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

$f_0(600)$ or σ

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

A REVIEW GOES HERE – Check our WWW List of Reviews

NODE=M014

f_0(600) T-MATRIX POLE $\sqrt{s}$

NODE=M014201

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

NODE=M014201

NODE=M014PP

→ NOT CHECKED ←

VALUE (MeV)	*DOCUMENT ID*	*TECN*	*COMMENT*
(400–1200)$-i$(300–500) OUR ESTIMATE			
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$(541 \pm 39) - i(252 \pm 42)$	[1] ABLIKIM 04A	BES2	$J/\psi \to \omega\pi^+\pi^-$
$(528 \pm 32) - i(207 \pm 23)$	[2] GALLEGOS 04	RVUE	Compilation
$(440 \pm 8) - i(212 \pm 15)$	[3] PELAEZ 04A	RVUE	$\pi\pi \to \pi\pi$
$(533 \pm 25) - i(247 \pm 25)$	[4] BUGG 03	RVUE	
$532 - i272$	BLACK 01	RVUE	$\pi^0\pi^0 \to \pi^0\pi^0$
$(470 \pm 30) - i(295 \pm 20)$	[5] COLANGELO 01	RVUE	$\pi\pi \to \pi\pi$
$(535^{+48}_{-36}) - i(155^{+76}_{-53})$	[6] ISHIDA 01		$\Upsilon(3S) \to \Upsilon\pi\pi$
$610 \pm 14 - i620 \pm 26$	[7] SUROVTSEV 01	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$
$(558^{+34}_{-27}) - i(196^{+32}_{-41})$	ISHIDA 00B		$p\overline{p} \to \pi^0\pi^0\pi^0$
$445 - i235$	HANNAH 99	RVUE	π scalar form factor
$(523 \pm 12) - i(259 \pm 7)$	KAMINSKI 99	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$, $\sigma\sigma$
$442 - i\ 227$	OLLER 99	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$
$469 - i203$	OLLER 99B	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$
$445 - i221$	OLLER 99C	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$, $\eta\eta$
$(1530^{+\ 90}_{-250}) - i(560 \pm 40)$	ANISOVICH 98B	RVUE	Compilation
$420 - i\ 212$	LOCHER 98	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$
$(602 \pm 26) - i(196 \pm 27)$	[8] ISHIDA 97		$\pi\pi \to \pi\pi$
$(537 \pm 20) - i(250 \pm 17)$	[9] KAMINSKI 97B	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$, 4π
$470 - i250$	[10,11] TORNQVIST 96	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$, $K\pi$, $\eta\pi$
$\sim (1100 - i300)$	AMSLER 95B	CBAR	$\overline{p}p \to 3\pi^0$
$400 - i500$	[11,12] AMSLER 95D	CBAR	$\overline{p}p \to 3\pi^0$
$1100 - i137$	[11,13] AMSLER 95D	CBAR	$\overline{p}p \to 3\pi^0$
$387 - i305$	[11,14] JANSSEN 95	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$
$525 - i269$	[15] ACHASOV 94	RVUE	$\pi\pi \to \pi\pi$
$(506 \pm 10) - i(247 \pm 3)$	KAMINSKI 94	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$
$370 - i356$	[16] ZOU 94B	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$
$408 - i342$	[11,16] ZOU 93	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$
$870 - i370$	[11,17] AU 87	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$
$470 - i208$	[18] BEVEREN 86	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$, $\eta\eta$, ...
$(750 \pm 50) - i(450 \pm 50)$	[19] ESTABROOKS 79	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$
$(660 \pm 100) - i(320 \pm 70)$	PROTOPOP... 73	HBC	$\pi\pi \to \pi\pi$, $K\overline{K}$
$650 - i370$	[20] BASDEVANT 72	RVUE	$\pi\pi \to \pi\pi$

OCCUR=2

[1] From a mean of six different analyses and $f_0(600)$ parameterizations. NODE=M014PP;LINKAGE=AB

[2] Using data on $\psi(2S) \to J/\psi\pi\pi$ from BAI 00E and on $\Upsilon(nS) \to \Upsilon(mS)\pi\pi$ from BUTLER 94B and ALEXANDER 98. NODE=M014PP;LINKAGE=GA

[3] Reanalysis of data from PROTOPOPESCU 73, ESTABROOKS 74, GRAYER 74, and COHEN 80 in the unitarized ChPT model. NODE=M014PP;LINKAGE=PE

[4] From a combined analysis of HYAMS 73, AUGUSTIN 89, AITALA 01B, and PISLAK 01. NODE=M014PP;LINKAGE=PS

[5] From a phase-shift analysis of HYAMS 73 and PROTOPOPESCU 73 data. NODE=M014PP;LINKAGE=CL

[6] A similar analysis (KOMADA 01) finds $(580^{+79}_{-30}) - i(190^{+107}_{-\ 49})$ MeV. NODE=M014PP;LINKAGE=KI

[7] 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

[8] Reanalysis of data from HYAMS 73, GRAYER 74, SRINIVASAN 75, and ROSSELET 77 using the interfering amplitude method. NODE=M014PP;LINKAGE=AA

[9] Average and spread of 4 variants ("up" and "down") of KAMINSKI 97B 3-channel model. NODE=M014PP;LINKAGE=E

[10] Uses data from BEIER 72B, OCHS 73, HYAMS 73, GRAYER 74, ROSSELET 77, CASON 83, ASTON 88, and ARMSTRONG 91B. Coupled channel analysis with flavor symmetry and all light two-pseudoscalars systems. NODE=M014PP;LINKAGE=B

[11] Demonstrates explicitly that $f_0(600)$ and $f_0(1370)$ are two different poles. NODE=M014PP;LINKAGE=G

[12] Coupled channel analysis of $\overline{p}p \to 3\pi^0$, $\pi^0\eta\eta$ and $\pi^0\pi^0\eta$ on sheet II. NODE=M014PP;LINKAGE=L

[13] Coupled channel analysis of $\overline{p}p \to 3\pi^0$, $\pi^0\eta\eta$ and $\pi^0\pi^0\eta$ on sheet III. NODE=M014PP;LINKAGE=M

[14] Analysis of data from FALVARD 88. NODE=M014PP;LINKAGE=C

[15] Analysis of data from OCHS 73, ESTABROOKS 75, ROSSELET 77, and MUKHIN 80. NODE=M014PP;LINKAGE=D

[16] Analysis of data from OCHS 73, GRAYER 74, and ROSSELET 77. NODE=M014PP;LINKAGE=F

[17] Analysis of data from OCHS 73, GRAYER 74, BECKER 79, and CASON 83. NODE=M014PP;LINKAGE=H

[18] 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

[19] Analysis of data from APEL 73, GRAYER 74, CASON 76, PAWLICKI 77. Includes spread and errors of 4 solutions. NODE=M014PP;LINKAGE=A

[20] Analysis of data from BATON 70, BENSINGER 71, COLTON 71, BAILLON 72,PROTOPOPESCU 73, and WALKER 67. NODE=M014PP;LINKAGE=J

$f_0(600)$ BREIT-WIGNER MASS OR K-MATRIX POLE PARAMETERS

NODE=M014205

NODE=M014M

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
(400–1200) OUR ESTIMATE				
513±32	[21] MURAMATSU	02	CLEO	$e^+e^- \approx$ 10 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$478^{+24}_{-23}\pm17$	AITALA	01B	E791	$D^+ \to \pi^-\pi^+\pi^+$
$563\pm{}^{+58}_{-20}$	[22] ISHIDA	01		$\Upsilon(3S) \to \Upsilon\pi\pi$
555	[23] ASNER	00	CLE2	$\tau^- \to \pi^-\pi^0\pi^0\nu_\tau$
540±36	ISHIDA	00B		$p\overline{p} \to \pi^0\pi^0\pi^0$
750± 4	ALEKSEEV	99	SPEC	1.78 $\pi^- p_{\text{polar}} \to \pi^-\pi^+ n$
744± 5	ALEKSEEV	98	SPEC	1.78 $\pi^- p_{\text{polar}} \to \pi^-\pi^+ n$
759± 5	[24] TROYAN	98		5.2 $np \to np\pi^+\pi^-$
780±30	ALDE	97	GAM2	450 $pp \to pp\pi^0\pi^0$
585±20	[25] ISHIDA	97		$\pi\pi \to \pi\pi$
761±12	[26] SVEC	96	RVUE	6–17 $\pi N_{\text{polar}} \to \pi^+\pi^- N$
∼ 860	[27,28] TORNQVIST	96	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$, $K\pi$, $\eta\pi$
1165±50	[29,30] 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	[31] ACHASOV	94	RVUE	$\pi\pi \to \pi\pi$
414±20	[26] AUGUSTIN	89	DM2	

→ NOT CHECKED ←

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

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

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

[24] 6σ effect, no PWA. NODE=M014M;LINKAGE=TN

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

[26] 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

[27] 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

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

[29] 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

[30] The pole is on Sheet III. Demonstrates explicitly that $f_0(600)$ and $f_0(1370)$ are two different poles. NODE=M014M;LINKAGE=G

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

$f_0(600)$ BREIT-WIGNER WIDTH

NODE=M014210

NODE=M014W

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
(600–1000) OUR ESTIMATE				
335±67	[32] MURAMATSU	02	CLEO	$e^+e^- \approx$ 10 GeV

→ NOT CHECKED ←

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

$324^{+42}_{-40} \pm 21$		AITALA	01B	E791	$D^+ \to \pi^-\pi^+\pi^+$
$372 \pm {}^{+229}_{-95}$	[33]	ISHIDA	01		$\Upsilon(3S) \to \Upsilon\pi\pi$
540	[34]	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	$1.78\ \pi^- p_{\text{polar}} \to \pi^-\pi^+ n$
77 ± 22		ALEKSEEV	98	SPEC	$1.78\ \pi^- p_{\text{polar}} \to \pi^-\pi^+ n$
35 ± 12	[35]	TROYAN	98		$5.2\ np \to np\pi^+\pi^-$
780 ± 60		ALDE	97	GAM2	$450\ pp \to pp\pi^0\pi^0$
385 ± 70	[36]	ISHIDA	97		$\pi\pi \to \pi\pi$
290 ± 54	[37]	SVEC	96	RVUE	$6–17\ \pi N_{\text{polar}} \to \pi^+\pi^- N$
~ 880	[38,39]	TORNQVIST	96	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$, $K\pi$, $\eta\pi$
460 ± 40	[40,41]	ANISOVICH	95	RVUE	$\pi^- p \to \pi^0\pi^0 n$, $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\pi^0\eta$, $\pi^0\eta\eta$
~ 3200	[42]	ACHASOV	94	RVUE	$\pi\pi \to \pi\pi$
494 ± 58	[37]	AUGUSTIN	89	DM2	

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

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

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

[35] 6σ effect, no PWA. NODE=M014W;LINKAGE=TN

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

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

[41] The pole is on Sheet III. Demonstrates explicitly that $f_0(600)$ and $f_0(1370)$ are two different poles. NODE=M014W;LINKAGE=G

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

$f_0(600)$ 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 ←

$f_0(600)$ PARTIAL WIDTHS

NODE=M014220

$\Gamma(\gamma\gamma)$ Γ_2

NODE=M014W2
NODE=M014W2

VALUE (keV)		*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3.8 ± 1.5	[43,44]	BOGLIONE	99	RVUE	$\gamma\gamma \to \pi^+\pi^-$, $\pi^0\pi^0$
5.4 ± 2.3	[43]	MORGAN	90	RVUE	$\gamma\gamma \to \pi^+\pi^-$, $\pi^0\pi^0$
10 ± 6		COURAU	86	DM1	$e^+e^- \to \pi^+\pi^- e^+e^-$

[43] 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

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

$f_0(600)$ REFERENCES

NODE=M014

ABLIKIM	04A	PL B598 149	M. Ablikim *et al.*	(BES Collab.)	REFID=49740
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
MURAMATSU	02	PRL 89 251802	H. Muramatsu *et al.*	(CLEO Collab.)	REFID=49081
Also	03	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	03	PR D67 072004	S. Pislak *et al.*	(BNL E865 Collab.)	REFID=49344
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	UFN 41 419	V.V. Anisovich *et al.*		REFID=46331
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
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	96	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
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
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
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
AU	87	PR D35 1633	K.L. Au, D. Morgan, M.R. Pennington	(DURH, RAL)	REFID=40064
BEVEREN	86	ZPHY C30 615	E. van Beveren *et al.*	(NIJM, BIEL)	REFID=45769
COURAU	86	NP B271 1	A. Courau *et al.*	(CLER, LALO)	REFID=44510
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.			
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
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
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
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

OTHER RELATED PAPERS

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AUBERT,B	05G	PR D72 052002	B. Aubert *et al.*	(BABAR Collab.)	REFID=50775
BRITO	05	PL B608 69	T.V. Brito *et al.*		REFID=50456
CRONIN-HEN...	05	PR D72 031102R	D. Cronin-Hennessy *et al.*	(CLEO Collab.)	REFID=50571
GIACOSA	05	PR C71 025202	F. Giacosa *et al.*		REFID=50500
JAFFE	05	PRPL 409 1	R.L. Jaffe		REFID=50502
AUBERT,B	04O	PR D70 091103R	B. Aubert *et al.*	(BABAR Collab.)	REFID=50190
AUBERT,B	04P	PR D70 092001	B. Aubert *et al.*	(BABAR Collab.)	REFID=50193
BUGG	04C	PRPL 397 257	D.V. Bugg		REFID=50203
BUGG	04D	EPJ C37 433	D.V. Bugg		REFID=50319
FARIBORZ	04	IJMP A19 2095	A.H. Fariborz		REFID=50160
KALOSHIN	04	EPJ A20 475	A.E. Kaloshin *et al.*		REFID=50157
LINK	04	PL B585 200	J.M. Link *et al.*	(FNAL FOCUS Collab.)	REFID=49774
MAIANI	04A	PRL 93 212002	L. Maiani *et al.*		REFID=50204
NAPSUCIALE	04A	PR D70 094043	N.N. Napsuciale, S. Rodriguez		REFID=50345
PELAEZ	04	PRL 92 102001	J.R. Pelaez		REFID=49777
PRAKHOV	04	PR C69 042202R	S. Prakhov *et al.*	(BNL Crystal Ball Collab.)	REFID=49948
PRAKHOV	04A	PR C69 045202	S. Prakhov *et al.*		REFID=50176
PRAKHOV	04B	PR C70 034605	S. Prakhov *et al.*		REFID=50179
TESHIMA	04	JPG 30 663	T. Teshima *et al.*		REFID=50161
VANBEVEREN	04	MPL A19 1949	E. Banbeveren, G. Rupp		REFID=50164
ABDEL-REHIM	03	PR D67 054001	A. Abdel-Rehim *et al.*		REFID=49396
ABDEL-REHIM	03B	PR D68 013008	A. Abdlel-Rehim *et al.*		REFID=49715
ISHIDA	03	PTPS 149 190	M. Ishida		REFID=49712
KAMINSKI	03	PL B551 241	R. Kaminski, L. Lesniak, B. Loiseau		REFID=49173
OLLER	03B	NP A714 161	J.A. Oller *et al.*		REFID=49718
SCADRON	03	NP A724 391	M.D. Scadron *et al.*		REFID=49716
SEMENOV	03	PAN 66 526	S.V. Semenov		REFID=49418
		Translated from YAF 66 553.			

AITALA	02	PRL 89 121801	E.M. Aitala *et al.*	(FNAL E791 Collab.)	REFID=48807
BEVEREN	02	MPL A17 1673	E. van Beveren *et al.*		REFID=48978
BLACK	02	PRL 88 181603	D. Black, M. Harada, J. Schechter		REFID=48834
BOGLIONE	02	PR D65 114010	M. Boglione, M.R. Pennington		REFID=48835
BRAMON	02	EPJ C26 253	A. Bramon *et al.*		REFID=49178
CLOSE	02B	JPG 28 R249	F.E. Close, N. Tornqvist		REFID=49166
HE	02	PL B536 59	J. He, Z.G. Xiao, H.Q. Zheng		REFID=49170
HERNANDEZ	02	PR C66 065201	E. Hernandez, E. Oset, M.J. Vicente Vacas		REFID=49168
ISHIDA	02	PL B539 249	S. Ishida, M. Ishida		REFID=48841
KAMINSKI	02	EPJ Direct C4 1	R. Kaminski, L. Lesniak, K. Rybicki		REFID=49179
LINK	02E	PL B535 43	J.M. Link *et al.*	(FNAL FOCUS Collab.)	REFID=48728
TESHIMA	02	JPG 28 1391	T. Teshima, I. Kitamura, N. Morisita		REFID=48854
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
BEVEREN	01B	EPJ C22 493	E. van Beveren		REFID=48569
CHERRY	01	NP A688 823	S.N. Cherry, M.R. Pennington		REFID=48657
DEANDREA	01	PL B502 79	A. Deandrea *et al.*		REFID=48322
FAZIO	01	PL B521 15	F. De Fazio, M.R. Pennington		REFID=48653
GOKALP	01	PR D64 053017	A. Gokalp, O. Yilmaz		REFID=48341
NARISON	01C	NPBPS 96 244	S. Narison		REFID=48656
XIAO	01	NP A695 273	Z. Xiao, H. Zheng		REFID=48544
ACHASOV	00H	PL B485 349	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=47930
ALFORD	00	NP B578 367	M. Alford, R.L. Jaffe		REFID=47938
BLACK	00B	PR D61 074030	D. Black, A. Fariborz, J. Schechter		REFID=47967
FANG	00	NP A671 416	Fang Shi *et al.*		REFID=48654;ERROR=1
JAMIN	00	NP B587 331	M. Jamin *et al.*		REFID=47983
MONTANET	00	NPBPS 86 381	L. Montanet		REFID=48659
ABREU	99J	PL B449 364	P. Abreu *et al.*	(DELPHI Collab.)	REFID=46917
BLACK	99	PR D59 074026	D. Black *et al.*		REFID=46898
DELBOURGO	99	PL B446 332	R. Delbourgo, D. Liu, M. Scadron		REFID=46607
IGI	99	PR D59 034005	K. Igi, K. Hikasa		REFID=46611
LUCIO	99	PL B454 365	J.L. Lucio, M. Napsuciale		REFID=48660
MINKOWSKI	99	EPJ C9 283	P. Minkowski, W. Ochs		REFID=46928
SCADRON	99	EPJ C6 141	M. Scadron		REFID=46603
TAKAMATSU	99	PAN 62 435	K. Takamatsu		REFID=46912
ACKERSTAFF	98A	EPJ C5 411	K. Ackerstaff *et al.*	(OPAL Collab.)	REFID=46263
ANISOVICH	98	PL B437 209	V.V. Anisovich *et al.*		REFID=46330
DELBOURGO	98	IJMP A13 657	R. Delbourgo *et al.*		REFID=46363
OLLER	98	PRL 80 3452	J.A. Oller *et al.*		REFID=46376
ANISOVICH	97	PL B395 123	A.V. Anisovich, A.V. Sarantsev	(PNPI)	REFID=45388
ANISOVICH	97D	ZPHY A359 173	A.V. Anisovich, V.V. Anisovich, A.V. Sarantsev		REFID=45818
HARADA	97	PRL 78 1603	M. Harada, F. Sannino, J. Schechter		REFID=49697
ISHIDA	97B	PTP 98 621	S. Ishida *et al.*		REFID=48655
KAMINSKI	97	ZPHY C74 79	R. Kaminski, L. Lesniak, K. Rybicki	(CRAC)	REFID=45532
MALTMAN	97	PL B393 19	K. Maltman, C.E. Wolfe	(YORKC)	REFID=45895
OLLER	97	NP A620 438	J.A. Oller *et al.*	(VALE)	REFID=45777
SVEC	97	PR D55 4355	M. Svec		REFID=45385
SVEC	97B	PR D55 5727	M. Svec	(MCGI)	REFID=45504
AMSLER	96	PR D53 295	C. Amsler, F.E. Close	(ZURI, RAL)	REFID=44635
BIJNENS	96	PL B374 210	J. Bijnens *et al.*	(NORD, BERN, WIEN+)	REFID=45894
BONUTTI	96	PRL 77 603	F. Bonutti *et al.*	(TRSTI, TRSTT, TRIU)	REFID=45164
BUGG	96	NP B471 59	D.V. Bugg, A.V. Sarantsev, B.S. Zou	(LOQM, PNPI)	REFID=45094
HARADA	96	PR D54 1991	M. Harasa *et al.*	(SYRA)	REFID=45118
ISHIDA	96	PTP 95 745	S. Ishida *et al.*	(TOKY, MIYA, KEK)	REFID=45770
ANTINORI	95	PL B353 589	F. Antinori *et al.*	(ATHU, BARI, BIRM+)	REFID=44437
GASPERO	95	NP A588 861	M. Gaspero	(ROMA)	REFID=45422
TORNQVIST	95	ZPHY C68 647	N.A. Tornqvist	(HELS)	REFID=44529
AMSLER	94	PL B322 431	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=43660
BUGG	94	PR D50 4412	D.V. Bugg *et al.*	(LOQM)	REFID=44078
ADAMO	93	NP A558 13C	A. Adamo *et al.*	(OBELIX Collab.)	REFID=43657
GASPERO	93	NP A562 407	M. Gaspero	(ROMAI)	REFID=43658
MORGAN	93	PR D48 1185	D. Morgan, M.R. Pennington	(RAL, DURH)	REFID=43614
Also	93C	NC A Conf. Suppl.	D. Morgan	(RAL)	REFID=43690
BOLTON	92B	PRL 69 1328	T. Bolton *et al.*	(Mark III Collab.)	REFID=42176
SVEC	92	PR D45 55	M. Svec, A. de Lesquen, L. van Rossum	(MCGI+)	REFID=41908
SVEC	92B	PR D45 1518	M. Svec, A. de Lesquen, L. van Rossum	(MCGI+)	REFID=43164
SVEC	92C	PR D46 949	M. Svec, A. de Lesquen, L. van Rossum	(MCGI+)	REFID=43165
RIGGENBACH	91	PR D43 127	C. Riggenbach *et al.*	(BERN, CERN, MASA)	REFID=45886
BAI	90C	PRL 65 2507	Z. Bai *et al.*	(Mark III Collab.)	REFID=41578
WEINSTEIN	90	PR D41 2236	J. Weinstein, N. Isgur	(TNTO)	REFID=43674
ASTON	88D	NP B301 525	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)	REFID=40330
ACHASOV	84	ZPHY C22 53	N.N. Achasov, S.A. Devyanin, G.N. Shestakov	(NOVM)	REFID=21121
GASSER	84	ANP 158 142	J. Gasser, H. Leutwyler		REFID=45890
TORNQVIST	82	PRL 49 624	N.A. Tornqvist	(HELS)	REFID=20392
COSTA	80	NP B175 402	G. Costa *et al.*	(BARI, BONN, CERN, GLAS+)	REFID=45889
BECKER	79B	NP B150 301	H. Becker *et al.*	(MPIM, CERN, ZEEM, CRAC)	REFID=21083
NAGELS	79	PR D20 1633	M.M. Nagels, T.A. Rijken, J.J. de Swart	(NIJM)	REFID=32727
POLYCHRO...	79	PR D19 1317	V.A. Polychronakos *et al.*	(NDAM, ANL) IJP	REFID=20378
CORDEN	78	NP B144 253	M.J. Corden *et al.*	(BIRM, RHEL, TELA+)	REFID=20452
JAFFE	77	PR D15 267,281	R. Jaffe	(MIT)	REFID=43673
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
DEFOIX	72	NP B44 125	C. Defoix *et al.*	(CDEF, CERN)	REFID=20435

NODE=M009

$\rho(770)$

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

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

CHARGED ONLY, τ DECAYS and e^+e^-

NODE=M009M5
NODE=M009M5

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

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT	
775.5±0.5 OUR AVERAGE							
775.5±0.5±0.4	1.98M	[3] ALOISIO	03	KLOE		1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	
775.1±1.1±0.5	87k	[13,14] ANDERSON	00A	CLE2		$\tau^- \to \pi^-\pi^0\nu_\tau$	
776.4±0.9±1.5		[14] BARATE	97M	ALEP		$\tau^- \to \pi^-\pi^0\nu_\tau$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
774.8±0.6±0.4	1.98M	[6] ALOISIO	03	KLOE	−	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	OCCUR=2
776.3±0.6±0.7	1.98M	[6] ALOISIO	03	KLOE	+	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	OCCUR=3
773.9±2.0$^{+0.3}_{-1.0}$		[15] SANZ-CILLERO	03	RVUE		$\tau^- \to \pi^-\pi^0\nu_\tau$	
774.5±0.7±1.5	500k	[3] ACHASOV	02	SND	±	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	OCCUR=2
775.1±0.5		[16] 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	[17] ABELE	99E	CBAR	0±	0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$

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		$\overline{p}n \to \pi^-\pi^0\pi^0$	
768 ±9		AGUILAR-...	91	EHS		400 pp	
767 ±3	2935	[18] CAPRARO	87	SPEC	−	200 π^- Cu $\to \pi^-\pi^0$ Cu	
761 ±5	967	[18] CAPRARO	87	SPEC	−	200 π^- Pb $\to \pi^-\pi^0$ Pb	OCCUR=2
771 ±4		HUSTON	86	SPEC	+	202 $\pi^+ A \to \pi^+\pi^0 A$	
766 ±7	6500	[19] BYERLY	73	OSPK	−	5 $\pi^- p$	
766.8±1.5	9650	[20] PISUT	68	RVUE	−	1.7–3.2 $\pi^- p$, t <10	
767 ±6	900	[18] EISNER	67	HBC	−	4.2 $\pi^- p$, t <10	

NEUTRAL ONLY, PHOTOPRODUCED

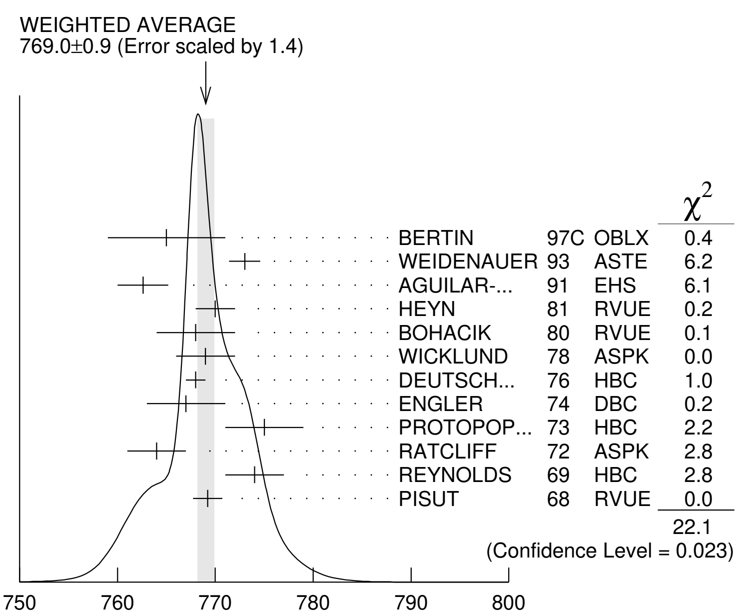
NODE=M009M0P
NODE=M009M0P

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT	
768.5± 1.1 OUR AVERAGE							
770 ± 2 ±1	79k	[21] 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	[22] BREITWEG	98B	ZEUS	0	50–100 γp	OCCUR=2

NEUTRAL ONLY, OTHER REACTIONS

NODE=M009M0R
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		[23] HEYN	81	RVUE		Pion form factor	
768 ±4		[24,25] BOHACIK	80	RVUE	0		
769 ±3		[19] 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	[24] 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	[26] 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		[27] COLANGELO	01	RVUE		$\pi\pi \rightarrow \pi\pi$	
762.3±0.5±1.2	600k	[28] ABELE	99E	CBAR	0	0.0 $\overline{p}p \rightarrow \pi^+ \pi^- \pi^0$	
777 ±2	4943	[29] ADAMS	97	E665		470 $\mu p \rightarrow \mu X B$	
770 ±2		[30] BOGOLYUB...	97	MIRA		32 $\overline{p}p \rightarrow \pi^+ \pi^-$ X	
768 ±8		[30] 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		[31] CHABAUD	83	ASPK	0	17 $\pi^- p$ polarized	
769.5±0.7		[24,25] LANG	79	RVUE	0		
770 ±9		[25] ESTABROOKS	74	RVUE	0	17 $\pi^- p \rightarrow \pi^+ \pi^- n$	
773.5±1.7	11200	[18] 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] Using the GOUNARIS 68 parametrization with the complex phase of the ρ-ω interference. NODE=M009M5;LINKAGE=GS
[2] Update of AKHMETSHIN 02. NODE=M009M5;LINKAGE=PT
[3] Assuming $m_{\rho^+} = m_{\rho^-}$, $\Gamma_{\rho^+} = \Gamma_{\rho^-}$. NODE=M009M0;LINKAGE=CH
[4] From the GOUNARIS 68 parametrization of the pion form factor. NODE=M009M;LINKAGE=K
[5] Assuming $m_{\rho^+} = m_{\rho^-} = m_{\rho^0}$, $\Gamma_{\rho^+} = \Gamma_{\rho^-} = \Gamma_{\rho^0}$. NODE=M009M;LINKAGE=DF
[6] Without limitations on masses and widths. NODE=M009M;LINKAGE=WO
[7] Assuming $m_{\rho^0} = m_{\rho^\pm}$, $g_{\rho^0 \pi\pi} = g_{\rho^\pm \pi\pi}$. NODE=M009M;LINKAGE=HC
[8] Using the data of BARKOV 85 in the hidden local symmetry model. NODE=M009M;LINKAGE=K2
[9] 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
[10] A fit of BARKOV 85 data assuming the direct $\omega\pi\pi$ coupling. NODE=M009M;LINKAGE=AB
[11] Applying the S-matrix formalism to the BARKOV 85 data. NODE=M009M;LINKAGE=AA
[12] Includes BARKOV 85 data. Model-dependent width definition. NODE=M009M;LINKAGE=F
[13] $\rho(1700)$ mass and width fixed at 1700 MeV and 235 MeV respectively. NODE=M009M;LINKAGE=A6
[14] 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
[15] Using the data of BARATE 97M and the effective chiral Lagrangian. NODE=M009M5;LINKAGE=Z
[16] From a fit of the model-independent parameterization of the pion form factor to the data of BARATE 97M. NODE=M009M;LINKAGE=PC
[17] Assuming the equality of ρ^+ and ρ^- masses and widths. NODE=M009M;LINKAGE=LB
[18] Mass errors enlarged by us to $\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M009M;LINKAGE=Z
[19] Phase shift analysis. Systematic errors added corresponding to spread of different fits. NODE=M009M;LINKAGE=X
[20] 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
[21] From the parametrization according to SOEDING 66. NODE=M009M;LINKAGE=B5
[22] From the parametrization according to ROSS 66. NODE=M009M;LINKAGE=B6
[23] HEYN 81 includes all spacelike and timelike F_π values until 1978. NODE=M009M;LINKAGE=B
[24] From pole extrapolation. NODE=M009M;LINKAGE=C
[25] From phase shift analysis of GRAYER 74 data. NODE=M009M;LINKAGE=H
[26] 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
[27] Breit-Wigner mass from a phase-shift analysis of HYAMS 73 and PROTOPOPESCU 73 data. NODE=M009M;LINKAGE=CL
[28] Using relativistic Breit-Wigner and taking into account ρ-ω interference. NODE=M009M;LINKAGE=BL
[29] Systematic errors not evaluated. NODE=M009M;LINKAGE=A1
[30] Systematic effects not studied. NODE=M009M;LINKAGE=QQ
[31] 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=M009210

NODE=M009D

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
0.7±0.7 OUR AVERAGE					
0.4±0.7±0.6	1.98M	[32] ALOISIO 03	KLOE		1.02 $e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
1.3±1.1±2.0	500k	[32] 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	[33] REYNOLDS 69	HBC	−0	2.26 $\pi^- p$
−5 ±5	3600	[33] FOSTER 68	HBC	±0	0.0 $\overline{p} p$
2.4±2.1	22950	[34] PISUT 68	RVUE		$\pi N \rightarrow \rho N$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.0±1.0		[35] BARATE 97M	ALEP		$\tau^- \rightarrow \pi^- \pi^0 \nu_\tau$

[32] Assuming $m_{\rho^+} = m_{\rho^-}$, $\Gamma_{\rho^+} = \Gamma_{\rho^-}$. NODE=M009D;LINKAGE=CH
[33] From quoted masses of charged and neutral modes. NODE=M009D;LINKAGE=A
[34] 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
[35] Using the compilation of $e^+ e^-$ data from BARKOV 85. NODE=M009D;LINKAGE=A1

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

NODE=M009212

NODE=M009D1

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1.5 \pm 0.8 \pm 0.7$	1.98M	[36] ALOISIO	03	KLOE	$1.02\ e^+e^- \rightarrow \pi^+\pi^-\pi^0$

[36] Without limitations on masses and widths.

NODE=M009D;LINKAGE=WO

ρ(770) RANGE PARAMETER

NODE=M009215

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=M009215

NODE=M009R

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

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

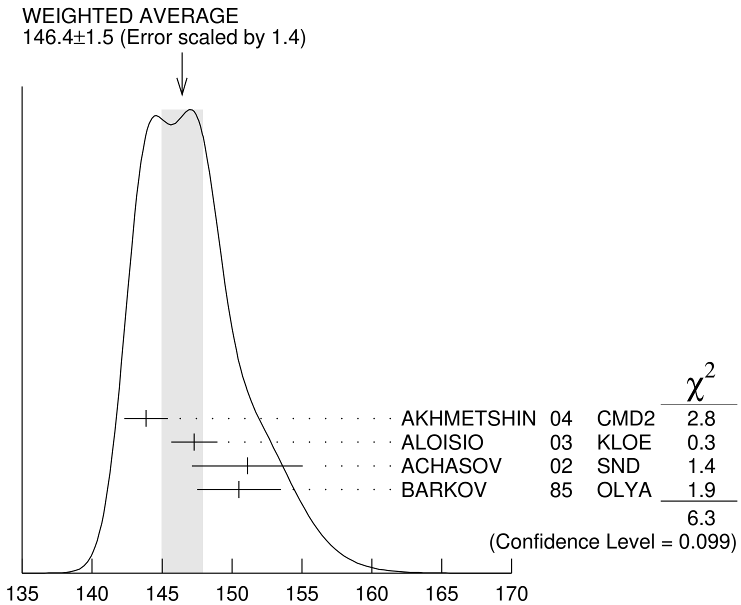
VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*	
146.4 ±1.5 OUR AVERAGE	Error includes scale factor of 1.4. See the ideogram below.						
$143.85 \pm 1.33 \pm 0.80$	114k	[39,40] AKHMETSHIN	04	CMD2		$e^+e^- \rightarrow \pi^+\pi^-$	
$147.3 \pm 1.5 \pm 0.7$	1.98M	[37] ALOISIO	03	KLOE		$1.02\ e^+e^- \rightarrow \pi^+\pi^-\pi^0$	
$151.1 \pm 2.6 \pm 3.0$	500k	[37] ACHASOV	02	SND	0	$1.02\ e^+e^- \rightarrow \pi^+\pi^-\pi^0$	
150.5 ± 3.0		[41] BARKOV	85	OLYA	0	$e^+e^- \rightarrow \pi^+\pi^-$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
$143.9 \pm 1.3 \pm 1.1$	1.98M	[42] ALOISIO	03	KLOE		$1.02\ e^+e^- \rightarrow \pi^+\pi^-\pi^0$	OCCUR=2
$147.4 \pm 1.5 \pm 0.7$	1.98M	[43] ALOISIO	03	KLOE		$1.02\ e^+e^- \rightarrow \pi^+\pi^-\pi^0$	OCCUR=3
$149.8 \pm 2.2 \pm 2.0$	500k	[38] ACHASOV	02	SND		$1.02\ e^+e^- \rightarrow \pi^+\pi^-\pi^0$	OCCUR=3
$147.9 \pm 1.5 \pm 7.5$		[44] BENAYOUN	98	RVUE		$e^+e^- \rightarrow \pi^+\pi^-, \mu^+\mu^-$	
$153.5 \pm 1.3 \pm 4.6$		[45] GARDNER	98	RVUE		0.28–$0.92\ e^+e^- \rightarrow \pi^+\pi^-$	
145.0 ± 1.7		[46] O'CONNELL	97	RVUE		$e^+e^- \rightarrow \pi^+\pi^-$	
142.5 ± 3.5		[47] BERNICHA	94	RVUE		$e^+e^- \rightarrow \pi^+\pi^-$	
138 ± 1		[48] GESHKEN...	89	RVUE		$e^+e^- \rightarrow \pi^+\pi^-$	

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

NODE=M009W;LINKAGE=CH

[38] Assuming $m_{\rho^0} = m_{\rho^\pm}$, $g_{\rho^0\pi\pi} = g_{\rho^\pm\pi\pi}$.

NODE=M009W;LINKAGE=HC



Neutral only, $e^+ e^-$

CHARGED ONLY, τ DECAYS and $e^+ e^-$

NODE=M009W5

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT	
The data in this block is included in the average printed for a previous datablock.						
150.3±1.6 OUR FIT						
150.3±1.6 OUR AVERAGE						
149.9±2.3±2.0	500k	[37] ACHASOV	02	SND	±	1.02 $e^+ e^- \to \pi^+ \pi^- \pi^0$	OCCUR=2
150.4±1.4±1.4	87k	[49,50] ANDERSON	00A	CLE2		$\tau^- \to \pi^- \pi^0 \nu_\tau$	
150.5±1.6±6.3		[50] BARATE	97M	ALEP		$\tau^- \to \pi^- \pi^0 \nu_\tau$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
143.7±1.3±1.2	1.98M	[37] ALOISIO	03	KLOE	±	1.02 $e^+ e^- \to \pi^+ \pi^- \pi^0$	
142.9±1.3±1.4	1.98M	[43] ALOISIO	03	KLOE	−	1.02 $e^+ e^- \to \pi^+ \pi^- \pi^0$	OCCUR=2
144.7±1.4±1.2	1.98M	[43] ALOISIO	03	KLOE	+	1.02 $e^+ e^- \to \pi^+ \pi^- \pi^0$	OCCUR=3
150.2±2.0$^{+0.7}_{-1.6}$		[51] SANZ-CILLERO	03	RVUE		$\tau^- \to \pi^- \pi^0 \nu_\tau$	
150.9±2.2±2.0	500k	[38] 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	[52] 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	[53] CAPRARO	87	SPEC	−	200 π^- Cu $\to \pi^- \pi^0$ Cu	
154 ±20	967	[53] CAPRARO	87	SPEC	−	200 π^- Pb $\to \pi^- \pi^0$ Pb	OCCUR=2
150 ± 5		HUSTON	86	SPEC	+	202 $\pi^+ A \to \pi^+ \pi^0 A$	
146 ±12	6500	[54] BYERLY	73	OSPK	−	5 $\pi^- p$	
148.2± 4.1	9650	[55] 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	[56] 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. • • •

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT	
138 ± 3	79k	[57] 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 $\gamma C \to \pi^+\pi^- C$	
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		[58,59] BOHACIK	80	RVUE	0	
152 ± 9		[54] WICKLUND	78	ASPK	0	3,4,6 $\pi^\pm p N$
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	[60] ABELE	99E	CBAR	0	0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$
146 ± 3	4943	[61] ADAMS	97	E665		470 $\mu p \to \mu X B$
$160.0^{+4.1}_{-4.0}$		[62] CHABAUD	83	ASPK	0	17 $\pi^- p$ polarized
155 ± 1		[63] HEYN	81	RVUE	0	π form factor
148.0± 1.3		[58,59] LANG	79	RVUE	0	
146 ±14	4100	ENGLER	74	DBC	0	6 $\pi^+ n \to \pi^+\pi^- p$
143 ±13		[59] ESTABROOKS	74	RVUE	0	17 $\pi^- p \to \pi^+\pi^- n$
160 ±10	32000	[58] PROTOPOP...	73	HBC	0	7.1 $\pi^+ p$, t <0.4
145 ±12	2250	[53] HYAMS	68	OSPK	0	11.2 $\pi^- p$
163 ±15	13300	[64] PISUT	68	RVUE	0	1.7–3.2 $\pi^- p$, t <10

[39] Using the GOUNARIS 68 parametrization with the complex phase of the ρ-ω interference. NODE=M009W5;LINKAGE=GS
[40] From a fit in the energy range 0.61 to 0.96 GeV. Update of AKHMETSHIN 02. NODE=M009W5;LINKAGE=P2
[41] From the GOUNARIS 68 parametrization of the pion form factor. NODE=M009W;LINKAGE=K
[42] Assuming $m_{\rho^+} = m_{\rho^-} = m_{\rho^0}$, $\Gamma_{\rho^+} = \Gamma_{\rho^-} = \Gamma_{\rho^0}$. NODE=M009W;LINKAGE=DF
[43] Without limitations on masses and widths. NODE=M009W;LINKAGE=WO
[44] Using the data of BARKOV 85 in the hidden local symmetry model. NODE=M009W;LINKAGE=K2
[45] From the fit to $e^+e^- \to \pi^+\pi^-$ data from the compilations of HEYN 81 and BARKOV 85, including the GOUNARIS 68 parametrization of the pion form factor. NODE=M009W;LINKAGE=G8
[46] A fit of BARKOV 85 data assuming the direct $\omega\pi\pi$ coupling. NODE=M009W;LINKAGE=AB
[47] Applying the S-matrix formalism to the BARKOV 85 data. NODE=M009W;LINKAGE=AA
[48] Includes BARKOV 85 data. Model-dependent width definition. NODE=M009W;LINKAGE=F
[49] $\rho(1700)$ mass and width fixed at 1700 MeV and 235 MeV respectively. NODE=M009W;LINKAGE=A6
[50] 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=M009W;LINKAGE=K1
[51] Using the data of BARATE 97M and the effective chiral Lagrangian. NODE=M009W5;LINKAGE=Z
[52] Assuming the equality of ρ^+ and ρ^- masses and widths. NODE=M009W;LINKAGE=LB
[53] Width errors enlarged by us to $4\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M009W;LINKAGE=Z
[54] Phase shift analysis. Systematic errors added corresponding to spread of different fits. NODE=M009W;LINKAGE=X
[55] 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=M009W;LINKAGE=A
[56] From the parametrization according to SOEDING 66. NODE=M009W;LINKAGE=B5
[57] From the parametrization according to ROSS 66. NODE=M009W;LINKAGE=B6
[58] From pole extrapolation. NODE=M009W;LINKAGE=C
[59] From phase shift analysis of GRAYER 74 data. NODE=M009W;LINKAGE=H
[60] Using relativistic Breit-Wigner and taking into account ρ-ω interference. NODE=M009W;LINKAGE=BL
[61] Systematic errors not evaluated. NODE=M009W;LINKAGE=A1
[62] From fit of 3-parameter relativistic Breit-Wigner to helicity-zero part of P-wave intensity. CHABAUD 83 includes data of GRAYER 74. NODE=M009W;LINKAGE=G
[63] HEYN 81 includes all spacelike and timelike F_π values until 1978. NODE=M009W;LINKAGE=B
[64] Includes MALAMUD 69, ARMENISE 68, BACON 67, HUWE 67, MILLER 67B, ALFF-STEINBERGER 66, HAGOPIAN 66, HAGOPIAN 66B, JACOBS 66B, JAMES 66, WEST 66, GOLDHABER 64, ABOLINS 63. NODE=M009W;LINKAGE=R

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

NODE=M009W6
NODE=M009W6

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
3.6±1.8±1.7	1.98M	[37] ALOISIO	03	KLOE	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
−0.1±1.9		[65] BARATE	97M	ALEP	$\tau^- \to \pi^-\pi^0\nu_\tau$

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

NODE=M009W16

NODE=M009W16

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
1.8±2.0±0.5	1.98M	[43] ALOISIO	03	KLOE	1.02 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$

[65] Using the compilation of e^+e^- data from BARKOV 85.

NODE=M009W6;LINKAGE=MB

ρ(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	$\pi^0\gamma$	$(6.1 \pm 0.8) \times 10^{-4}$		DESIG=40
Γ_9	$\eta\gamma$	$(2.96 \pm 0.31) \times 10^{-4}$	S=1.2	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] $(4.67 \pm 0.09) \times 10^{-5}$		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}	$\pi^+\pi^-\pi^0\pi^0$	$< 4 \times 10^{-5}$	CL=90%	DESIG=30
Γ_{16}	$\pi^0e^+e^-$			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, $\Gamma(\rho^0 \rightarrow \mu^+\mu^-) = \Gamma(\rho^0 \rightarrow e^+e^-) \times 0.99785$.

