi^+ n$
1434 ± 4 ± 6		[5] ASTON	87	LASS	11 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$
1433 ± 6 ±10		[5] ASTON	84B	LASS	11 $K^- p \to \overline{K}^0 2\pi n$
1471 ±12		[5] BAUBILLIER	82B	HBC	8.25 $K^- p \to N K_S^0 \pi\pi$
1428 ± 3		[5] ASTON	81C	LASS	11 $K^- p \to K^- \pi^+ n$
1434 ± 2		[5] ESTABROOKS	78	ASPK	13 $K^\pm p \to p K \pi$
1440 ±10		[5] 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	[6] 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		[7] 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 $K^+ p \to K^+ \pi^- X$

[1] Errors enlarged by us to $\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M022M;LINKAGE=D
[2] Number of events in peak re-evaluated by us. NODE=M022M;LINKAGE=W
[3] Systematic error added by us. NODE=M022M;LINKAGE=B
[4] From a partial wave amplitude analysis. NODE=M022M;LINKAGE=F
[5] From phase shift or partial-wave analysis. NODE=M022M;LINKAGE=P
[6] Systematic errors not estimated. NODE=M022M4;LINKAGE=NS
[7] 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 $K\pi$

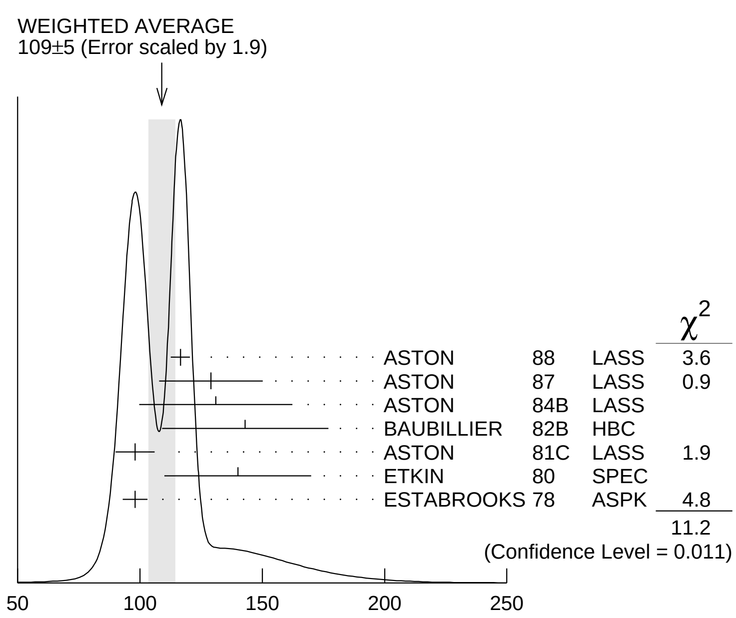
NODE=M022W1

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT	
98.5± 2.7 OUR FIT Error includes scale factor of 1.1.							
98.5± 2.9 OUR AVERAGE Error includes scale factor of 1.1.							
109 ±22	400	[8,9] CLELAND	82	SPEC	+	30 $K^+ p \to K_S^0 \pi^+ p$	
124 ±12.8	1500	[8,9] CLELAND	82	SPEC	+	50 $K^+ p \to K_S^0 \pi^+ p$	OCCUR=2
113 ±12.8	1200	[8,9] CLELAND	82	SPEC	−	50 $K^+ p \to K_S^0 \pi^- p$	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 $K^\pm p \to K_S^0 \pi p$	
97.7± 4.0		MARTIN	78	SPEC	−	10 $K^\pm p \to K_S^0 \pi p$	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	[10] 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		[11] ASTON	88	LASS	11 $K^- p \to K^- \pi^+ n$
129 ±15 ±15		[11] ASTON	87	LASS	11 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$
131 ±24 ±20		[11] ASTON	84B	LASS	11 $K^- p \to \overline{K}^0 2\pi n$
143 ±34		[11] BAUBILLIER	82B	HBC	8.25 $K^- p \to N K_S^0 \pi\pi$
98 ± 8		[11] ASTON	81C	LASS	11 $K^- p \to K^- \pi^+ n$
140 ±30		[11] ETKIN	80	SPEC	6 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$
98 ± 5		[11] 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	[12] AUBERT	07AK	BABR	10.6 $e^+ e^- \to K^{*0} K^\pm \pi^\mp \gamma$
125 ±29	300	[8] 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		[13] 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	[8] 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)

[8] Errors enlarged by us to $4\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M022W;LINKAGE=D

[9] Number of events in peak re-evaluated by us. NODE=M022W;LINKAGE=W

[10] From a partial wave amplitude analysis. NODE=M022W;LINKAGE=F

[11] From phase shift or partial-wave analysis. NODE=M022W;LINKAGE=P

[12] Systematic errors not estimated. NODE=M022W4;LINKAGE=NS

[13] 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; → NOT CHECKED ←

CONSTRAINED FIT INFORMATION

An overall fit to the total width, a partial width, and 10 branching ratios uses 31 measurements and one constraint to determine 8 parameters. The overall fit has a $\chi^2 = 20.2$ for 24 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	−13	0
	x_1	x_2	x_3	x_4	x_5	x_6	x_7

	Mode	Rate (MeV)	Scale factor	
Γ_1	$K\pi$	49.1 ± 1.8		DESIG=1
Γ_2	$K^*(892)\pi$	24.3 ± 1.6		DESIG=2
Γ_3	$K^*(892)\pi\pi$	13.2 ± 2.2		DESIG=6
Γ_4	$K\rho$	8.5 ± 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	$K\eta$	$0.15^{+0.33}_{-0.10}$	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 $K^+ Z \to Z K^+\pi^0$, $Z K^0_S\pi^+$

$\Gamma(K^0\gamma)$ 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 $K^0_L A \to K^0_S\pi^0 A$

$K_2^*(1430)$ 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	[14] ASTON	88	LASS	0	11 $K^- p \to K^- \pi^+ n$
0.49 ±0.02	[14] 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
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

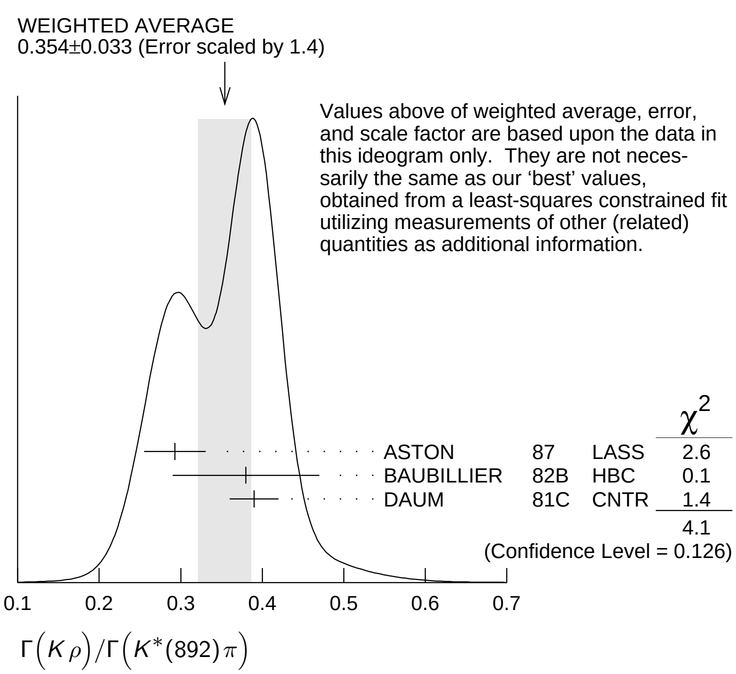
NODE=M022R6
NODE=M022R6

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
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
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
NODE=M022R9

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
$\mathbf{0.006^{+0.014}_{-0.004}}$ **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
NODE=M022R10

VALUE	CL%	DOCUMENT ID		TECN	CHG	COMMENT
$\mathbf{0.0030^{+0.0070}_{-0.0020}}$ **OUR FIT**	Error includes scale factor of 1.3.					
0 ±0.0056		[15] 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		[16] 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	[17] 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	[16,17] 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 $K^- p \to p\overline{K}^0 4\pi$

[14] From phase shift analysis. NODE=M022R;LINKAGE=P

[15] 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

[16] Restated by us. NODE=M022R;LINKAGE=R

[17] Assuming $\pi\pi$ system has isospin 1, which is supported by the data. NODE=M022R;LINKAGE=T

$K_2^*(1430)$ REFERENCES

NODE=M022

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)

$I(J^P) = \frac{1}{2}(0^-)$

OMITTED FROM SUMMARY TABLE

Observed in $K\pi\pi$ partial-wave analysis.

NODE=M021

K(1460) MASS

NODE=M021M

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
~ 1460	DAUM	81C	CNTR	−	63 $K^- p \to K^- 2\pi p$
~ 1400	[1] BRANDENB...	76B	ASPK	±	13 $K^\pm p \to K^+ 2\pi p$

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)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
~ 260	DAUM	81C	CNTR	−	63 $K^- p \to K^- 2\pi p$
~ 250	[2] BRANDENB...	76B	ASPK	±	13 $K^\pm p \to K^+ 2\pi p$

NODE=M021W

[2] 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;→ NOT CHECKED ←
Γ_2	$K\rho$	seen	DESIG=2;OUR EST;→ NOT CHECKED ←
Γ_3	$K_0^*(1430)\pi$	seen	DESIG=3;OUR EST;→ NOT CHECKED ←

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 $K^- p \to K^- 2\pi p$

K(1460) REFERENCES

NODE=M021

DAUM 81C NP B187 1 C. Daum *et al.* (AMST, CERN, CRAC, MPIM+) REFID=22548
BRANDENB... 76B PRL 36 1239 G.W. Brandenburg *et al.* (SLAC) JP 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. • • •				
~ 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. • • •				
~ 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		$B^+ \rightarrow J/\psi K^+ \pi^+ \pi^-$

$\Gamma(K_2^*(1430)\pi)/\Gamma_{total}$ — 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

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.

NODE=M160

$K(1630)$ MASS

NODE=M160M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
1629±7	~ 75	KARNAUKHOV 98	BC	16.0 $\pi^- p \rightarrow (K^0_S \pi^+ \pi^-) X^+ \pi^- X^0$

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 $\pi^- p \rightarrow (K^0_S \pi^+ \pi^-) X^+ \pi^- X^0$

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

$K_1(1650)$

$I(J^P) = \frac{1}{2}(1^+)$

OMITTED FROM SUMMARY TABLE

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.

NODE=M099

$K_1(1650)$ MASS

NODE=M099M

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
1650±50	FRAME	86	OMEG	+	13 $K^+ p \rightarrow \phi K^+ p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
~ 1840	ARMSTRONG	83	OMEG	−	18.5 $K^- p \rightarrow 3K p$
~ 1800	DAUM	81C	CNTR	−	63 $K^- p \rightarrow K^- 2\pi p$

NODE=M099M

$K_1(1650)$ WIDTH

NODE=M099W

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
150±50	FRAME	86	OMEG	+	13 $K^+ p \rightarrow \phi K^+ p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
~ 250	DAUM	81C	CNTR	−	63 $K^- p \rightarrow K^- 2\pi p$

NODE=M099W

$K_1(1650)$ 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

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=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)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
1717±27 OUR AVERAGE Error includes scale factor of 1.4.					
1677±10±32	ASTON	88	LASS	0	11 $K^- p \to K^- \pi^+ n$
1735±10±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 $K^\pm p \to K^\pm \pi^\pm n$

$K^*(1680)$ WIDTH

NODE=M095W

NODE=M095W

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
322±110 OUR AVERAGE Error includes scale factor of 4.2.					
205± 16±34	ASTON	88	LASS	0	11 $K^- p \to K^- \pi^+ n$
423± 18±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 $K^\pm p \to K^\pm \pi^\pm n$

$K^*(1680)$ 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

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

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

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

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 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$

$K^*(1680)$ REFERENCES

NODE=M095

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
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+) JP	REFID=22443

$K_2(1770)$

NODE=M023

$I(J^P) = \frac{1}{2}(2^-)$

See our mini-review in the 2004 edition of this *Review*, PDG 04.

NODE=M023

$K_2(1770)$ MASS

NODE=M023M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1773± 8		[1] 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		[2] 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	[3] FIRESTONE	72B	DBC	+	12 $K^+ d$
1765±40		[4] 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 a partial wave analysis of the $K^- \omega$ system. NODE=M023M;LINKAGE=A
[2] From a partial wave analysis of the $K^- 2\pi$ system. NODE=M023M;LINKAGE=B
[3] Produced in conjunction with excited deuteron. NODE=M023M;LINKAGE=P
[4] Systematic errors added correspond to spread of different fits. NODE=M023M;LINKAGE=X

$K_2(1770)$ WIDTH

NODE=M023W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
186±14		[5] 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		[6] 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	[7] FIRESTONE	72B	DBC	+	12 $K^+ d$
90±70		[8] 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 $K^- p$

[5] From a partial wave analysis of the $K^- \omega$ system. NODE=M023W;LINKAGE=B
[6] From a partial wave analysis of the $K^- 2\pi$ system. NODE=M023W;LINKAGE=C
[7] Produced in conjunction with excited deuteron. NODE=M023W;LINKAGE=P
[8] 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;→ NOT CHECKED ←
Γ_2	$K^*_2(1430)\pi$	dominant	DESIG=2;OUR EST;→ NOT CHECKED ←
Γ_3	$K^*(892)\pi$	seen	DESIG=4;OUR EST;→ NOT CHECKED ←
Γ_4	$K f_2(1270)$	seen	DESIG=9;OUR EST;→ NOT CHECKED ←
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	[9] 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 $K^+ p$

[9] 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	DOCUMENT ID	TECN	CHG	COMMENT
seen	ARMSTRONG 83	OMEG	−	18.5 $K^- p \to K^- \phi N$

$\Gamma(K\omega)/\Gamma_{total}$ 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

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

$K_3^*(1780)$

$I(J^P) = \frac{1}{2}(3^-)$

$K_3^*(1780)$ MASS

NODE=M060M

NODE=M060M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1776± 7 OUR AVERAGE		Error includes scale factor of 1.1.				
1781± 8± 4		[1] ASTON	88	LASS	0	11 $K^- p \to K^- \pi^+ n$
1740±14±15		[1] ASTON	87	LASS	0	11 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$
1779±11		[2] BALDI	76	SPEC	+	10 $K^+ p \to K^0 \pi^+ p$
1776±26		[3] 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±10±15	6111	[4] 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 $K^- p \to K_S^0 2\pi N$
1784± 9	2060	CLELAND	82	SPEC	±	50 $K^+ p \to K_S^0 \pi^\pm p$
1786±15		[5] 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] From energy-independent partial-wave analysis. NODE=M060M;LINKAGE=K

[2] From a fit to Y_6^2 moment. $J^P = 3^-$ found. NODE=M060M;LINKAGE=M

[3] Confirmed by phase shift analysis of ESTABROOKS 78, yields $J^P = 3^-$. NODE=M060M;LINKAGE=A

[4] From a partial wave amplitude analysis. NODE=M060M;LINKAGE=F

[5] From a fit to the Y_6^0 moment. NODE=M060M;LINKAGE=J

$K_3^*(1780)$ WIDTH

NODE=M060W

NODE=M060W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
159±21 OUR AVERAGE		Error includes scale factor of 1.3. See the ideogram below.				
203±30± 8		[6] ASTON	88	LASS	0	11 $K^- p \to K^- \pi^+ n$
171±42±20		[6] ASTON	87	LASS	0	11 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$
135±22		[7] 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	[8] 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		[9] 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		[10] 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		[11] BRANDENB...	76D	ASPK	0	13 $K^\pm p \to K^\pm \pi^\mp N$

[6] From energy-independent partial-wave analysis. NODE=M060W;LINKAGE=K

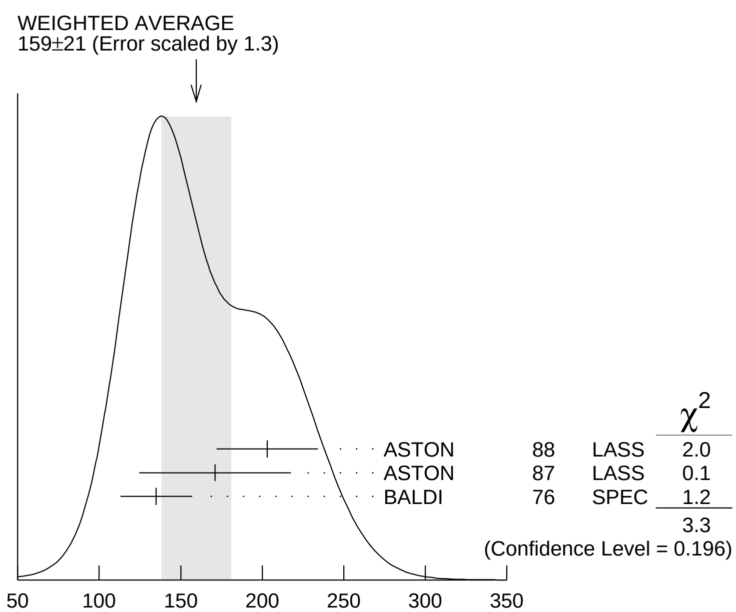
[7] From a fit to Y^2_6 moment. $J^P = 3^-$ found. NODE=M060W;LINKAGE=M

[8] From a partial wave amplitude analysis. NODE=M060W;LINKAGE=F

[9] From a fit to Y^0_6 moment. NODE=M060W;LINKAGE=J

[10] Errors enlarged by us to $4\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M060W;LINKAGE=D

[11] ESTABROOKS 78 find that BRANDENBURG 76D data are consistent with 175 MeV width. Not averaged. NODE=M060W;LINKAGE=E



$K^*_3(1780)$ width (MeV)

$K^*_3(1780)$ 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, $x_i \equiv \Gamma_i/\Gamma_{\text{total}}$. 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 $K^- p \to \overline{K}^0 2\pi n$

$\Gamma(K\pi)/\Gamma_{\text{total}}$ — 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	[12] BIRD	89	LASS	−	11 $K^- p \to \overline{K}^0 \pi^- p$
0.50±0.18	ASTON	88B	LASS	−	11 $K^- p \to K^- \eta p$

[12] 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

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

$K_2(1820)$

$I(J^P) = \frac{1}{2}(2^-)$

See our mini-review in the 2004 edition of this *Review* (PDG 04) under $K_2(1770)$.

NODE=M146

$K_2(1820)$ MASS

NODE=M146M

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
1816±13	[1] ASTON	93	LASS	$11 K^- p \to K^- \omega p$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
~ 1840	[2] DAUM	81C	CNTR	$63 K^- p \to K^- 2\pi p$

NODE=M146M

[1] From a partial wave analysis of the $K^- \omega$ system.
[2] From a partial wave analysis of the $K^- 2\pi$ system.

NODE=M146M;LINKAGE=A
NODE=M146M;LINKAGE=C

$K_2(1820)$ WIDTH

NODE=M146W

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
276±35	[3] ASTON	93	LASS	$11 K^- p \to K^- \omega p$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
~ 230	[4] DAUM	81C	CNTR	$63 K^- p \to K^- 2\pi p$

NODE=M146W

[3] From a partial wave analysis of the $K^- \omega$ system.
[4] From a partial wave analysis of the $K^- 2\pi$ system.

NODE=M146W;LINKAGE=B
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;→ NOT CHECKED ←
Γ_3	$K^*(892)\pi$	seen	DESIG=2;OUR EVAL;→ NOT CHECKED ←
Γ_4	$K f_2(1270)$	seen	DESIG=3;OUR EVAL;→ NOT CHECKED ←
Γ_5	$K\omega$	seen	DESIG=6;OUR EVAL;→ NOT CHECKED ←

$K_2(1820)$ 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	$63 K^- p \to \overline{K} 2\pi p$

$\Gamma(K^*(892)\pi)/\Gamma(K\pi\pi)$ — 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	$63 K^- p \to \overline{K} 2\pi p$

$\Gamma(K f_2(1270))/\Gamma(K\pi\pi)$ — 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	$63 K^- p \to \overline{K} 2\pi p$

$K_2(1820)$ REFERENCES

NODE=M146

PDG	04	PL B592 1	S. Eidelman *et al.*	(PDG Collab.)	REFID=49653
ASTON	93	PL B308 186	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)	REFID=43597
DAUM	81C	NP B187 1	C. Daum *et al.*	(AMST, CERN, CRAC, MPIM+)	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

VALUE (MeV)	DOCUMENT ID	TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
~ 1830	ARMSTRONG 83	OMEG	−	18.5 $K^- p \to 3K p$

NODE=M088M

$K(1830)$ WIDTH

NODE=M088W

VALUE (MeV)	DOCUMENT ID	TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
~ 250	ARMSTRONG 83	OMEG	−	18.5 $K^- p \to 3K p$

NODE=M088W

$K(1830)$ DECAY MODES

NODE=M088215;NODE=M088

	Mode
Γ_1	$K \phi$

DESIG=1

$K(1830)$ REFERENCES

NODE=M088

ARMSTRONG 83 NP B221 1 T.A. Armstrong *et al.* (BARI, BIRM, CERN+) JP

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
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

[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 $K_0^*(800)$, $K_0^*(1430)$.

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
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

[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 $K_0^*(800)$, $K_0^*(1430)$.

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 $K^- p \rightarrow K^- \pi^+ n$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$\sim$ 0.60	[8] ZHOU	06	RVUE		$K p \rightarrow K^- \pi^+ n$

[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 $K_0^*(800)$, $K_0^*(1430)$. NODE=M134R1;LINKAGE=ZU

$K_0^*(1950)$ REFERENCES

NODE=M134

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

$K_2^*(1980)$

$I(J^P) = \frac{1}{2}(2^+)$

OMITTED FROM SUMMARY TABLE

Needs confirmation.

NODE=M104

$K_2^*(1980)$ MASS

NODE=M104M

NODE=M104M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1973± 8±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. • • •						
2020±20		TIKHOMIROV	03	SPEC		40.0 $\pi^- C \rightarrow K_S^0 K_S^0 K_L^0 X$
1978±40	241 ± 47	BIRD	89	LASS	–	11 $K^- p \rightarrow \overline{K}^0 \pi^- p$

$K_2^*(1980)$ WIDTH

NODE=M104W

NODE=M104W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
373±33±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. • • •						
180±70		TIKHOMIROV	03	SPEC		40.0 $\pi^- C \rightarrow K_S^0 K_S^0 K_L^0 X$
398±47	241 ± 47	BIRD	89	LASS	–	11 $K^- p \rightarrow \overline{K}^0 \pi^- p$

$K_2^*(1980)$ 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

$K_2^*(1980)$ 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

VALUE	DOCUMENT ID	TECN	COMMENT
possibly seen	TIKHOMIROV 03	SPEC	$40.0\ \pi^- C \to K^0_S K^0_S K^0_L X$

$K^*_2(1980)$ REFERENCES

NODE=M104

GULER	11	PR D83 032005	H. Guler *et al.*	(BELLE Collab.)
TIKHOMIROV	03	PAN 66 828	G.D. Tikhomirov *et al.*	
		Translated from YAF 66 860.		
BIRD	89	SLAC-332	P.F. Bird	(SLAC)
ASTON	87	NP B292 693	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)

REFID=53668
REFID=49423
REFID=41002
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
2045± 9 OUR AVERAGE		Error includes scale factor of 1.1.				
2062± 14±13		[1] ASTON	86	LASS	0	$11\ K^- p \to K^- \pi^+ n$
2039± 10	400	[2,3] CLELAND	82	SPEC	±	$50\ K^+ p \to K^0_S \pi^\pm p$
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		$400\ pA \to 4K X$
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
198± 30 OUR AVERAGE						
221± 48±27		[5] ASTON	86	LASS	0	$11\ K^- p \to K^- \pi^+ n$
189± 35	400	[6,7] CLELAND	82	SPEC	±	$50\ K^+ p \to K^0_S \pi^\pm p$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
61± 58	431	TORRES	86	MPSF		$400\ pA \to 4K X$
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

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

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.

NODE=M040

$K_2(2250)$ MASS

NODE=M040M

NODE=M040M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
2247±17 OUR AVERAGE						
2200±40		[1] ARMSTRONG	83C	OMEG	−	18 $K^- p \to \Lambda \overline{p} X$
2235±50		[1] BAUBILLIER	81	HBC	−	8 $K^- p \to \Lambda \overline{p} X$
2260±20		[1] CLELAND	81	SPEC	±	50 $K^+ p \to \Lambda \overline{p} X$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
2280±20		TIKHOMIROV	03	SPEC		40.0 $\pi^- C \to K^0_S K^0_S K^0_L X$
2147± 4	37	CHLIAPNIK...	79	HBC	+	32 $K^+ p \to \overline{\Lambda} p X$
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 $K^- p \to \Lambda \overline{p} X$
210±30		[2] CLELAND	81	SPEC	±	50 $K^+ p \to \Lambda \overline{p} X$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
180±60		TIKHOMIROV	03	SPEC		40.0 $\pi^- C \to K^0_S K^0_S K^0_L X$
∼ 200		[2] BAUBILLIER	81	HBC	−	8 $K^- p \to \Lambda \overline{p} X$
∼ 40	37	CHLIAPNIK...	79	HBC	+	32 $K^+ p \to \overline{\Lambda} p X$
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

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 $K^+ p \to \Lambda \overline{p} X$

[1] $J^P = 3^+$ from moments analysis. NODE=M090M;LINKAGE=P

$K_3(2320)$ WIDTH
NODE=M090W

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 $K^+ p \to \Lambda \overline{p} X$

[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+) REFID=22852
CLELAND 81 NP B184 1 W.E. Cleland *et al.* (PITT, GEVA, LAUS+) 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 $K^- p \to K^- \pi^+ n$

$K_5^*(2380)$ REFERENCES

NODE=M098

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

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
2490±20	[1] CLELAND	81	SPEC	±	50 $K^+ p \to \Lambda \overline{p}$

NODE=M091M

[1] $J^P = 4^-$ from moments analysis.

NODE=M091M;LINKAGE=R

$K_4(2500)$ WIDTH

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 $K^+ p \to \Lambda \overline{p}$

NODE=M091W

[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

VALUE (MeV)	DOCUMENT ID
≈ 3100 OUR ESTIMATE	

NODE=M129M
→ NOT CHECKED ←

3-BODY DECAYS

NODE=M129M1

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT	
3054±11 OUR AVERAGE					
3060± 7±20	[1] ALEEV	93	BIS2	$K(3100) \rightarrow \Lambda\overline{p}\pi^+$	
3056± 7±20	[1] ALEEV	93	BIS2	$K(3100) \rightarrow \overline{\Lambda}p\pi^-$	OCCUR=2
3055± 8±20	[1] ALEEV	93	BIS2	$K(3100) \rightarrow \Lambda\overline{p}\pi^-$	OCCUR=3
3045± 8±20	[1] ALEEV	93	BIS2	$K(3100) \rightarrow \overline{\Lambda}p\pi^+$	OCCUR=4

4-BODY DECAYS

NODE=M129M2

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT	
3059±11 OUR AVERAGE					
3067± 6±20	[1] ALEEV	93	BIS2	$K(3100) \rightarrow \Lambda\overline{p}\pi^+\pi^+$	
3060± 8±20	[1] ALEEV	93	BIS2	$K(3100) \rightarrow \Lambda\overline{p}\pi^+\pi^-$	OCCUR=2
3055± 7±20	[1] ALEEV	93	BIS2	$K(3100) \rightarrow \overline{\Lambda}p\pi^-\pi^-$	OCCUR=3
3052± 8±20	[1] ALEEV	93	BIS2	$K(3100) \rightarrow \overline{\Lambda}p\pi^-\pi^+$	OCCUR=4
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3105±30	BOURQUIN	86	SPEC	$K(3100) \rightarrow \Lambda\overline{p}\pi^+\pi^+$	
3115±30	BOURQUIN	86	SPEC	$K(3100) \rightarrow \Lambda\overline{p}\pi^+\pi^-$	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± 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	$K(3100)^0 \to \Lambda \overline{p} \pi^+$	DESIG=1
Γ_2	$K(3100)^{--} \to \Lambda \overline{p} \pi^-$	DESIG=2
Γ_3	$K(3100)^- \to \Lambda \overline{p} \pi^+ \pi^-$	DESIG=3
Γ_4	$K(3100)^+ \to \Lambda \overline{p} \pi^+ \pi^+$	DESIG=4
Γ_5	$K(3100)^0 \to \Lambda \overline{p} \pi^+ \pi^+ \pi^-$	DESIG=5
Γ_6	$K(3100)^0 \to \Sigma(1385)^+ \overline{p}$	DESIG=6

$\Gamma(\Sigma(1385)^+ \overline{p})/\Gamma(\Lambda \overline{p} \pi^+)$ Γ_6/Γ_1

NODE=M129R1
NODE=M129R1

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.04	90	ALEEV	93	BIS2	$K(3100)^0 \to \Sigma(1385)^+ \overline{p}$

$K(3100)$ 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
$(C = \pm 1)$

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
NEW

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
2006.98±0.15 OUR FIT				
[2006.93 ± 0.16 MeV OUR 2011 FIT]				
• • • 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
142.12±0.07 OUR FIT					
142.12±0.07 OUR AVERAGE					
142.2 ±0.3 ±0.2	145	ALBRECHT	95F	ARG	$e^+e^- \to$ hadrons
142.12±0.05±0.05	1176	BORTOLETTO	92B	CLE2	$e^+e^- \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
142.2 ±2.0		SADROZINSKI	80	CBAL	$D^{*0} \to D^0\pi^0$
142.7 ±1.7		[2] GOLDHABER	77	MRK1	e^+e^-

[2] 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	[3] ABACHI	88B	HRS	$D^{*0} \to D^+\pi^-$

[3] 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	$D^0\pi^0$	(61.9 ± 2.9) %	DESIG=1
Γ_2	$D^0\gamma$	(38.1 ± 2.9) %	DESIG=2

CONSTRAINED FIT INFORMATION

An overall fit to a branching ratio uses 3 measurements and one constraint to determine 2 parameters. The overall fit has a $\chi^2 = 0.5$ for 2 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	-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	DOCUMENT ID		TECN	COMMENT
1.74±0.02±0.13	AUBERT,BE	05G	BABR	10.6 $e^+e^- \to$ hadrons

$\Gamma(D^0\pi^0)/\Gamma_{total}$ — Γ_1/Γ

NODE=M061R2
NODE=M061R2

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.619±0.029 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.635±0.003±0.017	69k	[4] AUBERT,BE	05G	BABR	10.6 $e^+e^- \to$ hadrons
0.596±0.035±0.028	858	[5] ALBRECHT	95F	ARG	$e^+e^- \to$ hadrons
0.636±0.023±0.033	1097	[5] 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
0.381±0.029 OUR FIT					
0.381±0.029 OUR AVERAGE					
0.404±0.035±0.028	456	[5] ALBRECHT	95F	ARG	$e^+e^- \to$ hadrons
0.364±0.023±0.033	621	[5] 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. • • •					
0.365±0.003±0.017	68k	[4] 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^-

[4] 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

[5] 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

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

NEW

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
2010.28±0.13 OUR FIT					
[2010.22 ± 0.14 MeV OUR 2011 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*
140.66±0.10 OUR FIT	Error includes scale factor of 1.1.				
140.64±0.08±0.06	620	BORTOLETTO	92B	CLE2	$e^+e^- \rightarrow$ 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*	
145.421±0.010 OUR FIT	Error includes scale factor of 1.1.					
145.421±0.010 OUR AVERAGE						
145.412±0.002±0.012		ANASTASSOV	02	CLE2	$D^{*\pm} \rightarrow D^0\pi^{\pm} \rightarrow (K\pi)\,\pi^{\pm}$	
145.54 ±0.08	611	[3] ADINOLFI	99	BEAT	$D^{*\pm} \rightarrow D^0\pi^{\pm}$	
145.45 ±0.02		[3] BREITWEG	99	ZEUS	$D^{*\pm} \rightarrow D^0\pi^{\pm} \rightarrow (K\pi)\pi^{\pm}$	
145.42 ±0.05		[3] BREITWEG	99	ZEUS	$D^{*\pm} \rightarrow D^0\pi^{\pm} \rightarrow (K^-3\pi)\pi^{\pm}$	OCCUR=2
145.5 ±0.15	103	[4] ADLOFF	97B	H1	$D^{*\pm} \rightarrow D^0\pi^{\pm}$	
145.44 ±0.08	152	[4] BREITWEG	97	ZEUS	$D^{*\pm} \rightarrow D^0\pi^{\pm}$, $D^0 \rightarrow K^-3\pi$	
145.42 ±0.11	199	[4] BREITWEG	97	ZEUS	$D^{*\pm} \rightarrow D^0\pi^{\pm}$, $D^0 \rightarrow K^-\pi^+$	OCCUR=2
145.4 ±0.2	48	[4] DERRICK	95	ZEUS	$D^{*\pm} \rightarrow D^0\pi^{\pm}$	
145.39 ±0.06 ±0.03		BARLAG	92B	ACCM	π^- 230 GeV	
145.5 ±0.2	115	[4] ALEXANDER	91B	OPAL	$D^{*\pm} \rightarrow D^0\pi^{\pm}$	
145.30 ±0.06		[4] DECAMP	91J	ALEP	$D^{*\pm} \rightarrow D^0\pi^{\pm}$	
145.40 ±0.05 ±0.10		ABACHI	88B	HRS	$D^{*\pm} \rightarrow D^0\pi^{\pm}$	
145.46 ±0.07 ±0.03		ALBRECHT	85F	ARG	$D^{*\pm} \rightarrow D^0\pi^+$	
145.5 ±0.3	28	BAILEY	83	SPEC	$D^{*\pm} \rightarrow D^0\pi^{\pm}$	OCCUR=2
145.5 ±0.3	60	FITCH	81	SPEC	π^- A	
145.3 ±0.5	30	FELDMAN	77B	MRK1	$D^{*+} \rightarrow D^0\pi^+$	

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

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

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^-

[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

NODE=M062W

VALUE (keV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
96±4±22			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. • • •						
<131	90	110	BARLAG	92B	ACCM	π^- 230 GeV

$D^*(2010)^\pm$ 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	[6,7,8] BARTELT	98	CLE2	e^+e^-
0.688 ±0.024 ±0.013	ALBRECHT	95F	ARG	$e^+e^- \to$ hadrons
0.681 ±0.010 ±0.013	[6] BUTLER	92	CLE2	$e^+e^- \to$ 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	[8] 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		[6,7,8] 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	[6] 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			[6,7] BARTELT 98	CLE2	e^+e^-
0.011 ±0.014 ±0.016		12	[6] 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			[9] COLES 82	MRK2	e^+e^-

[6] The branching ratios are not independent, they have been constrained by the authors to sum to 100%. NODE=M062R;LINKAGE=A

[7] Systematic error includes theoretical error on the prediction of the ratio of hadronic modes. NODE=M062R;LINKAGE=B

[8] Assuming that isospin is conserved in the decay. NODE=M062R;LINKAGE=G

[9] 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

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=M178

$D_0^*(2400)^0$

$I(J^P) = \frac{1}{2}(0^+)$

$J^P = 0^+$ assignment favored (ABE 04D).

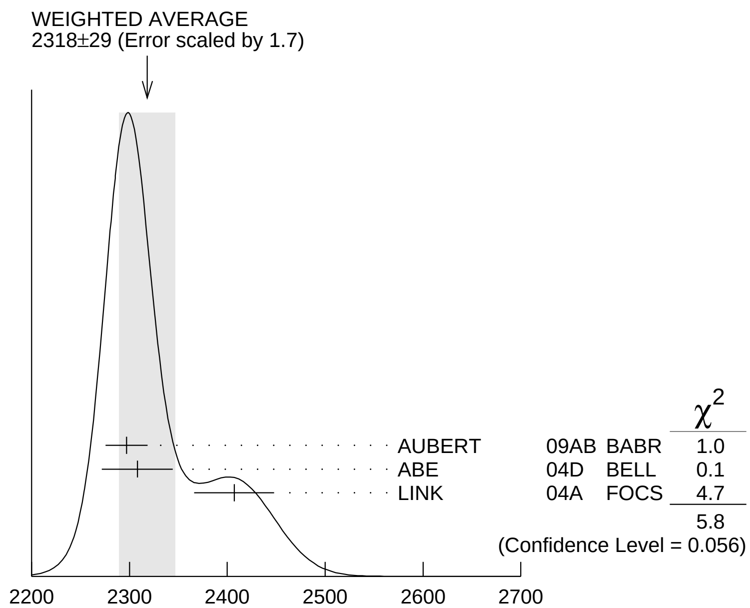
NODE=M178

$D_0^*(2400)^0$ MASS

NODE=M178M

NODE=M178M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2318±29 OUR AVERAGE	Error includes scale factor of 1.7. See the ideogram below.				
2297± 8±20	3.4k	AUBERT	09AB	BABR	$B^- \to D^+ \pi^- \pi^-$
2308±17±32		ABE	04D	BELL	$B^- \to D^+ \pi^- \pi^-$
2407±21±35	9.8k	LINK	04A	FOCS	γ A



$D_0^*(2400)^0$ MASS (MeV)

$D_0^*(2400)^0$ WIDTH

NODE=M178W

NODE=M178W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
267±40 OUR AVERAGE					
273±12±48	3.4k	AUBERT	09AB	BABR	$B^- \to D^+ \pi^- \pi^-$
276±21±63		ABE	04D	BELL	$B^- \to D^+ \pi^- \pi^-$
240±55±59	9.8k	LINK	04A	FOCS	γ A

$D_0^*(2400)^0$ DECAY MODES

NODE=M178215;NODE=M178

	Mode	Fraction (Γ_i/Γ)
Γ_1	$D^+ \pi^-$	seen

DESIG=1;OUR EVAL;→ NOT CHECKED ←

$D_0^*(2400)^0$ REFERENCES

NODE=M178

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=M179

$D_0^*(2400)^\pm$

$I(J^P) = \frac{1}{2}(0^+)$

OMITTED FROM SUMMARY TABLE

J, P need confirmation.

NODE=M179

$D_0^*(2400)^\pm$ MASS

NODE=M179M

NODE=M179M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2403±14±35	18.8k	LINK	04A	FOCS	γ A

$D_0^*(2400)^\pm$ WIDTH

NODE=M179W

NODE=M179W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
283±24±34	18.8k	LINK	04A	FOCS	γ A

$D_0^*(2400)^\pm$ DECAY MODES

NODE=M179215;NODE=M179

	Mode	Fraction (Γ_i/Γ)
Γ_1	$D^0\pi^+$	seen

DESIG=1;OUR EVAL;→ NOT CHECKED ←

$D_0^*(2400)^\pm$ REFERENCES

NODE=M179

LINK 04A PL B586 11 J.M. Link *et al.* (FOCUS Collab.)

REFID=49775

NODE=M097

$D_1(2420)^0$

$I(J^P) = \frac{1}{2}(1^+)$

I needs confirmation.

$D_1(2420)^0$ MASS

NODE=M097M

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=M097M

NODE=M097M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2421.3±0.6 OUR FIT Error includes scale factor of 1.2.					
2420.9±0.8 OUR AVERAGE Error includes scale factor of 1.2.					
2420.1±0.1±0.8	103k	DEL-AMO-SA...	10P	BABR	$e^+e^- \to D^{*+}\pi^- X$
2426 ±3 ±1	151	ABE	05A	BELL	$B^- \to D^0\pi^+\pi^-\pi^-$
2421.4±1.5±0.9		[1] ABE	04D	BELL	$B^- \to D^{*+}\pi^-\pi^-$
2421 $^{+1}_{-2}$ ±2	286	AVERY	94C	CLE2	$e^+e^- \to D^{*+}\pi^- X$
2422 ±2 ±2	51	FRABETTI	94B	E687	γBe $\to D^{*+}\pi^- X$
2428 ±3 ±2	279	AVERY	90	CLEO	$e^+e^- \to D^{*+}\pi^- X$
2414 ±2 ±5	171	ALBRECHT	89H	ARG	$e^+e^- \to D^{*+}\pi^- X$
2428 ±8 ±5	171	ANJOS	89C	TPS	$\gamma N \to D^{*+}\pi^- X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2420.5±2.1±0.9	3110±340	[2] CHEKANOV	09	ZEUS	$e^\pm p \to D^{*+}\pi^- X$
2421.7±0.7±0.6	7.5k	ABULENCIA	06A	CDF	1900 $p\overline{p} \to D^{*+}\pi^- X$
2425 ±3	235	[3] ABREU	98M	DLPH	e^+e^-

[1] Fit includes the contribution from $D_1^*(2430)^0$.

NODE=M097M;LINKAGE=AB

[2] 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=M097M;LINKAGE=CH

[3] No systematic error given.

NODE=M097M;LINKAGE=K

$m_{D_1^0} - m_{D^{*+}}$

NODE=M097DM

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=M097DM

NODE=M097DM

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
411.0±0.6 OUR FIT Error includes scale factor of 1.2.					
411.5±0.8 OUR AVERAGE					
410.2±2.1±0.9	3110±340	CHEKANOV	09	ZEUS	$e^{\pm} p \to D^{*+} \pi^- X$
411.7±0.7±0.4	7.5k	ABULENCIA	06A	CDF	1900 $p\overline{p} \to D^{*+} \pi^- X$

$D_1(2420)^0$ WIDTH

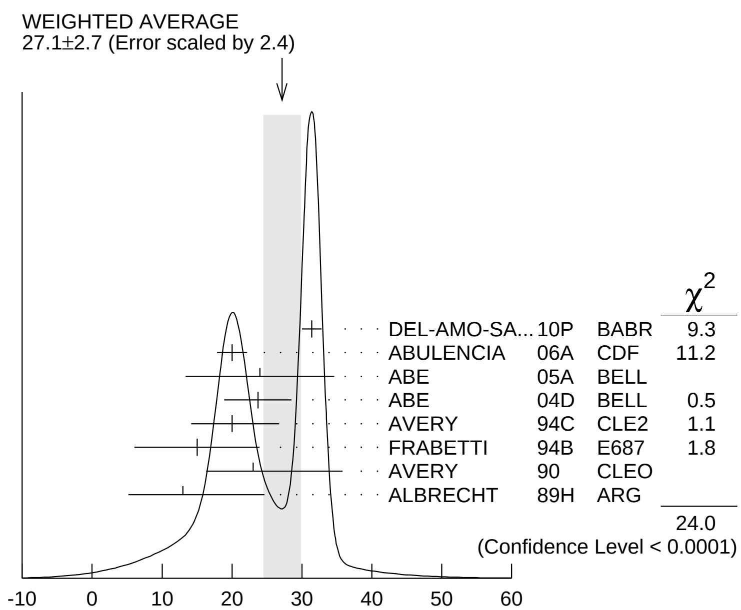
NODE=M097W

NODE=M097W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
27.1± 2.7 OUR AVERAGE Error includes scale factor of 2.4. See the ideogram below.					
31.4± 0.5± 1.3	103k	DEL-AMO-SA...	10P	BABR	$e^+ e^- \to D^{*+} \pi^- X$
20.0± 1.7± 1.3	7.5k	ABULENCIA	06A	CDF	1900 $p\overline{p} \to D^{*+} \pi^- X$
24 ± 7 ± 8	151	ABE	05A	BELL	$B^- \to D^0 \pi^+ \pi^- \pi^-$
23.7± 2.7± 4.0		[4] ABE	04D	BELL	$B^- \to D^{*+} \pi^- \pi^-$
$20\ ^{+6}_{-5}$ ± 3	286	AVERY	94C	CLE2	$e^+ e^- \to D^{*+} \pi^- X$
15 ± 8 ± 4	51	FRABETTI	94B	E687	$\gamma \mathrm{Be} \to D^{*+} \pi^- X$
$23\ ^{+8}_{-6}\ ^{+10}_{-3}$	279	AVERY	90	CLEO	$e^+ e^- \to D^{*+} \pi^- X$
$13 \pm 6\ ^{+10}_{-5}$	171	ALBRECHT	89H	ARG	$e^+ e^- \to D^{*+} \pi^- X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$53.2\pm 7.2\ ^{+3.3}_{-4.9}$	3110±340	CHEKANOV	09	ZEUS	$e^{\pm} p \to D^{*+} \pi^- X$
58 ±14 ±10	171	ANJOS	89C	TPS	$\gamma N \to D^{*+} \pi^- X$

[4] Fit includes the contribution from $D_1^*(2430)^0$.

NODE=M097W;LINKAGE=AB



$D_1(2420)^0$ WIDTH (MeV)

$D_1(2420)^0$ DECAY MODES

NODE=M097215;NODE=M097

$\overline{D}_1(2420)^0$ modes are charge conjugates of modes below.

NODE=M097

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$D^*(2010)^+ \pi^-$	seen	DESIG=1
Γ_2	$D^0 \pi^+ \pi^-$	seen	DESIG=3;OUR EST;→ NOT CHECKED ←
Γ_3	$D^0 \rho^0$		DESIG=4
Γ_4	$D^0 f_0(500)$		DESIG=5
Γ_5	$D_0^*(2400)^+ \pi^-$		DESIG=6
Γ_6	$D^+ \pi^-$	not seen	DESIG=2;OUR EST;→ NOT CHECKED ←
Γ_7	$D^{*0} \pi^+ \pi^-$	not seen	DESIG=7;OUR EST;→ NOT CHECKED ←

$D_1(2420)^0$ BRANCHING RATIOS

NODE=M097220

$\Gamma(D^*(2010)^+\pi^-)/\Gamma_{total}$ — Γ_1/Γ

NODE=M097R1
NODE=M097R1

VALUE	DOCUMENT ID		TECN	COMMENT
seen	ACKERSTAFF	97W	OPAL	$e^+e^- \rightarrow D^{*+}\pi^- X$
seen	AVERY	90	CLEO	$e^+e^- \rightarrow D^{*+}\pi^- X$
seen	ALBRECHT	89H	ARG	$e^+e^- \rightarrow D^*\pi^- X$
seen	ANJOS	89C	TPS	$\gamma N \rightarrow D^{*+}\pi^- X$

$\Gamma(D^+\pi^-)/\Gamma(D^*(2010)^+\pi^-)$ — Γ_6/Γ_1

NODE=M097R2
NODE=M097R2

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.24	90	AVERY	90	CLEO	$e^+e^- \rightarrow D^+\pi^- X$

$D_1(2420)^0$ POLARIZATION AMPLITUDE A_{D_1}

NODE=M097PAH

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 $D_1 \rightarrow D^*\pi$ and the $D^* \rightarrow D\pi$.

NODE=M097PAH

Unpolarized D_1 decaying purely via D-wave is predicted to give $A_{D_1} = 3$.

NODE=M097PAH

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
5.72±0.25 OUR AVERAGE					
5.72±0.25	103k	DEL-AMO-SA...	10P	BABR	$e^+e^- \rightarrow D^{*+}\pi^- X$
$5.9\ ^{+3.0}_{-1.7}\ ^{+2.4}_{-1.0}$		CHEKANOV	09	ZEUS	$e^\pm p \rightarrow D^{*+}\pi^- X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3.8 ±0.6 ±0.8		[5] AUBERT	09Y	BABR	$B^+ \rightarrow D_1^0\ell^+\nu_\ell$
$2.74^{+1.40}_{-0.93}$		[6] AVERY	94C	CLE2	$e^+e^- \rightarrow D^{*+}\pi^- X$

[5] Assuming $\Gamma(\Upsilon(4S) \rightarrow B^+B^-)$ / $\Gamma(\Upsilon(4S) \rightarrow B^0\overline{B}^0) = 1.065 \pm 0.026$ and equal partial widths and helicity angle distributions for charged and neutral D_1 mesons.

NODE=M097PAH;LINKAGE=AU

[6] Systematic uncertainties not estimated.

NODE=M097PAH;LINKAGE=AV

$D_1(2420)^0$ REFERENCES

NODE=M097

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
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=M120

$D_1(2420)^{\pm}$

$I(J^P) = \frac{1}{2}(?^?)$
I needs confirmation.

OMITTED FROM SUMMARY TABLE

Seen in $D^*(2007)^0\pi^+$. $J^P = 0^+$ ruled out.

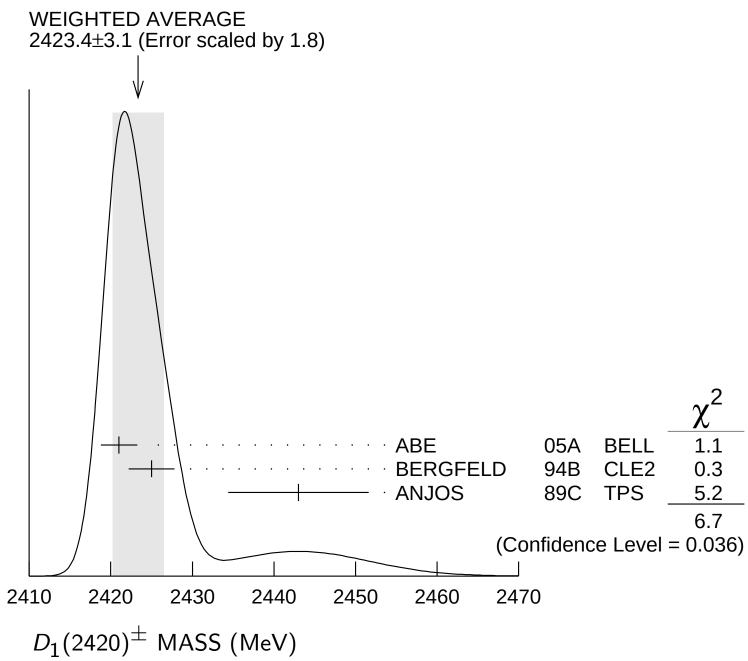
NODE=M120

$D_1(2420)^{\pm}$ MASS

NODE=M120M

NODE=M120M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2423.4±3.1 OUR AVERAGE	Error includes scale factor of 1.8. See the ideogram below.				
2421 ±2 ±1	124	ABE	05A	BELL	$\overline{B}^0 \to D^+\pi^+\pi^-\pi^-$
2425 ±2 ±2	146	BERGFELD	94B	CLE2	$e^+e^- \to D^{*0}\pi^+ X$
2443 ±7 ±5	190	ANJOS	89C	TPS	$\gamma N \to D^0\pi^+ X^0$



$m_{D_1^*(2420)^{\pm}} - m_{D_1^*(2420)^0}$

NODE=M120DM

NODE=M120DM

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
$\mathbf{4^{+2}_{-3}\pm3}$	BERGFELD	94B	CLE2	$e^+e^- \to$ hadrons

$D_1(2420)^{\pm}$ WIDTH

NODE=M120W

NODE=M120W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
25± 6 OUR AVERAGE					
21± 5±8	124	ABE	05A	BELL	$\overline{B}^0 \to D^+\pi^+\pi^-\pi^-$
$26^{+\ 8}_{-\ 7}\pm4$	146	BERGFELD	94B	CLE2	$e^+e^- \to D^{*0}\pi^+ X$
41±19±8	190	ANJOS	89C	TPS	$\gamma N \to D^0\pi^+ X^0$

$D_1(2420)^{\pm}$ DECAY MODES

NODE=M120215;NODE=M120

$D_1^*(2420)^-$ modes are charge conjugates of modes below.

NODE=M120

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$D^*(2007)^0\pi^+$	seen	DESIG=1
Γ_2	$D^+\pi^+\pi^-$	seen	DESIG=3;OUR EST;→ NOT CHECKED ←
Γ_3	$D^+\rho^0$		DESIG=4
Γ_4	$D^+f_0(500)$		DESIG=5
Γ_5	$D_0^*(2400)^0\pi^+$		DESIG=6
Γ_6	$D^0\pi^+$	not seen	DESIG=2;OUR EVAL;→ NOT CHECKED ←
Γ_7	$D^{*+}\pi^+\pi^-$	not seen	DESIG=7;OUR EST;→ NOT CHECKED ←

$D_1(2420)^{\pm}$ BRANCHING RATIOS

NODE=M120220

$\Gamma(D^*(2007)^0\pi^+)/\Gamma_{total}$ — Γ_1/Γ

NODE=M120R1
NODE=M120R1

VALUE	DOCUMENT ID		TECN	COMMENT
seen	ANJOS	89C	TPS	$\gamma N \rightarrow D^0\pi^+ X^0$

$\Gamma(D^0\pi^+)/\Gamma(D^*(2007)^0\pi^+)$ — Γ_6/Γ_1

NODE=M120R2
NODE=M120R2

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.18	90	BERGFELD	94B	CLE2	$e^+e^- \rightarrow$ hadrons

$D_1(2420)^{\pm}$ POLARIZATION AMPLITUDE A_{D_1}

NODE=M120PAH

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 $D_1 \rightarrow D^*\pi$ and the $D^* \rightarrow D\pi$.

Unpolarized D_1 decaying purely via D-wave is predicted to give $A_{D_1} = 3$.

NODE=M120PAH

NODE=M120PAH

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$3.8\pm0.6\pm0.8$	[1] AUBERT	09Y	BABR	$B^0 \rightarrow D_1^- \ell^+ \nu_\ell$

[1] Assuming $\Gamma(\Upsilon(4S) \rightarrow B^+B^-)$ / $\Gamma(\Upsilon(4S) \rightarrow B^0\overline{B}^0) = 1.065 \pm 0.026$ and equal partial widths and helicity angle distributions for charged and neutral D_1 mesons.

NODE=M120PAH;LINKAGE=AU

$D_1(2420)^{\pm}$ REFERENCES

NODE=M120

AUBERT	09Y	PRL 103 051803	B. Aubert *et al.*	(BABAR Collab.)	REFID=52929
ABE	05A	PRL 94 221805	K. Abe *et al.*	(BELLE Collab.)	REFID=50755
BERGFELD	94B	PL B340 194	T. Bergfeld *et al.*	(CLEO Collab.)	REFID=44099
ANJOS	89C	PRL 62 1717	J.C. Anjos *et al.*	(FNAL E691 Collab.)	REFID=40737

NODE=M180

$D_1(2430)^0$

$I(J^P) = \frac{1}{2}(1^+)$

OMITTED FROM SUMMARY TABLE

$J = 1^+$ assignment favored (ABE 04D).

NODE=M180

$D_1(2430)^0$ MASS

NODE=M180M

NODE=M180M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
$2427\pm26\pm25$	ABE	04D	BELL	$B^- \rightarrow D^{*+}\pi^-\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2477 ± 28	[1] AUBERT	06L	BABR	$\overline{B}^0 \rightarrow D^{*+}\omega\pi^-$

[1] Systematic errors not estimated.

NODE=M180M;LINKAGE=AU

$D_1(2430)^0$ WIDTH

NODE=M180W

NODE=M180W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
$384^{+107}_{-75}\pm74$	ABE	04D	BELL	$B^- \rightarrow D^{*+}\pi^-\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$266\pm\ 97$	[2] AUBERT	06L	BABR	$\overline{B}^0 \rightarrow D^{*+}\omega\pi^-$

[2] Systematic errors not estimated.

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;→ NOT CHECKED ←

$D_1(2430)^0$ REFERENCES

NODE=M180

AUBERT	06L	PR D74 012001	B. Aubert *et al.*	(BABAR Collab.)	REFID=51140
ABE	04D	PR D69 112002	K. Abe *et al.*	(BELLE Collab.)	REFID=50011

NODE=M119

$D_2^*(2460)^0$ $\quad I(J^P) = \frac{1}{2}(2^+)$

NODE=M119

$J^P = 2^+$ assignment strongly favored(ALBRECHT 89B, ALBRECHT 89H), natural parity confirmed by the helicity analysis(DEL-AMO-SANCHEZ 10P),

$D_2^*(2460)0$ MASS

NODE=M119M

NODE=M119M

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=M119M
NEW

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2462.6±0.7 OUR FIT Error includes scale factor of 1.3. [2462.6 ± 0.7 MeV OUR 2011 FIT Scale factor = 1.3]					
2461.8±0.8 OUR AVERAGE Error includes scale factor of 1.2.					
2462.2±0.1±0.8	243k	DEL-AMO-SA...	10P	BABR	$e^+e^- \rightarrow D^+\pi^- X$
2460.4±1.2±2.2	3.4k	AUBERT	09AB	BABR	$B^- \rightarrow D^+\pi^-\pi^-$
2461.6±2.1±3.3		[1] ABE	04D	BELL	$B^- \rightarrow D^+\pi^-\pi^-$
2464.5±1.1±1.9	5.8k	[1] LINK	04A	FOCS	γ A
2465 ±3 ±3	486	AVERY	94C	CLE2	$e^+e^- \rightarrow D^+\pi^- X$
2453 ±3 ±2	128	FRABETTI	94B	E687	$\gamma \text{Be} \rightarrow D^+\pi^- X$
2461 ±3 ±1	440	AVERY	90	CLEO	$e^+e^- \rightarrow D^{*+}\pi^- X$
2455 ±3 ±5	337	ALBRECHT	89B	ARG	$e^+e^- \rightarrow D^+\pi^- X$
2459 ±3 ±2	153	ANJOS	89C	TPS	$\gamma N \rightarrow D^+\pi^- X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$2469.1\pm3.7^{+1.2}_{-1.3}$	1560±230	[2] CHEKANOV	09	ZEUS	$e^\pm p \rightarrow D^{(*)+}\pi^- X$
2463.3±0.6±0.8	20k	ABULENCIA	06A	CDF	1900 $p\overline{p} \rightarrow D^+\pi^- X$
2461 ±6	126	[3] ABREU	98M	DLPH	e^+e^-
2466 ±7	1	ASRATYAN	95	BEBC	53,40 $\nu(\overline{\nu}) \rightarrow p X, d X$

NODE=M119M;LINKAGE=LI

[1] Fit includes the contribution from $D_0^*(2400)^0$.

NODE=M119M;LINKAGE=CH

[2] 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=M119M;LINKAGE=K

[3] No systematic error given.

$m_{D_2^{*0}} - m_{D^+}$

NODE=M119DM

NODE=M119DM

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=M119DM
NEW

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
593.0±0.7 OUR FIT Error includes scale factor of 1.3. [593.0 ± 0.7 MeV OUR 2011 FIT Scale factor = 1.3]					
593.9±0.6±0.5	20k	ABULENCIA	06A	CDF	1900 $p\overline{p} \rightarrow D^+\pi^- X$

$m_{D_2^{*0}} - m_{D^{*+}}$

NODE=M119DM2

NODE=M119DM2

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=M119DM2
NEW

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
452.3±0.7 OUR FIT Error includes scale factor of 1.3. [452.4 ± 0.7 MeV OUR 2011 FIT Scale factor = 1.3]					
$\mathbf{458.8\pm3.7^{+1.2}_{-1.3}}$	1560±230	CHEKANOV	09	ZEUS	$e^\pm p \rightarrow D^{(*)+}\pi^- X$

$D_2^*(2460)^0$ WIDTH

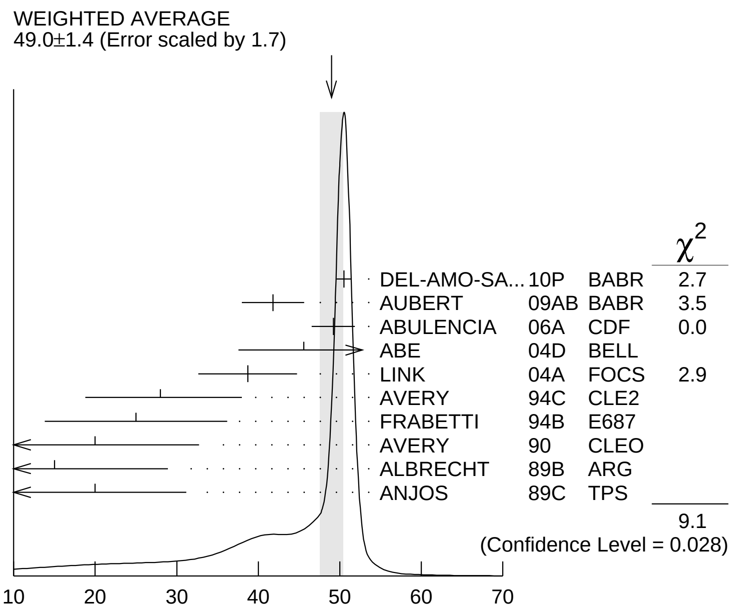
NODE=M119W

NODE=M119W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
49.0± 1.4 OUR AVERAGE	Error includes scale factor of 1.7. See the ideogram below.				
50.5± 0.6± 0.7	243k	DEL-AMO-SA...	10P	BABR	$e^+ e^- \to D^+ \pi^- X$
41.8± 2.5± 2.9	3.4k	AUBERT	09AB	BABR	$B^- \to D^+ \pi^- \pi^-$
49.2± 2.3± 1.3	20k	ABULENCIA	06A	CDF	1900 $p\overline{p} \to D^+ \pi^- X$
45.6± 4.4± 6.7		[4] ABE	04D	BELL	$B^- \to D^+ \pi^- \pi^-$
38.7± 5.3± 2.9	5.8k	[4] LINK	04A	FOCS	γ A
$28\ ^{+\ 8}_{-\ 7}\ \pm\ 6$	486	AVERY	94C	CLE2	$e^+ e^- \to D^+ \pi^- X$
25 ±10 ± 5	128	FRABETTI	94B	E687	γBe $\to D^+ \pi^- X$
$20\ ^{+\ 9}_{-12}\ ^{+\ 9}_{-10}$	440	AVERY	90	CLEO	$e^+ e^- \to D^{*+} \pi^- X$
$15\ ^{+13}_{-10}\ ^{+\ 5}_{-10}$	337	ALBRECHT	89B	ARG	$e^+ e^- \to D^+ \pi^- X$
20 ±10 ± 5	153	ANJOS	89C	TPS	$\gamma N \to D^+ \pi^- X$

[4] Fit includes the contribution from $D_0^*(2400)^0$.

NODE=M119W;LINKAGE=LI



$D_2^*(2460)^0$ WIDTH (MeV)

$D_2^*(2460)^0$ DECAY MODES

NODE=M119215;NODE=M119

$\overline{D}_2^*(2460)^0$ modes are charge conjugates of modes below.

NODE=M119

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$D^+ \pi^-$	seen	CLUMP=A;DESIG=1
Γ_2	$D^*(2010)^+ \pi^-$	seen	DESIG=2
Γ_3	$D^0 \pi^+ \pi^-$	not seen	DESIG=3;OUR EST;→ NOT CHECKED ←
Γ_4	$D^{*0} \pi^+ \pi^-$	not seen	DESIG=4;OUR EST;→ NOT CHECKED ←

$D_2^*(2460)^0$ BRANCHING RATIOS

NODE=M119220

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

NODE=M119R1

NODE=M119R1

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	3.4k	AUBERT	09AB	BABR	$B^- \to D^+ \pi^- \pi^-$
seen	337	ALBRECHT	89B	ARG	$e^+ e^- \to D^+ \pi^- X$
seen		ANJOS	89C	TPS	$\gamma N \to D^+ \pi^- X$

$\Gamma(D^*(2010)^+\pi^-)/\Gamma_{total}$ Γ_2/Γ

NODE=M119R2

NODE=M119R2

VALUE	DOCUMENT ID		TECN	COMMENT
seen	ACKERSTAFF	97W	OPAL	$e^+ e^- \to D^{*+} \pi^- X$
seen	AVERY	90	CLEO	$e^+ e^- \to D^{*+} \pi^- X$
seen	ALBRECHT	89H	ARG	$e^+ e^- \to D^* \pi^- X$

$\Gamma(D^+\pi^-)/\Gamma(D^*(2010)^+\pi^-)$ Γ_1/Γ_2

NODE=M119R3
NODE=M119R3

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
1.56±0.16 OUR AVERAGE					
1.47±0.03±0.16	379k	DEL-AMO-SA...	10P	BABR	$e^+e^- \rightarrow D^{(*)+}\pi^- X$
2.8 ±0.8 $^{+0.5}_{-0.6}$	1560±230	CHEKANOV	09	ZEUS	$e^\pm p \rightarrow D^{(*)+}\pi^- X$
2.2 ±0.7 ±0.6		AVERY	94C	CLE2	$e^+e^- \rightarrow D^{*+}\pi^- X$
2.3 ±0.8		AVERY	90	CLEO	e^+e^-
3.0 ±1.1 ±1.5		ALBRECHT	89H	ARG	$e^+e^- \rightarrow D^*\pi^- X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.9 ±0.5		ABE	04D	BELL	$B^- \rightarrow D^{(*)+}\pi^-\pi^-$

$\Gamma(D^+\pi^-)/[\Gamma(D^+\pi^-)+\Gamma(D^*(2010)^+\pi^-)]$ $\Gamma_1/(\Gamma_1+\Gamma_2)$

NODE=M119R01
NODE=M119R01

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.62±0.03±0.02	8414	[5] AUBERT	09Y	BABR	$B^+ \rightarrow D_2^{*0}\ell^+\nu_\ell$

[5] Assuming $\Gamma(\Upsilon(4S) \rightarrow B^+B^-)$ / $\Gamma(\Upsilon(4S) \rightarrow B^0\overline{B}^0)$ = 1.065 ± 0.026 and equal partial widths for charged and neutral D_2^* mesons. NODE=M119R01;LINKAGE=AU

$D_2^*(2460)^0$ POLARIZATION AMPLITUDE A_{D_2}

NODE=M119PAM

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 $1 + A_{D_2}\cos(\theta_H)$, where θ_H is the angle in the D^* rest frame between the two pions emitted by the $D_2 \rightarrow D^*\pi$ and $D^* \rightarrow D\pi$.

NODE=M119PAM

NODE=M119PAM

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
consistent with −1	243k	DEL-AMO-SA...	10P	BABR	$e^+e^- \rightarrow D^+\pi^- X$
$-0.74^{+0.49}_{-0.38}$		[6] AVERY	94C	CLE2	$e^+e^- \rightarrow D^{*+}\pi^- X$

[6] Systematic uncertainties not estimated. NODE=M119PAM;LINKAGE=AV

$D_2^*(2460)^0$ REFERENCES

NODE=M119

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
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
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	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=M150

$D_2^*(2460)^{\pm}$

$I(J^P) = \frac{1}{2}(2^+)$

$J^P = 2^+$ assignment strongly favored(ALBRECHT 89B).

NODE=M150

$D_2^*(2460)^{\pm}$ MASS

NODE=M150M

NODE=M150M

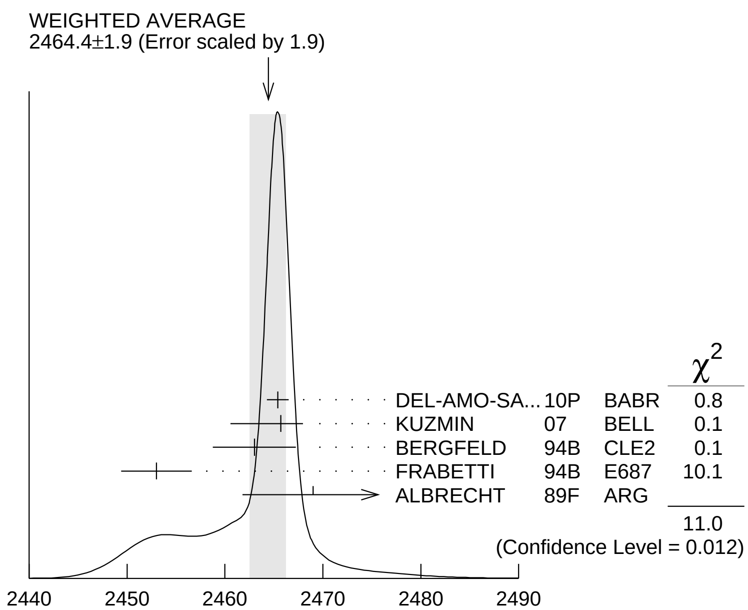
VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2464.4±1.9 OUR AVERAGE	Error includes scale factor of 1.9. See the ideogram below.				
2465.4±0.2±1.1	111k	[1] DEL-AMO-SA...	10P	BABR	$e^+e^- \rightarrow D^0\pi^+X$
$2465.7\pm1.8^{+1.4}_{-4.8}$	2909	KUZMIN	07	BELL	$e^+e^- \rightarrow$ hadrons
2463 ±3 ±3	310	BERGFELD	94B	CLE2	$e^+e^- \rightarrow D^0\pi^+X$
2453 ±3 ±2	185	FRABETTI	94B	E687	γBe $\rightarrow D^0\pi^+X$
2469 ±4 ±6		ALBRECHT	89F	ARG	$e^+e^- \rightarrow D^0\pi^+X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2467.6±1.5±0.8	3.5k	[2] LINK	04A	FOCS	γ A

[1] At a fixed width of 50.5 MeV.

[2] 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=M150M;LINKAGE=DE

NODE=M150M;LINKAGE=LI



$D_2^*(2460)^{\pm}$ mass (MeV)

$m_{D_2^*(2460)^{\pm}} - m_{D_2^*(2460)^0}$

NODE=M150DM

NODE=M150DM

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	$e^+e^- \rightarrow$ hadrons
0 ±4	FRABETTI	94B	E687	γBe $\rightarrow D\pi X$
14 ±5 ±8	ALBRECHT	89F	ARG	$e^+e^- \rightarrow D^0\pi^+X$

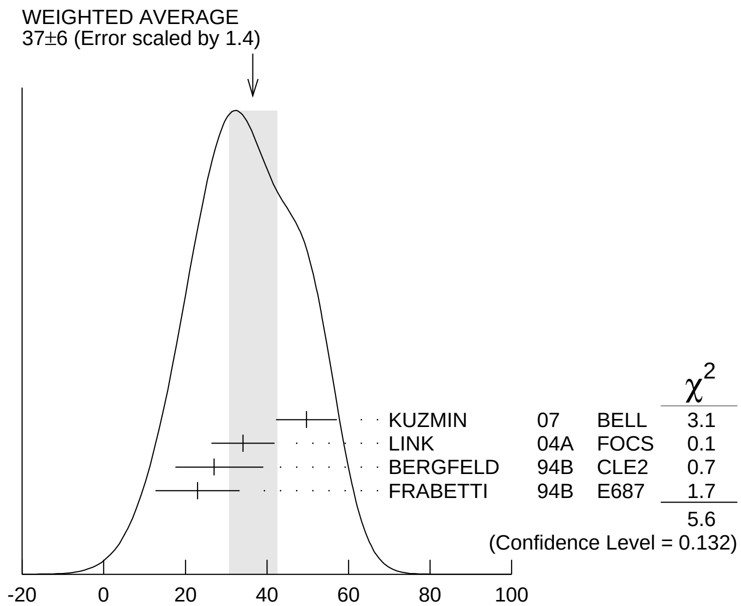
$D_2^*(2460)^{\pm}$ WIDTH

NODE=M150W

NODE=M150W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
37 ± 6 OUR AVERAGE	Error includes scale factor of 1.4. See the ideogram below.				
49.7± 3.8±6.4	2909	KUZMIN	07	BELL	$e^+e^- \rightarrow$ hadrons
34.1± 6.5±4.2	3.5k	[3] LINK	04A	FOCS	γ A
$27\ ^{+11}_{-\ 8}\ \pm5$	310	BERGFELD	94B	CLE2	$e^+e^- \rightarrow D^0\pi^+X$
23 ± 9 ±5	185	FRABETTI	94B	E687	γBe $\rightarrow D^0\pi^+X$

[3] Fit includes the contribution from $D_0^*(2400)^\pm$. NODE=M150W;LINKAGE=LI



$D_2^*(2460)^\pm$ width (MeV)

$D_2^*(2460)^\pm$ DECAY MODES

NODE=M150215;NODE=M150

$D_2^*(2460)^-$ modes are charge conjugates of modes below. NODE=M150

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$D^0\pi^+$	seen	DESIG=1
Γ_2	$D^{*0}\pi^+$	seen	DESIG=2;OUR EST;→ NOT CHECKED ←
Γ_3	$D^+\pi^+\pi^-$	not seen	DESIG=3;OUR EST;→ NOT CHECKED ←
Γ_4	$D^{*+}\pi^+\pi^-$	not seen	DESIG=4;OUR EST;→ NOT CHECKED ←

$D_2^*(2460)^\pm$ BRANCHING RATIOS

NODE=M150220

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

NODE=M150R1
NODE=M150R1

VALUE	DOCUMENT ID		TECN	COMMENT
seen	ALBRECHT	89F	ARG	$e^+e^- \rightarrow D^0\pi^+X$

$\Gamma(D^0\pi^+)/\Gamma(D^{*0}\pi^+)$ — Γ_1/Γ_2

NODE=M150R2
NODE=M150R2

VALUE	DOCUMENT ID		TECN	COMMENT
1.9±1.1±0.3	BERGFELD	94B	CLE2	$e^+e^- \rightarrow$ hadrons

$\Gamma(D^0\pi^+)/\left[\Gamma(D^0\pi^+)+\Gamma(D^{*0}\pi^+)\right]$ — $\Gamma_1/(\Gamma_1+\Gamma_2)$

NODE=M150R01
NODE=M150R01

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.62\pm0.03\pm0.02$	3361	[4] AUBERT	09Y	BABR	$\overline{B}^0 \rightarrow D_2^{*+}\ell^-\nu_\ell$

[4] Assuming $\Gamma(\Upsilon(4S) \rightarrow B^+B^-)$ / $\Gamma(\Upsilon(4S) \rightarrow B^0\overline{B}^0)$ = 1.065 ± 0.026 and equal partial widths for charged and neutral D_2^* mesons. NODE=M150R01;LINKAGE=AU

$D_2^*(2460)^\pm$ REFERENCES

NODE=M150

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
KUZMIN	07	PR D76 012006	A. Kuzmin *et al.*	(BELLE Collab.)	REFID=51854
LINK	04A	PL B586 11	J.M. Link *et al.*	(FOCUS Collab.)	REFID=49775
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
ALBRECHT	89B	PL B221 422	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=40736
ALBRECHT	89F	PL B231 208	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=40931

NODE=M198

$D(2550)^0$

$I(J^P) = \frac{1}{2}(0^-)$

OMITTED FROM SUMMARY TABLE

$J^P = 0^-$ assignment based on the helicity analysis (DEL-AMO-SANCHEZ 10P).

NODE=M198

$D(2550)^0$ MASS

NODE=M198M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
2539.4±4.5±6.8	34k	DEL-AMO-SA..10P	BABR	$e^+e^- \rightarrow D^{*+}\pi^- X$

NODE=M198M

$D(2550)^0$ WIDTH

NODE=M198W

VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
130±12±13	34k	DEL-AMO-SA..10P	BABR	$e^+e^- \rightarrow D^{*+}\pi^- X$

NODE=M198W

$D(2550)^0$ DECAY MODES

NODE=M198215;NODE=M198

	Mode	Fraction (Γ_i/Γ)
Γ_1	$D^{*+}\pi^-$	seen

DESIG=1;OUR EVAL;→ NOT CHECKED ←

$D(2550)^0$ REFERENCES

NODE=M198

DEL-AMO-SA... 10P PR D82 111101 P. del Amo Sanchez *et al.* (BABAR Collab.)

REFID=53534

NODE=M199

$D(2600)$

$I(J^P) = \frac{1}{2}(?^?)$

OMITTED FROM SUMMARY TABLE

J^P consistent with natural parity (DEL-AMO-SANCHEZ 10P).

NODE=M199

$D(2600)$ MASS

NODE=M199M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*CHG*	*COMMENT*
2612 ±6 OUR AVERAGE		Error includes scale factor of 1.9.			
2608.7±2.4±2.5	26k	DEL-AMO-SA..10P	BABR	0	$e^+e^- \rightarrow D^+\pi^- X$
2621.3±3.7±4.2	13k	[1] DEL-AMO-SA..10P	BABR	+	$e^+e^- \rightarrow D^0\pi^+ X$

NODE=M199M

OCCUR=2

[1] At a fixed width of 93 MeV.

NODE=M199M;LINKAGE=DE

$D(2600)$ WIDTH

NODE=M199W

VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
93±6±13	26k	DEL-AMO-SA..10P	BABR	$e^+e^- \rightarrow D^+\pi^- X$

NODE=M199W

$D(2600)$ DECAY MODES

NODE=M199215;NODE=M199

	Mode	Fraction (Γ_i/Γ)
Γ_1	$D\pi$	seen
Γ_2	$D^+\pi^-$	seen
Γ_3	$D^0\pi^\pm$	seen
Γ_4	$D^*\pi$	seen
Γ_5	$D^{*+}\pi^-$	seen

DESIG=1;OUR EVAL;→ NOT CHECKED ←
DESIG=2;OUR EVAL;→ NOT CHECKED ←
DESIG=3;OUR EVAL;→ NOT CHECKED ←
DESIG=4;OUR EVAL;→ NOT CHECKED ←
DESIG=5;OUR EVAL;→ NOT CHECKED ←

$D(2600)$ 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	$e^+e^- \rightarrow D^{(*)+}\pi^- X$

$D(2600)$ REFERENCES

NODE=M199

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;→ NOT CHECKED ←

$D^{*}(2640)^{\pm}$ 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=M203

$D(2750)$

$I(J^P) = \frac{1}{2}(?^?)$

OMITTED FROM SUMMARY TABLE

$D(2750)$ MASS

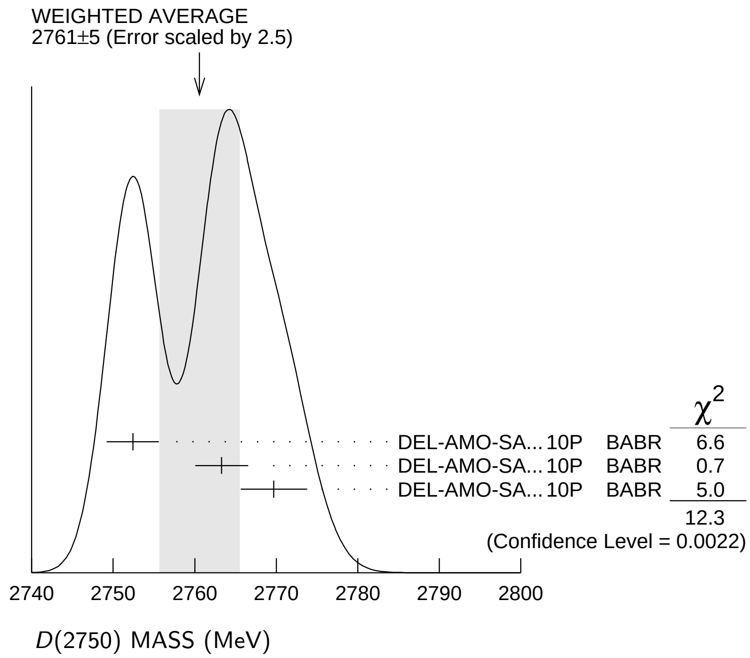
NODE=M203M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
2761 ±5 OUR AVERAGE	Error includes scale factor of 2.5. See the ideogram below.					
2752.4±1.7±2.7	23.5k	[1] DEL-AMO-SA..10P		BABR	0	$e^+e^- \to D^{*+}\pi^- X$
2763.3±2.3±2.3	11.3k	[1] DEL-AMO-SA..10P		BABR	0	$e^+e^- \to D^+\pi^- X$
2769.7±3.8±1.5	5.7k	[1,2] DEL-AMO-SA..10P		BABR	+	$e^+e^- \to D^0\pi^+ X$

NODE=M203M
OCCUR=2
OCCUR=3

[1] The states observed in the $D^{*}\pi$ and $D\pi$ final states are not necessarily the same.
[2] At a fixed width of 60.9 MeV.

NODE=M203M;LINKAGE=DE
NODE=M203M;LINKAGE=DA



D(2750) WIDTH

NODE=M203W

NODE=M203W

VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
63 ±6 OUR AVERAGE				
71 ±6 ±11	23.5k	[3] DEL-AMO-SA...10P	BABR	$e^+ e^- \rightarrow D^{*+} \pi^- X$
60.9±5.1± 3.6	11.3k	[3] DEL-AMO-SA...10P	BABR	$e^+ e^- \rightarrow D^+ \pi^- X$

OCCUR=2

[3] The states observed in the $D^* \pi$ and $D \pi$ final states are not necessarily the same.

NODE=M203W;LINKAGE=DE

D(2750) DECAY MODES

NODE=M203215;NODE=M203

	Mode	Fraction (Γ_i/Γ)
Γ_1	$D \pi$	seen
Γ_2	$D^+ \pi^-$	seen
Γ_3	$D^0 \pi^\pm$	seen
Γ_4	$D^* \pi$	seen
Γ_5	$D^{*+} \pi^-$	seen

DESIG=1;OUR EVAL;→ NOT CHECKED ←
DESIG=2;OUR EVAL;→ NOT CHECKED ←
DESIG=3;OUR EVAL;→ NOT CHECKED ←
DESIG=4;OUR EVAL;→ NOT CHECKED ←
DESIG=5;OUR EVAL;→ NOT CHECKED ←

D(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	[4] DEL-AMO-SA...10P	BABR	$e^+ e^- \rightarrow D^{(*)+} \pi^- X$

[4] The states observed in the $D^* \pi$ and $D \pi$ final states are not necessarily the same.

NODE=M203R01;LINKAGE=DE

D(2750) POLARIZATION AMPLITUDE A_D

NODE=M203PAM

A polarization amplitude A_D is a parameter that depends on the initial polarization of the D(2750). For D(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 $D(2750) \rightarrow D^* \pi$ and $D^* \rightarrow D \pi$.

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	[5] DEL-AMO-SA...10P	BABR	$e^+ e^- \rightarrow D^{*+} \pi^- X$

NODE=M203PAM

[5] 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(2750) REFERENCES

NODE=M203

DEL-AMO-SA... 10P PR D82 111101 P. del Amo Sanchez *et al.* (BABAR Collab.)

REFID=53534

CHARMED, STRANGE MESONS ($C = S = \pm1$)

NODE=MXXX040

$D_s^+ = c\bar{s}$, $D_s^- = \bar{c}s$, 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
2112.3±0.5 OUR FIT	Error includes scale factor of 1.1.			
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	$D_s^+\gamma$	(94.2±0.7) %	DESIG=1
Γ_2	$D_s^+\pi^0$	(5.8±0.7) %	DESIG=2

CONSTRAINED FIT INFORMATION

An overall fit to a branching ratio uses 2 measurements and one constraint to determine 2 parameters. The overall fit has a χ^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, $x_i \equiv \Gamma_i/\Gamma_{\rm total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_2	−100
	x_1

D_s^{*+} BRANCHING RATIOS

NODE=S074220

$\Gamma(D_s^+\gamma)/\Gamma_{\rm total}$ — Γ_1/Γ

NODE=S074R1
NODE=S074R1

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.942±0.007 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.942±0.004±0.006	16k	[3] AUBERT,BE	05G	BABR	10.6 $e^+e^- \rightarrow$ hadrons
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		

$\Gamma(D_s^+\pi^0)/\Gamma_{\rm total}$ — Γ_2/Γ

NODE=S074R3
NODE=S074R3

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.059±0.004±0.006	560	[3] AUBERT,BE	05G	BABR	10.6 $e^+e^- \rightarrow$ hadrons

$\Gamma(D_s^+\pi^0)/\Gamma(D_s^+\gamma)$ — 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
$0.062^{+0.020}_{-0.018}$±0.022	GRONBERG	95	CLE2	e^+e^-

[3] Derived from the ratio $\Gamma(D_s^+\pi^0)$ / $\Gamma(D_s^+\gamma)$ assuming that the branching fractions of $D_s^{*+} \rightarrow D_s^+\pi^0$ and $D_s^{*+} \rightarrow D_s^+\gamma$ decays sum to 100%.

NODE=S074R;LINKAGE=AU

$D_s^{*\pm}$ REFERENCES

NODE=S074

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.

NODE=M172

AUBERT 06P does not observe neutral and doubly charged partners of the $D^*_{s0}(2317)^+$.

$D^*_{s0}(2317)^{\pm}$ MASS

NODE=M172M

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=M172M

NODE=M172M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2317.8±0.6 OUR FIT	Error includes scale factor of 1.1.				
2318.0±1.0 OUR AVERAGE	Error includes scale factor of 1.4.				
2319.6±0.2±1.4	3180	AUBERT	06P	BABR	10.6 $e^+e^- \rightarrow D_s^+\pi^0 X$
2317.3±0.4±0.8	1022	[1] AUBERT	04E	BABR	10.6 e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2317.2±1.3	88	[2] AUBERT,B	04S	BABR	$B \rightarrow D_{s0}^{(*)}(2317)^+\overline{D}^{(*)}$
2317.2±0.5±0.9	761	[3] MIKAMI	04	BELL	10.6 e^+e^-
2316.8±0.4±3.0	1267 ± 53	[3,4] AUBERT	03G	BABR	10.6 e^+e^-
2317.6±1.3	273 ± 33	[3,5] AUBERT	03G	BABR	10.6 e^+e^-
2319.8±2.1±2.0	24	[3] KROKOVNY	03B	BELL	10.6 e^+e^-

OCCUR=2

[1] Supersedes AUBERT 03G. NODE=M172M;LINKAGE=AU
[2] Systematic errors not evaluated. NODE=M172M;LINKAGE=AB
[3] Not independent of the corresponding $m_{D^*_{s0}(2317)} - m_{D_s}$. NODE=M172M;LINKAGE=B1
[4] From $D_s^+ \rightarrow K^+K^-\pi^+$ decay. NODE=M172M;LINKAGE=A1
[5] From $D_s^+ \rightarrow K^+K^-\pi^+\pi^0$ decay. NODE=M172M;LINKAGE=A2

$m_{D^*_{s0}(2317)^{\pm}} - m_{D_s^{\pm}}$

NODE=M172DM

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=M172DM

NODE=M172DM

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
349.3±0.6 OUR FIT	Error includes scale factor of 1.1.				
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	[6] 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	[7,8] AUBERT	03G	BABR	10.6 e^+e^-
350.2±1.3	273	[9,10] AUBERT	03G	BABR	10.6 e^+e^-

OCCUR=2

[6] Recalculated by us using $m_{D_s^+} = 1968.5 \pm 0.6$ MeV. NODE=M172DM;LINKAGE=K3
[7] From $D_s^+ \rightarrow K^+K^-\pi^+$ decay. NODE=M172DM;LINKAGE=A1
[8] Recalculated by us using $m_{D_s^+} = 1967.20 \pm 0.03$ MeV. NODE=M172DM;LINKAGE=C1
[9] From $D_s^+ \rightarrow K^+K^-\pi^+\pi^0$ decay. NODE=M172DM;LINKAGE=A2
[10] Recalculated by us using $m_{D_s^+} = 1967.4 \pm 0.2$ MeV. Systematic errors not estimated. 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 $e^+e^- \rightarrow D_s^+\pi^0 X$
• • • 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)	
Γ_1	$D_s^+\pi^0$	seen	DESIG=1
Γ_2	$D_s^+\gamma$		DESIG=2
Γ_3	$D_s^*(2112)^+\gamma$		DESIG=3
Γ_4	$D_s^+\gamma\gamma$		DESIG=4
Γ_5	$D_s^*(2112)^+\pi^0$		DESIG=5
Γ_6	$D_s^+\pi^+\pi^-$		DESIG=6
Γ_7	$D_s^+\pi^0\pi^0$	not seen	DESIG=7;OUR EVAL;→ NOT CHECKED ←

$D^*_{s0}(2317)^\pm$ BRANCHING RATIOS

NODE=M172220

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

NODE=M172R1
NODE=M172R1

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	1540 ± 62	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

AUBERT	06P	PR D74 032007	B. Aubert *et al.*	(BABAR Collab.)	REFID=51144
AUBERT	04E	PR D69 031101R	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	
2459.6±0.6 OUR FIT Error includes scale factor of 1.1. [2459.5 ± 0.6 MeV OUR 2011 FIT Scale factor = 1.1]					NEW
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

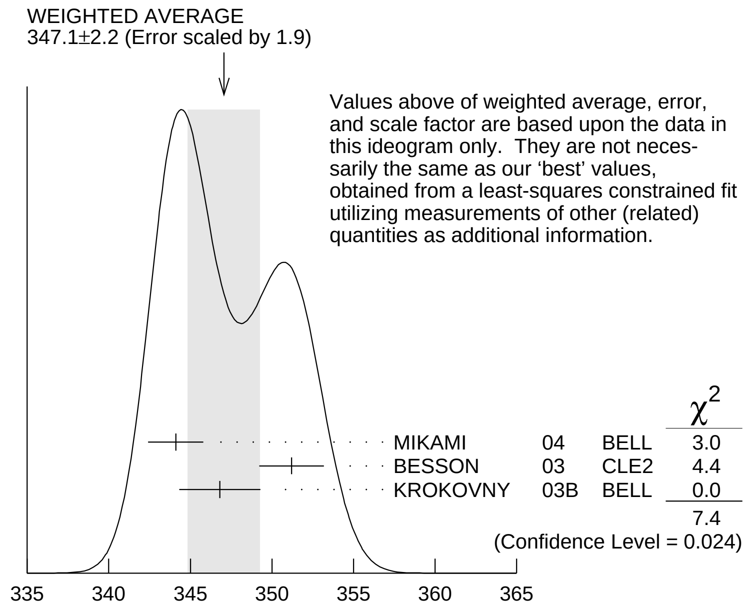
The fit includes $D^{\pm}$, D^0, $D_s^{\pm}$, $D^{*\pm}$, D^{*0}, $D_s^{*\pm}$, $D_1(2420)^0$, $D_2^*(2460)^0$, and $D_{s1}(2536)^{\pm}$ mass and mass difference measurements.

NODE=M173MD

NODE=M173MD

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT	
347.2±0.7 OUR FIT Error includes scale factor of 1.2. [347.3 ± 0.8 MeV OUR 2011 FIT Scale factor = 1.2]					NEW
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



$m_{D_{s1}(2460)^\pm} - m_{D_s^{*\pm}}$

$m_{D_{s1}(2460)^\pm} - m_{D_s^\pm}$ 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±0.7 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 $\left\langle\delta x_i \delta x_j\right\rangle/(\delta x_i \cdot \delta x_j)$, 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	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
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 031103R	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 031101R	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 NEW

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2535.12±0.13 OUR FIT					
[2535.28 ± 0.20 MeV OUR 2011 FIT]					
2535.18±0.24 OUR AVERAGE					
2535.7 ±0.6 ±0.5	46 ± 9	[1] 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	[2] 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	γ Be $\rightarrow D^{*+} K^0 X$, $D^{*0} K^+ X$
2535.3 ±0.2 ±0.5	134	ALEXANDER	93	CLE2	$e^+ e^- \rightarrow D^{*0} K^+ X$
2534.8 ±0.6 ±0.6	44	ALEXANDER	93	CLE2	$e^+ e^- \rightarrow D^{*+} K^0 X$
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	[3] AUSHEV	11	BELL	$B \rightarrow D_{s1}(2536)^+ D^{(*)}$
2535.08±0.01±0.15	8038	[4] LEES	11B	BABR	10.6 $e^+ e^- \rightarrow D^{*+} K_S^0 X$
$2535.57^{+0.44}_{-0.41}$±0.10	236 ± 30	[5] CHEKANOV	09	ZEUS	$e^{\pm} p \rightarrow D^{*+} K_S^0 X$, $D^{*0} K^+ X$
2535 ± 28		[6] ASRATYAN	88	HLBC	$\nu N \rightarrow D_s \gamma\gamma X$

OCCUR=2

[1] Using the $D^*(2010)^{\pm}$ mass of 2010.0 ± 0.4 MeV from PDG 06. NODE=M121M;LINKAGE=AB

[2] Calculated using $m(D^*(2010)^{\pm}) = 2010.0 \pm 0.5$ MeV, $m(D^*(2007)^0) = 2006.7 \pm 0.5$ MeV, and the mass difference below. NODE=M121M;LINKAGE=HI

[3] Systematic uncertainties not evaluated. NODE=M121M;LINKAGE=AU

[4] Calculated using the mass difference $m(D_{s1}^+) - m(D^{*+})_{PDG}$ below and $m(D^{*+})_{PDG} = 2010.25 \pm 0.14$ 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

[5] Calculated using the mass difference $m(D_{s1}^+) - m(D^{*+})_{PDG}$ reported below and $m(D^{*+})_{PDG} = 2010.27 \pm 0.17$ MeV. NODE=M121M;LINKAGE=CH

[6] 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 NEW

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
422.8± 0.5 OUR FIT Error includes scale factor of 1.1. [423.0 ± 0.5 MeV OUR 2011 FIT Scale factor = 1.1]				
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

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
524.84±0.04 OUR FIT						NODE=M121DN NEW
[525.06 ± 0.22 MeV OUR 2011 FIT]						
524.84±0.04 OUR AVERAGE						NEW
[525.30 ± 0.35 MeV OUR 2011 AVERAGE]						
524.83±0.01±0.04	8038	[7] LEES	11B	BABR	10.6 $e^+ e^- \rightarrow D^{*+} K^0_S X$	
$525.30^{+0.44}_{-0.41}$±0.10	236 ± 30	CHEKANOV	09	ZEUS	$e^\pm p \rightarrow D^{*+} K^0_S X$, $D^{*0} K^+ X$	
525.3 ±0.6 ±0.1	41	HEISTER	02B	ALEP	$e^+ e^- \rightarrow D^{*+} K^0 X$	

[7] Assuming S-wave decay of the $D_{s1}(2536)$ to $D^{*+} K^0_S$, 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

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
528.14±0.08 OUR FIT						NODE=M121DP NEW
[528.36 ± 0.23 MeV OUR 2011 FIT]						
528.1 ±1.5 OUR AVERAGE						
528.7 ±1.9 ±0.5	51	HEISTER	02B	ALEP	$e^+ e^- \rightarrow D^{*0} K^+ X$	
527.3 ±2.2	29	ACKERSTAFF	97W	OPAL	$e^+ e^- \rightarrow D^{*0} K^+ X$	

$D_{s1}(2536)^\pm$ WIDTH

NODE=M121W

VALUE (MeV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT	
0.92±0.03±0.04		8038	[8] LEES	11B	BABR	10.6 $e^+ e^- \rightarrow D^{*+} K^0_S X$	NODE=M121W
• • • We do not use the following data for averages, fits, limits, etc. • • •							
0.75±0.23		116	[9] AUSHEV	11	BELL	$B \rightarrow D_{s1}(2536)^+ D^{(*)}$	
< 2.5	95	193	AUBERT	06P	BABR	10.6 $e^+ e^- \rightarrow D_s^+ \pi^+ \pi^- X$	
< 3.2	90	75	FRABETTI	94B	E687	γBe $\rightarrow D^{*+} K^0$X, $D^{*0} K^+$X	
< 2.3	90		ALEXANDER	93	CLEO	$e^+ e^- \rightarrow D^{*0} K^+$X	
< 3.9	90		ALBRECHT	92R	ARG	10.4 $e^+ e^- \rightarrow D^{*0} K^+$X	
< 5.44	90		AVERY	90	CLEO	$e^+ e^- \rightarrow D^{*+} K^0$X	
< 4.6	90		ALBRECHT	89E	ARG	$D^*_{s1} \rightarrow D^*(2010) K^0$	

[8] Assuming S-wave decay of the $D_{s1}(2536)$ to $D^{*+} K^0_S$, using a Breit-Wigner line shape corresponding to L=0. NODE=M121W;LINKAGE=LE

[9] Systematic uncertainties not evaluated. NODE=M121W;LINKAGE=AU

$D_{s1}(2536)^+$ DECAY MODES

NODE=M121215;NODE=M121

$D_{s1}(2536)^-$ modes are charge conjugates of the modes below. NODE=M121

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$D^*(2010)^+ K^0$	seen	DESIG=1;OUR EST;→ NOT CHECKED ←
Γ_2	$(D^*(2010)^+ K^0)_{S-wave}$		DESIG=7
Γ_3	$(D^*(2010)^+ K^0)_{D-wave}$		DESIG=9
Γ_4	$D^+ \pi^- K^+$		DESIG=8
Γ_5	$D^*(2007)^0 K^+$	seen	DESIG=4;OUR EST;→ NOT CHECKED ←
Γ_6	$D^+ K^0$	not seen	DESIG=2;OUR EST;→ NOT CHECKED ←
Γ_7	$D^0 K^+$	not seen	DESIG=5;OUR EST;→ NOT CHECKED ←
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					
[1.36 ± 0.20 OUR 2011 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	[10] HEISTER	02B	ALEP	$e^+ e^- \to D^{*+} K^0 X$, $D^{*0} K^+ X$
1.9 $^{+1.1}_{-0.9}$ ±0.4	35	[10] 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		[11] ALBRECHT	92R	ARG	10.4 $e^+ e^- \to D^{*0} K^+$X, $D^{*+} K^0$X

NODE=M121R6 NEW

[10] Ratio of the production rates measured in Z^0 decays.

NODE=M121R6;LINKAGE=6A

[11] 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 $e^+ e^- \to D^{*+} K^0 X$

NODE=M121R8

$\Gamma(D^+ \pi^- K^+)/\Gamma(D^*(2010)^+ K^0)$ — 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 $e^+ e^- \to D^+ \pi^- K^+ X$

NODE=M121R9

$\Gamma(D^+ K^0)/\Gamma(D^*(2010)^+ K^0)$ — 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
<0.43	90	ALBRECHT	89E	ARG	$D^*_{s1} \to D^*(2010) K^0$

NODE=M121R1

$\Gamma(D^0 K^+)/\Gamma(D^*(2007)^0 K^+)$ — 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

NODE=M121R4

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

NODE=M121R3

VALUE	DOCUMENT ID		TECN	COMMENT
possibly seen	ASRATYAN	88	HLBC	$\nu N \to D_s \gamma\gamma$X

NODE=M121R3

$\Gamma(D_s^{*+} \gamma)/\Gamma(D^*(2007)^0 K^+)$ — 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

NODE=M121R5

$\Gamma(D_s^+ \pi^+ \pi^-)/\Gamma_{total}$ — Γ_9/Γ

NODE=M121R7

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AUBERT	06P	BABR	10.6 $e^+ e^- \to D_s^+ \pi^+ \pi^- X$

NODE=M121R7

$D_{s1}(2536)^{\pm}$ REFERENCES

NODE=M121

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 011102R	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	JPG 33 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

$D^*_{s2}(2573)$

$I(J^P) = 0(?^?)$

J^P is natural, width and decay modes consistent with 2^+.

NODE=M148

$D^*_{s2}(2573)$ MASS

NODE=M148M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2571.9±0.8 OUR AVERAGE					
[2572.6 ± 0.9 MeV OUR 2011 AVERAGE]					
2569.4±1.6±0.5	82 ± 17	AAIJ	11A	LHCB	$B_s \to D^*_{s2}(2573)\mu\overline{\nu}X$
2572.2±0.3±1.0		AUBERT,BE	06E	BABR	$e^+e^- \to DKX$
2574.5±3.3±1.6		ALBRECHT	96	ARG	$e^+e^- \to D^0K^+X$
$2573.2^{+1.7}_{-1.6}\pm0.9$	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	[1] EVDOKIMOV	04	SELX	600 $\Sigma^- A \to D^0K^+X$
2568.6±3.2	64	[2] HEISTER	02B	ALEP	$e^+e^- \to D^0K^+X$

NODE=M148M NEW

[1] Not independent of the mass difference below.

NODE=M148M;LINKAGE=EV

[2] 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

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
704 ±3 ±1	64	HEISTER	02B	ALEP	$e^+e^- \to D^0K^+X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
705.4±4.3	25	[3] EVDOKIMOV	04	SELX	600 $\Sigma^- A \to D^0K^+X$

NODE=M148DM

[3] Systematic errors not estimated.

NODE=M148DM;LINKAGE=EV

$D^*_{s2}(2573)$ WIDTH

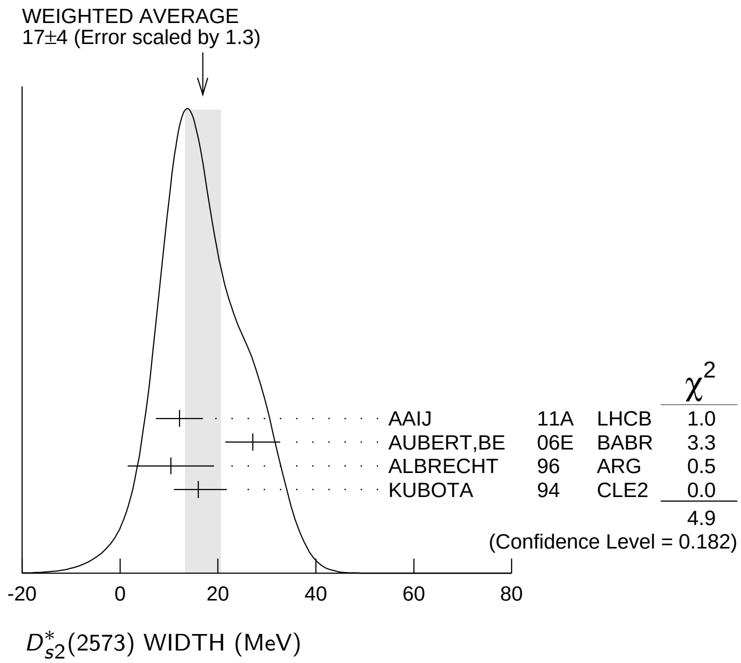
NODE=M148W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
17 ±4 OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below.					
[20 ± 5 MeV OUR 2011 AVERAGE Scale factor = 1.3]					
12.1±4.5±1.6	82 ± 17	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	$e^+e^- \to D^0K^+X$
$16\ ^{+5}_{-4}\ \pm3$	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	[4] EVDOKIMOV	04	SELX	600 $\Sigma^- A \to D^0K^+X$

NODE=M148W NEW

[4] Systematic errors not estimated.

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	DESIG=1
Γ_2	$D^*(2007)^0 K^+$	not seen	DESIG=2;OUR EVAL;→ NOT CHECKED ←

$D^*_{s2}(2573)^+$ 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	$\pm$	$e^+ e^- \sim$ 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

$D^*_{s2}(2573)$ REFERENCES

NODE=M148

AAIJ	11A	PL B698 14	R. Aaij *et al.*	(LHCb Collab.)	REFID=16665
AUBERT,BE	06E	PRL 97 222001	B. Aubert *et al.*	(BABAR Collab.)	REFID=51512
EVDOKIMOV	04	PRL 93 242001	A.V. Evdokimov *et al.*	(SELEX Collab.)	REFID=50337
HEISTER	02B	PL B526 34	A. Heister *et al.*	(ALEPH Collab.)	REFID=48562
ALBRECHT	96	ZPHY C69 405	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=44631
KUBOTA	94	PRL 72 1972	Y. Kubota *et al.*	(CLEO Collab.)	REFID=43781

NODE=M182

$D^*_{s1}(2700)^\pm$

$I(J^P) = 0(1^-)$

OMITTED FROM SUMMARY TABLE

$D^*_{s1}(2700)^+$ MASS

NODE=M182M

NODE=M182M

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
2709^{+9}_{-6} OUR AVERAGE				
$2710 \pm 2^{+12}_{-7}$	10.4k	[1] AUBERT 09AR	BABR	$e^+ e^- \to D^{(*)} K X$
$2708 \pm 9^{+11}_{-10}$	182	BRODZICKA 08	BELL	$B^+ \to D^0 \overline{D}{}^0 K^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$2688 \pm 4 \pm 3$		[2] AUBERT,BE 06E	BABR	$10.6\ e^+ e^- \to D K X$

[1] From simultaneous fits to the two DK mass spectra and to the total $D^* K$ mass spectrum. NODE=M182M;LINKAGE=AB

[2] Superseded by AUBERT 09AR. NODE=M182M;LINKAGE=AU

$D^*_{s1}(2700)^+$ WIDTH

NODE=M182W

NODE=M182W

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
125±30 OUR AVERAGE				
$149 \pm 7^{+39}_{-52}$	10.4k	[3] AUBERT 09AR	BABR	$e^+ e^- \to D^{(*)} K X$
$108 \pm 23^{+36}_{-31}$	182	BRODZICKA 08	BELL	$B^+ \to D^0 \overline{D}{}^0 K^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$112 \pm 7 \pm 36$		[4] AUBERT,BE 06E	BABR	$10.6\ e^+ e^- \to D K X$

[3] From simultaneous fits to the two DK 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	[5] AUBERT 09AR	BABR	$e^+ e^- \to D^{(*)} K X$

[5] From the average of the corresponding ratios with $D^{(*)0} K^+$ and $D^{(*)+} K^0_S$. NODE=M182R01;LINKAGE=AU

$\Gamma(D^{*0} K^+)/\Gamma(D^0 K^+)$ Γ_5/Γ_2

NODE=M182R02

NODE=M182R02

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.88 \pm 0.14 \pm 0.14$	7716	[6] AUBERT 09AR	BABR	$e^+ e^- \to D^{(*)} K X$

[6] From the $D^{*0} K^+$ and $D^0 K^+$, where $D^{*0} \to D^0 \pi^0$. NODE=M182R02;LINKAGE=AU

$\Gamma(D^{*+} K^0_S)/\Gamma(D^+ K^0_S)$ Γ_6/Γ_3

NODE=M182R03

NODE=M182R03

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$1.14 \pm 0.39 \pm 0.23$	2700	[7] AUBERT 09AR	BABR	$e^+ e^- \to D^{(*)} K X$

[7] From the $D^{*+} K^0_S$ and $D^+ K^0_S$, where $D^{*+} \to D^+ \pi^0$. NODE=M182R03;LINKAGE=AU

$D^*_{s1}(2700)^\pm$ REFERENCES

NODE=M182

AUBERT	09AR	PR D80 092003	B. Aubert *et al.*	(BABAR Collb.)
BRODZICKA	08	PRL 100 092001	J. Brodzicka *et al.*	(BELLE Collab.)
AUBERT,BE	06E	PRL 97 222001	B. Aubert *et al.*	(BABAR Collab.)

REFID=53135
REFID=52144
REFID=51512

NODE=M196

$D^*_{sJ}(2860)^\pm$

$I(J^P) = 0(?^?)$

OMITTED FROM SUMMARY TABLE

Observed by AUBERT,BE 06E and AUBERT 09AR in inclusive production of DK and D^*K in e^+e^- annihilation. J^P is natural.

NODE=M196

$D^*_{sJ}(2860)^+$ MASS

NODE=M196M

NODE=M196M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2862 ±2 $^{+5}_{-2}$	3122	[1] AUBERT	09AR	BABR	$e^+e^- \rightarrow D^{(*)}KX$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2856.6±1.5±5.0		[2] AUBERT,BE	06E	BABR	$e^+e^- \rightarrow DKX$

[1] From simultaneous fits to the two DK mass spectra and to the total D^*K mass spectrum.

NODE=M196M;LINKAGE=AB

[2] Superseded by AUBERT 09AR.

NODE=M196M;LINKAGE=AU

$D^*_{sJ}(2860)^+$ WIDTH

NODE=M196W

NODE=M196W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
48±3± 6	3122	[3] AUBERT	09AR	BABR	$e^+e^- \rightarrow D^{(*)}KX$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
47±7±10		[4] AUBERT,BE	06E	BABR	$e^+e^- \rightarrow DKX$

[3] From simultaneous fits to the two DK mass spectra and to the total D^*K mass spectrum.

NODE=M196W;LINKAGE=AB

[4] Superseded by AUBERT 09AR.

NODE=M196W;LINKAGE=AU

$D^*_{sJ}(2860)^\pm$ DECAY MODES

NODE=M196215;NODE=M196

	Mode	
Γ_1	DK	DESIG=1
Γ_2	D^0K^+	DESIG=2
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

$D^*_{sJ}(2860)^\pm$ BRANCHING RATIOS

NODE=M196225

$\Gamma(D^*K)/\Gamma(DK)$ Γ_4/Γ_1

NODE=M196R01
NODE=M196R01

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
1.10±0.15±0.19	3122	[5] AUBERT	09AR	BABR	$e^+e^- \rightarrow D^{(*)}KX$

[5] From the average of the corresponding ratios with $D^{(*)0}K^+$ and $D^{(*)+}K^0_S$.

NODE=M196R01;LINKAGE=AU

$\Gamma(D^{*0}K^+)/\Gamma(D^0K^+)$ Γ_5/Γ_2

NODE=M196R02
NODE=M196R02

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	[6] AUBERT	09AR	BABR	$e^+e^- \rightarrow D^{(*)}KX$

[6] From the $D^{*0}K^+$ and D^0K^+, where $D^{*0} \rightarrow D^0\pi^0$.

NODE=M196R02;LINKAGE=AU

$\Gamma(D^{*+}K^0_S)/\Gamma(D^+K^0_S)$ Γ_6/Γ_3

NODE=M196R03
NODE=M196R03

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	[7] AUBERT	09AR	BABR	$e^+e^- \rightarrow D^{(*)}KX$

[7] From the $D^{*+}K^0_S$ and $D^+K^0_S$, where $D^{*+} \rightarrow D^+\pi^0$.

NODE=M196R03;LINKAGE=AU

$D^*_{sJ}(2860)^{\pm}$ REFERENCES

NODE=M196

AUBERT	09AR	PR D80 092003	B. Aubert *et al.*	(BABAR Collb.)
AUBERT,BE	06E	PRL 97 222001	B. Aubert *et al.*	(BABAR Collab.)

REFID=53135
REFID=51512

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	$e^+ e^- \rightarrow D^* K X$

NODE=M197M

$D_{sJ}(3040)^+$ WIDTH

NODE=M197W

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
$239 \pm 35^{+46}_{-42}$	AUBERT	09AR	BABR	$e^+ e^- \rightarrow D^* K X$

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 Collb.)

REFID=53135

OTHER RELATED PAPERS

SUN	09	PR D80 074037	Z.-F. Sun, X. Lin

REFID=53128

BOTTOM MESONS
$(B = \pm 1)$

NODE=MXXX045

$B^+ = u\overline{b}$, $B^0 = d\overline{b}$, $\overline{B}^0 = \overline{d}\, b$, $B^- = \overline{u}\, b$, similarly for B^*'s

NODE=MXXX045

BOTTOM, STRANGE MESONS
$(B = \pm 1, S = \mp 1)$

NODE=MXXX046

$B^0_s = s\overline{b}$, $\overline{B}^0_s = \overline{s}\, b$, similarly for B^*_s's

NODE=MXXX046

BOTTOM, CHARMED MESONS
$(B = C = \pm 1)$

NODE=MXXX049

$B^+_c = c\overline{b}$, $B^-_c = \overline{c}\, b$, similarly for B^*_c's

NODE=MXXX049

$c\overline{c}$ MESONS

NODE=MXXX025

A REVIEW GOES HERE – Check our WWW List of Reviews

NODE=M826

NODE=M026

$\eta_c(1S)$ $\quad I^G(J^{PC}) = 0^+(0^{-+})$

$\eta_c(1S)$ MASS

NODE=M026M

NODE=M026M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
2981.0± 1.1 OUR AVERAGE		Error includes scale factor of 1.7. See the ideogram below.				NEW
[2980.3 ± 1.2 MeV OUR 2011 AVERAGE Scale factor = 1.6]						
2984.5± 0.8± 3.1	11k	DEL-AMO-SA...	11M	BABR	$\gamma\gamma \to K^+K^-\pi^+\pi^-\pi^0$	
$2985.4\pm 1.5^{+0.5}_{-2.0}$	920	[1] VINOKUROVA	11	BELL	$B^\pm \to K^\pm(K^0_S K^\pm\pi^\mp)$	
2982.2± 0.4± 1.6	14k	[2] 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	[3] ABE	07	BELL	$e^+e^- \to J/\psi(c\overline{c})$	
$2971 \pm 3 ^{+2}_{-1}$	195	WU	06	BELL	$B^+ \to p\overline{p}K^+$	
$2974 \pm 7 ^{+2}_{-1}$	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	[4] AMBROGIANI	03	E835	$\overline{p}p \to \eta_c \to \gamma\gamma$	
2977.5± 1.0± 1.2		[5,6] BAI	03	BES	$J/\psi \to \gamma\eta_c$	
2976.3± 2.3± 1.2		[6,7,8] BAI	00F	BES	$J/\psi \to \gamma\eta_c$ and $\psi(2S) \to \gamma\eta_c$	
2969 ± 4 ± 4	80	[6] BAI	90B	MRK3	$J/\psi \to \gamma K^+K^-K^+K^-$	
2984 ± 2.3± 4.0		[6] GAISER	86	CBAL	$J/\psi \to \gamma X$, $\psi(2S) \to \gamma X$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
2982.5± 0.4± 1.4	12k	[9] DEL-AMO-SA...	11M	BABR	$\gamma\gamma \to K^0_S K^\pm\pi^\mp$	OCCUR=2
2982.2± 0.6		[6] MITCHELL	09	CLEO	$e^+e^- \to \gamma X$	
2982 ± 5	270	[10] AUBERT	06E	BABR	$B^\pm \to K^\pm X_{c\overline{c}}$	
2982.5± 1.1± 0.9	2.5k	[11] AUBERT	04D	BABR	$\gamma\gamma \to \eta_c(1S) \to K\overline{K}\pi$	
2979.6± 2.3± 1.6	180	[12] FANG	03	BELL	$B \to \eta_c K$	
2976.6± 2.9± 1.3	140	[6,7,13] BAI	00F	BES	$J/\psi \to \gamma\eta_c$	OCCUR=2
2980.4± 2.3± 0.6		[14] BRANDENB...	00B	CLE2	$\gamma\gamma \to \eta_c \to K^\pm K^0_S\pi^\mp$	
2975.8± 3.9± 1.2		[7,13] 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		[6,13] BISELLO	91	DM2	$J/\psi \to \eta_c\gamma$	
2956 ±12 ±12		[6] 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		[6,13] BALTRUSAIT...	86	MRK3	$J/\psi \to \eta_c\gamma$	
2976 ± 8		[6,15] BALTRUSAIT...	84	MRK3	$J/\psi \to 2\phi\gamma$	
2982 ± 8	18	[16] HIMEL	80B	MRK2	e^+e^-	
2980 ± 9		[16] PARTRIDGE	80B	CBAL	e^+e^-	

[1] Accounts for interference with non-resonant continuum. NODE=M026M;LINKAGE=VA

[2] Taking into account interference with the non-resonant $J^P = 0^-$ amplitude. NODE=M026M;LINKAGE=LE

[3] From a fit of the J/ψ recoil mass spectrum. Supersedes ABE,K 02 and ABE 04G. NODE=M026M;LINKAGE=EB

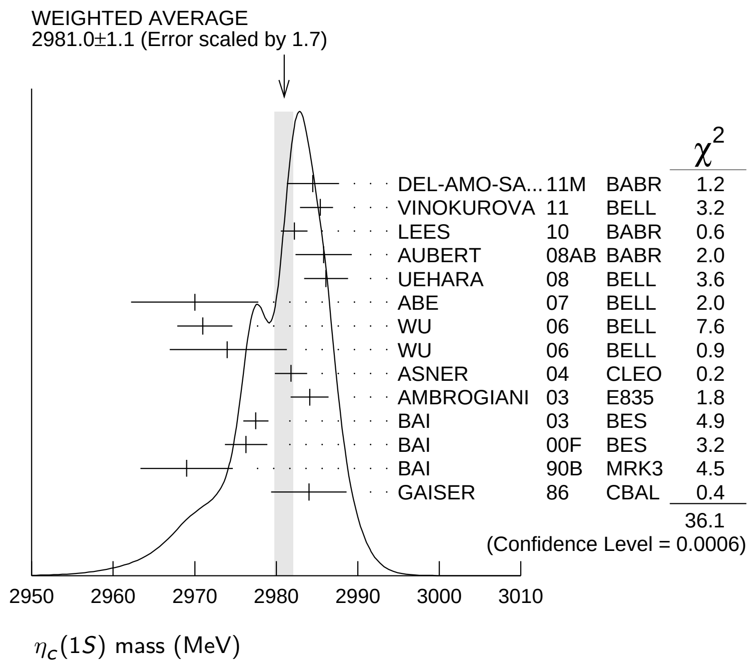
[4] Using mass of $\psi(2S) = 3686.00$ MeV. NODE=M026M;LINKAGE=BG

[5] From a simultaneous fit of five decay modes of the η_c. NODE=M026M;LINKAGE=AK

[6] 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

[7] Using an η_c width of 13.2 MeV. NODE=M026M;LINKAGE=C1

[8] Weighted average of the $\psi(2S)$ and $J/\psi(1S)$ samples. NODE=M026M;LINKAGE=KZ
[9] Not independent from the measurements reported by LEES 10. NODE=M026M;LINKAGE=DE
[10] From the fit of the kaon momentum spectrum. Systematic errors not evaluated. NODE=M026M;LINKAGE=AU
[11] Superseded by LEES 10. NODE=M026M;LINKAGE=UB
[12] Superseded by VINOKUROVA 11. NODE=M026M;LINKAGE=FA
[13] Average of several decay modes. NODE=M026M;LINKAGE=A
[14] Superseded by ASNER 04. NODE=M026M;LINKAGE=NN
[15] $\eta_c \to \phi\phi$. NODE=M026M;LINKAGE=B
[16] 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)	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
29.7± 1.0 OUR FIT					
29.7± 2.1 OUR AVERAGE Error includes scale factor of 2.0. See the ideogram below.					
[28.6 ± 2.2 MeV OUR 2011 AVERAGE Scale factor = 2.0]					
$36.2 \pm 2.8 \pm 3.0$		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	[17] VINOKUROVA 11	BELL	$B^\pm \to K^\pm (K^0_S K^\pm \pi^\mp)$
$31.7 \pm 1.2 \pm 0.8$		14k	[18] LEES 10	BABR	10.6 $e^+ e^- \to e^+ e^- K^0_S K^\pm \pi^\mp$
$36.3^{+3.7}_{-3.6} \pm 4.4$		921 ± 32	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	$B^+ \to p \overline{p} K^+$
$40 \pm 19 \pm 5$		20	WU 06	BELL	$B^+ \to \Lambda \overline{\Lambda} K^+$
$24.8 \pm 3.4 \pm 3.5$		592	ASNER 04	CLEO	$\gamma\gamma \to \eta_c \to K^0_S K^\pm \pi^\mp$
$20.4^{+7.7}_{-6.7} \pm 2.0$		190	AMBROGIANI 03	E835	$\overline{p} p \to \eta_c \to \gamma\gamma$
$17.0 \pm 3.7 \pm 7.4$			[19] BAI 03	BES	$J/\psi \to \gamma \eta_c$
$11.0 \pm 8.1 \pm 4.1$			[20] BAI 00F	BES	$J/\psi \to \gamma \eta_c$ and $\psi(2S) \to \gamma \eta_c$
$23.9^{+12.6}_{-7.1}$			ARMSTRONG 95F	E760	$\overline{p} p \to \gamma\gamma$
$7.0^{+7.5}_{-7.0}$		12	BAGLIN 87B	SPEC	$\overline{p} p \to \gamma\gamma$
$10.1^{+33.0}_{-8.2}$		23	[21] BALTRUSAIT..86	MRK3	$J/\psi \to \gamma p \overline{p}$
11.5 ± 4.5			GAISER 86	CBAL	$J/\psi \to \gamma X$, $\psi(2S) \to \gamma X$

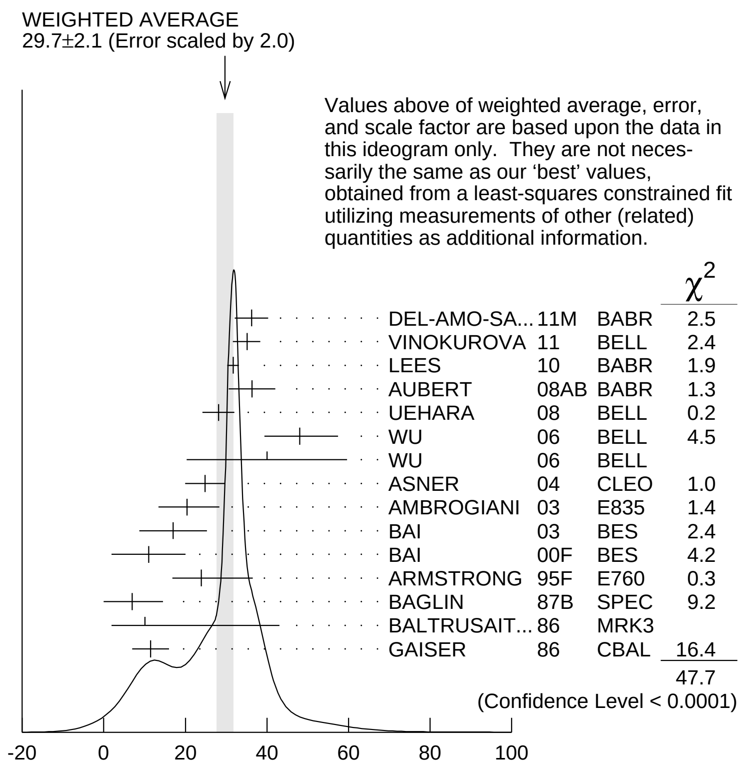
NEW

OCCUR=2

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

32.1± 1.1±1.3		12k	[22] DEL-AMO-SA...	11M	BABR	$\gamma\gamma \to K^0_S K^\pm \pi^\mp$	OCCUR=2
34.3± 2.3±0.9		2547 ± 90	[23] AUBERT	04D	BABR	$\gamma\gamma \to \eta_c(1S) \to K\overline{K}\pi$	
29 ± 8 ±6		182 ± 25	[24] FANG	03	BELL	$B \to \eta_c K$	
27.0± 5.8±1.4			[25] BRANDENB...	00B	CLE2	$\gamma\gamma \to \eta_c \to K^\pm K^0_S \pi^\mp$	
< 40	90	18	HIMEL	80B	MRK2	e^+e^-	
< 20	90		PARTRIDGE	80B	CBAL	e^+e^-	

[17] Accounts for interference with non-resonant continuum. NODE=M026W;LINKAGE=VA
[18] Taking into account interference with the non-resonant $J^P = 0^-$ amplitude. NODE=M026W;LINKAGE=LE
[19] From a simultaneous fit of five decay modes of the η_c. NODE=M026W;LINKAGE=AK
[20] 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
[21] Positive and negative errors correspond to 90% confidence level. NODE=M026W;LINKAGE=L
[22] Not independent from the measurements reported by LEES 10. NODE=M026W;LINKAGE=DE
[23] Superseded by LEES 10. NODE=M026W;LINKAGE=UB
[24] Superseded by VINOKUROVA 11. NODE=M026W;LINKAGE=FA
[25] Superseded by ASNER 04. NODE=M026W;LINKAGE=NN



$\eta_c(1S)$ WIDTH

$\eta_c(1S)$ 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	$\rho\rho$	(1.8 ±0.5) %		DESIG=19
Γ_3	$K^*(892)^0 K^-\pi^+$ + c.c.	(2.0 ±0.7) %		DESIG=26
Γ_4	$K^*(892)\overline{K}^*(892)$	(6.8 ±1.3) $\times 10^{-3}$		DESIG=18
Γ_5	$K^{*0}\overline{K}^{*0}\pi^+\pi^-$	(1.1 ±0.5) %		DESIG=57
Γ_6	$\phi K^+ K^-$	(2.9 ±1.4) $\times 10^{-3}$		DESIG=28
Γ_7	$\phi\phi$	(1.94±0.30) $\times 10^{-3}$		DESIG=17
Γ_8	$\phi 2(\pi^+\pi^-)$	< 3.5 $\times 10^{-3}$	90%	DESIG=58

Γ_9	$a_0(980)\pi$	< 2 %	90%		DESIG=21
Γ_{10}	$a_2(1320)\pi$	< 2 %	90%		DESIG=22
Γ_{11}	$K^*(892)\overline{K}$ + c.c.	< 1.28 %	90%		DESIG=40
Γ_{12}	$f_2(1270)\eta$	< 1.1 %	90%		DESIG=23
Γ_{13}	$\omega\omega$	$< 3.1 \times 10^{-3}$	90%		DESIG=20
Γ_{14}	$\omega\phi$	$< 1.7 \times 10^{-3}$	90%		DESIG=47
Γ_{15}	$f_2(1270) f_2(1270)$	$(9.7 \pm 2.5) \times 10^{-3}$			DESIG=46
Γ_{16}	$f_2(1270) f'_2(1525)$	$(9.3 \pm 3.1) \times 10^{-3}$			DESIG=59

Decays into stable hadrons

NODE=M026;CLUMP=B

Γ_{17}	$K\overline{K}\pi$	(7.2 ± 0.6) %			DESIG=14
Γ_{18}	$\eta\pi^+\pi^-$	(4.9 ± 1.8) %			DESIG=16
Γ_{19}	$K^+K^-\pi^+\pi^-$	$(6.1 \pm 1.2) \times 10^{-3}$			DESIG=15
Γ_{20}	$K^+K^-\pi^+\pi^-\pi^0$	(3.4 ± 0.6) %			DESIG=60
Γ_{21}	$K^+K^-2(\pi^+\pi^-)$	$(7.1 \pm 2.9) \times 10^{-3}$			DESIG=55
Γ_{22}	$2(K^+K^-)$	$(1.34 \pm 0.32) \times 10^{-3}$			DESIG=27
Γ_{23}	$2(\pi^+\pi^-)$	$(8.6 \pm 1.3) \times 10^{-3}$			DESIG=11
Γ_{24}	$3(\pi^+\pi^-)$	(1.5 ± 0.5) %			DESIG=56
Γ_{25}	$p\overline{p}$	$(1.41 \pm 0.17) \times 10^{-3}$			DESIG=12
Γ_{26}	$\Lambda\overline{\Lambda}$	$(9.4 \pm 3.2) \times 10^{-4}$			DESIG=45
Γ_{27}	$K\overline{K}\eta$	< 3.1 %	90%		DESIG=25
Γ_{28}	$\pi^+\pi^- p\overline{p}$	< 1.2 %	90%		DESIG=13

Radiative decays

NODE=M026;CLUMP=C

Γ_{29}	$\gamma\gamma$	$(1.78 \pm 0.16) \times 10^{-4}$			DESIG=31

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

NODE=M026;CLUMP=D

Γ_{30}	$\pi^+\pi^-$	P,CP	$< 1.1 \times 10^{-4}$	90%	DESIG=51
Γ_{31}	$\pi^0\pi^0$	P,CP	$< 3.5 \times 10^{-5}$	90%	DESIG=52
Γ_{32}	K^+K^-	P,CP	$< 6 \times 10^{-4}$	90%	DESIG=53
Γ_{33}	$K^0_S K^0_S$	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 14 branching ratios uses 73 measurements and one constraint to determine 11 parameters. The overall fit has a $\chi^2 = 136.4$ for 63 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_7	15								
x_{15}	5	6							
x_{17}	28	35	10						
x_{19}	15	17	5	32					
x_{22}	12	14	4	31	14				
x_{23}	18	20	6	38	20	16			
x_{25}	20	23	7	46	23	19	26		
x_{29}	−33	−39	−12	−72	−38	−31	−45	−56	
Γ	−3	−3	−1	−6	−3	−3	−4	10	−31
	x_4	x_7	x_{15}	x_{17}	x_{19}	x_{22}	x_{23}	x_{25}	x_{29}

	Mode	Rate (MeV)	
Γ_4	$K^*(892)\overline{K}^*(892)$	0.20 ± 0.04	DESIG=18
Γ_7	$\phi\phi$	0.058 ± 0.009	DESIG=17

Γ_{15}	$f_2(1270)\,f_2(1270)$	0.29 ± 0.07	DESIG=46
Γ_{17}	$K\overline{K}\pi$	2.12 ± 0.19	DESIG=14
Γ_{19}	$K^+K^-\pi^+\pi^-$	0.180 ± 0.035	DESIG=15
Γ_{22}	$2(K^+K^-)$	0.040 ± 0.009	DESIG=27
Γ_{23}	$2(\pi^+\pi^-)$	0.25 ± 0.04	DESIG=11
Γ_{25}	$p\overline{p}$	0.042 ± 0.005	DESIG=12
Γ_{29}	$\gamma\gamma$	0.0053 ± 0.0005	DESIG=31

$\eta_c(1S)$ PARTIAL WIDTHS

NODE=M026217

$\Gamma(\gamma\gamma)$ — Γ_{29}

NODE=M026W1
NODE=M026W1

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
5.3± 0.5 OUR FIT				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
5.2 ± 1.2	273 ± 43	[26,27] AUBERT 06E	BABR	$B^\pm \to K^\pm X_{c\overline{c}}$
$5.5 \pm 1.2 \pm 1.8$	157 ± 33	[28] KUO 05	BELL	$\gamma\gamma \to p\overline{p}$
$7.4 \pm 0.4 \pm 2.3$		[29] ASNER 04	CLEO	$\gamma\gamma \to \eta_c \to K^0_S K^\pm \pi^\mp$
$13.9 \pm 2.0 \pm 3.0$	41	[30] ABDALLAH 03J	DLPH	$\gamma\gamma \to \eta_c$
$3.8^{+1.1}_{-1.0}{}^{+1.9}_{-1.0}$	190	[31] AMBROGIANI 03	E835	$\overline{p}p \to \eta_c \to \gamma\gamma$
$7.6 \pm 0.8 \pm 2.3$		[29,32] BRANDENB... 00B	CLE2	$\gamma\gamma \to \eta_c \to K^\pm K^0_S \pi^\mp$
$6.9 \pm 1.7 \pm 2.1$	76	[33] ACCIARRI 99T	L3	$e^+e^- \to e^+e^-\eta_c$
$27 \pm 16 \pm 10$	5	[29] SHIRAI 98	AMY	$58\ e^+e^-$
$6.7^{+2.4}_{-1.7} \pm 2.3$		[28] ARMSTRONG 95F	E760	$\overline{p}p \to \gamma\gamma$
11.3 ± 4.2		[34] ALBRECHT 94H	ARG	$e^+e^- \to e^+e^-\eta_c$
$8.0 \pm 2.3 \pm 2.4$	17	[35] ADRIANI 93N	L3	$e^+e^- \to e^+e^-\eta_c$
$5.9^{+2.1}_{-1.8} \pm 1.9$		[31] CHEN 90B	CLEO	$e^+e^- \to e^+e^-\eta_c$
$6.4^{+5.0}_{-3.4}$		[36] AIHARA 88D	TPC	$e^+e^- \to e^+e^- X$
$4.3^{+3.4}_{-3.7} \pm 2.4$		[28] BAGLIN 87B	SPEC	$\overline{p}p \to \gamma\gamma$
28 ± 15		[29,37] BERGER 86	PLUT	$\gamma\gamma \to K\overline{K}\pi$

[26] Calculated by us using $\Gamma(\eta_c \to K\overline{K}\pi) \times \Gamma(\eta_c \to \gamma\gamma) / \Gamma = 0.44 \pm 0.05$ keV from PDG 06 and $B(\eta_c \to K\overline{K}\pi) = (8.5 \pm 1.8)\%$ from AUBERT 06E. NODE=M026W1;LINKAGE=AU

[27] Systematic errors not evaluated. NODE=M026W1;LINKAGE=NS

[28] Normalized to $B(\eta_c \to p\overline{p}) = (1.3 \pm 0.4) \times 10^{-3}$. NODE=M026W1;LINKAGE=N3

[29] Normalized to $B(\eta_c \to K^\pm K^0_S \pi^\mp)$. NODE=M026W1;LINKAGE=N2

[30] Average of $K^0_S K^\pm \pi^\mp$, $\pi^+\pi^-K^+K^-$, and $2(K^+K^-)$ decay modes. NODE=M026W;LINKAGE=FF

[31] 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

[32] Superseded by ASNER 04. NODE=M026W1;LINKAGE=NN

[33] Normalized to the sum of 9 branching ratios. NODE=M026W1;LINKAGE=N1

[34] 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

[35] Superseded by ACCIARRI 99T. NODE=M026W1;LINKAGE=WD

[36] 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

[37] Re-evaluated by AIHARA 88D. NODE=M026W1;LINKAGE=A

$\eta_c(1S)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M026220

$\Gamma(K\overline{K}\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_{17}\Gamma_{29}/\Gamma$

NODE=M026G14
NODE=M026G14

VALUE (keV)	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
0.377±0.021 OUR FIT					
0.407±0.027 OUR AVERAGE Error includes scale factor of 1.2.					
$0.374 \pm 0.009 \pm 0.031$		14k	[38] LEES 10	BABR	$10.6\ e^+e^- \to e^+e^- K^0_S K^\pm \pi^\mp$
$0.407 \pm 0.022 \pm 0.028$			[39,40] ASNER 04	CLEO	$\gamma\gamma \to \eta_c \to K^0_S K^\pm \pi^\mp$
$0.60 \pm 0.12 \pm 0.09$		41	[40,41] ABDALLAH 03J	DLPH	$\gamma\gamma \to K^0_S K^\pm \pi^\mp$
$1.47 \pm 0.87 \pm 0.27$			[40] SHIRAI 98	AMY	$\gamma\gamma \to \eta_c \to K^\pm K^0_S \pi^\mp$

0.84 $\pm$0.21		[40] ALBRECHT	94H	ARG	$\gamma\gamma \to K^{\pm} K^0_S \pi^{\mp}$	
0.60 $^{+0.23}_{-0.20}$		[40] CHEN	90B	CLEO	$\gamma\gamma \to \eta_c K^{\pm} K^0_S \pi^{\mp}$	
1.06 $\pm$0.41 $\pm$0.27	11	[40] BRAUNSCH...	89	TASS	$\gamma\gamma \to K\overline{K}\pi$	
1.5 $^{+0.60}_{-0.45}$ $\pm$0.3	7	[40] BERGER	86	PLUT	$\gamma\gamma \to K\overline{K}\pi$	

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

0.386$\pm$0.008$\pm$0.021	12k	[42] DEL-AMO-SA..11M		BABR	$\gamma\gamma \to K^0_S K^{\pm} \pi^{\mp}$
0.418$\pm$0.044$\pm$0.022		[40,43] BRANDENB...	00B	CLE2	$\gamma\gamma \to \eta_c \to K^{\pm} K^0_S \pi^{\mp}$
<0.63	95	[40] BEHREND	89	CELL	$\gamma\gamma \to K^0_S K^{\pm} \pi^{\mp}$
<4.4	95	ALTHOFF	85B	TASS	$\gamma\gamma \to K\overline{K}\pi$

[38] From the corrected and unfolded mass spectrum. NODE=M026G14;LINKAGE=LE

[39] Calculated by us from the value reported in ASNER 04 that assumes B($\eta_c \to K\overline{K}\pi$) = 5.5 $\pm$ 1.7% NODE=M026G14;LINKAGE=AA

[40] We have multiplied $K^{\pm} K^0_S \pi^{\mp}$ measurement by 3 to obtain $K\overline{K}\pi$. NODE=M026G14;LINKAGE=C

[41] 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 $\pm$ 0.4)%. NODE=M026G;LINKAGE=BB

[42] Not independent from the measurements reported by LEES 10. NODE=M026G14;LINKAGE=DE

[43] Superseded by ASNER 04. NODE=M026G14;LINKAGE=NN

$\Gamma(K^+ K^- \pi^+ \pi^-) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_{19}\Gamma_{29}/\Gamma$

NODE=M026G15
NODE=M026G15

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
32 $\pm$ 6 OUR FIT					
27 $\pm$ 6 OUR AVERAGE					
25.7$\pm$ 3.2$\pm$ 4.9	2019$\pm$248	UEHARA	08	BELL	$\gamma\gamma \to \pi^+\pi^- K^+ K^-$
280 $\pm$100 $\pm$60	42	[44] ABDALLAH	03J	DLPH	$\gamma\gamma \to \pi^+\pi^- K^+ K^-$
170 $\pm$ 80 $\pm$20	13.9 $\pm$ 6.6	ALBRECHT	94H	ARG	$\gamma\gamma \to \pi^+\pi^- K^+ K^-$

[44] Calculated by us from the value reported in ABDALLAH 03J, which uses B($\eta_c \to \pi^+\pi^- K^+ K^-$) = (2.0 $\pm$ 0.7)%. NODE=M026G;LINKAGE=CC

$\Gamma(K^+ K^- \pi^+ \pi^- \pi^0) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_{20}\Gamma_{29}/\Gamma$

NODE=M026G02
NODE=M026G02

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.190$\pm$0.006$\pm$0.028	11k	[45] DEL-AMO-SA..11M	BABR	$\gamma\gamma \to K^+ K^- \pi^+ \pi^- \pi^0$

[45] Not independent from other measurements reported in DEL-AMO-SANCHEZ 11M. NODE=M026G02;LINKAGE=DE

$\Gamma(K^*(892)\overline{K}^*(892)) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_4\Gamma_{29}/\Gamma$

NODE=M026G08
NODE=M026G08

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
36 $\pm$6 OUR FIT					
32.4$\pm$4.2$\pm$5.8	882 $\pm$ 115	UEHARA	08	BELL	$\gamma\gamma \to \pi^+\pi^- K^+ K^-$

$\Gamma(f_2(1270) f'_2(1525)) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_{16}\Gamma_{29}/\Gamma$

NODE=M026G20
NODE=M026G20

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
49$\pm$9$\pm$13	1128$\pm$206	UEHARA	08	BELL	$\gamma\gamma \to \pi^+\pi^- K^+ K^-$

$\Gamma(2(K^+ K^-)) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_{22}\Gamma_{29}/\Gamma$

NODE=M026G27
NODE=M026G27

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
7.0$\pm$ 1.6 OUR FIT					
5.8$\pm$ 1.9 OUR AVERAGE					
5.6$\pm$ 1.1$\pm$ 1.6	216 $\pm$ 42	UEHARA	08	BELL	$\gamma\gamma \to 2(K^+ K^-)$
350 $\pm$90 $\pm$60	46	[46] ABDALLAH	03J	DLPH	$\gamma\gamma \to 2(K^+ K^-)$
231 $\pm$90 $\pm$23	9.1 $\pm$ 3.3	[47] ALBRECHT	94H	ARG	$\gamma\gamma \to 2(K^+ K^-)$

[46] Calculated by us from the value reported in ABDALLAH 03J, which uses B($\eta_c \to$) 2($K^+ K^-$) = (2.1 $\pm$ 1.2)%. NODE=M026G;LINKAGE=DD

[47] Includes all topological modes except $\eta_c \to \phi\phi$. NODE=M026G;LINKAGE=EE

$\Gamma(\phi\phi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_7\Gamma_{29}/\Gamma$

NODE=M026G07
NODE=M026G07

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
10.2$\pm$1.4 OUR FIT					
6.8$\pm$1.2$\pm$1.3	132 $\pm$ 23	UEHARA	08	BELL	$\gamma\gamma \to 2(K^+ K^-)$

$\Gamma(2(\pi^+\pi^-)) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_{23}\Gamma_{29}/\Gamma$

NODE=M026G11

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
45 ± 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	$\gamma\gamma \to 2(\pi^+\pi^-)$

$\Gamma(\rho\rho) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_2\Gamma_{29}/\Gamma$

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	$\gamma\gamma \to 2(\pi^+\pi^-)$

$\Gamma(f_2(1270) f_2(1270)) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_{15}\Gamma_{29}/\Gamma$

NODE=M026G19

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
51±13 OUR FIT					
69±17±12	3182±766	UEHARA	08	BELL	$\gamma\gamma \to 2(\pi^+\pi^-)$

$\Gamma(p\overline{p}) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_{25}\Gamma_{29}/\Gamma$

NODE=M026G01

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
7.4 ±0.8 OUR FIT					
7.2 ±1.7 OUR AVERAGE [$6.2^{+1.1}_{-1.0}$ eV OUR 2011 AVERAGE Scale factor = 1.1]					
$7.20 \pm 1.53^{+0.67}_{-0.75}$	157 ± 33	[48] 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	[48] AMBROGIANI	03	E835	$\overline{p}p \to \gamma\gamma$
$8.1\ ^{+2.9}_{-2.0}$		[48] ARMSTRONG	95F	E760	$\overline{p}p \to \gamma\gamma$

NEW

[48] Not independent from the $\Gamma_{\gamma\gamma}$ reported by the same experiment.