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 18 measurements and one constraint to determine 9 parameters. The overall fit has a $\chi^2 = 6.3$ for 10 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_7	−100							
x_8	−5	0						
x_9	−2	0	3					
x_{10}	−1	0	0	0				
x_{11}	2	−3	0	0	0			
x_{12}	1	0	−14	−18	0	0		
x_{14}	−1	0	0	0	0	0	0	
Γ	−1	0	8	10	0	0	−55	0
	x_6	x_7	x_8	x_9	x_{10}	x_{11}	x_{12}	x_{14}

	Mode		Rate (MeV)		Scale factor	
Γ_6	$\pi^+\pi^-$		148.7	±1.6		DESIG=12
Γ_7	$\pi^+\pi^-\gamma$		1.49	±0.24		DESIG=60
Γ_8	$\pi^0\gamma$		0.091	±0.013		DESIG=40
Γ_9	$\eta\gamma$		0.045	±0.005	1.2	DESIG=8
Γ_{10}	$\pi^0\pi^0\gamma$		0.0067	±0.0013		DESIG=80
Γ_{11}	$\mu^+\mu^-$	[a]	0.0068	±0.0004		DESIG=6
Γ_{12}	e^+e^-	[a]	0.00702	±0.00011		DESIG=4
Γ_{14}	$\pi^+\pi^-\pi^+\pi^-$		0.0027	±0.0014		DESIG=22

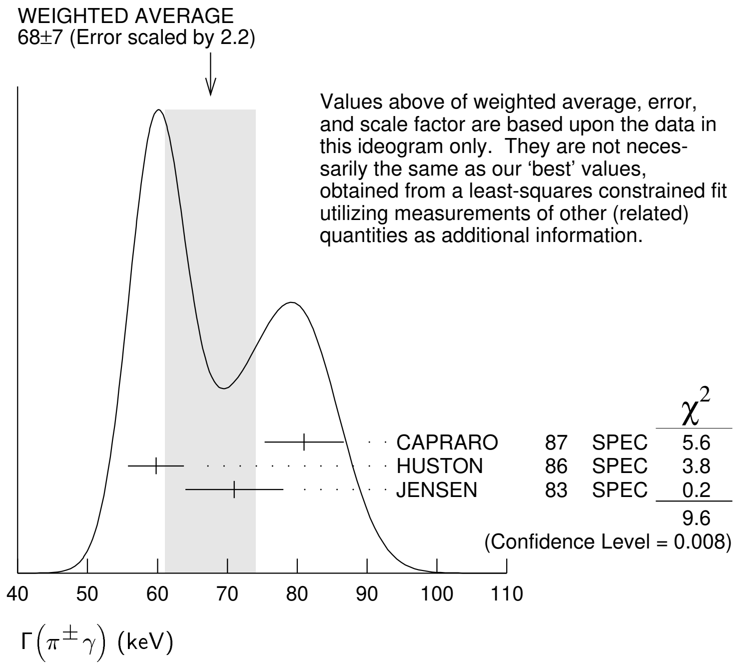
ρ(770) PARTIAL WIDTHS

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
NODE=M009W4

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
7.02±0.11 OUR FIT					
7.02±0.11 OUR AVERAGE					
7.06±0.11±0.05	114k	[66,67] AKHMETSHIN	04	CMD2	$e^+e^- \to \pi^+\pi^-$
6.77±0.10±0.30		BARKOV	85	OLYA	$e^+e^- \to \pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
6.3 ±0.1		[68] BENAYOUN	98	RVUE	$e^+e^- \to \pi^+\pi^-$, $\mu^+\mu^-$

OCCUR=2

$\Gamma(\pi^0\gamma)$ Γ_8

NODE=M009W31
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	[69] ACHASOV	03	SND	0.60–0.97 $e^+e^- \to \pi^0\gamma$
121±31		DOLINSKY	89	ND	$e^+e^- \to \pi^0\gamma$

$\Gamma(\eta\gamma)$ Γ_9

NODE=M009W32
NODE=M009W32

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
62±17	[70] DOLINSKY	89	ND	$e^+e^- \to \eta\gamma$

$\Gamma(\pi^+\pi^-\pi^+\pi^-)$ Γ_{14}

NODE=M009W33
NODE=M009W33

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

[66] Using the GOUNARIS 68 parametrization with the complex phase of the ρ-ω interference. NODE=M009W4;LINKAGE=GS
[67] From a fit in the energy range 0.61 to 0.96 GeV. Update of AKHMETSHIN 02. NODE=M009W4;LINKAGE=P2
[68] Using the data of BARKOV 85 in the hidden local symmetry model. NODE=M009W4;LINKAGE=K2
[69] Using Γ_{total} = 147.9 ± 1.3 MeV and B($\rho \to \pi^0\gamma$) from ACHASOV 03. NODE=M009W31;LINKAGE=AV
[70] Solution corresponding to constructive ω-ρ interference. NODE=M009W32;LINKAGE=L

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

NODE=M009233

$\Gamma(e^+e^-) \times \Gamma(\eta\gamma)/\Gamma^2_{total}$ $\Gamma_{12}\Gamma_9/\Gamma^2$

NODE=M009G1
NODE=M009G1

VALUE (units 10^{-8})	EVTS	DOCUMENT ID		TECN	COMMENT
1.38±0.14 OUR FIT Error includes scale factor of 1.2.					
1.36±0.12 OUR AVERAGE					
1.50±0.65±0.09	17400	[73] AKHMETSHIN	05	CMD2	0.60-1.38 $e^+e^- \to \eta\gamma$
1.61±0.20±0.11	23k	[74,75] AKHMETSHIN	01B	CMD2	$e^+e^- \to \eta\gamma$
1.21±0.14±0.04	312	[76] ACHASOV	00D	SND	$e^+e^- \to \eta\gamma$
1.85±0.49		[77] DOLINSKY	89	ND	$e^+e^- \to \eta\gamma$

$\Gamma(e^+e^-) \times \Gamma(\pi^0\gamma)/\Gamma^2_{total}$ — $\Gamma_{12}\Gamma_8/\Gamma^2$

NODE=M009G2

VALUE (units 10^{-8})	EVTS	DOCUMENT ID		TECN	COMMENT
2.8 ±0.4 OUR FIT					
2.8 ±0.4 OUR AVERAGE					
$2.90^{+0.60}_{-0.55}\pm0.18$	18680	AKHMETSHIN	05	CMD2	0.60-1.38 $e^+e^- \to \pi^0\gamma$
$2.37\pm0.53\pm0.33$	36500	[71] ACHASOV	03	SND	0.60–0.97 $e^+e^- \to \pi^0\gamma$
$3.61\pm0.74\pm0.49$	10625	[77] DOLINSKY	89	ND	$e^+e^- \to \pi^0\gamma$

[71] 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

$\Gamma(e^+e^-) \times \Gamma(\pi^+\pi^-\pi^0)/\Gamma^2_{total}$ — $\Gamma_{12}\Gamma_{13}/\Gamma^2$

NODE=M009G3

VALUE (units 10^{-9})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$4.58^{+2.46}_{-1.64}\pm1.56$	1.2M	[72] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$

[72] Statistical significance in less than 3 σ. NODE=M009G3;LINKAGE=AC

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

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

[75] 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

[76] From the $\eta \to 3\pi^0$ decay and using B($\eta \to 3\pi^0$)= (32.2 ± 0.4) $\times 10^{-2}$. NODE=M009G;LINKAGE=A

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

$\rho(770)$ BRANCHING RATIOS

NODE=M009235

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

NODE=M009R4

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

$\Gamma(\pi^\pm\pi^+\pi^-\pi^0)/\Gamma(\pi\pi)$ — Γ_5/Γ_1

NODE=M009R1

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	CHG	COMMENT
<20	84	FERBEL	66	HBC	±	$\pi^\pm p$ 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

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. • • •				
$8.2^{+1.6}_{-3.6}$	[78] ROTHWELL	69	CNTR	Photoproduction
5.6 ± 1.5	[79] WEHMANN	69	OSPK	12 π^- C, Fe
$9.7^{+3.1}_{-3.3}$	[80] HYAMS	67	OSPK	11 π^- Li, H

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

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	[81] BENAKSAS	72	OSPK	$e^+e^- \to \pi^+\pi^-$

$\Gamma(\eta\gamma)/\Gamma_{total}$ — Γ_9/Γ

NODE=M009R7

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
2.96±0.31 OUR FIT Error includes scale factor of 1.2.						
3.6 ±0.9		[82] ANDREWS	77	CNTR	0	6.7–10 γCu
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$3.21\pm1.39\pm0.20$	17400	[83,84] AKHMETSHIN	05	CMD2		0.60-1.38 $e^+e^- \to \eta\gamma$
$3.39\pm0.42\pm0.23$		[82,85,86] AKHMETSHIN	01B	CMD2		$e^+e^- \to \eta\gamma$
$2.69\pm0.32\pm0.16$	312	[87] ACHASOV	00D	SND		$e^+e^- \to \eta\gamma$
$1.9^{+0.6}_{-0.8}$		[88] BENAYOUN	96	RVUE		0.54-1.04 $e^+e^- \to \eta\gamma$
4.0 ± 1.1		[82,84] 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	[89] 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	[90] 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^{-4})	CL%	DOCUMENT ID		TECN	CHG	COMMENT
<0.4	90	AULCHENKO	87C	ND	0	$e^+e^- \to \pi^+\pi^-\pi^0\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<2	90	KURDADZE	86	OLYA	0	$e^+e^- \to \pi^+\pi^-\pi^0\pi^0$

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

NODE=M009R12
NODE=M009R12

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
0.0099±0.0016 OUR FIT					
0.0099±0.0016		[91] 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		[92] VASSERMAN	88	ND	$e^+e^- \to \pi^+\pi^-\gamma$
<0.005	90	[93] 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	[94,95] AKHMETSHIN	05	CMD2	0.60-1.38 $e^+e^- \to \pi^0\gamma$
5.22±1.17±0.75	36500	[95,96] ACHASOV	03	SND	0.60–0.97 $e^+e^- \to \pi^0\gamma$
6.8 ±1.7		[97] BENAYOUN	96	RVUE	0.54-1.04 $e^+e^- \to \pi^0\gamma$
7.9 ±2.0		[95] 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})	DOCUMENT ID		TECN	COMMENT
• • • 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^-

$\Gamma(\pi^0\pi^0\gamma)/\Gamma_{\rm total}$ 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	[98] AKHMETSHIN 04B	CMD2	0.6–0.97 $e^+e^-\rightarrow\pi^0\pi^0\gamma$
$4.1^{+1.0}_{-0.9}\pm0.3$	295	[99] 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	[100] ACHASOV 00G	SND	$e^+e^-\rightarrow\pi^0\pi^0\gamma$

OCCUR=2

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

[79] Result contains 11 $\pm$ 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

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

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

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

[83] 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

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

[85] 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

[86] 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

[87] Using B($\rho\rightarrow e^+e^-$) = (4.49 $\pm$ 0.22) $\times$ 10^{-5} and B($\eta\rightarrow 3\pi^0$) = (32.2 $\pm$ 0.4) $\times$ 10^{-2}. NODE=M009R;LINKAGE=DA

[88] 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

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

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

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

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

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

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

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

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

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

[98] This branching ratio includes the conventional VMD mechanism $\rho\rightarrow\omega\pi^0$, $\omega\rightarrow\pi^0\gamma$, and the new decay mode $\rho\rightarrow f_0(600)\gamma$, $f_0(600)\rightarrow\pi^0\pi^0$ with a branching ratio $(2.0^{+1.1}_{-0.9}\pm0.3)\times10^{-5}$ differing from zero by 2.0 standard deviations. NODE=M009R14;LINKAGE=AH

[99] This branching ratio includes the conventional VMD mechanism $\rho\rightarrow\omega\pi^0$, $\omega\rightarrow\pi^0\gamma$ and the new decay mode $\rho\rightarrow f_0(600)\gamma$, $f_0(600)\rightarrow\pi^0\pi^0$ with a branching ratio $(1.9^{+0.9}_{-0.8}\pm0.4)\times10^{-5}$ differing from zero by 2.4 standard deviations. Supersedes ACHASOV 00G. NODE=M009R;LINKAGE=FF

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

ρ(770) REFERENCES

NODE=M009

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
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	00A	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
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 33 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.*		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

OTHER RELATED PAPERS

GHOZZI	04	PL B583 222	S. Ghozzi, F. Jegerlehner		REFID=49704
ACHASOV	03C	JETP 96 789	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=49576
		Translated from ZETF 123 899.			
AZIMOV	03	EPJ A16 209	Ya.I. Aximov		REFID=49400
BENAYOUN	03	EPJ C29 397	M. Benayoun *et al.*		REFID=49477
BENAYOUN	03B	EPJ C31 525	M. Benayoun *et al.*		REFID=49591
DAVIER	03	EPJ C27 497	M. Davier *et al.*		REFID=49389
DAVIER	03A	NPBPS 123 47	M. Davier *et al.*		REFID=49706
DAVIER	03B	EPJ C31 503	M. Davier *et al.*		REFID=49703
BENAYOUN	01	EPJ C22 503	M. Benayoun, H.B. O'Connell		REFID=48570
CIRIGLIANO	01	PL B513 361	V. Cirigliano, G. Ecker, H. Neufeld		REFID=48651
CZYZ	01	EPJ C18 497	H. Czyz, J.J. Kuhn		REFID=48649
EIDELMAN	01	NPBPS 98 281	S. Eidelman		REFID=48648
FEUILLAT	01	PL B501 37	M. Feuillat, J.L. Lucio, M.J. Pestieau		REFID=48320
GOKALP	01B	EPJ C22 327	A. Gokalp, Y. Sarac, O. Yilmaz		REFID=48568
MELNIKOV	01	IJMP A16 4591	K. Melnikov		REFID=48650
ADLOFF	00F	EPJ C13 371	C. Adloff *et al.*	(H1 Collab.)	REFID=47934
ACHASOV	99F	JETPL 69 7	M.N. Achasov, N.N. Achasov		REFID=49707
ACKERSTAFF	99F	EPJ C7 571	K. Ackerstaff *et al.*		REFID=49708
BENAYOUN	99	PR D59 074020	M. Benayoun *et al.*		REFID=46897
EIDELMAN	99	NPBPS 76 319	S. Eidelman, V. Ivanchenko		REFID=47529
MARCO	99	PL B470 20	E. Marco *et al.*		REFID=47415
ROOS	99	APS 49 N2 vii	M. Roos		REFID=46900
ALEMANY	98	EPJ C2 123	R. Alemany *et al.*		REFID=47528
ABELE	97B	PL B402 195	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=45525
ABELE	97F	PL B411 354	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=45756
BIJNENS	96	PL B374 210	J. Bijnens *et al.*	(NORD, BERN, WIEN+)	REFID=45894
BENAYOUN	93	ZPHY C58 31	M. Benayoun *et al.*	(CDEF, CERN, BARI)	REFID=43178
LAFFERTY	93	ZPHY C60 659	G.D. Lafferty	(MCHS)	REFID=43715
KAMAL	92	PL B284 421	A.N. Kamal, Q.P. Xu	(ALBE)	REFID=43166
KUHN	90	ZPHY C48 445	J.H. Kuhn *et al.*	(MPIM)	REFID=45862
ERKAL	85	ZPHY C29 485	C. Erkal, M.G. Olsson	(WISC)	REFID=20136
RYBICKI	85	ZPHY C28 65	K. Rybicki, I. Sakrejda	(CRAC)	REFID=20135
KURDADZE	83	JETPL 37 733	L.M. Kurdadze *et al.*	(NOVO)	REFID=20133
		Translated from ZETFP 37 613.			
ALEKSEEV	82	JETP 55 591	E.A. Alekseeva *et al.*	(KIAE)	REFID=20130
		Translated from ZETF 82 1007.			
KENNEY	62	PR 126 736	V.P. Kenney, W.D. Shephard, C.D. Gall	(KNTY)	REFID=20003
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XUONG	62	PR 128 1849	H. Nguyen Ngoc, G.R. Lynch	(LRL)	REFID=20005
ANDERSON	61	PRL 6 365	J.A. Anderson *et al.*	(LRL)	REFID=20001
ERWIN	61	PRL 6 628	A.R. Erwin *et al.*	(WISC)	REFID=20002

NODE=M001

$\omega(782)$

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

ω(782) MASS

NODE=M001205

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 $\gamma C \to \pi^+\pi^-C$	
782.4 ±0.5	2400	BIZZARRI	69	HBC	0.0 $\overline{p}p$	

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

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

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

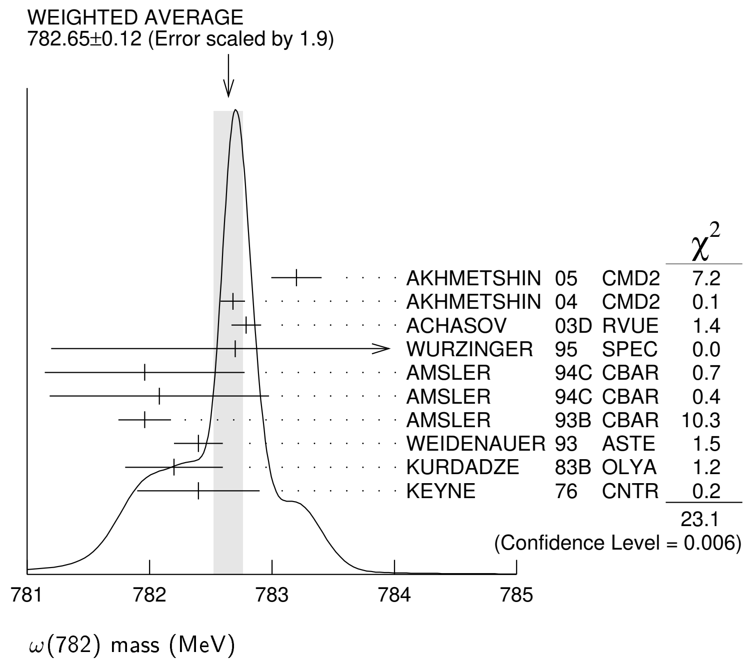
[4] From the $\eta \to 3\pi^0$ decay. NODE=M001M;LINKAGE=S2

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

[6] 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=M001210

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	$e^+e^- \to \pi^+\pi^-\pi^0$
8.68±0.04±0.15	1.2M	[10] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
8.2 ±0.3	19500	WURZINGER	95	SPEC	1.33 $pd \to {}^3\mathrm{He}\,\omega$
8.4 ±0.1		[11] AULCHENKO	87	ND	$e^+e^- \to \pi^+\pi^-\pi^0$
8.30±0.40		BARKOV	87	CMD	$e^+e^- \to \pi^+\pi^-\pi^0$
9.8 ±0.9	1488	KURDADZE	83B	OLYA	$e^+e^- \to \pi^+\pi^-\pi^0$
9.0 ±0.8	433	CORDIER	80	DM1	$e^+e^- \to \pi^+\pi^-\pi^0$
9.1 ±0.8	451	BENAKSAS	72B	OSPK	$e^+e^- \to \pi^+\pi^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
12 ±2	1430	COOPER	78B	HBC	0.7–0.8 $\overline{p}p \to 5\pi$
9.4 ±2.5	2100	GESSAROLI	77	HBC	11 $\pi^-p \to \omega n$
10.22±0.43	20000	[12] KEYNE	76	CNTR	$\pi^-p \to \omega n$
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 $\pi^-p \to n\,MM$
10.3 ±1.4	510	BIZZARRI	71	HBC	0.0 $p\overline{p} \to K_1 K_1 \omega$
12.8 ±3.0	248	BIZZARRI	71	HBC	0.0 $p\overline{p} \to K^+K^-\omega$ OCCUR=2
9.5 ±1.0	3583	COYNE	71	HBC	3.7 $\pi^+p \to p\pi^+\pi^+\pi^-\pi^0$

[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	$\pi^+\pi^-\pi^0$		(89.1 ± 0.7) %	S=1.1	DESIG=1
Γ_2	$\pi^0\gamma$		$(8.90^{+0.27}_{-0.23})$ %	S=1.1	DESIG=3
Γ_3	$\pi^+\pi^-$		(1.70 ± 0.27) %	S=1.4	DESIG=2
Γ_4	neutrals (excluding $\pi^0\gamma$)		$(1.6\ ^{+7.4}_{-1.1}) \times 10^{-3}$		DESIG=13
Γ_5	$\eta\gamma$		$(4.9 \pm 0.5) \times 10^{-4}$		DESIG=6
Γ_6	$\pi^0 e^+ e^-$		$(7.7 \pm 0.9) \times 10^{-4}$	S=1.1	DESIG=14
Γ_7	$\pi^0\mu^+\mu^-$		$(9.6 \pm 2.3) \times 10^{-5}$		DESIG=11
Γ_8	$\eta e^+ e^-$				DESIG=18
Γ_9	e^+e^-		$(7.18 \pm 0.12) \times 10^{-5}$	S=1.1	DESIG=7
Γ_{10}	$\pi^+\pi^-\pi^0\pi^0$		< 2 %	CL=90%	DESIG=12
Γ_{11}	$\pi^+\pi^-\gamma$		$< 3.6 \times 10^{-3}$	CL=95%	DESIG=4
Γ_{12}	$\pi^+\pi^-\pi^+\pi^-$		$< 1 \times 10^{-3}$	CL=90%	DESIG=15
Γ_{13}	$\pi^0\pi^0\gamma$		$(6.7 \pm 1.1) \times 10^{-5}$		DESIG=5
Γ_{14}	$\eta\pi^0\gamma$		$< 3.3 \times 10^{-5}$	CL=90%	DESIG=17
Γ_{15}	$\mu^+\mu^-$		$(9.0 \pm 3.1) \times 10^{-5}$		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	$< 1 \times 10^{-3}$	CL=90%	DESIG=9
Γ_{18}	$3\pi^0$	C	$< 3 \times 10^{-4}$	CL=90%	DESIG=16

CONSTRAINED FIT INFORMATION

An overall fit to 15 branching ratios uses 47 measurements and one constraint to determine 10 parameters. The overall fit has a $\chi^2 = 33.3$ for 38 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	28								
x_3	−36	−10							
x_4	−89	−55	1						
x_5	6	8	−2	−8					
x_6	−1	0	0	0	0				
x_7	0	0	0	0	0	0			
x_9	−44	−53	16	53	−15	1	0		
x_{13}	1	3	0	−2	0	0	0	−2	
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

$\Gamma(e^+e^-)$ 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	[13,14] AKHMETSHIN	04	CMD2	$e^+e^- \to \pi^+\pi^-\pi^0$
$0.653 \pm 0.003 \pm 0.021$	1.2M	[15] 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 ←

[13] Using $B(\omega \to \pi^+\pi^-\pi^0) = 0.891 \pm 0.007$ and $\Gamma_{\rm total} = 8.44 \pm 0.09$ MeV. NODE=M001W7;LINKAGE=3P

[14] Update of AKHMETSHIN 00C. NODE=M001W7;LINKAGE=PT

[15] Using ACHASOV 03, ACHASOV 03D and $B(\omega \to \pi^+\pi^-) = (1.70 \pm 0.28)$%. NODE=M001W;LINKAGE=VF

$\Gamma(\pi^0\gamma)$ Γ_2

NODE=M001W1

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$788\pm12\pm27$	36500	[16] ACHASOV 03	SND	0.60–0.97 $e^+e^- \to \pi^0\gamma$
764 ± 51	10625	DOLINSKY 89	ND	$e^+e^- \to \pi^0\gamma$

[16] 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

VALUE (keV)	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
6.1 ± 2.5	[17] DOLINSKY 89	ND	$e^+e^- \to \eta\gamma$

[17] Using $\Gamma_\omega = 8.4 \pm 0.1$ MeV and B($\omega \to \eta\gamma$) from DOLINSKY 89. NODE=M001W2;LINKAGE=DA

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

NODE=M001225

$\Gamma(e^+e^-) \times \Gamma(\pi^+\pi^-\pi^0)/\Gamma^2_{\text{total}}$ $\Gamma_9\Gamma_1/\Gamma^2$

NODE=M001G2

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
6.39±0.10 OUR FIT Error includes scale factor of 1.1.				
6.38±0.10 OUR AVERAGE Error includes scale factor of 1.1.				
$6.24\pm0.11\pm0.08$	11200	[18] AKHMETSHIN 04	CMD2	$e^+e^- \to \pi^+\pi^-\pi^0$
$6.70\pm0.06\pm0.27$		AUBERT,B 04N	BABR	10.6 $e^+e^- \to \pi^+\pi^-\pi^0\gamma$
$6.74\pm0.04\pm0.24$	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	$e^+e^- \to \pi^+\pi^-\pi^0$

$\Gamma(e^+e^-) \times \Gamma(\pi^0\gamma)/\Gamma^2_{\text{total}}$ $\Gamma_9\Gamma_2/\Gamma^2$

NODE=M001G4

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
$6.39^{+0.16}_{-0.14}$ OUR FIT				
6.45±0.17 OUR AVERAGE				
$6.47\pm0.14\pm0.39$	18680	AKHMETSHIN 05	CMD2	0.60-1.38 $e^+e^- \to \pi^0\gamma$
$6.50\pm0.11\pm0.20$	36500	[21] ACHASOV 03	SND	0.60–0.97 $e^+e^- \to \pi^0\gamma$
$6.34\pm0.21\pm0.21$	10625	[19] DOLINSKY 89	ND	$e^+e^- \to \pi^0\gamma$

$\Gamma(e^+e^-) \times \Gamma(\eta\gamma)/\Gamma^2_{\text{total}}$ $\Gamma_9\Gamma_5/\Gamma^2$

NODE=M001G3

VALUE (units 10^{-8})	EVTS	DOCUMENT ID	TECN	COMMENT
3.51±0.35 OUR FIT				
3.3 ±0.4 OUR AVERAGE				
$3.17^{+1.85}_{-1.31}\pm0.21$	17400	[22] AKHMETSHIN 05	CMD2	0.60-1.38 $e^+e^- \to \eta\gamma$
$3.41\pm0.52\pm0.21$	23k	[23,24] AKHMETSHIN 01B	CMD2	$e^+e^- \to \eta\gamma$
$3.25\pm0.51\pm0.10$	312	[25] ACHASOV 00D	SND	$e^+e^- \to \eta\gamma$

[18] Update of AKHMETSHIN 00C. NODE=M001G;LINKAGE=PT

[19] Recalculated by us from the cross section in the peak. NODE=M001G;LINKAGE=LP

[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. NODE=M001G;LINKAGE=VH

[21] 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 $(-10.2 \pm 7.0)^\circ$. NODE=M001G;LINKAGE=SH

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

[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=M001G;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=M001G;LINKAGE=BQ

[25] From the $\eta \to 3\pi^0$ decay and using B($\eta \to 3\pi^0$) = $(32.2 \pm 0.4) \times 10^{-2}$. NODE=M001G;LINKAGE=AC

$\omega(782)$ BRANCHING RATIOS

NODE=M001220

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

NODE=M001R1
NODE=M001R1

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.102 ± 0.008 OUR FIT					
$0.103^{+0.011}_{-0.010}$ OUR AVERAGE					
$0.15\ \pm0.04$	46	AGUILAR-...	72B	HBC	3.9,4.6 $K^- p$
$0.10\ \pm0.03$	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 $\pi^+ p$
$0.08\ \pm0.03$	35	KRAEMER	64	DBC	1.2 $\pi^+ d$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.11\ \pm0.02$	20	BUSCHBECK	63	HBC	1.5 $K^- p$

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

NODE=M001R2

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

NODE=M001R2
NODE=M001R2

VALUE	DOCUMENT ID		TECN	COMMENT
0.0191 ± 0.0030 OUR FIT Error includes scale factor of 1.4.				
$0.026\ \pm0.005$ OUR AVERAGE				
$0.021\ ^{+0.028}_{-0.009}$	[27] RATCLIFF	72	ASPK	15 $\pi^- p \to n 2\pi$
$0.028\ \pm0.006$	BEHREND	71	ASPK	Photoproduction
$0.022\ ^{+0.009}_{-0.01}$	[28] ROOS	70	RVUE	

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

NODE=M001R3
NODE=M001R3

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$0.0999^{+0.0029}_{-0.0025}$ OUR FIT Error includes scale factor of 1.1.					
$0.097\ \pm0.005$ OUR AVERAGE					
$0.0994\pm0.0036\pm0.0038$		[29] AULCHENKO	00A	SND	$e^+e^- \to \pi^+\pi^-\pi^0\pi^0$, $\pi^0\pi^0\gamma$
$0.084\ \pm0.013$		KEYNE	76	CNTR	$\pi^- p \to \omega n$
$0.109\ \pm0.025$		BENAKSAS	72C	OSPK	$e^+e^- \to \pi^0\gamma$
$0.081\ \pm0.020$		BALDIN	71	HLBC	2.9 $\pi^+ p$
$0.13\ \ \pm0.04$		JACQUET	69B	HLBC	2.05 $\pi^+ p \to \pi^+ p \omega$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.097\ \pm0.002\ \pm0.005$	1.2M	[30,31] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
$0.099\ \pm0.007$		[30] DOLINSKY	89	ND	$e^+e^- \to \pi^0\gamma$

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

NODE=M001R4
NODE=M001R4

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

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

NODE=M001R22
NODE=M001R22

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

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

NODE=M001R24
NODE=M001R24

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1\times10^{-3}$	90	KURDADZE	88	OLYA	$e^+e^- \to \pi^+\pi^-\pi^+\pi^-$

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

NODE=M001R5
NODE=M001R5

VALUE (units 10^{-2})	CL%	DOCUMENT ID		TECN	COMMENT
<2	90	KURDADZE	86	OLYA	$e^+e^- \to \pi^+\pi^-\pi^0\pi^0$

$\Gamma(\mu^+\mu^-)/\Gamma(\pi^+\pi^-\pi^0)$ — 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 → Fe
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.7	74	FLATTE	66	HBC	1.2 – 1.7 $K^- p \rightarrow \Lambda\mu^+\mu^-$
<1.2		BARBARO-...	65	HBC	2.7 $K^- p$

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

NODE=M001R29
NODE=M001R29

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
6.7±1.1 OUR FIT					
6.5±1.2 OUR AVERAGE					
$6.4^{+2.4}_{-2.0}\pm0.8$	190	[32] AKHMETSHIN	04B	CMD2	0.6–0.97 $e^+e^- \rightarrow \pi^0\pi^0\gamma$
$6.6^{+1.4}_{-1.3}\pm0.6$	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. • • •					
$11.8^{+2.1}_{-1.9}\pm1.4$	190	[33] AKHMETSHIN	04B	CMD2	0.6–0.97 $e^+e^- \rightarrow \pi^0\pi^0\gamma$
7.8±2.7±2.0	63	[32,34] ACHASOV	00G	SND	$e^+e^- \rightarrow \pi^0\pi^0\gamma$
12.7±2.3±2.5	63	[33,34] ACHASOV	00G	SND	$e^+e^- \rightarrow \pi^0\pi^0\gamma$

OCCUR=2
OCCUR=2

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

NODE=M001R7
NODE=M001R7

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
(7.6 ±1.3) × 10^{-4} OUR FIT						
0.00085±0.00029		40 ± 14	ALDE	94B	GAM2	38$\pi^- p \rightarrow \pi^0\pi^0\gamma n$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 0.005	90		DOLINSKY	89	ND	$e^+e^- \rightarrow \pi^0\pi^0\gamma$
< 0.18	95		KEYNE	76	CNTR	$\pi^- p \rightarrow \omega n$
< 0.15	90		BENAKSAS	72C	OSPK	e^+e^-
< 0.14			BALDIN	71	HLBC	2.9 $\pi^+ p$
< 0.1	90		BARMIN	64	HLBC	1.3–2.8 $\pi^- p$

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

NODE=M001R25

Violates C conservation.

NODE=M001R25
NODE=M001R25

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.001	90	ALDE	94B	GAM2	38$\pi^- p \rightarrow \eta\pi^0 n$

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

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

NODE=M001R8
NODE=M001R8

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.016	90	[35] FLATTE	66	HBC	1.2 – 1.7 $K^- p \rightarrow \Lambda\pi^+\pi^-$ MM
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.045	95	JACQUET	69B	HLBC	2.05 $\pi^+ p \rightarrow \pi^+ p\omega$

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

NODE=M001R9
NODE=M001R9

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

$\Gamma(\pi^0\pi^0\gamma)/\Gamma(\pi^+\pi^-\pi^0)$ — 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 $\pi^+ p \rightarrow \pi^+ p\omega$

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

NODE=M001R11

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.0098 ± 0.0024	[36] ALDE	93	GAM2	$38\pi^- p \to \omega n$
0.0082 ± 0.0033	[37] DOLINSKY	89	ND	$e^+e^- \to \eta\gamma$
0.010 ± 0.045	APEL	72B	OSPK	4–8 $\pi^- p \to n3\gamma$

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

NODE=M001R12

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
0.96±0.23 OUR FIT				
0.96±0.23	DZHELYADIN	81B	CNTR	25–33 $\pi^- p \to \omega n$

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

NODE=M001R23

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
7.7 ±0.9 OUR FIT Error includes scale factor of 1.1.					
7.7 ±0.9 OUR AVERAGE Error includes scale factor of 1.1.					
$8.19\pm0.71\pm0.62$		AKHMETSHIN	05A	CMD2	0.72-0.84 e^+e^-
5.9 ± 1.9	43	DOLINSKY	88	ND	$e^+e^- \to \pi^0 e^+e^-$

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

NODE=M001R34

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

$\Gamma(e^+e^-)/\Gamma_{total}$ Γ_9/Γ

NODE=M001R13

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.718±0.012 OUR FIT Error includes scale factor of 1.1.					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.700 ± 0.016	11200	[38,39] AKHMETSHIN	04	CMD2	$e^+e^- \to \pi^+\pi^-\pi^0$
$0.752\pm0.004\pm0.024$	1.2M	[38,40] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
0.714 ± 0.036		[38] DOLINSKY	89	ND	$e^+e^- \to \pi^+\pi^-\pi^0$
0.72 ± 0.03		[38] BARKOV	87	CMD	$e^+e^- \to \pi^+\pi^-\pi^0$
0.64 ± 0.04	1488	[38] KURDADZE	83B	OLYA	$e^+e^- \to \pi^+\pi^-\pi^0$
0.675 ± 0.069	433	[38] CORDIER	80	DM1	$e^+e^- \to \pi^+\pi^-\pi^0$
0.83 ± 0.10	451	[38] BENAKSAS	72B	OSPK	$e^+e^- \to \pi^+\pi^-\pi^0$
0.77 ± 0.06		[41] AUGUSTIN	69D	OSPK	$e^+e^- \to \pi^+\pi^-\pi^0$
0.65 ± 0.13	33	[42] ASTVACAT...	68	OSPK	Assume SU(3)+mixing

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

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	$Z \to \mu^+\mu^- + X$

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

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 $\pi^- p$

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

NODE=M001R15

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

NODE=M001R15

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
1.70±0.27 OUR FIT Error includes scale factor of 1.4.					
1.57±0.24 OUR AVERAGE Error includes scale factor of 1.2.					
$1.30\pm0.24\pm0.05$	11200	[43] AKHMETSHIN	04	CMD2	$e^+e^- \to \pi^+\pi^-\pi^0$
$2.38^{+1.77}_{-0.90}\pm0.18$	5.4k	[44] ACHASOV	02E	SND	1.1–1.38 $e^+e^- \to \pi^+\pi^-\pi^0$
2.3 ± 0.5		BARKOV	85	OLYA	$e^+e^- \to \pi^+\pi^-$
$1.6^{+0.9}_{-0.7}$		QUENZER	78	DM1	$e^+e^- \to \pi^+\pi^-$
3.6 ± 1.9		BENAKSAS	72	OSPK	$e^+e^- \to \pi^+\pi^-$

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

2.01 ± 0.29	[45] BENAYOUN	03	RVUE	$e^+e^- \to \pi^+\pi^-$
1.9 ± 0.3	[46] GARDNER	99	RVUE	$e^+e^- \to \pi^+\pi^-$
2.3 ± 0.4	[47] BENAYOUN	98	RVUE	$e^+e^- \to \pi^+\pi^-$, $\mu^+\mu^-$
1.0 ± 0.11	[48] 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
$0.80^{+0.28}_{-0.20}$	[49] BIGGS	70B	CNTR	$4.2 \gamma C \to \pi^+\pi^- C$

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

NODE=M001R33

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.20 ± 0.04	1.98M	[50] ALOISIO	03	KLOE	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$

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

NODE=M001R17

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.22 ± 0.07		[26] DAKIN	72	OSPK	1.4 $\pi^- p \to n$MM
<0.19	90	DEINET	69B	OSPK	

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

NODE=M001R17;LINKAGE=D

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

NODE=M001R18

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.78 ± 0.07		[51] DAKIN	72	OSPK	1.4 $\pi^- p \to n$MM
>0.81	90	DEINET	69B	OSPK	

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

NODE=M001R19

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
4.9 ± 0.5 OUR FIT					
6.3 ± 1.3 OUR AVERAGE Error includes scale factor of 1.2.					
6.6 ± 1.7		[52] ABELE	97E	CBAR	0.0 $\bar{p}p \to 5\gamma$
8.3 ± 2.1		ALDE	93	GAM2	$38\pi^- p \to \omega n$
$3.0^{+2.5}_{-1.8}$		[53] ANDREWS	77	CNTR	6.7–10 γCu
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$4.44^{+2.59}_{-1.83} \pm 0.28$	17400	[54,55] AKHMETSHIN	05	CMD2	0.60-1.38 $e^+e^- \to \eta\gamma$
$5.10 \pm 0.72 \pm 0.34$	23k	[56] AKHMETSHIN	01B	CMD2	$e^+e^- \to \eta\gamma$
$4.60 \pm 0.72 \pm 0.19$	312	[54,57] ACHASOV	00D	SND	$e^+e^- \to \eta\gamma$
0.7 to 5.5		[58] CASE	00	CBAR	0.0 $p\bar{p} \to \eta\eta\gamma$
$6.56^{+2.41}_{-2.55}$	3525	[53,59] BENAYOUN	96	RVUE	$e^+e^- \to \eta\gamma$
7.3 ± 2.9		[53,54] DOLINSKY	89	ND	$e^+e^- \to \eta\gamma$

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

NODE=M001R20

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.2 ± 0.6	30	[60] DZHELYADIN	79	CNTR	25–33 $\pi^- p$

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

NODE=M001R21

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.8965 \pm 0.0016 \pm 0.0048$	1.2M	[38,40] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
$0.880 \pm 0.020 \pm 0.032$	11200	[38,61] AKHMETSHIN	00C	CMD2	$e^+e^- \to \pi^+\pi^-\pi^0$
0.8942 ± 0.0062		[38] DOLINSKY	89	ND	$e^+e^- \to \pi^+\pi^-\pi^0$

$\Gamma(3\pi^0)/\Gamma_{\text{total}}$ Γ_{18}/Γ

NODE=M001R26

Violates C conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0003	90	PROKOSHKIN	95	GAM2	38 $\pi^- p \to 3\pi^0 n$

$\Gamma(3\pi^0)/\Gamma(\pi^+\pi^-\pi^0)$ Γ_{18}/Γ_1

NODE=M001R31
NODE=M001R31
NODE=M001R31

Violates *C* conservation.

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

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

NODE=M001R27
NODE=M001R27

VALUE (units 10^{-4})	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<1.9	95	[62] ABELE	97E	CBAR	0.0 $\bar{p}p \to 5\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<2	90	[62] PROKOSHKIN	95	GAM2	38 $\pi^- p \to 3\gamma n$

$\Gamma(\pi^0\gamma)/\Gamma_{total}$ 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. • • •					
$9.06\pm0.20\pm0.57$	18680	[30,63] AKHMETSHIN	05	CMD2	0.60–1.38 $e^+e^- \to \pi^0\gamma$
$9.34\pm0.15\pm0.31$	36500	[30] ACHASOV	03	SND	0.60–0.97 $e^+e^- \to \pi^0\gamma$
$8.65\pm0.16\pm0.42$	1.2M	[38,40] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
8.39 ± 0.24	9975	[64] BENAYOUN	96	RVUE	$e^+e^- \to \pi^0\gamma$
8.88 ± 0.62	10625	[30] DOLINSKY	89	ND	$e^+e^- \to \pi^0\gamma$

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

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

[29] 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

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

[31] Using ACHASOV 03. NODE=M001R3;LINKAGE=VW

[32] In the model assuming the $\rho \to \pi^0\pi^0\gamma$ decay via the $\omega\pi$ and $f_0(600)\gamma$ mechanisms. NODE=M001R29;LINKAGE=A

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

[34] Superseded by ACHASOV 02F. NODE=M001R;LINKAGE=GF

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

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

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

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

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

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

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

[42] Not resolved from ρ decay. Error statistical only. NODE=M001R13;LINKAGE=A

[43] Update of AKHMETSHIN 02. NODE=M001R15;LINKAGE=PT

[44] From the $m_{\pi^+\pi^-}$ spectrum taking into account the interference of the $\rho\pi$ and $\omega\pi$ amplitudes. NODE=M001R;LINKAGE=VE

[45] Using the data of AKHMETSHIN 02 in the hidden local symmetry model. NODE=M001R;LINKAGE=BY

[46] Using the data of BARKOV 85. NODE=M001R15;LINKAGE=H4

[47] Using the data of BARKOV 85 in the hidden local symmetry model. NODE=M001R15;LINKAGE=Q

[48] From a model-dependent analysis assuming complete coherence. NODE=M001R15;LINKAGE=F

[49] 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

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

[51] Error statistical only. Authors obtain good fit also assuming $\pi^0\gamma$ as the only neutral decay. NODE=M001R18;LINKAGE=D

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

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

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

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

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

[57] Using B($\omega \to e^+e^-$) = $(7.07\pm0.19)\times10^{-5}$ and B($\eta \to 3\pi^0$) = $(32.2\pm0.4)\times10^{-2}$. NODE=M001R;LINKAGE=9A

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

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

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

[61] Using $\Gamma(e^+e^-)$=0.60 ± 0.02 keV. NODE=M001R;LINKAGE=KH
[62] From direct 3γ decay search. NODE=M001R27;LINKAGE=A
[63] Using $B(\omega \rightarrow e^+e^-) = (7.14 \pm 0.13) \times 10^{-5}$. NODE=M001R;LINKAGE=AH
[64] Reanalysis of DRUZHININ 84, DOLINSKY 89, DOLINSKY 91 taking into account the triangle anomaly contributions. NODE=M001R28;LINKAGE=A1

ω(782) REFERENCES

NODE=M001

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
AKHMETSHIN	04	PL B578 285	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=49609
AKHMETSHIN	04B	PL B580 119	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=49610
AUBERT,B	04N	PR D70 072004	B. Aubert *et al.*	(BABAR Collab.)	REFID=50184
ACHASOV	03	PL B559 171	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=49187
ACHASOV	03D	PR D68 052006	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=49577
ALOISIO	03	PL B561 55	A. Aloisio *et al.*	(KLOE Collab.)	REFID=49404
BENAYOUN	03	EPJ C29 397	M. Benayoun *et al.*		REFID=49477
ACHASOV	02E	PR D66 032001	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=48815
ACHASOV	02F	PL B537 201	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=48816
AKHMETSHIN	02	PL B527 161	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=48565
ALOISIO	02D	PL B537 21	A. Aloisio *et al.*	(KLOE Collab.)	REFID=48824
HEISTER	02C	PL B528 19	A. Heister *et al.*	(ALEPH Collab.)	REFID=48564
ACHASOV	01E	PR D63 072002	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=48311
AKHMETSHIN	01B	PL B509 217	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=48167
BARBERIS	01	PL B507 14	D. Barberis *et al.*		REFID=48324
ACHASOV	00	EPJ C12 25	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=47417
ACHASOV	00D	JETPL 72 282	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=47882
		Translated from ZETFP 72 411.			
ACHASOV	00G	JETPL 71 355	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=47929
		Translated from ZETFP 71 519.			
AKHMETSHIN	00C	PL B476 33	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=47423
AULCHENKO	00A	JETP 90 927	V.M. Aulchenko *et al.*	(Novosibirsk SND Collab.)	REFID=47953
		Translated from ZETF 117 1067.			
CASE	00	PR D61 032002	T. Case *et al.*	(Crystal Barrel Collab.)	REFID=47409
ACHASOV	99E	PL B462 365	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=47391
GARDNER	99	PR D59 076002	S. Gardner, H.B. O'Connell		REFID=46919
BENAYOUN	98	EPJ C2 269	M. Benayoun *et al.*	(IPNP, NOVO, ADLD+)	REFID=45859
ABELE	97E	PL B411 361	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=45755
BENAYOUN	96	ZPHY C72 221	M. Benayoun *et al.*	(IPNP, NOVO)	REFID=45753
PROKOSHKIN	95	SPD 40 273	Y.D. Prokoshkin, V.D. Samoilenko	(SERP)	REFID=44616
		Translated from DANS 342 610.			
WURZINGER	95	PR C51 443	R. Wurzinger *et al.*	(BONN, ORSAY, SACL+)	REFID=45209
ALDE	94B	PL B340 122	D.M. Alde *et al.*	(SERP, BELG, LANL, LAPP+)	REFID=44100
AMSLER	94C	PL B327 425	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=44091
ALDE	93	PAN 56 1229	D.M. Alde *et al.*	(SERP, LAPP, LANL, BELG+)	REFID=43603
		Translated from YAF 56 137.			
Also	94	ZPHY C61 35	D.M. Alde *et al.*	(SERP, LAPP, LANL, BELG+)	REFID=43790
AMSLER	93B	PL B311 362	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=43602
WEIDENAUER	93	ZPHY C59 387	P. Weidenauer *et al.*	(ASTERIX Collab.)	REFID=43585
ANTONELLI	92	ZPHY C56 15	A. Antonelli *et al.*	(DM2 Collab.)	REFID=43168
DOLINSKY	91	PRPL 202 99	S.I. Dolinsky *et al.*	(NOVO)	REFID=41369
WEIDENAUER	90	ZPHY C47 353	P. Weidenauer *et al.*	(ASTERIX Collab.)	REFID=41368
DOLINSKY	89	ZPHY C42 511	S.I. Dolinsky *et al.*	(NOVO)	REFID=41003
BITYUKOV	88B	SJNP 47 800	S.I. Bityukov *et al.*	(SERP)	REFID=41021
		Translated from YAF 47 1258.			
DOLINSKY	88	SJNP 48 277	S.I. Dolinsky *et al.*	(NOVO)	REFID=41022
		Translated from YAF 48 442.			
KURDADZE	88	JETPL 47 512	L.M. Kurdadze *et al.*	(NOVO)	REFID=41121
		Translated from ZETFP 47 432.			
AULCHENKO	87	PL B186 432	V.M. Aulchenko *et al.*	(NOVO)	REFID=40007
BARKOV	87	JETPL 46 164	L.M. Barkov *et al.*	(NOVO)	REFID=40280
		Translated from ZETFP 46 132.			
KURDADZE	86	JETPL 43 643	L.M. Kurdadze *et al.*	(NOVO)	REFID=40287
		Translated from ZETFP 43 497.			
BARKOV	85	NP B256 365	L.M. Barkov *et al.*	(NOVO)	REFID=20134
DRUZHININ	84	PL 144B 136	V.P. Druzhinin *et al.*	(NOVO)	REFID=20561
KURDADZE	83B	JETPL 36 274	A.M. Kurdadze *et al.*	(NOVO)	REFID=20244
		Translated from ZETFP 36 221.			
DZHELYADIN	81B	PL 102B 296	R.I. Dzhelyadin *et al.*	(SERP)	REFID=20242
CORDIER	80	NP B172 13	A. Cordier *et al.*	(LALO)	REFID=20240
ROOS	80	LNC 27 321	M. Roos, A. Pellinen	(HELS)	REFID=20241
BENKHEIRI	79	NP B150 268	P. Benkheiri *et al.*	(EPOL, CERN, CDEF+)	REFID=20238
DZHELYADIN	79	PL 84B 143	R.I. Dzhelyadin *et al.*	(SERP)	REFID=20239
COOPER	78B	NP B146 1	A.M. Cooper *et al.*	(TATA, CERN, CDEF+)	REFID=20235
QUENZER	78	PL 76B 512	A. Quenzer *et al.*	(LALO)	REFID=20123
VANAPEL...	78	NP B133 245	G.W. van Apeldoorn *et al.*	(ZEEM)	REFID=20234
WICKLUND	78	PR D17 1197	A.B. Wicklund *et al.*	(ANL)	REFID=20124
ANDREWS	77	PRL 38 198	D.E. Andrews *et al.*	(ROCH)	REFID=20120
GESSAROLI	77	NP B126 382	R. Gessaroli *et al.*	(BGNA, FIRZ, GENO+)	REFID=20230
KEYNE	76	PR D14 28	J. Keyne *et al.*	(LOIC, SHMP)	REFID=20226
Also	73B	PR D8 2789	D.M. Binnie *et al.*	(LOIC, SHMP)	REFID=20216
KALBFLEISCH	75	PR D11 987	G.R. Kalbfleisch, R.C. Strand, J.W. Chapman	(BNL+)	REFID=20223
AGUILAR-...	72B	PR D6 29	M. Aguilar-Benitez *et al.*	(BNL)	REFID=20205
APEL	72B	PL 41B 234	W.D. Apel *et al.*	(KARLK, KARLE, PISA)	REFID=20206
BASILE	72B	Phil. Conf. 153	M. Basile *et al.*	(CERN)	REFID=20207
BENAKSAS	72	PL 39B 289	D. Benaksas *et al.*	(ORSAY)	REFID=20096
BENAKSAS	72B	PL 42B 507	D. Benaksas *et al.*	(ORSAY)	REFID=20209
BENAKSAS	72C	PL 42B 511	D. Benaksas *et al.*	(ORSAY)	REFID=20517
BORENSTEIN	72	PR D5 1559	S.R. Borenstein *et al.*	(BNL, MICH)	REFID=20215
BROWN	72	PL 42B 117	R.M. Brown *et al.*	(ILL, ILLC)	REFID=20211
DAKIN	72	PR D6 2321	J.T. Dakin *et al.*	(PRIN)	REFID=20212
RATCLIFF	72	PL 38B 345	B.N. Ratcliff *et al.*	(SLAC)	REFID=20102
ALVENSLEB...	71C	PRL 27 888	H. Alvensleben *et al.*	(DESY)	REFID=20193
BALDIN	71	SJNP 13 758	A.B. Baldin *et al.*	(ITEP)	REFID=20195
		Translated from YAF 13 1318.			