NODE=M026G01;LINKAGE=GG

$\eta_c(1S)$ 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	[49] BALTRUSAIT...	86	MRK3	$J/\psi \to \eta_c\gamma$

$\Gamma(\rho\rho)/\Gamma_{total}$ Γ_2/Γ

NODE=M026R9

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
18 ± 5 OUR AVERAGE						
12.6± 3.8±5.1		72	[49] ABLIKIM	05L	BES2	$J/\psi \to \pi^+\pi^-\pi^+\pi^-\gamma$
26.0± 2.4±8.8		113	[49] BISELLO	91	DM2	$J/\psi \to \gamma\rho^0\rho^0$
23.6±10.6±8.2		32	[49] BISELLO	91	DM2	$J/\psi \to \gamma\rho^+\rho^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<14	90		[49] BALTRUSAIT...	86	MRK3	$J/\psi \to \eta_c\gamma$

OCCUR=2

$\Gamma(K^*(892)^0 K^-\pi^+ + \text{c.c.})/\Gamma_{total}$ Γ_3/Γ

NODE=M026R16

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.02±0.007	63	[49] BALTRUSAIT...	86	MRK3	$J/\psi \to \eta_c\gamma$

$\Gamma(K^*(892)\overline{K}^*(892))/\Gamma_{total}$ Γ_4/Γ

NODE=M026R8

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
68±13 OUR FIT					
91±26 OUR AVERAGE					
108±25±44	60	[49] ABLIKIM	05L	BES2	$J/\psi \to K^+K^-\pi^+\pi^-\gamma$
82±28±27	14	[49] BISELLO	91	DM2	$e^+e^- \to \gamma K^+K^-\pi^+\pi^-$
90±50	9	[49] BALTRUSAIT...	86	MRK3	$J/\psi \to \eta_c\gamma$

$\Gamma(K^{*0}\overline{K}^{*0}\pi^+\pi^-)/\Gamma_{total}$ Γ_5/Γ

NODE=M026R25

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
112±47±26	45	[50] ABLIKIM	06A	BES2	$J/\psi \to K^{*0}\overline{K}^{*0}\pi^+\pi^-\gamma$

$\Gamma(\phi K^+ K^-)/\Gamma_{total}$ Γ_6/Γ

NODE=M026R21

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
$2.9^{+0.9}_{-0.8}\pm1.1$	$14.1^{+4.4}_{-3.7}$	[51] HUANG	03	BELL	$B^+ \to (\phi K^+ K^-) K^+$

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

NODE=M026R7

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
19.4± 3.0 OUR FIT					
30 ± 5 OUR AVERAGE					
[(27 ± 5) × 10^{-4} OUR 2011 AVERAGE]					
25.3± 5.1± 9.1	72	[49] ABLIKIM	05L	BES2	$J/\psi \to K^+ K^- K^+ K^- \gamma$
26 ± 9	357 ± 64	[49] BAI	04	BES	$J/\psi \to \gamma K^+ K^- K^+ K^-$
31 ± 7 ±10	19	[49] BISELLO	91	DM2	$J/\psi \to \gamma K^+ K^- K^+ K^-$
$30\ ^{+18}_{-12}$ ±10	5	[49] BISELLO	91	DM2	$J/\psi \to \gamma K^+ K^- K^0_S K^0_L$
74 ±18 ±24	80	[49] BAI	90B	MRK3	$J/\psi \to \gamma K^+ K^- K^+ K^-$
67 ±21 ±24		[49] 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. • • •					
$18\ ^{+8}_{-6}$ ± 7	$7.0^{+3.0}_{-2.3}$	[51] HUANG	03	BELL	$B^+ \to (\phi\phi) K^+$

NEW

OCCUR=2

OCCUR=3

$\Gamma(\phi\phi)/\Gamma(K\overline{K}\pi)$ Γ_7/Γ_{17}

NODE=M026R39

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.027±0.004 OUR FIT					
$0.044^{+0.012}_{-0.010}$ OUR AVERAGE					
[0.055 ± 0.015 OUR 2011 AVERAGE]					
0.055±0.014±0.005		AUBERT,B	04B	BABR	$B^\pm \to K^\pm \eta_c$
$0.032^{+0.014}_{-0.010}\pm0.009$	7	[51] HUANG	03	BELL	$B^\pm \to K^\pm \phi\phi$

NEW

$\Gamma(\phi 2(\pi^+\pi^-))/\Gamma_{total}$ Γ_8/Γ

NODE=M026R26

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<35	90	[52] ABLIKIM	06A	BES2	$J/\psi \to \phi 2(\pi^+\pi^-)\gamma$

$\Gamma(a_0(980)\pi)/\Gamma_{total}$ Γ_9/Γ

NODE=M026R11

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.02	90	[49,53] BALTRUSAIT...	86	MRK3	$J/\psi \to \eta_c \gamma$

$\Gamma(a_2(1320)\pi)/\Gamma_{total}$ Γ_{10}/Γ

NODE=M026R12

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.02	90	[49] BALTRUSAIT...	86	MRK3	$J/\psi \to \eta_c \gamma$

$\Gamma(K^*(892)\overline{K}+\text{c.c.})/\Gamma_{total}$ Γ_{11}/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	[49] BISELLO	91	DM2	$J/\psi \to \gamma K^+ K^- \pi^0$

OCCUR=2

$\Gamma(f_2(1270)\eta)/\Gamma_{total}$ Γ_{12}/Γ

NODE=M026R13

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.011	90	[49] BALTRUSAIT...	86	MRK3	$J/\psi \to \eta_c \gamma$

$\Gamma(\omega\omega)/\Gamma_{total}$ Γ_{13}/Γ

NODE=M026R10

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0031	90	[49] BALTRUSAIT...	86	MRK3	$J/\psi \to \eta_c \gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.0063	90	[49] ABLIKIM	05L	BES2	$J/\psi \to \pi^+\pi^-\pi^0\pi^+\pi^-\pi^0\gamma$
<0.0063		[49] BISELLO	91	DM2	$J/\psi \to \gamma\omega\omega$

$\Gamma(\omega\phi)/\Gamma_{total}$ Γ_{14}/Γ

NODE=M026R22

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0017	90	[49] ABLIKIM	05L	BES2	$J/\psi \to \pi^+\pi^-\pi^0 K^+ K^- \gamma$

$\Gamma(f_2(1270)f_2(1270))/\Gamma_{total}$ — Γ_{15}/Γ

NODE=M026R19
NODE=M026R19

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
0.97±0.25 OUR FIT				
$0.76^{+0.25}_{-0.29}$±0.18	91.2 ± 19.8	[54] ABLIKIM	04M BES	$J/\psi \rightarrow \gamma 2\pi^+ 2\pi^-$

$\Gamma(K\overline{K}\pi)/\Gamma_{total}$ — Γ_{17}/Γ

NODE=M026R4
NODE=M026R4

VALUE (units 10^{-2})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
7.2 ±0.6 OUR FIT					
6.1 ±0.8 OUR AVERAGE					
8.5 ±1.8			[55] AUBERT	06E BABR	$B^\pm \rightarrow K^\pm X_{c\overline{c}}$
5.1 ±2.1		609 ± 71	[49] BAI	04 BES	$J/\psi \rightarrow \gamma K^\pm \pi^\mp K^0_S$
6.90±1.42±1.32		33	[49] BISELLO	91 DM2	$J/\psi \rightarrow \gamma K^+ K^- \pi^0$
5.43±0.94±0.94		68	[49] BISELLO	91 DM2	$J/\psi \rightarrow \gamma K^\pm \pi^\mp K^0_S$
4.8 ±1.7		95	[49,56] BALTRUSAIT...86	MRK3	$J/\psi \rightarrow \eta_c \gamma$
16.1 $^{+9.2}_{-7.3}$			[57] HIMEL	80B MRK2	$\psi(2S) \rightarrow \eta_c \gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 10.7	90		[49] PARTRIDGE	80B CBAL	$J/\psi \rightarrow \eta_c \gamma$

OCCUR=2

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

NODE=M026R6
NODE=M026R6
→ NOT CHECKED ←

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.049±0.018 OUR EVALUATION				
0.047±0.015 OUR AVERAGE				
0.054±0.020	75	[49] BALTRUSAIT...86	MRK3	$J/\psi \rightarrow \eta_c \gamma$
0.037±0.013±0.020	18	[49] PARTRIDGE	80B CBAL	$J/\psi \rightarrow \eta \pi^+ \pi^- \gamma$

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

NODE=M026R5
NODE=M026R5

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.0061±0.0012 OUR FIT				
0.0142±0.0033 OUR AVERAGE				
0.012 ±0.004	413 ± 54	[49] BAI	04 BES	$J/\psi \rightarrow \gamma K^+ K^- \pi^+ \pi^-$
0.021 ±0.007	110	[49] BALTRUSAIT...86	MRK3	$J/\psi \rightarrow \eta_c \gamma$
0.014 $^{+0.022}_{-0.009}$		[57] HIMEL	80B MRK2	$\psi(2S) \rightarrow \eta_c \gamma$

$\Gamma(K^+K^-\pi^+\pi^-\pi^0)/\Gamma(K\overline{K}\pi)$ — Γ_{20}/Γ_{17}

NODE=M026R01
NODE=M026R01

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.477±0.017±0.070	11k	[58] DEL-AMO-SA...11M	BABR	$\gamma\gamma \rightarrow K^+ K^- \pi^+ \pi^- \pi^0$

$\Gamma(K^+K^-2(\pi^+\pi^-))/\Gamma_{total}$ — Γ_{21}/Γ

NODE=M026R23
NODE=M026R23

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
71±23±16	100	[59] ABLIKIM	06A BES2	$J/\psi \rightarrow K^+ K^- 2(\pi^+ \pi^-)\gamma$

$\Gamma(2(K^+K^-))/\Gamma_{total}$ — Γ_{22}/Γ

NODE=M026R20
NODE=M026R20

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
1.34± 0.32 OUR FIT				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.4 $^{+0.5}_{-0.4}$ ±0.6	$14.5^{+4.6}_{-3.0}$	[51] HUANG	03 BELL	$B^+ \rightarrow 2(K^+K^-) K^+$
21 ±10 ±6		[60] ALBRECHT	94H ARG	$\gamma\gamma \rightarrow K^+ K^- K^+ K^-$

$\Gamma(2(K^+K^-))/\Gamma(K\overline{K}\pi)$ — Γ_{22}/Γ_{17}

NODE=M026R38
NODE=M026R38

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.019±0.004 OUR FIT				
0.024±0.007 OUR AVERAGE				
[0.023 ± 0.009 OUR 2011 AVERAGE]				
0.023±0.007±0.006		AUBERT,B	04B BABR	$B^\pm \rightarrow K^\pm \eta_c$
$0.026^{+0.009}_{-0.007}$±0.007	15	[51] HUANG	03 BELL	$B^\pm \rightarrow K^\pm(2K^+ 2K^-)$

NEW

$\Gamma(2(\pi^+\pi^-))/\Gamma_{total}$ — Γ_{23}/Γ

NODE=M026R1

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
0.86±0.13 OUR FIT					
1.15±0.26 OUR AVERAGE					
1.0 ±0.5	542 ± 75	[49] BAI	04	BES	$J/\psi \to \gamma\, 2(\pi^+\pi^-)$
1.05±0.17±0.34	137	[49] BISELLO	91	DM2	$J/\psi \to \gamma 2\pi^+ 2\pi^-$
1.3 ±0.6	25	[49] BALTRUSAIT...	86	MRK3	$J/\psi \to \eta_c \gamma$
2.0 $^{+1.5}_{-1.0}$		[57] HIMEL	80B	MRK2	$\psi(2S) \to \eta_c \gamma$

$\Gamma(\phi K^+ K^-)/\Gamma(K\overline{K}\pi)$ — Γ_6/Γ_{17}

NODE=M026R02

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.052$^{+0.016}_{-0.014}$±0.014	7	[51] HUANG	03	BELL	$B^\pm \to K^\pm \phi\phi$

$\Gamma(3(\pi^+\pi^-))/\Gamma_{total}$ — Γ_{24}/Γ

NODE=M026R24

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
152±33±35	479	[61] ABLIKIM	06A	BES2	$J/\psi \to 3(\pi^+\pi^-)\gamma$

$\Gamma(p\overline{p})/\Gamma_{total}$ — Γ_{25}/Γ

NODE=M026R2

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
14.1± 1.7 OUR FIT					
12.5± 3.2 OUR AVERAGE					
[(14.0 ± 2.2) × 10^{-4} OUR 2011 AVERAGE]					
15 ± 6	213 ± 33	[49] BAI	04	BES	$J/\psi \to \gamma p\overline{p}$
10 ± 3 ±4	18	[49] BISELLO	91	DM2	$J/\psi \to \gamma p\overline{p}$
11 ± 6	23	[49] BALTRUSAIT...	86	MRK3	$J/\psi \to \eta_c \gamma$
29 $^{+29}_{-15}$		[57] HIMEL	80B	MRK2	$\psi(2S) \to \eta_c \gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
14.8$^{+2.0}_{-2.4}$±1.8	195	[62] WU	06	BELL	$B^+ \to p\overline{p} K^+$

NEW

$\Gamma(p\overline{p})/\Gamma(K\overline{K}\pi)$ — Γ_{25}/Γ_{17}

NODE=M026R03

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0197±0.0022 OUR FIT					
0.021 ±0.002 $^{+0.004}_{-0.006}$	195	[51] WU	06	BELL	$B^\pm \to K^\pm p\overline{p}$

$\Gamma(p\overline{p})/\Gamma_{total} \times \Gamma(\phi\phi)/\Gamma_{total}$ — $\Gamma_{25}/\Gamma \times \Gamma_7/\Gamma$

NODE=M026R33

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
0.27±0.06 OUR FIT				
4.0 $^{+3.5}_{-3.2}$	BAGLIN	89	SPEC	$\overline{p}p \to K^+K^-K^+K^-$

$\Gamma(\Lambda\overline{\Lambda})/\Gamma_{total}$ — Γ_{26}/Γ

NODE=M026R18

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
9.9$^{+2.7}_{-2.6}$±1.2		20	[63] WU	06	BELL	$B^+ \to \Lambda\overline{\Lambda} K^+$
<20	90		[49] BISELLO	91	DM2	$e^+e^- \to \gamma\Lambda\overline{\Lambda}$

$\Gamma(\Lambda\overline{\Lambda})/\Gamma(p\overline{p})$ — Γ_{26}/Γ_{25}

NODE=M026R27

VALUE	DOCUMENT ID		TECN	COMMENT
0.67$^{+0.19}_{-0.16}$±0.12	[64] WU	06	BELL	$B^+ \to p\overline{p}K^+$, $\Lambda\overline{\Lambda}K^+$

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

NODE=M026R15

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.031	90	[49] BALTRUSAIT...	86	MRK3	$J/\psi \to \eta_c \gamma$

$\Gamma(\pi^+\pi^- p\overline{p})/\Gamma_{total}$ — Γ_{28}/Γ

NODE=M026R3

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.012	90	HIMEL	80B	MRK2	$\psi(2S) \to \eta_c \gamma$

[49] The quoted branching ratios use B($J/\psi(1S) \rightarrow \gamma\eta_c(1S)$) = 0.0127 ± 0.0036. Where relevant, the error in this branching ratio is treated as a common systematic in computing averages. NODE=M026R;LINKAGE=E

[50] ABLIKIM 06A reports $[\Gamma(\eta_c(1S) \rightarrow K^{*0}\overline{K}^{*0}\pi^+\pi^-)/\Gamma_{\rm total}] \times [B(J/\psi(1S) \rightarrow \gamma\eta_c(1S))] = (1.91\pm0.64\pm0.48)\times10^{-4}$ which we divide by our best value $B(J/\psi(1S) \rightarrow \gamma\eta_c(1S)) = (1.7\pm0.4)\times10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M026R25;LINKAGE=AB

[51] Using $B(B^+ \rightarrow \eta_c K^+) = (1.25 \pm 0.12^{+0.10}_{-0.12}) \times 10^{-3}$ from FANG 03 and $B(\eta_c \rightarrow K\overline{K}\pi) = (5.5 \pm 1.7) \times 10^{-2}$. NODE=M026R;LINKAGE=BB

[52] ABLIKIM 06A reports $[\Gamma(\eta_c(1S) \rightarrow \phi 2(\pi^+\pi^-))/\Gamma_{\rm total}] \times [B(J/\psi(1S) \rightarrow \gamma\eta_c(1S))] < 0.603 \times 10^{-4}$ which we divide by our best value $B(J/\psi(1S) \rightarrow \gamma\eta_c(1S)) = 1.7 \times 10^{-2}$. NODE=M026R26;LINKAGE=AB

[53] We are assuming $B(a_0(980) \rightarrow \eta\pi) > 0.5$. NODE=M026R;LINKAGE=F

[54] ABLIKIM 04M reports $[\Gamma(\eta_c(1S) \rightarrow f_2(1270) f_2(1270))/\Gamma_{\rm total}] \times [B(J/\psi(1S) \rightarrow \gamma\eta_c(1S))] = (1.3 \pm 0.3^{+0.3}_{-0.4}) \times 10^{-4}$ which we divide by our best value $B(J/\psi(1S) \rightarrow \gamma\eta_c(1S)) = (1.7 \pm 0.4) \times 10^{-2}$. 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

[55] Determined from the ratio of $B(B^\pm \rightarrow K^\pm\eta_c)\, B(\eta_c \rightarrow K\overline{K}\pi) = (7.4 \pm 0.5 \pm 0.7) \times 10^{-5}$ reported in AUBERT,B 04B and $B(B^\pm \rightarrow K^\pm\eta_c) = (8.7 \pm 1.5) \times 10^{-3}$ reported in AUBERT 06E. NODE=M026R4;LINKAGE=AB

[56] Average from $K^+K^-\pi^0$ and $K^\pm K^0_S\pi^\mp$ decay channels. NODE=M026R;LINKAGE=D

[57] Estimated using $B(\psi(2S) \rightarrow \gamma\eta_c(1S)) = 0.0028 \pm 0.0006$. NODE=M026R;LINKAGE=A

[58] 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

[59] ABLIKIM 06A reports $[\Gamma(\eta_c(1S) \rightarrow K^+K^-2(\pi^+\pi^-))/\Gamma_{\rm total}] \times [B(J/\psi(1S) \rightarrow \gamma\eta_c(1S))] = (1.21\pm0.32\pm0.24)\times10^{-4}$ which we divide by our best value $B(J/\psi(1S) \rightarrow \gamma\eta_c(1S)) = (1.7\pm0.4)\times10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M026R23;LINKAGE=AB

[60] Normalized to the sum of $B(\eta_c \rightarrow K^\pm K^0_S\pi^\mp)$, $B(\eta_c \rightarrow \phi\phi)$, $B(\eta_c \rightarrow K^+K^-\pi^+\pi^-)$, and $B(\eta_c \rightarrow 2\pi^+2\pi^-)$. NODE=M026R;LINKAGE=AL

[61] ABLIKIM 06A reports $[\Gamma(\eta_c(1S) \rightarrow 3(\pi^+\pi^-))/\Gamma_{\rm total}] \times [B(J/\psi(1S) \rightarrow \gamma\eta_c(1S))] = (2.59 \pm 0.32 \pm 0.47) \times 10^{-4}$ which we divide by our best value $B(J/\psi(1S) \rightarrow \gamma\eta_c(1S)) = (1.7 \pm 0.4) \times 10^{-2}$. 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

[62] WU 06 reports $[\Gamma(\eta_c(1S) \rightarrow p\overline{p})/\Gamma_{\rm total}] \times [B(B^+ \rightarrow \eta_c K^+)] = (1.42\pm0.11^{+0.16}_{-0.20})\times 10^{-6}$ which we divide by our best value $B(B^+ \rightarrow \eta_c K^+) = (9.6 \pm 1.2) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M026R2;LINKAGE=WU

[63] WU 06 reports $[\Gamma(\eta_c(1S) \rightarrow \Lambda\overline{\Lambda})/\Gamma_{\rm total}] \times [B(B^+ \rightarrow \eta_c K^+)] = (0.95^{+0.25}_{-0.22}{}^{+0.08}_{-0.11}) \times 10^{-6}$ which we divide by our best value $B(B^+ \rightarrow \eta_c K^+) = (9.6 \pm 1.2) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M026R18;LINKAGE=WU

[64] Not independent from other $\eta_c \rightarrow \Lambda\overline{\Lambda}$, $p\overline{p}$ branching ratios reported by WU 06. NODE=M026R27;LINKAGE=WU

RADIATIVE DECAYS

NODE=M026310

$\Gamma(\gamma\gamma)/\Gamma_{\rm total}$ Γ_{29}/Γ

NODE=M026R31
NODE=M026R31

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
1.78±0.16 OUR FIT					
1.4 $^{+0.7}_{-0.6}$ OUR AVERAGE $[(1.8^{+0.6}_{-0.5}) \times 10^{-4}$ OUR 2011 AVERAGE]					NEW
1.4 $^{+0.7}_{-0.5}$ ±0.3		$1.2^{+2.8}_{-1.1}$	[65] ADAMS	08 CLEO	$\psi(2S) \rightarrow \pi^+\pi^- J/\psi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.3 $^{+1.0}_{-0.8}$ ±0.3		13	[66] WICHT	08 BELL	$B^\pm \rightarrow K^\pm\gamma\gamma$
$2.80^{+0.67}_{-0.58}$±1.0			[67] ARMSTRONG	95F E760	$\overline{p}p \rightarrow \gamma\gamma$
< 9	90		[68] BISELLO	91 DM2	$J/\psi \rightarrow \gamma\gamma\gamma$
6 $^{+4}_{-3}$ ±4			[67] BAGLIN	87B SPEC	$\overline{p}p \rightarrow \gamma\gamma$
< 18	90		[69] BLOOM	83 CBAL	$J/\psi \rightarrow \eta_c\gamma$

[65] ADAMS 08 reports $[\Gamma(\eta_c(1S) \to \gamma\gamma)/\Gamma_{\text{total}}] \times [B(J/\psi(1S) \to \gamma\eta_c(1S))] = (2.4^{+1.1}_{-0.8} \pm 0.3) \times 10^{-6}$ 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

[66] WICHT 08 reports $[\Gamma(\eta_c(1S) \to \gamma\gamma)/\Gamma_{\text{total}}] \times [B(B^+ \to \eta_c K^+)] = (2.2^{+0.9}_{-0.7}{}^{+0.4}_{-0.2}) \times 10^{-7}$ which we divide by our best value $B(B^+ \to \eta_c K^+) = (9.6 \pm 1.2) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M026R31;LINKAGE=WI

[67] Not independent from the values of the total and two-photon width quoted by the same experiment. NODE=M026R31;LINKAGE=AB

[68] 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=M026R31;LINKAGE=E

[69] 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_{29}/Γ_{17}

NODE=M026R04
NODE=M026R04

VALUE (units 10^{-3})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
2.5±0.4 OUR FIT					
$\mathbf{3.2^{+1.3}_{-1.0}{}^{+0.8}_{-0.6}}$	13	[70] WICHT	08	BELL	$B^{\pm} \to K^{\pm}\gamma\gamma$

[70] 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

$\Gamma(p\overline{p})/\Gamma_{\text{total}} \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_{25}/\Gamma \times \Gamma_{29}/\Gamma$

NODE=M026R32
NODE=M026R32

VALUE (units 10^{-6})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.250±0.026 OUR FIT					
0.26 ±0.05 OUR AVERAGE Error includes scale factor of 1.4.					
$0.224^{+0.038}_{-0.037} \pm 0.020$	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

$\Gamma(\pi^+\pi^-)/\Gamma_{\text{total}}$ — Γ_{30}/Γ

NODE=M026R34
NODE=M026R34

VALUE (units 10^{-5})	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<11 (CL = 90%) [$<60 \times 10^{-5}$ (CL = 90%) OUR 2011 BEST LIMIT]					
<11	90	[71] ABLIKIM	11G	BES3	$J/\psi \to \gamma\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<60	90	[72] ABLIKIM	06B	BES2	$J/\psi \to \pi^+\pi^-\gamma$

[71] ABLIKIM 11G reports $[\Gamma(\eta_c(1S) \to \pi^+\pi^-)/\Gamma_{\text{total}}] \times [B(J/\psi(1S) \to \gamma\eta_c(1S))] < 1.82\times10^{-6}$ which we divide by our best value $B(J/\psi(1S) \to \gamma\eta_c(1S)) = 1.7\times10^{-2}$. NODE=M026R34;LINKAGE=AL

[72] ABLIKIM 06B reports $[\Gamma(\eta_c(1S) \to \pi^+\pi^-)/\Gamma_{\text{total}}] \times [B(J/\psi(1S) \to \gamma\eta_c(1S))] < 1.1\times10^{-5}$ which we divide by our best value $B(J/\psi(1S) \to \gamma\eta_c(1S)) = 1.7\times10^{-2}$. NODE=M026R34;LINKAGE=AB

$\Gamma(\pi^0\pi^0)/\Gamma_{\text{total}}$ — Γ_{31}/Γ

NODE=M026R35
NODE=M026R35

VALUE (units 10^{-5})	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
< 3.5 (CL = 90%) [$<40 \times 10^{-5}$ (CL = 90%) OUR 2011 BEST LIMIT]					
< 3.5	90	[73] 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	[74] ABLIKIM	06B	BES2	$J/\psi \to \pi^0\pi^0\gamma$

[73] ABLIKIM 11G reports $[\Gamma(\eta_c(1S) \to \pi^0\pi^0)/\Gamma_{\text{total}}] \times [B(J/\psi(1S) \to \gamma\eta_c(1S))] < 6.0 \times 10^{-7}$ 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

[74] ABLIKIM 06B reports $[\Gamma(\eta_c(1S) \to \pi^0\pi^0)/\Gamma_{\text{total}}] \times [B(J/\psi(1S) \to \gamma\eta_c(1S))] < 0.71 \times 10^{-5}$ 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

$\Gamma(K^+K^-)/\Gamma_{\text{total}}$ — Γ_{32}/Γ

NODE=M026R36
NODE=M026R36

VALUE (units 10^{-5})	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<60	90	[75] ABLIKIM	06B	BES2	$J/\psi \to K^+K^-\gamma$

[75] ABLIKIM 06B reports $[\Gamma(\eta_c(1S) \to K^+K^-)/\Gamma_{\text{total}}] \times [B(J/\psi(1S) \to \gamma\eta_c(1S))] < 0.96\times10^{-5}$ 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_{33}/Γ

NODE=M026R37
NODE=M026R37

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<31	90	[76] ABLIKIM	06B	BES2	$J/\psi \rightarrow K^0_S K^0_S \gamma$

[76] ABLIKIM 06B reports $[\Gamma(\eta_c(1S) \rightarrow K^0_S K^0_S)/\Gamma_{total}] \times [B(J/\psi(1S) \rightarrow \gamma\eta_c(1S))] < 0.53\times10^{-5}$ which we divide by our best value $B(J/\psi(1S) \rightarrow \gamma\eta_c(1S)) = 1.7\times10^{-2}$.

NODE=M026R37;LINKAGE=AB

$\eta_c(1S)$ REFERENCES

NODE=M026

ABLIKIM	11G	PR D84 032006	M. Ablikim *et al.*	(BES-III 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	JPG 33 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 011101R	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
3096.916±0.011 OUR AVERAGE				
3096.917±0.010±0.007		AULCHENKO 03	KEDR	$e^+e^- \rightarrow$ hadrons
3096.89 ±0.09	502	[1] ARTAMONOV 00	OLYA	$e^+e^- \rightarrow$ hadrons
3096.91 ±0.03 ±0.01		[2] ARMSTRONG 93B	E760	$\overline{p}p \rightarrow e^+e^-$
3096.95 ±0.1 ±0.3	193	BAGLIN 87	SPEC	$\overline{p}p \rightarrow e^+e^-X$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
3097.5 ±0.3		GRIBUSHIN 96	FMPS	515 π^- Be $\rightarrow 2\mu X$
3098.4 ±2.0	38k	LEMOIGNE 82	GOLI	185 π^- Be $\rightarrow \gamma\mu^+\mu^-$ A
3096.93 ±0.09	502	[3] ZHOLENTZ 80	REDE	e^+e^-
3097.0 ±1		[4] BRANDELIK 79C	DASP	e^+e^-

[1] Reanalysis of ZHOLENTZ 80 using new electron mass (COHEN 87) and radiative corrections (KURAEV 85). NODE=M070M;LINKAGE=AR

[2] 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

[3] Superseded by ARTAMONOV 00. NODE=M070M;LINKAGE=RZ

[4] 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
92.9± 2.8 OUR AVERAGE		Error includes scale factor of 1.1.		
96.1± 3.2	13k	[5] ADAMS 06A	CLEO	$e^+e^- \rightarrow \mu^+\mu^-\gamma$
84.4± 8.9		BAI 95B	BES	e^+e^-
91 ±11 ±6		[6] ARMSTRONG 93B	E760	$\overline{p}p \rightarrow e^+e^-$
$85.5^{+6.1}_{-5.8}$		[7] HSUEH 92	RVUE	See Υ mini-review
• • • We do not use the following data for averages, fits, limits, etc. • • •				
94.1± 2.7		[8] ANASHIN 10	KEDR	3.097 $e^+e^- \rightarrow e^+e^-$, $\mu^+\mu^-$
93.7± 3.5	7.8k	[5] AUBERT 04	BABR	$e^+e^- \rightarrow \mu^+\mu^-\gamma$

[5] 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

[6] The initial-state radiation correction reevaluated by ANDREOTTI 07 in its Ref. [4]. NODE=M070W;LINKAGE=AN

[7] Using data from COFFMAN 92, BALDINI-CELIO 75, BOYARSKI 75, ESPOSITO 75B, BRANDELIK 79C. NODE=M070W;LINKAGE=A

[8] 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 $\gamma \rightarrow$ 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^-		(5.94 ±0.06) %		DESIG=1
Γ_6	$e^+e^-\gamma$	[a]	(8.8 ±1.4) $\times 10^{-3}$		DESIG=5
Γ_7	$\mu^+\mu^-$		(5.93 ±0.06) %		DESIG=2

Decays involving hadronic resonances

NODE=M070;CLUMP=A

Γ_{8}	$\rho\pi$		$(1.69 \pm 0.15)\%$	S=2.4	DESIG=20
Γ_{9}	$\rho^0\pi^0$		$(5.6 \pm 0.7) \times 10^{-3}$		DESIG=21
Γ_{10}	$a_2(1320)\rho$		$(1.09 \pm 0.22)\%$		DESIG=43
Γ_{11}	$\omega\pi^+\pi^+\pi^-\pi^-$		$(8.5 \pm 3.4) \times 10^{-3}$		DESIG=26
Γ_{12}	$\omega\pi^+\pi^-\pi^0$		$(4.0 \pm 0.7) \times 10^{-3}$		DESIG=211
Γ_{13}	$\omega\pi^+\pi^-$		$(8.6 \pm 0.7) \times 10^{-3}$	S=1.1	DESIG=24
Γ_{14}	$\omega f_2(1270)$		$(4.3 \pm 0.6) \times 10^{-3}$		DESIG=28
Γ_{15}	$K^*(892)^0\overline{K}^*(892)^0$		$(2.3 \pm 0.7) \times 10^{-4}$		DESIG=46
Γ_{16}	$K^*(892)^\pm\overline{K}^*(892)^\mp$		$(1.00\ {}^{+0.22}_{-0.40}) \times 10^{-3}$		DESIG=256
Γ_{17}	$K^*(892)^\pm\overline{K}^*(800)^\mp$		$(1.1\ {}^{+1.0}_{-0.6}) \times 10^{-3}$		DESIG=257
Γ_{18}	$\eta K^*(892)^0\overline{K}^*(892)^0$		$(1.15 \pm 0.26) \times 10^{-3}$		DESIG=252
Γ_{19}	$K^*(892)^0\overline{K}^*_2(1430)^0$ + c.c.		$(6.0 \pm 0.6) \times 10^{-3}$		DESIG=48
Γ_{20}	$K^*(892)^0\overline{K}_2(1770)^0$ + c.c. $\rightarrow$ $K^*(892)^0K^-\pi^+$ + c.c.		$(6.9 \pm 0.9) \times 10^{-4}$		DESIG=235
Γ_{21}	$\omega K^*(892)\overline{K}$ + c.c.		$(6.1 \pm 0.9) \times 10^{-3}$		DESIG=102
Γ_{22}	$K^+\overline{K}^*(892)^-$ + c.c.		$(5.12 \pm 0.30) \times 10^{-3}$		DESIG=121
Γ_{23}	$K^+\overline{K}^*(892)^-$ + c.c. $\rightarrow$ $K^+K^-\pi^0$		$(1.97 \pm 0.20) \times 10^{-3}$		DESIG=231
Γ_{24}	$K^+\overline{K}^*(892)^-$ + c.c. $\rightarrow$ $K^0K^\pm\pi^\mp$		$(3.0 \pm 0.4) \times 10^{-3}$		DESIG=232
Γ_{25}	$K^0\overline{K}^*(892)^0$ + c.c.		$(4.39 \pm 0.31) \times 10^{-3}$		DESIG=122
Γ_{26}	$K^0\overline{K}^*(892)^0$ + c.c. $\rightarrow$ $K^0K^\pm\pi^\mp$		$(3.2 \pm 0.4) \times 10^{-3}$		DESIG=233
Γ_{27}	$K_1(1400)^\pm K^\mp$		$(3.8 \pm 1.4) \times 10^{-3}$		DESIG=132
Γ_{28}	$\overline{K}^*(892)^0K^+\pi^-$ + c.c.		seen		DESIG=214
Γ_{29}	$\omega\pi^0\pi^0$		$(3.4 \pm 0.8) \times 10^{-3}$		DESIG=140
Γ_{30}	$b_1(1235)^\pm\pi^\mp$	[b]	$(3.0 \pm 0.5) \times 10^{-3}$		DESIG=49
Γ_{31}	$\omega K^\pm K^0_S\pi^\mp$	[b]	$(3.4 \pm 0.5) \times 10^{-3}$		DESIG=101
Γ_{32}	$b_1(1235)^0\pi^0$		$(2.3 \pm 0.6) \times 10^{-3}$		DESIG=160
Γ_{33}	$\eta K^\pm K^0_S\pi^\mp$	[b]	$(2.2 \pm 0.4) \times 10^{-3}$		DESIG=230
Γ_{34}	$\phi K^*(892)\overline{K}$ + c.c.		$(2.18 \pm 0.23) \times 10^{-3}$		DESIG=104
Γ_{35}	$\omega K\overline{K}$		$(1.70 \pm 0.32) \times 10^{-3}$		DESIG=27
Γ_{36}	$\omega f_0(1710) \rightarrow \omega K\overline{K}$		$(4.8 \pm 1.1) \times 10^{-4}$		DESIG=130
Γ_{37}	$\phi 2(\pi^+\pi^-)$		$(1.66 \pm 0.23) \times 10^{-3}$		DESIG=35
Γ_{38}	$\Delta(1232)^{++}\overline{p}\pi^-$		$(1.6 \pm 0.5) \times 10^{-3}$		DESIG=70
Γ_{39}	$\omega\eta$		$(1.74 \pm 0.20) \times 10^{-3}$	S=1.6	DESIG=30
Γ_{40}	$\phi K\overline{K}$		$(1.83 \pm 0.24) \times 10^{-3}$	S=1.5	DESIG=36
Γ_{41}	$\phi f_0(1710) \rightarrow \phi K\overline{K}$		$(3.6 \pm 0.6) \times 10^{-4}$		DESIG=129
Γ_{42}	$\phi f_2(1270)$		$(7.2 \pm 1.3) \times 10^{-4}$		DESIG=39
Γ_{43}	$\Delta(1232)^{++}\overline{\Delta}(1232)^{--}$		$(1.10 \pm 0.29) \times 10^{-3}$		DESIG=66
Γ_{44}	$\Sigma(1385)^-\overline{\Sigma}(1385)^+$ (or c.c.)	[b]	$(1.03 \pm 0.13) \times 10^{-3}$		DESIG=67
Γ_{45}	$\phi f'_2(1525)$		$(8 \pm 4) \times 10^{-4}$	S=2.7	DESIG=40
Γ_{46}	$\phi\pi^+\pi^-$		$(9.4 \pm 0.9) \times 10^{-4}$	S=1.2	DESIG=34
Γ_{47}	$\phi\pi^0\pi^0$		$(5.6 \pm 1.6) \times 10^{-4}$		DESIG=76
Γ_{48}	$\phi K^\pm K^0_S\pi^\mp$	[b]	$(7.2 \pm 0.8) \times 10^{-4}$		DESIG=103
Γ_{49}	$\omega f_1(1420)$		$(6.8 \pm 2.4) \times 10^{-4}$		DESIG=105
Γ_{50}	$\phi\eta$		$(7.5 \pm 0.8) \times 10^{-4}$	S=1.5	DESIG=37
Γ_{51}	$\Xi^0\overline{\Xi}^0$		$(1.20 \pm 0.24) \times 10^{-3}$		DESIG=248
Γ_{52}	$\Xi(1530)^-\overline{\Xi}^+$		$(5.9 \pm 1.5) \times 10^{-4}$		DESIG=107
Γ_{53}	$pK^-\overline{\Sigma}(1385)^0$		$(5.1 \pm 3.2) \times 10^{-4}$		DESIG=74
Γ_{54}	$\omega\pi^0$		$(4.5 \pm 0.5) \times 10^{-4}$	S=1.4	DESIG=32
Γ_{55}	$\phi\eta'(958)$		$(4.0 \pm 0.7) \times 10^{-4}$	S=2.1	DESIG=38
Γ_{56}	$\phi f_0(980)$		$(3.2 \pm 0.9) \times 10^{-4}$	S=1.9	DESIG=41
Γ_{57}	$\phi f_0(980) \rightarrow \phi\pi^+\pi^-$		$(1.8 \pm 0.4) \times 10^{-4}$		DESIG=236
Γ_{58}	$\phi f_0(980) \rightarrow \phi\pi^0\pi^0$		$(1.7 \pm 0.7) \times 10^{-4}$		DESIG=237
Γ_{59}	$\eta\phi f_0(980) \rightarrow \eta\phi\pi^+\pi^-$		$(3.2 \pm 1.0) \times 10^{-4}$		DESIG=229
Γ_{60}	$\phi a_0(980)^0 \rightarrow \phi\eta\pi^0$		$(5 \pm 4) \times 10^{-6}$		DESIG=258

Γ_{61}	$\Xi(1530)^0 \overline{\Xi}^0$		(3.2 ±1.4) $\times 10^{-4}$			DESIG=108
Γ_{62}	$\Sigma(1385)^- \overline{\Sigma}^+$ (or c.c.)	[b]	(3.1 ±0.5) $\times 10^{-4}$			DESIG=68
Γ_{63}	$\phi f_1(1285)$		(2.6 ±0.5) $\times 10^{-4}$		S=1.1	DESIG=106
Γ_{64}	$\eta \pi^+ \pi^-$		(4.0 ±1.7) $\times 10^{-4}$			DESIG=239
Γ_{65}	$\rho \eta$		(1.93 ±0.23) $\times 10^{-4}$			DESIG=22
Γ_{66}	$\omega \eta'(958)$		(1.82 ±0.21) $\times 10^{-4}$			DESIG=31
Γ_{67}	$\omega f_0(980)$		(1.4 ±0.5) $\times 10^{-4}$			DESIG=150
Γ_{68}	$\rho \eta'(958)$		(1.05 ±0.18) $\times 10^{-4}$			DESIG=23
Γ_{69}	$a_2(1320)^\pm \pi^\mp$	[b]	< 4.3 $\times 10^{-3}$	CL=90%		DESIG=42
Γ_{70}	$K \overline{K}{}^*_2(1430)+$ c.c.		< 4.0 $\times 10^{-3}$	CL=90%		DESIG=45
Γ_{71}	$K_1(1270)^\pm K^\mp$		< 3.0 $\times 10^{-3}$	CL=90%		DESIG=131
Γ_{72}	$K^*_2(1430)^0 \overline{K}{}^*_2(1430)^0$		< 2.9 $\times 10^{-3}$	CL=90%		DESIG=47
Γ_{73}	$\phi \pi^0$		< 6.4 $\times 10^{-6}$	CL=90%		DESIG=33
Γ_{74}	$\phi \eta(1405) \rightarrow \phi \eta \pi \pi$		< 2.5 $\times 10^{-4}$	CL=90%		DESIG=128
Γ_{75}	$\omega f'_2(1525)$		< 2.2 $\times 10^{-4}$	CL=90%		DESIG=29
Γ_{76}	$\eta \phi(2170) \rightarrow \eta K^*(892)^0 \overline{K}{}^*(892)^0$		< 2.52 $\times 10^{-4}$	CL=90%		DESIG=253
Γ_{77}	$\Sigma(1385)^0 \overline{\Lambda}$		< 2 $\times 10^{-4}$	CL=90%		DESIG=111
Γ_{78}	$\Delta(1232)^+ \overline{p}$		< 1 $\times 10^{-4}$	CL=90%		DESIG=112
Γ_{79}	$\Theta(1540) \overline{\Theta}(1540) \rightarrow K^0_S p K^- \overline{n}+$ c.c.		< 1.1 $\times 10^{-5}$	CL=90%		DESIG=205
Γ_{80}	$\Theta(1540) K^- \overline{n} \rightarrow K^0_S p K^- \overline{n}$		< 2.1 $\times 10^{-5}$	CL=90%		DESIG=206
Γ_{81}	$\Theta(1540) K^0_S \overline{p} \rightarrow K^0_S \overline{p} K^+ n$		< 1.6 $\times 10^{-5}$	CL=90%		DESIG=207
Γ_{82}	$\overline{\Theta}(1540) K^+ n \rightarrow K^0_S \overline{p} K^+ n$		< 5.6 $\times 10^{-5}$	CL=90%		DESIG=208
Γ_{83}	$\overline{\Theta}(1540) K^0_S p \rightarrow K^0_S p K^- \overline{n}$		< 1.1 $\times 10^{-5}$	CL=90%		DESIG=209
Γ_{84}	$\Sigma^0 \overline{\Lambda}$		< 9 $\times 10^{-5}$	CL=90%		DESIG=110

Decays into stable hadrons

NODE=M070;CLUMP=B

Γ_{85}	$2(\pi^+\pi^-)\pi^0$		(4.1 ±0.5) %		S=2.4	DESIG=9
Γ_{86}	$3(\pi^+\pi^-)\pi^0$		(2.9 ±0.6) %			DESIG=11
Γ_{87}	$\pi^+\pi^-\pi^0$		(2.07 ±0.12) %		S=1.6	DESIG=7
Γ_{88}	$\pi^+\pi^-\pi^0 K^+ K^-$		(1.79 ±0.29) %		S=2.2	DESIG=18
Γ_{89}	$4(\pi^+\pi^-)\pi^0$		(9.0 ±3.0) $\times 10^{-3}$			DESIG=12
Γ_{90}	$\pi^+\pi^- K^+ K^-$		(6.6 ±0.5) $\times 10^{-3}$			DESIG=16
Γ_{91}	$\pi^+\pi^- K^+ K^- \eta$		(1.84 ±0.28) $\times 10^{-3}$			DESIG=238
Γ_{92}	$\pi^0\pi^0 K^+ K^-$		(2.45 ±0.31) $\times 10^{-3}$			DESIG=234
Γ_{93}	$K \overline{K} \pi$		(6.1 ±1.0) $\times 10^{-3}$			DESIG=15
Γ_{94}	$2(\pi^+\pi^-)$		(3.55 ±0.23) $\times 10^{-3}$			DESIG=8
Γ_{95}	$3(\pi^+\pi^-)$		(4.3 ±0.4) $\times 10^{-3}$			DESIG=10
Γ_{96}	$2(\pi^+\pi^-\pi^0)$		(1.62 ±0.21) %			DESIG=210
Γ_{97}	$2(\pi^+\pi^-)\eta$		(2.29 ±0.24) $\times 10^{-3}$			DESIG=201
Γ_{98}	$3(\pi^+\pi^-)\eta$		(7.2 ±1.5) $\times 10^{-4}$			DESIG=202
Γ_{99}	$p \overline{p}$		(2.17 ±0.07) $\times 10^{-3}$			DESIG=50
Γ_{100}	$p \overline{p} \pi^0$		(1.19 ±0.08) $\times 10^{-3}$		S=1.1	DESIG=52
Γ_{101}	$p \overline{p} \pi^+\pi^-$		(6.0 ±0.5) $\times 10^{-3}$		S=1.3	DESIG=54
Γ_{102}	$p \overline{p} \pi^+\pi^-\pi^0$	[c]	(2.3 ±0.9) $\times 10^{-3}$		S=1.9	DESIG=55
Γ_{103}	$p \overline{p} \eta$		(2.00 ±0.12) $\times 10^{-3}$			DESIG=56
Γ_{104}	$p \overline{p} \rho$		< 3.1 $\times 10^{-4}$	CL=90%		DESIG=57
Γ_{105}	$p \overline{p} \omega$		(1.10 ±0.15) $\times 10^{-3}$		S=1.3	DESIG=58
Γ_{106}	$p \overline{p} \eta'(958)$		(2.1 ±0.4) $\times 10^{-4}$			DESIG=59
Γ_{107}	$p \overline{p} \phi$		(4.5 ±1.5) $\times 10^{-5}$			DESIG=127
Γ_{108}	$n \overline{n}$		(2.2 ±0.4) $\times 10^{-3}$			DESIG=64
Γ_{109}	$n \overline{n} \pi^+\pi^-$		(4 ±4) $\times 10^{-3}$			DESIG=65
Γ_{110}	$\Sigma^+ \overline{\Sigma}^-$		(1.50 ±0.24) $\times 10^{-3}$			DESIG=247
Γ_{111}	$\Sigma^0 \overline{\Sigma}^0$		(1.29 ±0.09) $\times 10^{-3}$			DESIG=63
Γ_{112}	$2(\pi^+\pi^-) K^+ K^-$		(4.7 ±0.7) $\times 10^{-3}$		S=1.3	DESIG=17

Γ_{113}	$p\overline{n}\pi^-$		$(2.12\ \pm0.09\ )\times10^{-3}$		DESIG=53
Γ_{114}	$n N(1440)$		seen		DESIG=215;OUR EST; → NOT CHECKED ←
Γ_{115}	$n N(1520)$		seen		DESIG=216;OUR EST; → NOT CHECKED ←
Γ_{116}	$n N(1535)$		seen		DESIG=217;OUR EST; → NOT CHECKED ←
Γ_{117}	$\Xi^-\overline{\Xi}^+$		$(8.5\ \pm1.6\ )\times10^{-4}$	S=1.5	DESIG=62
Γ_{118}	$\Lambda\overline{\Lambda}$		$(1.61\ \pm0.15\ )\times10^{-3}$	S=1.9	DESIG=60
Γ_{119}	$\Lambda\overline{\Sigma}^-\pi^+$ (or c.c.)	[b]	$(8.3\ \pm0.7\ )\times10^{-4}$	S=1.2	DESIG=71
Γ_{120}	$pK^-\overline{\Lambda}$		$(8.9\ \pm1.6\ )\times10^{-4}$		DESIG=72
Γ_{121}	$2(K^+K^-)$		$(7.6\ \pm0.9\ )\times10^{-4}$		DESIG=19
Γ_{122}	$pK^-\overline{\Sigma}^0$		$(2.9\ \pm0.8\ )\times10^{-4}$		DESIG=73
Γ_{123}	K^+K^-		$(2.37\ \pm0.31\ )\times10^{-4}$		DESIG=13
Γ_{124}	$K^0_S K^0_L$		$(1.46\ \pm0.26\ )\times10^{-4}$	S=2.7	DESIG=75
Γ_{125}	$\Lambda\overline{\Lambda}\eta$		$(2.6\ \pm0.7\ )\times10^{-4}$		DESIG=228
Γ_{126}	$\Lambda\overline{\Lambda}\pi^0$		$<6.4\ \times10^{-5}$	CL=90%	DESIG=109
Γ_{127}	$\overline{\Lambda}nK^0_S$ + c.c.		$(6.5\ \pm1.1\ )\times10^{-4}$		DESIG=225
Γ_{128}	$\pi^+\pi^-$		$(1.47\ \pm0.23\ )\times10^{-4}$		DESIG=6
Γ_{129}	$\Lambda\overline{\Sigma}$ + c.c.		$<1.5\ \times10^{-4}$	CL=90%	DESIG=61
Γ_{130}	$K^0_S K^0_S$		$<1\ \times10^{-6}$	CL=95%	DESIG=14

Radiative decays NODE=M070;CLUMP=C

Γ_{131}	3γ		$(1.2\ \pm0.4\ )\times10^{-5}$		DESIG=81
Γ_{132}	4γ		$<9\ \times10^{-6}$	CL=90%	DESIG=244
Γ_{133}	5γ		$<1.5\ \times10^{-5}$	CL=90%	DESIG=245
Γ_{134}	$\gamma\eta_c(1S)$		$(1.7\ \pm0.4\ )$ %	S=1.6	DESIG=85
Γ_{135}	$\gamma\eta_c(1S)\to\ 3\gamma$		$(1.2\ ^{+2.7}_{-1.1}\ )\times10^{-6}$		DESIG=246
Γ_{136}	$\gamma\pi^+\pi^-2\pi^0$		$(8.3\ \pm3.1\ )\times10^{-3}$		DESIG=99
Γ_{137}	$\gamma\eta\pi\pi$		$(6.1\ \pm1.0\ )\times10^{-3}$		DESIG=96
Γ_{138}	$\gamma\eta_2(1870)\to\ \gamma\eta\pi^+\pi^-$		$(6.2\ \pm2.4\ )\times10^{-4}$		DESIG=142
Γ_{139}	$\gamma\eta(1405/1475)\to\ \gamma K\overline{K}\pi$	[d]	$(2.8\ \pm0.6\ )\times10^{-3}$	S=1.6	DESIG=89
Γ_{140}	$\gamma\eta(1405/1475)\to\ \gamma\gamma\rho^0$		$(7.8\ \pm2.0\ )\times10^{-5}$	S=1.8	DESIG=171
Γ_{141}	$\gamma\eta(1405/1475)\to\ \gamma\eta\pi^+\pi^-$		$(3.0\ \pm0.5\ )\times10^{-4}$		DESIG=170
Γ_{142}	$\gamma\eta(1405/1475)\to\ \gamma\gamma\phi$		$<8.2\ \times10^{-5}$	CL=95%	DESIG=212
Γ_{143}	$\gamma\rho\rho$		$(4.5\ \pm0.8\ )\times10^{-3}$		DESIG=94
Γ_{144}	$\gamma\rho\omega$		$<5.4\ \times10^{-4}$	CL=90%	DESIG=226
Γ_{145}	$\gamma\rho\phi$		$<8.8\ \times10^{-5}$	CL=90%	DESIG=227
Γ_{146}	$\gamma\eta'(958)$		$(5.16\ \pm0.15\ )\times10^{-3}$	S=1.1	DESIG=84
Γ_{147}	$\gamma 2\pi^+2\pi^-$		$(2.8\ \pm0.5\ )\times10^{-3}$	S=1.9	DESIG=95
Γ_{148}	$\gamma f_2(1270) f_2(1270)$		$(9.5\ \pm1.7\ )\times10^{-4}$		DESIG=203
Γ_{149}	$\gamma f_2(1270) f_2(1270)$ (non resonant)		$(8.2\ \pm1.9\ )\times10^{-4}$		DESIG=204
Γ_{150}	$\gamma K^+K^-\pi^+\pi^-$		$(2.1\ \pm0.6\ )\times10^{-3}$		DESIG=143
Γ_{151}	$\gamma f_4(2050)$		$(2.7\ \pm0.7\ )\times10^{-3}$		DESIG=100
Γ_{152}	$\gamma\omega\omega$		$(1.61\ \pm0.33\ )\times10^{-3}$		DESIG=97
Γ_{153}	$\gamma\eta(1405/1475)\to\ \gamma\rho^0\rho^0$		$(1.7\ \pm0.4\ )\times10^{-3}$	S=1.3	DESIG=124
Γ_{154}	$\gamma f_2(1270)$		$(1.43\ \pm0.11\ )\times10^{-3}$		DESIG=86
Γ_{155}	$\gamma f_0(1710)\to\ \gamma K\overline{K}$		$(8.5\ ^{+1.2}_{-0.9}\ )\times10^{-4}$	S=1.2	DESIG=91
Γ_{156}	$\gamma f_0(1710)\to\ \gamma\pi\pi$		$(4.0\ \pm1.0\ )\times10^{-4}$		DESIG=135
Γ_{157}	$\gamma f_0(1710)\to\ \gamma\omega\omega$		$(3.1\ \pm1.0\ )\times10^{-4}$		DESIG=221
Γ_{158}	$\gamma\eta$		$(1.104\pm0.034)\times10^{-3}$		DESIG=83
Γ_{159}	$\gamma f_1(1420)\to\ \gamma K\overline{K}\pi$		$(7.9\ \pm1.3\ )\times10^{-4}$		DESIG=175
Γ_{160}	$\gamma f_1(1285)$		$(6.1\ \pm0.8\ )\times10^{-4}$		DESIG=88
Γ_{161}	$\gamma f_1(1510)\to\ \gamma\eta\pi^+\pi^-$		$(4.5\ \pm1.2\ )\times10^{-4}$		DESIG=141
Γ_{162}	$\gamma f'_2(1525)$		$(4.5\ ^{+0.7}_{-0.4}\ )\times10^{-4}$		DESIG=87
Γ_{163}	$\gamma f_2(1640)\to\ \gamma\omega\omega$		$(2.8\ \pm1.8\ )\times10^{-4}$		DESIG=222
Γ_{164}	$\gamma f_2(1910)\to\ \gamma\omega\omega$		$(2.0\ \pm1.4\ )\times10^{-4}$		DESIG=223
Γ_{165}	$\gamma f_2(1950)\to\ \gamma K^*(892)\overline{K}^*(892)$		$(7.0\ \pm2.2\ )\times10^{-4}$		DESIG=144

Γ_{166}	$\gamma K^*(892)\overline{K}^*(892)$	$(4.0 \pm 1.3) \times 10^{-3}$		DESIG=145
Γ_{167}	$\gamma\phi\phi$	$(4.0 \pm 1.2) \times 10^{-4}$	S=2.1	DESIG=98
Γ_{168}	$\gamma p\overline{p}$	$(3.8 \pm 1.0) \times 10^{-4}$		DESIG=90
Γ_{169}	$\gamma\eta(2225)$	$(3.3 \pm 0.5) \times 10^{-4}$		DESIG=126
Γ_{170}	$\gamma\eta(1760) \rightarrow \gamma\rho^0\rho^0$	$(1.3 \pm 0.9) \times 10^{-4}$		DESIG=125
Γ_{171}	$\gamma\eta(1760) \rightarrow \gamma\omega\omega$	$(1.98 \pm 0.33) \times 10^{-3}$		DESIG=224
Γ_{172}	$\gamma X(1835) \rightarrow \gamma\pi^+\pi^-\eta'$	$(2.6 \pm 0.4) \times 10^{-4}$		DESIG=213
Γ_{173}	$\gamma X(1835) \rightarrow \gamma p\overline{p}$	$(7.5 {}^{+1.9}_{-0.9}) \times 10^{-5}$		DESIG=254
Γ_{174}	$\gamma(K\overline{K}\pi)$ $[J^{PC} = 0^{-+}]$	$(7 \pm 4) \times 10^{-4}$	S=2.1	DESIG=176
Γ_{175}	$\gamma\pi^0$	$(3.49 {}^{+0.33}_{-0.30}) \times 10^{-5}$		DESIG=82
Γ_{176}	$\gamma p\overline{p}\pi^+\pi^-$	$< 7.9 \times 10^{-4}$	CL=90%	DESIG=93
Γ_{177}	$\gamma\Lambda\overline{\Lambda}$	$< 1.3 \times 10^{-4}$	CL=90%	DESIG=200
Γ_{178}	$\gamma f_0(2200)$			DESIG=123
Γ_{179}	$\gamma f_J(2220)$	$> 2.50 \times 10^{-3}$	CL=99.9%	DESIG=92
Γ_{180}	$\gamma f_J(2220) \rightarrow \gamma\pi\pi$	$(8 \pm 4) \times 10^{-5}$		DESIG=136
Γ_{181}	$\gamma f_J(2220) \rightarrow \gamma K\overline{K}$	$< 3.6 \times 10^{-5}$		DESIG=137
Γ_{182}	$\gamma f_J(2220) \rightarrow \gamma p\overline{p}$	$(1.5 \pm 0.8) \times 10^{-5}$		DESIG=138
Γ_{183}	$\gamma f_0(1500)$	$(1.01 \pm 0.32) \times 10^{-4}$		DESIG=172
Γ_{184}	$\gamma A \rightarrow \gamma$invisible	[e] $< 6.3 \times 10^{-6}$	CL=90%	DESIG=251

Weak decays

NODE=M070;CLUMP=E

Γ_{185}	$D^- e^+ \nu_e$ + c.c.	$< 1.2 \times 10^{-5}$	CL=90%	DESIG=218
Γ_{186}	$\overline{D}^0 e^+ e^-$ + c.c.	$< 1.1 \times 10^{-5}$	CL=90%	DESIG=219
Γ_{187}	$D_s^- e^+ \nu_e$ + c.c.	$< 3.6 \times 10^{-5}$	CL=90%	DESIG=220
Γ_{188}	$D^- \pi^+$ + c.c.	$< 7.5 \times 10^{-5}$	CL=90%	DESIG=241
Γ_{189}	$\overline{D}^0 \overline{K}^0$ + c.c.	$< 1.7 \times 10^{-4}$	CL=90%	DESIG=242
Γ_{190}	$D_s^- \pi^+$ + c.c.	$< 1.3 \times 10^{-4}$	CL=90%	DESIG=243

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

NODE=M070;CLUMP=D

Γ_{191}	$\gamma\gamma$	C	$< 5 \times 10^{-6}$	CL=90%	DESIG=80
Γ_{192}	$e^{\pm}\mu^{\mp}$	LF	$< 1.1 \times 10^{-6}$	CL=90%	DESIG=177
Γ_{193}	$e^{\pm}\tau^{\mp}$	LF	$< 8.3 \times 10^{-6}$	CL=90%	DESIG=178
Γ_{194}	$\mu^{\pm}\tau^{\mp}$	LF	$< 2.0 \times 10^{-6}$	CL=90%	DESIG=179

Other decays

NODE=M070;CLUMP=F

Γ_{195}	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] Includes $p\overline{p}\pi^+\pi^-\gamma$ and excludes $p\overline{p}\eta$, $p\overline{p}\omega$, $p\overline{p}\eta'$. LINKAGE=MF

[d] See the "Note on the $\eta(1405)$" in the $\eta(1405)$ Particle Listings. LINKAGE=MG

[e] For a narrow state A with mass less than 960 MeV. LINKAGE=NSA

$J/\psi(1S)$ PARTIAL WIDTHS

NODE=M070220

Γ(hadrons) Γ_1

NODE=M070W3

NODE=M070W3

VALUE (keV)	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • 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^-

$\Gamma(e^+e^-)$ Γ_5

NODE=M070W1
NODE=M070W1

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
5.55±0.14±0.02 OUR EVALUATION					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
5.71±0.16	13k	[9] ADAMS	06A	CLEO	$e^+e^- \to \mu^+\mu^-\gamma$
5.57±0.19	7.8k	[9] AUBERT	04	BABR	$e^+e^- \to \mu^+\mu^-\gamma$
5.14±0.39		BAI	95B	BES	e^+e^-
$5.36^{+0.29}_{-0.28}$		[10] HSUEH	92	RVUE	See Υ mini-review
4.72±0.35		ALEXANDER	89	RVUE	See Υ mini-review
4.4 ±0.6		[10] BRANDELIK	79C	DASP	e^+e^-
4.6 ±0.8		[11] BALDINI-...	75	FRAG	e^+e^-
4.8 ±0.6		BOYARSKI	75	MRK1	e^+e^-
4.6 ±1.0		ESPOSITO	75B	FRAM	e^+e^-

→ NOT CHECKED ←

[9] Calculated by us from the reported values of $\Gamma(e^+e^-)\times B(\mu^+\mu^-)$ using $B(\mu^+\mu^-) = (5.93 \pm 0.06)\%$. NODE=M070W1;LINKAGE=AA

[10] From a simultaneous fit to e^+e^-, $\mu^+\mu^-$, and hadronic channels assuming $\Gamma(e^+e^-) = \Gamma(\mu^+\mu^-)$. NODE=M070W1;LINKAGE=F

[11] Assuming equal partial widths for e^+e^- and $\mu^+\mu^-$. NODE=M070W1;LINKAGE=B

$\Gamma(\mu^+\mu^-)$ Γ_7

NODE=M070W2
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_{191}

NODE=M070W70
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
NODE=M070G3

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
4 ±0.8	[12] BALDINI-...	75	FRAG	e^+e^-
3.9±0.8	[12] ESPOSITO	75B	FRAM	e^+e^-

[12] 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
NODE=M070G1

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
332.3± 6.4±4.8	ANASHIN	10	KEDR	$3.097\ e^+e^- \to e^+e^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
350 ± 20	BRANDELIK	79C	DASP	e^+e^-
320 ± 70	[13] BALDINI-...	75	FRAG	e^+e^-
340 ± 90	[13] ESPOSITO	75B	FRAM	e^+e^-
360 ±100	[13] FORD	75	SPEC	e^+e^-

[13] Data redundant with branching ratios or partial widths above. NODE=M070G1;LINKAGE=S

$\Gamma(\mu^+\mu^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_7\Gamma_5/\Gamma$

NODE=M070G2
NODE=M070G2

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
334 ± 5 OUR AVERAGE					
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		[14] ESPOSITO	75B	FRAM	e^+e^-

[14] Data redundant with branching ratios or partial widths above. NODE=M070G2;LINKAGE=S

$\Gamma(\omega\pi^+\pi^-\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{12}\Gamma_5/\Gamma$

NODE=M070G8
NODE=M070G8

VALUE (10^{-2} keV)	EVTS	DOCUMENT ID		TECN	COMMENT
2.2±0.3±0.2	170	AUBERT	06D	BABR	10.6 $e^+e^- \to \omega\pi^+\pi^-\pi^0\gamma$

$\Gamma(\omega\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{13}\Gamma_5/\Gamma$

NODE=M070G24
NODE=M070G24

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
53.6±5.0±0.4	788	[15] AUBERT	07AU	BABR	10.6 $e^+e^- \to \omega\pi^+\pi^-\gamma$

[15] 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

$\Gamma(K^*(892)^0\overline{K}{}_2^*(1430)^0 + \text{c.c.}) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{19}\Gamma_5/\Gamma$

NODE=M070G02
NODE=M070G02

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
33±4±1	317 ± 23	[16,17] AUBERT	07AK	BABR	10.6 $e^+e^- \to \pi^+\pi^-K^+K^-\gamma$

[16] Dividing by 2/3 to take into account that $B(K^{*0} \to K^+\pi^-) = 2/3$.

NODE=M070G02;LINKAGE=AE

[17] AUBERT 07AK reports $[\Gamma(J/\psi(1S) \to K^*(892)^0\overline{K}{}_2^*(1430)^0 + \text{c.c.}) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}] \times [B(K_2^*(1430) \to K\pi)] = 16.4 \pm 1.1 \pm 1.4$ 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

$\Gamma(K^*(892)^0\overline{K}_2(1770)^0 + \text{c.c.} \to K^*(892)^0K^-\pi^+ + \text{c.c.}) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{20}\Gamma_5/\Gamma$

NODE=M070G03
NODE=M070G03

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
3.8±0.4±0.3	110 ± 14	[18] AUBERT	07AK	BABR	10.6 $e^+e^- \to \pi^+\pi^-K^+K^-\gamma$

[18] Dividing by 2/3 to take into account that $B(K^{*0} \to K^+\pi^-) = 2/3$.

NODE=M070G03;LINKAGE=AE

$\Gamma(K^+\overline{K}^*(892)^- + \text{c.c.}) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{22}\Gamma_5/\Gamma$

NODE=M070G18
NODE=M070G18

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
29.0±1.7±1.3	AUBERT	08S	BABR	10.6 $e^+e^- \to K^+K^*(892)^-\gamma$

$\Gamma(K^+\overline{K}^*(892)^- + \text{c.c.} \to K^+K^-\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{23}\Gamma_5/\Gamma$

NODE=M070G20
NODE=M070G20

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
10.96±0.85±0.70	155	AUBERT	08S	BABR	10.6 $e^+e^- \to K^+K^-\pi^0\gamma$

$\Gamma(K^+\overline{K}^*(892)^- + \text{c.c.} \to K^0K^\pm\pi^\mp) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{24}\Gamma_5/\Gamma$

NODE=M070G21
NODE=M070G21

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
16.76±1.70±1.00	89	AUBERT	08S	BABR	10.6 $e^+e^- \to K_S^0K^\pm\pi^\mp\gamma$

$\Gamma(K^0\overline{K}^*(892)^0 + \text{c.c.}) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{25}\Gamma_5/\Gamma$

NODE=M070G19
NODE=M070G19

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
26.6±2.5±1.5	AUBERT	08S	BABR	10.6 $e^+e^- \to K^0\overline{K}^*(892)^0\gamma$

$\Gamma(K^0\overline{K}^*(892)^0 + \text{c.c.} \to K^0K^\pm\pi^\mp) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{26}\Gamma_5/\Gamma$

NODE=M070G22
NODE=M070G22

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
17.70±1.70±1.00	94	AUBERT	08S	BABR	10.6 $e^+e^- \to K_S^0K^\pm\pi^\mp\gamma$

$\Gamma(\omega K\overline{K}) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{35}\Gamma_5/\Gamma$

NODE=M070G29
NODE=M070G29

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
3.70±1.98±0.03	24	[19] AUBERT	07AU	BABR	10.6 $e^+e^- \to \omega K^+K^-\gamma$

[19] 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

$\Gamma(\phi 2(\pi^+\pi^-)) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{37}\Gamma_5/\Gamma$

NODE=M070G10
NODE=M070G10

VALUE (10^{-2} keV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.96±0.19±0.01	35	[20] AUBERT	06D	BABR	10.6 $e^+e^- \to \phi 2(\pi^+\pi^-)\gamma$

[20] 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 $B(\phi(1020) \to K^+K^-) = (48.9 \pm 0.5) \times 10^{-2}$. 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

$\Gamma(\phi\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{46}\Gamma_5/\Gamma$

NODE=M070G14
NODE=M070G14

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
4.8 ±0.4 OUR AVERAGE				
4.52±0.48±0.04	254±23	[21] SHEN 09	BELL	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\gamma$
5.33±0.71±0.05	103	[22] AUBERT,BE 06D	BABR	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\gamma$

[21] SHEN 09 reports 4.50 ± 0.41 ± 0.26 eV from a measurement of [$\Gamma(J/\psi(1S) \to \phi\pi^+\pi^-) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}$] × [$B(\phi(1020) \to K^+K^-)$] assuming $B(\phi(1020) \to K^+K^-) = (49.2 \pm 0.6) \times 10^{-2}$, which we rescale to our best value $B(\phi(1020) \to K^+K^-) = (48.9 \pm 0.5) \times 10^{-2}$. 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

[22] AUBERT,BE 06D reports [$\Gamma(J/\psi(1S) \to \phi\pi^+\pi^-) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}$] × [$B(\phi(1020) \to K^+K^-)$] = 2.61 ± 0.30 ± 0.18 eV which we divide by our best value $B(\phi(1020) \to K^+K^-) = (48.9 \pm 0.5) \times 10^{-2}$. 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

$\Gamma(\phi\pi^0\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{47}\Gamma_5/\Gamma$

NODE=M070G15
NODE=M070G15

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
3.15±0.88±0.03	23	[23] AUBERT,BE 06D	BABR	10.6 $e^+e^- \to K^+K^-\pi^0\pi^0\gamma$

[23] AUBERT,BE 06D reports [$\Gamma(J/\psi(1S) \to \phi\pi^0\pi^0) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}$] × [$B(\phi(1020) \to K^+K^-)$] = 1.54 ± 0.40 ± 0.16 eV which we divide by our best value $B(\phi(1020) \to K^+K^-) = (48.9 \pm 0.5) \times 10^{-2}$. 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

$\Gamma(\phi\eta) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{50}\Gamma_5/\Gamma$

NODE=M070G28
NODE=M070G28

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
6.1±2.7±0.4	6	[24] AUBERT 07AU	BABR	10.6 $e^+e^- \to \phi\eta\gamma$

[24] AUBERT 07AU quotes $\Gamma^{J/\psi}_{ee} \cdot B(J/\psi \to \phi\eta) \cdot B(\phi \to K^+K^-) \cdot B(\eta \to 3\pi)$ = 0.84 ± 0.37 ± 0.05 eV.

NODE=M070G28;LINKAGE=AU

$\Gamma(\phi f_0(980) \to \phi\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{57}\Gamma_5/\Gamma$

NODE=M070G05
NODE=M070G05

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
1.21±0.23 OUR AVERAGE Error includes scale factor of 1.2.				
1.48±0.27±0.09	60±11	[25] SHEN 09	BELL	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\gamma$
1.02±0.24±0.01	20 ± 5	[26] AUBERT 07AK	BABR	10.6 $e^+e^- \to \pi^+\pi^-K^+K^-\gamma$

[25] Multiplied by 2/3 to take into account the $\phi\pi^+\pi^-$ mode only. Using $B(\phi \to K^+K^-)$ = (49.2 ± 0.6)%.

NODE=M070G05;LINKAGE=SH

[26] AUBERT 07AK reports [$\Gamma(J/\psi(1S) \to \phi f_0(980) \to \phi\pi^+\pi^-) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}$] × [$B(\phi(1020) \to K^+K^-)$] = 0.50 ± 0.11 ± 0.04 eV which we divide by our best value $B(\phi(1020) \to K^+K^-) = (48.9 \pm 0.5) \times 10^{-2}$. 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

$\Gamma(\phi f_0(980) \to \phi\pi^0\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{58}\Gamma_5/\Gamma$

NODE=M070G06
NODE=M070G06

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
0.96±0.40±0.01	7.0 ± 2.8	[27] AUBERT 07AK	BABR	10.6 $e^+e^- \to \pi^0\pi^0K^+K^-\gamma$

[27] AUBERT 07AK reports [$\Gamma(J/\psi(1S) \to \phi f_0(980) \to \phi\pi^0\pi^0) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}$] × [$B(\phi(1020) \to K^+K^-)$] = 0.47 ± 0.19 ± 0.05 eV which we divide by our best value $B(\phi(1020) \to K^+K^-) = (48.9 \pm 0.5) \times 10^{-2}$. 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

$\Gamma(\eta\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{64}\Gamma_5/\Gamma$

NODE=M070G25
NODE=M070G25

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
2.24±0.98±0.03	9	[28] AUBERT 07AU	BABR	10.6 $e^+e^- \to \eta\pi^+\pi^-\gamma$

[28] AUBERT 07AU reports [$\Gamma(J/\psi(1S) \to \eta\pi^+\pi^-) \times \Gamma(J/\psi(1S) \to e^+e^-)/\Gamma_{total}$] × [$B(\eta \to \pi^+\pi^-\pi^0)$] = 0.51 ± 0.22 ± 0.03 eV which we divide by our best value $B(\eta \to \pi^+\pi^-\pi^0) = (22.74 \pm 0.28) \times 10^{-2}$. 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

$\Gamma(K^*(892)^0\overline{K}^*(892)^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{15}\Gamma_5/\Gamma$

NODE=M070G01
NODE=M070G01

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
1.28±0.40±0.11	25 ± 8	[29] AUBERT 07AK	BABR	10.6 $e^+e^- \to \pi^+\pi^-K^+K^-\gamma$

[29] Dividing by $(2/3)^2$ to take twice into account that $B(K^{*0} \to K^+\pi^-) = 2/3$.

NODE=M070G01;LINKAGE=AE

$\Gamma(\phi f_2(1270)) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{42}\Gamma_5/\Gamma$

NODE=M070G07
NODE=M070G07

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
4.0±0.7±0.1	44 ± 7	[30,31] AUBERT	07AK	BABR	10.6 $e^+e^- \rightarrow \pi^+\pi^-K^+K^-\gamma$

[30] Using B($\phi \rightarrow (K+K)^-$) = (49.3 ± 0.6)%.

NODE=M070G07;LINKAGE=AE

[31] AUBERT 07AK reports [$\Gamma(J/\psi(1S) \rightarrow \phi f_2(1270)) \times \Gamma(J/\psi(1S) \rightarrow e^+e^-)/\Gamma_{\text{total}}$] × [B($f_2(1270) \rightarrow \pi\pi$)] = 3.41 ± 0.55 ± 0.28 eV which we divide by our best value B($f_2(1270) \rightarrow \pi\pi$) = $(84.8^{+2.4}_{-1.2}) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M070G07;LINKAGE=UB

$\Gamma(2(\pi^+\pi^-)\pi^0) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{85}\Gamma_5/\Gamma$

NODE=M070G23
NODE=M070G23

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
303±5±18	4990	AUBERT	07AU	BABR	10.6 $e^+e^- \rightarrow 2(\pi^+\pi^-)\pi^0\gamma$

$\Gamma(\pi^+\pi^-\pi^0) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{87}\Gamma_5/\Gamma$

NODE=M070G5
NODE=M070G5

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
0.122±0.005±0.008	AUBERT,B	04N	BABR	10.6 $e^+e^- \rightarrow \pi^+\pi^-\pi^0\gamma$

$\Gamma(\pi^+\pi^-\pi^0K^+K^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{88}\Gamma_5/\Gamma$

NODE=M070G27
NODE=M070G27

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
107.0±4.3±6.4	768	AUBERT	07AU	BABR	10.6 $e^+e^- \rightarrow K^+K^-\pi^+\pi^-\pi^0\gamma$

$\Gamma(\pi^+\pi^-K^+K^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{90}\Gamma_5/\Gamma$

NODE=M070G12
NODE=M070G12

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
36.3±1.3±2.1	1586 ± 58	AUBERT	07AK	BABR	10.6 $e^+e^- \rightarrow \pi^+\pi^-K^+K^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
33.6±2.7±2.7	233	[32] AUBERT	05D	BABR	10.6 $e^+e^- \rightarrow K^+K^-\pi^+\pi^-\gamma$

[32] Superseded by AUBERT 07AK.

NODE=M070G12;LINKAGE=AU

$\Gamma(\pi^+\pi^-K^+K^-\eta) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{91}\Gamma_5/\Gamma$

NODE=M070G30
NODE=M070G30

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
25.9±3.9±0.1	73	[33] AUBERT	07AU	BABR	10.6 $e^+e^- \rightarrow K^+K^-\pi^+\pi^-\eta\gamma$

[33] AUBERT 07AU reports [$\Gamma(J/\psi(1S) \rightarrow \pi^+\pi^-K^+K^-\eta) \times \Gamma(J/\psi(1S) \rightarrow e^+e^-)/\Gamma_{\text{total}}$] × [B($\eta \rightarrow 2\gamma$)] = 10.2 ± 1.3 ± 0.8 eV which we divide by our best value B($\eta \rightarrow 2\gamma$) = $(39.31 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M070G30;LINKAGE=AU

$\Gamma(\pi^0\pi^0K^+K^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{92}\Gamma_5/\Gamma$

NODE=M070G04
NODE=M070G04

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
13.6±1.1±1.3	203 ± 16	AUBERT	07AK	BABR	10.6 $e^+e^- \rightarrow \pi^0\pi^0K^+K^-\gamma$

$\Gamma(2(\pi^+\pi^-)) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{94}\Gamma_5/\Gamma$

NODE=M070G11
NODE=M070G11

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
19.5±1.4±1.3	270	AUBERT	05D	BABR	10.6 $e^+e^- \rightarrow 2(\pi^+\pi^-)\gamma$

$\Gamma(3(\pi^+\pi^-)) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{95}\Gamma_5/\Gamma$

NODE=M070G6
NODE=M070G6

VALUE (10^{-2} keV)	EVTS	DOCUMENT ID		TECN	COMMENT
2.37±0.16±0.14	496	AUBERT	06D	BABR	10.6 $e^+e^- \rightarrow 3(\pi^+\pi^-)\gamma$

$\Gamma(2(\pi^+\pi^-\pi^0)) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{96}\Gamma_5/\Gamma$

NODE=M070G7
NODE=M070G7

VALUE (10^{-2} keV)	EVTS	DOCUMENT ID		TECN	COMMENT
8.9±0.5±1.0	761	AUBERT	06D	BABR	10.6 $e^+e^- \rightarrow 2(\pi^+\pi^-\pi^0)\gamma$

$\Gamma(2(\pi^+\pi^-)\eta) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{97}\Gamma_5/\Gamma$

NODE=M070G26
NODE=M070G26

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
13.1±2.4±0.1	85	[34] AUBERT	07AU	BABR	10.6 $e^+e^- \rightarrow 2(\pi^+\pi^-)\eta\gamma$

[34] AUBERT 07AU reports [$\Gamma(J/\psi(1S) \rightarrow 2(\pi^+\pi^-)\eta) \times \Gamma(J/\psi(1S) \rightarrow e^+e^-)/\Gamma_{\text{total}}$] × [B($\eta \rightarrow 2\gamma$)] = 5.16 ± 0.85 ± 0.39 eV which we divide by our best value B($\eta \rightarrow 2\gamma$) = $(39.31 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M070G26;LINKAGE=AU

$\Gamma(p\overline{p}) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{99}\Gamma_5/\Gamma$

NODE=M070G4

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
11.6±0.9 OUR AVERAGE Error includes scale factor of 1.2.				
12.0±0.6±0.5	438	AUBERT 06B		$e^+e^- \to p\overline{p}\gamma$
9.7±1.7		[35] ARMSTRONG 93B	E760	$\overline{p}p \to e^+e^-$

[35] Using $\Gamma_{total} = 85.5^{+6.1}_{-5.8}$ MeV.

NODE=M070G;LINKAGE=A

$\Gamma(\Sigma^0\overline{\Sigma}^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{111}\Gamma_5/\Gamma$

NODE=M070G17

VALUE (eV)	DOCUMENT ID	TECN	COMMENT
6.4±1.2±0.6	AUBERT 07BD	BABR	10.6 $e^+e^- \to \Sigma^0\overline{\Sigma}^0\gamma$

$\Gamma(2(\pi^+\pi^-)K^+K^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{112}\Gamma_5/\Gamma$

NODE=M070G9

VALUE (10^{-2} keV)	EVTS	DOCUMENT ID	TECN	COMMENT
2.75±0.23±0.17	205	AUBERT 06D	BABR	10.6 $e^+e^- \to K^+K^-2(\pi^+\pi^-)\gamma$

$\Gamma(\Lambda\overline{\Lambda}) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{118}\Gamma_5/\Gamma$

NODE=M070G16

VALUE (eV)	DOCUMENT ID	TECN	COMMENT
10.7±0.9±0.7	AUBERT 07BD	BABR	10.6 $e^+e^- \to \Lambda\overline{\Lambda}\gamma$

$\Gamma(2(K^+K^-)) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{121}\Gamma_5/\Gamma$

NODE=M070G13

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
4.11±0.39±0.30	156 ± 15	AUBERT 07AK	BABR	10.6 $e^+e^- \to 2(K^+K^-)\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
4.0 ±0.7 ±0.6	38	[36] AUBERT 05D	BABR	10.6 $e^+e^- \to 2(K^+K^-)\gamma$

[36] Superseded by AUBERT 07AK.

NODE=M070G13;LINKAGE=AU

$J/\psi(1S)$ 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	[37,38] SETH 04	RVUE	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.17 ±0.02	[37] BOYARSKI 75	MRK1	e^+e^-

[37] Included in $\Gamma(\text{hadrons})/\Gamma_{total}$.

NODE=M070R4;LINKAGE=C

[38] 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	[39] BESSON 08	CLEO	$\psi(2S) \to \pi^+\pi^- +$ hadrons

[39] 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	[40] BESSON 08	CLEO	$\psi(2S) \to \pi^+\pi^-\gamma +$ hadrons

[40] 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

$\Gamma(\gamma g g)/\Gamma(g g g)$ 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
5.94 ±0.06 OUR AVERAGE					
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	[41] ARMSTRONG	96	E760	$\overline{p}p \to e^+e^-\gamma$

[41] For $E_\gamma > 100$ 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
5.93 ±0.06 OUR AVERAGE					
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
0.998±0.012 OUR AVERAGE				
1.002±0.021±0.013	[42] 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. • • •				
1.00 ±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^-

[42] 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		[43,44] AUBERT,B	04N	BABR	10.6 $e^+e^- \to \pi^+\pi^-\pi^0\gamma$
2.184±0.005±0.201	220k	[44,45] BAI	04H	BES	$e^+e^- \to J/\psi \to \pi^+\pi^-\pi^0$
2.091±0.021±0.116		[44,46] 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^-

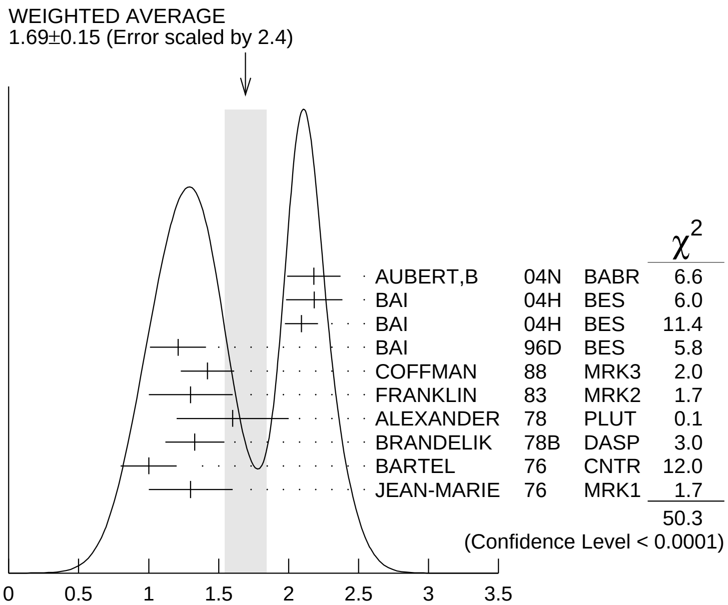
OCCUR=2

[43] 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

[44] Not independent of their B$(\pi^+\pi^-\pi^0)$. NODE=M070R20;LINKAGE=BU

[45] From $J/\psi \to \pi^+\pi^-\pi^0$ events directly. NODE=M070R20;LINKAGE=BA

[46] 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=M070R20;LINKAGE=BI



$\Gamma\big(\rho\pi\big)/\Gamma_{\rm total}$ (units 10^{-2})

$\Gamma(\rho^0\pi^0)/\Gamma(\rho\pi)$ — 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^-

$\Gamma\big(a_2(1320)\rho\big)/\Gamma_{\rm total}$ — 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	$e^+e^- \to 2(\pi^+\pi^-)\pi^0$

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

NODE=M070R26
NODE=M070R26

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
85±34	140	VANNUCCI	77	MRK1	$e^+e^- \to 3(\pi^+\pi^-)\pi^0$

$\Gamma\big(\omega\pi^+\pi^-\pi^0\big)/\Gamma_{\rm total}$ — Γ_{12}/Γ

NODE=M070R76
NODE=M070R76

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
0.40±0.06±0.04	170	[47] AUBERT	06D	BABR	10.6 $e^+e^- \to \omega\pi^+\pi^-\pi^0\gamma$

[47] Using $\Gamma(J/\psi \to e^+e^-) = 5.52 \pm 0.14 \pm 0.04$ keV.

NODE=M070R76;LINKAGE=EE

$\Gamma\big(\omega\pi^+\pi^-\big)/\Gamma_{\rm total}$ — Γ_{13}/Γ

NODE=M070R24
NODE=M070R24

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
8.6±0.7 OUR AVERAGE Error includes scale factor of 1.1.					
9.7±0.6±0.6	788	[48] AUBERT	07AU	BABR	10.6 $e^+e^- \to \omega\pi^+\pi^-\gamma$
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	$e^+e^- \to 2(\pi^+\pi^-)\pi^0$

[48] AUBERT 07AU quotes $\Gamma^{J/\psi}_{ee} \cdot$ B$(J/\psi \to \omega\pi^+\pi^-)$ $\cdot$B$(\omega \to 3\pi) = 47.8 \pm 3.1 \pm 3.2$ eV.

NODE=M070R24;LINKAGE=AU

$\Gamma\big(\omega f_2(1270)\big)/\Gamma_{\rm total}$ — Γ_{14}/Γ

NODE=M070R28
NODE=M070R28

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
4.3±0.6 OUR AVERAGE					
4.3±0.2±0.6	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	$e^+e^- \to 2(\pi^+\pi^-)\pi^0$

$\Gamma(K^*(892)^0 \overline{K}^*(892)^0)/\Gamma_{total}$ — Γ_{15}/Γ

NODE=M070R46

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
2.3±0.7±0.1		25 ± 8	[49] AUBERT	07AK	BABR	10.6 $e^+e^- \to \pi^+\pi^- K^+ K^- \gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<5	90		VANNUCCI	77	MRK1	$e^+e^- \to \pi^+\pi^- K^+ K^-$

[49] AUBERT 07AK reports $[\Gamma(J/\psi(1S) \to K^*(892)^0 \overline{K}^*(892)^0)/\Gamma_{total}] \times [\Gamma(J/\psi(1S) \to e^+e^-)] = (1.28 \pm 0.40 \pm 0.11) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \to e^+e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M070R46;LINKAGE=BE

$\Gamma(K^*(892)^\pm \overline{K}^*(892)^\mp)/\Gamma_{total}$ — Γ_{16}/Γ

NODE=M070S73

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{1.00 \pm 0.19^{+0.11}_{-0.32}}$	323	ABLIKIM	10E	BES2	$J/\psi \to K^\pm K^0_S \pi^\mp \pi^0$

$\Gamma(K^*(892)^\pm \overline{K}^*(800)^\mp)/\Gamma_{total}$ — Γ_{17}/Γ

NODE=M070S74

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{1.09 \pm 0.18^{+0.94}_{-0.54}}$	655	ABLIKIM	10E	BES2	$J/\psi \to K^\pm K^0_S \pi^\mp \pi^0$

$\Gamma(\eta K^*(892)^0 \overline{K}^*(892)^0)/\Gamma_{total}$ — Γ_{18}/Γ

NODE=M070S69

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.15±0.13±0.22	209	ABLIKIM	10C	BES2	$J/\psi \to \eta K^+ \pi^- K^- \pi^+$

$\Gamma(K^*(892)^0 \overline{K}^*_2(1430)^0 + \text{c.c.})/\Gamma_{total}$ — Γ_{19}/Γ

NODE=M070R48

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
6.0±0.6 OUR AVERAGE					
5.9±0.6±0.2	317 ± 23	[50,51] AUBERT	07AK	BABR	10.6 $e^+e^- \to \pi^+\pi^- K^+ K^- \gamma$
6.7±2.6	40	VANNUCCI	77	MRK1	$e^+e^- \to \pi^+\pi^- K^+ K^-$

[50] Using $B(K^*_2(1430)^0 \to K\pi) = (49.9 \pm 1.2)\%$.

NODE=M070R48;LINKAGE=AU

[51] AUBERT 07AK reports $[\Gamma(J/\psi(1S) \to K^*(892)^0 \overline{K}^*_2(1430)^0 + \text{c.c.})/\Gamma_{total}] \times [\Gamma(J/\psi(1S) \to e^+e^-)] = (32.9 \pm 2.3 \pm 2.7) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \to e^+e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M070R48;LINKAGE=BE

$\Gamma(\omega K^*(892) \overline{K} + \text{c.c.})/\Gamma_{total}$ — Γ_{21}/Γ

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	$J/\psi \to \omega K^+ K^- \pi^0$
53 ±14 ±14	530 ± 140	BECKER	87	MRK3	$e^+e^- \to$ hadrons

OCCUR=2

$\Gamma(K^+ \overline{K}^*(892)^- + \text{c.c.})/\Gamma_{total}$ — Γ_{22}/Γ

NODE=M070S15

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
5.12±0.30 OUR AVERAGE					
5.2 ±0.4 ±0.1		[52] AUBERT	08S	BABR	10.6 $e^+e^- \to K^+ K^*(892)^- \gamma$
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	$J/\psi \to K^\pm X$

[52] AUBERT 08S reports $[\Gamma(J/\psi(1S) \to K^+ \overline{K}^*(892)^- + \text{c.c.})/\Gamma_{total}] \times [\Gamma(J/\psi(1S) \to e^+e^-)] = (29.0 \pm 1.7 \pm 1.3) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \to e^+e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M070S15;LINKAGE=AU

$\Gamma(K^+\overline{K}^*(892)^- + \text{c.c.} \to K^+K^-\pi^0)/\Gamma_{\text{total}}$ — Γ_{23}/Γ

NODE=M070R09
NODE=M070R09

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.97±0.20±0.05	155	[53] AUBERT	08S	BABR	$10.6\ e^+e^- \to K^+K^-\pi^0\gamma$

[53] AUBERT 08S reports $[\Gamma(J/\psi(1S) \to K^+\overline{K}^*(892)^- + \text{c.c.} \to K^+K^-\pi^0)/\Gamma_{\text{total}}] \times [\Gamma(J/\psi(1S) \to e^+e^-)] = (10.96 \pm 0.85 \pm 0.70) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \to e^+e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M070R09;LINKAGE=AU

$\Gamma(K^+\overline{K}^*(892)^- + \text{c.c.} \to K^0K^\pm\pi^\mp)/\Gamma_{\text{total}}$ — Γ_{24}/Γ

NODE=M070S58
NODE=M070S58

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
3.0±0.4±0.1	89	[54] AUBERT	08S	BABR	$10.6\ e^+e^- \to K^0_S K^\pm\pi^\mp\gamma$

[54] AUBERT 08S reports $[\Gamma(J/\psi(1S) \to K^+\overline{K}^*(892)^- + \text{c.c.} \to K^0K^\pm\pi^\mp)/\Gamma_{\text{total}}] \times [\Gamma(J/\psi(1S) \to e^+e^-)] = (16.76 \pm 1.70 \pm 1.00) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \to e^+e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M070S58;LINKAGE=AU

$\Gamma(K^0\overline{K}^*(892)^0 + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_{25}/Γ

NODE=M070S16
NODE=M070S16

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
4.39±0.31 OUR AVERAGE					
4.8 ±0.5 ±0.1		[55] AUBERT	08S	BABR	$10.6\ e^+e^- \to K^0\overline{K}^*(892)^0\gamma$
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	$J/\psi \to K^\pm K^0_S\pi^\mp$

[55] AUBERT 08S reports $[\Gamma(J/\psi(1S) \to K^0\overline{K}^*(892)^0 + \text{c.c.})/\Gamma_{\text{total}}] \times [\Gamma(J/\psi(1S) \to e^+e^-)] = (26.6 \pm 2.5 \pm 1.5) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \to e^+e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M070S16;LINKAGE=AU

$\Gamma(K^0\overline{K}^*(892)^0 + \text{c.c.})/\Gamma(K^+\overline{K}^*(892)^- + \text{c.c.})$ — Γ_{25}/Γ_{22}

NODE=M070S17
NODE=M070S17

VALUE	DOCUMENT ID		TECN	COMMENT
0.82±0.05±0.09	COFFMAN	88	MRK3	$J/\psi \to K\overline{K}^*(892)$+c.c.

$\Gamma(K^0\overline{K}^*(892)^0 + \text{c.c.} \to K^0K^\pm\pi^\mp)/\Gamma_{\text{total}}$ — Γ_{26}/Γ

NODE=M070S59
NODE=M070S59

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
3.2±0.4±0.1	94	[56] AUBERT	08S	BABR	$10.6\ e^+e^- \to K^0_S K^\pm\pi^\mp\gamma$

[56] AUBERT 08S reports $[\Gamma(J/\psi(1S) \to K^0\overline{K}^*(892)^0 + \text{c.c.} \to K^0K^\pm\pi^\mp)/\Gamma_{\text{total}}] \times [\Gamma(J/\psi(1S) \to e^+e^-)] = (17.70 \pm 1.70 \pm 1.00) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \to e^+e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M070S59;LINKAGE=AU

$\Gamma(K_1(1400)^\pm K^\mp)/\Gamma_{\text{total}}$ — Γ_{27}/Γ

NODE=M070S35
NODE=M070S35

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
3.8±0.8±1.2	[57] BAI	99C	BES	e^+e^-

[57] Assuming $B(K_1(1400) \to K^*\pi) = 0.94 \pm 0.06$

NODE=M070S35;LINKAGE=M3

$\Gamma(\overline{K}^*(892)^0K^+\pi^- + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_{28}/Γ

NODE=M070S52
NODE=M070S52

VALUE	DOCUMENT ID		TECN	COMMENT
seen	[58] ABLIKIM	06C	BES2	$J/\psi \to \overline{K}^*(892)^0K^+\pi^-$

[58] A $K^*_0(800)$ is observed by ABLIKIM 06C in the $K^+\pi^-$ mass spectrum of the $\overline{K}^*(892)^0K^+\pi^-$ final state against the $\overline{K}^*(892)$. A corresponding branching fraction of the $J/\psi(1S)$ is not presented.

NODE=M070S52;LINKAGE=AB

$\Gamma(\omega\pi^0\pi^0)/\Gamma_{\text{total}}$ — Γ_{29}/Γ

NODE=M070S26
NODE=M070S26

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
3.4±0.3±0.7	509	AUGUSTIN	89	DM2	$J/\psi \to \pi^+\pi^-3\pi^0$

$\Gamma(b_1(1235)^\pm\pi^\mp)/\Gamma_{\text{total}}$ — Γ_{30}/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^-

$\Gamma(\omega K^{\pm} K^0_S \pi^{\mp})/\Gamma_{total}$ Γ_{31}/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	$e^+ e^- \rightarrow J/\psi$
29.5±1.4±7.0	879 ± 41	BECKER	87	MRK3	$e^+ e^- \rightarrow$ hadrons

$\Gamma(b_1(1235)^0 \pi^0)/\Gamma_{total}$ Γ_{32}/Γ

NODE=M070S28
NODE=M070S28

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
23±3±5	229	AUGUSTIN	89	DM2	$e^+ e^-$

$\Gamma(\eta K^{\pm} K^0_S \pi^{\mp})/\Gamma_{total}$ Γ_{33}/Γ

NODE=M070S57
NODE=M070S57

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
21.8±2.2±3.4	232 ± 23	ABLIKIM	08E	BES2	$e^+ e^- \rightarrow J/\psi$

$\Gamma(\phi K^*(892) \overline{K} + c.c.)/\Gamma_{total}$ Γ_{34}/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	$J/\psi \rightarrow \phi K^0_S K^{\pm} \pi^{\mp}$
29.6±3.7±4.7	238 ± 30	ABLIKIM	08E	BES2	$J/\psi \rightarrow \phi K^+ K^- \pi^0$
20.7±2.4±3.0		FALVARD	88	DM2	$J/\psi \rightarrow$ hadrons
20 ±3 ±3	155 ± 20	BECKER	87	MRK3	$e^+ e^- \rightarrow$ hadrons

OCCUR=2

$\Gamma(\omega K \overline{K})/\Gamma_{total}$ Γ_{35}/Γ

NODE=M070R27
NODE=M070R27

NEW

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
17.0± 3.2 OUR AVERAGE					
[(1.6 ± 0.5) × 10^{-4} OUR 2011 AVERAGE]					
13.6± 5.0±1.0	24	[59] AUBERT	07AU	BABR	10.6 $e^+ e^- \rightarrow \omega K^+ K^- \gamma$
19.8± 2.1±3.9		[60] FALVARD	88	DM2	$J/\psi \rightarrow$ hadrons
16 ±10	22	FELDMAN	77	MRK1	$e^+ e^-$

[59] AUBERT 07AU quotes $\Gamma^{J/\psi}_{ee} \cdot B(J/\psi \rightarrow \omega K^+ K^-) \cdot B(\eta \rightarrow 3\pi) = 3.3 \pm 1.3 \pm 0.2$ eV.

[60] Addition of $\omega K^+ K^-$ and $\omega K^0 \overline{K}^0$ branching ratios.

NODE=M070R27;LINKAGE=AU
NODE=M070R27;LINKAGE=B

$\Gamma(\omega f_0(1710) \rightarrow \omega K \overline{K})/\Gamma_{total}$ Γ_{36}/Γ

NODE=M070S25
NODE=M070S25

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
4.8±1.1±0.3	[61,62] FALVARD	88	DM2	$J/\psi \rightarrow$ hadrons

[61] Includes unknown branching fraction $f_0(1710) \rightarrow K \overline{K}$.

[62] Addition of $f_0(1710) \rightarrow K^+ K^-$ and $f_0(1710) \rightarrow K^0 \overline{K}^0$ branching ratios.

NODE=M070S25;LINKAGE=F
NODE=M070S25;LINKAGE=G

$\Gamma(\phi 2(\pi^+ \pi^-))/\Gamma_{total}$ Γ_{37}/Γ

NODE=M070R35
NODE=M070R35

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
16.6±2.3 OUR AVERAGE					
17.3±3.3±1.2	35	[63] AUBERT	06D	BABR	10.6 $e^+ e^- \rightarrow \phi 2(\pi^+ \pi^-) \gamma$
16.0±1.0±3.0		FALVARD	88	DM2	$J/\psi \rightarrow$ hadrons

[63] Using $\Gamma(J/\psi \rightarrow e^+ e^-) = 5.52 \pm 0.14 \pm 0.04$ keV.

NODE=M070R35;LINKAGE=EE

$\Gamma(\Delta(1232)^{++} \overline{p} \pi^-)/\Gamma_{total}$ Γ_{38}/Γ

NODE=M070R70
NODE=M070R70

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.58±0.23±0.40	332	EATON	84	MRK2	$e^+ e^-$

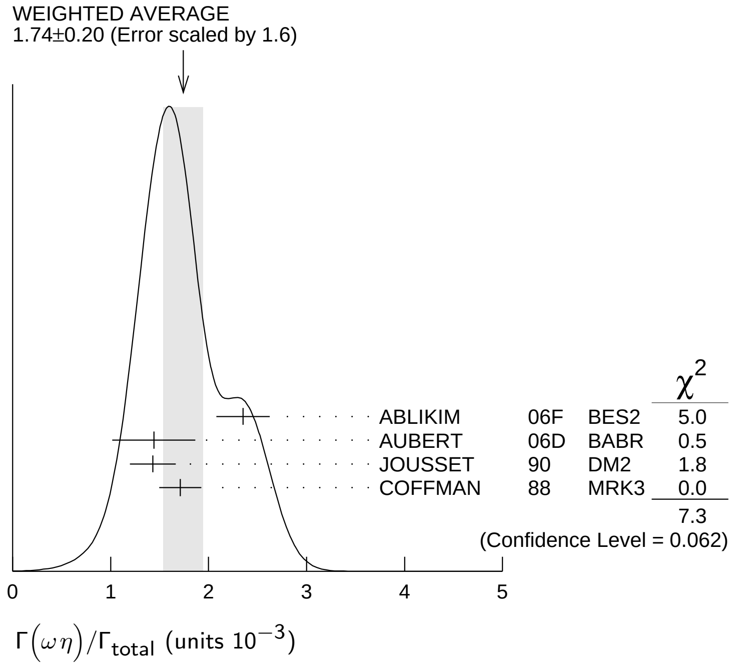
$\Gamma(\omega \eta)/\Gamma_{total}$ Γ_{39}/Γ

NODE=M070R30
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	[64] ABLIKIM	06F	BES2	$J/\psi \rightarrow \omega \eta$
1.44 ±0.40 ±0.14	13	[65] AUBERT	06D	BABR	10.6 $e^+ e^- \rightarrow \omega \eta \gamma$
1.43 ±0.10 ±0.21	378	JOUSSET	90	DM2	$J/\psi \rightarrow$ hadrons
1.71 ±0.08 ±0.20		COFFMAN	88	MRK3	$e^+ e^- \rightarrow 3\pi \eta$

[64] 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

[65] Using $\Gamma(J/\psi \to e^+e^-)$ = 5.52 ± 0.14 ± 0.04 keV. NODE=M070R30;LINKAGE=EE



$\Gamma(\phi K\overline{K})/\Gamma_{total}$ Γ_{40}/Γ

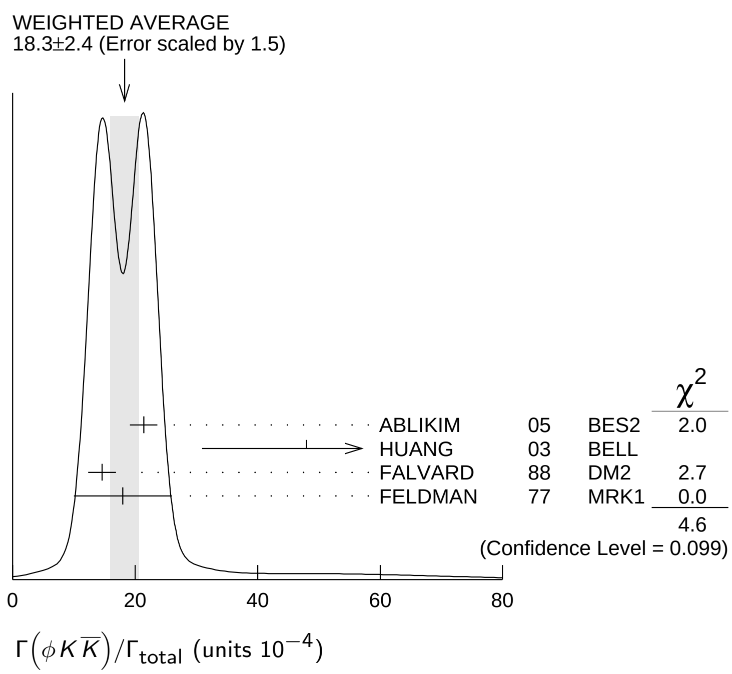
NODE=M070R36
NODE=M070R36

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
18.3± 2.4 OUR AVERAGE	Error includes scale factor of 1.5. See the ideogram below.				
21.4± 0.4±2.2		ABLIKIM	05	BES2	$J/\psi \to \phi\pi^+\pi^-$
48 $^{+20}_{-16}$ ±6	9.0$^{+3.7}_{-3.0}$	[66,67] HUANG	03	BELL	$B^+ \to (\phi K^+K^-) K^+$
14.6± 0.8±2.1		[68] FALVARD	88	DM2	$J/\psi \to$ hadrons
18 ± 8	14	FELDMAN	77	MRK1	e^+e^-

[66] We have multiplied K^+K^- measurement by 2 to obtain $K\overline{K}$. NODE=M070R36;LINKAGE=AA

[67] Using B($B^+ \to J/\psi K^+$) = (1.01 ± 0.05) × 10^{-3}. NODE=M070R36;LINKAGE=CC

[68] Addition of ϕK^+K^- and $\phi K^0\overline{K}^0$ branching ratios. NODE=M070R36;LINKAGE=A



$\Gamma(\phi f_0(1710) \to \phi K\overline{K})/\Gamma_{total}$ — Γ_{41}/Γ

NODE=M070S24

VALUE (units 10^{-4})		DOCUMENT ID		TECN	COMMENT
3.6±0.2±0.6	[69,70]	FALVARD	88	DM2	$J/\psi \to$ hadrons

[69] Including interference with $f'_2(1525)$.

[70] Includes unknown branching fraction $f_0(1710) \to K\overline{K}$.

NODE=M070S24;LINKAGE=D
NODE=M070S24;LINKAGE=E

$\Gamma(\phi f_2(1270))/\Gamma_{total}$ — Γ_{42}/Γ

NODE=M070R39

VALUE (units 10^{-3})	CL%	EVTS		DOCUMENT ID		TECN	COMMENT
0.72±0.13±0.02		44 ± 7	[71,72]	AUBERT	07AK	BABR	10.6 $e^+e^- \to \pi^+\pi^-K^+K^-\gamma$
• • • 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	$e^+e^- \to \pi^+\pi^-K^+K^-$

[71] Using $B(f_2(1270) \to \pi\pi) = (84.8^{+2.4}_{-1.2})\%$

[72] AUBERT 07AK reports $[\Gamma(J/\psi(1S) \to \phi f_2(1270))/\Gamma_{total}] \times [\Gamma(J/\psi(1S) \to e^+e^-)] = (4.02 \pm 0.65 \pm 0.33) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \to e^+e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M070R39;LINKAGE=AU
NODE=M070R39;LINKAGE=BE

$\Gamma(\Delta(1232)^{++}\overline{\Delta}(1232)^{--})/\Gamma_{total}$ — Γ_{43}/Γ

NODE=M070R66

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.10±0.09±0.28	233	EATON	84	MRK2	e^+e^-

$\Gamma(\Sigma(1385)^-\overline{\Sigma}(1385)^+ \text{(or c.c.)})/\Gamma_{total}$ — Γ_{44}/Γ

NODE=M070R67

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.03±0.13 OUR AVERAGE					
1.00±0.04±0.21	631 ± 25	HENRARD	87	DM2	$e^+e^- \to \Sigma^{*-}$
1.19±0.04±0.25	754 ± 27	HENRARD	87	DM2	$e^+e^- \to \Sigma^{*+}$
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
OCCUR=2

$\Gamma(\phi f'_2(1525))/\Gamma_{total}$ — Γ_{45}/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		[73,74]	FALVARD	88	DM2	$J/\psi \to$ hadrons
4.8±1.8	46	[73]	GIDAL	81	MRK2	$J/\psi \to K^+K^-K^+K^-$

[73] Re-evaluated using $B(f'_2(1525) \to K\overline{K}) = 0.713$.

[74] Including interference with $f_0(1710)$.

NODE=M070R40;LINKAGE=B
NODE=M070R40;LINKAGE=C

$\Gamma(\phi\pi^+\pi^-)/\Gamma_{total}$ — Γ_{46}/Γ

NODE=M070R34

VALUE (units 10^{-3})	EVTS		DOCUMENT ID		TECN	COMMENT
0.94±0.09 OUR AVERAGE Error includes scale factor of 1.2.						
0.96±0.13	103	[75]	AUBERT,BE	06D	BABR	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\gamma$
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^-

[75] Derived by us. AUBERT,BE 06D measures $\Gamma(J/\psi \to e^+e^-) \times B(J/\psi \to \phi\pi^+\pi^-) \times B(\phi \to K^+K^-) = (2.61 \pm 0.30 \pm 0.18)$ eV

NODE=M070R34;LINKAGE=AU

$\Gamma(\phi\pi^0\pi^0)/\Gamma_{total}$ — Γ_{47}/Γ

NODE=M070S44

VALUE (units 10^{-3})	EVTS		DOCUMENT ID		TECN	COMMENT
0.56±0.16	23	[76]	AUBERT,BE	06D	BABR	10.6 $e^+e^- \to K^+K^-\pi^0\pi^0\gamma$

[76] Derived by us. AUBERT,BE 06D measures $\Gamma(J/\psi \to e^+e^-) \times B(J/\psi \to \phi\pi^0\pi^0) \times B(\phi \to K^+K^-) = (1.54 \pm 0.40 \pm 0.16)$ eV

NODE=M070S44;LINKAGE=AU

$\Gamma(\phi K^\pm K^0_S\pi^\mp)/\Gamma_{total}$ — Γ_{48}/Γ

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

$\Gamma(\omega f_1(1420))/\Gamma_{total}$ Γ_{49}/Γ

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

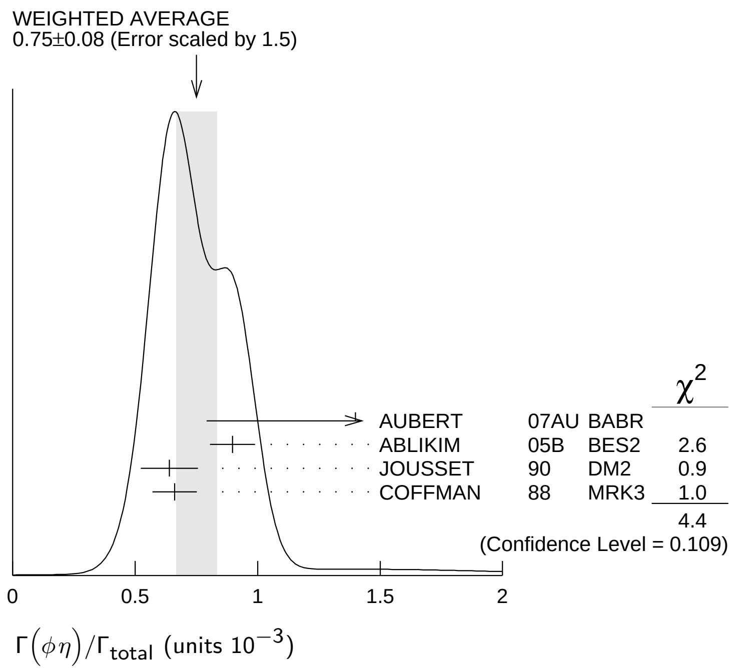
$\Gamma(\phi\eta)/\Gamma_{total}$ Γ_{50}/Γ

NODE=M070R37

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.75 ±0.08 OUR AVERAGE		Error includes scale factor of 1.5. See the ideogram below.			
1.4 ±0.6 ±0.1	6	[77] AUBERT	07AU	BABR	10.6 $e^+e^- \to \phi\eta\gamma$
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	$e^+e^- \to K^+K^-\eta$

[77] AUBERT 07AU quotes $\Gamma^{J/\psi}_{ee} \cdot B(J/\psi \to \phi\eta) \cdot B(\phi \to K^+K^-) \cdot B(\eta \to \gamma\gamma) = 0.84 \pm 0.37 \pm 0.05$ eV.

NODE=M070R37;LINKAGE=AU



$\Gamma(\Xi^0\overline{\Xi}^0)/\Gamma_{total}$ Γ_{51}/Γ

NODE=M070S64

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.20±0.12±0.21	206	ABLIKIM	08O	BES2	$e^+e^- \to J/\psi$

$\Gamma(\Xi(1530)^-\overline{\Xi}^+)/\Gamma_{total}$ Γ_{52}/Γ

NODE=M070S9

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.59±0.09±0.12	75 ± 11	HENRARD	87	DM2	e^+e^-

$\Gamma(pK^-\overline{\Sigma}(1385)^0)/\Gamma_{total}$ Γ_{53}/Γ

NODE=M070R74

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.51±0.26±0.18	89	EATON	84	MRK2	e^+e^-

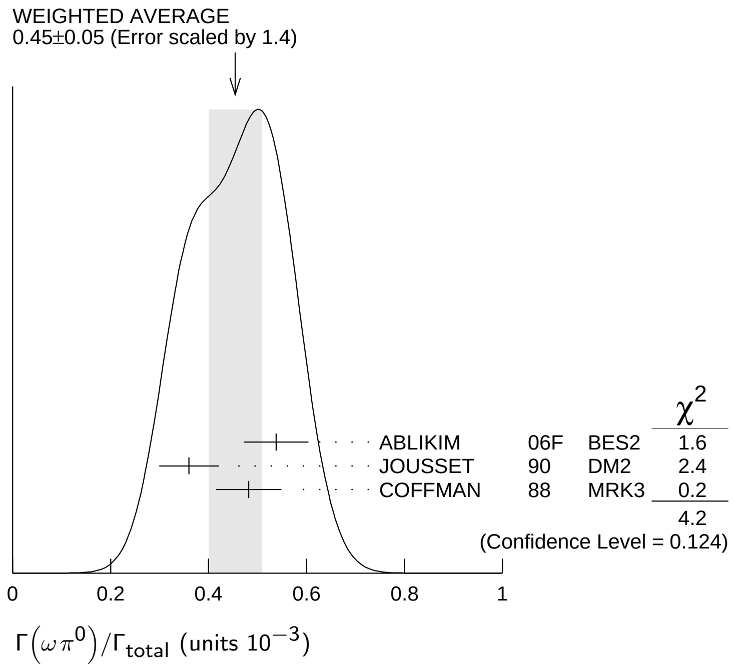
$\Gamma(\omega\pi^0)/\Gamma_{total}$ Γ_{54}/Γ

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±0.012±0.065	2090	[78] ABLIKIM	06F	BES2	$J/\psi \to \omega\pi^0$
0.360±0.028±0.054	222	JOUSSET	90	DM2	$J/\psi \to$ hadrons
0.482±0.019±0.064		COFFMAN	88	MRK3	$e^+e^- \to \pi^0\pi^+\pi^-\pi^0$

[78] Using $B(\omega \to \pi^+\pi^-\pi^0) = (89.1 \pm 0.7)\%$.

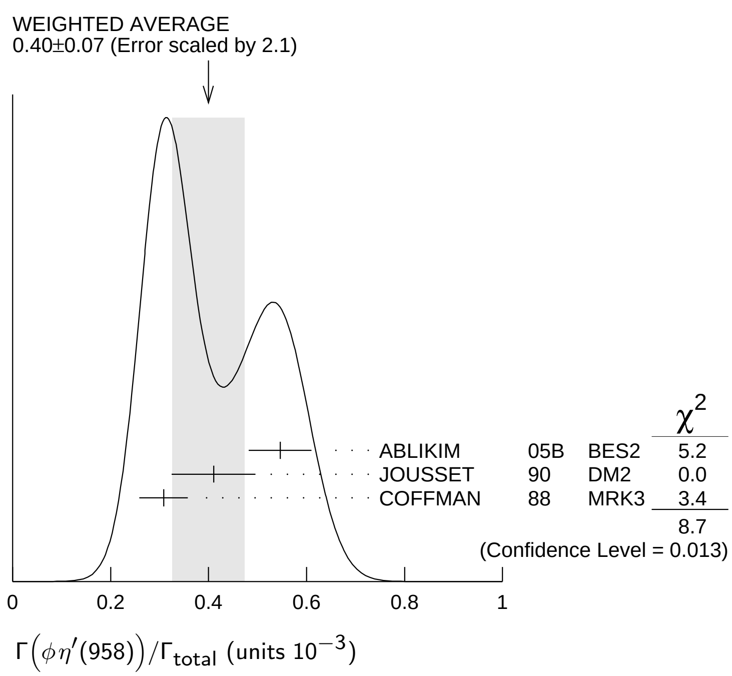
NODE=M070R32;LINKAGE=BL



$\Gamma(\phi\eta'(958))/\Gamma_{total}$ Γ_{55}/Γ

NODE=M070R38
NODE=M070R38

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.40 ±0.07 OUR AVERAGE			Error includes scale factor of 2.1. See the ideogram below.			
0.546±0.031±0.056			ABLIKIM	05B	BES2	$e^+e^- \rightarrow J/\psi \rightarrow$ hadr
0.41 ±0.03 ±0.08		167	JOUSSET	90	DM2	$J/\psi \rightarrow$ hadrons
0.308±0.034±0.036			COFFMAN	88	MRK3	$e^+e^- \rightarrow K^+K^-\eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 1.3	90		VANNUCCI	77	MRK1	e^+e^-



$\Gamma(\phi f_0(980))/\Gamma_{total}$ Γ_{56}/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		[79] FALVARD	88	DM2	$J/\psi \rightarrow$ hadrons
2.6±0.6	50	[79] GIDAL	81	MRK2	$J/\psi \rightarrow K^+K^-K^+K^-$

[79] Assuming B($f_0(980) \rightarrow \pi\pi$) = 0.78.

NODE=M070R41;LINKAGE=A

$\Gamma(\phi f_0(980) \to \phi\pi^+\pi^-)/\Gamma_{total}$ Γ_{57}/Γ

NODE=M070S02

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
0.182±0.042±0.005	19.5 ± 4.5	[80,81] AUBERT 07AK	BABR	10.6 $e^+e^- \to \pi^+\pi^- K^+K^-\gamma$

[80] Using B($\phi \to K^+K^-$) = (49.3 ± 0.6)%.

[81] AUBERT 07AK reports $[\Gamma(J/\psi(1S) \to \phi f_0(980) \to \phi\pi^+\pi^-)/\Gamma_{total}] \times [\Gamma(J/\psi(1S) \to e^+e^-)] = (1.01 \pm 0.22 \pm 0.08) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \to e^+e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M070S02;LINKAGE=AU
NODE=M070S02;LINKAGE=BE

$\Gamma(\phi f_0(980) \to \phi\pi^0\pi^0)/\Gamma_{total}$ Γ_{58}/Γ

NODE=M070S03

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
0.171±0.073±0.004	7.0 ± 2.8	[82,83] AUBERT 07AK	BABR	10.6 $e^+e^- \to \pi^0\pi^0 K^+K^-\gamma$

[82] Using B($\phi \to K^+K^-$) = (49.3 ± 0.6)%.

[83] AUBERT 07AK reports $[\Gamma(J/\psi(1S) \to \phi f_0(980) \to \phi\pi^0\pi^0)/\Gamma_{total}] \times [\Gamma(J/\psi(1S) \to e^+e^-)] = (0.95 \pm 0.39 \pm 0.10) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \to e^+e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M070S03;LINKAGE=AU
NODE=M070S03;LINKAGE=BE

$\Gamma(\eta\phi f_0(980) \to \eta\phi\pi^+\pi^-)/\Gamma_{total}$ Γ_{59}/Γ

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_{60}/Γ

NODE=M070S75

VALUE (units 10^{-6})	DOCUMENT ID	TECN	COMMENT
5.0±2.7±2.5	[84] ABLIKIM 11D	BES3	$J/\psi \to \phi\eta\pi^0$

[84] Assuming $a_0(980) - f_0(980)$ mixing and isospin breaking via γ^* and K^*K loops.

NODE=M070S75;LINKAGE=AB

$\Gamma(\Xi(1530)^0\overline{\Xi}^0)/\Gamma_{total}$ Γ_{61}/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^-

$\Gamma(\Sigma(1385)^-\overline{\Sigma}^+ \text{(or c.c.)})/\Gamma_{total}$ Γ_{62}/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	$e^+e^- \to \Sigma^{*+}$
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
OCCUR=2

$\Gamma(\phi f_1(1285))/\Gamma_{total}$ Γ_{63}/Γ

NODE=M070S6

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
2.6±0.5 OUR AVERAGE Error includes scale factor of 1.1.				
3.2±0.6±0.4		JOUSSET 90	DM2	$J/\psi \to \phi 2(\pi^+\pi^-)$
2.1±0.5±0.4	25	[85] 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 ± 6	BECKER 87	MRK3	$J/\psi \to \phi K\overline{K}\pi$

OCCUR=2

[85] 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

$\Gamma(\eta\pi^+\pi^-)/\Gamma_{total}$ Γ_{64}/Γ

NODE=M070S05

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
0.40±0.17±0.03	9	[86] AUBERT 07AU	BABR	10.6 $e^+e^- \to \eta\pi^+\pi^-\gamma$

[86] AUBERT 07AU quotes $\Gamma_{ee}^{J/\psi} \cdot B(J/\psi \to \eta\pi^+\pi^-) \cdot B(\eta \to 3\pi) = 0.51 \pm 0.22 \pm 0.03$ eV.

NODE=M070S05;LINKAGE=AU

$\Gamma(\rho\eta)/\Gamma_{total}$ Γ_{65}/Γ

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	$e^+e^- \to \pi^+\pi^-\eta$

$\Gamma(\omega\eta'(958))/\Gamma_{total}$ — Γ_{66}/Γ

NODE=M070R31
NODE=M070R31

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.182±0.021 OUR AVERAGE					
0.226±0.043	218	[87] ABLIKIM	06F	BES2	$J/\psi \to \omega\eta'$
$0.18\ ^{+0.10}_{-0.08}\ \pm0.03$	6	JOUSSET	90	DM2	$J/\psi \to$ hadrons
0.166±0.017±0.019		COFFMAN	88	MRK3	$e^+e^- \to 3\pi\eta'$

[87] Using $B(\eta' \to \pi^+\pi^-\eta) = (44.3 \pm 1.5)\%$, $B(\eta' \to \pi^+\pi^-\gamma) = 29.5 \pm 1.0\%$, $B(\eta \to 2\gamma) = 39.43 \pm 0.26\%$, and $B(\omega \to \pi^+\pi^-\pi^0) = (89.1 \pm 0.7)\%$.

NODE=M070R31;LINKAGE=BL

$\Gamma(\omega f_0(980))/\Gamma_{total}$ — Γ_{67}/Γ

NODE=M070S27
NODE=M070S27

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
1.41±0.27±0.47	[88] AUGUSTIN	89	DM2	$J/\psi \to 2(\pi^+\pi^-)\pi^0$

[88] Assuming $B(f_0(980) \to \pi\pi) = 0.78$.

NODE=M070S27;LINKAGE=K

$\Gamma(\rho\eta'(958))/\Gamma_{total}$ — Γ_{68}/Γ

NODE=M070R23
NODE=M070R23

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.105±0.018 OUR AVERAGE					
0.083±0.030±0.012	19	JOUSSET	90	DM2	$J/\psi \to$ hadrons
0.114±0.014±0.016		COFFMAN	88	MRK3	$J/\psi \to \pi^+\pi^-\eta'$

$\Gamma(a_2(1320)^\pm\pi^\mp)/\Gamma_{total}$ — Γ_{69}/Γ

NODE=M070R42
NODE=M070R42

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<43	90	BRAUNSCH...	76	DASP	e^+e^-

$\Gamma(K\overline{K}^*_2(1430)+\text{c.c.})/\Gamma_{total}$ — Γ_{70}/Γ

NODE=M070R45
NODE=M070R45

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<40	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	90	BRAUNSCH...	76	DASP	$e^+e^- \to K^\pm\overline{K}^{*\mp}_2$

$\Gamma(K_1(1270)^\pm K^\mp)/\Gamma_{total}$ — Γ_{71}/Γ

NODE=M070S34
NODE=M070S34

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<3.0	90	[89] BAI	99C	BES	e^+e^-

[89] Assuming $B(K_1(1270) \to K\rho) = 0.42 \pm 0.06$

NODE=M070S34;LINKAGE=M2

$\Gamma(K^*_2(1430)^0\overline{K}^*_2(1430)^0)/\Gamma_{total}$ — Γ_{72}/Γ

NODE=M070R47
NODE=M070R47

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<29	90	VANNUCCI	77	MRK1	$e^+e^- \to \pi^+\pi^-K^+K^-$

$\Gamma(\phi\pi^0)/\Gamma_{total}$ — Γ_{73}/Γ

NODE=M070R33
NODE=M070R33

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<6.4	90	ABLIKIM	05B	BES2	$e^+e^- \to J/\psi \to \phi\gamma\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<6.8	90	COFFMAN	88	MRK3	$e^+e^- \to K^+K^-\pi^0$

$\Gamma(\phi\eta(1405) \to \phi\eta\pi\pi)/\Gamma_{total}$ — Γ_{74}/Γ

NODE=M070S23
NODE=M070S23

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<2.5	90	[90] FALVARD	88	DM2	$J/\psi \to$ hadrons

[90] Includes unknown branching fraction $\eta(1405) \to \eta\pi\pi$.

NODE=M070S23;LINKAGE=A

$\Gamma(\omega f'_2(1525))/\Gamma_{total}$ — Γ_{75}/Γ

NODE=M070R29
NODE=M070R29

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<2.2	90	[91] 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	90	[91] FALVARD	88	DM2	$J/\psi \to$ hadrons

[91] Re-evaluated assuming $B(f'_2(1525) \to K\overline{K}) = 0.713$.

NODE=M070R29;LINKAGE=C

$\Gamma(\eta\phi(2170) \to \eta K^*(892)^0\overline{K}^*(892)^0)/\Gamma_{total}$ — Γ_{76}/Γ

NODE=M070S70
NODE=M070S70

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<2.52	90	ABLIKIM	10C	BES2	$J/\psi \to \eta K^+\pi^-K^-\pi^+$

$\Gamma(\Sigma(1385)^0\overline{\Lambda})/\Gamma_{total}$ Γ_{77}/Γ

NODE=M070S13

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.2	90	HENRARD	87	DM2	e^+e^-

$\Gamma(\Delta(1232)^+\overline{p})/\Gamma_{total}$ Γ_{78}/Γ

NODE=M070S14

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.1	90	HENRARD	87	DM2	e^+e^-

$\Gamma(\Theta(1540)\overline{\Theta}(1540)\rightarrow K^0_S pK^-\overline{n}+\text{c.c.})/\Gamma_{total}$ Γ_{79}/Γ

NODE=M070S47

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<1.1	90	BAI	04G	BES2	e^+e^-

$\Gamma(\Theta(1540)K^-\overline{n}\rightarrow K^0_S pK^-\overline{n})/\Gamma_{total}$ Γ_{80}/Γ

NODE=M070S48

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<2.1	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_{81}/Γ

NODE=M070S49

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<1.6	90	BAI	04G	BES2	e^+e^-

$\Gamma(\overline{\Theta}(1540)K^+n\rightarrow K^0_S\overline{p}K^+n)/\Gamma_{total}$ Γ_{82}/Γ

NODE=M070S50

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<5.6	90	BAI	04G	BES2	e^+e^-

$\Gamma(\overline{\Theta}(1540)K^0_S p\rightarrow K^0_S pK^-\overline{n})/\Gamma_{total}$ Γ_{83}/Γ

NODE=M070S51

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<1.1	90	BAI	04G	BES2	e^+e^-

$\Gamma(\Sigma^0\overline{\Lambda})/\Gamma_{total}$ Γ_{84}/Γ

NODE=M070S12

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.9	90	HENRARD	87	DM2	e^+e^-

STABLE HADRONS

NODE=M070307

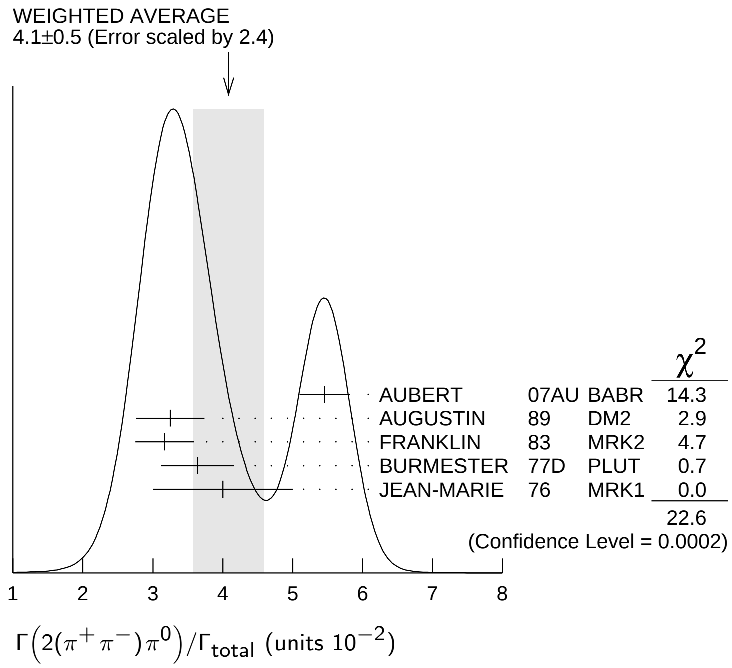
$\Gamma(2(\pi^+\pi^-)\pi^0)/\Gamma_{total}$ Γ_{85}/Γ

NODE=M070R9

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
4.1 ±0.5 OUR AVERAGE		Error includes scale factor of 2.4. See the ideogram below.			
5.46±0.34±0.14	4990	[92] AUBERT	07AU	BABR	10.6 $e^+e^-\rightarrow 2(\pi^+\pi^-)\pi^0\gamma$
3.25±0.49	46055	AUGUSTIN	89	DM2	$J/\psi\rightarrow 2(\pi^+\pi^-)\pi^0$
3.17±0.42	147	FRANKLIN	83	MRK2	$e^+e^-\rightarrow$ hadrons
3.64±0.52	1500	BURMESTER	77D	PLUT	e^+e^-
4 ±1	675	JEAN-MARIE	76	MRK1	e^+e^-

[92] AUBERT 07AU reports $[\Gamma(J/\psi(1S)\rightarrow 2(\pi^+\pi^-)\pi^0)/\Gamma_{total}]\times[\Gamma(J/\psi(1S)\rightarrow e^+e^-)] = 0.303\pm0.005\pm0.018$ keV which we divide by our best value $\Gamma(J/\psi(1S)\rightarrow e^+e^-) = 5.55\pm0.14\pm0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M070R9;LINKAGE=AU



$\Gamma(\omega\pi^+\pi^-)/\Gamma(2(\pi^+\pi^-)\pi^0)$ — Γ_{13}/Γ_{85}

NODE=M070R25
NODE=M070R25

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.3	[93] JEAN-MARIE 76	MRK1	e^+e^-

[93] Final state $(\pi^+\pi^-)\pi^0$ under the assumption that $\pi\pi$ is isospin 0.

NODE=M070R25;LINKAGE=J

$\Gamma(3(\pi^+\pi^-)\pi^0)/\Gamma_{total}$ — Γ_{86}/Γ

NODE=M070R11
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_{87}/Γ

NODE=M070R7
NODE=M070R7

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
20.7 ±1.2 OUR AVERAGE		Error includes scale factor of 1.6. See the ideogram below.		
23.6 ±2.1 ±0.5	256	[94] AUBERT 07AU	BABR	10.6 $e^+e^- \to J/\psi\pi^+\pi^-\gamma$
21.8 ±1.9		[95,96] AUBERT,B 04N	BABR	10.6 $e^+e^- \to \pi^+\pi^-\pi^0\gamma$
21.84±0.05±2.01	220k	[96,97] BAI 04H	BES	e^+e^-
20.91±0.21±1.16		[96,98] BAI 04H	BES	e^+e^-
15 ±2	168	FRANKLIN 83	MRK2	e^+e^-

OCCUR=2

[94] AUBERT 07AU reports $[\Gamma(J/\psi(1S) \to \pi^+\pi^-\pi^0)/\Gamma_{total}] \times [\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) \times \Gamma(\psi(2S) \to e^+e^-)/\Gamma_{total}] = (18.6 \pm 1.2 \pm 1.1)\times 10^{-3}$ keV which we divide by our best value $\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) \times \Gamma(\psi(2S) \to e^+e^-)/\Gamma_{total} = 0.789 \pm 0.015$ 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

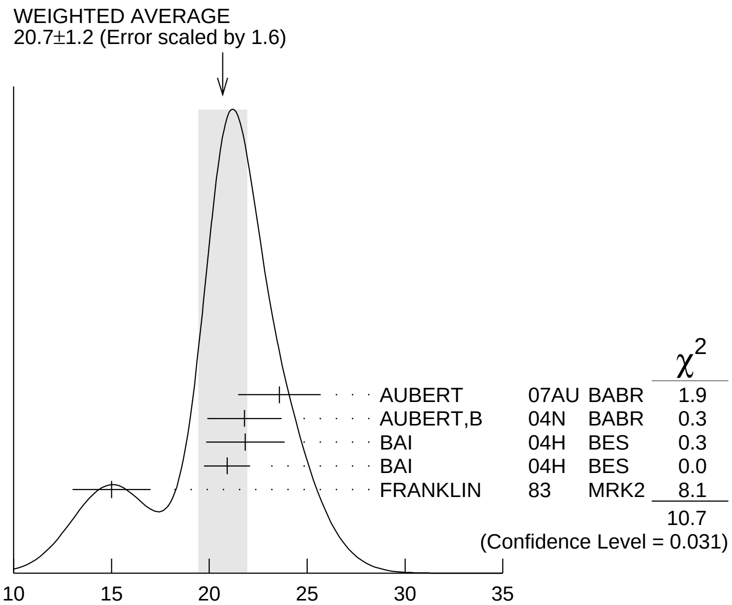
[95] From the ratio of $\Gamma(e^+e^-)$ B$(\pi^+\pi^-\pi^0)$ and $\Gamma(e^+e^-)$ B$(\mu^+\mu^-)$ (AUBERT 04).

[96] Mostly $\rho\pi$, see also $\rho\pi$ subsection.

[97] From $J/\psi \to \pi^+\pi^-\pi^0$ events directly.

[98] 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=AU
NODE=M070R;LINKAGE=BU
NODE=M070R;LINKAGE=BA
NODE=M070R;LINKAGE=BI



$\Gamma\left(\pi^+\pi^-\pi^0\right)/\Gamma_{total}$ (units 10^{-3})

$\Gamma\left(\pi^+\pi^-\pi^0 K^+ K^-\right)/\Gamma_{total}$ Γ_{88}/Γ

NODE=M070R18
NODE=M070R18

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
1.79±0.29 OUR AVERAGE	Error includes scale factor of 2.2.			
1.93±0.14±0.05	768	[99] AUBERT 07AU	BABR	10.6 $e^+e^- \rightarrow K^+K^-\pi^+\pi^-\pi^0\gamma$
1.2 ±0.3	309	VANNUCCI 77	MRK1	e^+e^-

[99] AUBERT 07AU reports $[\Gamma(J/\psi(1S) \rightarrow \pi^+\pi^-\pi^0 K^+K^-)/\Gamma_{total}] \times [\Gamma(J/\psi(1S) \rightarrow e^+e^-)] = 0.1070 \pm 0.0043 \pm 0.0064$ keV which we divide by our best value $\Gamma(J/\psi(1S) \rightarrow e^+e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070R18;LINKAGE=AU

$\Gamma\left(4(\pi^+\pi^-)\pi^0\right)/\Gamma_{total}$ Γ_{89}/Γ

NODE=M070R12
NODE=M070R12

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
90±30	13	JEAN-MARIE 76	MRK1	e^+e^-

$\Gamma\left(\pi^+\pi^- K^+ K^-\right)/\Gamma_{total}$ Γ_{90}/Γ

NODE=M070R16
NODE=M070R16

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
6.6±0.5 OUR AVERAGE				
6.5±0.4±0.2	1.6k	[100] AUBERT 07AK	BABR	10.6 $e^+e^- \rightarrow \pi^+\pi^-K^+K^-\gamma$
7.2±2.3	205	VANNUCCI 77	MRK1	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •				
6.1±0.7±0.2	233	[101] AUBERT 05D	BABR	10.6 $e^+e^- \rightarrow K^+K^-\pi^+\pi^-\gamma$

[100] AUBERT 07AK reports $[\Gamma(J/\psi(1S) \rightarrow \pi^+\pi^-K^+K^-)/\Gamma_{total}] \times [\Gamma(J/\psi(1S) \rightarrow e^+e^-)] = (36.3 \pm 1.3 \pm 2.1) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \rightarrow e^+e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070R16;LINKAGE=BE

[101] Superseded by AUBERT 07AK. AUBERT 05D reports $[\Gamma(J/\psi(1S) \rightarrow \pi^+\pi^-K^+K^-)/\Gamma_{total}] \times [\Gamma(J/\psi(1S) \rightarrow e^+e^-)] = (33.6 \pm 2.7 \pm 2.7) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \rightarrow e^+e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070R16;LINKAGE=AU

$\Gamma\left(\pi^+\pi^- K^+ K^- \eta\right)/\Gamma_{total}$ Γ_{91}/Γ

NODE=M070S04
NODE=M070S04

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
1.84±0.28±0.05	73	[102] AUBERT 07AU	BABR	10.6 $e^+e^- \rightarrow K^+K^-\pi^+\pi^-\eta\gamma$

[102] AUBERT 07AU reports $[\Gamma(J/\psi(1S) \rightarrow \pi^+\pi^-K^+K^-\eta)/\Gamma_{total}] \times [\Gamma(J/\psi(1S) \rightarrow e^+e^-)] = (10.2 \pm 1.3 \pm 0.8) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \rightarrow e^+e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070S04;LINKAGE=AU

$\Gamma(\pi^0\pi^0 K^+ K^-)/\Gamma_{total}$ Γ_{92}/Γ

NODE=M070S01

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
2.45±0.31±0.06	203 ± 16	[103] AUBERT 07AK	BABR	10.6 $e^+e^- \rightarrow \pi^0\pi^0 K^+K^-\gamma$

[103] AUBERT 07AK reports $[\Gamma(J/\psi(1S) \rightarrow \pi^0\pi^0 K^+K^-)/\Gamma_{total}] \times [\Gamma(J/\psi(1S) \rightarrow e^+e^-)] = (13.6\pm1.1\pm1.3)\times10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \rightarrow e^+e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M070S01;LINKAGE=BE

$\Gamma(K\overline{K}\pi)/\Gamma_{total}$ Γ_{93}/Γ

NODE=M070R15

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
61 ±10 OUR AVERAGE				
55.2±12.0	25	FRANKLIN 83	MRK2	$e^+e^- \rightarrow K^+K^-\pi^0$
78.0±21.0	126	VANNUCCI 77	MRK1	$e^+e^- \rightarrow K^0_S K^\pm\pi^\mp$

$\Gamma(2(\pi^+\pi^-))/\Gamma_{total}$ Γ_{94}/Γ

NODE=M070R8

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
3.55±0.23 OUR AVERAGE				
3.53±0.12±0.29	1107	[104] ABLIKIM 05H	BES2	$e^+e^- \rightarrow \psi(2S) \rightarrow J/\psi\pi^+\pi^-$, $J/\psi \rightarrow 2(\pi^+\pi^-)$
3.51±0.34±0.09	270	[105] AUBERT 05D	BABR	10.6 $e^+e^- \rightarrow 2(\pi^+\pi^-)\gamma$
4.0 ±1.0	76	JEAN-MARIE 76	MRK1	e^+e^-

[104] Computed using $B(J/\psi \rightarrow \mu^+\mu^-) = 0.0588 \pm 0.0010$.

NODE=M070R8;LINKAGE=AB

[105] AUBERT 05D reports $[\Gamma(J/\psi(1S) \rightarrow 2(\pi^+\pi^-))/\Gamma_{total}] \times [\Gamma(J/\psi(1S) \rightarrow e^+e^-)] = (19.5 \pm 1.4 \pm 1.3) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \rightarrow e^+e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M070R8;LINKAGE=AU

$\Gamma(3(\pi^+\pi^-))/\Gamma_{total}$ Γ_{95}/Γ

NODE=M070R10

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
43 ± 4 OUR AVERAGE				
43.0± 2.9±2.8	496	[106] AUBERT 06D	BABR	10.6 $e^+e^- \rightarrow 3(\pi^+\pi^-)\gamma$
40 ±20	32	JEAN-MARIE 76	MRK1	e^+e^-

[106] Using $\Gamma(J/\psi \rightarrow e^+e^-) = 5.52 \pm 0.14 \pm 0.04$ keV.

NODE=M070R10;LINKAGE=EE

$\Gamma(2(\pi^+\pi^-\pi^0))/\Gamma_{total}$ Γ_{96}/Γ

NODE=M070R69

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
1.62±0.09±0.19	761	[107] AUBERT 06D	BABR	10.6 $e^+e^- \rightarrow 2(\pi^+\pi^-\pi^0)\gamma$

[107] Using $\Gamma(J/\psi \rightarrow e^+e^-) = 5.52 \pm 0.14 \pm 0.04$ keV.

NODE=M070R69;LINKAGE=EE

$\Gamma(2(\pi^+\pi^-)\eta)/\Gamma_{total}$ Γ_{97}/Γ

NODE=M070S42

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
2.29±0.24 OUR AVERAGE				
2.35±0.39±0.20	85	[108] AUBERT 07AU	BABR	10.6 $e^+e^- \rightarrow 2(\pi^+\pi^-)\eta\gamma$
2.26±0.08±0.27	4839	ABLIKIM 05C	BES2	$e^+e^- \rightarrow 2(\pi^+\pi^-)\eta$

[108] AUBERT 07AU quotes $\Gamma^{J/\psi}_{ee} \cdot B(J/\psi \rightarrow 2(\pi^+\pi^-)\eta) \cdot B(\eta \rightarrow \gamma\gamma) = 5.16 \pm 0.85 \pm 0.39$ eV.

NODE=M070S42;LINKAGE=AU

$\Gamma(3(\pi^+\pi^-)\eta)/\Gamma_{total}$ Γ_{98}/Γ

NODE=M070S43

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
7.24±0.96±1.11	616	ABLIKIM 05C	BES2	$e^+e^- \rightarrow 3(\pi^+\pi^-)\eta$

$\Gamma(p\overline{p})/\Gamma_{total}$ Γ_{99}/Γ

NODE=M070R50

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
2.17±0.07 OUR AVERAGE				
2.18±0.16±0.07	317	[109] WU 06	BELL	$B^+ \rightarrow p\overline{p}K^+$
2.26±0.01±0.14	63316	BAI 04E	BES2	$e^+e^- \rightarrow J/\psi$
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	[110] 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^-

[109] WU 06 reports $[\Gamma(J/\psi(1S) \rightarrow p\overline{p})/\Gamma_{total}] \times [B(B^+ \rightarrow J/\psi(1S)K^+)] = (2.21 \pm 0.13 \pm 0.10) \times 10^{-6}$ which we divide by our best value $B(B^+ \rightarrow J/\psi(1S)K^+) = (1.016 \pm 0.033) \times 10^{-3}$. 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

[110] Assuming angular distribution $(1+\cos^2\theta)$. NODE=M070R50;LINKAGE=A

$\Gamma(p\overline{p}\pi^0)/\Gamma_{total}$ Γ_{100}/Γ

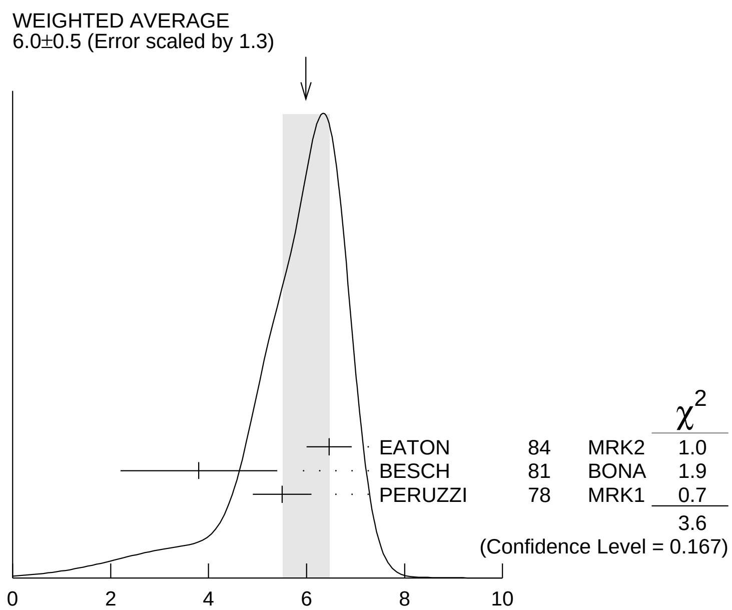
NODE=M070R52
NODE=M070R52

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_{101}/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^-



$\Gamma\left(p\overline{p}\pi^+\pi^-\right)/\Gamma_{total}$ (units 10^{-3})

$\Gamma(p\overline{p}\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{102}/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_{103}/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	[111] 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^-

[111] From the combination of $p\overline{p}\eta \rightarrow p\overline{p}\gamma\gamma$ and $p\overline{p}\eta \rightarrow p\overline{p}\pi^+\pi^-\pi^0$ channels. NODE=M070R56;LINKAGE=AB

$\Gamma(p\overline{p}\rho)/\Gamma_{total}$ Γ_{104}/Γ

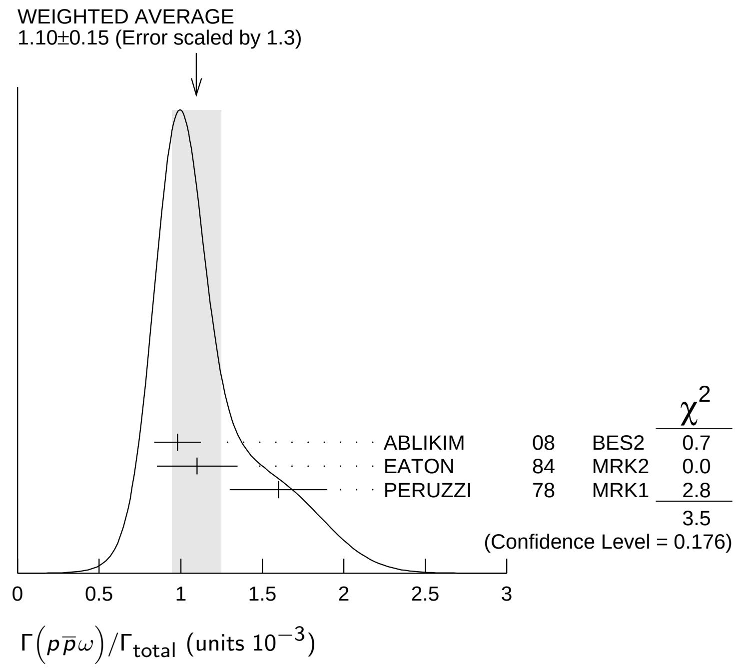
NODE=M070R57
NODE=M070R57

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.31	90	EATON	84	MRK2	$e^+e^- \rightarrow$ hadronsγ

$\Gamma(p\overline{p}\omega)/\Gamma_{total}$ Γ_{105}/Γ

NODE=M070R58

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.10±0.15 OUR AVERAGE	Error includes scale factor of 1.3. See the ideogram below.				
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_{106}/Γ

NODE=M070R59

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.21 ±0.04 OUR AVERAGE					
0.200±0.023±0.028	265 ± 31	[112] 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^-

[112] From the combination of $p\overline{p}\eta' \rightarrow p\overline{p}\pi^+\pi^-\eta$ and $p\overline{p}\eta' \rightarrow p\overline{p}\gamma\rho^0$ channels. NODE=M070R59;LINKAGE=AB

$\Gamma(p\overline{p}\phi)/\Gamma_{total}$ Γ_{107}/Γ

NODE=M070S22

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
0.45±0.13±0.07	FALVARD	88	DM2	$J/\psi \rightarrow$ hadrons

$\Gamma(n\overline{n})/\Gamma_{total}$ Γ_{108}/Γ

NODE=M070R64

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
0.22 ±0.04 OUR AVERAGE					
0.231±0.049	79	BALDINI	98	FENI	e^+e^-
0.18 ±0.09		BESCH	78	BONA	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.190±0.055	40	ANTONELLI	93	SPEC	e^+e^-

$\Gamma(n\overline{n}\pi^+\pi^-)/\Gamma_{total}$ Γ_{109}/Γ

NODE=M070R65

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
3.8±3.6	5	BESCH	81	BONA	e^+e^-

$\Gamma(\Sigma^+\overline{\Sigma}^-)/\Gamma_{total}$ Γ_{110}/Γ

NODE=M070S09

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.50±0.10±0.22	399	ABLIKIM	08O	BES2	$e^+e^- \rightarrow J/\psi$

$\Gamma(\Sigma^0\overline{\Sigma}^0)/\Gamma_{total}$ Γ_{111}/Γ

NODE=M070R63

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.29±0.09 OUR AVERAGE					
1.15±0.24±0.03		[113] AUBERT	07BD	BABR	10.6 $e^+e^- \to \Sigma^0\overline{\Sigma}^0\gamma$
1.33±0.04±0.11	1779	ABLIKIM	06	BES2	$J/\psi \to \Sigma^0\overline{\Sigma}^0$
1.06±0.04±0.23	884 ± 30	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	$e^+e^- \to \Sigma^+\overline{\Sigma}^-$

[113] AUBERT 07BD reports $[\Gamma(J/\psi(1S) \to \Sigma^0\overline{\Sigma}^0)/\Gamma_{total}] \times [\Gamma(J/\psi(1S) \to e^+e^-)] = (6.4 \pm 1.2 \pm 0.6) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \to e^+e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070R63;LINKAGE=AU

$\Gamma(2(\pi^+\pi^-)K^+K^-)/\Gamma_{total}$ Γ_{112}/Γ

NODE=M070R17

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
47 ± 7 OUR AVERAGE	Error includes scale factor of 1.3.				
49.8± 4.2±3.4	205	[114] AUBERT	06D	BABR	10.6 $e^+e^- \to \omega K^+K^-2(\pi^+\pi^-)\gamma$
31 ±13	30	VANNUCCI	77	MRK1	e^+e^-

[114] Using $\Gamma(J/\psi \to e^+e^-) = 5.52 \pm 0.14 \pm 0.04$ keV. NODE=M070R17;LINKAGE=EE

$\Gamma(p\overline{n}\pi^-)/\Gamma_{total}$ Γ_{113}/Γ

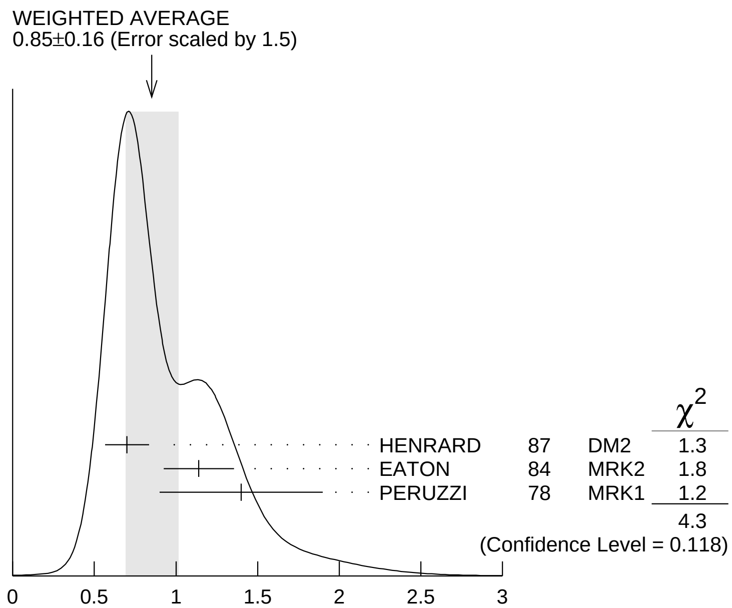
NODE=M070R53

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	$J/\psi \to p\pi^-\overline{n}$	
2.47±0.02±0.24	55k	ABLIKIM	06K	BES2	$J/\psi \to \overline{p}\pi^+n$	OCCUR=2
2.02±0.07±0.16	1288	EATON	84	MRK2	$e^+e^- \to p\pi^-$	
1.93±0.07±0.16	1191	EATON	84	MRK2	$e^+e^- \to \overline{p}\pi^+$	OCCUR=2
1.7 ±0.7	32	BESCH	81	BONA	$e^+e^- \to p\pi^-$	
1.6 ±1.2	5	BESCH	81	BONA	$e^+e^- \to \overline{p}\pi^+$	OCCUR=2
2.16±0.29	194	PERUZZI	78	MRK1	$e^+e^- \to p\pi^-$	
2.04±0.27	204	PERUZZI	78	MRK1	$e^+e^- \to \overline{p}\pi^+$	OCCUR=2

$\Gamma(\Xi^-\overline{\Xi}^+)/\Gamma_{total}$ Γ_{117}/Γ

NODE=M070R62

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.85±0.16 OUR AVERAGE	Error includes scale factor of 1.5. See the ideogram below.				
0.70±0.06±0.12	132 ± 11	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	$e^+e^- \to \Xi^-\overline{\Xi}^+$



$\Gamma(\Xi^-\overline{\Xi}^+)/\Gamma_{total}$ (units 10^{-3})

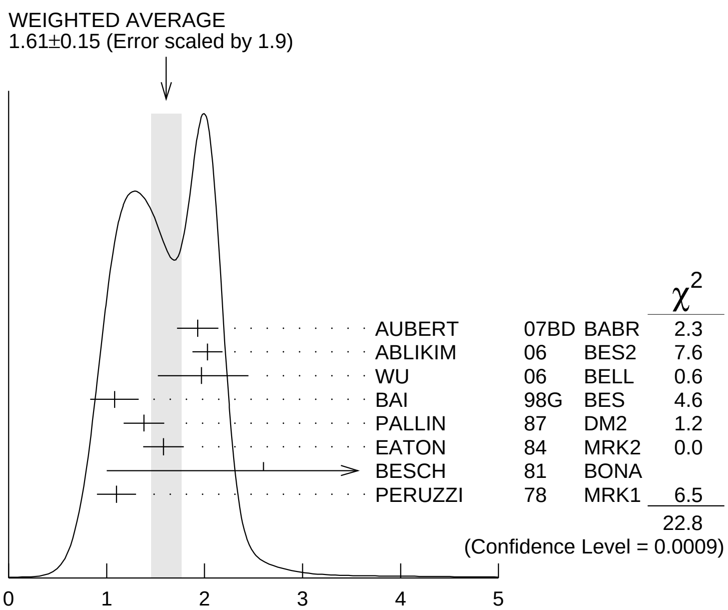
$\Gamma(\Lambda\overline{\Lambda})/\Gamma_{total}$ — Γ_{118}/Γ

NODE=M070R60
NODE=M070R60

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.61±0.15 OUR AVERAGE		Error includes scale factor of 1.9. See the ideogram below.			
1.93±0.21±0.05		[115] AUBERT	07BD	BABR	10.6 $e^+e^- \to \Lambda\overline{\Lambda}\gamma$
2.03±0.03±0.15	8887	ABLIKIM	06	BES2	$J/\psi \to \Lambda\overline{\Lambda}$
$2.0\ ^{+0.5}_{-0.4}\ \pm0.1$	46	[116] WU	06	BELL	$B^+ \to \Lambda\overline{\Lambda}K^+$
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^-

[115] AUBERT 07BD reports $[\Gamma(J/\psi(1S) \to \Lambda\overline{\Lambda})/\Gamma_{total}] \times [\Gamma(J/\psi(1S) \to e^+e^-)] = (10.7 \pm 0.9 \pm 0.7) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \to e^+e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070R60;LINKAGE=AU

[116] WU 06 reports $[\Gamma(J/\psi(1S) \to \Lambda\overline{\Lambda})/\Gamma_{total}] \times [B(B^+ \to J/\psi(1S)K^+)] = (2.00^{+0.34}_{-0.29} \pm 0.34) \times 10^{-6}$ which we divide by our best value $B(B^+ \to J/\psi(1S)K^+) = (1.016 \pm 0.033) \times 10^{-3}$. 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



$\Gamma(\Lambda\overline{\Lambda})/\Gamma_{total}$ (units 10^{-3})

$\Gamma(\Lambda\overline{\Lambda})/\Gamma(p\overline{p})$ — Γ_{118}/Γ_{99}

NODE=M070R79
NODE=M070R79

VALUE	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.90^{+0.15}_{-0.14}\pm0.10}$	[117] WU	06	BELL	$B^+ \to p\overline{p}K^+$, $\Lambda\overline{\Lambda}K^+$

[117] Not independent of other $J/\psi \to \Lambda\overline{\Lambda}$, $p\overline{p}$ branching ratios reported by WU 06. NODE=M070R79;LINKAGE=WU

$\Gamma(\Lambda\overline{\Sigma}^-\pi^+ \text{(or c.c.)})/\Gamma_{total}$ — Γ_{119}/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	[118] ABLIKIM	07H	BES2	$e^+e^- \to \overline{\Lambda}\Sigma^+\pi^-$	
0.747±0.056±0.076	254	[118] 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

[118] Using $B(\Lambda \to \pi^- p) = 63.9\%$ and $B(\Sigma^+ \to \pi^0 p) = 51.6\%$. NODE=M070R71;LINKAGE=AB

$\Gamma(pK^-\overline{\Lambda})/\Gamma_{total}$ — Γ_{120}/Γ

NODE=M070R72
NODE=M070R72

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.89±0.07±0.14	307	EATON	84	MRK2	e^+e^-

$\Gamma\big(2(K^+K^-)\big)/\Gamma_{total}$ Γ_{121}/Γ

NODE=M070R19
NODE=M070R19

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.76±0.09 OUR AVERAGE					
0.74±0.09±0.02	156 ± 15	[119] AUBERT	07AK	BABR	10.6 $e^+e^- \to 2(K^+K^-)\gamma$
1.4 $^{+0.5}_{-0.4}$ ±0.2	$11.0^{+4.3}_{-3.5}$	[120] HUANG	03	BELL	$B^+ \to 2(K^+K^-)\,K^+$
0.7 ±0.3		VANNUCCI	77	MRK1	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.72±0.17±0.02	38	[121] AUBERT	05D	BABR	10.6 $e^+e^- \to 2(K^+K^-)\gamma$

[119] AUBERT 07AK reports $[\Gamma(J/\psi(1S) \to 2(K^+K^-))/\Gamma_{total}] \times [\Gamma(J/\psi(1S) \to e^+e^-)] = (4.11 \pm 0.39 \pm 0.30) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \to e^+e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070R19;LINKAGE=BE

[120] Using $B(B^+ \to J/\psi K^+) = (1.01 \pm 0.05) \times 10^{-3}$. NODE=M070R19;LINKAGE=CC

[121] Superseded by AUBERT 07AK. AUBERT 05D reports $[\Gamma(J/\psi(1S) \to 2(K^+K^-))/\Gamma_{total}] \times [\Gamma(J/\psi(1S) \to e^+e^-)] = (4.0 \pm 0.7 \pm 0.6) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \to e^+e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070R19;LINKAGE=AU

$\Gamma(pK^-\overline{\Sigma}^0)/\Gamma_{total}$ Γ_{122}/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^-

$\Gamma(K^+K^-)/\Gamma_{total}$ Γ_{123}/Γ

NODE=M070R13
NODE=M070R13

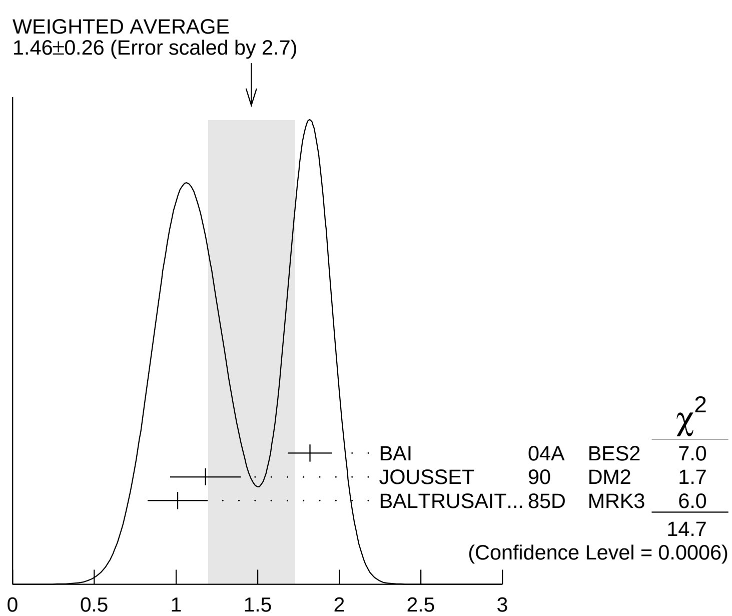
VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.37±0.31 OUR AVERAGE					
2.39±0.24±0.22	107	BALTRUSAIT...	85D	MRK3	e^+e^-
2.2 ±0.9	6	BRANDELIK	79C	DASP	e^+e^-

$\Gamma(K^0_S K^0_L)/\Gamma_{total}$ Γ_{124}/Γ

NODE=M070R75
NODE=M070R75

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.46±0.26 OUR AVERAGE Error includes scale factor of 2.7. See the ideogram below.					
1.82±0.04±0.13	2155 ± 45	[122] BAI	04A	BES2	$J/\psi \to K^0_S K^0_L \to \pi^+\pi^- X$
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^-

[122] Using $B(K^0_S \to \pi^+\pi^-) = 0.6868 \pm 0.0027$. NODE=M070R;LINKAGE=HZ



$\Gamma\big(K^0_S K^0_L\big)/\Gamma_{total}$ Γ_{124}/Γ

$\Gamma(\Lambda\overline{\Lambda}\eta)/\Gamma_{total}$ Γ_{125}/Γ

NODE=M070R07
NODE=M070R07

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.62±0.60±0.44	44	[123] ABLIKIM	07H	BES2	$e^+e^- \to \psi(2S)$

[123] Using B($\Lambda \to \pi^- p$) = 63.9% and B($\eta \to \gamma\gamma$) = 39.4%.

NODE=M070R07;LINKAGE=AB

$\Gamma(\Lambda\overline{\Lambda}\pi^0)/\Gamma_{total}$ Γ_{126}/Γ

NODE=M070S11
NODE=M070S11

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<0.64	90		[124] ABLIKIM	07H	BES2	$e^+e^- \to \psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
2.3 ±0.7±0.8		11	BAI	98G	BES	e^+e^-
2.2 ±0.5±0.5		19 ± 4	HENRARD	87	DM2	e^+e^-

[124] Using B($\Lambda \to \pi^- p$) = 63.9%.

NODE=M070S11;LINKAGE=AB

$\Gamma(\overline{\Lambda} n K^0_S + \text{c.c.})/\Gamma_{total}$ Γ_{127}/Γ

NODE=M070S56
NODE=M070S56

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
6.46±0.20±1.07	1058	[125] ABLIKIM	08C	BES2	$e^+e^- \to J/\psi$

[125] Using B($\overline{\Lambda} \to \overline{p}\pi^+$) = 63.9% and B($K^0_S \to \pi^+\pi^-$) = 69.2%.

NODE=M070S56;LINKAGE=AB

$\Gamma(\pi^+\pi^-)/\Gamma_{total}$ Γ_{128}/Γ

NODE=M070R6
NODE=M070R6

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.47±0.23 OUR AVERAGE					
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^-

$\Gamma(\Lambda\overline{\Sigma} + \text{c.c.})/\Gamma_{total}$ Γ_{129}/Γ

NODE=M070R61
NODE=M070R61

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.15	90	PERUZZI	78	MRK1	$e^+e^- \to \Lambda X$

$\Gamma(K^0_S K^0_S)/\Gamma_{total}$ Γ_{130}/Γ

NODE=M070R14
NODE=M070R14

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.01	95	[126] BAI	04D	BES	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.052	90	[126] BALTRUSAIT...	85C	MRK3	e^+e^-

[126] Forbidden by *CP*.

NODE=M070R14;LINKAGE=C

RADIATIVE DECAYS

NODE=M070310

$\Gamma(3\gamma)/\Gamma_{total}$ Γ_{131}/Γ

NODE=M070R81
NODE=M070R81

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
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_{132}/Γ

NODE=M070S06
NODE=M070S06

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<9	90	ADAMS	08	CLEO	$\psi(2S) \to \pi^+\pi^- J/\psi$

$\Gamma(5\gamma)/\Gamma_{total}$ Γ_{133}/Γ

NODE=M070S07
NODE=M070S07

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<15	90	ADAMS	08	CLEO	$\psi(2S) \to \pi^+\pi^- J/\psi$

$\Gamma(\gamma\eta_c(1S))/\Gamma_{total}$ Γ_{134}/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 1.6.					
2.06±0.32±0.03		[127] 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. • • •					
0.79±0.20	273 ± 43	[128] AUBERT	06E	BABR	$B^\pm \to K^\pm X_{c\overline{c}}$
seen	16	BALTRUSAIT...	84	MRK3	$J/\psi \to 2\phi\gamma$

[127] MITCHELL 09 reports $(1.98 \pm 0.09 \pm 0.30) \times 10^{-2}$ from a measurement of $[\Gamma(J/\psi(1S) \rightarrow \gamma\eta_c(1S))/\Gamma_{total}] \times [B(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-)]$ assuming $B(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) = (35.04 \pm 0.07 \pm 0.77) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) = (33.6 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070R85;LINKAGE=MI

[128] Calculated by the authors using an average of $B(J/\psi \rightarrow \gamma\eta_c) \times B(\eta_c \rightarrow K\overline{K}\pi)$ from BALTRUSAITIS 86, BISELLO 91, BAI 04 and $B(\eta_c \rightarrow K\overline{K}\pi) = (8.5 \pm 1.8)\%$ from AUBERT 06E. NODE=M070R85;LINKAGE=AU

$\Gamma(\gamma\eta_c(1S) \rightarrow 3\gamma)/\Gamma_{total}$ Γ_{135}/Γ

NODE=M070S08
NODE=M070S08

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
$1.2^{+2.7}_{-1.1} \pm 0.3$	$1.2^{+2.8}_{-1.1}$	ADAMS	08	CLEO	$\psi(2S) \rightarrow \pi^+\pi^- J/\psi$

$\Gamma(\gamma\pi^+\pi^- 2\pi^0)/\Gamma_{total}$ Γ_{136}/Γ

NODE=M070R99
NODE=M070R99

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
8.3±0.2±3.1	[129] BALTRUSAIT...	86B	MRK3	$J/\psi \rightarrow 4\pi\gamma$

[129] 4π mass less than 2.0 GeV. NODE=M070R99;LINKAGE=M

$\Gamma(\gamma\eta\pi\pi)/\Gamma_{total}$ Γ_{137}/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	[130] EDWARDS	83B	CBAL	$J/\psi \rightarrow \eta\pi^+\pi^-$	
7.8 ±1.2±2.4	[130] EDWARDS	83B	CBAL	$J/\psi \rightarrow \eta 2\pi^0$	OCCUR=2

[130] Broad enhancement at 1700 MeV. NODE=M070R96;LINKAGE=M

$\Gamma(\gamma\eta_2(1870) \rightarrow \gamma\eta\pi^+\pi^-)/\Gamma_{total}$ Γ_{138}/Γ

NODE=M070S37
NODE=M070S37

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
6.2±2.2±0.9	BAI	99	BES	$J/\psi \rightarrow \gamma\eta\pi^+\pi^-$

$\Gamma(\gamma\eta(1405/1475) \rightarrow \gamma K\overline{K}\pi)/\Gamma_{total}$ Γ_{139}/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	[131,132] BAI	00D	BES	$J/\psi \rightarrow \gamma K^{\pm} K^0_S \pi^{\mp}$	
3.8 ±0.3 ±0.6	[133] AUGUSTIN	90	DM2	$J/\psi \rightarrow \gamma K\overline{K}\pi$	
4.0 ±0.7 ±1.0	[133] EDWARDS	82E	CBAL	$J/\psi \rightarrow K^+K^-\pi^0\gamma$	
4.3 ±1.7	[133,134] SCHARRE	80	MRK2	e^+e^-	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.78±0.21±0.33	[133,135,136] AUGUSTIN	92	DM2	$J/\psi \rightarrow \gamma K\overline{K}\pi$	
0.83±0.13±0.18	[133,137,138] AUGUSTIN	92	DM2	$J/\psi \rightarrow \gamma K\overline{K}\pi$	OCCUR=2
$0.66^{+0.17}_{-0.16}{}^{+0.24}_{-0.15}$	[133,136,139] BAI	90C	MRK3	$J/\psi \rightarrow \gamma K^0_S K^{\pm}\pi^{\mp}$	
$1.03^{+0.21}_{-0.18}{}^{+0.26}_{-0.19}$	[133,138,140] BAI	90C	MRK3	$J/\psi \rightarrow \gamma K^0_S K^{\pm}\pi^{\mp}$	OCCUR=2

[131] 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

[132] 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

[133] Includes unknown branching fraction $\eta(1405) \rightarrow K\overline{K}\pi$. NODE=M070R89;LINKAGE=B

[134] Corrected for spin-zero hypothesis for $\eta(1405)$. NODE=M070R89;LINKAGE=C

[135] From fit to the $a_0(980)\pi$ 0^{-+} partial wave. NODE=M070R89;LINKAGE=H

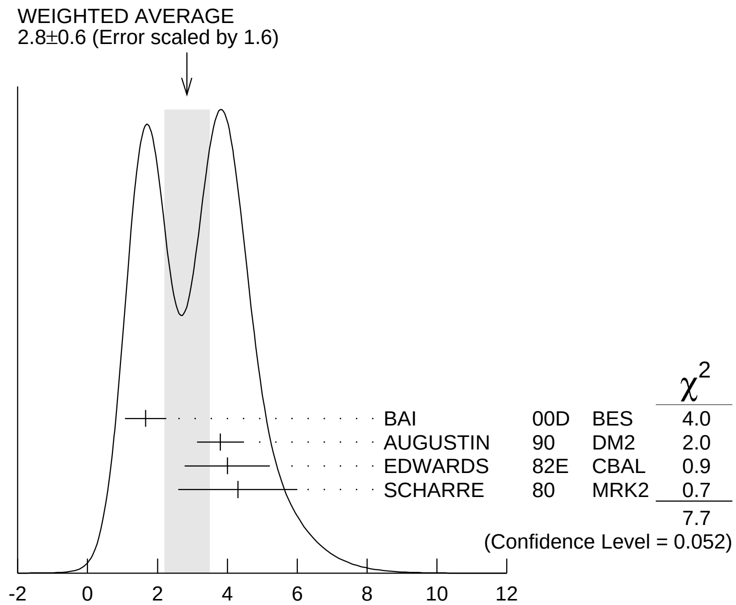
[136] $a_0(980)\pi$ mode. NODE=M070R89;LINKAGE=K9

[137] From fit to the $K^*(892)K$ 0^{-+} partial wave. NODE=M070R89;LINKAGE=J

[138] K^*K mode. NODE=M070R89;LINKAGE=K8

[139] From $a_0(980)\pi$ final state. NODE=M070R89;LINKAGE=D

[140] From $K^*(890)K$ final state. NODE=M070R89;LINKAGE=E



$\Gamma\big(\gamma\eta(1405/1475) \to \gamma K \overline{K} \pi\big)/\Gamma_{total}$ (units 10^{-3})

$\Gamma\big(\gamma\eta(1405/1475) \to \gamma\gamma\rho^0\big)/\Gamma_{total}$ — Γ_{140}/Γ

NODE=M070S30
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	[141] BAI	04J	BES2	$J/\psi \to \gamma\gamma\pi^+\pi^-$
0.64±0.12±0.07	[141] COFFMAN	90	MRK3	$J/\psi \to \gamma\gamma\pi^+\pi^-$

[141] 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_{141}/Γ

NODE=M070S29
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		[142] 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	[143] AUGUSTIN	90	DM2	$J/\psi \to \gamma\eta\pi^+\pi^-$

[142] Via $a_0(980)\pi$.
[143] Includes unknown branching fraction to $\eta\pi^+\pi^-$.

NODE=M070S29;LINKAGE=RR
NODE=M070S29;LINKAGE=R

$\Gamma\big(\gamma\eta(1405/1475) \to \gamma\gamma\phi\big)/\Gamma_{total}$ — Γ_{142}/Γ

NODE=M070R77
NODE=M070R77

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.82	95	BAI	04J	BES2	$J/\psi \to \gamma\gamma K^+ K^-$

$\Gamma(\gamma\rho\rho)/\Gamma_{total}$ — Γ_{143}/Γ

NODE=M070R94
NODE=M070R94

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
4.5 ±0.8 OUR AVERAGE					
4.7 ±0.3 ±0.9		[144] BALTRUSAIT...	86B	MRK3	$J/\psi \to 4\pi\gamma$
3.75±1.05±1.20		[145] BURKE	82	MRK2	$J/\psi \to 4\pi\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.09	90	[146] BISELLO	89B		$J/\psi \to 4\pi\gamma$

[144] 4π mass less than 2.0 GeV.
[145] 4π mass less than 2.0 GeV. We have multiplied $2\rho^0$ measurement by 3 to obtain 2ρ.
[146] 4π mass in the range 2.0–25 GeV.

NODE=M070R94;LINKAGE=N
NODE=M070R94;LINKAGE=M
NODE=M070R94;LINKAGE=A

$\Gamma(\gamma\rho\omega)/\Gamma_{total}$ — Γ_{144}/Γ

NODE=M070R05
NODE=M070R05

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<5.4	90	ABLIKIM	08A	BES2	$e^+e^- \to J/\psi$

$\Gamma(\gamma\rho\phi)/\Gamma_{total}$ — Γ_{145}/Γ

NODE=M070R06
NODE=M070R06

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<8.8	90	ABLIKIM	08A	BES2	$e^+e^- \to J/\psi$

$\Gamma(\gamma\eta'(958))/\Gamma_{total}$ Γ_{146}/Γ

NODE=M070R84
NODE=M070R84

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
5.16±0.15 OUR AVERAGE		Error includes scale factor of 1.1.		
4.86±0.23±0.08		[147] 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
OCCUR=2

[147] 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 $B(\eta'(958) \to \pi^+\pi^-\eta) = (43.4 \pm 0.7) \times 10^{-2}$, $B(\eta \to 2\gamma) = (39.31 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

NODE=M070R84;LINKAGE=AB

$\Gamma(\gamma 2\pi^+2\pi^-)/\Gamma_{total}$ Γ_{147}/Γ

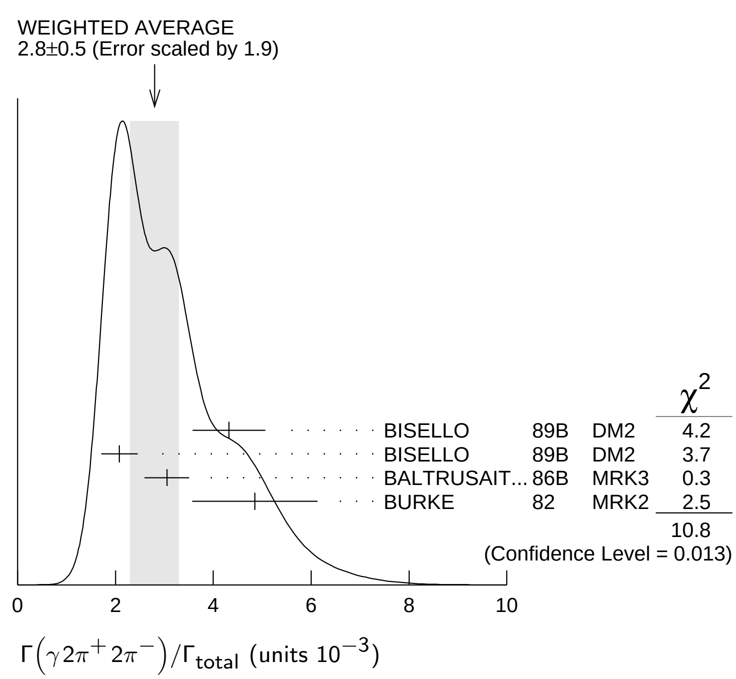
NODE=M070R95
NODE=M070R95

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	[148] BISELLO 89B	DM2	$J/\psi \to 4\pi\gamma$
2.08±0.13±0.35	[149] BISELLO 89B	DM2	$J/\psi \to 4\pi\gamma$
3.05±0.08±0.45	[149] BALTRUSAIT...86B	MRK3	$J/\psi \to 4\pi\gamma$
4.85±0.45±1.20	[150] BURKE 82	MRK2	e^+e^-

OCCUR=2

[148] 4π mass less than 3.0 GeV.
[149] 4π mass less than 2.0 GeV.
[150] 4π mass less than 2.5 GeV.

NODE=M070R95;LINKAGE=A
NODE=M070R95;LINKAGE=B
NODE=M070R95;LINKAGE=M



$\Gamma(\gamma f_2(1270) f_2(1270))/\Gamma_{total}$ Γ_{148}/Γ

NODE=M070S45
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_{149}/Γ

NODE=M070S46
NODE=M070S46

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
8.2±0.8±1.7	[151] ABLIKIM 04M	BES	$J/\psi \to \gamma 2\pi^+2\pi^-$

[151] Subtracting contribution from intermediate $\eta_c(1S)$ decays.

NODE=M070S46;LINKAGE=AB

$\Gamma(\gamma K^+ K^- \pi^+ \pi^-)/\Gamma_{total}$ — Γ_{150}/Γ

NODE=M070B05

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
2.1±0.1±0.6	1516	BAI	00B	BES	$J/\psi \to \gamma K^+ K^0 \pi^+ \pi^-$

$\Gamma(\gamma f_4(2050))/\Gamma_{total}$ — Γ_{151}/Γ

NODE=M070S7

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
2.7±0.5±0.5	[152] BALTRUSAIT...	87	MRK3	$J/\psi \to \gamma \pi^+ \pi^-$

[152] Assuming branching fraction $f_4(2050) \to \pi\pi/$ total = 0.167. NODE=M070S7;LINKAGE=V

$\Gamma(\gamma\omega\omega)/\Gamma_{total}$ — Γ_{152}/Γ

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	$J/\psi \to \gamma\omega\pi^+\pi^-$
1.41±0.2 ±0.42	120 ± 17	BISELLO	87	SPEC	e^+e^-, hadronsγ
1.76±0.09±0.45		BALTRUSAIT...	85C	MRK3	$e^+e^- \to$ hadronsγ

$\Gamma(\gamma\eta(1405/1475) \to \gamma\rho^0\rho^0)/\Gamma_{total}$ — Γ_{153}/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	[153,154] BISELLO	89B	DM2	$J/\psi \to 4\pi\gamma$

[153] Estimated by us from various fits. NODE=M070S19;LINKAGE=A

[154] Includes unknown branching fraction to $\rho^0\rho^0$. NODE=M070S19;LINKAGE=B

$\Gamma(\gamma f_2(1270))/\Gamma_{total}$ — Γ_{154}/Γ

NODE=M070R86

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT	
1.43±0.11 OUR AVERAGE						
$1.62\pm0.26^{+0.02}_{-0.05}$		[155] ABLIKIM	06V	BES2	$e^+e^- \to J/\psi \to \gamma\pi^+\pi^-$	
$1.42\pm0.21^{+0.02}_{-0.04}$		[156] ABLIKIM	06V	BES2	$e^+e^- \to J/\psi \to \gamma\pi^0\pi^0$	OCCUR=2
1.33±0.05±0.20		[157] AUGUSTIN	87	DM2	$J/\psi \to \gamma\pi^+\pi^-$	
1.36±0.09±0.23		[157] 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	[158] BRANDELIK	78B	DASP	$e^+e^- \to \pi^+\pi^-\gamma$	

[155] 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 $B(f_2(1270) \to \pi\pi) = (84.8^{+2.4}_{-1.2}) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070R86;LINKAGE=AI

[156] 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 $B(f_2(1270) \to \pi\pi) = (84.8^{+2.4}_{-1.2}) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070R86;LINKAGE=AL

[157] 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

[158] Restated by us to take account of spread of E1, M2, E3 transitions. NODE=M070R86;LINKAGE=T

$\Gamma(\gamma f_0(1710) \to \gamma K\overline{K})/\Gamma_{total}$ — Γ_{155}/Γ

NODE=M070R91

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT	
$8.5^{+1.2}_{-0.9}$ OUR AVERAGE Error includes scale factor of 1.2.						
$9.62\pm029\ ^{+3.51}_{-1.86}$		[159] BAI	03G	BES	$J/\psi \to \gamma K\overline{K}$	
$5.0 \pm 0.8^{+1.8}_{-0.4}$		[160,161] BAI	96C	BES	$J/\psi \to \gamma K^+K^-$	
9.2 ± 1.4±1.4		[161] AUGUSTIN	88	DM2	$J/\psi \to \gamma K^+K^-$	
10.4 ± 1.2±1.6		[161] AUGUSTIN	88	DM2	$J/\psi \to \gamma K^0_S K^0_S$	OCCUR=2
9.6 ± 1.2±1.8		[161] BALTRUSAIT...	87	MRK3	$J/\psi \to \gamma K^+K^-$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$1.6 \pm 0.2^{+0.6}_{-0.2}$		[161,162] BAI	96C	BES	$J/\psi \to \gamma K^+K^-$	OCCUR=2
< 0.8	90	[163] BISELLO	89B		$J/\psi \to 4\pi\gamma$	
1.6 ± 0.4±0.3		[164] BALTRUSAIT...	87	MRK3	$J/\psi \to \gamma\pi^+\pi^-$	OCCUR=2
3.8 ± 1.6		[165] EDWARDS	82D	CBAL	$e^+e^- \to \eta\eta\gamma$	

[159] Includes unknown branching ratio to K^+K^- or $K_S^0 K_S^0$. NODE=M070R91;LINKAGE=K9
[160] Assuming $J^P = 2^+$ for $f_0(1710)$. NODE=M070R91;LINKAGE=A1
[161] Includes unknown branching fraction to K^+K^- or $K_S^0 K_S^0$. We have multiplied K^+K^- measurement by 2, and $K_S^0 K_S^0$ by 4 to obtain $K\overline{K}$ result. NODE=M070R91;LINKAGE=B
[162] Assuming $J^P = 0^+$ for $f_0(1710)$. NODE=M070R91;LINKAGE=A2
[163] Includes unknown branching fraction to $\rho^0\rho^0$. NODE=M070R91;LINKAGE=C
[164] Includes unknown branching fraction to $\pi^+\pi^-$. NODE=M070R91;LINKAGE=Z
[165] Includes unknown branching fraction to $\eta\eta$. NODE=M070R91;LINKAGE=A

$\Gamma(\gamma f_0(1710) \to \gamma\pi\pi)/\Gamma_{total}$ Γ_{156}/Γ

NODE=M070B01
NODE=M070B01

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT	
4.0 ±1.0 OUR AVERAGE					
3.96±0.06±1.12	[166] ABLIKIM	06V	BES2	$e^+e^- \to J/\psi \to \gamma\pi^+\pi^-$	
3.99±0.15±2.64	[166] ABLIKIM	06V	BES2	$e^+e^- \to J/\psi \to \gamma\pi^0\pi^0$	OCCUR=2
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.5 ±1.6 ±0.8	BAI	98H	BES	$J/\psi \to \gamma\pi^0\pi^0$	

[166] Including unknown branching fraction to $\pi\pi$. NODE=M070B01;LINKAGE=AB

$\Gamma(\gamma f_0(1710) \to \gamma\omega\omega)/\Gamma_{total}$ Γ_{157}/Γ

NODE=M070R01
NODE=M070R01

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.31±0.06±0.08	180	ABLIKIM	06H	BES	$J/\psi \to \gamma\omega\omega$

$\Gamma(\gamma\eta)/\Gamma_{total}$ Γ_{158}/Γ

NODE=M070R83
NODE=M070R83

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.104±0.034 OUR AVERAGE					
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^-

$\Gamma(\gamma f_1(1420) \to \gamma K\overline{K}\pi)/\Gamma_{total}$ Γ_{159}/Γ

NODE=M070S31
NODE=M070S31

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT	
0.79±0.13 OUR AVERAGE					
0.68±0.04±0.24	BAI	00D	BES	$J/\psi \to \gamma K^\pm K_S^0\pi^\mp$	
0.76±0.15±0.21	[167,168] AUGUSTIN	92	DM2	$J/\psi \to \gamma K\overline{K}\pi$	OCCUR=2
$0.87\pm0.14^{+0.14}_{-0.11}$	[167] BAI	90C	MRK3	$J/\psi \to \gamma K_S^0 K^\pm\pi^\mp$	

[167] Included unknown branching fraction $f_1(1420) \to K\overline{K}\pi$. NODE=M070S31;LINKAGE=A
[168] From fit to the $K^*(892)K$ 1^{++} partial wave. NODE=M070S31;LINKAGE=D

$\Gamma(\gamma f_1(1285))/\Gamma_{total}$ Γ_{160}/Γ

NODE=M070R88
NODE=M070R88

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.61 ±0.08 OUR AVERAGE				
0.69 ±0.16 ±0.20	[169] BAI	04J	BES2	$J/\psi \to \gamma\gamma\rho^0$
0.61 ±0.04 ±0.21	[170] BAI	00D	BES	$J/\psi \to \gamma K^\pm K_S^0\pi^\mp$
0.45 ±0.09 ±0.17	[171] BAI	99	BES	$J/\psi \to \gamma\eta\pi^+\pi^-$
0.625±0.063±0.103	[172] BOLTON	92	MRK3	$J/\psi \to \gamma f_1(1285)$
0.70 ±0.08 ±0.16	[173] BOLTON	92B	MRK3	$J/\psi \to \gamma\eta\pi^+\pi^-$

[169] Assuming $B(f_1(1285) \to \rho^0\gamma) = 0.055 \pm 0.013$. NODE=M070R88;LINKAGE=BI
[170] Assuming $\Gamma(f_1(1285) \to K\overline{K}\pi)/\Gamma_{total} = 0.090 \pm 0.004$. NODE=M070R88;LINKAGE=BD
[171] Assuming $\Gamma(f_1(1285) \to \eta\pi\pi)/\Gamma_{total} = 0.5 \pm 0.18$. NODE=M070R88;LINKAGE=BA
[172] Obtained summing the sequential decay channels NODE=M070R88;LINKAGE=B
$B(J/\psi \to \gamma f_1(1285), f_1(1285) \to \pi\pi\pi\pi) = (1.44 \pm 0.39 \pm 0.27) \times 10^{-4}$;
$B(J/\psi \to \gamma f_1(1285), f_1(1285) \to a_0(980)\pi, a_0(980) \to \eta\pi) = (3.90 \pm 0.42 \pm 0.87) \times 10^{-4}$;
$B(J/\psi \to \gamma f_1(1285), f_1(1285) \to a_0(980)\pi, a_0(980) \to K\overline{K}) = (0.66 \pm 0.26 \pm 0.29) \times 10^{-4}$;
$B(J/\psi \to \gamma f_1(1285), f_1(1285) \to \gamma\rho^0) = (0.25 \pm 0.07 \pm 0.03) \times 10^{-4}$.
[173] 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

$\Gamma(\gamma f_1(1510) \to \gamma\eta\pi^+\pi^-)/\Gamma_{total}$ — Γ_{161}/Γ — NODE=M070S36

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
4.5±1.0±0.7	BAI	99	BES	$J/\psi \to \gamma\eta\pi^+\pi^-$

$\Gamma(\gamma f'_2(1525))/\Gamma_{total}$ — Γ_{162}/Γ — NODE=M070R87

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT	
$4.5^{+0.7}_{-0.4}$ OUR AVERAGE							
$3.85\pm0.17^{+1.91}_{-0.73}$			[174] BAI	03G	BES	$J/\psi \to \gamma K\overline{K}$	
$3.6\pm0.4^{+1.4}_{-0.4}$			[174] BAI	96C	BES	$J/\psi \to \gamma K^+K^-$	
5.6 ±1.4 ±0.9			[174] AUGUSTIN	88	DM2	$J/\psi \to \gamma K^+K^-$	OCCUR=3
4.5 ±0.4 ±0.9			[174] AUGUSTIN	88	DM2	$J/\psi \to \gamma K^0_S K^0_S$	OCCUR=4
6.8 ±1.6 ±1.4			[174] BALTRUSAIT...87		MRK3	$J/\psi \to \gamma K^+K^-$	OCCUR=2
• • • We do not use the following data for averages, fits, limits, etc. • • •							
<3.4	90	4	[175] BRANDELIK	79C	DASP	$e^+e^- \to \pi^+\pi^-\gamma$	
<2.3	90	3	ALEXANDER	78	PLUT	$e^+e^- \to K^+K^-\gamma$	

[174] Using B($f'_2(1525) \to K\overline{K}$) = 0.888. NODE=M070R87;LINKAGE=A1

[175] Assuming isotropic production and decay of the $f'_2(1525)$ and isospin. NODE=M070R87;LINKAGE=I

$\Gamma(\gamma f_2(1640) \to \gamma\omega\omega)/\Gamma_{total}$ — Γ_{163}/Γ — NODE=M070R02

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.28±0.05±0.17	141	ABLIKIM	06H	BES	$J/\psi \to \gamma\omega\omega$

$\Gamma(\gamma f_2(1910) \to \gamma\omega\omega)/\Gamma_{total}$ — Γ_{164}/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_{165}/Γ — NODE=M070B06

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.7±0.1±0.2	BAI	00B	BES	$J/\psi \to \gamma K^+K^0\pi^+\pi^-$

$\Gamma(\gamma K^*(892)\overline{K}^*(892))/\Gamma_{total}$ — Γ_{166}/Γ — NODE=M070B07

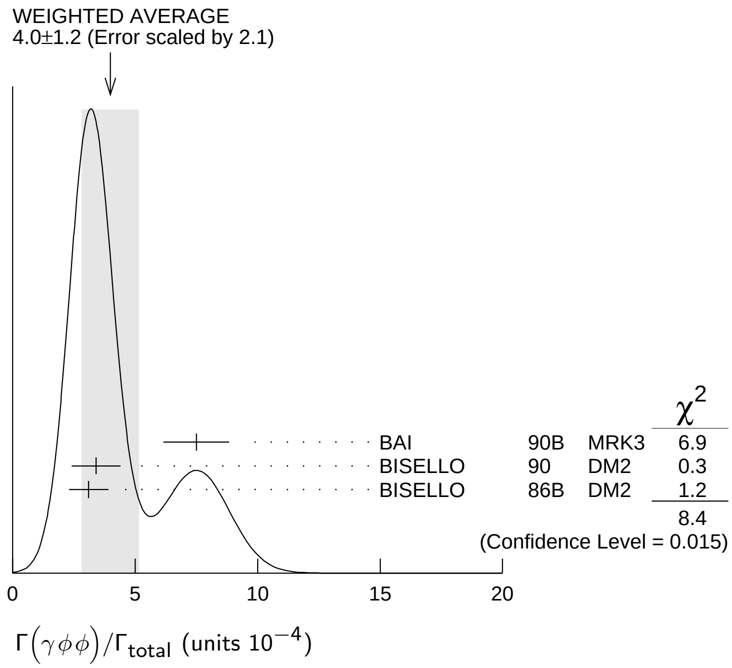
VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
4.0±0.3±1.3	320	[176] BAI	00B	BES	$J/\psi \to \gamma K^+K^0\pi^+\pi^-$

[176] Summed over all charges. NODE=M070R;LINKAGE=B7

$\Gamma(\gamma\phi\phi)/\Gamma_{total}$ — Γ_{167}/Γ — 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	$J/\psi \to \gamma 4K$
3.4±0.8±0.6	33 ± 7	[177] BISELLO	90	DM2	$J/\psi \to \gamma K^+K^-K^0_S K^0_L$
3.1±0.7±0.4		[177] BISELLO	86B	DM2	$J/\psi \to \gamma K^+K^-K^+K^-$

[177] $\phi\phi$ mass less than 2.9 GeV, η_c excluded. NODE=M070R98;LINKAGE=C



$\Gamma(\gamma p\overline{p})/\Gamma_{total}$ — Γ_{168}/Γ

NODE=M070R90
NODE=M070R90

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.38±0.07±0.07		49	EATON	84	MRK2	$e^+ e^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.11	90		PERUZZI	78	MRK1	$e^+ e^-$

$\Gamma(\gamma\eta(2225))/\Gamma_{total}$ — Γ_{169}/Γ

NODE=M070S21
NODE=M070S21

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.33±0.05 OUR AVERAGE					
0.44±0.04±0.08	196 ± 19	[178] ABLIKIM	08I	BES	$J/\psi \to \gamma K^+ K^- K^0_S K^0_L$
0.33±0.08±0.05		[178] BAI	90B	MRK3	$J/\psi \to \gamma K^+ K^- K^+ K^-$
0.27±0.06±0.06		[178] BAI	90B	MRK3	$J/\psi \to \gamma K^+ K^- K^0_S K^0_L$
$0.24^{+0.15}_{-0.10}$		[179,180] BISELLO	89B	DM2	$J/\psi \to 4\pi\gamma$

OCCUR=2

[178] Includes unknown branching fraction to $\phi\phi$. NODE=M070S21;LINKAGE=U
[179] Estimated by us from various fits. NODE=M070S21;LINKAGE=A
[180] Includes unknown branching fraction to $\rho^0\rho^0$. NODE=M070S21;LINKAGE=B

$\Gamma(\gamma\eta(1760) \to \gamma\rho^0\rho^0)/\Gamma_{total}$ — Γ_{170}/Γ

NODE=M070S20
NODE=M070S20

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.13±0.09	[181,182] BISELLO	89B	DM2	$J/\psi \to 4\pi\gamma$

[181] Estimated by us from various fits. NODE=M070S20;LINKAGE=A
[182] Includes unknown branching fraction to $\rho^0\rho^0$. NODE=M070S20;LINKAGE=B

$\Gamma(\gamma\eta(1760) \to \gamma\omega\omega)/\Gamma_{total}$ — Γ_{171}/Γ

NODE=M070R04
NODE=M070R04

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.98±0.08±0.32	1045	ABLIKIM	06H	BES	$J/\psi \to \gamma\omega\omega$

$\Gamma(\gamma X(1835) \to \gamma\pi^+\pi^-\eta')/\Gamma_{total}$ — Γ_{172}/Γ

NODE=M070R78
NODE=M070R78

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.6 ±0.4 OUR AVERAGE					
$2.87\pm0.09^{+0.49}_{-0.52}$	4265	[183] ABLIKIM	11C	BES3	$J/\psi \to \gamma\pi^+\pi^-\eta'$
2.2 ±0.4 ±0.4	264	ABLIKIM	05R	BES2	$J/\psi \to \gamma\pi^+\pi^-\eta'$

[183] From a fit of the $\pi^+\pi^-\eta'$ mass distribution to a combination of $\gamma f_1(1510)$, $\gamma X(1835)$, and two unconfirmed states $\gamma X(2120)$, and $\gamma X(2370)$, for $M(p\overline{p}) < 2.8$ 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_{173}/Γ

NODE=M070S71

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
$0.75^{+0.19}_{-0.09}$ OUR AVERAGE					
$1.14^{+0.43}_{-0.30}{}^{+0.42}_{-0.26}$	231	[184] ALEXANDER	10	CLEO	$J/\psi \to \gamma p\overline{p}$
$0.70\pm0.04^{+0.19}_{-0.08}$		BAI	03F	BES2	$J/\psi \to \gamma p\overline{p}$

[184] 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

$\Gamma(\gamma(K\overline{K}\pi)\,[J^{PC}=0^{-+}])/\Gamma_{total}$ Γ_{174}/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	[185] BAI	00D	BES	$J/\psi \to \gamma K^{\pm} K^0_S \pi^{\mp}$	
2.1 ±0.1 ±0.7	[186] BAI	00D	BES	$J/\psi \to \gamma K^{\pm} K^0_S \pi^{\mp}$	OCCUR=2

[185] For a broad structure around 1800 MeV. NODE=M070S38;LINKAGE=BD
[186] For a broad structure around 2040 MeV. NODE=M070S38;LINKAGE=BE

$\Gamma(\gamma\pi^0)/\Gamma_{total}$ Γ_{175}/Γ

NODE=M070R82

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$3.49^{+0.33}_{-0.30}$ OUR AVERAGE					
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^-

$\Gamma(\gamma p\overline{p}\pi^+\pi^-)/\Gamma_{total}$ Γ_{176}/Γ

NODE=M070R93

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.79	90	EATON	84	MRK2	e^+e^-

$\Gamma(\gamma\Lambda\overline{\Lambda})/\Gamma_{total}$ Γ_{177}/Γ

NODE=M070S8

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.13	90	HENRARD	87	DM2	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.16	90	BAI	98G	BES	e^+e^-

$\Gamma(\gamma f_0(2200))/\Gamma_{total}$ Γ_{178}/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	[187] AUGUSTIN	88	DM2	$J/\psi \to \gamma K^0_S K^0_S$

[187] Includes unknown branching fraction to $K^0_S K^0_S$. NODE=M070S18;LINKAGE=A

$\Gamma(\gamma f_J(2220))/\Gamma_{total}$ Γ_{179}/Γ

NODE=M070R92

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT	
>250	99.9		[188] HASAN	96	SPEC	$\overline{p}p \to \pi^+\pi^-$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
>300			[189] BAI	96B	BES	$e^+e^- \to \gamma\overline{p}p,\ K\overline{K}$	
< 2.3	95		[190] AUGUSTIN	88	DM2	$J/\psi \to \gamma K^+K^-$	
< 1.6	95		[190] AUGUSTIN	88	DM2	$J/\psi \to \gamma K^0_S K^0_S$	OCCUR=2
$12.4^{+6.4}_{-5.2}\pm2.8$		23	[190] BALTRUSAIT...	86D	MRK3	$J/\psi \to \gamma K^0_S K^0_S$	
$8.4^{+3.4}_{-2.8}\pm1.6$		93	[190] BALTRUSAIT...	86D	MRK3	$J/\psi \to \gamma K^+K^-$	OCCUR=2

[188] Using BAI 96B. NODE=M070R92;LINKAGE=M
[189] Using BARNES 93. NODE=M070R92;LINKAGE=A
[190] Includes unknown branching fraction to K^+K^- or $K^0_S K^0_S$. NODE=M070R92;LINKAGE=W

$\Gamma(\gamma f_J(2220) \to \gamma\pi\pi)/\Gamma_{total}$ Γ_{180}/Γ

NODE=M070B02
NODE=M070B02

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
0.84±0.26±0.30	BAI	96B	BES	$e^+e^- \to J/\psi \to \gamma\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.4 ±0.8 ±0.4	BAI	98H	BES	$J/\psi \to \gamma\pi^0\pi^0$

$\Gamma(\gamma f_J(2220) \to \gamma K\overline{K})/\Gamma_{total}$ Γ_{181}/Γ

NODE=M070B03
NODE=M070B03

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT	
< 3.6	[191] DEL-AMO-SA...	10O	BABR	$e^+e^- \to J/\psi \to \gamma K^+K^-$	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 2.9	[191] DEL-AMO-SA...	10O	BABR	$e^+e^- \to J/\psi \to \gamma K^0_S K^0_S$	OCCUR=2
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

[191] For spin 2 and helicity 0; other combinations lead to more stringent upper limits. NODE=M070B03;LINKAGE=DE

$\Gamma(\gamma f_J(2220) \to \gamma p\overline{p})/\Gamma_{total}$ Γ_{182}/Γ

NODE=M070B04
NODE=M070B04

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
1.5±0.6±0.5	BAI	96B	BES	$e^+e^- \to J/\psi \to \gamma p\overline{p}$

$\Gamma(\gamma f_0(1500))/\Gamma_{total}$ Γ_{183}/Γ

NODE=M070S32
NODE=M070S32

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT	
1.01±0.32 OUR AVERAGE					
1.00±0.03±0.45	[192] ABLIKIM	06V	BES2	$e^+e^- \to J/\psi \to \gamma\pi^+\pi^-$	
1.02±0.09±0.45	[192] ABLIKIM	06V	BES2	$e^+e^- \to J/\psi \to \gamma\pi^0\pi^0$	OCCUR=2
• • • We do not use the following data for averages, fits, limits, etc. • • •					
>5.7 ±0.8	[193,194] BUGG	95	MRK3	$J/\psi \to \gamma\pi^+\pi^-\pi^+\pi^-$	

[192] Including unknown branching fraction to $\pi\pi$. NODE=M070S32;LINKAGE=AB
[193] Including unknown branching ratio for $f_0(1500) \to \pi^+\pi^-\pi^+\pi^-$. NODE=M070S32;LINKAGE=A
[194] Assuming that $f_0(1500)$ decays only to two S-wave dipions. NODE=M070S32;LINKAGE=B

$\Gamma(\gamma A \to \gamma\,\text{invisible})/\Gamma_{total}$ (narrow state A with m_A < 960 MeV) Γ_{184}/Γ

NODE=M070S68
NODE=M070S68

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<6.3	90	[195] INSLER	10	CLEO	$e^+e^- \to \pi^+\pi^- J/\psi$

[195] The limit varies with mass m_A of a narrow state A and is 4.3×10^{-6} for $m_A = 0$ MeV, 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

WEAK DECAYS

NODE=M070320

$\Gamma(D^- e^+ \nu_e + \text{c.c.})/\Gamma_{total}$ Γ_{185}/Γ

NODE=M070S53
NODE=M070S53

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<1.2	90	ABLIKIM	06M	BES2	$e^+e^- \to J/\psi$

$\Gamma(\overline{D}^0 e^+ e^- + \text{c.c.})/\Gamma_{total}$ Γ_{186}/Γ

NODE=M070S54
NODE=M070S54

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<1.1	90	ABLIKIM	06M	BES2	$e^+e^- \to J/\psi$

$\Gamma(D_s^- e^+ \nu_e + \text{c.c.})/\Gamma_{total}$ Γ_{187}/Γ

NODE=M070S55
NODE=M070S55

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<3.6	90	[196] ABLIKIM	06M	BES2	$e^+e^- \to J/\psi$

[196] Using B($D_s^- \to \phi\pi^-$) = 4.4 ± 0.5 %. NODE=M070S55;LINKAGE=AB

$\Gamma(D^- \pi^+ + \text{c.c.})/\Gamma_{total}$ Γ_{188}/Γ

NODE=M070S61
NODE=M070S61

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<7.5 × 10^{-5}	90	ABLIKIM	08J	BES2	$e^+e^- \to J/\psi$

$\Gamma(\overline{D}^0 \overline{K}^0 + \text{c.c.})/\Gamma_{total}$ Γ_{189}/Γ

NODE=M070S62
NODE=M070S62

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.7 × 10^{-4}	90	ABLIKIM	08J	BES2	$e^+e^- \to J/\psi$

$\Gamma(D_s^- \pi^+ + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_{190}/Γ

NODE=M070S63
NODE=M070S63

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.3 × 10^−4	90	ABLIKIM	08J	BES2	$e^+e^- \to J/\psi$

$\Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — Γ_{191}/Γ

NODE=M070R80
NODE=M070R80

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
< 0.5	90	ADAMS	08	CLEO	$\psi(2S) \to \pi^+\pi^- J/\psi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<16	90	[197] WICHT	08	BELL	$B^\pm \to K^\pm\gamma\gamma$
< 2.2	90	ABLIKIM	07J	BES2	$\psi(2S) \to J/\psi\pi^+\pi^-$
<50	90	BARTEL	77	CNTR	e^+e^-

[197] 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 $B(B^+ \to J/\psi(1S)K^+) = 1.016 \times 10^{-3}$.

NODE=M070R80;LINKAGE=WI

LEPTON FAMILY NUMBER (*LF*) VIOLATING MODES

NODE=M070315

$\Gamma(e^\pm\mu^\mp)/\Gamma_{\text{total}}$ — Γ_{192}/Γ

NODE=M070S39
NODE=M070S39

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<1.1	90	BAI	03D	BES	$e^+e^- \to J/\psi$

$\Gamma(e^\pm\tau^\mp)/\Gamma_{\text{total}}$ — Γ_{193}/Γ

NODE=M070S40
NODE=M070S40

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<8.3	90	ABLIKIM	04	BES	$e^+e^- \to J/\psi$

$\Gamma(\mu^\pm\tau^\mp)/\Gamma_{\text{total}}$ — Γ_{194}/Γ

NODE=M070S41
NODE=M070S41

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<2.0	90	ABLIKIM	04	BES	$e^+e^- \to J/\psi$

OTHER DECAYS

NODE=M070325

$\Gamma(\text{invisible})/\Gamma(\mu^+\mu^-)$ — Γ_{195}/Γ_7

NODE=M070S60
NODE=M070S60

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.2 × 10^−2	90	ABLIKIM	08G	BES2	$\psi(2S) \to \pi^+\pi^- J/\psi$

J/ψ(1*S*) REFERENCES

NODE=M070

ABLIKIM	11	PR D83 012003	M. Ablikim *et al.*	(BES III Collab.)	REFID=53646
ABLIKIM	11C	PRL 106 072002	M. Ablikim *et al.*	(BES III Collab.)	REFID=53684
ABLIKIM	11D	PR D83 032003	M. Ablikim *et al.*	(BES III 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 091101R	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 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 031101R	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	06K	PRL 97 062001	M. Ablikim *et al.*	(BES 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 051103R	G.S. Adams *et al.*	(CLEO Collab.)	REFID=51036

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 091103R	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
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 Collab., 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 R2181	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, MANZ)	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, MANZ)	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

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NODE=M870

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*
3414.75± 0.31 OUR AVERAGE					
3414.2 ± 0.5 ±2.3	5.4k	UEHARA	08	BELL	$\gamma\gamma \to \chi_{c0} \to$ hadrons
3406 ± 7 ±6	230	[1] ABE	07	BELL	$e^+e^- \to J/\psi(c\overline{c})$
3414.21± 0.39±0.27		ABLIKIM	05G	BES2	$\psi(2S) \to \gamma\chi_{c0}$
3414.7 $^{+0.7}_{-0.6}$ ±0.2		[2] ANDREOTTI	03	E835	$\overline{p}p \to \chi_{c0} \to \pi^0\pi^0$
3415.5 ± 0.4 ±0.4	392	[3] BAGNASCO	02	E835	$\overline{p}p \to \chi_{c0} \to J/\psi\gamma$
3417.4 $^{+1.8}_{-1.9}$ ±0.2		[2] AMBROGIANI	99B	E835	$\overline{p}p \to e^+e^-\gamma$
3414.1 ± 0.6 ±0.8		BAI	99B	BES	$\psi(2S) \to \gamma X$
3417.8 ± 0.4 ±4		[2] GAISER	86	CBAL	$\psi(2S) \to \gamma X$
3416 ± 3 ±4		[4] TANENBAUM	78	MRK1	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3416.5 ± 3.0		EISENSTEIN	01	CLE2	$e^+e^- \to e^+e^-\chi_{c0}$
3422 ±10		[4] BARTEL	78B	CNTR	$e^+e^- \to J/\psi 2\gamma$
3415 ± 9		[4] BIDDICK	77	CNTR	$e^+e^- \to \gamma X$

[1] From a fit of the J/ψ recoil mass spectrum. Supersedes ABE,K 02 and ABE 04G. NODE=M056M;LINKAGE=EB

[2] Using mass of $\psi(2S)$ = 3686.0 MeV. NODE=M056M;LINKAGE=C

[3] Recalculated by ANDREOTTI 05A, using the value of $\psi(2S)$ mass from AULCHENKO 03. NODE=M056M;LINKAGE=NW

[4] 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*
10.4±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	$\overline{p}p \to \chi_{c0} \to \pi^0\pi^0$
9.7±1.0	392	[5] BAGNASCO	02	E835	$\overline{p}p \to \chi_{c0} \to J/\psi\gamma$
$16.6^{+5.2}_{-3.7}$±0.1		AMBROGIANI	99B	E835	$\overline{p}p \to e^+e^-\gamma$
14.3±2.0±3.0		BAI	98I	BES	$\psi(2S) \to \gamma\pi^+\pi^-$
13.5±3.3±4.2		GAISER	86	CBAL	$\psi(2S) \to \gamma X$, $\gamma\pi^0\pi^0$

[5] 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	$2(\pi^+\pi^-)$	(2.26 ± 0.19) %		DESIG=3
Γ_2	$\rho^0\pi^+\pi^-$	$(8.8\ \pm2.8\ )\times10^{-3}$		DESIG=9
Γ_3	$\rho^0\rho^0$			DESIG=54
Γ_4	$f_0(980)f_0(980)$	$(6.7\ \pm2.1\ )\times10^{-4}$		DESIG=20
Γ_5	$\pi^+\pi^-\pi^0\pi^0$	$(3.4\ \pm0.4\ )$ %		DESIG=61
Γ_6	$\rho^+\pi^-\pi^0+$ c.c.	$(2.9\ \pm0.4\ )$ %		DESIG=62
Γ_7	$4\pi^0$	$(3.3\ \pm0.4\ )\times10^{-3}$		DESIG=70
Γ_8	$\pi^+\pi^-K^+K^-$	(1.79 ± 0.15) %		DESIG=5
Γ_9	$K_0^*(1430)^0\overline{K}_0^*(1430)^0\rightarrow\pi^+\pi^-K^+K^-$	$(9.9\ {}^{+4.0}_{-2.9}\ )\times10^{-4}$		DESIG=31
Γ_{10}	$K_0^*(1430)^0\overline{K}_2^*(1430)^0+$ c.c. $\rightarrow\pi^+\pi^-K^+K^-$	$(8.1\ {}^{+2.0}_{-2.4}\ )\times10^{-4}$		DESIG=32
Γ_{11}	$K_1(1270)^+K^-+$ c.c. $\rightarrow\pi^+\pi^-K^+K^-$	$(6.3\ \pm1.9\ )\times10^{-3}$		DESIG=33
Γ_{12}	$K_1(1400)^+K^-+$ c.c. $\rightarrow\pi^+\pi^-K^+K^-$	$<2.7\ \times10^{-3}$	CL=90%	DESIG=34
Γ_{13}	$f_0(980)f_0(980)$	$(1.6\ {}^{+1.1}_{-0.9}\ )\times10^{-4}$		DESIG=23
Γ_{14}	$f_0(980)f_0(2200)$	$(8.0\ {}^{+2.0}_{-2.5}\ )\times10^{-4}$		DESIG=24
Γ_{15}	$f_0(1370)f_0(1370)$	$<2.8\ \times10^{-4}$	CL=90%	DESIG=25
Γ_{16}	$f_0(1370)f_0(1500)$	$<1.7\ \times10^{-4}$	CL=90%	DESIG=26
Γ_{17}	$f_0(1370)f_0(1710)$	$(6.8\ {}^{+4.0}_{-2.4}\ )\times10^{-4}$		DESIG=27
Γ_{18}	$f_0(1500)f_0(1370)$	$<1.3\ \times10^{-4}$	CL=90%	DESIG=28
Γ_{19}	$f_0(1500)f_0(1500)$	$<5\ \times10^{-5}$	CL=90%	DESIG=29
Γ_{20}	$f_0(1500)f_0(1710)$	$<7\ \times10^{-5}$	CL=90%	DESIG=30
Γ_{21}	$K^+K^-\pi^+\pi^-\pi^0$	(1.13 ± 0.27) %		DESIG=75
Γ_{22}	$K^+K^-\pi^0\pi^0$	$(5.6\ \pm0.9\ )\times10^{-3}$		DESIG=63
Γ_{23}	$K^+\pi^-K^0\pi^0+$ c.c.	(2.52 ± 0.34) %		DESIG=65
Γ_{24}	$\rho^+K^-K^0+$ c.c.	(1.22 ± 0.21) %		DESIG=66
Γ_{25}	$K^*(892)^-K^+\pi^0\rightarrow K^+\pi^-K^0\pi^0+$ c.c.	$(4.7\ \pm1.2\ )\times10^{-3}$		DESIG=67
Γ_{26}	$K_S^0K_S^0\pi^+\pi^-$	$(5.8\ \pm1.1\ )\times10^{-3}$		DESIG=41
Γ_{27}	$K^+K^-\eta\pi^0$	$(3.0\ \pm0.7\ )\times10^{-3}$		DESIG=68
Γ_{28}	$3(\pi^+\pi^-)$	(1.20 ± 0.18) %		DESIG=4
Γ_{29}	$K^+\overline{K}^*(892)^0\pi^-+$ c.c.	$(7.3\ \pm1.6\ )\times10^{-3}$		DESIG=10
Γ_{30}	$K^*(892)^0\overline{K}^*(892)^0$	$(1.7\ \pm0.6\ )\times10^{-3}$		DESIG=21
Γ_{31}	$\pi\pi$	$(8.5\ \pm0.4\ )\times10^{-3}$		DESIG=18
Γ_{32}	$\pi^0\eta$	$<1.8\ \times10^{-4}$		DESIG=35
Γ_{33}	$\pi^0\eta'$	$<1.1\ \times10^{-3}$		DESIG=36
Γ_{34}	$\eta\eta$	$(3.03\pm0.21)\times10^{-3}$		DESIG=13
Γ_{35}	$\eta\eta'$	$<2.4\ \times10^{-4}$	CL=90%	DESIG=37
Γ_{36}	$\eta'\eta'$	$(2.02\pm0.22)\times10^{-3}$		DESIG=46
Γ_{37}	$\omega\omega$	$(9.8\ \pm1.1\ )\times10^{-4}$		DESIG=22
Γ_{38}	$\omega\phi$	$(1.19\pm0.22)\times10^{-4}$		DESIG=76
Γ_{39}	K^+K^-	$(6.06\pm0.35)\times10^{-3}$		DESIG=2
Γ_{40}	$K_S^0K_S^0$	$(3.14\pm0.18)\times10^{-3}$		DESIG=15
Γ_{41}	$\pi^+\pi^-\eta$	$<2.0\ \times10^{-4}$	CL=90%	DESIG=50
Γ_{42}	$\pi^+\pi^-\eta'$	$<4\ \times10^{-4}$	CL=90%	DESIG=53
Γ_{43}	$\overline{K}^0K^+\pi^-+$ c.c.	$<1.0\ \times10^{-4}$	CL=90%	DESIG=17
Γ_{44}	$K^+K^-\pi^0$	$<6\ \times10^{-5}$	CL=90%	DESIG=47
Γ_{45}	$K^+K^-\eta$	$<2.3\ \times10^{-4}$	CL=90%	DESIG=51
Γ_{46}	$K^+K^-K_S^0K_S^0$	$(1.4\ \pm0.5\ )\times10^{-3}$		DESIG=42
Γ_{47}	$K^+K^-K^+K^-$	$(2.79\pm0.29)\times10^{-3}$		DESIG=14
Γ_{48}	$K^+K^-\phi$	$(9.8\ \pm2.5\ )\times10^{-4}$		DESIG=44
Γ_{49}	$\phi\phi$	$(8.2\ \pm0.8\ )\times10^{-4}$		DESIG=16
Γ_{50}	$p\overline{p}$	$(2.23\pm0.13)\times10^{-4}$		DESIG=11

Γ_{51}	$p\overline{p}\pi^0$	$(7.0 \pm 0.7) \times 10^{-4}$	S=1.2	DESIG=48
Γ_{52}	$p\overline{p}\eta$	$(3.6 \pm 0.4) \times 10^{-4}$		DESIG=52
Γ_{53}	$p\overline{p}\omega$	$(5.3 \pm 0.6) \times 10^{-4}$		DESIG=69
Γ_{54}	$p\overline{p}\phi$	$(6.1 \pm 1.5) \times 10^{-5}$		DESIG=74
Γ_{55}	$p\overline{p}\pi^+\pi^-$	$(2.1 \pm 0.7) \times 10^{-3}$	S=1.4	DESIG=8
Γ_{56}	$p\overline{p}\pi^0\pi^0$	$(1.05 \pm 0.28) \times 10^{-3}$		DESIG=64
Γ_{57}	$p\overline{p}K^+K^-$ (non-resonant)	$(1.23 \pm 0.27) \times 10^{-4}$		DESIG=71
Γ_{58}	$p\overline{p}K^0_S K^0_S$	$< 8.8 \times 10^{-4}$	CL=90%	DESIG=40
Γ_{59}	$p\overline{n}\pi^-$	$(1.14 \pm 0.31) \times 10^{-3}$		DESIG=43
Γ_{60}	$\Lambda\overline{\Lambda}$	$(3.3 \pm 0.4) \times 10^{-4}$		DESIG=19
Γ_{61}	$\Lambda\overline{\Lambda}\pi^+\pi^-$	$< 4.0 \times 10^{-3}$	CL=90%	DESIG=38
Γ_{62}	$K^+\overline{p}\Lambda +$ c.c.	$(1.02 \pm 0.19) \times 10^{-3}$		DESIG=49
Γ_{63}	$K^+ p\Lambda(1520) +$ c.c.	$(3.0 \pm 0.8) \times 10^{-4}$		DESIG=72
Γ_{64}	$\Lambda(1520)\overline{\Lambda}(1520)$	$(3.2 \pm 1.2) \times 10^{-4}$		DESIG=73
Γ_{65}	$\Sigma^0\overline{\Sigma}^0$	$(4.2 \pm 0.7) \times 10^{-4}$		DESIG=58
Γ_{66}	$\Sigma^+\overline{\Sigma}^-$	$(3.1 \pm 0.7) \times 10^{-4}$		DESIG=59
Γ_{67}	$\Xi^0\overline{\Xi}^0$	$(3.2 \pm 0.8) \times 10^{-4}$		DESIG=60
Γ_{68}	$\Xi^-\overline{\Xi}^+$	$(4.9 \pm 0.7) \times 10^{-4}$		DESIG=39

Radiative decays NODE=M056;CLUMP=B

Γ_{69}	$\gamma J/\psi(1S)$	(1.17 ± 0.08) %		DESIG=6
Γ_{70}	$\gamma\rho^0$	$< 9 \times 10^{-6}$	CL=90%	DESIG=55
Γ_{71}	$\gamma\omega$	$< 8 \times 10^{-6}$	CL=90%	DESIG=56
Γ_{72}	$\gamma\phi$	$< 6 \times 10^{-6}$	CL=90%	DESIG=57
Γ_{73}	$\gamma\gamma$	$(2.23 \pm 0.17) \times 10^{-4}$		DESIG=7

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 223 measurements to determine 49 parameters. The overall fit has a $\chi^2 = 312.2$ for 174 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, $x_i \equiv \Gamma_i/\Gamma_{\text{total}}$.

	x_1	x_2	x_8	x_{29}	x_{31}	x_{34}	x_{39}	x_{40}	x_{47}	x_{49}
x_2	26									
x_8	20	5								
x_{29}	9	2	30							
x_{31}	22	6	23	8						
x_{34}	13	3	14	5	28					
x_{39}	20	5	20	7	36	23				
x_{40}	22	6	22	8	35	22	30			
x_{47}	13	3	12	5	19	12	16	17		
x_{49}	11	3	11	4	20	13	17	17	9	
x_{50}	2	1	2	1	−6	−7	2	2	1	1
x_{60}	8	2	9	3	17	11	15	14	8	8
x_{69}	2	1	3	1	13	10	8	6	4	4
x_{73}	−26	−7	−18	−10	−9	−4	−10	−15	−9	−5
Γ	−14	−4	−12	−6	−12	−8	−11	−13	−7	−6

	x_{50}	x_{60}	x_{69}	x_{73}
x_{60}	1			
x_{69}	−46	4		
x_{73}	−6	−3	11	
Γ	3	−5	−10	−57

$\chi_{c0}(1P)$ PARTIAL WIDTHS

NODE=M056217

$\chi_{c0}(1P)$ $\Gamma(i)\Gamma(\gamma J/\psi(1S))/\Gamma(total)$

NODE=M056223

$\Gamma(p\overline{p}) \times \Gamma(\gamma J/\psi(1S))/\Gamma_{total}$ — $\Gamma_{50}\Gamma_{69}/\Gamma$

NODE=M056G1
NODE=M056G1

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
27.1± 2.4 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
26.6± 2.6±1.4	392	[6,7] BAGNASCO	02	E835	$\overline{p}p \to \chi_{c0} \to J/\psi\gamma$
$48.7^{+11.3}_{-8.9}\pm2.4$		[6,7] AMBROGIANI	99B	E835	$\overline{p}p \to \gamma J/\psi$

[6] Calculated by us using $B(J/\psi(1S) \to e^+e^-) = 0.0593 \pm 0.0010$. NODE=M056G;LINKAGE=7A

[7] 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=M056G;LINKAGE=KS

$\chi_{c0}(1P)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(total)$

NODE=M056224

$\Gamma(\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{31}\Gamma_{73}/\Gamma$

NODE=M056G3
NODE=M056G3

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
19.7± 1.4 OUR FIT					
23 ± 5 OUR AVERAGE					
$29.7^{+17.4}_{-12.0}\pm4.8$	103^{+60}_{-42}	[8] UEHARA	09	BELL	10.6 $e^+e^- \to e^+e^-\pi^0\pi^0$
22.7± 3.2±3.5	129 ± 18	[9] NAKAZAWA	05	BELL	10.6 $e^+e^- \to e^+e^-\pi^+\pi^-$

[8] 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

[9] We have multiplied $\pi^+\pi^-$ measurement by 3/2 to obtain $\pi\pi$. NODE=M056G;LINKAGE=NA

$\Gamma(\eta\eta) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{34}\Gamma_{73}/\Gamma$

NODE=M056G06
NODE=M056G06

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
9.4±2.3±1.2	22	[10] UEHARA	10A	BELL	10.6 $e^+e^- \to e^+e^-\eta\eta$

[10] Interference with the continuum not included. NODE=M056G06;LINKAGE=UE

$\Gamma(K^+K^-) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{39}\Gamma_{73}/\Gamma$

NODE=M056G4
NODE=M056G4

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
14.0±1.1 OUR FIT					
14.3±1.6±2.3	153 ± 17	NAKAZAWA	05	BELL	10.6 $e^+e^- \to e^+e^-K^+K^-$

$\Gamma(K^0_SK^0_S) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{40}\Gamma_{73}/\Gamma$

NODE=M056G5
NODE=M056G5

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
7.3 ±0.5 OUR FIT					
7.00±0.65±0.71	134 ± 12	CHEN	07B	BELL	$e^+e^- \to e^+e^-\chi_{c0}$

$\Gamma(2(\pi^+\pi^-)) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_1\Gamma_{73}/\Gamma$

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	$e^+e^- \to e^+e^-\chi_{c0}$

$\Gamma(\rho^0\rho^0) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_3\Gamma_{73}/\Gamma$

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	$\gamma\gamma \to \chi_{c0} \to 2(\pi^+\pi^-)$

$\Gamma(\pi^+\pi^-K^+K^-) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_8\Gamma_{73}/\Gamma$

NODE=M056G08
NODE=M056G08

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
41 ±4 OUR FIT					
38.8±3.7±4.7	1.7k	UEHARA	08	BELL	$\gamma\gamma \to \chi_{c0} \to K^+K^-\pi^+\pi^-$

$\Gamma(K^+K^-\pi^+\pi^-\pi^0) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{21}\Gamma_{73}/\Gamma$

NODE=M056G01
NODE=M056G01

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
26±4±4	1094	DEL-AMO-SA..11M		BABR	$\gamma\gamma \to K^+K^-\pi^+\pi^-\pi^0$

$\Gamma(K^+\overline{K}^*(892)^0\pi^- + c.c.) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{29}\Gamma_{73}/\Gamma$

NODE=M056G09
NODE=M056G09

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
17 ±4 OUR FIT					
16.7±6.1±3.0	495 ± 182	UEHARA	08	BELL	$\gamma\gamma \to \chi_{c0} \to K^+K^-\pi^+\pi^-$

$\Gamma(K^*(892)^0 \overline{K}^*(892)^0) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{30}\Gamma_{73}/\Gamma$

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	$\gamma\gamma \to \chi_{c0} \to K^+ K^- \pi^+ \pi^-$

$\Gamma(K^+ K^- K^+ K^-) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{47}\Gamma_{73}/\Gamma$

NODE=M056G11

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
6.4±0.7 OUR FIT					
7.9±1.3±1.1	215 ± 36	UEHARA	08	BELL	$\gamma\gamma \to \chi_{c0} \to 2(K^+ K^-)$

$\Gamma(\phi\phi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{49}\Gamma_{73}/\Gamma$

NODE=M056G12

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
1.89±0.22 OUR FIT					
[2.1 ± 0.5 eV OUR 2011 FIT]					
2.3 ±0.9 ±0.4	23.6 ± 9.6	UEHARA	08	BELL	$\gamma\gamma \to \chi_{c0} \to 2(K^+ K^-)$

NEW

$\chi_{c0}(1P)$ BRANCHING RATIOS

NODE=M056220

HADRONIC DECAYS

NODE=M056305

$\Gamma(2(\pi^+\pi^-))/\Gamma_{total}$ — Γ_1/Γ

NODE=M056R2

VALUE	DOCUMENT ID
0.0226±0.0019 OUR FIT	

$\Gamma(\rho^0\pi^+\pi^-)/\Gamma(2(\pi^+\pi^-))$ — Γ_2/Γ_1

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

VALUE	DOCUMENT ID
0.0088±0.0028 OUR FIT	

$\Gamma(f_0(980) f_0(980))/\Gamma_{total}$ — Γ_4/Γ

NODE=M056R24

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
6.7±2.1±0.2	36 ± 9	[11] ABLIKIM	04G	BES	$\psi(2S) \to \gamma 2\pi^+ 2\pi^-$

[11] 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R24;LINKAGE=AB

$\Gamma(\pi^+\pi^-\pi^0\pi^0)/\Gamma_{total}$ — Γ_5/Γ

NODE=M056R62

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
3.4±0.4 OUR AVERAGE [(3.4 ± 0.4)% OUR 2011 AVERAGE]					
3.4±0.4±0.1	1751.4	[12] HE	08B	CLEO	$e^+ e^- \to \gamma h^+ h^- h^0 h^0$

NEW

[12] HE 08B reports $3.54 \pm 0.10 \pm 0.43 \pm 0.18$ % 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R62;LINKAGE=HE

$\Gamma(\rho^+\pi^-\pi^0 + c.c.)/\Gamma_{total}$ — Γ_6/Γ

NODE=M056R63

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
2.9±0.4 OUR AVERAGE [(2.9 ± 0.4)% OUR 2011 AVERAGE]					
2.9±0.4±0.1	1358.5	[13,14] HE	08B	CLEO	$e^+ e^- \to \gamma h^+ h^- h^0 h^0$

NEW

[13] HE 08B reports $3.04 \pm 0.18 \pm 0.42 \pm 0.16$ % from a measurement of $[\Gamma(\chi_{c0}(1P) \to \rho^+\pi^-\pi^0 + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R63;LINKAGE=HE

[14] 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	[15] ABLIKIM 11A	BES3	$e^+e^- \rightarrow \psi(2S) \rightarrow \gamma\chi_{c0}$

[15] ABLIKIM 11A reports $(3.34\pm0.06\pm0.44)\times10^{-3}$ from a measurement of $[\Gamma(\chi_{c0}(1P)\rightarrow 4\pi^0)/\Gamma_{total}] \times [B(\psi(2S)\rightarrow\gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S)\rightarrow\gamma\chi_{c0}(1P)) = (9.62\pm0.31)\times10^{-2}$, which we rescale to our best value $B(\psi(2S)\rightarrow\gamma\chi_{c0}(1P)) = (9.68\pm0.31)\times10^{-2}$. 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
17.9±1.5 OUR FIT	

$\Gamma(K^+\overline{K}^*(892)^0\pi^- + \text{c.c.})/\Gamma(\pi^+\pi^-K^+K^-)$ — Γ_{29}/Γ_8

NODE=M056R55
NODE=M056R55

VALUE	DOCUMENT ID	TECN	COMMENT
0.41±0.09 OUR FIT			
0.41±0.10	TANENBAUM 78	MRK1	$\psi(2S)\rightarrow\gamma\chi_{c0}$

$\Gamma(K_0^*(1430)^0\overline{K}_0^*(1430)^0 \rightarrow \pi^+\pi^-K^+K^-)/\Gamma_{total}$ — Γ_9/Γ

NODE=M056R36
NODE=M056R36

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
$9.9^{+3.6}_{-2.8}\pm0.3$	83	[16] ABLIKIM 05Q	BES2	$\psi(2S)\rightarrow\gamma\pi^+\pi^-K^+K^-$

[16] ABLIKIM 05Q reports $(10.44\pm2.37^{+3.05}_{-1.90})\times10^{-4}$ from a measurement of $[\Gamma(\chi_{c0}(1P)\rightarrow K_0^*(1430)^0\overline{K}_0^*(1430)^0\rightarrow\pi^+\pi^-K^+K^-)/\Gamma_{total}] \times [B(\psi(2S)\rightarrow\gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S)\rightarrow\gamma\chi_{c0}(1P)) = (9.22\pm0.11\pm0.46)\times10^{-2}$, which we rescale to our best value $B(\psi(2S)\rightarrow\gamma\chi_{c0}(1P)) = (9.68\pm0.31)\times10^{-2}$. 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

$\Gamma(K_0^*(1430)^0\overline{K}_2^*(1430)^0 + \text{c.c.} \rightarrow \pi^+\pi^-K^+K^-)/\Gamma_{total}$ — Γ_{10}/Γ

NODE=M056R37
NODE=M056R37

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
$8.1^{+2.0}_{-2.4}\pm0.3$	62	[17] ABLIKIM 05Q	BES2	$\psi(2S)\rightarrow\gamma\pi^+\pi^-K^+K^-$

[17] ABLIKIM 05Q reports $(8.49\pm1.66^{+1.32}_{-1.99})\times10^{-4}$ from a measurement of $[\Gamma(\chi_{c0}(1P)\rightarrow K_0^*(1430)^0\overline{K}_2^*(1430)^0 + \text{c.c.}\rightarrow\pi^+\pi^-K^+K^-)/\Gamma_{total}] \times [B(\psi(2S)\rightarrow\gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S)\rightarrow\gamma\chi_{c0}(1P)) = (9.22\pm0.11\pm0.46)\times10^{-2}$, which we rescale to our best value $B(\psi(2S)\rightarrow\gamma\chi_{c0}(1P)) = (9.68\pm0.31)\times10^{-2}$. 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

$\Gamma(K_1(1270)^+K^- + \text{c.c.} \rightarrow \pi^+\pi^-K^+K^-)/\Gamma_{total}$ — Γ_{11}/Γ

NODE=M056R38
NODE=M056R38

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
6.3±1.9±0.2	68	[18] ABLIKIM 05Q	BES2	$\psi(2S)\rightarrow\gamma\pi^+\pi^-K^+K^-$

[18] ABLIKIM 05Q reports $(6.66\pm1.31^{+1.60}_{-1.51})\times10^{-3}$ from a measurement of $[\Gamma(\chi_{c0}(1P)\rightarrow K_1(1270)^+K^- + \text{c.c.}\rightarrow\pi^+\pi^-K^+K^-)/\Gamma_{total}] \times [B(\psi(2S)\rightarrow\gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S)\rightarrow\gamma\chi_{c0}(1P)) = (9.22\pm0.11\pm0.46)\times10^{-2}$, which we rescale to our best value $B(\psi(2S)\rightarrow\gamma\chi_{c0}(1P)) = (9.68\pm0.31)\times10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. The measurement assumes $B(K_1(1270)\rightarrow K\rho(770)) = 42\pm6\%$.

NODE=M056R38;LINKAGE=AB

$\Gamma(K_1(1400)^+K^- + \text{c.c.} \rightarrow \pi^+\pi^-K^+K^-)/\Gamma_{total}$ — Γ_{12}/Γ

NODE=M056R39
NODE=M056R39

VALUE (units 10^{-3})	CL%	DOCUMENT ID	TECN	COMMENT
<2.7	90	[19] ABLIKIM 05Q	BES2	$\psi(2S)\rightarrow\gamma\pi^+\pi^-K^+K^-$

[19] ABLIKIM 05Q reports $< 2.85\times10^{-3}$ from a measurement of $[\Gamma(\chi_{c0}(1P)\rightarrow K_1(1400)^+K^- + \text{c.c.}\rightarrow\pi^+\pi^-K^+K^-)/\Gamma_{total}] \times [B(\psi(2S)\rightarrow\gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S)\rightarrow\gamma\chi_{c0}(1P)) = (9.22\pm0.11\pm0.46)\times10^{-2}$, which we rescale to our best value $B(\psi(2S)\rightarrow\gamma\chi_{c0}(1P)) = 9.68\times10^{-2}$. The measurement assumes $B(K_1(1400)\rightarrow K^*(892)\pi) = 94\pm6\%$.

NODE=M056R39;LINKAGE=AB

$\Gamma(f_0(980)\,f_0(980))/\Gamma_{total}$ Γ_{13}/Γ

NODE=M056R28
NODE=M056R28

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$16^{+11}_{-9}\pm1$	28	[20] ABLIKIM	05Q	BES2	$\psi(2S) \to \gamma\pi^+\pi^-K^+K^-$

[20] ABLIKIM 05Q reports $[\Gamma(\chi_{c0}(1P) \to f_0(980)\,f_0(980))/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))] = (1.59\pm0.50^{+0.89}_{-0.72})\times10^{-5}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best 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
NODE=M056R29

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
$8.0^{+2.0}_{-2.5}\pm0.3$	77	[21] ABLIKIM	05Q	BES2	$\psi(2S) \to \gamma\pi^+\pi^-K^+K^-$

[21] ABLIKIM 05Q reports $(8.42\pm1.42^{+1.65}_{-2.29})\times10^{-4}$ 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.22\pm0.11\pm0.46)\times10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best 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
<2.8	90	[22] ABLIKIM	05Q	BES2	$\psi(2S) \to \gamma\pi^+\pi^-K^+K^-$

[22] 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.22\pm0.11\pm0.46)\times10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = 9.68\times10^{-2}$. 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	[23] ABLIKIM	05Q	BES2	$\psi(2S) \to \gamma\pi^+\pi^-K^+K^-$

[23] 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.22\pm0.11\pm0.46)\times10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = 9.68 \times 10^{-2}$. 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
$6.8^{+3.6}_{-2.4}\pm0.2$	61	[24] ABLIKIM	05Q	BES2	$\psi(2S) \to \gamma\pi^+\pi^-K^+K^-$

[24] ABLIKIM 05Q reports $(7.12\pm1.85^{+3.28}_{-1.68})\times10^{-4}$ 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.22\pm0.11\pm0.46)\times10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best 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	[25] ABLIKIM	05Q	BES2	$\psi(2S) \to \gamma\pi^+\pi^-K^+K^-$

[25] 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.22\pm0.11\pm0.46)\times10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = 9.68 \times 10^{-2}$. 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	[26] ABLIKIM	05Q	BES2	$\psi(2S) \rightarrow \gamma \pi^+ \pi^- K^+ K^-$

[26] ABLIKIM 05Q reports $< 0.55 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \rightarrow f_0(1500) f_0(1500))/\Gamma_{total}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = 9.68 \times 10^{-2}$. 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	[27] ABLIKIM	05Q	BES2	$\psi(2S) \rightarrow \gamma \pi^+ \pi^- K^+ K^-$

[27] ABLIKIM 05Q reports $< 0.73 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \rightarrow f_0(1500) f_0(1710))/\Gamma_{total}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = 9.68 \times 10^{-2}$. The f_0 mesons are identified via $f_0(1500) \rightarrow \pi^+ \pi^-$ and $f_0(1710) \rightarrow K^+ K^-$ decays. Both branching fractions for these f_0 decays are implicitly included in the quoted result.

NODE=M056R35;LINKAGE=AB

$\Gamma(K^+ K^- \pi^0 \pi^0)/\Gamma_{total}$ Γ_{22}/Γ

NODE=M056R64
NODE=M056R64

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.56±0.09 OUR AVERAGE	[(0.56 ± 0.09)% OUR 2011 AVERAGE]				
0.56±0.09±0.02	213.5	[28] HE	08B	CLEO	$e^+ e^- \rightarrow \gamma h^+ h^- h^0 h^0$

NEW

[28] HE 08B reports $0.59 \pm 0.05 \pm 0.08 \pm 0.03$ % from a measurement of $[\Gamma(\chi_{c0}(1P) \rightarrow K^+ K^- \pi^0 \pi^0)/\Gamma_{total}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R64;LINKAGE=HE

$\Gamma(K^+ \pi^- K^0 \pi^0 + \text{c.c.})/\Gamma_{total}$ Γ_{23}/Γ

NODE=M056R66
NODE=M056R66

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
2.52±0.34 OUR AVERAGE	[(2.52 ± 0.34)% OUR 2011 AVERAGE]				
2.52±0.33±0.08	401.7	[29] HE	08B	CLEO	$e^+ e^- \rightarrow \gamma h^+ h^- h^0 h^0$

NEW

[29] HE 08B reports $2.64 \pm 0.15 \pm 0.31 \pm 0.14$ % from a measurement of $[\Gamma(\chi_{c0}(1P) \rightarrow K^+ \pi^- K^0 \pi^0 + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R66;LINKAGE=HE

$\Gamma(\rho^+ K^- K^0 + \text{c.c.})/\Gamma_{total}$ Γ_{24}/Γ

NODE=M056R67
NODE=M056R67

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
1.22±0.21 OUR AVERAGE	[(1.22 ± 0.21)% OUR 2011 AVERAGE]				
1.22±0.21±0.04	179.7	[30] HE	08B	CLEO	$e^+ e^- \rightarrow \gamma h^+ h^- h^0 h^0$

NEW

[30] HE 08B reports $1.28 \pm 0.16 \pm 0.15 \pm 0.07$ % from a measurement of $[\Gamma(\chi_{c0}(1P) \rightarrow \rho^+ K^- K^0 + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R67;LINKAGE=HE

$\Gamma(K^*(892)^- K^+ \pi^0 \rightarrow K^+ \pi^- K^0 \pi^0 + \text{c.c.})/\Gamma_{total}$ Γ_{25}/Γ

NODE=M056R68
NODE=M056R68

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.47±0.12 OUR AVERAGE	[(0.47 ± 0.12)% OUR 2011 AVERAGE]				
0.47±0.12±0.01	64.1	[31] HE	08B	CLEO	$e^+ e^- \rightarrow \gamma h^+ h^- h^0 h^0$

NEW

[31] HE 08B reports $0.49 \pm 0.10 \pm 0.07 \pm 0.03$ % from a measurement of $[\Gamma(\chi_{c0}(1P) \rightarrow K^*(892)^- K^+ \pi^0 \rightarrow K^+ \pi^- K^0 \pi^0 + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R68;LINKAGE=HE

$\Gamma(K^0_S K^0_S \pi^+ \pi^-)/\Gamma_{total}$ Γ_{26}/Γ

NODE=M056R47

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
5.8±1.1±0.2	152 ± 14	[32] ABLIKIM 05O	BES2	$\psi(2S) \to \gamma \chi_{c0}$

[32] 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R47;LINKAGE=AB

$\Gamma(K^+ K^- \eta \pi^0)/\Gamma_{total}$ Γ_{27}/Γ

NODE=M056R69

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
0.30±0.07 OUR AVERAGE	[(0.30 ± 0.07)% OUR 2011 AVERAGE]			
0.30±0.07±0.01	56.4	[33] HE 08B	CLEO	$e^+e^- \to \gamma h^+ h^- h^0 h^0$

NEW

[33] 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R69;LINKAGE=HE

$\Gamma(3(\pi^+\pi^-))/\Gamma_{total}$ Γ_{28}/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	[34] BAI 99B	BES	$\psi(2S) \to \gamma\chi_{c0}$
12.5±2.9±0.5	[34] TANENBAUM 78	MRK1	$\psi(2S) \to \gamma\chi_{c0}$

→ NOT CHECKED ←

[34] 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_{29}/Γ

NODE=M056R10

VALUE	DOCUMENT ID
0.0073±0.0016 OUR FIT	

$\Gamma(K^*(892)^0 \overline{K}^*(892)^0)/\Gamma_{total}$ Γ_{30}/Γ

NODE=M056R26

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
$1.7^{+0.6}_{-0.5}\pm0.1$	64	[35] ABLIKIM 05Q	BES2	$\psi(2S) \to \gamma\pi^+\pi^-K^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.6±0.4±0.1	30.1 ± 5.7	[36,37] ABLIKIM 04H	BES	Repl. by ABLIKIM 05Q

[35] 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R26;LINKAGE=AI

[36] Assumes $B(K^*(892)^0 \to K^-\pi^+) = 2/3$.

NODE=M056R;LINKAGE=AL

[37] 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R26;LINKAGE=AB

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

NODE=M056R22

VALUE (units 10^{-3})	DOCUMENT ID
8.5±0.4 OUR FIT	

$\Gamma(\eta\eta)/\Gamma_{total}$ Γ_{34}/Γ

NODE=M056R13

VALUE (units 10^{-3})	DOCUMENT ID
3.03±0.21 OUR FIT	

$\Gamma(\eta\eta)/\Gamma(\pi\pi)$ Γ_{34}/Γ_{31}

NODE=M056R20

VALUE	DOCUMENT ID	TECN	COMMENT
0.356±0.025 OUR FIT			
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.26 \pm 0.09 ^{+0.03}_{-0.02}$	[38] ANDREOTTI 05C	E835	$\overline{p}p \to$ 2 mesons
$0.24 \pm 0.10 \pm 0.08$	[38] BAI 03C	BES	$\psi(2S) \to 5\gamma$

[38] We have multiplied $\pi^0\pi^0$ measurement by 3 to obtain $\pi\pi$.

NODE=M056R;LINKAGE=D1

$\Gamma(\eta\eta')/\Gamma_{total}$ — Γ_{35}/Γ

NODE=M056R03
NODE=M056R03

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<0.24	90	35 ± 13	[39] ASNER	09	CLEO	$\psi(2S) \to \gamma\eta'\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.5	90		[40] ADAMS	07	CLEO	$\psi(2S) \to \gamma\chi_{c0}$

[39] 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = 9.68 \times 10^{-2}$. NODE=M056R03;LINKAGE=AS

[40] 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = 9.68 \times 10^{-2}$. NODE=M056R03;LINKAGE=AD

$\Gamma(\eta'\eta')/\Gamma_{total}$ — Γ_{36}/Γ

NODE=M056R04
NODE=M056R04

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
$2.02 \pm 0.21 \pm 0.06$	0.4k	[41] ASNER	09	CLEO	$\psi(2S) \to \gamma\eta'\eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1.6 \pm 0.4 \pm 0.1$	23	[42] ADAMS	07	CLEO	$\psi(2S) \to \gamma\chi_{c0}$

[41] 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M056R04;LINKAGE=AS

[42] 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M056R04;LINKAGE=AD

$\Gamma(\omega\omega)/\Gamma_{total}$ — Γ_{37}/Γ

NODE=M056R27
NODE=M056R27

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.98 ± 0.11 OUR AVERAGE					
[$(2.2 \pm 0.7) \times 10^{-3}$ OUR 2011 AVERAGE]					
$0.94 \pm 0.11 \pm 0.03$	991	[43] ABLIKIM	11K	BES3	$\psi(2S) \to \gamma$ hadrons
$2.2 \pm 0.7 \pm 0.1$	38.1 ± 9.6	[44] ABLIKIM	05N	BES2	$\psi(2S) \to \gamma\chi_{c0} \to \gamma 6\pi$

NEW

[43] ABLIKIM 11K reports $(0.95 \pm 0.03 \pm 0.11) \times 10^{-3}$ 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M056R27;LINKAGE=AL

[44] 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M056R27;LINKAGE=AB

$\Gamma(\omega\phi)/\Gamma_{total}$ — Γ_{38}/Γ

NODE=M056R76
NODE=M056R76

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
$1.19 \pm 0.22 \pm 0.04$	76	[45] ABLIKIM	11K	BES3	$\psi(2S) \to \gamma$ hadrons

[45] 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M056R76;LINKAGE=AL

$\Gamma(K^+K^-)/\Gamma_{total}$ — Γ_{39}/Γ

NODE=M056R6
NODE=M056R6

VALUE (units 10^{-3})	DOCUMENT ID
6.06 ± 0.35 OUR FIT	

$\Gamma(K^0_S K^0_S)/\Gamma_{total}$ — Γ_{40}/Γ

NODE=M056R15
NODE=M056R15

VALUE (units 10^{-3})	DOCUMENT ID
3.14 ± 0.18 OUR FIT	
[$(3.15 \pm 0.18) \times 10^{-3}$ OUR 2011 FIT]	

NEW

$\Gamma(K^0_S K^0_S)/\Gamma(\pi\pi)$ — Γ_{40}/Γ_{31}

NODE=M056R53
NODE=M056R53

VALUE	DOCUMENT ID	TECN	COMMENT
0.369±0.022 OUR FIT			
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.31 ±0.05 ±0.05	[46,47] CHEN 07B	BELL	$e^+e^- \to e^+e^-\chi_{c0}$

[46] Using $\Gamma(\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ from the $\pi^+\pi^-$ measurement of NAKAZAWA 05 rescaled by 3/2 to convert to $\pi\pi$. NODE=M056R53;LINKAGE=CH

[47] Not independent from other measurements. NODE=M056R53;LINKAGE=NI

$\Gamma(K^0_S K^0_S)/\Gamma(K^+K^-)$ — Γ_{40}/Γ_{39}

NODE=M056R52
NODE=M056R52

VALUE	DOCUMENT ID	TECN	COMMENT
0.519±0.035 OUR FIT			
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.49 ±0.07 ±0.08	[48,49] CHEN 07B	BELL	$e^+e^- \to e^+e^-\chi_{c0}$

[48] Using $\Gamma(K^+K^-) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ from NAKAZAWA 05. NODE=M056R52;LINKAGE=CH

[49] Not independent from other measurements. NODE=M056R52;LINKAGE=NI

$\Gamma(\pi^+\pi^-\eta)/\Gamma_{\text{total}}$ — Γ_{41}/Γ

NODE=M056R08
NODE=M056R08

VALUE (units 10^{-3})	CL%	DOCUMENT ID	TECN	COMMENT
<0.20	90	[50] 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	[51] ABLIKIM 06R	BES2	$\psi(2S) \to \gamma\chi_{c0}$

[50] ATHAR 07 reports $< 0.21 \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \pi^+\pi^-\eta)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = 9.68 \times 10^{-2}$. NODE=M056R08;LINKAGE=AT

[51] ABLIKIM 06R reports $< 1.1 \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \pi^+\pi^-\eta)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = 9.68 \times 10^{-2}$. NODE=M056R08;LINKAGE=AB

$\Gamma(\pi^+\pi^-\eta')/\Gamma_{\text{total}}$ — Γ_{42}/Γ

NODE=M056R51
NODE=M056R51

VALUE (units 10^{-3})	CL%	DOCUMENT ID	TECN	COMMENT
<0.4	90	[52] ATHAR 07	CLEO	$\psi(2S) \to \gamma h^+h^-h^0$

[52] ATHAR 07 reports $< 0.38 \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \pi^+\pi^-\eta')/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = 9.68 \times 10^{-2}$. NODE=M056R51;LINKAGE=AT

$\Gamma(\overline{K}^0 K^+\pi^- + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_{43}/Γ

NODE=M056R17
NODE=M056R17

VALUE (units 10^{-3})	CL%	DOCUMENT ID	TECN	COMMENT
<0.10	90	[53] 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	[54,55] ABLIKIM 06R	BES2	$\psi(2S) \to \gamma\chi_{c0}$
<0.7	90	[55,56] BAI 99B	BES	$\psi(2S) \to \gamma\chi_{c0}$

[53] ATHAR 07 reports $< 0.10 \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \overline{K}^0 K^+\pi^- + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = 9.68 \times 10^{-2}$. NODE=M056R17;LINKAGE=AT

[54] ABLIKIM 06R reports $< 0.70 \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \overline{K}^0 K^+\pi^- + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = 9.68 \times 10^{-2}$. NODE=M056R17;LINKAGE=AB

[55] 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

[56] 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

$\Gamma(K^+K^-\pi^0)/\Gamma_{\text{total}}$ — Γ_{44}/Γ

NODE=M056R05
NODE=M056R05

VALUE (units 10^{-3})	CL%	DOCUMENT ID	TECN	COMMENT
<0.06	90	[57] ATHAR 07	CLEO	$\psi(2S) \to \gamma h^+h^-h^0$

[57] ATHAR 07 reports $< 0.06 \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to K^+K^-\pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = 9.68 \times 10^{-2}$. NODE=M056R05;LINKAGE=AT

$\Gamma(K^+K^-\eta)/\Gamma_{total}$ Γ_{45}/Γ

NODE=M056R09

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.23	90	[58] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[58] 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = 9.68 \times 10^{-2}$.

NODE=M056R09;LINKAGE=AT

$\Gamma(K^+K^-K^0_S K^0_S)/\Gamma_{total}$ Γ_{46}/Γ

NODE=M056R48

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.43±0.48±0.05	16.8 ± 4.8	[59] ABLIKIM	05O	BES2	$\psi(2S) \to \gamma\chi_{c0}$

[59] 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R48;LINKAGE=AB

$\Gamma(K^+K^-K^+K^-)/\Gamma_{total}$ Γ_{47}/Γ

NODE=M056R14

VALUE (units 10^{-3})	DOCUMENT ID
2.79±0.29 OUR FIT	

$\Gamma(K^+K^-\phi)/\Gamma_{total}$ Γ_{48}/Γ

NODE=M056R01

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.98±0.25±0.03	38	[60] ABLIKIM	06T	BES2	$\psi(2S) \to \gamma 2K^+ 2K^-$

[60] 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R01;LINKAGE=AB

$\Gamma(\phi\phi)/\Gamma_{total}$ Γ_{49}/Γ

NODE=M056R16

VALUE (units 10^{-3})	DOCUMENT ID
0.82±0.08 OUR FIT	
$[(0.91 \pm 0.19) \times 10^{-3}$ OUR 2011 FIT]	

NEW

$\Gamma(p\overline{p})/\Gamma_{total}$ Γ_{50}/Γ

NODE=M056R11

VALUE (units 10^{-4})	DOCUMENT ID
2.23±0.13 OUR FIT	

$\Gamma(p\overline{p}\pi^0)/\Gamma_{total}$ Γ_{51}/Γ

NODE=M056R06

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.70±0.07 OUR AVERAGE Error includes scale factor of 1.2.				
0.74±0.06±0.02	[61] ONYISI	10	CLE3	$\psi(2S) \to \gamma p\overline{p}X$
0.56±0.12±0.02	[62] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[61] ONYISI 10 reports $(7.76 \pm 0.37 \pm 0.51 \pm 0.39) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to p\overline{p}\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R06;LINKAGE=ON

[62] ATHAR 07 reports $(0.59 \pm 0.10 \pm 0.08) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to p\overline{p}\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R06;LINKAGE=AT

$\Gamma(p\overline{p}\eta)/\Gamma_{total}$ Γ_{52}/Γ

NODE=M056R50

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.36±0.04 OUR AVERAGE				
0.36±0.04±0.01	[63] ONYISI	10	CLE3	$\psi(2S) \to \gamma p\overline{p}X$
0.37±0.11±0.01	[64] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[63] ONYISI 10 reports $(3.73 \pm 0.38 \pm 0.28 \pm 0.19) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to p\overline{p}\eta)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M056R50;LINKAGE=ON

[64] ATHAR 07 reports $(0.39 \pm 0.11 \pm 0.04) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to p\overline{p}\eta)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M056R50;LINKAGE=AT

$\Gamma(p\overline{p}\omega)/\Gamma_{total}$ Γ_{53}/Γ

NODE=M056R70
NODE=M056R70

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.53±0.06±0.02	[65] ONYISI	10	CLE3	$\psi(2S) \to \gamma p\overline{p}X$

[65] 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M056R70;LINKAGE=ON

$\Gamma(p\overline{p}\phi)/\Gamma_{total}$ Γ_{54}/Γ

NODE=M056R75
NODE=M056R75

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
6.1±1.4±0.2	42 ± 8	[66] ABLIKIM	11F	BES3	$\psi(2S) \to \gamma p\overline{p}K^+K^-$

[66] 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M056R75;LINKAGE=AB

$\Gamma(p\overline{p}\pi^+\pi^-)/\Gamma_{total}$ Γ_{55}/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	[67] BAI	99B	BES	$\psi(2S) \to \gamma\chi_{c0}$
4.20±1.15±0.18	[67] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c0}$

→ NOT CHECKED ←

[67] 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_{56}/Γ

NODE=M056R65
NODE=M056R65

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.105±0.028 OUR AVERAGE [(0.105 ± 0.028)% OUR 2011 AVERAGE]					
0.105±0.028±0.003	39.5	[68] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^-h^0h^0$

NEW

[68] 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M056R65;LINKAGE=HE

$\Gamma(p\overline{p}K^+K^-(\text{non-resonant}))/\Gamma_{total}$ Γ_{57}/Γ

NODE=M056R72
NODE=M056R72

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.23±0.26±0.04	48 ± 8	[69] ABLIKIM	11F	BES3	$\psi(2S) \to \gamma p\overline{p}K^+K^-$

[69] 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M056R72;LINKAGE=AB

$\Gamma(p\overline{p}K^0_SK^0_S)/\Gamma_{total}$ Γ_{58}/Γ

NODE=M056R46
NODE=M056R46

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<8.8	90	[70] ABLIKIM	06D	BES2	$\psi(2S) \to \chi_{c0}\gamma$

[70] 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_{59}/Γ

NODE=M056R49

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
11.4±3.1±0.4	[71] ABLIKIM	06I	BES2	$\psi(2S) \to \gamma p \pi^- X$

[71] 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R49;LINKAGE=AB

$\Gamma(\Lambda\overline{\Lambda})/\Gamma_{total}$ Γ_{60}/Γ

NODE=M056R23

VALUE (units 10^{-4})	DOCUMENT ID
3.3±0.4 OUR FIT	

$\Gamma(\Lambda\overline{\Lambda}\pi^+\pi^-)/\Gamma_{total}$ Γ_{61}/Γ

NODE=M056R44

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<4.0	90	[72] ABLIKIM	06D	BES2	$\psi(2S) \to \chi_{c0}\gamma$

[72] Using $B(\psi(2S) \to \chi_{c0}\gamma) = (9.2 \pm 0.5)\%$

NODE=M056R44;LINKAGE=AB

$\Gamma(K^+\overline{p}\Lambda + \text{c.c.})/\Gamma_{total}$ Γ_{62}/Γ

NODE=M056R07

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
1.02±0.19±0.03	[73] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[73] ATHAR 07 reports $(1.07 \pm 0.17 \pm 0.12) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to K^+\overline{p}\Lambda + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R07;LINKAGE=AT

$\Gamma(K^+ p\Lambda(1520) + \text{c.c.})/\Gamma_{total}$ Γ_{63}/Γ

NODE=M056R73

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.0±0.8±0.1	62 ± 12	[74] ABLIKIM	11F	BES3	$\psi(2S) \to \gamma p\overline{p}K^+K^-$

[74] ABLIKIM 11F reports $(3.00 \pm 0.58 \pm 0.50) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to K^+ p\Lambda(1520) + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.62 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R73;LINKAGE=AB

$\Gamma(\Lambda(1520)\overline{\Lambda}(1520))/\Gamma_{total}$ Γ_{64}/Γ

NODE=M056R74

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.2±1.2±0.1	28 ± 10	[75] ABLIKIM	11F	BES3	$\psi(2S) \to \gamma p\overline{p}K^+K^-$

[75] ABLIKIM 11F reports $(3.18 \pm 1.11 \pm 0.53) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \Lambda(1520)\overline{\Lambda}(1520))/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.62 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R74;LINKAGE=AB

$\Gamma(\Sigma^0\overline{\Sigma}^0)/\Gamma_{total}$ Γ_{65}/Γ

NODE=M056R59

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
4.2±0.7±0.1	78 ± 10	[76] NAIK	08	CLEO	$\psi(2S) \to \gamma\Sigma^0\overline{\Sigma}^0$

[76] 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R59;LINKAGE=NA

$\Gamma(\Sigma^+\overline{\Sigma}^-)/\Gamma_{total}$ Γ_{66}/Γ

NODE=M056R60

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.1±0.7±0.1	39 ± 7	[77] NAIK	08	CLEO	$\psi(2S) \to \gamma\Sigma^+\overline{\Sigma}^-$

[77] 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 $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R60;LINKAGE=NA

$\Gamma(\Xi^0 \overline{\Xi}^0)/\Gamma_{total}$ Γ_{67}/Γ

NODE=M056R61
NODE=M056R61

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.2±0.8±0.1	23.3 ± 4.9	[78] NAIK	08	CLEO	$\psi(2S) \to \gamma \Xi^0 \overline{\Xi}^0$

[78] 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 $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R61;LINKAGE=NA

$\Gamma(\Xi^- \overline{\Xi}^+)/\Gamma_{total}$ Γ_{68}/Γ

NODE=M056R45
NODE=M056R45

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
4.9±0.7±0.2		95 ± 11	[79] 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		[80] ABLIKIM	06D	BES2	$\psi(2S) \to \chi_{c0} \gamma$

[79] 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 $B(\psi(2S) \to \gamma \chi_{c0}(1P)) = (9.68 \pm 0.31) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R45;LINKAGE=NA

[80] Using $B(\psi(2S) \to \chi_{c0} \gamma) = (9.2 \pm 0.5)\%$

NODE=M056R45;LINKAGE=AB

$\Gamma(p\overline{p})/\Gamma_{total} \times \Gamma(\pi\pi)/\Gamma_{total}$ $\Gamma_{50}/\Gamma \times \Gamma_{31}/\Gamma$

NODE=M056R21
NODE=M056R21

VALUE (units 10^{-7})	DOCUMENT ID		TECN	COMMENT
19.0±1.4 OUR FIT				
15.3±2.4±0.8	[81] ANDREOTTI	03	E835	$\overline{p}p \to \chi_{c0} \to \pi^0\pi^0$

[81] 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

$\Gamma(p\overline{p})/\Gamma_{total} \times \Gamma(\pi^0\eta)/\Gamma_{total}$ $\Gamma_{50}/\Gamma \times \Gamma_{32}/\Gamma$

NODE=M056R41
NODE=M056R41

VALUE (units 10^{-7})	DOCUMENT ID		TECN	COMMENT
<0.4	ANDREOTTI	05C	E835	$\overline{p}p \to \pi^0\eta$

$\Gamma(p\overline{p})/\Gamma_{total} \times \Gamma(\pi^0\eta')/\Gamma_{total}$ $\Gamma_{50}/\Gamma \times \Gamma_{33}/\Gamma$

NODE=M056R42
NODE=M056R42

VALUE (units 10^{-7})	DOCUMENT ID		TECN	COMMENT
<2.5	ANDREOTTI	05C	E835	$\overline{p}p \to \pi^0\eta$

$\Gamma(p\overline{p})/\Gamma_{total} \times \Gamma(\eta\eta)/\Gamma_{total}$ $\Gamma_{50}/\Gamma \times \Gamma_{34}/\Gamma$

NODE=M056R40
NODE=M056R40

VALUE (units 10^{-7})	DOCUMENT ID		TECN	COMMENT
6.8±0.6 OUR FIT				
$\mathbf{4.0 \pm 1.2^{+0.5}_{-0.3}}$	ANDREOTTI	05C	E835	$\overline{p}p \to \eta\eta$

$\Gamma(p\overline{p})/\Gamma_{total} \times \Gamma(\eta\eta')/\Gamma_{total}$ $\Gamma_{50}/\Gamma \times \Gamma_{35}/\Gamma$

NODE=M056R43
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_{69}/Γ

NODE=M056R8
NODE=M056R8

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
117± 8 OUR FIT				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$200 \pm 20 \pm 20$	[82] ADAM	05A	CLEO	$e^+e^- \to \psi(2S) \to \gamma\chi_{c0}$

[82] 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_{70}/Γ

NODE=M056R56
NODE=M056R56

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
< 9	90	1.2 ± 4.5	[83] 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	[84] ABLIKIM	11E	BES3	$\psi(2S) \to \gamma\gamma\rho^0$

[83] BENNETT 08A reports $< 9.6 \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \gamma\rho^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = 9.68 \times 10^{-2}$. NODE=M056R56;LINKAGE=BE

[84] ABLIKIM 11E reports $< 10.5 \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \gamma\rho^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.62 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = 9.68 \times 10^{-2}$. NODE=M056R56;LINKAGE=AB

$\Gamma(\gamma\omega)/\Gamma_{total}$ Γ_{71}/Γ

NODE=M056R57
NODE=M056R57

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
< 8	90	0.0 ± 2.8	[85] 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	[86] ABLIKIM	11E	BES3	$\psi(2S) \to \gamma\gamma\omega$

[85] BENNETT 08A reports $< 8.8 \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \gamma\omega)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = 9.68 \times 10^{-2}$. NODE=M056R57;LINKAGE=BE

[86] ABLIKIM 11E reports $< 12.9 \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \gamma\omega)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.62 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = 9.68 \times 10^{-2}$. NODE=M056R57;LINKAGE=AB

$\Gamma(\gamma\phi)/\Gamma_{total}$ Γ_{72}/Γ

NODE=M056R58
NODE=M056R58

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
< 6	90	0.1 ± 1.6	[87] 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	[88] ABLIKIM	11E	BES3	$\psi(2S) \to \gamma\gamma\phi$

[87] BENNETT 08A reports $< 6.4 \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \gamma\phi)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = 9.68 \times 10^{-2}$. NODE=M056R58;LINKAGE=BE

[88] ABLIKIM 11E reports $< 16.2 \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c0}(1P) \to \gamma\phi)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c0}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.62 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = 9.68 \times 10^{-2}$. NODE=M056R58;LINKAGE=AB

$\Gamma(\gamma\gamma)/\Gamma_{total}$ Γ_{73}/Γ

NODE=M056R1
NODE=M056R1

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
2.23±0.17 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<8	90	[89] WICHT	08	BELL	$B^{\pm} \to K^{\pm}\gamma\gamma$

[89] WICHT 08 reports $[\Gamma(\chi_{c0}(1P) \to \gamma\gamma)/\Gamma_{total}] \times [B(B^+ \to \chi_{c0}(1P)K^+)] < 0.11 \times 10^{-6}$ which we divide by our best value $B(B^+ \to \chi_{c0}(1P)K^+) = 1.34 \times 10^{-4}$. NODE=M056R1;LINKAGE=WI

$\Gamma(\gamma\gamma)/\Gamma(\gamma J/\psi(1S))$ Γ_{73}/Γ_{69}

NODE=M056R18
NODE=M056R18

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
1.90±0.19 OUR FIT				
2.0 ±0.4 OUR AVERAGE				
$2.2 \pm 0.4 {}^{+0.1}_{-0.2}$	[90] ANDREOTTI	04	E835	$p\overline{p} \to \chi_{c0} \to \gamma\gamma$
1.45 ± 0.74	[91] AMBROGIANI	00B	E835	$\overline{p}p \to \chi_{c2} \to \gamma\gamma, \gamma J/\psi$

[90] 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

[91] Calculated by us using $B(J/\psi(1S) \to e^+e^-) = 0.0593 \pm 0.0010$. NODE=M056R;LINKAGE=7A

$\Gamma(p\overline{p})/\Gamma_{total} \times \Gamma(\gamma J/\psi(1S))/\Gamma_{total}$ $\Gamma_{50}/\Gamma \times \Gamma_{69}/\Gamma$

NODE=M056R19
NODE=M056R19

VALUE (units 10^{-7})	EVTS	DOCUMENT ID		TECN	COMMENT
26.2±1.7 OUR FIT					
28.2±2.1 OUR AVERAGE					
$28.0 \pm 1.9 \pm 1.3$	392	[92,93,94] BAGNASCO	02	E835	$\overline{p}p \to \chi_{c0} \to J/\psi\gamma$
$29.3^{+5.7}_{-4.7} \pm 1.5$	89	[92,93] AMBROGIANI	99B		$\overline{p}p \to \chi_{c0} \to J/\psi\gamma$

[92] 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

[93] Calculated by us using $B(J/\psi(1S) \to e^+e^-) = 0.0593 \pm 0.0010$. NODE=M056R19;LINKAGE=7A

[94] Recalculated by ANDREOTTI 05A. NODE=M056R19;LINKAGE=AN

$\Gamma(p\overline{p})/\Gamma_{total} \times \Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_{50}/\Gamma \times \Gamma_{73}/\Gamma$

NODE=M056R25

VALUE (units 10^{-8})	DOCUMENT ID	TECN	COMMENT
5.0 ±0.5 OUR FIT			
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$6.52\pm1.18^{+0.48}_{-0.72}$	[95] ANDREOTTI 04	E835	$p\overline{p} \to \chi_{c0} \to \gamma\gamma$

[95] 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

$\Gamma(\chi_{c0}(1P) \to p\overline{p})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma_{total}$ $\Gamma_{50}/\Gamma \times \Gamma_{109}^{\psi(2S)}/\Gamma^{\psi(2S)}$

NODE=M056B6

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
21.6±1.4 OUR FIT				
23.7±1.8 OUR AVERAGE				
23.7±1.4±1.4	383 ± 22	[96] 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	$\psi(2S) \to \gamma\chi_{c0}(1P) \to \gamma\overline{p}p$

[96] Calculated by us. NAIK 08 reports $B(\chi_c^0 \to p\overline{p}) = (25.7 \pm 1.5 \pm 1.5 \pm 1.3) \times 10^{-5}$ using $B(\psi(2S) \to \gamma\chi_c^0) = (9.22 \pm 0.11 \pm 0.46)\%$. NODE=M056B6;LINKAGE=NA

$\Gamma(\chi_{c0}(1P) \to p\overline{p})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{50}/\Gamma \times \Gamma_{109}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}$

NODE=M056B1

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
6.4±0.4 OUR FIT			
4.6±1.9	[97] BAI 98I	BES	$\psi(2S) \to \gamma\chi_{c0} \to \gamma\overline{p}p$

[97] 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

$\Gamma(\chi_{c0}(1P) \to \Lambda\overline{\Lambda})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma_{total}$ $\Gamma_{60}/\Gamma \times \Gamma_{109}^{\psi(2S)}/\Gamma^{\psi(2S)}$

NODE=M056B20

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
32 ±4 OUR FIT				
31.2±3.3±2.0	131 ± 12	[98] NAIK 08	CLEO	$\psi(2S) \to \gamma\Lambda\overline{\Lambda}$

[98] Calculated by us. NAIK 08 reports $B(\chi_c^0 \to \Lambda\overline{\Lambda}) = (33.8 \pm 3.6 \pm 2.2 \pm 1.7) \times 10^{-5}$ using $B(\psi(2S) \to \gamma\chi_c^0) = (9.22 \pm 0.11 \pm 0.46)\%$. NODE=M056B20;LINKAGE=NA

$\Gamma(\chi_{c0}(1P) \to \Lambda\overline{\Lambda})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{60}/\Gamma \times \Gamma_{109}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}$

NODE=M056B21

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
9.5±1.1 OUR FIT				
$\mathbf{13.0^{+3.6}_{-3.5}\pm2.5}$	$15.2^{+4.2}_{-4.0}$	[99] BAI 03E	BES	$\psi(2S) \to \gamma\Lambda\overline{\Lambda}$

[99] BAI 03E reports $[B(\chi_c^0 \to \Lambda\overline{\Lambda})\, B(\psi(2S) \to \gamma\chi_c^0) / B(\psi(2S) \to J/\psi\pi^+\pi^-)] \times [B^2(\Lambda \to \pi^- p) / B(J/\psi \to p\overline{p})] = (2.45^{+0.68}_{-0.65} \pm 0.46)\%$. 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

$\Gamma(\chi_{c0}(1P) \to \gamma J/\psi(1S))/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma_{total}$ $\Gamma_{69}/\Gamma \times \Gamma_{109}^{\psi(2S)}/\Gamma^{\psi(2S)}$

NODE=M056B2

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
0.113±0.008 OUR FIT				
0.073±0.018 OUR AVERAGE				
0.069±0.018		[100] OREGLIA 82	CBAL	$\psi(2S) \to \gamma\chi_{c0}$
0.4 ±0.3		[101] BRANDELIK 79B	DASP	$\psi(2S) \to \gamma\chi_{c0}$
0.16 ±0.11		[101] BARTEL 78B	CNTR	$\psi(2S) \to \gamma\chi_{c0}$
3.3 ±1.7		[102] BIDDICK 77	CNTR	$e^+e^- \to \gamma X$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.125±0.007±0.013	560	[103] MENDEZ 08	CLEO	$\psi(2S) \to \gamma\chi_{c0}$
0.18 ±0.01 ±0.02	172	[104] ADAM 05A	CLEO	Repl. by MENDEZ 08

[100] Recalculated by us using B($J/\psi(1S) \to \ell^+\ell^-$) = 0.1181 ± 0.0020. NODE=M056B;LINKAGE=3Q
[101] Recalculated by us using B($J/\psi(1S) \to \mu^+\mu^-$) = 0.0588 ± 0.0010. NODE=M056B;LINKAGE=2Q
[102] Assumes isotropic gamma distribution. NODE=M056B;LINKAGE=EA
[103] Not independent from other measurements of MENDEZ 08. NODE=M056B2;LINKAGE=ME
[104] Not independent from other values reported by ADAM 05A. NODE=M056B2;LINKAGE=AD

$\Gamma(\chi_{c0}(1P) \to \gamma J/\psi(1S))/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\,\text{anything})$ $\Gamma_{69}/\Gamma \times \Gamma_{109}^{\psi(2S)}/\Gamma_{9}^{\psi(2S)}$

NODE=M056B7

$\Gamma_{69}/\Gamma \times \Gamma_{109}^{\psi(2S)}/\Gamma_{9}^{\psi(2S)} = \Gamma_{69}/\Gamma \times \Gamma_{109}^{\psi(2S)}/(\Gamma_{11}^{\psi(2S)}+\Gamma_{12}^{\psi(2S)}+\Gamma_{13}^{\psi(2S)}+0.344\Gamma_{110}^{\psi(2S)}+0.195\Gamma_{111}^{\psi(2S)})$

NODE=M056B7

NODE=M056B7

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
0.191±0.014 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.201±0.011±0.021	560	[105] MENDEZ	08	CLEO	$\psi(2S) \to \gamma\chi_{c0}$
0.31 ±0.02 ±0.03	172	ADAM	05A	CLEO	Repl. by MENDEZ 08

[105] Not independent from other measurements of MENDEZ 08. NODE=M056B7;LINKAGE=ME

$\Gamma(\chi_{c0}(1P) \to \gamma J/\psi(1S))/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{69}/\Gamma \times \Gamma_{109}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}$

NODE=M056B8
NODE=M056B8

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
0.338±0.024 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	[106] ADAM	05A	CLEO	Repl. by MENDEZ 08

[106] Not independent from other values reported by ADAM 05A. NODE=M056B;LINKAGE=AD

$\Gamma(\chi_{c0}(1P) \to \gamma\gamma)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma_{total}$ $\Gamma_{73}/\Gamma \times \Gamma_{109}^{\psi(2S)}/\Gamma^{\psi(2S)}$

NODE=M056B3
NODE=M056B3

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
2.16±0.19 OUR FIT					
2.21±0.33 OUR AVERAGE					
2.17±0.32±0.10	207 ± 31	ECKLUND	08A	CLEO	$\psi(2S) \to \gamma\chi_{c0} \to 3\gamma$
3.7 ±1.8 ±1.0		LEE	85	CBAL	$\psi(2S) \to \gamma\chi_{c0}$

$\Gamma(\chi_{c0}(1P) \to \pi\pi)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma_{total}$ $\Gamma_{31}/\Gamma \times \Gamma_{109}^{\psi(2S)}/\Gamma^{\psi(2S)}$

NODE=M056B22
NODE=M056B22

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
8.25±0.29 OUR FIT					
8.80±0.34 OUR AVERAGE					
9.11±0.08±0.65	17k	[107] ABLIKIM	10A	BES3	$e^+e^- \to \psi(2S) \to \gamma\chi_{c0}$
8.81±0.11±0.43	8.9k	[108] ASNER	09	CLEO	$\psi(2S) \to \gamma\pi^+\pi^-$
8.13±0.19±0.89	2.8k	[109] ASNER	09	CLEO	$\psi(2S) \to \gamma\pi^0\pi^0$ OCCUR=2

[107] 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
[108] 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
[109] 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

$\Gamma(\chi_{c0}(1P) \to \pi\pi)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{31}/\Gamma \times \Gamma_{109}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}$

NODE=M056B5
NODE=M056B5

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
24.5±0.9 OUR FIT					
20.7±1.7 OUR AVERAGE					
23.9±2.7±4.1	97 ± 11	[110] BAI	03C	BES	$\psi(2S) \to \gamma\chi_{c0} \to \gamma\pi^0\pi^0$
20.2±1.1±1.5	720 ± 32	[111] BAI	98I	BES	$\psi(2S) \to \gamma\chi_{c0} \to \gamma\pi^+\pi^-$

[110] We have multiplied $\pi^0\pi^0$ measurement by 3 to obtain $\pi\pi$. NODE=M056B;LINKAGE=D1
[111] 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

$\Gamma(\chi_{c0}(1P) \to \eta\eta)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma_{total}$ $\Gamma_{34}/\Gamma \times \Gamma^{\psi(2S)}_{109}/\Gamma^{\psi(2S)}$

NODE=M056B11
NODE=M056B11

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.93±0.18 OUR FIT					
3.12±0.19 OUR AVERAGE					
3.23±0.09±0.23	2132	[112] ABLIKIM	10A	BES3	$e^+e^- \to \psi(2S) \to \gamma\chi_{c0}$
2.93±0.12±0.29	0.9k	[113] 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	[114] ADAMS	07	CLEO	$\psi(2S) \to \gamma\chi_{c0}$

[112] Calculated by us. ABLIKIM 10A reports $B(\chi_{c0} \to \eta\eta) = (3.44 \pm 0.10 \pm 0.24 \pm 0.13) \times 10^{-3}$ using $B(\psi(2S) \to \gamma\chi_{c0}) = (9.4 \pm 0.4)\%$. NODE=M056B11;LINKAGE=AB

[113] Calculated by us. ASNER 09 reports $B(\chi_{c0} \to \eta\eta) = (3.18 \pm 0.13 \pm 0.31 \pm 0.16) \times 10^{-3}$ using $B(\psi(2S) \to \gamma\chi_{c0}) = (9.22 \pm 0.11 \pm 0.46)\%$. NODE=M056B11;LINKAGE=AS

[114] Superseded by ASNER 09. Calculated by us. The value of $B(\chi_{c0}(1P) \to \eta\eta)$ reported by ADAMS 07 was derived using $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46)\%$ (ATHAR 04). NODE=M056B11;LINKAGE=AD

$\Gamma(\chi_{c0}(1P) \to \eta\eta)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{34}/\Gamma \times \Gamma^{\psi(2S)}_{109}/\Gamma^{\psi(2S)}_{11}$

NODE=M056B10
NODE=M056B10

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.87 ±0.05 OUR FIT				
0.578±0.241±0.158	BAI	03C	BES	$\psi(2S) \to \gamma\eta\eta$

$\Gamma(\chi_{c0}(1P) \to K^+K^-)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma_{total}$ $\Gamma_{39}/\Gamma \times \Gamma^{\psi(2S)}_{109}/\Gamma^{\psi(2S)}$

NODE=M056B23
NODE=M056B23

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
5.87±0.28 OUR FIT					
5.97±0.07±0.32	8.1k	[115] ASNER	09	CLEO	$\psi(2S) \to \gamma K^+K^-$

[115] Calculated by us. ASNER 09 reports $B(\chi_{c0} \to K^+K^-) = (6.47 \pm 0.08 \pm 0.35 \pm 0.32) \times 10^{-3}$ using $B(\psi(2S) \to \gamma\chi_{c0}) = (9.22 \pm 0.11 \pm 0.46)\%$. NODE=M056B23;LINKAGE=AS

$\Gamma(\chi_{c0}(1P) \to K^+K^-)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{39}/\Gamma \times \Gamma^{\psi(2S)}_{109}/\Gamma^{\psi(2S)}_{11}$

NODE=M056B9
NODE=M056B9

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.75±0.09 OUR FIT					
1.63±0.10±0.15	774 ± 38	[116] BAI	98I	BES	$\psi(2S) \to \gamma K^+K^-$

[116] Calculated by us. The value for $B(\chi_{c0} \to K^+K^-)$ reported by BAI 98I is derived using $B(\psi(2S) \to \gamma\chi_{c0}) = (9.3 \pm 0.8)\%$ and $B(\psi(2S) \to J/\psi\pi^+\pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D]. NODE=M056B9;LINKAGE=BA

$\Gamma(\chi_{c0}(1P) \to K^0_S K^0_S)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma_{total}$ $\Gamma_{40}/\Gamma \times \Gamma^{\psi(2S)}_{109}/\Gamma^{\psi(2S)}$

NODE=M056B12
NODE=M056B12

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.04±0.15 OUR FIT					
3.18±0.17 OUR AVERAGE					
3.22±0.07±0.17	2.1k	[117] ASNER	09	CLEO	$\psi(2S) \to \gamma K^0_S K^0_S$
3.02±0.19±0.33	322	ABLIKIM	05O	BES2	$\psi(2S) \to \gamma K^0_S K^0_S$

[117] Calculated by us. ASNER 09 reports $B(\chi_{c0} \to K^0_S K^0_S) = (3.49 \pm 0.08 \pm 0.18 \pm 0.17) \times 10^{-3}$ using $B(\psi(2S) \to \gamma\chi_{c0}) = (9.22 \pm 0.11 \pm 0.46)\%$. NODE=M056B12;LINKAGE=AS

$\Gamma(\chi_{c0}(1P) \to K^0_S K^0_S)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{40}/\Gamma \times \Gamma^{\psi(2S)}_{109}/\Gamma^{\psi(2S)}_{11}$

NODE=M056B13
NODE=M056B13

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
9.1±0.5 OUR FIT				
5.6±0.8±1.3	[118] BAI	99B	BES	$\psi(2S) \to \gamma K^0_S K^0_S$

[118] 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

$\Gamma(\chi_{c0}(1P) \to 2(\pi^+\pi^-))/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_1/\Gamma \times \Gamma^{\psi(2S)}_{109}/\Gamma^{\psi(2S)}_{11}$

NODE=M056B4
NODE=M056B4

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
6.5±0.5 OUR FIT			
6.9±2.4 OUR AVERAGE Error includes scale factor of 3.8.			
4.4±0.1±0.9	[119] BAI 99B	BES	$\psi(2S) \to \gamma\chi_{c0}$
9.3±0.9	[120] TANENBAUM 78	MRK1	$\psi(2S) \to \gamma\chi_{c0}$

[119] 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 ± 0.8)% and B($\psi(2S) \to J/\psi(1S)\pi^+\pi^-$) = (32.4 ± 2.6)% [BAI 98D].