BEHREND	71	PRL 27 61	H.J. Behrend *et al.*	(ROCH, CORN, FNAL)	REFID=20197
BIZZARRI	71	NP B27 140	R. Bizzarri *et al.*	(CERN, CDEF)	REFID=20198
COYNE	71	NP B32 333	D.G. Coyne *et al.*	(LRL)	REFID=20201
MOFFEIT	71	NP B29 349	K.C. Moffeit *et al.*	(LRL, UCB, SLAC+)	REFID=20204
ABRAMOVI...	70	NP B20 209	M. Abramovich *et al.*	(CERN)	REFID=20180
BIGGS	70B	PRL 24 1201	P.J. Biggs *et al.*	(DARE)	REFID=20184
BIZZARRI	70	PRL 25 1385	R. Bizzarri *et al.*	(ROMA, SYRA)	REFID=20181
ROOS	70	DNPL/R7 173	M. Roos	(CERN)	REFID=20191
Proc. Daresbury Study Weekend No. 1.					
AUGUSTIN	69D	PL 28B 513	J.E. Augustin *et al.*	(ORSAY)	REFID=20169
BIZZARRI	69	NP B14 169	R. Bizzarri *et al.*	(CERN, CDEF)	REFID=20171
DEINET	69B	PL 30B 426	W. Deinet *et al.*	(KARL, CERN)	REFID=20173
JACQUET	69B	NC 63A 743	F. Jacquet *et al.*	(EPOL, BERG)	REFID=20176
WILSON	69	Private Comm.	R. Wilson	(HARV)	REFID=20179
Also	69	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 136B 496	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

OTHER RELATED PAPERS

AZIMOV	03	EPJ A16 209	Ya.I. Aximov		REFID=49400
BENAYOUN	01	EPJ C22 503	M. Benayoun, H.B. O'Connell		REFID=48570
GOKALP	01B	EPJ C22 327	A. Gokalp, Y. Sarac, O. Yilmaz		REFID=48568
DELBOURGO	99B	PR D59 113006	R. Delbourgo *et al.*		REFID=46918
GARDNER	98	PR D57 2716	S. Gardner, H.B. O'Connell		REFID=46366
Also	00A	PR D62 019903 (erratum)	S. Gardner, H.B. O'Connell		REFID=47981
ABELE	97F	PL B411 354	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=45756
DOLINSKY	86	PL B174 453	S.I. Dolinsky *et al.*	(NOVO)	REFID=20246
KURDADZE	83	JETPL 37 733	L.M. Kurdadze *et al.*	(NOVO)	REFID=20133
		Translated from ZETFP 37 613.			
ALFF-...	62B	PRL 9 325	C. Alff-Steinberger *et al.*	(COLU, RUTG)	REFID=20141
STEVENSON	62	PR 125 687	M.L. Stevenson *et al.*	(LRL)	REFID=20143
MAGLICH	61	PRL 7 178	B.C. Maglich *et al.*	(LRL)	REFID=20138
PEVSNER	61	PRL 7 421	A. Pevsner *et al.*	(JHU)	REFID=10745
XUONG	61	PRL 7 327	H. Nguyen Ngoc, G.R. Lynch	(LRL)	REFID=20140

NODE=M002

$\eta'(958)$

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

$\eta'(958)$ MASS

NODE=M002205

NODE=M002M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*	
957.78±0.14 OUR AVERAGE						
957.9 ±0.2 ±0.6	4800	WURZINGER	96	SPEC	1.68 $pd \rightarrow {}^3\mathrm{He}\eta'$	
959 ±1	630	BELADIDZE	92C	VES	36 $\pi^- \mathrm{Be} \rightarrow \pi^- \eta' \eta \mathrm{Be}$	
958 ±1	340	ARMSTRONG	91B	OMEG	300 $pp \rightarrow pp\eta\pi^+\pi^-$	
958.2 ±0.4	622	AUGUSTIN	90	DM2	$J/\psi \rightarrow \gamma\eta\pi^+\pi^-$	
957.8 ±0.2	2420	AUGUSTIN	90	DM2	$J/\psi \rightarrow \gamma\gamma\pi^+\pi^-$	OCCUR=2
956.3 ±1.0	143	GIDAL	87	MRK2	$e^+e^- \rightarrow e^+e^-\eta\pi^+\pi^-$	
957.46±0.33		DUANE	74	MMS	$\pi^- p \rightarrow n\mathrm{MM}$	
958.2 ±0.5	1414	DANBURG	73	HBC	2.2 $K^- p \rightarrow \Lambda X^0$	
958 ±1	400	JACOBS	73	HBC	2.9 $K^- p \rightarrow \Lambda X^0$	
956.1 ±1.1	3415	BASILE	71	CNTR	1.6 $\pi^- p \rightarrow nX^0$	
957.4 ±1.4	535	BASILE	71	CNTR	1.6 $\pi^- p \rightarrow nX^0$	OCCUR=2
957 ±1		RITTENBERG	69	HBC	1.7–2.7 $K^- p$	

$\eta'(958)$ WIDTH

NODE=M002210

NODE=M002W

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
0.202±0.016 OUR FIT Error includes scale factor of 1.3.						
0.30 ±0.09 OUR AVERAGE						
0.40 ±0.22	4800	WURZINGER	96	SPEC		1.68 $pd \rightarrow {}^3\mathrm{He}\eta'$
0.28 ±0.10	1000	BINNIE	79	MMS	0	$\pi^- p \rightarrow n\mathrm{MM}$

$\eta'(958)$ DECAY MODES

NODE=M002215;NODE=M002

	Mode		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	
Γ_1	$\pi^+\pi^-\eta$		(44.3 ± 1.5) %	S=1.2	DESIG=1
Γ_2	$\rho^0\gamma$ (including non-resonant $\pi^+\pi^-\gamma$)		(29.5 ± 1.0) %	S=1.2	DESIG=9
Γ_3	$\pi^0\pi^0\eta$		(20.9 ± 1.2) %	S=1.2	DESIG=2
Γ_4	$\omega\gamma$		(3.03 ± 0.31) %		DESIG=7
Γ_5	$\gamma\gamma$		(2.12 ± 0.14) %	S=1.3	DESIG=6
Γ_6	$3\pi^0$		$(1.56\pm0.26)\times10^{-3}$		DESIG=8
Γ_7	$\mu^+\mu^-\gamma$		$(1.04\pm0.26)\times10^{-4}$		DESIG=20
Γ_8	$\pi^+\pi^-\pi^0$		<5 %	CL=90%	DESIG=121
Γ_9	$\pi^0\rho^0$		<4 %	CL=90%	DESIG=18
Γ_{10}	$\pi^+\pi^+\pi^-\pi^-$		<1 %	CL=90%	DESIG=131
Γ_{11}	$\pi^+\pi^+\pi^-\pi^-$ neutrals		<1 %	CL=95%	DESIG=132
Γ_{12}	$\pi^+\pi^+\pi^-\pi^-\pi^0$		<1 %	CL=90%	DESIG=141
Γ_{13}	6π		<1 %	CL=90%	DESIG=15
Γ_{14}	$\pi^+\pi^-e^+e^-$		$<6\times10^{-3}$	CL=90%	DESIG=10
Γ_{15}	γe^+e^-		$<9\times10^{-4}$	CL=90%	DESIG=28
Γ_{16}	$\pi^0\gamma\gamma$		$<8\times10^{-4}$	CL=90%	DESIG=24
Γ_{17}	$4\pi^0$		$<5\times10^{-4}$	CL=90%	DESIG=26
Γ_{18}	e^+e^-		$<2.1\times10^{-7}$	CL=90%	DESIG=150
	Charge conjugation (C), Parity (P), Lepton family number (LF) violating modes				NODE=M002;CLUMP=B
Γ_{19}	$\pi^+\pi^-$	P,CP	<2 %	CL=90%	DESIG=111
Γ_{20}	$\pi^0\pi^0$	P,CP	$<9\times10^{-4}$	CL=90%	DESIG=25
Γ_{21}	$\pi^0e^+e^-$	C	[a] $<1.4\times10^{-3}$	CL=90%	DESIG=16
Γ_{22}	ηe^+e^-	C	[a] $<2.4\times10^{-3}$	CL=90%	DESIG=17
Γ_{23}	3γ	C	$<1.0\times10^{-4}$	CL=90%	DESIG=23
Γ_{24}	$\mu^+\mu^-\pi^0$	C	[a] $<6.0\times10^{-5}$	CL=90%	DESIG=22
Γ_{25}	$\mu^+\mu^-\eta$	C	[a] $<1.5\times10^{-5}$	CL=90%	DESIG=21
Γ_{26}	$e\mu$	LF	$<4.7\times10^{-4}$	CL=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 16 branching ratios uses 48 measurements and one constraint to determine 7 parameters. The overall fit has a $\chi^2 = 35.6$ for 42 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_2	−39					
x_3	−74	−29				
x_4	−33	−24	32			
x_5	−25	−12	26	8		
x_6	−27	−11	35	11	9	
Γ	32	−3	−24	−5	−88	−8

	Mode	Rate (MeV)	Scale factor	
Γ_1	$\pi^+\pi^-\eta$	0.090 ± 0.008	1.2	DESIG=1
Γ_2	$\rho^0\gamma$ (including non-resonant $\pi^+\pi^-\gamma$)	0.060 ± 0.005	1.3	DESIG=9
Γ_3	$\pi^0\pi^0\eta$	0.042 ± 0.004	1.6	DESIG=2

Γ_4	$\omega\gamma$	0.0061 ± 0.0008	1.2	DESIG=7
Γ_5	$\gamma\gamma$	0.00429 ± 0.00015	1.1	DESIG=6
Γ_6	$3\pi^0$	$(3.1 \pm 0.6) \times 10^{-4}$	1.1	DESIG=8

$\eta'(958)$ PARTIAL WIDTHS

NODE=M002220

$\Gamma(\gamma\gamma)$ Γ_5

NODE=M002W4
NODE=M002W4

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
4.29±0.15 OUR FIT Error includes scale factor of 1.1.					
4.28±0.19 OUR AVERAGE					
$4.17\pm0.10\pm0.27$	2000	[1] ACCIARRI	98B	L3	$e^+e^- \to e^+e^-\pi^+\pi^-\gamma$
$4.53\pm0.29\pm0.51$	266	KARCH	92	CBAL	$e^+e^- \to e^+e^-\eta\pi^0\pi^0$
$3.61\pm0.13\pm0.48$		[2] BEHREND	91	CELL	$e^+e^- \to e^+e^-\eta'(958)$
$4.6 \pm1.1 \pm0.6$	23	BARU	90	MD1	$e^+e^- \to e^+e^-\pi^+\pi^-\gamma$
$4.57\pm0.25\pm0.44$		BUTLER	90	MRK2	$e^+e^- \to e^+e^-\eta'(958)$
$5.08\pm0.24\pm0.71$	547	[3] ROE	90	ASP	$e^+e^- \to e^+e^-2\gamma$
$3.8 \pm0.7 \pm0.6$	34	AIHARA	88C	TPC	$e^+e^- \to e^+e^-\eta\pi^+\pi^-$
$4.9 \pm0.5 \pm0.5$	136	[4] WILLIAMS	88	CBAL	$e^+e^- \to e^+e^-2\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$4.7 \pm0.6 \pm0.9$	143	[5] GIDAL	87	MRK2	$e^+e^- \to e^+e^-\eta\pi^+\pi^-$
4.0 ± 0.9		[6] BARTEL	85E	JADE	$e^+e^- \to e^+e^-2\gamma$

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

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

NODE=M002223

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

NODE=M002223

$\Gamma(\gamma\gamma) \times \Gamma(\rho^0\gamma(\text{including non-resonant } \pi^+\pi^-\gamma))/\Gamma_{\text{total}}$ $\Gamma_5\Gamma_2/\Gamma$

NODE=M002G1
NODE=M002G1

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
1.27±0.05 OUR FIT Error includes scale factor of 1.2.					
1.26±0.07 OUR AVERAGE Error includes scale factor of 1.2.					
$1.09\pm0.04\pm0.13$		BEHREND	91	CELL	$e^+e^- \to e^+e^-\rho(770)^0\gamma$
$1.35\pm0.09\pm0.21$		AIHARA	87	TPC	$e^+e^- \to e^+e^-\rho\gamma$
$1.13\pm0.04\pm0.13$	867	ALBRECHT	87B	ARG	$e^+e^- \to e^+e^-\rho\gamma$
$1.53\pm0.09\pm0.21$		ALTHOFF	84E	TASS	$e^+e^- \to e^+e^-\rho\gamma$
$1.14\pm0.08\pm0.11$	243	BERGER	84B	PLUT	$e^+e^- \to e^+e^-\rho\gamma$
$1.73\pm0.34\pm0.35$	95	JENNI	83	MRK2	$e^+e^- \to e^+e^-\rho\gamma$
$1.49\pm0.13\pm0.027$	213	BARTEL	82B	JADE	$e^+e^- \to e^+e^-\rho\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1.85\pm0.31\pm0.24$	43	BEHREND	83B	CELL	$e^+e^- \to e^+e^-\rho\gamma$

$\Gamma(\gamma\gamma) \times \Gamma(\pi^0\pi^0\eta)/\Gamma_{\text{total}}$ $\Gamma_5\Gamma_3/\Gamma$

NODE=M002G2
NODE=M002G2

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
0.90±0.06 OUR FIT Error includes scale factor of 1.2.				
0.92±0.06±0.11	[7] KARCH	92	CBAL	$e^+e^- \to e^+e^-\eta\pi^0\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.95\pm0.05\pm0.08$	[8] KARCH	90	CBAL	$e^+e^- \to e^+e^-\eta\pi^0\pi^0$
$1.00\pm0.08\pm0.10$	[8,9] ANTREASYAN	87	CBAL	$e^+e^- \to e^+e^-\eta\pi^0\pi^0$

[7] Reevaluated by us using $B(\eta \to \gamma\gamma) = (39.21 \pm 0.34)\%$. Supersedes ANTREASYAN 87 and KARCH 90. NODE=M002G2;LINKAGE=K4
[8] Superseded by KARCH 92. NODE=M002G2;LINKAGE=A
[9] Using $BR(\eta \to 2\gamma)=(38.9 \pm 0.5)\%$. NODE=M002G2;LINKAGE=D

$\eta'(958)$ α PARAMETER

NODE=M002225

$|\text{MATRIX ELEMENT}|^2 = (1 + \alpha y)^2 + cx^2$

NODE=M002A0
NODE=M002A0

VALUE	DOCUMENT ID		TECN	COMMENT
$-$0.058$\pm$0.013	[10] ALDE	86	GAM2	38 $\pi^- p \to n\eta 2\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$-$0.08 $\pm$0.03	[10] KALBFLEISCH	74	RVUE	$\eta' \to \eta\pi^+\pi^-$

[10] May not necessarily be the same for $\eta' \to \eta\pi^+\pi^-$ and $\eta' \to \eta\pi^0\pi^0$.

NODE=M002A0;LINKAGE=A

$\eta'(958)$ β PARAMETER

NODE=M002226

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

NODE=M002226

$|\text{MATRIX ELEMENT}|^2 = (1 + 2\beta Z)$

NODE=M002B0
NODE=M002B0

VALUE	DOCUMENT ID		TECN	COMMENT
$-$0.1 $\pm$0.3	ALDE	87B	GAM2	38 $\pi^- p \to n 3\pi^0$

$\eta'(958)$ BRANCHING RATIOS

NODE=M002230

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

NODE=M002R1
NODE=M002R1

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.316$\pm$0.010 OUR FIT	Error includes scale factor of 1.2.				
0.314$\pm$0.026	281	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
NODE=M002R2

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.403$\pm$0.008 OUR FIT	Error includes scale factor of 1.2.				
0.36 $\pm$0.05 OUR AVERAGE					
0.4 $\pm$0.1	39	LONDON	66	HBC	2.24 $K^- p \to \Lambda\pi^+\pi^-$ neutrals
0.35 $\pm$0.06	33	BADIER	65B	HBC	3 $K^- p$

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

NODE=M002R3
NODE=M002R3

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.127$\pm$0.004 OUR FIT	Error includes scale factor of 1.2.				
0.116$\pm$0.013 OUR AVERAGE					
0.123$\pm$0.014	107	RITTENBERG	69	HBC	1.7–2.7 $K^- p$
0.10 $\pm$0.04	10	LONDON	66	HBC	2.24 $K^- p \to \Lambda\pi^+\pi^-\pi^+\pi^-\pi^0$
0.07 $\pm$0.04	7	BADIER	65B	HBC	3 $K^- p$

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

NODE=M002R4
NODE=M002R4

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.087$\pm$0.005 OUR FIT	Error includes scale factor of 1.2.				
0.045$\pm$0.029	42	RITTENBERG	69	HBC	1.7–2.7 $K^- p$

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

NODE=M002R5
NODE=M002R5

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.173$\pm$0.009 OUR FIT	Error includes scale factor of 1.2.				
0.187$\pm$0.017 OUR AVERAGE					
0.185$\pm$0.022	535	BASILE	71	CNTR	1.6 $\pi^- p \to n X^0$
0.189$\pm$0.026	123	RITTENBERG	69	HBC	1.7–2.7 $K^- p$

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

NODE=M002R6
NODE=M002R6

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.295$\pm$0.010 OUR FIT	Error includes scale factor of 1.2.				
0.319$\pm$0.030 OUR AVERAGE					
0.329$\pm$0.033	298	RITTENBERG	69	HBC	1.7–2.7 $K^- p$
0.2 $\pm$0.1	20	LONDON	66	HBC	2.24 $K^- p \to \Lambda\pi^+\pi^-\gamma$
0.34 $\pm$0.09	35	BADIER	65B	HBC	3 $K^- p$

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

NODE=M002R7
NODE=M002R7

VALUE	DOCUMENT ID		TECN	COMMENT
0.453±0.022 OUR FIT Error includes scale factor of 1.2.				
0.426±0.028 OUR AVERAGE				
0.43 ±0.02 ±0.02	BARBERIS	98C	OMEG	450 $pp \to p_f \eta' p_s$
0.31 ±0.15	DAVIS	68	HBC	5.5 $K^- p$

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

NODE=M002R40
NODE=M002R40

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

$\Gamma(\pi^0 e^+e^-)/\Gamma_{total}$ — Γ_{21}/Γ

NODE=M002R8
NODE=M002R8

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

$\Gamma(\eta e^+e^-)/\Gamma_{total}$ — Γ_{22}/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 $K^- p$

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

NODE=M002R10
NODE=M002R10

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

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

NODE=M002R12
NODE=M002R12

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.006	90	RITTENBERG	65	HBC	2.7 $K^- p$

$\Gamma(6\pi)/\Gamma_{total}$ — Γ_{13}/Γ

NODE=M002R16
NODE=M002R16

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.01	90	LONDON	66	HBC	Compilation

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

NODE=M002R17
NODE=M002R17

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.069±0.008 OUR FIT Error includes scale factor of 1.1.					
0.068±0.013	68	ZANFINO	77	ASPK	8.4 $\pi^- p$

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

NODE=M002R18
NODE=M002R18

VALUE	DOCUMENT ID		TECN	COMMENT
0.433±0.021 OUR FIT Error includes scale factor of 1.2.				
0.25 ±0.14	DAUBER	64	HBC	1.95 $K^- p$

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

NODE=M002R19
NODE=M002R19

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0212±0.0014 OUR FIT Error includes scale factor of 1.3.					
0.0196±0.0015 OUR AVERAGE					
0.0200±0.0018		[11] STANTON	80	SPEC	8.45 $\pi^- p \to n\pi^+\pi^- 2\gamma$
0.025 ±0.007		DUANE	74	MMS	$\pi^- p \to n$MM
0.0171±0.0033	68	DALPIAZ	72	CNTR	1.6 $\pi^- p \to nX^0$
0.020 $^{+0.008}_{-0.006}$	31	HARVEY	71	OSPK	3.65 $\pi^- p \to nX^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.018 ±0.002	6000	[12] APEL	79	NICE	15–40 $\pi^- p \to n2\gamma$

[11] Includes APEL 79 result.
[12] Data is included in STANTON 80 evaluation.

NODE=M002R19;LINKAGE=S
NODE=M002R19;LINKAGE=A

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

NODE=M002R39
NODE=M002R39

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

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

NODE=M002R20

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.02	90	RITTENBERG	69	HBC	1.7–2.7 $K^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.08	95	DANBURG	73	HBC	2.2 $K^- p \rightarrow \Lambda X^0$

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_8/Γ

NODE=M002R21

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.05	90	RITTENBERG	69	HBC	1.7–2.7 $K^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.09	95	DANBURG	73	HBC	2.2 $K^- p \rightarrow \Lambda X^0$

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

NODE=M002R22

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

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

NODE=M002R23

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.01	90	RITTENBERG	69	HBC	1.7–2.7 $K^- p$

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

NODE=M002R24

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.01	90	RITTENBERG	69	HBC	1.7–2.7 $K^- p$

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

NODE=M002R26

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.067±0.004 OUR FIT	Error includes scale factor of 1.2.				
0.11 ±0.06	4	BENSINGER	70	DBC	2.2 $\pi^+ d$

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

NODE=M002R27

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.93±0.05 OUR FIT	Error includes scale factor of 1.2.				
1.01±0.09 OUR AVERAGE					
1.07±0.17		BELADIDZE	92C	VES	36 π^- Be $\rightarrow \pi^-\eta'\eta$ Be
0.92±0.14	473	DANBURG	73	HBC	2.2 $K^- p \rightarrow \Lambda X^0$
1.11±0.18	192	JACOBS	73	HBC	2.9 $K^- p \rightarrow \Lambda X^0$

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

NODE=M002R28

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.142±0.010 OUR FIT	Error includes scale factor of 1.6.				
0.188±0.058	16	APEL	72	OSPK	3.8 $\pi^- p \rightarrow n X^0$

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

NODE=M002R29

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

$\Gamma(\mu^+\mu^-\eta)/\Gamma_{total}$ — Γ_{25}/Γ

NODE=M002R30

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

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

NODE=M002R31

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

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

NODE=M002R32

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
74±12 OUR FIT				
74±12 OUR AVERAGE				
74±15	ALDE	87B	GAM2	38 $\pi^- p \rightarrow n6\gamma$
75±18	BINON	84	GAM2	30–40 $\pi^- p \rightarrow n6\gamma$

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

NODE=M002R38
NODE=M002R38

VALUE	DOCUMENT ID		TECN	COMMENT
0.101±0.007 OUR FIT Error includes scale factor of 1.6.				
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 $\pi^- p \to n2\gamma$

$\Gamma(\omega\gamma)/\Gamma(\pi^0\pi^0\eta)$ Γ_4/Γ_3

NODE=M002R33
NODE=M002R33

VALUE	DOCUMENT ID		TECN	COMMENT
0.145±0.014 OUR FIT				
0.147±0.016	ALDE	87B	GAM2	38 $\pi^- p \to n4\gamma$

$\Gamma(3\gamma)/\Gamma(\pi^0\pi^0\eta)$ Γ_{23}/Γ_3

NODE=M002R34
NODE=M002R34

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<4.6	90	ALDE	87B	GAM2	38 $\pi^- p \to n3\gamma$

$\Gamma(\pi^0\gamma\gamma)/\Gamma(\pi^0\pi^0\eta)$ Γ_{16}/Γ_3

NODE=M002R35
NODE=M002R35

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

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

NODE=M002R36
NODE=M002R36

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

$\Gamma(4\pi^0)/\Gamma(\pi^0\pi^0\eta)$ Γ_{17}/Γ_3

NODE=M002R37
NODE=M002R37

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

$\Gamma(e\mu)/\Gamma_{\text{total}}$ Γ_{26}/Γ

NODE=M002R41
NODE=M002R41

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

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

NODE=M002235

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

NODE=M002235

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

NODE=M002A
NODE=M002A

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
−0.01 ±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 $K^- p \to \Lambda\pi^+\pi^-\gamma$
0.07 ±0.08	152	RITTENBERG	65	HBC	2.1–2.7 $K^- p$

$\eta'(958)$ REFERENCES

NODE=M002

BRIERE	00	PRL 84 26	R. Briere *et al.*	(CLEO Collab.)	REFID=47410
ACCIARRI	98B	PL B418 389	M. Acciarri *et al.*	(L3 Collab.)	REFID=45905
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 Translated from YAF 55 2748.	G.M. Beladidze, S.I. Bityukov, G.V. Borisov	(SERP+)	REFID=43175
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 Translated from YAF 48 436.	P.V. Vorobiev *et al.*	(NOVO)	REFID=41023

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	H.J. Behrend *et al.*	(CELLO Collab.)	REFID=20302
Also	82C	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 92 B 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
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

OTHER RELATED PAPERS

BENAYOUN	03B	EPJ C31 525	M. Benayoun *et al.*		REFID=49591
BENAYOUN	99B	PR D59 114027	M. Benayoun *et al.*		REFID=46936
PROKOSHKIN	99	PAN 62 356	Yu.D. Prokoshkin		REFID=46946
		Translated from YAF 62 396.			
GRONBERG	98	PR D57 33	J. Gronberg *et al.*	(CLEO Collab.)	REFID=45781
ABELE	97B	PL B402 195	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=45525
GENOVESE	94	ZPHY C61 425	M. Genovese, D.B. Lichtenberg, E. Predazzi	(TORI+)	REFID=44089
BENAYOUN	93	ZPHY C58 31	M. Benayoun *et al.*	(CDEF, CERN, BARI)	REFID=43178
KAMAL	92	PL B284 421	A.N. Kamal, Q.P. Xu	(ALBE)	REFID=43166
BICKERSTAFF	82	ZPHY C16 171	R.P. Bickerstaff, B.H.J. McKellar	(MELB)	REFID=20301
KIENZLE	65	PL 19 438	W. Kienzle *et al.*	(CERN)	REFID=20254
TRILLING	65	PL 19 427	G.H. Trilling *et al.*	(LRL)	REFID=20256
GOLDBERG	64	PRL 12 546	M. Goldberg *et al.*	(SYRA, BNL)	REFID=20249
GOLDBERG	64B	PRL 13 249	M. Goldberg *et al.*	(SYRA, BNL)	REFID=20250
KALBFLEISCH	64	PRL 12 527	G.R. Kalbfleisch *et al.*	(LRL) JP	REFID=20251
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 $f_0(600)$. (See the index for the page number.)

NODE=M003

$f_0(980)$ MASS

NODE=M003205

NODE=M003M1

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
980 ±10 OUR ESTIMATE						→ NOT CHECKED ←
• • • We do not use the following data for averages, fits, limits, etc. • • •						
965 ±10		ABLIKIM	05	BES2	$J/\psi \to \phi\pi^+\pi^-$, $\phi K^+ K^-$	
976 ± 4 $^{+2}_{-3}$	2584	[27] GARMASH	05	BELL	$B^+ \to K^+\pi^+\pi^-$	
1031 ± 8		[1] ANISOVICH	03	RVUE		
1037 ±31		TIKHOMIROV	03	SPEC	40.0 $\pi^- C \to K^0_S K^0_S K^0_L X$	
973 ± 1	2438	[2] ALOISIO	02D	KLOE	$e^+e^- \to \pi^0\pi^0\gamma$	
977 ± 3 ±2	848	[3] AITALA	01A	E791	$D^+_s \to \pi^-\pi^+\pi^+$	
969.8± 4.5	419	[4] ACHASOV	00H	SND	$e^+e^- \to \pi^0\pi^0\gamma$	
985 $^{+16}_{-12}$	419	[5,6] ACHASOV	00H	SND	$e^+e^- \to \pi^0\pi^0\gamma$	OCCUR=2
976 ± 5 ±6		[7] AKHMETSHIN	99B	CMD2	$e^+e^- \to \pi^+\pi^-\gamma$	
977 ± 3 ±6	268	[7] AKHMETSHIN	99C	CMD2	$e^+e^- \to \pi^0\pi^0\gamma$	
975 ± 4 ±6		[8] AKHMETSHIN	99C	CMD2	$e^+e^- \to \pi^0\pi^0\gamma$	OCCUR=2
975 ± 4 ±6		[9] AKHMETSHIN	99C	CMD2	$e^+e^- \to \pi^+\pi^-\gamma$, $\pi^0\pi^0\gamma$	OCCUR=3
985 ±10		BARBERIS	99	OMEG	450 $pp \to p_s p_f K^+ K^-$	
982 ± 3		BARBERIS	99B	OMEG	450 $pp \to p_s p_f \pi^+\pi^-$	
982 ± 3		BARBERIS	99C	OMEG	450 $pp \to p_s p_f \pi^0\pi^0$	
987 ± 6 ±6		[10] BARBERIS	99D	OMEG	450 $pp \to K^+K^-$, $\pi^+\pi^-$	
989 ±15		BELLAZZINI	99	GAM4	450 $pp \to pp\pi^0\pi^0$	
991 ± 3		[11] KAMINSKI	99	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$, $\sigma\sigma$	
~ 980		[11] OLLER	99	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$	
~ 993.5		OLLER	99B	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$	
~ 987		[11] OLLER	99C	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$, $\eta\eta$	
957 ± 6		[12] ACKERSTAFF	98Q	OPAL	$Z \to f_0 X$	
960 ±10		ALDE	98	GAM4		
1015 ±15		[11] ANISOVICH	98B	RVUE	Compilation	
1008		[13] LOCHER	98	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$	
955 ±10		[12] ALDE	97	GAM2	450 $pp \to pp\pi^0\pi^0$	
994 ± 9		[14] BERTIN	97C	OBLX	0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$	
993.2± 6.5±6.9		[15] ISHIDA	96	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$	
1006		TORNQVIST	96	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$, $K\pi$, $\eta\pi$	
997 ± 5	3k	[16] ALDE	95B	GAM2	38 $\pi^- p \to \pi^0\pi^0 n$	
960 ±10	10k	[17] ALDE	95B	GAM2	38 $\pi^- p \to \pi^0\pi^0 n$	OCCUR=2
994 ± 5		AMSLER	95B	CBAR	0.0 $\overline{p}p \to 3\pi^0$	
~ 996		[18] AMSLER	95D	CBAR	0.0 $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$	
987 ± 6		[19] ANISOVICH	95	RVUE		
1015		JANSSEN	95	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$	
983		[20] BUGG	94	RVUE	$\overline{p}p \to \eta 2\pi^0$	
973 ± 2		[21] KAMINSKI	94	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$	
988		[22] ZOU	94B	RVUE		
988 ±10		[23] MORGAN	93	RVUE	$\pi\pi(K\overline{K}) \to \pi\pi(K\overline{K})$, $J/\psi \to \phi\pi\pi(K\overline{K})$, $D_s \to \pi(\pi\pi)$	
971.1± 4.0		[12] AGUILAR-...	91	EHS	400 pp	
979 ± 4		[24] ARMSTRONG	91	OMEG	300 $pp \to pp\pi\pi$, $ppK\overline{K}$	

956 ± 12	BREAKSTONE	90	SFM	$pp \to pp\pi^+\pi^-$
959.4 ± 6.5	[12] AUGUSTIN	89	DM2	$J/\psi \to \omega\pi^+\pi^-$
978 ± 9	[12] ABACHI	86B	HRS	$e^+e^- \to \pi^+\pi^- X$
$985.0^{+9.0}_{-39.0}$	ETKIN	82B	MPS	$23\ \pi^- p \to n2K^0_S$
974 ± 4	[24] GIDAL	81	MRK2	$J/\psi \to \pi^+\pi^- X$
975	[25] ACHASOV	80	RVUE	
986 ± 10	[24] AGUILAR-...	78	HBC	$0.7\ \overline{p}p \to K^0_S K^0_S$
969 ± 5	[24] LEEPER	77	ASPK	$2–2.4\ \pi^- p \to \pi^+\pi^- n,\ K^+K^- n$
987 ± 7	[24] BINNIE	73	CNTR	$\pi^- p \to n$MM
1012 ± 6	[26] GRAYER	73	ASPK	$17\ \pi^- p \to \pi^+\pi^- n$
1007 ± 20	[26] HYAMS	73	ASPK	$17\ \pi^- p \to \pi^+\pi^- n$
997 ± 6	[26] PROTOPOP...	73	HBC	$7\ \pi^+ p \to \pi^+ p\pi^+\pi^-$

[1] K-matrix pole from combined analysis of $\pi^- p \to \pi^0\pi^0 n$, $\pi^- p \to K\overline{K}n$, $\pi^+\pi^- \to \pi^+\pi^-$, $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$, $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, $K^0_S K^0_S\pi^0$, $K^+K^0_S\pi^-$ at rest, $\overline{p}n \to \pi^-\pi^-\pi^+$, $K^0_S K^-\pi^0$, $K^0_S K^0_S\pi^-$ at rest. NODE=M003M;LINKAGE=KM

[2] From the negative interference with the $f_0(600)$ meson of AITALA 01B using the ACHASOV 89 parameterization for the $f_0(980)$, a Breit-Wigner for the $f_0(600)$, and ACHASOV 01F for the $\rho\pi$ contribution. NODE=M003M1;LINKAGE=KD

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

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

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

[6] In the "narrow resonance" approximation. NODE=M003M1;LINKAGE=AI

[7] Assuming $\Gamma(f_0) = 40$ MeV. NODE=M003M;LINKAGE=SM

[8] From a narrow pole fit taking into account $f_0(980)$ and $f_0(1200)$ intermediate mechanisms. NODE=M003M;LINKAGE=ST

[9] 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

[10] Supersedes BARBERIS 99 and BARBERIS 99B NODE=M003M1;LINKAGE=BD

[11] T-matrix pole. NODE=M003M1;LINKAGE=AN

[12] From invariant mass fit. NODE=M003M1;LINKAGE=A

[13] On sheet II in a 2 pole solution. The other pole is found on sheet III at $(1039-93i)$ MeV. NODE=M003M1;LINKAGE=LC

[14] On sheet II in a 2 pole solution. The other pole is found on sheet III at (963-29i) MeV. NODE=M003M1;LINKAGE=X

[15] Reanalysis of data from HYAMS 73, GRAYER 74, SRINIVASAN 75, and ROSSELET 77 using the interfering amplitude method. NODE=M003M1;LINKAGE=AA

[16] At high $|t|$. NODE=M003M1;LINKAGE=LA

[17] At low $|t|$. NODE=M003M1;LINKAGE=LB

[18] 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

[19] Combined fit of ALDE 95B, ANISOVICH 94, AMSLER 94D. NODE=M003M1;LINKAGE=CF

[20] On sheet II in a 2 pole solution. The other pole is found on sheet III at $(996-103i)$ MeV. NODE=M003M1;LINKAGE=C2

[21] From sheet II pole position. NODE=M003M1;LINKAGE=KM

[22] 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

[23] On sheet II in a 2 pole solution. The other pole is found on sheet III at $(978-28i)$ MeV. NODE=M003M1;LINKAGE=K

[24] From coupled channel analysis. NODE=M003M1;LINKAGE=B

[25] Coupled channel analysis with finite width corrections. NODE=M003M;LINKAGE=B

[26] Included in AGUILAR-BENITEZ 78 fit. NODE=M003M;LINKAGE=R

[27] Breit-Wigner, solution 1, PWA ambiguous. NODE=M003M1;LINKAGE=GA

$f_0(980)$ WIDTH

NODE=M003210

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 → NOT CHECKED ←

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
40 to 100 OUR ESTIMATE					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$61 \pm 9 {}^{+14}_{-8}$	2584	[28] GARMASH	05	BELL	$B^+ \to K^+\pi^+\pi^-$
64 ± 16		[29] ANISOVICH	03	RVUE	
121 ± 23		TIKHOMIROV	03	SPEC	$40.0\ \pi^- C \to K^0_S K^0_S K^0_L X$
~ 70		[30] BRAMON	02	RVUE	$1.02\ e^+e^- \to \pi^0\pi^0\gamma$
$44 \pm 2 \pm 2$	848	[31] AITALA	01A	E791	$D^+_s \to \pi^-\pi^+\pi^+$
201 ± 28	419	[32] ACHASOV	00H	SND	$e^+e^- \to \pi^0\pi^0\gamma$

122 ± 13	419	[33,34] ACHASOV	00H	SND	$e^+e^- \to \pi^0\pi^0\gamma$	OCCUR=2
56 ± 20		[35] 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		[36] BARBERIS	99D	OMEG	450 $pp \to K^+K^-$, $\pi^+\pi^-$	
65 ± 25		BELLAZZINI	99	GAM4	450 $pp \to pp\pi^0\pi^0$	
71 ± 14		[37] KAMINSKI	99	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$, $\sigma\sigma$	
~ 28		[37] OLLER	99	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$	
~ 25		OLLER	99B	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$	
~ 14		[37] OLLER	99C	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$, $\eta\eta$	
70 ± 20		ALDE	98	GAM4		
86 ± 16		[37] ANISOVICH	98B	RVUE	Compilation	
54		[38] LOCHER	98	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$	
69 ± 15		[39] ALDE	97	GAM2	450 $pp \to pp\pi^0\pi^0$	
38 ± 20		[40] BERTIN	97C	OBLX	0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$	
~ 100		[41] ISHIDA	96	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$	
34		TORNQVIST	96	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$, $K\pi$, $\eta\pi$	
48 ± 10	3k	[42] ALDE	95B	GAM2	38 $\pi^-p \to \pi^0\pi^0 n$	
95 ± 20	10k	[43] ALDE	95B	GAM2	38 $\pi^-p \to \pi^0\pi^0 n$	OCCUR=2
26 ± 10		AMSLER	95B	CBAR	0.0 $\overline{p}p \to 3\pi^0$	
~ 112		[44] AMSLER	95D	CBAR	0.0 $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$	
80 ± 12		[45] ANISOVICH	95	RVUE		
30		JANSSEN	95	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$	
74		[46] BUGG	94	RVUE	$\overline{p}p \to \eta 2\pi^0$	
29 ± 2		[47] KAMINSKI	94	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$	
46		[48] ZOU	94B	RVUE		
48 ± 12		[49] MORGAN	93	RVUE	$\pi\pi(K\overline{K}) \to \pi\pi(K\overline{K})$, $J/\psi \to \phi\pi\pi(K\overline{K})$, $D_s \to \pi(\pi\pi)$	
37.4 ± 10.6		[39] AGUILAR-...	91	EHS	400 pp	
72 ± 8		[50] ARMSTRONG	91	OMEG	300 $pp \to pp\pi\pi$, $ppK\overline{K}$	
110 ± 30		BREAKSTONE	90	SFM	$pp \to pp\pi^+\pi^-$	
29 ± 13		[39] ABACHI	86B	HRS	$e^+e^- \to \pi^+\pi^- X$	
120 ± 281 ± 20		ETKIN	82B	MPS	23 $\pi^-p \to n2K^0_S$	
28 ± 10		[50] GIDAL	81	MRK2	$J/\psi \to \pi^+\pi^- X$	
70 to 300		[51] ACHASOV	80	RVUE		
100 ± 80		[52] AGUILAR-...	78	HBC	0.7 $\overline{p}p \to K^0_S K^0_S$	
30 ± 8		[50] LEEPER	77	ASPK	2–2.4 $\pi^-p \to \pi^+\pi^- n$, $K^+K^- n$	
48 ± 14		[50] BINNIE	73	CNTR	$\pi^-p \to n MM$	
32 ± 10		[53] GRAYER	73	ASPK	17 $\pi^-p \to \pi^+\pi^- n$	
30 ± 10		[53] HYAMS	73	ASPK	17 $\pi^-p \to \pi^+\pi^- n$	
54 ± 16		[53] PROTOPOP...	73	HBC	7 $\pi^+p \to \pi^+p\pi^+\pi^-$	

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

[29] 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=M003W;LINKAGE=KM

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

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

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

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

[34] In the "narrow resonance" approximation. NODE=M003W1;LINKAGE=AI

[35] From the combined fit of the photon spectra in the reactions $e^+e^- \to \pi^+\pi^-\gamma$, $\pi^0\pi^0\gamma$. NODE=M003W;LINKAGE=SL

[36] Supersedes BARBERIS 99 and BARBERIS 99B NODE=M003W1;LINKAGE=BD

[37] T-matrix pole. NODE=M003W1;LINKAGE=AN

[38] On sheet II in a 2 pole solution. The other pole is found on sheet III at $(1039-93i)$ MeV. NODE=M003W1;LINKAGE=LO

[39] From invariant mass fit. NODE=M003W1;LINKAGE=A
[40] On sheet II in a 2 pole solution. The other pole is found on sheet III at (963-29i) MeV. NODE=M003W1;LINKAGE=X
[41] Reanalysis of data from HYAMS 73, GRAYER 74, SRINIVASAN 75, and ROSSELET 77 using the interfering amplitude method. NODE=M003W1;LINKAGE=AA
[42] At high $|t|$. NODE=M003W1;LINKAGE=LA
[43] At low $|t|$. NODE=M003W1;LINKAGE=LB
[44] 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
[45] Combined fit of ALDE 95B, ANISOVICH 94, NODE=M003W1;LINKAGE=CF
[46] On sheet II in a 2 pole solution. The other pole is found on sheet III at $(996-103i)$ MeV. NODE=M003W1;LINKAGE=C2
[47] From sheet II pole position. NODE=M003W1;LINKAGE=KM
[48] 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
[49] On sheet II in a 2 pole solution. The other pole is found on sheet III at $(978-28i)$ MeV. NODE=M003W1;LINKAGE=K
[50] From coupled channel analysis. NODE=M003W1;LINKAGE=B
[51] Coupled channel analysis with finite width corrections. NODE=M003W;LINKAGE=B
[52] 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
[53] 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

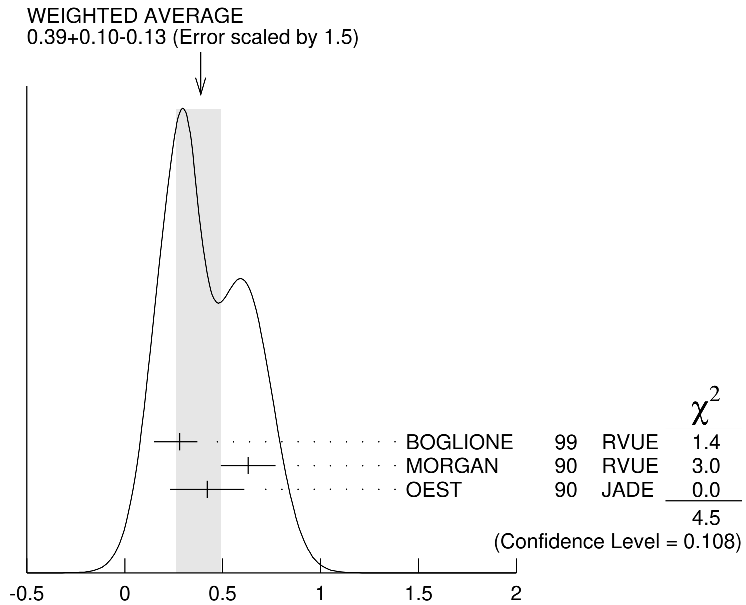
NODE=M003220

$\Gamma(\gamma\gamma)$ Γ_3

NODE=M003W4
NODE=M003W4

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
$0.39^{+0.10}_{-0.13}$ OUR AVERAGE		Error includes scale factor of 1.5. See the ideogram below.			
$0.28^{+0.09}_{-0.13}$		[54] BOGLIONE	99	RVUE	$\gamma\gamma \to \pi^+\pi^-, \pi^0\pi^0$
0.63 ± 0.14		[55] MORGAN	90	RVUE	$\gamma\gamma \to \pi^+\pi^-, \pi^0\pi^0$
$0.42\pm0.06\pm0.18$	60	[56] OEST	90	JADE	$e^+e^- \to e^+e^-\pi^0\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.29\pm0.07\pm0.12$		[57,58] BOYER	90	MRK2	$e^+e^- \to e^+e^-\pi^+\pi^-$
$0.31\pm0.14\pm0.09$		[57,58] MARSISKE	90	CBAL	$e^+e^- \to e^+e^-\pi^0\pi^0$

[54] Supersedes MORGAN 90. NODE=M003W4;LINKAGE=BL
[55] From amplitude analysis of BOYER 90 and MARSISKE 90, data corresponds to resonance parameters $m = 989$ MeV, $\Gamma = 61$ MeV. NODE=M003W4;LINKAGE=A
[56] OEST 90 quote systematic errors $^{+0.08}_{-0.18}$. We use ±0.18. NODE=M003W4;LINKAGE=H
[57] From analysis allowing arbitrary background unconstrained by unitarity. NODE=M003W4;LINKAGE=B
[58] Data included in MORGAN 90, BOGLIONE 99 analyses. NODE=M003W4;LINKAGE=C



$\Gamma(\gamma\gamma)$ Γ_3

$\Gamma(e^+e^-)$ 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	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.84 ± 0.02	[59] ANISOVICH	02D	SPEC	Combined fit
~ 0.68	OLLER	99B	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$
0.67 ± 0.09	[60] LOVERRE	80	HBC	$4\ \pi^- p \to n 2K^0_S$
$0.81^{+0.09}_{-0.04}$	[60] CASON	78	STRC	$7\ \pi^- p \to n 2K^0_S$
0.78 ± 0.03	[60] WETZEL	76	OSPK	$8.9\ \pi^- p \to n 2K^0_S$

[59] 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

[60] 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

ABLIKIM	05	PL B607 243	M. Ablikim *et al.*	(BES Collab.)	REFID=50450
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
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 *et al.*	(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	99	PAN 62 405	D. Alde *et al.*	(GAMS Collab.)	REFID=46914
		Translated from YAF 62 446.			

ANISOVICH	98B	UFN 41 419	V.V. Anisovich *et al.*		REFID=46331
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
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.			
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
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

OTHER RELATED PAPERS

ACHASOV	05	PR D72 013006	N.N. Achasov, G.N. Shestakov		REFID=50762
AUBERT,B	05G	PR D72 052002	B. Aubert *et al.*	(BABAR Collab.)	REFID=50775
BRITO	05	PL B608 69	T.V. Brito *et al.*		REFID=50456
TESHIMA	05	NP A759 131	T. Teshima, I. Kitamura, N. Morisita		REFID=50815
ABLIKIM	04A	PL B598 149	M. Ablikim *et al.*	(BES Collab.)	REFID=49740
AUBERT,B	04P	PR D70 092001	B. Aubert *et al.*	(BABAR Collab.)	REFID=50193
BARU	04	PL B586 53	V. Baru *et al.*		REFID=49757
BEDIAGA	04	PL B579 59	I. Bediaga *et al.*		REFID=49758
BUGG	04B	PL B598 8	D.V. Bugg		REFID=50169
LINK	04	PL B585 200	J.M. Link *et al.*	(FNAL FOCUS Collab.)	REFID=49774
PELAEZ	04	PRL 92 102001	J.R. Pelaez		REFID=49777
PELAEZ	04A	MPL A19 2879	J.R. Pelaez		REFID=50347
WANG	04B	EPJ C37 223	Z.-G. Wang *et al.*		REFID=50159
ACHASOV	03E	NP A728 425	N.N. Achasov		REFID=49612
ANISOVICH	03B	PAN 66 741	V.V. Anisovich, V.A. Nikonov, A.V. Sarantsev		REFID=49420
		Translated from YAF 66 772.			
ANISOVICH	03D	PAN 66 928	V.V. Anisovich, A.V. Sarantsev		REFID=49422
		Translated from YAF 66 960.			
BEDAIGA	03	PR D68 036001	I. Bedaiga, M. Nielsen		REFID=49582
BOGLIONE	03	EPJ C30 503	M. Boglione, M.R. Pennington		REFID=49584
CHEN	03	PR D67 094011	C.-H. Chen		REFID=49411
COLANGELO	03	PL B559 49	P. Colangelo, F. De Fazio		REFID=49398
PALOMAR	03	NP A729 743	J.E. Palomar *et al.*		REFID=49669
ACHASOV	02G	PL B534 83	N.N Achasov, A.V. Kiselev		REFID=48817
ANISOVICH	02C	PAN 65 497	A.V. Anisovich *et al.*		REFID=48830
		Translated from YAF 65 523.			
BLACK	02	PRL 88 181603	D. Black, M. Harada, J. Schechter		REFID=48834
CLOSE	02B	JPG 28 R249	F.E. Close, N. Tornqvist		REFID=49166
KAMINSKI	02	EPJ Direct C4 1	R. Kaminski, L. Lesniak, K. Rybicki		REFID=49179
KLEEFELD	02	PR D66 034007	F. Kleefeld *et al.*		REFID=48844
RUPP	02	PR D65 078501	G. Rupp, E. vanBeveren, M.D. Scadron		REFID=48851
SHAKIN	02	PR D65 078502	C.M. Shakin, H. Wang		REFID=48853
TESHIMA	02	JPG 28 1391	T. Teshima, I. Kitamura, N. Morisita		REFID=48854
VOLKOV	02	PAN 65 1657	M.K. Volkov, V.L. Yudichev		REFID=48855
		Translated from YAF 65 1701.			
ACHASOV	01F	PR D63 094007	N.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=48312
CLOSE	01	PL B515 13	F.E. Close, A. Kirk		REFID=48351
GOKALP	01	PR D64 053017	A. Gokalp, O. Yilmaz		REFID=48341
SUROVTSEV	01	PR D63 054024	Y.S. Surovtsev, D. Krupa, M. Nagy		REFID=48310
MARKUSHIN	00	EPJ A8 389	V.E. Markushin		REFID=47996
WANG	00A	PR D62 017503	Z. Wang		REFID=47995
ABREU	99J	PL B449 364	P. Abreu *et al.*	(DELPHI Collab.)	REFID=46917
ANISOVICH	99D	PL B452 180	A.V. Anisovich *et al.*		REFID=46901
Also	99F	NP A651 253	A.V. Anisovich *et al.*		REFID=46926
ANISOVICH	99H	PL B467 289	A.V. Anisovich, V.V. Anisovich		REFID=47399
BLACK	99	PR D59 074026	D. Black *et al.*		REFID=46898
DELBOURGO	99	PL B446 332	R. Delbourgo, D. Liu, M. Scadron		REFID=46607
MARCO	99	PL B470 20	E. Marco *et al.*		REFID=47415
MINKOWSKI	99	EPJ C9 283	P. Minkowski, W. Ochs		REFID=46928
ACHASOV	98G	JETPL 67 464	N.N. Achasov *et al.*		REFID=46322
ACHASOV	98J	SPU 41 1149	N.N. Achasov		REFID=46906
CHLIAPNIK...	98	PL B423 401	P.V. Chliapnikov, V.A. Uvarov		REFID=46359
PROKOSHKIN	97	SPD 42 117	Y.D. Prokoshkin *et al.*	(SERP)	REFID=45386
		Translated from DANS 353 323.			
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
BEVEREN	86	ZPHY C30 615	E. van Beveren *et al.*	(NIJM, BIEL)	REFID=45769
MENNESSIER	83	ZPHY C16 241	G. Mennessier	(MONP)	REFID=20393
BARBER	82	ZPHY C12 1	D.P. Barber *et al.*	(DARE, LANC, SHEF)	REFID=20389
ETKIN	82C	PR D25 2446	A. Etkin *et al.*	(BNL, CUNY, TUFTS, VAND)	REFID=20391
SRINIVASAN	75	PR D12 681	V. Srinivasan *et al.*	(NDAM, ANL)	REFID=21062
BIGI	62	CERN Conf. 247	A. Bigi *et al.*	(CERN)	REFID=20312
BINGHAM	62	CERN Conf. 240	H.H. Bingham *et al.*	(EPOL, CERN)	REFID=20313
ERWIN	62	PRL 9 34	A.R. Erwin *et al.*	(WISC, BNL)	REFID=20314
WANG	61	JETP 13 323	K.-C. Wang *et al.*	(JINR)	REFID=20311
		Translated from ZETF 40 464.			

NODE=M036

$a_0(980)$

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

See our minireview on scalar mesons under $f_0(600)$. (See the index for the page number.)

NODE=M036

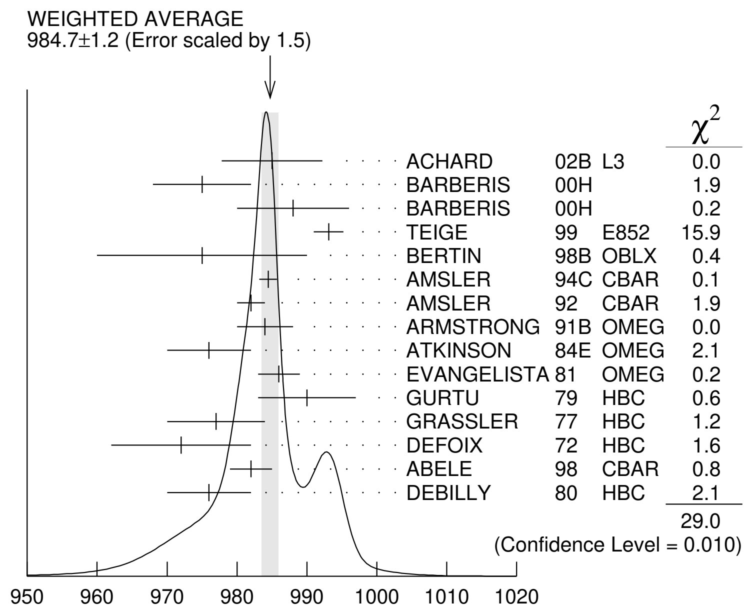
$a_0(980)$ MASS

NODE=M036205

NODE=M036MX

VALUE (MeV) — *DOCUMENT ID*

984.7±1.2 OUR AVERAGE Includes data from the 2 datablocks that follow this one. Error includes scale factor of 1.5. See the ideogram below.



$a_0(980)$ MASS

$\eta\pi$ FINAL STATE ONLY

NODE=M036M1

NODE=M036M1

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

985.1 ± 1.3 OUR AVERAGE Error includes scale factor of 1.5. See the ideogram below.

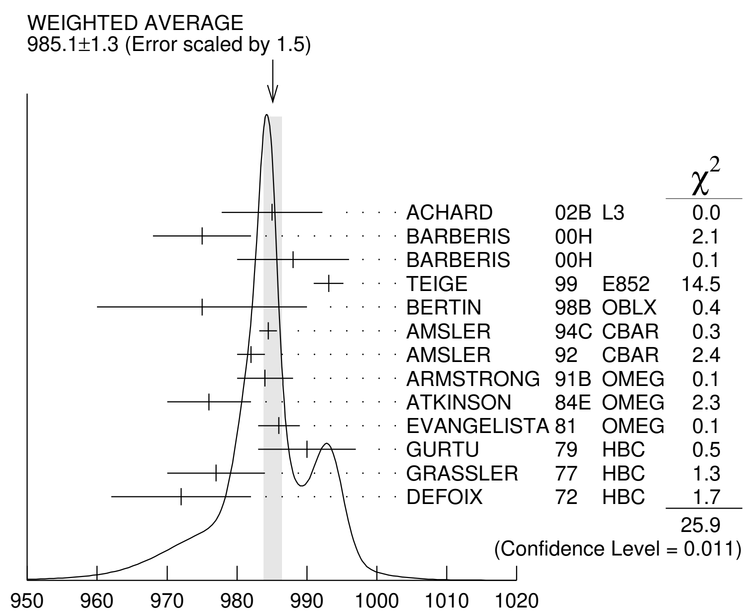
VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*CHG*	*COMMENT*
985 ± 4 ±6	318	ACHARD 02B	L3		183–209 $e^+e^- \to e^+e^-\eta\pi^+\pi^-$
975 ± 7		BARBERIS 00H			450 $pp \to p_f\eta\pi^0 p_s$
988 ± 8		BARBERIS 00H			450 $pp \to \Delta_f^{++}\eta\pi^- p_s$
993.1 ± 2.1		[1] TEIGE 99	E852		18.3 $\pi^- p \to \eta\pi^+\pi^- n$
975 ±15		BERTIN 98B	OBLX		0.0 $\overline{p}p \to K^\pm K_S \pi^\mp$
984.45± 1.23±0.34		AMSLER 94C	CBAR		0.0 $\overline{p}p \to \omega\eta\pi^0$
982 ± 2		[2] AMSLER 92	CBAR		0.0 $\overline{p}p \to \eta\eta\pi^0$
984 ± 4	1040	[2] ARMSTRONG 91B	OMEG	±	300 $pp \to pp\eta\pi^+\pi^-$
976 ± 6		ATKINSON 84E	OMEG	±	25–55 $\gamma p \to \eta\pi n$
986 ± 3	500	[3] EVANGELISTA 81	OMEG	±	12 $\pi^- p \to \eta\pi^+\pi^-\pi^- p$
990 ± 7	145	[3] GURTU 79	HBC	±	4.2 $K^- p \to \Lambda\eta 2\pi$
977 ± 7		GRASSLER 77	HBC	−	16 $\pi^\mp p \to p\eta 3\pi$
972 ±10	150	DEFOIX 72	HBC	±	0.7 $\overline{p}p \to 7\pi$

OCCUR=2

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

995	$^{+52}_{-10}$	36	[4] ACHASOV	00F	SND		$e^+e^- \to \eta\pi^0\gamma$
994	$^{+33}_{-\ 8}$	36	[5] ACHASOV	00F	SND		$e^+e^- \to \eta\pi^0\gamma$ OCCUR=2
∼ 1055			[6] OLLER	99	RVUE		$\eta\pi$, $K\overline{K}$
∼ 1009.2			[6] OLLER	99B	RVUE		$\pi\pi \to \pi\pi$, $K\overline{K}$
988	± 6		[6] ANISOVICH	98B	RVUE		Compilation
987			TORNQVIST	96	RVUE		$\pi\pi \to \pi\pi$, $K\overline{K}$, $K\pi$, $\eta\pi$
991			JANSSEN	95	RVUE		$\eta\pi \to \eta\pi$, $K\overline{K}$, $K\pi$, $\eta\pi$
980	±11	47	CONFORTO	78	OSPK	−	4.5 $\pi^- p \to pX^-$
978	±16	50	CORDEN	78	OMEG	±	12–15 $\pi^- p \to n\eta 2\pi$
989	± 4	70	WELLS	75	HBC	−	3.1–6 $K^- p \to \Lambda\eta 2\pi$ OCCUR=2
970	±15	20	BARNES	69C	HBC	−	4–5 $K^- p \to \Lambda\eta 2\pi$
980	±10		CAMPBELL	69	DBC	±	2.7 $\pi^+ d$
980	±10	15	MILLER	69B	HBC	−	4.5 $K^- N \to \eta\pi\Lambda$
980	±10	30	AMMAR	68	HBC	±	5.5 $K^- p \to \Lambda\eta 2\pi$

[1] 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
[2] From a single Breit-Wigner fit. NODE=M036M1;LINKAGE=A
[3] From $f_1(1285)$ decay. NODE=M036M1;LINKAGE=R
[4] Supersedes ACHASOV 98B. Using the model of ACHASOV 89. NODE=M036M1;LINKAGE=V1
[5] Supersedes ACHASOV 98B. Using the model of JAFFE 77. NODE=M036M1;LINKAGE=M2
[6] T-matrix pole. NODE=M036M1;LINKAGE=AN



$\eta\pi$ FINAL STATE ONLY

$K\overline{K}$ ONLY

NODE=M036M2
NODE=M036M2

VALUE (MeV)		*EVTS*	*DOCUMENT ID*	*TECN*	*CHG*	*COMMENT*
The data in this block is included in the average printed for a previous datablock.						
980.8±	**2.7 OUR AVERAGE**					
982	± 3		[7] ABELE	98	CBAR	0.0 $\overline{p}p \to K_L^0 K^\pm \pi^\mp$
976	± 6	316	DEBILLY	80	HBC ±	1.2–2 $\overline{p}p \to f_1(1285)\omega$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
∼ 1053			[8] OLLER	99C	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$
1016	±10	100	[9] ASTIER	67	HBC ±	0.0 $\overline{p}p$
1003.3	± 7.0	143	[10] ROSENFELD	65	RVUE ±	

[7] T-matrix pole on sheet II, the pole on sheet III is at 1006-i49 MeV. NODE=M036M2;LINKAGE=Q
[8] T-matrix pole. NODE=M036M2;LINKAGE=AN
[9] ASTIER 67 includes data of BARLOW 67, CONFORTO 67, ARMENTEROS 65. NODE=M036M2;LINKAGE=A
[10] Plus systematic errors. NODE=M036M2;LINKAGE=S

$a_0(980)$ WIDTH

NODE=M036210

NODE=M036W1

→ NOT CHECKED ←

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. • • •

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
50 ±13 ±4	318	ACHARD 02B	L3		183–209 $e^+e^- \rightarrow e^+e^-\eta\pi^+\pi^-$
72 ±16		BARBERIS 00H			450 $pp \rightarrow p_f\eta\pi^0 p_s$
61 ±19		BARBERIS 00H			450 $pp \rightarrow \Delta_f^{++}\eta\pi^- p_s$ (OCCUR=2)
∼ 42		[11] OLLER 99	RVUE		$\eta\pi$, $K\overline{K}$
∼ 112		[11] OLLER 99B	RVUE		$\pi\pi \rightarrow \eta\pi$, $K\overline{K}$
71 ± 7		TEIGE 99	E852		18.3 $\pi^- p \rightarrow \eta\pi^+\pi^- n$
92 ±20		[11] ANISOVICH 98B	RVUE		Compilation
65 ±10		BERTIN 98B	OBLX		0.0 $\overline{p}p \rightarrow K^\pm K_S \pi^\mp$
∼ 100		TORNQVIST 96	RVUE		$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$, $K\pi$, $\eta\pi$
202		JANSSEN 95	RVUE		$\eta\pi \rightarrow \eta\pi$, $K\overline{K}$, $K\pi$, $\eta\pi$
54.12± 0.34±0.12		AMSLER 94C	CBAR		0.0 $\overline{p}p \rightarrow \omega\eta\pi^0$
54 ±10		[12] AMSLER 92	CBAR		0.0 $\overline{p}p \rightarrow \eta\eta\pi^0$
95 ±14	1040	[12] ARMSTRONG 91B	OMEG	±	300 $pp \rightarrow pp\eta\pi^+\pi^-$
62 ±15	500	[13] EVANGELISTA 81	OMEG	±	12 $\pi^- p \rightarrow \eta\pi^+\pi^-\pi^- p$
60 ±20	145	[13] GURTU 79	HBC	±	4.2 $K^- p \rightarrow \Lambda\eta 2\pi$
60 $^{+50}_{-30}$	47	CONFORTO 78	OSPK	−	4.5 $\pi^- p \rightarrow pX^-$
86.0 $^{+60.0}_{-50.0}$	50	CORDEN 78	OMEG	±	12–15 $\pi^- p \rightarrow n\eta 2\pi$
44 ±22		GRASSLER 77	HBC	−	16 $\pi^\mp p \rightarrow p\eta 3\pi$
80 to 300		[14] FLATTE 76	RVUE	−	4.2 $K^- p \rightarrow \Lambda\eta 2\pi$
16.0 $^{+25.0}_{-16.0}$	70	WELLS 75	HBC	−	3.1–6 $K^- p \rightarrow \Lambda\eta 2\pi$
30 ± 5	150	DEFOIX 72	HBC	±	0.7 $\overline{p}p \rightarrow 7\pi$
40 ±15		CAMPBELL 69	DBC	±	2.7 $\pi^+ d$
60 ±30	15	MILLER 69B	HBC	−	4.5 $K^- N \rightarrow \eta\pi\Lambda$
80 ±30	30	AMMAR 68	HBC	±	5.5 $K^- p \rightarrow \Lambda\eta 2\pi$

[11] T-matrix pole. NODE=M036W1;LINKAGE=AN
[12] From a single Breit-Wigner fit. NODE=M036W1;LINKAGE=A
[13] From $f_1(1285)$ decay. NODE=M036W1;LINKAGE=R
[14] Using a two-channel resonance parametrization of GAY 76B data. NODE=M036W1;LINKAGE=F

$K\overline{K}$ ONLY

NODE=M036W2
NODE=M036W2

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
92± 8		[15] ABELE 98	CBAR		0.0 $\overline{p}p \rightarrow K_L^0 K^\pm \pi^\mp$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
∼ 24		[16] OLLER 99C	RVUE		$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$
∼ 25	100	[17] ASTIER 67	HBC	±	
57±13	143	[18] ROSENFELD 65	RVUE	±	

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

$a_0(980)$ DECAY MODES

NODE=M036215;NODE=M036

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\eta\pi$	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
NODE=M036W4

VALUE (keV)	DOCUMENT ID		TECN
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.30 ± 0.10	[19] AMSLER	98	RVUE

[19] Using $\Gamma_{\gamma\gamma}$B($a0(980) \to \eta\pi$) =0.24 ± 0.08 keV.

NODE=M036W4;LINKAGE=A

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

NODE=M036220

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

NODE=M036G1
NODE=M036G1

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
$0.24^{+0.08}_{-0.07}$ OUR AVERAGE					
$0.28\pm0.04\pm0.10$	44	OEST	90	JADE	$e^+e^- \to e^+e^-\pi^0\eta$
$0.19\pm0.07^{+0.10}_{-0.07}$		ANTREASYAN	86	CBAL	$e^+e^- \to e^+e^-\pi^0\eta$

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

NODE=M036G2
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
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	[20] BARGIOTTI	03	OBLX		$\overline{p}p$
0.23 ± 0.05	[21] ABELE	98	CBAR		0.0 $\overline{p}p \to K^0_L K^\pm\pi^\mp$
$0.166\pm0.01\pm0.02$	[22] BARBERIS	98C	OMEG		450 $pp \to p_f f_1(1285) p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
~ 0.60	OLLER	99B	RVUE		$\pi\pi \to \eta\pi$, $K\overline{K}$
1.16 ± 0.18	[23] BUGG	94	RVUE		$\overline{p}p \to \eta\eta\pi^0$
0.7 ± 0.3	[22] CORDEN	78	OMEG		12–15 $\pi^-p \to n\eta 2\pi$
0.25 ± 0.08	[22] 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
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	±	4.1,5.5 $K^-p \to \Lambda\eta 2\pi$

[20] Coupled channel analysis of $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, and $K^\pm K^0_S\pi^\mp$.

NODE=M036R;LINKAGE=BG

[21] Using $\pi^0\pi^0\eta$ from AMSLER 94D.

NODE=M036R2;LINKAGE=Q

[22] From the decay of $f_1(1285)$.

NODE=M036R2;LINKAGE=L

[23] BUGG 94 uses AMSLER 94C data. This is a ratio of couplings.

NODE=M036R2;LINKAGE=C2

a_0(980) REFERENCES

NODE=M036

BARGIOTTI	03	EPJ C26 371	M. Bargiotti *et al.*	(OBELIX Collab.)	REFID=49217
ACHARD	02B	PL B526 269	P. Achard *et al.*	(L3 Collab.)	REFID=48574
ACHASOV	00F	PL B479 53	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=47928
BARBERIS	00H	PL B488 225	D. Barberis *et al.*	(WA 102 Collab.)	REFID=47964
OLLER	99	PR D60 099906 (erratum)	J.A. Oller *et al.*		REFID=46899
OLLER	99B	NP A652 407 (erratum)	J.A. Oller, E. Oset		REFID=46924
OLLER	99C	PR D60 074023	J.A. Oller, E. Oset		REFID=47386
TEIGE	99	PR D59 012001	S. Teige *et al.*	(BNL E852 Collab.)	REFID=46613
ABELE	98	PR D57 3860	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=45863
ACHASOV	98B	PL B438 441	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=46317
AMSLER	98	RMP 70 1293	C. Amsler		REFID=46601
ANISOVICH	98B	UFN 41 419	V.V. Anisovich *et al.*		REFID=46331
BARBERIS	98C	PL B440 225	D. Barberis *et al.*	(WA 102 Collab.)	REFID=46346
BERTIN	98B	PL B434 180	A. Bertin *et al.*	(OBELIX Collab.)	REFID=46351
TORNQVIST	96	PRL 76 1575	N.A. Tornqvist, M. Roos	(HELS)	REFID=44507
JANSSEN	95	PR D52 2690	G. Janssen *et al.*	(STON, ADLD, JULI)	REFID=44508
AMSLER	94C	PL B327 425	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=44091
AMSLER	94D	PL B333 277	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=44093
BUGG	94	PR D50 4412	D.V. Bugg *et al.*	(LOQM)	REFID=44078
AMSLER	92	PL B291 347	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=43169
ARMSTRONG	91B	ZPHY C52 389	T.A. Armstrong *et al.*	(ATHU, BARI, BIRM+)	REFID=41862
OEST	90	ZPHY C47 343	T. Oest *et al.*	(JADE Collab.)	REFID=41358
ACHASOV	89	NP B315 465	N.N. Achasov, V.N. Ivanchenko		REFID=48021
VOROBYEV	88	SJNP 48 273	P.V. Vorobiev *et al.*	(NOVO)	REFID=41023
		Translated from YAF 48 436.			
ANTREASYAN	86	PR D33 1847	D. Antreasyan *et al.*	(Crystal Ball Collab.)	REFID=20469
ATKINSON	84E	PL 138B 459	M. Atkinson *et al.*	(BONN, CERN, GLAS+)	REFID=20624
EVANGELISTA	81	NP B178 197	C. Evangelista *et al.*	(BARI, BONN, CERN+)	REFID=20462
DEBILLY	80	NP B176 1	L. de Billy *et al.*	(CURIN, LAUS, NEUC+)	REFID=20461
GURTU	79	NP B151 181	A. Gurtu *et al.*	(CERN, ZEEM, NIJM, OXF)	REFID=20456
CONFORTO	78	LNC 23 419	B. Conforto *et al.*	(RHEL, TNTO, CHIC+)	REFID=20451
CORDEN	78	NP B144 253	M.J. Corden *et al.*	(BIRM, RHEL, TELA+)	REFID=20452
GRASSLER	77	NP B121 189	H. Grassler *et al.*	(AACH3, BERL, BONN+)	REFID=20447
JAFFE	77	PR D15 267,281	R. Jaffe	(MIT)	REFID=43673
FLATTE	76	PL 63B 224	S.M. Flatte	(CERN)	REFID=20446
GAY	76B	PL 63B 220	J.B. Gay *et al.*	(CERN, AMST, NIJM) JP	REFID=20445
WELLS	75	NP B101 333	J. Wells *et al.*	(OXF)	REFID=20444
DEFOIX	72	NP B44 125	C. Defoix *et al.*	(CDEF, CERN)	REFID=20435
AMMAR	70	PR D2 430	R. Ammar *et al.*	(KANS, NWES, ANL, WISC)	REFID=20428
BARNES	69C	PRL 23 610	V.E. Barnes *et al.*	(BNL, SYRA)	REFID=20418
CAMPBELL	69	PRL 22 1204	J.H. Campbell *et al.*	(PURD)	REFID=20419
MILLER	69B	PL 29B 255	D.H. Miller *et al.*	(PURD)	REFID=20424
Also	69	PR 188 2011	W.L. Yen *et al.*	(PURD)	REFID=20425
AMMAR	68	PRL 21 1832	R. Ammar *et al.*	(NWES, ANL)	REFID=20412
ASTIER	67	PL 25B 294	A. Astier *et al.*	(CDEF, CERN, IRAD)	REFID=20405
Includes data of BARLOW 67, CONFORTO 67, and ARMENTEROS 65.					
BARLOW	67	NC 50A 701	J. Barlow *et al.*	(CERN, CDEF, IRAD, LIVP)	REFID=20041
CONFORTO	67	NP B3 469	G. Conforto *et al.*	(CERN, CDEF, IPNP+)	REFID=20411
ARMENTEROS	65	PL 17 344	R. Armenteros *et al.*	(CERN, CDEF)	REFID=20396
ROSENFELD	65	Oxford Conf. 58	A.H. Rosenfeld	(LRL)	REFID=20399

OTHER RELATED PAPERS

AUBERT,B	05J	PR D72 052008	B. Aubert *et al.*	(BABAR Collab.)	REFID=50824
BRITO	05	PL B608 69	T.V. Brito *et al.*		REFID=50456
TESHIMA	05	NP A759 131	T. Teshima, I. Kitamura, N. Morisita		REFID=50815
BARU	04	PL B586 53	V. Baru *et al.*		REFID=49757
PELAEZ	04	PRL 92 102001	J.R. Pelaez		REFID=49777
PELAEZ	04A	MPL A19 2879	J.R. Pelaez		REFID=50347
WANG	04B	EPJ C37 223	Z.-G. Wang *et al.*		REFID=50159
ACHASOV	03B	PR D68 014006	N.N. Achsaov, A.V. Kiselev		REFID=49476
ACHASOV	03E	NP A728 425	N.N. Achasov		REFID=49612
PALOMAR	03	NP A729 743	J.E. Palomar *et al.*		REFID=49669
ACHASOV	02G	PL B534 83	N.N Achasov, A.V. Kiselev		REFID=48817
BLACK	02	PRL 88 181603	D. Black, M. Harada, J. Schechter		REFID=48834
BOGLIONE	02	PR D65 114010	M. Boglione, M.R. Pennington		REFID=48835
CLOSE	02B	JPG 28 R249	F.E. Close, N. Tornqvist		REFID=49166
FURMAN	02	PL B538 266	A. Furman, L. Lesniak		REFID=48840
ACHASOV	01F	PR D63 094007	N.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=48312
CLOSE	01	PL B515 13	F.E. Close, A. Kirk		REFID=48351
ANISOVICH	99D	PL B452 180	A.V. Anisovich *et al.*		REFID=46901
Also	99F	NP A651 253	A.V. Anisovich *et al.*		REFID=46926
MARCO	99	PL B470 20	E. Marco *et al.*		REFID=47415
ACHASOV	98J	SPU 41 1149	N.N. Achasov		REFID=46906
TORNQVIST	90	NPBPS 21 196	N.A. Tornqvist	(HELS)	REFID=41655
WEINSTEIN	90	PR D41 2236	J. Weinstein, N. Isgur	(TNTO)	REFID=43674
ACHASOV	88B	ZPHY C41 309	N.N. Achasov, G.N. Shestakov	(NOVM)	REFID=40591
BEVEREN	86	ZPHY C30 615	E. van Beveren *et al.*	(NIJM, BIEL)	REFID=45769
TORNQVIST	82	PRL 49 624	N.A. Tornqvist	(HELS)	REFID=20392
BRAMON	80	PL 93B 65	A. Bramon, E. Masso	(BARC)	REFID=20460
TURKOT	63	Siena Conf. 1 661	F. Turkot *et al.*	(BNL, PITT)	REFID=20395

NODE=M004

$\phi(1020)$

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

ϕ(1020) MASS

NODE=M004205

We average mass and width values only when the systematic errors have been evaluated.

NODE=M004205

NODE=M004M

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
1019.460±0.019 OUR AVERAGE				
1019.52 ±0.05 ±0.05	17400	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. • • •				
1019.63 ±0.07	12540	[6] 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	[6] ATKINSON 86	OMEG	20–70 γp
1019.7 ±1.0		BEBEK 86	CLEO	$e^+e^- \to \Upsilon(4S)$
1019.411±0.008	642k	[7] DIJKSTRA 86	SPEC	100–200 $\pi^\pm$, $\overline{p}$, p, $K^\pm$, on Be
1020.9 ±0.2		[6] FRAME 86	OMEG	13 $K^+p \to \phi K^+p$
1021.0 ±0.2		[6] ARMSTRONG 83B	OMEG	18.5 $K^-p \to K^-K^+\Lambda$
1020.0 ±0.5		[6] ARMSTRONG 83B	OMEG	18.5 $K^-p \to K^-K^+\Lambda$
1019.7 ±0.3		[6] 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	[6] BALDI 77	CNTR	10 $\pi^-p \to \pi^-\phi p$
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	[8] AGUILAR-... 72B	HBC	3.9,4.6 $K^-p \to \Lambda K^+K^-$
1019.9 ±0.5	100	[8] AGUILAR-... 72B	HBC	3.9,4.6 $K^-p \to K^-pK^+K^-$
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 $K^-p \to \Sigma/\Lambda K\overline{K}$

OCCUR=2 (ARMSTRONG 83B, 1020.0)

OCCUR=2 (BALDI 77)

OCCUR=2 (AGUILAR-... 72B, 1019.9)

[1] Update of AKHMETSHIN 01D

NODE=M004M;LINKAGE=GS

[2] 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=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] Systematic errors not evaluated. NODE=M004M;LINKAGE=A
[7] Weighted and scaled average of 12 measurements of DIJKSTRA 86. NODE=M004M;LINKAGE=B
[8] Mass errors enlarged by us to $\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M004M;LINKAGE=D

ϕ(1020) WIDTH

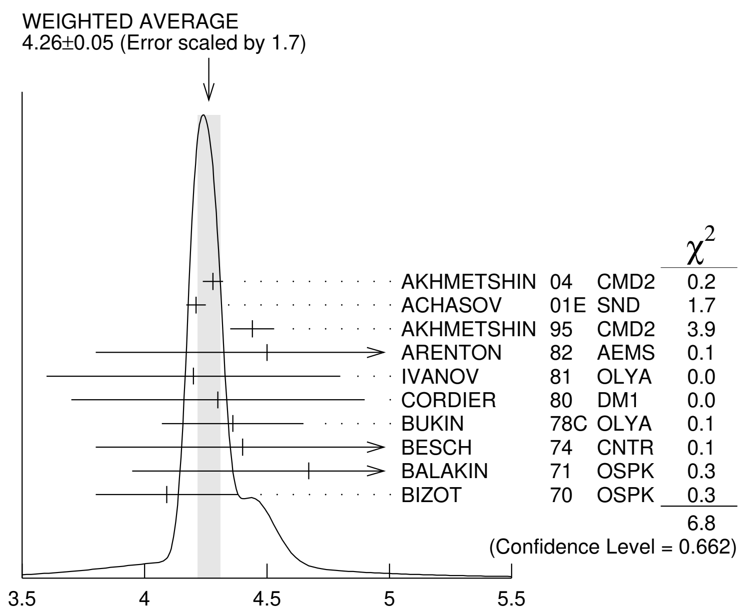
NODE=M004210

We average mass and width values only when the systematic errors have been evaluated.

NODE=M004210

NODE=M004W

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
4.26 ±0.05 OUR AVERAGE		Error includes scale factor of 1.7. See the ideogram below.			
4.280±0.033±0.025	272k	[9] AKHMETSHIN	04	CMD2	$e^+e^- \rightarrow K^0_L K^0_S$
4.21 ±0.04	1900k	[10] ACHASOV	01E	SND	$e^+e^- \rightarrow K^+K^-$, $K_S K_L$, $\pi^+\pi^-\pi^0$
4.44 ±0.09	55600	AKHMETSHIN	95	CMD2	$e^+e^- \rightarrow$ hadrons
4.5 ±0.7	1500	ARENTON	82	AEMS	11.8 polar. $pp \rightarrow KK$
4.2 ±0.6	766	[11] IVANOV	81	OLYA	1–1.4 $e^+e^- \rightarrow K^+K^-$
4.3 ±0.6		[11] CORDIER	80	DM1	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
4.36 ±0.29	3681	[11] BUKIN	78C	OLYA	$e^+e^- \rightarrow$ hadrons
4.4 ±0.6	984	[11] BESCH	74	CNTR	2 $\gamma p \rightarrow pK^+K^-$
4.67 ±0.72	681	[11] BALAKIN	71	OSPK	$e^+e^- \rightarrow$ hadrons
4.09 ±0.29		BIZOT	70	OSPK	$e^+e^- \rightarrow$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
4.28 ±0.13	12540	[12] AUBERT,B	05J	BABR	$D^0 \rightarrow \overline{K}^0 K^+K^-$
4.45 ±0.06	271k	DIJKSTRA	86	SPEC	100 π^- Be
3.6 ±0.8	337	[11] COOPER	78B	HBC	0.7–0.8 $\overline{p}p \rightarrow K^0_S K^0_L \pi^+\pi^-$
4.5 ±0.50	1300	[11,12] AKERLOF	77	SPEC	400 pA $\rightarrow K^+K^-$X
4.5 ±0.8	500	[11,12] AYRES	74	ASPK	3–6 $\pi^-p \rightarrow K^+K^-n$, $K^-p \rightarrow K^+K^-\Lambda/\Sigma^0$
3.81 ±0.37		COSME	74B	OSPK	$e^+e^- \rightarrow K^0_L K^0_S$
3.8 ±0.7	454	[11] BORENSTEIN	72	HBC	2.18 $K^-p \rightarrow K\overline{K}n$



ϕ(1020) width (MeV)

[9] Update of AKHMETSHIN 01D NODE=M004W;LINKAGE=GS
[10] 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
[11] Width errors enlarged by us to $4\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M004W;LINKAGE=D
[12] Systematic errors not evaluated. NODE=M004W;LINKAGE=A

$\phi(1020)$ DECAY MODES

NODE=M004215;NODE=M004

	Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	
Γ_1	K^+K^-	(49.2 ± 0.6) %	S=1.2	DESIG=1
Γ_2	$K^0_L K^0_S$	(34.0 ± 0.5) %	S=1.1	DESIG=2
Γ_3	$\rho\pi + \pi^+\pi^-\pi^0$	(15.3 ± 0.4) %	S=1.2	DESIG=24
Γ_4	$\rho\pi$			DESIG=16
Γ_5	$\pi^+\pi^-\pi^0$			DESIG=3
Γ_6	$\eta\gamma$	(1.301 ± 0.024) %	S=1.1	DESIG=4
Γ_7	$\pi^0\gamma$	$(1.25 \pm 0.07) \times 10^{-3}$		DESIG=7
Γ_8	$\ell^+\ell^-$			DESIG=256
Γ_9	e^+e^-	$(2.97 \pm 0.04) \times 10^{-4}$	S=1.1	DESIG=5
Γ_{10}	$\mu^+\mu^-$	$(2.86 \pm 0.19) \times 10^{-4}$		DESIG=6
Γ_{11}	ηe^+e^-	$(1.15 \pm 0.10) \times 10^{-4}$		DESIG=17
Γ_{12}	$\pi^+\pi^-$	$(7.3 \pm 1.3) \times 10^{-5}$		DESIG=8
Γ_{13}	$\omega\pi^0$	$(5.2 {}^{+1.3}_{-1.1}) \times 10^{-5}$		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}	$f_0(980)\gamma$	$(4.40 \pm 0.21) \times 10^{-4}$		DESIG=20
Γ_{18}	$\pi^0\pi^0\gamma$	$(1.09 \pm 0.06) \times 10^{-4}$		DESIG=19
Γ_{19}	$\pi^+\pi^-\pi^+\pi^-$	$(3.9 {}^{+2.8}_{-2.2}) \times 10^{-6}$		DESIG=15
Γ_{20}	$\pi^+\pi^+\pi^-\pi^-\pi^0$	$< 4.6 \times 10^{-6}$	CL=90%	DESIG=14
Γ_{21}	$\pi^0 e^+e^-$	$(1.12 \pm 0.28) \times 10^{-5}$		DESIG=21
Γ_{22}	$\pi^0\eta\gamma$	$(8.3 \pm 0.5) \times 10^{-5}$		DESIG=22
Γ_{23}	$a_0(980)\gamma$	$(7.6 \pm 0.6) \times 10^{-5}$		DESIG=23
Γ_{24}	$\eta'(958)\gamma$	$(6.2 \pm 0.7) \times 10^{-5}$	S=1.1	DESIG=194
Γ_{25}	$\eta\pi^0\pi^0\gamma$	$< 2 \times 10^{-5}$	CL=90%	DESIG=195
Γ_{26}	$\mu^+\mu^-\gamma$	$(1.4 \pm 0.5) \times 10^{-5}$		DESIG=196
Γ_{27}	$\rho\gamma\gamma$	$< 5 \times 10^{-4}$	CL=90%	DESIG=250
Γ_{28}	$\eta\pi^+\pi^-$	$< 1.8 \times 10^{-5}$	CL=90%	DESIG=255
Γ_{29}	$\eta\mu^+\mu^-$	$< 9.4 \times 10^{-6}$	CL=90%	DESIG=26

CONSTRAINED FIT INFORMATION

An overall fit to 25 branching ratios uses 70 measurements and one constraint to determine 12 parameters. The overall fit has a $\chi^2 = 58.1$ for 59 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_1	x_2	x_3	x_6	x_7	x_9	x_{10}	x_{12}	x_{17}	x_{19}
x_2	−75									
x_3	−62	−5								
x_6	−30	25	9							
x_7	−13	12	4	12						
x_9	55	−51	−20	−51	−23					
x_{10}	−8	7	3	7	3	−15				
x_{12}	−4	4	1	4	2	−7	1			
x_{17}	0	0	0	0	0	0	0	0		
x_{19}	−1	1	0	1	0	−2	0	0	0	
x_{23}	0	0	0	0	0	0	0	0	0	0
x_{24}	−5	4	2	17	2	−9	1	1	0	0

	x_{23}
x_{24}	0

$\phi(1020)$ PARTIAL WIDTHS

NODE=M004218

$\Gamma(\eta\gamma)$ Γ_6

NODE=M004W6
NODE=M004W6

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

$\Gamma(\pi^0\gamma)$ Γ_7

NODE=M004W7
NODE=M004W7

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$5.40 \pm 0.16 ^{+0.43}_{-0.40}$	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. • • •				
$1.320 \pm 0.017 \pm 0.015$	[13] AMBROSINO	05	KLOE	$1.02\ e^+e^- \to \mu^+\mu^-$

$\Gamma(e^+e^-)$ Γ_9

NODE=M004W8
NODE=M004W8
→ NOT CHECKED ←

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
1.27±0.04 OUR EVALUATION					
1.32±0.05±0.03		[14] AMBROSINO	05	KLOE	$1.02\ e^+e^- \to e^+e^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.27 ± 0.03	272k	[15] AKHMETSHIN	04	CMD2	$e^+e^- \to K^0_L K^0_S$

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

NODE=M004W9
NODE=M004W9

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
1.320±0.018±0.017	AMBROSINO	05	KLOE	$1.02\ e^+e^- \to \mu^+\mu^-$

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

NODE=M004W5;LINKAGE=AM

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

NODE=M004W8;LINKAGE=AM

[15] Using B($\phi \to K^0_L K^0_S$) = 0.337 ± 0.005 and $\Gamma_{\text{total}} = 4.26 \pm 0.05$ MeV. Update of AKHMETSHIN 99D.

NODE=M004W8;LINKAGE=KG

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

NODE=M004224

$\Gamma(e^+e^-) \times \Gamma(K^+K^-)/\Gamma^2_{\text{total}}$ $\Gamma_9\Gamma_1/\Gamma^2$

NODE=M004G10
NODE=M004G10

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
14.60±0.33 OUR FIT	Error includes scale factor of 1.2.				
13.93±0.14±0.99	1000k	[16] ACHASOV	01E	SND	$e^+e^- \to K^+K^-$, $K_S K_L$, $\pi^+\pi^-\pi^0$

$\Gamma(e^+e^-) \times \Gamma(K^0_L K^0_S)/\Gamma^2_{\text{total}}$ $\Gamma_9\Gamma_2/\Gamma^2$

NODE=M004G6
NODE=M004G6

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
10.11±0.13 OUR FIT					
10.06±0.16 OUR AVERAGE					
$10.01 \pm 0.04 \pm 0.17$	272k	[17] AKHMETSHIN	04	CMD2	$e^+e^- \to K^0_L K^0_S$
$10.27 \pm 0.07 \pm 0.34$	500k	[16] ACHASOV	01E	SND	$e^+e^- \to K^+K^-$, $K_S K_L$, $\pi^+\pi^-\pi^0$

$\Gamma(e^+e^-) \times [\Gamma(\rho\pi) + \Gamma(\pi^+\pi^-\pi^0)]/\Gamma^2_{\text{total}}$ $\Gamma_9\Gamma_3/\Gamma^2$

NODE=M004G7
NODE=M004G7

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
4.53 ±0.12 OUR FIT	Error includes scale factor of 1.1.				
4.43 ±0.15 OUR AVERAGE					
$4.30 \pm 0.08 \pm 0.21$		AUBERT,B	04N	BABR	$10.6\ e^+e^- \to \pi^+\pi^-\pi^0\gamma$
$4.665 \pm 0.042 \pm 0.261$	400k	[16] ACHASOV	01E	SND	$e^+e^- \to K^+K^-$, $K_S K_L$, $\pi^+\pi^-\pi^0$
$4.35 \pm 0.27 \pm 0.08$	11169	[18] AKHMETSHIN	98	CMD2	$e^+e^- \to \pi^+\pi^-\pi^0$

$\Gamma(e^+e^-) \times \Gamma(\eta\gamma)/\Gamma^2_{total}$ $\Gamma_9\Gamma_6/\Gamma^2$

NODE=M004G2

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
3.86 ±0.06 OUR FIT Error includes scale factor of 1.1.				
3.90 ±0.07 OUR AVERAGE Error includes scale factor of 1.2.				
$4.093^{+0.040}_{-0.043}\pm0.247$	17400	[19] AKHMETSHIN 05	CMD2	0.60-1.38 $e^+e^- \to \eta\gamma$
$3.850\pm0.041\pm0.159$	23k	[20,21] AKHMETSHIN 01B	CMD2	$e^+e^- \to \eta\gamma$
$4.00 \pm0.04 \pm0.11$		[22] ACHASOV 00	SND	$e^+e^- \to \eta\gamma$
$3.765\pm0.092\pm0.143$		[23] ACHASOV 00B	SND	$e^+e^- \to \eta\gamma$
$4.017\pm0.035\pm0.124$	23k	[24] ACHASOV 00D	SND	$e^+e^- \to \eta\gamma$
$3.53 \pm0.08 \pm0.17$	2200	[23,25] AKHMETSHIN 99F	CMD2	$e^+e^- \to \eta\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$3.848\pm0.036\pm0.070$		[26] ACHASOV 00B	SND	$e^+e^- \to \eta\gamma$

OCCUR=2

$\Gamma(e^+e^-) \times \Gamma(\pi^0\gamma)/\Gamma^2_{total}$ $\Gamma_9\Gamma_7/\Gamma^2$

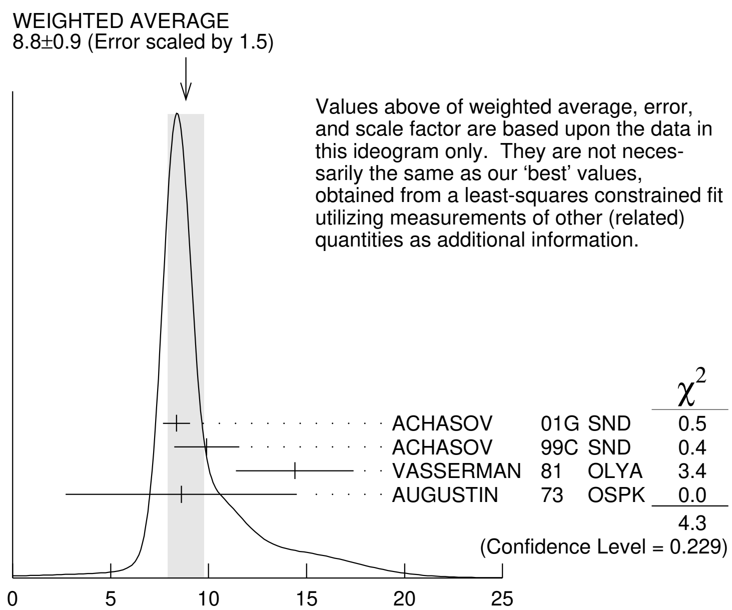
NODE=M004G3

VALUE (units 10^{-7})	EVTS	DOCUMENT ID	TECN	COMMENT
3.71±0.21 OUR FIT				
3.71±0.21 OUR AVERAGE				
$3.75\pm0.11\pm0.29$	18680	AKHMETSHIN 05	CMD2	0.60-1.38 $e^+e^- \to \pi^0\gamma$
$3.67\pm0.10^{+0.27}_{-0.25}$		[27] ACHASOV 00	SND	$e^+e^- \to \pi^0\gamma$

$\Gamma(e^+e^-) \times \Gamma(\mu^+\mu^-)/\Gamma^2_{total}$ $\Gamma_9\Gamma_{10}/\Gamma^2$

NODE=M004G5

VALUE (units 10^{-8})	DOCUMENT ID	TECN	COMMENT
8.5 ±0.6 OUR FIT			
8.8 ±0.9 OUR AVERAGE Error includes scale factor of 1.5. See the ideogram below.			
$8.36\pm0.59\pm0.37$	ACHASOV 01G	SND	$e^+e^- \to \mu^+\mu^-$
$9.9 \pm1.4 \pm0.9$	[25] ACHASOV 99C	SND	$e^+e^- \to \mu^+\mu^-$
14.4 ± 3.0	[18] VASSERMAN 81	OLYA	$e^+e^- \to \mu^+\mu^-$
8.6 ± 5.9	[18] AUGUSTIN 73	OSPK	$e^+e^- \to \mu^+\mu^-$



$\Gamma(e^+e^-) \times \Gamma(\mu^+\mu^-)/\Gamma^2_{total}$ $\Gamma_9\Gamma_{10}/\Gamma^2$

$\Gamma(e^+e^-) \times \Gamma(\pi^+\pi^-)/\Gamma^2_{total}$ $\Gamma_9\Gamma_{12}/\Gamma^2$

NODE=M004G4

VALUE (units 10^{-8})	DOCUMENT ID	TECN	COMMENT
2.2 ±0.4 OUR FIT			
2.2 ±0.4 OUR AVERAGE			
$2.1 \pm0.3 \pm0.3$	[25] ACHASOV 00C	SND	$e^+e^- \to \pi^+\pi^-$
$1.95^{+1.15}_{-0.87}$	[18] GOLUBEV 86	ND	$e^+e^- \to \pi^+\pi^-$
$6.01^{+3.19}_{-2.51}$	[18] VASSERMAN 81	OLYA	$e^+e^- \to \pi^+\pi^-$

$\Gamma(e^+e^-) \times \Gamma(\pi^+\pi^-\pi^+\pi^-)/\Gamma^2_{total}$ — $\Gamma_9\Gamma_{19}/\Gamma^2$

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	[25] AKHMETSHIN 00E	CMD2	$e^+e^- \to \pi^+\pi^-\pi^+\pi^-$

[16] 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

[17] Update of AKHMETSHIN 01D NODE=M004G;LINKAGE=GS

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

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

[20] From the $\eta \to 3\pi^0$ decay and using B($\eta \to 3\pi^0$)= (32.24 ± 0.29) × 10^{-2}. NODE=M004G;LINKAGE=AK

[21] 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

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

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

[24] From the $\eta \to 3\pi^0$ decay and using B($\eta \to 3\pi^0$) = (32.2 ± 0.4) × 10^{-2}. NODE=M004G;LINKAGE=9A

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

[26] Using various decay modes of the η from ACHASOV 98F, ACHASOV 00, and ACHASOV 00B. NODE=M004G2;LINKAGE=B

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

$\phi(1020)$ BRANCHING RATIOS

NODE=M004220

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

NODE=M004R1
NODE=M004R1

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.492±0.006 OUR FIT Error includes scale factor of 1.2.				
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. • • •				
0.476±0.017	1000k	[28] 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
0.340±0.005 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. • • •				
0.351±0.013	500k	[28] 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 $K^-p \to \Lambda K^0_L K^0_S$

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

NODE=M004R3
NODE=M004R3

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.153±0.004 OUR FIT Error includes scale factor of 1.2.				
0.151±0.009 OUR AVERAGE Error includes scale factor of 1.7.				
0.161±0.008	11761	AKHMETSHIN 95	CMD2	$e^+e^- \to \pi^+\pi^-\pi^0$
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. • • •				
0.159±0.008	400k	[28] ACHASOV 01E	SND	$e^+e^- \to K^+K^-$, $K_S K_L$, $\pi^+\pi^-\pi^0$
0.145±0.009±0.003	11169	[29] AKHMETSHIN 98	CMD2	$e^+e^- \to \pi^+\pi^-\pi^0$
0.139±0.007		[30] PARROUR 76B	OSPK	e^+e^-

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

NODE=M004R5

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.409±0.006 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 $K^- p \to \Lambda K \overline{K}$

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

NODE=M004R6

VALUE	DOCUMENT ID		TECN	COMMENT
0.184±0.006 OUR FIT Error includes scale factor of 1.2.				
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
0.449±0.013 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	$e^+ e^- \to \pi^+ \pi^- \pi^0$

$\Gamma(\eta\gamma)/\Gamma(\pi^0\gamma)$ Γ_6/Γ_7

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	$e^+ e^- \to \eta\gamma$, $\pi^0\gamma$

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

NODE=M004R10

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
2.86±0.19 OUR FIT				
2.5 ±0.4 OUR AVERAGE				
2.69±0.46	[31] HAYES	71	CNTR	8.3,9.8 $\gamma C \to \mu^+ \mu^- X$
2.17±0.60	[31] 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	[32] ACHASOV	01G	SND	$e^+ e^- \to \mu^+ \mu^-$
3.30±0.45±0.32	[29] ACHASOV	99C	SND	$e^+ e^- \to \mu^+ \mu^-$
4.83±1.02	[33] VASSERMAN	81	OLYA	$e^+ e^- \to \mu^+ \mu^-$
2.87±1.98	[33] AUGUSTIN	73	OSPK	$e^+ e^- \to \mu^+ \mu^-$