NODE=M056B;LINKAGE=B2

[120] The value B($\psi(1S) \to \gamma\chi_{c0}$)×B($\chi_{c0} \to 2\pi^+ 2\pi^-$) reported in TANENBAUM 78 is derived using B($\psi(2S) \to J/\psi(1S)\pi^+\pi^-$)×B($J/\psi(1S) \to \ell^+\ell^-$) =(4.6 ± 0.7)%. Calculated by us using B($J/\psi(1S) \to \ell^+\ell^-$) = 0.1181 ± 0.0020.

NODE=M056B;LINKAGE=J1

$\Gamma(\chi_{c0}(1P) \to \pi^+\pi^- K^+ K^-)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma_{total}$ $\Gamma_8/\Gamma \times \Gamma^{\psi(2S)}_{109}/\Gamma^{\psi(2S)}$

NODE=M056B18
NODE=M056B18

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
1.73±0.13 OUR FIT			
[(1.73 ± 0.14) × 10^{-3} OUR 2011 FIT]			
1.64±0.05±0.2	ABLIKIM 05Q	BES2	$\psi(2S) \to \gamma\chi_{c0}$

NEW

$\Gamma(\chi_{c0}(1P) \to \pi^+\pi^- K^+ K^-)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_8/\Gamma \times \Gamma^{\psi(2S)}_{109}/\Gamma^{\psi(2S)}_{11}$

NODE=M056B19
NODE=M056B19

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
5.2 ±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	[121] TANENBAUM 78	MRK1	$\psi(2S) \to \gamma\chi_{c0}$

[121] The reported value is derived using B($\psi(2S) \to \pi^+\pi^- J/\psi$) × B($J/\psi \to \ell^+\ell^-$) = (4.6 ± 0.7)%. Calculated by us using B($J/\psi \to \ell^+\ell^-$) = 0.1181 ± 0.0020.

NODE=M056B19;LINKAGE=TA

$\Gamma(\chi_{c0}(1P) \to K^+K^-K^+K^-)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma_{total}$ $\Gamma_{47}/\Gamma \times \Gamma^{\psi(2S)}_{109}/\Gamma^{\psi(2S)}$

NODE=M056B14
NODE=M056B14

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
2.70±0.27 OUR FIT				
3.20±0.11±0.41	278	[122] ABLIKIM 06T	BES2	$\psi(2S) \to \gamma 2K^+ 2K^-$

[122] 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 ± 0.4)%.

NODE=M056B14;LINKAGE=AB

$\Gamma(\chi_{c0}(1P) \to K^+K^-K^+K^-)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{47}/\Gamma \times \Gamma^{\psi(2S)}_{109}/\Gamma^{\psi(2S)}_{11}$

NODE=M056B15
NODE=M056B15

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
8.0±0.8 OUR FIT			
6.1±0.8±0.9	[123] BAI 99B	BES	$\psi(2S) \to \gamma 2K^+ 2K^-$

[123] 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 ± 0.8)% and B($\psi(2S) \to J/\psi\pi^+\pi^-$) = (32.4 ± 2.6)% [BAI 98D].

NODE=M056B15;LINKAGE=BA

$\Gamma(\chi_{c0}(1P) \to \phi\phi)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma_{total}$ $\Gamma_{49}/\Gamma \times \Gamma^{\psi(2S)}_{109}/\Gamma^{\psi(2S)}$

NODE=M056B16
NODE=M056B16

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
0.79±0.08 OUR FIT				
[(0.88 ± 0.18) × 10^{-4} OUR 2011 FIT]				
0.78±0.08 OUR AVERAGE				
[(0.86 ± 0.22) × 10^{-4} OUR 2011 AVERAGE]				
0.77±0.03±0.08	612	[124] ABLIKIM 11K	BES3	$\psi(2S) \to \gamma$ hadrons
0.86±0.19±0.12	26	[125] ABLIKIM 06T	BES2	$\psi(2S) \to \gamma 2K^+ 2K^-$

NEW
NEW

[124] 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

[125] 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

$\Gamma(\chi_{c0}(1P) \to \phi\phi)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{49}/\Gamma \times \Gamma_{109}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}$

NODE=M056B17
NODE=M056B17

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
2.35±0.23 OUR FIT				
[$(2.6 \pm 0.5) \times 10^{-4}$ OUR 2011 FIT]				
2.6 ±1.0 ±1.1	[126] BAI	99B	BES	$\psi(2S) \to \gamma 2K^+ 2K^-$

NEW

[126] Calculated by us. The value of $B(\chi_{c0} \to \phi\phi)$ reported by BAI 99B was derived using $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.3 \pm 0.8)\%$ and $B(\psi(2S) \to J/\psi\pi^+\pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D].

NODE=M056B17;LINKAGE=BA

$\chi_{c0}(1P)$ REFERENCES

NODE=M056

ABLIKIM	11A	PR D83 012006	M. Ablikim *et al.*	(BES III Collab.)	REFID=53647
ABLIKIM	11E	PR D83 112005	M. Ablikim *et al.*	(BES III Collab.)	REFID=16717
ABLIKIM	11F	PR D83 112009	M. Ablikim *et al.*	(BES III Collab.)	REFID=16719
ABLIKIM	11K	PRL 107 092001	M. Ablikim *et al.*	(BES III 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.*	(BES III Collab.)	REFID=53347
ONYISI	10	PR D82 011103R	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 091501R	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 011102R	H. Mendez *et al.*	(CLEO Collab.)	REFID=52684
NAIK	08	PR D78 031101R	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 071101R	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
3510.66 ± 0.07 OUR AVERAGE		Error includes scale factor of 1.5. See the ideogram below.			
3510.30 ± 0.14 ±0.16		ABLIKIM	05G	BES2	$\psi(2S) \rightarrow \gamma\chi_{c1}$
3510.719± 0.051±0.019		ANDREOTTI	05A	E835	$p\overline{p} \rightarrow e^+e^-\gamma$
3509.4 ± 0.9		BAI	99B	BES	$\psi(2S) \rightarrow \gamma X$
3510.60 ± 0.087±0.019	513	[1] ARMSTRONG	92	E760	$\overline{p}p \rightarrow e^+e^-\gamma$
3511.3 ± 0.4 ±0.4	30	BAGLIN	86B	SPEC	$\overline{p}p \rightarrow e^+e^-X$
3512.3 ± 0.3 ±4.0		[2] GAISER	86	CBAL	$\psi(2S) \rightarrow \gamma X$
3507.4 ± 1.7	91	[3] LEMOIGNE	82	GOLI	185 π^- Be $\rightarrow \gamma\mu^+\mu^-$ A
3510.4 ± 0.6		OREGLIA	82	CBAL	$e^+e^- \rightarrow J/\psi 2\gamma$
3510.1 ± 1.1	254	[4] HIMEL	80	MRK2	$e^+e^- \rightarrow J/\psi 2\gamma$
3509 ±11	21	BRANDELIK	79B	DASP	$e^+e^- \rightarrow J/\psi 2\gamma$
3507 ± 3		[4] BARTEL	78B	CNTR	$e^+e^- \rightarrow J/\psi 2\gamma$
3505.0 ± 4 ±4		[4,5] TANENBAUM	78	MRK1	e^+e^-
3513 ± 7	367	[4] BIDDICK	77	CNTR	$\psi(2S) \rightarrow \gamma X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3500 ±10	40	TANENBAUM	75	MRK1	Hadrons γ

OCCUR=2

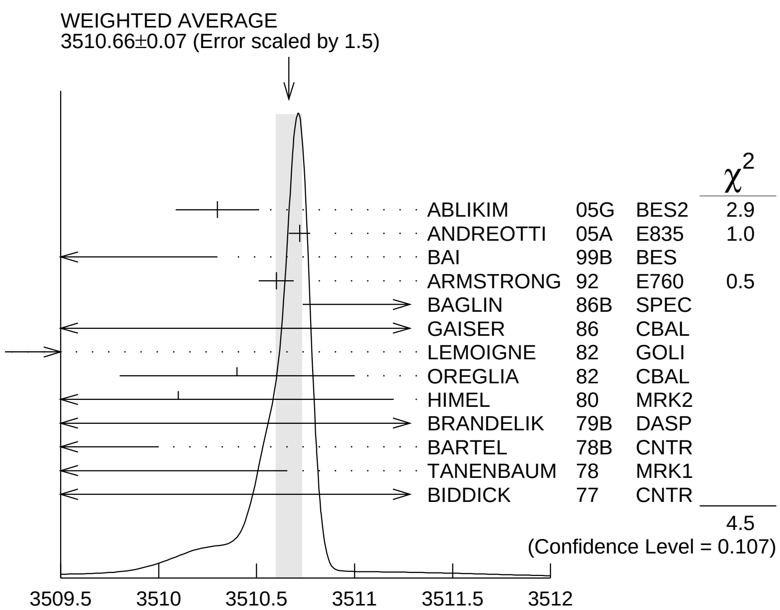
[1] Recalculated by ANDREOTTI 05A, using the value of $\psi(2S)$ mass from AULCHENKO 03. NODE=M055M;LINKAGE=NW

[2] Using mass of $\psi(2S) = 3686.0$ MeV. NODE=M055M;LINKAGE=C

[3] $J/\psi(1S)$ mass constrained to 3097 MeV. NODE=M055M;LINKAGE=P

[4] 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

[5] From a simultaneous fit to radiative and hadronic decay channels. NODE=M055M;LINKAGE=M



$\chi_{c1}(1P)$ mass (MeV)

$\chi_{c1}(1P)$ WIDTH

NODE=M055W

NODE=M055W

VALUE (MeV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.86 ±0.05 OUR FIT						
0.88 ±0.05 OUR AVERAGE						
1.39 $^{+0.40}_{-0.38}$ $^{+0.26}_{-0.77}$			ABLIKIM	05G	BES2	$\psi(2S) \rightarrow \gamma\chi_{c1}$
0.876±0.045±0.026			ANDREOTTI	05A	E835	$p\overline{p} \rightarrow e^+e^-\gamma$
0.87 ±0.11 ±0.08		513	[6] ARMSTRONG	92	E760	$\overline{p}p \rightarrow e^+e^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •						

<1.3	95	BAGLIN	86B	SPEC	$\overline{p}p \to e^+e^-X$
<3.8	90	GAISER	86	CBAL	$\psi(2S) \to \gamma X$

[6] 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	$\pi^+\pi^-\pi^0\pi^0$	(1.26 ± 0.17) %		DESIG=51
Γ_4	$\rho^+\pi^-\pi^0$ + c.c.	(1.53 ± 0.26) %		DESIG=52
Γ_5	$\rho^0\pi^+\pi^-$	$(3.9 \pm 3.5) \times 10^{-3}$		DESIG=9
Γ_6	$4\pi^0$	$(5.7 \pm 0.8) \times 10^{-4}$		DESIG=60
Γ_7	$\pi^+\pi^-K^+K^-$	$(4.5 \pm 1.0) \times 10^{-3}$		DESIG=7
Γ_8	$K^+K^-\pi^0\pi^0$	$(1.18\pm0.29) \times 10^{-3}$		DESIG=53
Γ_9	$K^+\pi^-K^0\pi^0$ + c.c.	$(9.0 \pm 1.5) \times 10^{-3}$		DESIG=55
Γ_{10}	$\rho^+K^-K^0$ + c.c.	$(5.3 \pm 1.3) \times 10^{-3}$		DESIG=56
Γ_{11}	$K^*(892)^0K^0\pi^0 \to K^+\pi^-K^0\pi^0$ + c.c.	$(2.5 \pm 0.7) \times 10^{-3}$		DESIG=57
Γ_{12}	$K^+K^-\eta\pi^0$	$(1.2 \pm 0.4) \times 10^{-3}$		DESIG=58
Γ_{13}	$\pi^+\pi^-K^0_SK^0_S$	$(7.2 \pm 3.1) \times 10^{-4}$		DESIG=28
Γ_{14}	$K^+K^-\eta$	$(3.3 \pm 1.0) \times 10^{-4}$		DESIG=42
Γ_{15}	$K^0K^+\pi^-$ + c.c.	$(7.3 \pm 0.6) \times 10^{-3}$		DESIG=17
Γ_{16}	$K^*(892)^0\overline{K}^0$ + c.c.	$(1.0 \pm 0.4) \times 10^{-3}$		DESIG=32
Γ_{17}	$K^*(892)^+K^-$ + c.c.	$(1.5 \pm 0.7) \times 10^{-3}$		DESIG=33
Γ_{18}	$K^*_J(1430)^0\overline{K}^0$ + c.c. $\to K^0_SK^+\pi^-$ + c.c.	$< 8 \times 10^{-4}$	CL=90%	DESIG=34
Γ_{19}	$K^*_J(1430)^+K^-$ + c.c. $\to K^0_SK^+\pi^-$ + c.c.	$< 2.3 \times 10^{-3}$	CL=90%	DESIG=35
Γ_{20}	$K^+K^-\pi^0$	$(1.91\pm0.26) \times 10^{-3}$		DESIG=38
Γ_{21}	$\eta\pi^+\pi^-$	$(5.0 \pm 0.5) \times 10^{-3}$		DESIG=31
Γ_{22}	$a_0(980)^+\pi^-$ + c.c. $\to \eta\pi^+\pi^-$	$(1.9 \pm 0.7) \times 10^{-3}$		DESIG=36
Γ_{23}	$f_2(1270)\eta$	$(2.8 \pm 0.8) \times 10^{-3}$		DESIG=37
Γ_{24}	$\pi^+\pi^-\eta'$	$(2.4 \pm 0.5) \times 10^{-3}$		DESIG=44
Γ_{25}	$\pi^0f_0(980) \to \pi^0\pi^+\pi^-$	$< 6 \times 10^{-6}$	CL=90%	DESIG=61
Γ_{26}	$K^+\overline{K}^*(892)^0\pi^-$ + c.c.	$(3.2 \pm 2.1) \times 10^{-3}$		DESIG=10
Γ_{27}	$K^*(892)^0\overline{K}^*(892)^0$	$(1.5 \pm 0.4) \times 10^{-3}$		DESIG=21
Γ_{28}	$K^+K^-K^0_SK^0_S$	$< 5 \times 10^{-4}$	CL=90%	DESIG=29
Γ_{29}	$K^+K^-K^+K^-$	$(5.6 \pm 1.2) \times 10^{-4}$		DESIG=14
Γ_{30}	$K^+K^-\phi$	$(4.3 \pm 1.6) \times 10^{-4}$		DESIG=30
Γ_{31}	$\omega\omega$	$(6.0 \pm 0.7) \times 10^{-4}$		DESIG=66
Γ_{32}	$\omega\phi$	$(2.2 \pm 0.6) \times 10^{-5}$		DESIG=67
Γ_{33}	$\phi\phi$	$(4.4 \pm 0.6) \times 10^{-4}$		DESIG=68
Γ_{34}	$p\overline{p}$	$(7.3 \pm 0.4) \times 10^{-5}$		DESIG=11
Γ_{35}	$p\overline{p}\pi^0$	$(1.64\pm0.20) \times 10^{-4}$		DESIG=39
Γ_{36}	$p\overline{p}\eta$	$(1.53\pm0.26) \times 10^{-4}$		DESIG=43
Γ_{37}	$p\overline{p}\omega$	$(2.24\pm0.33) \times 10^{-4}$		DESIG=59
Γ_{38}	$p\overline{p}\phi$	$< 1.8 \times 10^{-5}$	CL=90%	DESIG=65
Γ_{39}	$p\overline{p}\pi^+\pi^-$	$(5.0 \pm 1.9) \times 10^{-4}$		DESIG=8
Γ_{40}	$p\overline{p}\pi^0\pi^0$			DESIG=54
Γ_{41}	$p\overline{p}K^+K^-$ (non-resonant)	$(1.34\pm0.24) \times 10^{-4}$		DESIG=62
Γ_{42}	$p\overline{p}K^0_SK^0_S$	$< 4.5 \times 10^{-4}$	CL=90%	DESIG=25
Γ_{43}	$\Lambda\overline{\Lambda}$	$(1.18\pm0.19) \times 10^{-4}$		DESIG=19
Γ_{44}	$\Lambda\overline{\Lambda}\pi^+\pi^-$	$< 1.5 \times 10^{-3}$	CL=90%	DESIG=24
Γ_{45}	$K^+\overline{p}\Lambda$	$(3.2 \pm 1.0) \times 10^{-4}$		DESIG=40
Γ_{46}	$K^+p\Lambda(1520)$ + c.c.	$(1.8 \pm 0.5) \times 10^{-4}$		DESIG=63
Γ_{47}	$\Lambda(1520)\overline{\Lambda}(1520)$	$< 1.0 \times 10^{-4}$	CL=90%	DESIG=64
Γ_{48}	$\Sigma^0\overline{\Sigma}^0$	$< 4 \times 10^{-5}$	CL=90%	DESIG=48
Γ_{49}	$\Sigma^+\overline{\Sigma}^-$	$< 6 \times 10^{-5}$	CL=90%	DESIG=49
Γ_{50}	$\Xi^0\overline{\Xi}^0$	$< 6 \times 10^{-5}$	CL=90%	DESIG=50
Γ_{51}	$\Xi^-\overline{\Xi}^+$	$(8.4 \pm 2.3) \times 10^{-5}$		DESIG=26
Γ_{52}	$\pi^+\pi^- + K^+K^-$	$< 2.1 \times 10^{-3}$		DESIG=23
Γ_{53}	$K^0_SK^0_S$	$< 6 \times 10^{-5}$	CL=90%	DESIG=27

Radiative decays

NODE=M055;CLUMP=B

Γ_{54}	$\gamma J/\psi(1S)$	(34.4 ± 1.5) %	DESIG=1
Γ_{55}	$\gamma \rho^0$	$(2.28 \pm 0.19) \times 10^{-4}$	DESIG=45
Γ_{56}	$\gamma \omega$	$(7.1 \pm 0.9) \times 10^{-5}$	DESIG=46
Γ_{57}	$\gamma \phi$	$(2.6 \pm 0.6) \times 10^{-5}$	DESIG=47
Γ_{58}	$\gamma \gamma$		DESIG=4

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 223 measurements to determine 49 parameters. The overall fit has a $\chi^2 = 312.2$ for 174 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, $x_i \equiv \Gamma_i / \Gamma_{\text{total}}$.

x_{29}	8				
x_{34}	−9	−4			
x_{43}	11	5	−5		
x_{54}	36	16	−32	20	
Γ	−13	−5	−59	−7	−30
	x_{15}	x_{29}	x_{34}	x_{43}	x_{54}

$\chi_{c1}(1P)$ PARTIAL WIDTHS

NODE=M055220

$\chi_{c1}(1P)$ $\Gamma(i)\Gamma(\gamma J/\psi(1S))/\Gamma(\text{total})$

NODE=M055223

$\Gamma(p\overline{p}) \times \Gamma(\gamma J/\psi(1S))/\Gamma_{\text{total}}$ $\Gamma_{34}\Gamma_{54}/\Gamma$

NODE=M055G1
NODE=M055G1

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
21.7±0.8 OUR FIT				
21.4±0.9 OUR AVERAGE				
21.5±0.5±0.8	[7] ANDREOTTI	05A	E835	$p\overline{p} \to e^+e^-\gamma$
21.4±1.5±2.2	[7,8] ARMSTRONG	92	E760	$\overline{p}p \to e^+e^-\gamma$
$19.9^{+4.4}_{-4.0}$	[7] BAGLIN	86B	SPEC	$\overline{p}p \to e^+e^-X$

[7] Calculated by us using B($J/\psi(1S) \to e^+e^-$) = 0.0593 ± 0.0010. NODE=M055G;LINKAGE=7A

[8] 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	[9] BAI	99B	BES	$\psi(2S) \to \gamma\chi_{c1}$
16.0±5.9±0.8	[9] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c1}$

→ NOT CHECKED ←

[9] 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	[10] BAI	99B	BES	$\psi(2S) \to \gamma\chi_{c1}$
12.5±4.2±0.6	[10] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c1}$

→ NOT CHECKED ←

[10] 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

$\Gamma(\pi^+\pi^-\pi^0\pi^0)/\Gamma_{total}$ Γ_3/Γ

NODE=M055R35
NODE=M055R35

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
1.26±0.17 OUR AVERAGE	[(1.26 ± 0.17)% OUR 2011 AVERAGE]				
1.26±0.16±0.05	604.7	[11] HE	08B	CLEO	$e^+e^- \rightarrow \gamma h^+h^-h^0h^0$

NEW

[11] HE 08B reports 1.28 ± 0.06 ± 0.15 ± 0.08 % from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow \pi^+\pi^-\pi^0\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R35;LINKAGE=HE

$\Gamma(\rho^+\pi^-\pi^0+\text{c.c.})/\Gamma_{total}$ Γ_4/Γ

NODE=M055R36
NODE=M055R36

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
1.53±0.26 OUR AVERAGE	[(1.53 ± 0.26)% OUR 2011 AVERAGE]				
1.53±0.25±0.06	712.3	[12,13] HE	08B	CLEO	$e^+e^- \rightarrow \gamma h^+h^-h^0h^0$

NEW

[12] HE 08B reports 1.56 ± 0.13 ± 0.22 ± 0.10 % from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow \rho^+\pi^-\pi^0+\text{ c.c.})/\Gamma_{total}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R36;LINKAGE=HE

[13] 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

$\Gamma(\rho^0\pi^+\pi^-)/\Gamma_{total}$ Γ_5/Γ

NODE=M055R8
NODE=M055R8

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
39±35	[14] TANENBAUM	78	MRK1	$\psi(2S) \rightarrow \gamma\chi_{c1}$

[14] Estimated using $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = 0.087$. 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^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.57±0.03±0.08	608	[15] ABLIKIM	11A	BES3	$e^+e^- \rightarrow \psi(2S) \rightarrow \gamma\chi_{c1}$

[15] ABLIKIM 11A reports $(0.57 \pm 0.03 \pm 0.08) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow 4\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$.

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	[16] BAI	99B	BES	$\psi(2S) \rightarrow \gamma\chi_{c1}$
7.3±3.0±0.4	[16] TANENBAUM	78	MRK1	$\psi(2S) \rightarrow \gamma\chi_{c1}$

→ NOT CHECKED ←

[16] Rescaled by us using $B(\psi(2S) \rightarrow \gamma\chi_{c1}) = (8.8 \pm 0.4)\%$ and $B(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) = (32.6 \pm 0.5)\%$.

NODE=M055R5;LINKAGE=X2

$\Gamma(K^+K^-\pi^0\pi^0)/\Gamma_{total}$ Γ_8/Γ

NODE=M055R37
NODE=M055R37

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.118±0.029 OUR AVERAGE	[(0.118 ± 0.029)% OUR 2011 AVERAGE]				
0.118±0.029±0.005	45.1	[17] HE	08B	CLEO	$e^+e^- \rightarrow \gamma h^+h^-h^0h^0$

NEW

[17] HE 08B reports 0.12 ± 0.02 ± 0.02 ± 0.01 % from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow K^+K^-\pi^0\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R37;LINKAGE=HE

$\Gamma(K^+\pi^-K^0\pi^0+\text{c.c.})/\Gamma_{total}$ Γ_9/Γ

NODE=M055R39
NODE=M055R39

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.90±0.15 OUR AVERAGE	[(0.90 ± 0.15)% OUR 2011 AVERAGE]				
0.90±0.14±0.03	141.3	[18] HE	08B	CLEO	$e^+e^- \rightarrow \gamma h^+h^-h^0h^0$

NEW

[18] HE 08B reports 0.92 ± 0.09 ± 0.11 ± 0.06 % from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow K^+\pi^-K^0\pi^0+\text{ c.c.})/\Gamma_{total}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R39;LINKAGE=HE

$\Gamma(\rho^+ K^- K^0 + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_{10}/Γ

NODE=M055R40
NODE=M055R40

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
0.53±0.13 OUR AVERAGE [(0.53 ± 0.13)% OUR 2011 AVERAGE]				
0.53±0.13±0.02	141.3	[19] HE 08B	CLEO	$e^+e^- \to \gamma h^+ h^- h^0 h^0$

NEW

[19] HE 08B reports 0.54 ± 0.11 ± 0.07 ± 0.03 % from a measurement of $[\Gamma(\chi_{c1}(1P) \to \rho^+ K^- K^0 + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R40;LINKAGE=HE

$\Gamma(K^*(892)^0 K^0 \pi^0 \to K^+ \pi^- K^0 \pi^0 + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_{11}/Γ

NODE=M055R41
NODE=M055R41

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
0.25±0.07 OUR AVERAGE [(0.25 ± 0.07)% OUR 2011 AVERAGE]				
0.25±0.07±0.01	141.3	[20] HE 08B	CLEO	$e^+e^- \to \gamma h^+ h^- h^0 h^0$

NEW

[20] HE 08B reports 0.25 ± 0.06 ± 0.03 ± 0.02 % from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^*(892)^0 K^0 \pi^0 \to K^+ \pi^- K^0 \pi^0 + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R41;LINKAGE=HE

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

NODE=M055R42
NODE=M055R42

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
0.12 ±0.04 OUR AVERAGE [(0.12 ± 0.04)% OUR 2011 AVERAGE]				
0.118±0.036±0.005	141.3	[21] HE 08B	CLEO	$e^+e^- \to \gamma h^+ h^- h^0 h^0$

NEW

[21] HE 08B reports 0.12 ± 0.03 ± 0.02 ± 0.01 % from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^+ K^- \eta \pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R42;LINKAGE=HE

$\Gamma(\pi^+ \pi^- K^0_S K^0_S)/\Gamma_{\text{total}}$ — Γ_{13}/Γ

NODE=M055R05
NODE=M055R05

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
7.2±3.1±0.3	19.8 ± 7.7	[22] ABLIKIM 05O	BES2	$\psi(2S) \to \chi_{c1}\gamma$

[22] ABLIKIM 05O reports $[\Gamma(\chi_{c1}(1P) \to \pi^+ \pi^- K^0_S K^0_S)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))] = (0.67 \pm 0.26 \pm 0.11) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R05;LINKAGE=AB

$\Gamma(K^+ K^- \eta)/\Gamma_{\text{total}}$ — Γ_{14}/Γ

NODE=M055R25
NODE=M055R25

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
0.33±0.10±0.01	[23] ATHAR 07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[23] ATHAR 07 reports $(0.34 \pm 0.10 \pm 0.04) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^+ K^- \eta)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 0.0907 \pm 0.0011 \pm 0.0054$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R25;LINKAGE=AT

$\Gamma(K^0 K^+ \pi^- + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_{15}/Γ

NODE=M055R17
NODE=M055R17

VALUE (units 10^{-3})	DOCUMENT ID
7.3±0.6 OUR FIT	

$\Gamma(K^*(892)^0 \overline{K}^0 + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_{16}/Γ

NODE=M055R09
NODE=M055R09

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
1.03±0.38±0.04	22	[24] ABLIKIM 06R	BES2	$\psi(2S) \to \gamma\chi_{c1}$

[24] ABLIKIM 06R reports $(1.1 \pm 0.4 \pm 0.1) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^*(892)^0 \overline{K}^0 + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R09;LINKAGE=AB

$\Gamma(K^*(892)^+ K^- + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{17}/Γ

NODE=M055R10
NODE=M055R10

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.5±0.7±0.1	27	[25] ABLIKIM	06R	BES2	$\psi(2S) \to \gamma\chi_{c1}$

[25] ABLIKIM 06R reports $(1.6 \pm 0.7 \pm 0.2) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^*(892)^+ K^- + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R10;LINKAGE=AB

$\Gamma(K_J^*(1430)^0 \overline{K}^0 + \text{c.c.} \to K_S^0 K^+ \pi^- + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{18}/Γ

NODE=M055R12
NODE=M055R12

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.8	90	[26] ABLIKIM	06R	BES2	$\psi(2S) \to \gamma\chi_{c1}$

[26] ABLIKIM 06R reports $< 0.9 \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K_J^*(1430)^0 \overline{K}^0 + \text{c.c.} \to K_S^0 K^+ \pi^- + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.2 \times 10^{-2}$.

NODE=M055R12;LINKAGE=AB

$\Gamma(K_J^*(1430)^+ K^- + \text{c.c.} \to K_S^0 K^+ \pi^- + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{19}/Γ

NODE=M055R13
NODE=M055R13

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<2.3	90	[27] ABLIKIM	06R	BES2	$\psi(2S) \to \gamma\chi_{c1}$

[27] ABLIKIM 06R reports $< 2.4 \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K_J^*(1430)^+ K^- + \text{c.c.} \to K_S^0 K^+ \pi^- + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.2 \times 10^{-2}$.

NODE=M055R13;LINKAGE=AB

$\Gamma(K^+ K^- \pi^0)/\Gamma_{\text{total}}$ Γ_{20}/Γ

NODE=M055R20
NODE=M055R20

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
1.91±0.25±0.07	[28] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[28] ATHAR 07 reports $(1.95 \pm 0.16 \pm 0.23) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^+ K^- \pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 0.0907 \pm 0.0011 \pm 0.0054$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R20;LINKAGE=AT

$\Gamma(\eta\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{21}/Γ

NODE=M055R08
NODE=M055R08

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
5.0±0.5 OUR AVERAGE					
4.9±0.5±0.2		[29] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$
5.5±1.0±0.2	222	[30] ABLIKIM	06R	BES2	$\psi(2S) \to \gamma\chi_{c1}$

[29] ATHAR 07 reports $(5.0 \pm 0.3 \pm 0.5) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \eta\pi^+\pi^-)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 0.0907 \pm 0.0011 \pm 0.0054$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R08;LINKAGE=AT

[30] ABLIKIM 06R reports $(5.9 \pm 0.7 \pm 0.8) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \eta\pi^+\pi^-)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R08;LINKAGE=AB

$\Gamma(a_0(980)^+ \pi^- + \text{c.c.} \to \eta\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{22}/Γ

NODE=M055R15
NODE=M055R15

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.9±0.7±0.1	58	[31] ABLIKIM	06R	BES2	$\psi(2S) \to \gamma\chi_{c1}$

[31] ABLIKIM 06R reports $(2.0 \pm 0.5 \pm 0.5) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to a_0(980)^+ \pi^- + \text{c.c.} \to \eta\pi^+\pi^-)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R15;LINKAGE=AB

$\Gamma(f_2(1270)\eta)/\Gamma_{total}$ Γ_{23}/Γ

NODE=M055R16
NODE=M055R16

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
2.8±0.8±0.1	53	[32] ABLIKIM	06R	BES2	$\psi(2S) \to \gamma\chi_{c1}$

[32] 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R16;LINKAGE=AB

$\Gamma(\pi^+\pi^-\eta')/\Gamma_{total}$ Γ_{24}/Γ

NODE=M055R28
NODE=M055R28

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
2.4±0.5±0.1	[33] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[33] 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R28;LINKAGE=AT

$\Gamma(\pi^0 f_0(980) \to \pi^0\pi^+\pi^-)/\Gamma_{total}$ Γ_{25}/Γ

NODE=M055R18
NODE=M055R18

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<6 × 10⁻⁶	90	[34] ABLIKIM	11D	BES3	$\psi(2S) \to \gamma\pi^0\pi^+\pi^-$

[34] 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.2 \times 10^{-2}$.

NODE=M055R18;LINKAGE=BR

$\Gamma(K^+\overline{K}^*(892)^0\pi^- + c.c.)/\Gamma_{total}$ Γ_{26}/Γ

NODE=M055R9
NODE=M055R9

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
32±21	[35] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c1}$

[35] 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_{27}/Γ

NODE=M055R26
NODE=M055R26

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.5±0.4±0.1	28.4 ± 5.5	[36,37] ABLIKIM	04H	BES	$\psi(2S) \to \gamma K^+ K^- \pi^+\pi^-$

[36] 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R26;LINKAGE=AB

[37] 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_{28}/Γ

NODE=M055R06
NODE=M055R06

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<5	90	3.2 ± 2.4	[38] ABLIKIM	05O	BES2	$\psi(2S) \to \chi_{c1}\gamma$

[38] 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.2 \times 10^{-2}$.

NODE=M055R06;LINKAGE=AB

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

NODE=M055R14
NODE=M055R14

VALUE (units 10^{-3})	DOCUMENT ID
0.56±0.12 OUR FIT	

$\Gamma(K^+K^-\phi)/\Gamma_{total}$ Γ_{30}/Γ

NODE=M055R07
NODE=M055R07

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.43±0.16±0.02	17	[39] ABLIKIM	06T	BES2	$\psi(2S) \to \gamma 2K^+ 2K^-$

[39] 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R07;LINKAGE=AB

$\Gamma(\omega\omega)/\Gamma_{total}$ Γ_{31}/Γ

NODE=M055R49

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
6.0±0.3±0.7	597	[40] ABLIKIM	11K	BES3	$\psi(2S) \to \gamma$ hadrons

[40] 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$.

NODE=M055R49;LINKAGE=AL

$\Gamma(\omega\phi)/\Gamma_{total}$ Γ_{32}/Γ

NODE=M055R50

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.22±0.06±0.02	15	[41] ABLIKIM	11K	BES3	$\psi(2S) \to \gamma$ hadrons

[41] 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$.

NODE=M055R50;LINKAGE=AL

$\Gamma(\phi\phi)/\Gamma_{total}$ Γ_{33}/Γ

NODE=M055R51

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
4.4±0.3±0.5	366	[42] ABLIKIM	11K	BES3	$\psi(2S) \to \gamma$ hadrons

[42] 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$.

NODE=M055R51;LINKAGE=AL

$\Gamma(p\overline{p})/\Gamma_{total}$ Γ_{34}/Γ

NODE=M055R11

VALUE (units 10^{-4})	DOCUMENT ID
0.73±0.04 OUR FIT	

$\Gamma(p\overline{p}\pi^0)/\Gamma_{total}$ Γ_{35}/Γ

NODE=M055R21

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.164±0.020 OUR AVERAGE				
0.172±0.020±0.007	[43] ONYISI	10	CLE3	$\psi(2S) \to \gamma p\overline{p}X$
0.118±0.049±0.005	[44] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[43] 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R21;LINKAGE=ON

[44] 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R21;LINKAGE=AT

$\Gamma(p\overline{p}\eta)/\Gamma_{total}$ Γ_{36}/Γ

NODE=M055R27

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
0.153±0.026±0.006		[45] ONYISI	10	CLE3	$\psi(2S) \to \gamma p\overline{p}X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.16	90	[46] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[45] 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R27;LINKAGE=ON

[46] 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.2 \times 10^{-2}$.

NODE=M055R27;LINKAGE=AT

$\Gamma(p\overline{p}\omega)/\Gamma_{total}$ Γ_{37}/Γ

NODE=M055R43

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.224±0.032±0.009	[47] ONYISI	10	CLE3	$\psi(2S) \to \gamma p\overline{p}X$

[47] 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R43;LINKAGE=ON

$\Gamma(p\overline{p}\phi)/\Gamma_{total}$ — Γ_{38}/Γ

NODE=M055R48
NODE=M055R48

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<1.8	90	[48] ABLIKIM	11F	BES3	$\psi(2S) \to \gamma p\overline{p}K^+K^-$

[48] 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$.

NODE=M055R48;LINKAGE=AB

$\Gamma(p\overline{p}\pi^+\pi^-)/\Gamma_{total}$ — Γ_{39}/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	[49] BAI	99B	BES	$\psi(2S) \to \gamma\chi_{c1}$
1.08±0.77±0.05	[49] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c1}$

→ NOT CHECKED ←

[49] 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_{40}/Γ

NODE=M055R38
NODE=M055R38

VALUE (%)	CL%	DOCUMENT ID		TECN	COMMENT
<0.05	90	[50] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^-h^0h^0$

[50] HE 08B reports < 0.05 % 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.2 \times 10^{-2}$.

NODE=M055R38;LINKAGE=HE

$\Gamma(p\overline{p}K^+K^-\text{(non-resonant)})/\Gamma_{total}$ — Γ_{41}/Γ

NODE=M055R45
NODE=M055R45

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.35±0.15±0.19	82 ± 9	[51] ABLIKIM	11F	BES3	$\psi(2S) \to \gamma p\overline{p}K^+K^-$

[51] 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$.

NODE=M055R45;LINKAGE=AB

$\Gamma(p\overline{p}K^0_SK^0_S)/\Gamma_{total}$ — Γ_{42}/Γ

NODE=M055R02
NODE=M055R02

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<4.5	90	[52] ABLIKIM	06D	BES2	$\psi(2S) \to \gamma\chi_{c1}$

[52] Using $B(\psi(2S) \to \chi_{c1}\gamma)$ $(9.1 \pm 0.6)\%$.

NODE=M055R;LINKAGE=AB

$\Gamma(\Lambda\overline{\Lambda})/\Gamma_{total}$ — Γ_{43}/Γ

NODE=M055R23
NODE=M055R23

VALUE (units 10^{-4})	DOCUMENT ID
1.18±0.19 OUR FIT	

$\Gamma(\Lambda\overline{\Lambda}\pi^+\pi^-)/\Gamma_{total}$ — Γ_{44}/Γ

NODE=M055R01
NODE=M055R01

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<1.5	90	[53] ABLIKIM	06D	BES2	$\psi(2S) \to \gamma\chi_{c1}$

[53] Using $B(\psi(2S) \to \chi_{c1}\gamma)$ $(9.1 \pm 0.6)\%$.

NODE=M055R01;LINKAGE=AB

$\Gamma(K^+\overline{p}\Lambda)/\Gamma_{total}$ — Γ_{45}/Γ

NODE=M055R22
NODE=M055R22

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.32±0.09±0.01	[54] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+h^-h^0$

[54] ATHAR 07 reports $(0.33 \pm 0.09 \pm 0.04) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^+\overline{p}\Lambda)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 0.0907 \pm 0.0011 \pm 0.0054$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R22;LINKAGE=AT

$\Gamma(K^+p\Lambda(1520)+\text{c.c.})/\Gamma_{total}$ — Γ_{46}/Γ

NODE=M055R46
NODE=M055R46

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.8±0.4±0.3	48 ± 10	[55] ABLIKIM	11F	BES3	$\psi(2S) \to \gamma p\overline{p}K^+K^-$

[55] ABLIKIM 11F reports $(1.81 \pm 0.38 \pm 0.28) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^+p\Lambda(1520)+\text{ c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$.

NODE=M055R46;LINKAGE=AB

$\Gamma(\Lambda(1520)\overline{\Lambda}(1520))/\Gamma_{total}$ — Γ_{47}/Γ

NODE=M055R47

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.0	90	[56] ABLIKIM	11F	BES3	$\psi(2S) \to \gamma p \overline{p} K^+ K^-$

[56] ABLIKIM 11F reports $< 1.00 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \Lambda(1520)\overline{\Lambda}(1520))/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$.

NODE=M055R47;LINKAGE=AB

$\Gamma(\Sigma^0\overline{\Sigma}^0)/\Gamma_{total}$ — Γ_{48}/Γ

NODE=M055R32

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<0.4	90	3.8 ± 2.5	[57] NAIK	08	CLEO	$\psi(2S) \to \gamma\Sigma^0\overline{\Sigma}^0$

[57] 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.2 \times 10^{-2}$.

NODE=M055R32;LINKAGE=NA

$\Gamma(\Sigma^+\overline{\Sigma}^-)/\Gamma_{total}$ — Γ_{49}/Γ

NODE=M055R33

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<0.6	90	4.3 ± 2.3	[58] NAIK	08	CLEO	$\psi(2S) \to \gamma\Sigma^+\overline{\Sigma}^-$

[58] 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.2 \times 10^{-2}$.

NODE=M055R33;LINKAGE=NA

$\Gamma(\Xi^0\overline{\Xi}^0)/\Gamma_{total}$ — Γ_{50}/Γ

NODE=M055R34

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<0.6	90	1.7 ± 2.4	[59] NAIK	08	CLEO	$\psi(2S) \to \gamma\Xi^0\overline{\Xi}^0$

[59] NAIK 08 reports $< 0.60 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \Xi^0\overline{\Xi}^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.2 \times 10^{-2}$.

NODE=M055R34;LINKAGE=NA

$\Gamma(\Xi^-\overline{\Xi}^+)/\Gamma_{total}$ — Γ_{51}/Γ

NODE=M055R03

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.84±0.22±0.03		16.4 ± 4.3	[60] 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		[61] ABLIKIM	06D	BES2	$\psi(2S) \to \gamma\chi_{c1}$

[60] NAIK 08 reports $(0.86 \pm 0.22 \pm 0.08) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \Xi^-\overline{\Xi}^+)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M055R03;LINKAGE=NA

[61] Using $B(\psi(2S) \to \chi_{c1}\gamma)$ (9.1 ± 0.6)%.

NODE=M055R03;LINKAGE=AB

$[\Gamma(\pi^+\pi^-) + \Gamma(K^+K^-)]/\Gamma_{total}$ — Γ_{52}/Γ

NODE=M055R2

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<21		[62] FELDMAN	77	MRK1	$\psi(2S) \to \gamma\chi_{c1}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<38	90	[62] BRANDELIK	79B	DASP	$\psi(2S) \to \gamma\chi_{c1}$

[62] 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

$\Gamma(K^0_S K^0_S)/\Gamma_{total}$ — Γ_{53}/Γ

NODE=M055R04

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.6	90	[63] ABLIKIM	05O	BES2	$\psi(2S) \to \chi_{c1}\gamma$

[63] ABLIKIM 05O reports $[\Gamma(\chi_{c1}(1P) \to K^0_S K^0_S)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))] < 0.6 \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.2 \times 10^{-2}$.

NODE=M055R04;LINKAGE=AB

RADIATIVE DECAYS

NODE=M055310

$\Gamma(\gamma J/\psi(1S))/\Gamma_{total}$ — Γ_{54}/Γ

NODE=M055R1

VALUE	DOCUMENT ID		TECN	COMMENT
0.344±0.015 OUR FIT				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.379 \pm 0.008 \pm 0.021$	[64] ADAM	05A	CLEO	$e^+e^- \to \psi(2S) \to \gamma\chi_{c1}$

[64] 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_{55}/Γ

NODE=M055R29
NODE=M055R29

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
228±19 OUR AVERAGE				
[(229 ± 27) × 10^{-6} OUR 2011 AVERAGE]				
228±13±22	432 ± 25	[65] ABLIKIM 11E	BES3	$\psi(2S) \to \gamma\gamma\rho^0$
229±25± 9	186 ± 15	[66] BENNETT 08A	CLEO	$\psi(2S) \to \gamma\gamma\rho^0$

NEW

[65] ABLIKIM 11E reports (228 ± 13 ± 22) × 10^{-6} from a measurement of [$\Gamma(\chi_{c1}(1P) \to \gamma\rho^0)/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c1}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c1}(1P)$) = (9.2 ± 0.4) × 10^{-2}.

NODE=M055R29;LINKAGE=AB

[66] BENNETT 08A reports (243 ± 19 ± 22) × 10^{-6} from a measurement of [$\Gamma(\chi_{c1}(1P) \to \gamma\rho^0)/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c1}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c1}(1P)$) = (8.7 ± 0.4) × 10^{-2}, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c1}(1P)$) = (9.2 ± 0.4) × 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_{56}/Γ

NODE=M055R30
NODE=M055R30

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
71± 9 OUR AVERAGE				
[(78 ± 18) × 10^{-6} OUR 2011 AVERAGE]				
70± 7±7	136 ± 14	[67] ABLIKIM 11E	BES3	$\psi(2S) \to \gamma\gamma\omega$
78±18±3	39 ± 7	[68] BENNETT 08A	CLEO	$\psi(2S) \to \gamma\gamma\omega$

NEW

[67] ABLIKIM 11E reports (69.7 ± 7.2 ± 6.6) × 10^{-6} from a measurement of [$\Gamma(\chi_{c1}(1P) \to \gamma\omega)/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c1}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c1}(1P)$) = (9.2 ± 0.4) × 10^{-2}.

NODE=M055R30;LINKAGE=AB

[68] BENNETT 08A reports (83 ± 15 ± 12) × 10^{-6} from a measurement of [$\Gamma(\chi_{c1}(1P) \to \gamma\omega)/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c1}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c1}(1P)$) = (8.7 ± 0.4) × 10^{-2}, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c1}(1P)$) = (9.2 ± 0.4) × 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_{57}/Γ

NODE=M055R31
NODE=M055R31

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
26±5±2		43 ± 9	[69] ABLIKIM 11E	BES3	$\psi(2S) \to \gamma\gamma\phi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<24	90	5.2 ± 3.1	[70] BENNETT 08A	CLEO	$\psi(2S) \to \gamma\gamma\phi$

[69] ABLIKIM 11E reports (25.8 ± 5.2 ± 2.3) × 10^{-6} from a measurement of [$\Gamma(\chi_{c1}(1P) \to \gamma\phi)/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c1}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c1}(1P)$) = (9.2 ± 0.4) × 10^{-2}.

NODE=M055R31;LINKAGE=AB

[70] BENNETT 08A reports < 26 × 10^{-6} from a measurement of [$\Gamma(\chi_{c1}(1P) \to \gamma\phi)/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c1}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c1}(1P)$) = (8.7 ± 0.4) × 10^{-2}, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c1}(1P)$) = 9.2 × 10^{-2}.

NODE=M055R31;LINKAGE=BE

$\Gamma(\gamma\gamma)/\Gamma_{total}$ Γ_{58}/Γ

NODE=M055R3
NODE=M055R3

VALUE (units 10^{-5})	CL%	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
< 3.5	90	ECKLUND 08A	CLEO	$\psi(2S) \to \gamma\chi_{c1} \to 3\gamma$
<150	90	[71] YAMADA 77	DASP	$e^+e^- \to 3\gamma$

[71] 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

$\chi_{c1}(1P)$ CROSS-PARTICLE BRANCHING RATIOS

NODE=M055230

$\Gamma(\chi_{c1}(1P) \to p\overline{p})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{34}/\Gamma \times \Gamma^{\psi(2S)}_{110}/\Gamma^{\psi(2S)}_{11}$

NODE=M055B1
NODE=M055B1

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
2.02±0.16 OUR FIT			
1.1 ±1.0	[72] BAI 98I	BES	$\psi(2S) \to \gamma\chi_{c1} \to \gamma\overline{p}p$

[72] 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

$\Gamma(\chi_{c1}(1P) \to \Lambda\overline{\Lambda})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma_{total}$ $\Gamma_{43}/\Gamma \times \Gamma^{\psi(2S)}_{110}/\Gamma^{\psi(2S)}$

NODE=M055B10
NODE=M055B10

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
10.9±1.7 OUR FIT					
10.5±1.6±0.6	46 ± 7	[73] NAIK	08	CLEO	$\psi(2S) \to \gamma\Lambda\overline{\Lambda}$

[73] Calculated by us. NAIK 08 reports $B(\chi_{c1} \to \Lambda\overline{\Lambda}) = (11.6 \pm 1.8 \pm 0.7 \pm 0.7) \times 10^{-5}$ using $B(\psi(2S) \to \gamma\chi_{c1}) = (9.07 \pm 0.11 \pm 0.54)\%$.

NODE=M055B10;LINKAGE=NA

$\Gamma(\chi_{c1}(1P) \to \Lambda\overline{\Lambda})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{43}/\Gamma \times \Gamma^{\psi(2S)}_{110}/\Gamma^{\psi(2S)}_{11}$

NODE=M055B11
NODE=M055B11

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
3.3±0.5 OUR FIT					
$7.1^{+2.8}_{-2.4}\pm1.3$	$9.0^{+3.5}_{-3.1}$	[74] BAI	03E	BES	$\psi(2S) \to \gamma\Lambda\overline{\Lambda}$

[74] BAI 03E reports $[B(\chi_{c1} \to \Lambda\overline{\Lambda})\ B(\psi(2S) \to \gamma\chi_{c1})\ /\ B(\psi(2S) \to J/\psi\pi^+\pi^-)] \times [B^2(\Lambda \to \pi^- p)\ /\ B(J/\psi \to p\overline{p})] = (1.33^{+0.52}_{-0.46} \pm 0.25)\%$. 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=M055B11;LINKAGE=BA

$\Gamma(\chi_{c1}(1P) \to \gamma J/\psi(1S))/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma_{total}$ $\Gamma_{54}/\Gamma \times \Gamma^{\psi(2S)}_{110}/\Gamma^{\psi(2S)}$

NODE=M055B2
NODE=M055B2

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
3.18±0.08 OUR FIT					
2.70±0.13 OUR AVERAGE					
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		[75] OREGLIA	82	CBAL	$\psi(2S) \to \gamma\chi_{c1}$
2.2 ±0.5		[76] BRANDELIK	79B	DASP	$\psi(2S) \to \gamma\chi_{c1}$
2.9 ±0.5		[76] BARTEL	78B	CNTR	$\psi(2S) \to \gamma\chi_{c1}$
5.0 ±1.5		[77] BIDDICK	77	CNTR	$e^+e^- \to \gamma X$
2.8 ±0.9		[75] WHITAKER	76	MRK1	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3.56±0.03±0.12	24.9k	[78] MENDEZ	08	CLEO	$\psi(2S) \to \gamma\chi_{c1}$
3.44±0.06±0.13	3.7k	[79] ADAM	05A	CLEO	Repl. by MENDEZ 08

[75] Recalculated by us using $B(J/\psi(1S) \to \ell^+\ell^-) = 0.1181 \pm 0.0020$.
[76] Recalculated by us using $B(J/\psi(1S) \to \mu^+\mu^-) = 0.0588 \pm 0.0010$.
[77] Assumes isotropic gamma distribution.
[78] Not independent from other measurements of MENDEZ 08.
[79] Not independent from other values reported by ADAM 05A.

NODE=M055B;LINKAGE=3Q
NODE=M055B;LINKAGE=2Q
NODE=M055B;LINKAGE=EA
NODE=M055B2;LINKAGE=ME
NODE=M055B;LINKAGE=AD

$\Gamma(\chi_{c1}(1P) \to \gamma J/\psi(1S))/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\text{anything})$ $\Gamma_{54}/\Gamma \times \Gamma^{\psi(2S)}_{110}/\Gamma^{\psi(2S)}_{9}$

NODE=M055B7

$\Gamma_{54}/\Gamma \times \Gamma^{\psi(2S)}_{110}/\Gamma^{\psi(2S)}_{9} = \Gamma_{54}/\Gamma \times \Gamma^{\psi(2S)}_{110}/(\Gamma^{\psi(2S)}_{11}+\Gamma^{\psi(2S)}_{12}+\Gamma^{\psi(2S)}_{13}+0.344\Gamma^{\psi(2S)}_{110}+0.195\Gamma^{\psi(2S)}_{111})$

NODE=M055B7

NODE=M055B7

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
5.34±0.12 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
5.70±0.04±0.15	24.9k	[80] MENDEZ	08	CLEO	$\psi(2S) \to \gamma\chi_{c1}$
5.77±0.10±0.12	3.7k	ADAM	05A	CLEO	Repl. by MENDEZ 08

[80] Not independent from other measurements of MENDEZ 08.

NODE=M055B7;LINKAGE=ME

$\Gamma(\chi_{c1}(1P) \to \gamma J/\psi(1S))/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{54}/\Gamma \times \Gamma^{\psi(2S)}_{110}/\Gamma^{\psi(2S)}_{11}$

NODE=M055B3
NODE=M055B3

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
9.46±0.23 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	[81] ABLIKIM	04B	BES	$\psi(2S) \to J/\psi X$
8.5 ±2.1		[82] 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	[83] ADAM	05A	CLEO	Repl. by MENDEZ 08

[81] From a fit to the J/ψ recoil mass spectra. NODE=M055B;LINKAGE=AB

[82] The value for B($\psi(2S) \rightarrow \gamma \chi_{c1}$)×B($\chi_{c1} \rightarrow \gamma J/\psi(1S)$) quoted in HIMEL 80 is derived using B($\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-$) = (33 ± 3)% and B($J/\psi(1S) \rightarrow \ell^+\ell^-$) = 0.138 ± 0.018. Calculated by us using B($J/\psi(1S) \rightarrow \ell^+\ell^-$) = 0.1181 ± 0.0020. NODE=M055B;LINKAGE=J3

[83] Not independent from other values reported by ADAM 05A. NODE=M055B3;LINKAGE=AD

$\Gamma(\chi_{c1}(1P) \rightarrow K^0 K^+ \pi^- + \text{c.c.})/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))/\Gamma_{\text{total}}$ $\Gamma_{15}/\Gamma \times \Gamma_{110}^{\psi(2S)}/\Gamma^{\psi(2S)}$

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	[84] ATHAR	07	CLEO	$\psi(2S) \rightarrow \gamma K^0_S K^+ \pi^-$
7.0±0.5±0.9	[85] ABLIKIM	06R	BES2	$\psi(2S) \rightarrow \gamma \chi_{c1}$

[84] Calculated by us. The value of B($\chi_{c1} \rightarrow K^0 K^+ \pi^- +$ c.c.) reported by ATHAR 07 was derived using B($\psi(2S) \rightarrow \gamma \chi_{c1}(1P)$) = (9.07 ± 0.11 ± 0.54)%. NODE=M055B16;LINKAGE=AT

[85] Calculated by us. ABLIKIM 06R reports B($\chi_{c1} \rightarrow K^0_S K^+ \pi^-$) = (4.0 ± 0.3 ± 0.5) × 10^{-3}. We use B($\psi(2S) \rightarrow \gamma \chi_{c1}$) = (8.7 ± 0.4) × 10^{-2}. NODE=M055B16;LINKAGE=AB

$\Gamma(\chi_{c1}(1P) \rightarrow K^0 K^+ \pi^- + \text{c.c.})/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))/\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{15}/\Gamma \times \Gamma_{110}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}$

NODE=M055B17
NODE=M055B17

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
20.1±1.6 OUR FIT				
13.2±2.4±3.2	[86] BAI	99B	BES	$\psi(2S) \rightarrow \gamma K^0_S K^+ \pi^-$

[86] Calculated by us. The value of B($\chi_{c1} \rightarrow K^0_S K^+ \pi^-$) reported by BAI 99B was derived using B($\psi(2S) \rightarrow \gamma \chi_{c1}(1P)$) = (8.7 ± 0.8)% and B($\psi(2S) \rightarrow J/\psi \pi^+\pi^-$) = (32.4 ± 2.6)% [BAI 98D]. NODE=M055B17;LINKAGE=BA

$\Gamma(\chi_{c1}(1P) \rightarrow K^+ K^- K^+ K^-)/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))/\Gamma_{\text{total}}$ $\Gamma_{29}/\Gamma \times \Gamma_{110}^{\psi(2S)}/\Gamma^{\psi(2S)}$

NODE=M055B14
NODE=M055B14

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.52±0.11 OUR FIT					
0.61±0.11±0.08	54	[87] ABLIKIM	06T	BES2	$\psi(2S) \rightarrow \gamma K^+ K^+ K^- K^-$

[87] Calculated by us. The value of B($\chi_{c1} \rightarrow 2K^+ 2K^-$) reported by ABLIKIM 06T was derived using B($\psi(2S) \rightarrow \gamma \chi_{c1}(1P)$) = (8.7 ± 0.8)%. NODE=M055B14;LINKAGE=AB

$\Gamma(\chi_{c1}(1P) \rightarrow K^+ K^- K^+ K^-)/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))/\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{29}/\Gamma \times \Gamma_{110}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}$

NODE=M055B15
NODE=M055B15

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
1.54±0.31 OUR FIT				
1.13±0.40±0.29	[88] BAI	99B	BES	$\psi(2S) \rightarrow \gamma K^+ K^+ K^- K^-$

[88] Calculated by us. The value of B($\chi_{c1} \rightarrow 2K^+ 2K^-$) reported by BAI 99B was derived using B($\psi(2S) \rightarrow \gamma \chi_{c1}(1P)$) = (8.7 ± 0.8)% and B($\psi(2S) \rightarrow J/\psi \pi^+\pi^-$) = (32.4 ± 2.6)% [BAI 98D]. NODE=M055B15;LINKAGE=BA

$\Gamma(\chi_{c1}(1P) \rightarrow p\overline{p})/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))/\Gamma_{\text{total}}$ $\Gamma_{34}/\Gamma \times \Gamma_{110}^{\psi(2S)}/\Gamma^{\psi(2S)}$

NODE=M055B6
NODE=M055B6

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
6.8±0.5 OUR FIT					
7.5±1.4 OUR AVERAGE Error includes scale factor of 2.0.					
8.2±0.7±0.4	141 ± 13	[89] NAIK	08	CLEO	$\psi(2S) \rightarrow \gamma p \overline{p}$
$4.8^{+1.4}_{-1.3}$±0.6	$18.2^{+5.5}_{-4.9}$	BAI	04F	BES	$\psi(2S) \rightarrow \gamma \chi_{c1}(1P) \rightarrow \gamma \overline{p} p$

[89] Calculated by us. NAIK 08 reports B($\chi_{c1} \rightarrow p\overline{p}$) = (9.0 ± 0.8 ± 0.4 ± 0.5) × 10^{-5} using B($\psi(2S) \rightarrow \gamma \chi_{c1}$) = (9.07 ± 0.11 ± 0.54)%. NODE=M055B6;LINKAGE=NA

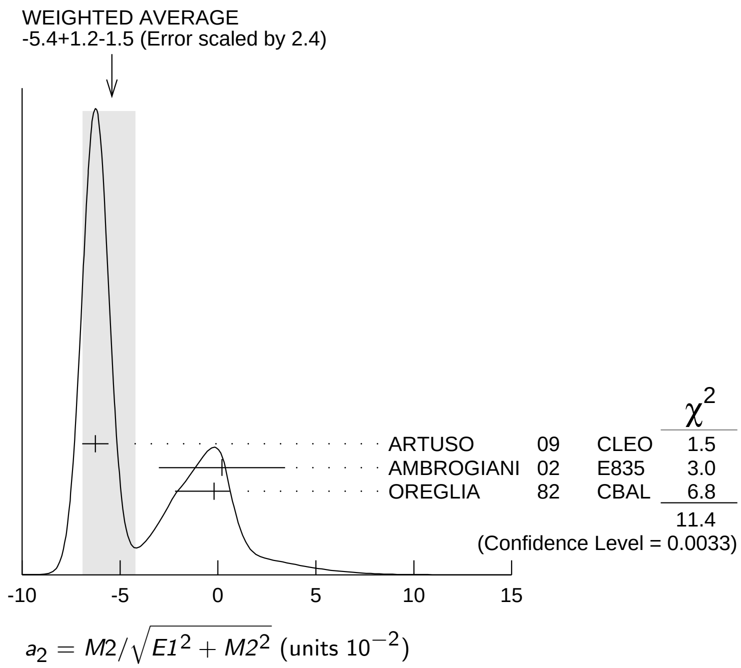
MULTIPOLE AMPLITUDES IN $\chi_{c1}(1P) \rightarrow \gamma J/\psi(1S)$

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
$-5.4\ {}^{+1.2}_{-1.5}$ **OUR AVERAGE**		Error includes scale factor of 2.4. See the ideogram below.			
$-6.26 \pm 0.63 \pm 0.24$	39k	ARTUSO	09	CLEO	$\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$
$0.2\ \pm 3.2\ \pm 0.4$	2090	AMBROGIANI	02	E835	$p\overline{p} \rightarrow \chi_{c1} \rightarrow J/\psi\gamma$
$-0.2\ {}^{+0.8}_{-2.0}$	921	OREGLIA	82	CBAL	$\psi(2S) \rightarrow \chi_{c1}\gamma \rightarrow J/\psi\gamma\gamma$



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
2.9 ±0.8 OUR AVERAGE					
$2.76 \pm 0.73 \pm 0.23$	39k	ARTUSO	09	CLEO	$\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$
$7.7\ {}^{+5.0}_{-4.5}$	921	OREGLIA	82	CBAL	$\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$

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
$-2.27\ {}^{+0.57}_{-0.99}$	39k	[90] ARTUSO	09	CLEO	$\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$

[90] 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	11A	PR D83 012006	M. Ablikim *et al.*	(BES III Collab.)	REFID=53647
ABLIKIM	11D	PR D83 032003	M. Ablikim *et al.*	(BES III Collab.)	REFID=16715
ABLIKIM	11E	PR D83 112005	M. Ablikim *et al.*	(BES III Collab.)	REFID=16717
ABLIKIM	11F	PR D83 112009	M. Ablikim *et al.*	(BES III Collab.)	REFID=16719
ABLIKIM	11K	PRL 107 092001	M. Ablikim *et al.*	(BES III Collab.)	REFID=53940
ONYISI	10	PR D82 011103R	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 091501R	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 011102R	H. Mendez *et al.*	(CLEO Collab.)	REFID=52684
NAIK	08	PR D78 031101R	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

$h_c(1P)$

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

Quantum numbers are quark model prediction, $C = -$ established by $\eta_c\gamma$ decay.

NODE=M144

$h_c(1P)$ MASS

NODE=M144M

NODE=M144M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
3525.41±0.16 OUR AVERAGE	Error includes scale factor of 1.2.				
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	[1] 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	[2] 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	[3] ARMSTRONG	92D	E760	$\overline{p}p \to J/\psi\pi^0$
3525.4 ±0.8 ±0.4	5	BAGLIN	86	SPEC	$\overline{p}p \to J/\psi X$

[1] 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

[2] Superseded by DOBBS 08A. NODE=M144M;LINKAGE=RO

[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=M144M;LINKAGE=NW

$h_c(1P)$ WIDTH

NODE=M144W

NODE=M144W

VALUE (MeV)	*CL%*	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
<1		13	ANDREOTTI	05B	E835	$\overline{p}p \to \eta_c\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<1.44	90	3679	[4] ABLIKIM	10B	BES3	$\psi(2S) \to \pi^0\gamma\eta_c$
<1.1	90	59	ARMSTRONG	92D	E760	$\overline{p}p \to J/\psi\pi^0$

[4] 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)	
Γ_1	$J/\psi(1S)\pi^0$		DESIG=1
Γ_2	$J/\psi(1S)\pi\pi$	not seen	DESIG=2;OUR EST;→ NOT CHECKED ←
Γ_3	$p\overline{p}$		DESIG=3
Γ_4	$\eta_c(1S)\gamma$	(51 ± 6) %	DESIG=4
Γ_5	$\pi^+\pi^-\pi^0$	$< 2.2 \times 10^{-3}$	DESIG=5
Γ_6	$2\pi^+2\pi^-\pi^0$	$(2.2^{+0.8}_{-0.7})$ %	DESIG=6
Γ_7	$3\pi^+3\pi^-\pi^0$	< 2.9 %	DESIG=7

$h_c(1P)$ PARTIAL WIDTHS

NODE=M144220

$h_c(1P)$ $\Gamma(i)\Gamma(\overline{p}p)/\Gamma(\text{total})$

NODE=M144223

$\Gamma(\eta_c(1S)\gamma) \times \Gamma(p\overline{p})/\Gamma_{total}$ — $\Gamma_4\Gamma_3/\Gamma$

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	[5] ANDREOTTI 05B	E835	$\overline{p}p \to \eta_c\gamma$

[5] 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	$\overline{p}p \to J/\psi\pi^0$

$\Gamma(\eta_c(1S)\gamma)/\Gamma_{total}$ — Γ_4/Γ

NODE=M144R2
NODE=M144R2

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
51 ± 6 OUR AVERAGE				
[$(53 \pm 7) \times 10^{-2}$ OUR 2011 AVERAGE]				
$54.3 \pm 6.7 \pm 5.2$	3679	ABLIKIM 10B	BES3	$\psi(2S) \to \pi^0\gamma\eta_c$
$48 \pm 6 \pm 7$		[6] DOBBS 08A	CLEO	$\psi(2S) \to \pi^0\eta_c\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$48 \pm 6 \pm 7$	1282	[7] DOBBS 08A	CLEO	$\psi(2S) \to \pi^0\eta_c\gamma$
$46 \pm 12 \pm 7$	168	[8] ROSNER 05	CLEO	$\psi(2S) \to \pi^0\eta_c\gamma$

NEW

OCCUR=2

[6] Average of DOBBS 08A and ROSNER 05. DOBBS 08A reports $[\Gamma(h_c(1P) \to \eta_c(1S)\gamma)/\Gamma_{total}] \times [B(\psi(2S) \to \pi^0 h_c(1P))] = (4.16 \pm 0.30 \pm 0.37) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \to \pi^0 h_c(1P)) = (8.6 \pm 1.3) \times 10^{-4}$. 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

[7] DOBBS 08A reports $[\Gamma(h_c(1P) \to \eta_c(1S)\gamma)/\Gamma_{total}] \times [B(\psi(2S) \to \pi^0 h_c(1P))] = (4.19 \pm 0.32 \pm 0.45) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \to \pi^0 h_c(1P)) = (8.6 \pm 1.3) \times 10^{-4}$. 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

[8] ROSNER 05 reports $[\Gamma(h_c(1P) \to \eta_c(1S)\gamma)/\Gamma_{total}] \times [B(\psi(2S) \to \pi^0 h_c(1P))] = (4.0 \pm 0.8 \pm 0.7) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \to \pi^0 h_c(1P)) = (8.6 \pm 1.3) \times 10^{-4}$. 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

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_5/Γ

NODE=M144R01
NODE=M144R01

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
<2.2 [$<2.3 \times 10^{-3}$ OUR 2011 BEST LIMIT]			
<2.2	[9] ADAMS 09	CLEO	$\psi(2S) \to \pi^0\gamma\eta_c$

[9] ADAMS 09 reports $[\Gamma(h_c(1P) \to \pi^+\pi^-\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \pi^0 h_c(1P))] < 0.19 \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \to \pi^0 h_c(1P)) = 8.6 \times 10^{-4}$.

NODE=M144R01;LINKAGE=AD

$\Gamma(2\pi^+2\pi^-\pi^0)/\Gamma_{total}$ — Γ_6/Γ

NODE=M144R02
NODE=M144R02

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
$2.2^{+0.8}_{-0.7}$ OUR AVERAGE [$(2.2^{+0.9}_{-0.8}) \times 10^{-2}$ OUR 2011 AVERAGE]				
$2.2^{+0.8}_{-0.6}\pm0.3$	92	[10] ADAMS 09	CLEO	$\psi(2S) \to \pi^0\gamma\eta_c$

NEW

[10] ADAMS 09 reports $[\Gamma(h_c(1P) \to 2\pi^+2\pi^-\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \pi^0 h_c(1P))] = (1.88^{+0.48}_{-0.45}{}^{+0.47}_{-0.30}) \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \to \pi^0 h_c(1P)) = (8.6 \pm 1.3) \times 10^{-4}$. 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_7/Γ

NODE=M144R03
NODE=M144R03

VALUE (units 10^{-2})	DOCUMENT ID	TECN	COMMENT
<2.9 [$<3.0 \times 10^{-2}$ OUR 2011 BEST LIMIT]			
<2.9	[11] ADAMS 09	CLEO	$\psi(2S) \to \pi^0\gamma\eta_c$

[11] ADAMS 09 reports $[\Gamma(h_c(1P) \to 3\pi^+3\pi^-\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \pi^0 h_c(1P))] < 2.5 \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \to \pi^0 h_c(1P)) = 8.6 \times 10^{-4}$.

NODE=M144R03;LINKAGE=AD

$\Gamma(h_c(1P) \to \eta_c(1S)\gamma)/\Gamma_{total} \times \Gamma(\psi(2S) \to \pi^0 h_c(1P))/\Gamma_{total}$ — $\Gamma_4/\Gamma \times \Gamma_{15}^{\psi(2S)}/\Gamma^{\psi(2S)}$

NODE=M144R04
NODE=M144R04

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
4.3 ±0.4 OUR AVERAGE				
$4.58\pm0.40\pm0.50$	3679	[12] ABLIKIM 10B	BES3	$\psi(2S) \to \pi^0\gamma X$
$4.16\pm0.30\pm0.37$	1430	[13] DOBBS 08A	CLEO	$\psi(2S) \to \pi^0\gamma\eta_c$

[12] Not independent of other branching fractions in ABLIKIM 10B.
[13] Not independent of other branching fractions in DOBBS 08A.

NODE=M144R04;LINKAGE=AB
NODE=M144R04;LINKAGE=DO

$h_c(1P)$ REFERENCES

NODE=M144

ABLIKIM	10B	PRL 104 132002	M. Ablikim *et al.*	(BES III Collab.)
ADAMS	09	PR D80 051106	G.S. Adams *et al.*	(CLEO Collab.)
DOBBS	08A	PRL 101 182003	S. Dobbs *et al.*	(CLEO Collab.)
ANDREOTTI	05B	PR D72 032001	M. Andreotti *et al.*	(FNAL E835 Collab.)
ROSNER	05	PRL 95 102003	J.L. Rosner *et al.*	(CLEO Collab.)
AULCHENKO	03	PL B573 63	V.M. Aulchenko *et al.*	(KEDR Collab.)
ANTONIAZZI	94	PR D50 4258	L. Antoniazzi *et al.*	(E705 Collab.)
ARMSTRONG	93B	PR D47 772	T.A. Armstrong *et al.*	(FNAL E760 Collab.)
ARMSTRONG	92D	PRL 69 2337	T.A. Armstrong *et al.*	(FNAL, FERR, GENO+)
BAGLIN	86	PL B171 135	C. Baglin *et al.*	(LAPP, CERN, TORI, STRB+)

REFID=53348
REFID=53103
REFID=52579
REFID=50768
REFID=50812
REFID=49579
REFID=44074
REFID=43307
REFID=43174
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
3556.20 ± 0.09 OUR AVERAGE					
3555.3 ± 0.6 ±2.2	2.5k	UEHARA	08	BELL	$\gamma\gamma \to$ hadrons
3555.70 ± 0.59 ±0.39		ABLIKIM	05G	BES2	$\psi(2S) \to \gamma\chi_{c2}$
3556.173± 0.123±0.020		ANDREOTTI	05A	E835	$p\overline{p} \to e^+e^-\gamma$
3559.9 ± 2.9		EISENSTEIN	01	CLE2	$e^+e^- \to e^+e^-\chi_{c2}$
3556.4 ± 0.7		BAI	99B	BES	$\psi(2S) \to \gamma X$
3556.22 ± 0.131±0.020	585	[1] ARMSTRONG	92	E760	$\overline{p}p \to e^+e^-\gamma$
3556.9 ± 0.4 ±0.5	50	BAGLIN	86B	SPEC	$\overline{p}p \to e^+e^- X$
3557.8 ± 0.2 ±4		[2] GAISER	86	CBAL	$\psi(2S) \to \gamma X$
3553.4 ± 2.2	66	[3] LEMOIGNE	82	GOLI	185 π^- Be $\to \gamma\mu^+\mu^-$ A
3555.9 ± 0.7		[4] OREGLIA	82	CBAL	$e^+e^- \to J/\psi 2\gamma$
3557 ± 1.5	69	[5] HIMEL	80	MRK2	$e^+e^- \to J/\psi 2\gamma$
3551 ±11	15	BRANDELIK	79B	DASP	$e^+e^- \to J/\psi 2\gamma$
3553 ± 4		[5] BARTEL	78B	CNTR	$e^+e^- \to J/\psi 2\gamma$
3553 ± 4 ±4		[5,6] TANENBAUM	78	MRK1	e^+e^-
3563 ± 7	360	[5] BIDDICK	77	CNTR	$e^+e^- \to \gamma X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3543 ±10	4	WHITAKER	76	MRK1	$e^+e^- \to J/\psi 2\gamma$

[1] Recalculated by ANDREOTTI 05A, using the value of $\psi(2S)$ mass from AULCHENKO 03. NODE=M057M;LINKAGE=NW
[2] Using mass of $\psi(2S)$ = 3686.0 MeV. NODE=M057M;LINKAGE=C
[3] $J/\psi(1S)$ mass constrained to 3097 MeV. NODE=M057M;LINKAGE=P
[4] Assuming $\psi(2S)$ mass = 3686 MeV and $J/\psi(1S)$ mass = 3097 MeV. NODE=M057M;LINKAGE=E
[5] 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
[6] From a simultaneous fit to radiative and hadronic decay channels. NODE=M057M;LINKAGE=M

$\chi_{c2}(1P)$ WIDTH

NODE=M057W

NODE=M057W

NEW

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1.98 ±0.11 OUR FIT					
[1.97 ± 0.11 MeV OUR 2011 FIT]					
1.95 ±0.13 OUR AVERAGE					
1.915±0.188±0.013		ANDREOTTI	05A	E835	$p\overline{p} \to e^+e^-\gamma$
1.96 ±0.17 ±0.07	585	[7] 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 $^{+2.1}_{-2.0}$		[8] GAISER	86	CBAL	$\psi(2S) \to \gamma X$

[7] Recalculated by ANDREOTTI 05A. NODE=M057W;LINKAGE=AN
[8] 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	$2(\pi^+\pi^-)$	(1.10±0.11) %		DESIG=3
Γ_2	$\rho\rho$			DESIG=43
Γ_3	$\pi^+\pi^-\pi^0\pi^0$	(2.00±0.26) %		DESIG=50
Γ_4	$\rho^+\pi^-\pi^0$ + c.c.	(2.4 ±0.4) %		DESIG=51
Γ_5	$4\pi^0$	(1.21±0.17) $\times 10^{-3}$		DESIG=62
Γ_6	$K^+K^-\pi^0\pi^0$	(2.2 ±0.5) $\times 10^{-3}$		DESIG=52
Γ_7	$K^+\pi^-K^0\pi^0$ + c.c.	(1.51±0.22) %		DESIG=54
Γ_8	$\rho^+K^-K^0$ + c.c.	(4.5 ±1.4) $\times 10^{-3}$		DESIG=55
Γ_9	$K^*(892)^0K^+\pi^- \to K^+\pi^-K^0\pi^0$ + c.c.	(3.2 ±0.9) $\times 10^{-3}$		DESIG=60
Γ_{10}	$K^*(892)^0K^0\pi^0 \to K^+\pi^-K^0\pi^0$ + c.c.	(4.2 ±0.9) $\times 10^{-3}$		DESIG=56
Γ_{11}	$K^*(892)^-K^+\pi^0 \to K^+\pi^-K^0\pi^0$ + c.c.	(4.1 ±0.9) $\times 10^{-3}$		DESIG=57
Γ_{12}	$K^*(892)^+K^0\pi^- \to K^+\pi^-K^0\pi^0$ + c.c.	(3.2 ±0.9) $\times 10^{-3}$		DESIG=58
Γ_{13}	$K^+K^-\eta\pi^0$	(1.4 ±0.5) $\times 10^{-3}$		DESIG=59
Γ_{14}	$K^+K^-\pi^+\pi^-$	(9.1 ±1.1) $\times 10^{-3}$		DESIG=5
Γ_{15}	$K^+K^-\pi^+\pi^-\pi^0$	(1.3 ±0.4) %		DESIG=67
Γ_{16}	$K^+\overline{K}^*(892)^0\pi^-$ + c.c.	(2.3 ±1.2) $\times 10^{-3}$		DESIG=10
Γ_{17}	$K^*(892)^0\overline{K}^*(892)^0$	(2.5 ±0.5) $\times 10^{-3}$		DESIG=21
Γ_{18}	$3(\pi^+\pi^-)$	(8.6 ±1.8) $\times 10^{-3}$		DESIG=4
Γ_{19}	$\phi\phi$	(1.14±0.12) $\times 10^{-3}$		DESIG=16
Γ_{20}	$\omega\omega$	(9.2 ±1.1) $\times 10^{-4}$		DESIG=25
Γ_{21}	$\omega\phi$			DESIG=68
Γ_{22}	$\pi\pi$	(2.43±0.13) $\times 10^{-3}$		DESIG=22
Γ_{23}	$\rho^0\pi^+\pi^-$	(4.0 ±1.7) $\times 10^{-3}$		DESIG=9
Γ_{24}	$\pi^+\pi^-\eta$	(5.2 ±1.4) $\times 10^{-4}$		DESIG=39
Γ_{25}	$\pi^+\pi^-\eta'$	(5.5 ±2.0) $\times 10^{-4}$		DESIG=42
Γ_{26}	$\eta\eta$	(5.9 ±0.5) $\times 10^{-4}$		DESIG=14
Γ_{27}	K^+K^-	(1.09±0.08) $\times 10^{-3}$		DESIG=2
Γ_{28}	$K^0_SK^0_S$	(5.8 ±0.5) $\times 10^{-4}$		DESIG=15
Γ_{29}	$\overline{K}^0K^+\pi^-$ + c.c.	(1.40±0.20) $\times 10^{-3}$		DESIG=17
Γ_{30}	$K^+K^-\pi^0$	(3.3 ±0.8) $\times 10^{-4}$		DESIG=36

Γ_{31}	$K^+ K^- \eta$	$<$ 3.5 $\times 10^{-4}$	90%		DESIG=40
Γ_{32}	$\eta\eta'$	$<$ 6 $\times 10^{-5}$	90%		DESIG=34
Γ_{33}	$\eta'\eta'$	$<$ 1.1 $\times 10^{-4}$	90%		DESIG=35
Γ_{34}	$\pi^+ \pi^- K^0_S K^0_S$	$(2.4 \pm 0.6) \times 10^{-3}$			DESIG=29
Γ_{35}	$K^+ K^- K^0_S K^0_S$	$<$ 4 $\times 10^{-4}$	90%		DESIG=30
Γ_{36}	$K^+ K^- K^+ K^-$	$(1.78 \pm 0.22) \times 10^{-3}$			DESIG=24
Γ_{37}	$K^+ K^- \phi$	$(1.55 \pm 0.33) \times 10^{-3}$			DESIG=32
Γ_{38}	$p\overline{p}$	$(7.2 \pm 0.4) \times 10^{-5}$			DESIG=11
Γ_{39}	$p\overline{p}\pi^0$	$(5.1 \pm 0.5) \times 10^{-4}$			DESIG=37
Γ_{40}	$p\overline{p}\eta$	$(1.90 \pm 0.28) \times 10^{-4}$			DESIG=41
Γ_{41}	$p\overline{p}\omega$	$(3.9 \pm 0.5) \times 10^{-4}$			DESIG=61
Γ_{42}	$p\overline{p}\phi$	$(3.0 \pm 1.0) \times 10^{-5}$			DESIG=66
Γ_{43}	$p\overline{p}\pi^+\pi^-$	$(1.32 \pm 0.34) \times 10^{-3}$			DESIG=8
Γ_{44}	$p\overline{p}\pi^0\pi^0$	$(8.6 \pm 2.6) \times 10^{-4}$			DESIG=53
Γ_{45}	$p\overline{p}K^+K^-$ (non-resonant)	$(2.1 \pm 0.4) \times 10^{-4}$			DESIG=63
Γ_{46}	$p\overline{p}K^0_S K^0_S$	$<$ 7.9 $\times 10^{-4}$	90%		DESIG=28
Γ_{47}	$p\overline{n}\pi^-$	$(1.1 \pm 0.4) \times 10^{-3}$			DESIG=31
Γ_{48}	$\Lambda\overline{\Lambda}$	$(1.86 \pm 0.27) \times 10^{-4}$			DESIG=19
Γ_{49}	$\Lambda\overline{\Lambda}\pi^+\pi^-$	$<$ 3.5 $\times 10^{-3}$	90%		DESIG=27
Γ_{50}	$K^+\overline{p}\Lambda$ + c.c.	$(9.1 \pm 1.8) \times 10^{-4}$			DESIG=38
Γ_{51}	$K^+ p\Lambda(1520)$ + c.c.	$(3.1 \pm 0.7) \times 10^{-4}$			DESIG=64
Γ_{52}	$\Lambda(1520)\overline{\Lambda}(1520)$	$(5.1 \pm 1.6) \times 10^{-4}$			DESIG=65
Γ_{53}	$\Sigma^0\overline{\Sigma}^0$	$<$ 8 $\times 10^{-5}$	90%		DESIG=47
Γ_{54}	$\Sigma^+\overline{\Sigma}^-$	$<$ 7 $\times 10^{-5}$	90%		DESIG=48
Γ_{55}	$\Xi^0\overline{\Xi}^0$	$<$ 1.1 $\times 10^{-4}$	90%		DESIG=49
Γ_{56}	$\Xi^-\overline{\Xi}^+$	$(1.55 \pm 0.35) \times 10^{-4}$			DESIG=26
Γ_{57}	$J/\psi(1S)\pi^+\pi^-\pi^0$	$<$ 1.5 %	90%		DESIG=12
	Radiative decays				NODE=M057;CLUMP=B
Γ_{58}	$\gamma J/\psi(1S)$	(19.5 ± 0.8) %			DESIG=6
Γ_{59}	$\gamma\rho^0$	$<$ 2.1 $\times 10^{-5}$	90%		DESIG=44
Γ_{60}	$\gamma\omega$	$<$ 6 $\times 10^{-6}$	90%		DESIG=45
Γ_{61}	$\gamma\phi$	$<$ 8 $\times 10^{-6}$	90%		DESIG=46
Γ_{62}	$\gamma\gamma$	$(2.59 \pm 0.16) \times 10^{-4}$			DESIG=7

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 223 measurements to determine 49 parameters. The overall fit has a $\chi^2 = 312.2$ for 174 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_1	x_{14}	x_{16}	x_{17}	x_{19}	x_{22}	x_{23}	x_{26}	x_{27}	x_{28}
x_{14}	17									
x_{16}	4	22								
x_{17}	10	8	2							
x_{19}	12	11	2	6						
x_{22}	23	20	4	12	27					
x_{23}	20	4	1	2	3	5				
x_{26}	13	12	3	7	17	32	3			
x_{27}	18	16	3	9	20	39	4	24		
x_{28}	17	15	3	9	18	34	4	21	25	
x_{29}	9	8	2	5	10	19	2	12	14	13
x_{36}	12	10	2	6	11	22	3	13	16	14
x_{38}	7	6	1	4	1	1	2	0	1	2
x_{48}	8	7	2	4	10	20	2	12	14	13
x_{58}	28	24	5	14	30	59	6	36	44	39
x_{62}	−18	−15	−3	−9	1	3	−5	3	0	−2
Γ	−25	−21	−5	−13	−19	−36	−6	−21	−27	−25

	x_{29}	x_{36}	x_{38}	x_{48}	x_{58}	x_{62}
x_{36}	8					
x_{38}	1	2				
x_{48}	7	8	0			
x_{58}	21	25	−11	22		
x_{62}	0	−3	27	2	9	
Γ	−13	−17	−50	−13	−49	−48

$\chi_{c2}(1P)$ 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$_{total}$ — $\Gamma_{38}\Gamma_{58}/\Gamma$

NODE=M057G1
NODE=M057G1

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
27.7±1.4 OUR FIT				
27.5±1.5 OUR AVERAGE				
27.0±1.5±1.1	[9] ANDREOTTI	05A	E835	$p\overline{p} \to e^+e^-\gamma$
27.7±1.5±2.0	[9,10] ARMSTRONG	92	E760	$\overline{p}p \to e^+e^-\gamma$
36 ±8	[9] BAGLIN	86B	SPEC	$\overline{p}p \to e^+e^-X$

[9] Calculated by us using B($J/\psi(1S) \to e^+e^-$) = 0.0593 ± 0.0010.
[10] Recalculated by ANDREOTTI 05A.

NODE=M057G;LINKAGE=7A
NODE=M057G;LINKAGE=AN

Γ($\gamma\gamma$) × Γ($\gamma J/\psi(1S)$)/Γ$_{total}$ — $\Gamma_{62}\Gamma_{58}/\Gamma$

NODE=M057G2
NODE=M057G2
NEW

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
100± 6 OUR FIT					
[98 ± 6 eV OUR 2011 FIT]					
117± 10 OUR AVERAGE					
111± 12± 9	147 ± 15	[11] DOBBS	06	CLE3	10.4 $e^+e^- \to e^+e^-\chi_{c2}$
114± 11± 9	136 ± 13.3	[11,12] ABE	02T	BELL	$e^+e^- \to e^+e^-\chi_{c2}$
139± 55± 21		[11,13] ACCIARRI	99E	L3	$e^+e^- \to e^+e^-\chi_{c2}$
242± 65± 51		[11,14] ACKER..,K...	98	OPAL	$e^+e^- \to e^+e^-\chi_{c2}$
150± 42± 36		[11,15] DOMINICK	94	CLE2	$e^+e^- \to e^+e^-\chi_{c2}$
470±240±120		[11,16] BAUER	93	TPC	$e^+e^- \to e^+e^-\chi_{c2}$

[11] Calculated by us using $B(J/\psi \to \ell^+\ell^-) = 0.1187 \pm 0.0008$. NODE=M057G;LINKAGE=LL
[12] All systematic errors added in quadrature. NODE=M057G;LINKAGE=GT
[13] The value for $\Gamma(\chi_{c2} \to \gamma\gamma)$ reported in ACCIARRI 99E is derived using $B(\chi_{c2} \to \gamma J/\psi(1S)) \times B(J/\psi(1S) \to \ell^+\ell^-) = 0.0162 \pm 0.0014$. NODE=M057G;LINKAGE=J4
[14] The value for $\Gamma(\chi_{c2} \to \gamma\gamma)$ reported in ACKERSTAFF,K 98 is derived using $B(\chi_{c2} \to \gamma J/\psi(1S)) = 0.135 \pm 0.011$ and $B(J/\psi(1S) \to \ell^+\ell^-) = 0.1203 \pm 0.0038$. NODE=M057G;LINKAGE=J5
[15] The value for $\Gamma(\chi_{c2} \to \gamma\gamma)$ reported in DOMINICK 94 is derived using $B(\chi_{c2} \to \gamma J/\psi(1S)) = 0.135 \pm 0.011$, $B(J/\psi(1S) \to e^+e^-) = 0.0627 \pm 0.0020$, and $B(J/\psi(1S) \to \mu^+\mu^-) = 0.0597 \pm 0.0025$. NODE=M057G;LINKAGE=J6
[16] The value for $\Gamma(\chi_{c2} \to \gamma\gamma)$ reported in BAUER 93 is derived using $B(\chi_{c2} \to \gamma J/\psi(1S)) = 0.135 \pm 0.011$, $B(J/\psi(1S) \to e^+e^-) = 0.0627 \pm 0.0020$, and $B(J/\psi(1S) \to \mu^+\mu^-) = 0.0597 \pm 0.0025$. NODE=M057G;LINKAGE=J7

$\chi_{c2}(1P)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M057224

$\Gamma(\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_{22}\Gamma_{62}/\Gamma$

NODE=M057G4
NODE=M057G4

VALUE (eV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1.24±0.08 OUR FIT					
[1.22 ± 0.08 eV OUR 2011 FIT]					
1.18±0.25 OUR AVERAGE					
1.44±0.54±0.47	34 ± 13	[17] UEHARA	09	BELL	10.6 $e^+e^- \to e^+e^-\pi^0\pi^0$
1.14±0.21±0.17	54 ± 10	[18] NAKAZAWA	05	BELL	10.6 $e^+e^- \to e^+e^-\pi^+\pi^-$

NEW

[17] 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
[18] We have multiplied $\pi^+\pi^-$ measurement by 3/2 to obtain $\pi\pi$. NODE=M057G;LINKAGE=NA

$\Gamma(\eta\eta) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_{26}\Gamma_{62}/\Gamma$

NODE=M057G13
NODE=M057G13

VALUE (eV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.53±0.22±0.09	8	[19] UEHARA	10A	BELL	10.6 $e^+e^- \to e^+e^-\eta\eta$

[19] Interference with the continuum not included. NODE=M057G13;LINKAGE=UE

$\Gamma(K^+K^-) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_{27}\Gamma_{62}/\Gamma$

NODE=M057G5
NODE=M057G5

VALUE (eV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.56±0.05 OUR FIT					
[0.55 ± 0.04 eV OUR 2011 FIT]					
0.44±0.11±0.07	33 ± 8	NAKAZAWA	05	BELL	10.6 $e^+e^- \to e^+e^-K^+K^-$

NEW

$\Gamma(K^0_S K^0_S) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_{28}\Gamma_{62}/\Gamma$

NODE=M057G6
NODE=M057G6

VALUE (eV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.297±0.026 OUR FIT					
[0.292 ± 0.025 eV OUR 2011 FIT]					
0.31 ±0.05 ±0.03	38 ± 7	CHEN	07B	BELL	$e^+e^- \to e^+e^-\chi_{c2}$

NEW

$\Gamma(2(\pi^+\pi^-)) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_1\Gamma_{62}/\Gamma$

NODE=M057G3
NODE=M057G3

VALUE (eV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
5.6 ±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	$e^+e^- \to e^+e^-\chi_{c2}$

$\Gamma(\rho^0\pi^+\pi^-) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_{23}\Gamma_{62}/\Gamma$

NODE=M057G07
NODE=M057G07

VALUE (eV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
2.0±0.9 OUR FIT					
3.2±1.9±0.5	986±578	UEHARA	08	BELL	$\gamma\gamma \to \chi_{c2} \to 2(\pi^+\pi^-)$

$\Gamma(\rho\rho) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_2\Gamma_{62}/\Gamma$

NODE=M057G08
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	$\gamma\gamma \to \chi_{c2} \to 2(\pi^+\pi^-)$

$\Gamma(K^+K^-\pi^+\pi^-) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_{14}\Gamma_{62}/\Gamma$

NODE=M057G09
NODE=M057G09

VALUE (eV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
4.7 ±0.5 OUR FIT					
[4.6 ± 0.5 eV OUR 2011 FIT]					
4.42±0.42±0.53	780 ± 74	UEHARA	08	BELL	$\gamma\gamma \to \chi_{c2} \to K^+K^-\pi^+\pi^-$

NEW

$\Gamma(\overline{K}^0 K^+ \pi^- + c.c.) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{29}\Gamma_{62}/\Gamma$

NODE=M057G01

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
0.72±0.11 OUR FIT				
1.20±0.33±0.13	126	[20] DEL-AMO-SA..11M	BABR	$\gamma\gamma \to K^0_S K^\pm \pi^\mp$

[20] We have multiplied $\overline{K} K \pi$ by 2/3 to obtain $\overline{K}^0 K^+ \pi^- +$ c.c.

NODE=M057G01;LINKAGE=DE

$\Gamma(K^+ K^- \pi^+ \pi^- \pi^0) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{15}\Gamma_{62}/\Gamma$

NODE=M057G02

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
6.5±0.9±1.5	1250	DEL-AMO-SA..11M	BABR	$\gamma\gamma \to K^+ K^- \pi^+ \pi^- \pi^0$

$\Gamma(K^*(892)^0 \overline{K}^*(892)^0) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{17}\Gamma_{62}/\Gamma$

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	$\gamma\gamma \to \chi_{c2} \to K^+ K^- \pi^+ \pi^-$

$\Gamma(K^+ K^- K^+ K^-) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{36}\Gamma_{62}/\Gamma$

NODE=M057G11

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
0.91±0.12 OUR FIT				
[0.90 ± 0.12 eV OUR 2011 FIT]				
1.10±0.21±0.15	126 ± 24	UEHARA 08	BELL	$\gamma\gamma \to \chi_{c2} \to 2(K^+ K^-)$

NEW

$\Gamma(\phi\phi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{19}\Gamma_{62}/\Gamma$

NODE=M057G12

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
0.58±0.06 OUR FIT				
[0.74 ± 0.14 eV OUR 2011 FIT]				
0.58±0.18±0.16	26.5 ± 8.1	UEHARA 08	BELL	$\gamma\gamma \to \chi_{c2} \to 2(K^+ K^-)$

NEW

$\chi_{c2}(1P)$ BRANCHING RATIOS

NODE=M057225

HADRONIC DECAYS

NODE=M057305

$\Gamma(2(\pi^+ \pi^-))/\Gamma_{total}$ — Γ_1/Γ

NODE=M057R2

VALUE	DOCUMENT ID
0.0110±0.0011 OUR FIT	
[0.0111 ± 0.0011 OUR 2011 FIT]	

NEW

$\Gamma(\rho^0 \pi^+ \pi^-)/\Gamma(2(\pi^+ \pi^-))$ — Γ_{23}/Γ_1

NODE=M057R38

VALUE	DOCUMENT ID	TECN	COMMENT
0.36±0.15 OUR FIT			
0.31±0.17	TANENBAUM 78	MRK1	$\psi(2S) \to \gamma \chi_{c2}$

$\Gamma(\pi^+ \pi^- \pi^0 \pi^0)/\Gamma_{total}$ — Γ_3/Γ

NODE=M057R46

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
2.00±0.26 OUR AVERAGE [(1.99 ± 0.26)% OUR 2011 AVERAGE]				
2.00±0.25±0.08	903.5	[21] HE 08B	CLEO	$e^+ e^- \to \gamma h^+ h^- h^0 h^0$

NEW

[21] HE 08B reports 1.87 ± 0.07 ± 0.22 ± 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 $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R46;LINKAGE=HE

$\Gamma(\rho^+ \pi^- \pi^0 + c.c.)/\Gamma_{total}$ — Γ_4/Γ

NODE=M057R47

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
2.4±0.4 OUR AVERAGE [(2.4 ± 0.4)% OUR 2011 AVERAGE]				
2.4±0.4±0.1	1031.9	[22,23] HE 08B	CLEO	$e^+ e^- \to \gamma h^+ h^- h^0 h^0$

NEW

[22] HE 08B reports 2.23 ± 0.11 ± 0.32 ± 0.16 % from a measurement of $[\Gamma(\chi_{c2}(1P) \to \rho^+ \pi^- \pi^0 +$ 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 $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R47;LINKAGE=HE

[23] 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=M057R47;LINKAGE=OC

$\Gamma(4\pi^0)/\Gamma_{total}$ Γ_5/Γ

NODE=M057R58
NODE=M057R58

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.21±0.16±0.05	1164	[24] ABLIKIM	11A	BES3	$e^+e^- \to \psi(2S) \to \gamma\chi_{c2}$

[24] 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 $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R58;LINKAGE=AB

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

NODE=M057R48
NODE=M057R48

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.22±0.05 OUR AVERAGE	[(0.22 ± 0.04)% OUR 2011 AVERAGE]				
0.22±0.04±0.01	76.9	[25] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^-h^0h^0$

NEW

[25] 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 $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R48;LINKAGE=HE

$\Gamma(K^+\pi^-K^0\pi^0 + \text{c.c.})/\Gamma_{total}$ Γ_7/Γ

NODE=M057R50
NODE=M057R50

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
1.51±0.22 OUR AVERAGE	[(1.50 ± 0.22)% OUR 2011 AVERAGE]				
1.51±0.21±0.06	211.6	[26] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^-h^0h^0$

NEW

[26] HE 08B reports $1.41 \pm 0.11 \pm 0.16 \pm 0.10$ % from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^+\pi^-K^0\pi^0 + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ 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 $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R50;LINKAGE=HE

$\Gamma(\rho^+K^-K^0 + \text{c.c.})/\Gamma_{total}$ Γ_8/Γ

NODE=M057R51
NODE=M057R51

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.45±0.14 OUR AVERAGE	[(0.45 ± 0.14)% OUR 2011 AVERAGE]				
0.45±0.13±0.02	62.9	[27] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^-h^0h^0$

NEW

[27] HE 08B reports $0.42 \pm 0.11 \pm 0.06 \pm 0.03$ % from a measurement of $[\Gamma(\chi_{c2}(1P) \to \rho^+K^-K^0 + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ 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 $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R51;LINKAGE=HE

$\Gamma(K^*(892)^0K^+\pi^- \to K^+\pi^-K^0\pi^0 + \text{c.c.})/\Gamma_{total}$ Γ_9/Γ

NODE=M057R57
NODE=M057R57

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.32±0.09 OUR AVERAGE	[(0.32 ± 0.09)% OUR 2011 AVERAGE]				
0.32±0.09±0.01	38.7	[28] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^-h^0h^0$

NEW

[28] 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 $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R57;LINKAGE=HE

$\Gamma(K^*(892)^0K^0\pi^0 \to K^+\pi^-K^0\pi^0 + \text{c.c.})/\Gamma_{total}$ Γ_{10}/Γ

NODE=M057R52
NODE=M057R52

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.42±0.09 OUR AVERAGE	[(0.42 ± 0.09)% OUR 2011 AVERAGE]				
0.42±0.09±0.02	63.0	[29] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^-h^0h^0$

NEW

[29] HE 08B reports $0.39 \pm 0.07 \pm 0.05 \pm 0.03$ % from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^*(892)^0K^0\pi^0 \to K^+\pi^-K^0\pi^0 + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ 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 $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$. 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

$\Gamma\big(K^*(892)^- K^+ \pi^0 \rightarrow K^+ \pi^- K^0 \pi^0 + \text{c.c.}\big)/\Gamma_{\text{total}}$ Γ_{11}/Γ

NODE=M057R53
NODE=M057R53

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.41±0.09 OUR AVERAGE	[(0.41 ± 0.09)% OUR 2011 AVERAGE]				
0.41±0.09±0.02	51.1	[30] HE	08B	CLEO	$e^+ e^- \rightarrow \gamma h^+ h^- h^0 h^0$

NEW

[30] HE 08B reports 0.38 ± 0.07 ± 0.04 ± 0.03 % from a measurement of [$\Gamma\big(\chi_{c2}(1P) \rightarrow K^*(892)^- K^+ \pi^0 \rightarrow K^+ \pi^- K^0 \pi^0 + \text{c.c.}\big)/\Gamma_{\text{total}}$] × [B($\psi(2S) \rightarrow \gamma \chi_{c2}(1P)$)] assuming B($\psi(2S) \rightarrow \gamma \chi_{c2}(1P)$) = $(9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value B($\psi(2S) \rightarrow \gamma \chi_{c2}(1P)$) = $(8.72 \pm 0.34) \times 10^{-2}$. 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

$\Gamma\big(K^*(892)^+ K^0 \pi^- \rightarrow K^+ \pi^- K^0 \pi^0 + \text{c.c.}\big)/\Gamma_{\text{total}}$ Γ_{12}/Γ

NODE=M057R54
NODE=M057R54

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.32±0.09 OUR AVERAGE	[(0.32 ± 0.09)% OUR 2011 AVERAGE]				
0.32±0.09±0.01	39.3	[31] HE	08B	CLEO	$e^+ e^- \rightarrow \gamma h^+ h^- h^0 h^0$

NEW

[31] HE 08B reports 0.30 ± 0.07 ± 0.04 ± 0.02 % from a measurement of [$\Gamma\big(\chi_{c2}(1P) \rightarrow K^*(892)^+ K^0 \pi^- \rightarrow K^+ \pi^- K^0 \pi^0 + \text{c.c.}\big)/\Gamma_{\text{total}}$] × [B($\psi(2S) \rightarrow \gamma \chi_{c2}(1P)$)] assuming B($\psi(2S) \rightarrow \gamma \chi_{c2}(1P)$) = $(9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value B($\psi(2S) \rightarrow \gamma \chi_{c2}(1P)$) = $(8.72 \pm 0.34) \times 10^{-2}$. 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

$\Gamma\big(K^+ K^- \eta \pi^0\big)/\Gamma_{\text{total}}$ Γ_{13}/Γ

NODE=M057R55
NODE=M057R55

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.14±0.05 OUR AVERAGE	[(0.14 ± 0.05)% OUR 2011 AVERAGE]				
0.14±0.05±0.01	22.9	[32] HE	08B	CLEO	$e^+ e^- \rightarrow \gamma h^+ h^- h^0 h^0$

NEW

[32] HE 08B reports 0.13 ± 0.04 ± 0.02 ± 0.01 % from a measurement of [$\Gamma\big(\chi_{c2}(1P) \rightarrow K^+ K^- \eta \pi^0\big)/\Gamma_{\text{total}}$] × [B($\psi(2S) \rightarrow \gamma \chi_{c2}(1P)$)] assuming B($\psi(2S) \rightarrow \gamma \chi_{c2}(1P)$) = $(9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value B($\psi(2S) \rightarrow \gamma \chi_{c2}(1P)$) = $(8.72 \pm 0.34) \times 10^{-2}$. 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

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

NODE=M057R3
NODE=M057R3

VALUE (units 10^{-3})	DOCUMENT ID
9.1±1.1 OUR FIT	

[$(9.2 \pm 1.1) \times 10^{-3}$ OUR 2011 FIT]

NEW

$\Gamma\big(K^+ \overline{K}^*(892)^0 \pi^- + \text{c.c.}\big)/\Gamma\big(K^+ K^- \pi^+ \pi^-\big)$ Γ_{16}/Γ_{14}

NODE=M057R39
NODE=M057R39

VALUE	DOCUMENT ID		TECN	COMMENT
0.25±0.13 OUR FIT				
0.25±0.13	TANENBAUM	78	MRK1	$\psi(2S) \rightarrow \gamma \chi_{c2}$

$\Gamma\big(K^+ \overline{K}^*(892)^0 \pi^- + \text{c.c.}\big)/\Gamma_{\text{total}}$ Γ_{16}/Γ

NODE=M057R9
NODE=M057R9

VALUE (units 10^{-4})	DOCUMENT ID
23±12 OUR FIT	

$\Gamma\big(K^*(892)^0 \overline{K}^*(892)^0\big)/\Gamma_{\text{total}}$ Γ_{17}/Γ

NODE=M057R26
NODE=M057R26

VALUE (units 10^{-3})	DOCUMENT ID
2.5±0.5 OUR FIT	

$\Gamma\big(3(\pi^+ \pi^-)\big)/\Gamma_{\text{total}}$ Γ_{18}/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	[33] BAI	99B	BES	$\psi(2S) \rightarrow \gamma \chi_{c2}$
8.7±5.9±0.4	[33] TANENBAUM	78	MRK1	$\psi(2S) \rightarrow \gamma \chi_{c2}$

→ NOT CHECKED ←

[33] Rescaled by us using B($\psi(2S) \rightarrow \gamma \chi_{c2}$)= (8.3 ± 0.4)% and B($\psi(2S) \rightarrow J/\psi(1S) \pi^+ \pi^-$) = (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

$\Gamma(\phi\phi)/\Gamma_{\text{total}}$ Γ_{19}/Γ

NODE=M057R20
NODE=M057R20

VALUE (units 10^{-3})	DOCUMENT ID
1.14±0.12 OUR FIT	

[$(1.48 \pm 0.28) \times 10^{-3}$ OUR 2011 FIT]

NEW

$\Gamma(\omega\omega)/\Gamma_{total}$ — Γ_{20}/Γ

NODE=M057R28
NODE=M057R28

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.92±0.11 OUR AVERAGE					
[$(1.9 \pm 0.6) \times 10^{-3}$ OUR 2011 AVERAGE]					
0.89±0.11±0.04	762	[34] ABLIKIM	11K	BES3	$\psi(2S) \to \gamma$ hadrons
1.9 ±0.6 ±0.1	27.7±7.4	[35] ABLIKIM	05N	BES2	$\psi(2S) \to \gamma\chi_{c2} \to \gamma 6\pi$

NEW

[34] ABLIKIM 11K reports $(8.9 \pm 0.3 \pm 1.1) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \omega\omega)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$. 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

[35] ABLIKIM 05N reports $[\Gamma(\chi_{c2}(1P) \to \omega\omega)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))] = (0.165 \pm 0.044 \pm 0.032) \times 10^{-3}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$. 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

$\Gamma(\omega\phi)/\Gamma_{total}$ — Γ_{21}/Γ

NODE=M057R63
NODE=M057R63

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<2.0	90	[36] ABLIKIM	11K	BES3	$\psi(2S) \to \gamma$ hadrons

[36] ABLIKIM 11K reports $< 2 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \omega\phi)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 8.72 \times 10^{-2}$.

NODE=M057R63;LINKAGE=AL

$\Gamma(\pi\pi)/\Gamma_{total}$ — Γ_{22}/Γ

NODE=M057R27
NODE=M057R27

VALUE (units 10^{-3})	DOCUMENT ID
2.43±0.13 OUR FIT	
[$(2.42 \pm 0.13) \times 10^{-3}$ OUR 2011 FIT]	

NEW

$\Gamma(\rho^0\pi^+\pi^-)/\Gamma_{total}$ — Γ_{23}/Γ

NODE=M057R8
NODE=M057R8

VALUE (units 10^{-4})	DOCUMENT ID
40±17 OUR FIT	

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

NODE=M057R08
NODE=M057R08

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
0.52±0.14±0.02		[37] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.6	90	[38] ABLIKIM	06R	BES2	$\psi(2S) \to \gamma\chi_{c2}$

[37] 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 $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$. 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

[38] 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 $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 8.72 \times 10^{-2}$.

NODE=M057R08;LINKAGE=AB

$\Gamma(\pi^+\pi^-\eta')/\Gamma_{total}$ — Γ_{25}/Γ

NODE=M057R35
NODE=M057R35

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.55±0.20 OUR AVERAGE [$(0.54 \pm 0.20) \times 10^{-3}$ OUR 2011 AVERAGE]				
0.55±0.20±0.02	[39] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

NEW

[39] 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 $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$. 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_{26}/Γ

NODE=M057R16
NODE=M057R16

VALUE (units 10^{-4})	DOCUMENT ID
5.9±0.5 OUR FIT	

$\Gamma(K^+K^-)/\Gamma_{total}$ — Γ_{27}/Γ

NODE=M057R11
NODE=M057R11

VALUE (units 10^{-3})	DOCUMENT ID
1.09±0.08 OUR FIT	

$\Gamma(K^0_S K^0_S)/\Gamma_{\text{total}}$ Γ_{28}/Γ

NODE=M057R19
NODE=M057R19

VALUE (units 10^{-3})	DOCUMENT ID
0.58±0.05 OUR FIT	

$\Gamma(K^0_S K^0_S)/\Gamma(\pi\pi)$ Γ_{28}/Γ_{22}

NODE=M057R36
NODE=M057R36
NEW

VALUE	DOCUMENT ID	TECN	COMMENT
0.239±0.019 OUR FIT			
[0.240 ± 0.019 OUR 2011 FIT]			
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.27 ±0.07 ±0.04	[40,41] CHEN 07B	BELL	$e^+e^- \to e^+e^-\chi_{c2}$

[40] Using $\Gamma(\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ from the $\pi^+\pi^-$ measurement of NAKAZAWA 05 rescaled by 3/2 to convert to $\pi\pi$. NODE=M057R36;LINKAGE=CH

[41] Not independent from other measurements. NODE=M057R36;LINKAGE=NI

$\Gamma(K^0_S K^0_S)/\Gamma(K^+K^-)$ Γ_{28}/Γ_{27}

NODE=M057R37
NODE=M057R37

VALUE	DOCUMENT ID	TECN	COMMENT
0.53±0.05 OUR FIT			
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.70±0.21±0.12	[42,43] CHEN 07B	BELL	$e^+e^- \to e^+e^-\chi_{c2}$

[42] Using $\Gamma(K^+K^-) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ from NAKAZAWA 05. NODE=M057R37;LINKAGE=CH

[43] Not independent from other measurements. NODE=M057R37;LINKAGE=NI

$\Gamma(K^+K^-\pi^0)/\Gamma_{\text{total}}$ Γ_{30}/Γ

NODE=M057R05
NODE=M057R05

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
0.33±0.08±0.01	[44] ATHAR 07	CLEO	$\psi(2S) \to \gamma h^+h^-h^0$

[44] ATHAR 07 reports $(0.31 \pm 0.07 \pm 0.04) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^+K^-\pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ 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 $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$. 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

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

NODE=M057R09
NODE=M057R09

VALUE (units 10^{-3})	CL%	DOCUMENT ID	TECN	COMMENT
<0.35	90	[45] ATHAR 07	CLEO	$\psi(2S) \to \gamma h^+h^-h^0$

[45] ATHAR 07 reports $< 0.33 \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^+K^-\eta)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ 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 $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 8.72 \times 10^{-2}$. NODE=M057R09;LINKAGE=AT

$\Gamma(\eta\eta')/\Gamma_{\text{total}}$ Γ_{32}/Γ

NODE=M057R03
NODE=M057R03

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<0.6	90	3.3 ± 8.0	[46] ASNER 09	CLEO	$\psi(2S) \to \gamma\eta\eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<2.5	90		[47] ADAMS 07	CLEO	$\psi(2S) \to \gamma\chi_{c2}$

[46] ASNER 09 reports $< 0.6 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \eta\eta')/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ 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 $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 8.72 \times 10^{-2}$. NODE=M057R03;LINKAGE=AS

[47] Superseded by ASNER 09. ADAMS 07 reports $< 2.3 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \eta\eta')/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 0.0933 \pm 0.0014 \pm 0.0061$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 8.72 \times 10^{-2}$. NODE=M057R03;LINKAGE=AD

$\Gamma(\eta'\eta')/\Gamma_{\text{total}}$ Γ_{33}/Γ

NODE=M057R04
NODE=M057R04

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<1.1	90	12 ± 7	[48] ASNER 09	CLEO	$\psi(2S) \to \gamma\eta'\eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<3.3	90		[49] ADAMS 07	CLEO	$\psi(2S) \to \gamma\chi_{c2}$

[48] ASNER 09 reports $< 1.0 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \eta'\eta')/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ 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 $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 8.72 \times 10^{-2}$. NODE=M057R04;LINKAGE=AS

[49] Superseded by ASNER 09. ADAMS 07 reports $< 3.1 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \eta'\eta')/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 0.0933 \pm 0.0014 \pm 0.0061$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 8.72 \times 10^{-2}$. NODE=M057R04;LINKAGE=AD

$\Gamma(\pi^+\pi^-K^0_S K^0_S)/\Gamma_{\text{total}}$ Γ_{34}/Γ

NODE=M057R31
NODE=M057R31

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
2.4±0.6±0.1	57 ± 11	[50] ABLIKIM 05O	BES2	$\psi(2S) \to \gamma\chi_{c2}$

[50] ABLIKIM 05O reports $[\Gamma(\chi_{c2}(1P) \to \pi^+\pi^-K^0_S K^0_S)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))] = (0.207 \pm 0.039 \pm 0.033) \times 10^{-3}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$. 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

$\Gamma(K^+K^-K^0_S K^0_S)/\Gamma_{\text{total}}$ Γ_{35}/Γ

NODE=M057R32
NODE=M057R32

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<4	90	2.3 ± 2.2	[51] ABLIKIM 05O	BES2	$e^+e^- \to \chi_{c2}\gamma$

[51] ABLIKIM 05O reports $[\Gamma(\chi_{c2}(1P) \to K^+K^-K^0_S K^0_S)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))] < 3.5 \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 8.72 \times 10^{-2}$.

NODE=M057R32;LINKAGE=AB

$\Gamma(K^+K^-K^+K^-)/\Gamma_{\text{total}}$ Γ_{36}/Γ

NODE=M057R18
NODE=M057R18

VALUE (units 10^{-3})	DOCUMENT ID
1.78±0.22 OUR FIT	

$\Gamma(K^+K^-\phi)/\Gamma_{\text{total}}$ Γ_{37}/Γ

NODE=M057R01
NODE=M057R01

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
1.55±0.33 OUR AVERAGE [$(1.55 \pm 0.32) \times 10^{-3}$ OUR 2011 AVERAGE]				
1.55±0.32±0.06	52	[52] ABLIKIM 06T	BES2	$\psi(2S) \to \gamma 2K^+2K^-$

NEW

[52] ABLIKIM 06T reports $(1.67 \pm 0.26 \pm 0.24) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^+K^-\phi)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$. 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

$\Gamma(p\overline{p})/\Gamma_{\text{total}}$ Γ_{38}/Γ

NODE=M057R12
NODE=M057R12

VALUE (units 10^{-4})	DOCUMENT ID
0.72±0.04 OUR FIT	

$\Gamma(p\overline{p}\pi^0)/\Gamma_{\text{total}}$ Γ_{39}/Γ

NODE=M057R06
NODE=M057R06

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
0.51±0.05 OUR AVERAGE			
0.52±0.04±0.02	[53] ONYISI 10	CLE3	$\psi(2S) \to \gamma p\overline{p}X$
0.47±0.10±0.02	[54] ATHAR 07	CLEO	$\psi(2S) \to \gamma h^+h^-h^0$

[53] ONYISI 10 reports $(4.83 \pm 0.25 \pm 0.35 \pm 0.31) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to p\overline{p}\pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ 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 $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$. 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

[54] ATHAR 07 reports $(0.44 \pm 0.08 \pm 0.05) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to p\overline{p}\pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ 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 $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R06;LINKAGE=AT

$\Gamma(p\overline{p}\eta)/\Gamma_{\text{total}}$ Γ_{40}/Γ

NODE=M057R34
NODE=M057R34

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
0.190±0.028 OUR AVERAGE			
0.188±0.028±0.007	[55] ONYISI 10	CLE3	$\psi(2S) \to \gamma p\overline{p}X$
0.20 ±0.08 ±0.01	[56] ATHAR 07	CLEO	$\psi(2S) \to \gamma h^+h^-h^0$

[55] ONYISI 10 reports $(1.76 \pm 0.23 \pm 0.14 \pm 0.11) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to p\overline{p}\eta)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ 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 $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$. 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

[56] ATHAR 07 reports $(0.19 \pm 0.07 \pm 0.02) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to p\overline{p}\eta)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ 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 $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R34;LINKAGE=AT

$\Gamma(p\overline{p}\omega)/\Gamma_{\text{total}}$ Γ_{41}/Γ

NODE=M057R56
NODE=M057R56

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.39±0.05±0.02	[57] ONYISI	10	CLE3	$\psi(2S) \to \gamma p \overline{p} X$

[57] ONYISI 10 reports (3.68 ± 0.35 ± 0.26 ± 0.24) × 10^{-4} from a measurement of $[\Gamma(\chi_{c2}(1P) \to p\overline{p}\omega)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33\pm0.14\pm0.61)\times10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$. 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

$\Gamma(p\overline{p}\phi)/\Gamma_{\text{total}}$ Γ_{42}/Γ

NODE=M057R62
NODE=M057R62

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
3.0±0.9±0.1	24 ± 7	[58] ABLIKIM	11F	BES3	$\psi(2S) \to \gamma p\overline{p} K^+ K^-$

[58] ABLIKIM 11F reports $(3.04\pm0.85\pm0.43)\times10^{-5}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to p\overline{p}\phi)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$. 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

$\Gamma(p\overline{p}\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{43}/Γ

NODE=M057R6
NODE=M057R6

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	[59] BAI	99B	BES	$\psi(2S) \to \gamma\chi_{c2}$
2.64±1.03±0.14	[59] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c2}$

→ NOT CHECKED ←

[59] 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

$\Gamma(p\overline{p}\pi^0\pi^0)/\Gamma_{\text{total}}$ Γ_{44}/Γ

NODE=M057R49
NODE=M057R49

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.086±0.026 OUR AVERAGE	[(0.085 ± 0.026)% OUR 2011 AVERAGE]				
0.086±0.026±0.003	29.2	[60] HE	08B	CLEO	$e^+e^- \to \gamma h^+ h^- h^0 h^0$

NEW

[60] HE 08B reports 0.08 ± 0.02 ± 0.01 ± 0.01 % from a measurement of $[\Gamma(\chi_{c2}(1P) \to p\overline{p}\pi^0\pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33\pm0.14\pm0.61)\times10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$. 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

$\Gamma(p\overline{p}K^+K^-\text{(non-resonant)})/\Gamma_{\text{total}}$ Γ_{45}/Γ

NODE=M057R59
NODE=M057R59

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.09±0.35±0.08	131 ± 12	[61] ABLIKIM	11F	BES3	$\psi(2S) \to \gamma p\overline{p} K^+ K^-$

[61] ABLIKIM 11F reports $(2.08\pm0.19\pm0.30)\times10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to p\overline{p}K^+K^-\text{(non-resonant)})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$. 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

$\Gamma(p\overline{p}K^0_S K^0_S)/\Gamma_{\text{total}}$ Γ_{46}/Γ

NODE=M057R30
NODE=M057R30

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<7.9	90	[62] ABLIKIM	06D	BES2	$\psi(2S) \to \chi_{c2}\gamma$

[62] Using $B(\psi(2S) \to \chi_{c2}\gamma) = (9.3 \pm 0.6)\%$.

NODE=M057R;LINKAGE=AB

$\Gamma(p\overline{n}\pi^-)/\Gamma_{\text{total}}$ Γ_{47}/Γ

NODE=M057R33
NODE=M057R33

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
11.1±3.8±0.4	[63] ABLIKIM	06I	BES2	$\psi(2S) \to \gamma p\pi^- X$

[63] ABLIKIM 06I reports $[\Gamma(\chi_{c2}(1P) \to p\overline{n}\pi^-)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))] = (0.97 \pm 0.20 \pm 0.26)\times10^{-4}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$. 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

$\Gamma(\Lambda\overline{\Lambda})/\Gamma_{\text{total}}$ Γ_{48}/Γ

NODE=M057R25
NODE=M057R25

VALUE (units 10^{-4})	DOCUMENT ID
1.86±0.27 OUR FIT	

$\Gamma(\Lambda\overline{\Lambda}\pi^+\pi^-)/\Gamma_{total}$ Γ_{49}/Γ

NODE=M057R29

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<3.5	90	[64] ABLIKIM	06D	BES2	$\psi(2S) \to \chi_{c2}\gamma$

[64] Using B($\psi(2S) \to \chi_{c2}\gamma$) = (9.3 ± 0.6)%.

NODE=M057R29;LINKAGE=AB

$\Gamma(K^+\overline{p}\Lambda + \text{c.c.})/\Gamma_{total}$ Γ_{50}/Γ

NODE=M057R07

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.91±0.17±0.04	[65] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[65] ATHAR 07 reports $(0.85 \pm 0.14 \pm 0.10) \times 10^{-3}$ from a measurement of [$\Gamma(\chi_{c2}(1P) \to K^+\overline{p}\Lambda + \text{c.c.})/\Gamma_{total}$] × [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($\psi(2S) \to \gamma\chi_{c2}(1P)$) = $(8.72 \pm 0.34) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R07;LINKAGE=AT

$\Gamma(K^+ p\Lambda(1520) + \text{c.c.})/\Gamma_{total}$ Γ_{51}/Γ

NODE=M057R60

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.1±0.7±0.1	79 ± 13	[66] ABLIKIM	11F	BES3	$\psi(2S) \to \gamma p\overline{p}K^+K^-$

[66] ABLIKIM 11F reports $(3.06 \pm 0.50 \pm 0.54) \times 10^{-4}$ from a measurement of [$\Gamma(\chi_{c2}(1P) \to K^+ p\Lambda(1520) + \text{c.c.})/\Gamma_{total}$] × [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($\psi(2S) \to \gamma\chi_{c2}(1P)$) = $(8.72 \pm 0.34) \times 10^{-2}$. 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

$\Gamma(\Lambda(1520)\overline{\Lambda}(1520))/\Gamma_{total}$ Γ_{52}/Γ

NODE=M057R61

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
5.1±1.6±0.2	29 ± 7	[67] ABLIKIM	11F	BES3	$\psi(2S) \to \gamma p\overline{p}K^+K^-$

[67] ABLIKIM 11F reports $(5.05 \pm 1.29 \pm 0.93) \times 10^{-4}$ from a measurement of [$\Gamma(\chi_{c2}(1P) \to \Lambda(1520)\overline{\Lambda}(1520))/\Gamma_{total}$] × [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($\psi(2S) \to \gamma\chi_{c2}(1P)$) = $(8.72 \pm 0.34) \times 10^{-2}$. 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

$\Gamma(\Sigma^0\overline{\Sigma}^0)/\Gamma_{total}$ Γ_{53}/Γ

NODE=M057R43

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<0.8	90	7.5 ± 3.4	[68] NAIK	08	CLEO	$\psi(2S) \to \gamma\Sigma^0\overline{\Sigma}^0$

[68] NAIK 08 reports $< 0.75 \times 10^{-4}$ from a measurement of [$\Gamma(\chi_{c2}(1P) \to \Sigma^0\overline{\Sigma}^0)/\Gamma_{total}$] × [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($\psi(2S) \to \gamma\chi_{c2}(1P)$) = 8.72×10^{-2}.

NODE=M057R43;LINKAGE=NA

$\Gamma(\Sigma^+\overline{\Sigma}^-)/\Gamma_{total}$ Γ_{54}/Γ

NODE=M057R44

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<0.7	90	4.0 ± 3.5	[69] NAIK	08	CLEO	$\psi(2S) \to \gamma\Sigma^+\overline{\Sigma}^-$

[69] NAIK 08 reports $< 0.67 \times 10^{-4}$ from a measurement of [$\Gamma(\chi_{c2}(1P) \to \Sigma^+\overline{\Sigma}^-)/\Gamma_{total}$] × [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($\psi(2S) \to \gamma\chi_{c2}(1P)$) = 8.72×10^{-2}.

NODE=M057R44;LINKAGE=NA

$\Gamma(\Xi^0\overline{\Xi}^0)/\Gamma_{total}$ Γ_{55}/Γ

NODE=M057R45

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<1.1	90	2.9 ± 1.7	[70] NAIK	08	CLEO	$\psi(2S) \to \gamma\Xi^0\overline{\Xi}^0$

[70] NAIK 08 reports $< 1.06 \times 10^{-4}$ from a measurement of [$\Gamma(\chi_{c2}(1P) \to \Xi^0\overline{\Xi}^0)/\Gamma_{total}$] × [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($\psi(2S) \to \gamma\chi_{c2}(1P)$) = 8.72×10^{-2}.

NODE=M057R45;LINKAGE=NA

$\Gamma(\Xi^-\overline{\Xi}^+)/\Gamma_{total}$ Γ_{56}/Γ

NODE=M057R17

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
1.55±0.34±0.06		29 ± 5	[71] NAIK	08	CLEO	$\psi(2S) \to \gamma\Xi^+\Xi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 3.7	90		[72] ABLIKIM	06D	BES2	$\psi(2S) \to \chi_{c2}\gamma$

[71] NAIK 08 reports $(1.45 \pm 0.30 \pm 0.15) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \Xi^- \overline{\Xi}^+)/\Gamma_{\rm total}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$. 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

[72] Using $B(\psi(2S) \rightarrow \chi_{c2}\gamma) = (9.3 \pm 0.6)\%$. NODE=M057R17;LINKAGE=AB

$\Gamma(J/\psi(1S)\pi^+\pi^-\pi^0)/\Gamma_{\rm total}$ Γ_{57}/Γ

NODE=M057R13
NODE=M057R13

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.015	90	BARATE	81	SPEC	190 GeV π^- Be $\rightarrow 2\pi 2\mu$

RADIATIVE DECAYS

NODE=M057310

$\Gamma(\gamma J/\psi(1S))/\Gamma_{\rm total}$ Γ_{58}/Γ

NODE=M057R7
NODE=M057R7

VALUE	DOCUMENT ID		TECN	COMMENT
0.195±0.008 OUR FIT				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.199 \pm 0.005 \pm 0.012$	[73] ADAM	05A	CLEO	$e^+e^- \rightarrow \psi(2S) \rightarrow \gamma\chi_{c2}$

[73] Uses $B(\psi(2S) \rightarrow \gamma\chi_{c2} \rightarrow \gamma\gamma J/\psi)$ from ADAM 05A and $B(\psi(2S) \rightarrow \gamma\chi_{c2})$ from ATHAR 04. NODE=M057R7;LINKAGE=AD

$\Gamma(\gamma\rho^0)/\Gamma_{\rm total}$ Γ_{59}/Γ

NODE=M057R40
NODE=M057R40

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<21 (CL = 90%) [$<50 \times 10^{-6}$ (CL = 90%) OUR 2011 BEST LIMIT]						
<21	90	13 ± 11	[74] ABLIKIM	11E	BES3	$\psi(2S) \rightarrow \gamma\gamma\rho^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<50	90	17.2 ± 6.8	[75] BENNETT	08A	CLEO	$\psi(2S) \rightarrow \gamma\gamma\rho^0$

[74] ABLIKIM 11E reports $< 20.8 \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \gamma\rho^0)/\Gamma_{\rm total}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 8.72 \times 10^{-2}$. NODE=M057R40;LINKAGE=AB

[75] BENNETT 08A reports $< 50 \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \gamma\rho^0)/\Gamma_{\rm total}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 8.72 \times 10^{-2}$. NODE=M057R40;LINKAGE=BE

$\Gamma(\gamma\omega)/\Gamma_{\rm total}$ Γ_{60}/Γ

NODE=M057R41
NODE=M057R41

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<6	90	1 ± 6	[76] ABLIKIM	11E	BES3	$\psi(2S) \rightarrow \gamma\gamma\omega$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<7	90	0.0 ± 1.8	[77] BENNETT	08A	CLEO	$\psi(2S) \rightarrow \gamma\gamma\omega$

[76] ABLIKIM 11E reports $< 6.1 \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \gamma\omega)/\Gamma_{\rm total}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 8.72 \times 10^{-2}$. NODE=M057R41;LINKAGE=AB

[77] BENNETT 08A reports $< 7.0 \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \gamma\omega)/\Gamma_{\rm total}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 8.72 \times 10^{-2}$. NODE=M057R41;LINKAGE=BE

$\Gamma(\gamma\phi)/\Gamma_{\rm total}$ Γ_{61}/Γ

NODE=M057R42
NODE=M057R42

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
< 8 (CL = 90%) [$<12 \times 10^{-6}$ (CL = 90%) OUR 2011 BEST LIMIT]						
< 8	90	5 ± 5	[78] ABLIKIM	11E	BES3	$\psi(2S) \rightarrow \gamma\gamma\phi$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<12	90	1.3 ± 2.5	[79] BENNETT	08A	CLEO	$\psi(2S) \rightarrow \gamma\gamma\phi$

[78] ABLIKIM 11E reports $< 8.1 \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \gamma\phi)/\Gamma_{\rm total}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 8.72 \times 10^{-2}$. NODE=M057R42;LINKAGE=AB

[79] BENNETT 08A reports $< 13 \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \gamma\phi)/\Gamma_{\rm total}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 8.72 \times 10^{-2}$. NODE=M057R42;LINKAGE=BE

$\Gamma(\gamma\gamma)/\Gamma_{\rm total}$ Γ_{62}/Γ

NODE=M057R1
NODE=M057R1

VALUE (units 10^{-4})	DOCUMENT ID
2.59±0.16 OUR FIT	
[$(2.56 \pm 0.16) \times 10^{-4}$ OUR 2011 FIT]	

NEW

$\Gamma(\gamma\gamma)/\Gamma(\gamma J/\psi(1S))$ — Γ_{62}/Γ_{58}

NODE=M057R23
NODE=M057R23

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
1.33±0.09 OUR FIT			
[(1.31 ± 0.09) × 10^{-3} OUR 2011 FIT]			
0.99±0.18	[80] AMBROGIANI 00B	E835	$\overline{p}p \to \chi_{c2} \to \gamma\gamma, \gamma J/\psi$

NEW

[80] Calculated by us using B($J/\psi(1S) \to e^+e^-$) = 0.0593 ± 0.0010.