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

NODE=M004R11

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT	
1.301±0.024 OUR FIT Error includes scale factor of 1.1.						
1.26 ±0.04 OUR AVERAGE						
1.246±0.025±0.057	10k	[34] ACHASOV	98F	SND	$e^+ e^- \to 7\gamma$	
1.18 ±0.11	279	[35] AKHMETSHIN	95	CMD2	$e^+ e^- \to \pi^+ \pi^- 3\gamma$	
1.30 ±0.06		[36] DRUZHININ	84	ND	$e^+ e^- \to 3\gamma$	
1.4 ±0.2		[37] DRUZHININ	84	ND	$e^+ e^- \to 6\gamma$	OCCUR=2
0.88 ±0.20	290	KURDADZE	83C	OLYA	$e^+ e^- \to 3\gamma$	
1.35 ±0.29		ANDREWS	77	CNTR	6.7–10 γCu	
1.5 ±0.4	54	[36] COSME	76	OSPK	$e^+ e^-$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1.373±0.014±0.085	17400	[38,39] AKHMETSHIN	05	CMD2	0.60-1.38 $e^+ e^- \to \eta\gamma$	
1.287±0.013±0.063		[40,41] AKHMETSHIN	01B	CMD2	$e^+ e^- \to \eta\gamma$	
1.338±0.012±0.052		[42] ACHASOV	00	SND	$e^+ e^- \to \eta\gamma$	
1.287±0.012±0.042		[43] ACHASOV	00B	SND	$e^+ e^- \to \eta\gamma$	
1.259±0.030±0.059		[44] ACHASOV	00B	SND	$e^+ e^- \to \eta\gamma$	OCCUR=2
1.343±0.012±0.055	23k	[34] ACHASOV	00D	SND	$e^+ e^- \to \eta\gamma$	
1.18 ±0.03 ±0.06	2200	[45] AKHMETSHIN	99F	CMD2	$e^+ e^- \to \eta\gamma$	
1.21 ±0.07		[46] BENAYOUN	96	RVUE	0.54-1.04 $e^+ e^- \to \eta\gamma$	

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

NODE=M004R12
NODE=M004R12

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
0.41±0.12±0.04		30175	[47] AKHMETSHIN 99B	CMD2	$e^+e^- \to \pi^+\pi^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 0.3	90		[48] 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

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

NODE=M004R14
NODE=M004R14

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.05	84	LINDSEY 66	HBC	2.1–2.7 $K^-p \to \Lambda\pi^+\pi^-$ neutrals

$\Gamma(\rho\gamma)/\Gamma_{total}$ — Γ_{15}/Γ

NODE=M004R15
NODE=M004R15

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT
< 0.12	90	[49] 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

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

NODE=M004R16
NODE=M004R16

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
2.97±0.04 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	[50] 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		[51] 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^-

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

NODE=M004R17
NODE=M004R17

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
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	[52,53] AKHMETSHIN 05	CMD2	0.60-1.38 $e^+e^- \to \pi^0\gamma$
$1.226\pm0.036^{+0.096}_{-0.089}$		[54] ACHASOV 00	SND	$e^+e^- \to \pi^0\gamma$
1.26 ±0.17		[46] BENAYOUN 96	RVUE	0.54-1.04 $e^+e^- \to \pi^0\gamma$

$\Gamma(\pi^+\pi^-)/\Gamma_{total}$ — 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		[29] ACHASOV 00C	SND	$e^+e^- \to \pi^+\pi^-$
$0.65^{+0.38}_{-0.29}$		[29] GOLUBEV 86	ND	$e^+e^- \to \pi^+\pi^-$
$2.01^{+1.07}_{-0.84}$		[29] VASSERMAN 81	OLYA	$e^+e^- \to \pi^+\pi^-$
<6.6	95	BUKIN 78B	OLYA	$e^+e^- \to \pi^+\pi^-$
<2.7	95	ALVENSLEB... 72	CNTR	6.7 γC $\to$ C$\pi^+\pi^-$

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

NODE=M004R28
NODE=M004R28

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT	
$5.2^{+1.3}_{-1.1}$	[55,56] AULCHENKO	00A	SND	$e^+e^- \rightarrow \pi^+\pi^-\pi^0\pi^0$	OCCUR=2
• • • We do not use the following data for averages, fits, limits, etc. • • •					
~ 5.4	[57] ACHASOV	00E	SND	$e^+e^- \rightarrow \pi^0\pi^0\gamma$	
$5.5^{+1.6}_{-1.4}\pm0.3$	[56,58] AULCHENKO	00A	SND	$e^+e^- \rightarrow \pi^+\pi^-\pi^0\pi^0$	
$4.8^{+1.9}_{-1.7}\pm0.8$	[57] ACHASOV	99	SND	$e^+e^- \rightarrow \pi^+\pi^-\pi^0\pi^0$	

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

NODE=M004R19
NODE=M004R19

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.692±0.017 OUR FIT	Error includes scale factor of 1.1.				
0.740±0.031 OUR AVERAGE					
0.70 ±0.06	2732	BUKIN	78C	OLYA	$e^+e^- \rightarrow K^0_L K^0_S$
0.82 ±0.08		LOSTY	78	HBC	4.2 $K^-p \rightarrow \phi$ hyperon
0.71 ±0.05		LAVEN	77	HBC	10 $K^-p \rightarrow K^+K^-\Lambda$
0.71 ±0.08		LYONS	77	HBC	3–4 $K^-p \rightarrow \Lambda\phi$
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		[59] AKHMETSHIN	95	CMD2	$e^+e^- \rightarrow K^0_L K^0_S$, K^+K^-

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

NODE=M004R20
NODE=M004R20

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.311±0.011 OUR FIT	Error includes scale factor of 1.2.				
0.28 ±0.09	34	AGUILAR-...	72B	HBC	3.9,4.6 K^-p

$\Gamma(\eta e^+e^-)/\Gamma_{total}$ 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	[60] ACHASOV	01B	SND	$e^+e^- \rightarrow \gamma\gamma e^+e^-$	
1.14±0.10±0.06	355	[61] AKHMETSHIN	01	CMD2	$e^+e^- \rightarrow \eta e^+e^-$	
$1.3\ ^{+0.8}_{-0.6}$	7	GOLUBEV	85	ND	$e^+e^- \rightarrow \gamma\gamma e^+e^-$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1.13±0.14±0.07	183	[62] AKHMETSHIN	01	CMD2	$e^+e^- \rightarrow \eta e^+e^-$	OCCUR=2
1.21±0.14±0.09	130	[63] AKHMETSHIN	01	CMD2	$e^+e^- \rightarrow \eta e^+e^-$	OCCUR=3
1.04±0.20±0.08	42	[64] AKHMETSHIN	01	CMD2	$e^+e^- \rightarrow \eta e^+e^-$	OCCUR=4

$\Gamma(\eta'(958)\gamma)/\Gamma_{total}$ Γ_{24}/Γ

NODE=M004R25
NODE=M004R25

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT	
6.2 ±0.7 OUR FIT	Error includes scale factor of 1.1.						
$6.7\ ^{+2.8}_{-2.4}\ \pm0.8$		12	[65] AULCHENKO	03B	SND	$e^+e^- \rightarrow \eta'\gamma$	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	$e^+e^- \rightarrow 7\gamma$	
6.10±0.61±0.43		120	[66] ALOISIO	02E	KLOE	1.02 $e^+e^- \rightarrow \pi^+\pi^-3\gamma$	
$8.2\ ^{+2.1}_{-1.9}\ \pm1.1$		21	[67] AKHMETSHIN	00B	CMD2	$e^+e^- \rightarrow \pi^+\pi^-3\gamma$	
$4.9\ ^{+2.2}_{-1.8}\ \pm0.6$		9	[68] AKHMETSHIN	00F	CMD2	$e^+e^- \rightarrow \pi^+\pi^-\pi^+\pi^- \geq 2\gamma$	
6.4 ±1.6		30	[69] AKHMETSHIN	00F	CMD2	$e^+e^- \rightarrow \eta'(958)\gamma$	OCCUR=2
$6.7\ ^{+3.4}_{-2.9}\ \pm1.0$		5	[70] AULCHENKO	99	SND	$e^+e^- \rightarrow \pi^+\pi^-3\gamma$	
<11	90		AULCHENKO	98	SND	$e^+e^- \rightarrow 7\gamma$	
$12\ ^{+7}_{-5}\ \pm2$		6	[67] AKHMETSHIN	97B	CMD2	$e^+e^- \rightarrow \pi^+\pi^-3\gamma$	
<41	90		DRUZHININ	87	ND	$e^+e^- \rightarrow \gamma\eta\pi^+\pi^-$	

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

NODE=M004R36
NODE=M004R36

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<2	90	AULCHENKO	98	SND	$e^+e^- \rightarrow 7\gamma$

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

NODE=M004R26

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
1.09 ±0.06 OUR AVERAGE					
1.09 ±0.03 ±0.05		2438	ALOISIO 02D	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. • • •					
1.158±0.093±0.052		419	[71,72] 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

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
0.865±0.070±0.017	419	[72] 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	$e^+e^- \to 5\gamma$

$\Gamma(\pi^+\pi^+\pi^-\pi^-\pi^0)/\Gamma_{total}$ Γ_{20}/Γ

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	$e^+e^- \to \pi^+\pi^-\pi^+\pi^-\pi^0$

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

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

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

NODE=M004R30

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
4.40±0.21 OUR FIT					
4.44±0.21 OUR AVERAGE					
4.47±0.21		2438	[73] ALOISIO 02D	KLOE	$e^+e^- \to \pi^0\pi^0\gamma$
2.90±0.21±1.54			[74] 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. • • •					
3.5 ±0.3 $^{+1.3}_{-0.5}$		419	[71,75] ACHASOV 00H	SND	$e^+e^- \to \pi^0\pi^0\gamma$
1.93±0.46±0.50		27188	[76] AKHMETSHIN 99B	CMD2	$e^+e^- \to \pi^+\pi^-\gamma$
3.05±0.25±0.72		268	[77] AKHMETSHIN 99C	CMD2	$e^+e^- \to \pi^0\pi^0\gamma$
1.5 ±0.5		268	[78] AKHMETSHIN 99C	CMD2	$e^+e^- \to \pi^0\pi^0\gamma$
3.42±0.30±0.36		164	[75] ACHASOV 98I	SND	$e^+e^- \to 5\gamma$
< 1	90		[79] AKHMETSHIN 97C	CMD2	$e^+e^- \to \pi^+\pi^-\gamma$
< 7	90		[80] 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
3.38±0.17 OUR FIT				
2.6 ±0.2 $^{+0.8}_{-0.3}$	419	[75] ACHASOV 00H	SND	$e^+e^- \to \pi^0\pi^0\gamma$

$\Gamma(\pi^0 e^+ e^-)/\Gamma_{total}$ 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	[81] ACHASOV	02D	SND	$e^+ e^- \rightarrow \pi^0 e^+ e^-$
1.22±0.34±0.21		46	[82] AKHMETSHIN	01C	CMD2	$e^+ e^- \rightarrow \pi^0 e^+ e^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<12	90		DOLINSKY	88	ND	$e^+ e^- \rightarrow \pi^0 e^+ e^-$

$\Gamma(\pi^0 \eta \gamma)/\Gamma_{total}$ Γ_{22}/Γ

NODE=M004R32
NODE=M004R32

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
8.3 ±0.5 OUR AVERAGE						
8.51±0.51±0.57		607	[83] ALOISIO	02C	KLOE	$e^+ e^- \rightarrow \eta \pi^0 \gamma$
7.96±0.60±0.40		197	[84] ALOISIO	02C	KLOE	$e^+ e^- \rightarrow \eta \pi^0 \gamma$
8.8 ±1.4 ±0.9		36	[85] ACHASOV	00F	SND	$e^+ e^- \rightarrow \eta \pi^0 \gamma$
9.0 ±2.4 ±1.0		80	AKHMETSHIN	99C	CMD2	$e^+ e^- \rightarrow \eta \pi^0 \gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
8.3 ±2.3 ±1.2		20	ACHASOV	98B	SND	$e^+ e^- \rightarrow 5\gamma$
<250	90		DOLINSKY	91	ND	$e^+ e^- \rightarrow \pi^0 \eta \gamma$

OCCUR=2

$\Gamma(a_0(980)\gamma)/\Gamma_{total}$ 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			[86] ALOISIO	02C	KLOE	$e^+ e^- \rightarrow \eta \pi^0 \gamma$
8.8±1.7		36	[87] ACHASOV	00F	SND	$e^+ e^- \rightarrow \eta \pi^0 \gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
11 ±2			[88] GOKALP	02	RVUE	$e^+ e^- \rightarrow \eta \pi^0 \gamma$
<500	90		DOLINSKY	91	ND	$e^+ e^- \rightarrow \pi^0 \eta \gamma$

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

NODE=M004R47
NODE=M004R47

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
6.1±0.6	[89] ALOISIO	02C	KLOE	$e^+ e^- \rightarrow \eta \pi^0 \gamma$

$\Gamma(\eta'(958)\gamma)/\Gamma(K^0_L K^0_S)$ Γ_{24}/Γ_2

NODE=M004R43
NODE=M004R43

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.84±0.21 OUR FIT Error includes scale factor of 1.1.					
$1.46^{+0.64}_{-0.54}$±0.18	9	[90] AKHMETSHIN	00F	CMD2	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^+ \pi^- \geq 2\gamma$

$\Gamma(\eta'(958)\gamma)/\Gamma(\eta\gamma)$ Γ_{24}/Γ_6

NODE=M004R34
NODE=M004R34

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
4.8 ±0.5 OUR FIT Error includes scale factor of 1.1.					
4.9 ±0.5 OUR AVERAGE					
4.70±0.47±0.31	120	[91] ALOISIO	02E	KLOE	1.02 $e^+ e^- \rightarrow \pi^+ \pi^- 3\gamma$
6.5 $^{+1.7}_{-1.5}$ ±0.8	21	AKHMETSHIN	00B	CMD2	$e^+ e^- \rightarrow \pi^+ \pi^- 3\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
9.5 $^{+5.2}_{-4.0}$ ±1.4	6	[92] AKHMETSHIN	97B	CMD2	$e^+ e^- \rightarrow \pi^+ \pi^- 3\gamma$

$\Gamma(\mu^+ \mu^- \gamma)/\Gamma_{total}$ Γ_{26}/Γ

NODE=M004R35
NODE=M004R35

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
1.43±0.45±0.14	27188	[76] AKHMETSHIN	99B	CMD2	$e^+ e^- \rightarrow \mu^+ \mu^- \gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.3 ±1.0	824±33	[93] AKHMETSHIN	97C	CMD2	$e^+ e^- \rightarrow \mu^+ \mu^- \gamma$

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

NODE=M004R37
NODE=M004R37

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<5	90	AKHMETSHIN	98	CMD2	$e^+ e^- \rightarrow \pi^+ \pi^- \gamma\gamma$

$\Gamma(\eta\pi^+\pi^-)/\Gamma_{total}$ Γ_{28}/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. • • •				
<30	90	AKHMETSHIN 98	CMD2	$e^+e^- \to \pi^+\pi^-\gamma\gamma$

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

NODE=M004R45
NODE=M004R45

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

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

NODE=M004R46
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	[94,95] ALOISIO 03	KLOE	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$
<0.0006	90		[96] ACHASOV 02	SND	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$
<0.23	90		[96] CORDIER 80	DM1	$e^+e^- \to \pi^+\pi^-\pi^0$
<0.20	90		[96] PARROUR 76B	OSPK	$e^+e^- \to \pi^+\pi^-\pi^0$

28 Using B($\phi \to e^+e^-$)= (2.93 $\pm$ 0.14) $\times 10^{-4}$. NODE=M004R;LINKAGE=B2
29 Using B($\phi \to e^+e^-$)=(2.99 $\pm$ 0.08) $\times 10^{-4}$. NODE=M004R;LINKAGE=8D
30 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
31 Neglecting interference between resonance and continuum. NODE=M004R10;LINKAGE=A
32 Using B($\phi \to e^+e^-$) = (2.91 $\pm$ 0.07) $\times 10^{-4}$. NODE=M004R;LINKAGE=GZ
33 Recalculated by us using B($\phi \to e^+e^-$)= (2.99 $\pm$ 0.08) $\times 10^{-4}$. NODE=M004R;LINKAGE=VA
34 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
35 From $\pi^+\pi^-\pi^0$ decay mode of η. NODE=M004R11;LINKAGE=Z3
36 From 2γ decay mode of η. NODE=M004R11;LINKAGE=A
37 From $3\pi^0$ decay mode of η. NODE=M004R11;LINKAGE=C
38 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
39 Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\eta\gamma)/\Gamma^2_{total}$. NODE=M004R11;LINKAGE=AK
40 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
41 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
42 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
43 Using various decay modes of the η from ACHASOV 98F, ACHASOV 00, and ACHASOV 00B and B($\phi \to e^+e^-$) = (2.99 $\pm$ 0.08) $\times 10^{-4}$. NODE=M004R;LINKAGE=G2
44 From the $\eta \to \pi^+\pi^-\pi^0$ decay and B($\phi \to e^+e^-$) = (2.99 $\pm$ 0.08) $\times 10^{-4}$. NODE=M004R;LINKAGE=G3
45 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
46 Reanalysis of DRUZHININ 84, DOLINSKY 89, and DOLINSKY 91 taking into account a triangle anomaly contribution. NODE=M004R;LINKAGE=TS
47 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
48 For $E_\gamma > 20$ MeV and assuming that B($\phi(1020) \to f_0(980)\gamma$) is negligible. NODE=M004R12;LINKAGE=Z3
49 Supersedes AKHMETSHIN 97C. NODE=M004R;LINKAGE=1N
50 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
51 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
52 Using B($\phi \to e^+e^-$) = (2.98 $\pm$ 0.04) $\times 10^{-4}$. NODE=M004R17;LINKAGE=AH
53 Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\pi^0\gamma)/\Gamma^2_{total}$. NODE=M004R17;LINKAGE=AK
54 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
55 Using the 1996 and 1998 data. NODE=M004R28;LINKAGE=K2
56 (2.3 $\pm$ 0.3)% correction for other decay modes of the $\omega(782)$ applied. NODE=M004R28;LINKAGE=K3
57 Using the 1996 data. NODE=M004R28;LINKAGE=VS
58 Using the 1998 data. NODE=M004R28;LINKAGE=K1
59 Theoretical analysis of BRAMON 00 taking into account phase-space difference, electromagnetic radiative corrections, as well as isospin breaking, predicts 0.62. FISCHBACH 02 calculates additional corrections caused by the close threshold and predicts 0.68. NODE=M004R19;LINKAGE=KH
60 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
61 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
62 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

[63] From $\eta \rightarrow 3\pi^0$ decays and using B($\pi^0 \rightarrow \gamma\gamma$) = $(98.798 \pm 0.033) \times 10^{-2}$, B($\eta \rightarrow 3\pi^0$) = $(32.24 \pm 0.29) \times 10^{-2}$, B($\eta \rightarrow \pi^+\pi^-\gamma$) = $(4.75 \pm 0.11) \times 10^{-2}$, and B($\phi \rightarrow \eta\gamma$) = $(1.297 \pm 0.033) \times 10^{-2}$. NODE=M004R;LINKAGE=H3

[64] From $\eta \rightarrow \pi^+\pi^-\pi^0$ decays and using B($\pi^0 \rightarrow \gamma\gamma$) = $(98.798 \pm 0.033) \times 10^{-2}$, B($\pi^0 \rightarrow e^+e^-\gamma$) = $(1.198 \pm 0.032) \times 10^{-2}$, B($\eta \rightarrow \pi^+\pi^-\pi^0$) = $(23.0 \pm 0.4) \times 10^{-2}$, B($\phi \rightarrow \pi^+\pi^-\pi^0$) = $(15.5 \pm 0.6) \times 10^{-2}$, and B($\phi \rightarrow \eta\gamma$) = $(1.297 \pm 0.033) \times 10^{-2}$. NODE=M004R;LINKAGE=H4

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

[66] Using B($\phi \rightarrow \eta\gamma$)= (1.297 ± 0.033)%. NODE=M004R;LINKAGE=E2

[67] Using the value B($\phi \rightarrow \eta\gamma$) = $(1.26 \pm 0.06) \times 10^{-2}$. NODE=M004R25;LINKAGE=Q

[68] Using B($\phi \rightarrow K^0_L K^0_S$) = (33.8 ± 0.6)%. NODE=M004R;LINKAGE=T2

[69] Averaging AKHMETSHIN 00B with AKHMETSHIN 00F. NODE=M004R;LINKAGE=T3

[70] Using the value B($\eta' \rightarrow \eta\pi^+\pi^-$)= $(43.7 \pm 1.5) \times 10^{-2}$ and B($\eta \rightarrow \gamma\gamma$)= $(39.25 \pm 0.31) \times 10^{-2}$. NODE=M004R25;LINKAGE=AU

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

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

[73] From the negative interference with the $f_0(600)$ meson of AITALA 01B using the ACHASOV 89 parameterization for the $f_0(980)$, a Breit-Wigner for the $f_0(600)$, and ACHASOV 01F for the $\rho\pi$ contribution. NODE=M004R;LINKAGE=KD

[74] From the combined fit of the photon spectra in the reactions $e^+e^- \rightarrow \pi^+\pi^-\gamma$, $\pi^0\pi^0\gamma$. NODE=M004R;LINKAGE=SL

[75] Assuming that the $\pi^0\pi^0\gamma$ final state is completely determined by the $f_0\gamma$ mechanism, neglecting the decay B($\phi \rightarrow K\overline{K}\gamma$) and using B($f_0 \rightarrow \pi^+\pi^-$)= 2B($f_0 \rightarrow \pi^0\pi^0$). NODE=M004R;LINKAGE=AI

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

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

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

[79] For destructive interference with the Bremsstrahlung process NODE=M004R30;LINKAGE=A

[80] For constructive interference with the Bremsstrahlung process NODE=M004R30;LINKAGE=B

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

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

[83] From the decay mode $\eta \rightarrow \gamma\gamma$. NODE=M004R;LINKAGE=C1

[84] From the decay mode $\eta \rightarrow \pi^+\pi^-\pi^0$. NODE=M004R;LINKAGE=C2

[85] Supersedes ACHASOV 98B. NODE=M004R32;LINKAGE=AF

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

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

[88] Using data of ACHASOV 00F. NODE=S004R;LINKAGE=GK

[89] 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

[90] 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

[91] From the decay mode $\eta' \rightarrow \eta\pi^+\pi^-$, $\eta \rightarrow \gamma\gamma$. NODE=M004R;LINKAGE=E1

[92] Superseded by AKHMETSHIN 00B. NODE=M004R;LINKAGE=KS

[93] For $E_\gamma > 20$ MeV. NODE=M004R35;LINKAGE=A

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

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

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

$\pi^+\pi^-\pi^0$ / $\rho\pi$ AMPLITUDE RATIO a_1 IN DECAY OF $\phi \rightarrow \pi^+\pi^-\pi^0$

NODE=M004225

NODE=M004D1

VALUE	*CL%*	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.090±0.011±0.006		1.98M	[98,99] ALOISIO	03	KLOE	1.02 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$-0.06 < a_1 < 0.06$		500k	[100] ACHASOV	02	SND	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
$-0.16 < a_1 < 0.11$	90		[97] AKHMETSHIN	98	CMD2	$e^+e^- \rightarrow \pi^+\pi^-\gamma\gamma$

[97] Dalitz plot analysis of 9735 events taking into account interference between the contact and $\rho\pi$ terms and assuming zero phase for the contact term. NODE=M004D1;LINKAGE=AK

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

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

[100] Recalculated by the authors to match the notations of AKHMETSHIN 98. NODE=M004D1;LINKAGE=KL

ϕ(1020) REFERENCES

NODE=M004

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 *et al.* (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
AKHMETSHIN 01D PL B508 217 (erratum) R.R. Akhmetshin *et al.* (Novosibirsk CMD-2 Collab.) REFID=48328
Also 99D PL B466 385 R.R. Akhmetshin *et al.* REFID=47397
ACHASOV 00 EPJ C12 25 M.N. Achasov *et al.* (Novosibirsk SND Collab.) REFID=47417
ACHASOV 00B JETP 90 17 M.N. Achasov *et al.* (Novosibirsk SND Collab.) REFID=47425
Translated from ZETF 117 22.
ACHASOV 00C PL B474 188 M.N. Achasov *et al.* (Novosibirsk SND Collab.) REFID=47431
ACHASOV 00D JETPL 72 282 M.N. Achasov *et al.* (Novosibirsk SND Collab.) REFID=47882
Translated from ZETFP 72 411.
ACHASOV 00E NP B569 158 M.N. Achasov *et al.* (Novosibirsk SND Collab.) REFID=47927
ACHASOV 00F PL B479 53 M.N. Achasov *et al.* (Novosibirsk SND Collab.) REFID=47928
ACHASOV 00H PL B485 349 M.N. Achasov *et al.* (Novosibirsk SND Collab.) REFID=47930
AKHMETSHIN 00B PL B473 337 R.R. Akhmetshin *et al.* (Novosibirsk CMD-2 Collab.) REFID=47422
AKHMETSHIN 00E PL B491 81 R.R. Akhmetshin *et al.* (Novosibirsk CMD-2 Collab.) REFID=47936
AKHMETSHIN 00F PL B494 26 R.R. Akhmetshin *et al.* (Novosibirsk CMD-2 Collab.) REFID=47937
AULCHENKO 00A JETP 90 927 V.M. Aulchenko *et al.* (Novosibirsk SND Collab.) REFID=47953
Translated from ZETF 117 1067.
BRAMON 00 PL B486 406 A. Bramon *et al.* REFID=47969
PDG 00 EPJ C15 1 D.E. Groom *et al.* REFID=47469
ACHASOV 99 PL B449 122 M.N. Achasov *et al.* REFID=46896
ACHASOV 99C PL B456 304 M.N. Achasov *et al.* REFID=46939
AKHMETSHIN 99B PL B462 371 R.R. Akhmetshin *et al.* (Novosibirsk CMD-2 Collab.) REFID=47392
AKHMETSHIN 99C PL B462 380 R.R. Akhmetshin *et al.* (Novosibirsk CMD-2 Collab.) REFID=47393
AKHMETSHIN 99D PL B466 385 R.R. Akhmetshin *et al.* REFID=47397
AKHMETSHIN 99F PL B460 242 R.R. Akhmetshin *et al.* (Novosibirsk CMD-2 Collab.) REFID=47473
AULCHENKO 99 JETPL 69 97 V.M. Aulchenko *et al.* REFID=46920
Translated from ZETFP 69 87.
ACHASOV 98B PL B438 441 M.N. Achasov *et al.* (Novosibirsk SND Collab.) REFID=46317
ACHASOV 98F JETPL 68 573 M.N. Achasov *et al.* (Novosibirsk SND Collab.) REFID=46321
ACHASOV 98I PL B440 442 M.N. Achasov *et al.* REFID=46600
AKHMETSHIN 98 PL B434 426 R.R. Akhmetshin *et al.* 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
ACHASOV 89 NP B315 465 N.N. Achasov, V.N. Ivanchenko REFID=48021
DOLINSKY 89 ZPHY C42 511 S.I. Dolinsky *et al.* (NOVO) REFID=41003
BARKOV 88 SJNP 47 248 L.M. Barkov *et al.* (NOVO) REFID=41024
Translated from YAF 47 393.
DOLINSKY 88 SJNP 48 277 S.I. Dolinsky *et al.* (NOVO) REFID=41022
Translated from YAF 48 442.
DRUZHININ 87 ZPHY C37 1 V.P. Druzhinin *et al.* (NOVO) REFID=40448
ARMSTRONG 86 PL 166B 245 T.A. Armstrong *et al.* (ATHU, BARI, BIRM+) REFID=20563
ATKINSON 86 ZPHY C30 521 M. Atkinson *et al.* (BONN, CERN, GLAS+) REFID=20564
BEBEK 86 PRL 56 1893 C. Bebek *et al.* (CLEO Collab.) REFID=11540
DAVENPORT 86 PR 33 2519 T.F. Davenport (TUFTS, ARIZ, FNAL, FSU, NDAM+) REFID=20567
DIJKSTRA 86 ZPHY C31 375 H. Dijkstra *et al.* (ANIK, BRIS, CERN+) REFID=20568
FRAME 86 NP B276 667 D. Frame *et al.* (GLAS) REFID=20569
GOLUBEV 86 SJNP 44 409 V.B. Golubev *et al.* (NOVO) REFID=40449
Translated from YAF 44 633.
ALBRECHT 85D PL 153B 343 H. Albrecht *et al.* (ARGUS Collab.) REFID=20562
GOLUBEV 85 SJNP 41 756 V.B. Golubev *et al.* (NOVO) REFID=40450
Translated from YAF 41 1183.
DRUZHININ 84 PL 144B 136 V.P. Druzhinin *et al.* (NOVO) REFID=20561
ARMSTRONG 83B NP B224 193 T.A. Armstrong *et al.* (BARI, BIRM, CERN+) REFID=20558
BARATE 83 PL 121B 449 R. Barate *et al.* (SACL, LOIC, SHMP, IND) REFID=12177
KURDADZE 83C JETPL 38 366 L.M. Kurdadze *et al.* (NOVO) REFID=20560
Translated from ZETFP 38 306.
ARENTON 82 PR D25 2241 M.W. Arenton *et al.* (ANL, ILL) REFID=20556
PELLINEN 82 PS 25 599 A. Pellinen, M. Roos (HELS) REFID=20557
DAUM 81 PL 100B 439 C. Daum *et al.* (AMST, BRIS, CERN, CRAC+) REFID=20552
IVANOV 81 PL 107B 297 P.M. Ivanov *et al.* (NOVO) REFID=20553
Also 82 Private Comm. S.I. Eidelman (NOVO) REFID=20554
VASSERMAN 81 PL 99B 62 I.B. Vasserman *et al.* (NOVO) REFID=20555
Also 82 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	70	PL 32 416	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 32 416	J.C. Bizot *et al.*	(ORSAY)	REFID=20501
Also	69	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

OTHER RELATED PAPERS

ACHASOV	03B	PR D68 014006	N.N. Achsaov, A.V. Kiselev		REFID=49476
BOGLIONE	03	EPJ C30 503	M. Boglione, M.R. Pennington		REFID=49584
ACHASOV	02L	PAN 65 1887	N.N. Achasov *et al.*		REFID=48979
		Translated from YAF 65 1939.			
ANISOVICH	02C	PAN 65 497	A.V. Anisovich *et al.*		REFID=48830
		Translated from YAF 65 523.			
BRAMON	02	EPJ C26 253	A. Bramon *et al.*		REFID=49178
ACHASOV	01F	PR D63 094007	N.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=48312
BENAYOUN	01	EPJ C22 503	M. Benayoun, H.B. O'Connell		REFID=48570
CLOSE	01	PL B515 13	F.E. Close, A. Kirk		REFID=48351
GOKALP	01	PR D64 053017	A. Gokalp, O. Yilmaz		REFID=48341
MARKUSHIN	00	EPJ A8 389	V.E. Markushin		REFID=47996
ACHASOV	99B	PAN 62 442	M.N. Achasov *et al.*		REFID=46911
		Translated from YAF 62 484.			
MARCO	99	PL B470 20	E. Marco *et al.*		REFID=47415
OLLER	98B	PL B426 7	J.A. Oller		REFID=46377
ACHASOV	95	PL B363 106	N.N. Achasov, V.V. Gubin	(NOVM)	REFID=44655
KAMAL	92	PL B284 421	A.N. Kamal, Q.P. Xu	(ALBE)	REFID=43166
GEORGIO...	85	PL 152B 428	C. Georgiopoulos *et al.*	(TUFTS, ARIZ, FNAL+)	REFID=11474
GELFAND	63B	PRL 11 438	N. Gelfand *et al.*	(COLU, RUTG)	REFID=20473
BERTANZA	62	PRL 9 180	L. Bertanza *et al.*	(BNL, SYRA)	REFID=20471

NODE=M030

$h_1(1170)$

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

$h_1(1170)$ MASS

NODE=M030205

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=M030210

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	$20\text{–}70\ \gamma p \to \pi^+\pi^-\pi^0 p$
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

$b_1(1235)$

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

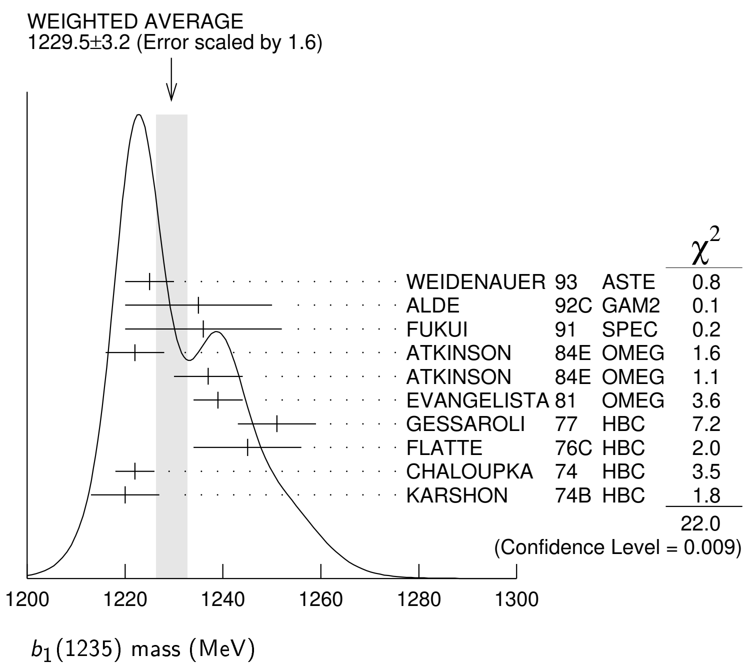
$b_1(1235)$ MASS

NODE=M011205

NODE=M011M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1229.5± 3.2 OUR AVERAGE		Error includes scale factor of 1.6. See the ideogram below.				
1225 ± 5		WEIDENAUER	93	ASTE		$\overline{p}p \rightarrow 2\pi^+ 2\pi^- \pi^0$
1235 ±15		ALDE	92C	GAM2		38,100 $\pi^- p \rightarrow \omega \pi^0 n$
1236 ±16		FUKUI	91	SPEC		8.95 $\pi^- p \rightarrow \omega \pi^0 n$
1222 ± 6		ATKINSON	84E	OMEG	±	25–55 $\gamma p \rightarrow \omega \pi X$
1237 ± 7		ATKINSON	84E	OMEG	0	25–55 $\gamma p \rightarrow \omega \pi X$
1239 ± 5		EVANGELISTA	81	OMEG	−	12 $\pi^- p \rightarrow \omega \pi p$
1251 ± 8	450	GESSAROLI	77	HBC	−	11 $\pi^- p \rightarrow \pi^- \omega p$
1245 ±11	890	FLATTE	76C	HBC	−	4.2 $K^- p \rightarrow \pi^- \omega \Sigma^+$
1222 ± 4	1400	CHALOUPKA	74	HBC	−	3.9 $\pi^- p$
1220 ± 7	600	KARSHON	74B	HBC	+	4.9 $\pi^+ p$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1190 ±10		AUGUSTIN	89	DM2	±	$e^+ e^- \rightarrow 5\pi$
1213 ± 5		ATKINSON	84C	OMEG	0	20–70 γp
1271 ±11		COLLICK	84	SPEC	+	200 $\pi^+ Z \rightarrow Z \pi \omega$

OCCUR=2



$b_1(1235)$ WIDTH

NODE=M011210

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		$\overline{p}p \rightarrow 2\pi^+ 2\pi^- \pi^0$
160±30		ALDE	92C	GAM2		38,100 $\pi^- p \rightarrow \omega \pi^0 n$
151±31		FUKUI	91	SPEC		8.95 $\pi^- p \rightarrow \omega \pi^0 n$
170±15		EVANGELISTA	81	OMEG	−	12 $\pi^- p \rightarrow \omega \pi p$
170±50	225	BALTAY	78B	HBC	+	15 $\pi^+ p \rightarrow p 4\pi$

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	$\pi^\pm \gamma$	$(1.6\pm0.4) \times 10^{-3}$		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	$(K\overline{K})^\pm \pi^0$	< 8 %	90%	DESIG=71;OUR EST;→ NOT CHECKED ←
Γ_6	$K^0_S K^0_L \pi^\pm$	< 6 %	90%	DESIG=73;OUR EST;→ NOT CHECKED ←
Γ_7	$K^0_S K^0_S \pi^\pm$	< 2 %	90%	DESIG=72;OUR EST;→ NOT CHECKED ←
Γ_8	$\phi\pi$	< 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

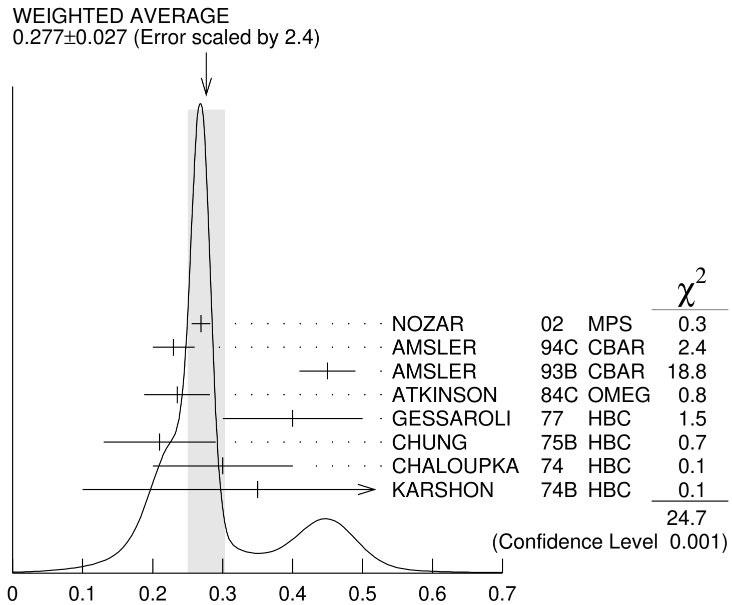
VALUE (keV)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
230±60	COLLICK	84	SPEC	+	200 $\pi^+ Z \to Z \pi \omega$

$b_1(1235)$ D-wave/S-wave AMPLITUDE RATIO IN DECAY OF $b_1(1235) \to \omega\pi$

NODE=M011225

NODE=M011DS

VALUE	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
0.277±0.027 OUR AVERAGE	Error includes scale factor of 2.4. See the ideogram below.					
0.269±0.009±0.010		NOZAR	02	MPS	−	18 $\pi^- p \to \omega \pi^- p$
0.23 ±0.03		AMSLER	94C	CBAR		0.0 $\overline{p} p \to \omega \eta \pi^0$
0.45 ±0.04		AMSLER	93B	CBAR		0.0 $\overline{p} p \to \omega \pi^0 \pi^0$
0.235±0.047		ATKINSON	84C	OMEG		20–70 γp
0.4 $^{+0.1}_{-0.1}$		GESSAROLI	77	HBC	−	11 $\pi^- p \to \pi^- \omega p$
0.21 ±0.08		CHUNG	75B	HBC	+	7.1 $\pi^+ p$
0.3 ±0.1		CHALOUPKA	74	HBC	−	3.9–7.5 $\pi^- p$
0.35 ±0.25	600	KARSHON	74B	HBC	+	4.9 $\pi^+ p$



$b_1(1235)$ D-wave/S-wave amplitude ratio in decay of $b_1(1235) \to \omega\pi$

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

NODE=M011227

NODE=M011PH

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

$b_1(1235)$ BRANCHING RATIOS

NODE=M011230

$\Gamma(\eta\rho)/\Gamma(\omega\pi)$ $\qquad \Gamma_3/\Gamma_1$

NODE=M011R9
NODE=M011R9

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
<0.10	ATKINSON	84D	OMEG	20–70 γp

$\Gamma(\pi^+\pi^+\pi^-\pi^0)/\Gamma(\omega\pi)$ $\qquad \Gamma_4/\Gamma_1$

NODE=M011R1
NODE=M011R1

VALUE	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
<0.5	ABOLINS	63	HBC	+	3.5 $\pi^+ p$

$\Gamma((K\overline{K})^{\pm}\pi^0)/\Gamma(\omega\pi)$ $\qquad \Gamma_5/\Gamma_1$

NODE=M011R6
NODE=M011R6

VALUE	*CL%*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
<0.08	90	BALTAY	67	HBC	±	0.0 $\overline{p}p$

$\Gamma(K^0_S K^0_L \pi^{\pm})/\Gamma(\omega\pi)$ $\qquad \Gamma_6/\Gamma_1$

NODE=M011R8
NODE=M011R8

VALUE	*CL%*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
<0.06	90	BALTAY	67	HBC	±	0.0 $\overline{p}p$

$\Gamma(K^0_S K^0_S \pi^{\pm})/\Gamma(\omega\pi)$ $\qquad \Gamma_7/\Gamma_1$

NODE=M011R7
NODE=M011R7

VALUE	*CL%*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
<0.02	90	BALTAY	67	HBC	±	0.0 $\overline{p}p$

$\Gamma(\phi\pi)/\Gamma(\omega\pi)$ $\qquad \Gamma_8/\Gamma_1$

NODE=M011R4
NODE=M011R4

VALUE	*CL%*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
<0.004	95	VIKTOROV	96	SPEC	0	32.5 $\pi^- p \to K^+ K^- \pi^0 n$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.04	95	BIZZARRI	69	HBC	±	0.0 $\overline{p}p$
<0.015		DAHL	67	HBC		1.6–4.2 $\pi^- p$

$b_1(1235)$ REFERENCES

NODE=M011

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
EVANGELISTA	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

OTHER RELATED PAPERS

ABLIKIM	04A	PL B598 149	M. Ablikim *et al.*	(BES Collab.)	REFID=49740
GOLOVKIN	97	ZPHY A359 435	S.V. Golovkin *et al.*	(SERP, ITEP)	REFID=45861
BRAU	88	PR D37 2379	J.E. Brau *et al.*	JP	REFID=40571
ATKINSON	84C	NP B243 1	M. Atkinson *et al.*	(BONN, CERN, GLAS+) JP	REFID=20625
GOLDHABER	65	PRL 15 118	G. Goldhaber *et al.*	(LRL)	REFID=20579
CARMONY	64	PRL 12 254	D.D. Carmony *et al.*	(UCB) JP	REFID=20578
BONDAR	63B	PL 5 209	L. Bondar *et al.*	(AACH, BIRM, HAMB, LOIC+)	REFID=20576

NODE=M010

$a_1(1260)$

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

A REVIEW GOES HERE – Check our WWW List of Reviews

NODE=M010

$a_1(1260)$ MASS

NODE=M010205

NODE=M010M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*	
1230±40 OUR ESTIMATE							→ NOT CHECKED ←
• • • We do not use the following data for averages, fits, limits, etc. • • •							
1203± 3		[1] GOMEZ DUMM	04	RVUE		$\tau^+ \to \pi^+\pi^+\pi^-\nu_\tau$	
1331±10± 3	37k	[2] ASNER	00	CLE2		10.6 $e^+e^- \to \tau^+\tau^-$, $\tau^- \to \pi^-\pi^0\pi^0\nu_\tau$	
1255± 7± 6	5904	[3] ABREU	98G	DLPH		e^+e^-	
1207± 5± 8	5904	[4] ABREU	98G	DLPH		e^+e^-	OCCUR=2
1196± 4± 5	5904	[5,6] 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		[3,7] ACKERSTAFF	97R	OPAL		E^{ee}_{cm}= 88–94, $\tau \to 3\pi\nu$	
1210± 7± 2		[4,7] ACKERSTAFF	97R	OPAL		E^{ee}_{cm}= 88–94, $\tau \to 3\pi\nu$	OCCUR=2
$1211\pm 7^{+50}_{-0}$		[4] ALBRECHT	93C	ARG		$\tau^+ \to \pi^+\pi^+\pi^-\nu$	
1121± 8		[8] ANDO	92	SPEC		8 $\pi^-p \to \pi^+\pi^-\pi^0 n$	
1242±37		[9] IVANOV	91	RVUE		$\tau \to \pi^+\pi^+\pi^-\nu$	
1260±14		[10] IVANOV	91	RVUE		$\tau \to \pi^+\pi^+\pi^-\nu$	OCCUR=2
1250± 9		[11] IVANOV	91	RVUE		$\tau \to \pi^+\pi^+\pi^-\nu$	OCCUR=3
1208±15		ARMSTRONG	90	OMEG	0	300.0$pp \to pp\pi^+\pi^-\pi^0$	
1220±15		[12] ISGUR	89	RVUE		$\tau^+ \to \pi^+\pi^+\pi^-\nu$	
1260±25		[13] 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		[12] 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		[14] DANKOWY...	81	SPEC	0	8.45 $\pi^-p \to n3\pi$	
1280±30		[14] DAUM	81B	CNTR		63,94 $\pi^-p \to p3\pi$	
1041±13		[15] GAVILLET	77	HBC	+	4.2 $K^-p \to \Sigma 3\pi$	

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

$a_1(1260)$ WIDTH

NODE=M010210

NODE=M010W

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*	
250 to 600 OUR ESTIMATE							→ NOT CHECKED ←
• • • We do not use the following data for averages, fits, limits, etc. • • •							
480 ± 20		[16] GOMEZ DUMM	04	RVUE		$\tau^+ \to \pi^+\pi^+\pi^-\nu_\tau$	
460 ± 85	205	[17] DRUTSKOY	02	BELL		$B \to D^{(*)}K^-K^{*0}$	
814 ± 36 ± 13	37k	[18] ASNER	00	CLE2		10.6 $e^+e^- \to \tau^+\tau^-$, $\tau^- \to \pi^-\pi^0\pi^0\nu_\tau$	
450 ± 50	22k	[19] AKHMETSHIN	99E	CMD2		1.05–1.38 $e^+e^- \to \pi^+\pi^-\pi^0\pi^0$	
570 ± 10		[20] BONDAR	99	RVUE		$e^+e^- \to 4\pi$, $\tau \to 3\pi\nu_\tau$	
587 ± 27 ± 21	5904	[21] ABREU	98G	DLPH		e^+e^-	
478 ± 3 ± 15	5904	[22] ABREU	98G	DLPH		e^+e^-	OCCUR=2
425 ± 14 ± 8	5904	[23,24] ABREU	98G	DLPH		e^+e^-	OCCUR=3
400 ± 35		BARBERIS	98B			450 $pp \to p_f\pi^+\pi^-\pi^0p_s$	
621 ± 32 ± 58		[21,25] ACKERSTAFF	97R	OPAL		E^{ee}_{cm}= 88–94, $\tau \to 3\pi\nu$	
457 ± 15 ± 17		[22,25] ACKERSTAFF	97R	OPAL		E^{ee}_{cm}= 88–94, $\tau \to 3\pi\nu$	OCCUR=2
$446 \pm 21 ^{+140}_{-\ \ 0}$		[22] ALBRECHT	93C	ARG		$\tau^+ \to \pi^+\pi^+\pi^-\nu$	
239 ± 11		ANDO	92	SPEC		8 $\pi^-p \to \pi^+\pi^-\pi^0n$	
266 ± 13 ± 4		[26] ANDO	92	SPEC		8 $\pi^-p \to \pi^+\pi^-\pi^0n$	OCCUR=3
$465 ^{+228}_{-143}$		[27] IVANOV	91	RVUE		$\tau \to \pi^+\pi^+\pi^-\nu$	
$298 ^{+\ 40}_{-\ 34}$		[28] IVANOV	91	RVUE		$\tau \to \pi^+\pi^+\pi^-\nu$	OCCUR=2
488 ± 32		[29] IVANOV	91	RVUE		$\tau \to \pi^+\pi^+\pi^-\nu$	OCCUR=3
430 ± 50		ARMSTRONG	90	OMEG	0	300.0$pp \to pp\pi^+\pi^-\pi^0$	
420 ± 40		[30] ISGUR	89	RVUE		$\tau^+ \to \pi^+\pi^+\pi^-\nu$	
396 ± 43		[31] BOWLER	88	RVUE			
405 ± 75 ± 25		BAND	87	MAC		$\tau^+ \to \pi^+\pi^+\pi^-\nu$	
419 ± 108 ± 57		BAND	87	MAC		$\tau^+ \to \pi^+\pi^0\pi^0\nu$	OCCUR=2
521 ± 27		ALBRECHT	86B	ARG		$\tau^+ \to \pi^+\pi^+\pi^-\nu$	
$476 ^{+132}_{-120} \pm 54$		RUCKSTUHL	86	DLCO		$\tau^+ \to \pi^+\pi^+\pi^-\nu$	
462 ± 56 ± 30		SCHMIDKE	86	MRK2		$\tau^+ \to \pi^+\pi^+\pi^-\nu$	
292 ± 40		BELLINI	85	SPEC		40 $\pi^-A \to \pi^-\pi^+\pi^-A$	
380 ± 100		[32] DANKOWY...	81	SPEC	0	8.45 $\pi^-p \to n3\pi$	
300 ± 50		[32] DAUM	81B	CNTR		63,94 $\pi^-p \to p3\pi$	
230 ± 50		[33] GAVILLET	77	HBC	+	4.2 $K^-p \to \Sigma 3\pi$	