NODE=M057R;LINKAGE=7A

$\Gamma(\gamma\gamma)/\Gamma_{total} \times \Gamma(p\overline{p})/\Gamma_{total}$ — $\Gamma_{62}/\Gamma \times \Gamma_{38}/\Gamma$

NODE=M057R24
NODE=M057R24

VALUE (units 10^{-8})	DOCUMENT ID	TECN	COMMENT
1.86±0.18 OUR FIT			
[(1.85 ± 0.18) × 10^{-8} OUR 2011 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	$\overline{p}p \to \gamma\gamma X$

NEW

$\chi_{c2}(1P)$ CROSS-PARTICLE BRANCHING RATIOS

NODE=M057230

$\Gamma(\chi_{c2}(1P) \to K^+K^-\pi^+\pi^-)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ — $\Gamma_{14}/\Gamma \times \Gamma^{\psi(2S)}_{111}/\Gamma^{\psi(2S)}_{11}$

NODE=M057B18
NODE=M057B18

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
2.36±0.27 OUR FIT			
[(2.39 ± 0.27) × 10^{-3} OUR 2011 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	[81] TANENBAUM 78	MRK1	$\psi(2S) \to \gamma\chi_{c2}$

NEW

[81] The reported value is derived using B($\psi(2S) \to \pi^+\pi^- J/\psi$) × B($J/\psi \to \ell^+\ell^-$) = (4.6 ± 0.7)%. Calculated by us using B($J/\psi \to \ell^+\ell^-$) = 0.1181 ± 0.0020.

NODE=M057B18;LINKAGE=TA

$\Gamma(\chi_{c2}(1P) \to K^*(892)^0\overline{K}^*(892)^0)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma_{total}$ — $\Gamma_{17}/\Gamma \times \Gamma^{\psi(2S)}_{111}/\Gamma^{\psi(2S)}$

NODE=M057B19
NODE=M057B19

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
2.2 ±0.4 OUR FIT			
3.11±0.36±0.48	ABLIKIM 04H	BES2	$\psi(2S) \to \gamma\chi_{c2}$

$\Gamma(\chi_{c2}(1P) \to p\overline{p})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ — $\Gamma_{38}/\Gamma \times \Gamma^{\psi(2S)}_{111}/\Gamma^{\psi(2S)}_{11}$

NODE=M057B1
NODE=M057B1

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
1.86±0.14 OUR FIT			
[(1.88 ± 0.14) × 10^{-5} OUR 2011 FIT]			
1.4 ±1.1	[82] BAI 98I	BES	$\psi(2S) \to \gamma\chi_{c2} \to \gamma\overline{p}p$

NEW

[82] 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 ± 0.8)% and B($\psi(2S) \to J/\psi(1S)\pi^+\pi^-$) = (32.4 ± 2.6)% [BAI 98D].

NODE=M057B;LINKAGE=J8

$\Gamma(\chi_{c2}(1P) \to p\overline{p})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma_{total}$ — $\Gamma_{38}/\Gamma \times \Gamma^{\psi(2S)}_{111}/\Gamma^{\psi(2S)}$

NODE=M057B6
NODE=M057B6

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
6.3±0.5 OUR FIT				
6.7±1.1 OUR AVERAGE Error includes scale factor of 1.5.				
7.2±0.7±0.4	121 ± 12	[83] 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	$\psi(2S) \to \gamma\chi_{c2}(1P) \to \gamma\overline{p}p$

[83] 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

$\Gamma(\chi_{c2}(1P) \to \Lambda\overline{\Lambda})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma_{total}$ — $\Gamma_{48}/\Gamma \times \Gamma^{\psi(2S)}_{111}/\Gamma^{\psi(2S)}$

NODE=M057B10
NODE=M057B10

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
16.3±2.3 OUR FIT				
15.9±2.1±1.0	71 ± 9	[84] NAIK 08	CLEO	$\psi(2S) \to \gamma\Lambda\overline{\Lambda}$

[84] 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

$\Gamma(\chi_{c2}(1P) \to \Lambda\overline{\Lambda})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{48}/\Gamma \times \Gamma_{111}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}$

NODE=M057B11
NODE=M057B11

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
4.8±0.7 OUR FIT					
$\mathbf{7.1^{+3.1}_{-2.9}\pm1.3}$	$8.3^{+3.7}_{-3.4}$	[85] BAI	03E	BES	$\psi(2S) \to \gamma\Lambda\overline{\Lambda}$

[85] BAI 03E reports [$B(\chi_{c2} \to \Lambda\overline{\Lambda})$ $B(\psi(2S) \to \gamma\chi_{c2})$ / $B(\psi(2S) \to J/\psi\pi^+\pi^-)$] × [$B^2(\Lambda \to \pi^- p)$ / $B(J/\psi \to p\overline{p})$] = $(1.33^{+0.59}_{-0.55} \pm 0.25)$%. 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=M057B11;LINKAGE=BA

$\Gamma(\chi_{c2}(1P) \to \pi\pi)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma_{total}$ $\Gamma_{22}/\Gamma \times \Gamma_{111}^{\psi(2S)}/\Gamma^{\psi(2S)}$

NODE=M057B02
NODE=M057B02

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.11±0.08 OUR FIT					
[$(2.12 \pm 0.08) \times 10^{-4}$ OUR 2011 FIT]					
2.17±0.09 OUR AVERAGE					
2.19±0.05±0.15	4.5k	[86] ABLIKIM	10A	BES3	$e^+e^- \to \psi(2S) \to \gamma\chi_{c2}$
2.23±0.06±0.10	2.5k	[87] ASNER	09	CLEO	$\psi(2S) \to \gamma\pi^+\pi^-$
1.90±0.08±0.20	0.8k	[88] ASNER	09	CLEO	$\psi(2S) \to \gamma\pi^0\pi^0$

NEW
OCCUR=2

[86] Calculated by us. ABLIKIM 10A reports $B(\chi_{c2} \to \pi^0\pi^0) = (0.88 \pm 0.02 \pm 0.06 \pm 0.04) \times 10^{-3}$ using $B(\psi(2S) \to \gamma\chi_{c2}) = (8.3 \pm 0.4)$%. We have multiplied the $\pi^0\pi^0$ measurement by 3 to obtain $\pi\pi$. NODE=M057B02;LINKAGE=AB

[87] Calculated by us. ASNER 09 reports $B(\chi_{c2} \to \pi^+\pi^-) = (1.59 \pm 0.04 \pm 0.07 \pm 0.10) \times 10^{-3}$ using $B(\psi(2S) \to \gamma\chi_{c2}) = (9.33 \pm 0.14 \pm 0.61)$%. We have multiplied the $\pi^+\pi^-$ measurement by 3/2 to obtain $\pi\pi$. NODE=M057B02;LINKAGE=AS

[88] Calculated by us. ASNER 09 reports $B(\chi_{c2} \to \pi^0\pi^0) = (0.68 \pm 0.03 \pm 0.07 \pm 0.04) \times 10^{-3}$ using $B(\psi(2S) \to \gamma\chi_{c2}) = (9.33 \pm 0.14 \pm 0.61)$%. We have multiplied the $\pi^0\pi^0$ measurement by 3 to obtain $\pi\pi$. NODE=M057B02;LINKAGE=AN

$\Gamma(\chi_{c2}(1P) \to \pi\pi)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{22}/\Gamma \times \Gamma_{111}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}$

NODE=M057B9
NODE=M057B9

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.629±0.024 OUR FIT					
0.54 ±0.06 OUR AVERAGE					
0.66 ±0.18 ±0.37	21 ± 6	[89] BAI	03C	BES	$\psi(2S) \to \gamma\pi^0\pi^0$
0.54 ±0.05 ±0.04	185 ± 16	[90] BAI	98I	BES	$\psi(2S) \to \gamma\pi^+\pi^-$

[89] We have multiplied $\pi^0\pi^0$ measurement by 3 to obtain $\pi\pi$. NODE=M057B;LINKAGE=BM

[90] 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

$\Gamma(\chi_{c2}(1P) \to \eta\eta)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma_{total}$ $\Gamma_{26}/\Gamma \times \Gamma_{111}^{\psi(2S)}/\Gamma^{\psi(2S)}$

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	[91] ABLIKIM	10A	BES3	$e^+e^- \to \psi(2S) \to \gamma\chi_{c2}$
0.47±0.05±0.05		156 ± 14	ASNER	09	CLEO	$\psi(2S) \to \gamma\eta\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 0.44	90		[92] 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

[91] 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

[92] Superseded by ASNER 09. NODE=M057B04;LINKAGE=AD

$\Gamma(\chi_{c2}(1P) \rightarrow K^+K^-)/\Gamma_{total} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))/\Gamma_{total}$ $\Gamma_{27}/\Gamma \times \Gamma^{\psi(2S)}_{111}/\Gamma^{\psi(2S)}$

NODE=M057B03
NODE=M057B03

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
9.5±0.6 OUR FIT				
10.5±0.3±0.6	1.6k	[93] ASNER 09	CLEO	$\psi(2S) \rightarrow \gamma K^+K^-$

[93] Calculated by us. ASNER 09 reports $B(\chi_{c2} \rightarrow K^+K^-) = (1.13 \pm 0.03 \pm 0.06 \pm 0.07) \times 10^{-3}$ using $B(\psi(2S) \rightarrow \gamma\chi_{c2}) = (9.33 \pm 0.14 \pm 0.61)\%$. NODE=M057B03;LINKAGE=AS

$\Gamma(\chi_{c2}(1P) \rightarrow K^+K^-)/\Gamma_{total} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))/\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{27}/\Gamma \times \Gamma^{\psi(2S)}_{111}/\Gamma^{\psi(2S)}_{11}$

NODE=M057B8
NODE=M057B8

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
0.283±0.017 OUR FIT				
0.190±0.034±0.019	115 ± 13	[94] BAI 98I	BES	$\psi(2S) \rightarrow \gamma K^+K^-$

[94] Calculated by us. The value for $B(\chi_{c2} \rightarrow K^+K^-)$ reported by BAI 98I is derived using $B(\psi(2S) \rightarrow \gamma\chi_{c2}) = (7.8 \pm 0.8)\%$ and $B(\psi(2S) \rightarrow J/\psi\pi^+\pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D]. NODE=M057B;LINKAGE=BI

$\Gamma(\chi_{c2}(1P) \rightarrow K^0_S K^0_S)/\Gamma_{total} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))/\Gamma_{total}$ $\Gamma_{28}/\Gamma \times \Gamma^{\psi(2S)}_{111}/\Gamma^{\psi(2S)}$

NODE=M057B12
NODE=M057B12

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
5.1 ±0.4 OUR FIT				
5.0 ±0.4 OUR AVERAGE				
4.9 ±0.3 ±0.3	373 ± 20	[95] ASNER 09	CLEO	$\psi(2S) \rightarrow \gamma K^0_S K^0_S$
5.72±0.76±0.63	65	ABLIKIM 05O	BES2	$\psi(2S) \rightarrow \gamma K^0_S K^0_S$

[95] Calculated by us. ASNER 09 reports $B(\chi_{c2} \rightarrow K^0_S K^0_S) = (0.53 \pm 0.03 \pm 0.03 \pm 0.03) \times 10^{-3}$ using $B(\psi(2S) \rightarrow \gamma\chi_{c2}) = (9.33 \pm 0.14 \pm 0.61)\%$. NODE=M057B12;LINKAGE=AS

$\Gamma(\chi_{c2}(1P) \rightarrow K^0_S K^0_S)/\Gamma_{total} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))/\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{28}/\Gamma \times \Gamma^{\psi(2S)}_{111}/\Gamma^{\psi(2S)}_{11}$

NODE=M057B13
NODE=M057B13

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
15.0±1.1 OUR FIT			
[$(15.1 \pm 1.1) \times 10^{-5}$ OUR 2011 FIT]			
14.7±4.1±3.3	[96] BAI 99B	BES	$\psi(2S) \rightarrow \gamma K^0_S K^0_S$

NEW

[96] Calculated by us. The value of $B(\chi_{c2} \rightarrow K^0_S K^0_S)$ reported by BAI 99B was derived using $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (7.8 \pm 0.8)\%$ and $B(\psi(2S) \rightarrow J/\psi\pi^+\pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D]. NODE=M057B13;LINKAGE=BA

$\Gamma(\chi_{c2}(1P) \rightarrow \overline{K}^0 K^+\pi^- + \text{c.c.})/\Gamma_{total} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))/\Gamma_{total}$ $\Gamma_{29}/\Gamma \times \Gamma^{\psi(2S)}_{111}/\Gamma^{\psi(2S)}$

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	[97] ATHAR 07	CLEO	$\psi(2S) \rightarrow \gamma K^0_S K^\pm\pi^\mp$
0.97±0.32±0.13	28	[98] ABLIKIM 06R	BES2	$\psi(2S) \rightarrow \gamma K^0_S K^\pm\pi^\mp$

[97] Calculated by us. ATHAR 07 reports $B(\chi_{c2} \rightarrow \overline{K}^0 K^+\pi^- + \text{c.c.}) = (1.3 \pm 0.2 \pm 0.1 \pm 0.1) \times 10^{-3}$ using $B(\psi(2S) \rightarrow \gamma\chi_{c2}) = (9.33 \pm 0.14 \pm 0.61)\%$. NODE=M057B05;LINKAGE=AT

[98] Calculated by us. ABLIKIM 06R reports $B(\chi_{c2} \rightarrow K^0_S K^\pm\pi^\mp) = (0.6 \pm 0.2 \pm 0.1) \times 10^{-3}$ using $B(\psi(2S) \rightarrow \gamma\chi_{c2}) = (8.1 \pm 0.6)\%$. We have multiplied by 2 to obtain $\overline{K}^0 K^+\pi^- + \text{c.c.}$ from $K^0_S K^\pm\pi^\mp$. NODE=M057B05;LINKAGE=AB

$\Gamma(\chi_{c2}(1P) \rightarrow 2(\pi^+\pi^-))/\Gamma_{total} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))/\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{1}/\Gamma \times \Gamma^{\psi(2S)}_{111}/\Gamma^{\psi(2S)}_{11}$

NODE=M057B5
NODE=M057B5

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
2.86±0.27 OUR FIT			
[$(2.89 \pm 0.27) \times 10^{-3}$ OUR 2011 FIT]			
3.1 ±1.0 OUR AVERAGE Error includes scale factor of 2.5.			
2.3 ±0.1 ±0.5	[99] BAI 99B	BES	$\psi(2S) \rightarrow \gamma\chi_{c2}$
4.3 ±0.6	[100] TANENBAUM 78	MRK1	$\psi(2S) \rightarrow \gamma\chi_{c2}$

NEW

[99] Calculated by us. The value for B($\chi_{c2} \rightarrow 2\pi^+ 2\pi^-$) reported in BAI 99B is derived using B($\psi(2S) \rightarrow \gamma\chi_{c2}$) = (7.8 ± 0.8)% and B($\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-$) = (32.4 ± 2.6)% [BAI 98D]. NODE=M057B;LINKAGE=K1

[100] The value for B($\psi(2S) \rightarrow \gamma\chi_{c2}$)×B($\chi_{c2} \rightarrow 2\pi^+\pi^-$) reported in TANENBAUM 78 is derived using B($\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-$)×B($J/\psi(1S)\ell^+\ell^-$) = (4.6 ± 0.7)%. Calculated by us using B($J/\psi(1S) \rightarrow \ell^+\ell^-$) = 0.1181 ± 0.0020. NODE=M057B;LINKAGE=K2

$\Gamma(\chi_{c2}(1P) \rightarrow K^+K^-K^+K^-)/\Gamma_{total} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))/\Gamma_{total}$ $\Gamma_{36}/\Gamma \times \Gamma^{\psi(2S)}_{111}/\Gamma^{\psi(2S)}$

NODE=M057B14
NODE=M057B14

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.55±0.19 OUR FIT					
1.76±0.16±0.24	160	[101] ABLIKIM	06T	BES2	$\psi(2S) \rightarrow \gamma 2K^+2K^-$

[101] Calculated by us. The value of B($\chi_{c2} \rightarrow 2K^+2K^-$) reported by ABLIKIM 06T was derived using B($\psi(2S) \rightarrow \gamma\chi_{c2}(1P)$) = (8.1 ± 0.4)%. NODE=M057B14;LINKAGE=AB

$\Gamma(\chi_{c2}(1P) \rightarrow K^+K^-K^+K^-)/\Gamma_{total} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))/\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{36}/\Gamma \times \Gamma^{\psi(2S)}_{111}/\Gamma^{\psi(2S)}_{11}$

NODE=M057B15
NODE=M057B15

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
4.6±0.6 OUR FIT				
3.6±0.6±0.6	[102] BAI	99B	BES	$\psi(2S) \rightarrow \gamma 2K^+2K^-$

[102] Calculated by us. The value of B($\chi_{c2} \rightarrow 2K^+2K^-$) reported by BAI 99B was derived using B($\psi(2S) \rightarrow \gamma\chi_{c2}(1P)$) = (7.8 ± 0.8)% and B($\psi(2S) \rightarrow J/\psi\pi^+\pi^-$) = (32.4 ± 2.6)% [BAI 98D]. NODE=M057B15;LINKAGE=BA

$\Gamma(\chi_{c2}(1P) \rightarrow \phi\phi)/\Gamma_{total} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))/\Gamma_{total}$ $\Gamma_{19}/\Gamma \times \Gamma^{\psi(2S)}_{111}/\Gamma^{\psi(2S)}$

NODE=M057B16
NODE=M057B16

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.00±0.10 OUR FIT					
[(1.29 ± 0.24) × 10^{-4} OUR 2011 FIT]					
0.98±0.13 OUR AVERAGE Error includes scale factor of 1.3. [(1.38 ± 0.33) × 10^{-4} OUR 2011 AVERAGE]					
0.94±0.03±0.10	849	[103] ABLIKIM	11K	BES3	$\psi(2S) \rightarrow \gamma$ hadrons
1.38±0.24±0.23	41	[104] ABLIKIM	06T	BES2	$\psi(2S) \rightarrow \gamma 2K^+2K^-$

NEW
NEW

[103] Calculated by us. The value of B($\chi_{c2} \rightarrow \phi\phi$) reported by ABLIKIM 11K was derived using B($\psi(2S) \rightarrow \gamma\chi_{c2}(1P)$) = (8.74 ± 0.35)%. NODE=M057B16;LINKAGE=AL

[104] Calculated by us. The value of B($\chi_{c2} \rightarrow \phi\phi$) reported by ABLIKIM 06T was derived using B($\psi(2S) \rightarrow \gamma\chi_{c2}(1P)$) = (8.1 ± 0.4)%. NODE=M057B16;LINKAGE=AB

$\Gamma(\chi_{c2}(1P) \rightarrow \phi\phi)/\Gamma_{total} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))/\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{19}/\Gamma \times \Gamma^{\psi(2S)}_{111}/\Gamma^{\psi(2S)}_{11}$

NODE=M057B17
NODE=M057B17

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
2.96±0.29 OUR FIT				
[(3.8 ± 0.7) × 10^{-4} OUR 2011 FIT]				
4.8 ±1.3 ±1.3	[105] BAI	99B	BES	$\psi(2S) \rightarrow \gamma 2K^+2K^-$

NEW

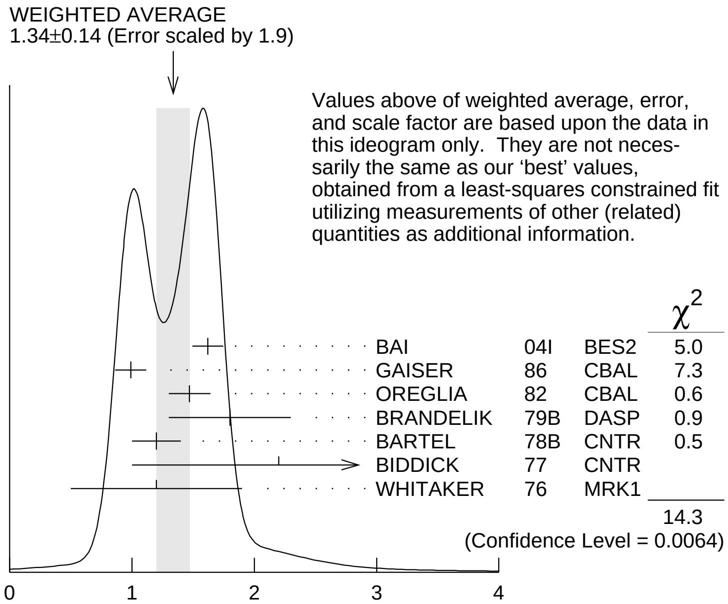
[105] Calculated by us. The value of B($\chi_{c2} \rightarrow \phi\phi$) reported by BAI 99B was derived using B($\psi(2S) \rightarrow \gamma\chi_{c2}(1P)$) = (7.8 ± 0.8)% and B($\psi(2S) \rightarrow J/\psi\pi^+\pi^-$) = (32.4 ± 2.6)% [BAI 98D]. NODE=M057B17;LINKAGE=BA

$\Gamma(\chi_{c2}(1P) \rightarrow \gamma J/\psi(1S))/\Gamma_{total} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))/\Gamma_{total}$ $\Gamma_{58}/\Gamma \times \Gamma^{\psi(2S)}_{111}/\Gamma^{\psi(2S)}$

NODE=M057B2
NODE=M057B2

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
1.70±0.04 OUR FIT					
1.34±0.14 OUR AVERAGE Error includes scale factor of 1.9. See the ideogram below.					
1.62±0.04±0.12	5.8k	BAI	04I	BES2	$\psi(2S) \rightarrow J/\psi\gamma\gamma$
0.99±0.10±0.08		GAISER	86	CBAL	$\psi(2S) \rightarrow \gamma X$
1.47±0.17		[106] OREGLIA	82	CBAL	$\psi(2S) \rightarrow \gamma\chi_{c2}$
1.8 ±0.5		[107] BRANDELIK	79B	DASP	$\psi(2S) \rightarrow \gamma\chi_{c2}$
1.2 ±0.2		[107] BARTEL	78B	CNTR	$\psi(2S) \rightarrow \gamma\chi_{c2}$
2.2 ±1.2		[108] BIDDICK	77	CNTR	$e^+e^- \rightarrow \gamma X$
1.2 ±0.7		[106] WHITAKER	76	MRK1	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.95±0.02±0.07	12.4k	[109] MENDEZ	08	CLEO	$\psi(2S) \rightarrow \gamma\chi_{c2}$
1.85±0.04±0.07	1.9k	[110] ADAM	05A	CLEO	Repl. by MENDEZ 08

[106] Recalculated by us using $B(J/\psi(1S) \to \ell^+\ell^-) = 0.1181 \pm 0.0020$. NODE=M057B;LINKAGE=3Q
[107] Recalculated by us using $B(J/\psi(1S) \to \mu^+\mu^-) = 0.0588 \pm 0.0010$. NODE=M057B;LINKAGE=2Q
[108] Assumes isotropic gamma distribution. NODE=M057B;LINKAGE=EA
[109] Not independent from other measurements of MENDEZ 08. NODE=M057B2;LINKAGE=ME
[110] 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})

$\Gamma(\chi_{c2}(1P) \to \gamma J/\psi(1S))/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\,\text{anything})$ $\Gamma_{58}/\Gamma \times \Gamma^{\psi(2S)}_{111}/\Gamma^{\psi(2S)}_{9}$

NODE=M057B7

$\Gamma_{58}/\Gamma \times \Gamma^{\psi(2S)}_{111}/\Gamma^{\psi(2S)}_{9} = \Gamma_{58}/\Gamma \times \Gamma^{\psi(2S)}_{111}/(\Gamma^{\psi(2S)}_{11} + \Gamma^{\psi(2S)}_{12} + \Gamma^{\psi(2S)}_{13} + 0.344\Gamma^{\psi(2S)}_{110} + 0.195\Gamma^{\psi(2S)}_{111})$ NODE=M057B7

NODE=M057B7

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
2.86±0.07 OUR FIT				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
3.12±0.03±0.09	12.4k	[111] MENDEZ 08	CLEO	$\psi(2S) \to \gamma\chi_{c2}$
3.11±0.07±0.07	1.9k	ADAM 05A	CLEO	Repl. by MENDEZ 08

[111] Not independent from other measurements of MENDEZ 08. NODE=M057B7;LINKAGE=ME

$\Gamma(\chi_{c2}(1P) \to \gamma J/\psi(1S))/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{58}/\Gamma \times \Gamma^{\psi(2S)}_{111}/\Gamma^{\psi(2S)}_{11}$

NODE=M057B3
NODE=M057B3

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
5.07±0.13 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	[112] ABLIKIM 04B	BES	$\psi(2S) \to J/\psi X$
3.9 ±1.2		[113] 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	[114] ADAM 05A	CLEO	Repl. by MENDEZ 08

[112] From a fit to the J/ψ recoil mass spectra. NODE=M057B;LINKAGE=AB
[113] 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
[114] Not independent from other values reported by ADAM 05A. NODE=M057B3;LINKAGE=AD

$\Gamma(\chi_{c2}(1P) \to \gamma\gamma)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma_{total}$ — $\Gamma_{62}/\Gamma \times \Gamma^{\psi(2S)}_{111}/\Gamma^{\psi(2S)}$

NODE=M057B4
NODE=M057B4

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
2.26±0.16 OUR FIT					
[(2.24 ± 0.16) × 10^{-5} OUR 2011 FIT]					
2.73±0.32 OUR AVERAGE					
2.68±0.28±0.15	333 ± 35	ECKLUND	08A	CLEO	$\psi(2S) \to \gamma\chi_{c2} \to 3\gamma$
7.0 ±2.1 ±2.0		LEE	85	CBAL	$\psi(2S) \to \gamma\chi_{c2}$

NEW

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
−10.0± 1.5 OUR AVERAGE					
− 9.3± 1.6±0.3	19.8k	[115] ARTUSO	09	CLEO	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$
$-9.3^{+3.9}_{-4.1}\pm0.6$	5.9k	[116] AMBROGIANI	02	E835	$p\overline{p} \to \chi_{c2} \to J/\psi\gamma$
−14 ± 6	1.9k	[116] ARMSTRONG	93E	E760	$p\overline{p} \to \chi_{c2} \to J/\psi\gamma$
$-33.3^{+11.6}_{-29.2}$	441	[116] 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	[117] ARTUSO	09	CLEO	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$

OCCUR=2

[115] 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
[116] Assuming a_3=0. NODE=M057A1;LINKAGE=A
[117] 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
1.6±1.3 OUR AVERAGE					
1.7±1.4±0.3	19.8k	[118] 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	$p\overline{p} \to \chi_{c2} \to J/\psi\gamma$

[118] From a fit with floating $M2$ and $E3$ amplitudes a_2, b_2, and a_3, and b_3. NODE=M057A2;LINKAGE=AR

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

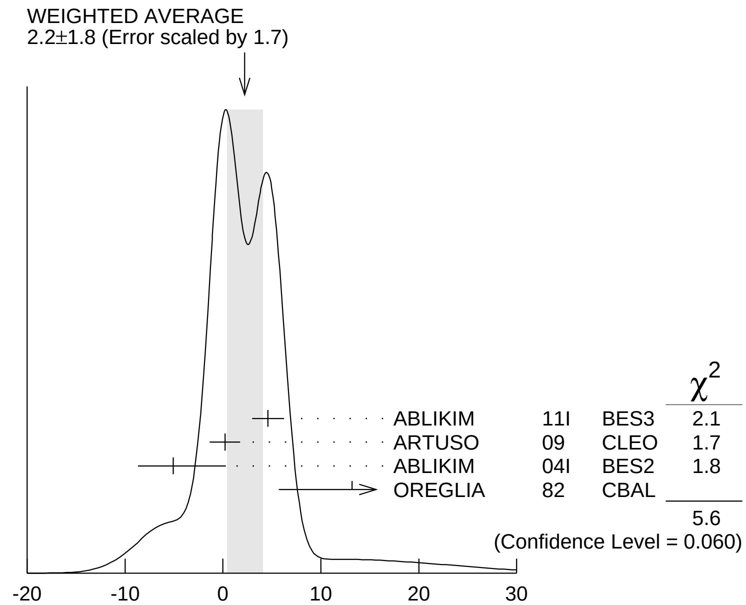
NODE=M057QB2
NODE=M057QB2

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
2.2±1.8 OUR AVERAGE Error includes scale factor of 1.7. See the ideogram below.					
[(1.0 ± 1.4) × 10^{-2} OUR 2011 AVERAGE Scale factor = 1.1]					
4.6±1.0±1.3	13.8k	[119] ABLIKIM	11I	BES3	$\psi(2S) \to \gamma\pi^+\pi^-, \gamma K^+K^-$
0.2±1.5±0.4	19.8k	[120] ARTUSO	09	CLEO	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$
$-5.1^{+5.4}_{-3.6}$	721	[119] ABLIKIM	04I	BES2	$\psi(2S) \to \gamma\pi^+\pi^-, \gamma K^+K^-$
$13.2^{+9.8}_{-7.5}$	441	[121] 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	[121] ARTUSO	09	CLEO	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$

NEW

OCCUR=2

[119] From a fit with floating $M2$ and $E3$ amplitudes b_2 and b_3. NODE=M057QB2;LINKAGE=AB
[120] From a fit with floating $M2$ and $E3$ amplitudes a_2, b_2, and a_3, and b_3. NODE=M057QB2;LINKAGE=AT
[121] 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
−0.3±1.0 OUR AVERAGE					
[(−1.0 ± 1.1) × 10^{-2} OUR 2011 AVERAGE]					
1.5±0.8±1.8	13.8k	[122] ABLIKIM	11I	BES3	$\psi(2S) \to \gamma\pi^+\pi^-, \gamma K^+K^-$
−0.8±1.2±0.2	19.8k	ARTUSO	09	CLEO	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$
$-2.7^{+4.3}_{-2.9}$	721	[122] ABLIKIM	04I	BES2	$\psi(2S) \to \gamma\pi^+\pi^-, \gamma K^+K^-$

NEW

[122] 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	[123] ARTUSO	09	CLEO	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$

[123] 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	11A	PR D83 012006	M. Ablikim *et al.*	(BES III Collab.)	REFID=53647
ABLIKIM	11E	PR D83 112005	M. Ablikim *et al.*	(BES III Collab.)	REFID=16717
ABLIKIM	11F	PR D83 112009	M. Ablikim *et al.*	(BES III Collab.)	REFID=16719
ABLIKIM	11I	PR D84 092006	M. Ablikim *et al.*	(BES III Collab.)	REFID=53930
ABLIKIM	11K	PRL 107 092001	M. Ablikim *et al.*	(BES III 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.*	(BES III Collab.)	REFID=53347
ONYISI	10	PR D82 011103R	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 091501R	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 011102R	H. Mendez *et al.*	(CLEO Collab.)	REFID=52684
NAIK	08	PR D78 031101R	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 071101R	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 071101R	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

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
3638.9±1.3 OUR AVERAGE					
[3637 ± 4 MeV OUR 2011 AVERAGE Scale factor = 1.7]					
$3638.5\pm1.5\pm0.8$	624	[1] DEL-AMO-SA..	11M	BABR	$\gamma\gamma \rightarrow K^0_S K^\pm \pi^\mp$
$3640.5\pm3.2\pm2.5$	1201	[1] DEL-AMO-SA..	11M	BABR	$\gamma\gamma \rightarrow K^+ K^- \pi^+ \pi^- \pi^0$
$3636.1^{+3.9}_{-4.2}{}^{+0.7}_{-2.0}$	128	[2] VINOKUROVA	11	BELL	$B^\pm \rightarrow K^\pm (K^0_S K^\pm \pi^\mp)$
$3626 \pm5 \pm6$	311	[3] ABE	07	BELL	$e^+ e^- \rightarrow J/\psi(c\overline{c})$
$3645.0\pm5.5^{+4.9}_{-7.8}$	121 ± 27	AUBERT	05C	BABR	$e^+ e^- \rightarrow J/\psi c\overline{c}$
$3642.9\pm3.1\pm1.5$	61	ASNER	04	CLEO	$\gamma\gamma \rightarrow \eta_c \rightarrow K^0_S K^\pm \pi^\mp$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3639 ± 7	98 ± 52	[4] AUBERT	06E	BABR	$B^\pm \rightarrow K^\pm X_{c\overline{c}}$
$3630.8\pm3.4\pm1.0$	112 ± 24	[5] AUBERT	04D	BABR	$\gamma\gamma \rightarrow \eta_c(2S) \rightarrow K\overline{K}\pi$
$3654 \pm6 \pm8$	39 ± 11	[6] CHOI	02	BELL	$B \rightarrow K K_S K^- \pi^+$
3594 ± 5		[7] EDWARDS	82C	CBAL	$e^+ e^- \rightarrow \gamma X$

NODE=M059M
NEW
OCCUR=2

[1] Ignoring possible interference with continuum. NODE=M059M;LINKAGE=DE
[2] Accounts for interference with non-resonant continuum. NODE=M059M;LINKAGE=VA
[3] From a fit of the J/ψ recoil mass spectrum. Supersedes ABE,K 02 and ABE 04G. NODE=M059M;LINKAGE=EB
[4] From the fit of the kaon momentum spectrum. Systematic errors not evaluated. NODE=M059M;LINKAGE=AU
[5] Superseded by DEL-AMO-SANCHEZ 11M. NODE=M059M;LINKAGE=AR
[6] Superseded by VINOKUROVA 11. NODE=M059M;LINKAGE=CH
[7] Assuming mass of $\psi(2S)$ = 3686 MeV. NODE=M059M;LINKAGE=A

$\eta_c(2S)$ WIDTH

NODE=M059W

NODE=M059W
NEW

VALUE (MeV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
10 ± 4 OUR AVERAGE						
[14 ± 7 MeV OUR 2011 AVERAGE]						
13.4± 4.6±3.2		624	[8] DEL-AMO-SA..	11M	BABR	$\gamma\gamma \to K^0_S K^\pm \pi^\mp$
$6.6^{+8.4+2.6}_{-5.1-0.9}$		128	[9] 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	[10] 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	[11] AUBERT	04D	BABR	$\gamma\gamma \to \eta_c(2S) \to K\overline{K}\pi$
<55	90	39 ± 11	[12] CHOI	02	BELL	$B \to K K_S K^- \pi^+$
<8.0	95		[13] EDWARDS	82C	CBAL	$e^+e^- \to \gamma X$

[8] Ignoring possible interference with continuum. NODE=M059W;LINKAGE=DE
[9] Accounts for interference with non-resonant continuum. NODE=M059W;LINKAGE=VA
[10] From the fit of the kaon momentum spectrum. Systematic errors not evaluated. NODE=M059W;LINKAGE=AU
[11] Superseded by DEL-AMO-SANCHEZ 11M. NODE=M059W;LINKAGE=AR
[12] For a mass value of 3654 ± 6 MeV. Superseded by VINOKUROVA 11. NODE=M059W;LINKAGE=W2
[13] 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	$2\pi^+2\pi^-$	not seen		DESIG=5
Γ_4	$\rho^0\rho^0$	not seen		DESIG=16
Γ_5	$3\pi^+3\pi^-$	not seen		DESIG=8;OUR EVAL;→ NOT CHECKED ←
Γ_6	$K^+K^-\pi^+\pi^-$	not seen		DESIG=6
Γ_7	$K^{*0}\overline{K}^{*0}$	not seen		DESIG=17
Γ_8	$K^+K^-\pi^+\pi^-\pi^0$	(1.4±1.0) %		DESIG=9
Γ_9	$K^+K^-2\pi^+2\pi^-$	not seen		DESIG=10;OUR EVAL; → NOT CHECKED ←
Γ_{10}	$K^0_S K^-2\pi^+\pi^-$ + c.c.	not seen		DESIG=11;OUR EVAL; → NOT CHECKED ←
Γ_{11}	$2K^+2K^-$	not seen		DESIG=7
Γ_{12}	$\phi\phi$	not seen		DESIG=18
Γ_{13}	$p\overline{p}$			DESIG=3
Γ_{14}	$\gamma\gamma$	$< 5 \times 10^{-4}$	90%	DESIG=2
Γ_{15}	$\pi^+\pi^-\eta$	not seen		DESIG=12;OUR EVAL; → NOT CHECKED ←
Γ_{16}	$\pi^+\pi^-\eta'$	not seen		DESIG=13;OUR EVAL; → NOT CHECKED ←
Γ_{17}	$K^+K^-\eta$	not seen		DESIG=14;OUR EVAL; → NOT CHECKED ←
Γ_{18}	$\pi^+\pi^-\eta_c(1S)$	not seen		DESIG=15;OUR EVAL; → NOT CHECKED ←

$\eta_c(2S)$ PARTIAL WIDTHS

NODE=M059216

$\Gamma(\gamma\gamma)$ Γ_{14}

NODE=M059W1
NODE=M059W1

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.3±0.6	[14] ASNER	04	CLEO	$\gamma\gamma \to \eta_c \to K^0_S K^\pm \pi^\mp$

[14] They measure $\Gamma(\eta_c(2S)\gamma\gamma)$ B($\eta_c(2S) \to K\overline{K}\pi$) = (0.18 ± 0.05 ± 0.02) $\Gamma(\eta_c(1S)\gamma\gamma)$ B($\eta_c(1S) \to K\overline{K}\pi$). The value for $\Gamma(\eta_c(2S) \to \gamma\gamma)$ 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 $\Gamma(\eta_c(1S) \to \gamma\gamma)$ = 7.4 ± 0.4 ± 2.3 keV. NODE=M059W1;LINKAGE=AS

$\eta_c(2S)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M059218

$\Gamma(2\pi^+2\pi^-) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_3\Gamma_{14}/\Gamma$

NODE=M059G01
NODE=M059G01

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<6.5	90	UEHARA	08	BELL	$\gamma\gamma \to \eta_c(2S) \to 2(\pi^+\pi^-)$

$\Gamma(K\overline{K}\pi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_2\Gamma_{14}/\Gamma$

NODE=M059G04
NODE=M059G04

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
41±4±6	624	[15] DEL-AMO-SA...11M	BABR	$\gamma\gamma \to K^0_S K^\pm \pi^\mp$

[15] Not independent from other measurements reported in DEL-AMO-SANCHEZ 11M.

NODE=M059G04;LINKAGE=DE

$\Gamma(K^+K^-\pi^+\pi^-) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_6\Gamma_{14}/\Gamma$

NODE=M059G02
NODE=M059G02

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<5.0	90	UEHARA	08	BELL	$\gamma\gamma \to \eta_c(2S) \to K^+K^-\pi^+\pi^-$

$\Gamma(K^+K^-\pi^+\pi^-\pi^0) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_8\Gamma_{14}/\Gamma$

NODE=M059G05
NODE=M059G05

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
30±6±5	1201	[16] DEL-AMO-SA...11M	BABR	$\gamma\gamma \to K^+K^-\pi^+\pi^-\pi^0$

[16] Not independent from other measurements reported in DEL-AMO-SANCHEZ 11M.

NODE=M059G05;LINKAGE=DE

$\Gamma(2K^+2K^-) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{11}\Gamma_{14}/\Gamma$

NODE=M059G03
NODE=M059G03

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<2.9	90	UEHARA	08	BELL	$\gamma\gamma \to \eta_c(2S) \to 2(K^+K^-)$

$\eta_c(2S)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma^2(\text{total})$

NODE=M059217

$\Gamma(p\overline{p})/\Gamma_{total} \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{13}/\Gamma \times \Gamma_{14}/\Gamma$

NODE=M059G1
NODE=M059G1

VALUE (units 10^{-8})	CL%	DOCUMENT ID		TECN	COMMENT
< 5.6	90	[17,18,19] AMBROGIANI	01	E835	$\overline{p}p \to \gamma\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 8.0	90	[17,18,20] AMBROGIANI	01	E835	$\overline{p}p \to \gamma\gamma$
<12.0	90	[18,20] AMBROGIANI	01	E835	$\overline{p}p \to \gamma\gamma$

OCCUR=2
OCCUR=3

[17] Including the measurements of of ARMSTRONG 95F in the AMBROGIANI 01 analysis.
[18] For a total width Γ=5 MeV.
[19] For the resonance mass region 3589–3599 MeV/c^2.
[20] For the resonance mass region 3575–3660 MeV/c^2.

NODE=M059G1;LINKAGE=A
NODE=M059G1;LINKAGE=B
NODE=M059G1;LINKAGE=C1
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	[21] EDWARDS	82C	CBAL	$e^+e^- \to \gamma X$

[21] 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	[22] 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	39 ± 11	[23] CHOI	02	BELL	$B \to K K_S K^-\pi^+$

[22] 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

[23] For a mass value of 3654 ± 6 MeV

NODE=M059R;LINKAGE=W2

$\Gamma(2\pi^+2\pi^-)/\Gamma_{total}$ — Γ_3/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_4/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_6/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_8/Γ_2

NODE=M059R21

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.73±0.17±0.17	1201	[24] DEL-AMO-SA..11M	BABR	$\gamma\gamma \to K^+K^-\pi^+\pi^-\pi^0$

[24] 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_7/Γ

NODE=M059R16

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	ABLIKIM	11H	BES3	$\psi(2S) \to \gamma K^+K^-\pi^+\pi^-$

$\Gamma(2K^+2K^-)/\Gamma_{total}$ — Γ_{11}/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_{12}/Γ

NODE=M059R17

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	ABLIKIM	11H	BES3	$\psi(2S) \to \gamma K^+K^-K^+K^-$

$\Gamma(\gamma\gamma)/\Gamma_{total}$ — Γ_{14}/Γ

NODE=M059R2

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<5 × 10^{-4}	90	[25] WICHT	08	BELL	$B^\pm \to K^\pm\gamma\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
not seen		AMBROGIANI	01	E835	$\overline{p}p \to \gamma\gamma$
<0.01	90	LEE	85	CBAL	$\psi' \to$ photons

[25] WICHT 08 reports $[\Gamma(\eta_c(2S) \to \gamma\gamma)/\Gamma_{total}] \times [B(B^+ \to \eta_c(2S)K^+)] < 0.18\times10^{-6}$ which we divide by our best value $B(B^+ \to \eta_c(2S)K^+) = 3.4 \times 10^{-4}$.

NODE=M059R2;LINKAGE=WI

$\eta_c(2S)$ CROSS-PARTICLE BRANCHING RATIOS

NODE=M059230

$\Gamma(\eta_c(2S) \to 2\pi^+2\pi^-)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\eta_c(2S))/\Gamma_{total}$ — $\Gamma_3/\Gamma \times \Gamma^{\psi(2S)}_{113}/\Gamma^{\psi(2S)}$

NODE=M059R05

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<14.6 × 10^{-6}	90	[26] CRONIN-HEN..10	CLEO	$\psi(2S) \to \gamma 2\pi^+2\pi^-$

[26] Assuming $\Gamma(\eta_c(2S)) = 14$ MeV. CRONIN-HENNESSY 10 gives the analytic dependence of limits on width.

NODE=M059R05;LINKAGE=CR

$\Gamma(\eta_c(2S) \to \rho^0\rho^0)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\eta_c(2S))/\Gamma_{total}$ — $\Gamma_4/\Gamma \times \Gamma^{\psi(2S)}_{113}/\Gamma^{\psi(2S)}$

NODE=M059R18

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<12.7 × 10^{-7}	90	ABLIKIM	11H	BES3	$\psi(2S) \to \gamma 2\pi^+2\pi^-$

$\Gamma(\eta_c(2S) \to 3\pi^+3\pi^-)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\eta_c(2S))/\Gamma_{total}$ — $\Gamma_5/\Gamma \times \Gamma^{\psi(2S)}_{113}/\Gamma^{\psi(2S)}$

NODE=M059R06

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<13.2 × 10^{-6}	90	[27] CRONIN-HEN..10	CLEO	$\psi(2S) \to \gamma 3\pi^+3\pi^-$

[27] Assuming $\Gamma(\eta_c(2S)) = 14$ MeV. CRONIN-HENNESSY 10 gives the analytic dependence of limits on width.

NODE=M059R06;LINKAGE=CR

$\Gamma(\eta_c(2S) \to K^+K^-\pi^+\pi^-)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\eta_c(2S))/\Gamma_{total}$ — $\Gamma_6/\Gamma \times \Gamma^{\psi(2S)}_{113}/\Gamma^{\psi(2S)}$

NODE=M059R07

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<9.6 × 10^{-6}	90	[28] CRONIN-HEN..10	CLEO	$\psi(2S) \to \gamma K^+K^-\pi^+\pi^-$

[28] Assuming $\Gamma(\eta_c(2S)) = 14$ MeV. CRONIN-HENNESSY 10 gives the analytic dependence of limits on width.

NODE=M059R07;LINKAGE=CR

$\Gamma(\eta_c(2S) \to K^{*0}\overline{K}^{*0})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\eta_c(2S))/\Gamma_{total}$ $\Gamma_7/\Gamma \times \Gamma_{113}^{\psi(2S)}/\Gamma^{\psi(2S)}$

NODE=M059R19
NODE=M059R19

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<19.6 \times 10^{-7}$	90	ABLIKIM	11H	BES3	$\psi(2S) \to \gamma K^+ K^- \pi^+ \pi^-$

$\Gamma(\eta_c(2S) \to K^+K^-\pi^+\pi^-\pi^0)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\eta_c(2S))/\Gamma_{total}$ $\Gamma_8/\Gamma \times \Gamma_{113}^{\psi(2S)}/\Gamma^{\psi(2S)}$

NODE=M059R08
NODE=M059R08

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<43.0 \times 10^{-6}$	90	[29] CRONIN-HEN..10	CLEO	$\psi(2S) \to \gamma K^+ K^- \pi^+ \pi^- \pi^0$

[29] Assuming $\Gamma(\eta_c(2S))$ = 14 MeV. CRONIN-HENNESSY 10 gives the analytic dependence of limits on width.

NODE=M059R08;LINKAGE=CR

$\Gamma(\eta_c(2S) \to K^+K^-2\pi^+2\pi^-)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\eta_c(2S))/\Gamma_{total}$ $\Gamma_9/\Gamma \times \Gamma_{113}^{\psi(2S)}/\Gamma^{\psi(2S)}$

NODE=M059R09
NODE=M059R09

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<9.7 \times 10^{-6}$	90	[30] CRONIN-HEN..10	CLEO	$\psi(2S) \to \gamma K^+ K^- 2\pi^+ 2\pi^-$

[30] Assuming $\Gamma(\eta_c(2S))$ = 14 MeV. CRONIN-HENNESSY 10 gives the analytic dependence of limits on width.

NODE=M059R09;LINKAGE=CR

$\Gamma(\eta_c(2S) \to K^0_S K^- 2\pi^+\pi^- + \text{c.c.})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\eta_c(2S))/\Gamma_{total}$ $\Gamma_{10}/\Gamma \times \Gamma_{113}^{\psi(2S)}/\Gamma^{\psi(2S)}$

NODE=M059R10
NODE=M059R10

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<15.2 \times 10^{-6}$	90	[31] CRONIN-HEN..10	CLEO	$\psi(2S) \to \gamma K^0_S K^- 2\pi^+ \pi^-$+c.c.

[31] Assuming $\Gamma(\eta_c(2S))$ = 14 MeV. CRONIN-HENNESSY 10 gives the analytic dependence of limits on width.

NODE=M059R10;LINKAGE=CR

$\Gamma(\eta_c(2S) \to \phi\phi)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\eta_c(2S))/\Gamma_{total}$ $\Gamma_{12}/\Gamma \times \Gamma_{113}^{\psi(2S)}/\Gamma^{\psi(2S)}$

NODE=M059R20
NODE=M059R20

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<7.8 \times 10^{-7}$	90	ABLIKIM	11H	BES3	$\psi(2S) \to \gamma K^+ K^- K^+ K^-$

$\Gamma(\eta_c(2S) \to \pi^+\pi^-\eta)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\eta_c(2S))/\Gamma_{total}$ $\Gamma_{15}/\Gamma \times \Gamma_{113}^{\psi(2S)}/\Gamma^{\psi(2S)}$

NODE=M059R11
NODE=M059R11

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<4.3 \times 10^{-6}$	90	[32] CRONIN-HEN..10	CLEO	$\psi(2S) \to \gamma \pi^+ \pi^- \eta$

[32] Assuming $\Gamma(\eta_c(2S))$ = 14 MeV. CRONIN-HENNESSY 10 gives the analytic dependence of limits on width.

NODE=M059R11;LINKAGE=CR

$\Gamma(\eta_c(2S) \to \pi^+\pi^-\eta')/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\eta_c(2S))/\Gamma_{total}$ $\Gamma_{16}/\Gamma \times \Gamma_{113}^{\psi(2S)}/\Gamma^{\psi(2S)}$

NODE=M059R12
NODE=M059R12

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<14.2 \times 10^{-6}$	90	[33] CRONIN-HEN..10	CLEO	$\psi(2S) \to \gamma \pi^+ \pi^- \eta'$

[33] Assuming $\Gamma(\eta_c(2S))$ = 14 MeV. CRONIN-HENNESSY 10 gives the analytic dependence of limits on width.

NODE=M059R12;LINKAGE=CR

$\Gamma(\eta_c(2S) \to K^+K^-\eta)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\eta_c(2S))/\Gamma_{total}$ $\Gamma_{17}/\Gamma \times \Gamma_{113}^{\psi(2S)}/\Gamma^{\psi(2S)}$

NODE=M059R13
NODE=M059R13

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<5.9 \times 10^{-6}$	90	[34] CRONIN-HEN..10	CLEO	$\psi(2S) \to \gamma K^+ K^- \eta$

[34] Assuming $\Gamma(\eta_c(2S))$ = 14 MeV. CRONIN-HENNESSY 10 gives the analytic dependence of limits on width.

NODE=M059R13;LINKAGE=CR

$\Gamma(\eta_c(2S) \to \pi^+\pi^-\eta_c(1S))/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\eta_c(2S))/\Gamma_{total}$ $\Gamma_{18}/\Gamma \times \Gamma_{113}^{\psi(2S)}/\Gamma^{\psi(2S)}$

NODE=M059R14
NODE=M059R14

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<1.7 \times 10^{-4}$	90	[35] CRONIN-HEN..10	CLEO	$\psi(2S) \to \gamma \pi^+ \pi^- \eta_c(1S)$

[35] 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

ABLIKIM	11H	PR D84 091102	M. Ablikim *et al.*	(BES III 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 031101R	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

$\psi(2S)$

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

NODE=M071

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*
$3686.109^{+0.012}_{-0.014}$ OUR FIT					
[3686.09 ± 0.04 MeV OUR 2011 FIT Scale factor = 1.6]					
$3686.108^{+0.011}_{-0.014}$ OUR AVERAGE					
[3686.093 ± 0.034 MeV OUR 2011 AVERAGE Scale factor = 1.4]					
3686.12 ±0.06 ±0.10	4k	AAIJ	12H	LHCB	$pp \to J/\psi\pi^+\pi^- X$
$3686.114 \pm 0.007^{+0.011}_{-0.016}$		[1] ANASHIN	12	KEDR	$e^+e^- \to$ hadrons
3686.111±0.025±0.009		AULCHENKO	03	KEDR	$e^+e^- \to$ hadrons
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. • • •					
3686.00 ±0.10	413	[4] ZHOLENTZ	80	OLYA	e^+e^-

NEW

NEW

[1] From the scans in 2004 and 2006. ANASHIN 12 reports the value $3686.114 \pm 0.007 \pm 0.011^{+0.002}_{-0.012}$ 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

[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] 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	[5] 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	[5] 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	[6] BAI	98E	BES	e^+e^-

[5] Redundant with data in mass above. NODE=M071DM;LINKAGE=R
[6] Systematic errors not evaluated. NODE=M071DM;LINKAGE=BD

$\psi(2S)$ WIDTH

NODE=M071W

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
304± 9 OUR FIT					
286±16 OUR AVERAGE					
358±88± 4		ABLIKIM	08B	BES2	$e^+e^- \rightarrow$ hadrons
290±25± 4	2.7k	ANDREOTTI	07	E835	$p\overline{p} \rightarrow e^+e^-$, $J/\psi X$
331±58± 2		ABLIKIM	06L	BES2	$e^+e^- \rightarrow$ hadrons
264±27		[7] BAI	02B	BES2	e^+e^-
287±37±16		[8] ARMSTRONG	93B	E760	$\overline{p}p \rightarrow e^+e^-$

NODE=M071W

[7] 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
[8] 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 $\gamma \rightarrow$ 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	e^+e^-	(7.73±0.17) $\times 10^{-3}$		DESIG=1
Γ_7	$\mu^+\mu^-$	(7.7 ±0.8) $\times 10^{-3}$		DESIG=2
Γ_8	$\tau^+\tau^-$	(3.0 ±0.4) $\times 10^{-3}$		DESIG=68
	Decays into $J/\psi(1S)$ and anything			NODE=M071;CLUMP=A
Γ_9	$J/\psi(1S)$ anything	(59.5 ±0.8) %		DESIG=11
Γ_{10}	$J/\psi(1S)$ neutrals	(24.6 ±0.4) %		DESIG=12
Γ_{11}	$J/\psi(1S)\pi^+\pi^-$	(33.6 ±0.4) %		DESIG=13
Γ_{12}	$J/\psi(1S)\pi^0\pi^0$	(17.75±0.34) %		DESIG=14
Γ_{13}	$J/\psi(1S)\eta$	(3.28±0.07) %		DESIG=15
Γ_{14}	$J/\psi(1S)\pi^0$	(1.30±0.10) $\times 10^{-3}$	S=1.4	DESIG=18
	Hadronic decays			NODE=M071;CLUMP=B
Γ_{15}	$\pi^0 h_c(1P)$	(8.6 ±1.3) $\times 10^{-4}$		DESIG=254
Γ_{16}	$3(\pi^+\pi^-)\pi^0$	(3.5 ±1.6) $\times 10^{-3}$		DESIG=37
Γ_{17}	$2(\pi^+\pi^-)\pi^0$	(2.9 ±1.0) $\times 10^{-3}$	S=4.6	DESIG=25
Γ_{18}	$\rho a_2(1320)$	(2.6 ±0.9) $\times 10^{-4}$		DESIG=65
Γ_{19}	$p\overline{p}$	(2.76±0.12) $\times 10^{-4}$		DESIG=27
Γ_{20}	$\Delta^{++}\overline{\Delta}^{--}$	(1.28±0.35) $\times 10^{-4}$		DESIG=70
Γ_{21}	$\Lambda\overline{\Lambda}\pi^0$	$<$ 1.2 $\times 10^{-4}$	CL=90%	DESIG=238
Γ_{22}	$\Lambda\overline{\Lambda}\eta$	$<$ 4.9 $\times 10^{-5}$	CL=90%	DESIG=239
Γ_{23}	$\Lambda\overline{p}K^+$	(1.00±0.14) $\times 10^{-4}$		DESIG=214
Γ_{24}	$\Lambda\overline{p}K^+\pi^+\pi^-$	(1.8 ±0.4) $\times 10^{-4}$		DESIG=215
Γ_{25}	$\Lambda\overline{\Lambda}\pi^+\pi^-$	(2.8 ±0.6) $\times 10^{-4}$		DESIG=213
Γ_{26}	$\Lambda\overline{\Lambda}$	(2.8 ±0.5) $\times 10^{-4}$	S=2.6	DESIG=28
Γ_{27}	$\Sigma^+\overline{\Sigma}^-$	(2.6 ±0.8) $\times 10^{-4}$		DESIG=223
Γ_{28}	$\Sigma^0\overline{\Sigma}^0$	(2.2 ±0.4) $\times 10^{-4}$	S=1.5	DESIG=71
Γ_{29}	$\Sigma(1385)^+\overline{\Sigma}(1385)^-$	(1.1 ±0.4) $\times 10^{-4}$		DESIG=72
Γ_{30}	$\Xi^-\overline{\Xi}^+$	(1.8 ±0.6) $\times 10^{-4}$	S=2.8	DESIG=29
Γ_{31}	$\Xi^0\overline{\Xi}^0$	(2.8 ±0.9) $\times 10^{-4}$		DESIG=224
Γ_{32}	$\Xi(1530)^0\overline{\Xi}(1530)^0$	$<$ 8.1 $\times 10^{-5}$	CL=90%	DESIG=73
Γ_{33}	$\Omega^-\overline{\Omega}^+$	$<$ 7.3 $\times 10^{-5}$	CL=90%	DESIG=74
Γ_{34}	$\pi^0 p\overline{p}$	(1.50±0.08) $\times 10^{-4}$	S=1.1	DESIG=35
Γ_{35}	$N_1^*(1440)\overline{p} \rightarrow \pi^0 p\overline{p}$	(8.1 ±0.8) $\times 10^{-5}$		DESIG=261
Γ_{36}	$\pi^0 f_0(2100) \rightarrow \pi^0 p\overline{p}$	(1.1 ±0.4) $\times 10^{-5}$		DESIG=262
Γ_{37}	$\eta p\overline{p}$	(5.7 ±0.6) $\times 10^{-5}$		DESIG=200
Γ_{38}	$\eta f_0(2100) \rightarrow \eta p\overline{p}$	(1.2 ±0.4) $\times 10^{-5}$		DESIG=263
Γ_{39}	$N^*(1535)\overline{p} \rightarrow \eta p\overline{p}$	(4.4 ±0.7) $\times 10^{-5}$		DESIG=264

Γ_{40}	$\omega p \overline{p}$	$(6.9 \pm 2.1) \times 10^{-5}$		DESIG=77
Γ_{41}	$\phi p \overline{p}$	$< 2.4 \times 10^{-5}$	CL=90%	DESIG=80
Γ_{42}	$\pi^+ \pi^- p \overline{p}$	$(6.0 \pm 0.4) \times 10^{-4}$		DESIG=31
Γ_{43}	$p \overline{n} \pi^-$ or c.c.	$(2.48 \pm 0.17) \times 10^{-4}$		DESIG=227
Γ_{44}	$p \overline{n} \pi^- \pi^0$	$(3.2 \pm 0.7) \times 10^{-4}$		DESIG=228
Γ_{45}	$2(\pi^+ \pi^- \pi^0)$	$(4.8 \pm 1.5) \times 10^{-3}$		DESIG=221
Γ_{46}	$\eta \pi^+ \pi^-$	$< 1.6 \times 10^{-4}$	CL=90%	DESIG=202
Γ_{47}	$\eta \pi^+ \pi^- \pi^0$	$(9.5 \pm 1.7) \times 10^{-4}$		DESIG=203
Γ_{48}	$2(\pi^+ \pi^-) \eta$	$(1.2 \pm 0.6) \times 10^{-3}$		DESIG=251
Γ_{49}	$\eta' \pi^+ \pi^- \pi^0$	$(4.5 \pm 2.1) \times 10^{-4}$		DESIG=204
Γ_{50}	$\omega \pi^+ \pi^-$	$(7.3 \pm 1.2) \times 10^{-4}$	S=2.1	DESIG=75
Γ_{51}	$b_1^{\pm} \pi^{\mp}$	$(4.0 \pm 0.6) \times 10^{-4}$	S=1.1	DESIG=40
Γ_{52}	$b_1^0 \pi^0$	$(2.4 \pm 0.6) \times 10^{-4}$		DESIG=193
Γ_{53}	$\omega f_2(1270)$	$(2.2 \pm 0.4) \times 10^{-4}$		DESIG=64
Γ_{54}	$\pi^+ \pi^- K^+ K^-$	$(7.5 \pm 0.9) \times 10^{-4}$	S=1.9	DESIG=26
Γ_{55}	$\rho^0 K^+ K^-$	$(2.2 \pm 0.4) \times 10^{-4}$		DESIG=205
Γ_{56}	$K^*(892)^0 \overline{K}_2^*(1430)^0$	$(1.9 \pm 0.5) \times 10^{-4}$		DESIG=66
Γ_{57}	$K^+ K^- \pi^+ \pi^- \eta$	$(1.3 \pm 0.7) \times 10^{-3}$		DESIG=252
Γ_{58}	$K^+ K^- 2(\pi^+ \pi^-) \pi^0$	$(1.00 \pm 0.31) \times 10^{-3}$		DESIG=240
Γ_{59}	$K^+ K^- 2(\pi^+ \pi^-)$	$(1.9 \pm 0.9) \times 10^{-3}$		DESIG=222
Γ_{60}	$K_1(1270)^{\pm} K^{\mp}$	$(1.00 \pm 0.28) \times 10^{-3}$		DESIG=41
Γ_{61}	$K_S^0 K_S^0 \pi^+ \pi^-$	$(2.2 \pm 0.4) \times 10^{-4}$		DESIG=225
Γ_{62}	$\rho^0 p \overline{p}$	$(5.0 \pm 2.2) \times 10^{-5}$		DESIG=210
Γ_{63}	$K^+ \overline{K}^*(892)^0 \pi^- +$ c.c.	$(6.7 \pm 2.5) \times 10^{-4}$		DESIG=34
Γ_{64}	$2(\pi^+ \pi^-)$	$(2.4 \pm 0.6) \times 10^{-4}$	S=2.2	DESIG=24
Γ_{65}	$\rho^0 \pi^+ \pi^-$	$(2.2 \pm 0.6) \times 10^{-4}$	S=1.4	DESIG=33
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}	$\eta K^+ K^-$	$< 1.3 \times 10^{-4}$	CL=90%	DESIG=207
Γ_{73}	$\omega K^+ K^-$	$(1.85 \pm 0.25) \times 10^{-4}$	S=1.1	DESIG=76
Γ_{74}	$3(\pi^+ \pi^-)$	$(3.5 \pm 2.0) \times 10^{-4}$	S=2.8	DESIG=32
Γ_{75}	$p \overline{p} \pi^+ \pi^- \pi^0$	$(7.3 \pm 0.7) \times 10^{-4}$		DESIG=211
Γ_{76}	$K^+ K^-$	$(6.3 \pm 0.7) \times 10^{-5}$		DESIG=23
Γ_{77}	$K_S^0 K_L^0$	$(5.4 \pm 0.5) \times 10^{-5}$		DESIG=85
Γ_{78}	$\pi^+ \pi^- \pi^0$	$(1.68 \pm 0.26) \times 10^{-4}$	S=1.4	DESIG=36
Γ_{79}	$\rho(2150) \pi \to \pi^+ \pi^- \pi^0$	$(1.9 {}^{+1.2}_{-0.4}) \times 10^{-4}$		DESIG=201
Γ_{80}	$\rho(770) \pi \to \pi^+ \pi^- \pi^0$	$(3.2 \pm 1.2) \times 10^{-5}$	S=1.8	DESIG=22
Γ_{81}	$\pi^+ \pi^-$	$(8 \pm 5) \times 10^{-5}$		DESIG=21
Γ_{82}	$K_1(1400)^{\pm} K^{\mp}$	$< 3.1 \times 10^{-4}$	CL=90%	DESIG=42
Γ_{83}	$K^+ K^- \pi^0$	$< 2.96 \times 10^{-5}$	CL=90%	DESIG=38
Γ_{84}	$K^+ \overline{K}^*(892)^- +$ c.c.	$(1.7 {}^{+0.8}_{-0.7}) \times 10^{-5}$		DESIG=39
Γ_{85}	$K^*(892)^0 \overline{K}^0 +$ c.c.	$(1.09 \pm 0.20) \times 10^{-4}$		DESIG=194
Γ_{86}	$\phi \pi^+ \pi^-$	$(1.17 \pm 0.29) \times 10^{-4}$	S=1.7	DESIG=78
Γ_{87}	$\phi f_0(980) \to \pi^+ \pi^-$	$(6.8 \pm 2.5) \times 10^{-5}$	S=1.1	DESIG=81
Γ_{88}	$2(K^+ K^-)$	$(6.0 \pm 1.4) \times 10^{-5}$		DESIG=208
Γ_{89}	$\phi K^+ K^-$	$(7.0 \pm 1.6) \times 10^{-5}$		DESIG=79
Γ_{90}	$2(K^+ K^-) \pi^0$	$(1.10 \pm 0.28) \times 10^{-4}$		DESIG=209
Γ_{91}	$\phi \eta$	$(2.8 {}^{+1.0}_{-0.8}) \times 10^{-5}$		DESIG=89
Γ_{92}	$\phi \eta'$	$(3.1 \pm 1.6) \times 10^{-5}$		DESIG=90
Γ_{93}	$\omega \eta'$	$(3.2 {}^{+2.5}_{-2.1}) \times 10^{-5}$		DESIG=91
Γ_{94}	$\omega \pi^0$	$(2.1 \pm 0.6) \times 10^{-5}$		DESIG=92

Γ_{95}	$\rho\eta'$		$(1.9\ ^{+1.7}_{-1.2}) \times 10^{-5}$		DESIG=93
Γ_{96}	$\rho\eta$		$(2.2 \pm 0.6) \times 10^{-5}$	S=1.1	DESIG=94
Γ_{97}	$\omega\eta$		$< 1.1 \times 10^{-5}$	CL=90%	DESIG=95
Γ_{98}	$\phi\pi^0$		$< 4 \times 10^{-6}$	CL=90%	DESIG=96
Γ_{99}	$\eta_c\pi^+\pi^-\pi^0$		$< 1.0 \times 10^{-3}$	CL=90%	DESIG=229
Γ_{100}	$p\overline{p}K^+K^-$		$(2.7 \pm 0.7) \times 10^{-5}$		DESIG=212
Γ_{101}	$\overline{\Lambda}nK^0_S$ + c.c.		$(8.1 \pm 1.8) \times 10^{-5}$		DESIG=237
Γ_{102}	$\phi f'_2(1525)$		$(4.4 \pm 1.6) \times 10^{-5}$		DESIG=67
Γ_{103}	$\Theta(1540)\overline{\Theta}(1540) \to K^0_S pK^-\overline{n}$ + c.c.		$< 8.8 \times 10^{-6}$	CL=90%	DESIG=195
Γ_{104}	$\Theta(1540)K^-\overline{n} \to K^0_S pK^-\overline{n}$		$< 1.0 \times 10^{-5}$	CL=90%	DESIG=196
Γ_{105}	$\Theta(1540)K^0_S\overline{p} \to K^0_S\overline{p}K^+n$		$< 7.0 \times 10^{-6}$	CL=90%	DESIG=197
Γ_{106}	$\overline{\Theta}(1540)K^+n \to K^0_S\overline{p}K^+n$		$< 2.6 \times 10^{-5}$	CL=90%	DESIG=198
Γ_{107}	$\overline{\Theta}(1540)K^0_S p \to K^0_S pK^-\overline{n}$		$< 6.0 \times 10^{-6}$	CL=90%	DESIG=199
Γ_{108}	$K^0_S K^0_S$		$< 4.6 \times 10^{-6}$		DESIG=86
	Radiative decays				NODE=M071;CLUMP=C
Γ_{109}	$\gamma\chi_{c0}(1P)$		(9.68 ± 0.31) %		DESIG=56
Γ_{110}	$\gamma\chi_{c1}(1P)$		(9.2 ± 0.4) %		DESIG=58
Γ_{111}	$\gamma\chi_{c2}(1P)$		(8.72 ± 0.34) %		DESIG=59
Γ_{112}	$\gamma\eta_c(1S)$		$(3.4 \pm 0.5) \times 10^{-3}$	S=1.3	DESIG=61
Γ_{113}	$\gamma\eta_c(2S)$		$< 8 \times 10^{-4}$	CL=90%	DESIG=63
Γ_{114}	$\gamma\pi^0$		$(1.6 \pm 0.4) \times 10^{-6}$		DESIG=52
Γ_{115}	$\gamma\eta'(958)$		$(1.23 \pm 0.06) \times 10^{-4}$		DESIG=54
Γ_{116}	$\gamma f_2(1270)$		$(2.1 \pm 0.4) \times 10^{-4}$		DESIG=82
Γ_{117}	$\gamma f_0(1710)$				DESIG=236
Γ_{118}	$\gamma f_0(1710) \to \gamma\pi\pi$		$(3.0 \pm 1.3) \times 10^{-5}$		DESIG=83
Γ_{119}	$\gamma f_0(1710) \to \gamma K\overline{K}$		$(6.0 \pm 1.6) \times 10^{-5}$		DESIG=84
Γ_{120}	$\gamma\gamma$		$< 1.4 \times 10^{-4}$	CL=90%	DESIG=51
Γ_{121}	$\gamma\eta$		$(1.4 \pm 0.5) \times 10^{-6}$		DESIG=53
Γ_{122}	$\gamma\eta\pi^+\pi^-$		$(8.7 \pm 2.1) \times 10^{-4}$		DESIG=230
Γ_{123}	$\gamma\eta(1405)$				DESIG=231
Γ_{124}	$\gamma\eta(1405) \to \gamma K\overline{K}\pi$		$< 9 \times 10^{-5}$	CL=90%	DESIG=62
Γ_{125}	$\gamma\eta(1405) \to \eta\pi^+\pi^-$		$(3.6 \pm 2.5) \times 10^{-5}$		DESIG=232
Γ_{126}	$\gamma\eta(1475)$				DESIG=233
Γ_{127}	$\gamma\eta(1475) \to K\overline{K}\pi$		$< 1.4 \times 10^{-4}$	CL=90%	DESIG=234
Γ_{128}	$\gamma\eta(1475) \to \eta\pi^+\pi^-$		$< 8.8 \times 10^{-5}$	CL=90%	DESIG=235
Γ_{129}	$\gamma 2(\pi^+\pi^-)$		$(4.0 \pm 0.6) \times 10^{-4}$		DESIG=241
Γ_{130}	$\gamma K^{*0}K^+\pi^-$ + c.c.		$(3.7 \pm 0.9) \times 10^{-4}$		DESIG=242
Γ_{131}	$\gamma K^{*0}\overline{K}^{*0}$		$(2.4 \pm 0.7) \times 10^{-4}$		DESIG=243
Γ_{132}	$\gamma K^0_S K^+\pi^-$ + c.c.		$(2.6 \pm 0.5) \times 10^{-4}$		DESIG=244
Γ_{133}	$\gamma K^+K^-\pi^+\pi^-$		$(1.9 \pm 0.5) \times 10^{-4}$		DESIG=245
Γ_{134}	$\gamma p\overline{p}$		$(3.9 \pm 0.5) \times 10^{-5}$	S=2.0	DESIG=246
Γ_{135}	$\gamma f_2(1950) \to \gamma p\overline{p}$		$(1.20 \pm 0.22) \times 10^{-5}$		DESIG=257
Γ_{136}	$\gamma f_2(2150) \to \gamma p\overline{p}$		$(7.2 \pm 1.8) \times 10^{-6}$		DESIG=258
Γ_{137}	$\gamma X(1835) \to \gamma p\overline{p}$		$< 1.6 \times 10^{-6}$	CL=90%	DESIG=259
Γ_{138}	$\gamma X \to \gamma p\overline{p}$	[a]	$< 2 \times 10^{-6}$	CL=90%	DESIG=260
Γ_{139}	$\gamma\pi^+\pi^-p\overline{p}$		$(2.8 \pm 1.4) \times 10^{-5}$		DESIG=247
Γ_{140}	$\gamma 2(\pi^+\pi^-)K^+K^-$		$< 2.2 \times 10^{-4}$	CL=90%	DESIG=248
Γ_{141}	$\gamma 3(\pi^+\pi^-)$		$< 1.7 \times 10^{-4}$	CL=90%	DESIG=249
Γ_{142}	$\gamma K^+K^-K^+K^-$		$< 4 \times 10^{-5}$	CL=90%	DESIG=250

[a] 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 223 measurements to determine 49 parameters. The overall fit has a $\chi^2 = 312.2$ for 174 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, $x_i \equiv \Gamma_i/\Gamma_{total}$.

x_7	5									
x_8	1	0								
x_{11}	44	12	3							
x_{12}	39	8	2	64						
x_{13}	27	7	2	57	35					
x_{19}	2	1	0	7	5	4				
x_{109}	2	1	0	4	3	2	0			
x_{110}	2	1	0	5	2	3	0	0		
x_{111}	3	1	0	6	4	4	0	0	0	
Γ	−79	−6	−2	−52	−46	−32	−10	−2	−3	−3
	x_6	x_7	x_8	x_{11}	x_{12}	x_{13}	x_{19}	x_{109}	x_{110}	x_{111}

$\psi(2S)$ 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_6

NODE=M071W1
NODE=M071W1

VALUE (keV)	*DOCUMENT ID*		*TECN*	*COMMENT*
2.35 ±0.04 OUR FIT				
2.33 ±0.07 OUR AVERAGE				
2.338±0.037±0.096	ABLIKIM	08B	BES2	$e^+ e^- \rightarrow$ hadrons
2.330±0.036±0.110	ABLIKIM	06L	BES2	$e^+ e^- \rightarrow$ hadrons
2.44 ±0.21	[9] 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. • • •				
2.0 ±0.3	BRANDELIK	79C	DASP	$e^+ e^-$
2.1 ±0.3	[10] LUTH	75	MRK1	$e^+ e^-$

[9] 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

[10] 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_{120}

NODE=M071W51
NODE=M071W51

VALUE (eV)	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<43	90	BRANDELIK	79C	DASP	$e^+ e^-$

$\psi(2S)$ Γ(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 Γ(i) or the branching ratio Γ(i)/total.

NODE=M071230

Γ(hadrons) $\times$ $\Gamma(e^+ e^-)/\Gamma_{total}$ $\Gamma_1\Gamma_6/\Gamma$

NODE=M071G3
NODE=M071G3

VALUE (keV)	*DOCUMENT ID*		*TECN*	*COMMENT*
2.233±0.015±0.042	[11] 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	$e^+ e^-$

[11] 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

$\Gamma(\tau^+\tau^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_8\Gamma_6/\Gamma$

NODE=M071G9
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	[12] ANASHIN 07	KEDR	$e^+e^- \to \psi(2S) \to \tau^+\tau^-$

[12] Using $\psi(2S)$ total width of 337 ± 13 keV. Systematic errors not evaluated. NODE=M071G9;LINKAGE=AN

$\Gamma(J/\psi(1S)\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{11}\Gamma_6/\Gamma$

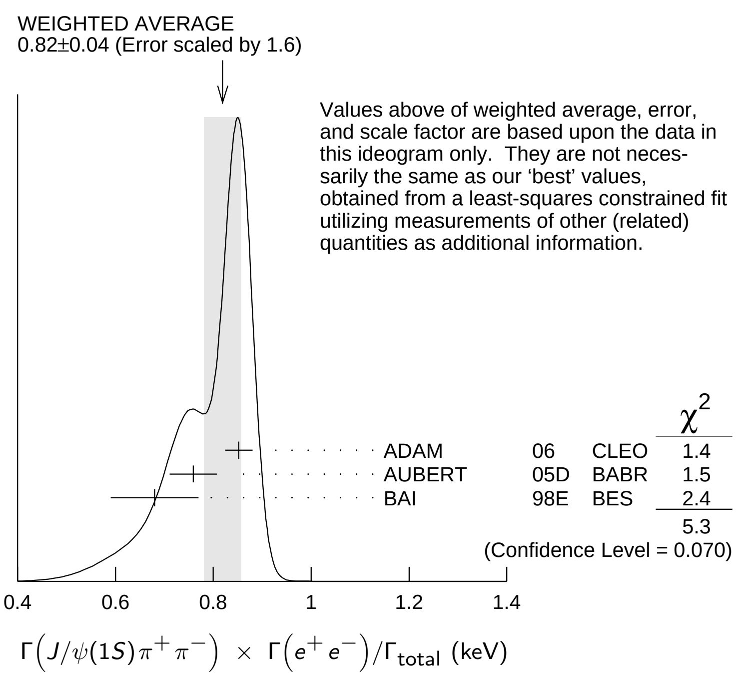
NODE=M071G1
NODE=M071G1

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
0.789±0.015 OUR FIT				
0.82 ±0.04 OUR AVERAGE Error includes scale factor of 1.6. See the ideogram below.				
0.852±0.010±0.026	19.5k±243	ADAM 06	CLEO	3.773 $e^+e^- \to \gamma\psi(2S)$
0.76 ±0.05 ±0.01	544	[13] AUBERT 05D	BABR	10.6 $e^+e^- \to \pi^+\pi^-\mu^+\mu^-\gamma$
0.68 ±0.09		[14] BAI 98E	BES	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.90 ±0.08 ±0.05	256	[15] AUBERT 07AU	BABR	10.6 $e^+e^- \to J/\psi\pi^+\pi^-\gamma$

[13] AUBERT 05D reports $[\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) \times \Gamma(\psi(2S) \to e^+e^-)/\Gamma_{total}] \times [B(J/\psi(1S) \to \mu^+\mu^-)] = 0.0450 \pm 0.0018 \pm 0.0022$ keV which we divide by our best value $B(J/\psi(1S) \to \mu^+\mu^-) = (5.93 \pm 0.06) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M071G1;LINKAGE=AU

[14] The value of $\Gamma(e^+e^-)$ quoted in BAI 98E is derived using $B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) = (32.4 \pm 2.6) \times 10^{-2}$ and $B(J/\psi(1S) \to \ell^+\ell^-) = 0.1203 \pm 0.0038$. Recalculated by us using $B(J/\psi(1S) \to \ell^+\ell^-) = 0.1181 \pm 0.0020$. NODE=M071G1;LINKAGE=A

[15] AUBERT 07AU reports $[\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) \times \Gamma(\psi(2S) \to e^+e^-)/\Gamma_{total}] \times [B(J/\psi(1S) \to \pi^+\pi^-\pi^0)] = 0.0186 \pm 0.0012 \pm 0.0011$ keV which we divide by our best value $B(J/\psi(1S) \to \pi^+\pi^-\pi^0) = (2.07 \pm 0.12) \times 10^{-2}$. 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



$\Gamma(J/\psi(1S)\pi^0\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{12}\Gamma_6/\Gamma$

NODE=M071G6
NODE=M071G6

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
0.417±0.010 OUR FIT				
0.411±0.008±0.018	3.6k±96	ADAM 06	CLEO	3.773 $e^+e^- \to \gamma\psi(2S)$

$\Gamma(J/\psi(1S)\eta) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{13}\Gamma_6/\Gamma$

NODE=M071G7

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
77.0± 1.9 OUR FIT					
87 ± 9 OUR AVERAGE					
83 ±25 ±5	14	[16] 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 $e^+e^- \to \gamma\psi(2S)$

[16] 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 ± 0.33 ± 0.07 eV. NODE=M071G7;LINKAGE=UB

$\Gamma(J/\psi(1S)\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{14}\Gamma_6/\Gamma$

NODE=M071G8

VALUE (eV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<8	90	<37	ADAM	06	CLEO	3.773 $e^+e^- \to \gamma\psi(2S)$

$\Gamma(p\overline{p}) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{19}\Gamma_6/\Gamma$

NODE=M071G2

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.647±0.028 OUR FIT					
0.59 ±0.05 OUR AVERAGE					
0.579±0.038±0.036	2.7k	ANDREOTTI	07	E835	$p\overline{p} \to e^+e^-$, $J/\psi X$
0.70 ±0.17 ±0.03	22	AUBERT	06B		$e^+e^- \to p\overline{p}\gamma$

$\Gamma(\Lambda\overline{\Lambda}) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{26}\Gamma_6/\Gamma$

NODE=M071G11

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
1.5±0.4±0.1	AUBERT	07BD	BABR	10.6 $e^+e^- \to \Lambda\overline{\Lambda}\gamma$

$\Gamma(2(\pi^+\pi^-\pi^0)) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{45}\Gamma_6/\Gamma$

NODE=M071G4

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
11.2±3.3±1.3	43	AUBERT	06D	BABR	10.6 $e^+e^- \to 2(\pi^+\pi^-\pi^0)\gamma$

$\Gamma(K^+K^-2(\pi^+\pi^-)) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{59}\Gamma_6/\Gamma$

NODE=M071G5

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
4.4±2.1±0.3	26	AUBERT	06D	BABR	10.6 $e^+e^- \to K^+K^-2(\pi^+\pi^-)\gamma$

$\Gamma(\pi^+\pi^-K^+K^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{54}\Gamma_6/\Gamma$

NODE=M071G12

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
2.56±0.42±0.16	85	AUBERT	07AK	BABR	10.6 $e^+e^- \to \pi^+\pi^-K^+K^-\gamma$

$\Gamma(\phi f_0(980) \to \pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{87}\Gamma_6/\Gamma$

NODE=M071G13

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.347±0.169±0.003	6 ± 3	[17] AUBERT	07AK	BABR	10.6 $e^+e^- \to \pi^+\pi^-K^+K^-\gamma$

[17] AUBERT 07AK reports [$\Gamma(\psi(2S) \to \phi f_0(980) \to \pi^+\pi^-) \times \Gamma(\psi(2S) \to e^+e^-)/\Gamma_{total}$] × [B($\phi(1020) \to K^+K^-$)] = 0.17 ± 0.08 ± 0.02 eV which we divide by our best value B($\phi(1020) \to K^+K^-$) = (48.9 ± 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=M071G13;LINKAGE=AU

$\Gamma(\phi\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{86}\Gamma_6/\Gamma$

NODE=M071G10

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.57±0.23±0.01	10	[18] AUBERT,BE	06D	BABR	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\gamma$

[18] AUBERT,BE 06D reports [$\Gamma(\psi(2S) \to \phi\pi^+\pi^-) \times \Gamma(\psi(2S) \to e^+e^-)/\Gamma_{total}$] × [B($\phi(1020) \to K^+K^-$)] = 0.28 ± 0.11 ± 0.02 eV which we divide by our best value B($\phi(1020) \to K^+K^-$) = (48.9 ± 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=M071G10;LINKAGE=AU

$\Gamma(2(\pi^+\pi^-)\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{17}\Gamma_6/\Gamma$

NODE=M071G01

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
29.7±2.2±1.8	410	AUBERT	07AU	BABR	10.6 $e^+e^- \to 2(\pi^+\pi^-)\pi^0\gamma$

$\Gamma(\omega\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{50}\Gamma_6/\Gamma$

NODE=M071G02

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
3.01±0.84±0.02	37	[19] AUBERT	07AU	BABR	10.6 $e^+e^- \to \omega\pi^+\pi^-\gamma$

[19] AUBERT 07AU reports [$\Gamma(\psi(2S) \to \omega\pi^+\pi^-) \times \Gamma(\psi(2S) \to e^+e^-)/\Gamma_{total}$] × [B($\omega(782) \to \pi^+\pi^-\pi^0$)] = 2.69 ± 0.73 ± 0.16 eV which we divide by our best value B($\omega(782) \to \pi^+\pi^-\pi^0$) = (89.2 ± 0.7) × 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

$\Gamma(2(\pi^+\pi^-)\eta) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{48}\Gamma_6/\Gamma$

NODE=M071G03

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
2.87±1.41±0.01	16	[20] AUBERT	07AU	BABR	10.6 $e^+e^- \rightarrow 2(\pi^+\pi^-)\eta\gamma$

[20] AUBERT 07AU reports $[\Gamma(\psi(2S) \rightarrow 2(\pi^+\pi^-)\eta) \times \Gamma(\psi(2S) \rightarrow e^+e^-)/\Gamma_{total}] \times [B(\eta \rightarrow 2\gamma)] = 1.13 \pm 0.55 \pm 0.08$ eV which we divide by our best value $B(\eta \rightarrow 2\gamma) = (39.31 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M071G03;LINKAGE=UB

$\Gamma(K^+K^-\pi^+\pi^-\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{66}\Gamma_6/\Gamma$

NODE=M071G04

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
4.4±1.3±0.3	32	AUBERT	07AU	BABR	10.6 $e^+e^- \rightarrow K^+K^-\pi^+\pi^-\pi^0\gamma$

$\Gamma(K^+K^-\pi^+\pi^-\eta) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{57}\Gamma_6/\Gamma$

NODE=M071G05

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
3.05±1.80±0.02	7	[21] AUBERT	07AU	BABR	10.6 $e^+e^- \rightarrow K^+K^-\pi^+\pi^-\eta\gamma$

[21] AUBERT 07AU reports $[\Gamma(\psi(2S) \rightarrow K^+K^-\pi^+\pi^-\eta) \times \Gamma(\psi(2S) \rightarrow e^+e^-)/\Gamma_{total}] \times [B(\eta \rightarrow 2\gamma)] = 1.2 \pm 0.7 \pm 0.1$ eV which we divide by our best value $B(\eta \rightarrow 2\gamma) = (39.31 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M071G05;LINKAGE=UB

$\psi(2S)$ 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	[22] BAI	02B	BES2	e^+e^-
0.981 ±0.003	[22] LUTH	75	MRK1	e^+e^-

[22] Includes cascade decay into $J/\psi(1S)$.

NODE=M071R;LINKAGE=P

$\Gamma(\text{virtual}\gamma \rightarrow \text{hadrons})/\Gamma_{total}$ — Γ_2/Γ

NODE=M071R5

VALUE	DOCUMENT ID		TECN	COMMENT
0.0173±0.0014 OUR AVERAGE Error includes scale factor of 1.5.				
0.0166±0.0010	[23,24] SETH	04	RVUE	e^+e^-
0.0199±0.0019	[23] BAI	02B	BES2	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.029 ±0.004	[23] LUTH	75	MRK1	e^+e^-

[23] Included in $\Gamma(\text{hadrons})/\Gamma_{total}$.

NODE=M071R;LINKAGE=Z

[24] Using $B(\psi(2S) \rightarrow \ell^+\ell^-) = (0.73 \pm 0.04)\%$ from RPP-2002 and R = 2.28 ± 0.04 determined by a fit to data from BAI 00 and BAI 02C.

NODE=M071R5;LINKAGE=SE

$\Gamma(ggg)/\Gamma_{total}$ — Γ_3/Γ

NODE=M071S43

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
10.58±1.62	2.9 M	[25] LIBBY	09	CLEO	$\psi(2S) \rightarrow$ hadrons

[25] Calculated using $\Gamma(\gamma gg)/\Gamma(ggg) = 0.097 \pm 0.026 \pm 0.016$ from LIBBY 09, $B(\psi(2S) \rightarrow X J/\psi)$ relative and absolute branching fractions from MENDEZ 08, $B(\psi(2S) \rightarrow \gamma\eta_c)$ from MITCHELL 09, and $B(\psi(2S) \rightarrow \text{virtual } \gamma \rightarrow \text{hadrons})$, $B(\psi(2S) \rightarrow \gamma\chi_{cJ})$, and $B(\psi(2S) \rightarrow \ell^+\ell^-)$ 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

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
1.025±0.288	200 k	[26] LIBBY	09	CLEO	$\psi(2S) \rightarrow \gamma +$ hadrons

[26] 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

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
9.7±2.6±1.6	2.9 M	LIBBY	09	CLEO	$\psi(2S) \rightarrow (\gamma +)$ hadrons

$\Gamma(\text{light hadrons})/\Gamma_{total}$ Γ_5/Γ

NODE=M071S27
NODE=M071S27

VALUE	DOCUMENT ID	TECN	COMMENT
0.154±0.015	[27] MENDEZ 08	CLEO	$e^+e^- \to \psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.169±0.026	[28] ADAM 05A	CLEO	$e^+e^- \to \psi(2S)$

[27] Uses B($\psi(2S) \to J/\psi X$) from MENDEZ 08 and other branching fractions from PDG 07. NODE=M071S27;LINKAGE=ME

[28] 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=AD

$\Gamma(e^+e^-)/\Gamma_{total}$ Γ_6/Γ

NODE=M071R1
NODE=M071R1

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
77.3± 1.7 OUR FIT			
• • • We do not use the following data for averages, fits, limits, etc. • • •			
88 ±13	[29] FELDMAN 77	RVUE	e^+e^-

[29] 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_7/Γ

NODE=M071R2
NODE=M071R2

VALUE (units 10^{-4})	DOCUMENT ID
77±8 OUR FIT	

$\Gamma(\mu^+\mu^-)/\Gamma(e^+e^-)$ Γ_7/Γ_6

NODE=M071R4
NODE=M071R4

VALUE	DOCUMENT ID	TECN	COMMENT
1.00±0.11 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_8/Γ

NODE=M071R75
NODE=M071R75

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
30 ±4 OUR FIT			
30.8±2.1±3.8	[30] ABLIKIM 06W	BES	$e^+e^- \to \psi(2S)$

[30] 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

$\Gamma(J/\psi(1S)\text{anything})/\Gamma_{total}$ Γ_9/Γ

NODE=M071R10
NODE=M071R10

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.595 ±0.008 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. • • •				
0.6254±0.0016±0.0155	1.1M	[31] MENDEZ 08	CLEO	$\psi(2S) \to \ell^+\ell^- X$
0.5950±0.0015±0.0190	151k	ADAM 05A	CLEO	Repl. by MENDEZ 08

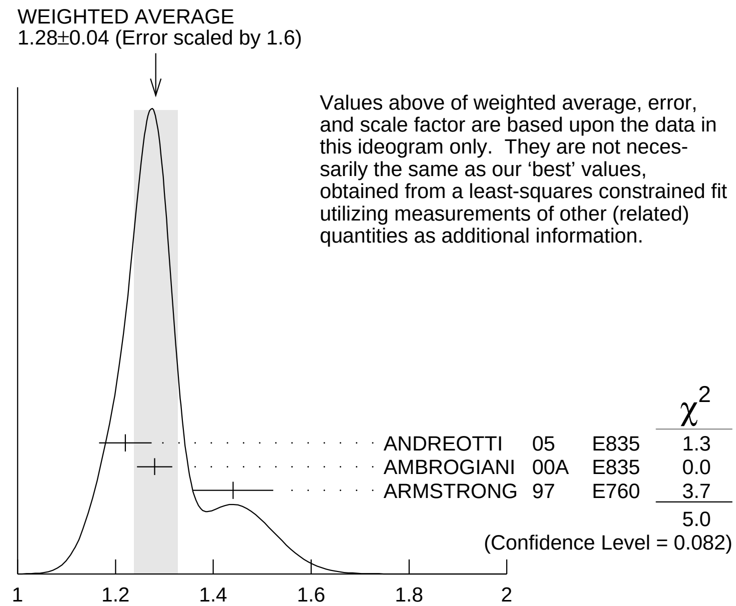
[31] Not independent from other measurements of MENDEZ 08. NODE=M071R10;LINKAGE=ME

$\Gamma(e^+e^-)/\Gamma(J/\psi(1S)\text{anything})$
$\Gamma_6/\Gamma_9 = \Gamma_6/(\Gamma_{11}+\Gamma_{12}+\Gamma_{13}+0.344\Gamma_{110}+0.195\Gamma_{111})$

NODE=M071R72
NODE=M071R72

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
1.299±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	[32] ANDREOTTI 05	E835	$p\overline{p} \to \psi(2S) \to e^+e^-$
1.28 ±0.03 ±0.02		[32] AMBROGIANI 00A	E835	$p\overline{p} \to \psi(2S)$
1.44 ±0.08 ±0.02		[32] ARMSTRONG 97	E760	$\overline{p}p \to \psi(2S)$

[32] Using B($J/\psi(1S) \to e^+ e^-$) = 0.0593 ± 0.0010. NODE=M071R;LINKAGE=7A



$\Gamma(e^+e^-)/\Gamma(J/\psi(1S)\,\text{anything})$ (units 10^{-2})

$\Gamma(\mu^+\mu^-)/\Gamma(J/\psi(1S)\,\text{anything})$ $\Gamma_7/\Gamma_9 = \Gamma_7/(\Gamma_{11}+\Gamma_{12}+\Gamma_{13}+0.344\Gamma_{110}+0.195\Gamma_{111})$

NODE=M071R74
NODE=M071R74

VALUE	DOCUMENT ID		TECN	COMMENT
0.0130±0.0014 OUR FIT				
0.014 ±0.003	HILGER	75	SPEC	e^+e^-

$\Gamma(J/\psi(1S)\,\text{neutrals})/\Gamma_{\text{total}}$ Γ_{10}/Γ

NODE=M071R18
NODE=M071R18

VALUE	DOCUMENT ID
0.246±0.004 OUR FIT	

$\Gamma(J/\psi(1S)\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{11}/Γ

NODE=M071R12
NODE=M071R12

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.336 ±0.004 OUR FIT					
0.343 ±0.011 OUR AVERAGE	Error includes scale factor of 1.7.				
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	[33] ADAM	05A	CLEO	Repl. by MENDEZ 08

[33] Not independent from other values reported by ADAM 05A. NODE=M071R;LINKAGE=AD

$\Gamma(e^+e^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ Γ_6/Γ_{11}

NODE=M071R73
NODE=M071R73

VALUE	DOCUMENT ID		TECN	COMMENT
0.0230±0.0005 OUR FIT				
0.0252±0.0028±0.0011	[34] AUBERT	02B	BABR	e^+e^-

[34] Using B($J/\psi(1S) \to e^+e^-$) = 0.0593 ± 0.0010. NODE=M071R73;LINKAGE=7A

$\Gamma(\mu^+\mu^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ Γ_7/Γ_{11}

NODE=M071R63
NODE=M071R63

VALUE	DOCUMENT ID		TECN	COMMENT
0.0229±0.0025 OUR FIT				
0.0224±0.0029 OUR AVERAGE				
0.0216±0.0026±0.0014	[35] AUBERT	02B	BABR	e^+e^-
0.0327±0.0077±0.0072	[35] GRIBUSHIN	96	FMPS	515 π^- Be $\to 2\mu X$

[35] Using B($J/\psi(1S) \to \mu^+\mu^-$) = 0.0588 ± 0.0010. NODE=M071R;LINKAGE=Q2

$\Gamma(\tau^+\tau^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ Γ_8/Γ_{11}

NODE=M071R76
NODE=M071R76

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
9.0 ±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_{11}/Γ_9

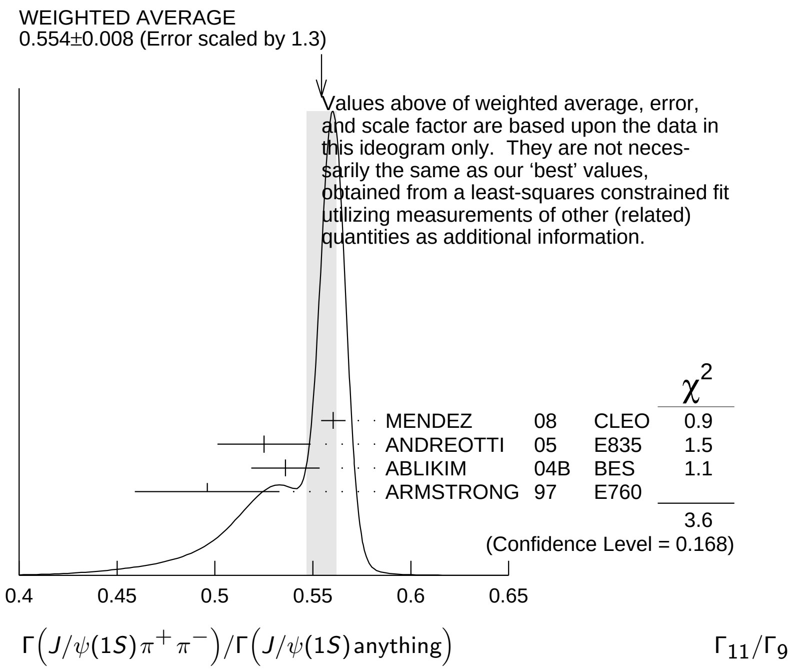
NODE=M071R70
NODE=M071R70

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.5646±0.0026 OUR FIT				
[0.5647 ± 0.0026 OUR 2011 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	[36,37] 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

NEW

[36] From a fit to the J/ψ recoil mass spectra. NODE=M071R;LINKAGE=AB

[37] ABLIKIM 04B quotes B($\psi(2S) \to J/\psi X$) / B($\psi(2S) \to J/\psi\pi^+\pi^-$). NODE=M071R;LINKAGE=AL



$\Gamma(J/\psi(1S)\text{neutrals})/\Gamma(J/\psi(1S)\pi^+\pi^-)$
$\Gamma_{10}/\Gamma_{11} = (0.9761\Gamma_{12}+0.719\Gamma_{13}+0.344\Gamma_{110}+0.195\Gamma_{111})/\Gamma_{11}$

NODE=M071R11
NODE=M071R11

VALUE	DOCUMENT ID	TECN	COMMENT
0.731±0.008 OUR FIT			
0.73 ±0.09	TANENBAUM 76	MRK1	e^+e^-

$\Gamma(J/\psi(1S)\pi^0\pi^0)/\Gamma_{total}$ — Γ_{12}/Γ

NODE=M071R17
NODE=M071R17

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.1775±0.0034 OUR FIT				
[0.1776 ± 0.0034 OUR 2011 FIT]				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.1769±0.0008±0.0053	61k	[38] MENDEZ	08 CLEO	$\psi(2S) \to \ell^+\ell^-2\pi^0$
0.1652±0.0014±0.0058	13.4k	[39] ADAM	05A CLEO	Repl. by MENDEZ 08

NEW

[38] Not independent from other measurements of MENDEZ 08. NODE=M071R17;LINKAGE=ME

[39] Not independent from other values reported by ADAM 05A. NODE=M071R17;LINKAGE=AD

$\Gamma(J/\psi(1S)\pi^0\pi^0)/\Gamma(J/\psi(1S)\text{anything})$ — Γ_{12}/Γ_9

NODE=M071R69
NODE=M071R69

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.2982±0.0032 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_{12}/Γ_{11}

NODE=M071R14
NODE=M071R14

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.528 ±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	[40] 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	[41,42] ADAM 05A	CLEO	Repl. by MENDEZ 08
0.571 ±0.018 ±0.044		[43] ANDREOTTI 05	E835	$\psi(2S) \to J/\psi X$
0.53 ±0.06		TANENBAUM 76	MRK1	e^+e^-
0.64 ±0.15		[44] HILGER 75	SPEC	e^+e^-

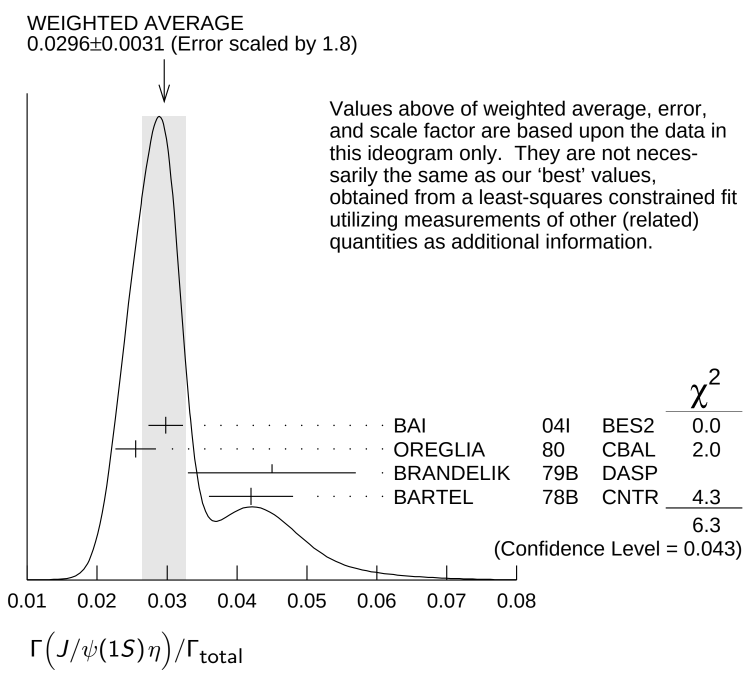
[40] From a fit to the J/ψ recoil mass spectra. NODE=M071R14;LINKAGE=AB
[41] Not independent from other values reported by ADAM 05A. NODE=M071R14;LINKAGE=AD
[42] Using 13,217 $J/\psi\pi^0\pi^0$ and 60,010 $J/\psi\pi^+\pi^-$ events. NODE=M071R14;LINKAGE=AM
[43] Not independent from other values reported by ANDREOTTI 05. NODE=M071R;LINKAGE=AN
[44] Ignoring the $J/\psi(1S)\eta$ and $J/\psi(1S)\gamma\gamma$ decays. NODE=M071R;LINKAGE=I

$\Gamma(J/\psi(1S)\eta)/\Gamma_{\text{total}}$ Γ_{13}/Γ

NODE=M071R15
NODE=M071R15

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.0328±0.0007 OUR FIT				
0.0296±0.0031 OUR AVERAGE Error includes scale factor of 1.8. See the ideogram below.				
0.0298±0.0009±0.0023	5.7k	BAI 04I	BES2	$\psi(2S) \to J/\psi\gamma\gamma$
0.0255±0.0029	386	[45] OREGLIA 80	CBAL	$e^+e^- \to J/\psi 2\gamma$
0.045 ±0.012	17	[46] BRANDELIK 79B	DASP	$e^+e^- \to J/\psi 2\gamma$
0.042 ±0.006	164	[46] BARTEL 78B	CNTR	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.0343±0.0004±0.0009	18.4k	[47] MENDEZ 08	CLEO	$\psi(2S) \to \ell^+\ell^-\eta$
0.0325±0.0006±0.0011	2.8k	[48] ADAM 05A	CLEO	Repl. by MENDEZ 08
0.043 ±0.008	44	TANENBAUM 76	MRK1	e^+e^-

[45] Recalculated by us using $B(J/\psi(1S) \to \ell^+\ell^-) = 0.1181 \pm 0.0020$. NODE=M071R;LINKAGE=3Q
[46] Recalculated by us using $B(J/\psi(1S) \to \mu^+\mu^-) = 0.0588 \pm 0.0010$. NODE=M071R;LINKAGE=2Q
[47] Not independent from other measurements of MENDEZ 08. NODE=M071R15;LINKAGE=ME
[48] 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_{13}/Γ_9

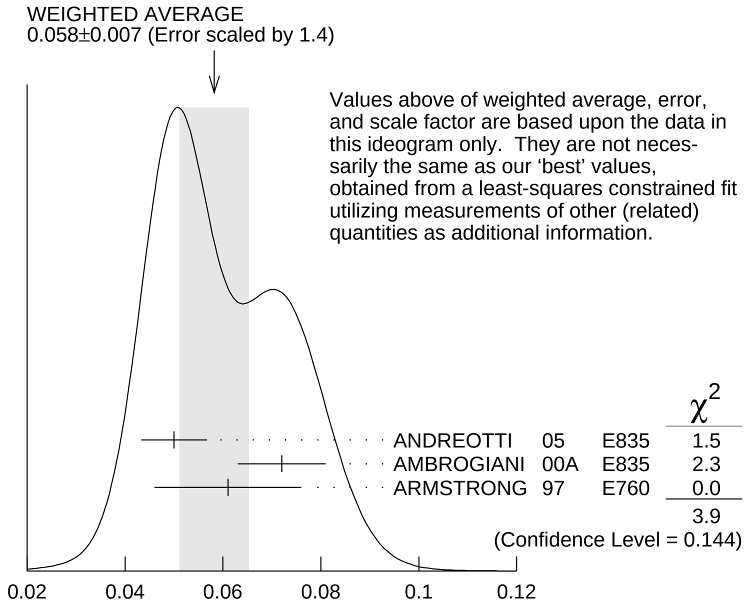
NODE=M071R68
NODE=M071R68

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.0551±0.0009 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. • • •				

OCCUR=2

$0.0549 \pm 0.0006 \pm 0.0009$	18.4k	[49] MENDEZ	08	CLEO	$\psi(2S) \to \ell^+ \ell^- \eta$
$0.0546 \pm 0.0010 \pm 0.0007$	2.8k	ADAM	05A	CLEO	Repl. by MENDEZ 08

[49] Not independent from other measurements of MENDEZ 08. NODE=M071R68;LINKAGE=ME



$\Gamma\big(J/\psi(1S)\eta\big)/\Gamma\big(J/\psi(1S)\,\text{anything}\big)$ Γ_{13}/Γ_9

$\Gamma\big(J/\psi(1S)\eta\big)/\Gamma\big(J/\psi(1S)\pi^+\pi^-\big)$ Γ_{13}/Γ_{11}

NODE=M071R71
NODE=M071R71

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0976±0.0016 OUR FIT					
0.0979±0.0018 OUR AVERAGE					
$0.0979 \pm 0.0010 \pm 0.0015$	18.4k	MENDEZ	08	CLEO	$\psi(2S) \to \ell^+ \ell^- \eta$
$0.098 \pm 0.005 \pm 0.010$	2k	[50] ABLIKIM	04B	BES	$\psi(2S) \to J/\psi X$
0.091 ± 0.021		[51] HIMEL	80	MRK2	$e^+ e^- \to \psi(2S) X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.0968 \pm 0.0019 \pm 0.0013$	2.8k	[52] ADAM	05A	CLEO	Repl. by MENDEZ 08
$0.095 \pm 0.007 \pm 0.007$		[53] ANDREOTTI	05	E835	$\psi(2S) \to J/\psi X$

[50] From a fit to the J/ψ recoil mass spectra. NODE=M071R71;LINKAGE=AB

[51] The value for $B(\psi(2S) \to J/\psi(1s)\eta)$ 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=M071R;LINKAGE=8H

[52] Not independent from other values reported by ADAM 05A. NODE=M071R71;LINKAGE=AD

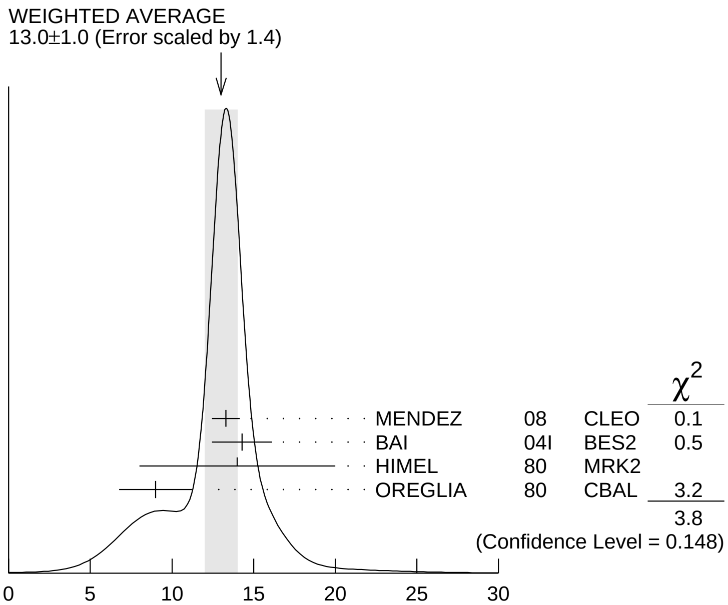
[53] Not independent from other values reported by ANDREOTTI 05. NODE=M071R71;LINKAGE=AN

$\Gamma\big(J/\psi(1S)\pi^0\big)/\Gamma_{\text{total}}$ Γ_{14}/Γ

NODE=M071R16
NODE=M071R16

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
13.0±1.0 OUR AVERAGE Error includes scale factor of 1.4. See the ideogram below.					
$13.3 \pm 0.8 \pm 0.3$	530	MENDEZ	08	CLEO	$\psi(2S) \to \ell^+ \ell^- 2\gamma$
$14.3 \pm 1.4 \pm 1.2$	280	BAI	04I	BES2	$\psi(2S) \to J/\psi \gamma\gamma$
14 ± 6	7	HIMEL	80	MRK2	$e^+ e^-$
$9 \pm 2 \pm 1$	23	[54] OREGLIA	80	CBAL	$\psi(2S) \to J/\psi 2\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$13 \pm 1 \pm 1$	88	ADAM	05A	CLEO	Repl. by MENDEZ 08

[54] Recalculated by us using $B(J/\psi(1S) \to \ell^+\ell^-) = 0.1181 \pm 0.0020$. NODE=M071R16;LINKAGE=3Q



$\Gamma\big(J/\psi(1S)\pi^0\big)/\Gamma_{\rm total}$ (units 10^{-4})

$\Gamma\big(J/\psi(1S)\pi^0\big)/\Gamma\big(J/\psi(1S)\text{anything}\big)$ $\quad\Gamma_{14}/\Gamma_9 = \Gamma_{14}/(\Gamma_{11}+\Gamma_{12}+\Gamma_{13}+0.344\Gamma_{110}+0.195\Gamma_{111})$

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	[55] MENDEZ	08	CLEO	$e^+e^- \to J/\psi\gamma\gamma$
0.22 ±0.02 ±0.01		[56] ADAM	05A	CLEO	$e^+e^- \to \psi(2S) \to J/\psi\gamma\gamma$

[55] Not independent from other values reported by MENDEZ 08. Supersedes ADAM 05A. NODE=M071S25;LINKAGE=ME
[56] Not independent from other values reported by ADAM 05A. NODE=M071S25;LINKAGE=AD

$\Gamma\big(J/\psi(1S)\pi^0\big)/\Gamma\big(J/\psi(1S)\pi^+\pi^-\big)$ $\quad\Gamma_{14}/\Gamma_{11}$

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±0.022±0.005	527	[57] MENDEZ	08	CLEO	$e^+e^- \to J/\psi\gamma\gamma$
0.39 ±0.04 ±0.01		[58] ADAM	05A	CLEO	$e^+e^- \to \psi(2S) \to J/\psi\gamma\gamma$

[57] Not independent from other values reported by MENDEZ 08. Supersedes ADAM 05A. NODE=M071S26;LINKAGE=ME
[58] Not independent from other values reported by ADAM 05A. NODE=M071S26;LINKAGE=AD

HADRONIC DECAYS

NODE=M071310

$\Gamma\big(\pi^0 h_c(1P)\big)/\Gamma_{\rm total}$ $\quad\Gamma_{15}/\Gamma$

NODE=M071S42
NODE=M071S42

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
8.6±1.3 OUR AVERAGE					
[(8.4 ± 1.6) × 10^{-4} OUR 2011 AVERAGE]					
9.0±1.5±1.3	3k	[59] GE	11	CLEO	$\Upsilon(2S) \to \pi^0$ 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	$\psi(2S) \to \pi^0\eta_c\gamma$

NEW

[59] 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

$\Gamma\big(3(\pi^+\pi^-)\pi^0\big)/\Gamma_{\rm total}$ $\quad\Gamma_{16}/\Gamma$

NODE=M071R37
NODE=M071R37

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
35±16	6	FRANKLIN	83	MRK2	$e^+e^- \to$ hadrons

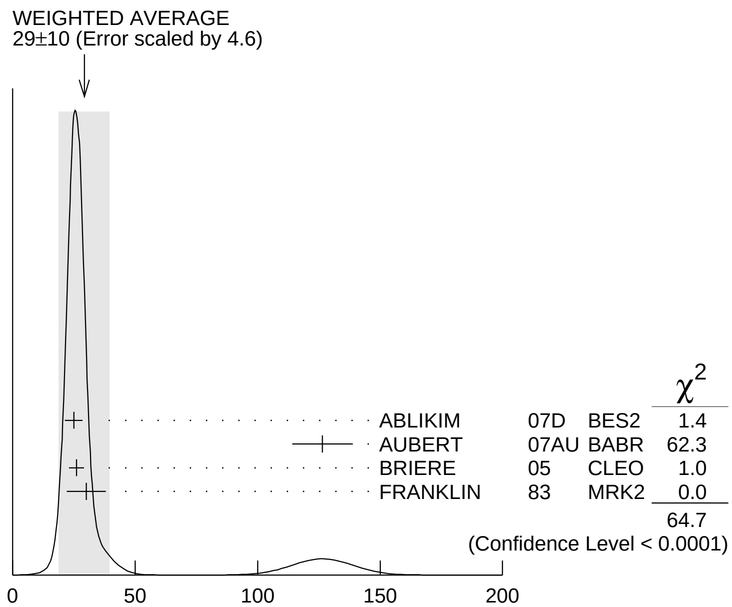
$\Gamma(2(\pi^+\pi^-)\pi^0)/\Gamma_{total}$ Γ_{17}/Γ

NODE=M071R22

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
29 ±10 OUR AVERAGE		Error includes scale factor of 4.6. See the ideogram below.		
24.9± 0.7±3.6	2173	ABLIKIM 07D	BES2	$e^+e^- \to \psi(2S)$
127 ±12 ±2	410	[60] 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^-

[60] 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 $\Gamma(\psi(2S) \to e^+e^-) = 2.35 \pm 0.04$ 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



$\Gamma\left(2(\pi^+\pi^-)\pi^0\right)/\Gamma_{total}$ (units 10^{-4})

$\Gamma(\rho a_2(1320))/\Gamma_{total}$ Γ_{18}/Γ

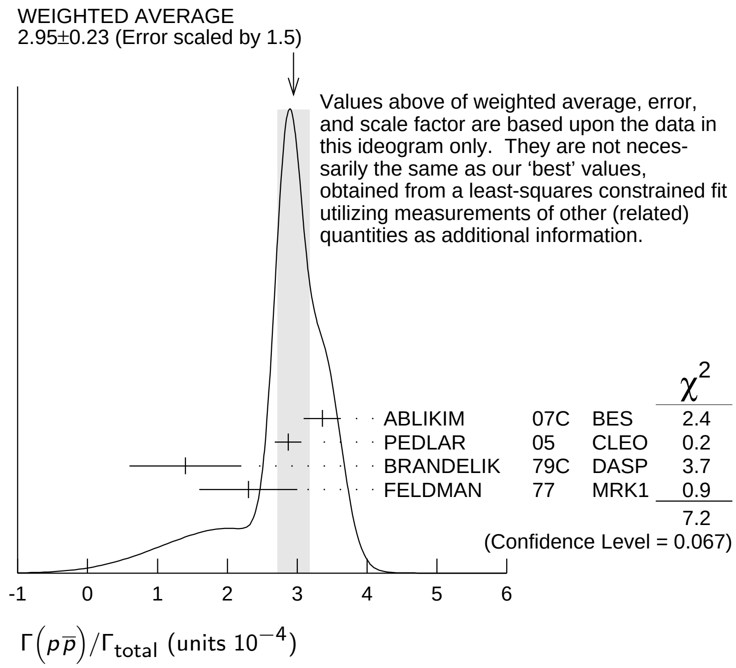
NODE=M071R65

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^-

$\Gamma(p\overline{p})/\Gamma_{total}$ Γ_{19}/Γ

NODE=M071R25

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
2.76±0.12 OUR FIT				
2.95±0.23 OUR AVERAGE		Error includes scale factor of 1.5. See the ideogram below.		
3.36±0.09±0.25	1618	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	$e^+e^- \to \psi(2S) \to p\overline{p}$



$\Gamma(p\overline{p})/\Gamma(J/\psi(1S)\pi^+\pi^-)$ — Γ_{19}/Γ_{11}

NODE=M071S40
NODE=M071S40

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
8.2 ±0.4 OUR FIT				
6.98±0.49±0.97	BAI	01	BES	$e^+e^- \to \psi(2S) \to p\overline{p}$

$\Gamma(\Delta^{++}\overline{\Delta}^{--})/\Gamma_{total}$ — Γ_{20}/Γ

NODE=M071R50
NODE=M071R50

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
12.8±1.0±3.4	157	[61] BAI	01	BES	$e^+e^- \to \psi(2S) \to$ hadrons

[61] Estimated using B($\psi(2S) \to J/\psi\pi^+\pi^-$)= 0.310 ± 0.028.

NODE=M071R50;LINKAGE=PP

$\Gamma(\Lambda\overline{\Lambda}\pi^0)/\Gamma_{total}$ — Γ_{21}/Γ

NODE=M071R6
NODE=M071R6

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.2	90	[62] ABLIKIM	07H	BES2	$e^+e^- \to \psi(2S)$

[62] Using B($\Lambda \to \pi^- p$) = 63.9% and B($\eta \to \gamma\gamma$) = 39.4%.

NODE=M071R6;LINKAGE=AB

$\Gamma(\Lambda\overline{\Lambda}\eta)/\Gamma_{total}$ — Γ_{22}/Γ

NODE=M071R7
NODE=M071R7

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.49	90	[63] ABLIKIM	07H	BES2	$e^+e^- \to \psi(2S)$

[63] Using B($\Lambda \to \pi^- p$) = 63.9%.

NODE=M071R7;LINKAGE=AB

$\Gamma(\Lambda\overline{p}K^+)/\Gamma_{total}$ — Γ_{23}/Γ

NODE=M071S18
NODE=M071S18

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.0±0.1±0.1	74.0	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to p\overline{p}K^+\pi^-$

$\Gamma(\Lambda\overline{p}K^+\pi^+\pi^-)/\Gamma_{total}$ — Γ_{24}/Γ

NODE=M071S19
NODE=M071S19

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.8±0.3±0.3	45.8	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to p\overline{p}K^+\pi^+\pi^-\pi^-$

$\Gamma(\Lambda\overline{\Lambda}\pi^+\pi^-)/\Gamma_{total}$ — Γ_{25}/Γ

NODE=M071S17
NODE=M071S17

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.8±0.4±0.5	73.4	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to p\overline{p}2(\pi^+\pi^-)$

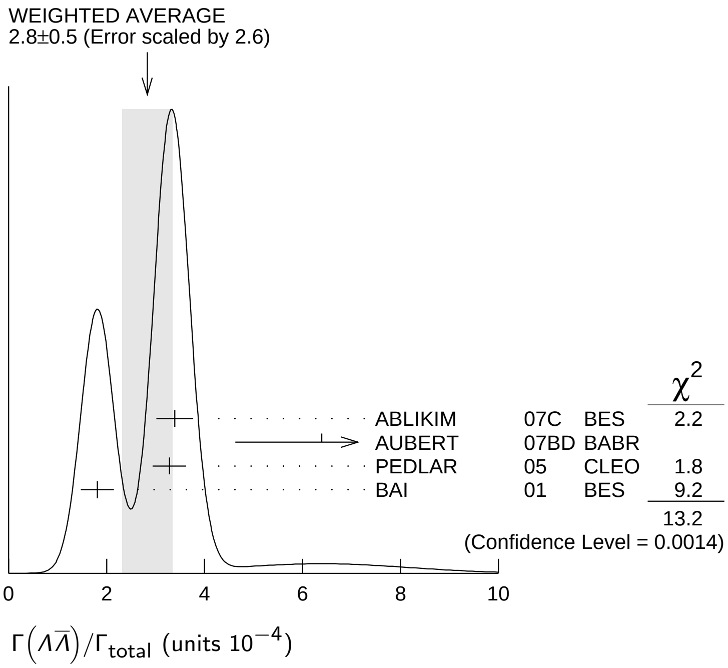
$\Gamma(\Lambda\overline{\Lambda})/\Gamma_{total}$ Γ_{26}/Γ

NODE=M071R28
NODE=M071R28

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
2.8 ±0.5 OUR AVERAGE			Error includes scale factor of 2.6. See the ideogram below.			
3.39±0.20±0.32		337	ABLIKIM	07C	BES	$e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons
6.4 ±1.8 ±0.1			[64] AUBERT	07BD	BABR	10.6 $e^+e^- \rightarrow \Lambda\overline{\Lambda}\gamma$
3.28±0.23±0.25		208	PEDLAR	05	CLEO	$e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons
1.81±0.20±0.27		80	[65] BAI	01	BES	$e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<4	90		FELDMAN	77	MRK1	$e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons

[64] AUBERT 07BD reports $[\Gamma(\psi(2S) \rightarrow \Lambda\overline{\Lambda})/\Gamma_{total}] \times [\Gamma(\psi(2S) \rightarrow e^+e^-)] = (15 \pm 4 \pm 1) \times 10^{-4}$ keV which we divide by our best value $\Gamma(\psi(2S) \rightarrow e^+e^-) = 2.35 \pm 0.04$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M071R28;LINKAGE=AU

[65] Estimated using $B(\psi(2S) \rightarrow J/\psi\pi^+\pi^-) = 0.310 \pm 0.028$. NODE=M071R28;LINKAGE=PP



$\Gamma(\Sigma^+\overline{\Sigma}^-)/\Gamma_{total}$ Γ_{27}/Γ

NODE=M071R47
NODE=M071R47

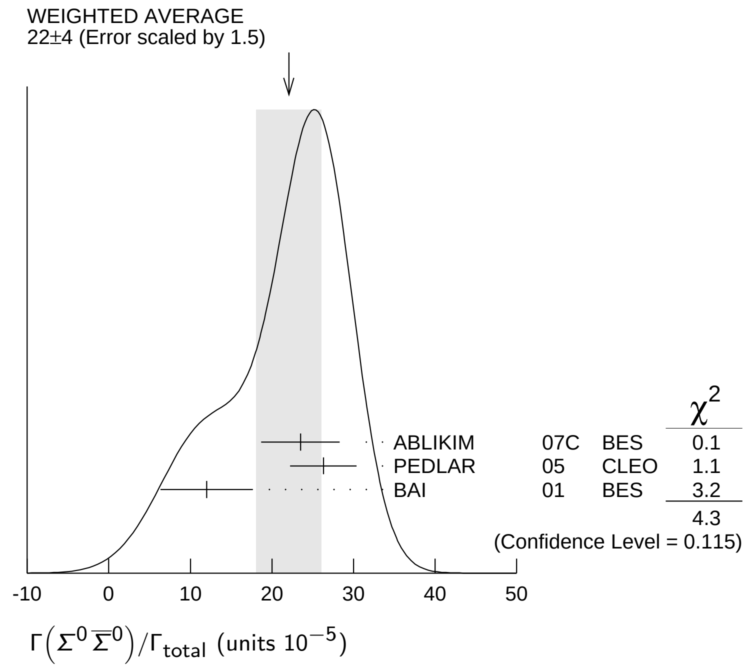
VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
25.7±4.4±6.8	35	PEDLAR	05	CLEO	$e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons

$\Gamma(\Sigma^0\overline{\Sigma}^0)/\Gamma_{total}$ Γ_{28}/Γ

NODE=M071R51
NODE=M071R51

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
22 ±4 OUR AVERAGE		Error includes scale factor of 1.5. See the ideogram below.			
23.5±3.6±3.2	59	ABLIKIM	07C	BES	$e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons
26.3±3.5±2.1	58	PEDLAR	05	CLEO	$e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons
12 ±4 ±4	8	[66] BAI	01	BES	$e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons

[66] Estimated using $B(\psi(2S) \rightarrow J/\psi\pi^+\pi^-) = 0.310 \pm 0.028$. NODE=M071R51;LINKAGE=PP



$\Gamma\left(\Sigma(1385)^+\overline{\Sigma}(1385)^-\right)/\Gamma_{total}$ Γ_{29}/Γ

NODE=M071R52
NODE=M071R52

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
11±3±3	14	[67] BAI	01	BES	$e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons

[67] Estimated using B($\psi(2S) \rightarrow J/\psi\pi^+\pi^-$)= 0.310 ± 0.028.

NODE=M071R52;LINKAGE=PP

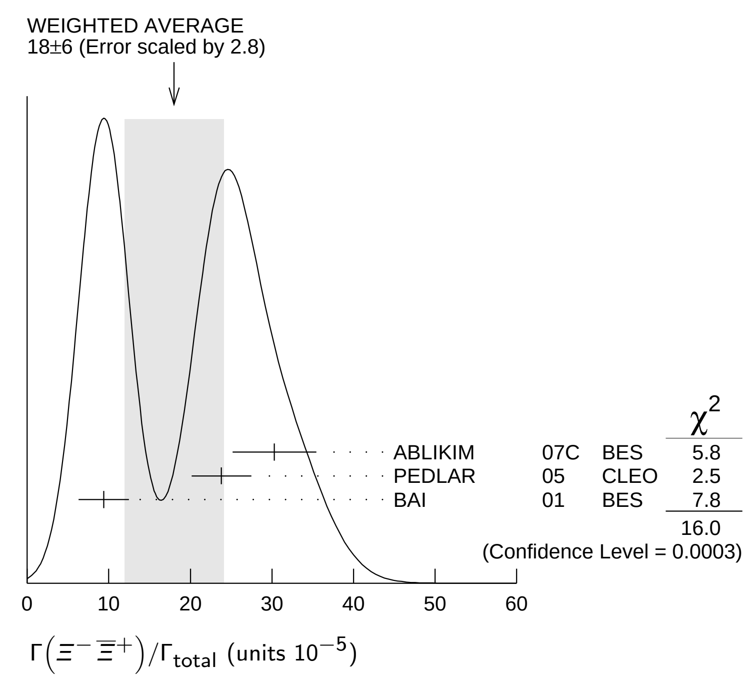
$\Gamma\left(\Xi^-\overline{\Xi}^+\right)/\Gamma_{total}$ Γ_{30}/Γ

NODE=M071R29
NODE=M071R29

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
18 ±6 OUR AVERAGE			Error includes scale factor of 2.8. See the ideogram below.			
30.3±4.0±3.2		67	ABLIKIM	07C	BES	$e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons
23.8±3.0±2.1		63	PEDLAR	05	CLEO	$e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons
9.4±2.7±1.5		12	[68] BAI	01	BES	$e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<20	90		FELDMAN	77	MRK1	$e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons

[68] 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_{31}/Γ

NODE=M071R48
NODE=M071R48

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
27.5±6.4±6.1	19	PEDLAR	05	CLEO	$e^+e^- \to \psi(2S) \to$ hadrons

$\Gamma(\Xi(1530)^0\overline{\Xi}(1530)^0)/\Gamma_{total}$ Γ_{32}/Γ

NODE=M071R53
NODE=M071R53

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
< 8.1	90	[69] BAI	01	BES	$e^+e^- \to \psi(2S) \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<32	90	PEDLAR	05	CLEO	$e^+e^- \to \psi(2S) \to$ hadrons

[69] Estimated using B($\psi(2S) \to J/\psi\pi^+\pi^-$)= 0.310 ± 0.028.

NODE=M071R53;LINKAGE=PP

$\Gamma(\Omega^-\overline{\Omega}^+)/\Gamma_{total}$ Γ_{33}/Γ

NODE=M071R54
NODE=M071R54

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
< 7.3	90	[70] BAI	01	BES	$e^+e^- \to \psi(2S) \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<16	90	PEDLAR	05	CLEO	$e^+e^- \to \psi(2S) \to$ hadrons

[70] Estimated using B($\psi(2S) \to J/\psi\pi^+\pi^-$)= 0.310 ± 0.028.

NODE=M071R54;LINKAGE=PP

$\Gamma(\pi^0 p\overline{p})/\Gamma_{total}$ Γ_{34}/Γ

NODE=M071R35
NODE=M071R35

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.50±0.08 OUR AVERAGE Error includes scale factor of 1.1.					
1.54±0.06±0.06	948	ALEXANDER	10	CLEO	$\psi(2S) \to \pi^0 p\overline{p}$
1.32±0.10±0.15	256 ± 18	[71] ABLIKIM	05E	BES2	$e^+e^- \to \psi(2S) \to p\overline{p}\gamma\gamma$
1.4 ±0.5	9	FRANKLIN	83	MRK2	e^+e^-

[71] Computed using B($\pi^0 \to \gamma\gamma$) = (98.80 ± 0.03)%.

NODE=M071R35;LINKAGE=AB

$\Gamma(N_1^*(1440)\overline{p} \to \pi^0 p\overline{p})/\Gamma_{total}$ Γ_{35}/Γ

NODE=M071S50
NODE=M071S50

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
8.1±0.7±0.3	474	[72] ALEXANDER	10	CLEO	$\psi(2S) \to \pi^0 p\overline{p}$

[72] From a fit of the $p\overline{p}$ and $p\pi^0$ mass distributions to a combination of $N_1^*(1440)\overline{p}$, $\pi^0 f_0(2100)$, and two other broad, unestablished resonances.

NODE=M071S50;LINKAGE=AL

$\Gamma(\pi^0 f_0(2100) \to \pi^0 p\overline{p})/\Gamma_{total}$ Γ_{36}/Γ

NODE=M071S51
NODE=M071S51

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
1.1±0.4±0.1	76	[73] ALEXANDER	10	CLEO	$\psi(2S) \to \pi^0 p\overline{p}$

[73] From a fit of the $p\overline{p}$ and $p\pi^0$ mass distributions to a combination of $N_1^*(1440)\overline{p}$, $\pi^0 f_0(2100)$, and two other broad, unestablished resonances.

NODE=M071S51;LINKAGE=AL

$\Gamma(\eta p\overline{p})/\Gamma_{total}$ Γ_{37}/Γ

NODE=M071R56
NODE=M071R56

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
5.7±0.6 OUR AVERAGE					
5.6±0.6±0.3	154	ALEXANDER	10	CLEO	$\psi(2S) \to \eta p\overline{p}$
5.8±1.1±0.7	44.8 ± 8.5	[74] ABLIKIM	05E	BES2	$e^+e^- \to \psi(2S) \to p\overline{p}\gamma\gamma$
8 ±3 ±3	9.8	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to p\overline{p}\pi^+\pi^-\pi^0$

[74] Computed using B($\eta \to \gamma\gamma$) = (39.43 ± 0.26)%.

NODE=M071R56;LINKAGE=AB

$\Gamma(\eta f_0(2100) \to \eta p\overline{p})/\Gamma_{total}$ Γ_{38}/Γ

NODE=M071S52
NODE=M071S52

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
1.2±0.4±0.1	31	[75] ALEXANDER	10	CLEO	$\psi(2S) \to \eta p\overline{p}$

[75] From a fit of the $p\overline{p}$ and $p\eta$ distributions to a combination of $N^*(1535)\overline{p}$ and $\eta f_0(2100)$.

NODE=M071S52;LINKAGE=AL

$\Gamma(N^*(1535)\overline{p} \to \eta p\overline{p})/\Gamma_{total}$ Γ_{39}/Γ

NODE=M071S53
NODE=M071S53

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
4.4±0.6±0.3	123	[76] ALEXANDER	10	CLEO	$\psi(2S) \to \eta p\overline{p}$

[76] From a fit of the $p\overline{p}$ and $p\eta$ distributions to a combination of $N^*(1535)\overline{p}$ and $\eta f_0(2100)$.

NODE=M071S53;LINKAGE=AL

$\Gamma(\omega p\overline{p})/\Gamma_{total}$ Γ_{40}/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	[77] BAI	03B	BES	$\psi(2S) \to p\overline{p}\pi^+\pi^-\pi^0$

[77] Normalized to B($\psi(2S) \to J/\psi\pi^+\pi^-$) = 0.305 ± 0.016. NODE=M071R;LINKAGE=B3

$\Gamma(\phi p\overline{p})/\Gamma_{total}$ Γ_{41}/Γ

NODE=M071R82

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.24	90	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to p\overline{p}K^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.26	90	[78] BAI	03B	BES	$\psi(2S) \to K^+K^-p\overline{p}$

[78] Normalized to B($\psi(2S) \to J/\psi\pi^+\pi^-$) = 0.305 ± 0.016. NODE=M071R82;LINKAGE=B3

$\Gamma(\pi^+\pi^-p\overline{p})/\Gamma_{total}$ Γ_{42}/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		[79] TANENBAUM	78	MRK1	e^+e^-

[79] Assuming entirely strong decay. NODE=M071R;LINKAGE=K

$\Gamma(p\overline{n}\pi^-$ or c.c.$)/\Gamma_{total}$ Γ_{43}/Γ

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_{44}/Γ

NODE=M071R02

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.18±0.50±0.50	135 ± 21	ABLIKIM	06I	BES2	$e^+e^- \to p\pi^-\pi^0X$

$\Gamma(\eta\pi^+\pi^-)/\Gamma_{total}$ Γ_{46}/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_{47}/Γ

NODE=M071S07

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
9.5±0.7±1.5		[80] 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	[81] BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to \eta 3\pi(\eta \to \gamma\gamma)$ OCCUR=2
8.1±1.4±1.6	50.0	[81] BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to \eta 3\pi(\eta \to 3\pi)$ OCCUR=3

[80] Average of $\eta \to \gamma\gamma$ and $\eta \to 3\pi$. NODE=M071S07;LINKAGE=BR

[81] Not independent from other values reported by BRIERE 05. NODE=M071S07;LINKAGE=BI

$\Gamma(2(\pi^+\pi^-)\eta)/\Gamma_{total}$ Γ_{48}/Γ

NODE=M071S38

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.2±0.6±0.1	16	[82] AUBERT	07AU	BABR	10.6 $e^+e^- \to 2(\pi^+\pi^-)\eta\gamma$

[82] AUBERT 07AU quotes $\Gamma_{ee}^{\psi(2S)} \cdot$B($\psi(2S) \to 2(\pi^+\pi)\eta$) $\cdot$B($\eta \to \gamma\gamma$) = 1.2±0.7±0.1 eV. NODE=M071S38;LINKAGE=UB

$\Gamma(\eta'\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{49}/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

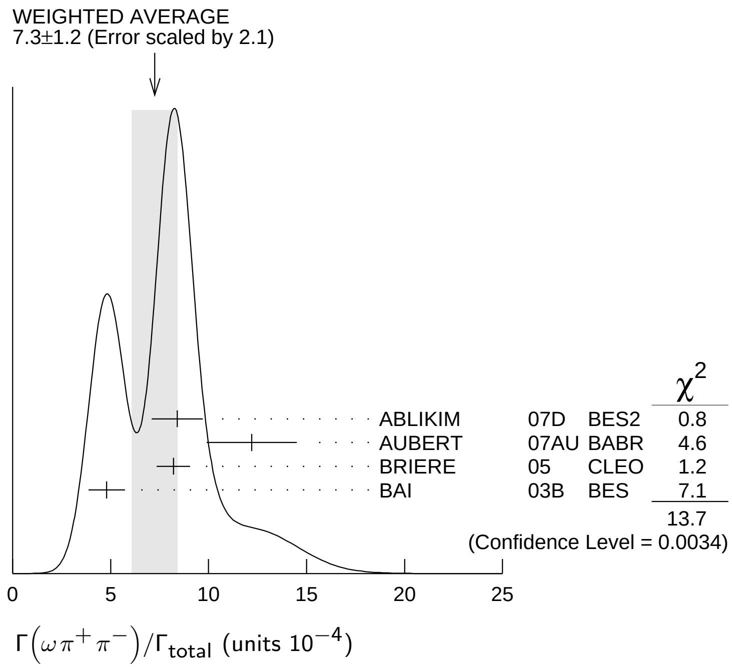
$\Gamma(\omega\pi^+\pi^-)/\Gamma_{total}$ Γ_{50}/Γ

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	[83] 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	[84] BAI	03B	BES	$\psi(2S) \to 2(\pi^+\pi^-)\pi^0$

[83] 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

[84] Normalized to $B(\psi(2S) \to J/\psi\pi^+\pi^-) = 0.305 \pm 0.016$. NODE=M071R77;LINKAGE=B3



$\Gamma(b_1^{\pm}\pi^{\mp})/\Gamma_{total}$ Γ_{51}/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	[85,86] 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		[85] BAI	99C	BES	Repl. by BAI 03B

[85] Assuming $B(b_1 \to \omega\pi)$=1. NODE=M071R;LINKAGE=M1

[86] Normalized to $B(\psi(2S) \to J/\psi\pi^+\pi^-) = 0.305 \pm 0.016$. NODE=M071R40;LINKAGE=B3

$\Gamma(b_1^0\pi^0)/\Gamma_{total}$ Γ_{52}/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	$e^+e^- \to \psi(2S)$

$\Gamma(\omega f_2(1270))/\Gamma_{total}$ Γ_{53}/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		[87] BAI	03B	BES	$\psi(2S) \to 2(\pi^+\pi^-)\pi^0$
<1.7	90		BAI	98J	BES	Repl. by BAI 03B

[87] Normalized to $B(\psi(2S) \to J/\psi\pi^+\pi^-) = 0.305 \pm 0.016$. NODE=M071R64;LINKAGE=B3

$\Gamma(\pi^+\pi^- K^+ K^-)/\Gamma_{total}$ Γ_{54}/Γ

NODE=M071R24

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
7.5±0.9 OUR AVERAGE	Error includes scale factor of 1.9.				
10.9±1.9±0.2	85	[88] AUBERT	07AK	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		[89] TANENBAUM	78	MRK1	e^+e^-

[88] AUBERT 07AK reports $[\Gamma(\psi(2S) \to \pi^+\pi^- K^+K^-)/\Gamma_{total}] \times [\Gamma(\psi(2S) \to e^+e^-)] = (2.56 \pm 0.42 \pm 0.16) \times 10^{-3}$ keV which we divide by our best value $\Gamma(\psi(2S) \to e^+e^-) = 2.35 \pm 0.04$ 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=BE

[89] Assuming entirely strong decay.

NODE=M071R24;LINKAGE=K

$\Gamma(\rho^0 K^+ K^-)/\Gamma_{total}$ Γ_{55}/Γ

NODE=M071S09

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.2±0.2±0.4	223.8	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to K^+K^-\pi^+\pi^-$

$\Gamma(K^*(892)^0 \overline{K}{}^*_2(1430)^0)/\Gamma_{total}$ Γ_{56}/Γ

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^-

$\Gamma(K^+ K^- \pi^+\pi^-\eta)/\Gamma_{total}$ Γ_{57}/Γ

NODE=M071S39

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.3±0.7±0.1	7	[90] AUBERT	07AU	BABR	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\eta\gamma$

[90] 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

$\Gamma(K^+ K^- 2(\pi^+\pi^-)\pi^0)/\Gamma_{total}$ Γ_{58}/Γ

NODE=M071R09

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
10.0±2.5±1.8	65	ABLIKIM	07D	BES2	$e^+e^- \to \psi(2S)$

$\Gamma(K_1(1270)^\pm K^\mp)/\Gamma_{total}$ Γ_{60}/Γ

NODE=M071R41

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
10.0±1.8±2.1	[91] BAI	99C	BES	e^+e^-

[91] Assuming $B(K_1(1270) \to K\rho) = 0.42 \pm 0.06$

NODE=M071R;LINKAGE=M2

$\Gamma(K^0_S K^0_S \pi^+\pi^-)/\Gamma_{total}$ Γ_{61}/Γ

NODE=M071R49

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.20±0.25±0.37	83 ± 9	ABLIKIM	05O	BES2	$e^+e^- \to \psi(2S)$

$\Gamma(\rho^0 p\overline{p})/\Gamma_{total}$ Γ_{62}/Γ

NODE=M071S14

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.5±0.1±0.2	61.1	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to p\overline{p}\pi^+\pi^-$

$\Gamma(K^+ \overline{K}{}^*(892)^0 \pi^- + c.c.)/\Gamma_{total}$ Γ_{63}/Γ

NODE=M071R34

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
6.7±2.5	TANENBAUM	78	MRK1	e^+e^-

$\Gamma(2(\pi^+\pi^-))/\Gamma_{total}$ Γ_{64}/Γ

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_{65}/Γ

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^-

$\Gamma(K^+K^-\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{66}/Γ

NODE=M071S10
NODE=M071S10

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
12.6±0.9 OUR AVERAGE					
18.7±5.7±0.3	32	[92] 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	$e^+e^- \to \psi(2S) \to K^+K^-\pi^+\pi^-\pi^0$

[92] 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 $\Gamma(\psi(2S) \to e^+e^-) = 2.35 \pm 0.04$ 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	$\psi(2S) \to K^+K^-\pi^+\pi^-\pi^0$

$\Gamma(K^*(892)^+K^-\rho^0 + \text{c.c.})/\Gamma_{total}$ — 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	$\psi(2S) \to K^+K^-\pi^+\pi^-\pi^0$

$\Gamma(K^*(892)^0K^-\rho^+ + \text{c.c.})/\Gamma_{total}$ — 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	$\psi(2S) \to K^+K^-\pi^+\pi^-\pi^0$

$\Gamma(\eta K^+K^-)/\Gamma_{total}$ — Γ_{72}/Γ

NODE=M071S11
NODE=M071S11

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.3	90	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to K^+K^-\pi^+\pi^-\pi^0$

$\Gamma(\omega K^+K^-)/\Gamma_{total}$ — Γ_{73}/Γ

NODE=M071R78
NODE=M071R78

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.85±0.25 OUR AVERAGE Error includes scale factor of 1.1.					
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	23.0 ± 5.2	[93] BAI	03B	BES	$\psi(2S) \to K^+K^-\pi^+\pi^-\pi^0$

[93] Normalized to $B(\psi(2S) \to J/\psi\pi^+\pi^-) = 0.305 \pm 0.016$. NODE=M071R78;LINKAGE=B3

$\Gamma(3(\pi^+\pi^-))/\Gamma_{total}$ — Γ_{74}/Γ

NODE=M071R32
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		[94] TANENBAUM	78	MRK1	e^+e^-

[94] Assuming entirely strong decay. NODE=M071R32;LINKAGE=K

$\Gamma(p\overline{p}\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{75}/Γ

NODE=M071S15
NODE=M071S15

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
7.3±0.4±0.6	434.9	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to p\overline{p}\pi^+\pi^-\pi^0$

$\Gamma(K^+K^-)/\Gamma_{total}$ Γ_{76}/Γ

NODE=M071R23

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
6.3±0.7 OUR AVERAGE					
6.3±0.6±0.3		DOBBS	06A	CLEO	e^+e^-
10 ±7		BRANDELIK	79C	DASP	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 5	90	FELDMAN	77	MRK1	e^+e^-

$\Gamma(K^0_S K^0_L)/\Gamma_{total}$ Γ_{77}/Γ

NODE=M071R87

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
5.4 ±0.5 OUR AVERAGE					
5.8 ±0.8 ±0.4		DOBBS	06A	CLEO	e^+e^-
5.24±0.47±0.48	156 ± 14	[95] BAI	04B	BES2	$\psi(2S) \to K^0_S K^0_L \to \pi^+\pi^- X$

[95] Using B($K^0_S \to \pi^+\pi^-$) = 0.6860 ± 0.0027.

NODE=M071R;LINKAGE=KZ

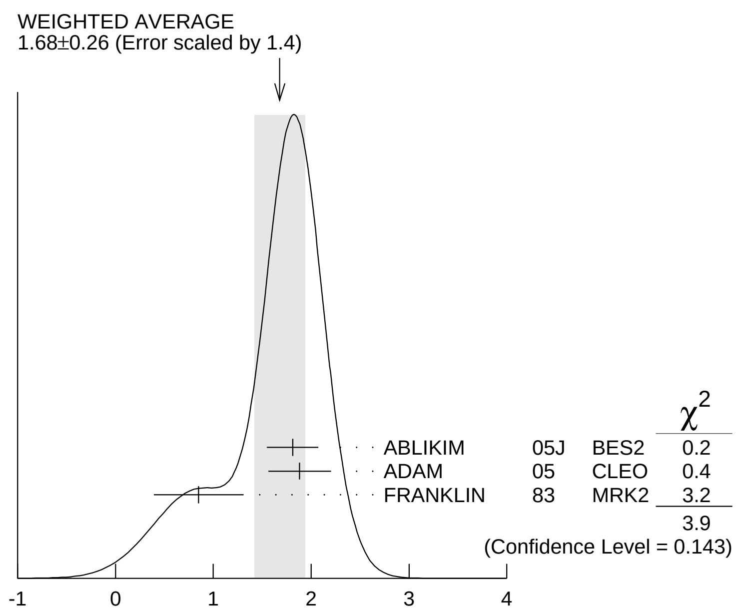
$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{78}/Γ

NODE=M071R36

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.68±0.26 OUR AVERAGE Error includes scale factor of 1.4. See the ideogram below.					
1.81±0.18±0.19	260 ± 19	[96] ABLIKIM	05J	BES2	$e^+e^- \to \psi(2S)$
$1.88^{+0.16}_{-0.15}$±0.28	194	ADAM	05	CLEO	$e^+e^- \to \psi(2S)$
0.85±0.46	4	FRANKLIN	83	MRK2	$e^+e^- \to$ hadrons

[96] From a PW analysis of $\psi(2S) \to \pi^+\pi^-\pi^0$.

NODE=M071R;LINKAGE=AK



$\Gamma\left(\pi^+\pi^-\pi^0\right)/\Gamma_{total}$ (units 10^{-4})

$\Gamma(\rho(2150)\pi \to \pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{79}/Γ

NODE=M071R57

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
1.94±0.25$^{+1.15}_{-0.34}$	[97] ABLIKIM	05J	BES2	$\psi(2S) \to \rho(2150)\pi \to \pi^+\pi^-\pi^0$

[97] From a PW analysis of $\psi(2S) \to \pi^+\pi^-\pi^0$.

NODE=M071R57;LINKAGE=AK

$\Gamma(\rho(770)\pi \to \pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{80}/Γ

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±0.07±0.11			[98] ABLIKIM	05J	BES2	$\psi(2S) \to \rho(770)\pi \to \pi^+\pi^-\pi^0$
$0.24^{+0.08}_{-0.07}$±0.02		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		[99] ABRAMS	75	MRK1	e^+e^-

[98] From a PW analysis of $\psi(2S) \to \pi^+\pi^-\pi^0$. NODE=M071R26;LINKAGE=AK
[99] Final state $\rho^0\pi^0$. NODE=M071R;LINKAGE=N

$\Gamma(\pi^+\pi^-)/\Gamma_{total}$ Γ_{81}/Γ

NODE=M071R20
NODE=M071R20

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
8 ±5		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^-

$\Gamma(K_1(1400)^\pm K^\mp)/\Gamma_{total}$ Γ_{82}/Γ

NODE=M071R45
NODE=M071R45

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<3.1	90	[100] BAI	99C	BES	e^+e^-

[100] Assuming B($K_1(1400) \to K^*\pi$)=0.94 ± 0.06 NODE=M071R;LINKAGE=M3

$\Gamma(K^+K^-\pi^0)/\Gamma_{total}$ Γ_{83}/Γ

NODE=M071R38
NODE=M071R38

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<2.96	90	1	FRANKLIN	83	MRK2	$e^+e^- \to$ hadrons

$\Gamma(K^+\overline{K}^*(892)^- + \text{c.c.})/\Gamma_{total}$ Γ_{84}/Γ

NODE=M071R39
NODE=M071R39

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$1.7^{+0.8}_{-0.7}$ OUR AVERAGE						
$2.9^{+1.3}_{-1.7}\pm0.4$		9.6 ± 4.2	ABLIKIM	05I	BES2	$e^+e^- \to \psi(2S)$
$1.3^{+1.0}_{-0.7}\pm0.3$		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

$\Gamma(K^*(892)^0\overline{K}^0 + \text{c.c.})/\Gamma_{total}$ Γ_{85}/Γ

NODE=M071R30
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	$e^+e^- \to \psi(2S)$

$\Gamma(K^+\overline{K}^*(892)^- + \text{c.c.})/\Gamma(K^*(892)^0\overline{K}^0 + \text{c.c.})$ Γ_{84}/Γ_{85}

NODE=M071R46
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	$e^+e^- \to \psi(2S)$

$\Gamma(\phi\pi^+\pi^-)/\Gamma_{total}$ Γ_{86}/Γ

NODE=M071R80
NODE=M071R80

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.17±0.29 OUR AVERAGE Error includes scale factor of 1.7.					
2.43±0.95±0.04	10 ± 4	[101,102] AUBERT	07AK	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	[103] BAI	03B	BES	$\psi(2S) \to K^+K^-\pi^+\pi^-$

[101] 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 $\Gamma(\psi(2S) \to e^+e^-) = 2.35 \pm 0.04$ 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
[102] Using B($\phi \to K^+K^-$) = (49.3 ± 0.6)%. NODE=M071R80;LINKAGE=UB
[103] Normalized to B($\psi(2S) \to J/\psi\pi^+\pi^-$) = 0.305 ± 0.016. NODE=M071R80;LINKAGE=B3

$\Gamma(\phi f_0(980) \to \pi^+\pi^-)/\Gamma_{total}$ Γ_{87}/Γ

NODE=M071R83

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
0.68±0.25 OUR AVERAGE	Error includes scale factor of 1.1.			
1.45±0.70±0.03	6 ± 3	[104,105] AUBERT 07AK	BABR	10.6 $e^+e^- \to \pi^+\pi^- K^+K^-\gamma$
0.6 ±0.2 ±0.1	18.4±6.4	[106] BAI 03B	BES	$\psi(2S) \to K^+K^-\pi^+\pi^-$

[104] AUBERT 07AK reports $[\Gamma(\psi(2S) \to \phi f_0(980) \to \pi^+\pi^-)/\Gamma_{total}] \times [\Gamma(\psi(2S) \to e^+e^-)] = (0.34\pm0.16\pm0.04)\times10^{-3}$ keV which we divide by our best value $\Gamma(\psi(2S) \to e^+e^-) = 2.35 \pm 0.04$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M071R83;LINKAGE=BE

[105] Using $B(\phi \to K^+K^-) = (49.3 \pm 0.6)\%$. NODE=M071R83;LINKAGE=UB

[106] Normalized to $B(\psi(2S) \to J/\psi\pi^+\pi^-) = 0.305 \pm 0.016$. NODE=M071R83;LINKAGE=B3

$\Gamma(2(K^+K^-))/\Gamma_{total}$ Γ_{88}/Γ

NODE=M071S12

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
0.6±0.1±0.1	59.2	BRIERE 05	CLEO	$e^+e^- \to \psi(2S) \to 2(K^+K^-)$

$\Gamma(\phi K^+K^-)/\Gamma_{total}$ Γ_{89}/Γ

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	[107] BAI 03B	BES	$\psi(2S) \to 2(K^+K^-)$

[107] Normalized to $B(\psi(2S) \to J/\psi\pi^+\pi^-) = 0.305 \pm 0.016$. NODE=M071R81;LINKAGE=B3

$\Gamma(2(K^+K^-)\pi^0)/\Gamma_{total}$ Γ_{90}/Γ

NODE=M071S13

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
1.1±0.2±0.2	44.7	BRIERE 05	CLEO	$e^+e^- \to \psi(2S) \to 2(K^+K^-)\pi^0$

$\Gamma(\phi\eta)/\Gamma_{total}$ Γ_{91}/Γ

NODE=M071R89

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
$2.8^{+1.0}_{-0.8}$ OUR AVERAGE				
$2.0^{+1.5}_{-1.1}\pm0.4$	6	ADAM 05	CLEO	$e^+e^- \to \psi(2S)$
3.3±1.1±0.5	17	ABLIKIM 04K	BES	$e^+e^- \to \psi(2S)$

$\Gamma(\phi\eta')/\Gamma_{total}$ Γ_{92}/Γ

NODE=M071R90

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
3.1±1.4±0.7	8	[108] ABLIKIM 04K	BES	$e^+e^- \to \psi(2S)$

[108] Calculated combining $\eta' \to \gamma\rho$ and $\eta\pi^+\pi^-$ channels. NODE=M071R;LINKAGE=AI

$\Gamma(\omega\eta')/\Gamma_{total}$ Γ_{93}/Γ

NODE=M071R91

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
$3.2^{+2.4}_{-2.0}\pm0.7$	4	[109] ABLIKIM 04K	BES	$e^+e^- \to \psi(2S)$

[109] Calculated combining $\eta' \to \gamma\rho$ and $\eta\pi^+\pi^-$ channels. NODE=M071R91;LINKAGE=AI

$\Gamma(\omega\pi^0)/\Gamma_{total}$ Γ_{94}/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	$e^+e^- \to \psi(2S)$

$\Gamma(\rho\eta')/\Gamma_{total}$ Γ_{95}/Γ

NODE=M071R93

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
$1.87^{+1.64}_{-1.11}\pm0.33$	2	ABLIKIM 04L	BES	$e^+e^- \to \psi(2S)$

$\Gamma(\rho\eta)/\Gamma_{total}$ Γ_{96}/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	$e^+e^- \rightarrow \psi(2S)$
$1.78^{+0.67}_{-0.62}\pm0.17$	13	ABLIKIM	04L	BES	$e^+e^- \rightarrow \psi(2S)$

$\Gamma(\omega\eta)/\Gamma_{total}$ Γ_{97}/Γ

NODE=M071R95

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<1.1	90	ADAM	05	CLEO	$e^+e^- \rightarrow \psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<3.1	90	ABLIKIM	04K	BES	$e^+e^- \rightarrow \psi(2S)$

$\Gamma(\phi\pi^0)/\Gamma_{total}$ Γ_{98}/Γ

NODE=M071R96

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<0.4	90	ABLIKIM	04K	BES	$e^+e^- \rightarrow \psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.7	90	ADAM	05	CLEO	$e^+e^- \rightarrow \psi(2S)$

$\Gamma(\eta_c\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{99}/Γ

NODE=M071R03

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<1.0	90	PEDLAR	07	CLEO	$e^+e^- \rightarrow \psi(2S)$

$\Gamma(p\overline{p}K^+K^-)/\Gamma_{total}$ Γ_{100}/Γ

NODE=M071S16

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
2.7±0.6±0.4	30.1	BRIERE	05	CLEO	$e^+e^- \rightarrow \psi(2S) \rightarrow p\overline{p}K^+K^-$

$\Gamma(\overline{\Lambda}nK^0_S+\text{c.c.})/\Gamma_{total}$ Γ_{101}/Γ

NODE=M071R08

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.81±0.11±0.14	50	[110] ABLIKIM	08C	BES2	$e^+e^- \rightarrow J/\psi$

[110] Using B($\overline{\Lambda} \rightarrow \overline{p}\pi^+$) = 63.9% and B($K^0_S \rightarrow \pi^+\pi^-$) = 69.2%.

NODE=M071R08;LINKAGE=AB

$\Gamma(\phi f_2'(1525))/\Gamma_{total}$ Γ_{102}/Γ

NODE=M071R67

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.44±0.12±0.11		20 ± 6	BAI	04C		$\psi(2S) \rightarrow 2(K^+K^-)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.45	90		BAI	98J	BES	$e^+e^- \rightarrow 2(K^+K^-)$

$\Gamma(\Theta(1540)\overline{\Theta}(1540) \rightarrow K^0_S pK^-\overline{n}+\text{c.c.})/\Gamma_{total}$ Γ_{103}/Γ

NODE=M071S01

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<0.88	90	BAI	04G	BES2	e^+e^-

$\Gamma(\Theta(1540)K^-\overline{n} \rightarrow K^0_S pK^-\overline{n})/\Gamma_{total}$ Γ_{104}/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_{105}/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_{106}/Γ

NODE=M071S04

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<2.6	90	BAI	04G	BES2	e^+e^-

$\Gamma(\overline{\Theta}(1540)K^0_S p \rightarrow K^0_S pK^-\overline{n})/\Gamma_{total}$ Γ_{107}/Γ

NODE=M071S05

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<0.60	90	BAI	04G	BES2	e^+e^-

$\Gamma(K^0_S K^0_S)/\Gamma_{total}$ — Γ_{108}/Γ

NODE=M071R88

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
<0.046	[111] BAI 04D	BES	e^+e^-

[111] Forbidden by CP.

NODE=M071R;LINKAGE=BA

RADIATIVE DECAYS

NODE=M071315

$\Gamma(\gamma\chi_{c0}(1P))/\Gamma_{total}$ — Γ_{109}/Γ

NODE=M071R55

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
9.68±0.31 OUR FIT				
9.2 ±0.4 OUR AVERAGE				
9.22±0.11±0.46	72600	ATHAR 04	CLEO	$e^+e^- \to \gamma X$
9.9 ±0.5 ±0.8		[112] GAISER 86	CBAL	$e^+e^- \to \gamma X$
7.2 ±2.3		[112] BIDDICK 77	CNTR	$e^+e^- \to \gamma X$
7.5 ±2.6		[112] WHITAKER 76	MRK1	e^+e^-

[112] Angular distribution $(1+\cos^2\theta)$ assumed.

NODE=M071R;LINKAGE=A

$\Gamma(\gamma\chi_{c1}(1P))/\Gamma_{total}$ — Γ_{110}/Γ

NODE=M071R58

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
9.2 ±0.4 OUR FIT				
8.9 ±0.5 OUR AVERAGE				
9.07±0.11±0.54	76700	ATHAR 04	CLEO	$e^+e^- \to \gamma X$
9.0 ±0.5 ±0.7		[113] GAISER 86	CBAL	$e^+e^- \to \gamma X$
7.1 ±1.9		[114] BIDDICK 77	CNTR	$e^+e^- \to \gamma X$

[113] Angular distribution $(1-0.189\cos^2\theta)$ assumed.

NODE=M071R;LINKAGE=G

[114] Valid for isotropic distribution of the photon.

NODE=M071R;LINKAGE=B

$\Gamma(\gamma\chi_{c2}(1P))/\Gamma_{total}$ — Γ_{111}/Γ

NODE=M071R59

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
8.72±0.34 OUR FIT				
[$(8.75 \pm 0.35) \times 10^{-2}$ OUR 2011 FIT]				
8.8 ±0.5 OUR AVERAGE Error includes scale factor of 1.1.				
9.33±0.14±0.61	79300	ATHAR 04	CLEO	$e^+e^- \to \gamma X$
8.0 ±0.5 ±0.7		[115] GAISER 86	CBAL	$e^+e^- \to \gamma X$
7.0 ±2.0		[116] BIDDICK 77	CNTR	$e^+e^- \to \gamma X$

NEW

[115] Angular distribution $(1-0.052\cos^2\theta)$ assumed.

NODE=M071R;LINKAGE=F

[116] Valid for isotropic distribution of the photon.

NODE=M071R59;LINKAGE=B

$[\Gamma(\gamma\chi_{c0}(1P))+\Gamma(\gamma\chi_{c1}(1P))+\Gamma(\gamma\chi_{c2}(1P))]/\Gamma_{total}$ — $(\Gamma_{109}+\Gamma_{110}+\Gamma_{111})/\Gamma$

NODE=M071R19

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
27.6±0.3±2.0	[117] ATHAR 04	CLEO	$e^+e^- \to \gamma X$

[117] Not independent from ATHAR 04 measurements of B($\gamma\chi_{cJ}$).

NODE=M071R;LINKAGE=AH

$\Gamma(\gamma\chi_{c0}(1P))/\Gamma(\gamma\chi_{c1}(1P))$ — $\Gamma_{109}/\Gamma_{110}$

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	[118] ATHAR 04	CLEO	$e^+e^- \to \gamma X$

[118] Not independent from ATHAR 04 measurements of B($\gamma\chi_{cJ}$).

NODE=M071R97;LINKAGE=AH

$\Gamma(\gamma\chi_{c2}(1P))/\Gamma(\gamma\chi_{c1}(1P))$ — $\Gamma_{111}/\Gamma_{110}$

NODE=M071R98

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1.03±0.02±0.03	[119] ATHAR 04	CLEO	$e^+e^- \to \gamma X$

[119] Not independent from ATHAR 04 measurements of B($\gamma\chi_{cJ}$).

NODE=M071R98;LINKAGE=AH

$\Gamma(\gamma\chi_{c0}(1P))/\Gamma(\gamma\chi_{c2}(1P))$ — $\Gamma_{109}/\Gamma_{111}$

NODE=M071R99

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.99±0.02±0.08	[120] ATHAR 04	CLEO	$e^+e^- \to \gamma X$

[120] Not independent from ATHAR 04 measurements of B($\gamma\chi_{cJ}$).

NODE=M071R99;LINKAGE=AH

$\Gamma(\gamma\eta_c(1S))/\Gamma_{total}$ — Γ_{112}/Γ

NODE=M071R60
NODE=M071R60

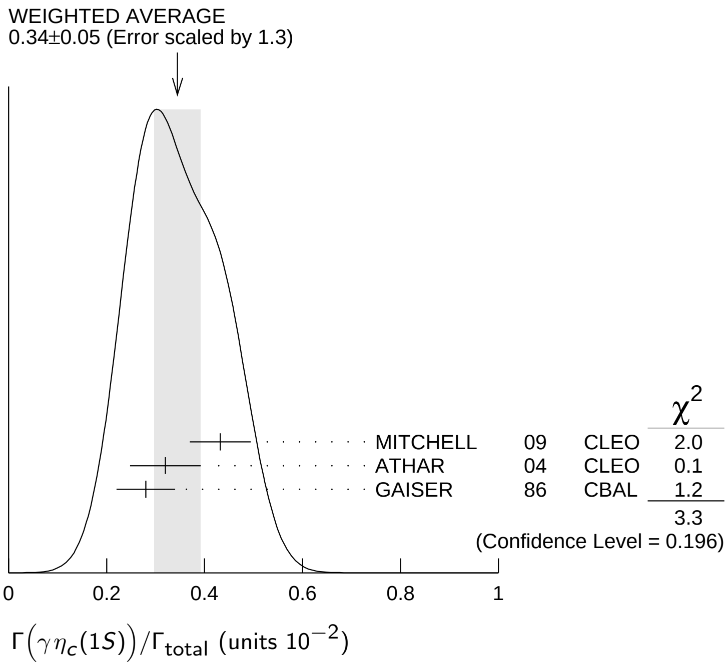
VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
0.34 ±0.05 OUR AVERAGE		Error includes scale factor of 1.3. See the ideogram below.		
0.432±0.016±0.060		MITCHELL 09	CLEO	$e^+e^- \to \gamma X$
0.32 ±0.04 ±0.06	2560	[121] ATHAR 04	CLEO	$e^+e^- \to \gamma X$
0.28 ±0.06		[122] GAISER 86	CBAL	$e^+e^- \to \gamma X$

[121] ATHAR 04 used $\Gamma_{\eta_c(1S)} = 24.8 \pm 4.9$ MeV to obtain this result.

NODE=M071R60;LINKAGE=AT

[122] GAISER 86 used $\Gamma_{\eta_c(1S)} = 11.5 \pm 4.5$ MeV to obtain this result.

NODE=M071R60;LINKAGE=GA



$\Gamma(\gamma\eta_c(2S))/\Gamma_{total}$ — Γ_{113}/Γ

NODE=M071R62
NODE=M071R62

VALUE	*CL%*	*DOCUMENT ID*	*TECN*	*COMMENT*
<8 × 10^{-4}	90	[123] CRONIN-HEN..10	CLEO	$\psi(2S) \to \gamma K\overline{K}\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$<2 \times 10^{-3}$	90	ATHAR 04	CLEO	$e^+e^- \to \gamma X$
0.2–1.3 $\times 10^{-2}$	95	EDWARDS 82C	CBAL	$e^+e^- \to \gamma X$

[123] 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 $B(\eta_c(2S) \to K\overline{K}\pi) = 1.9\times10^{-2}$. 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_{114}/Γ

NODE=M071R42
NODE=M071R42

VALUE (units 10^{-6})	*CL%*	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
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		[124] LIBERMAN 75	SPEC	e^+e^-
$< 1 \times 10^4$	90		WIIK 75	DASP	e^+e^-

[124] Restated by us using $B(\psi(2S) \to \mu^+\mu^-) = 0.0077$.

NODE=M071R;LINKAGE=U

$\Gamma(\gamma\eta'(958))/\Gamma_{total}$ — Γ_{115}/Γ

NODE=M071R44
NODE=M071R44

VALUE (units 10^{-4})	*CL%*	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
1.23±0.06 OUR AVERAGE					
1.26±0.03±0.08		2226	[125] 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		[126] BRAUNSCH... 77	DASP	e^+e^-
< 11	90		[127] BARTEL 76	CNTR	e^+e^-

[125] Combining the results from $\eta' \rightarrow \pi^+\pi^-\eta$ and $\eta' \rightarrow \pi^+\pi^-\gamma$ decay modes. NODE=M071R44;LINKAGE=AB
[126] Restated by us using total decay width 228 keV. NODE=M071R;LINKAGE=R
[127] The value is normalized to the branching ratio for $\Gamma(J/\psi(1S)\eta)/\Gamma_{\text{total}}$. NODE=M071R;LINKAGE=C

$\Gamma(\gamma f_2(1270))/\Gamma_{\text{total}}$ — Γ_{116}/Γ

NODE=M071R84
NODE=M071R84

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT	
2.12±0.19±0.32		[128,129] BAI	03C	BES	$\psi(2S) \rightarrow \gamma\pi\pi$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
2.08±0.19±0.33	200.6 ± 18.8	[128] BAI	03C	BES	$\psi(2S) \rightarrow \gamma\pi^+\pi^-$	OCCUR=2
2.90±1.08±1.07	29.9 ± 11.1	[128] BAI	03C	BES	$\psi(2S) \rightarrow \gamma\pi^0\pi^0$	OCCUR=3

[128] Normalized to $B(\psi(2S) \rightarrow J/\psi\pi^+\pi^-) = 0.305 \pm 0.016$. NODE=M071R;LINKAGE=3B
[129] Combining the results from $\pi^+\pi^-$ and $\pi^0\pi^0$ decay modes. NODE=M071R;LINKAGE=B9

$\Gamma(\gamma f_0(1710) \rightarrow \gamma\pi\pi)/\Gamma_{\text{total}}$ — Γ_{118}/Γ

NODE=M071R85
NODE=M071R85

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.301±0.041±0.124	35.6 ± 4.8	[130] BAI	03C	BES	$\psi(2S) \rightarrow \gamma\pi^+\pi^-$

[130] Normalized to $B(\psi(2S) \rightarrow J/\psi\pi^+\pi^-) = 0.305 \pm 0.016$. NODE=M071R85;LINKAGE=3B

$\Gamma(\gamma f_0(1710) \rightarrow \gamma K\overline{K})/\Gamma_{\text{total}}$ — Γ_{119}/Γ

NODE=M071R86
NODE=M071R86

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT	
0.604±0.090±0.132		39.6 ± 5.9	[131,132] BAI	03C	BES	$\psi(2S) \rightarrow \gamma K^+K^-$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
< 1.56	90	6.8 ± 3.1	[131,132] BAI	03C	BES	$\psi(2S) \rightarrow \gamma K^0_S K^0_S$	OCCUR=2

[131] 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
[132] Normalized to $B(\psi(2S) \rightarrow J/\psi\pi^+\pi^-) = 0.305 \pm 0.016$. NODE=M071R86;LINKAGE=3B

$\Gamma(\gamma\eta)/\Gamma_{\text{total}}$ — Γ_{121}/Γ

NODE=M071R43
NODE=M071R43

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
1.38±0.48±0.09		13	[133] ABLIKIM	10F	BES3	$\psi(2S) \rightarrow \gamma\pi^+\pi^-\pi^0$, $\gamma 3\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 2	90		PEDLAR	09	CLE3	$\psi(2S) \rightarrow \gamma X$
< 90	90		BAI	98F	BES	$\psi(2S) \rightarrow \pi^+\pi^- 3\gamma$
<200	90		YAMADA	77	DASP	$e^+e^- \rightarrow 3\gamma$

[133] Combining the results from $\eta \rightarrow \pi^+\pi^-\pi^0$ and $\eta \rightarrow 3\pi^0$ decay modes. NODE=M071R43;LINKAGE=AB

$\Gamma(\gamma\eta\pi^+\pi^-)/\Gamma_{\text{total}}$ — Γ_{122}/Γ

NODE=M071R04
NODE=M071R04

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
8.71±1.25±1.64	418	ABLIKIM	06R	BES2	$\psi(2S) \rightarrow \gamma\eta\pi^+\pi^-$

$\Gamma(\gamma\eta(1405) \rightarrow \gamma K\overline{K}\pi)/\Gamma_{\text{total}}$ — Γ_{124}/Γ

NODE=M071R61
NODE=M071R61

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT	
<0.9	90	ABLIKIM	06R	BES2	$\psi(2S) \rightarrow \gamma K^0_S K^+\pi^-$ + c.c.	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<1.3	90	ABLIKIM	06R	BES2	$\psi(2S) \rightarrow \gamma K^+K^-\pi^0$	OCCUR=2
<1.2	90	[134] SCHARRE	80	MRK1	e^+e^-	

[134] Includes unknown branching fraction $\eta(1405) \rightarrow K\overline{K}\pi$. NODE=M071R;LINKAGE=E

$\Gamma(\gamma\eta(1405) \rightarrow \eta\pi^+\pi^-)/\Gamma_{\text{total}}$ — Γ_{125}/Γ

NODE=M071R05
NODE=M071R05

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.36±0.25±0.05	10	ABLIKIM	06R	BES2	$\psi(2S) \rightarrow \gamma\eta\pi^+\pi^-$

$\Gamma(\gamma\eta(1475) \rightarrow K\overline{K}\pi)/\Gamma_{\text{total}}$ — Γ_{127}/Γ

NODE=M071R06
NODE=M071R06

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT	
<1.4	90	ABLIKIM	06R	BES2	$\psi(2S) \rightarrow \gamma K^+K^-\pi^0$	OCCUR=2
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<1.5	90	ABLIKIM	06R	BES2	$\psi(2S) \rightarrow \gamma K^0_S K^+\pi^-$ + c.c.	

$\Gamma(\gamma\eta(1475) \to \eta\pi^+\pi^-)/\Gamma_{total}$ Γ_{128}/Γ

NODE=M071R07
NODE=M071R07

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.88	90	ABLIKIM	06R	BES2	$\psi(2S) \to \gamma\eta\pi^+\pi^-$

$\Gamma(\gamma 2(\pi^+\pi^-))/\Gamma_{total}$ Γ_{129}/Γ

NODE=M071S28
NODE=M071S28

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
39.6±2.8±5.0	583	ABLIKIM	07D	BES2	$e^+e^- \to \psi(2S)$

$\Gamma(\gamma K^{*0}K^+\pi^- + c.c.)/\Gamma_{total}$ Γ_{130}/Γ

NODE=M071S29
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_{131}/Γ

NODE=M071S30
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_{132}/Γ

NODE=M071S31
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_{133}/Γ

NODE=M071S32
NODE=M071S32

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
19.1±2.7±4.3	132	ABLIKIM	07D	BES2	$e^+e^- \to \psi(2S)$

$\Gamma(\gamma p\overline{p})/\Gamma_{total}$ Γ_{134}/Γ

NODE=M071S33
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	[135] ALEXANDER	10	CLEO	$\psi(2S) \to \gamma p\overline{p}$
2.9 ±0.4 ±0.4	142	ABLIKIM	07D	BES2	$e^+e^- \to \psi(2S)$

[135] 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_{135}/Γ

NODE=M071S46
NODE=M071S46

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
1.2±0.2±0.1	111	[136] ALEXANDER	10	CLEO	$\psi(2S) \to \gamma p\overline{p}$

[136] 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_{136}/Γ

NODE=M071S47
NODE=M071S47

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
0.72±0.18±0.03	73	[137] ALEXANDER	10	CLEO	$\psi(2S) \to \gamma p\overline{p}$

[137] 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_{137}/Γ

NODE=M071S48
NODE=M071S48

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<1.6	90	ALEXANDER	10	CLEO	$\psi(2S) \to \gamma p\overline{p}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<5.4	90	ABLIKIM	07D	BES	$\psi(2S) \to \gamma p\overline{p}$

$\Gamma(\gamma X \to \gamma p\overline{p})/\Gamma_{total}$ Γ_{138}/Γ

NODE=M071S49

For a narrow resonance in the range $2.2 < M(X) < 2.8$ GeV.

NODE=M071S49
NODE=M071S49

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<2	90	ALEXANDER	10	CLEO	$\psi(2S) \to \gamma p\overline{p}$

$\Gamma(\gamma\pi^+\pi^- p\overline{p})/\Gamma_{total}$ Γ_{139}/Γ

NODE=M071S34
NODE=M071S34

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
2.8±1.2±0.7	17	ABLIKIM	07D	BES2	$e^+e^- \to \psi(2S)$

$\Gamma(\gamma 2(\pi^+\pi^-) K^+ K^-)/\Gamma_{total}$ Γ_{140}/Γ NODE=M071S35

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<22	90	ABLIKIM	07D	BES2	$e^+ e^- \rightarrow \psi(2S)$

$\Gamma(\gamma 3(\pi^+\pi^-))/\Gamma_{total}$ Γ_{141}/Γ NODE=M071S36

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<17	90	ABLIKIM	07D	BES2	$e^+ e^- \rightarrow \psi(2S)$

$\Gamma(\gamma K^+ K^- K^+ K^-)/\Gamma_{total}$ Γ_{142}/Γ NODE=M071S37

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<4	90	ABLIKIM	07D	BES2	$e^+ e^- \rightarrow \psi(2S)$

$\psi(2S)$ CROSS-PARTICLE BRANCHING RATIOS

NODE=M071240

For measurements involving B($\psi(2S) \rightarrow \gamma \chi_{cJ}(1P)$)×B($\chi_{cJ}(1P) \rightarrow X$) see the corresponding entries in the $\chi_{cJ}(1P)$ sections.

NODE=M071240

MULTIPOLE AMPLITUDE RATIOS IN RADIATIVE DECAYS $\psi(2S) \rightarrow \gamma \chi_{cJ}(1P)$ and $\chi_{cJ} \rightarrow \gamma J/\psi(1S)$

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
$\mathbf{67^{+19}_{-13}}$	59k	[138] ARTUSO	09	CLEO	$\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$

[138] 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
$\mathbf{37^{+53}_{-47}}$	59k	[139] ARTUSO	09	CLEO	$\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$

[139] 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

AAIJ	12H	EPJ C72 1972	R. Aaij *et al.*	(LHCb Collab.)	REFID=54056
ANASHIN	12	PL B711 280	V.V. Anashin *et al.*	(KEDR Collab.)	REFID=54038
GE	11	PR D84 032008	J.Y. Ge *et al.*	(CLEO Collab.)	REFID=53960
ABLIKIM	10B	PRL 104 132002	M. Ablikim *et al.*	(BES III Collab.)	REFID=53348
ABLIKIM	10F	PRL 105 261801	M. Ablikim *et al.*	(BES III 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 011102R	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	V.V. Anashin *et al.*	(KEDR Collab.)	REFID=51655
		Translated from ZETFP 85 429.			
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=2
PEDLAR	07	PR D75 011102R	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 091103R	B. Aubert *et al.*	(BABAR Collab.)	REFID=51511
DOBBS	06A	PR D74 011105R	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 051108R	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 031101R	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.*		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 Collab., 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	E.A. Kuraev, V.S. Fadin	(NOVO)	REFID=40033
		Translated from YAF 41 733.			
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	A.A. Zholents *et al.*	(NOVO)	REFID=10321
		Translated from YAF 34 1471.			
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
3773.15±0.33 OUR FIT				
[3772.92 ± 0.35 MeV OUR 2011 FIT Scale factor = 1.1]				
3778.1 ±1.2 OUR AVERAGE				
[3775.2 ± 1.7 MeV OUR 2011 AVERAGE Scale factor = 1.4]				
$3779.2\ {}^{+1.8}_{-1.7}\ {}^{+0.6}_{-0.8}$		[1] 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. • • •				
3772.0 ±1.9		[2,3] ABLIKIM	08D	BES2	$e^+e^- \to$ hadrons
3778.4 ±3.0 ±1.3	34	CHISTOV	04	BELL	Sup. by BRODZICKA 08

NEW

NEW

[1] Taking into account interference between the resonant and non-resonant $D\overline{D}$ production.

[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 $\delta = 0^\circ$.

[3] Interference between the resonant and non-resonant $D\overline{D}$ production not taken into account.

NODE=M053M;LINKAGE=AN
NODE=M053M;LINKAGE=AB
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

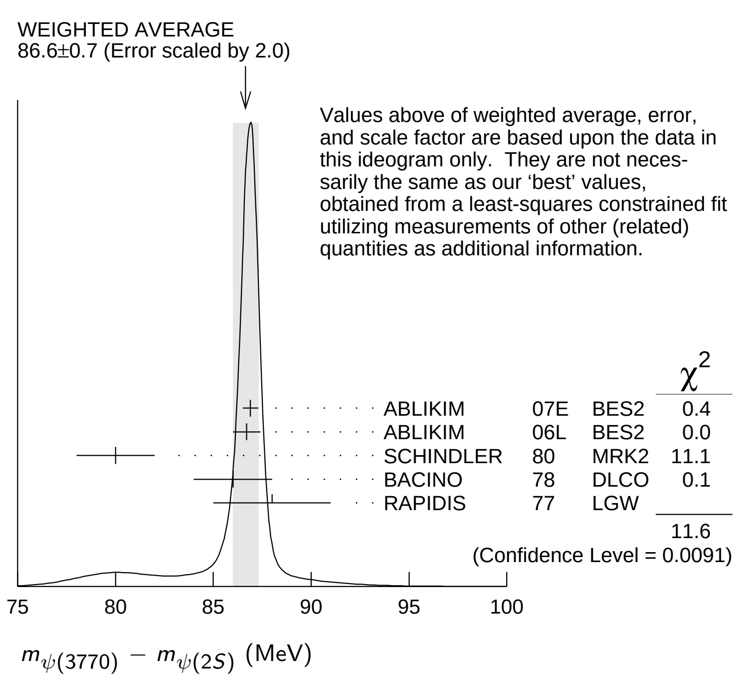
VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
87.04±0.33 OUR FIT			
[86.83 ± 0.35 MeV OUR 2011 FIT Scale factor = 1.1]			
86.6 ±0.7 OUR AVERAGE Error includes scale factor of 2.0. See the ideogram below.			
86.9 ±0.4	[4] ABLIKIM 07E	BES2	$e^+e^- \to$ hadrons
86.7 ±0.7	ABLIKIM 06L	BES2	$e^+e^- \to$ hadrons
80 ±2	SCHINDLER 80	MRK2	e^+e^-
86 ±2	[5] BACINO 78	DLCO	e^+e^-
88 ±3	RAPIDIS 77	LGW	e^+e^-

NEW

[4] BES-II $\psi(2S)$ mass subtracted (see ABLIKIM 06L).

[5] SPEAR $\psi(2S)$ mass subtracted (see SCHINDLER 80).

NODE=M053DM;LINKAGE=AK
NODE=M053DM;LINKAGE=S



$\psi(3770)$ WIDTH

NODE=M053W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
27.2± 1.0 OUR FIT						NODE=M053W NEW
[27.3 ± 1.0 MeV OUR 2011 FIT]						
27.5± 0.9 OUR AVERAGE						NEW
[27.6 ± 1.0 MeV OUR 2011 AVERAGE]						
$24.9^{+4.6+0.5}_{-4.0-1.1}$		[6] ANASHIN	12A	KEDR	$e^+e^- \rightarrow D\overline{D}$	
30.4± 8.5		[7,8] ABLIKIM	08D	BES2	$e^+e^- \rightarrow$ hadrons	
27 ±10 ±5	68	BRODZICKA	08	BELL	$B^+ \rightarrow D^0\overline{D}^0K^+$	
28.5± 1.2±0.2		[8] ABLIKIM	07E	BES2	$e^+e^- \rightarrow$ hadrons	
23.5± 3.7±0.9		AUBERT	07BE	BABR	$e^+e^- \rightarrow D\overline{D}\gamma$	
26.9± 2.4±0.3		[8] ABLIKIM	06L	BES2	$e^+e^- \rightarrow$ hadrons	
24 ± 5		[8] SCHINDLER	80	MRK2	e^+e^-	
24 ± 5		[8] BACINO	78	DLCO	e^+e^-	
28 ± 5		[8] RAPIDIS	77	LGW	e^+e^-	

[6] Taking into account interference between the resonant and non-resonant $D\overline{D}$ production. NODE=M053W;LINKAGE=AN

[7] 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=M053W;LINKAGE=AB

[8] Interference between the resonant and non-resonant $D\overline{D}$ production not taken into account. NODE=M053W;LINKAGE=NI

$\psi(3770)$ DECAY MODES

NODE=M053220;NODE=M053

In addition to the dominant decay mode to $D\overline{D}$, $\psi(3770)$ was found to decay into the final states containing the J/ψ (BAI 05, ADAM 06). ADAMS 06 and HUANG 06A searched for various decay modes with light hadrons and found a statistically significant signal for the decay to $\phi\eta$ only (ADAMS 06). 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 ±5) %	S=2.0	DESIG=5
Γ_3	D^+D^-	(41 ±4) %	S=2.0	DESIG=6
Γ_4	$J/\psi\pi^+\pi^-$	(1.93±0.28) × 10^{-3}		DESIG=4
Γ_5	$J/\psi\pi^0\pi^0$	(8.0 ±3.0) × 10^{-4}		DESIG=46
Γ_6	$J/\psi\eta$	(9 ±4) × 10^{-4}		DESIG=47
Γ_7	$J/\psi\pi^0$	< 2.8 × 10^{-4}	CL=90%	DESIG=48
Γ_8	e^+e^-	(9.6 ±0.7) × 10^{-6}	S=1.3	DESIG=1
	Decays to light hadrons			NODE=M053;CLUMP=H
Γ_9	$b_1(1235)\pi$	< 1.4 × 10^{-5}	CL=90%	DESIG=20
Γ_{10}	$\phi\eta'$	< 7 × 10^{-4}	CL=90%	DESIG=17
Γ_{11}	$\omega\eta'$	< 4 × 10^{-4}	CL=90%	DESIG=16
Γ_{12}	$\rho^0\eta'$	< 6 × 10^{-4}	CL=90%	DESIG=15
Γ_{13}	$\phi\eta$	(3.1 ±0.7) × 10^{-4}		DESIG=8
Γ_{14}	$\omega\eta$	< 1.4 × 10^{-5}	CL=90%	DESIG=14
Γ_{15}	$\rho^0\eta$	< 5 × 10^{-4}	CL=90%	DESIG=13
Γ_{16}	$\phi\pi^0$	< 3 × 10^{-5}	CL=90%	DESIG=12
Γ_{17}	$\omega\pi^0$	< 6 × 10^{-4}	CL=90%	DESIG=11
Γ_{18}	$\pi^+\pi^-\pi^0$	< 5 × 10^{-6}	CL=90%	DESIG=9
Γ_{19}	$\rho\pi$	< 5 × 10^{-6}	CL=90%	DESIG=10
Γ_{20}	$K^*(892)^+K^-$ + c.c.	< 1.4 × 10^{-5}	CL=90%	DESIG=19
Γ_{21}	$K^*(892)^0\overline{K}^0$ + c.c.	< 1.2 × 10^{-3}	CL=90%	DESIG=18
Γ_{22}	$K^0_SK^0_L$	< 1.2 × 10^{-5}	CL=90%	DESIG=3
Γ_{23}	$2(\pi^+\pi^-)$	< 1.12 × 10^{-3}	CL=90%	DESIG=21
Γ_{24}	$2(\pi^+\pi^-)\pi^0$	< 1.06 × 10^{-3}	CL=90%	DESIG=22
Γ_{25}	$2(\pi^+\pi^-\pi^0)$	< 5.85 %	CL=90%	DESIG=208
Γ_{26}	$\omega\pi^+\pi^-$	< 6.0 × 10^{-4}	CL=90%	DESIG=24
Γ_{27}	$3(\pi^+\pi^-)$	< 9.1 × 10^{-3}		DESIG=52
Γ_{28}	$3(\pi^+\pi^-)\pi^0$	< 1.37 %		DESIG=55
Γ_{29}	$3(\pi^+\pi^-)2\pi^0$	< 11.74 %	CL=90%	DESIG=210

Γ_{30}	$\eta\pi^+\pi^-$	$<$	1.24	$\times 10^{-3}$	CL=90%	DESIG=23
Γ_{31}	$\pi^+\pi^- 2\pi^0$	$<$	8.9	$\times 10^{-3}$	CL=90%	DESIG=206
Γ_{32}	$\rho^0\pi^+\pi^-$	$<$	6.9	$\times 10^{-3}$	CL=90%	DESIG=64
Γ_{33}	$\eta 3\pi$	$<$	1.34	$\times 10^{-3}$	CL=90%	DESIG=25
Γ_{34}	$\eta 2(\pi^+\pi^-)$	$<$	2.43	%		DESIG=53
Γ_{35}	$\eta\rho^0\pi^+\pi^-$	$<$	1.45	%	CL=90%	DESIG=221
Γ_{36}	$\eta' 3\pi$	$<$	2.44	$\times 10^{-3}$	CL=90%	DESIG=26
Γ_{37}	$K^+K^-\pi^+\pi^-$	$<$	9.0	$\times 10^{-4}$	CL=90%	DESIG=27
Γ_{38}	$\phi\pi^+\pi^-$	$<$	4.1	$\times 10^{-4}$	CL=90%	DESIG=28
Γ_{39}	$K^+K^- 2\pi^0$	$<$	4.2	$\times 10^{-3}$	CL=90%	DESIG=207
Γ_{40}	$4(\pi^+\pi^-)$	$<$	1.67	%	CL=90%	DESIG=62
Γ_{41}	$4(\pi^+\pi^-)\pi^0$	$<$	3.06	%	CL=90%	DESIG=63
Γ_{42}	$\phi f_0(980)$	$<$	4.5	$\times 10^{-4}$	CL=90%	DESIG=29
Γ_{43}	$K^+K^-\pi^+\pi^-\pi^0$	$<$	2.36	$\times 10^{-3}$	CL=90%	DESIG=30
Γ_{44}	$K^+K^-\rho^0\pi^0$	$<$	8	$\times 10^{-4}$	CL=90%	DESIG=67
Γ_{45}	$K^+K^-\rho^+\pi^-$	$<$	1.46	%	CL=90%	DESIG=68
Γ_{46}	ωK^+K^-	$<$	3.4	$\times 10^{-4}$	CL=90%	DESIG=32
Γ_{47}	$\phi\pi^+\pi^-\pi^0$	$<$	3.8	$\times 10^{-3}$	CL=90%	DESIG=69
Γ_{48}	$K^{*0}K^-\pi^+\pi^0 +$ c.c.	$<$	1.62	%	CL=90%	DESIG=70
Γ_{49}	$K^{*+}K^-\pi^+\pi^- +$ c.c.	$<$	3.23	%	CL=90%	DESIG=71
Γ_{50}	$K^+K^-\pi^+\pi^- 2\pi^0$	$<$	2.67	%	CL=90%	DESIG=209
Γ_{51}	$K^+K^- 2(\pi^+\pi^-)$	$<$	1.03	%	CL=90%	DESIG=57
Γ_{52}	$K^+K^- 2(\pi^+\pi^-)\pi^0$	$<$	3.60	%	CL=90%	DESIG=58
Γ_{53}	ηK^+K^-	$<$	4.1	$\times 10^{-4}$	CL=90%	DESIG=31
Γ_{54}	$\eta K^+K^-\pi^+\pi^-$	$<$	1.24	%	CL=90%	DESIG=222
Γ_{55}	$\rho^0 K^+K^-$	$<$	5.0	$\times 10^{-3}$	CL=90%	DESIG=65
Γ_{56}	$2(K^+K^-)$	$<$	6.0	$\times 10^{-4}$	CL=90%	DESIG=33
Γ_{57}	ϕK^+K^-	$<$	7.5	$\times 10^{-4}$	CL=90%	DESIG=34
Γ_{58}	$2(K^+K^-)\pi^0$	$<$	2.9	$\times 10^{-4}$	CL=90%	DESIG=35
Γ_{59}	$2(K^+K^-)\pi^+\pi^-$	$<$	3.2	$\times 10^{-3}$	CL=90%	DESIG=59
Γ_{60}	$K^0_S K^-\pi^+$	$<$	3.2	$\times 10^{-3}$	CL=90%	DESIG=200
Γ_{61}	$K^0_S K^-\pi^+\pi^0$	$<$	1.33	%	CL=90%	DESIG=201
Γ_{62}	$K^0_S K^-\rho^+$	$<$	6.6	$\times 10^{-3}$	CL=90%	DESIG=214
Γ_{63}	$K^0_S K^- 2\pi^+\pi^-$	$<$	8.7	$\times 10^{-3}$	CL=90%	DESIG=202
Γ_{64}	$K^0_S K^-\pi^+\rho^0$	$<$	1.6	%	CL=90%	DESIG=215
Γ_{65}	$K^0_S K^-\pi^+\eta$	$<$	1.3	%	CL=90%	DESIG=216
Γ_{66}	$K^0_S K^- 2\pi^+\pi^-\pi^0$	$<$	4.18	%	CL=90%	DESIG=203
Γ_{67}	$K^0_S K^- 2\pi^+\pi^-\eta$	$<$	4.8	%	CL=90%	DESIG=217
Γ_{68}	$K^0_S K^-\pi^+ 2(\pi^+\pi^-)$	$<$	1.22	%	CL=90%	DESIG=204
Γ_{69}	$K^0_S K^-\pi^+ 2\pi^0$	$<$	2.65	%	CL=90%	DESIG=205
Γ_{70}	$K^0_S K^-K^+K^-\pi^+$	$<$	4.9	$\times 10^{-3}$	CL=90%	DESIG=218
Γ_{71}	$K^0_S K^-K^+K^-\pi^+\pi^0$	$<$	3.0	%	CL=90%	DESIG=219
Γ_{72}	$K^0_S K^-K^+K^-\pi^+\eta$	$<$	2.2	%	CL=90%	DESIG=220
Γ_{73}	$K^{*0}K^-\pi^+ +$ c.c.	$<$	9.7	$\times 10^{-3}$	CL=90%	DESIG=60
Γ_{74}	$p\overline{p}\pi^0$	$<$	1.2	$\times 10^{-3}$		DESIG=54
Γ_{75}	$p\overline{p}\pi^+\pi^-$	$<$	5.8	$\times 10^{-4}$	CL=90%	DESIG=36
Γ_{76}	$\Lambda\overline{\Lambda}$	$<$	1.2	$\times 10^{-4}$	CL=90%	DESIG=42
Γ_{77}	$p\overline{p}\pi^+\pi^-\pi^0$	$<$	1.85	$\times 10^{-3}$	CL=90%	DESIG=37
Γ_{78}	$\omega p\overline{p}$	$<$	2.9	$\times 10^{-4}$	CL=90%	DESIG=39
Γ_{79}	$\Lambda\overline{\Lambda}\pi^0$	$<$	1.2	$\times 10^{-3}$	CL=90%	DESIG=72
Γ_{80}	$p\overline{p} 2(\pi^+\pi^-)$	$<$	2.6	$\times 10^{-3}$	CL=90%	DESIG=61
Γ_{81}	$\eta p\overline{p}$	$<$	5.4	$\times 10^{-4}$	CL=90%	DESIG=38
Γ_{82}	$\eta p\overline{p}\pi^+\pi^-$	$<$	3.3	$\times 10^{-3}$	CL=90%	DESIG=223
Γ_{83}	$\rho^0 p\overline{p}$	$<$	1.7	$\times 10^{-3}$	CL=90%	DESIG=66
Γ_{84}	$p\overline{p}K^+K^-$	$<$	3.2	$\times 10^{-4}$	CL=90%	DESIG=40
Γ_{85}	$\eta p\overline{p}K^+K^-$	$<$	6.9	$\times 10^{-3}$	CL=90%	DESIG=224
Γ_{86}	$\pi^0 p\overline{p}K^+K^-$	$<$	1.2	$\times 10^{-3}$	CL=90%	DESIG=225
Γ_{87}	$\phi p\overline{p}$	$<$	1.3	$\times 10^{-4}$	CL=90%	DESIG=41
Γ_{88}	$\Lambda\overline{\Lambda}\pi^+\pi^-$	$<$	2.5	$\times 10^{-4}$	CL=90%	DESIG=43
Γ_{89}	$\Lambda\overline{p}K^+$	$<$	2.8	$\times 10^{-4}$	CL=90%	DESIG=44
Γ_{90}	$\Lambda\overline{p}K^+\pi^+\pi^-$	$<$	6.3	$\times 10^{-4}$	CL=90%	DESIG=45

Radiative decays

NODE=M053;CLUMP=R

Γ_{91}	$\gamma\chi_{c2}$	$< 9 \times 10^{-4}$	CL=90%	DESIG=51
Γ_{92}	$\gamma\chi_{c1}$	$(2.9 \pm 0.6) \times 10^{-3}$		DESIG=50
Γ_{93}	$\gamma\chi_{c0}$	$(7.3 \pm 0.9) \times 10^{-3}$		DESIG=49
Γ_{94}	$\gamma\eta'$	$< 1.8 \times 10^{-4}$	CL=90%	DESIG=213
Γ_{95}	$\gamma\eta$	$< 1.5 \times 10^{-4}$	CL=90%	DESIG=212
Γ_{96}	$\gamma\pi^0$	$< 2 \times 10^{-4}$	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 $\chi^2 = 20.0$ for 19 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_3	98		
x_8	0	0	
Γ	0	0	−44
	x_2	x_3	x_8

	Mode	Rate (MeV)	Scale factor	
Γ_2	$D^0 \overline{D}{}^0$	14.1 ± 1.4	1.7	DESIG=5
Γ_3	$D^+ D^-$	11.2 ± 1.1	1.7	DESIG=6
Γ_8	$e^+ e^-$	$(2.62 \pm 0.18) \times 10^{-4}$	1.4	DESIG=1

ψ(3770) PARTIAL WIDTHS

NODE=M053225

$\Gamma(e^+e^-)$ Γ_8

NODE=M053W1
NODE=M053W1

VALUE (keV)	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
0.262±0.018 OUR FIT Error includes scale factor of 1.4. [0.265 ± 0.018 keV OUR 2011 FIT Scale factor = 1.3]				NEW
0.256±0.016 OUR AVERAGE Error includes scale factor of 1.2. [0.259 ± 0.016 keV OUR 2011 AVERAGE Scale factor = 1.2]				NEW
$0.154^{+0.079+0.021}_{-0.058-0.027}$		[9,10] ANASHIN 12A	KEDR	$e^+e^- \to D\overline{D}$
0.22 ± 0.05		[11,12] ABLIKIM 08D	BES2	$e^+e^- \to$ hadrons
$0.277 \pm 0.011 \pm 0.013$		[12] ABLIKIM 07E	BES2	$e^+e^- \to$ hadrons
$0.203 \pm 0.003^{+0.041}_{-0.027}$	1.4M	[12,13] BESSON 06	CLEO	$e^+e^- \to$ hadrons
0.276 ± 0.050		[12] SCHINDLER 80	MRK2	e^+e^-
0.18 ± 0.06		[12] BACINO 78	DLCO	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.414^{+0.072+0.093}_{-0.080-0.028}$		[10,14] ANASHIN 12A	KEDR	$e^+e^- \to D\overline{D}$ (OCCUR=2)
0.37 ± 0.09		[15] RAPIDIS 77	LGW	e^+e^-

[9] Solution I of the two solutions. NODE=M053W1;LINKAGE=A1

[10] Taking into account interference between the resonant and non-resonant $D\overline{D}$ production. NODE=M053W1;LINKAGE=AN

[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 $\delta = 0°$. NODE=M053W1;LINKAGE=AB

[12] Interference between the resonant and non-resonant $D\overline{D}$ production not taken into account. NODE=M053W1;LINKAGE=NI

[13] 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

[14] Solution II of the two solutions. NODE=M053W1;LINKAGE=A2

[15] 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
NODE=M053R1

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$0.93^{+0.08}_{-0.09}$ OUR FIT Error includes scale factor of 2.0.					
$0.93^{+0.08}_{-0.09}$ OUR AVERAGE Error includes scale factor of 2.1.					
$0.849\pm0.056\pm0.018$		[16] ABLIKIM	08B	BES2	$e^+e^- \to$ non-$D\overline{D}$
$1.033\pm0.014^{+0.048}_{-0.066}$	1.427M	[17] BESSON	06	CLEO	$e^+e^- \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.866\pm0.050\pm0.036$		[18,19] ABLIKIM	07K	BES2	$e^+e^- \to$ non-$D\overline{D}$
$0.836\pm0.073\pm0.042$		[19] ABLIKIM	06L	BES2	$e^+e^- \to D\overline{D}$
$0.855\pm0.017\pm0.058$		[19,20] ABLIKIM	06N	BES2	$e^+e^- \to D\overline{D}$

$\Gamma(D^0\overline{D}^0)/\Gamma_{total}$ — Γ_2/Γ

NODE=M053R46
NODE=M053R46

VALUE	DOCUMENT ID		TECN	COMMENT
0.52 ±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	$e^+e^- \to D^0\overline{D}^0$
$0.499\pm0.013\pm0.038$	[20] ABLIKIM	06N	BES2	$e^+e^- \to D^0\overline{D}^0$

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

NODE=M053R47
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. • • •				
$0.369\pm0.037\pm0.028$	ABLIKIM	06L	BES2	$e^+e^- \to D^+D^-$
$0.357\pm0.011\pm0.034$	[20] ABLIKIM	06N	BES2	$e^+e^- \to D^+D^-$

$\Gamma(D^0\overline{D}^0)/\Gamma(D^+D^-)$ — Γ_2/Γ_3

NODE=M053R5
NODE=M053R5

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
1.260±0.021 OUR FIT					
1.260±0.021 OUR AVERAGE					
$1.39\pm0.31\pm0.12$		PAKHLOVA	08	BELL	$10.6\ e^+e^- \to D\overline{D}\gamma$
$1.78\pm0.33\pm0.24$		AUBERT	07BE	BABR	$e^+e^- \to D\overline{D}\gamma$
$1.258\pm0.016\pm0.014$		DOBBS	07	CLEO	$e^+e^- \to D\overline{D}$
$1.27\pm0.12\pm0.08$		ABLIKIM	06L	BES2	$e^+e^- \to D\overline{D}$
$2.43\pm1.50\pm0.43$	34	[21] CHISTOV	04	BELL	$B^+ \to \psi(3770)K^+$

$\Gamma(J/\psi\pi^+\pi^-)/\Gamma_{total}$ — Γ_4/Γ

NODE=M053R4
NODE=M053R4

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.93±0.28 OUR AVERAGE					
$1.89\pm0.20\pm0.20$	231 ± 33	ADAM	06	CLEO	$e^+e^- \to \psi(3770)$
$3.4\pm1.4\pm0.9$	17.8 ± 4.8	BAI	05	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(J/\psi\pi^0\pi^0)/\Gamma_{total}$ — Γ_5/Γ

NODE=M053R7
NODE=M053R7

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
$0.080\pm0.025\pm0.016$	39 ± 14	ADAM	06	CLEO	$e^+e^- \to \psi(3770)$

$\Gamma(J/\psi\eta)/\Gamma_{total}$ — Γ_6/Γ

NODE=M053R8
NODE=M053R8

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$87\pm33\pm22$	22 ± 10	ADAM	06	CLEO	$e^+e^- \to \psi(3770)$

$\Gamma(J/\psi\pi^0)/\Gamma_{total}$ — Γ_7/Γ

NODE=M053R9
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_8/Γ

NODE=M053R2
NODE=M053R2

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
0.96±0.07 OUR FIT Error includes scale factor of 1.3. [$(0.97\pm0.07)\times10^{-5}$ OUR 2011 FIT Scale factor = 1.2]				
1.3 ±0.2	RAPIDIS	77	LGW	e^+e^-

NEW

[16] Neglecting interference. NODE=M053R1;LINKAGE=AI

[17] 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

[18] Using σ^{obs} = 7.07 ± 0.58 nb and neglecting interference. NODE=M053R1;LINKAGE=AL

[19] Not independent of ABLIKIM 08B. NODE=M053R1;LINKAGE=SU

[20] From a measurement of $\sigma(e^+ e^- \rightarrow D\overline{D})$ at $\sqrt{s}$ = 3773 MeV, using the $\psi(3770)$ resonance parameters measured by ABLIKIM 06L. NODE=M053R;LINKAGE=AB

[21] See ADLER 88C for older measurements of this quantity. NODE=M053R5;LINKAGE=CH

DECAYS TO LIGHT HADRONS

NODE=M053250

$\Gamma(b_1(1235)\pi)/\Gamma_{total}$ — Γ_9/Γ

NODE=M053R82
NODE=M053R82

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<1.4	90	[22] ADAMS	06	CLEO	$e^+ e^- \rightarrow \psi(3770)$

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

NODE=M053R83
NODE=M053R83

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<7	90	[22] ADAMS	06	CLEO	$e^+ e^- \rightarrow \psi(3770)$

$\Gamma(\omega\eta')/\Gamma_{total}$ — Γ_{11}/Γ

NODE=M053R84
NODE=M053R84

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<4	90	[22] ADAMS	06	CLEO	$e^+ e^- \rightarrow \psi(3770)$

$\Gamma(\rho^0\eta')/\Gamma_{total}$ — Γ_{12}/Γ

NODE=M053R85
NODE=M053R85

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<6	90	[22] ADAMS	06	CLEO	$e^+ e^- \rightarrow \psi(3770)$

$\Gamma(\phi\eta)/\Gamma_{total}$ — Γ_{13}/Γ

NODE=M053R6
NODE=M053R6

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
3.1±0.6±0.3	[22] ADAMS	06	CLEO	3.773 $e^+ e^- \rightarrow \phi\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<19	[23] ABLIKIM	07B	BES2	$e^+ e^- \rightarrow \psi(3770)$

$\Gamma(\omega\eta)/\Gamma_{total}$ — Γ_{14}/Γ

NODE=M053R86
NODE=M053R86

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<1.4	90	[22] ADAMS	06	CLEO	$e^+ e^- \rightarrow \psi(3770)$

$\Gamma(\rho^0\eta)/\Gamma_{total}$ — Γ_{15}/Γ

NODE=M053R87
NODE=M053R87

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<5	90	[22] ADAMS	06	CLEO	$e^+ e^- \rightarrow \psi(3770)$

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

NODE=M053R11
NODE=M053R11

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
< 3	90	[22] ADAMS	06	CLEO	$e^+ e^- \rightarrow \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<50		[23] ABLIKIM	07B	BES2	$e^+ e^- \rightarrow \psi(3770)$

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

NODE=M053R88
NODE=M053R88

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<6	90	[22] ADAMS	06	CLEO	$e^+ e^- \rightarrow \psi(3770)$

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

NODE=M053R89
NODE=M053R89

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<5	90	[22,24] ADAMS	06	CLEO	$e^+ e^- \rightarrow \psi(3770)$

$\Gamma(\rho\pi)/\Gamma_{total}$ — Γ_{19}/Γ

NODE=M053R90
NODE=M053R90

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<5	90	[22,24] ADAMS	06	CLEO	$e^+ e^- \rightarrow \psi(3770)$

$\Gamma(K^*(892)^+ K^- + \text{c.c.})/\Gamma_{total}$ — Γ_{20}/Γ

NODE=M053R91
NODE=M053R91

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<1.4	90	[22] ADAMS	06	CLEO	$e^+ e^- \rightarrow \psi(3770)$

$\Gamma(K^*(892)^0\overline{K}^0 + \text{c.c.})/\Gamma_{total}$ — Γ_{21}/Γ

NODE=M053R92

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<1.2	90	[22] ADAMS	06	CLEO	$e^+e^- \to \psi(3770)$

$\Gamma(K^0_S K^0_L)/\Gamma_{total}$ — Γ_{22}/Γ

NODE=M053R3

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
< 1.2	90	[25] CRONIN-HEN...	06	CLEO	$e^+e^- \to \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<21	90	[26] ABLIKIM	04F	BES	$e^+e^- \to \psi(3770)$

$\Gamma(2(\pi^+\pi^-))/\Gamma_{total}$ — Γ_{23}/Γ

NODE=M053R21

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<11.2	90	[27] HUANG	06A	CLEO	$e^+e^- \to \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<48		[23] ABLIKIM	07B	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(2(\pi^+\pi^-)\pi^0)/\Gamma_{total}$ — Γ_{24}/Γ

NODE=M053R22

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<10.6	90	[27] HUANG	06A	CLEO	$e^+e^- \to \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<62		[23] ABLIKIM	07B	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(2(\pi^+\pi^-\pi^0))/\Gamma_{total}$ — Γ_{25}/Γ

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_{26}/Γ

NODE=M053R24

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 6.0	90	[27] HUANG	06A	CLEO	$e^+e^- \to \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<55	90	[23] ABLIKIM	07I	BES2	3.77 e^+e^-

$\Gamma(3(\pi^+\pi^-))/\Gamma_{total}$ — Γ_{27}/Γ

NODE=M053R07

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
<91	[23] ABLIKIM	07B	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(3(\pi^+\pi^-)\pi^0)/\Gamma_{total}$ — Γ_{28}/Γ

NODE=M053R10

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
<137	[23] ABLIKIM	07B	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(3(\pi^+\pi^-)2\pi^0)/\Gamma_{total}$ — Γ_{29}/Γ

NODE=M053R74

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<117.4	90	59	ABLIKIM	08N	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(\eta\pi^+\pi^-)/\Gamma_{total}$ — Γ_{30}/Γ

NODE=M053R23

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<1.24	90	[27] HUANG	06A	CLEO	$e^+e^- \to \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<2.3	90	[23] ABLIKIM	10D	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(\pi^+\pi^-2\pi^0)/\Gamma_{total}$ — Γ_{31}/Γ

NODE=M053R70

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<8.9	90	218	ABLIKIM	08N	BES2	$e^+e^- \to \psi(3770)$

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

NODE=M053R53

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<6.9	90	[23] ABLIKIM	07F	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(\eta 3\pi)/\Gamma_{total}$ — Γ_{33}/Γ

NODE=M053R25

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<13.4	90	[27] HUANG	06A	CLEO	$e^+e^- \to \psi(3770)$

$\Gamma(\eta 2(\pi^+\pi^-))/\Gamma_{\text{total}}$ — Γ_{34}/Γ

NODE=M053R08

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
<243	[23] ABLIKIM	07B	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(\eta\rho^0\pi^+\pi^-)/\Gamma_{\text{total}}$ — Γ_{35}/Γ

NODE=M053R77

VALUE (units 10^{-2})	CL%	DOCUMENT ID		TECN	COMMENT
<1.45	90	[23] ABLIKIM	10D	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(\eta' 3\pi)/\Gamma_{\text{total}}$ — Γ_{36}/Γ

NODE=M053R26

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<24.4	90	[27] HUANG	06A	CLEO	$e^+e^- \to \psi(3770)$

$\Gamma(K^+K^-\pi^+\pi^-)/\Gamma_{\text{total}}$ — Γ_{37}/Γ

NODE=M053R27

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 9.0	90	[27] HUANG	06A	CLEO	$e^+e^- \to \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<48		[23] ABLIKIM	07B	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(\phi\pi^+\pi^-)/\Gamma_{\text{total}}$ — Γ_{38}/Γ

NODE=M053R28

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 4.1	90	[27] HUANG	06A	CLEO	$e^+e^- \to \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<16		[23] ABLIKIM	07B	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(K^+K^-2\pi^0)/\Gamma_{\text{total}}$ — Γ_{39}/Γ

NODE=M053R71

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<4.2	90	14	ABLIKIM	08N	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(4(\pi^+\pi^-))/\Gamma_{\text{total}}$ — Γ_{40}/Γ

NODE=M053R50

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<16.7	90	[23] ABLIKIM	07F	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(4(\pi^+\pi^-)\pi^0)/\Gamma_{\text{total}}$ — Γ_{41}/Γ

NODE=M053R52

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<30.6	90	[23] ABLIKIM	07F	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(\phi f_0(980))/\Gamma_{\text{total}}$ — Γ_{42}/Γ

NODE=M053R29

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<4.5	90	[27] HUANG	06A	CLEO	$e^+e^- \to \psi(3770)$

$\Gamma(K^+K^-\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}$ — Γ_{43}/Γ

NODE=M053R30

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 23.6	90	[27] HUANG	06A	CLEO	$e^+e^- \to \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<111		[23] ABLIKIM	07B	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(K^+K^-\rho^0\pi^0)/\Gamma_{\text{total}}$ — Γ_{44}/Γ

NODE=M053R58

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<8	90	[23] ABLIKIM	07I	BES2	3.77 e^+e^-

$\Gamma(K^+K^-\rho^+\pi^-)/\Gamma_{\text{total}}$ — Γ_{45}/Γ

NODE=M053R59

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<146	90	[23] ABLIKIM	07I	BES2	3.77 e^+e^-

$\Gamma(\omega K^+K^-)/\Gamma_{\text{total}}$ — Γ_{46}/Γ

NODE=M053R32

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 3.4	90	[27] HUANG	06A	CLEO	$e^+e^- \to \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<66	90	[23] ABLIKIM	07I	BES2	3.77 e^+e^-

$\Gamma(\phi\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{47}/Γ

NODE=M053R60
NODE=M053R60

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<38	90	[23] ABLIKIM	07I	BES2	3.77 e^+e^-

$\Gamma(K^{*0}K^-\pi^+\pi^0 + \text{c.c.})/\Gamma_{total}$ — Γ_{48}/Γ

NODE=M053R61
NODE=M053R61

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<162	90	[23] ABLIKIM	07I	BES2	3.77 e^+e^-

$\Gamma(K^{*+}K^-\pi^+\pi^- + \text{c.c.})/\Gamma_{total}$ — Γ_{49}/Γ

NODE=M053R62
NODE=M053R62

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<323	90	[23] ABLIKIM	07I	BES2	3.77 e^+e^-

$\Gamma(K^+K^-\pi^+\pi^-2\pi^0)/\Gamma_{total}$ — Γ_{50}/Γ

NODE=M053R73
NODE=M053R73

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<26.7	90	24	ABLIKIM	08N	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(K^+K^-2(\pi^+\pi^-))/\Gamma_{total}$ — Γ_{51}/Γ

NODE=M053R57
NODE=M053R57

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<10.3	90	[23] ABLIKIM	07F	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(K^+K^-2(\pi^+\pi^-)\pi^0)/\Gamma_{total}$ — Γ_{52}/Γ

NODE=M053R51
NODE=M053R51

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<36.0	90	[23] ABLIKIM	07F	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(\eta K^+K^-)/\Gamma_{total}$ — Γ_{53}/Γ

NODE=M053R31
NODE=M053R31

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 4.1	90	[27] HUANG	06A	CLEO	$e^+e^- \to \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<31	90	[23] ABLIKIM	10D	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(\eta K^+K^-\pi^+\pi^-)/\Gamma_{total}$ — Γ_{54}/Γ

NODE=M053R78
NODE=M053R78

VALUE (units 10^{-2})	CL%	DOCUMENT ID		TECN	COMMENT
<1.24	90	[23] ABLIKIM	10D	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(\rho^0K^+K^-)/\Gamma_{total}$ — Γ_{55}/Γ

NODE=M053R54
NODE=M053R54

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<5.0	90	[23] ABLIKIM	07F	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(2(K^+K^-))/\Gamma_{total}$ — Γ_{56}/Γ

NODE=M053R33
NODE=M053R33

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 6.0	90	[27] HUANG	06A	CLEO	$e^+e^- \to \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<17		[23] ABLIKIM	07B	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(\phi K^+K^-)/\Gamma_{total}$ — Γ_{57}/Γ

NODE=M053R34
NODE=M053R34

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 7.5	90	[27] HUANG	06A	CLEO	$e^+e^- \to \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<24		[23] ABLIKIM	07B	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(2(K^+K^-)\pi^0)/\Gamma_{total}$ — Γ_{58}/Γ

NODE=M053R35
NODE=M053R35

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 2.9	90	[27] HUANG	06A	CLEO	$e^+e^- \to \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<46		[23] ABLIKIM	07B	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(2(K^+K^-)\pi^+\pi^-)/\Gamma_{total}$ — Γ_{59}/Γ

NODE=M053R48
NODE=M053R48

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<3.2	90	[23] ABLIKIM	07F	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(K^0_S K^- \pi^+)/\Gamma_{total}$ Γ_{60}/Γ

NODE=M053R64
NODE=M053R64

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<3.2	90	18	ABLIKIM	08M	BES2	$e^+ e^- \rightarrow \psi(3770)$

$\Gamma(K^0_S K^- \pi^+ \pi^0)/\Gamma_{total}$ Γ_{61}/Γ

NODE=M053R65
NODE=M053R65

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<13.3	90	40	ABLIKIM	08M	BES2	$e^+ e^- \rightarrow \psi(3770)$

$\Gamma(K^0_S K^- \rho^+)/\Gamma_{total}$ Γ_{62}/Γ

NODE=M053R15
NODE=M053R15

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<6.6	90	ABLIKIM	09C	BES2	$e^+ e^- \rightarrow \psi(3770)$

$\Gamma(K^0_S K^- 2\pi^+ \pi^-)/\Gamma_{total}$ Γ_{63}/Γ

NODE=M053R66
NODE=M053R66

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<8.7	90	39	ABLIKIM	08M	BES2	$e^+ e^- \rightarrow \psi(3770)$

$\Gamma(K^0_S K^- \pi^+ \rho^0)/\Gamma_{total}$ Γ_{64}/Γ

NODE=M053R16
NODE=M053R16

VALUE (units 10^{-2})	CL%	DOCUMENT ID		TECN	COMMENT
<1.6	90	ABLIKIM	09C	BES2	$e^+ e^- \rightarrow \psi(3770)$

$\Gamma(K^0_S K^- \pi^+ \eta)/\Gamma_{total}$ Γ_{65}/Γ

NODE=M053R17
NODE=M053R17

VALUE (units 10^{-2})	CL%	DOCUMENT ID		TECN	COMMENT
<1.3	90	ABLIKIM	09C	BES2	$e^+ e^- \rightarrow \psi(3770)$

$\Gamma(K^0_S K^- 2\pi^+ \pi^- \pi^0)/\Gamma_{total}$ Γ_{66}/Γ

NODE=M053R67
NODE=M053R67

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<41.8	90	23	ABLIKIM	08M	BES2	$e^+ e^- \rightarrow \psi(3770)$

$\Gamma(K^0_S K^- 2\pi^+ \pi^- \eta)/\Gamma_{total}$ Γ_{67}/Γ

NODE=M053R18
NODE=M053R18

VALUE (units 10^{-2})	CL%	DOCUMENT ID		TECN	COMMENT
<4.8	90	ABLIKIM	09C	BES2	$e^+ e^- \rightarrow \psi(3770)$

$\Gamma(K^0_S K^- \pi^+ 2(\pi^+ \pi^-))/\Gamma_{total}$ Γ_{68}/Γ

NODE=M053R68
NODE=M053R68

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<12.2	90	4	ABLIKIM	08M	BES2	$e^+ e^- \rightarrow \psi(3770)$

$\Gamma(K^0_S K^- \pi^+ 2\pi^0)/\Gamma_{total}$ Γ_{69}/Γ

NODE=M053R69
NODE=M053R69

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<26.5	90	17	ABLIKIM	08M	BES2	$e^+ e^- \rightarrow \psi(3770)$

$\Gamma(K^0_S K^- K^+ K^- \pi^+)/\Gamma_{total}$ Γ_{70}/Γ

NODE=M053R19
NODE=M053R19

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<4.9	90	ABLIKIM	09C	BES2	$e^+ e^- \rightarrow \psi(3770)$

$\Gamma(K^0_S K^- K^+ K^- \pi^+ \pi^0)/\Gamma_{total}$ Γ_{71}/Γ

NODE=M053R75
NODE=M053R75

VALUE (units 10^{-2})	CL%	DOCUMENT ID		TECN	COMMENT
<3.0	90	ABLIKIM	09C	BES2	$e^+ e^- \rightarrow \psi(3770)$

$\Gamma(K^0_S K^- K^+ K^- \pi^+ \eta)/\Gamma_{total}$ Γ_{72}/Γ

NODE=M053R76
NODE=M053R76

VALUE (units 10^{-2})	CL%	DOCUMENT ID		TECN	COMMENT
<2.2	90	ABLIKIM	09C	BES2	$e^+ e^- \rightarrow \psi(3770)$

$\Gamma(K^{*0} K^- \pi^+ + \text{c.c.})/\Gamma_{total}$ Γ_{73}/Γ

NODE=M053R55
NODE=M053R55

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<9.7	90	[23] ABLIKIM	07F	BES2	$e^+ e^- \rightarrow \psi(3770)$

$\Gamma(p \overline{p} \pi^0)/\Gamma_{total}$ Γ_{74}/Γ

NODE=M053R09
NODE=M053R09

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
<12	[23] ABLIKIM	07B	BES2	$e^+ e^- \rightarrow \psi(3770)$

$\Gamma(p\overline{p}\pi^+\pi^-)/\Gamma_{total}$ — Γ_{75}/Γ

NODE=M053R36
NODE=M053R36

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 5.8	90	[27] HUANG	06A	CLEO	$e^+e^- \to \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<16		[23] ABLIKIM	07B	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(\Lambda\overline{\Lambda})/\Gamma_{total}$ — Γ_{76}/Γ

NODE=M053R42
NODE=M053R42

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.2	90	[27] HUANG	06A	CLEO	$e^+e^- \to \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<4	90	[23] ABLIKIM	07F	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(p\overline{p}\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{77}/Γ

NODE=M053R37
NODE=M053R37

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<18.5	90	[27] HUANG	06A	CLEO	$e^+e^- \to \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<73		[23] ABLIKIM	07B	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(\omega p\overline{p})/\Gamma_{total}$ — Γ_{78}/Γ

NODE=M053R39
NODE=M053R39

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 2.9	90	[27] HUANG	06A	CLEO	$e^+e^- \to \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<30	90	[28] ABLIKIM	07I	BES2	3.77 e^+e^-

$\Gamma(\Lambda\overline{\Lambda}\pi^0)/\Gamma_{total}$ — Γ_{79}/Γ

NODE=M053R63
NODE=M053R63

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<12	90	[23] ABLIKIM	07I	BES2	3.77 e^+e^-

$\Gamma(p\overline{p}2(\pi^+\pi^-))/\Gamma_{total}$ — Γ_{80}/Γ

NODE=M053R49
NODE=M053R49

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<2.6	90	[23] ABLIKIM	07F	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(\eta p\overline{p})/\Gamma_{total}$ — Γ_{81}/Γ

NODE=M053R38
NODE=M053R38

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 5.4	90	[27] HUANG	06A	CLEO	$e^+e^- \to \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<11	90	[23] ABLIKIM	10D	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(\eta p\overline{p}\pi^+\pi^-)/\Gamma_{total}$ — Γ_{82}/Γ

NODE=M053R79
NODE=M053R79

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<3.3	90	[23] ABLIKIM	10D	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(\rho^0 p\overline{p})/\Gamma_{total}$ — Γ_{83}/Γ

NODE=M053R56
NODE=M053R56

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<1.7	90	[23] ABLIKIM	07F	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(p\overline{p}K^+K^-)/\Gamma_{total}$ — Γ_{84}/Γ

NODE=M053R40
NODE=M053R40

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 3.2	90	[27] HUANG	06A	CLEO	$e^+e^- \to \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<11		[23] ABLIKIM	07B	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(\eta p\overline{p}K^+K^-)/\Gamma_{total}$ — Γ_{85}/Γ

NODE=M053R80
NODE=M053R80

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<6.9	90	[23] ABLIKIM	10D	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(\pi^0 p\overline{p}K^+K^-)/\Gamma_{total}$ — Γ_{86}/Γ

NODE=M053R81
NODE=M053R81

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<1.2	90	[23] ABLIKIM	10D	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(\phi p \overline{p})/\Gamma_{total}$ — Γ_{87}/Γ

NODE=M053R41

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.3	90	[27] HUANG	06A	CLEO	$e^+e^- \to \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<9		[23] ABLIKIM	07B	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(\Lambda\overline{\Lambda}\pi^+\pi^-)/\Gamma_{total}$ — Γ_{88}/Γ

NODE=M053R43

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 2.5	90	[27] HUANG	06A	CLEO	$e^+e^- \to \psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<39	90	[23] ABLIKIM	07F	BES2	$e^+e^- \to \psi(3770)$

$\Gamma(\Lambda\overline{p}K^+)/\Gamma_{total}$ — Γ_{89}/Γ

NODE=M053R44

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<2.8	90	[27] HUANG	06A	CLEO	$e^+e^- \to \psi(3770)$

$\Gamma(\Lambda\overline{p}K^+\pi^+\pi^-)/\Gamma_{total}$ — Γ_{90}/Γ

NODE=M053R45

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<6.3	90	[27] HUANG	06A	CLEO	$e^+e^- \to \psi(3770)$

[22] Comparing cross sections at $\sqrt{s} = 3.773$ GeV and $\sqrt{s} = 3.671$ GeV, neglecting interference, and using $\sigma(\psi(3770) \to D\overline{D}) = 6.39 \pm 0.20$ nb. NODE=M053R6;LINKAGE=AD

[23] 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=M053R10;LINKAGE=AK

[24] Data suggest possible destructive interference with continuum. NODE=M053R89;LINKAGE=AD

[25] Using $\sigma(e^+e^- \to \psi(3770) \to \text{hadrons}) = (6.38 \pm 0.08^{+0.41}_{-0.30})$ nb from BESSON 06 and $B(K^0_S \to \pi^+\pi^-) = 0.6895 \pm 0.0014$. NODE=M053R3;LINKAGE=CR

[26] Using $B(K^0_S \to \pi^+\pi^-) = 0.6860 \pm 0.0027$. NODE=M053R3;LINKAGE=AB

[27] Using $\sigma_{tot}(e^+e^- \to \psi(3770)) = 7.9 \pm 0.6$ nb at the resonance. NODE=M053R;LINKAGE=HU

[28] Using $\sigma^{obs} = 7.15 \pm 0.27 \pm 0.27$ nb and neglecting interference. NODE=M053R24;LINKAGE=AB

RADIATIVE DECAYS

NODE=M053240

$\Gamma(\gamma\chi_{c2})/\Gamma_{total}$ — Γ_{91}/Γ

NODE=M053R03

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.9	90	[29] COAN	06A	CLEO	$e^+e^- \to \psi(3770) \to \gamma\gamma J/\psi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<2.0	90	[30] BRIERE	06	CLEO	$e^+e^- \to \psi(3770) \to \gamma +$ hadrons

$\Gamma(\gamma\chi_{c1})/\Gamma_{total}$ — Γ_{92}/Γ

NODE=M053R02

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
2.9±0.5±0.4		[31] BRIERE	06	CLEO	$e^+e^- \to \psi(3770) \to \gamma +$ hadrons, $\gamma\gamma J/\psi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3.9±1.4±0.6	54 ± 17	[32] BRIERE	06	CLEO	$e^+e^- \to \psi(3770) \to \gamma +$ hadrons
2.8±0.5±0.4	53 ± 10	[29] COAN	06A	CLEO	$e^+e^- \to \psi(3770) \to \gamma\gamma J/\psi$

OCCUR=2

$\Gamma(\gamma\chi_{c1})/\Gamma(J/\psi\pi^+\pi^-)$ — Γ_{92}/Γ_4

NODE=M053R04

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
1.49±0.31±0.26	53 ± 10	[33] COAN	06A	CLEO	$e^+e^- \to \psi(3770) \to \gamma\gamma J/\psi$

$\Gamma(\gamma\chi_{c0})/\Gamma_{total}$ — Γ_{93}/Γ

NODE=M053R01

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
7.3±0.7±0.6		274 ± 27	[34] BRIERE	06	CLEO	$e^+e^- \to \psi(3770) \to \gamma +$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 44	90		[29] COAN	06A	CLEO	$e^+e^- \to \psi(3770) \to \gamma\gamma J/\psi$

$\Gamma(\gamma\chi_{c0})/\Gamma(\gamma\chi_{c2})$ — Γ_{93}/Γ_{91}

NODE=M053R06
NODE=M053R06

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
>8	90	[35] BRIERE	06	CLEO	$e^+e^- \to \psi(3770)$

$\Gamma(\gamma\chi_{c0})/\Gamma(\gamma\chi_{c1})$ — Γ_{93}/Γ_{92}

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	[35] BRIERE	06	CLEO	$e^+e^- \to \psi(3770)$

$\Gamma(\gamma\eta')/\Gamma_{\text{total}}$ — Γ_{94}/Γ

NODE=M053R14
NODE=M053R14

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.8	90	[36] PEDLAR	09	CLE3	$\psi(2S) \to \gamma X$

$\Gamma(\gamma\eta)/\Gamma_{\text{total}}$ — Γ_{95}/Γ

NODE=M053R13
NODE=M053R13

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.5	90	[36] PEDLAR	09	CLE3	$\psi(2S) \to \gamma X$

$\Gamma(\gamma\pi^0)/\Gamma_{\text{total}}$ — Γ_{96}/Γ

NODE=M053R12
NODE=M053R12

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<2	90	PEDLAR	09	CLE3	$\psi(2S) \to \gamma X$

[29] Using $\Gamma_{ee}(\psi(2S)) = (2.54 \pm 0.03 \pm 0.11)$ keV from ADAM 06 and taking $\sigma(e^+e^- \to D\overline{D})$ from HE 05 for $\sigma(e^+e^- \to \psi(3770))$. NODE=M053R0;LINKAGE=CO

[30] Uses $B(\psi(2S) \to \gamma\chi_{c2}) = 9.22 \pm 0.11 \pm 0.46\,\%$ 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

[31] Averages the two measurements from COAN 06A and BRIERE 06. NODE=M053R02;LINKAGE=BI

[32] Uses $B(\psi(2S) \to \gamma\chi_{c1}) = 9.07 \pm 0.11 \pm 0.54\,\%$ 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

[33] Using $B(\psi(3770) \to J/\psi\pi^+\pi^-) = (1.89 \pm 0.20 \pm 0.20) \times 10^{-3}$ from ADAM 06. NODE=M053R04;LINKAGE=CO

[34] Uses $B(\psi(2S) \to \gamma\chi_{c0}) = 9.33 \pm 0.14 \pm 0.61\,\%$ 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=M053R01;LINKAGE=BR

[35] Not independent of other results in BRIERE 06. NODE=M053R05;LINKAGE=BR

[36] Assuming maximal destructive interference between $\psi(3770)$ and continuum sources. NODE=M053R13;LINKAGE=PE

$\psi(3770)$ REFERENCES

NODE=M053

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 159901E	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	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 011102R	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 011103R	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 111105R	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 159901E	D. Besson *et al.*	(CLEO Collab.)	REFID=53245
BRIERE	06	PR D74 031106R	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=M176

$X(3872)$

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

NODE=M176

Seen 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, but not seen in the $\gamma\chi_{c1}$ final state of these decays. Possibly absent in the invariant mass spectrum of the final state $\pi^+\pi^- J/\psi(1S)$ in e^+e^- collisions. Interpretation as a 1^{--} charmonium state not favored. Isovector hypothesis excluded by AUBERT 05B and CHOI 11. A helicity amplitude analysis of the $X(3872) \to J/\psi\pi^+\pi^-$ decay gives two possible J^{PC} assignments: $J^{PC} = 1^{++}$ and 2^{-+} (ABULENCIA 07E and CHOI 11). A study of the 3π invariant mass distribution in $J/\psi\omega$ decays slightly favors $J^P = 2^-$ (DEL-AMO-SANCHEZ 10B).

See our note on "Developments in Heavy Quarkonium Spectroscopy".

$X(3872)$ MASS FROM $J/\psi X$ MODE

NODE=M176M

NODE=M176M

NEW

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT	
3871.68 ± 0.17 OUR AVERAGE					
[3871.57 ± 0.25 MeV OUR 2011 AVERAGE Scale factor = 1.1]					
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	[1] CHOI 11	BELL	$B \to K\pi^+\pi^- J/\psi$	
$3873\ ^{+1.8}_{-1.6} \pm 1.3$	27 ± 8	[2] DEL-AMO-SA.10B	BABR	$B \to \omega J/\psi K$	
3871.61 ± 0.16 ± 0.19	6k	[2,3] 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	$B^0 \to K^0_S J/\psi\pi^+\pi^-$	OCCUR=2
3871.8 ± 3.1 ± 3.0	522	[2,4] ABAZOV 04F	D0	$p\overline{p} \to J/\psi\pi^+\pi^- X$	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3868.6 ± 1.2 ± 0.2	8	[5] AUBERT 06	BABR	$B^0 \to K^0_S J/\psi\pi^+\pi^-$	
3871.3 ± 0.6 ± 0.1	61	[5] AUBERT 06	BABR	$B^- \to K^- J/\psi\pi^+\pi^-$	OCCUR=2
3873.4 ± 1.4	25	[6] AUBERT 05R	BABR	$B^+ \to K^+ J/\psi\pi^+\pi^-$	
3871.3 ± 0.7 ± 0.4	730	[2,7] ACOSTA 04	CDF2	$p\overline{p} \to J/\psi\pi^+\pi^- X$	
3872.0 ± 0.6 ± 0.5	36	[8] CHOI 03	BELL	$B \to K\pi^+\pi^- J/\psi$	
3836 ± 13	58	[2,9] ANTONIAZZI 94	E705	$300\ \pi^\pm Li \to J/\psi\pi^+\pi^- X$	

[1] The mass difference for the $X(3872)$ produced in B^+ and B^0 decays is $(-0.71 \pm 0.96 \pm 0.19)$ MeV. NODE=M176M;LINKAGE=CO

[2] Width consistent with detector resolution. NODE=M176M;LINKAGE=AC

[3] 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

[4] Calculated from the corresponding $m_{X(3872)} - m_{J/\psi}$ using $m_{J/\psi}$=3096.916 MeV. NODE=M176M;LINKAGE=AB

[5] Calculated from the corresponding $m_{X(3872)} - m_{\psi(2S)}$ using $m_{\psi(2S)} = 3686.093$ MeV. Superseded by AUBERT 08Y. NODE=M176M;LINKAGE=AE

[6] Calculated from the corresponding $m_{X(3872)} - m_{\psi(2S)}$ using $m_{\psi(2S)} = 3685.96$MeV. Superseded by AUBERT 06. NODE=M176M;LINKAGE=AU

[7] Superseded by AALTONEN 09AU. NODE=M176M;LINKAGE=AT

[8] Superseded by CHOI 11. NODE=M176M;LINKAGE=CH

[9] A lower mass value can be due to an incorrect momentum scale for soft pions. NODE=M176M;LINKAGE=AN

$X(3872)$ 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	[10,11] AUSHEV 10	BELL	$B \to \overline{D}^{*0} D^0 K$
$3875.1^{+0.7}_{-0.5} \pm 0.5$	33 ± 6	[11] AUBERT 08B	BABR	$B \to \overline{D}^{*0} D^0 K$
$3875.2 \pm 0.7^{+0.9}_{-1.8}$	24 ± 6	[11,12] GOKHROO 06	BELL	$B \to D^0 \overline{D}^0 \pi^0 K$

[10] Calculated from the measured $m_{X(3872)} - m_{D^{*0}} - m_{\overline{D}^0} = 1.1^{+0.6}_{-0.4}{}^{+0.1}_{-0.3}$ MeV. NODE=M176MD0;LINKAGE=AS

[11] 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

[12] Superseded by AUSHEV 10. NODE=M176MD0;LINKAGE=GO

$m_{X(3872)} - m_{J/\psi}$

NODE=M176207

NODE=M176DM

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
774.9±3.1±3.0	522	ABAZOV	04F	D0	$p\overline{p} \to J/\psi\pi^+\pi^- X$

$m_{X(3872)} - m_{\psi(2S)}$

NODE=M176DM2

NODE=M176DM2

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
187.4±1.4	25	[13] AUBERT	05R	BABR	$B^+ \to K^+ J/\psi\pi^+\pi^-$

[13] Superseded by AUBERT 06. NODE=M176DM2;LINKAGE=AU

X(3872) WIDTH

NODE=M176W

NODE=M176W

VALUE (MeV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<1.2 (CL = 90%) [<2.3 MeV (CL = 90%) OUR 2011 BEST LIMIT]						
<1.2	90		CHOI	11	BELL	$B \to K\pi^+\pi^- J/\psi$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<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	[14] CHOI	03	BELL	$B \to K\pi^+\pi^- J/\psi$

[14] Superseded by CHOI 11. NODE=M176W;LINKAGE=CH

X(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. • • •					
$3.9^{+2.8}_{-1.4}{}^{+0.2}_{-1.1}$	50	[15] AUSHEV	10	BELL	$B \to \overline{D}^{*0} D^0 K$
$3.0^{+1.9}_{-1.4}\pm0.9$	33 ± 6	AUBERT	08B	BABR	$B \to \overline{D}^{*0} D^0 K$

[15] With a measured value of B($B \to X(3872) K$) × B($X(3872) \to D^{*0}\overline{D}^0$) = (0.80 ± 0.20 ± 0.10) × 10^{-4}, assumed to be equal for both charged and neutral modes. NODE=M176WD0;LINKAGE=AU

X(3872) DECAY MODES

NODE=M176215;NODE=M176

	Mode	Fraction (Γ_i/Γ)	
Γ_1	e^+e^-		DESIG=1
Γ_2	$\pi^+\pi^- J/\psi(1S)$	>2.6 %	DESIG=2
Γ_3	$\rho^0 J/\psi(1S)$		DESIG=10
Γ_4	$\omega J/\psi(1S)$	>1.9 %	DESIG=13
Γ_5	$D^0\overline{D}^0\pi^0$	$>3.2 \times 10^{-3}$	DESIG=8
Γ_6	$\overline{D}^{*0} D^0$	$>5 \times 10^{-3}$	DESIG=12
Γ_7	$\gamma\gamma$		DESIG=5
Γ_8	$D^0\overline{D}^0$		DESIG=6
Γ_9	D^+D^-		DESIG=7
Γ_{10}	$\gamma\chi_{c1}$		DESIG=3
Γ_{11}	$\eta J/\psi$		DESIG=4
Γ_{12}	$\gamma J/\psi$	$>9 \times 10^{-3}$	DESIG=9
Γ_{13}	$\gamma\psi(2S)$	>3.0 %	DESIG=11

X(3872) PARTIAL WIDTHS

NODE=M176220

$\Gamma(e^+e^-)$ Γ_1

NODE=M176W1
NODE=M176W1

VALUE (keV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.28	90	[16] YUAN	04	RVUE	$e^+e^- \to \pi^+\pi^- J/\psi$

[16] Using BAI 98E data on $e^+e^- \to \pi^+\pi^-\ell^+\ell^-$. Assuming that $\Gamma(\pi^+\pi^- J/\psi)$ of $X(3872)$ is the same as that of $\psi(2S)$ (85.4 keV). NODE=M176W1;LINKAGE=A

$X(3872)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma(\text{total})$

NODE=M176230

$\Gamma(\pi^+\pi^- J/\psi(1S)) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_2\Gamma_1/\Gamma$

NODE=M176G1
NODE=M176G1

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
< 6.2	90	[17,18] AUBERT	05D	BABR	10.6 $e^+e^- \rightarrow K^+K^-\pi^+\pi^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 8.3	90	[18] DOBBS	05	CLE3	$e^+e^- \rightarrow \pi^+\pi^- J/\psi$
<10	90	[19] YUAN	04	RVUE	$e^+e^- \rightarrow \pi^+\pi^- J/\psi$

[17] Using B($X(3872) \rightarrow J/\psi\pi^+\pi^-$) · B($J/\psi \rightarrow \mu^+\mu^-$) · Γ($X(3872) \rightarrow e^+e^-$) < 0.37 eV from AUBERT 05D and B($J/\psi \rightarrow \mu^+\mu^-$) = 0.0588 ± 0.0010 from the PDG 04. NODE=M176G1;LINKAGE=AU

[18] Assuming $X(3872)$ has $J^{PC} = 1^{--}$. NODE=M176G1;LINKAGE=DO

[19] Using BAI 98E data on $e^+e^- \rightarrow \pi^+\pi^-\ell^+\ell^-$. From theoretical calculation of the production cross section and using B($J/\psi \rightarrow \mu^+\mu^-$) = (5.88 ± 0.10)%. NODE=M176G1;LINKAGE=A

$X(3872)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M176232

$\Gamma(\gamma\gamma) \times \Gamma(\pi^+\pi^- J/\psi(1S))/\Gamma_{\text{total}}$ $\Gamma_7\Gamma_2/\Gamma$

NODE=M176H1
NODE=M176H1

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<12.9	90	[20] DOBBS	05	CLE3	$e^+e^- \rightarrow \pi^+\pi^- J/\psi\gamma$

[20] Assuming $X(3872)$ has positive C parity and spin 0. NODE=M176H1;LINKAGE=DO

$X(3872)$ BRANCHING RATIOS

NODE=M176235

$\Gamma(\pi^+\pi^- J/\psi(1S))/\Gamma_{\text{total}}$ Γ_2/Γ

NODE=M176R6
NODE=M176R6

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
>0.026	93 ± 17	[21] AUBERT	08Y	BABR	$B \rightarrow X(3872)K$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
>0.04	30	[22] AUBERT	05R	BABR	$B^+ \rightarrow K^+ J/\psi\pi^+\pi^-$
>0.04	36 ± 7	[23] CHOI	03	BABR	$B^+ \rightarrow K^+ J/\psi\pi^+\pi^-$

[21] AUBERT 08Y reports [$\Gamma(X(3872) \rightarrow \pi^+\pi^- J/\psi(1S))/\Gamma_{\text{total}}$] × [B($B^+ \rightarrow X(3872)K^+$)] = $(8.4 \pm 1.5 \pm 0.7) \times 10^{-6}$ which we divide by our best value B($B^+ \rightarrow X(3872)K^+$) < 3.2×10^{-4}. NODE=M176R6;LINKAGE=AB

[22] Superseded by AUBERT 08Y. AUBERT 05R reports [$\Gamma(X(3872) \rightarrow \pi^+\pi^- J/\psi(1S))/\Gamma_{\text{total}}$] × [B($B^+ \rightarrow X(3872)K^+$)] = $(1.28 \pm 0.41) \times 10^{-5}$ which we divide by our best value B($B^+ \rightarrow X(3872)K^+$) < 3.2×10^{-4}. NODE=M176R6;LINKAGE=AE

[23] CHOI 03 reports [$\Gamma(X(3872) \rightarrow \pi^+\pi^- J/\psi(1S))/\Gamma_{\text{total}}$] × [B($B^+ \rightarrow X(3872)K^+$)] / [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($B^+ \rightarrow X(3872)K^+$) < 3.2×10^{-4}, B($B^+ \rightarrow \psi(2S)K^+$) = $(6.39 \pm 0.33) \times 10^{-4}$, B($\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-$) = $(33.6 \pm 0.4) \times 10^{-2}$. NODE=M176R6;LINKAGE=CH

$\Gamma(\omega J/\psi(1S))/\Gamma_{\text{total}}$ Γ_4/Γ

NODE=M176R14
NODE=M176R14

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
>0.019	21 ± 7	[24] DEL-AMO-SA..10B		BABR	$B^+ \rightarrow \omega J/\psi K^+$

[24] DEL-AMO-SANCHEZ 10B reports [$\Gamma(X(3872) \rightarrow \omega J/\psi(1S))/\Gamma_{\text{total}}$] × [B($B^+ \rightarrow X(3872)K^+$)] = $(6 \pm 2 \pm 1) \times 10^{-6}$ which we divide by our best value B($B^+ \rightarrow X(3872)K^+$) < 3.2×10^{-4}. DEL-AMO-SANCHEZ 10B also reports B($B^0 \rightarrow X(3872)K^0$) × B($X(3872) \rightarrow J/\psi\omega$) = $(6 \pm 3 \pm 1) \times 10^{-6}$. NODE=M176R14;LINKAGE=DE

$\Gamma(\omega J/\psi(1S))/\Gamma(\pi^+\pi^- J/\psi(1S))$ Γ_4/Γ_2

NODE=M176R15
NODE=M176R15

VALUE	DOCUMENT ID		TECN	COMMENT
0.8±0.3	[25] DEL-AMO-SA..10B		BABR	$B \rightarrow \omega J/\psi K$

[25] Statistical and systematic errors added in quadrature. Uses the values of B($B \rightarrow X(3872)K$) × B($X(3872) \rightarrow J/\psi\pi^+\pi^-$) reported in AUBERT 08Y, taking into account the common systematics. NODE=M176R15;LINKAGE=DE

$\Gamma(D^0\overline{D}^0\pi^0)/\Gamma_{\text{total}}$ Γ_5/Γ

NODE=M176R12
NODE=M176R12

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
>3.2 × 10^{-3}	17 ± 5	[26] GOKHROO	06	BELL	$B^+ \rightarrow D^0\overline{D}^0\pi^0 K^+$

[26] GOKHROO 06 reports [$\Gamma(X(3872) \rightarrow D^0\overline{D}^0\pi^0)/\Gamma_{\text{total}}$] × [B($B^+ \rightarrow X(3872)K^+$)] = $(1.02 \pm 0.31^{+0.21}_{-0.29}) \times 10^{-6}$ which we divide by our best value B($B^+ \rightarrow X(3872)K^+$) < 3.2×10^{-4}. NODE=M176R12;LINKAGE=GO

$\Gamma(\overline{D}^{*0} D^0)/\Gamma_{total}$ — Γ_6/Γ

NODE=M176R13

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
>5 × 10^{-3}	27 ± 6	[27] AUBERT	08B	BABR	$B^+ \to \overline{D}^{*0} D^0 K^+$

[27] AUBERT 08B reports $[\Gamma(X(3872) \to \overline{D}^{*0} D^0)/\Gamma_{total}] \times [B(B^+ \to X(3872) K^+)] = (1.67 \pm 0.36 \pm 0.47) \times 10^{-6}$ which we divide by our best value $B(B^+ \to X(3872) K^+) < 3.2 \times 10^{-4}$. NODE=M176R13;LINKAGE=AU

$\Gamma(D^0 \overline{D}^0 \pi^0)/\Gamma(\pi^+\pi^- J/\psi(1S))$ — Γ_5/Γ_2

NODE=M176R5

VALUE	DOCUMENT ID		TECN	COMMENT
seen	[28] GOKHROO	06	BELL	$B \to D^0 \overline{D}^0 \pi^0 K$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	AUSHEV	10	BELL	$B \to D^0 \overline{D}^0 \pi^0 K$

[28] May not necessarily be the same state as that observed in the $J/\psi \pi^+\pi^-$ mode. Supersedes CHISTOV 04. NODE=M176R5;LINKAGE=GO

$\Gamma(D^0 \overline{D}^0)/\Gamma(\pi^+\pi^- J/\psi(1S))$ — Γ_8/Γ_2

NODE=M176R3

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	CHISTOV	04	BELL	$B \to K D^0 \overline{D}^0$

$\Gamma(D^+ D^-)/\Gamma(\pi^+\pi^- J/\psi(1S))$ — Γ_9/Γ_2

NODE=M176R4

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	CHISTOV	04	BELL	$B \to K D^+ D^-$

$\Gamma(\gamma \chi_{c1})/\Gamma(\pi^+\pi^- J/\psi(1S))$ — Γ_{10}/Γ_2

NODE=M176R1

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.89	90	CHOI	03	BELL	$B \to K \pi^+\pi^- J/\psi$

$\Gamma(\eta J/\psi)/\Gamma(\pi^+\pi^- J/\psi(1S))$ — Γ_{11}/Γ_2

NODE=M176R2

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.6	90	AUBERT	04Y	BABR	$B \to K \eta J/\psi$

$\Gamma(\gamma J/\psi)/\Gamma_{total}$ — Γ_{12}/Γ

NODE=M176R7

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
>9 × 10^{-3}	23 ± 6	[29] AUBERT	09B	BABR	$B^+ \to \gamma J/\psi K^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
>0.010	19	[30] AUBERT,BE	06M	BABR	$B^+ \to \gamma J/\psi K^+$

[29] AUBERT 09B reports $[\Gamma(X(3872) \to \gamma J/\psi)/\Gamma_{total}] \times [B(B^+ \to X(3872) K^+)] = (2.8 \pm 0.8 \pm 0.1) \times 10^{-6}$ which we divide by our best value $B(B^+ \to X(3872) K^+) < 3.2 \times 10^{-4}$. NODE=M176R7;LINKAGE=AB

[30] Superseded by AUBERT 09B. AUBERT,BE 06M reports $[\Gamma(X(3872) \to \gamma J/\psi)/\Gamma_{total}] \times [B(B^+ \to X(3872) K^+)] = (3.3 \pm 1.0 \pm 0.3) \times 10^{-6}$ which we divide by our best value $B(B^+ \to X(3872) K^+) < 3.2 \times 10^{-4}$. NODE=M176R7;LINKAGE=AU

$\Gamma(\gamma \psi(2S))/\Gamma_{total}$ — Γ_{13}/Γ

NODE=M176R10

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
>0.030	25 ± 7	[31] AUBERT	09B	BABR	$B^+ \to \gamma \psi(2S) K^+$

[31] AUBERT 09B reports $[\Gamma(X(3872) \to \gamma \psi(2S))/\Gamma_{total}] \times [B(B^+ \to X(3872) K^+)] = (9.5 \pm 2.7 \pm 0.6) \times 10^{-6}$ which we divide by our best value $B(B^+ \to X(3872) K^+) < 3.2 \times 10^{-4}$. NODE=M176R10;LINKAGE=AU

$\Gamma(\gamma \psi(2S))/\Gamma(\gamma J/\psi)$ — Γ_{13}/Γ_{12}

NODE=M176R11

VALUE	DOCUMENT ID		TECN	COMMENT
3.4±1.4	AUBERT	09B	BABR	$B^+ \to \gamma c \overline{c} K'$

$X(3872)$ REFERENCES

NODE=M176

AAIJ	12H	EPJ C72 1972	R. Aaij *et al.*	(LHCb Collab.)	REFID=54056
CHOI	11	PR D84 052004	S.-K. Choi *et al.*	(BELLE Collab.)	REFID=53934
AUSHEV	10	PR D81 031103R	T. Aushev *et al.*	(BELLE Collab.)	REFID=53225
DEL-AMO-SA...	10B	PR D82 011101R	P. del Amo Sanchez *et al.*	(BABAR Collab.)	REFID=53362
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 011102R	B. Aubert *et al.*	(BABAR Collab.)	REFID=52120
AUBERT	08Y	PR D77 111101R	B. Aubert *et al.*	(BABAR Collab.)	REFID=52265
ABULENCIA	07E	PRL 98 132002	A. Abulencia *et al.*	(CDF Collab.)	REFID=51722
AUBERT	06	PR D73 011101R	B. Aubert *et al.*	(BABAR Collab.)	REFID=51017
AUBERT,BE	06M	PR D74 071101R	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 031501R	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 071103R	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=M159

$X(3915)$

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

Observed in $\omega J/\psi$, thus $C = +$. May be the same state as $\chi_{c2}(2P)$.

NODE=M159

$X(3915)$ MASS

NODE=M159M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
3917.5± 2.7 OUR AVERAGE					
[3917.4 ± 2.7 MeV OUR 2011 AVERAGE]					
$3919.1^{+3.8}_{-3.4} \pm 2.0$		DEL-AMO-SA..	10B	BABR	$B \to \omega J/\psi K$
$3915 \pm 3 \pm 2$	49 ± 15	[1] UEHARA	10	BELL	$10.6\ e^+e^- \to e^+e^-\omega J/\psi$
$3943 \pm 11 \pm 13$	58 ± 11	[2] CHOI	05	BELL	$B \to \omega J/\psi K$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$3914.6^{+3.8}_{-3.4} \pm 2.0$		[2] AUBERT	08W	BABR	Superseded by DEL-AMO-SANCHEZ 10B

NODE=M159M NEW

[1] May be $\chi_{c2}(2P)$. NODE=M159M;LINKAGE=UE

[2] $\omega J/\psi$ threshold enhancement fitted as an S-wave Breit-Wigner resonance. NODE=M159M;LINKAGE=CH

$X(3915)$ WIDTH

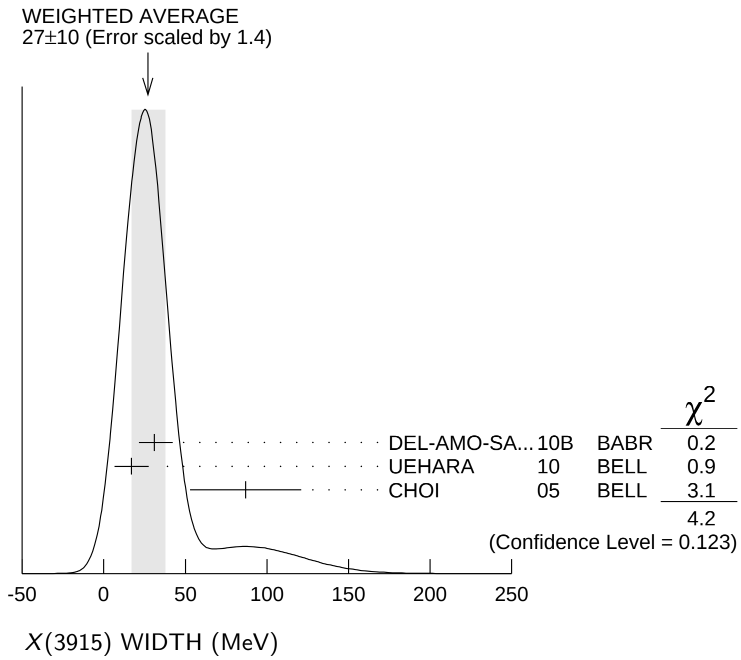
NODE=M159W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
27±10 OUR AVERAGE Error includes scale factor of 1.4. See the ideogram below.					
[28^{+10}_{-9} MeV OUR 2011 AVERAGE Scale factor = 1.5]					
$31^{+10}_{-8} \pm 5$		DEL-AMO-SA..	10B	BABR	$B \to \omega J/\psi K$
$17 \pm 10 \pm 3$	49 ± 15	[3] UEHARA	10	BELL	$10.6\ e^+e^- \to e^+e^-\omega J/\psi$
$87 \pm 22 \pm 26$	58 ± 11	[4] CHOI	05	BELL	$B \to \omega J/\psi K$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$34^{+12}_{-8} \pm 5$		[4] AUBERT	08W	BABR	Superseded by DEL-AMO-SANCHEZ 10B

NODE=M159W NEW

[3] May be $\chi_{c2}(2P)$. NODE=M159W;LINKAGE=UE

[4] $\omega J/\psi$ threshold enhancement fitted as an S-wave Breit-Wigner resonance. NODE=M159W;LINKAGE=CH



$X(3915)$ DECAY MODES

NODE=M159215;NODE=M159

	Mode	Fraction (Γ_i/Γ)
Γ_1	$\omega J/\psi$	seen
Γ_2	$\overline{D}^{*0} D^0$	
Γ_3	$\gamma\gamma$	seen

DESIG=1;OUR EST;→ NOT CHECKED ←
DESIG=3
DESIG=2

$X(3915)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M159220

$\Gamma(\omega J/\psi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_1\Gamma_3/\Gamma$

NODE=M159G01
NODE=M159G01

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
18± 5±2	49 ± 15	[5,6] 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. • • •					
61±17±8	49 ± 15	[5,7] UEHARA	10	BELL	10.6 $e^+e^- \to e^+e^-\omega J/\psi$

OCCUR=2

[5] May be $\chi_{c2}(2P)$.
[6] For $J^P = 2^+$, helicity-2.
[7] For $J^P = 0^+$.

NODE=M159G01;LINKAGE=UE
NODE=M159G01;LINKAGE=UR
NODE=M159G01;LINKAGE=UH

$X(3915)$ BRANCHING RATIOS

NODE=M159225

$\Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ Γ_3/Γ

NODE=M159R01
NODE=M159R01

VALUE	DOCUMENT ID		TECN	COMMENT
seen	[8] UEHARA	10	BELL	10.6 $e^+e^- \to e^+e^-\omega J/\psi$

[8] May be $\chi_{c2}(2P)$.

NODE=M159R01;LINKAGE=UE

$\Gamma(\omega J/\psi)/\Gamma(\overline{D}^{*0} D^0)$ Γ_1/Γ_2

NODE=M159R02
NODE=M159R02

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
>0.71	90	[9] AUSHEV	10	BELL	$B \to \overline{D}^{*0} D^0 K$

[9] By combining the upper limit B($B \to X(3915)K$) × 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($B \to X(3915)K$) × B($X(3915) \to \omega J/\psi$) = $(0.51 \pm 0.11) \times 10^{-4}$.

NODE=M159R02;LINKAGE=AU

$\Gamma(\omega J/\psi)/\Gamma_{\text{total}}$ Γ_1/Γ

NODE=M159R03
NODE=M159R03

VALUE	DOCUMENT ID		TECN	COMMENT
seen	[10] DEL-AMO-SA...	10B	BABR	$B \to \omega J/\psi K$
seen	[11] CHOI	05	BELL	$B \to \omega J/\psi K$

[10] DEL-AMO-SANCHEZ 10B reports B($B^\pm \to X(3915)K^\pm$) × B($X(3915) \to J/\psi\omega$) = $(3.0^{+0.7}_{-0.6}{}^{+0.5}_{-0.3}) \times 10^{-5}$ and B($B^0 \to X(3915)K^0$) × B($X(3915) \to J/\psi\omega$) = $(2.1 \pm 0.9 \pm 0.3) \times 10^{-5}$.

NODE=M159R03;LINKAGE=DE

[11] CHOI 05 reports B($B \to X(3915)K$)×B($X(3915) \to J/\psi\omega$)=$(7.1 \pm 1.3 \pm 3.1) \times 10^{-5}$.

NODE=M159R03;LINKAGE=CH

$X(3915)$ REFERENCES

NODE=M159

AUSHEV	10	PR D81 031103R	T. Aushev *et al.*	(BELLE Collab.)	REFID=53225
DEL-AMO-SA...	10B	PR D82 011101R	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

$\chi_{c2}(2P)$

$I^G(J^{PC}) = 0^+(2^{++})$

$\chi_{c2}(2P)$ MASS

NODE=M050M

NODE=M050M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
3927.2±2.6 OUR AVERAGE					
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 $e^+e^- \to e^+e^- D\overline{D}$

$\chi_{c2}(2P)$ WIDTH

NODE=M050W

NODE=M050W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
24 ± 6 OUR AVERAGE					
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 $e^+e^- \to e^+e^- D\overline{D}$

$\chi_{c2}(2P)$ DECAY MODES

NODE=M050215;NODE=M050

	Mode	
Γ_1	$\gamma\gamma$	DESIG=1
Γ_2	$K\overline{K}\pi$	DESIG=5
Γ_3	$K^+K^-\pi^+\pi^-\pi^0$	DESIG=6
Γ_4	$D\overline{D}$	DESIG=2
Γ_5	D^+D^-	DESIG=3
Γ_6	$D^0\overline{D}^0$	DESIG=4

$\chi_{c2}(2P)$ PARTIAL WIDTHS

NODE=M050220

$\chi_{c2}(2P)$ Γ(i)Γ(γγ)/Γ(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

$\chi_{c2}(2P)$ 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 $e^+e^- \to e^+e^- D\overline{D}$

$\chi_{c2}(2P)$ REFERENCES

NODE=M050

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. • • •					
$3943\pm6\pm6$	25	[1] ABE	07	BELL	$e^+e^- \to J/\psi X$
3936 ± 14	266	[2] ABE	07	BELL	$e^+e^- \to J/\psi(c\overline{c})$

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;→ NOT CHECKED ←

DESIG=2;OUR EVAL;→ NOT CHECKED ←

DESIG=3;OUR EVAL;→ NOT CHECKED ←

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	[3,4] ABE	07	BELL	$e^+e^- \to J/\psi X$

[3] For $X(3940)$ decaying to final states with more than two tracks.

[4] 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	[5,6] ABE	07	BELL	$e^+e^- \to J/\psi X$

[5] For $X(3940)$ decaying to final states with more than two tracks.

[6] 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	[7,8] ABE	07	BELL	$e^+e^- \to J/\psi X$

[7] For $X(3940)$ decaying to final states with more than two tracks.

[8] 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.)
ABE	07	PRL 98 082001	K. Abe *et al.*	(BELLE Collab.)

REFID=52302

REFID=51627

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
→ NOT CHECKED ←
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
→ NOT CHECKED ←
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	$e^+ e^-$	$(1.07 \pm 0.16) \times 10^{-5}$		DESIG=5
Γ_2	$D\overline{D}$	seen		DESIG=17;OUR EST;→ NOT CHECKED ←
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;→ NOT CHECKED ←
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;→ NOT CHECKED ←
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}	$D^0 D^- \pi^+$ +c.c. (excl. $D^*(2007)^0 \overline{D}^0$ +c.c., $D^*(2010)^+ D^-$ +c.c.)	not seen		DESIG=24
Γ_{13}	$D\overline{D}^*\pi$ (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}	$J/\psi(1S)$ hadrons				DESIG=4
Γ_{17}	$J/\psi \pi^+ \pi^-$	< 4	$\times 10^{-3}$	90%	DESIG=7
Γ_{18}	$J/\psi \pi^0 \pi^0$	< 2	$\times 10^{-3}$	90%	DESIG=8
Γ_{19}	$J/\psi \eta$	< 7	$\times 10^{-3}$	90%	DESIG=9
Γ_{20}	$J/\psi \pi^0$	< 2	$\times 10^{-3}$	90%	DESIG=10
Γ_{21}	$J/\psi \pi^+ \pi^- \pi^0$	< 2	$\times 10^{-3}$	90%	DESIG=11
Γ_{22}	$\chi_{c1} \gamma$	< 1.1	%	90%	DESIG=12
Γ_{23}	$\chi_{c2} \gamma$	< 1.7	%	90%	DESIG=13
Γ_{24}	$\chi_{c1} \pi^+ \pi^- \pi^0$	< 1.1	%	90%	DESIG=14
Γ_{25}	$\chi_{c2} \pi^+ \pi^- \pi^0$	< 3.2	%	90%	DESIG=15
Γ_{26}	$h_c(1P) \pi^+ \pi^-$	< 3	$\times 10^{-3}$	90%	DESIG=28
Γ_{27}	$\phi \pi^+ \pi^-$	< 3	$\times 10^{-3}$	90%	DESIG=16
Γ_{28}	$\mu^+ \mu^-$				DESIG=6

ψ(4040) PARTIAL WIDTHS

NODE=M072220

$\Gamma(e^+ e^-)$ — Γ_1

NODE=M072W5
NODE=M072W5
→ NOT CHECKED ←

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	$e^+ e^-$

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

ψ(4040) BRANCHING RATIOS

NODE=M072225

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

NODE=M072R4
NODE=M072R4

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
~ 1.0	FELDMAN	77	MRK1	$e^+ e^-$

$\Gamma(D^0 \overline{D}^0)/\Gamma_{\text{total}}$ — Γ_3/Γ

NODE=M072R14
NODE=M072R14

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AUBERT	09M	BABR	$e^+ e^- \rightarrow D^0 \overline{D}^0 \gamma$
seen	CRONIN-HEN..	09	CLEO	$e^+ e^- \rightarrow D^0 \overline{D}^0$
seen	PAKHLOVA	08	BELL	$e^+ e^- \rightarrow D^0 \overline{D}^0 \gamma$

$\Gamma(D^+ D^-)/\Gamma_{\text{total}}$ — Γ_4/Γ

NODE=M072R15
NODE=M072R15

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AUBERT	09M	BABR	$e^+ e^- \rightarrow D^+ D^- \gamma$
seen	CRONIN-HEN..	09	CLEO	$e^+ e^- \rightarrow D^+ D^-$
seen	PAKHLOVA	08	BELL	$e^+ e^- \rightarrow D^+ D^- \gamma$

$\Gamma(D \overline{D})/\Gamma(D^* \overline{D}+\text{c.c.})$ — Γ_2/Γ_5

NODE=M072R12
NODE=M072R12

VALUE	DOCUMENT ID		TECN	COMMENT
0.24±0.05±0.12	AUBERT	09M	BABR	$e^+ e^- \rightarrow \gamma D^{(*)} \overline{D}$

$\Gamma(D^0\overline{D}^0)/\Gamma(D^*(2007)^0\overline{D}^0+\text{c.c.})$ — Γ_3/Γ_6

NODE=M072R1

VALUE	DOCUMENT ID		TECN	COMMENT
0.05±0.03	[13] GOLDHABER	77	MRK1	e^+e^-

[13] Phase-space factor (p^3) explicitly removed.

NODE=M072R;LINKAGE=P

$\Gamma(D^*(2007)^0\overline{D}^0+\text{c.c.})/\Gamma_{total}$ — 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	$e^+e^- \to D^{*0}\overline{D}^0$

$\Gamma(D^*(2010)^+D^-+\text{c.c.})/\Gamma_{total}$ — Γ_7/Γ

NODE=M072R17

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	07	BELL	$e^+e^- \to D^{*+}D^-\gamma$

$\Gamma(D^*(2010)^+D^-+\text{c.c.})/\Gamma(D^*(2007)^0\overline{D}^0+\text{c.c.})$ — 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	$e^+e^- \to \gamma D^{(*)}\overline{D}^{(*)}$

$\Gamma(D^*(2007)^0\overline{D}^*(2007)^0)/\Gamma_{total}$ — 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	[14] GOLDHABER	77	MRK1	e^+e^-

[14] Phase-space factor (p^3) explicitly removed.

NODE=M072R2;LINKAGE=P

$\Gamma(D^*(2010)^+D^*(2010)^-)/\Gamma_{total}$ — Γ_{10}/Γ

NODE=M072R19

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	07	BELL	$e^+e^- \to D^{*+}D^{*-}\gamma$

$\Gamma(D^0D^-\pi^+ +\text{c.c. (excl. } D^*(2007)^0\overline{D}^0 +\text{c.c.}, D^*(2010)^+D^- +\text{c.c.}))/\Gamma_{total}$ — Γ_{12}/Γ

NODE=M072R20

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	PAKHLOVA	08A	BELL	$e^+e^- \to D^0D^-\pi^+\gamma$

$\Gamma(D\overline{D}^*\pi\,(\text{excl. } D^*\overline{D}^*))/\Gamma_{total}$ — Γ_{13}/Γ

NODE=M072R21

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	CRONIN-HEN...	09	CLEO	$e^+e^- \to D\overline{D}^*\pi$

$\Gamma(D^0\overline{D}^{*-}\pi^+ +\text{c.c. (excl. } D^*(2010)^+D^*(2010)^-))/\Gamma_{total}$ — Γ_{14}/Γ

NODE=M072R22

VALUE	DOCUMENT ID		TECN	COMMENT
seen	PAKHLOVA	09	BELL	$e^+e^- \to D^0D^{*-}\pi^+\gamma$

$\Gamma(D_s^+D_s^-)/\Gamma_{total}$ — 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	$e^+e^- \to D_s^+D_s^-$

$\Gamma(J/\psi\pi^+\pi^-)/\Gamma_{total}$ — Γ_{17}/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_{18}/Γ

NODE=M072R02
NODE=M072R02

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<2	90	COAN	06	CLEO	3.97–4.06 $e^+e^- \rightarrow$ hadrons

$\Gamma(J/\psi\eta)/\Gamma_{total}$ Γ_{19}/Γ

NODE=M072R03
NODE=M072R03

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<7	90	COAN	06	CLEO	3.97–4.06 $e^+e^- \rightarrow$ hadrons

$\Gamma(J/\psi\pi^0)/\Gamma_{total}$ Γ_{20}/Γ

NODE=M072R04
NODE=M072R04

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<2	90	COAN	06	CLEO	3.97–4.06 $e^+e^- \rightarrow$ hadrons

$\Gamma(J/\psi\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{21}/Γ

NODE=M072R05
NODE=M072R05

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<2	90	COAN	06	CLEO	3.97–4.06 $e^+e^- \rightarrow$ hadrons

$\Gamma(\chi_{c1}\gamma)/\Gamma_{total}$ Γ_{22}/Γ

NODE=M072R06
NODE=M072R06

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<11	90	COAN	06	CLEO	3.97–4.06 $e^+e^- \rightarrow$ hadrons

$\Gamma(\chi_{c2}\gamma)/\Gamma_{total}$ Γ_{23}/Γ

NODE=M072R07
NODE=M072R07

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<17	90	COAN	06	CLEO	3.97–4.06 $e^+e^- \rightarrow$ hadrons

$\Gamma(\chi_{c1}\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{24}/Γ

NODE=M072R08
NODE=M072R08

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<11	90	COAN	06	CLEO	3.97–4.06 $e^+e^- \rightarrow$ hadrons

$\Gamma(\chi_{c2}\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{25}/Γ

NODE=M072R09
NODE=M072R09

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<32	90	COAN	06	CLEO	3.97–4.06 $e^+e^- \rightarrow$ hadrons

$\Gamma(h_c(1P)\pi^+\pi^-)/\Gamma_{total}$ Γ_{26}/Γ

NODE=M072R24
NODE=M072R24

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<3	90	[15] PEDLAR	11	CLEO	$e^+e^- \rightarrow h_c(1P)\pi^+\pi^-$

[15] From several values of $\sqrt{s}$ near the peak of the $\psi(4040)$, PEDLAR 11 measures $\sigma(e^+e^- \rightarrow h_c(1P)\pi^+\pi^-) = 1.0 \pm 8.0 \pm 5.4 \pm 0.2$ pb, where the errors are statistical, systematic, and due to uncertainty in $B(\psi(2S) \rightarrow \pi^0 h_c(1P))$, respectively.

NODE=M072R24;LINKAGE=PE

$\Gamma(\phi\pi^+\pi^-)/\Gamma_{total}$ Γ_{27}/Γ

NODE=M072R10
NODE=M072R10

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<3	90	COAN	06	CLEO	3.97–4.06 $e^+e^- \rightarrow$ hadrons

ψ(4040) REFERENCES

NODE=M072

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 091101R	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 011103R	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

$X(4050)^{\pm}$

$I(J^P) = ?(?^?)$

OMITTED FROM SUMMARY TABLE

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.

NODE=M191

$X(4050)^{\pm}$ MASS

NODE=M191M

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
$4051 \pm 14^{+20}_{-41}$	[1] MIZUK	08	BELL	$\overline{B}^0 \to K^- \pi^+ \chi_{c1}(1P)$

NODE=M191M

[1] From a Dalitz plot analysis with two Breit-Wigner amplitudes.

NODE=M191M;LINKAGE=MI

$X(4050)^{\pm}$ WIDTH

NODE=M191W

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
$82^{+21}_{-17}{}^{+47}_{-22}$	[2] MIZUK	08	BELL	$\overline{B}^0 \to K^- \pi^+ \chi_{c1}(1P)$

NODE=M191W

[2] 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

DESIG=1

$X(4050)^{\pm}$ BRANCHING RATIOS

NODE=M191225

$\Gamma(\pi^+ \chi_{c1}(1P))/\Gamma_{total}$ Γ_1/Γ

NODE=M191R01
NODE=M191R01

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
seen	[3] 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	[4] LEES	12B	BABR	$B \to K \pi \chi_{c1}(1P)$

[3] With a product branching fraction measurement of $B(\overline{B}^0 \to K^- X(4050)^+) \times B(X(4050)^+ \to \pi^+ \chi_{c1}(1P)) = (3.0^{+1.5}_{-0.8}{}^{+3.7}_{-1.6}) \times 10^{-5}$.

NODE=M191R01;LINKAGE=MI

[4] With a product branching fraction limit of $B(\overline{B}^0 \to X(4050)^+ K^-) \times B(X(4050)^+ \to \chi_{c1} \pi^+) < 1.8 \times 10^{-5}$ at 90% CL.

NODE=M191R01;LINKAGE=LE

$X(4050)^{\pm}$ REFERENCES

NODE=M191

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=M193

$X(4140)$

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

OMITTED FROM SUMMARY TABLE

Needs confirmation.
Seen by AALTONEN 09AH in the $B^+ \to X K^+$, $X \to J/\psi\phi$. Not seen by SHEN 10 in $\gamma\gamma \to J/\psi\phi$.

NODE=M193

X(4140) MASS

NODE=M193M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
4143.0±2.9±1.2	14 ± 5	[1] AALTONEN	09AH	CDF	$B^+ \to J/\psi\phi K^+$

NODE=M193M

[1] Statistical significance of 3.8 σ.

NODE=M193M;LINKAGE=AA

X(4140) WIDTH

NODE=M193W

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
$\mathbf{11.7^{+8.3}_{-5.0}\pm3.7}$	14 ± 5	[2] AALTONEN	09AH	CDF	$B^+ \to J/\psi\phi K^+$

NODE=M193W

[2] Statistical significance of 3.8 σ.

NODE=M193W;LINKAGE=AA

X(4140) DECAY MODES

NODE=M193215;NODE=M193

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$J/\psi\phi$	seen	DESIG=1
Γ_2	$\gamma\gamma$	not seen	DESIG=2

X(4140) Γ(i)$\Gamma(\gamma\gamma)$/Γ(total)

NODE=M193220

$\Gamma(\gamma\gamma) \times \Gamma(J/\psi\phi)/\Gamma_{total}$ — $\Gamma_2\Gamma_1/\Gamma$

NODE=M193G01
NODE=M193G01

VALUE (eV)	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<41	90	[3] 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	[4] SHEN	10	BELL	10.6 $e^+e^- \to e^+e^- J/\psi\phi$

OCCUR=2

[3] For $J^P = 0^+$.
[4] For $J^P = 2^+$.

NODE=M193G01;LINKAGE=S0
NODE=M193G01;LINKAGE=S2

X(4140) BRANCHING RATIOS

NODE=M193225

$\Gamma(J/\psi\phi)/\Gamma_{total}$ — Γ_1/Γ

NODE=M193R01
NODE=M193R01

VALUE	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
seen	14 ± 5	[5] AALTONEN	09AH	CDF	$B^+ \to J/\psi\phi K^+$

[5] Statistical significance of 3.8 σ.

NODE=M193R01;LINKAGE=AA

$\Gamma(\gamma\gamma)/\Gamma_{total}$ — Γ_2/Γ

NODE=M193R02
NODE=M193R02

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
not seen	SHEN	10	BELL	10.6 $e^+e^- \to e^+e^- J/\psi\phi$

X(4140) REFERENCES

NODE=M193

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

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
4153 ± 3 OUR ESTIMATE				
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^-

NODE=M025M
→ NOT CHECKED ←
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=M025M;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=M025M;LINKAGE=MO

[3] From a fit to Crystal Ball (OSTERHELD 86) data. NODE=M025M;LINKAGE=ST

[4] From a fit to BES (BAI 02C) data. NODE=M025M;LINKAGE=SE

ψ(4160) WIDTH

NODE=M025W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
103 ± 8 OUR ESTIMATE				
71.8±12.3	[5] ABLIKIM	08D	BES2	$e^+e^- \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •				
79 ±14	[6] MO	10	RVUE	$e^+e^- \to$ hadrons
107 ±10	[7] SETH	05A	RVUE	$e^+e^- \to$ hadrons
107 ±16	[8] SETH	05A	RVUE	$e^+e^- \to$ hadrons
78 ±20	BRANDELIK	78C	DASP	e^+e^-

NODE=M025W
→ NOT CHECKED ←
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 $\delta = (293 \pm 57)^\circ$. NODE=M025W;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=M025W;LINKAGE=MO

[7] From a fit to Crystal Ball (OSTERHELD 86) data. NODE=M025W;LINKAGE=ST

[8] From a fit to BES (BAI 02C) data. NODE=M025W;LINKAGE=SE

ψ(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^-	$(8.1\pm0.9)\times10^{-6}$		DESIG=1
Γ_2	$D\overline{D}$	seen		DESIG=15;OUR EVAL; → NOT CHECKED ←
Γ_3	$D^0\overline{D}^0$	seen		DESIG=16
Γ_4	D^+D^-	seen		DESIG=17
Γ_5	$D^*\overline{D}+$ c.c.	seen		DESIG=18;OUR EVAL; → NOT CHECKED ←
Γ_6	$D^*(2007)^0\overline{D}^0+$ c.c.	seen		DESIG=19
Γ_7	$D^*(2010)^+D^-+$ c.c.	seen		DESIG=20
Γ_8	$D^*\overline{D}^*$	seen		DESIG=21;OUR EVAL; → NOT CHECKED ←
Γ_9	$D^*(2007)^0\overline{D}^*(2007)^0$	seen		DESIG=22
Γ_{10}	$D^*(2010)^+D^*(2010)^-$	seen		DESIG=23
Γ_{11}	$D^0D^-\pi^+$+c.c. (excl. $D^*(2007)^0\overline{D}^0$ +c.c., $D^*(2010)^+D^-$ +c.c.)	not seen		DESIG=24
Γ_{12}	$D\overline{D}^*\pi$+c.c. (excl. $D^*\overline{D}^*$)	seen		DESIG=25

Γ_{13}	$D^0 D^{*-} \pi^+$ +c.c. (excl. $D^*(2010)^+ D^*(2010)^-$)	not seen			DESIG=26
Γ_{14}	$D_s^+ D_s^-$	not seen			DESIG=27
Γ_{15}	$D_s^{*+} D_s^-$ +c.c.	seen			DESIG=28
Γ_{16}	$J/\psi \pi^+ \pi^-$	< 3	$\times 10^{-3}$	90%	DESIG=2
Γ_{17}	$J/\psi \pi^0 \pi^0$	< 3	$\times 10^{-3}$	90%	DESIG=3
Γ_{18}	$J/\psi K^+ K^-$	< 2	$\times 10^{-3}$	90%	DESIG=4
Γ_{19}	$J/\psi \eta$	< 8	$\times 10^{-3}$	90%	DESIG=5
Γ_{20}	$J/\psi \pi^0$	< 1	$\times 10^{-3}$	90%	DESIG=6
Γ_{21}	$J/\psi \eta'$	< 5	$\times 10^{-3}$	90%	DESIG=7
Γ_{22}	$J/\psi \pi^+ \pi^- \pi^0$	< 1	$\times 10^{-3}$	90%	DESIG=8
Γ_{23}	$\psi(2S) \pi^+ \pi^-$	< 4	$\times 10^{-3}$	90%	DESIG=9
Γ_{24}	$\chi_{c1} \gamma$	< 7	$\times 10^{-3}$	90%	DESIG=10
Γ_{25}	$\chi_{c2} \gamma$	< 1.3	%	90%	DESIG=11
Γ_{26}	$\chi_{c1} \pi^+ \pi^- \pi^0$	< 2	$\times 10^{-3}$	90%	DESIG=12
Γ_{27}	$\chi_{c2} \pi^+ \pi^- \pi^0$	< 8	$\times 10^{-3}$	90%	DESIG=13
Γ_{28}	$h_c(1P) \pi^+ \pi^-$	< 5	$\times 10^{-3}$	90%	DESIG=29
Γ_{29}	$h_c(1P) \pi^0 \pi^0$	< 2	$\times 10^{-3}$	90%	DESIG=30
Γ_{30}	$h_c(1P) \eta$	< 2	$\times 10^{-3}$	90%	DESIG=31
Γ_{31}	$h_c(1P) \pi^0$	< 4	$\times 10^{-4}$	90%	DESIG=32
Γ_{32}	$\phi \pi^+ \pi^-$	< 2	$\times 10^{-3}$	90%	DESIG=14

ψ(4160) PARTIAL WIDTHS

NODE=M025220

$\Gamma(e^+ e^-)$ Γ_1

NODE=M025W1
NODE=M025W1

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
0.83±0.07 OUR ESTIMATE				
0.48±0.22	[9] ABLIKIM	08D	BES2	$e^+ e^- \rightarrow$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.4 to 1.1	[10] MO	10	RVUE	$e^+ e^- \rightarrow$ hadrons
0.83±0.08	[11] SETH	05A	RVUE	$e^+ e^- \rightarrow$ hadrons
0.84±0.13	[12] SETH	05A	RVUE	$e^+ e^- \rightarrow$ hadrons
0.77±0.23	BRANDELIK	78C	DASP	$e^+ e^-$

→ NOT CHECKED ←

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 $\delta = (293 \pm 57)^\circ$.