[16] Using the data of BARATE 98R. NODE=M010W;LINKAGE=GO
[17] 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
[18] From a fit to the 3π mass spectrum including the $K\overline{K}^*(892)$ threshold. NODE=M010W;LINKAGE=B6
[19] Using the $a_1(1260)$ mass of 1230 MeV. NODE=M010W;LINKAGE=WE
[20] From AKHMETSHIN 99E and ASNER 00 data using the $a_1(1260)$ mass of 1230 MeV. NODE=M010W;LINKAGE=WB
[21] Uses the model of KUHN 90. NODE=M010W;LINKAGE=KS
[22] Uses the model of ISGUR 89. NODE=M010W;LINKAGE=IM
[23] Includes the effect of a possible a_1' state. NODE=M010W;LINKAGE=A1
[24] Uses the model of FEINDT 90. NODE=M010W;LINKAGE=F1
[25] Supersedes AKERS 95P. NODE=M010W;LINKAGE=X
[26] Average and spread of values using 2 variants of the model of BOWLER 75. NODE=M010W;LINKAGE=P
[27] Reanalysis of RUCKSTUHL 86. NODE=M010W;LINKAGE=I
[28] Reanalysis of SCHMIDKE 86. NODE=M010W;LINKAGE=L
[29] Reanalysis of ALBRECHT 86B. NODE=M010W;LINKAGE=M
[30] From a combined reanalysis of ALBRECHT 86B, SCHMIDKE 86, and RUCKSTUHL 86. NODE=M010W;LINKAGE=K
[31] From a combined reanalysis of ALBRECHT 86B and DAUM 81B. NODE=M010W;LINKAGE=G
[32] Uses the model of BOWLER 75. NODE=M010W;LINKAGE=D
[33] 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=M010222

NODE=M010DS

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
−0.108±0.016 OUR AVERAGE				
−0.14 ±0.04 ±0.07	[36] CHUNG	02	E852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$
−0.10 ±0.02 ±0.02	[34,35] ACKERSTAFF	97R	OPAL	E^{ee}_{cm}= 88–94, $\tau \to 3\pi\nu$
−0.11 ±0.02	[34] ALBRECHT	93C	ARG	$\tau^+ \to \pi^+\pi^+\pi^-\nu$

[34] Uses the model of ISGUR 89. NODE=M010DS;LINKAGE=IM
[35] Supersedes AKERS 95P. NODE=M010DS;LINKAGE=X
[36] Deck-type background not subtracted. NODE=M010DS;LINKAGE=C

$a_1(1260)$ BRANCHING RATIOS

NODE=M010225

$\Gamma((\rho\pi)_{S-\text{wave}})/\Gamma_{\text{total}}$ 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	[37] ASNER	00	CLE2	10.6 $e^+e^- \to \tau^+\tau^-$, $\tau^- \to \pi^-\pi^0\pi^0\nu_\tau$

$\Gamma((\rho\pi)_{D-\text{wave}})/\Gamma_{\text{total}}$ Γ_4/Γ

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	[37] ASNER 00	CLE2	$10.6\ e^+e^- \rightarrow \tau^+\tau^-$, $\tau^- \rightarrow \pi^-\pi^0\pi^0\nu_\tau$

$\Gamma((\rho(1450)\pi)_{S-\text{wave}})/\Gamma_{\text{total}}$ Γ_5/Γ

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	[37,38] ASNER 00	CLE2	$10.6\ e^+e^- \rightarrow \tau^+\tau^-$, $\tau^- \rightarrow \pi^-\pi^0\pi^0\nu_\tau$

$\Gamma((\rho(1450)\pi)_{D-\text{wave}})/\Gamma_{\text{total}}$ Γ_6/Γ

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	[37,38] ASNER 00	CLE2	$10.6\ e^+e^- \rightarrow \tau^+\tau^-$, $\tau^- \rightarrow \pi^-\pi^0\pi^0\nu_\tau$

$\Gamma(\sigma\pi)/\Gamma_{\text{total}}$ Γ_7/Γ

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	E852	$18.3\ \pi^- p \rightarrow \pi^+\pi^-\pi^- p$
$18.76\pm4.29\pm1.48$	37k	[37,39] ASNER 00	CLE2	$10.6\ e^+e^- \rightarrow \tau^+\tau^-$, $\tau^- \rightarrow \pi^-\pi^0\pi^0\nu_\tau$

$\Gamma(f_0(980)\pi)/\Gamma_{\text{total}}$ Γ_8/Γ

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	$10.6\ e^+e^- \rightarrow \tau^+\tau^-$, $\tau^- \rightarrow \pi^-\pi^0\pi^0\nu_\tau$

$\Gamma(f_0(1370)\pi)/\Gamma_{\text{total}}$ Γ_9/Γ

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	[37,40] ASNER 00	CLE2	$10.6\ e^+e^- \rightarrow \tau^+\tau^-$, $\tau^- \rightarrow \pi^-\pi^0\pi^0\nu_\tau$

$\Gamma(f_2(1270)\pi)/\Gamma_{\text{total}}$ Γ_{10}/Γ

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	[37,41] ASNER 00	CLE2	$10.6\ e^+e^- \rightarrow \tau^+\tau^-$, $\tau^- \rightarrow \pi^-\pi^0\pi^0\nu_\tau$

$\Gamma(K\overline{K}^*(892)+\text{c.c.})/\Gamma_{\text{total}}$ Γ_{11}/Γ

NODE=M010R13

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
8 to 15	205	[42] DRUTSKOY 02	BELL	$B \rightarrow D^{(*)}K^-K^{*0}$
$3.3\pm0.5\pm0.1$	37k	[43] ASNER 00	CLE2	$10.6\ e^+e^- \rightarrow \tau^+\tau^-$, $\tau^- \rightarrow \pi^-\pi^0\pi^0\nu_\tau$

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

NODE=M010R4

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
~ 0.3	28k	AKHMETSHIN 99E	CMD2	1.05–$1.38\ e^+e^- \rightarrow \pi^+\pi^-\pi^+\pi^-$
0.003 ± 0.003		[44] LONGACRE 82	RVUE	

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

NODE=M010R15

VALUE	CL%	DOCUMENT ID		COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.008	90	[45] BARBERIS	01	450 $pp \to p_f 3\pi^0 p_s$

[37] From a fit to the Dalitz plot. NODE=M010R;LINKAGE=B1
[38] Assuming for $\rho(1450)$ mass and width of 1370 and 386 MeV respectively. NODE=M010R;LINKAGE=B2
[39] Assuming for σ mass and width of 860 and 880 MeV respectively. NODE=M010R;LINKAGE=B3
[40] Assuming for $f_0(1370)$ mass and width of 1186 and 350 MeV respectively. NODE=M010R;LINKAGE=B4
[41] Assuming for $f_2(1270)$ mass and width of 1275 and 185 MeV respectively. NODE=M010R;LINKAGE=B5
[42] From a comparison to ALAM 94 assuming purely resonant production of the $K^- K^{*0}$ system. NODE=M010R;LINKAGE=DR
[43] From a fit to the 3π mass spectrum including the $K\overline{K}{}^*(892)$ threshold. NODE=M010R;LINKAGE=B6
[44] Uses multichannel Aitchison-Bowler model (BOWLER 75). Uses data from GAVILLET 77, DAUM 80, and DANKOWYCH 81. NODE=M010R4;LINKAGE=E
[45] 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

GOMEZ DUMM	04	PR D69 073002	D. Gomez Dumm, A. Pich, J. Portoles		REFID=49771
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
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
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
ANDO	92	PL B291 496	A. Ando *et al.*	(KEK, KYOT, NIRS, SAGA+)	REFID=43171
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		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 Translated from YAF 41 1223.	D. Bellini *et al.*		REFID=47490
ZIELINSKI	84C	PRL 52 1195	M. Zielinski *et al.*	(ROCH, MINN, FNAL)	REFID=20882
LONGACRE	82	PR D26 83	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

OTHER RELATED PAPERS

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
FEUILLAT	01	PL B501 37	M. Feuillat, J.L. Lucio, M.J. Pestieau		REFID=48320
MOLCHANOV	01	PL B521 171	V.V. Molchanov *et al.*	(FNAL SELEX Collab.)	REFID=48559
BAKER	99	PL B449 114	C.A. Baker *et al.*		REFID=46888
ZAIMIDOROGA	99	PAN 30 1 Translated from SJPN 30 5.	O.A. Zaimidoroga		REFID=46907
BARNES	97	PR D55 4157	T. Barnes *et al.*	(ORNL, RAL, MCHS)	REFID=45384
AMELIN	95B	PL B356 595	D.V. Amelin *et al.*	(SERP, TBIL)	REFID=44433
BOLONKIN	95	PAN 58 1535 Translated from YAF 58 1628.	B.V. Bolonkin *et al.*	(ITEP)	REFID=44618
WINGATE	95	PRL 74 4596	M. Wingate, T. de Grand	(COLO, FSU)	REFID=44436
CONDO	93	PR D48 3045	G.T. Condo *et al.*	(SLAC Hybrid Collab.)	REFID=43600
GOUZ	92	Dallas HEP 92, p. 572 Proceedings XXVI Int. Conf. on High Energy Physics	Yu.P. Gouz *et al.*	(VES Collab.)	REFID=47527
IIZUKA	89	PR D39 3357	J. Iizuka, H. Koibuchi, F. Masuda	(NAGO, IBAR+)	REFID=41006
BOWLER	86	PL B182 400	M.G. Bowler	(OXF)	REFID=20885
BASDEVANT	78	PRL 40 994	J.L. Basdevant, E.L. Berger	(FNAL, ANL) JP	REFID=20858
BASDEVANT	77	PR D16 657	J.L. Basdevant, E.L. Berger	(FNAL, ANL) JP	REFID=20848
ADERHOLZ	64	PL 10 226	M. Aderholz *et al.*	(AACH3, BERL, BIRM+)	REFID=20770
GOLDHABER	64	PRL 12 336	G. Goldhaber *et al.*	(LRL, UCB)	REFID=20013
LANDER	64	PRL 13 346A	R.L. Lander *et al.*	(UCSD) JP	REFID=21141
BELLINI	63	NC 29 896	G. Bellini *et al.*	(MILA)	REFID=20769

NODE=M005

$f_2(1270)$ $I^G(J^{PC}) = 0^+(2^{++})$

$f_2(1270)$ MASS

NODE=M005205

NODE=M005M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1275.4 ± 1.1 OUR AVERAGE					
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 $\pi^- p \to n2K^0_S$
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 $\pi^- p \to n2\pi$
1269 ± 4	10k	APEL	75	NICE	40 $\pi^- p \to n2\pi^0$
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. • • •					
1251 ±10		TIKHOMIROV	03	SPEC	40.0 $\pi^- C \to K^0_S K^0_S K^0_L X$
1260 ±10		[7] ALDE	97	GAM2	450 $pp \to pp\pi^0\pi^0$
1278 ± 6		[7] 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 $\pi^- p \to n2\eta$
1280 ±20	3k	APEL	82	CNTR	25 $\pi^- p \to n2\pi^0$
1284 ±10	16000	DEUTSCH...	76	HBC	16 $\pi^+ p$
1258 ±10	600	TAKAHASHI	72	HBC	8 $\pi^- p \to n2\pi$
1275 ±13		ARMENISE	70	HBC	9 $\pi^+ n \to p\pi^+\pi^-$
1261 ± 5	1960	[2] ARMENISE	68	DBC	5.1 $\pi^+ n \to p\pi^+ MM^-$
1270 ±10	360	[2] ARMENISE	68	DBC	5.1 $\pi^+ n \to p\pi^0 MM$
1268 ± 6		[8] JOHNSON	68	HBC	3.7–4.2 $\pi^- p$

OCCUR=2

OCCUR=2

[1] T-matrix pole.
[2] Mass errors enlarged by us to $\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass.
[3] From a partial-wave analysis of data using a K-matrix formalism with 5 poles.
[4] From an energy-independent partial-wave analysis.
[5] From an amplitude analysis of the reaction $\pi^+\pi^- \to 2\pi^0$.
[6] From an amplitude analysis of $\pi^+\pi^- \to \pi^+\pi^-$ scattering data.
[7] Systematic uncertainties not estimated.
[8] JOHNSON 68 includes BONDAR 63, LEE 64, DERADO 65, EISNER 67.

NODE=M005M;LINKAGE=A
NODE=M005M;LINKAGE=T
NODE=M005M;LINKAGE=L
NODE=M005M;LINKAGE=O
NODE=M005M;LINKAGE=P
NODE=M005M;LINKAGE=S
NODE=M005M;LINKAGE=QQ
NODE=M005M;LINKAGE=J

$f_2(1270)$ WIDTH

NODE=M005210

NODE=M005W

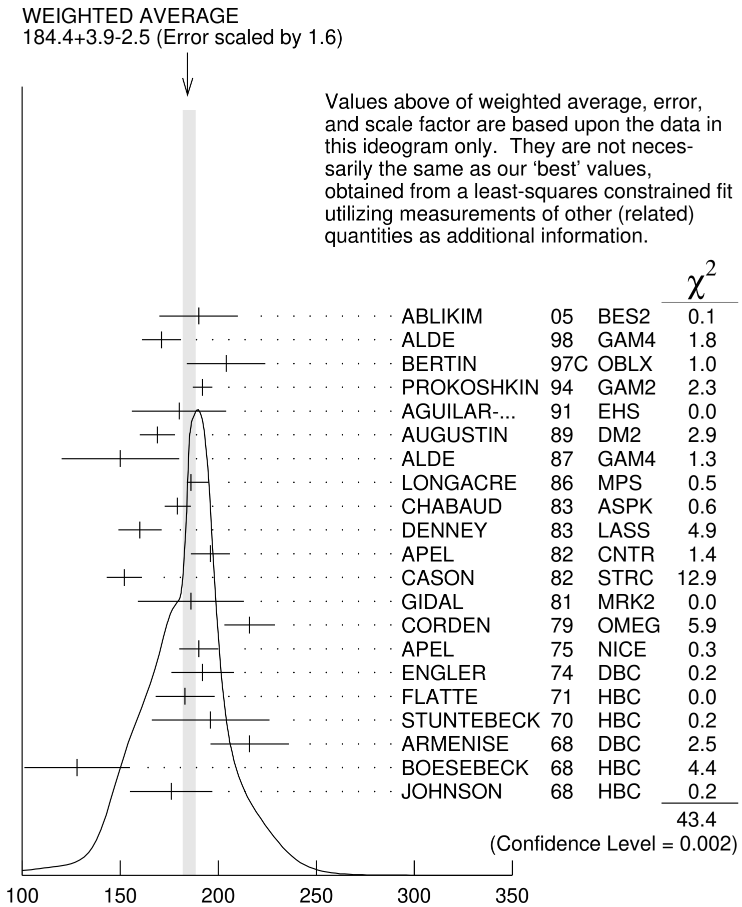
VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$185.2^{+3.1}_{-2.5}$ OUR FIT Error includes scale factor of 1.5.					
$184.4^{+3.9}_{-2.5}$ OUR AVERAGE Error includes scale factor of 1.6. See the ideogram below.					
190 ±20		ABLIKIM	05	BES2	$J/\psi \to \phi\pi^+\pi^-$
171 ±10		ALDE	98	GAM4	100 $\pi^- p \to \pi^0\pi^0 n$
204 ±20		[9] BERTIN	97C	OBLX	0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$
192 ± 5	200k	PROKOSHKIN	94	GAM2	38 $\pi^- p \to \pi^0\pi^0 n$
180 ±24		AGUILAR-...	91	EHS	400 pp
169 ± 9	5730	[10] AUGUSTIN	89	DM2	$e^+e^- \to 5\pi$
150 ±30	400	[10] ALDE	87	GAM4	100 $\pi^- p \to 4\pi^0 n$

$186\ ^{+9}_{-2}$		[11] LONGACRE	86	MPS	$22\ \pi^- p \to n 2 K^0_S$	
$179.2^{+6.9}_{-6.6}$		[12] CHABAUD	83	ASPK	$17\ \pi^- p$ polarized	
160 ± 11		DENNEY	83	LASS	$10\ \pi^+ N$	
196 ± 10	3k	APEL	82	CNTR	$25\ \pi^- p \to n 2\pi^0$	
152 ± 9		[13] CASON	82	STRC	$8\ \pi^+ p \to \Delta^{++} \pi^0 \pi^0$	
186 ± 27	11600	GIDAL	81	MRK2	J/ψ decay	
216 ± 13		[14] CORDEN	79	OMEG	12–15 $\pi^- p \to n 2\pi$	
190 ± 10	10k	APEL	75	NICE	$40\ \pi^- p \to n 2\pi^0$	
192 ± 16	4600	ENGLER	74	DBC	$6\ \pi^+ n \to \pi^+ \pi^- p$	
183 ± 15	5300	FLATTE	71	HBC	$7\ \pi^+ p \to \Delta^{++} f_2$	
196 ± 30		[10] STUNTEBECK	70	HBC	$8\ \pi^- p$, $5.4\ \pi^+ d$	
216 ± 20	1960	[10] ARMENISE	68	DBC	$5.1\ \pi^+ n \to p \pi^+ \text{MM}^-$	OCCUR=2
128 ± 27		[10] BOESEBECK	68	HBC	$8\ \pi^+ p$	
176 ± 21		[10,15] JOHNSON	68	HBC	3.7–4.2 $\pi^- p$	

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

121 ± 26		TIKHOMIROV	03	SPEC	$40.0\ \pi^- C \to K^0_S K^0_S K^0_L X$	
187 ± 20		[16] ALDE	97	GAM2	$450\ p p \to p p \pi^0 \pi^0$	
184 ± 10		[16] GRYGOREV	96	SPEC	$40\ \pi^- N \to K^0_S K^0_S X$	
200 ± 10		AKER	91	CBAR	$0.0\ \overline{p} p \to 3\pi^0$	
240 ± 40	3k	BINON	83	GAM2	$38\ \pi^- p \to n 2\eta$	
187 ± 30	650	[10] ANTIPOV	77	CIBS	$25\ \pi^- p \to p 3\pi$	
225 ± 38	16000	DEUTSCH...	76	HBC	$16\ \pi^+ p$	
166 ± 28	600	[10] TAKAHASHI	72	HBC	$8\ \pi^- p \to n 2\pi$	
173 ± 53		[10] ARMENISE	70	HBC	$9\ \pi^+ n \to p \pi^+ \pi^-$	OCCUR=2

[9] T-matrix pole. NODE=M005W;LINKAGE=QA
[10] Width errors enlarged by us to $4\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M005W;LINKAGE=T
[11] From a partial-wave analysis of data using a K-matrix formalism with 5 poles. NODE=M005W;LINKAGE=L
[12] From an energy-independent partial-wave analysis. NODE=M005W;LINKAGE=R
[13] From an amplitude analysis of the reaction $\pi^+ \pi^- \to 2\pi^0$. NODE=M005W;LINKAGE=Q
[14] From an amplitude analysis of $\pi^+ \pi^- \to \pi^+ \pi^-$ scattering data. NODE=M005W;LINKAGE=U
[15] JOHNSON 68 includes BONDAR 63, LEE 64, DERADO 65, EISNER 67. NODE=M005W;LINKAGE=J
[16] 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	$\pi\pi$	$(84.7 \ ^{+2.5}_{-1.2})$ %	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	$K\overline{K}$	$(\ 4.6 \ \pm0.4)$ %	S=2.7	DESIG=4
Γ_4	$2\pi^+2\pi^-$	$(\ 2.8 \ \pm0.4)$ %	S=1.2	DESIG=2
Γ_5	$\eta\eta$	$(\ 4.0 \ \pm0.8) \times 10^{-3}$	S=2.1	DESIG=7
Γ_6	$4\pi^0$	$(\ 3.0 \ \pm1.0) \times 10^{-3}$		DESIG=9
Γ_7	$\gamma\gamma$	$(\ 1.41\pm0.13) \times 10^{-5}$		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 $\chi^2 = 79.2$ 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	−92						
x_3	12	−38					
x_4	10	−37	1				
x_5	1	−6	0	0			
x_6	0	−7	0	0	0		
x_7	11	−7	−8	1	0	0	
Γ	−78	73	−12	−8	−1	0	−14
	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	$\pi^+\pi^- 2\pi^0$	$13.2 \, ^{+2.8}_{-5.2}$	1.3	DESIG=3
Γ_3	$K\overline{K}$	8.5 ± 0.8	2.7	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 ± 0.19		DESIG=9
Γ_7	$\gamma\gamma$	0.00260 ± 0.00024		DESIG=8

f_2(1270) PARTIAL WIDTHS

NODE=M005220

$\Gamma(\pi\pi)$ — Γ_1

NODE=M005W1
NODE=M005W1

VALUE (MeV)	*DOCUMENT ID*	*TECN*	*COMMENT*
$156.9^{+4.0}_{-1.2}$ OUR NEW UNCHECKED FIT [$156.9^{+3.9}_{-1.2}$ MeV OUR 2005 FIT]			
$157.0^{+6.0}_{-1.0}$	[18] LONGACRE 86	MPS	$22\ \pi^- p \rightarrow n 2K^0_S$

$\Gamma(K\overline{K})$ — Γ_3

NODE=M005W4
NODE=M005W4

VALUE (MeV)	*DOCUMENT ID*	*TECN*	*COMMENT*
8.5 ±0.8 OUR FIT Error includes scale factor of 2.7.			
$9.0 \, ^{+0.7}_{-0.3}$	[18] LONGACRE 86	MPS	$22\ \pi^- p \rightarrow n 2K^0_S$

$\Gamma(\eta\eta)$ — Γ_5

NODE=M005W7
NODE=M005W7

VALUE (MeV)	*DOCUMENT ID*	*TECN*	*COMMENT*
0.74±0.14 OUR NEW UNCHECKED FIT Error includes scale factor of 2.1. [0.83 ± 0.18 MeV OUR 2005 FIT Scale factor = 2.4]			
1.0 ±0.1	[18] LONGACRE 86	MPS	$22\ \pi^- p \rightarrow n 2K^0_S$

$\Gamma(\gamma\gamma)$ — Γ_7

NODE=M005W8

The value of this width depends on the theoretical model used. Unitarised models with scalars give values clustering around $\simeq$ 2.6 keV; without an *S*-wave contribution, values are systematically higher (typically around 3 keV).

NODE=M005W8

NODE=M005W8

VALUE (keV)	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
2.60±0.24 OUR FIT				
$2.71^{+0.26}_{-0.23}$ OUR AVERAGE				
2.84±0.35		BOGLIONE 99	RVUE	$\gamma\gamma \rightarrow \pi^+\pi^-, \pi^0\pi^0$
$2.58 \pm 0.13 \, ^{+0.36}_{-0.27}$		[19] BEHREND 92	CELL	$e^+e^- \rightarrow e^+e^-\pi^+\pi^-$

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

$2.93 \pm 0.23 \pm 0.32$		[17] YABUKI	95	VNS	
$3.10 \pm 0.35 \pm 0.35$		[20] 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		[21] 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	$e^+e^- \to e^+e^-\pi^0\pi^0$
$3.2 \pm 0.1 \pm 0.4$		[22] AIHARA	86B	TPC	$e^+e^- \to e^+e^-\pi^+\pi^-$
$2.5 \pm 0.1 \pm 0.5$		BEHREND	84B	CELL	$e^+e^- \to e^+e^-\pi^+\pi^-$
$2.85 \pm 0.25 \pm 0.5$		[23] BERGER	84	PLUT	$e^+e^- \to e^+e^- 2\pi$
$2.70 \pm 0.05 \pm 0.20$		COURAU	84	DLCO	$e^+e^- \to e^+e^-\pi^+\pi^-$
$2.52 \pm 0.13 \pm 0.38$		[24] SMITH	84C	MRK2	$e^+e^- \to e^+e^-\pi^+\pi^-$
$2.7 \pm 0.2 \pm 0.6$		EDWARDS	82F	CBAL	$e^+e^- \to e^+e^- 2\pi^0$
$2.9 {}^{+0.6}_{-0.4} \pm 0.6$		[25] 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		[26] BERGER	80B	PLUT	e^+e^-

OCCUR=2

[17] With a narrow scalar state around 1220 MeV.

NODE=M005W8;LINKAGE=YA

$\Gamma(e^+e^-)$ 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	$e^+e^- \to \pi^0\pi^0$

[18] From a partial-wave analysis of data using a K-matrix formalism with 5 poles.
[19] Using a unitarized model with a 300 - 500 keV wide scalar at 1100 MeV.
[20] Using the unitarized model of LYTH 85.
[21] 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.
[22] Radiative corrections modify the partial widths; for instance the COURAU 84 value becomes 2.66 ± 0.21 in the calculation of LANDRO 86.
[23] Using the MENNESSIER 83 model.
[24] Superseded by BOYER 90.
[25] If helicity = 2 assumption is not made.
[26] Using mass, width and B($f_2(1270) \to 2\pi$) from PDG 78.

NODE=M005PW;LINKAGE=L
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
0.120 ± 0.014 OUR FIT Error includes scale factor of 1.3.				
$0.091 \pm 0.007 \pm 0.027$	[27] ALBRECHT	90G	ARG	$e^+e^- \to e^+e^-K^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.104 \pm 0.007 \pm 0.072$	[28] ALBRECHT	90G	ARG	$e^+e^- \to e^+e^-K^+K^-$

OCCUR=2

[27] Using an incoherent background.
[28] Using a coherent background.

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

$f_2(1270)$ BRANCHING RATIOS

NODE=M005225

$\Gamma(\pi\pi)/\Gamma_{\text{total}}$ Γ_1/Γ

NODE=M005R10
NODE=M005R10

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$0.847 {}^{+0.025}_{-0.012}$ OUR NEW UNCHECKED FIT Error includes scale factor of 1.2.					
[$0.848 {}^{+0.025}_{-0.012}$ OUR 2005 FIT Scale factor = 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
$0.084^{+0.018}_{-0.034}$ 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 2.7.					
$0.041^{+0.004}_{-0.005}$ OUR AVERAGE					
0.045 ± 0.01		[29] 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		[30] COSTA...	80	OMEG	1–$2.2\ \pi^- p \to K^+ K^- n$
0.030 ± 0.005		[31] MARTIN	79	RVUE	
0.027 ± 0.009		[32] 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 NEW UNCHECKED FIT Error includes scale factor of 2.1. [$(4.5 \pm 1.0) \times 10^{-3}$ OUR 2005 FIT Scale factor = 2.4]				
2.9 ± 0.5 OUR NEW AVERAGE [$(3.1 \pm 0.8) \times 10^{-3}$ OUR 2005 AVERAGE Scale factor = 1.3]				
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	$100\ \pi^- p \to 4\pi^0 n$

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

NODE=M005R5
NODE=M005R5

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

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

NODE=M005R4
NODE=M005R4

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

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

NODE=M005R12
NODE=M005R12

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

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

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

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

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

$f_2(1270)$ REFERENCES

NODE=M005

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	99	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	83B	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	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

OTHER RELATED PAPERS

ABLIKIM	04A	PL B598 149	M. Ablikim *et al.*	(BES Collab.)	REFID=49740
GARMASH	02	PR D65 092005	A. Garmash *et al.*	(BELLE Collab.)	REFID=48634
LI	01	JPG 27 807	D.-M. Li, H. Yu, Q.-X. Shen		REFID=48306

NODE=M008

$f_1(1285)$

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

$f_1(1285)$ MASS

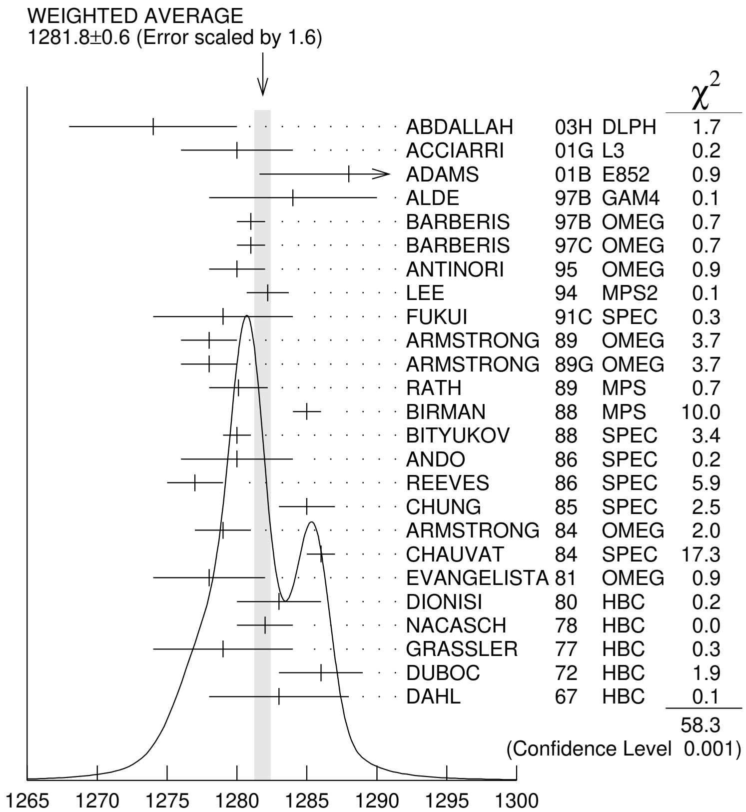
NODE=M008205

NODE=M008M

VALUE (MeV)	*CL%*	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1281.8 ± 0.6 OUR AVERAGE Error includes scale factor of 1.6. See the ideogram below.						
1274 ± 6		237	ABDALLAH	03H	DLPH	91.2 $e^+e^- \to K^0_S K^\pm \pi^\mp + X$
1280 ± 4	95		ACCIARRI	01G	L3	
1288 ± 4 ± 5		20k	ADAMS	01B	E852	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 $pp \to pp 2(\pi^+\pi^-)$
1281 ± 1			BARBERIS	97C	OMEG	450 $pp \to pp K^0_S K^\pm \pi^\mp$
1280 ± 2			[1] ANTINORI	95	OMEG	300,450 $pp \to pp 2(\pi^+\pi^-)$
1282.2 ± 1.5			LEE	94	MPS2	18 $\pi^- p \to K^+ \overline{K}^0 2\pi^- p$
1279 ± 5			FUKUI	91C	SPEC	8.95 $\pi^- p \to \eta \pi^+ \pi^- n$
1278 ± 2		140	ARMSTRONG	89	OMEG	300 $pp \to K \overline{K} \pi pp$
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	[2] BIRMAN	88	MPS	8 $\pi^- p \to K^+ \overline{K}^0 \pi^- n$
1280 ± 1		504	BITYUKOV	88	SPEC	32.5 $\pi^- p \to K^+ K^- \pi^0 n$
1280 ± 4			ANDO	86	SPEC	8 $\pi^- p \to \eta \pi^+ \pi^- n$
1277 ± 2		420	REEVES	86	SPEC	6.6 $p\overline{p} \to K K \pi X$
1285 ± 2			CHUNG	85	SPEC	8 $\pi^- p \to N K \overline{K} \pi$

1279 ± 2	604		ARMSTRONG	84	OMEG	85 $\pi^+ p \to K\overline{K}\pi\pi p$, $pp \to K\overline{K}\pi pp$	
1286 ± 1			CHAUVAT	84	SPEC	ISR 31.5 pp	
1278 ± 4			EVANGELISTA	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		[3]	SOSA	99	SPEC	$pp \to p_{slow}(K^0_S K^+\pi^-) p_{fast}$	
1282.8 ± 0.6		[3]	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 $pp \to pp\pi^+\pi^-\gamma$	
1264 ± 8			AUGUSTIN	90	DM2	$J/\psi \to \gamma\eta\pi^+\pi^-$	
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		[4]	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	[5]	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 $\pi^- p \to n5\pi$	OCCUR=2
1292 ±10	150		DEFOIX	72	HBC	0.7 $\overline{p}p \to 7\pi$	
1280 ± 3	500	[6]	THUN	72	MMS	13.4 $\pi^- p$	
1303 ± 8			BARDADIN-...	71	HBC	8 $\pi^+ p \to p6\pi$	
1283 ± 6			BOESEBECK	71	HBC	16.0 $\pi p \to p5\pi$	
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] Supersedes ABATZIS 94, ARMSTRONG 89E. NODE=M008M;LINKAGE=B
[2] From partial wave analysis of $K^+\overline{K}^0\pi^-$ system. NODE=M008M;LINKAGE=A
[3] No systematic error given. NODE=M008M;LINKAGE=N1
[4] From a unitarized quark-model calculation. NODE=M008M;LINKAGE=T
[5] From phase shift analysis of $\eta\pi^+\pi^-$ system. NODE=M008M;LINKAGE=P
[6] Seen in the missing mass spectrum. NODE=M008M;LINKAGE=S



$f_1(1285)$ mass (MeV)

$f_1(1285)$ WIDTH

NODE=M008210

Only experiments giving width error less than 20 MeV are kept for averaging.

NODE=M008210

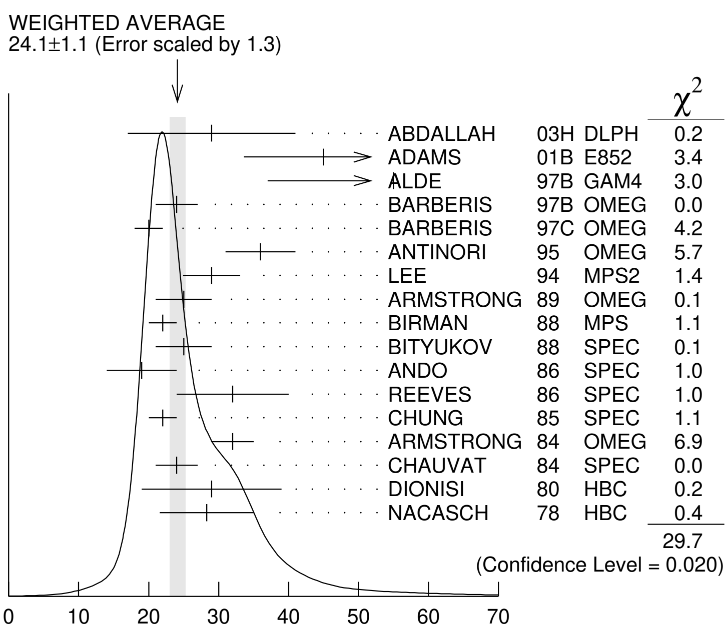
NODE=M008W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
24.1± 1.1 OUR AVERAGE		Error includes scale factor of 1.3. See the ideogram below.			
29 ±12	237	ABDALLAH	03H	DLPH	91.2 $e^+e^- \rightarrow K^0_S K^\pm \pi^\mp + X$
45 ± 9 ± 7	20k	ADAMS	01B	E852	18 GeV $\pi^- p \rightarrow K^+ K^- \pi^0 n$
55 ±18	1400	ALDE	97B	GAM4	100 $\pi^- p \rightarrow \eta \pi^0 \pi^0 n$
24 ± 3		BARBERIS	97B	OMEG	450 $p p \rightarrow p p 2(\pi^+ \pi^-)$
20 ± 2		BARBERIS	97C	OMEG	450 $p p \rightarrow p p K^0_S K^\pm \pi^\mp$
36 ± 5		[7] ANTINORI	95	OMEG	300,450 $p p \rightarrow p p 2(\pi^+ \pi^-)$
29.0± 4.1		LEE	94	MPS2	18 $\pi^- p \rightarrow K^+ \overline{K}^0 2\pi^- p$
25 ± 4	140	ARMSTRONG	89	OMEG	300 $p p \rightarrow K \overline{K} \pi p p$
22 ± 2	4750	[8] BIRMAN	88	MPS	8 $\pi^- p \rightarrow K^+ \overline{K}^0 \pi^- n$
25 ± 4	504	BITYUKOV	88	SPEC	32.5 $\pi^- p \rightarrow K^+ K^- \pi^0 n$
19 ± 5		ANDO	86	SPEC	8 $\pi^- p \rightarrow \eta \pi^+ \pi^- n$
32 ± 8	420	REEVES	86	SPEC	6.6 $p \overline{p} \rightarrow K K \pi X$
22 ± 2		CHUNG	85	SPEC	8 $\pi^- p \rightarrow N K \overline{K} \pi$
32 ± 3	604	ARMSTRONG	84	OMEG	85 $\pi^+ p \rightarrow K \overline{K} \pi \pi p$, $p p \rightarrow K \overline{K} \pi p p$
24 ± 3		CHAUVAT	84	SPEC	ISR 31.5 $p p$
29 ±10	103	DIONISI	80	HBC	4 $\pi^- p \rightarrow K \overline{K} \pi n$
28.3± 6.7	320	NACASCH	78	HBC	0.7,0.76 $\overline{p} p \rightarrow K \overline{K} 3\pi$

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

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT	
18.2 ± 1.2		[9] SOSA	99	SPEC	$pp \to p_{slow} (K^0_S K^+ \pi^-) p_{fast}$	
19.4 ± 1.5		[9] SOSA	99	SPEC	$pp \to p_{slow} (K^0_S K^- \pi^+) p_{fast}$	OCCUR=2
40 ± 5		ABATZIS	94	OMEG	$450\ pp \to pp2(\pi^+\pi^-)$	
44 ± 20		AUGUSTIN	90	DM2	$J/\psi \to \gamma\eta\pi^+\pi^-$	
31 ± 5		ARMSTRONG	89E	OMEG	$300\ pp \to pp2(\pi^+\pi^-)$	
41 ± 12		ARMSTRONG	89G	OMEG	$85\ \pi^+ p \to 4\pi\pi p$, $pp \to 4\pi pp$	
17.9 ± 10.9	60	RATH	89	MPS	$21.4\ \pi^- p \to K^0_S K^0_S \pi^0 n$	
$14 {}^{+20}_{-14} \pm 10$	16	BECKER	87	MRK3	$e^+ e^- \to \phi K \overline{K} \pi$	
26 ± 12		EVANGELISTA	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		[10] 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	[11] DEFOIX	72	HBC	$0.7\ \overline{p} p \to 7\pi$	
46 ± 9	180	[11] DUBOC	72	HBC	$1.2\ \overline{p} p \to 2K 4\pi$	
37 ± 5	500	[12] 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		[11] LORSTAD	69	HBC	$0.7\ \overline{p} p$, 4,5-body	
35 ± 10		[11] DAHL	67	HBC	$1.6–4.2\ \pi^- p$	

[7] Supersedes ABATZIS 94, ARMSTRONG 89E. NODE=M008W;LINKAGE=B
[8] From partial wave analysis of $K^+ \overline{K}^0 \pi^-$ system. NODE=M008W;LINKAGE=A
[9] No systematic error given. NODE=M008W;LINKAGE=N1
[10] From phase shift analysis of $\eta\pi^+\pi^-$ system. NODE=M008W;LINKAGE=P
[11] Resolution is not unfolded. NODE=M008W;LINKAGE=R
[12] Seen in the missing mass spectrum. NODE=M008W;LINKAGE=S



$f_1(1285)$ width (MeV)

$f_1(1285)$ 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	$\eta\pi\pi$	(52 ±16) %		DESIG=3
Γ_8	$a_0(980)\pi$ [ignoring $a_0(980) \to K\overline{K}$]	(36 ± 7) %		DESIG=4
Γ_9	$\eta\pi\pi$ [excluding $a_0(980)\pi$]	(16 ± 7) %		DESIG=5
Γ_{10}	$K\overline{K}\pi$	(9.0± 0.4) %	S=1.1	DESIG=1
Γ_{11}	$K\overline{K}^*(892)$	not seen		DESIG=6
Γ_{12}	$\gamma\rho^0$	(5.5± 1.3) %	S=2.8	DESIG=13
Γ_{13}	$\phi\gamma$	$(7.4\pm 2.6)\times 10^{-4}$		DESIG=10
Γ_{14}	$\gamma\gamma^*$			DESIG=9
Γ_{15}	$\gamma\gamma$			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, $x_i \equiv \Gamma_i/\Gamma_{\rm total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_8	−17			
x_9	−8	−95		
x_{10}	46	−9	−4	
x_{12}	−36	−4	−2	−34
	x_1	x_8	x_9	x_{10}

$f_1(1285)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M008217

$\Gamma(\eta\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\rm total}$ $\quad\Gamma_7\Gamma_{15}/\Gamma = (\Gamma_8+\Gamma_9)\Gamma_{15}/\Gamma$

NODE=M008G2
NODE=M008G2

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

$\Gamma(\eta\pi\pi) \times \Gamma(\gamma\gamma^*)/\Gamma_{\rm total}$ $\quad\Gamma_7\Gamma_{14}/\Gamma = (\Gamma_8+\Gamma_9)\Gamma_{14}/\Gamma$

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	[13,14] AIHARA	88B	TPC	$e^+e^- \to e^+e^-\eta\pi^+\pi^-$
2.30±0.61±0.42		[13,15] GIDAL	87	MRK2	$e^+e^- \to e^+e^-\eta\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.8 ±0.3 ±0.3	420	[16] ACHARD	02B	L3	183–209 $e^+e^- \to e^+e^-\eta\pi^+\pi^-$

[13] Assuming a ρ-pole form factor. NODE=M008G3;LINKAGE=A
[14] Published value multiplied by $\eta\pi\pi$ branching ratio 0.49. NODE=M008G3;LINKAGE=F
[15] Published value divided by 2 and multiplied by the $\eta\pi\pi$ branching ratio 0.49. NODE=M008G3;LINKAGE=B
[16] Published value multiplied by the $\eta\pi\pi$ branching ratio 0.52. NODE=M008G3;LINKAGE=AC

$f_1(1285)$ BRANCHING RATIOS

NODE=M008220

$\Gamma(K\overline{K}\pi)/\Gamma(4\pi)$ $\quad\Gamma_{10}/\Gamma_1$

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	[17] BARBERIS	97C	OMEG	450 $pp \to ppK^0_S K^\pm\pi^\mp$
0.28 ±0.05	[18] ARMSTRONG	89E	OMEG	300 $pp \to ppf_1(1285)$
0.37 ±0.03 ±0.05	[19] ARMSTRONG	89G	OMEG	85 $\pi p \to 4\pi X$

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

$\Gamma(\rho^0\rho^0)/\Gamma_{total}$ — 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 $pp \to p_f 4\pi p_s$

$\Gamma(K\overline{K}\pi)/\Gamma(\eta\pi\pi)$ — $\Gamma_{10}/\Gamma_7 = \Gamma_{10}/(\Gamma_8+\Gamma_9)$

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±0.01 ±0.008	BARBERIS	98C	OMEG	450 $pp \to p_f f_1(1285) p_s$
0.42 ±0.15	GURTU	79	HBC	4.2 $K^- p$
0.5 ±0.2	[20] CORDEN	78	OMEG	12–15 $\pi^- p$
0.20 ±0.08	[21] DEFOIX	72	HBC	0.7 $\overline{p}p \to 7\pi$
0.16 ±0.08	CAMPBELL	69	DBC	2.7 $\pi^+ d$

[20] CORDEN 78 assumes low-mass $\eta\pi\pi$ region is dominantly 1^{++}. See BARBERIS 98C and MANAK 00A for discussion. NODE=M008R2;LINKAGE=CD
[21] $K\overline{K}$ system characterized by the $I = 1$ threshold enhancement. (See under $a_0(980)$). NODE=M008R2;LINKAGE=K

$\Gamma(a_0(980)\pi$ [ignoring $a_0(980) \to K\overline{K}$]$)/\Gamma(\eta\pi\pi)$ — $\Gamma_8/\Gamma_7 = \Gamma_8/(\Gamma_8+\Gamma_9)$

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 $e^+e^- \to e^+e^-\eta\pi^+\pi^-$
0.28±0.07		1400	ALDE	97B	GAM4	100 $\pi^- p \to \eta\pi^0\pi^0 n$
1.0 ±0.3			GRASSLER	77	HBC	16 $\pi^\mp p$

$\Gamma(4\pi)/\Gamma(\eta\pi\pi)$ — $\Gamma_1/\Gamma_7 = \Gamma_1/(\Gamma_8+\Gamma_9)$

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±0.11±0.11	BOLTON	92	MRK3	$J/\psi \to \gamma f_1(1285)$
0.64±0.40	GURTU	79	HBC	4.2 $K^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.93±0.30	[22] GRASSLER	77	HBC	16 $\pi^\mp p$

[22] Assuming $\rho\pi\pi$ and $a_0(980)\pi$ intermediate states. NODE=M008R4;LINKAGE=M

$\Gamma(K\overline{K}^*(892))/\Gamma_{total}$ — Γ_{11}/Γ

NODE=M008R5
NODE=M008R5

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	NACASCH	78	HBC	0.7,0.76 $\overline{p}p \to K\overline{K}3\pi$

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

NODE=M008R6

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.0 ± 0.4	GRASSLER	77	HBC	16 GeV $\pi^\pm p$

$\Gamma(4\pi^0)/\Gamma_{total}$ Γ_6/Γ

NODE=M008R8

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

$\Gamma(\phi\gamma)/\Gamma(K\overline{K}\pi)$ Γ_{13}/Γ_{10}

NODE=M008R9

VALUE (units 10^{-2})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$0.82\pm0.21\pm0.20$		19	BITYUKOV	88	SPEC	32.5 $\pi^- p \to K^+ K^- \pi^0 n$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.50	95		BARBERIS	98C	OMEG	450 $pp \to p_f f_1(1285) p_s$
<0.93	95		AMELIN	95	VES	37 $\pi^- N \to \pi^-\pi^+\pi^-\gamma N$

$\Gamma(\gamma\rho^0)/\Gamma(K\overline{K}\pi)$ Γ_{12}/Γ_{10}

NODE=M008R12

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
>0.035	90	[23] COFFMAN	90	MRK3	$J/\psi \to \gamma\gamma\pi^+\pi^-$

[23] Using B($J/\psi \to \gamma f_1(1285) \to \gamma\gamma\rho^0$)=$0.25\times10^{-4}$ and B($J/\psi \to \gamma f_1(1285) \to \gamma K\overline{K}\pi$)=$< 0.72\times10^{-3}$.

NODE=M008R12;LINKAGE=F

$\Gamma(\gamma\rho^0)/\Gamma(2\pi^+2\pi^-)$ $\Gamma_{12}/\Gamma_3 = \Gamma_{12}/\frac{1}{3}\Gamma_1$

NODE=M008R13

VALUE	DOCUMENT ID		TECN	COMMENT
0.50 ± 0.13 OUR FIT Error includes scale factor of 2.5.				
0.45 ± 0.18	[24] COFFMAN	90	MRK3	$J/\psi \to \gamma\gamma\pi^+\pi^-$

[24] Using B($J/\psi \to \gamma f_1(1285) \to \gamma\gamma\rho^0$)=$0.25\times10^{-4}$ and B($J/\psi \to \gamma f_1(1285) \to \gamma 2\pi^+ 2\pi^-$)=$0.55\times10^{-4}$ given by MIR 88.

NODE=M008R13;LINKAGE=E

$\Gamma(\gamma\rho^0)/\Gamma_{total}$ Γ_{12}/Γ

NODE=M008R15

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
0.055 ± 0.013 OUR FIT Error includes scale factor of 2.8.					
$0.028\pm0.007\pm0.006$		AMELIN	95	VES	37 $\pi^- N \to \pi^-\pi^+\pi^-\gamma N$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.05	95	BITYUKOV	91B	SPEC	32 $\pi^- p \to \pi^+\pi^-\gamma n$

$\Gamma(\eta\pi\pi)/\Gamma(\gamma\rho^0)$ $\Gamma_7/\Gamma_{12} = (\Gamma_8+\Gamma_9)/\Gamma_{12}$

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				
$10.0\pm1.0\pm2.0$	BARBERIS	98C	OMEG	450 $pp \to p_f f_1(1285) p_s$
7.5 ± 1.0	[25] ARMSTRONG	92C	OMEG	300 $pp \to pp\pi^+\pi^-\gamma$, $pp\eta\pi^+\pi^-$

[25] Published value multiplied by 1.5.