NODE=M025W1;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=M025W1;LINKAGE=MO

[11] From a fit to Crystal Ball (OSTERHELD 86) data.

NODE=M025W1;LINKAGE=ST

[12] From a fit to BES (BAI 02C) data.

NODE=M025W1;LINKAGE=SE

ψ(4160) BRANCHING RATIOS

NODE=M025225

$\Gamma(D\overline{D})/\Gamma(D^*\overline{D}^*)$ Γ_2/Γ_8

NODE=M025R14
NODE=M025R14

VALUE	DOCUMENT ID		TECN	COMMENT
0.02±0.03±0.02	AUBERT	09M	BABR	$e^+ e^- \rightarrow \gamma D^{(*)} \overline{D}^{(*)}$

$\Gamma(D^0\overline{D}^0)/\Gamma_{total}$ Γ_3/Γ

NODE=M025R16
NODE=M025R16

VALUE	DOCUMENT ID		TECN	COMMENT
seen	CRONIN-HEN...	09	CLEO	$e^+ e^- \rightarrow D^0 \overline{D}^0$
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_4/Γ

NODE=M025R17
NODE=M025R17

VALUE	DOCUMENT ID		TECN	COMMENT
seen	CRONIN-HEN...	09	CLEO	$e^+ e^- \rightarrow D^+ D^-$
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	$e^+ e^- \rightarrow D^+ D^- \gamma$

$\Gamma(D^*(2007)^0 \overline{D}^0 + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_6/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	$e^+ e^- \to D^{*0} \overline{D}^0$

$\Gamma(D^*(2010)^+ D^- + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_7/Γ

NODE=M025R19
NODE=M025R19

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	07	BELL	$e^+ e^- \to D^{*+} D^- \gamma$

$\Gamma(D^* \overline{D} + \text{c.c.})/\Gamma(D^* \overline{D}^*)$ — Γ_5/Γ_8

NODE=M025R15
NODE=M025R15

VALUE	DOCUMENT ID		TECN	COMMENT
0.34±0.14±0.05	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=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	$e^+ e^- \to D^{*0} \overline{D}^{*0}$

$\Gamma(D^*(2010)^+ D^*(2010)^-)/\Gamma_{\text{total}}$ — Γ_{10}/Γ

NODE=M025R21
NODE=M025R21

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	07	BELL	$e^+ e^- \to D^{*+} D^{*-} \gamma$

$\Gamma(D^0 D^- \pi^+ + \text{c.c. (excl. } D^*(2007)^0 \overline{D}^0 + \text{c.c.}, D^*(2010)^+ D^- + \text{c.c.}))/\Gamma_{\text{total}}$ — Γ_{11}/Γ

NODE=M025R22
NODE=M025R22

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	PAKHLOVA	08A	BELL	$e^+ e^- \to D^0 D^- \pi^+ \gamma$

$\Gamma(D \overline{D}^* \pi + \text{c.c. (excl. } D^* \overline{D}^*))/\Gamma_{\text{total}}$ — Γ_{12}/Γ

NODE=M025R23
NODE=M025R23

VALUE	DOCUMENT ID		TECN	COMMENT
seen	CRONIN-HEN...	09	CLEO	$e^+ e^- \to D \overline{D}^* \pi$

$\Gamma(D^0 D^{*-} \pi^+ + \text{c.c. (excl. } D^*(2010)^+ D^*(2010)^-))/\Gamma_{\text{total}}$ — Γ_{13}/Γ

NODE=M025R24
NODE=M025R24

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	PAKHLOVA	09	BELL	$e^+ e^- \to D^0 D^{*-} \pi^+ \gamma$

$\Gamma(D_s^+ D_s^-)/\Gamma_{\text{total}}$ — Γ_{14}/Γ

NODE=M025R25
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	$e^+ e^- \to D_s^+ D_s^-$

$\Gamma(D_s^{*+} D_s^- + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_{15}/Γ

NODE=M025R26
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	$e^+ e^- \to D_s^{*+} D_s^-$

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

NODE=M025R01
NODE=M025R01

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<3	90	COAN	06	CLEO	4.12–4.2 $e^+ e^- \to$ hadrons

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

NODE=M025R02
NODE=M025R02

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<3	90	COAN	06	CLEO	4.12–4.2 $e^+ e^- \to$ hadrons

$\Gamma(J/\psi K^+ K^-)/\Gamma_{\text{total}}$ — Γ_{18}/Γ

NODE=M025R03
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_{19}/Γ

NODE=M025R04
NODE=M025R04

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<8	90	COAN	06	CLEO	4.12–4.2 $e^+e^- \rightarrow$ hadrons

$\Gamma(J/\psi\pi^0)/\Gamma_{total}$ — Γ_{20}/Γ

NODE=M025R05
NODE=M025R05

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<1	90	COAN	06	CLEO	4.12–4.2 $e^+e^- \rightarrow$ hadrons

$\Gamma(J/\psi\eta')/\Gamma_{total}$ — Γ_{21}/Γ

NODE=M025R06
NODE=M025R06

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<5	90	COAN	06	CLEO	4.12–4.2 $e^+e^- \rightarrow$ hadrons

$\Gamma(J/\psi\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{22}/Γ

NODE=M025R07
NODE=M025R07

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<1	90	COAN	06	CLEO	4.12–4.2 $e^+e^- \rightarrow$ hadrons

$\Gamma(\psi(2S)\pi^+\pi^-)/\Gamma_{total}$ — Γ_{23}/Γ

NODE=M025R08
NODE=M025R08

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<4	90	COAN	06	CLEO	4.12–4.2 $e^+e^- \rightarrow$ hadrons

$\Gamma(\chi_{c1}\gamma)/\Gamma_{total}$ — Γ_{24}/Γ

NODE=M025R09
NODE=M025R09

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<7	90	COAN	06	CLEO	4.12–4.2 $e^+e^- \rightarrow$ hadrons

$\Gamma(\chi_{c2}\gamma)/\Gamma_{total}$ — Γ_{25}/Γ

NODE=M025R10
NODE=M025R10

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<13	90	COAN	06	CLEO	4.12–4.2 $e^+e^- \rightarrow$ hadrons

$\Gamma(\chi_{c1}\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{26}/Γ

NODE=M025R11
NODE=M025R11

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<2	90	COAN	06	CLEO	4.12–4.2 $e^+e^- \rightarrow$ hadrons

$\Gamma(\chi_{c2}\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{27}/Γ

NODE=M025R12
NODE=M025R12

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<8	90	COAN	06	CLEO	4.12–4.2 $e^+e^- \rightarrow$ hadrons

$\Gamma(h_c(1P)\pi^+\pi^-)/\Gamma_{total}$ — Γ_{28}/Γ

NODE=M025R27
NODE=M025R27

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<5	90	[13] PEDLAR	11	CLEO	$e^+e^- \rightarrow h_c(1P)\pi^+\pi^-$

[13] At $\sqrt{s}$ = 4170 MeV, PEDLAR 11 measures $\sigma(e^+e^- \rightarrow h_c(1P)\pi^+\pi^-) = 15.6 \pm 2.3 \pm 1.9 \pm 3.0$ pb, where the errors are statistical, systematic, and due to uncertainty in B($\psi(2S) \rightarrow \pi^0 h_c(1P)$), respectively.

NODE=M025R27;LINKAGE=PE

$\Gamma(h_c(1P)\pi^0\pi^0)/\Gamma_{total}$ — Γ_{29}/Γ

NODE=M025R28
NODE=M025R28

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<2	90	[14] PEDLAR	11	CLEO	$e^+e^- \rightarrow h_c(1P)\pi^0\pi^0$

[14] At $\sqrt{s}$ = 4170 MeV, PEDLAR 11 measures $\sigma(e^+e^- \rightarrow h_c(1P)\pi^0\pi^0) = 3.0 \pm 3.3 \pm 1.1 \pm 0.6$ pb, where the errors are statistical, systematic, and due to uncertainty in B($\psi(2S) \rightarrow \pi^0 h_c(1P)$), respectively.

NODE=M025R28;LINKAGE=PE

$\Gamma(h_c(1P)\eta)/\Gamma_{total}$ — Γ_{30}/Γ

NODE=M025R29
NODE=M025R29

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<2	90	[15] PEDLAR	11	CLEO	$e^+e^- \rightarrow h_c(1P)\eta$

[15] At $\sqrt{s}$ = 4170 MeV, PEDLAR 11 measures $\sigma(e^+e^- \rightarrow h_c(1P)\eta) = 4.7 \pm 1.7 \pm 1.0 \pm 0.9$ pb, where the errors are statistical, systematic, and due to uncertainty in B($\psi(2S) \rightarrow \pi^0 h_c(1P)$), respectively.

NODE=M025R29;LINKAGE=PE

$\Gamma(h_c(1P)\pi^0)/\Gamma_{total}$ — Γ_{31}/Γ

NODE=M025R30
NODE=M025R30

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.4	90	[16] PEDLAR	11	CLEO	$e^+e^- \rightarrow h_c(1P)\pi^0$

[16] At $\sqrt{s}$ = 4170 MeV, PEDLAR 11 measures $\sigma(e^+e^- \rightarrow h_c(1P)\pi^0) = -0.7 \pm 1.8 \pm 0.7 \pm 0.1$ pb, where the errors are statistical, systematic, and due to uncertainty in B($\psi(2S) \rightarrow \pi^0 h_c(1P)$), respectively.

NODE=M025R30;LINKAGE=PE

$\Gamma(\phi\pi^+\pi^-)/\Gamma_{total}$ Γ_{32}/Γ

NODE=M025R13
NODE=M025R13

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<2	90	COAN	06	CLEO	4.12–4.2 $e^+e^- \rightarrow$ hadrons

ψ(4160) REFERENCES

NODE=M025

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 091101R	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 011103R	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 $e^+e^- \rightarrow J/\psi X$, $X \rightarrow D^*\overline{D}^*$

NODE=M190

X(4160) MASS

NODE=M190M

NODE=M190M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{4156^{+25}_{-20}\pm15}$	24	PAKHLOV	08	BELL	$e^+e^- \rightarrow J/\psi X$

X(4160) WIDTH

NODE=M190W

NODE=M190W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{139^{+111}_{-\ 61}\pm21}$	24	PAKHLOV	08	BELL	$e^+e^- \rightarrow J/\psi X$

X(4160) DECAY MODES

NODE=M190215;NODE=M190

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$D\overline{D}$	not seen	DESIG=1;OUR EVAL;→ NOT CHECKED ←
Γ_2	$D^*\overline{D}$+ c.c.	not seen	DESIG=2;OUR EVAL;→ NOT CHECKED ←
Γ_3	$D^*\overline{D}^*$	seen	DESIG=3;OUR EVAL;→ NOT CHECKED ←

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	$e^+e^- \rightarrow J/\psi X$

$\Gamma(D^*\overline{D}+\text{c.c.})/\Gamma(D^*\overline{D}^*)$ Γ_2/Γ_3

NODE=M190R02
NODE=M190R02

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.22	90	PAKHLOV	08	BELL	$e^+e^- \rightarrow J/\psi X$

X(4160) REFERENCES

NODE=M190

PAKHLOV 08 PRL 100 202001 P. Pakhlov *et al.* (BELLE Collab.) REFID=52302

NODE=M192

$X(4250)^{\pm}$

$I(J^P) = ?(?^?)$

OMITTED FROM SUMMARY TABLE

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.

NODE=M192

$X(4250)^{\pm}$ MASS

NODE=M192M

NODE=M192M

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
$\mathbf{4248^{+44}_{-29}{}^{+180}_{-\ 35}}$	[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=M192M;LINKAGE=MI

$X(4250)^{\pm}$ WIDTH

NODE=M192W

NODE=M192W

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
$\mathbf{177^{+54}_{-39}{}^{+316}_{-\ 61}}$	[2] MIZUK	08	BELL	$\overline{B}^0 \rightarrow K^- \pi^+ \chi_{c1}(1P)$

[2] 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

$\Gamma(\pi^+ \chi_{c1}(1P))/\Gamma_{\text{total}}$ Γ_1/Γ

NODE=M192R01
NODE=M192R01

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
seen	[3] 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	[4] LEES	12B	BABR	$B \rightarrow K \pi \chi_{c1}(1P)$

[3] With a product branching fraction measurement of $B(\overline{B}^0 \rightarrow K^- X(4250)^+) \times B(X(4250)^+ \rightarrow \pi^+ \chi_{c1}(1P)) = (4.0^{+2.3}_{-0.9}{}^{+19.7}_{-\ 0.5}) \times 10^{-5}$.

NODE=M192R01;LINKAGE=MI

[4] With a product branching fraction limit of $B(\overline{B}^0 \rightarrow X(4250)^+ K^-) \times B(X(4250)^+ \rightarrow \chi_{c1} \pi^+) < 4.0 \times 10^{-5}$ 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=M074

$X(4260)$

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

Seen in radiative return from e^+e^- collisions at $\sqrt{s} = 9.54$–10.58 GeV by AUBERT,B 05I, HE 06B, and YUAN 07, and in e^+e^- collisions at $\sqrt{s} \approx 4.26$ GeV by COAN 06. Possibly seen by AUBERT 06 in $B^- \to K^-\pi^+\pi^- J/\psi$. See also the mini-review under the $X(3872)$. (See the index for the page number.)

NODE=M074

$X(4260)$ MASS

NODE=M074M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
4263^{+8}_{-9} OUR AVERAGE		Error includes scale factor of 1.1.			
$4247 \pm 12^{+17}_{-32}$		[1] 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	[2] AUBERT,B	05I	BABR	$10.58\ e^+e^- \to \gamma\pi^+\pi^- J/\psi$

NODE=M074M

[1] From a two-resonance fit.
[2] From a single-resonance fit. Two interfering resonances are not excluded.

NODE=M074M;LINKAGE=YU
NODE=M074M;LINKAGE=AU

$X(4260)$ WIDTH

NODE=M074W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
95 ± 14 OUR AVERAGE					
$108 \pm 19 \pm 10$		[3] 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	[4] AUBERT,B	05I	BABR	$10.58\ e^+e^- \to \gamma\pi^+\pi^- J/\psi$

NODE=M074W

[3] From a two-resonance fit.
[4] From a single-resonance fit. Two interfering resonances are not excluded.

NODE=M074W;LINKAGE=YU
NODE=M074W;LINKAGE=AU

$X(4260)$ DECAY MODES

NODE=M074215;NODE=M074

	Mode	Fraction (Γ_i/Γ)	
Γ_1	e^+e^-		DESIG=1
Γ_2	$J/\psi\pi^+\pi^-$	seen	DESIG=2;OUR EVAL;→ NOT CHECKED ←
Γ_3	$J/\psi\pi^0\pi^0$	seen	DESIG=4;OUR EVAL;→ NOT CHECKED ←
Γ_4	$J/\psi K^+K^-$	seen	DESIG=5;OUR EVAL;→ NOT CHECKED ←
Γ_5	$J/\psi\eta$	not seen	DESIG=6;OUR EVAL;→ NOT CHECKED ←
Γ_6	$J/\psi\pi^0$	not seen	DESIG=7;OUR EVAL;→ NOT CHECKED ←
Γ_7	$J/\psi\eta'$	not seen	DESIG=8;OUR EVAL;→ NOT CHECKED ←
Γ_8	$J/\psi\pi^+\pi^-\pi^0$	not seen	DESIG=9;OUR EVAL;→ NOT CHECKED ←
Γ_9	$J/\psi\eta\eta$	not seen	DESIG=10;OUR EVAL;→ NOT CHECKED ←
Γ_{10}	$\psi(2S)\pi^+\pi^-$	not seen	DESIG=11;OUR EVAL;→ NOT CHECKED ←
Γ_{11}	$\psi(2S)\eta$	not seen	DESIG=12;OUR EVAL;→ NOT CHECKED ←
Γ_{12}	$\chi_{c0}\omega$	not seen	DESIG=13;OUR EVAL;→ NOT CHECKED ←
Γ_{13}	$\chi_{c1}\gamma$	not seen	DESIG=14;OUR EVAL;→ NOT CHECKED ←
Γ_{14}	$\chi_{c2}\gamma$	not seen	DESIG=15;OUR EVAL;→ NOT CHECKED ←
Γ_{15}	$\chi_{c1}\pi^+\pi^-\pi^0$	not seen	DESIG=16;OUR EVAL;→ NOT CHECKED ←
Γ_{16}	$\chi_{c2}\pi^+\pi^-\pi^0$	not seen	DESIG=17;OUR EVAL;→ NOT CHECKED ←
Γ_{17}	$h_c(1P)\pi^+\pi^-$	not seen	DESIG=40;OUR EVAL;→ NOT CHECKED ←
Γ_{18}	$\phi\pi^+\pi^-$	not seen	DESIG=18;OUR EVAL;→ NOT CHECKED ←
Γ_{19}	$\phi f_0(980) \to \phi\pi^+\pi^-$	not seen	DESIG=22;OUR EVAL;→ NOT CHECKED ←
Γ_{20}	$D\overline{D}$	not seen	DESIG=19;OUR EVAL;→ NOT CHECKED ←
Γ_{21}	$D^0\overline{D}^0$	not seen	DESIG=31
Γ_{22}	D^+D^-	not seen	DESIG=32
Γ_{23}	$D^*\overline{D}$+c.c.	not seen	DESIG=23;OUR EVAL;→ NOT CHECKED ←
Γ_{24}	$D^*(2007)^0\overline{D}^0$+c.c.	not seen	DESIG=33

Γ_{25}	$D^*(2010)^+ D^-$ +c.c.	not seen	DESIG=34
Γ_{26}	$D^* \overline{D}{}^*$	not seen	DESIG=24;OUR EVAL; → NOT CHECKED ←
Γ_{27}	$D^*(2007)^0 \overline{D}{}^*(2007)^0$	not seen	DESIG=35
Γ_{28}	$D^*(2010)^+ D^*(2010)^-$	not seen	DESIG=36
Γ_{29}	$D \overline{D} \pi$ +c.c.		DESIG=37
Γ_{30}	$D^0 D^- \pi^+$ +c.c. (excl. $D^*(2007)^0 \overline{D}{}^{*0}$ +c.c., $D^*(2010)^+ D^-$ +c.c.)	not seen	DESIG=38
Γ_{31}	$D \overline{D}{}^* \pi$ +c.c. (excl. $D^* \overline{D}{}^*$)	not seen	DESIG=25
Γ_{32}	$D^0 D^{*-} \pi^+$ +c.c. (excl. $D^*(2010)^+ D^*(2010)^-$)	not seen	DESIG=39
Γ_{33}	$D^0 D^*(2010)^- \pi^+$ +c.c.	not seen	DESIG=30;OUR EVAL; → NOT CHECKED ←
Γ_{34}	$D^* \overline{D}{}^* \pi$	not seen	DESIG=26
Γ_{35}	$D_s^+ D_s^-$	not seen	DESIG=27
Γ_{36}	$D_s^{*+} D_s^-$ +c.c.	not seen	DESIG=28
Γ_{37}	$D_s^{*+} D_s^{*-}$	not seen	DESIG=29
Γ_{38}	$p \overline{p}$	not seen	DESIG=3;OUR EVAL;→ NOT CHECKED ←
Γ_{39}	$K_S^0 K^\pm \pi^\mp$	not seen	DESIG=20;OUR EVAL; → NOT CHECKED ←
Γ_{40}	$K^+ K^- \pi^0$	not seen	DESIG=21;OUR EVAL; → NOT CHECKED ←

$X(4260)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma(\text{total})$

NODE=M074230

$\Gamma(J/\psi \pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_2\Gamma_1/\Gamma$

NODE=M074G1
NODE=M074G1

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
$5.9^{+1.2}_{-0.9}$ OUR AVERAGE					
$6.0 \pm 1.2^{+4.7}_{-0.5}$		[5] YUAN	07	BELL	10.58 $e^+e^- \to \gamma \pi^+\pi^- J/\psi$
$8.9^{+3.9}_{-3.1} \pm 1.8$	8.1	HE	06B	CLEO	9.4–10.6 $e^+e^- \to \gamma \pi^+\pi^- J/\psi$
$5.5 \pm 1.0^{+0.8}_{-0.7}$	125	[6] AUBERT,B	05I	BABR	10.58 $e^+e^- \to \gamma \pi^+\pi^- J/\psi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$20.6 \pm 2.3^{+9.1}_{-1.7}$		[7] YUAN	07	BELL	10.58 $e^+e^- \to \gamma \pi^+\pi^- J/\psi$

OCCUR=2

[5] Solution I of two equivalent solutions in a fit using two interfering resonances. NODE=M074G1;LINKAGE=YU
[6] From a single-resonance fit. Two interfering resonances are not excluded. NODE=M074G1;LINKAGE=AU
[7] Solution II of two equivalent solutions in a fit using two interfering resonances. NODE=M074G1;LINKAGE=YA

$\Gamma(J/\psi K^+K^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_4\Gamma_1/\Gamma$

NODE=M074G3
NODE=M074G3

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.2	90	[8] YUAN	08	BELL	$e^+e^- \to \gamma K^+K^- J/\psi$

[8] From a fit of the broad $K^+K^- J/\psi$ enhancement including a coherent $X(4260)$ amplitude with mass and width from YUAN 07. NODE=M074G3;LINKAGE=YU

$\Gamma(\psi(2S)\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{10}\Gamma_1/\Gamma$

NODE=M074G7
NODE=M074G7

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<4.3	90	[9] LIU	08H	RVUE	10.58 $e^+e^- \to \psi(2S)\pi^+\pi^-\gamma$
$7.4^{+2.1}_{-1.7}$		[10] LIU	08H	RVUE	10.58 $e^+e^- \to \psi(2S)\pi^+\pi^-\gamma$

OCCUR=2

[9] For constructive interference with the $X(4360)$ in a combined fit of AUBERT 07S and WANG 07D data with three resonances. NODE=M074G7;LINKAGE=LI
[10] For destructive interference with the $X(4360)$ in a combined fit of AUBERT 07S and WANG 07D data with three resonances. NODE=M074G7;LINKAGE=LU

$\Gamma(\phi \pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{18}\Gamma_1/\Gamma$

NODE=M074G2
NODE=M074G2

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<0.4	90	AUBERT,BE	06D	BABR	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\gamma$

$\Gamma(\phi f_0(980) \to \phi\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{19}\Gamma_1/\Gamma$

NODE=M074G6
NODE=M074G6

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<0.29	90	[11] AUBERT	07AK	BABR	10.6 $e^+e^- \to \pi^+\pi^-K^+K^-\gamma$

[11] AUBERT 07AK reports $[\Gamma(X(4260) \to \phi f_0(980) \to \phi\pi^+\pi^-) \times \Gamma(X(4260) \to e^+e^-)/\Gamma_{total}] \times [B(\phi(1020) \to K^+K^-)] < 0.14$ eV which we divide by our best value $B(\phi(1020) \to K^+K^-) = 48.9 \times 10^{-2}$.

NODE=M074G6;LINKAGE=AU

$\Gamma(K^0_S K^\pm\pi^\mp) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{39}\Gamma_1/\Gamma$

NODE=M074G4
NODE=M074G4

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.5	90	AUBERT	08S	BABR	10.6 $e^+e^- \to K^0_S K^\pm\pi^\mp\gamma$

$\Gamma(K^+K^-\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{40}\Gamma_1/\Gamma$

NODE=M074G5
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 $e^+e^- \to K^+K^-\pi^0\gamma$

$X(4260)$ BRANCHING RATIOS

NODE=M074240

$\Gamma(h_c(1P)\pi^+\pi^-)/\Gamma(J/\psi\pi^+\pi^-)$ — Γ_{17}/Γ_2

NODE=M074R25
NODE=M074R25

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.0	90	[12] PEDLAR	11	CLEO	$e^+e^- \to h_c(1P)\pi^+\pi^-$

[12] At $\sqrt{s} = 4260$ MeV, PEDLAR 11 measures $\sigma(e^+e^- \to h_c(1P)\pi^+\pi^-) = 32 \pm 17 \pm 6 \pm 6$ 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_{20}/Γ_2

NODE=M074R2
NODE=M074R2

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.0	90	[13] 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^-

[13] Using 4259 ± 10 MeV for the mass and 88 ± 24 MeV for the width of $X(4260)$.

NODE=M074R2;LINKAGE=AU

$\Gamma(D^0\overline{D}^0)/\Gamma_{total}$ — Γ_{21}/Γ

NODE=M074R12
NODE=M074R12

VALUE	DOCUMENT ID		TECN	COMMENT
not seen [seen OUR 2011 BEST LIMIT]				
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_{22}/Γ

NODE=M074R13
NODE=M074R13

VALUE	DOCUMENT ID		TECN	COMMENT
not seen [seen OUR 2011 BEST LIMIT]				
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_{23}/Γ_2

NODE=M074R03
NODE=M074R03

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<34	90	AUBERT	09M	BABR	$e^+e^- \to \gamma D^*\overline{D}$
• • • 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_{24}/Γ

NODE=M074R14
NODE=M074R14

VALUE	DOCUMENT ID		TECN	COMMENT
not seen [seen OUR 2011 BEST LIMIT]				
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	$e^+e^- \to D^{*0}\overline{D}^0\gamma$

$\Gamma(D^*(2010)^+ D^- + c.c.)/\Gamma_{total}$ Γ_{25}/Γ

NODE=M074R15
NODE=M074R15

VALUE	DOCUMENT ID		TECN	COMMENT
not seen [seen OUR 2011 BEST LIMIT]				
not seen	CRONIN-HEN...	09	CLEO	$e^+e^- \to D^{*+}D^-$
not seen	PAKHLOVA	07	BELL	$e^+e^- \to D^{*+}D^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	AUBERT	09M	BABR	$e^+e^- \to D^{*+}D^-\gamma$

$\Gamma(D^*\overline{D}^*)/\Gamma(J/\psi\pi^+\pi^-)$ Γ_{26}/Γ_2

NODE=M074R04
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	$e^+e^- \to \gamma D^*\overline{D}^*$

$\Gamma(D^*(2007)^0\overline{D}^*(2007)^0)/\Gamma_{total}$ Γ_{27}/Γ

NODE=M074R17
NODE=M074R17

VALUE	DOCUMENT ID		TECN	COMMENT
not seen [seen OUR 2011 BEST LIMIT]				
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	$e^+e^- \to D^{*0}\overline{D}^{*0}\gamma$

$\Gamma(D^*(2010)^+ D^*(2010)^-)/\Gamma_{total}$ Γ_{28}/Γ

NODE=M074R18
NODE=M074R18

VALUE	DOCUMENT ID		TECN	COMMENT
not seen [seen OUR 2011 BEST LIMIT]				
not seen	CRONIN-HEN...	09	CLEO	$e^+e^- \to D^{*+}D^{*-}$
not seen	PAKHLOVA	07	BELL	$e^+e^- \to D^{*+}D^{*-}\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	AUBERT	09M	BABR	$e^+e^- \to D^{*+}D^{*-}\gamma$

$\Gamma(D^0 D^-\pi^+ + c.c.\ (excl.\ D^*(2007)^0\overline{D}^{*0} + c.c.,\ D^*(2010)^+ D^- + c.c.))/\Gamma_{total}$ Γ_{30}/Γ

NODE=M074R16
NODE=M074R16

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	PAKHLOVA	08A	BELL	10.6 $e^+e^- \to D^0 D^-\pi^+\gamma$

$\Gamma(D\overline{D}^*\pi + c.c.\ (excl.\ D^*\overline{D}^*))/\Gamma_{total}$ Γ_{31}/Γ

NODE=M074R22
NODE=M074R22

VALUE	DOCUMENT ID		TECN	COMMENT
not seen [seen OUR 2011 BEST LIMIT]				
not seen	CRONIN-HEN...	09	CLEO	$e^+e^- \to D^*\overline{D}\pi$

$\Gamma(D\overline{D}^*\pi + c.c.\ (excl.\ D^*\overline{D}^*))/\Gamma(J/\psi\pi^+\pi^-)$ Γ_{31}/Γ_2

NODE=M074R05
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_{32}/Γ

NODE=M074R23
NODE=M074R23

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	PAKHLOVA	09	BELL	$e^+e^- \to D^0 D^{*-}\pi^+\gamma$

$\Gamma(D^0 D^*(2010)^-\pi^+ + c.c.)/\Gamma(J/\psi\pi^+\pi^-)$ Γ_{33}/Γ_2

NODE=M074R10
NODE=M074R10

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<9	90	PAKHLOVA	09	BELL	$e^+e^- \to D^0 D^{*-}\pi^+$

$\Gamma(D^0 D^*(2010)^-\pi^+ + c.c.)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{33}/\Gamma \times \Gamma_1/\Gamma$

NODE=M074R11
NODE=M074R11

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<0.42 \times 10^{-6}$	90	[14] PAKHLOVA	09	BELL	$e^+e^- \to D^0 D^{*-}\pi^+$

[14] Using 4263^{+8}_{-9} MeV for the mass of $X(4260)$.

NODE=M074R11;LINKAGE=PA

$\Gamma(D^*\overline{D}^*\pi)/\Gamma_{total}$ Γ_{34}/Γ

NODE=M074R24
NODE=M074R24

VALUE	DOCUMENT ID		TECN	COMMENT
not seen [seen OUR 2011 BEST LIMIT]				
not seen	CRONIN-HEN...	09	CLEO	$e^+e^- \to D^*\overline{D}^*\pi$

$\Gamma(D^*\overline{D}^*\pi)/\Gamma(J/\psi\pi^+\pi^-)$ Γ_{34}/Γ_2

NODE=M074R06
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_{35}/Γ

NODE=M074R19
NODE=M074R19

VALUE	DOCUMENT ID		TECN	COMMENT
not seen [seen OUR 2011 BEST LIMIT]				
not seen	DEL-AMO-SA...	10N	BABR	$e^+ e^- \to D_s^+ D_s^- \gamma$
not seen	CRONIN-HEN...	09	CLEO	$e^+ e^- \to D_s^+ D_s^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	PAKHLOVA	11	BELL	$e^+ e^- \to D_s^+ D_s^- \gamma$

$\Gamma(D_s^+ D_s^-)/\Gamma(J/\psi \pi^+ \pi^-)$ — Γ_{35}/Γ_2

NODE=M074R07
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_{36}/Γ

NODE=M074R20
NODE=M074R20

VALUE	DOCUMENT ID		TECN	COMMENT
not seen [seen OUR 2011 BEST LIMIT]				
not seen	DEL-AMO-SA...	10N	BABR	$e^+ e^- \to D_s^{*+} D_s^- \gamma$
not seen	CRONIN-HEN...	09	CLEO	$e^+ e^- \to D_s^{*+} D_s^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	PAKHLOVA	11	BELL	$e^+ e^- \to D_s^{*+} D_s^- \gamma$

$\Gamma(D_s^{*+} D_s^- + \text{c.c.})/\Gamma(J/\psi \pi^+ \pi^-)$ — Γ_{36}/Γ_2

NODE=M074R08
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_{37}/Γ

NODE=M074R21
NODE=M074R21

VALUE	DOCUMENT ID		TECN	COMMENT
not seen [seen OUR 2011 BEST LIMIT]				
not seen	CRONIN-HEN...	09	CLEO	$e^+ e^- \to D_s^{*+} D_s^{*-}$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	PAKHLOVA	11	BELL	$e^+ e^- \to D_s^{*+} D_s^{*-} \gamma$
not seen	DEL-AMO-SA...	10N	BABR	$e^+ e^- \to D_s^{*+} D_s^{*-} \gamma$

$\Gamma(D_s^{*+} D_s^{*-})/\Gamma(J/\psi \pi^+ \pi^-)$ — Γ_{37}/Γ_2

NODE=M074R09
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 $e^+ e^-$

$\Gamma(p\bar{p})/\Gamma(J/\psi \pi^+ \pi^-)$ — Γ_{38}/Γ_2

NODE=M074R1
NODE=M074R1

VALUE	CL%	DOCUMENT ID		COMMENT
<0.13	90	[15] AUBERT	06B	$e^+ e^- \to p\bar{p}\gamma$

[15] Using 4259 ± 10 MeV for the mass and 88 ± 24 MeV for the width of $X(4260)$.

NODE=M074R1;LINKAGE=AU

X(4260) REFERENCES

NODE=M074

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 091101R	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 011103R	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 011105R	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 111105R	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	06	PR D73 011101R	B. Aubert *et al.*	(BABAR Collab.)	REFID=51017
AUBERT	06B	PR D73 012005	B. Aubert *et al.*	(BABAR Collab.)	REFID=51026
AUBERT,BE	06D	PR D74 091103R	B. Aubert *et al.*	(BABAR Collab.)	REFID=51511
COAN	06	PRL 96 162003	T.E. Coan *et al.*	(CLEO Collab.)	REFID=51075
HE	06B	PR D74 091104R	Q. He *et al.*	(CLEO Collab.)	REFID=51523
AUBERT,B	05I	PRL 95 142001	B. Aubert *et al.*	(BABAR Collab.)	REFID=50776

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

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$4350.6^{+4.6}_{-5.1}\pm0.7$	$8.8^{+4.2}_{-3.2}$	[1] SHEN	10	BELL	$10.6\ e^+e^- \to e^+e^- J/\psi\phi$

NODE=M194M

[1] Statistical significance of 3.2 σ.

NODE=M194M;LINKAGE=SH

X(4350) WIDTH

NODE=M194W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$13^{+18}_{-9}\pm4$	$8.8^{+4.2}_{-3.2}$	[2] SHEN	10	BELL	$10.6\ e^+e^- \to e^+e^- J/\psi\phi$

NODE=M194W

[2] 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) $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma$(total)

NODE=M194220

$\Gamma(\gamma\gamma) \times \Gamma(J/\psi\phi)/\Gamma_{total}$ — $\Gamma_2\Gamma_1/\Gamma$

NODE=M194G01
NODE=M194G01

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
$6.7^{+3.2}_{-2.4}\pm1.1$	$8.8^{+4.2}_{-3.2}$	[3] 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. • • •					
$1.5^{+0.7}_{-0.6}\pm0.3$	$8.8^{+4.2}_{-3.2}$	[4] SHEN	10	BELL	$10.6\ e^+e^- \to e^+e^- J/\psi\phi$

OCCUR=2

[3] For $J^P = 0^+$. Statistical significance of 3.2 σ.
[4] For $J^P = 2^+$. Statistical significance of 3.2 σ.

NODE=M194G01;LINKAGE=S0
NODE=M194G01;LINKAGE=S2

X(4350) BRANCHING RATIOS

NODE=M194225

$\Gamma(J/\psi\phi)/\Gamma_{total}$ — Γ_1/Γ

NODE=M194R01
NODE=M194R01

VALUE	DOCUMENT ID		TECN	COMMENT
seen	[5] SHEN	10	BELL	$10.6\ e^+e^- \to e^+e^- J/\psi\phi$

[5] Statistical significance of 3.2 σ.

NODE=M194R01;LINKAGE=SH

$\Gamma(\gamma\gamma)/\Gamma_{total}$ — Γ_2/Γ

NODE=M194R02
NODE=M194R02

VALUE	DOCUMENT ID		TECN	COMMENT
seen	[6] SHEN	10	BELL	$10.6\ e^+e^- \to e^+e^- J/\psi\phi$

[6] 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

$X(4360)$ $\quad I^G(J^{PC}) = ?^?(1^{--})$

OMITTED FROM SUMMARY TABLE

Seen in radiative return from e^+e^- collisions at $\sqrt{s} = 9.54$–10.58 GeV by AUBERT 07S and WANG 07D. See also the review under the $X(3872)$ particle listings. (See the index for the page number.) NODE=M181

$X(4360)$ MASS

NODE=M181M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
4361± 9±9	[1] WANG	07D	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$4355^{+9}_{-10}\pm9$	[2] LIU	08H	RVUE	10.58 $e^+e^- \to \psi(2S)\pi^+\pi^-\gamma$
4324 ± 24	[3] AUBERT	07S	BABR	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$

NODE=M181M

[1] From a two-resonance fit. NODE=M181M;LINKAGE=WA
[2] From a combined fit of AUBERT 07S and WANG 07D data with two resonances. NODE=M181M;LINKAGE=LI
[3] From a single-resonance fit. Systematic errors not estimated. NODE=M181M;LINKAGE=AU

$X(4360)$ WIDTH

NODE=M181W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
74±15±10	[4] WANG	07D	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$103^{+17}_{-15}\pm11$	[5] LIU	08H	RVUE	10.58 $e^+e^- \to \psi(2S)\pi^+\pi^-\gamma$
172 ± 33	[6] AUBERT	07S	BABR	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$

NODE=M181W

[4] From a two-resonance fit. NODE=M181W;LINKAGE=WA
[5] From a combined fit of AUBERT 07S and WANG 07D data with two resonances. NODE=M181W;LINKAGE=LI
[6] From a single-resonance fit. Systematic errors not estimated. NODE=M181W;LINKAGE=AU

$X(4360)$ DECAY MODES

NODE=M181215;NODE=M181

	Mode	Fraction (Γ_i/Γ)	
Γ_1	e^+e^-		DESIG=1
Γ_2	$\psi(2S)\pi^+\pi^-$	seen	DESIG=2;OUR EVAL;→ NOT CHECKED ←
Γ_3	$D^0D^{*-}\pi^+$		DESIG=3

$X(4360)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma(\text{total})$

NODE=M181230

$\Gamma(\psi(2S)\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\quad\Gamma_2\Gamma_1/\Gamma$

NODE=M181G1
NODE=M181G1

VALUE (eV)	DOCUMENT ID		TECN	COMMENT	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$11.1^{+1.3}_{-1.2}$	[7] LIU	08H	RVUE	10.58 $e^+e^- \to \psi(2S)\pi^+\pi^-\gamma$	
12.3 ± 1.2	[8] LIU	08H	RVUE	10.58 $e^+e^- \to \psi(2S)\pi^+\pi^-\gamma$	OCCUR=2
$10.4\pm1.7\pm1.5$	[9] WANG	07D	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$	
$11.8\pm1.8\pm1.4$	[10] WANG	07D	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$	OCCUR=2

[7] Solution I in a combined fit of AUBERT 07S and WANG 07D data with two resonances. NODE=M181G1;LINKAGE=LI
[8] Solution II in a combined fit of AUBERT 07S and WANG 07D data with two resonances. NODE=M181G1;LINKAGE=LU
[9] Solution I of two equivalent solutions in a fit using two interfering resonances. NODE=M181G1;LINKAGE=WA
[10] Solution II of two equivalent solutions in a fit using two interfering resonances. NODE=M181G1;LINKAGE=WN

$X(4360)$ BRANCHING RATIOS

NODE=M181225

$\Gamma(D^0D^{*-}\pi^+)/\Gamma(\psi(2S)\pi^+\pi^-)$ $\quad\Gamma_3/\Gamma_2$

NODE=M181R01
NODE=M181R01

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<8	90	PAKHLOVA	09	BELL	$e^+e^- \to X(4360) \to D^0D^{*-}\pi^+$

$\Gamma(D^0 D^{*-} \pi^+)/\Gamma_{total} \times \Gamma(e^+ e^-)/\Gamma_{total}$ $\Gamma_3/\Gamma \times \Gamma_1/\Gamma$

NODE=M181R02

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.72 × 10^{-6}	90	[11] PAKHLOVA	09	BELL	$e^+ e^- \to X(4360) \to D^0 D^{*-} \pi^+$

[11] Using $4355^{+9}_{-10} \pm 9$ MeV for the mass of $X(4360)$.

NODE=M181R02;LINKAGE=PA

X(4360) REFERENCES

NODE=M181

PAKHLOVA	09	PR D80 091101R	G. Pakhlova *et al.*	(BELLE Collab.)
LIU	08H	PR D78 014032	Z.Q. Liu, X.S. Qin, C.Z. Yuan	
AUBERT	07S	PRL 98 212001	B. Aubert *et al.*	(BABAR Collab.)
WANG	07D	PRL 99 142002	X.L. Wang *et al.*	(BELLE Collab.)

REFID=53143
REFID=52296
REFID=51724
REFID=51959

NODE=M073

$\psi(4415)$

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

$\psi(4415)$ 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
→ NOT CHECKED ←
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

$\psi(4415)$ 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
→ NOT CHECKED ←
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

$\psi(4415)$ 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	$D\overline{D}$	not seen		DESIG=7;OUR EVAL;→ NOT CHECKED ←
Γ_2	$D^0\overline{D}^0$	seen		DESIG=8
Γ_3	D^+D^-	seen		DESIG=9
Γ_4	$D^*\overline{D}$+ c.c.	not seen		DESIG=10;OUR EVAL; → NOT CHECKED ←
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	$D^*\overline{D}^*$	not seen		DESIG=13;OUR EVAL; → NOT CHECKED ←
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}	$D^0D^-\pi^+$ (excl. $D^*(2007)^0\overline{D}^0$ +c.c., $D^*(2010)^+D^-$ +c.c.	$<$ 2.3 %	90%	DESIG=4
Γ_{11}	$D\overline{D}_2^*(2460) \rightarrow D^0D^-\pi^+$+c.c.	(10 ±4) %		DESIG=5
Γ_{12}	$D^0D^{*-}\pi^+$+c.c.	$<$ 11 %	90%	DESIG=6
Γ_{13}	$D_s^+D_s^-$	not seen		DESIG=16
Γ_{14}	$D_s^{*+}D_s^-$ +c.c.	seen		DESIG=17
Γ_{15}	$D_s^{*+}D_s^{*-}$	not seen		DESIG=18
Γ_{16}	e^+e^-	(9.4±3.2) $\times 10^{-6}$		DESIG=1

$\psi(4415)$ PARTIAL WIDTHS

NODE=M073220

$\Gamma(e^+e^-)$ Γ_{16}

NODE=M073W1
NODE=M073W1

VALUE (keV)	DOCUMENT ID		TECN	COMMENT	
0.58±0.07 OUR ESTIMATE					→ NOT CHECKED ←
0.35±0.12	[11] ABLIKIM	08D	BES2	$e^+e^- \rightarrow$ hadrons	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.4 to 0.8	[12] MO	10	RVUE	$e^+e^- \rightarrow$ hadrons	
0.72±0.11	[13] SETH	05A	RVUE	$e^+e^- \rightarrow$ hadrons	
0.64±0.23	[14] SETH	05A	RVUE	$e^+e^- \rightarrow$ hadrons	OCCUR=2
0.49±0.13	BRANDELIK	78C	DASP	e^+e^-	
0.44±0.14	SIEGRIST	76	MRK1	e^+e^-	

[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

$\psi(4415)$ BRANCHING RATIOS

NODE=M073225

$\Gamma(D^0\overline{D}^0)/\Gamma_{total}$ Γ_2/Γ

NODE=M073R04
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
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	$e^+e^- \to \gamma D^{(*)}\overline{D}^{(*)}$

$\Gamma(D^*(2007)^0\overline{D}^0 + \text{c.c.})/\Gamma_{\text{total}}$ Γ_5/Γ

NODE=M073R06

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AUBERT	09M	BABR	$e^+e^- \to D^{*0}\overline{D}^0\gamma$

$\Gamma(D^*(2010)^+D^- + \text{c.c.})/\Gamma_{\text{total}}$ Γ_6/Γ

NODE=M073R07

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AUBERT	09M	BABR	$e^+e^- \to D^{*+}D^-\gamma$
seen	PAKHLOVA	07	BELL	$e^+e^- \to D^{*+}D^-\gamma$

$\Gamma(D^*\overline{D} + \text{c.c.})/\Gamma(D^*\overline{D}^*)$ Γ_4/Γ_7

NODE=M073R03

VALUE	DOCUMENT ID		TECN	COMMENT
0.17±0.25±0.03	AUBERT	09M	BABR	$e^+e^- \to \gamma D^{(*)}\overline{D}^{(*)}$

$\Gamma(D^*(2007)^0\overline{D}^*(2007)^0 + \text{c.c.})/\Gamma_{\text{total}}$ Γ_8/Γ

NODE=M073R08

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AUBERT	09M	BABR	$e^+e^- \to D^{*0}\overline{D}^{*0}\gamma$

$\Gamma(D^*(2010)^+D^*(2010)^- + \text{c.c.})/\Gamma_{\text{total}}$ Γ_9/Γ

NODE=M073R09

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AUBERT	09M	BABR	$e^+e^- \to D^{*+}D^{*-}\gamma$
seen	PAKHLOVA	07	BELL	$e^+e^- \to D^{*+}D^{*-}\gamma$

$\Gamma(D\overline{D}_2^*(2460) \to D^0D^-\pi^+ + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{11}/Γ

NODE=M073R3

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
10.5±2.4±3.8	[15] PAKHLOVA	08A	BELL	10.6 $e^+e^- \to D^0D^-\pi^+\gamma$

[15] Using 4421 ± 4 MeV for the mass and 62 ± 20 MeV for the width of $\psi(4415)$.

NODE=M073R3;LINKAGE=PA

$\Gamma(D^0D^-\pi^+(\text{excl. } D^*(2007)^0\overline{D}^0 + \text{c.c.}, D^*(2010)^+D^- + \text{c.c.})/\Gamma(D\overline{D}_2^*(2460) \to D^0D^-\pi^+ + \text{c.c.})$ Γ_{10}/Γ_{11}

NODE=M073R4

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.22	90	[16] PAKHLOVA	08A	BELL	10.6 $e^+e^- \to D^0D^-\pi^+\gamma$

[16] Using 4421 ± 4 MeV for the mass and 62 ± 20 MeV for the width of $\psi(4415)$.

NODE=M073R4;LINKAGE=PA

$\Gamma(D^0D^{*-}\pi^+ + \text{c.c.})/\Gamma_{\text{total}} \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{12}/\Gamma \times \Gamma_{16}/\Gamma$

NODE=M073R01

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.99 × 10^{-6}	90	[17] PAKHLOVA	09	BELL	$e^+e^- \to D^0D^{*-}\pi^+$

[17] Using 4421 ± 4 MeV for the mass of $\psi(4415)$.

NODE=M073R01;LINKAGE=PA

$\Gamma(D_s^+D_s^-)/\Gamma_{\text{total}}$ Γ_{13}/Γ

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	$e^+e^- \to D_s^+D_s^-\gamma$

$\Gamma(D_s^{*+}D_s^- + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{14}/Γ

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	$e^+e^- \to D_s^{*+}D_s^-\gamma$

$\Gamma(D_s^{*+}D_s^{*-})/\Gamma_{\text{total}}$ Γ_{15}/Γ

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	$e^+e^- \to D_s^{*+}D_s^{*-}\gamma$

ψ(4415) REFERENCES

NODE=M073

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 091101R	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 011103R	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

$X(4430)^{\pm}$

$I(J^P) = ?(?^?)$

OMITTED FROM SUMMARY TABLE

Seen by CHOI 08 in $B \to K\pi^+\psi(2S)$ decays and confirmed by reanalysis of the same data sample in MIZUK 09. Not seen by AUBERT 09AA.

NODE=M195

$X(4430)^{\pm}$ MASS

NODE=M195M

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
$\mathbf{4443^{+15+19}_{-12-13}}$	[1] MIZUK	09	BELL	$B \to K\pi^+\psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$4433\pm 4\pm 2$	[2] CHOI	08	BELL	$B \to K\pi^+\psi(2S)$

NODE=M195M

[1] From a Dalitz plot analysis. NODE=M195M;LINKAGE=MI

[2] Superseded by MIZUK 09. NODE=M195M;LINKAGE=CH

$X(4430)^{\pm}$ WIDTH

NODE=M195W

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
$\mathbf{107^{+86+74}_{-43-56}}$	[3] MIZUK	09	BELL	$B \to K\pi^+\psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
45^{+18+30}_{-13-13}	[4] CHOI	08	BELL	$B \to K\pi^+\psi(2S)$

NODE=M195W

[3] From a Dalitz plot analysis. NODE=M195W;LINKAGE=MI

[4] Superseded by MIZUK 09. NODE=M195W;LINKAGE=CH

$X(4430)^{\pm}$ DECAY MODES

NODE=M195215;NODE=M195

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\pi^+\psi(2S)$	seen	DESIG=1
Γ_2	$\pi^+ J/\psi$	not seen	DESIG=2

$X(4430)^{\pm}$ BRANCHING RATIOS

NODE=M195225

$\Gamma(\pi^+\psi(2S))/\Gamma_{total}$ **Γ_1/Γ**

NODE=M195R01
NODE=M195R01

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
seen	[5] MIZUK	09	BELL	$B \to K\pi^+\psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	[6] AUBERT	09AA	BABR	$B \to K\pi^+\psi(2S)$

[5] Measured a product of branching fractions $B(\overline{B}^0 \to K^- X(4430)^+) \times B(X(4430)^+ \to \pi^+\psi(2S)) = (3.2^{+1.8+5.3}_{-0.9-1.6}) \times 10^{-5}$. NODE=M195R01;LINKAGE=MI

[6] AUBERT 09AA quotes $B(B^+ \to \overline{K}^0 X(4430)^+) \times B(X(4430)^+ \to \pi^+\psi(2S)) < 4.7\times10^{-5}$ and $B(\overline{B}^0 \to K^- X(4430)^+) \times B(X(4430)^+ \to \pi^+\psi(2S)) < 3.1\times10^{-5}$ at 95% CL. NODE=M195R01;LINKAGE=AU

$\Gamma(\pi^+ J/\psi)/\Gamma_{total}$ Γ_2/Γ

NODE=M195R02

VALUE	DOCUMENT ID	TECN	COMMENT
not seen	[7] AUBERT 09AA	BABR	$B \rightarrow K\pi^+ J/\psi$

[7] AUBERT 09AA quotes $B(B^+ \rightarrow \overline{K}^0 X(4430)^+) \times B(X(4430)^+ \rightarrow \pi^+ J/\psi) < 1.5 \times 10^{-5}$ and $B(\overline{B}^0 \rightarrow K^- X(4430)^+) \times B(X(4430)^+ \rightarrow \pi^+ J/\psi) < 0.4 \times 10^{-5}$ at 95% CL.

NODE=M195R02;LINKAGE=AU

$X(4430)^\pm$ REFERENCES

NODE=M195

AUBERT	09AA	PR D79 112001	B. Aubert *et al.*	(BABAR Collab.)
MIZUK	09	PR D80 031104R	R. Mizuk *et al.*	(BELLE Collab.)
CHOI	08	PRL 100 142001	S.-K. Choi *et al.*	(BELLE Collab.)

REFID=52940
REFID=52960
REFID=52178

NODE=M189

X(4660)

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

OMITTED FROM SUMMARY TABLE

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 and AUBERT 07S. See also the review under the $X(3872)$ particle listings. (See the index for the page number.)

NODE=M189

$X(4660)$ MASS

NODE=M189M

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
4664±11±5	WANG 07D	BELL	$10.58\ e^+e^- \rightarrow \psi(2S)\pi^+\pi^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$4661^{+9}_{-8}\pm6$	[1] LIU 08H	RVUE	$10.58\ e^+e^- \rightarrow \psi(2S)\pi^+\pi^-\gamma$

[1] From a combined fit of AUBERT 07S and WANG 07D data with two resonances.

NODE=M189M;LINKAGE=LI

$X(4660)$ WIDTH

NODE=M189W

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
48±15±3	WANG 07D	BELL	$10.58\ e^+e^- \rightarrow \psi(2S)\pi^+\pi^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$42^{+17}_{-12}\pm6$	[2] LIU 08H	RVUE	$10.58\ e^+e^- \rightarrow \psi(2S)\pi^+\pi^-\gamma$

[2] From a combined fit of AUBERT 07S and WANG 07D data with two resonances.

NODE=M189W;LINKAGE=LI

$X(4660)$ DECAY MODES

NODE=M189215;NODE=M189

	Mode	Fraction (Γ_i/Γ)
Γ_1	e^+e^-	
Γ_2	$\psi(2S)\pi^+\pi^-$	seen
Γ_3	$D^0 D^{*-}\pi^+$	

DESIG=1
DESIG=2;OUR EVAL;→ NOT CHECKED ←
DESIG=3

$X(4660)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma(total)$

NODE=M189230

$\Gamma(\psi(2S)\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_2\Gamma_1/\Gamma$

NODE=M189G1

VALUE (eV)	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$2.2^{+0.7}_{-0.6}$	[3] LIU 08H	RVUE	$10.58\ e^+e^- \rightarrow \psi(2S)\pi^+\pi^-\gamma$
5.9±1.6	[4] LIU 08H	RVUE	$10.58\ e^+e^- \rightarrow \psi(2S)\pi^+\pi^-\gamma$
3.0±0.9±0.3	[5] WANG 07D	BELL	$10.58\ e^+e^- \rightarrow \psi(2S)\pi^+\pi^-\gamma$
7.6±1.8±0.8	[6] WANG 07D	BELL	$10.58\ e^+e^- \rightarrow \psi(2S)\pi^+\pi^-\gamma$

OCCUR=2
OCCUR=2

[3] Solution I in a combined fit of AUBERT 07S and WANG 07D data with two resonances.
[4] Solution II in a combined fit of AUBERT 07S and WANG 07D data with two resonances.
[5] Solution I of two equivalent solutions in a fit using two interfering resonances.
[6] Solution II of two equivalent solutions in a fit using two interfering resonances.

NODE=M189G1;LINKAGE=LI
NODE=M189G1;LINKAGE=LU
NODE=M189G1;LINKAGE=WA
NODE=M189G1;LINKAGE=WN

$X(4660)$ BRANCHING RATIOS

NODE=M189225

$\Gamma(D^0 D^{*-} \pi^+)/\Gamma(\psi(2S)\pi^+\pi^-)$ Γ_3/Γ_2

NODE=M189R01
NODE=M189R01

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<10	90	PAKHLOVA	09	BELL	$e^+ e^- \rightarrow X(4660) \rightarrow D^0 D^{*-} \pi^+$

$\Gamma(D^0 D^{*-} \pi^+)/\Gamma_{total} \times \Gamma(e^+ e^-)/\Gamma_{total}$ $\Gamma_3/\Gamma \times \Gamma_1/\Gamma$

NODE=M189R02
NODE=M189R02

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<0.37 \times 10^{-6}$	90	[7] PAKHLOVA	09	BELL	$e^+ e^- \rightarrow X(4660) \rightarrow D^0 D^{*-} \pi^+$

[7] Using 4664 ± 11 ± 5 MeV for the mass of $X(4660)$.

NODE=M189R02;LINKAGE=PA

$X(4660)$ REFERENCES

NODE=M189

PAKHLOVA	09	PR D80 091101R	G. Pakhlova *et al.*	(BELLE Collab.)
LIU	08H	PR D78 014032	Z.Q. Liu, X.S. Qin, C.Z. Yuan	
AUBERT	07S	PRL 98 212001	B. Aubert *et al.*	(BABAR Collab.)
WANG	07D	PRL 99 142002	X.L. Wang *et al.*	(BELLE Collab.)

REFID=53143
REFID=52296
REFID=51724
REFID=51959

$b\overline{b}$ MESONS

NODE=MXXX030

A REVIEW GOES HERE – Check our WWW List of Reviews

NODE=M849

A REVIEW GOES HERE – Check our WWW List of Reviews

NODE=M849

NODE=M171

$\eta_b(1S)$

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

OMITTED FROM SUMMARY TABLE

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
NEW

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
9391.0± 2.8 OUR AVERAGE					
[9390.9 ± 2.8 MeV OUR 2011 AVERAGE]					
9391.8± 6.6± 2.0	2.3 ± 0.5k	[1] BONVICINI	10	CLEO	$\Upsilon(3S) \rightarrow \gamma X$
$9394.2^{+4.8}_{-4.9}\pm 2.0$	13 ± 5k	[1] AUBERT	09AQ	BABR	$\Upsilon(2S) \rightarrow \gamma X$
$9388.9^{+3.1}_{-2.3}\pm 2.7$	19 ± 3k	[1] AUBERT	08V	BABR	$\Upsilon(3S) \rightarrow \gamma X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
9300 ±20 ±20		HEISTER	02D	ALEP	181–209 $e^+ e^-$

[1] Assuming $\Gamma_{\eta_b(1S)}$ = 10 MeV. Not independent of the corresponding γ energy or mass difference measurements.

NODE=M171M;LINKAGE=AU

$m_{\Upsilon(1S)} - m_{\eta_b}$

NODE=M171M2

NODE=M171M2

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
69.3±2.8 OUR AVERAGE					
68.5±6.6±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	$\Upsilon(3S) \rightarrow \gamma X$

[2] Assuming $\Gamma_{\eta_b(1S)}$ = 10 MeV. Not independent of the corresponding γ energy or mass measurements. NODE=M171M2;LINKAGE=AU

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	[3] BONVICINI	10	CLEO	$\Upsilon(3S)\to\gamma X$
$921.2^{+2.1}_{-2.8}\pm2.4$	19 ± 3k	[3] AUBERT	08V	BABR	$\Upsilon(3S)\to\gamma X$

[3] 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	[4] AUBERT	09AQ	BABR	$\Upsilon(2S)\to\gamma X$

[4] Assuming $\Gamma_{\eta_b(1S)}$ = 10 MeV. Not independent of the corresponding mass or mass difference measurements. NODE=M171U2S;LINKAGE=AU

$\eta_b(1S)$ DECAY MODES

NODE=M171225;NODE=M171

	Mode	Fraction (Γ_i/Γ)	Confidence level	
Γ_1	$3h^+3h^-$	not seen		DESIG=1;OUR EST;→ NOT CHECKED ←
Γ_2	$2h^+2h^-$	not seen		DESIG=2;OUR EST;→ NOT CHECKED ←
Γ_3	$4h^+4h^-$			DESIG=4
Γ_4	$\gamma\gamma$	not seen		DESIG=3;OUR EST;→ NOT CHECKED ←
Γ_5	$\mu^+\mu^-$	$<9\times10^{-3}$	90%	DESIG=5
Γ_6	$\tau^+\tau^-$	<8 %	90%	DESIG=6

$\eta_b(1S)$ Γ(i)$\Gamma(\gamma\gamma)/\Gamma$(total)

NODE=M171230

$\Gamma(3h^+3h^-)\times\Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_1\Gamma_4/\Gamma$

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^-

$\Gamma(2h^+2h^-)\times\Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_2\Gamma_4/\Gamma$

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^-

$\Gamma(4h^+4h^-)\times\Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_3\Gamma_4/\Gamma$

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

$\Gamma(\mu^+\mu^-)/\Gamma_{total}$ Γ_5/Γ

NODE=M171R01

NODE=M171R01

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<9\times10^{-3}$	90	[5] AUBERT	09Z	BABR	$e^+e^-\to\Upsilon(2S,3S)\to\gamma\eta_b$

[5] Obtained using B($\Upsilon(2S)\to\gamma\eta_b$) = $(4.2^{+1.1}_{-1.0}\pm0.9)\times10^{-4}$ and B($\Upsilon(3S)\to\gamma\eta_b$) = $(4.8\pm0.5\pm0.6)\times10^{-4}$. This limit is equivalent to B($\eta_b\to\mu^+\mu^-$) = $(-0.25\pm0.51\pm0.33)$% measurement. NODE=M171R01;LINKAGE=AU

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

NODE=M171R02

NODE=M171R02

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<8\times10^{-2}$	90	AUBERT	09P	BABR	$e^+e^-\to\gamma\tau^+\tau^-$

$\eta_b(1S)$ REFERENCES

NODE=M171

BONVICINI	10	PR D81 031104R	G. Bonvicini *et al.*	(CLEO Collab.)	REFID=53231
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
AUBERT	08V	PRL 101 071801	B. Aubert *et al.*	(BABAR Collab.)	REFID=52262
ABDALLAH	06	PL B634 340	J.M. Abdallah *et al.*	(DELPHI Collab.)	REFID=51042
HEISTER	02D	PL B530 56	A. Heister *et al.*	(ALEPH Collab.)	REFID=48577

NODE=M049

$\Upsilon(1S)$

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

$\Upsilon(1S)$ MASS

NODE=M049M

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	$e^+e^- \to$ hadrons
9459.97±0.11±0.07		MACKAY	84	REDE	$e^+e^- \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
9460.60±0.09±0.05	[2,3]	BARU	92B	REDE	$e^+e^- \to$ hadrons
9460.59±0.12		BARU	86	REDE	$e^+e^- \to$ hadrons
9460.6 ±0.4	[3,4]	ARTAMONOV	84	REDE	$e^+e^- \to$ 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

NODE=M049W

VALUE (keV)	*DOCUMENT ID*
54.02±1.25 OUR EVALUATION	See the Note on "Width Determinations of the Υ States"

→ NOT CHECKED ←

$\Upsilon(1S)$ DECAY MODES

NODE=M049215;NODE=M049

	Mode	Fraction (Γ_i/Γ)	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	(6.5 ±0.7) $\times 10^{-4}$		DESIG=12
Γ_8	χ_{c0} anything	< 5 $\times 10^{-3}$	90%	DESIG=5
Γ_9	χ_{c1} anything	(2.3 ±0.7) $\times 10^{-4}$		DESIG=6
Γ_{10}	χ_{c2} anything	(3.4 ±1.0) $\times 10^{-4}$		DESIG=7
Γ_{11}	$\psi(2S)$ anything	(2.7 ±0.9) $\times 10^{-4}$		DESIG=8
Γ_{12}	$\rho\pi$	< 2 $\times 10^{-4}$	90%	DESIG=11
Γ_{13}	$\pi^+\pi^-$	< 5 $\times 10^{-4}$	90%	DESIG=23
Γ_{14}	K^+K^-	< 5 $\times 10^{-4}$	90%	DESIG=24
Γ_{15}	$p\overline{p}$	< 5 $\times 10^{-4}$	90%	DESIG=25
Γ_{16}	$\pi^0\pi^+\pi^-$	< 1.84 $\times 10^{-5}$	90%	DESIG=72
Γ_{17}	$D^*(2010)^\pm$ anything	(2.52±0.20) %		DESIG=30
Γ_{18}	$\overline{d}$ anything	(2.86±0.28) $\times 10^{-5}$		DESIG=107

Radiative decays

NODE=M049;CLUMP=B

Γ_{19}	$\gamma\pi^+\pi^-$		$(6.3 \pm 1.8) \times 10^{-5}$		DESIG=70
Γ_{20}	$\gamma\pi^0\pi^0$		$(1.7 \pm 0.7) \times 10^{-5}$		DESIG=71
Γ_{21}	$\gamma\pi^0\eta$		$< 2.4 \times 10^{-6}$	90%	DESIG=111
Γ_{22}	γK^+K^-	[a]	$(1.14 \pm 0.13) \times 10^{-5}$		DESIG=102
Γ_{23}	$\gamma p\overline{p}$	[b]	$< 6 \times 10^{-6}$	90%	DESIG=103
Γ_{24}	$\gamma 2h^+ 2h^-$		$(7.0 \pm 1.5) \times 10^{-4}$		DESIG=20
Γ_{25}	$\gamma 3h^+ 3h^-$		$(5.4 \pm 2.0) \times 10^{-4}$		DESIG=21
Γ_{26}	$\gamma 4h^+ 4h^-$		$(7.4 \pm 3.5) \times 10^{-4}$		DESIG=22
Γ_{27}	$\gamma\pi^+\pi^- K^+K^-$		$(2.9 \pm 0.9) \times 10^{-4}$		DESIG=14
Γ_{28}	$\gamma 2\pi^+ 2\pi^-$		$(2.5 \pm 0.9) \times 10^{-4}$		DESIG=13
Γ_{29}	$\gamma 3\pi^+ 3\pi^-$		$(2.5 \pm 1.2) \times 10^{-4}$		DESIG=17
Γ_{30}	$\gamma 2\pi^+ 2\pi^- K^+K^-$		$(2.4 \pm 1.2) \times 10^{-4}$		DESIG=18
Γ_{31}	$\gamma\pi^+\pi^- p\overline{p}$		$(1.5 \pm 0.6) \times 10^{-4}$		DESIG=15
Γ_{32}	$\gamma 2\pi^+ 2\pi^- p\overline{p}$		$(4 \pm 6) \times 10^{-5}$		DESIG=19
Γ_{33}	$\gamma 2K^+ 2K^-$		$(2.0 \pm 2.0) \times 10^{-5}$		DESIG=16
Γ_{34}	$\gamma\eta'(958)$		$< 1.9 \times 10^{-6}$	90%	DESIG=55
Γ_{35}	$\gamma\eta$		$< 1.0 \times 10^{-6}$	90%	DESIG=54
Γ_{36}	$\gamma f_0(980)$		$< 3 \times 10^{-5}$	90%	DESIG=105
Γ_{37}	$\gamma f_2'(1525)$		$(3.8 \pm 0.9) \times 10^{-5}$		DESIG=52
Γ_{38}	$\gamma f_2(1270)$		$(1.01 \pm 0.09) \times 10^{-4}$		DESIG=51
Γ_{39}	$\gamma\eta(1405)$		$< 8.2 \times 10^{-5}$	90%	DESIG=65
Γ_{40}	$\gamma f_0(1500)$		$< 1.5 \times 10^{-5}$	90%	DESIG=108
Γ_{41}	$\gamma f_0(1710)$		$< 2.6 \times 10^{-4}$	90%	DESIG=53
Γ_{42}	$\gamma f_0(1710) \to \gamma K^+K^-$		$< 7 \times 10^{-6}$	90%	DESIG=112
Γ_{43}	$\gamma f_0(1710) \to \gamma\pi^0\pi^0$		$< 1.4 \times 10^{-6}$	90%	DESIG=109
Γ_{44}	$\gamma f_0(1710) \to \gamma\eta\eta$		$< 1.8 \times 10^{-6}$	90%	DESIG=110
Γ_{45}	$\gamma f_4(2050)$		$< 5.3 \times 10^{-5}$	90%	DESIG=104
Γ_{46}	$\gamma f_0(2200) \to \gamma K^+K^-$		$< 2 \times 10^{-4}$	90%	DESIG=69
Γ_{47}	$\gamma f_J(2220) \to \gamma K^+K^-$		$< 8 \times 10^{-7}$	90%	DESIG=60
Γ_{48}	$\gamma f_J(2220) \to \gamma\pi^+\pi^-$		$< 6 \times 10^{-7}$	90%	DESIG=61
Γ_{49}	$\gamma f_J(2220) \to \gamma p\overline{p}$		$< 1.1 \times 10^{-6}$	90%	DESIG=62
Γ_{50}	$\gamma\eta(2225) \to \gamma\phi\phi$		$< 3 \times 10^{-3}$	90%	DESIG=68
Γ_{51}	$\gamma\eta_c(1S)$		$< 5.7 \times 10^{-5}$	90%	DESIG=119
Γ_{52}	$\gamma\chi_{c0}$		$< 6.5 \times 10^{-4}$	90%	DESIG=120
Γ_{53}	$\gamma\chi_{c1}$		$< 2.3 \times 10^{-5}$	90%	DESIG=121
Γ_{54}	$\gamma\chi_{c2}$		$< 7.6 \times 10^{-6}$	90%	DESIG=122
Γ_{55}	$\gamma X(3872) \to \pi^+\pi^- J/\psi$		$< 1.6 \times 10^{-6}$	90%	DESIG=123
Γ_{56}	$\gamma X(3872) \to \pi^+\pi^-\pi^0 J/\psi$		$< 2.8 \times 10^{-6}$	90%	DESIG=124
Γ_{57}	$\gamma X(3915) \to \omega J/\psi$		$< 3.0 \times 10^{-6}$	90%	DESIG=125
Γ_{58}	$\gamma X(4140) \to \phi J/\psi$		$< 2.2 \times 10^{-6}$	90%	DESIG=126
Γ_{59}	γX	[c]	$< 4.5 \times 10^{-6}$	90%	DESIG=66
Γ_{60}	$\gamma X\overline{X}(m_X < 3.1$ GeV)	[d]	$< 1 \times 10^{-3}$	90%	DESIG=67
Γ_{61}	$\gamma X\overline{X}(m_X < 4.5$ GeV)	[e]	$< 2.4 \times 10^{-4}$	90%	DESIG=127
Γ_{62}	$\gamma X \to \gamma + \geq 4$ prongs	[f]	$< 1.78 \times 10^{-4}$	95%	DESIG=113
Γ_{63}	$\gamma a_1^0 \to \gamma\mu^+\mu^-$	[g]	$< 9 \times 10^{-6}$	90%	DESIG=114
Γ_{64}	$\gamma a_1^0 \to \gamma\tau^+\tau^-$	[a]	$< 5.0 \times 10^{-5}$	90%	DESIG=115

Lepton Family number (*LF*) violating modes

NODE=M049;CLUMP=C

Γ_{65}	$\mu^\pm\tau^\mp$	*LF*	$< 6.0 \times 10^{-6}$	95%	DESIG=116

Other decays

NODE=M049;CLUMP=D

Γ_{66}	invisible		$< 3.0 \times 10^{-4}$	90%	DESIG=106

[a] $2m_\tau < M(\tau^+\tau^-) < 7500$ MeV LINKAGE=E49

[b] $2 < m_{K^+K^-} < 3$ 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] $1.5 \text{ GeV} < m_X < 5.0$ GeV LINKAGE=C49

[g] $201 < M(\mu^+\mu^-) < 3565$ MeV LINKAGE=D49

$\Upsilon(1S)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma(\text{total})$

NODE=M049218

$\Gamma(e^+e^-) \times \Gamma(\mu^+\mu^-)/\Gamma_{\text{total}}$ — $\Gamma_2\Gamma_3/\Gamma$

NODE=M049G1
NODE=M049G1

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
31.2±1.6±1.7	KOBEL	92	CBAL	$e^+e^- \rightarrow \mu^+\mu^-$

$\Gamma(\text{hadrons}) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_0\Gamma_2/\Gamma$

NODE=M049G2
NODE=M049G2

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
1.240±0.016 OUR AVERAGE				
1.252±0.004±0.019	[5] ROSNER	06	CLEO	9.5 $e^+e^- \rightarrow$ hadrons
1.187±0.023±0.031	[5] BARU	92B	MD1	$e^+e^- \rightarrow$ hadrons
1.23 ±0.02 ±0.05	[5] JAKUBOWSKI	88	CBAL	$e^+e^- \rightarrow$ hadrons
1.37 ±0.06 ±0.09	[6] GILES	84B	CLEO	$e^+e^- \rightarrow$ hadrons
1.23 ±0.08 ±0.04	[6] ALBRECHT	82	DASP	$e^+e^- \rightarrow$ hadrons
1.13 ±0.07 ±0.11	[6] NICZYPORUK	82	LENA	$e^+e^- \rightarrow$ hadrons
1.09 ±0.25	[6] BOCK	80	CNTR	$e^+e^- \rightarrow$ hadrons
1.35 ±0.14	[7] BERGER	79	PLUT	$e^+e^- \rightarrow$ hadrons

[5] Radiative corrections evaluated following KURAEV 85.
[6] Radiative corrections reevaluated by BUCHMUELLER 88 following KURAEV 85.
[7] Radiative corrections reevaluated by ALEXANDER 89 using B($\mu\mu$) = 0.026.

NODE=M049G2;LINKAGE=B
NODE=M049G2;LINKAGE=R
NODE=M049G2;LINKAGE=P

$\Upsilon(1S)$ PARTIAL WIDTHS

NODE=M049220

$\Gamma(e^+e^-)$ — Γ_2

NODE=M049W2
NODE=M049W2
→ NOT CHECKED ←

VALUE (keV)	DOCUMENT ID
1.340±0.018 OUR EVALUATION	

$\Upsilon(1S)$ BRANCHING RATIOS

NODE=M049225

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

NODE=M049R3
NODE=M049R3

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
2.60±0.10 OUR AVERAGE					
2.53±0.13±0.05	60k	[8] BESSON	07	CLEO	$e^+e^- \rightarrow \Upsilon(1S) \rightarrow \tau^+\tau^-$
$2.61\pm0.12{}^{+0.09}_{-0.13}$	25k	CINABRO	94B	CLE2	$e^+e^- \rightarrow \tau^+\tau^-$
2.7 ±0.4 ±0.2		[9] ALBRECHT	85C	ARG	$\Upsilon(2S) \rightarrow \pi^+\pi^-\tau^+\tau^-$
3.4 ±0.4 ±0.4		GILES	83	CLEO	$e^+e^- \rightarrow \tau^+\tau^-$

[8] BESSON 07 reports $[\Gamma(\Upsilon(1S) \rightarrow \tau^+\tau^-)/\Gamma_{\text{total}}]$ / $[B(\Upsilon(1S) \rightarrow \mu^+\mu^-)] = 1.02 \pm 0.02 \pm 0.05$ which we multiply by our best value $B(\Upsilon(1S) \rightarrow \mu^+\mu^-) = (2.48 \pm 0.05) \times 10^{-2}$. 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

[9] Using $B(\Upsilon(1S) \rightarrow ee) = B(\Upsilon(1S) \rightarrow \mu\mu) = 0.0256$; not used for width evaluations.

NODE=M049R3;LINKAGE=A

$\Gamma(e^+e^-)/\Gamma_{\text{total}}$ — Γ_2/Γ

NODE=M049R2
NODE=M049R2

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
2.38±0.11 OUR AVERAGE					
2.29±0.08±0.11		ALEXANDER	98	CLE2	$\Upsilon(2S) \rightarrow \pi^+\pi^-e^+e^-$
2.42±0.14±0.14	307	ALBRECHT	87	ARG	$\Upsilon(2S) \rightarrow \pi^+\pi^-e^+e^-$
2.8 ±0.3 ±0.2	826	BESSON	84	CLEO	$\Upsilon(2S) \rightarrow \pi^+\pi^-e^+e^-$
5.1 ±3.0		BERGER	80C	PLUT	$e^+e^- \rightarrow e^+e^-$

$\Gamma(\mu^+\mu^-)/\Gamma_{\text{total}}$ — Γ_3/Γ

NODE=M049R1
NODE=M049R1

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0248±0.0005 OUR AVERAGE					
0.0249±0.0002±0.0007	345k	ADAMS	05	CLEO	$e^+e^- \rightarrow \mu^+\mu^-$
0.0249±0.0008±0.0013		ALEXANDER	98	CLE2	$\Upsilon(2S) \rightarrow \pi^+\pi^-\mu^+\mu^-$
0.0212±0.0020±0.0010		[10] BARU	92	MD1	$e^+e^- \rightarrow \mu^+\mu^-$
0.0231±0.0012±0.0010		[10] KOBEL	92	CBAL	$e^+e^- \rightarrow \mu^+\mu^-$
0.0252±0.0007±0.0007		CHEN	89B	CLEO	$e^+e^- \rightarrow \mu^+\mu^-$
0.0261±0.0009±0.0011		KAARSBERG	89	CSB2	$e^+e^- \rightarrow \mu^+\mu^-$
0.0230±0.0025±0.0013	86	ALBRECHT	87	ARG	$\Upsilon(2S) \rightarrow \pi^+\pi^-\mu^+\mu^-$

0.029 ±0.003 ±0.002	864	BESSON	84	CLEO	$\Upsilon(2S) \rightarrow \pi^+\pi^-\mu^+\mu^-$	
0.027 ±0.003 ±0.003		ANDREWS	83	CLEO	$e^+e^- \rightarrow \mu^+\mu^-$	
0.032 ±0.013 ±0.003		ALBRECHT	82	DASP	$e^+e^- \rightarrow \mu^+\mu^-$	
0.038 ±0.015 ±0.002		NICZYPORUK	82	LENA	$e^+e^- \rightarrow \mu^+\mu^-$	
0.014 $^{+0.034}_{-0.014}$		BOCK	80	CNTR	$e^+e^- \rightarrow \mu^+\mu^-$	
0.022 ±0.020		BERGER	79	PLUT	$e^+e^- \rightarrow \mu^+\mu^-$	

[10] 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±0.013±0.022	0.7M	[11] DEL-AMO-SA..	10C	BABR	$\Upsilon(3S) \rightarrow \pi^+\pi^-\Upsilon(1S)$
1.02 ±0.02 ±0.05	60k	BESSON	07	CLEO	$e^+e^- \rightarrow \Upsilon(1S)$

[11] Allows any number of extra photons with total energy < 500 MeV. NODE=M049R43;LINKAGE=DE

$\Gamma(ggg)/\Gamma_{\text{total}}$ Γ_4/Γ

NODE=M049R35
NODE=M049R35

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
81.7±0.7	20M	[12] BESSON	06A	CLEO	$\Upsilon(1S) \rightarrow$ hadrons

[12] 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 $R_{\text{hadrons}} = 3.51$. The statistical error is negligible and the systematic error is partially correlated with that of $\Gamma(\gamma gg)/\Gamma_{\text{total}}$ measurement of BESSON 06A. NODE=M049R35;LINKAGE=BE

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

NODE=M049R36
NODE=M049R36

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
2.20±0.60	400k	[13] BESSON	06A	CLEO	$\Upsilon(1S) \rightarrow \gamma +$ hadrons

[13] Calculated using BESSON 06A values of $\Gamma(\gamma gg)/\Gamma(ggg) = (2.70 \pm 0.01 \pm 0.13 \pm 0.24)\%$ and $\Gamma(ggg)/\Gamma_{\text{total}}$. The statistical error is negligible and the systematic error is partially correlated with that of $\Gamma(ggg)/\Gamma_{\text{total}}$ measurement of BESSON 06A. NODE=M049R36;LINKAGE=BE

$\Gamma(\gamma gg)/\Gamma(ggg)$ Γ_5/Γ_4

NODE=M049R37
NODE=M049R37

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
2.70±0.01±0.27	20M	BESSON	06A	CLEO	$\Upsilon(1S) \rightarrow (\gamma +)$ hadrons

$\Gamma(\eta'(958)\text{ anything})/\Gamma_{\text{total}}$ Γ_6/Γ

NODE=M049R73
NODE=M049R73

VALUE	DOCUMENT ID		TECN	COMMENT
0.0294±0.0024 OUR AVERAGE				
0.030 ±0.002 ±0.002	AQUINES	06A	CLE3	$\Upsilon(1S) \rightarrow \eta'$ anything
0.028 ±0.004 ±0.002	ARTUSO	03	CLE2	$\Upsilon(1S) \rightarrow \eta'$ anything

$\Gamma(J/\psi(1S)\text{ anything})/\Gamma_{\text{total}}$ Γ_7/Γ

NODE=M049R12
NODE=M049R12

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.65±0.07 OUR AVERAGE						
0.64±0.04±0.06		730 ± 40	BRIERE	04	CLEO	$e^+e^- \rightarrow J/\psi X$
1.1 ±0.4 ±0.2			[14] FULTON	89	CLEO	$e^+e^- \rightarrow \mu^+\mu^- X$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.68	90		ALBRECHT	92J	ARG	$e^+e^- \rightarrow e^+e^- X$, $\mu^+\mu^- X$
<1.7	90		MASCHMANN	90	CBAL	$e^+e^- \rightarrow$ hadrons
<20	90		NICZYPORUK	83	LENA	

[14] Using $B((J/\psi) \rightarrow \mu^+\mu^-) = (6.9 \pm 0.9)\%$. NODE=M049R12;LINKAGE=K

$\Gamma(\chi_{c0}\text{ anything})/\Gamma(J/\psi(1S)\text{ anything})$ Γ_8/Γ_7

NODE=M049R25
NODE=M049R25

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<7.4	90	BRIERE	04	CLEO	$e^+e^- \rightarrow J/\psi X$

$\Gamma(\chi_{c1}\text{ anything})/\Gamma(J/\psi(1S)\text{ anything})$ Γ_9/Γ_7

NODE=M049R26
NODE=M049R26

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.35±0.08±0.06	52 ± 12	BRIERE	04	CLEO	$e^+e^- \rightarrow J/\psi X$

$\Gamma(\chi_{c2}\text{ anything})/\Gamma(J/\psi(1S)\text{ anything})$ Γ_{10}/Γ_7

NODE=M049R27
NODE=M049R27

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.52±0.12±0.09	47 ± 11	BRIERE	04	CLEO	$e^+e^- \rightarrow J/\psi X$

$\Gamma(\psi(2S)$ anything$)/\Gamma(J/\psi(1S)$ anything$)$ — Γ_{11}/Γ_7

NODE=M049R28

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.41±0.11±0.08	42 ± 11	BRIERE	04	CLEO	$e^+e^- \rightarrow J/\psi\pi^+\pi^- X$

$\Gamma(\rho\pi)/\Gamma_{total}$ — Γ_{12}/Γ

NODE=M049R11

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 2	90	FULTON	90B		$\Upsilon(1S) \rightarrow \rho^0\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<10	90	BLINOV	90	MD1	$\Upsilon(1S) \rightarrow \rho^0\pi^0$
<21	90	NICZYPORUK	83	LENA	$\Upsilon(1S) \rightarrow \rho^0\pi^0$

$\Gamma(\pi^+\pi^-)/\Gamma_{total}$ — Γ_{13}/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_{14}/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_{15}/Γ

NODE=M049R59

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<5	90	[15] BARU	96	MD1	$\Upsilon(1S) \rightarrow p\overline{p}$

[15] Supersedes BARU 92 in this node. NODE=M049R59;LINKAGE=A

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

NODE=M049R72

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<1.84	90	ANASTASSOV	99	CLE2	$e^+e^- \rightarrow$ hadrons

$\Gamma(D^*(2010)^\pm$ anything$)/\Gamma_{total}$ — Γ_{17}/Γ

NODE=M049R32

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
25.2±1.3±1.5		≈ 2k	[16] AUBERT	10C	BABR	$\Upsilon(2S) \rightarrow \pi^+\pi^-\Upsilon(1S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<19	90		[17] ALBRECHT	92J	ARG	$e^+e^- \rightarrow D^0\pi^\pm X$

[16] For $x_p > 0.1$. NODE=M049R32;LINKAGE=AU

[17] For $x_p > 0.2$. NODE=M049R32;LINKAGE=B

$\Gamma(\overline{d}$ anything$)/\Gamma_{total}$ — Γ_{18}/Γ

NODE=M049R33

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
2.86±0.19±0.21	455	ASNER	07	CLEO	$e^+e^- \rightarrow \overline{d}X$

$\Gamma(ggg, \gamma gg \rightarrow \overline{d}$ anything$)/\Gamma(ggg, \gamma gg \rightarrow$ anything$)$

NODE=M049R34

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
3.36±0.23±0.25	455	ASNER	07	CLEO	$e^+e^- \rightarrow \overline{d}X$

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

NODE=M049R70

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
6.3±1.2±1.3	[18] ANASTASSOV	99	CLE2	$e^+e^- \rightarrow$ hadrons

[18] For $m_{\pi\pi} >1$ GeV. NODE=M049R70;LINKAGE=A

$\Gamma(\gamma\pi^0\pi^0)/\Gamma_{total}$ — Γ_{20}/Γ

NODE=M049R71

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
1.7±0.6±0.3	[19] ANASTASSOV	99	CLE2	$e^+e^- \rightarrow$ hadrons

[19] For $m_{\pi\pi} >1$ GeV. NODE=M049R71;LINKAGE=A

$\Gamma(\gamma\pi^0\eta)/\Gamma_{total}$ — Γ_{21}/Γ

NODE=M049R47

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<2.4	90	[20] BESSON	07A	CLEO	$e^+e^- \rightarrow \Upsilon(1S)$

[20] 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_{22}/Γ

NODE=M049R24

$(2 < m_{K^+ K^-} < 3$ GeV)

NODE=M049R24
NODE=M049R24

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
1.14±0.08±0.10	90	ATHAR	06	CLE3	$\Upsilon(1S) \rightarrow \gamma K^+ K^-$

$\Gamma(\gamma p\overline{p})/\Gamma_{total}$ — Γ_{23}/Γ

NODE=M049R29

$(2 < m_{p\overline{p}} < 3$ GeV)

NODE=M049R29
NODE=M049R29

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<0.6	90	ATHAR	06	CLE3	$\Upsilon(1S) \rightarrow \gamma p\overline{p}$

$\Gamma(\gamma 2h^+ 2h^-)/\Gamma_{total}$ — Γ_{24}/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	$e^+ e^- \rightarrow$ hadrons

$\Gamma(\gamma 3h^+ 3h^-)/\Gamma_{total}$ — Γ_{25}/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	$e^+ e^- \rightarrow$ hadrons

$\Gamma(\gamma 4h^+ 4h^-)/\Gamma_{total}$ — Γ_{26}/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	$e^+ e^- \rightarrow$ hadrons

$\Gamma(\gamma \pi^+ \pi^- K^+ K^-)/\Gamma_{total}$ — Γ_{27}/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	$e^+ e^- \rightarrow$ hadrons

$\Gamma(\gamma 2\pi^+ 2\pi^-)/\Gamma_{total}$ — Γ_{28}/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	$e^+ e^- \rightarrow$ hadrons

$\Gamma(\gamma 3\pi^+ 3\pi^-)/\Gamma_{total}$ — Γ_{29}/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	$e^+ e^- \rightarrow$ hadrons

$\Gamma(\gamma 2\pi^+ 2\pi^- K^+ K^-)/\Gamma_{total}$ — Γ_{30}/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	$e^+ e^- \rightarrow$ hadrons

$\Gamma(\gamma \pi^+ \pi^- p\overline{p})/\Gamma_{total}$ — Γ_{31}/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	$e^+ e^- \rightarrow$ hadrons

$\Gamma(\gamma 2\pi^+ 2\pi^- p\overline{p})/\Gamma_{total}$ — Γ_{32}/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	$e^+ e^- \rightarrow$ hadrons

$\Gamma(\gamma 2K^+ 2K^-)/\Gamma_{total}$ — Γ_{33}/Γ

NODE=M049R16
NODE=M049R16

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.2±0.2	2 ± 2	FULTON	90B	CLEO	$e^+ e^- \rightarrow$ hadrons

$\Gamma(\gamma \eta'(958))/\Gamma_{total}$ — Γ_{34}/Γ

NODE=M049R55
NODE=M049R55

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
< 1.9	90	ATHAR	07A	CLEO	$\Upsilon(1S) \rightarrow \gamma \eta' \rightarrow \gamma \pi^+ \pi^- \eta, \gamma \rho$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<16	90	RICHICHI	01B	CLE2	$\Upsilon(1S) \rightarrow \gamma \eta' \rightarrow \gamma \eta \pi^+ \pi^-$

$\Gamma(\gamma \eta)/\Gamma_{total}$ — Γ_{35}/Γ

NODE=M049R54
NODE=M049R54

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
< 1.0	90	ATHAR	07A	CLEO	$\Upsilon(1S) \rightarrow \gamma \eta \rightarrow \gamma\gamma\gamma, \gamma \pi^+ \pi^- \pi^0, \gamma 3\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<21	90	MASEK	02	CLEO	$\Upsilon(1S) \rightarrow \gamma \eta$

$\Gamma(\gamma f_0(980))/\Gamma_{total}$ — Γ_{36}/Γ

NODE=M049R31
NODE=M049R31

VALUE (units 10^{-5})	CL%	DOCUMENT ID	TECN	COMMENT
<3	90	[21] ATHAR 06	CLE3	$\Upsilon(1S) \to \gamma\pi^+\pi^-$

[21] Assuming $B(f_0(980) \to \pi\pi) = 1$.

NODE=M049R31;LINKAGE=AT

$\Gamma(\gamma f'_2(1525))/\Gamma_{total}$ — Γ_{37}/Γ

NODE=M049R52
NODE=M049R52

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
3.8±0.9 OUR AVERAGE					
[$(3.7^{+1.2}_{-1.1}) \times 10^{-5}$ OUR 2011 AVERAGE]					
$4.0\pm1.4\pm0.1$		17 ± 5	[22] BESSON 11	CLEO	$\Upsilon(1S) \to K^0_S K^0_S$
$3.7^{+0.9}_{-0.7}\pm0.8$			ATHAR 06	CLE3	$\Upsilon(1S) \to \gamma K^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<14	90		[23] FULTON 90B	CLEO	$\Upsilon(1S) \to \gamma K^+K^-$
<19.4	90		[23] ALBRECHT 89	ARG	$\Upsilon(1S) \to \gamma K^+K^-$

NEW

[22] BESSON 11 reports $(4.0 \pm 1.3 \pm 0.6) \times 10^{-5}$ from a measurement of $[\Gamma(\Upsilon(1S) \to \gamma f'_2(1525))/\Gamma_{total}] \times [B(f'_2(1525) \to K\overline{K})]$ assuming $B(f'_2(1525) \to K\overline{K}) = (88.8 \pm 3.1) \times 10^{-2}$, which we rescale to our best value $B(f'_2(1525) \to K\overline{K}) = (88.7 \pm 2.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. The result also assumes $B(K^0_S \to \pi^+\pi^-) = (69.20 \pm 0.05)\%$ 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

[23] Assuming $B(f'_2(1525) \to K\overline{K}) = 0.71$.

NODE=M049R52;LINKAGE=D

$\Gamma(\gamma f_2(1270))/\Gamma_{total}$ — Γ_{38}/Γ

NODE=M049R51
NODE=M049R51

VALUE (units 10^{-5})	CL%	DOCUMENT ID	TECN	COMMENT
10.1±0.9 OUR AVERAGE				
$10.5\pm1.6^{+1.9}_{-1.8}$		[24] BESSON 07A	CLE3	$\Upsilon(1S) \to \gamma\pi^0\pi^0$
$10.2\pm0.8\pm0.7$		ATHAR 06	CLE3	$\Upsilon(1S) \to \gamma\pi^+\pi^-$
$8.1\pm2.3^{+2.9}_{-2.7}$		[25] ANASTASSOV 99	CLE2	$e^+e^- \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<21	90	[25] FULTON 90B	CLEO	$\Upsilon(1S) \to \gamma\pi^+\pi^-$
<13	90	[25] ALBRECHT 89	ARG	$\Upsilon(1S) \to \gamma\pi^+\pi^-$
<81	90	SCHMITT 88	CBAL	$\Upsilon(1S) \to \gamma X$

[24] Using $B(f_2(1270) \to \pi^0\pi^0) = B(f_2(1270) \to \pi\pi)/3$ and $B(f_2(1270) \to \pi\pi) = (0.845^{+0.025}_{-0.012})\%$.

NODE=M049R51;LINKAGE=BE

[25] Using $B(f_2(1270) \to \pi\pi) = 0.84$.

NODE=M049R51;LINKAGE=C

$\Gamma(\gamma\eta(1405))/\Gamma_{total}$ — Γ_{39}/Γ

NODE=M049R23
NODE=M049R23

VALUE (units 10^{-5})	CL%	DOCUMENT ID	TECN	COMMENT
<8.2	90	[26] FULTON 90B	CLEO	$\Upsilon(1S) \to \gamma K^\pm\pi^\mp K^0_S$

[26] 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_{40}/Γ

NODE=M049R44
NODE=M049R44

VALUE (units 10^{-5})	CL%	DOCUMENT ID	TECN	COMMENT
<1.5	90	[27] 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	[28] BESSON 07A	CLEO	$e^+e^- \to \Upsilon(1S) \to \gamma\eta\eta$

OCCUR=2

[27] Using $B(f_0(1500) \to \pi^0\pi^0) = B(f_0(1500) \to \pi\pi)/3$ and $B(f_0(1500) \to \pi\pi) = (0.349 \pm 0.023)\%$.

NODE=M049R44;LINKAGE=BE

[28] Calculated by us using $B(f_0(1500) \to \eta\eta) = (5.1 \pm 0.9)\%$.

NODE=M049R44;LINKAGE=BS

$\Gamma(\gamma f_0(1710))/\Gamma_{total}$ — Γ_{41}/Γ

NODE=M049R53
NODE=M049R53

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT
< 2.6	90	[29] ALBRECHT 89	ARG	$\Upsilon(1S) \to \gamma K^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
< 6.3	90	[29] FULTON 90B	CLEO	$\Upsilon(1S) \to \gamma K^+K^-$
<19	90	[29] FULTON 90B	CLEO	$\Upsilon(1S) \to \gamma K^0_S K^0_S$
< 8	90	[30] ALBRECHT 89	ARG	$\Upsilon(1S) \to \gamma\pi^+\pi^-$
<24	90	[31] SCHMITT 88	CBAL	$\Upsilon(1S) \to \gamma X$

OCCUR=2
OCCUR=2

[29] Assuming $B(f_0(1710) \to K\overline{K}) = 0.38$.

NODE=M049R53;LINKAGE=E

[30] Assuming $B(f_0(1710) \to \pi\pi) = 0.04$.

NODE=M049R53;LINKAGE=F

[31] Assuming $B(f_0(1710) \to \eta\eta) = 0.18$.

NODE=M049R53;LINKAGE=A

$\Gamma(\gamma f_0(1710) \to \gamma K^+ K^-)/\Gamma_{total}$ — Γ_{42}/Γ

NODE=M049R50
NODE=M049R50

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<0.7	90	ATHAR	06	CLEO	$e^+ e^- \to \Upsilon(1S) \to \gamma K^+ K^-$

$\Gamma(\gamma f_0(1710) \to \gamma \pi^0 \pi^0)/\Gamma_{total}$ — Γ_{43}/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_{44}/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_{45}/Γ

NODE=M049R30
NODE=M049R30

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<5.3	90	[32] ATHAR	06	CLE3	$\Upsilon(1S) \to \gamma \pi^+ \pi^-$

[32] 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_{46}/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_{47}/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_{48}/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_{49}/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_{50}/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_{51}/Γ

NODE=M049R38
NODE=M049R38

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<5.7	90	SHEN	10A	BELL	$\Upsilon(1S) \to \gamma X$

$\Gamma(\gamma \chi_{c0})/\Gamma_{total}$ — Γ_{52}/Γ

NODE=M049R39
NODE=M049R39

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<6.5	90	SHEN	10A	BELL	$\Upsilon(1S) \to \gamma X$

$\Gamma(\gamma \chi_{c1})/\Gamma_{total}$ — Γ_{53}/Γ

NODE=M049R40
NODE=M049R40

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<2.3	90	SHEN	10A	BELL	$\Upsilon(1S) \to \gamma X$

$\Gamma(\gamma \chi_{c2})/\Gamma_{total}$ — Γ_{54}/Γ

NODE=M049R48
NODE=M049R48

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<7.6	90	SHEN	10A	BELL	$\Upsilon(1S) \to \gamma X$

$\Gamma(\gamma X(3872) \to \pi^+\pi^- J/\psi)/\Gamma_{total}$ Γ_{55}/Γ

NODE=M049R49
NODE=M049R49

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<1.6	90	SHEN	10A	BELL	$\Upsilon(1S) \to \gamma X$

$\Gamma(\gamma X(3872) \to \pi^+\pi^-\pi^0 J/\psi)/\Gamma_{total}$ Γ_{56}/Γ

NODE=M049R68
NODE=M049R68

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<2.8	90	SHEN	10A	BELL	$\Upsilon(1S) \to \gamma X$

$\Gamma(\gamma X(3915) \to \omega J/\psi)/\Gamma_{total}$ Γ_{57}/Γ

NODE=M049R69
NODE=M049R69

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<3.0	90	SHEN	10A	BELL	$\Upsilon(1S) \to \gamma X$

$\Gamma(\gamma X(4140) \to \phi J/\psi)/\Gamma_{total}$ Γ_{58}/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_{59}/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 (CL = 90%)	[$<3 \times 10^{-5}$ (CL = 90%) OUR 2011 BEST LIMIT]				
< 4.5	90	[33] DEL-AMO-SA...	11J	BABR	$e^+e^- \to \gamma + X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<30	90	[34] BALEST	95	CLEO	$e^+e^- \to \gamma + X$

[33] For a noninteracting scalar X with mass $m <$ 8.0 GeV.

NODE=M049R60;LINKAGE=DA

[34] For a noninteracting pseudoscalar X with mass $<$ 7.2 GeV.

NODE=M049R60;LINKAGE=A

$\Gamma(\gamma X\overline{X}(m_X < 3.1\text{ GeV}))/\Gamma_{total}$ Γ_{60}/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	[35] BALEST	95	CLEO	$e^+e^- \to \gamma + X\overline{X}$

[35] 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_{61}/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	[36] DEL-AMO-SA...	11J	BABR	$e^+e^- \to \gamma + X\overline{X}$

[36] 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_{62}/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_{63}/Γ

NODE=M049R65

(201 $<$ M($\mu^+\mu^-$) $<$ 3565 MeV)

NODE=M049R65
NODE=M049R65

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<9	90	[37] LOVE	08	CLEO	$e^+e^- \to \gamma a_1^0 \to \gamma\mu^+\mu^-$

[37] 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

$\Gamma(\gamma a_1^0 \to \gamma\tau^+\tau^-)/\Gamma_{total}$ Γ_{64}/Γ

NODE=M049R66

($2m_\tau <$ M($\tau^+\tau^-$) $<$ 7500 MeV)

NODE=M049R66
NODE=M049R66

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<50	90	[38] LOVE	08	CLEO	$e^+e^- \to \gamma a_1^0 \to \gamma\tau^+\tau^-$

[38] For a narrow scalar or pseudoscalar a_1^0 with $2m_\tau <$ M($\tau^+\tau^-$) $<$ 7500 MeV. Measured 90% CL limits as a function of M($\tau^+\tau^-$) range from 1–5 $\times 10^{-5}$.

NODE=M049R66;LINKAGE=LO

LEPTON FAMILY NUMBER (*LF*) VIOLATING MODES

NODE=M049230

$\Gamma(\mu^\pm\tau^\mp)/\Gamma_{total}$ Γ_{65}/Γ

NODE=M049R67
NODE=M049R67

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<6.0	95	LOVE	08A	CLEO	$e^+e^- \to \mu^\pm\tau^\mp$

OTHER DECAYS

NODE=M049235

$\Gamma(\text{invisible})/\Gamma_{\text{total}}$ Γ_{66}/Γ

NODE=M049R10
NODE=M049R10

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 3.0	90	AUBERT	09AX	BABR	$\Upsilon(3S) \to \pi^+\pi^-\Upsilon(1S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<39	90	RUBIN	07	CLEO	$\Upsilon(2S) \to \pi^+\pi^-\Upsilon(1S)$
<25	90	TAJIMA	07	BELL	$\Upsilon(3S) \to \pi^+\pi^-\Upsilon(1S)$

$\Upsilon(1S)$ REFERENCES

NODE=M049

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 Collb.)	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 051504R	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

→ NOT CHECKED ←

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	$\gamma\,\Upsilon(1S)$	(1.76±0.35) %		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

$\chi_{b0}(1P)$ BRANCHING RATIOS

NODE=M076220

$\Gamma(\gamma\,\Upsilon(1S))/\Gamma_{total}$ — Γ_1/Γ

NODE=M076R1
NODE=M076R1

VALUE (%)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
1.76±0.30±0.18		87	[1,2] 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		[3] 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] Assuming B($\Upsilon(1S) \to \ell^+\ell^-$) = (2.48 ± 0.05)%. NODE=M076R1;LINKAGE=KA

[2] 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

[3] 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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<10.4 × 10^{-2}	90	[4,5] BRIERE	08	CLEO	$\Upsilon(2S) \to \gamma D^0 X$

[4] For $p_{D^0} > 2.5$ GeV/c.

[5] The authors also present their result as $(5.6 \pm 3.6 \pm 0.5) \times 10^{-2}$.

$\Gamma(\pi^+\pi^- K^+ K^- \pi^0)/\Gamma_{total}$ Γ_3/Γ

NODE=M076R02

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.6	90	[6] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma\pi^+\pi^- K^+ K^- \pi^0$

[6] 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 $B(\Upsilon(2S) \to \gamma\chi_{b0}(1P)) = 3.8 \times 10^{-2}$.

$\Gamma(2\pi^+\pi^- K^- K^0_S)/\Gamma_{total}$ Γ_4/Γ

NODE=M076R03

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.5	90	[7] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 2\pi^+\pi^- K^- K^0_S$

[7] 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 $B(\Upsilon(2S) \to \gamma\chi_{b0}(1P)) = 3.8 \times 10^{-2}$.

$\Gamma(2\pi^+\pi^- K^- K^0_S 2\pi^0)/\Gamma_{total}$ Γ_5/Γ

NODE=M076R04

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<5	90	[8] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 2\pi^+\pi^- K^- 2\pi^0$

[8] 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 $B(\Upsilon(2S) \to \gamma\chi_{b0}(1P)) = 3.8 \times 10^{-2}$.

$\Gamma(2\pi^+ 2\pi^- 2\pi^0)/\Gamma_{total}$ Γ_6/Γ

NODE=M076R05

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<2.1	90	[9] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 2\pi^+ 2\pi^- 2\pi^0$

[9] 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 $B(\Upsilon(2S) \to \gamma\chi_{b0}(1P)) = 3.8 \times 10^{-2}$.

$\Gamma(2\pi^+ 2\pi^- K^+ K^-)/\Gamma_{total}$ Γ_7/Γ

NODE=M076R06

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.1±0.6±0.1	7	[10] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 2\pi^+ 2\pi^- K^+ K^-$

[10] 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.

$\Gamma(2\pi^+ 2\pi^- K^+ K^- \pi^0)/\Gamma_{total}$ Γ_8/Γ

NODE=M076R07

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<2.7	90	[11] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 2\pi^+ 2\pi^- K^+ K^- \pi^0$

[11] 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 $B(\Upsilon(2S) \to \gamma\chi_{b0}(1P)) = 3.8 \times 10^{-2}$.

$\Gamma(2\pi^+ 2\pi^- K^+ K^- 2\pi^0)/\Gamma_{total}$ Γ_9/Γ

NODE=M076R08

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<5	90	[12] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 2\pi^+ 2\pi^- K^+ K^- 2\pi^0$

[12] 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 $B(\Upsilon(2S) \to \gamma\chi_{b0}(1P)) = 3.8 \times 10^{-2}$.

$\Gamma(3\pi^+ 2\pi^- K^- K^0_S \pi^0)/\Gamma_{total}$ Γ_{10}/Γ

NODE=M076R09

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.6	90	[13] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 3\pi^+ 2\pi^- K^- K^0_S \pi^0$

[13] 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 $B(\Upsilon(2S) \to \gamma\chi_{b0}(1P)) = 3.8 \times 10^{-2}$.

$\Gamma(3\pi^+ 3\pi^-)/\Gamma_{total}$ — Γ_{11}/Γ

NODE=M076R10
NODE=M076R10

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.8	90	[14] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 3\pi^+ 3\pi^-$

[14] ASNER 08A reports $[\Gamma(\chi_{b0}(1P) \to 3\pi^+ 3\pi^-)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b0}(1P))] < 3\times10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b0}(1P)) = 3.8\times10^{-2}$.

NODE=M076R10;LINKAGE=AS

$\Gamma(3\pi^+ 3\pi^- 2\pi^0)/\Gamma_{total}$ — Γ_{12}/Γ

NODE=M076R11
NODE=M076R11

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<6	90	[15] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 3\pi^+ 3\pi^- 2\pi^0$

[15] ASNER 08A reports $[\Gamma(\chi_{b0}(1P) \to 3\pi^+ 3\pi^- 2\pi^0)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b0}(1P))] < 22\times10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b0}(1P)) = 3.8\times10^{-2}$.

NODE=M076R11;LINKAGE=AS

$\Gamma(3\pi^+ 3\pi^- K^+ K^-)/\Gamma_{total}$ — Γ_{13}/Γ

NODE=M076R12
NODE=M076R12

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.4±1.2±0.2	9	[16] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 3\pi^+ 3\pi^- K^+ K^-$

[16] 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
NODE=M076R13

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<10	90	[17] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 3\pi^+ 3\pi^- K^+ K^- \pi^0$

[17] 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
NODE=M076R14

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.8	90	[18] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 4\pi^+ 4\pi^-$

[18] ASNER 08A reports $[\Gamma(\chi_{b0}(1P) \to 4\pi^+ 4\pi^-)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b0}(1P))] < 3\times10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b0}(1P)) = 3.8\times10^{-2}$.

NODE=M076R14;LINKAGE=AS

$\Gamma(4\pi^+ 4\pi^- 2\pi^0)/\Gamma_{total}$ — Γ_{16}/Γ

NODE=M076R15
NODE=M076R15

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<21	90	[19] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 4\pi^+ 4\pi^- 2\pi^0$

[19] ASNER 08A reports $[\Gamma(\chi_{b0}(1P) \to 4\pi^+ 4\pi^- 2\pi^0)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b0}(1P))] < 77\times10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \to \gamma\chi_{b0}(1P)) = 3.8\times10^{-2}$.

NODE=M076R15;LINKAGE=AS

$\chi_{b0}(1P)$ CROSS-PARTICLE BRANCHING RATIOS

NODE=M076230

$\Gamma(\chi_{b0}(1P) \to \gamma\Upsilon(1S))/\Gamma_{total} \times \Gamma(\Upsilon(2S) \to \gamma\chi_{b0}(1P))/\Gamma_{total}$ — $\Gamma_1/\Gamma \times \Gamma_{15}^{\Upsilon(2S)}/\Gamma^{\Upsilon(2S)}$

NODE=M076B02
NODE=M076B02

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.7 \times 10^{-3}$	90	[20] LEES	11J	BABR	$\Upsilon(2S) \to X\gamma$

[20] 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 $B(\Upsilon(4S) \to \gamma\chi_{b0}(1P)) = (3.8 \pm 0.4)\%$.

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
NODE=M076B01

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
1.63±0.24±0.15	87	KORNICER	11	CLEO	$e^+e^- \to \gamma\gamma\ell^+\ell^-$

$\chi_{b0}(1P)$ REFERENCES

NODE=M076

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.

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. NODE=M077

$\chi_{b1}(1P)$ 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

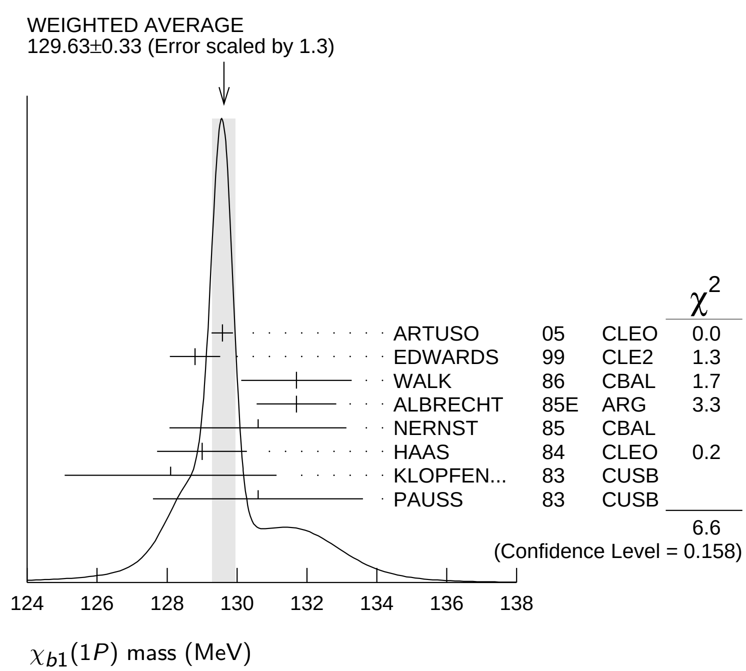
NODE=M077M
→ NOT CHECKED ←

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	$\gamma\,\Upsilon(1S)$	(33.9±2.2) %		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	$2\pi^+ 2\pi^- K^+ K^- 2\pi^0$	$(8.6\pm3.2)\times10^{-4}$	DESIG=9
Γ_{10}	$3\pi^+ 2\pi^- K^- K^0_S \pi^0$	$(9.3\pm3.3)\times10^{-4}$	DESIG=10
Γ_{11}	$3\pi^+ 3\pi^-$	$(1.9\pm0.6)\times10^{-4}$	DESIG=11
Γ_{12}	$3\pi^+ 3\pi^- 2\pi^0$	$(1.7\pm0.5)\times10^{-3}$	DESIG=12
Γ_{13}	$3\pi^+ 3\pi^- K^+ K^-$	$(2.6\pm0.8)\times10^{-4}$	DESIG=13
Γ_{14}	$3\pi^+ 3\pi^- K^+ K^- \pi^0$	$(7.5\pm2.6)\times10^{-4}$	DESIG=14
Γ_{15}	$4\pi^+ 4\pi^-$	$(2.6\pm0.9)\times10^{-4}$	DESIG=15
Γ_{16}	$4\pi^+ 4\pi^- 2\pi^0$	$(1.4\pm0.6)\times10^{-3}$	DESIG=16

$\chi_{b1}(1P)$ BRANCHING RATIOS

NODE=M077220

$\Gamma(\gamma\Upsilon(1S))/\Gamma_{total}$ — Γ_1/Γ

NODE=M077R1
NODE=M077R1
NEW

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.339±0.022 OUR AVERAGE					
[0.35 ± 0.08 OUR 2011 AVERAGE]					
$0.331\pm0.018\pm0.017$	3222	[1,2] KORNICER	11	CLEO	$e^+e^- \rightarrow \gamma\gamma\ell^+\ell^-$
$0.350\pm0.023\pm0.018$	13k	[3] LEES	11J	BABR	$\Upsilon(2S) \rightarrow X\gamma$
$0.32\pm0.06\pm0.07$		WALK	86	CBAL	$\Upsilon(2S) \rightarrow \gamma\gamma\ell^+\ell^-$
0.47 ± 0.18		KLOPFEN...	83	CUSB	$\Upsilon(2S) \rightarrow \gamma\gamma\ell^+\ell^-$

[1] Assuming B($\Upsilon(1S) \rightarrow \ell^+\ell^-$) = (2.48 ± 0.05)%. NODE=M077R1;LINKAGE=KA

[2] KORNICER 11 reports $[\Gamma(\chi_{b1}(1P) \rightarrow \gamma\Upsilon(1S))/\Gamma_{total}] \times [B(\Upsilon(2S) \rightarrow \gamma\chi_{b1}(1P))] = (22.8 \pm 0.4 \pm 1.2)\times10^{-3}$ which we divide by our best value $B(\Upsilon(2S) \rightarrow \gamma\chi_{b1}(1P)) = (6.9 \pm 0.4)\times10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M077R1;LINKAGE=KR

[3] LEES 11J reports $[\Gamma(\chi_{b1}(1P) \rightarrow \gamma\Upsilon(1S))/\Gamma_{total}] \times [B(\Upsilon(2S) \rightarrow \gamma\chi_{b1}(1P))] = (24.1 \pm 0.6 \pm 1.5)\times10^{-3}$ which we divide by our best value $B(\Upsilon(2S) \rightarrow \gamma\chi_{b1}(1P)) = (6.9 \pm 0.4)\times10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M077R1;LINKAGE=LE

$\Gamma(D^0 X)/\Gamma_{total}$ — Γ_2/Γ

NODE=M077R01
NODE=M077R01

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
12.6±1.9±1.1	2310	[4] BRIERE	08	CLEO	$\Upsilon(2S) \rightarrow \gamma D^0 X$

[4] 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	[5] ASNER	08A	CLEO	$\Upsilon(2S) \rightarrow \gamma\pi^+\pi^- K^+ K^- \pi^0$

[5] ASNER 08A reports $[\Gamma(\chi_{b1}(1P) \rightarrow \pi^+\pi^- K^+ K^- \pi^0)/\Gamma_{total}] \times [B(\Upsilon(2S) \rightarrow \gamma\chi_{b1}(1P))] = (14 \pm 3 \pm 3)\times10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \rightarrow \gamma\chi_{b1}(1P)) = (6.9 \pm 0.4)\times10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M077R02;LINKAGE=AS

$\Gamma(2\pi^+\pi^- K^- K^0_S)/\Gamma_{total}$ — Γ_4/Γ

NODE=M077R03
NODE=M077R03

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.3±0.5±0.1	11	[6] ASNER	08A	CLEO	$\Upsilon(2S) \rightarrow \gamma 2\pi^+\pi^- K^- K^0_S$

[6] ASNER 08A reports $[\Gamma(\chi_{b1}(1P) \rightarrow 2\pi^+\pi^- K^- K^0_S)/\Gamma_{total}] \times [B(\Upsilon(2S) \rightarrow \gamma\chi_{b1}(1P))] = (9 \pm 3 \pm 2)\times10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \rightarrow \gamma\chi_{b1}(1P)) = (6.9 \pm 0.4)\times10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M077R03;LINKAGE=AS

$\Gamma(2\pi^+\pi^- K^- K^0_S 2\pi^0)/\Gamma_{total}$ — Γ_5/Γ

NODE=M077R04
NODE=M077R04

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<6	90	[7] ASNER	08A	CLEO	$\Upsilon(2S) \rightarrow \gamma 2\pi^+\pi^- K^- 2\pi^0$

[7] ASNER 08A reports $[\Gamma(\chi_{b1}(1P) \rightarrow 2\pi^+\pi^- K^- K^0_S 2\pi^0)/\Gamma_{total}] \times [B(\Upsilon(2S) \rightarrow \gamma\chi_{b1}(1P))] < 42\times10^{-6}$ which we divide by our best value $B(\Upsilon(2S) \rightarrow \gamma\chi_{b1}(1P)) = 6.9\times10^{-2}$. NODE=M077R04;LINKAGE=AS

$\Gamma(2\pi^+2\pi^-2\pi^0)/\Gamma_{total}$ Γ_6/Γ

NODE=M077R05
NODE=M077R05

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
8.0±2.4±0.4	46	[8] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 2\pi^+ 2\pi^- 2\pi^0$

[8] 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
NODE=M077R06

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.5±0.5±0.1	18	[9] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 2\pi^+ 2\pi^- K^+ K^-$

[9] 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
NODE=M077R07

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.5±1.2±0.2	22	[10] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 2\pi^+ 2\pi^- K^+ K^- \pi^0$

[10] 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
NODE=M077R08

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
8.6±3.2±0.4	26	[11] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 2\pi^+ 2\pi^- K^+ K^- 2\pi^0$

[11] 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
NODE=M077R09

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
9.3±3.3±0.5	21	[12] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 3\pi^+ 2\pi^- K^- K^0_S \pi^0$

[12] 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
NODE=M077R10

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.9±0.6±0.1	25	[13] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 3\pi^+ 3\pi^-$

[13] 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	[14] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 3\pi^+ 3\pi^- 2\pi^0$

[14] 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	[15] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 3\pi^+ 3\pi^- K^+ K^-$

[15] 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

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
7.5±2.6±0.4	28	[16] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 3\pi^+ 3\pi^- K^+ K^- \pi^0$

[16] 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

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.6±0.9±0.1	24	[17] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 4\pi^+ 4\pi^-$

[17] 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

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
14±5±1	26	[18] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 4\pi^+ 4\pi^- 2\pi^0$

[18] 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

$\chi_{b1}(1P)$ Cross-Particle Branching Ratios

NODE=M077230

$\Gamma(\chi_{b1}(1P) \to \gamma\Upsilon(1S))/\Gamma_{total} \times \Gamma(\Upsilon(2S) \to \gamma\chi_{b1}(1P))/\Gamma_{total}$ $\Gamma_1/\Gamma \times \Gamma_{13}^{\Upsilon(2S)}/\Gamma^{\Upsilon(2S)}$

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
5.65±0.11±0.27	3222	KORNICER	11	CLEO	$e^+e^- \to \gamma\gamma\ell^+\ell^-$

$B(\chi_{b1}(1P) \to \gamma\Upsilon(1S)) \times B(\Upsilon(3S) \to \gamma\chi_{b1}(1P)) \times B(\Upsilon(1S) \to \ell^+\ell^-)$

NODE=M077B02

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
1.33±0.30±0.23	50	KORNICER	11	CLEO	$e^+e^- \to \gamma\gamma\ell^+\ell^-$

$B(\chi_{b2}(1P) \to pX + \bar{p}X)/B(\chi_{b1}(1P) \to pX + \bar{p}X)$

NODE=M077R20

VALUE	DOCUMENT ID		TECN	COMMENT
1.068±0.010±0.040	BRIERE	07	CLEO	$\Upsilon(2S) \to \gamma\chi_{bJ}(1P)$

$B(\chi_{b0}(1P) \to pX + \bar{p}X)/B(\chi_{b1}(1P) \to pX + \bar{p}X)$

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

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

$h_b(1P)$

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

Quantum numbers are quark model predictions, $C = -$ established by $\eta_b \gamma$ decay.

NODE=M204

$h_b(1P)$ MASS

NODE=M204M

NODE=M204M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
9898.6±1.4 OUR AVERAGE					
$9898.2^{+1.1}_{-1.0}{}^{+1.0}_{-1.1}$	50.0k	ADACHI	12	BELL	10.86 $e^+ e^- \rightarrow \pi^+ \pi^-$ MM
9902 ±4 ±2	10.8k	LEES	11K	BABR	$\Upsilon(3S) \rightarrow \eta_b \gamma \pi^0$

$h_b(1P)$ DECAY MODES

NODE=M204215;NODE=M204

	Mode	Fraction (Γ_i/Γ)
Γ_1	$\eta_b(1S)\gamma$	seen

DESIG=1

$h_b(1P)$ BRANCHING RATIOS

NODE=M204225

$\Gamma(\eta_b(1S)\gamma)/\Gamma_{total}$ **Γ_1/Γ**

NODE=M204R01
NODE=M204R01

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	10.8k	LEES	11K	BABR	$\Upsilon(3S) \rightarrow \eta_b \gamma \pi^0$

$h_b(1P)$ REFERENCES

NODE=M204

ADACHI 12 PRL 108 032001 I. Adachi *et al.* (BELLE Collab.)
LEES 11K PR D84 091101 J.P. Lees *et al.* (BABAR Collab.)

REFID=53962
REFID=53937

NODE=M078

$\chi_{b2}(1P)$

$I^G(J^{PC}) = 0^+(2^{++})$
J needs confirmation.

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.

NODE=M078

$\chi_{b2}(1P)$ MASS

NODE=M078M

NODE=M078M
→ NOT CHECKED ←

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	

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	$\Upsilon(2S) \rightarrow \gamma X$
110.8 ±0.3 ±0.6	EDWARDS	99	CLE2	$\Upsilon(2S) \rightarrow \gamma \chi(1P)$
107.0 ±1.1 ±1.3	WALK	86	CBAL	$\Upsilon(2S) \rightarrow \gamma \gamma \ell^+ \ell^-$
110.6 ±0.3 ±0.9	ALBRECHT	85E	ARG	$\Upsilon(2S) \rightarrow$ conv. γX
110.4 ±0.8 ±2.2	NERNST	85	CBAL	$\Upsilon(2S) \rightarrow \gamma$X
109.5 ±0.7 ±1.0	HAAS	84	CLEO	$\Upsilon(2S) \rightarrow$ conv. γX
108.2 ±0.3 ±2.0	KLOPFEN...	83	CUSB	$\Upsilon(2S) \rightarrow \gamma$X
108.8 ±4.0	PAUSS	83	CUSB	$\Upsilon(2S) \rightarrow \gamma \gamma \ell^+ \ell^-$

$\chi_{b2}(1P)$ DECAY MODES

NODE=M078215;NODE=M078

	Mode	Fraction (Γ_i/Γ)	Confidence level	
Γ_1	$\gamma\Upsilon(1S)$	(19.1 ± 1.2) %		DESIG=1
Γ_2	$D^0 X$	< 7.9 %	90%	DESIG=2
Γ_3	$\pi^+\pi^-K^+K^-\pi^0$	$(8\pm5)\times10^{-5}$		DESIG=3
Γ_4	$2\pi^+\pi^-K^-K^0_S$	$< 1.0\times10^{-4}$	90%	DESIG=4
Γ_5	$2\pi^+\pi^-K^-K^0_S2\pi^0$	$(5.3\pm2.4)\times10^{-4}$		DESIG=5
Γ_6	$2\pi^+2\pi^-2\pi^0$	$(3.5\pm1.4)\times10^{-4}$		DESIG=6
Γ_7	$2\pi^+2\pi^-K^+K^-$	$(1.1\pm0.4)\times10^{-4}$		DESIG=7
Γ_8	$2\pi^+2\pi^-K^+K^-\pi^0$	$(2.1\pm0.9)\times10^{-4}$		DESIG=8
Γ_9	$2\pi^+2\pi^-K^+K^-2\pi^0$	$(3.9\pm1.8)\times10^{-4}$		DESIG=9
Γ_{10}	$3\pi^+2\pi^-K^-K^0_S\pi^0$	$< 5\times10^{-4}$	90%	DESIG=10
Γ_{11}	$3\pi^+3\pi^-$	$(7.0\pm3.1)\times10^{-5}$		DESIG=11
Γ_{12}	$3\pi^+3\pi^-2\pi^0$	$(1.0\pm0.4)\times10^{-3}$		DESIG=12
Γ_{13}	$3\pi^+3\pi^-K^+K^-$	$< 8\times10^{-5}$	90%	DESIG=13
Γ_{14}	$3\pi^+3\pi^-K^+K^-\pi^0$	$(3.6\pm1.5)\times10^{-4}$		DESIG=14
Γ_{15}	$4\pi^+4\pi^-$	$(8\pm4)\times10^{-5}$		DESIG=15
Γ_{16}	$4\pi^+4\pi^-2\pi^0$	$(1.8\pm0.7)\times10^{-3}$		DESIG=16

$\chi_{b2}(1P)$ BRANCHING RATIOS

NODE=M078220

$\Gamma(\gamma\Upsilon(1S))/\Gamma_{total}$ — Γ_1/Γ

NODE=M078R1
NODE=M078R1

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.191 ± 0.012 OUR AVERAGE					
[0.22 ± 0.04 OUR 2011 AVERAGE]					
$0.186\pm0.011\pm0.009$	1770	[1,2] KORNICER	11	CLEO	$e^+e^-\to\gamma\gamma\ell^+\ell^-$
$0.194^{+0.014}_{-0.017}\pm0.009$	8k	[3] LEES	11J	BABR	$\Upsilon(2S)\to X\gamma$
$0.27\pm0.06\pm0.06$		WALK	86	CBAL	$\Upsilon(2S)\to\gamma\gamma\ell^+\ell^-$
0.20 ± 0.05		KLOPFEN...	83	CUSB	$\Upsilon(2S)\to\gamma\gamma\ell^+\ell^-$

NEW

[1] Assuming B($\Upsilon(1S)\to\ell^+\ell^-$) = (2.48 ± 0.05)%. NODE=M078R1;LINKAGE=KA

[2] 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

[3] 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

$\Gamma(D^0X)/\Gamma_{total}$ — Γ_2/Γ

NODE=M078R01
NODE=M078R01

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<7.9\times10^{-2}$	90	[4,5] BRIERE	08	CLEO	$\Upsilon(2S)\to\gamma D^0X$

[4] For $p_{D^0} > 2.5$ GeV/c. NODE=M078R01;LINKAGE=BR

[5] 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
$0.84\pm0.50\pm0.04$	8	[6] ASNER	08A	CLEO	$\Upsilon(2S)\to\gamma\pi^+\pi^-K^+K^-\pi^0$

[6] 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	[7] ASNER	08A	CLEO	$\Upsilon(2S)\to\gamma2\pi^+\pi^-K^-K^0_S$

[7] 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($\Upsilon(2S)\to\gamma\chi_{b2}(1P)$) = 7.15×10^{-2}. NODE=M078R03;LINKAGE=AS

$\Gamma(2\pi^+\pi^- K^- K^0_S 2\pi^0)/\Gamma_{total}$ — Γ_5/Γ

NODE=M078R04

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
5.3±2.4±0.3	11	[8] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 2\pi^+\pi^- K^- 2\pi^0$

[8] ASNER 08A reports $[\Gamma(\chi_{b2}(1P) \to 2\pi^+\pi^- K^- K^0_S 2\pi^0)/\Gamma_{total}] \times [B(\Upsilon(2S) \to \gamma\chi_{b2}(1P))] = (38 \pm 14 \pm 10) \times 10^{-6}$ 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	[9] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 2\pi^+ 2\pi^- 2\pi^0$

[9] 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	[10] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 2\pi^+ 2\pi^- K^+ K^-$

[10] 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	[11] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 2\pi^+ 2\pi^- K^+ K^- \pi^0$

[11] 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	[12] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 2\pi^+ 2\pi^- K^+ K^- 2\pi^0$

[12] 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	[13] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 3\pi^+ 2\pi^- K^- K^0_S \pi^0$

[13] 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	[14] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 3\pi^+ 3\pi^-$

[14] 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	[15] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 3\pi^+ 3\pi^- 2\pi^0$

[15] 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
NODE=M078R12

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.8	90	[16] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 3\pi^+ 3\pi^- K^+ K^-$

[16] 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
NODE=M078R13

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.6±1.5±0.2	14	[17] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 3\pi^+ 3\pi^- K^+ K^- \pi^0$

[17] 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
NODE=M078R14

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.84±0.40±0.04	7	[18] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 4\pi^+ 4\pi^-$

[18] 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
NODE=M078R15

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
18±7±1	29	[19] ASNER	08A	CLEO	$\Upsilon(2S) \to \gamma 4\pi^+ 4\pi^- 2\pi^0$

[19] 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

$\chi_{b2}(1P)$ Cross-Particle Branching Ratios

NODE=M078230

$\Gamma(\chi_{b2}(1P) \to \gamma \Upsilon(1S))/\Gamma_{total} \times \Gamma(\Upsilon(2S) \to \gamma \chi_{b2}(1P))/\Gamma_{total}$ $\Gamma_1/\Gamma \times \Gamma_{14}^{\Upsilon(2S)}/\Gamma^{\Upsilon(2S)}$

NODE=M078B03
NODE=M078B03

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
$13.9\pm0.5^{+0.9}_{-1.1}$	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
NODE=M078B01

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.29±0.09±0.16	1770	KORNICER	11	CLEO	$e^+ e^- \to \gamma\gamma \ell^+ \ell^-$

$B(\chi_{b2}(1P) \to \gamma \Upsilon(1S)) \times B(\Upsilon(3S) \to \gamma \chi_{b2}(1P)) \times B(\Upsilon(1S) \to \ell^+ \ell^-)$

NODE=M078B02
NODE=M078B02

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
3.56±0.40±0.41	126	KORNICER	11	CLEO	$e^+ e^- \to \gamma\gamma \ell^+ \ell^-$

$\chi_{b2}(1P)$ REFERENCES

NODE=M078

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=M052

$\Upsilon(2S)$

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

$\Upsilon(2S)$ MASS

NODE=M052M

NODE=M052M

VALUE (GeV)		DOCUMENT ID		TECN	COMMENT
10.02326±0.00031 OUR AVERAGE					
10.0235 ±0.0005	[1]	ARTAMONOV	00	MD1	$e^+e^- \to$ hadrons
10.0231 ±0.0004		BARBER	84	REDE	$e^+e^- \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
10.0236 ±0.0005	[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"

→ NOT CHECKED ←

$\Upsilon(2S)$ DECAY MODES

NODE=M052215;NODE=M052

	Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	
Γ_1	$\Upsilon(1S)\pi^+\pi^-$	(17.92± 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	$\Upsilon(1S)\pi^0$	< 1.8 $\times 10^{-4}$	CL=90%	DESIG=10
Γ_7	$\Upsilon(1S)\eta$	(2.34± 0.31) $\times 10^{-4}$		DESIG=6
Γ_8	$J/\psi(1S)$ anything	< 6 $\times 10^{-3}$	CL=90%	DESIG=20
Γ_9	$\overline{d}$ anything	(3.4 ± 0.6) $\times 10^{-5}$		DESIG=16
Γ_{10}	hadrons	(94 ±11) %		DESIG=101
Γ_{11}	ggg	(58.8 ± 1.2) %		DESIG=105
Γ_{12}	γgg	(8.8 ± 1.1) %		DESIG=106
	Radiative decays			NODE=M052;CLUMP=A
Γ_{13}	$\gamma\chi_{b1}(1P)$	(6.9 ± 0.4) %		DESIG=8
Γ_{14}	$\gamma\chi_{b2}(1P)$	(7.15± 0.35) %		DESIG=7
Γ_{15}	$\gamma\chi_{b0}(1P)$	(3.8 ± 0.4) %		DESIG=9
Γ_{16}	$\gamma f_0(1710)$	< 5.9 $\times 10^{-4}$	CL=90%	DESIG=13
Γ_{17}	$\gamma f'_2(1525)$	< 5.3 $\times 10^{-4}$	CL=90%	DESIG=12
Γ_{18}	$\gamma f_2(1270)$	< 2.41 $\times 10^{-4}$	CL=90%	DESIG=11
Γ_{19}	$\gamma f_J(2220)$			DESIG=14
Γ_{20}	$\gamma\eta_c(1S)$	< 2.7 $\times 10^{-5}$	CL=90%	DESIG=111
Γ_{21}	$\gamma\chi_{c0}$	< 1.0 $\times 10^{-4}$	CL=90%	DESIG=112
Γ_{22}	$\gamma\chi_{c1}$	< 3.6 $\times 10^{-6}$	CL=90%	DESIG=113
Γ_{23}	$\gamma\chi_{c2}$	< 1.5 $\times 10^{-5}$	CL=90%	DESIG=114
Γ_{24}	$\gamma X(3872) \to \pi^+\pi^- J/\psi$	< 8 $\times 10^{-7}$	CL=90%	DESIG=115
Γ_{25}	$\gamma X(3872) \to \pi^+\pi^-\pi^0 J/\psi$	< 2.4 $\times 10^{-6}$	CL=90%	DESIG=116
Γ_{26}	$\gamma X(3915) \to \omega J/\psi$	< 2.8 $\times 10^{-6}$	CL=90%	DESIG=117
Γ_{27}	$\gamma X(4140) \to \phi J/\psi$	< 1.2 $\times 10^{-6}$	CL=90%	DESIG=118
Γ_{28}	$\gamma X(4350) \to \phi J/\psi$	< 1.3 $\times 10^{-6}$	CL=90%	DESIG=119
Γ_{29}	$\gamma\eta_b(1S)$	(3.9 ± 1.5) $\times 10^{-4}$		DESIG=102
Γ_{30}	$\gamma X \to \gamma + \geq 4$ prongs	[a] < 1.95 $\times 10^{-4}$	CL=95%	DESIG=103
Γ_{31}	$\gamma A^0 \to \gamma$ hadrons	< 8 $\times 10^{-5}$	CL=90%	DESIG=108

Lepton Family number (LF) violating modes

NODE=M052;CLUMP=B

Γ_{32}	$e^{\pm}\tau^{\mp}$	LF	$<$ 3.2	$\times 10^{-6}$	CL=90%
Γ_{33}	$\mu^{\pm}\tau^{\mp}$	LF	$<$ 3.3	$\times 10^{-6}$	CL=90%

DESIG=107
DESIG=104

[a] 1.5 GeV $< m_X <$ 5.0 GeV

LINKAGE=C52

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

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	$e^+e^- \rightarrow \mu^+\mu^-$

$\Gamma(\Upsilon(1S)\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_1\Gamma_5/\Gamma$

NODE=M052G03
NODE=M052G03

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
105.4±1.0±4.2	11.8K	[4] AUBERT	08BP	BABR	10.58 $e^+e^- \rightarrow \gamma\pi^+\pi^-\ell^+\ell^-$

[4] Using B($\Upsilon(1S) \rightarrow e^+e^-$) = (2.38 ± 0.11)% and B($\Upsilon(1S) \rightarrow \mu^+\mu^-$) = (2.48 ± 0.05)%.

NODE=M052G03;LINKAGE=AU

$\Gamma(\text{hadrons}) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{10}\Gamma_5/\Gamma$

NODE=M052G2
NODE=M052G2

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
0.577±0.009 OUR AVERAGE				
0.581±0.004±0.009	[5] ROSNER	06	CLEO	10.0 $e^+e^- \rightarrow$ hadrons
0.552±0.031±0.017	[5] BARU	96	MD1	$e^+e^- \rightarrow$ hadrons
0.54 ±0.04 ±0.02	[5] JAKUBOWSKI	88	CBAL	$e^+e^- \rightarrow$ hadrons
0.58 ±0.03 ±0.04	[6] GILES	84B	CLEO	$e^+e^- \rightarrow$ hadrons
0.60 ±0.12 ±0.07	[6] ALBRECHT	82	DASP	$e^+e^- \rightarrow$ hadrons
0.54 ±0.07 $^{+0.09}_{-0.05}$	[6] NICZYPORUK	81C	LENA	$e^+e^- \rightarrow$ hadrons
0.41 ±0.18	[6] BOCK	80	CNTR	$e^+e^- \rightarrow$ hadrons

[5] Radiative corrections evaluated following KURAEV 85.
[6] 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	

→ NOT CHECKED ←

$\Upsilon(2S)$ 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

NEW

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
17.92±0.26 OUR AVERAGE					
[(18.1 ± 0.4) × 10^{-2} OUR 2011 AVERAGE]					
16.8 ±1.1 ±1.3	906k	[7] LEES	11C	BABR	$e^+e^- \rightarrow \pi^+\pi^- X$
17.80±0.05±0.37	170k	[8] LEES	11L	BABR	$\Upsilon(2S) \rightarrow \pi^+\pi^-\mu^+\mu^-$
18.02±0.02±0.61	851k	[9] BHARI	09	CLEO	$e^+e^- \rightarrow \pi^+\pi^-$ MM
17.22±0.17±0.75	11.8K	[10] AUBERT	08BP	BABR	$e^+e^- \rightarrow \gamma\pi^+\pi^-\ell^+\ell^-$
19.2 ±0.2 ±1.0	52.6k	[11] 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	$e^+e^- \rightarrow \ell^+\ell^-\pi^+\pi^-$

[7] 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($\Upsilon(3S) \rightarrow \Upsilon(2S)$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

[8] Using B($\Upsilon(1S) \rightarrow \mu^+\mu^-$) = (2.48 ± 0.05)%.
[9] A weighted average of the inclusive and exclusive results.
[10] Using B($\Upsilon(2S) \rightarrow e^+e^-$) = (1.91 ± 0.16)%, B($\Upsilon(2S) \rightarrow \mu^+\mu^-$) = (1.93 ± 0.17)% and, $\Gamma_{ee}(\Upsilon(2S))$ = 0.612 ± 0.011 keV.
[11] Using B($\Upsilon(1S) \rightarrow e^+e^-$) = (2.52 ± 0.17)% and B($\Upsilon(1S) \rightarrow \mu^+\mu^-$) = (2.48 ± 0.07)%.

NODE=M052R4;LINKAGE=LE
NODE=M052R4;LINKAGE=BH
NODE=M052R4;LINKAGE=AU
NODE=M052R4;LINKAGE=T

$\Gamma(\Upsilon(1S)\pi^0\pi^0)/\Gamma_{total}$ — Γ_2/Γ

NODE=M052R5

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
8.6 ±0.4 OUR AVERAGE				
8.43±0.16±0.42	38k	[12] BHARI 09	CLEO	$e^+e^- \to \pi^0\pi^0\ell^+\ell^-$
9.2 ±0.6 ±0.8	275	[13] ALEXANDER 98	CLE2	$e^+e^- \to \pi^0\pi^0\ell^+\ell^-$
9.5 ±1.9 ±1.9	25	ALBRECHT 87	ARG	$e^+e^- \to \pi^0\pi^0\ell^+\ell^-$
8.0 ±1.5		GELPHMAN 85	CBAL	$e^+e^- \to \pi^0\pi^0\ell^+\ell^-$
10.3 ±2.3		FONSECA 84	CUSB	$e^+e^- \to \pi^0\pi^0\ell^+\ell^-$

[12] Authors assume $B(\Upsilon(1S) \to e^+e^-) + B(\Upsilon(1S) \to \mu^+\mu^-) = 4.96\%$. NODE=M052R5;LINKAGE=BH

[13] Using $B(\Upsilon(1S) \to e^+e^-) = (2.52 \pm 0.17)\%$ and $B(\Upsilon(1S) \to \mu^+\mu^-) = (2.48 \pm 0.07)\%$. NODE=M052R5;LINKAGE=T

$\Gamma(\Upsilon(1S)\pi^0\pi^0)/\Gamma(\Upsilon(1S)\pi^+\pi^-)$ — Γ_2/Γ_1

NODE=M052R21

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.462±0.037	[14] BHARI 09	CLEO	$e^+e^- \to \Upsilon(2S)$

[14] Not independent of other values reported by BHARI 09. NODE=M052R21;LINKAGE=BH

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

NODE=M052R3

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
2.00±0.21 OUR AVERAGE				
2.00±0.12±0.18	22k	[15] BESSON 07	CLEO	$e^+e^- \to \Upsilon(2S) \to \tau^+\tau^-$
1.7 ±1.5 ±0.6		HAAS 84B	CLEO	$e^+e^- \to \tau^+\tau^-$

[15] BESSON 07 reports $[\Gamma(\Upsilon(2S) \to \tau^+\tau^-)/\Gamma_{total}] / [B(\Upsilon(2S) \to \mu^+\mu^-)] = 1.04 \pm 0.04 \pm 0.05$ which we multiply 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=M052R3;LINKAGE=BE

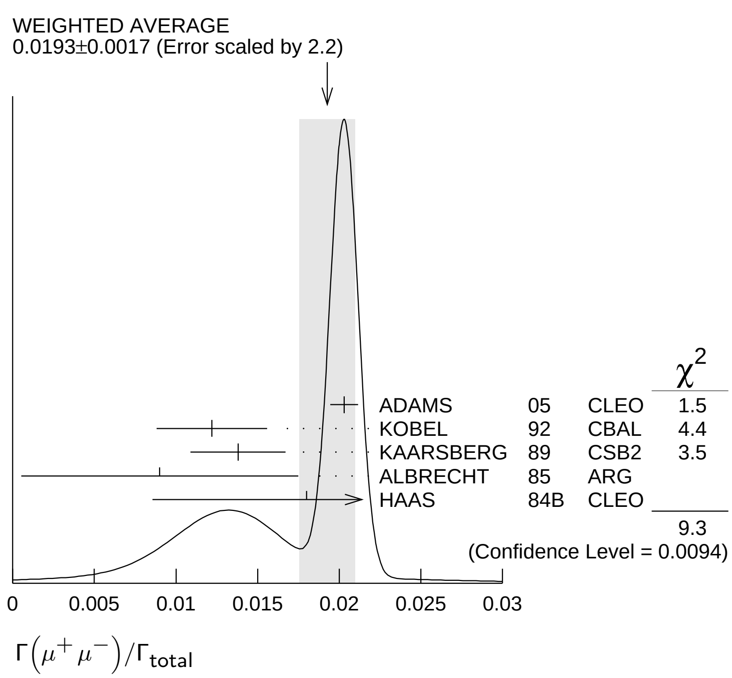
$\Gamma(\mu^+\mu^-)/\Gamma_{total}$ — Γ_4/Γ

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	$e^+e^- \to \mu^+\mu^-$
0.0122±0.0028±0.0019			[16] KOBEL 92	CBAL	$e^+e^- \to \mu^+\mu^-$
0.0138±0.0025±0.0015			KAARSBERG 89	CSB2	$e^+e^- \to \mu^+\mu^-$
0.009 ±0.006 ±0.006			[17] ALBRECHT 85	ARG	$e^+e^- \to \mu^+\mu^-$
0.018 ±0.008 ±0.005			HAAS 84B	CLEO	$e^+e^- \to \mu^+\mu^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.038	90		NICZYPORUK 81C	LENA	$e^+e^- \to \mu^+\mu^-$

[16] Taking into account interference between the resonance and continuum. NODE=M052R1;LINKAGE=A

[17] Re-evaluated using $B(\Upsilon(1S) \to \mu^+\mu^-) = 0.026$. 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^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.18	90	[18] HE	08A	CLEO	$e^+e^- \to \ell^+\ell^-\gamma\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.1	90	ALEXANDER	98	CLE2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$
<8	90	LURZ	87	CBAL	$e^+e^- \to \ell^+\ell^-\gamma\gamma$

[18] Authors assume $B(\Upsilon(1S) \to e^+e^-) + B(\Upsilon(1S) \to \mu^+\mu^-) = 4.96\%$.

NODE=M052R10;LINKAGE=HE

$\Gamma(\Upsilon(1S)\eta)/\Gamma_{total}$ Γ_7/Γ

NODE=M052R6

NEW

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
2.34±0.31 OUR AVERAGE						
$[(0.21^{+0.08}_{-0.07}) \times 10^{-3}$ OUR 2011 AVERAGE]						
2.39±0.31±0.14		112	[19] LEES	11L	BABR	$\Upsilon(2S) \to \ell^+\ell^-\eta$
$2.1\ ^{+0.7}_{-0.6}\ \pm0.3$		14	[20] HE	08A	CLEO	$e^+e^- \to \ell^+\ell^-\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 9	90		[19,21] 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	$e^+e^- \to \ell^+\ell^-(\gamma\gamma,\pi^+\pi^-\pi^0)$

[19] 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=M052R6;LINKAGE=AU

[20] Authors assume $B(\Upsilon(1S) \to e^+e^-) + B(\Upsilon(1S) \to \mu^+\mu^-) = 4.96\%$.

NODE=M052R6;LINKAGE=HE

[21] Using $\Gamma_{ee}(\Upsilon(2S)) = 0.612 \pm 0.011$ keV.

NODE=M052R6;LINKAGE=UB

$\Gamma(\Upsilon(1S)\eta)/\Gamma(\Upsilon(1S)\pi^+\pi^-)$ Γ_7/Γ_1

NODE=M052R22

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.35±0.17±0.08		[22] LEES	11L	BABR	$\Upsilon(2S) \to (\pi^+\pi^-)(\gamma\gamma)\mu^+\mu^-$
<5.2	90	[23] AUBERT	08BP	BABR	$e^+e^- \to \gamma\pi^+\pi^-(\pi^0)\ell^+\ell^-$

[22] Not independent of other values reported by LEES 11L.

NODE=M052R22;LINKAGE=LE

[23] Not independent of other values reported by AUBERT 08BP.

NODE=M052R22;LINKAGE=AU

$\Gamma(J/\psi(1S)$ anything$)/\Gamma_{total}$ Γ_8/Γ

NODE=M052R16

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.006	90	MASCHMANN	90	CBAL	$e^+e^- \to$ hadrons

$\Gamma(\overline{d}$ anything$)/\Gamma_{total}$ Γ_9/Γ

NODE=M052R18

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
3.37±0.50±0.25	58	ASNER	07	CLEO	$e^+e^- \to \overline{d}X$

$\Gamma(ggg)/\Gamma_{total}$ Γ_{11}/Γ

NODE=M052R01

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
58.8±1.2	6M	[24] BESSON	06A	CLEO	$\Upsilon(2S) \to$ hadrons

[24] Calculated using the value $\Gamma(\gamma gg)/\Gamma(ggg) = (3.18 \pm 0.04 \pm 0.22 \pm 0.41)\%$ from BESSON 06A and PDG 08 values of $B(\pi^+\pi^-\ \Upsilon(1S)) = (18.1 \pm 0.4)\%$, $B(\pi^0\pi^0\ \Upsilon(1S)) = (8.6 \pm 0.4)\%$, $B(\mu^+\mu^-) = (1.93 \pm 0.17)\%$, 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=M052R01;LINKAGE=BE

$\Gamma(\gamma gg)/\Gamma_{total}$ Γ_{12}/Γ

NODE=M052R02

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
8.79±1.05	100k	[25] BESSON	06A	CLEO	$\Upsilon(2S) \to \gamma +$ hadrons

[25] Calculated using BESSON 06A values of $\Gamma(\gamma gg)/\Gamma(ggg) = (3.18 \pm 0.04 \pm 0.22 \pm 0.41)\%$ and $\Gamma(ggg)/\Gamma_{total}$. The statistical error is negligible and the systematic error is partially correlated with that of $\Gamma(ggg)/\Gamma_{total}$ measurement of BESSON 06A.

NODE=M052R02;LINKAGE=BE

$\Gamma(\gamma gg)/\Gamma(ggg)$ — Γ_{12}/Γ_{11}

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

$\Gamma(\gamma\chi_{b1}(1P))/\Gamma_{total}$ — Γ_{13}/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

$\Gamma(\gamma\chi_{b2}(1P))/\Gamma_{total}$ — Γ_{14}/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

$\Gamma(\gamma\chi_{b0}(1P))/\Gamma_{total}$ — Γ_{15}/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

$\Gamma(\gamma f_0(1710))/\Gamma_{total}$ — Γ_{16}/Γ

NODE=M052R13

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<59	90	[26] ALBRECHT	89	ARG	$\Upsilon(2S) \to \gamma K^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 5.9	90	[27] ALBRECHT	89	ARG	$\Upsilon(2S) \to \gamma\pi^+\pi^-$

OCCUR=2

[26] Re-evaluated assuming B($f_0(1710) \to K^+K^-$) = 0.19. NODE=M052R13;LINKAGE=M

[27] Includes unknown branching ratio of $f_0(1710) \to \pi^+\pi^-$. NODE=M052R13;LINKAGE=N

$\Gamma(\gamma f'_2(1525))/\Gamma_{total}$ — Γ_{17}/Γ

NODE=M052R12

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<53	90	[28] ALBRECHT	89	ARG	$\Upsilon(2S) \to \gamma K^+K^-$

[28] Re-evaluated assuming B($f'_2(1525) \to K\overline{K}$) = 0.71. NODE=M052R12;LINKAGE=L

$\Gamma(\gamma f_2(1270))/\Gamma_{total}$ — Γ_{18}/Γ

NODE=M052R11

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<24.1	90	[29] ALBRECHT	89	ARG	$\Upsilon(2S) \to \gamma\pi^+\pi^-$

[29] Using B($f_2(1270) \to \pi\pi$) = 0.84. NODE=M052R11;LINKAGE=K

$\Gamma(\gamma f_J(2220))/\Gamma_{total}$ — Γ_{19}/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	[30] ALBRECHT	89	ARG	$\Upsilon(2S) \to \gamma K^+K^-$

[30] Includes unknown branching ratio of $f_J(2220) \to K^+K^-$. NODE=M052R14;LINKAGE=S

$\Gamma(\gamma\eta_b(1S))/\Gamma_{total}$ Γ_{29}/Γ

NODE=M052R15
NODE=M052R15

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$3.9\pm1.1^{+1.1}_{-0.9}$		13 ± 5k	[31] 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		[31] BONVICINI	10	CLEO	$\Upsilon(2S)\to\gamma X$
<5.1	90		[32] ARTUSO	05	CLEO	$e^+e^-\to\gamma X$

[31] Assuming $\Gamma_{\eta_b(1S)}$ = 10 MeV.
[32] Superseded by BONVICINI 10.

NODE=M052R15;LINKAGE=BO
NODE=M052R15;LINKAGE=SU

$\Gamma(\gamma\eta_c(1S))/\Gamma_{total}$ Γ_{20}/Γ

NODE=M052R31
NODE=M052R31

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.7\times10^{-5}$	90	WANG	11B	BELL	$\Upsilon(2S)\to\gamma X$

$\Gamma(\gamma\chi_{c0})/\Gamma_{total}$ Γ_{21}/Γ

NODE=M052R32
NODE=M052R32

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.0\times10^{-4}$	90	WANG	11B	BELL	$\Upsilon(2S)\to\gamma X$

$\Gamma(\gamma\chi_{c1})/\Gamma_{total}$ Γ_{22}/Γ

NODE=M052R33
NODE=M052R33

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<3.6\times10^{-6}$	90	WANG	11B	BELL	$\Upsilon(2S)\to\gamma X$

$\Gamma(\gamma\chi_{c2})/\Gamma_{total}$ Γ_{23}/Γ

NODE=M052R34
NODE=M052R34

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.5\times10^{-5}$	90	WANG	11B	BELL	$\Upsilon(2S)\to\gamma X$

$\Gamma(\gamma X(3872)\to\pi^+\pi^-J/\psi)/\Gamma_{total}$ Γ_{24}/Γ

NODE=M052R35
NODE=M052R35

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<0.8\times10^{-6}$	90	WANG	11B	BELL	$\Upsilon(2S)\to\gamma X$

$\Gamma(\gamma X(3872)\to\pi^+\pi^-\pi^0J/\psi)/\Gamma_{total}$ Γ_{25}/Γ

NODE=M052R36
NODE=M052R36

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.4\times10^{-6}$	90	WANG	11B	BELL	$\Upsilon(2S)\to\gamma X$

$\Gamma(\gamma X(3915)\to\omega J/\psi)/\Gamma_{total}$ Γ_{26}/Γ

NODE=M052R37
NODE=M052R37

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.8\times10^{-6}$	90	WANG	11B	BELL	$\Upsilon(2S)\to\gamma X$

$\Gamma(\gamma X(4140)\to\phi J/\psi)/\Gamma_{total}$ Γ_{27}/Γ

NODE=M052R38
NODE=M052R38

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.2\times10^{-6}$	90	WANG	11B	BELL	$\Upsilon(2S)\to\gamma X$

$\Gamma(\gamma X(4350)\to\phi J/\psi)/\Gamma_{total}$ Γ_{28}/Γ

NODE=M052R39
NODE=M052R39

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.3\times10^{-6}$	90	WANG	11B	BELL	$\Upsilon(2S)\to\gamma X$

$\Gamma(\gamma X\to\gamma+\geq 4\text{ prongs})/\Gamma_{total}$ Γ_{30}/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	$e^+e^-\to\gamma X$

$\Gamma(\gamma A^0\to\gamma\,\text{hadrons})/\Gamma_{total}$ Γ_{31}/Γ

NODE=M052R06

(0.3 GeV $< m_{A^0} <$ 7 GeV)

NODE=M052R06
NODE=M052R06

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<8\times10^{-5}$	90	[33] LEES	11H	BABR	$\Upsilon(2S)\to\gamma$ hadrons

[33] 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

LEPTON FAMILY NUMBER (*LF*) VIOLATING MODES

NODE=M052230

$\Gamma(e^\pm\tau^\mp)/\Gamma_{total}$ Γ_{32}/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_{33}/Γ

NODE=M052R20
NODE=M052R20

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
< 3.3	90	LEES	10B	BABR	$e^+e^- \rightarrow \mu^{\pm}\tau^{\mp}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<14.4	95	LOVE	08A	CLEO	$e^+e^- \rightarrow \mu^{\pm}\tau^{\mp}$

$\Upsilon(2S)$ Cross-Particle Branching Ratios

NODE=M052240

$B(\Upsilon(2S) \rightarrow \pi^+\pi^-) \times B(\Upsilon(3S) \rightarrow \Upsilon(2S)X)$

NODE=M052R05
NODE=M052R05

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
1.78±0.02±0.11	906k	LEES	11C	BABR	$e^+e^- \rightarrow \pi^+\pi^- X$

$\Upsilon(2S)$ REFERENCES

NODE=M052

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 031104R	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
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.*	(DESY, ARGUS Collab.+)	REFID=22327
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

$\Upsilon(1D)$

$I^G(J^{PC}) = 0^-(2^{--})$

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.

$\Upsilon(1D)$ 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	$\Upsilon(3S) \to 4\gamma\ell^+\ell^-$

$\Upsilon(1D)$ DECAY MODES

NODE=M177215;NODE=M177

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\gamma\gamma\,\Upsilon(1S)$	seen	DESIG=1;OUR EVAL;→ NOT CHECKED ←
Γ_2	$\gamma\chi_{bJ}(1P)$	seen	DESIG=2;OUR EVAL;→ NOT CHECKED ←
Γ_3	$\eta\,\Upsilon(1S)$	not seen	DESIG=3;OUR EVAL;→ NOT CHECKED ←
Γ_4	$\pi^+\pi^-\,\Upsilon(1S)$	$(6.6\pm1.6)\times10^{-3}$	DESIG=4

$\Upsilon(1D)$ 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($\chi_{bJ}(2P) \to \gamma\,\Upsilon(1D)$).

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

$\Upsilon(1D)$ 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 (GeV)	*DOCUMENT ID*
10.2325±0.0004±0.0005 OUR EVALUATION	From γ energy below, using $\Upsilon(3S)$ mass = 10355.2 ± 0.5 MeV

NODE=M079M
→ NOT CHECKED ←

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	$e^+e^- \to \gamma X$

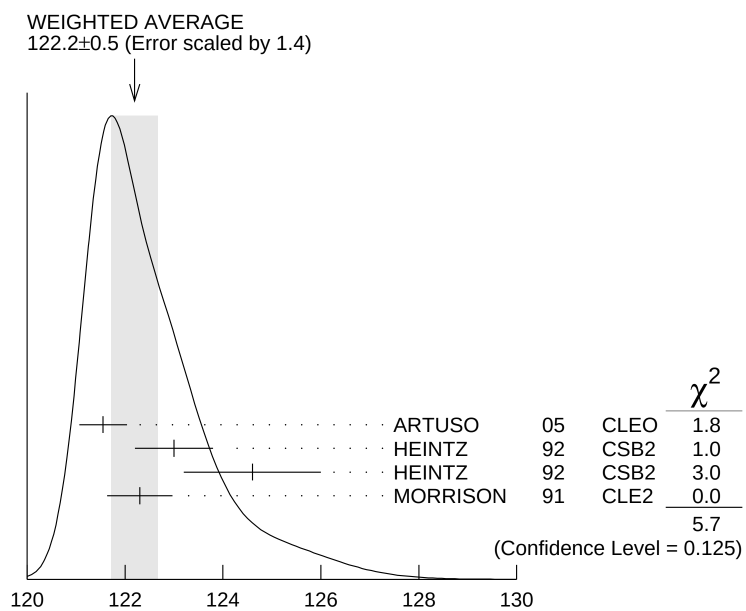
NODE=M079DM
→ NOT CHECKED ←
OCCUR=2

[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	$\gamma\,\Upsilon(2S)$	(4.6 ± 2.1) %		DESIG=2
Γ_2	$\gamma\,\Upsilon(1S)$	$(9\ \pm6\ )\times10^{-3}$		DESIG=1
Γ_3	$D^0 X$	<8.2 %	90%	DESIG=3
Γ_4	$\pi^+\pi^-K^+K^-\pi^0$	$<3.4\times10^{-5}$	90%	DESIG=4
Γ_5	$2\pi^+\pi^-K^-K^0_S$	$<5\times10^{-5}$	90%	DESIG=5
Γ_6	$2\pi^+\pi^-K^-K^0_S2\pi^0$	$<2.2\times10^{-4}$	90%	DESIG=6
Γ_7	$2\pi^+2\pi^-2\pi^0$	$<2.4\times10^{-4}$	90%	DESIG=7
Γ_8	$2\pi^+2\pi^-K^+K^-$	$<1.5\times10^{-4}$	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

$\Gamma(\gamma\Upsilon(2S))/\Gamma_{total}$ — Γ_1/Γ

NODE=M079R2
NODE=M079R2

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
0.046±0.020±0.007		[3] HEINTZ	92	CSB2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.028	90	[4] LEES	11J	BABR	$\Upsilon(3S) \to X\gamma$
<0.089	90	[5] CRAWFORD	92B	CLE2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$

[3] Using B($\Upsilon(2S) \to \mu^+\mu^-$) = (1.44 ± 0.10)%, B($\Upsilon(3S) \to \gamma\chi_{b0}(2P)$) = (6.0 ± 0.4 ± 0.6)% and assuming $e\mu$ universality. Supersedes HEINTZ 91. NODE=M079R2;LINKAGE=C

[4] LEES 11J quotes a central value of $\Gamma(\chi_{b0}(2P) \to \gamma\Upsilon(2S))/\Gamma_{total} \times \Gamma(\Upsilon(3S) \to \gamma\chi_{b0}(2P))/\Gamma_{total} = (-0.3 \pm 0.2^{+0.5}_{-0.4})$%. NODE=M079R2;LINKAGE=LE

[5] 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

$\Gamma(\gamma\Upsilon(1S))/\Gamma_{total}$ — Γ_2/Γ

NODE=M079R1
NODE=M079R1

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
0.009±0.006±0.001		[6] HEINTZ	92	CSB2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.012	90	[7] LEES	11J	BABR	$\Upsilon(3S) \to X\gamma$
<0.025	90	[8] CRAWFORD	92B	CLE2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$

[6] Using B($\Upsilon(1S) \to \mu^+\mu^-$) = (2.57 ± 0.07)%, B($\Upsilon(3S) \to \gamma\chi_{b0}(2P)$) = (6.0 ± 0.4 ± 0.6)% and assuming $e\mu$ universality. Supersedes HEINTZ 91. NODE=M079R1;LINKAGE=C

[7] LEES 11J quotes a central value of $\Gamma(\chi_{b0}(2P) \to \gamma\Upsilon(1S))/\Gamma_{total} \times \Gamma(\Upsilon(3S) \to \gamma\chi_{b0}(2P))/\Gamma_{total} = (3.9 \pm 2.2^{+1.2}_{-0.6}) \times 10^{-4}$. NODE=M079R1;LINKAGE=LE

[8] 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

$\Gamma(D^0 X)/\Gamma_{total}$ — Γ_3/Γ

NODE=M079R01
NODE=M079R01

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<8.2 × 10⁻²	90	[9,10] BRIERE	08	CLEO	$\Upsilon(3S) \to \gamma D^0 X$

[9] For $p_{D^0} > 2.5$ GeV/c. NODE=M079R01;LINKAGE=BR

[10] The authors also present their result as $(4.1 \pm 3.0 \pm 0.4) \times 10^{-2}$. 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	[11] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma\pi^+\pi^- K^+ K^- \pi^0$

[11] 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($\Upsilon(3S) \to \gamma\chi_{b0}(2P)$) = 5.9×10^{-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	[12] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 2\pi^+\pi^- K^- K^0_S$

[12] 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($\Upsilon(3S) \to \gamma\chi_{b0}(2P)$) = 5.9×10^{-2}. NODE=M079R03;LINKAGE=AS

$\Gamma(2\pi^+\pi^-K^-K^0_S 2\pi^0)/\Gamma_{total}$ Γ_6/Γ

NODE=M079R04

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<2.2	90	[13] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 2\pi^+\pi^-K^-2\pi^0$

[13] 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

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<2.4	90	[14] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 2\pi^+2\pi^-2\pi^0$

[14] 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

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.5	90	[15] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 2\pi^+2\pi^-K^+K^-$

[15] 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

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<2.2	90	[16] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 2\pi^+2\pi^-K^+K^-\pi^0$

[16] 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

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<11	90	[17] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 2\pi^+2\pi^-K^+K^-2\pi^0$

[17] 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

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<7	90	[18] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 3\pi^+2\pi^-K^-K^0_S\pi^0$

[18] 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

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.7	90	[19] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 3\pi^+3\pi^-$

[19] 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

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<12	90	[20] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 3\pi^+3\pi^-2\pi^0$

[20] 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

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.5	90	[21] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 3\pi^+3\pi^-K^+K^-$

[21] 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	[22] ASNER	08A	CLEO	$\Upsilon(3S) \rightarrow \gamma 3\pi^+ 3\pi^- K^+ K^- \pi^0$

[22] ASNER 08A reports $[\Gamma(\chi_{b0}(2P) \rightarrow 3\pi^+ 3\pi^- K^+ K^- \pi^0)/\Gamma_{total}] \times [B(\Upsilon(3S) \rightarrow \gamma \chi_{b0}(2P))] < 43 \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \rightarrow \gamma \chi_{b0}(2P)) = 5.9 \times 10^{-2}$.

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	[23] ASNER	08A	CLEO	$\Upsilon(3S) \rightarrow \gamma 4\pi^+ 4\pi^-$

[23] ASNER 08A reports $[\Gamma(\chi_{b0}(2P) \rightarrow 4\pi^+ 4\pi^-)/\Gamma_{total}] \times [B(\Upsilon(3S) \rightarrow \gamma \chi_{b0}(2P))] < 10 \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \rightarrow \gamma \chi_{b0}(2P)) = 5.9 \times 10^{-2}$.

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	[24] ASNER	08A	CLEO	$\Upsilon(3S) \rightarrow \gamma 4\pi^+ 4\pi^- 2\pi^0$

[24] ASNER 08A reports $[\Gamma(\chi_{b0}(2P) \rightarrow 4\pi^+ 4\pi^- 2\pi^0)/\Gamma_{total}] \times [B(\Upsilon(3S) \rightarrow \gamma \chi_{b0}(2P))] < 38 \times 10^{-6}$ which we divide by our best value $B(\Upsilon(3S) \rightarrow \gamma \chi_{b0}(2P)) = 5.9 \times 10^{-2}$.

NODE=M079R15;LINKAGE=AS

$\Gamma(\chi_{b0}(2P) \rightarrow \gamma \Upsilon(1S))/\Gamma_{total} \times \Gamma(\Upsilon(3S) \rightarrow \gamma \chi_{b0}(2P))/\Gamma_{total}$ $\Gamma_2/\Gamma \times \Gamma_{21}^{\Upsilon(3S)}/\Gamma^{\Upsilon(3S)}$

NODE=M079B01
NODE=M079B01

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<8.2	90	[25] LEES	11J	BABR	$\Upsilon(3S) \rightarrow X \gamma$

[25] LEES 11J quotes a central value of $\Gamma(\chi_{b0}(2P) \rightarrow \gamma \Upsilon(1S))/\Gamma_{total} \times \Gamma(\Upsilon(3S) \rightarrow \gamma \chi_{b0}(2P))/\Gamma_{total} = (3.9 \pm 2.2^{+1.2}_{-0.6}) \times 10^{-4}$ and derives a 90% CL upper limit of $B(\chi_{b0}(2P) \rightarrow \gamma \Upsilon(1S)) < 1.2\%$ using $B(\Upsilon(3S) \rightarrow \gamma \chi_{b0}(2P)) = (5.9 \pm 0.6)\%$.

NODE=M079B01;LINKAGE=LE

$\Gamma(\chi_{b0}(2P) \rightarrow \gamma \Upsilon(2S))/\Gamma_{total} \times \Gamma(\Upsilon(3S) \rightarrow \gamma \chi_{b0}(2P))/\Gamma_{total}$ $\Gamma_1/\Gamma \times \Gamma_{21}^{\Upsilon(3S)}/\Gamma^{\Upsilon(3S)}$

NODE=M079B02
NODE=M079B02

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<1.6	90	[26] LEES	11J	BABR	$\Upsilon(3S) \rightarrow X \gamma$

[26] LEES 11J quotes a central value of $\Gamma(\chi_{b0}(2P) \rightarrow \gamma \Upsilon(2S))/\Gamma_{total} \times \Gamma(\Upsilon(3S) \rightarrow \gamma \chi_{b0}(2P))/\Gamma_{total} = (-0.3 \pm 0.2^{+0.5}_{-0.4})\%$ and derives a 90% CL upper limit of $B(\chi_{b0}(2P) \rightarrow \gamma \Upsilon(2S)) < 2.8\%$ using $B(\Upsilon(3S) \rightarrow \gamma \chi_{b0}(2P)) = (5.9 \pm 0.6)\%$.

NODE=M079B02;LINKAGE=LE

$\chi_{b0}(2P)$ REFERENCES

NODE=M079

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, R. Fulton	(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.

NODE=M080

Observed in radiative decay of the $\Upsilon(3S)$, therefore $C = +$. Branching ratio requires E1 transition, M1 is strongly disfavored, therefore $P = +$.

$\chi_{b1}(2P)$ MASS

NODE=M080M

VALUE (GeV)	DOCUMENT ID
10.25546±0.00022±0.00050 OUR EVALUATION	From γ energy below, using $\Upsilon(3S)$ mass = 10355.2 ± 0.5 MeV

NODE=M080M
→ NOT CHECKED ←

$m_{\chi_{b1}(2P)} - m_{\chi_{b0}(2P)}$

NODE=M080M2

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
23.5±0.7±0.7	[1] HEINTZ	92	CSB2	$e^+e^- \rightarrow \gamma X, \ell^+\ell^-\gamma\gamma$

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	$\Upsilon(3S) \rightarrow \gamma X$
99 ±1	169	CRAWFORD	92B	CLE2	$e^+e^- \rightarrow \ell^+\ell^-\gamma\gamma$
100.1 ±0.4	11147	[2] HEINTZ	92	CSB2	$e^+e^- \rightarrow \gamma X$
100.2 ±0.5	223	[3] HEINTZ	92	CSB2	$e^+e^- \rightarrow \ell^+\ell^-\gamma\gamma$
99.5 ±0.1 ±0.5	25759	MORRISON	91	CLE2	$e^+e^- \rightarrow \gamma X$

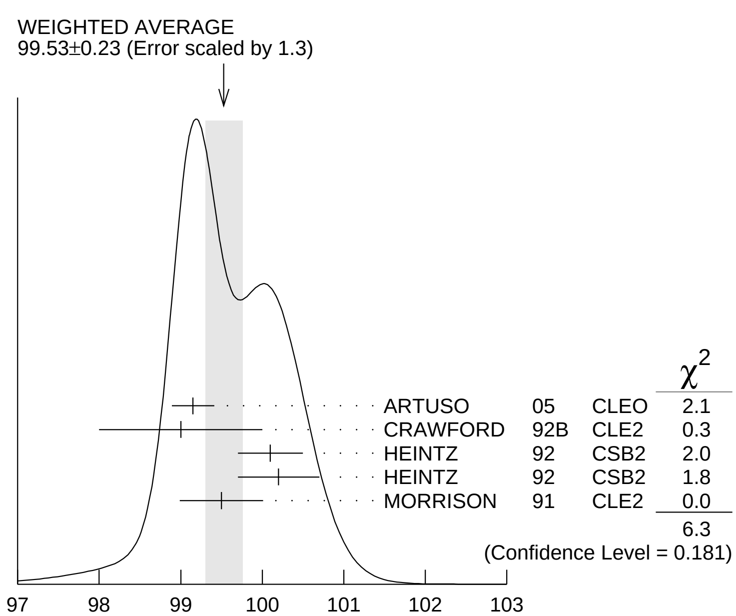
NODE=M080DM
→ NOT CHECKED ←
OCCUR=2

[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



γ energy in $\Upsilon(3S)$ decay (MeV)

$\chi_{b1}(2P)$ DECAY MODES

NODE=M080215;NODE=M080

	Mode	Fraction (Γ_i/Γ)	Scale factor	
Γ_1	$\omega\Upsilon(1S)$	$(1.63^{+0.40}_{-0.34})$ %		DESIG=3
Γ_2	$\gamma\Upsilon(2S)$	(19.9 ± 1.9) %		DESIG=2
Γ_3	$\gamma\Upsilon(1S)$	(9.2 ± 0.8) %	1.1	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
0.199±0.019 OUR AVERAGE				
[0.21 ± 0.04 OUR 2011 AVERAGE Scale factor = 1.5]				
0.190±0.018±0.017	4.3k	[5] LEES 11J	BABR	$\Upsilon(3S) \to X\gamma$
0.356±0.042±0.092		[6] CRAWFORD 92B	CLE2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$
0.199±0.020±0.022		[7] HEINTZ 92	CSB2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$

NEW

[5] LEES 11J reports $[\Gamma(\chi_{b1}(2P) \to \gamma\Upsilon(2S))/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b1}(2P))] = (2.4 \pm 0.1 \pm 0.2) \times 10^{-2}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b1}(2P)) = (12.6 \pm 1.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M080R2;LINKAGE=LE

[6] Using $B(\Upsilon(2S) \to \mu^+\mu^-) = (1.37 \pm 0.26)\%$, $B(\Upsilon(3S) \to \gamma\gamma\Upsilon(2S)) \times 2\, B(\Upsilon(2S) \to \mu^+\mu^-) = (10.23 \pm 1.20 \pm 1.26) \times 10^{-4}$, and $B(\Upsilon(3S) \to \gamma\chi_{b1}(2P)) = 0.105^{+0.003}_{-0.002} \pm 0.013$. NODE=M080R2;LINKAGE=B

[7] Using $B(\Upsilon(2S) \to \mu^+\mu^-) = (1.44 \pm 0.10)\%$, $B(\Upsilon(3S) \to \gamma\chi_{b1}(2P)) = (11.5 \pm 0.5 \pm 0.5)\%$ and assuming $e\mu$ universality. 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
0.092±0.008 OUR AVERAGE Error includes scale factor of 1.1. [0.085 ± 0.013 OUR 2011 AVERAGE Scale factor = 1.3]				
0.098±0.005±0.009	15k	[8] LEES 11J	BABR	$\Upsilon(3S) \to X\gamma$
0.120±0.021±0.021		[9] CRAWFORD 92B	CLE2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$
0.080±0.009±0.007		[10] HEINTZ 92	CSB2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$

NEW

[8] LEES 11J reports $[\Gamma(\chi_{b1}(2P) \to \gamma\Upsilon(1S))/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b1}(2P))] = (12.4 \pm 0.3 \pm 0.6) \times 10^{-3}$ which we divide by our best value $B(\Upsilon(3S) \to \gamma\chi_{b1}(2P)) = (12.6 \pm 1.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M080R1;LINKAGE=LE

[9] Using $B(\Upsilon(1S) \to \mu^+\mu^-) = (2.57 \pm 0.07)\%$, $B(\Upsilon(3S) \to \gamma\gamma\Upsilon(1S)) \times 2\, B(\Upsilon(1S) \to \mu^+\mu^-) = (6.47 \pm 1.12 \pm 0.82) \times 10^{-4}$ and $B(\Upsilon(3S) \to \gamma\chi_{b1}(2P)) = 0.105^{+0.003}_{-0.002} \pm 0.013$. NODE=M080R1;LINKAGE=B

[10] Using $B(\Upsilon(1S) \to \mu^+\mu^-) = (2.57 \pm 0.07)\%$, $B(\Upsilon(3S) \to \gamma\chi_{b1}(2P)) = (11.5 \pm 0.5 \pm 0.5)\%$ and assuming $e\mu$ universality. Supersedes HEINTZ 91. NODE=M080R1;LINKAGE=C

$\Gamma(\pi\pi\chi_{b1}(1P))/\Gamma_{total}$ — Γ_4/Γ

NODE=M080R4
NODE=M080R4

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
9.1±1.3 OUR AVERAGE					
[(8.6 ± 3.1) × 10^{-3} OUR 2011 AVERAGE]					
9.2±1.1±0.8	31k	[11] LEES	11C	BABR	$e^+e^- \to \pi^+\pi^- X$
8.6±2.3±2.1		[12] CAWLFIELD	06	CLE3	$\Upsilon(3S) \to 2(\gamma\pi\ell)$

NEW

[11] LEES 11C measures B($\Upsilon(3S) \to \chi_{b1}(2P)X$) × B($\chi_{b1}(2P) \to \chi_{b1}(1P)\pi^+\pi^-$) = (1.16 ± 0.07 ± 0.12) × 10^{-3}. We derive the value assuming B($\Upsilon(3S) \to \chi_{b1}(2P)X$) = B($\Upsilon(3S) \to \chi_{b1}(2P)\gamma$) = (12.6 ± 1.2) × 10^{-2}.

NODE=M080R4;LINKAGE=LE

[12] 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=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	[13] BRIERE	08	CLEO	$\Upsilon(3S) \to \gamma D^0 X$

[13] 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	[14] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma\pi^+\pi^-K^+K^-\pi^0$

[14] ASNER 08A reports [$\Gamma(\chi_{b1}(2P) \to \pi^+\pi^-K^+K^-\pi^0)/\Gamma_{total}$] × [B($\Upsilon(3S) \to \gamma\chi_{b1}(2P)$)] = (39 ± 8 ± 9) × 10^{-6} which we divide by our best value B($\Upsilon(3S) \to \gamma\chi_{b1}(2P)$) = (12.6 ± 1.2) × 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	[15] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 2\pi^+\pi^-K^-K^0_S$

[15] ASNER 08A reports [$\Gamma(\chi_{b1}(2P) \to 2\pi^+\pi^-K^-K^0_S)/\Gamma_{total}$] × [B($\Upsilon(3S) \to \gamma\chi_{b1}(2P)$)] = (14 ± 5 ± 3) × 10^{-6} which we divide by our best value B($\Upsilon(3S) \to \gamma\chi_{b1}(2P)$) = (12.6 ± 1.2) × 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	[16] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 2\pi^+\pi^-K^- 2\pi^0$

[16] ASNER 08A reports [$\Gamma(\chi_{b1}(2P) \to 2\pi^+\pi^-K^-K^0_S 2\pi^0)/\Gamma_{total}$] × [B($\Upsilon(3S) \to \gamma\chi_{b1}(2P)$)] = (97 ± 30 ± 26) × 10^{-6} which we divide by our best value B($\Upsilon(3S) \to \gamma\chi_{b1}(2P)$) = (12.6 ± 1.2) × 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	[17] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 2\pi^+2\pi^-2\pi^0$

[17] ASNER 08A reports [$\Gamma(\chi_{b1}(2P) \to 2\pi^+2\pi^-2\pi^0)/\Gamma_{total}$] × [B($\Upsilon(3S) \to \gamma\chi_{b1}(2P)$)] = (74 ± 16 ± 19) × 10^{-6} which we divide by our best value B($\Upsilon(3S) \to \gamma\chi_{b1}(2P)$) = (12.6 ± 1.2) × 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	[18] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 2\pi^+2\pi^-K^+K^-$

[18] ASNER 08A reports [$\Gamma(\chi_{b1}(2P) \to 2\pi^+2\pi^-K^+K^-)/\Gamma_{total}$] × [B($\Upsilon(3S) \to \gamma\chi_{b1}(2P)$)] = (12 ± 4 ± 3) × 10^{-6} which we divide by our best value B($\Upsilon(3S) \to \gamma\chi_{b1}(2P)$) = (12.6 ± 1.2) × 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	[19] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 2\pi^+2\pi^-K^+K^-\pi^0$

NODE=M080R07;LINKAGE=AS

[19] 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.

$\Gamma(2\pi^+2\pi^-K^+K^-2\pi^0)/\Gamma_{total}$ Γ_{12}/Γ

NODE=M080R08
NODE=M080R08

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
9.6±3.5±0.9	27	[20] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 2\pi^+2\pi^-K^+K^-2\pi^0$

NODE=M080R08;LINKAGE=AS

[20] 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.

$\Gamma(3\pi^+2\pi^-K^-K^0_S\pi^0)/\Gamma_{total}$ Γ_{13}/Γ

NODE=M080R09
NODE=M080R09

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
6.7±2.5±0.6	17	[21] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 3\pi^+2\pi^-K^-K^0_S\pi^0$

NODE=M080R09;LINKAGE=AS

[21] 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.

$\Gamma(3\pi^+3\pi^-)/\Gamma_{total}$ Γ_{14}/Γ

NODE=M080R10
NODE=M080R10

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.2±0.4±0.1	18	[22] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 3\pi^+3\pi^-$

NODE=M080R10;LINKAGE=AS

[22] 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.

$\Gamma(3\pi^+3\pi^-2\pi^0)/\Gamma_{total}$ Γ_{15}/Γ

NODE=M080R11
NODE=M080R11

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
12±4±1	44	[23] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 3\pi^+3\pi^-2\pi^0$

NODE=M080R11;LINKAGE=AS

[23] 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.

$\Gamma(3\pi^+3\pi^-K^+K^-)/\Gamma_{total}$ Γ_{16}/Γ

NODE=M080R12
NODE=M080R12

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.0±0.7±0.2	16	[24] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 3\pi^+3\pi^-K^+K^-$

NODE=M080R12;LINKAGE=AS

[24] 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.

$\Gamma(3\pi^+3\pi^-K^+K^-\pi^0)/\Gamma_{total}$ Γ_{17}/Γ

NODE=M080R13
NODE=M080R13

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
6.1±2.1±0.6	25	[25] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 3\pi^+3\pi^-K^+K^-\pi^0$

NODE=M080R13;LINKAGE=AS

[25] 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.

$\Gamma(4\pi^+4\pi^-)/\Gamma_{total}$ Γ_{18}/Γ

NODE=M080R14
NODE=M080R14

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.7±0.6±0.2	16	[26] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 4\pi^+4\pi^-$

NODE=M080R14;LINKAGE=AS

[26] 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.

$\Gamma(4\pi^+ 4\pi^- 2\pi^0)/\Gamma_{total}$ Γ_{19}/Γ

NODE=M080R15
NODE=M080R15

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
19±7±2	41	[27] ASNER	08A	CLEO	$\Upsilon(3S) \rightarrow \gamma 4\pi^+ 4\pi^- 2\pi^0$

[27] ASNER 08A reports $[\Gamma(\chi_{b1}(2P) \rightarrow 4\pi^+ 4\pi^- 2\pi^0)/\Gamma_{total}] \times [B(\Upsilon(3S) \rightarrow \gamma \chi_{b1}(2P))] = (241 \pm 47 \pm 72) \times 10^{-6}$ 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=M080R15;LINKAGE=AS

$\chi_{b1}(2P)$ Cross-Particle Branching Ratios

NODE=M080230

$\Gamma(\chi_{b1}(2P) \rightarrow \gamma \Upsilon(1S))/\Gamma_{total} \times \Gamma(\Upsilon(3S) \rightarrow \gamma \chi_{b1}(2P))/\Gamma_{total}$ $\Gamma_3/\Gamma \times \Gamma_{20}^{\Upsilon(3S)}/\Gamma^{\Upsilon(3S)}$

NODE=M080B01
NODE=M080B01

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
12.4±0.3±0.6	15k	LEES	11J	BABR	$\Upsilon(3S) \rightarrow X\gamma$

$\Gamma(\chi_{b1}(2P) \rightarrow \gamma \Upsilon(2S))/\Gamma_{total} \times \Gamma(\Upsilon(3S) \rightarrow \gamma \chi_{b1}(2P))/\Gamma_{total}$ $\Gamma_2/\Gamma \times \Gamma_{20}^{\Upsilon(3S)}/\Gamma^{\Upsilon(3S)}$

NODE=M080B02
NODE=M080B02

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
2.4±0.1±0.2	4.3k	LEES	11J	BABR	$\Upsilon(3S) \rightarrow X\gamma$

$B(\chi_{b1}(2P) \rightarrow \chi_{b1}(1P)\pi^+\pi^-) \times B(\Upsilon(3S) \rightarrow \chi_{b1}(2P)X)$

NODE=M080R16
NODE=M080R16

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.16±0.07±0.12	31k	LEES	11C	BABR	$e^+e^- \rightarrow \pi^+\pi^- X$

$B(\chi_{b2}(2P) \rightarrow pX + \bar{p}X)/B(\chi_{b1}(2P) \rightarrow pX + \bar{p}X)$

NODE=M080R20
NODE=M080R20

VALUE	DOCUMENT ID		TECN	COMMENT
1.109±0.007±0.040	BRIERE	07	CLEO	$\Upsilon(3S) \rightarrow \gamma \chi_{bJ}(2P)$

$B(\chi_{b0}(2P) \rightarrow pX + \bar{p}X)/B(\chi_{b1}(2P) \rightarrow pX + \bar{p}X)$

NODE=M080R21
NODE=M080R21

VALUE	DOCUMENT ID		TECN	COMMENT
1.082±0.025±0.060	BRIERE	07	CLEO	$\Upsilon(3S) \rightarrow \gamma \chi_{bJ}(2P)$

$\chi_{b1}(2P)$ REFERENCES

NODE=M080

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, R. Fulton	(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

$h_b(2P)$

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

OMITTED FROM SUMMARY TABLE

Quantum numbers are quark model predictions.

NODE=M205

$h_b(2P)$ MASS

NODE=M205M

NODE=M205M

VALUE (GeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$10.2598 \pm 0.0006^{+0.0014}_{-0.0010}$	83.9k	ADACHI	12	BELL	10.86 $e^+e^- \rightarrow \pi^+\pi^-$ MM

$h_b(2P)$ DECAY MODES

NODE=M205215;NODE=M205

	Mode	Fraction (Γ_i/Γ)
Γ_1	hadrons	not seen

DESIG=1

$h_b(2P)$ BRANCHING RATIOS

NODE=M205225

$\Gamma($hadrons$)/\Gamma_{total}$ **Γ_1/Γ**

NODE=M205R01
NODE=M205R01

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
not seen	83.9k	ADACHI	12	BELL	10.86 $e^+e^- \rightarrow \pi^+\pi^-$ MM

$h_b(2P)$ REFERENCES

NODE=M205

ADACHI 12 PRL 108 032001 I. Adachi *et al.* (BELLE Collab.)

REFID=53962

NODE=M081

$\chi_{b2}(2P)$

$I^G(J^{PC}) = 0^+(2^{++})$

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=M081

$\chi_{b2}(2P)$ MASS

NODE=M081M

NODE=M081M

→ NOT CHECKED ←

VALUE (GeV)	DOCUMENT ID
$10.26865 \pm 0.00022 \pm 0.00050$ OUR EVALUATION	From γ energy below, using $\Upsilon(3S)$ mass = 10355.2 ± 0.5 MeV

$m_{\chi_{b2}(2P)} - m_{\chi_{b1}(2P)}$

NODE=M081M2

NODE=M081M2

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
$13.5 \pm 0.4 \pm 0.5$	[1] HEINTZ	92	CSB2	$e^+e^- \rightarrow \gamma X, \ell^+\ell^-\gamma\gamma$

[1] 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

→ NOT CHECKED ←

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
86.19 ± 0.22 OUR EVALUATION		Treating systematic errors as correlated			
86.40 ± 0.18 OUR AVERAGE					
$86.04 \pm 0.06 \pm 0.27$		ARTUSO	05	CLEO	$\Upsilon(3S) \rightarrow \gamma X$
86 ± 1	101	CRAWFORD	92B	CLE2	$e^+e^- \rightarrow \ell^+\ell^-\gamma\gamma$
86.7 ± 0.4	10319	[2] HEINTZ	92	CSB2	$e^+e^- \rightarrow \gamma X$
86.9 ± 0.4	157	[3] HEINTZ	92	CSB2	$e^+e^- \rightarrow \ell^+\ell^-\gamma\gamma$
$86.4 \pm 0.1 \pm 0.4$	30741	MORRISON	91	CLE2	$e^+e^- \rightarrow \gamma X$

OCCUR=2

[2] A systematic uncertainty on the energy scale of 0.9% not included. Supersedes NARAIN 91.

NODE=M081DM;LINKAGE=A

[3] 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)	Scale factor/ Confidence level	
Γ_1	$\omega\Upsilon(1S)$	$(1.10^{+0.34}_{-0.30})$ %		DESIG=3
Γ_2	$\gamma\Upsilon(2S)$	(10.6 ± 2.6) %	S=2.0	DESIG=2
Γ_3	$\gamma\Upsilon(1S)$	(7.0 ± 0.7) %		DESIG=1
Γ_4	$\pi\pi\chi_{b2}(1P)$	$(5.1 \pm 0.9) \times 10^{-3}$		DESIG=4
Γ_5	$D^0 X$	< 2.4 %	CL=90%	DESIG=5
Γ_6	$\pi^+\pi^-K^+K^-\pi^0$	$< 1.1 \times 10^{-4}$	CL=90%	DESIG=6
Γ_7	$2\pi^+\pi^-K^-K^0_S$	$< 9 \times 10^{-5}$	CL=90%	DESIG=7
Γ_8	$2\pi^+\pi^-K^-K^0_S 2\pi^0$	$< 7 \times 10^{-4}$	CL=90%	DESIG=8
Γ_9	$2\pi^+2\pi^-2\pi^0$	$(3.9 \pm 1.6) \times 10^{-4}$		DESIG=9
Γ_{10}	$2\pi^+2\pi^-K^+K^-$	$(9 \pm 4) \times 10^{-5}$		DESIG=10
Γ_{11}	$2\pi^+2\pi^-K^+K^-\pi^0$	$(2.4 \pm 1.1) \times 10^{-4}$		DESIG=11
Γ_{12}	$2\pi^+2\pi^-K^+K^-2\pi^0$	$(4.7 \pm 2.3) \times 10^{-4}$		DESIG=12
Γ_{13}	$3\pi^+2\pi^-K^-K^0_S\pi^0$	$< 4 \times 10^{-4}$	CL=90%	DESIG=13
Γ_{14}	$3\pi^+3\pi^-$	$(9 \pm 4) \times 10^{-5}$		DESIG=14
Γ_{15}	$3\pi^+3\pi^-2\pi^0$	$(1.2 \pm 0.4) \times 10^{-3}$		DESIG=15
Γ_{16}	$3\pi^+3\pi^-K^+K^-$	$(1.4 \pm 0.7) \times 10^{-4}$		DESIG=16
Γ_{17}	$3\pi^+3\pi^-K^+K^-\pi^0$	$(4.2 \pm 1.7) \times 10^{-4}$		DESIG=17
Γ_{18}	$4\pi^+4\pi^-$	$(9 \pm 5) \times 10^{-5}$		DESIG=18
Γ_{19}	$4\pi^+4\pi^-2\pi^0$	$(1.3 \pm 0.5) \times 10^{-3}$		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*
$\mathbf{1.10^{+0.32+0.11}_{-0.28-0.10}}$	$20.1^{+5.8}_{-5.1}$	[4] CRONIN-HEN...04	CLE3	$\Upsilon(3S) \to \gamma\omega\Upsilon(1S)$

[4] 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

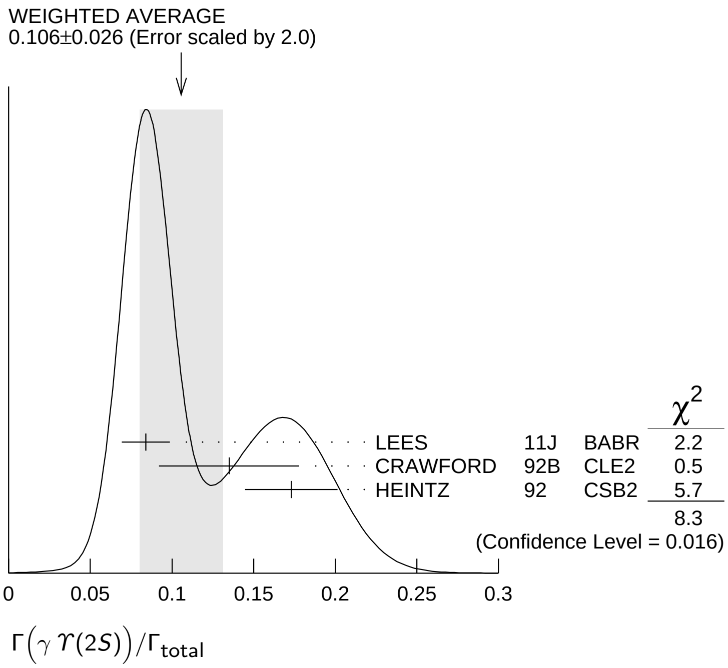
VALUE	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
0.106±0.026 OUR AVERAGE Error includes scale factor of 2.0. See the ideogram below.				
[0.162 ± 0.024 OUR 2011 AVERAGE]				
0.084±0.011±0.010	2.5k	[5] LEES 11J	BABR	$\Upsilon(3S) \to X\gamma$
0.135±0.025±0.035		[6] CRAWFORD 92B	CLE2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$
0.173±0.021±0.019		[7] HEINTZ 92	CSB2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$

NEW

[5] LEES 11J reports [$\Gamma(\chi_{b2}(2P) \to \gamma\Upsilon(2S))/\Gamma_{total}$] × [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

[6] Using B($\Upsilon(2S) \to \mu^+\mu^-$) = (1.37 ± 0.26)%, B($\Upsilon(3S) \to \gamma\gamma\Upsilon(2S)$)×2 B($\Upsilon(2S) \to \mu^+\mu^-$) = (4.98 ± 0.94 ± 0.62) × 10^{-4}, and B($\Upsilon(3S) \to \gamma\chi_{b2}(2P)$) = 0.135 ± 0.003 ± 0.017. NODE=M081R2;LINKAGE=B

[7] Using B($\Upsilon(2S) \to \mu^+\mu^-$) = (1.44 ± 0.10)%, B($\Upsilon(3S) \to \gamma\chi_{b2}(2P)$) = (11.1 ± 0.5 ± 0.4)% and assuming $e\mu$ universality. 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
0.070±0.007 OUR AVERAGE				
[0.071 ± 0.010 OUR 2011 AVERAGE]				
0.070±0.004±0.008	11k	[8] LEES 11J	BABR	$\Upsilon(3S) \to X\gamma$
0.072±0.014±0.013		[9] CRAWFORD 92B	CLE2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$
0.070±0.010±0.006		[10] HEINTZ 92	CSB2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$

NEW

[8] LEES 11J reports $[\Gamma(\chi_{b2}(2P) \to \gamma\,\Upsilon(1S))/\Gamma_{total}] \times [B(\Upsilon(3S) \to \gamma\chi_{b2}(2P))] = (9.2 \pm 0.3 \pm 0.4) \times 10^{-3}$ 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=M081R1;LINKAGE=LE

[9] Using $B(\Upsilon(1S) \to \mu^+\mu^-) = (2.57 \pm 0.07)\%$, $B(\Upsilon(3S) \to \gamma\gamma\,\Upsilon(2S)) \times 2\,B(\Upsilon(1S) \to \mu^+\mu^-) = (5.03 \pm 0.94 \pm 0.63) \times 10^{-4}$, and $B(\Upsilon(3S) \to \gamma\chi_{b2}(2P)) = 0.135 \pm 0.003 \pm 0.017$. NODE=M081R1;LINKAGE=B

[10] Using $B(\Upsilon(1S) \to \mu^+\mu^-) = (2.57 \pm 0.07)\%$, $B(\Upsilon(3S) \to \gamma\chi_{b2}(2P)) = (11.1 \pm 0.5 \pm 0.4)\%$ and assuming $e\mu$ universality. 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				
[$(6.0 \pm 2.1) \times 10^{-3}$ OUR 2011 AVERAGE]				
4.9±0.7±0.6	17k	[11] LEES 11C	BABR	$e^+e^- \to \pi^+\pi^- X$
6.0±1.6±1.4		[12] CAWLFIELD 06	CLE3	$\Upsilon(3S) \to 2(\gamma\pi\ell)$

NEW

[11] $(0.64 \pm 0.05 \pm 0.08) \times 10^{-3}$. We derive the value assuming $B(\Upsilon(3S) \to \chi_{b2}(2P)X) = B(\Upsilon(3S) \to \chi_{b2}(2P)\gamma) = (13.1 \pm 1.6) \times 10^{-2}$. NODE=M081R4;LINKAGE=LE

[12] CAWLFIELD 06 quote $\Gamma(\chi_b(2P) \to \pi\pi\chi_b(1P)) = 0.83 \pm 0.22 \pm 0.08 \pm 0.19$ keV assuming I-spin conservation, no D-wave contribution, $\Gamma(\chi_{b1}(2P)) = 96 \pm 16$keV, and $\Gamma(\chi_{b2}(2P)) = 138 \pm 19$ keV. NODE=M081R4;LINKAGE=CA

$\Gamma(D^0 X)/\Gamma_{total}$ — Γ_5/Γ

NODE=M081R01
NODE=M081R01

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<2.4 × 10^{-2}	90	[13,14] BRIERE	08 CLEO	$\Upsilon(3S) \to \gamma D^0 X$

[13] For $p_{D^0} > 2.5$ GeV/c. NODE=M081R01;LINKAGE=BR

[14] The authors also present their result as $(0.2 \pm 1.4 \pm 0.1) \times 10^{-2}$. NODE=M081R01;LINKAGE=RI

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

NODE=M081R02
NODE=M081R02

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT
<1.1	90	[15] ASNER 08A	CLEO	$\Upsilon(3S) \to \gamma\pi^+\pi^- K^+ K^- \pi^0$

[15] 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	[16] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 2\pi^+\pi^- K^- K^0_S$

[16] 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	[17] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 2\pi^+\pi^- K^- 2\pi^0$

[17] 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	[18] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 2\pi^+ 2\pi^- 2\pi^0$

[18] 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	[19] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 2\pi^+ 2\pi^- K^+ K^-$

[19] 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	[20] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 2\pi^+ 2\pi^- K^+ K^- \pi^0$

[20] 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	[21] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 2\pi^+ 2\pi^- K^+ K^- 2\pi^0$

[21] 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

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<4	90	[22] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 3\pi^+ 2\pi^- K^- K^0_S \pi^0$

[22] 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

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.9±0.4±0.1	14	[23] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 3\pi^+ 3\pi^-$

[23] 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	[24] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 3\pi^+ 3\pi^- 2\pi^0$

[24] 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	[25] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 3\pi^+ 3\pi^- K^+ K^-$

[25] 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	[26] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 3\pi^+ 3\pi^- K^+ K^- \pi^0$

[26] 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	[27] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 4\pi^+ 4\pi^-$

[27] 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	[28] ASNER	08A	CLEO	$\Upsilon(3S) \to \gamma 4\pi^+ 4\pi^- 2\pi^0$

[28] 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

$\Gamma(\chi_{b2}(2P) \to \gamma\Upsilon(1S))/\Gamma_{total} \times \Gamma(\Upsilon(3S) \to \gamma\chi_{b2}(2P))/\Gamma_{total}$ — $\Gamma_3/\Gamma \times \Gamma_{19}^{\Upsilon(3S)}/\Gamma^{\Upsilon(3S)}$

NODE=M081B01
NODE=M081B01

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
9.2±0.3±0.4	11k	LEES	11J	BABR	$\Upsilon(3S) \to X\gamma$

$\Gamma(\chi_{b2}(2P) \to \gamma\Upsilon(2S))/\Gamma_{total} \times \Gamma(\Upsilon(3S) \to \gamma\chi_{b2}(2P))/\Gamma_{total}$ — $\Gamma_2/\Gamma \times \Gamma_{19}^{\Upsilon(3S)}/\Gamma^{\Upsilon(3S)}$

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	$e^+e^- \to \pi^+\pi^- X$

$\chi_{b2}(2P)$ REFERENCES

NODE=M081

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, R. Fulton	(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

VALUE (GeV)	*DOCUMENT ID*	*TECN*	*COMMENT*
10.3552±0.0005	[1] ARTAMONOV 00	MD1	$e^+e^- \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •			
10.3553±0.0005	[2,3] BARU 86B	REDE	$e^+e^- \to$ hadrons

NODE=M048M

[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

VALUE (MeV)	*DOCUMENT ID*	*TECN*	*COMMENT*
331.50±0.02±0.13	LEES 11C	BABR	$e^+e^- \to \pi^+\pi^- X$

NODE=M048DM2

$\Upsilon(3S)$ WIDTH

NODE=M048W

VALUE (keV)	*DOCUMENT ID*
20.32±1.85 OUR EVALUATION	See the Note on "Width Determinations of the Υ States"

NODE=M048W

→ NOT CHECKED ←

$\Upsilon(3S)$ 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^-	seen		DESIG=2;OUR EVAL;→ NOT CHECKED ←
Γ_{16}	hadrons			DESIG=101
Γ_{17}	ggg	(35.7 ±2.6) %		DESIG=109
Γ_{18}	γgg	(9.7 ±1.8) $\times 10^{-3}$		DESIG=110

Radiative decays

NODE=M048;CLUMP=B

Γ_{19}	$\gamma \chi_{b2}(2P)$		(13.1 ± 1.6) %	S=3.4	DESIG=5
Γ_{20}	$\gamma \chi_{b1}(2P)$		(12.6 ± 1.2) %	S=2.4	DESIG=6
Γ_{21}	$\gamma \chi_{b0}(2P)$		(5.9 ± 0.6) %	S=1.4	DESIG=7
Γ_{22}	$\gamma \chi_{b2}(1P)$		$(9.9 \pm 1.3) \times 10^{-3}$	S=2.0	DESIG=103
Γ_{23}	$\gamma A^0 \rightarrow \gamma$ hadrons		$< 8 \times 10^{-5}$	CL=90%	DESIG=115
Γ_{24}	$\gamma \chi_{b1}(1P)$		$(9 \pm 5) \times 10^{-4}$	S=1.9	DESIG=104
Γ_{25}	$\gamma \chi_{b0}(1P)$		$(2.7 \pm 0.4) \times 10^{-3}$		DESIG=13
Γ_{26}	$\gamma \eta_b(2S)$		$< 6.2 \times 10^{-4}$	CL=90%	DESIG=14
Γ_{27}	$\gamma \eta_b(1S)$		$(5.1 \pm 0.7) \times 10^{-4}$		DESIG=15
Γ_{28}	$\gamma X \rightarrow \gamma + \geq 4$ prongs	[a]	$< 2.2 \times 10^{-4}$	CL=95%	DESIG=102
Γ_{29}	$\gamma a_1^0 \rightarrow \gamma \tau^+ \tau^-$	[b]	$< 1.6 \times 10^{-4}$	CL=90%	DESIG=108

Lepton Family number (*LF*) violating modes

NODE=M048;CLUMP=C

Γ_{30}	$e^\pm \tau^\mp$	*LF*	$< 4.2 \times 10^{-6}$	CL=90%	DESIG=111
Γ_{31}	$\mu^\pm \tau^\mp$	*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

$\Upsilon(3S)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma(\text{total})$

NODE=M048218

$\Gamma(\text{hadrons}) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_{16}\Gamma_{15}/\Gamma$

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

$\Gamma(\Upsilon(1S)\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_6\Gamma_{15}/\Gamma$

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

$\Gamma(e^+e^-)$ — Γ_{15}

NODE=M048W2
NODE=M048W2

VALUE (keV)	*DOCUMENT ID*
0.443±0.008 OUR EVALUATION	

→ NOT CHECKED ←

$\Upsilon(3S)$ BRANCHING RATIOS

NODE=M048225

$\Gamma(\Upsilon(2S)\text{anything})/\Gamma_{\text{total}}$ — 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

$\Gamma(\Upsilon(2S)\pi^+\pi^-)/\Gamma_{total}$ 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.					
[(2.45 ± 0.23) × 10^{-2} OUR 2011 AVERAGE Scale factor = 1.1]					
3.00±0.02±0.14	543k	LEES	11C	BABR	$e^+e^- \to \pi^+\pi^- X$
2.40±0.10±0.26	800	[10] AUBERT	08BP	BABR	$e^+e^- \to \gamma\pi^+\pi^- e^+e^-$
3.12±0.49	980	[11,12] BUTLER	94B	CLE2	$e^+e^- \to \pi^+\pi^-\ell^+\ell^-$
2.13±0.38	974	[13] 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. • • •					
4.82±0.65±0.53	138	[13] WU	93	CUSB	$\Upsilon(3S) \to \pi^+\pi^-\ell^+\ell^-$
3.1 ±2.0	5	MAGERAS	82	CUSB	$\Upsilon(3S) \to \pi^+\pi^-\ell^+\ell^-$

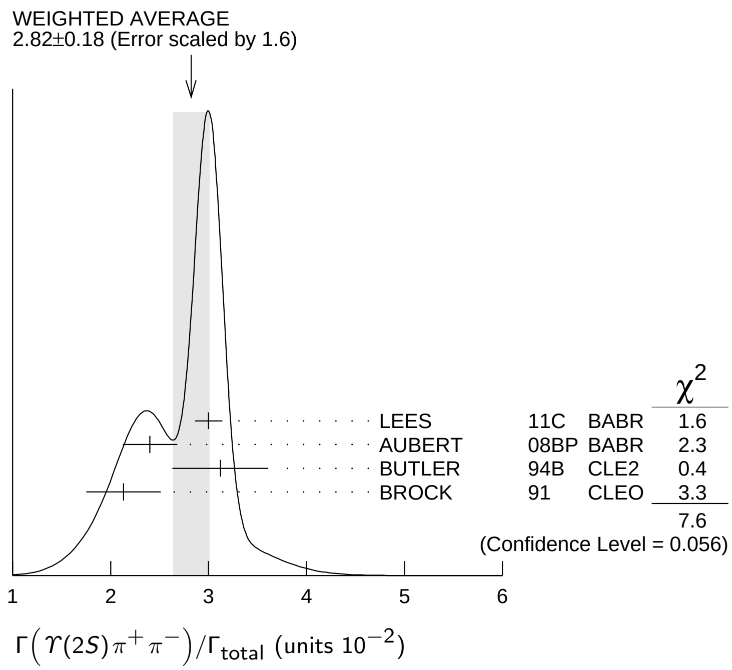
NEW

[10] Using B($\Upsilon(1S) \to e^+e^-$) = (2.38 ± 0.11)%, B($\Upsilon(1S) \to \mu^+\mu^-$) = (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($\Upsilon(2S) \to \Upsilon(1S)\gamma\gamma$) = (0.038 ± 0.007)%, and B($\Upsilon(2S) \to \Upsilon(1S)\pi^0\pi^0$) = (1/2)B($\Upsilon(2S) \to \Upsilon(1S)\pi^+\pi^-$). NODE=M048R4;LINKAGE=A

[13] Using B($\Upsilon(2S) \to \mu^+\mu^-$) = (1.31 ± 0.21)%, B($\Upsilon(2S) \to \Upsilon(1S)\gamma\gamma$)×2B($\Upsilon(1S) \to \mu^+\mu^-$) = (0.188 ± 0.035)%, and B($\Upsilon(2S) \to \Upsilon(1S)\pi^0\pi^0$)×2B($\Upsilon(1S) \to \mu^+\mu^-$) = (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

NEW

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
4.37±0.08 OUR AVERAGE					
[(4.40 ± 0.10) × 10^{-2} OUR 2011 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
NODE=M048R28

VALUE	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.577±0.026±0.060	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
NODE=M048R11

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
2.20±0.13 OUR AVERAGE					
2.24±0.09±0.11	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 ±0.4 ±0.3	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
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
NODE=M048R9

VALUE (units 10^{-3})	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<0.1 (CL = 90%) [<0.18 × 10^{-3} (CL = 90%) OUR 2011 BEST LIMIT]					
<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
$<1.2 \times 10^{-3}$	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}

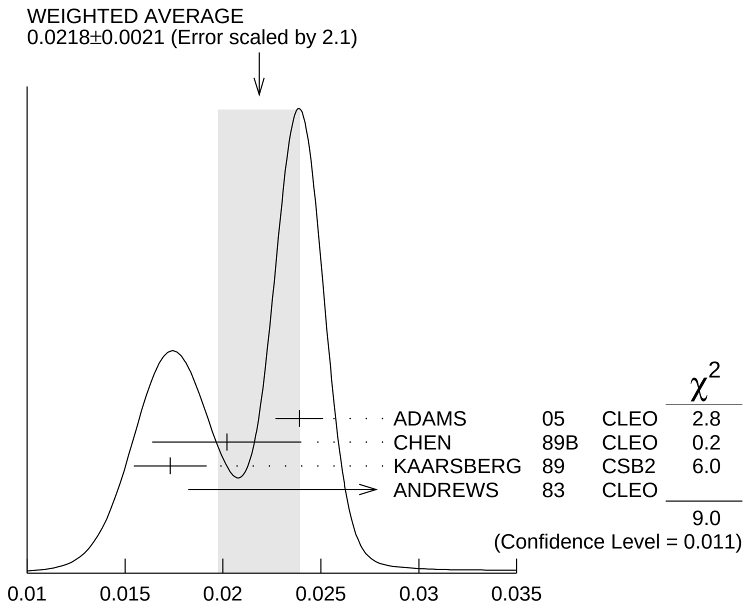
NODE=M048R19

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
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	$e^+e^- \to \mu^+\mu^-$



$\Gamma\left(\mu^+\mu^-\right)/\Gamma_{\text{total}}$

$\Gamma(ggg)/\Gamma_{\text{total}}$ Γ_{17}/Γ

NODE=M048R30
NODE=M048R30

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
35.7±2.6	3M	[38] BESSON	06A	CLEO	$\Upsilon(3S) \rightarrow$ 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($\Upsilon(2S)$ + 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 $R_{\text{hadrons}} = 3.51$. The statistical error is negligible and the systematic error is partially correlated with $\Gamma(\gamma gg)/\Gamma_{\text{total}}$ BESSON 06A value.

NODE=M048R30;LINKAGE=BE

$\Gamma(\gamma gg)/\Gamma_{\text{total}}$ 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	$\Upsilon(3S) \rightarrow \gamma$ + hadrons

[39] Calculated using BESSON 06A values of $\Gamma(\gamma gg)/\Gamma(ggg) = (2.72 \pm 0.06 \pm 0.32 \pm 0.37)\%$ and $\Gamma(ggg)/\Gamma_{\text{total}}$. The statistical error is negligible and the systematic error is partially correlated with $\Gamma(ggg)/\Gamma_{\text{total}}$ BESSON 06A value.

NODE=M048R31;LINKAGE=BE

$\Gamma(\gamma gg)/\Gamma(ggg)$ 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	$\Upsilon(3S) \rightarrow (\gamma +)$ hadrons

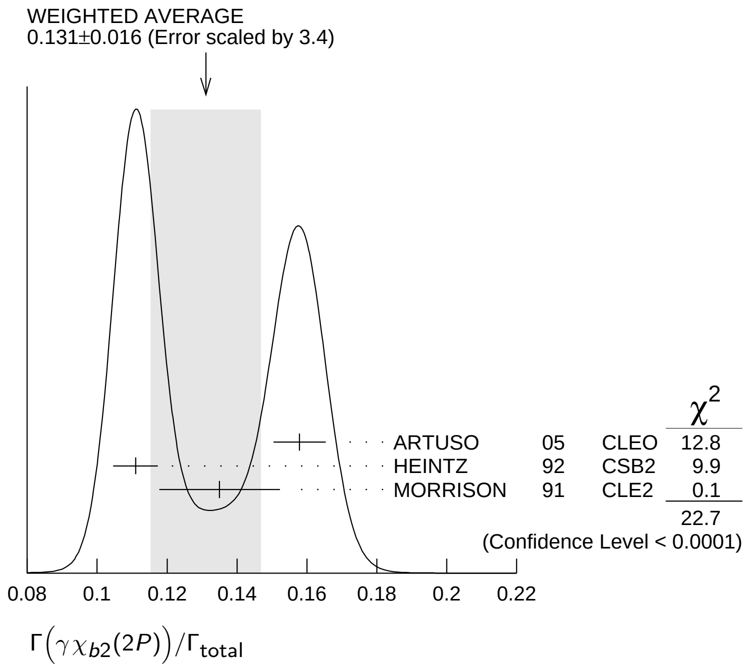
$\Gamma(\gamma\chi_{b2}(2P))/\Gamma_{\text{total}}$ Γ_{19}/Γ

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	$e^+e^- \rightarrow \gamma X$
0.111 ±0.005 ±0.004	10319	[40] HEINTZ	92	CSB2	$e^+e^- \rightarrow \gamma X$
0.135 ±0.003 ±0.017	30741	MORRISON	91	CLE2	$e^+e^- \rightarrow \gamma X$

[40] Supersedes NARAIN 91.

NODE=M048R;LINKAGE=H



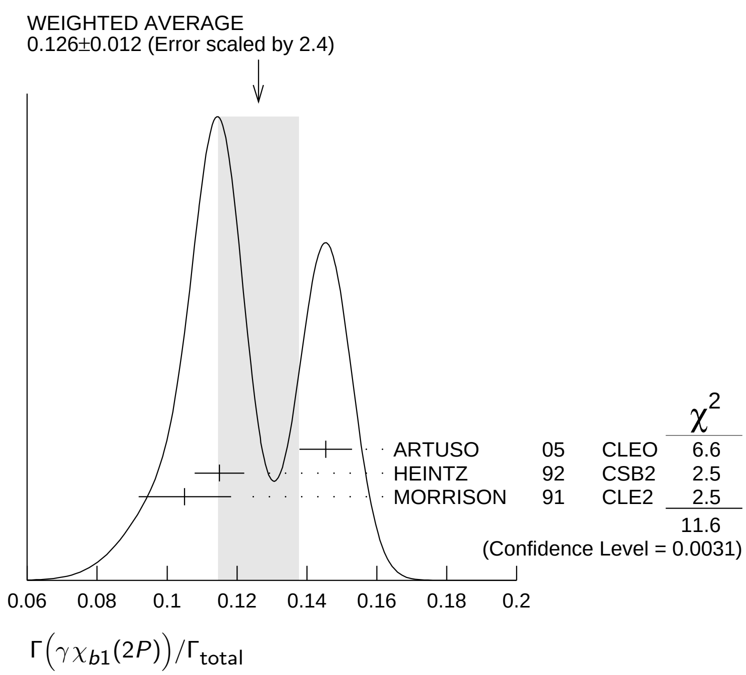
$\Gamma\big(\gamma\chi_{b1}(2P)\big)/\Gamma_{total}$ — Γ_{20}/Γ

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	$e^+e^- \rightarrow \gamma X$
0.115 ±0.005 ±0.005	11147	[41] HEINTZ	92 CSB2	$e^+e^- \rightarrow \gamma X$
0.105 $^{+0.003}_{-0.002}$ ±0.013	25759	MORRISON	91 CLE2	$e^+e^- \rightarrow \gamma X$

[41] Supersedes NARAIN 91.

NODE=M048R6;LINKAGE=H

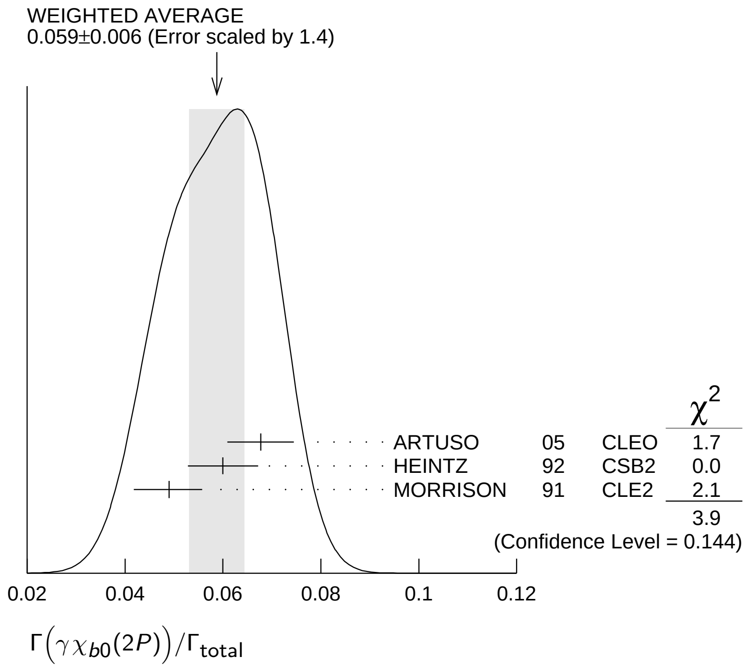


$\Gamma\big(\gamma\chi_{b0}(2P)\big)/\Gamma_{total}$ — Γ_{21}/Γ

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	$e^+e^- \rightarrow \gamma X$
0.060 ±0.004 ±0.006	4959	[42] HEINTZ	92 CSB2	$e^+e^- \rightarrow \gamma X$
0.049 $^{+0.003}_{-0.004}$ ±0.006	9903	MORRISON	91 CLE2	$e^+e^- \rightarrow \gamma X$

[42] Supersedes NARAIN 91. NODE=M048R7;LINKAGE=H



$\Gamma(\gamma\chi_{b2}(1P))/\Gamma_{total}$ Γ_{22}/Γ

NODE=M048R21
NODE=M048R21

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
9.9±1.3 OUR AVERAGE			Error includes scale factor of 2.0.		
7.5±1.2±0.5		126	[43,44] KORNICER 11	CLEO	$e^+e^- \to \gamma\gamma\ell^+\ell^-$
$10.5\pm0.3^{+0.7}_{-0.6}$		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($\chi_{b2}(1P) \to \gamma\Upsilon(1S)$) = (19.1 ± 1.2) × 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 $(1.2^{+0.4}_{-0.3} \pm 0.09) \times 10^{-3}$ 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 1.9.		
1.6±0.5±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($\chi_{b1}(1P) \to \gamma\Upsilon(1S)$) = (33.9 ± 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. 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 $\sum_J B(\Upsilon(3S) \rightarrow \gamma\chi_{bJ}) \times B(\chi_{bJ} \rightarrow \gamma\Upsilon(1S)) = (1.7 \pm 0.4 \pm 0.6) \times 10^{-3}$ for $J = 0,1,2$ using inclusive $\Upsilon(1S)$ decays and $(1.2^{+0.4}_{-0.3} \pm 0.09) \times 10^{-3}$ for $J = 1,2$ using $\Upsilon(1S) \rightarrow \ell^+\ell^-$.

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						
[(0.30 ± 0.11) × 10^{-2} OUR 2011 AVERAGE]						
0.27±0.04±0.02		2.3k	LEES	11J	BABR	$\Upsilon(3S) \rightarrow X\gamma$
0.30±0.04±0.10		8.7k	ARTUSO	05	CLEO	$e^+e^- \rightarrow \gamma X$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.8	90		[51] ASNER	08A	CLEO	$\Upsilon(3S) \rightarrow \gamma +$ hadrons

NEW

[51] ASNER 08A reports $[\Gamma(\Upsilon(3S) \rightarrow \gamma\chi_{b0}(1P))/\Gamma_{total}] / [B(\Upsilon(2S) \rightarrow \gamma\chi_{b0}(1P))] < 21.9 \times 10^{-2}$ which we multiply by our best value $B(\Upsilon(2S) \rightarrow \gamma\chi_{b0}(1P)) = 3.8 \times 10^{-2}$.

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	$e^+e^- \rightarrow \gamma X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<19	90	LEES	11J	BABR	$\Upsilon(3S) \rightarrow X\gamma$

$\Gamma(\gamma\eta_b(1S))/\Gamma_{total}$ 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	$\Upsilon(3S) \rightarrow \gamma X$
4.8±0.5±0.6		19 ± 3k	[52] AUBERT	09AQ	BABR	$\Upsilon(3S) \rightarrow \gamma X$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<8.5	90		LEES	11J	BABR	$\Upsilon(3S) \rightarrow X\gamma$
4.8±0.5±1.2		19 ± 3k	[52,53] AUBERT	08V	BABR	$\Upsilon(3S) \rightarrow \gamma X$
<4.3	90		[54] ARTUSO	05	CLEO	$e^+e^- \rightarrow \gamma X$

[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

$\Gamma(\gamma X \rightarrow \gamma + \geq 4\ \text{prongs})/\Gamma_{total}$ Γ_{28}/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	$e^+e^- \rightarrow \gamma X$

$\Gamma(\gamma a_1^0 \rightarrow \gamma\tau^+\tau^-)/\Gamma_{total}$ Γ_{29}/Γ

NODE=M048R29
NODE=M048R29

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.6 × 10^{-4}	90	[55] AUBERT	09P	BABR	$e^+e^- \rightarrow \gamma a_1^0 \rightarrow \gamma\tau^+\tau^-$

[55] 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 × 10^{-5}.

NODE=M048R29;LINKAGE=AU

$\Gamma(\gamma A^0 \rightarrow \gamma\,\text{hadrons})/\Gamma_{total}$ Γ_{23}/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	[56] LEES	11H	BABR	$\Upsilon(3S) \rightarrow \gamma$ hadrons

[56] 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

LEPTON FAMILY NUMBER (*LF*) VIOLATING MODES

NODE=M048230

$\Gamma(e^\pm\tau^\mp)/\Gamma_{total}$ Γ_{30}/Γ

NODE=M048R01
NODE=M048R01

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<4.2	90	LEES	10B	BABR	$e^+e^- \rightarrow e^\pm\tau^\mp$

$\Gamma(\mu^\pm\tau^\mp)/\Gamma_{total}$ Γ_{31}/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

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 031104R	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
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

$\chi_b(3P)$

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

OMITTED FROM SUMMARY TABLE

A mixture of $J = 0$, 1, and 2 spin components observed in the radiative decay to $\Upsilon(1S)$ and $\Upsilon(2S)$, therefore $C = +$.

NODE=M206

$\chi_b(3P)$ MASS

NODE=M206M

VALUE (GeV)	DOCUMENT ID		TECN	COMMENT
10.530±0.005±0.009	[1] AAD	12A	ATLS	$p p \to \gamma \mu^+ \mu^- + X$

NODE=M206M

[1] The mass barycenter of the merged lineshapes from the $J = 1$ and 2 states.

NODE=M206M;LINKAGE=AA

$\chi_b(3P)$ DECAY MODES

NODE=M206215;NODE=M206

	Mode	Fraction (Γ_i/Γ)
Γ_1	$\Upsilon(1S)\gamma$	seen
Γ_2	$\Upsilon(2S)\gamma$	seen

DESIG=1
DESIG=2

$\chi_b(3P)$ BRANCHING RATIOS

NODE=M206225

$\Gamma(\Upsilon(1S)\gamma)/\Gamma_{total}$ — Γ_1/Γ

NODE=M206R01
NODE=M206R01

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AAD	12A	ATLS	$p p \to \gamma \mu^+ \mu^- + X$

$\Gamma(\Upsilon(2S)\gamma)/\Gamma_{total}$ — Γ_2/Γ

NODE=M206R02
NODE=M206R02

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AAD	12A	ATLS	$p p \to \gamma \mu^+ \mu^- + X$

$\chi_b(3P)$ REFERENCES

NODE=M206

AAD 12A PRL 108 152001 G. Aad *et al.* (ATLAS Collab.)

REFID=54037

NODE=M047

$\Upsilon(4S)$ or $\Upsilon(10580)$

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

$\Upsilon(4S)$ MASS

NODE=M047M

VALUE (GeV)	DOCUMENT ID		TECN	COMMENT
10.5794±0.0012 OUR AVERAGE				
10.5793±0.0004±0.0012	AUBERT	05Q	BABR	$e^+e^- \to$ hadrons
10.5800±0.0035	[1] BEBEK	87	CLEO	$e^+e^- \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •				
10.5774±0.0010	[2] LOVELOCK	85	CUSB	$e^+e^- \to$ hadrons

NODE=M047M

[1] Reanalysis of BESSON 85.
[2] No systematic error given.

NODE=M047M;LINKAGE=C
NODE=M047M;LINKAGE=B

$\Upsilon(4S)$ WIDTH

NODE=M047W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
20.5±2.5 OUR AVERAGE				
20.7±1.6±2.5	AUBERT	05Q	BABR	$e^+e^- \to$ hadrons
20 ±2 ±4	BESSON	85	CLEO	$e^+e^- \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •				
25 ±2.5	LOVELOCK	85	CUSB	$e^+e^- \to$ hadrons

NODE=M047W

$\Upsilon(4S)$ DECAY MODES

NODE=M047215;NODE=M047

	Mode	Fraction (Γ_i/Γ)	Confidence level	
Γ_1	$B\overline{B}$	> 96 %	95%	DESIG=8;OUR EST;→ NOT CHECKED ←
Γ_2	B^+B^-	(51.3 ± 0.6) %		DESIG=10
Γ_3	D_s^+ anything + c.c.	(17.8 ± 2.6) %		DESIG=12
Γ_4	$B^0\overline{B}^0$	(48.7 ± 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^-	$(1.57 \pm 0.08) \times 10^{-5}$		DESIG=1
Γ_8	$\rho^+\rho^-$	$< 5.7 \times 10^{-6}$	90%	DESIG=16
Γ_9	$J/\psi(1S)$ anything	$< 1.9 \times 10^{-4}$	95%	DESIG=2
Γ_{10}	D^{*+} anything + c.c.	< 7.4 %	90%	DESIG=3
Γ_{11}	ϕ anything	(7.1 ± 0.6) %		DESIG=4
Γ_{12}	$\phi\eta$	$< 1.8 \times 10^{-6}$	90%	DESIG=13
Γ_{13}	$\phi\eta'$	$< 4.3 \times 10^{-6}$	90%	DESIG=18
Γ_{14}	$\rho\eta$	$< 1.3 \times 10^{-6}$	90%	DESIG=19
Γ_{15}	$\rho\eta'$	$< 2.5 \times 10^{-6}$	90%	DESIG=20
Γ_{16}	$\Upsilon(1S)$ anything	$< 4 \times 10^{-3}$	90%	DESIG=5
Γ_{17}	$\Upsilon(1S)\pi^+\pi^-$	$(8.1 \pm 0.6) \times 10^{-5}$		DESIG=7
Γ_{18}	$\Upsilon(1S)\eta$	$(1.96 \pm 0.11) \times 10^{-4}$		DESIG=17
Γ_{19}	$\Upsilon(2S)\pi^+\pi^-$	$(8.6 \pm 1.3) \times 10^{-5}$		DESIG=9
Γ_{20}	$h_b(1P)\pi^+\pi^-$	not seen		DESIG=21
Γ_{21}	$\overline{d}$ anything	$< 1.3 \times 10^{-5}$	90%	DESIG=14

$\Upsilon(4S)$ PARTIAL WIDTHS

NODE=M047220

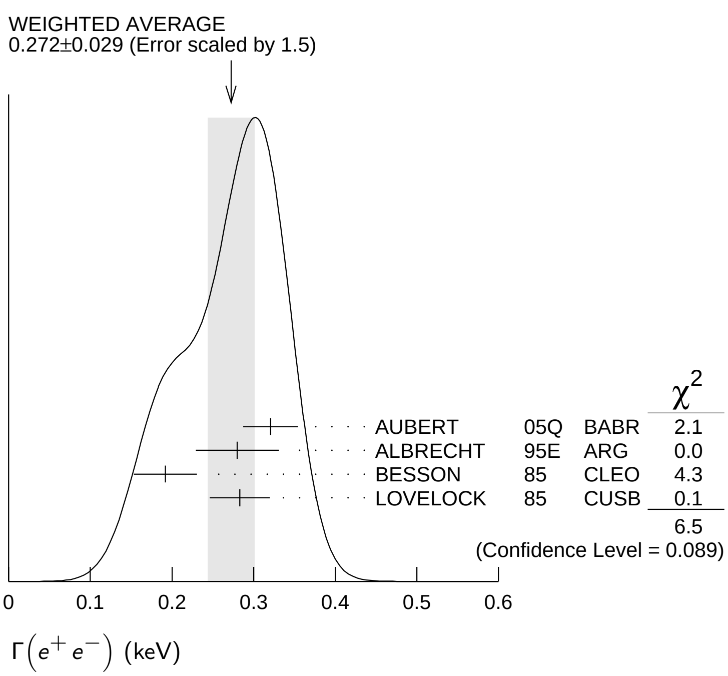
$\Gamma(e^+e^-)$ Γ_7

NODE=M047W1
NODE=M047W1

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	[3] 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

[3] Using LEYAOUANC 77 parametrization of $\Gamma(s)$.

NODE=M047W1;LINKAGE=A



$\Upsilon(4S)$ BRANCHING RATIOS

NODE=M047230

—— $B\overline{B}$ DECAYS ——

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 (HFAG) and are described at http://www.slac.stanford.edu/xorg/hfag/. The averaging/rescaling procedure takes into account the common dependence of the measurement on the value of the lifetime ratio.

NODE=M047BBD

$\Gamma(B^+B^-)/\Gamma_{\text{total}}$ — Γ_2/Γ

NODE=M047R11
NODE=M047R11

VALUE	DOCUMENT ID
0.513±0.006 OUR EVALUATION	Assuming B($\Upsilon(4S) \to B\overline{B}$) = 1 [0.516 ± 0.006 OUR 2011 EVALUATION]

NEW;→ NOT CHECKED ←

$\Gamma(D_s^+ \text{ anything} + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_3/Γ

NODE=M047R13
NODE=M047R13

VALUE	DOCUMENT ID		TECN	COMMENT
0.178±0.021±0.016	[4] ARTUSO	05B	CLE3	$e^+e^- \to D_X X$

[4] ARTUSO 05B reports $[\Gamma(\Upsilon(4S) \to D_s^+ \text{ anything} + \text{ c.c.})/\Gamma_{\text{total}}] \times [B(D_s^+ \to \phi\pi^+)] = (8.0 \pm 0.2 \pm 0.9) \times 10^{-3}$ 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

$\Gamma(B^0\overline{B}^0)/\Gamma_{\text{total}}$ — Γ_4/Γ

NODE=M047R12
NODE=M047R12

VALUE	DOCUMENT ID		TECN	COMMENT
0.487±0.006 OUR EVALUATION	Assuming B($\Upsilon(4S) \to B\overline{B}$) = 1 [0.484 ± 0.006 OUR 2011 EVALUATION]			
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.487±0.010±0.008	[5] AUBERT,B	05H	BABR	$\Upsilon(4S) \to \overline{B}B \to D^*\ell\nu_\ell$

NEW;→ NOT CHECKED ←

[5] 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
1.055±0.025 OUR EVALUATION [1.065 ± 0.026 OUR 2011 EVALUATION]				
1.006±0.036±0.031	[6] AUBERT	04F	BABR	$\Upsilon(4S) \to B\overline{B} \to J/\psi K$
1.01 ±0.03 ±0.09	[6] HASTINGS	03	BELL	$\Upsilon(4S) \to B\overline{B} \to$ dileptons
1.058±0.084±0.136	[7] ATHAR	02	CLEO	$\Upsilon(4S) \to B\overline{B} \to D^*\ell\nu$
1.10 ±0.06 ±0.05	[8] AUBERT	02	BABR	$\Upsilon(4S) \to B\overline{B} \to (c\overline{c})K^*$
1.04 ±0.07 ±0.04	[9] ALEXANDER	01	CLEO	$\Upsilon(4S) \to B\overline{B} \to J/\psi K^*$

NEW;→ NOT CHECKED ←

[6] HASTINGS 03 and AUBERT 04F assume $\tau(B^+)$ / $\tau(B^0) = 1.083 \pm 0.017$. NODE=M047R10;LINKAGE=F

[7] ATHAR 02 assumes $\tau(B^+)$ / $\tau(B^0) = 1.074 \pm 0.028$. Supersedes BARISH 95. NODE=M047R10;LINKAGE=D

[8] AUBERT 02 assumes $\tau(B^+)$ / $\tau(B^0) = 1.062 \pm 0.029$. NODE=M047R10;LINKAGE=E

[9] ALEXANDER 01 assumes $\tau(B^+)$ / $\tau(B^0) = 1.066 \pm 0.024$. NODE=M047R10;LINKAGE=C

$\Gamma(J/\psi K^0_S(J/\psi, \eta_c)K^0_S)/\Gamma_{\text{total}}$ — Γ_5/Γ

NODE=M047R16

Forbidden by *CP* invariance.

NODE=M047R16
NODE=M047R16

VALUE (units 10^{-7})	CL%	DOCUMENT ID		TECN	COMMENT
<4	90	[10] TAJIMA	07A	BELL	$\Upsilon(4S) \to B^0\overline{B}^0$

[10] $\Upsilon(4S)$ with $CP = +1$ decays to the final state with $CP = -1$.

NODE=M047R16;LINKAGE=TA

—— non-$B\overline{B}$ DECAYS ——

NODE=M047NBB

$\Gamma(\text{non-}B\overline{B})/\Gamma_{\text{total}}$ — Γ_6/Γ

NODE=M047R6
NODE=M047R6

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.04	95	BARISH	96B	CLEO	e^+e^-

$\Gamma(e^+e^-)/\Gamma_{\text{total}}$ — 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	[11] ALBRECHT	95E	ARG	$e^+e^- \to$ hadrons

[11] 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	$e^+e^- \to \pi^+\pi^- 2\pi^0$

$\Gamma(J/\psi(1S)$ anything$)/\Gamma_{total}$ Γ_9/Γ

NODE=M047R1
NODE=M047R1

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.9	95	[12] 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	[12] AUBERT	01C	BABR	$e^+e^- \to J/\psi X \to \ell^+\ell^- X$

[12] Uses B($J/\psi \to e^+e^-$) = 0.0593 ± 0.0010 and B($J/\psi \to \mu^+\mu^-$) = 0.0588 ± 0.0010.

NODE=M047R;LINKAGE=AC

$\Gamma(D^{*+}$ anything + c.c.$)/\Gamma_{total}$ Γ_{10}/Γ

NODE=M047R2
NODE=M047R2

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.074	90	[13] ALEXANDER	90C	CLEO	e^+e^-

[13] For $x >$ 0.473.

NODE=M047R2;LINKAGE=A

$\Gamma(\phi$ anything$)/\Gamma_{total}$ Γ_{11}/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	[14] ALEXANDER	90C	CLEO	e^+e^-

[14] For $x >$ 0.52.

NODE=M047R3;LINKAGE=A

$\Gamma(\phi\eta)/\Gamma_{total}$ Γ_{12}/Γ

NODE=M047R14
NODE=M047R14

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<1.8	90	[15] 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	$e^+e^- \to \phi\eta$

[15] Using all intermedite branching fraction values from PDG 08.

NODE=M047R14;LINKAGE=BE

$\Gamma(\phi\eta')/\Gamma_{total}$ Γ_{13}/Γ

NODE=M047R21
NODE=M047R21

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<4.3	90	[16] BELOUS	09	BELL	$e^+e^- \to \phi\eta'$

[16] Using all intermedite branching fraction values from PDG 08.

NODE=M047R21;LINKAGE=BE

$\Gamma(\rho\eta)/\Gamma_{total}$ Γ_{14}/Γ

NODE=M047R22
NODE=M047R22

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<1.3	90	[17] BELOUS	09	BELL	$e^+e^- \to \rho\eta$

[17] Using all intermedite branching fraction values from PDG 08.

NODE=M047R22;LINKAGE=BE

$\Gamma(\rho\eta')/\Gamma_{total}$ Γ_{15}/Γ

NODE=M047R23
NODE=M047R23

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<2.5	90	[18] BELOUS	09	BELL	$e^+e^- \to \rho\eta'$

[18] Using all intermedite branching fraction values from PDG 08.

NODE=M047R23;LINKAGE=BE

$\Gamma(\Upsilon(1S)$ anything$)/\Gamma_{total}$ Γ_{16}/Γ

NODE=M047R4
NODE=M047R4

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.004	90	ALEXANDER	90C	CLEO	e^+e^-

$\Gamma(\Upsilon(1S)\pi^+\pi^-)/\Gamma_{total}$ Γ_{17}/Γ

NODE=M047R7
NODE=M047R7

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
8.1 ±0.6 OUR AVERAGE						
8.5 ±1.3 ±0.2		113 ± 16	[19] SOKOLOV	09	BELL	$e^+e^- \to \pi^+\pi^-\mu^+\mu^-$
8.00±0.64±0.27		430	[20] 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			[21,22] SOKOLOV	07	BELL	$e^+e^- \to \pi^+\pi^-\mu^+\mu^-$
9.0 ±1.5 ±0.2		167 ± 19	[23] AUBERT	06R	BABR	$e^+e^- \to \pi^+\pi^-\mu^+\mu^-$
<12	90		GLENN	99	CLE2	e^+e^-

[19] SOKOLOV 09 reports $[\Gamma(\Upsilon(4S) \rightarrow \Upsilon(1S)\pi^+\pi^-)/\Gamma_{total}] \times [B(\Upsilon(1S) \rightarrow \mu^+\mu^-)] = (0.211 \pm 0.030 \pm 0.014) \times 10^{-5}$ which we divide by our best value $B(\Upsilon(1S) \rightarrow \mu^+\mu^-) = (2.48 \pm 0.05) \times 10^{-2}$. 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

[20] Using $B(\Upsilon(1S) \rightarrow e^+e^-) = (2.38 \pm 0.11)\%$ and $B(\Upsilon(1S) \rightarrow \mu^+\mu^-) = (2.48 \pm 0.05)\%$. NODE=M047R7;LINKAGE=UB

[21] SOKOLOV 07 reports $[\Gamma(\Upsilon(4S) \rightarrow \Upsilon(1S)\pi^+\pi^-)/\Gamma_{total}] \times [B(\Upsilon(1S) \rightarrow \mu^+\mu^-)] = (4.42 \pm 0.81 \pm 0.56) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(1S) \rightarrow \mu^+\mu^-) = (2.48 \pm 0.05) \times 10^{-2}$. 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

[22] According to the authors, systematic errors were underestimated. NODE=M047R7;LINKAGE=US

[23] Superseded by AUBERT 08BP. AUBERT 06R reports $[\Gamma(\Upsilon(4S) \rightarrow \Upsilon(1S)\pi^+\pi^-)/\Gamma_{total}] \times [B(\Upsilon(1S) \rightarrow \mu^+\mu^-)] = (2.23 \pm 0.25 \pm 0.27) \times 10^{-6}$ which we divide by our best value $B(\Upsilon(1S) \rightarrow \mu^+\mu^-) = (2.48 \pm 0.05) \times 10^{-2}$. 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

$\Gamma(\Upsilon(1S)\eta)/\Gamma_{total}$ — Γ_{18}/Γ

NODE=M047R18
NODE=M047R18

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.96±0.06±0.09	56	[24] AUBERT	08BP	BABR	$\Upsilon(4S) \rightarrow \pi^+\pi^-\pi^0\ell^+\ell^-$

[24] Using $B(\Upsilon(1S) \rightarrow e^+e^-) = (2.38 \pm 0.11)\%$ and $B(\Upsilon(1S) \rightarrow \mu^+\mu^-) = (2.48 \pm 0.05)\%$. NODE=M047R18;LINKAGE=UB

$\Gamma(\Upsilon(1S)\eta)/\Gamma(\Upsilon(1S)\pi^+\pi^-)$ — Γ_{18}/Γ_{17}

NODE=M047R19
NODE=M047R19

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.41±0.40±0.12	56	[25] AUBERT	08BP	BABR	$\Upsilon(4S) \rightarrow \pi^+\pi^-(\pi^0)\ell^+\ell^-$

[25] Not independent of other values reported by AUBERT 08BP. NODE=M047R19;LINKAGE=UB

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

NODE=M047R9
NODE=M047R9

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.86±0.11±0.07		220	[26] AUBERT	08BP	BABR	$\Upsilon(4S) \rightarrow \pi^+\pi^-\ell^+\ell^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
0.88±0.17±0.08		97 ± 15	[27] AUBERT	06R	BABR	$e^+e^- \rightarrow \pi^+\pi^-\mu^+\mu^-$
<3.9	90		GLENN	99	CLE2	e^+e^-

[26] Using $B(\Upsilon(2S) \rightarrow e^+e^-) = (1.91 \pm 0.16)\%$ and $B(\Upsilon(2S) \rightarrow \mu^+\mu^-) = (1.93 \pm 0.17)\%$. NODE=M047R9;LINKAGE=UB

[27] Superseded by AUBERT 08BP. AUBERT 06R reports $[\Gamma(\Upsilon(4S) \rightarrow \Upsilon(2S)\pi^+\pi^-)/\Gamma_{total}] \times [B(\Upsilon(2S) \rightarrow \mu^+\mu^-)] = (1.69 \pm 0.26 \pm 0.20) \times 10^{-6}$ which we divide 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=M047R9;LINKAGE=AU

$\Gamma(\Upsilon(2S)\pi^+\pi^-)/\Gamma(\Upsilon(1S)\pi^+\pi^-)$ — Γ_{19}/Γ_{17}

NODE=M047R20
NODE=M047R20

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.16±0.16±0.14	220	[28] AUBERT	08BP	BABR	$\Upsilon(4S) \rightarrow \pi^+\pi^-\ell^+\ell^-$

[28] Using $B(\Upsilon(1S) \rightarrow e^+e^-) = (2.38 \pm 0.11)\%$, $B(\Upsilon(1S) \rightarrow \mu^+\mu^-) = (2.48 \pm 0.05)\%$, $B(\Upsilon(2S) \rightarrow e^+e^-) = (1.91 \pm 0.16)\%$, and $B(\Upsilon(2S) \rightarrow \mu^+\mu^-) = (1.93 \pm 0.17)\%$. Not independent of other values reported by AUBERT 08BP. NODE=M047R20;LINKAGE=UB

$\Gamma(h_b(1P)\pi^+\pi^-)/\Gamma_{total}$ — Γ_{20}/Γ

NODE=M047R01
NODE=M047R01

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
not seen	35 ± 21k	[29] ADACHI	12	BELL	10.58 $e^+e^- \rightarrow h_b(1P)\pi^+\pi^-$

[29] From the upper limit on the ratio of $\sigma(e^+e^- \rightarrow h_b(1P)\pi^+\pi^-)$ at the $\Upsilon(4S)$ to that at the $\Upsilon(5S)$ of 0.27. NODE=M047R01;LINKAGE=AD

$\Gamma(\overline{d}\text{ anything})/\Gamma_{total}$ — Γ_{21}/Γ

NODE=M047R15
NODE=M047R15

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<1.3	90	ASNER	07	CLEO	$e^+e^- \rightarrow \overline{d}X$

$\Upsilon(4S)$ REFERENCES

NODE=M047

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 051103R	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 071103R	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 111103R	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

$X(10610)^{\pm}$

$I^G(J^P) = ?^+(1^+)$

OMITTED FROM SUMMARY TABLE

Observed by BONDAR 12 in $\Upsilon(5S)$ decays to $\Upsilon(\mathrm{nS})\pi^+\pi^-$ (n = 1, 2, 3) and $h_b(\mathrm{mP})\pi^+\pi^-$ (m = 1, 2). $J^P = 1^+$ is favored from angular analyses.

NODE=M207

$X(10610)^{\pm}$ MASS

NODE=M207M

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*	
10607.2±2.0	[1] BONDAR	12	BELL	$e^+e^- \rightarrow$ hadrons	NODE=M207M
• • • We do not use the following data for averages, fits, limits, etc. • • •					
10611 ±4 ±3	[2] BONDAR	12	BELL	$e^+e^- \rightarrow \Upsilon(1S)\pi^+\pi^-$	OCCUR=2
10609 ±2 ±3	[2] BONDAR	12	BELL	$e^+e^- \rightarrow \Upsilon(2S)\pi^+\pi^-$	OCCUR=3
10608 ±2 ±3	[2] BONDAR	12	BELL	$e^+e^- \rightarrow \Upsilon(3S)\pi^+\pi^-$	OCCUR=4
$10605\ \pm2\ {}^{+3}_{-1}$	[2] BONDAR	12	BELL	$e^+e^- \rightarrow h_b(1P)\pi^+\pi^-$	OCCUR=5
$10599\ {}^{+6}_{-3}\ {}^{+5}_{-4}$	[2] BONDAR	12	BELL	$e^+e^- \rightarrow h_b(2P)\pi^+\pi^-$	OCCUR=6

[1] Average of the BONDAR 12 measurements in separate channels. NODE=M207M;LINKAGE=BO

[2] Superseded by the average measurement of BONDAR 12. NODE=M207M;LINKAGE=BN

$X(10610)^{\pm}$ WIDTH

NODE=M207W

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*	
18.4± 2.4	[3] BONDAR	12	BELL	$e^+e^- \rightarrow$ hadrons	NODE=M207W
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$22.3\pm\ 7.7{}^{+3.0}_{-4.0}$	[4] BONDAR	12	BELL	$e^+e^- \rightarrow \Upsilon(1S)\pi^+\pi^-$	OCCUR=2
$24.2\pm\ 3.1{}^{+2.0}_{-3.0}$	[4] BONDAR	12	BELL	$e^+e^- \rightarrow \Upsilon(2S)\pi^+\pi^-$	OCCUR=3
17.6± 3.0±3.0	[4] BONDAR	12	BELL	$e^+e^- \rightarrow \Upsilon(3S)\pi^+\pi^-$	OCCUR=4
$11.4\ {}^{+\ 4.5}_{-\ 3.9}\ {}^{+2.1}_{-1.2}$	[4] BONDAR	12	BELL	$e^+e^- \rightarrow h_b(1P)\pi^+\pi^-$	OCCUR=5
$13\ {}^{+10}_{-\ 8}\ {}^{+9}_{-7}$	[4] BONDAR	12	BELL	$e^+e^- \rightarrow h_b(2P)\pi^+\pi^-$	OCCUR=6

[3] Average of the BONDAR 12 measurements in separate channels. NODE=M207W;LINKAGE=BO

[4] Superseded by the average measurement of BONDAR 12. NODE=M207W;LINKAGE=BN

$X(10610)^+$ DECAY MODES

NODE=M207215;NODE=M207

$X(10610)^-$ decay modes are charge conjugates of the modes below.

NODE=M207

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\Upsilon(1S)\pi^+$	seen	DESIG=1
Γ_2	$\Upsilon(2S)\pi^+$	seen	DESIG=2
Γ_3	$\Upsilon(3S)\pi^+$	seen	DESIG=3
Γ_4	$h_b(1P)\pi^+$	seen	DESIG=4
Γ_5	$h_b(2P)\pi^+$	seen	DESIG=5

$X(10610)^\pm$ BRANCHING RATIOS

NODE=M207225

$\Gamma(\Upsilon(1S)\pi^+)/\Gamma_{total}$ — Γ_1/Γ

NODE=M207R01
NODE=M207R01

VALUE	DOCUMENT ID		TECN	COMMENT
seen	BONDAR	12	BELL	$e^+e^- \rightarrow \Upsilon(1S)\pi^+\pi^-$

$\Gamma(\Upsilon(2S)\pi^+)/\Gamma_{total}$ — Γ_2/Γ

NODE=M207R02
NODE=M207R02

VALUE	DOCUMENT ID		TECN	COMMENT
seen	BONDAR	12	BELL	$e^+e^- \rightarrow \Upsilon(2S)\pi^+\pi^-$

$\Gamma(\Upsilon(3S)\pi^+)/\Gamma_{total}$ — Γ_3/Γ

NODE=M207R03
NODE=M207R03

VALUE	DOCUMENT ID		TECN	COMMENT
seen	BONDAR	12	BELL	$e^+e^- \rightarrow \Upsilon(3S)\pi^+\pi^-$

$\Gamma(h_b(1P)\pi^+)/\Gamma_{total}$ — Γ_4/Γ

NODE=M207R04
NODE=M207R04

VALUE	DOCUMENT ID		TECN	COMMENT
seen	BONDAR	12	BELL	$e^+e^- \rightarrow h_b(1P)\pi^+\pi^-$

$\Gamma(h_b(2P)\pi^+)/\Gamma_{total}$ — Γ_5/Γ

NODE=M207R05
NODE=M207R05

VALUE	DOCUMENT ID		TECN	COMMENT
seen	BONDAR	12	BELL	$e^+e^- \rightarrow h_b(2P)\pi^+\pi^-$

$X(10610)^\pm$ REFERENCES

NODE=M207

BONDAR 12 PRL 108 122001 A. Bondar *et al.* (BELLE Collab.) REFID=53963

NODE=M208

$X(10650)^\pm$

$I^G(J^P) = ?^+(1^+)$

OMITTED FROM SUMMARY TABLE

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.

NODE=M208

$X(10650)^\pm$ MASS

NODE=M208M

NODE=M208M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT	
10652.2±1.5	[1] BONDAR	12	BELL	$e^+e^- \rightarrow$ hadrons	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$10657 \pm 6 \pm 3$	[2] BONDAR	12	BELL	$e^+e^- \rightarrow \Upsilon(1S)\pi^+\pi^-$	OCCUR=2
$10651 \pm 2 \pm 3$	[2] BONDAR	12	BELL	$e^+e^- \rightarrow \Upsilon(2S)\pi^+\pi^-$	OCCUR=3
$10652 \pm 1 \pm 2$	[2] BONDAR	12	BELL	$e^+e^- \rightarrow \Upsilon(3S)\pi^+\pi^-$	OCCUR=4
$10654 \pm 3 {}^{+1}_{-2}$	[2] BONDAR	12	BELL	$e^+e^- \rightarrow h_b(1P)\pi^+\pi^-$	OCCUR=5
$10651 {}^{+2}_{-3} {}^{+3}_{-2}$	[2] BONDAR	12	BELL	$e^+e^- \rightarrow h_b(2P)\pi^+\pi^-$	OCCUR=6

[1] Average of the BONDAR 12 measurements in separate channels. NODE=M208M;LINKAGE=BO

[2] Superseded by the average measurement of BONDAR 12. NODE=M208M;LINKAGE=BN

$X(10650)^\pm$ WIDTH

NODE=M208W

NODE=M208W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
11.5±2.2	[3] BONDAR	12	BELL	$e^+e^- \rightarrow$ hadrons

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

$16.3 \pm 9.8^{+6.0}_{-2.0}$	[4] BONDAR	12	BELL	$e^+ e^- \rightarrow \Upsilon(1S)\pi^+\pi^-$	OCCUR=2
$13.3 \pm 3.3^{+4.0}_{-3.0}$	[4] BONDAR	12	BELL	$e^+ e^- \rightarrow \Upsilon(2S)\pi^+\pi^-$	OCCUR=3
$8.4 \pm 2.0 \pm 2.0$	[4] BONDAR	12	BELL	$e^+ e^- \rightarrow \Upsilon(3S)\pi^+\pi^-$	OCCUR=4
$20.9^{+5.4}_{-4.7}{}^{+2.1}_{-5.7}$	[4] BONDAR	12	BELL	$e^+ e^- \rightarrow h_b(1P)\pi^+\pi^-$	OCCUR=5
$19 \pm 7 ^{+11}_{-7}$	[4] BONDAR	12	BELL	$e^+ e^- \rightarrow h_b(2P)\pi^+\pi^-$	OCCUR=6

[3] Average of the BONDAR 12 measurements in separate channels. NODE=M208W;LINKAGE=BO
[4] Superseded by the average measurement of BONDAR 12. NODE=M208W;LINKAGE=BN

$X(10650)^+$ DECAY MODES

NODE=M208215;NODE=M208

$X(10650)^-$ decay modes are charge conjugates of the modes below. NODE=M208

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\Upsilon(1S)\pi^+$	seen	DESIG=1
Γ_2	$\Upsilon(2S)\pi^+$	seen	DESIG=2
Γ_3	$\Upsilon(3S)\pi^+$	seen	DESIG=3
Γ_4	$h_b(1P)\pi^+$	seen	DESIG=4
Γ_5	$h_b(2P)\pi^+$	seen	DESIG=5

$X(10650)^\pm$ BRANCHING RATIOS

NODE=M208225

$\Gamma(\Upsilon(1S)\pi^+)/\Gamma_{total}$ Γ_1/Γ

NODE=M208R01
NODE=M208R01

VALUE	DOCUMENT ID		TECN	COMMENT
seen	BONDAR	12	BELL	$e^+ e^- \rightarrow \Upsilon(1S)\pi^+\pi^-$

$\Gamma(\Upsilon(2S)\pi^+)/\Gamma_{total}$ Γ_2/Γ

NODE=M208R02
NODE=M208R02

VALUE	DOCUMENT ID		TECN	COMMENT
seen	BONDAR	12	BELL	$e^+ e^- \rightarrow \Upsilon(2S)\pi^+\pi^-$

$\Gamma(\Upsilon(3S)\pi^+)/\Gamma_{total}$ Γ_3/Γ

NODE=M208R03
NODE=M208R03

VALUE	DOCUMENT ID		TECN	COMMENT
seen	BONDAR	12	BELL	$e^+ e^- \rightarrow \Upsilon(3S)\pi^+\pi^-$

$\Gamma(h_b(1P)\pi^+)/\Gamma_{total}$ Γ_4/Γ

NODE=M208R04
NODE=M208R04

VALUE	DOCUMENT ID		TECN	COMMENT
seen	BONDAR	12	BELL	$e^+ e^- \rightarrow h_b(1P)\pi^+\pi^-$

$\Gamma(h_b(2P)\pi^+)/\Gamma_{total}$ Γ_5/Γ

NODE=M208R05
NODE=M208R05

VALUE	DOCUMENT ID		TECN	COMMENT
seen	BONDAR	12	BELL	$e^+ e^- \rightarrow h_b(2P)\pi^+\pi^-$

$X(10650)^\pm$ REFERENCES

NODE=M208

BONDAR 12 PRL 108 122001 A. Bondar *et al.* (BELLE Collab.) REFID=53963

NODE=M092

$\Upsilon(10860)$

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

$\Upsilon(10860)$ MASS

NODE=M092M

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
10876 ±11 OUR EVALUATION Weighted-average of Belle and BaBar results, but tripling the scaling S-factors applied to the uncertainties to account for model-dependence, handling of radiative corrections, and interference effects.			
• • • We do not use the following data for averages, fits, limits, etc. • • •			
10879 ± 3	[1,2] CHEN	10 BELL	$e^+e^- \to$ hadrons
$10888.4^{+2.7}_{-2.6} \pm 1.2$	[3] CHEN	10 BELL	$e^+e^- \to \Upsilon(1S,2S,3S)\pi^+\pi^-$
10876 ± 2	[1] AUBERT	09E BABR	$e^+e^- \to$ hadrons
10869 ± 2	[4] AUBERT	09E BABR	$e^+e^- \to$ hadrons
10868 ± 6 ±5	[5] BESSON	85 CLEO	$e^+e^- \to$ hadrons
10845 ±20	[6] LOVELOCK	85 CUSB	$e^+e^- \to$ hadrons

NODE=M092M
→ NOT CHECKED ←
OCCUR=2
OCCUR=2

[1] 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

[2] The parameters of the $\Upsilon(11020)$ are fixed to those in AUBERT 09E. NODE=M092M;LINKAGE=CH

[3] 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

[4] In a model where a non-resonant $b\bar{b}$-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

[5] Assuming four Gaussians with radiative tails and a single step in R. NODE=M092M;LINKAGE=BE

[6] In a coupled-channel model with three resonances and a smooth step in R. NODE=M092M;LINKAGE=LO

$\Upsilon(10860)$ WIDTH

NODE=M092W

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
55 ±28 OUR EVALUATION Weighted-average of Belle and BaBar results, but tripling the scaling S-factors applied to the uncertainties to account for model-dependence, handling of radiative corrections, and interference effects.			
• • • We do not use the following data for averages, fits, limits, etc. • • •			
46^{+9}_{-7}	[7,8] CHEN	10 BELL	$e^+e^- \to$ hadrons
$30.7^{+8.3}_{-7.0} \pm 3.1$	[9] CHEN	10 BELL	$e^+e^- \to \Upsilon(1S,2S,3S)\pi^+\pi^-$
43 ± 4	[7] AUBERT	09E BABR	$e^+e^- \to$ hadrons
74 ± 4	[10] AUBERT	09E BABR	$e^+e^- \to$ hadrons
112 ±17 ±23	[11] BESSON	85 CLEO	$e^+e^- \to$ hadrons
110 ±15	[12] LOVELOCK	85 CUSB	$e^+e^- \to$ hadrons

NODE=M092W
→ NOT CHECKED ←
OCCUR=2
OCCUR=2

[7] 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=M092W;LINKAGE=AU

[8] The parameters of the $\Upsilon(11020)$ are fixed to those in AUBERT 09E. NODE=M092W;LINKAGE=CH

[9] 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

[10] In a model where a non-resonant $b\bar{b}$-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

[11] Assuming four Gaussians with radiative tails and a single step in R. NODE=M092W;LINKAGE=BE

[12] 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	$B\bar{B}X$	$(75.9^{+2.7}_{-4.0})$ %		DESIG=9
Γ_2	$B\bar{B}$	(5.5 ±1.0) %		DESIG=2
Γ_3	$B\bar{B}^*$ + c.c.	(13.7 ±1.6) %		DESIG=3
Γ_4	$B^*\bar{B}^*$	(38.1 ±3.4) %		DESIG=4
Γ_5	$B\bar{B}^{(*)}\pi$	< 19.7 %	90%	DESIG=10
Γ_6	$B\bar{B}\pi$	(0.0 ±1.2) %		DESIG=23
Γ_7	$B^*\bar{B}\pi$ + $B\bar{B}^*\pi$	(7.3 ±2.3) %		DESIG=24

Γ_8	$B^* \overline{B}^* \pi$	(1.0 ± 1.4) %		DESIG=25
Γ_9	$B \overline{B} \pi \pi$	< 8.9 %	90%	DESIG=11
Γ_{10}	$B_s^{(*)} \overline{B}_s^{(*)}$	(19.9 ± 3.0) %		DESIG=16
Γ_{11}	$B_s \overline{B}_s$	$(5 \pm 5) \times 10^{-3}$		DESIG=5
Γ_{12}	$B_s \overline{B}_s^* +$ c.c.	(1.5 ± 0.7) %		DESIG=7
Γ_{13}	$B_s^* \overline{B}_s^*$	(17.9 ± 2.8) %		DESIG=8
Γ_{14}	no open-bottom	$(4.2 ^{+5.0}_{-0.6})$ %		DESIG=28
Γ_{15}	$e^+ e^-$	$(5.6 \pm 3.1) \times 10^{-6}$		DESIG=1
Γ_{16}	$\Upsilon(1S) \pi^+ \pi^-$	$(5.3 \pm 0.6) \times 10^{-3}$		DESIG=17
Γ_{17}	$\Upsilon(2S) \pi^+ \pi^-$	$(7.8 \pm 1.3) \times 10^{-3}$		DESIG=18
Γ_{18}	$\Upsilon(3S) \pi^+ \pi^-$	$(4.8 ^{+1.9}_{-1.7}) \times 10^{-3}$		DESIG=19
Γ_{19}	$\Upsilon(1S) K^+ K^-$	$(6.1 \pm 1.8) \times 10^{-4}$		DESIG=20
Γ_{20}	$h_b(1P) \pi^+ \pi^-$	$(3.5 ^{+1.0}_{-1.3}) \times 10^{-3}$		DESIG=26
Γ_{21}	$h_b(2P) \pi^+ \pi^-$	$(6.0 ^{+2.1}_{-1.8}) \times 10^{-3}$		DESIG=27

Inclusive Decays.

NODE=M092;CLUMP=I

These decay modes are submodes of one or more of the decay modes above.

NODE=M092

Γ_{22}	ϕ anything	$(13.8 ^{+2.4}_{-1.7})$ %	DESIG=12
Γ_{23}	D^0 anything + c.c.	(108 ± 8) %	DESIG=13
Γ_{24}	D_s anything + c.c.	(46 ± 6) %	DESIG=6
Γ_{25}	J/ψ anything	(2.06 ± 0.21) %	DESIG=14
Γ_{26}	B^0 anything + c.c.	(77 ± 8) %	DESIG=21
Γ_{27}	B^+ anything + c.c.	(72 ± 6) %	DESIG=22

Υ(10860) PARTIAL WIDTHS

NODE=M092220

$\Gamma(e^+ e^-)$ — Γ_{15}

NODE=M092W1

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	$e^+ e^- \rightarrow$ hadrons
0.365±0.070	LOVELOCK	85	CUSB	$e^+ e^- \rightarrow$ hadrons

Υ(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 (HFAG) and are described at http://www.slac.stanford.edu/xorg/hfag/.

NODE=M092230

$\Gamma(B \overline{B} X)/\Gamma_{total}$ — Γ_1/Γ

NODE=M092R13

NODE=M092R13

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$0.759^{+0.027}_{-0.040}$ OUR EVALUATION					
0.71 ±0.06 OUR AVERAGE					
0.737±0.032±0.051	1063	[13] DRUTSKOY	10	BELL	$\Upsilon(5S) \rightarrow B^+ X,\ B^0 X$
0.589±0.100±0.092		[14] HUANG	07	CLEO	$\Upsilon(5S) \rightarrow$ hadrons

→ NOT CHECKED ←

$\Gamma(B \overline{B})/\Gamma_{total}$ — Γ_2/Γ

NODE=M092R16

NODE=M092R16

VALUE (units 10^{-2})	CL%	DOCUMENT ID		TECN	COMMENT
$5.5^{+1.0}_{-0.9} \pm 0.4$		[15] DRUTSKOY	10	BELL	$\Upsilon(5S) \rightarrow B^+ X,\ B^0 X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<13.8	90	[14] HUANG	07	CLEO	$\Upsilon(5S) \rightarrow$ hadrons

$\Gamma(B \overline{B})/\Gamma(B \overline{B} X)$ — Γ_2/Γ_1

NODE=M092R05

NODE=M092R05

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.22	90	AQUINES	06	CLE3	$\Upsilon(5S) \rightarrow$ 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	[15] DRUTSKOY	10	BELL	$\Upsilon(5S) \rightarrow B^+X,\ B^0X$
0.143±0.053±0.027	[14] HUANG	07	CLEO	$\Upsilon(5S) \rightarrow$ hadrons

$\Gamma(B\overline{B}^* + \text{c.c.})/\Gamma(B\overline{B}X)$ — Γ_3/Γ_1

NODE=M092R06

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.24±0.09±0.03	10	AQUINES	06	CLE3	$\Upsilon(5S) \rightarrow$ hadrons

$\Gamma(B^*\overline{B}^*)/\Gamma_{\text{total}}$ — Γ_4/Γ

NODE=M092R14

VALUE	DOCUMENT ID		TECN	COMMENT
0.381±0.034 OUR AVERAGE				
$0.375^{+0.021}_{-0.019}\pm0.030$	[15] DRUTSKOY	10	BELL	$\Upsilon(5S) \rightarrow B^+X,\ B^0X$
0.436±0.083±0.072	[14] HUANG	07	CLEO	$\Upsilon(5S) \rightarrow$ hadrons

$\Gamma(B^*\overline{B}^*)/\Gamma(B\overline{B}X)$ — Γ_4/Γ_1

NODE=M092R07

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.74±0.15±0.08	31	AQUINES	06	CLE3	$\Upsilon(5S) \rightarrow$ hadrons

$\Gamma(B\overline{B}^{(*)}\pi)/\Gamma_{\text{total}}$ — Γ_5/Γ

NODE=M092R17

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.197	90	[14] HUANG	07	CLEO	$\Upsilon(5S) \rightarrow$ hadrons

$\Gamma(B\overline{B}^{(*)}\pi)/\Gamma(B\overline{B}X)$ — Γ_5/Γ_1

NODE=M092R08

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.32	90	AQUINES	06	CLE3	$\Upsilon(5S) \rightarrow$ 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	[15] DRUTSKOY	10	BELL	$\Upsilon(5S) \rightarrow B^{+,0}\pi^-X$

$[\Gamma(B^*\overline{B}\pi) + \Gamma(B\overline{B}^*\pi)]/\Gamma_{\text{total}}$ — Γ_7/Γ

NODE=M092R29

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{7.3^{+2.3}_{-2.1}\pm0.8}$	38	[15] DRUTSKOY	10	BELL	$\Upsilon(5S) \rightarrow B^{+,0}\pi^-X$

$\Gamma(B^*\overline{B}^*\pi)/\Gamma_{\text{total}}$ — Γ_8/Γ

NODE=M092R30

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{1.0^{+1.4}_{-1.3}\pm0.4}$	5	[15] DRUTSKOY	10	BELL	$\Upsilon(5S) \rightarrow B^{+,0}\pi^-X$

$\Gamma(B\overline{B}\pi\pi)/\Gamma_{\text{total}}$ — Γ_9/Γ

NODE=M092R18

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.089	90	[14] HUANG	07	CLEO	$\Upsilon(5S) \rightarrow$ hadrons

$\Gamma(B\overline{B}\pi\pi)/\Gamma(B\overline{B}X)$ — Γ_9/Γ_1

NODE=M092R09

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.14	90	AQUINES	06	CLE3	$\Upsilon(5S) \rightarrow$ hadrons

$\Gamma(B_s^{(*)}\overline{B}_s^{(*)})/\Gamma_{\text{total}}$ — $\Gamma_{10}/\Gamma = (\Gamma_{11}+\Gamma_{12}+\Gamma_{13})/\Gamma$

NODE=M092R01

VALUE	DOCUMENT ID		TECN	COMMENT
0.199±0.030 OUR EVALUATION				
[0.193 ± 0.029 OUR 2011 EVALUATION]				
$\mathbf{0.195^{+0.030}_{-0.023}}$ **OUR AVERAGE**				
0.180±0.013±0.032	[16] DRUTSKOY	07	BELL	$\Upsilon(5S) \rightarrow D^0X,\ D_sX$
$0.21\ ^{+0.06}_{-0.03}$	[17] HUANG	07	CLEO	$\Upsilon(5S) \rightarrow D_sX$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.160±0.026±0.058	[18] ARTUSO	05B	CLEO	$e^+e^- \rightarrow D_xX$

NEW;→ NOT CHECKED ←

$\Gamma(B_s^{(*)}\overline{B}_s^{(*)})/\Gamma(B\overline{B}X)$ — Γ_{10}/Γ_1

NODE=M092R34

VALUE	DOCUMENT ID
$\mathbf{0.262^{+0.051}_{-0.043}}$ **OUR EVALUATION**	

→ NOT CHECKED ←

$\Gamma(B_s^* \overline{B}_s^*)/\Gamma(B_s^{(*)} \overline{B}_s^{(*)})$ $\Gamma_{13}/\Gamma_{10} = \Gamma_{13}/(\Gamma_{11}+\Gamma_{12}+\Gamma_{13})$

NODE=M092R19

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
$90.1^{+3.8}_{-4.0}\pm0.2$	[19] LOUVOT	09	BELL	10.86 $e^+e^- \rightarrow B_s^{(*)}\overline{B}_s^{(*)}$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$93\ ^{+7}_{-9}\ \pm1$	[19] DRUTSKOY	07A	BELL	Superseded by LOUVOT 09

$\Gamma(B_s \overline{B}_s)/\Gamma(B_s^{(*)} \overline{B}_s^{(*)})$ $\Gamma_{11}/\Gamma_{10} = \Gamma_{11}/(\Gamma_{11}+\Gamma_{12}+\Gamma_{13})$

NODE=M092R24

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
$2.6^{+2.6}_{-2.5}$	LOUVOT	09	BELL	10.86 $e^+e^- \rightarrow B_s^{(*)}\overline{B}_s^{(*)}$

$\Gamma(B_s \overline{B}_s)/\Gamma(B_s^* \overline{B}_s^*)$ 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})	DOCUMENT ID		TECN	COMMENT
$7.3^{+3.3}_{-3.0}\pm0.1$	LOUVOT	09	BELL	10.86 $e^+e^- \rightarrow B_s^{(*)}\overline{B}_s^{(*)}$

$\Gamma(B_s \overline{B}_s^* + \text{c.c.})/\Gamma(B_s^* \overline{B}_s^*)$ 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
$0.042^{+0.046}_{-0.006}$ OUR EVALUATION	

→ NOT CHECKED ←

$\Gamma(\Upsilon(1S)\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{16}/Γ

NODE=M092R20

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
5.3±0.3±0.5	325	[20] CHEN	08	BELL	10.87 $e^+e^- \rightarrow \Upsilon(1S)\pi^+\pi^-$

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

NODE=M092R21

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
7.8±0.6±1.1	186	[20] CHEN	08	BELL	10.87 $e^+e^- \rightarrow \Upsilon(2S)\pi^+\pi^-$

$\Gamma(\Upsilon(3S)\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{18}/Γ

NODE=M092R22

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
$4.8^{+1.8}_{-1.5}\pm0.7$	10	[20] CHEN	08	BELL	10.87 $e^+e^- \rightarrow \Upsilon(3S)\pi^+\pi^-$

$\Gamma(\Upsilon(1S)K^+K^-)/\Gamma_{\text{total}}$ Γ_{19}/Γ

NODE=M092R23

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
$6.1^{+1.6}_{-1.4}\pm1.0$	20	[20] CHEN	08	BELL	10.87 $e^+e^- \rightarrow \Upsilon(1S)K^+K^-$

$\Gamma(h_b(1P)\pi^+\pi^-)/\Gamma(\Upsilon(2S)\pi^+\pi^-)$ Γ_{20}/Γ_{17}

NODE=M092R31

VALUE	DOCUMENT ID		TECN	COMMENT
$0.45\pm0.08^{+0.07}_{-0.12}$	ADACHI	12	BELL	10.86 $e^+e^- \rightarrow$ hadrons

$\Gamma(h_b(2P)\pi^+\pi^-)/\Gamma(\Upsilon(2S)\pi^+\pi^-)$ Γ_{21}/Γ_{17}

NODE=M092R32

VALUE	DOCUMENT ID		TECN	COMMENT
$0.77\pm0.08^{+0.22}_{-0.17}$	ADACHI	12	BELL	10.86 $e^+e^- \rightarrow$ hadrons

$\Gamma(\phi\ \text{anything})/\Gamma_{\text{total}}$ Γ_{22}/Γ

NODE=M092R12

VALUE	DOCUMENT ID		TECN	COMMENT
$0.138\pm0.007^{+0.023}_{-0.015}$	HUANG	07	CLEO	$\Upsilon(5S) \rightarrow \phi X$

$\Gamma(D^0\ \text{anything} + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{23}/Γ

NODE=M092R10

VALUE	DOCUMENT ID		TECN	COMMENT
1.076±0.040±0.068	DRUTSKOY	07	BELL	$\Upsilon(5S) \rightarrow D^0 X$

$\Gamma(D_s$ anything + c.c.$)/\Gamma_{total}$ Γ_{24}/Γ

NODE=M092R02
NODE=M092R02

VALUE	DOCUMENT ID		TECN	COMMENT
0.46 ±0.06 OUR AVERAGE				
0.472±0.024±0.072	[16] DRUTSKOY	07	BELL	$\Upsilon(5S) \to D_s X$
0.44 ±0.09 ±0.04	[21] ARTUSO	05B	CLE3	$e^+ e^- \to D_x X$

$\Gamma(J/\psi$ anything$)/\Gamma_{total}$ Γ_{25}/Γ

NODE=M092R11
NODE=M092R11

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
2.060±0.160±0.134	DRUTSKOY	07	BELL	$\Upsilon(5S) \to J/\psi X$

$\Gamma(B^0$ anything + c.c.$)/\Gamma_{total}$ Γ_{26}/Γ

NODE=M092R26
NODE=M092R26

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.770^{+0.058}_{-0.056}\pm0.061}$	352	DRUTSKOY	10	BELL	$\Upsilon(5S) \to B^0 X$

$\Gamma(B^+$ anything + c.c.$)/\Gamma_{total}$ Γ_{27}/Γ

NODE=M092R27
NODE=M092R27

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.721^{+0.039}_{-0.038}\pm0.050}$	711	DRUTSKOY	10	BELL	$\Upsilon(5S) \to B^+ X$

[13] Not independent of DRUTSKOY 10 values for $\Upsilon(5S) \to B^{\pm,0}$ anything. NODE=M092R13;LINKAGE=DR

[14] Using measurements or limits from AQUINES 06. NODE=M092R;LINKAGE=HU

[15] Assuming isospin conservation. NODE=M092R15;LINKAGE=DR

[16] Using $B(D_s^+ \to \phi\pi^+) = (4.4 \pm 0.6)\%$ from PDG 06. NODE=M092R02;LINKAGE=DR

[17] Supersedes ARTUSO 05B. Combining inclusive ϕ, D_s, and B measurements. Using $B(D_s^+ \to \phi\pi^+) = 4.4 \pm 0.6\%$ from PDG 06. NODE=M092R01;LINKAGE=HU

[18] Uses a model-dependent estimate $B(B_s \to D_s X) = (92 \pm 11)\%$. NODE=M092R01;LINKAGE=AR

[19] 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=DR

[20] Assuming that the observed events are solely due to the $\Upsilon(5S)$ resonance. NODE=M092R20;LINKAGE=CH

[21] ARTUSO 05B reports $[\Gamma(\Upsilon(10860) \to D_s$ anything + c.c.$)/\Gamma_{total}] \times [B(D_s^+ \to \phi\pi^+)] = 0.0198 \pm 0.0019 \pm 0.0038$ 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=M092R02;LINKAGE=AR

$\Upsilon(10860)$ REFERENCES

NODE=M092

ADACHI	12	PRL 108 032001	I. Adachi *et al.*	(BELLE Collab.)	REFID=53962
CHEN	10	PR D82 091106R	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	JPG 33 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

$\Upsilon(11020)$

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

$\Upsilon(11020)$ MASS

NODE=M093M

NODE=M093M

VALUE (GeV)	DOCUMENT ID		TECN	COMMENT
11.019±0.008 OUR AVERAGE				
11.019±0.005±0.007	BESSON	85	CLEO	$e^+e^- \to$ hadrons
11.020±0.030	LOVELOCK	85	CUSB	$e^+e^- \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •				
10.996±0.002	[1] AUBERT	09E	BABR	$e^+e^- \to$ hadrons

[1] 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=AU

$\Upsilon(11020)$ WIDTH

NODE=M093W

NODE=M093W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
79±16 OUR AVERAGE				
61±13±22	BESSON	85	CLEO	$e^+e^- \to$ hadrons
90±20	LOVELOCK	85	CUSB	$e^+e^- \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •				
37± 3	[2] AUBERT	09E	BABR	$e^+e^- \to$ hadrons

[2] 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=AU

$\Upsilon(11020)$ DECAY MODES

NODE=M093215;NODE=M093

	Mode	Fraction (Γ_i/Γ)
Γ_1	e^+e^-	$(1.6\pm0.5)\times10^{-6}$

DESIG=1

$\Upsilon(11020)$ PARTIAL WIDTHS

NODE=M093220

$\Gamma(e^+e^-)$ Γ_1

NODE=M093W1

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

$\Upsilon(11020)$ REFERENCES

NODE=M093

AUBERT	09E	PRL 102 012001	B. Aubert *et al.*	(BABAR Collab.)
BESSON	85	PRL 54 381	D. Besson *et al.*	(CLEO Collab.)
LOVELOCK	85	PRL 54 377	D.M.J. Lovelock *et al.*	(CUSB Collab.)

REFID=52661
REFID=22368
REFID=22369

NON-$q\overline{q}$ CANDIDATES

NODE=MXXX050

NODE=MXXX050

For a review on gluonium and other non-$q\overline{q}$ candidates see PDG 06, Journal of Physics, G **33** 1 (2006). See also the "Note on scalar mesons" in the $f_0(500)$ Particle Listings, our note "New charmonium-like states" in PDG 08, Physics Letters **B667** 1 (2008), and the extensive chapter on Spectroscopy in N. Brambilla *et al.* (Quarkonium Working Group), The European Physical Journal **C71** 1534 (2011).

BRAMBILLA	11	EPJ C71 1534	N. Brambilla *et al.*	(Quarkonium Working Group)
PDG	08	PL B667 1	C. Amsler *et al.*	(PDG Collab.)
PDG	06	JPG 33 1	W.-M. Yao *et al.*	(PDG Collab.)

REFID=53692
REFID=52166
REFID=51004