NODE=M008R16;LINKAGE=B

$f_1(1285)$ REFERENCES

NODE=M008

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 Translated from YAF 60 458.	D. Alde *et al.*	(GAMS Collab.)	REFID=45396
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 Translated from YAF 54 529.	S.I. Bityukov *et al.*	(SERP)	REFID=41864

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
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
EVANGELISTA	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

OTHER RELATED PAPERS

AHOHE	05	PR D71 072001	R. Ahohe *et al.*	(CLEO Collab.)	REFID=50764
AIHARA	88C	PR D38 1	H. Aihara *et al.*	(TPC-2γ Collab.) JPC	REFID=40564
ASTON	85	PR D32 2255	D. Aston *et al.*	(SLAC, CARL, CNRC)	REFID=20933
ATKINSON	84E	PL 138B 459	M. Atkinson *et al.*	(BONN, CERN, GLAS+)	REFID=20624
GAVILLET	82	ZPHY C16 119	P. Gavillet *et al.*	(CERN, CDEF, PADO+)	REFID=20877
D'ANDLAU	65	PL 17 347	C. d'Andlau *et al.*	(CDEF, CERN, IRAD+)	REFID=20893
MILLER	65	PRL 14 1074	D.H. Miller *et al.*	(LRL, UCB)	REFID=21291

NODE=M037

$\eta(1295)$

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

See also the mini-review under non-$q\overline{q}$ candidates. (See the index for the page number.)

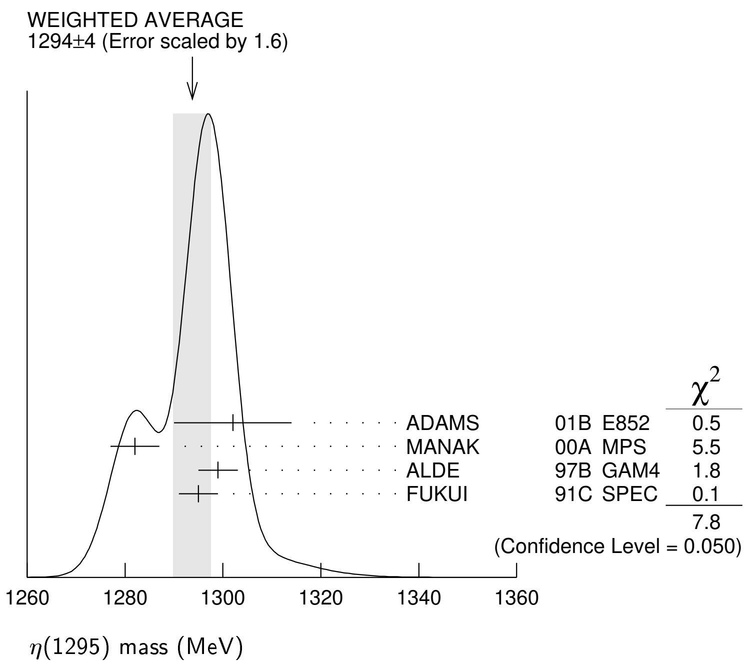
NODE=M037

$\eta(1295)$ MASS

NODE=M037205

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	E852	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. • • •					
~ 1275		STANTON	79	CNTR	8.4 $\pi^- p \to n \eta 2\pi$



$\eta(1295)$ WIDTH

NODE=M037210

NODE=M037W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
55± 5 OUR AVERAGE					
57±23±21	20k	ADAMS	01B	E852	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 $\pi^- p \to \eta \pi^0 \pi^0 n$
~ 70		STANTON	79	CNTR	8.4 $\pi^- p \to n \eta 2\pi$

$\eta(1295)$ 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

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

NODE=M037G2

VALUE (keV)	CL%	DOCUMENT ID		TECN	COMMENT
<0.066	95	ACCIARRI	01G	L3	183–202 $e^+e^- \rightarrow e^+e^-\eta\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.6	90	AIHARA	88C	TPC	$e^+e^- \rightarrow e^+e^-\eta\pi^+\pi^-$
<0.3		ANTREASYAN	87	CBAL	$e^+e^- \rightarrow e^+e^-\eta\pi\pi$

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

NODE=M037G3

VALUE (keV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.014	90	[1,2] AHOHE	05	CLE2	10.6 $e^+e^- \rightarrow e^+e^-K^0_S K^\pm\pi^\mp$

[1] Using $\eta(1295)$ mass and width 1294 MeV and 55 MeV, respectively. NODE=M037G3;LINKAGE=AH

[2] Assuming three-body phase-space decay to $K^0_S K^\pm\pi^\mp$. NODE=M037G3;LINKAGE=B3

$\eta(1295)$ BRANCHING RATIOS

NODE=M037225

$\Gamma(a_0(980)\pi)/\Gamma_{total}$ — Γ_2/Γ

NODE=M037R1

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	BERTIN	97	OBLX	0.0 $\overline{p}p \rightarrow K^\pm(K^0)\pi^\mp\pi^+\pi^-$
seen	BIRMAN	88	MPS	8 $\pi^-p \rightarrow K^+\overline{K}^0\pi^-n$
large	ANDO	86	SPEC	8 $\pi^-p \rightarrow \eta\pi^+\pi^-n$
large	STANTON	79	CNTR	8.4 $\pi^-p \rightarrow n\eta 2\pi$

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

NODE=M037R2

VALUE	DOCUMENT ID		TECN	COMMENT
0.65±0.10	[3] ALDE	97B	GAM4	100 $\pi^-p \rightarrow \eta\pi^0\pi^0n$

[3] 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

VALUE	DOCUMENT ID		TECN	COMMENT
0.35±0.10	ALDE	97B	GAM4	100 $\pi^-p \rightarrow \eta\pi^0\pi^0n$

$\Gamma(a_0(980)\pi)/\Gamma(\sigma\eta)$ — Γ_2/Γ_6

NODE=M037R5

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.48±0.22	9082	MANAK	00A	MPS	18 $\pi^-p \rightarrow \eta\pi^+\pi^-n$

$\eta(1295)$ 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
FUKUI 91C PL B267 293 S. Fukui *et al.* (SUGI, NAGO, KEK, KYOT+) REFID=41748
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

OTHER RELATED PAPERS

ANISOVICH 00F EPJ A6 247 A.V. Anisovich *et al.* REFID=47946

NODE=M058

$\pi(1300)$ $I^G(J^{PC}) = 1^-(0^{-+})$

π(1300) MASS

NODE=M058205

NODE=M058M
→ NOT CHECKED ←

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1300±100 OUR ESTIMATE				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1343± 15±24	CHUNG	02	E852	18.3 $\pi^- p \rightarrow \pi^+\pi^-\pi^- p$
1375± 40	ABELE	01	CBAR	0.0 $\overline{p}d \rightarrow \pi^- 4\pi^0 p$
1275± 15	BERTIN	97D	OBLX	0.05 $\overline{p}p \rightarrow 2\pi^+ 2\pi^-$
~ 1114	ABELE	96	CBAR	0.0 $\overline{p}p \rightarrow 5\pi^0$
1190± 30	ZIELINSKI	84	SPEC	200 $\pi^+ Z \rightarrow Z 3\pi$
1240± 30	BELLINI	82	SPEC	40 $\pi^- A \rightarrow A 3\pi$
1273± 50	[1] AARON	81	RVUE	
1342± 20	BONESINI	81	OMEG	12 $\pi^- p \rightarrow p 3\pi$
~ 1400	DAUM	81B	SPEC	63,94 $\pi^- p$

[1] Uses multichannel Aitchison-Bowler model (BOWLER 75). Uses data from DAUM 80 and DANKOWYCH 81.

NODE=M058M;LINKAGE=E

π(1300) WIDTH

NODE=M058210

NODE=M058W
→ NOT CHECKED ←

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
200 to 600 OUR ESTIMATE				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
449± 39±47	CHUNG	02	E852	18.3 $\pi^- p \rightarrow \pi^+\pi^-\pi^- p$
268± 50	ABELE	01	CBAR	0.0 $\overline{p}d \rightarrow \pi^- 4\pi^0 p$
218±100	BERTIN	97D	OBLX	0.05 $\overline{p}p \rightarrow 2\pi^+ 2\pi^-$
~ 340	ABELE	96	CBAR	0.0 $\overline{p}p \rightarrow 5\pi^0$
440± 80	ZIELINSKI	84	SPEC	200 $\pi^+ Z \rightarrow Z 3\pi$
360±120	BELLINI	82	SPEC	40 $\pi^- A \rightarrow A 3\pi$
580±100	[2] AARON	81	RVUE	
220± 70	BONESINI	81	OMEG	12 $\pi^- p \rightarrow p 3\pi$
~ 600	DAUM	81B	SPEC	63,94 $\pi^- p$

[2] Uses multichannel Aitchison-Bowler model (BOWLER 75). Uses data from DAUM 80 and DANKOWYCH 81.

NODE=M058W;LINKAGE=E

π(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

π(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	$e^+e^- \rightarrow e^+e^-\pi^+\pi^-\pi^0$
<0.54	90	ALBRECHT	97B	ARG	$e^+e^- \rightarrow e^+e^-\pi^+\pi^-\pi^0$

π(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%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen		CHUNG	02	E852	18.3 $\pi^- p \rightarrow \pi^+\pi^-\pi^- p$
<0.15	90	ABELE	01	CBAR	0.0 $\overline{p}d \rightarrow \pi^- 4\pi^0 p$
2.12		[3] AARON	81	RVUE	

[3] Uses multichannel Aitchison-Bowler model (BOWLER 75). Uses data from DAUM 80 and DANKOWYCH 81.

NODE=M058R1;LINKAGE=E

$\pi(1300)$ REFERENCES

NODE=M058

CHUNG	02	PR D65 072001	S.U. Chung *et al.*	(BNL E852 Collab.)	REFID=48837
ABELE	01	EPJ C19 667	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=48334
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
BERTIN	97D	PL B414 220	A. Bertin *et al.*	(OBELIX Collab.)	REFID=45763
ABELE	96	PL B380 453	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=45011
ZIELINSKI	84	PR D30 1855	M. Zielinski *et al.*	(ROCH, MINN, FNAL)	REFID=20881
BELLINI	82	PRL 48 1697	G. Bellini *et al.*	(MILA, BGNA, JINR)	REFID=21134
AARON	81	PR D24 1207	R.A. Aaron, R.S. Longacre	(NEAS, BNL)	REFID=20870
BONESINI	81	PL 103B 75	M. Bonesini *et al.*	(MILA, LIVP, DARE+)	REFID=21130
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+)	REFID=20868
BOWLER	75	NP B97 227	M.G. Bowler *et al.*	(OXFTP, DARE)	REFID=20571

OTHER RELATED PAPERS

ASNER	00	PR D61 012002	D.M. Asner *et al.*	(CLEO Collab.)	REFID=47339
ZAIMIDOROGA	99	PAN 30 1 Translated from SJPN 30 5.	O.A. Zaimidoroga		REFID=46907
ACKERSTAFF	97R	ZPHY C75 593	K. Ackerstaff *et al.*	(OPAL Collab.)	REFID=45616
ALBRECHT	95C	PL B349 576	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=44267

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±0.6 OUR AVERAGE Includes data from the 4 datablocks that follow this one. Error includes scale factor of 1.2.

3π MODE

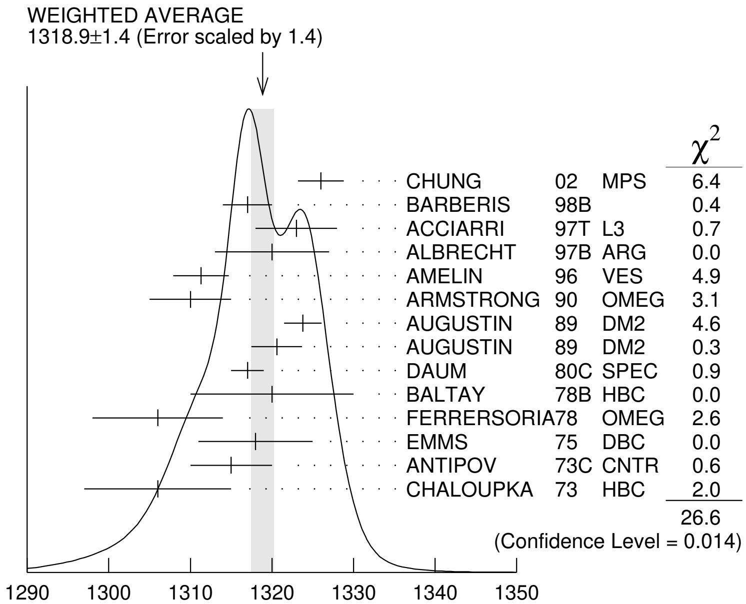
NODE=M012M1

NODE=M012M1

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

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*	
1318.9± 1.4 OUR AVERAGE		Error includes scale factor of 1.4. See the ideogram below.					
1326 ± 2 ±2		CHUNG	02	E852		18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$	
1317 ± 3		BARBERIS	98B			450 $pp \to p_f \pi^+\pi^-\pi^0 p_s$	
1323 ± 4 ±3		ACCIARRI	97T	L3		$e^+e^- \to e^+e^-\pi^+\pi^-\pi^0$	
1320 ± 7		ALBRECHT	97B	ARG		$e^+e^- \to e^+e^-\pi^+\pi^-\pi^0$	
1311.3± 1.6±3.0	72400	AMELIN	96	VES		36 $\pi^- p \to \pi^+\pi^-\pi^0 n$	
1310 ± 5		ARMSTRONG	90	OMEG	0	300.0$pp \to pp\pi^+\pi^-\pi^0$	
1323.8± 2.3	4022	AUGUSTIN	89	DM2	±	$J/\psi \to \rho^\pm a_2^\mp$	
1320.6± 3.1	3562	AUGUSTIN	89	DM2	0	$J/\psi \to \rho^0 a_2^0$	OCCUR=2
1317 ± 2	25000	[1] DAUM	80C	SPEC	−	63,94 $\pi^- p \to 3\pi p$	
1320 ±10	1097	[1] BALTAY	78B	HBC	+0	15 $\pi^+ p \to p 4\pi$	
1306 ± 8		FERRERSORIA	78	OMEG	−	9 $\pi^- p \to p 3\pi$	
1318 ± 7	1600	[1] EMMS	75	DBC	0	4 $\pi^+ n \to p(3\pi)^0$	
1315 ± 5		[1] ANTIPOV	73C	CNTR	−	25,40 $\pi^- p \to p\eta\pi^-$	
1306 ± 9	1580	CHALOUPKA	73	HBC	−	3.9 $\pi^- p$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
1305 ±14		CONDO	93	SHF		$\gamma p \to \eta\pi^+\pi^+\pi^-$	
1310 ± 2		[1] EVANGELISTA	81	OMEG	−	12 $\pi^- p \to 3\pi p$	
1343 ±11	490	BALTAY	78B	HBC	0	15 $\pi^+ p \to \Delta 3\pi$	OCCUR=2
1309 ± 5	5000	BINNIE	71	MMS	−	$\pi^- p$ near a_2 threshold	OCCUR=2
1299 ± 6	28000	BOWEN	71	MMS	−	5 $\pi^- p$	
1300 ± 6	24000	BOWEN	71	MMS	+	5 $\pi^+ p$	OCCUR=2
1309 ± 4	17000	BOWEN	71	MMS	−	7 $\pi^- p$	OCCUR=3
1306 ± 4	941	ALSTON-...	70	HBC	+	7.0 $\pi^+ p \to 3\pi p$	

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



$a_2(1320)$ mass, 3π mode (MeV)

$K^{\pm}K^0_S$ MODE

NODE=M012M2
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.							
1318.1± 0.7 OUR AVERAGE							
1319 ± 5	4700	[2,3] CLELAND	82B	SPEC	+	50 $\pi^+ p \to K^0_S K^+ p$	OCCUR=2
1324 ± 6	5200	[2,3] CLELAND	82B	SPEC	−	50 $\pi^- p \to K^0_S K^- p$	OCCUR=3
1320 ± 2	4000	CHABAUD	80	SPEC	−	17 π^- A $\to K^0_S K^-$ A	
1312 ± 4	11000	CHABAUD	78	SPEC	−	9.8 $\pi^- p \to K^- K^0_S p$	
1316 ± 2	4730	CHABAUD	78	SPEC	−	18.8 $\pi^- p \to K^- K^0_S p$	OCCUR=2
1318 ± 1		[2,4] MARTIN	78D	SPEC	−	10 $\pi^- p \to K^0_S K^- p$	
1320 ± 2	2724	MARGULIE	76	SPEC	−	23 $\pi^- p \to K^- K^0_S p$	
1313 ± 4	730	FOLEY	72	CNTR	−	20.3 $\pi^- p \to K^- K^0_S p$	
1319 ± 3	1500	[4] GRAYER	71	ASPK	−	17.2 $\pi^- p \to K^- K^0_S p$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
1330 ±11	1000	[2,3] CLELAND	82B	SPEC	+	30 $\pi^+ p \to K^0_S K^+ p$	
1324 ± 5	350	HYAMS	78	ASPK	+	12.7 $\pi^+ p \to K^+ K^0_S p$	

[2] From a fit to $J^P = 2^+$ partial wave. NODE=M012M2;LINKAGE=P
[3] Number of events evaluated by us. NODE=M012M2;LINKAGE=W
[4] Systematic error in mass scale subtracted. NODE=M012M2;LINKAGE=S

$\eta\pi$ MODE

NODE=M012M3
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 $p p \to p_f \eta \pi^0 p_s$	
1316 ±9		BARBERIS	00H			450 $p p \to \Delta^{++}_f \eta \pi^- p_s$	OCCUR=2
1317 ±1 ±2		THOMPSON	97	MPS		18 $\pi^- p \to \eta \pi^- p$	
1315 ±5 ±2		[5] AMSLER	94D	CBAR		0.0 $\overline{p} p \to \pi^0 \pi^0 \eta$	
1325.1±5.1		AOYAGI	93	BKEI		$\pi^- p \to \eta \pi^- p$	
1317.7±1.4±2.0		BELADIDZE	93	VES		37$\pi^- N \to \eta \pi^- N$	
1323 ±8	1000	[6] KEY	73	OSPK	−	6 $\pi^- p \to p \pi^- \eta$	

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

1324 ±5		ARMSTRONG	93C	E760	0	$\overline{p}p \to \pi^0\eta\eta \to 6\gamma$	
1336.2±1.7	2561	DELFOSSE	81	SPEC	+	$\pi^\pm p \to p\pi^\pm\eta$	
1330.7±2.4	1653	DELFOSSE	81	SPEC	−	$\pi^\pm p \to p\pi^\pm\eta$	OCCUR=2
1324 ±8	6200	[6,7] CONFORTO	73	OSPK	−	$6\ \pi^- p \to p MM^-$	

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

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

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

$\eta'\pi$ MODE

NODE=M012M4

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	E852	$18\ \pi^- p \to \eta'\pi^- p$
1327.0±10.7	BELADIDZE	93	VES	$37\pi^- N \to \eta'\pi^- N$

$a_2(1320)$ WIDTH

NODE=M012210

3π MODE

NODE=M012W1

NODE=M012W1

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*	
104.7± 1.9 OUR AVERAGE							
108 ± 3 ±15		CHUNG	02	E852		$18.3\ \pi^- p \to \pi^+\pi^-\pi^- p$	
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	72400	AMELIN	96	VES		$36\ \pi^- p \to \pi^+\pi^-\pi^0 n$	
120 ±10		ARMSTRONG	90	OMEG	0	$300.0 pp \to pp\pi^+\pi^-\pi^0$	
107.0± 9.7	4022	AUGUSTIN	89	DM2	±	$J/\psi \to \rho^\pm a_2^\mp$	
118.5±12.5	3562	AUGUSTIN	89	DM2	0	$J/\psi \to \rho^0 a_2^0$	OCCUR=2
97 ± 5		[8] EVANGELISTA	81	OMEG	−	$12\ \pi^- p \to 3\pi p$	
96 ± 9	25000	[8] DAUM	80C	SPEC	−	$63,94\ \pi^- p \to 3\pi p$	
110 ±15	1097	[8] BALTAY	78B	HBC	+0	$15\ \pi^+ p \to p4\pi$	
112 ±18	1600	[8] EMMS	75	DBC	0	$4\ \pi^+ n \to p(3\pi)^0$	
122 ±14	1200	[8,9] WAGNER	75	HBC	0	$7\ \pi^+ p \to \Delta^{++}(3\pi)^0$	
115 ±15		[8] ANTIPOV	73C	CNTR	−	$25,40\ \pi^- p \to p\eta\pi^-$	
99 ±15	1580	CHALOUPKA	73	HBC	−	$3.9\ \pi^- p$	
105 ± 5	28000	BOWEN	71	MMS	−	$5\ \pi^- p$	
99 ± 5	24000	BOWEN	71	MMS	+	$5\ \pi^+ p$	OCCUR=2
103 ± 5	17000	BOWEN	71	MMS	−	$7\ \pi^- p$	OCCUR=3
• • • We do not use the following data for averages, fits, limits, etc. • • •							
120 ±40		CONDO	93	SHF		$\gamma p \to \eta\pi^+\pi^+\pi^-$	
115 ±14	490	BALTAY	78B	HBC	0	$15\ \pi^+ p \to \Delta 3\pi$	OCCUR=2
72 ±16	5000	BINNIE	71	MMS	−	$\pi^- p$ near a_2 threshold	OCCUR=2
79 ±12	941	ALSTON-...	70	HBC	+	$7.0\ \pi^+ p \to 3\pi p$	

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

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

$K^\pm K^0_S$ AND $\eta\pi$ MODES

NODE=M012W0

NODE=M012W0

VALUE (MeV)	*DOCUMENT ID*
107 ±5 OUR ESTIMATE	
110.4±1.7 OUR AVERAGE Includes data from the 2 datablocks that follow this one.	

→ NOT CHECKED ←

$K^{\pm}K^0_S$ MODE

NODE=M012W2
NODE=M012W2

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
The data in this block is included in the average printed for a previous datablock.						
109.8± 2.4 OUR AVERAGE						
112 ±20	4700	[10,11] CLELAND	82B	SPEC	+	50 $\pi^+ p \to K^0_S K^+ p$
120 ±25	5200	[10,11] CLELAND	82B	SPEC	−	50 $\pi^- p \to K^0_S K^- p$
106 ± 4	4000	CHABAUD	80	SPEC	−	17 $\pi^- A \to K^0_S K^- A$
126 ±11	11000	CHABAUD	78	SPEC	−	9.8 $\pi^- p \to K^- K^0_S p$
101 ± 8	4730	CHABAUD	78	SPEC	−	18.8 $\pi^- p \to K^- K^0_S p$
113 ± 4		[10,12] MARTIN	78D	SPEC	−	10 $\pi^- p \to K^0_S K^- p$
105 ± 8	2724	[12] MARGULIE	76	SPEC	−	23 $\pi^- p \to K^- K^0_S p$
113 ±19	730	FOLEY	72	CNTR	−	20.3 $\pi^- p \to K^- K^0_S p$
123 ±13	1500	[12] GRAYER	71	ASPK	−	17.2 $\pi^- p \to K^- K^0_S p$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
121 ±51	1000	[10,11] CLELAND	82B	SPEC	+	30 $\pi^+ p \to K^0_S K^+ p$
110 ±18	350	HYAMS	78	ASPK	+	12.7 $\pi^+ p \to K^+ K^0_S p$

OCCUR=2 (112 ±20); OCCUR=3 (120 ±25); OCCUR=2 (101 ± 8)

[10] From a fit to $J^P = 2^+$ partial wave.
[11] Number of events evaluated by us.
[12] Width errors enlarged by us to $4\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass.

NODE=M012W2;LINKAGE=P
NODE=M012W2;LINKAGE=W
NODE=M012W2;LINKAGE=S

$\eta\pi$ MODE

NODE=M012W3
NODE=M012W3

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
The data in this block is included in the average printed for a previous datablock.						
111.1± 2.4 OUR AVERAGE						
115 ±20		BARBERIS	00H			450 $pp \to p_f \eta\pi^0 p_s$
112 ±14		BARBERIS	00H			450 $pp \to \Delta^{++}_f \eta\pi^- p_s$
112 ± 3 ±2		[13] AMSLER	94D	CBAR		0.0 $\overline{p}p \to \pi^0\pi^0\eta$
103 ± 6 ±3		BELADIDZE	93	VES		37$\pi^- N \to \eta\pi^- N$
112.2± 5.7	2561	DELFOSSE	81	SPEC	+	$\pi^\pm p \to p\pi^\pm\eta$
116.6± 7.7	1653	DELFOSSE	81	SPEC	−	$\pi^\pm p \to p\pi^\pm\eta$
108 ± 9	1000	KEY	73	OSPK	−	6 $\pi^- p \to p\pi^-\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
127 ± 2 ±2		[14] THOMPSON	97	MPS		18 $\pi^- p \to \eta\pi^- p$
118 ±10		ARMSTRONG	93C	E760	0	$\overline{p}p \to \pi^0\eta\eta \to 6\gamma$
104 ± 9	6200	[15] CONFORTO	73	OSPK	−	6 $\pi^- p \to p MM^-$

OCCUR=2 (112 ±14); OCCUR=2 (116.6± 7.7)

[13] The systematic error of 2 MeV corresponds to the spread of solutions.
[14] Resolution is not unfolded.
[15] Missing mass with enriched MMS $= \eta\pi^-$, $\eta = 2\gamma$.

NODE=M012W3;LINKAGE=DD
NODE=M012W3;LINKAGE=A
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	E852	18 $\pi^- p \to \eta'\pi^- p$
106±32	BELADIDZE	93	VES	37$\pi^- N \to \eta'\pi^- N$

$a_2(1320)$ DECAY MODES

NODE=M012215;NODE=M012

	Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	
Γ_1	$\rho\pi$	(70.1 ±2.7) %	S=1.2	DESIG=1
Γ_2	$\eta\pi$	(14.5 ±1.2) %		DESIG=3
Γ_3	$\omega\pi\pi$	(10.6 ±3.2) %	S=1.3	DESIG=4
Γ_4	$K\overline{K}$	(4.9 ±0.8) %		DESIG=2
Γ_5	$\eta'(958)\pi$	(5.3 ±0.9) $\times 10^{-3}$		DESIG=8
Γ_6	$\pi^\pm\gamma$	(2.68±0.31) $\times 10^{-3}$		DESIG=7
Γ_7	$\gamma\gamma$	(9.4 ±0.7) $\times 10^{-6}$		DESIG=9
Γ_8	$\pi^+\pi^-\pi^-$	< 8 %	CL=90%	DESIG=6
Γ_9	e^+e^-	< 6 $\times 10^{-9}$	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 χ^2 = 9.3 for 15 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	10		
x_3	−89	−46	
x_4	−1	−2	−24
	x_1	x_2	x_3

$a_2(1320)$ PARTIAL WIDTHS

NODE=M012220

$\Gamma(\pi^\pm\gamma)$ Γ_6

NODE=M012W7
NODE=M012W7

VALUE (keV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
287± 30 OUR AVERAGE					
284± 25±25	7100	MOLCHANOV 01	SELX		600 $\pi^- A \rightarrow \pi^+\pi^-\pi^- A$
295± 60		CIHANGIR 82	SPEC	+	200 π^+ A
• • • We do not use the following data for averages, fits, limits, etc. • • •					
461±110		[18] MAY 77	SPEC	±	9.7 γA

$\Gamma(\gamma\gamma)$ Γ_7

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		$e^+e^- \rightarrow e^+e^-\pi^+\pi^-\pi^0$
0.96±0.03±0.13		ALBRECHT 97B	ARG		$e^+e^- \rightarrow e^+e^-\pi^+\pi^-\pi^0$
1.26±0.26±0.18	36	BARU 90	MD1		$e^+e^- \rightarrow e^+e^-\pi^+\pi^-\pi^0$
1.00±0.07±0.15	415	BEHREND 90C	CELL	0	$e^+e^- \rightarrow e^+e^-\pi^+\pi^-\pi^0$
1.03±0.13±0.21		BUTLER 90	MRK2		$e^+e^- \rightarrow e^+e^-\pi^+\pi^-\pi^0$
1.01±0.14±0.22	85	OEST 90	JADE		$e^+e^- \rightarrow e^+e^-\pi^0\eta$
0.90±0.27±0.15	56	[16] ALTHOFF 86	TASS	0	$e^+e^- \rightarrow e^+e^- 3\pi$
1.14±0.20±0.26		[17] ANTREASYAN 86	CBAL	0	$e^+e^- \rightarrow e^+e^-\pi^0\eta$
1.06±0.18±0.19		BERGER 84C	PLUT	0	$e^+e^- \rightarrow e^+e^- 3\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.81\pm0.19^{+0.42}_{-0.11}$	35	[16] BEHREND 83B	CELL	0	$e^+e^- \rightarrow e^+e^- 3\pi$
0.77±0.18±0.27	22	[17] EDWARDS 82F	CBAL	0	$e^+e^- \rightarrow e^+e^-\pi^0\eta$

[16] From $\rho\pi$ decay mode.
[17] From $\eta\pi^0$ decay mode.

NODE=M012W;LINKAGE=F
NODE=M012W;LINKAGE=G

$\Gamma(e^+e^-)$ Γ_9

NODE=M012W10
NODE=M012W10

VALUE (eV)	CL%	DOCUMENT ID	TECN	COMMENT
< 0.56	90	ACHASOV 00K	SND	$e^+e^- \rightarrow \pi^0\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<25	90	VOROBYEV 88	ND	$e^+e^- \rightarrow \pi^0\eta$

[18] Assuming one-pion exchange.

NODE=M012W;LINKAGE=M2

$a_2(1320)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(total)$

NODE=M012223

$\Gamma(K\overline{K}) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_4\Gamma_7/\Gamma$

NODE=M012G1
NODE=M012G1

VALUE (keV)	DOCUMENT ID	TECN	COMMENT
0.126±0.007±0.028	[19] ALBRECHT 90G	ARG	$e^+e^- \rightarrow e^+e^- K^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.081±0.006±0.027	[20] ALBRECHT 90G	ARG	$e^+e^- \rightarrow e^+e^- K^+K^-$

OCCUR=2

[19] Using an incoherent background. NODE=M012G1;LINKAGE=A
[20] Using a coherent background. NODE=M012G1;LINKAGE=B

$a_2(1320)$ BRANCHING RATIOS

NODE=M012225

$\Gamma(K\overline{K})/\Gamma(\rho\pi)$ — Γ_4/Γ_1

NODE=M012R1

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
0.070±0.012 OUR FIT						
0.078±0.017		CHABAUD	78	RVUE		
• • • We do not use the following data for averages, fits, limits, etc. • • •						
0.011±0.003		[21] BERTIN	98B	OBLX		0.0 $\overline{p}p \to K^{\pm}K_S\pi^{\mp}$
0.056±0.014	50	[22] CHALOUPKA	73	HBC	−	3.9 $\pi^- p$
0.097±0.018	113	[22] ALSTON-...	71	HBC	+	7.0 $\pi^+ p$
0.06 ±0.03		[22] ABRAMOVI...	70B	HBC	−	3.93 $\pi^- p$
0.054±0.022		[22] CHUNG	68	HBC	−	3.2 $\pi^- p$

[21] Using 4π data from BERTIN 97D. NODE=M012R1;LINKAGE=BE
[22] Included in CHABAUD 78 review. NODE=M012R1;LINKAGE=C

$\Gamma(\eta\pi)/[\Gamma(\rho\pi)+\Gamma(\eta\pi)+\Gamma(K\overline{K})]$ — $\Gamma_2/(\Gamma_1+\Gamma_2+\Gamma_4)$

NODE=M012R2

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
0.162±0.012 OUR FIT						
0.140±0.028 OUR AVERAGE						
0.13 ±0.04		ESPIGAT	72	HBC	±	0.0 $\overline{p}p$
0.15 ±0.04	34	BARNHAM	71	HBC	+	3.7 $\pi^+ p$

$\Gamma(\eta\pi)/\Gamma(\rho\pi)$ — Γ_2/Γ_1

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 $\pi^- p$

$\Gamma(\eta'(958)\pi)/\Gamma_{\text{total}}$ — Γ_5/Γ

NODE=M012R4

VALUE	CL%	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.006	95	ALDE	92B	GAM2		38,100 $\pi^- p \to \eta'\pi^0 n$
<0.02	97	BARNHAM	71	HBC	+	3.7 $\pi^+ p$
0.004±0.004		BOESEBECK	68	HBC	+	8 $\pi^+ p$

$\Gamma(\eta'(958)\pi)/\Gamma(\rho\pi)$ — Γ_5/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 $\pi^+ p$

$\Gamma(K\overline{K})/[\Gamma(\rho\pi)+\Gamma(\eta\pi)+\Gamma(K\overline{K})]$ — $\Gamma_4/(\Gamma_1+\Gamma_2+\Gamma_4)$

NODE=M012R8

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
0.054±0.009 OUR FIT						
0.048±0.012 OUR AVERAGE						
0.05 ±0.02		TOET	73	HBC	+	5 $\pi^+ p$
0.09 ±0.04		TOET	73	HBC	0	5 $\pi^+ p$
0.03 ±0.02	8	DAMERI	72	HBC	−	11 $\pi^- p$
0.06 ±0.03	17	BARNHAM	71	HBC	+	3.7 $\pi^+ p$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
0.020±0.004		[23] ESPIGAT	72	HBC	±	0.0 $\overline{p}p$

OCCUR=2

[23] Not averaged because of discrepancy between masses from $K\overline{K}$ and $\rho\pi$ modes. NODE=M012R8;LINKAGE=A

$\Gamma(\pi^+\pi^-\pi^-)/\Gamma(\rho\pi)$ Γ_8/Γ_1

NODE=M012R9
NODE=M012R9

VALUE	CL%	DOCUMENT ID		TECN	CHG	COMMENT
<0.12	90	ABRAMOVI...	70B	HBC	−	3.93 $\pi^- p$

$\Gamma(\pi^\pm\gamma)/\Gamma_{total}$ Γ_6/Γ

NODE=M012R11
NODE=M012R11

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.005^{+0.005}_{-0.003}$	[24] EISENBERG	72	HBC	4.3,5.25,7.5 γp

[24] Pion-exchange model used in this estimation.

NODE=M012R11;LINKAGE=R

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

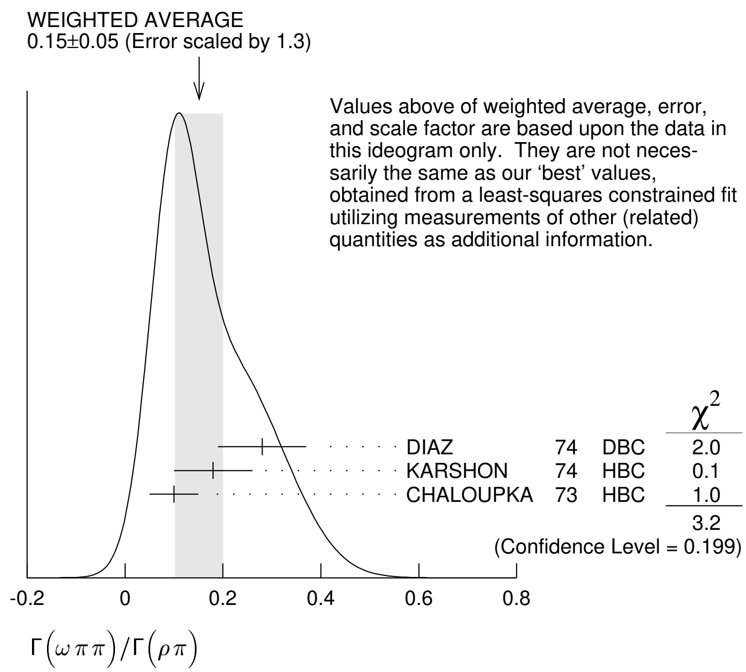
NODE=M012R12
NODE=M012R12

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		[25] 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	[25] KARSHON	74	HBC	0	4.9 $\pi^+ p$
0.10±0.04	60	[25] KARSHON	74	HBC	+	4.9 $\pi^+ p$
0.19±0.08		DEFOIX	73	HBC	0	0.7 $\overline{p}p$

OCCUR=3
OCCUR=2

[25] 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



$\Gamma(\eta'(958)\pi)/\Gamma(\eta\pi)$ Γ_5/Γ_2

NODE=M012R13
NODE=M012R13

VALUE	DOCUMENT ID		TECN	COMMENT
0.037±0.006 OUR AVERAGE				
0.032±0.009	ABELE	97C	CBAR	0.0 $\overline{p}p \to \pi^0\pi^0\eta'$
0.047±0.010±0.004	[26] BELADIDZE	93	VES	$37\pi^- N \to a_2^- N$
0.034±0.008±0.005	BELADIDZE	92	VES	$36\pi^- C \to a_2^- C$

[26] Using B($\eta' \to \pi^+\pi^-\eta$) = 0.441, B($\eta \to \gamma\gamma$) = 0.389 and B($\eta \to \pi^+\pi^-\pi^0$) = 0.236.

NODE=M012R13;LINKAGE=A

$\Gamma(K\overline{K})/\Gamma(\eta\pi)$ Γ_4/Γ_2

NODE=M012R14
NODE=M012R14

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.08±0.02	[27] BERTIN	98B	OBLX	0.0 $\overline{p}p \to K^\pm K_S \pi^\mp$

[27] Using $\eta\pi\pi$ data from AMSLER 94D.

NODE=M012R14;LINKAGE=BE

$\Gamma(e^+e^-)/\Gamma_{total}$ Γ_9/Γ

NODE=M012R15
NODE=M012R15

VALUE (units 10^{-9})	CL%	DOCUMENT ID	TECN	COMMENT
<6	90	ACHASOV 00K	SND	$e^+e^- \rightarrow \pi^0\pi^0$

$a_2(1320)$ REFERENCES

NODE=M012

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.*	(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		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	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
EVANGELISTA	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

OTHER RELATED PAPERS

ALDE	99B	PAN 62 421	D. Alde *et al.*	(GAMS Collab.)	REFID=46913
		Translated from YAF 62 462.			
JENNI	83	PR D27 1031	P. Jenni *et al.*	(SLAC, LBL)	REFID=20304
BEHREND	82C	PL 114B 378	H.J. Behrend *et al.*	(CELLO Collab.)	REFID=20303
ADERHOLZ	65	PR 138B 897	M. Aderholz	(AACH3, BERL, BIRM, BONN, HAMB+)	REFID=21143
ALITTI	65	PL 15 69	J. Alitti *et al.*	(SACL, BGNA) JP	REFID=20774
CHUNG	65	PRL 15 325	S.U. Chung *et al.*	(LRL)	REFID=20667
FORINO	65B	PL 19 68	A. Forino *et al.*	(BGNA, BARI, FIRZ, ORSAY+)	REFID=21146
LEFEBVRES	65	PL 19 434	F. Lefebvres *et al.*		REFID=21147
SEIDLITZ	65	PRL 15 217	L. Seidlitz, O.I. Dahl, D.H. Miller	(LRL)	REFID=21148
ADERHOLZ	64	PL 10 226	M. Aderholz *et al.*	(AACH3, BERL, BIRM+)	REFID=20770
CHUNG	64	PRL 12 621	S.U. Chung *et al.*	(LRL)	REFID=21138
GOLDHABER	64	PRL 12 336	G. Goldhaber *et al.*	(LRL, UCB)	REFID=20013
LANDER	64	PRL 13 346A	R.L. Lander *et al.*	(UCSD)	REFID=21141

NODE=M147

$f_0(1370)$

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

See also the mini-reviews on scalar mesons under $f_0(600)$ and on non-$q\overline{q}$ candidates. (See the index for the page number.)

NODE=M147

$f_0(1370)$ T-MATRIX POLE POSITION

NODE=M147201

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

NODE=M147201

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. • • •						
$(1373 \pm 15)-i(137 \pm 10)$	[12]	BARGIOTTI	03	OBLX	$\overline{p}p$	
$(1302 \pm 17)-i(166 \pm 18)$	[1]	BARBERIS	00C		450 $pp \to p_f 4\pi p_s$	
$(1312 \pm 25 \pm 10)-i(109 \pm 22 \pm 15)$		BARBERIS	99D	OMEG	450 $pp \to K^+K^-, \pi^+\pi^-$	
$(1406 \pm 19)-i(80 \pm 6)$	[2]	KAMINSKI	99	RVUE	$\pi\pi \to \pi\pi, K\overline{K}, \sigma\sigma$	OCCUR=2
$(1300 \pm 20)-i(120 \pm 20)$		ANISOVICH	98B	RVUE	Compilation	
$(1290 \pm 15)-i(145 \pm 15)$		BARBERIS	97B	OMEG	450 $pp \to pp2(\pi^+\pi^-)$	
$(1548 \pm 40)-i(560 \pm 40)$		BERTIN	97C	OBLX	0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$	
$(1380 \pm 40)-i(180 \pm 25)$		ABELE	96B	CBAR	0.0 $\overline{p}p \to \pi^0 K^0_L K^0_L$	
$(1300 \pm 15)-i(115 \pm 8)$		BUGG	96	RVUE		
$(1330 \pm 50)-i(150 \pm 40)$	[3]	AMSLER	95B	CBAR	$\overline{p}p \to 3\pi^0$	
$(1360 \pm 35)-i(150–300)$	[3]	AMSLER	95C	CBAR	$\overline{p}p \to \pi^0\eta\eta$	
$(1390 \pm 30)-i(190 \pm 40)$	[4]	AMSLER	95D	CBAR	$\overline{p}p \to 3\pi^0, \pi^0\eta\eta, \pi^0\pi^0\eta$	OCCUR=2
$1346-i249$	[5,6]	JANSSEN	95	RVUE	$\pi\pi \to \pi\pi, K\overline{K}$	OCCUR=2
$1214-i168$	[6,7]	TORNQVIST	95	RVUE	$\pi\pi \to \pi\pi, K\overline{K}, K\pi, \eta\pi$	
$1364-i139$		AMSLER	94D	CBAR	$\overline{p}p \to \pi^0\pi^0\eta$	
$(1365^{+20}_{-55})-i(134 \pm 35)$		ANISOVICH	94	CBAR	$\overline{p}p \to 3\pi^0, \pi^0\eta\eta$	
$(1340 \pm 40)-i(127^{+30}_{-20})$	[8]	BUGG	94	RVUE	$\overline{p}p \to 3\pi^0, \eta\eta\pi^0, \eta\pi^0\pi^0$	OCCUR=2
$(1430 \pm 5)-i(73 \pm 13)$	[9]	KAMINSKI	94	RVUE	$\pi\pi \to \pi\pi, K\overline{K}$	
$1515-i214$	[6,10]	ZOU	93	RVUE	$\pi\pi \to \pi\pi, K\overline{K}$	
$1420-i220$	[11]	AU	87	RVUE	$\pi\pi \to \pi\pi, K\overline{K}$	

[1] Average between $\pi^+\pi^-2\pi^0$ and $2(\pi^+\pi^-)$. NODE=M147PP;LINKAGE=PC

[2] T-matrix pole on sheet $---$. NODE=M147PP;LINKAGE=TK

[3] Supersedes ANISOVICH 94. NODE=M147PP;LINKAGE=K

[4] Coupled-channel analysis of $\overline{p}p \to 3\pi^0$, $\pi^0\eta\eta$, and $\pi^0\pi^0\eta$ on sheet IV. Demonstrates explicitly that $f_0(600)$ and $f_0(1370)$ are two different poles. NODE=M147PP;LINKAGE=A

[5] Analysis of data from FALVARD 88. NODE=M147PP;LINKAGE=C

[6] The pole is on Sheet III. Demonstrates explicitly that $f_0(600)$ and $f_0(1370)$ are two different poles. NODE=M147PP;LINKAGE=DD

[7] 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

[8] Reanalysis of ANISOVICH 94 data. NODE=M147PP;LINKAGE=C1

[9] T-matrix pole on sheet III. NODE=M147PP;LINKAGE=KM

[10] Analysis of data from OCHS 73, GRAYER 74, and ROSSELET 77. NODE=M147PP;LINKAGE=F

[11] Analysis of data from OCHS 73,GRAYER 74, BECKER 79, and CASON 83. NODE=M147PP;LINKAGE=H

[12] Coupled channel analysis of $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, and $K^\pm K^0_S\pi^\mp$. NODE=M147PP;LINKAGE=BG

$f_0(1370)$ 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
NODE=M147M1

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1350 ± 50		ABLIKIM	05	BES2	$J/\psi \rightarrow \phi\pi^+\pi^-$
1369 ± 26	2584	[13] GARMASH	05	BELL	$B^+ \rightarrow K^+\pi^+\pi^-$
$1434 \pm 18 \pm 9$	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		[14,15] 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] Solution 1, PWA ambiguous. NODE=M147M1;LINKAGE=GA

[14] 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

[15] 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
NODE=M147M2

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1391 ± 10	TIKHOMIROV	03	SPEC	40.0 $\pi^- C \rightarrow K_S^0 K_S^0 K_L^0 X$
1440 ± 50	BOLONKIN	88	SPEC	40 $\pi^- p \rightarrow K_S^0 K_S^0 n$
1463 ± 9	ETKIN	82B	MPS	23 $\pi^- p \rightarrow n 2K_S^0$
1425 ± 15	WICKLUND	80	SPEC	6 $\pi N \rightarrow K^+K^- N$
~ 1300	POLYCHRO...	79	STRC	7 $\pi^- p \rightarrow n 2K_S^0$

4π MODE $2(\pi\pi)_S + \rho\rho$

NODE=M147M3
NODE=M147M3

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1395 ± 40	ABELE	01	CBAR	0.0 $\overline{p}d \rightarrow \pi^- 4\pi^0 p$
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 $\overline{p}n \rightarrow 2\pi^+ 3\pi^-$

$\eta\eta$ MODE

NODE=M147M4
NODE=M147M4

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1430	AMSLER	92	CBAR	0.0 $\overline{p}p \rightarrow \pi^0\eta\eta$
1220 ± 40	ALDE	86D	GAM4	100 $\pi^- p \rightarrow n 2\eta$

COUPLED CHANNEL MODE

NODE=M147M5
NODE=M147M5

VALUE (MeV)	DOCUMENT ID		TECN
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1306 ± 20	[16] ANISOVICH	03	RVUE

[16] K-matrix pole from combined analysis of $\pi^- p \rightarrow \pi^0\pi^0 n$, $\pi^- p \rightarrow K\overline{K}n$, $\pi^+\pi^- \rightarrow \pi^+\pi^-$, $\overline{p}p \rightarrow \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$, $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, $K_S^0K_S^0\pi^0$, $K^+K_S^0\pi^-$ at rest, $\overline{p}n \rightarrow \pi^-\pi^-\pi^+$, $K_S^0K^-\pi^0$, $K_S^0K_S^0\pi^-$ at rest. NODE=M147M;LINKAGE=KM

$f_0(1370)$ BREIT-WIGNER WIDTH

NODE=M147210

NODE=M147W

VALUE (MeV)	DOCUMENT ID
200 to 500 OUR ESTIMATE	

→ 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. • • •					
265±40		ABLIKIM	05	BES2	$J/\psi \to \phi\pi^+\pi^-$
185±52	2584	[17] GARMASH	05	BELL	$B^+ \to K^+\pi^+\pi^-$
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		[18,19] 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		[20] FROGGATT	77	RVUE	$\pi^+\pi^-$ channel

[17] Solution 1, PWA ambiguous. NODE=M147W1;LINKAGE=GA

[18] 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

[19] Also observed by ASNER 00 in $\tau^- \to \pi^-\pi^0\pi^0\nu_\tau$ decays NODE=M147W1;LINKAGE=FF

[20] 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. • • •				
55± 26	TIKHOMIROV	03	SPEC	40.0 $\pi^- C \to K_S^0 K_S^0 K_L^0 X$
250± 80	BOLONKIN	88	SPEC	40 $\pi^- p \to K_S^0 K_S^0 n$
118^{+138}_{-16}	ETKIN	82B	MPS	23 $\pi^- p \to n2K_S^0$
160± 30	WICKLUND	80	SPEC	6 $\pi N \to K^+K^- N$
∼ 150	POLYCHRO...	79	STRC	7 $\pi^- p \to n2K_S^0$

4π MODE $2(\pi\pi)_S+\rho\rho$

NODE=M147W3

VALUE (MeV)	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 $\overline{p}n \to 2\pi^+ 3\pi^-$

$\eta\eta$ MODE

NODE=M147W4

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
250	AMSLER	92	CBAR	0.0 $\overline{p}p \to \pi^0\eta\eta$
320±40	ALDE	86D	GAM4	100 $\pi^- p \to n2\eta$

COUPLED CHANNEL MODE

NODE=M147W5

VALUE (MeV)	DOCUMENT ID		TECN
• • • We do not use the following data for averages, fits, limits, etc. • • •			
147^{+30}_{-50}	[21] ANISOVICH	03	RVUE

[21] K-matrix pole from combined analysis of $\pi^- p \to \pi^0\pi^0 n$, $\pi^- p \to K\overline{K}n$, $\pi^+\pi^- \to \pi^+\pi^-$, $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$, $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, $K_S^0K_S^0\pi^0$, $K^+K_S^0\pi^-$ at rest, $\overline{p}n \to \pi^-\pi^-\pi^+$, $K_S^0K^-\pi^0$, $K_S^0K_S^0\pi^-$ 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}	$\gamma\gamma$	seen	DESIG=12;OUR EST;→ NOT CHECKED ←
Γ_{13}	e^+e^-	not seen	DESIG=13;OUR EST;→ NOT CHECKED ←

$f_0(1370)$ PARTIAL WIDTHS

NODE=M147217

$\Gamma(\gamma\gamma)$ Γ_{12}

NODE=M147W11

See $\gamma\gamma$ widths under $f_0(600)$ and MORGAN 90.

NODE=M147W11

NODE=M147W11

$\Gamma(e^+e^-)$ Γ_{13}

NODE=M147W12
NODE=M147W12

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<20	90	VOROBYEV	88	ND	$e^+e^- \to \pi^0\pi^0$

$f_0(1370)$ BRANCHING RATIOS

NODE=M147220

$\Gamma(\pi\pi)/\Gamma_{total}$ Γ_1/Γ

NODE=M147R3
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	[22] AMSLER	94	CBAR	$\overline{p}p \to \pi^+\pi^-3\pi^0$
<0.20	GASPERO	93	DBC	0.0 $\overline{p}n \to$ hadrons

[22] 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
NODE=M147R4

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.80±0.04	GASPERO	93	DBC	0.0 $\overline{p}n \to$ hadrons

$\Gamma(4\pi^0)/\Gamma_{total}$ Γ_3/Γ

NODE=M147R12
NODE=M147R12

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	ABELE	96	CBAR	0.0 $\overline{p}p \to 5\pi^0$

$\Gamma(2\pi^+2\pi^-)/\Gamma(4\pi)$ $\Gamma_4/\Gamma_2 = \Gamma_4/(\Gamma_3+\Gamma_4+\Gamma_5)$

NODE=M147R5
NODE=M147R5

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.420±0.014	[23] GASPERO	93	DBC	0.0 $\overline{p}n \to 2\pi^+3\pi^-$

[23] Model-dependent evaluation.

NODE=M147R5;LINKAGE=A

$\Gamma(\pi^+\pi^-2\pi^0)/\Gamma(4\pi)$ $\Gamma_5/\Gamma_2 = \Gamma_5/(\Gamma_3+\Gamma_4+\Gamma_5)$

NODE=M147R6
NODE=M147R6

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.512±0.019	[24] GASPERO	93	DBC	0.0 $\overline{p}n \to$ hadrons

[24] Model-dependent evaluation.

NODE=M147R6;LINKAGE=A

$\Gamma(\rho\rho)/\Gamma(2(\pi\pi)_{S\text{-wave}})$ 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	$\overline{p}p \to \pi^+\pi^- 3\pi^0$
0.58±0.16	GASPERO 93	DBC	0.0 $\overline{p}n \to 2\pi^+ 3\pi^-$

$\Gamma(2(\pi\pi)_{S\text{-wave}})/\Gamma(4\pi)$ Γ_7/Γ_2

NODE=M147R15

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
5.6±2.6	[25] 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_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 $\overline{p}n \to 5\pi$

$\Gamma(\rho\rho)/\Gamma(4\pi)$ 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 $\overline{p}n \to 5\pi$

$\Gamma(\pi(1300)\pi)/\Gamma(4\pi)$ 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 $\overline{p}n \to 5\pi$

$\Gamma(a_1(1260)\pi)/\Gamma(4\pi)$ 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 $\overline{p}n \to 5\pi$

$\Gamma(K\overline{K})/\Gamma_{total}$ 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	$J/\psi \to \phi\pi^+\pi^-$, $\phi K^+ K^-$
0.91±0.20	[26] BARGIOTTI 03	OBLX	$\overline{p}p$
0.12±0.06	[27] ANISOVICH 02D	SPEC	Combined fit
0.46±0.15±0.11	BARBERIS 99D	OMEG	450 $pp \to K^+K^-$, $\pi^+\pi^-$

$\Gamma(\eta\eta)/\Gamma(4\pi)$ $\Gamma_{10}/\Gamma_2 = \Gamma_{10}/(\Gamma_3+\Gamma_4+\Gamma_5)$

NODE=M147R14

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$(28 \pm 11) \times 10^{-3}$	[27] ANISOVICH 02D	SPEC	Combined fit
$(4.7 \pm 2.0) \times 10^{-3}$	BARBERIS 00E		450 $pp \to p_f \eta\eta p_s$

[25] From the combined data of ABELE 96 and ABELE 96C. NODE=M147R;LINKAGE=KZ

[26] Coupled channel analysis of $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, and $K^\pm K^0_S \pi^\mp$. NODE=M147R;LINKAGE=BG

[27] 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

f_0(1370) REFERENCES

NODE=M147

ABLIKIM	05	PL B607 243	M. Ablikim *et al.*	(BES Collab.)	REFID=50450
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	99	PAN 62 405	D. Alde *et al.*	(GAMS Collab.)	REFID=46914
		Translated from YAF 62 446.			
ANISOVICH	98B	UFN 41 419	V.V. Anisovich *et al.*		REFID=46331
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
ZOU	93	PR D48 R3948	B.S. Zou, D.V. Bugg	(LOQM)	REFID=43672
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

OTHER RELATED PAPERS

AUBERT,B	05G	PR D72 052002	B. Aubert *et al.*	(BABAR Collab.)	REFID=50775
AUBERT,B	05J	PR D72 052008	B. Aubert *et al.*	(BABAR Collab.)	REFID=50824
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
GIACOSA	05	PR C71 025202	F. Giacosa *et al.*		REFID=50500
LINK	04	PL B585 200	J.M. Link *et al.*	(FNAL FOCUS Collab.)	REFID=49774
ANISOVICH	03B	PAN 66 741	V.V. Anisovich, V.A. Nikonov, A.V. Sarantsev		REFID=49420
		Translated from YAF 66 772.			
ANISOVICH	03D	PAN 66 928	V.V. Anisovich, A.V. Sarantsev		REFID=49422
		Translated from YAF 66 960.			
GARMASH	02	PR D65 092005	A. Garmash *et al.*	(BELLE Collab.)	REFID=48634
JIN	02	PR D66 057505	H. Jin, X. Zhang		REFID=48843
KLEEFELD	02	PR D66 034007	F. Kleefeld *et al.*		REFID=48844
RUPP	02	PR D65 078501	G. Rupp, E. vanBeveren, M.D. Scadron		REFID=48851
SHAKIN	02	PR D65 078502	C.M. Shakin, H. Wang		REFID=48853
TESHIMA	02	JPG 28 1391	T. Teshima, I. Kitamura, N. Morisita		REFID=48854
VOLKOV	02	PAN 65 1657	M.K. Volkov, V.L. Yudichev		REFID=48855
		Translated from YAF 65 1701.			

KOPP	01	PR D63 092001	S. Kopp *et al.*	(CLEO Collab.)	REFID=48134
LI	01B	EPJ C19 529	D.-M. Li, H. Yu, Q.-X. Shen		REFID=48333
SUROVTSEV	01	PR D63 054024	Y.S. Surovtsev, D. Krupa, M. Nagy		REFID=48310
AKHMETSHIN	00C	PL B476 33	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=47423
KAMINSKI	00	APP B31 895	R. Kaminski, L. Lesniak, K. Rybicki		REFID=47520
SADOVSKY	00	NP A655 131c	S.A. Sadovsky		REFID=47430
BEVEREN	99	EPJ C10 469	E. Van Beveren, G. Rupp		REFID=47405
ISHIDA	99	PTP 101 661	M. Ishida		REFID=47521
MINKOWSKI	99	EPJ C9 283	P. Minkowski, W. Ochs		REFID=46928
ACHASOV	98D	PAN 61 224	N.N. Achasov, V.V. Gubin		REFID=46319
ACHASOV	98E	PR D58 054011	N.N. Achasov, G.N. Shestakov		REFID=46320
AMSLER	98	RMP 70 1293	C. Amsler		REFID=46601
ANISOVICH	98	PL B437 209	V.V. Anisovich *et al.*		REFID=46330
BLACK	98	PR D58 054012	D. Black *et al.*		REFID=46352
LOCHER	98	EPJ C4 317	M.P. Locher *et al.*	(PSI)	REFID=46372
NARISON	98	NP B509 312	S. Narison		REFID=47522
ANISOVICH	97	PL B395 123	A.V. Anisovich, A.V. Sarantsev	(PNPI)	REFID=45388
KAMINSKI	97	ZPHY C74 79	R. Kaminski, L. Lesniak, K. Rybicki	(CRAC)	REFID=45532
PROKOSHKIN	97	SPD 42 117 Translated from DANS 353 323.	Y.D. Prokoshkin *et al.*	(SERP)	REFID=45386
TORNQVIST	96	PRL 76 1575	N.A. Tornqvist, M. Roos	(HELS)	REFID=44507
GASPERO	95	NP A588 861	M. Gaspero	(ROMA)	REFID=45422
KLEMPT	95	PL B361 160	E. Klempt *et al.*		REFID=47523
ZOU	94B	PR D50 591	B.S. Zou, D.V. Bugg	(LOQM)	REFID=44072
CLOSE	93A	PL B319 291	F.E. Close *et al.*		REFID=47524
CLOSE	93B	NP B389 513	F.E. Close, N. Isgur, S. Kumano		REFID=47525
MORGAN	93	PR D48 1185	D. Morgan, M.R. Pennington	(RAL, DURH)	REFID=43614
LI	91	PR D43 2161	Z.P. Li *et al.*	(TENN)	REFID=44720
BARNES	85	PL B165 434	T. Barnes		REFID=47526
BIZZARRI	69	NP B14 169	R. Bizzarri *et al.*	(CERN, CDEF)	REFID=20171
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=M109205

NODE=M109M

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
1386±19 OUR AVERAGE				
1440±60	ABELE	97H	CBAR	$\overline{p}p \rightarrow K^0_L K^0_S \pi^0 \pi^0$
1380±20	ASTON	88C	LASS	$11\ K^- p \rightarrow K^0_S K^\pm \pi^\mp \Lambda$

$h_1(1380)$ WIDTH

NODE=M109210

NODE=M109W

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
91±30 OUR AVERAGE Error includes scale factor of 1.1.				
170±80	ABELE	97H	CBAR	$\overline{p}p \rightarrow K^0_L K^0_S \pi^0 \pi^0$
80±30	ASTON	88C	LASS	$11\ K^- p \rightarrow K^0_S K^\pm \pi^\mp \Lambda$

$h_1(1380)$ 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.)	REFID=45765
ASTON	88C	PL B201 573	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)	REFID=40282

OTHER RELATED PAPERS

LI	05D	EPJ A26 141	D.-M. Li, B. Ma, H. Yu	REFID=50969

NODE=M111

$\pi_1(1400)$ $I^G(J^{PC}) = 1^-(1^{-+})$

NODE=M111

See also the mini-review under non-$q\overline{q}$ candidates. (See the index for the page number.)

$\pi_1(1400)$ MASS

NODE=M111205

NODE=M111M

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
1376 ±17 OUR AVERAGE					
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=M111210

NODE=M111W

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
300 ±40 OUR AVERAGE					
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

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
possibly seen	BELADIDZE	93	VES	$37\pi^- N \rightarrow \eta\pi^- N$

$\Gamma(\eta'\pi)/\Gamma(\eta\pi^0)$ Γ_3/Γ_1

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	$100\ \pi^- p \rightarrow 4\gamma n$

$\pi_1(1400)$ REFERENCES

NODE=M111

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.*	(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

OTHER RELATED PAPERS

HEDDITCH	05	PR D72 114507	J.N. Hedditch *et al.*		REFID=50998
ZHANG	05	PR D71 011502R	Z.F. Zhang, H.Y. Jin		REFID=50461
BERNARD	03	PR D68 074505	C. Bernard *et al.*		REFID=49623
JIN	03	PR D67 014025	H.Y. Jin, J.G. Korener, T.G. Steele		REFID=49184
SZCZEPANIAK	03B	PRL 91 092002	A.P. Szczepaniak *et al.*		REFID=49575
ZHANG	03	PR D67 074020	A. Zhang, T.G. Steele		REFID=49409
ACHASOV	02J	PAN 65 552	N.N. Achasov, G.N. Shestakov		REFID=48820
		Translated from YAF 65 579.			
CHUNG	02C	EPL A15 539	S.U. Chung, E. Klempt, J.G. Korener		REFID=49176
ZHANG	02	PR D65 096005	R. Zhang *et al.*		REFID=48856
IDDIR	01	PL B507 183	F. Iddir, A.S. Safir		REFID=48326
SADOVSKY	00	NP A655 131c	S.A. Sadovsky		REFID=47430
ALDE	99B	PAN 62 421	D. Alde *et al.*	(GAMS Collab.)	REFID=46913
		Translated from YAF 62 462.			
CHUNG	99	PR D60 092001	S.U. Chung *et al.*	(BNL E852 Collab.)	REFID=47387
DONNACHIE	98	PR D58 114012	A. Donnachie *et al.*		REFID=46598
LACOCK	97	PL B401 308	P. Lacock *et al.*	(EDIN, LIVP)	REFID=45773
SVEC	97C	PR D56 4355	M. Svec	(MCGI)	REFID=45691
PROKOSHKIN	95C	PAN 58 853	Y.D. Prokoshkin, S.A. Sadovsky	(SERP)	REFID=44620
		Translated from YAF 58 921.			
KALASHNIK...	94	ZPHY C62 323	Y.S. Kalashnikova	(ITEP)	REFID=44088
TUAN	88	PL B213 537	S.F. Tuan, T. Ferbel, R.H. Dalitz	(HAWA, ROCH+)	REFID=40561
ZIELINSKI	87	ZPHY C34 255	M. Zielinski	(ROCH)	REFID=40926

NODE=M027

$\eta(1405)$
was $\eta(1440)$

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

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NODE=M027

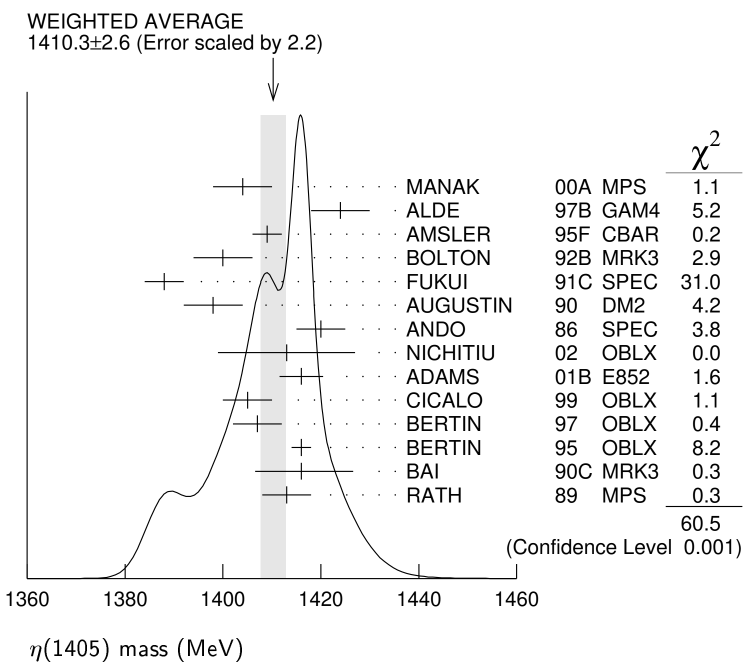
$\eta(1405)$ MASS

NODE=M027205

NODE=M027MX

VALUE (MeV)	DOCUMENT ID

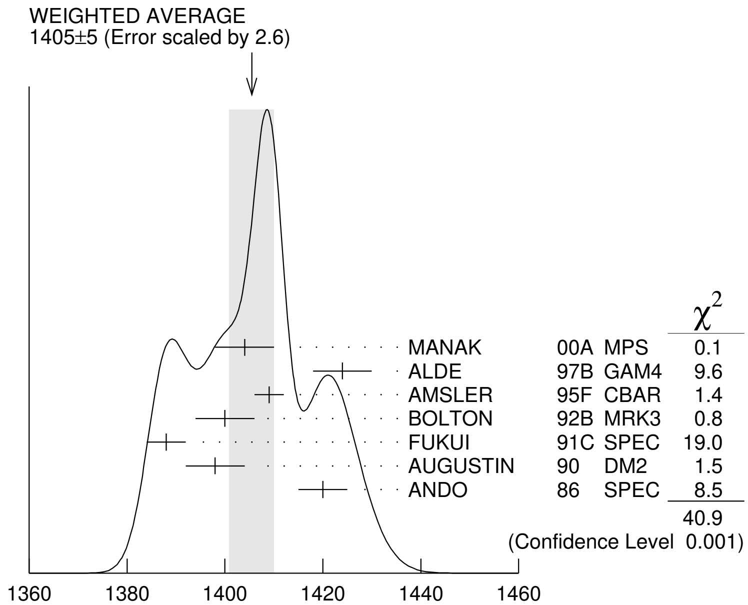
1410.3±2.6 OUR AVERAGE Includes data from the 2 datablocks that follow this one. Error includes scale factor of 2.2. See the ideogram below.



$\eta\pi\pi$ 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.				
1405±5 OUR AVERAGE Error includes scale factor of 2.6. See the ideogram below.				
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		[1] 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	[2] 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	$J/\psi \rightarrow \gamma\pi^+\pi^-$



$\eta(1405)$ 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.

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT	
1413.9± 1.7 OUR AVERAGE		Error includes scale factor of 1.1.			
1413 ±14	3651	[3] NICHITIU	02 OBLX		
1416 ± 4 ±2	20k	ADAMS	01B E852	18 GeV $\pi^- p \to K^+ K^- \pi^0 n$	
1405 ± 5		[4] CICALO	99 OBLX	0 $\overline{p}p \to K^\pm K^0_S \pi^\mp \pi^+ \pi^-$	
1407 ± 5		[4] BERTIN	97 OBLX	0 $\overline{p}p \to K^\pm (K^0) \pi^\mp \pi^+ \pi^-$	
1416 ± 2		[4] BERTIN	95 OBLX	0 $\overline{p}p \to K\overline{K}\pi\pi\pi$	
1416 ± 8 $^{+7}_{-5}$	700	[5] BAI	90C MRK3	$J/\psi \to \gamma K^0_S K^\pm \pi^\mp$	OCCUR=2
1413 ± 5		[5] RATH	89 MPS	21.4 $\pi^- p \to n K^0_S K^0_S \pi^0$	OCCUR=3
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1459 ± 5		[6] AUGUSTIN	92 DM2	$J/\psi \to \gamma K\overline{K}\pi$	

$\pi\pi\gamma$ MODE

NODE=M027M2
NODE=M027M2

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1401±18	[7,8] AUGUSTIN	90 DM2	$J/\psi \to \pi^+\pi^-\gamma\gamma$	OCCUR=4
1432± 8	[8] COFFMAN	90 MRK3	$J/\psi \to \pi^+\pi^- 2\gamma$	

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	[9] 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. • • •					
1442±10	410	[10] BAI	98C BES	$J/\psi \to \gamma K^+ K^- \pi^0$	
1445± 8	693	[10] AUGUSTIN	90 DM2	$J/\psi \to \gamma K^0_S K^\pm \pi^\mp$	
1433± 8	296	[10] AUGUSTIN	90 DM2	$J/\psi \to \gamma K^+ K^- \pi^0$	OCCUR=2
1413± 8	500	[10] DUCH	89 ASTE	$\overline{p}p \to \pi^+\pi^- K^\pm \pi^\mp K^0$	

1453 ± 7	170	[10] RATH	89	MPS	$21.4\ \pi^- p \to K_S^0 K_S^0 \pi^0 n$	OCCUR=2
1419 ± 1	8800	[10] BIRMAN	88	MPS	$8\ \pi^- p \to K^+ \overline{K}^0 \pi^- n$	
1424 ± 3	620	[10] REEVES	86	SPEC	$6.6\ p\overline{p} \to K\overline{K}\pi X$	
1421 ± 2		[10] CHUNG	85	SPEC	$8\ \pi^- p \to K\overline{K}\pi n$	
1440^{+20}_{-15}	174	[10] EDWARDS	82E	CBAL	$J/\psi \to \gamma K^+ K^- \pi^0$	
1440^{+10}_{-15}		[10] SCHARRE	80	MRK2	$J/\psi \to \gamma K_S^0 K^\pm \pi^\mp$	
1425 ± 7	800	[10,11] BAILLON	67	HBC	$0\ \overline{p}p \to K\overline{K}\pi\pi\pi$	

[1] From fit to the $a_0(980)\pi$ 0^{-+} partial wave. NODE=M027M1;LINKAGE=J1
[2] Best fit with a single Breit Wigner. NODE=M027M1;LINKAGE=A1
[3] Decaying dominantly directly to $K^+ K^- \pi^0$. NODE=M027M;LINKAGE=NC
[4] Decaying into $(K\overline{K})_S\pi$, $(K\pi)_S\overline{K}$, and $a_0(980)\pi$. NODE=M027M4;LINKAGE=FX
[5] 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
[6] Excluded from averaging because averaging would be meaningless. NODE=M027M4;LINKAGE=AA
[7] Best fit with a single Breit Wigner. NODE=M027M2;LINKAGE=E
[8] This peak in the $\gamma\rho$ channel may not be related to the $\eta(1405)$. NODE=M027M2;LINKAGE=X
[9] Estimated by us from various fits. NODE=M027M3;LINKAGE=E
[10] These experiments identify only one pseudoscalar in the 1400–1500 range. Data could also refer to $\eta(1475)$. NODE=M027M;LINKAGE=NP
[11] From best fit of 0^{-+} partial wave , 50% $K^*(892)K$, 50% $a_0(980)\pi$. NODE=M027M6;LINKAGE=H

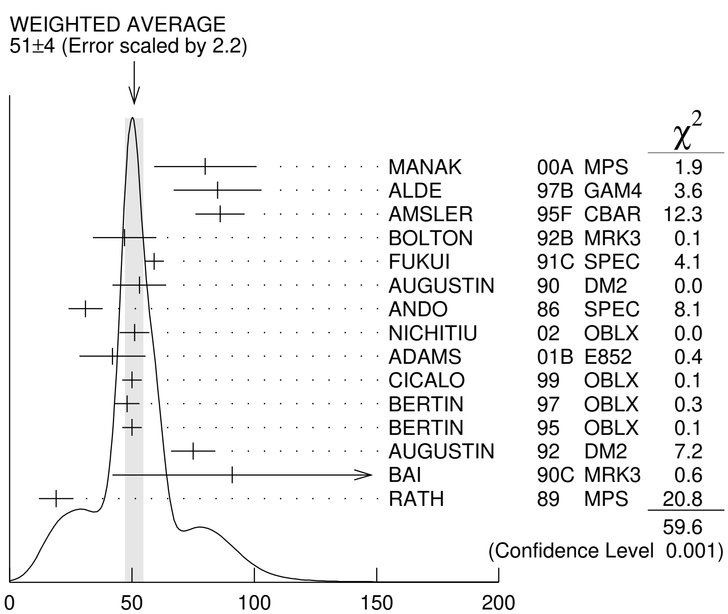
$\eta(1405)$ WIDTH

NODE=M027210

VALUE (MeV)	*DOCUMENT ID*

NODE=M027WX

51±4 OUR AVERAGE Includes data from the 2 datablocks that follow this one. Error includes scale factor of 2.2. See the ideogram below.

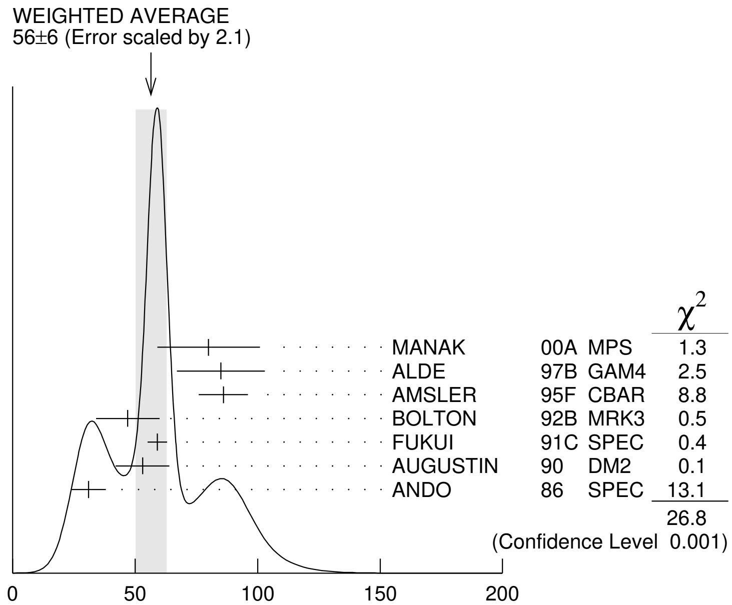


$\eta(1405)$ width (MeV)

$\eta\pi\pi$ MODE

NODE=M027W1
NODE=M027W1

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
The data in this block is included in the average printed for a previous datablock.					
56± 6 OUR AVERAGE Error includes scale factor of 2.1. See the ideogram below.					
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		[12] 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		[13] AUGUSTIN	90	DM2	$J/\psi \to \gamma\eta\pi^+\pi^-$
31 ± 7		ANDO	86	SPEC	$8\ \pi^- p \to \eta\pi^+\pi^- n$

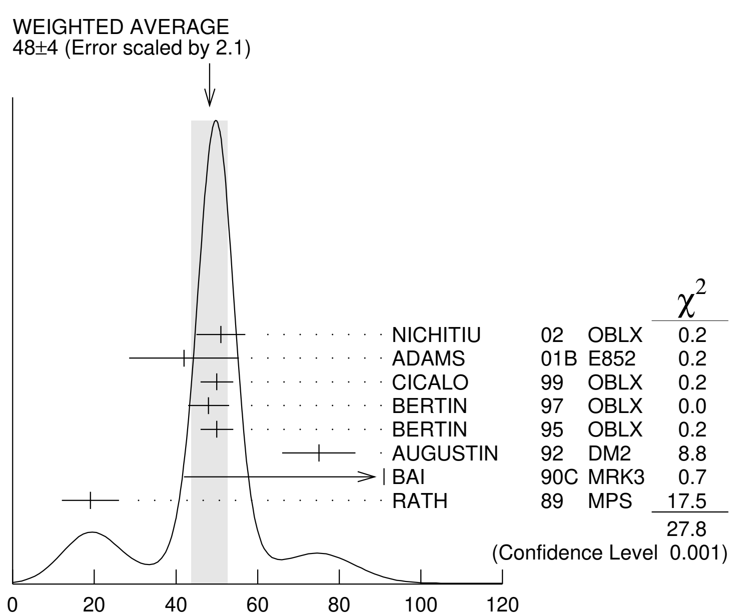


$\eta(1405)$ width $\eta\pi\pi$ mode (MeV)

$K\overline{K}\pi$ MODE ($a_0(980)\pi$ or direct $K\overline{K}\pi$)

NODE=M027W4
NODE=M027W4

VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*	
The data in this block is included in the average printed for a previous datablock.					
48± 4 OUR AVERAGE	Error includes scale factor of 2.1. See the ideogram below.				
51± 6	3651	[14] NICHITIU 02	OBLX		
42±10± 9	20k	ADAMS 01B	E852	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		[15] BERTIN 97	OBLX	0.0 $\overline{p} p \to K^\pm (K^0) \pi^\mp \pi^+ \pi^-$	
50± 4		[15] BERTIN 95	OBLX	0 $\overline{p} p \to K\overline{K}\pi\pi\pi$	
75± 9		AUGUSTIN 92	DM2	$J/\psi \to \gamma K\overline{K}\pi$	
$91^{+67}_{-31}{}^{+15}_{-38}$		[16] BAI 90C	MRK3	$J/\psi \to \gamma K^0_S K^\pm \pi^\mp$	OCCUR=2
19± 7		[16] 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 ($a_0(980)$ π dominant)

$\pi\pi\gamma$ MODE

NODE=M027W2
NODE=M027W2

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
174±44	AUGUSTIN	90	DM2	$J/\psi \to \pi^+\pi^-\gamma\gamma$
90±26	[17] COFFMAN	90	MRK3	$J/\psi \to \pi^+\pi^- 2\gamma$

4π MODE

NODE=M027W3
NODE=M027W3

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
160±30		BUGG	95	MRK3	$J/\psi \to \gamma\pi^+\pi^-\pi^+\pi^-$
144±13	3270	[18] BISELLO	89B	DM2	$J/\psi \to 4\pi\gamma$

$K\overline{K}\pi$ MODE (unresolved)

NODE=M027W6
NODE=M027W6

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
93±14	296	[19] AUGUSTIN	90	DM2	$J/\psi \to \gamma K^+ K^- \pi^0$	OCCUR=2
105±10	693	[19] AUGUSTIN	90	DM2	$J/\psi \to \gamma K^0_S K^\pm \pi^\mp$	OCCUR=3
62±16	500	[19] DUCH	89	ASTE	$\overline{p}p \to K\overline{K}\pi\pi\pi$	
100±11	170	[19] RATH	89	MPS	$21.4\ \pi^- p \to K^0_S K^0_S \pi^0 n$	OCCUR=2
66± 2	8800	[19] BIRMAN	88	MPS	$8\ \pi^- p \to K^+ \overline{K}^0 \pi^- n$	
60±10	620	[19] REEVES	86	SPEC	$6.6\ p\overline{p} \to K K \pi X$	
60±10		[19] CHUNG	85	SPEC	$8\ \pi^- p \to K\overline{K}\pi n$	
55^{+20}_{-30}	174	[19] EDWARDS	82E	CBAL	$J/\psi \to \gamma K^+ K^- \pi^0$	
50^{+30}_{-20}		[19] SCHARRE	80	MRK2	$J/\psi \to \gamma K^0_S K^\pm \pi^\mp$	
80±10	800	[19,20] BAILLON	67	HBC	$0.0\ \overline{p}p \to K\overline{K}\pi\pi\pi$	

[12] From fit to the $a_0(980)\pi$ 0^{-+} partial wave. NODE=M027W1;LINKAGE=A1

[13] From $\eta\pi^+\pi^-$ mass distribution - mainly $a_0(980)\pi$ - no spin–parity determination available. NODE=M027W1;LINKAGE=D1

[14] Decaying dominantly directly to $K^+ K^- \pi^0$. NODE=M027W;LINKAGE=NC

[15] Decaying into $(K\overline{K})_S\pi$, $(K\pi)_S\overline{K}$, and $a_0(980)\pi$. NODE=M027W4;LINKAGE=FX

[16] From fit to the $a_0(980)\pi$ 0^{-+} partial wave , but $a_0(980)\pi$ 1^{++} cannot be excluded. NODE=M027W4;LINKAGE=C

[17] This peak in the $\gamma\rho$ channel may not be related to the $\eta(1405)$. NODE=M027W2;LINKAGE=X

[18] Estimated by us from various fits. NODE=M027W3;LINKAGE=F2

[19] These experiments identify only one pseudoscalar in the 1400–1500 range. Data could also refer to $\eta(1475)$. NODE=M027W;LINKAGE=NP

[20] From best fit to 0^{-+} partial wave , 50% $K^*(892)K$, 50% $a_0(980)\pi$. NODE=M027W6;LINKAGE=H1

$\eta(1405)$ DECAY MODES

NODE=M027215;NODE=M027

	Mode	Fraction (Γ_i/Γ)	
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	$\gamma\gamma$		DESIG=7
Γ_8	$\rho^0\gamma$		DESIG=8
Γ_9	$K^*(892)K$	seen	DESIG=11;OUR EST;→ NOT CHECKED ←

$\eta(1405)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M027220

$\Gamma(K\overline{K}\pi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_1\Gamma_7/\Gamma$

NODE=M027G3
NODE=M027G3

VALUE (keV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.024	90	[21,22] AHOHE	05	CLE2	$10.6\ e^+e^- \to e^+e^- K^0_S K^\pm \pi^\mp$

$\Gamma(\eta\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_2\Gamma_7/\Gamma$

NODE=M027G5
NODE=M027G5

VALUE (keV)	CL%	DOCUMENT ID		TECN	COMMENT
<0.095	95	ACCIARRI	01G	L3	$183–202\ e^+e^- \to e^+e^-\eta\pi^+\pi^-$

$\Gamma(\rho^0\gamma) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_8\Gamma_7/\Gamma$

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

[21] Using $\eta(1405)$ mass and width 1410 MeV and 51 MeV, respectively.
[22] 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. • • •					
<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 $\overline{p}p$

$\Gamma(a_0(980)\pi)/\Gamma(K\overline{K}\pi)$ — Γ_3/Γ_1

NODE=M027R4
NODE=M027R4

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
~ 0.15		[23] BERTIN	95	OBLX	0 $\overline{p}p \to K\overline{K}\pi\pi\pi$
~ 0.8	500	[23] DUCH	89	ASTE	$\overline{p}p \to \pi^+\pi^-K^\pm\pi^\mp K^0$
~ 0.75		[23] 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
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	[24] ALDE	97B	GAM4	100 $\pi^-p \to \eta\pi^0\pi^0 n$
$0.56\pm0.04\pm0.03$		[24] 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
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	MANAK	00A	MPS	18 $\pi^-p \to \eta\pi^+\pi^- n$
$0.70\pm0.12\pm0.20$		[25] BAI	99	BES	$J/\psi \to \gamma\eta\pi^+\pi^-$

$\Gamma(\rho^0\gamma)/\Gamma(K\overline{K}\pi)$ — Γ_8/Γ_1

NODE=M027R7
NODE=M027R7

VALUE	DOCUMENT ID		TECN	COMMENT
0.0152 ± 0.0038	[26] 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
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 $\pi^-p \to \eta\pi^0\pi^0 n$

$\Gamma(a_0(980)\pi)/\Gamma(\eta(\pi\pi)_{S\text{-wave}})$ — Γ_3/Γ_4

NODE=M027R10
NODE=M027R10

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.32 ± 0.07	[27] ANISOVICH	99I	SPEC	0.9–1.2 $\overline{p}p \to \eta 3\pi^0$

$\Gamma(K^*(892)K)/\Gamma(a_0(980)\pi)$ — Γ_9/Γ_3

NODE=M027R11
NODE=M027R11

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.084 ± 0.024	[28] ADAMS	01B	E852	18 GeV $\pi^-p \to K^+K^-\pi^0 n$

[23] Assuming that the $a_0(980)$ decays only into $K\overline{K}$.
[24] Assuming that the $a_0(980)$ decays only into $\eta\pi$.
[25] Assuming that the $a_0(980)$ decays only into $\eta\pi$.
[26] 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 $f_1(1420)$.
[27] Using preliminary Crystal Barrel data.
[28] Statistical error only.

NODE=M027R4;LINKAGE=C
NODE=M027R2;LINKAGE=A
NODE=M027R9;LINKAGE=BK
NODE=M027R7;LINKAGE=D
NODE=M027R10;LINKAGE=D
NODE=M027R;LINKAGE=K3

$\eta(1405)$ REFERENCES

NODE=M027

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
ANISOVICH	01	NP A690 567	A.V. Anisovich *et al.*		REFID=48308
MANAK	00A	PR D62 012003	J.J. Manak *et al.*	(BNL E852 Collab.)	REFID=47989
ANISOVICH	99I	PL B468 304	A.V. Anisovich *et al.*		REFID=47402
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	83	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

OTHER RELATED PAPERS

FADDEEV	04	PR D70 114033	L. Faddeev *et al.*		REFID=50338
LI	03C	EPJ C28 335	D.M. Li *et al.*		REFID=49415
LI	03D	IJMP A18 3335	D.M. Li *et al.*		REFID=49593
ANISOVICH	00F	EPJ A6 247	A.V. Anisovich *et al.*		REFID=47946
CARVALHO	99	EPJ C7 95	W.S. Carvalho *et al.*		REFID=46894
NEKRASOV	98	EPJ C5 507	M.L. Nekrasov		REFID=46374
BERTIN	96	PL B385 493	A. Bertin *et al.*	(Obelix Collab.)	REFID=45196
FARRAR	96	PRL 76 4111	G.R. Farrar	(RUTG)	REFID=45155
AMELIN	95	ZPHY C66 71	D.V. Amelin *et al.*	(VES Collab.)	REFID=44376
GENOVESE	94	ZPHY C61 425	M. Genovese, D.B. Lichtenberg, E. Predazzi	(TORI+)	REFID=44089
BALI	93	PL B309 378	G.S. Bali *et al.*	(LIVP)	REFID=43607
AHMAD	89	NP B (PROC.)8 50	S. Ahmad *et al.*	(ASTERIX Collab.)	REFID=40923
ARMSTRONG	89	PL B221 216	T.A. Armstrong *et al.*	(CERN, CDEF, BIRM+)	REFID=40729
ARMSTRONG	87	ZPHY C34 23	T.A. Armstrong *et al.*	(CERN, BIRM, BARI+)	REFID=40024
ARMSTRONG	84	PL 146B 273	T.A. Armstrong *et al.*	(ATHU, BARI, BIRM+)	REFID=20929
DIONISI	80	NP B169 1	C. Dionisi *et al.*	(CERN, MADR, CDEF+)	REFID=20924
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
LORSTAD	69	NP B14 63	B. Lorstad *et al.*	(CDEF, CERN)	REFID=20901

NODE=M006

$f_1(1420)$

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

See the minireview under $\eta(1405)$.

NODE=M006

$f_1(1420)$ MASS

NODE=M006205

NODE=M006M2

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1426.3± 0.9 OUR AVERAGE		Error includes scale factor of 1.1.			
1426 ± 6	711	ABDALLAH	03H	DLPH	91.2 $e^+e^- \rightarrow K^0_S K^\pm \pi^\mp + X$
1420 ±14	3651	NICHITIU	02	OBLX	
1428 ± 4 ± 2	20k	ADAMS	01B	E852	18 GeV $\pi^- p \rightarrow K^+ K^- \pi^0 n$
1426 ± 1		BARBERIS	97C	OMEG	450 $pp \rightarrow pp K^0_S K^\pm \pi^\mp$
1425 ± 8		BERTIN	97	OBLX	0.0 $\overline{p}p \rightarrow K^\pm (K^0) \pi^\mp \pi^+ \pi^-$
1435 ± 9		PROKOSHKIN	97B	GAM4	100 $\pi^- p \rightarrow \eta \pi^0 \pi^0 n$
1430 ± 4		[1] ARMSTRONG	92E	OMEG	85,300 $\pi^+ p$, $pp \rightarrow \pi^+ p$, $pp(K\overline{K}\pi)$
1462 ±20		[2] AUGUSTIN	92	DM2	$J/\psi \rightarrow \gamma K \overline{K} \pi$
1443 $^{+7}_{-6}$ $^{+3}_{-2}$	1100	BAI	90C	MRK3	$J/\psi \rightarrow \gamma K^0_S K^\pm \pi^\mp$
1425 ±10	17	BEHREND	89	CELL	$\gamma\gamma \rightarrow K^0_S K^\pm \pi^\mp$
1442 ± 5 $^{+10}_{-17}$	111	BECKER	87	MRK3	e^+e^-, $\omega K \overline{K} \pi$
1423 ± 4		GIDAL	87B	MRK2	$e^+e^- \rightarrow e^+e^- K\overline{K}\pi$
1417 ±13	13	AIHARA	86C	TPC	$e^+e^- \rightarrow e^+e^- K\overline{K}\pi$
1422 ± 3		CHAUVAT	84	SPEC	ISR 31.5 pp
1440 ±10		[3] BROMBERG	80	SPEC	100 $\pi^- p \rightarrow K\overline{K}\pi X$
1426 ± 6	221	DIONISI	80	HBC	4 $\pi^- p \rightarrow K\overline{K}\pi n$
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		[4] SOSA	99	SPEC	$pp \rightarrow p_{slow} (K^0_S K^+ \pi^-) p_{fast}$
1433.4± 0.8		[4] SOSA	99	SPEC	$pp \rightarrow p_{slow} (K^0_S K^- \pi^+) p_{fast}$
1429 ± 3	389	ARMSTRONG	89	OMEG	300 $pp \rightarrow K\overline{K}\pi pp$
1425 ± 2	1520	ARMSTRONG	84	OMEG	85 $\pi^+ p$, $pp \rightarrow (\pi^+, p)(K\overline{K}\pi)p$
~ 1420		BITYUKOV	84	SPEC	32 $K^- p \rightarrow K^+ K^- \pi^0 Y$

OCCUR=2

[1] This result supersedes ARMSTRONG 84, ARMSTRONG 89.
NODE=M006M2;LINKAGE=C

[2] From fit to the $K^*(892) K$ 1^{++} partial wave.
NODE=M006M2;LINKAGE=B

[3] Mass error increased to account for $a_0(980)$ mass cut uncertainties.
NODE=M006M2;LINKAGE=A

[4] No systematic error given.
NODE=M006M2;LINKAGE=N1

$f_1(1420)$ WIDTH

NODE=M006210

NODE=M006W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
54.9± 2.6 OUR AVERAGE					
51 ±14	711	ABDALLAH	03H	DLPH	91.2 $e^+e^- \rightarrow K^0_S K^\pm \pi^\mp + X$
61 ± 8	3651	NICHITIU	02	OBLX	
38 ± 9 ±6	20k	ADAMS	01B	E852	18 GeV $\pi^- p \rightarrow K^+ K^- \pi^0 n$
58 ± 4		BARBERIS	97C	OMEG	450 $pp \rightarrow pp K^0_S K^\pm \pi^\mp$
45 ±10		BERTIN	97	OBLX	0.0 $\overline{p}p \rightarrow K^\pm (K^0) \pi^\mp \pi^+ \pi^-$
90 ±25		PROKOSHKIN	97B	GAM4	100 $\pi^- p \rightarrow \eta \pi^0 \pi^0 n$
58 ±10		[5] ARMSTRONG	92E	OMEG	85,300 $\pi^+ p$, $pp \rightarrow \pi^+ p$, $pp(K\overline{K}\pi)$
129 ±41		[6] AUGUSTIN	92	DM2	$J/\psi \rightarrow \gamma K \overline{K} \pi$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT	
$68\ ^{+29}_{-18}\ ^{+8}_{-9}$	1100	BAI	90C	MRK3	$J/\psi \to \gamma K^0_S K^\pm \pi^\mp$	
$42\ \pm 22$	17	BEHREND	89	CELL	$\gamma\gamma \to K^0_S K^\pm \pi^\mp$	
$40\ ^{+17}_{-13}\ \pm 5$	111	BECKER	87	MRK3	$e^+ e^- \to \omega K \overline{K} \pi$	
$35\ ^{+47}_{-20}$	13	AIHARA	86C	TPC	$e^+ e^- \to e^+ e^- K \overline{K} \pi$	
$47\ \pm 10$		CHAUVAT	84	SPEC	ISR 31.5 $p p$	
$62\ \pm 14$		BROMBERG	80	SPEC	100 $\pi^- p \to K \overline{K} \pi X$	
$40\ \pm 15$	221	DIONISI	80	HBC	4 $\pi^- p \to K \overline{K} \pi n$	
$60\ \pm 20$		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		[7] SOSA	99	SPEC	$p p \to p_{slow} (K^0_S K^+ \pi^-) p_{fast}$	
58.8 ± 3.3		[7] SOSA	99	SPEC	$p p \to p_{slow} (K^0_S K^- \pi^+) p_{fast}$	OCCUR=2
$58\ \pm 8$	389	ARMSTRONG	89	OMEG	300 $p p \to K \overline{K} \pi p p$	
$62\ \pm 5$	1520	ARMSTRONG	84	OMEG	85 $\pi^+ p$, $p p \to (\pi^+, p)(K \overline{K} \pi) p$	
~ 50		BITYUKOV	84	SPEC	32 $K^- p \to K^+ K^- \pi^0 Y$	

[5] This result supersedes ARMSTRONG 84, ARMSTRONG 89. NODE=M006W;LINKAGE=C
[6] From fit to the $K^*(892) K$ 1^{++} partial wave. NODE=M006W;LINKAGE=B
[7] 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

$\Gamma(K \overline{K} \pi) \times \Gamma(\gamma\gamma^*)/\Gamma_{total}$

NODE=M006G2
NODE=M006G2

VALUE (keV)	CL%	DOCUMENT ID		TECN	COMMENT
1.7±0.4 OUR AVERAGE					
$3.0 \pm 0.9 \pm 0.7$		[8,9] BEHREND	89	CELL	$e^+ e^- \to e^+ e^- K^0_S K \pi$
$2.3^{+1.0}_{-0.9} \pm 0.8$		HILL	89	JADE	$e^+ e^- \to e^+ e^- K^\pm K^0_S \pi^\mp$
$1.3 \pm 0.5 \pm 0.3$		AIHARA	88B	TPC	$e^+ e^- \to e^+ e^- K^\pm K^0_S \pi^\mp$
$1.6 \pm 0.7 \pm 0.3$		[8,10] 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	$e^+ e^- \to e^+ e^- K \overline{K} \pi$

[8] Assume a ρ-pole form factor. NODE=M006G2;LINKAGE=A
[9] A ϕ - pole form factor gives considerably smaller widths. NODE=M006G2;LINKAGE=D
[10] 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

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

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

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

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

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.65±0.27	[11] DIONISI	80	HBC	4 $\pi^- p$

[11] 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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
0.04 ±0.01 ±0.01		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

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.08	95	[12] ARMSTRONG	92C	SPEC	300 $pp \to pp\pi^+\pi^-\gamma$

[12] 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

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.003 ±0.001 ±0.001	BARBERIS	98C	OMEG	450 $pp \to p_f f_1(1420) p_s$

$f_1(1420)$ REFERENCES

NODE=M006

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	65	PRL 14 1074	D.H. Miller *et al.*	(LRL, UCB)	REFID=21291

OTHER RELATED PAPERS

AHOHE	05	PR D71 072001	R. Ahohe *et al.*	(CLEO Collab.)	REFID=50764
KANADA-EN...	05	PR D71 094005	Y. Kanada-Enyo, O. Morimatsu, T. Nishikawa		REFID=50800
PROKOSHKIN	99	PAN 62 356	Yu.D. Prokoshkin		REFID=46946
		Translated from YAF 62 396.			
IIZUKA	91	PTP 86 885	J. Iizuka, H. Koibuchi	(NAGO)	REFID=44654
ISHIDA	89	PTP 82 119	S. Ishida *et al.*	(NIHO)	REFID=41008
AIHARA	88C	PR D38 1	H. Aihara *et al.*	(TPC-2γ Collab.) JPC	REFID=40564
BITYUKOV	88	PL B203 327	S.I. Bityukov *et al.*	(SERP)	REFID=40569
PROTOPOP...	87B	Hadron 87 Conf.	S.D. Protopopescu, S.U. Chung	(BNL)	REFID=40328

NODE=M125

$\omega(1420)$ $I^G(J^{PC}) = 0^-(1^{--})$

$\omega(1420)$ MASS

NODE=M125205

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. • • •				
$1350\pm 20\pm 20$		AUBERT,B	04N BABR	10.6 $e^+e^- \to \pi^+\pi^-\pi^0\gamma$
$1400\pm 50\pm130$	1.2M	[1] ACHASOV	03D RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
1450 ± 10		[2] HENNER	02 RVUE	1.2–2.0 $e^+e^- \to \rho\pi$, $\omega\pi\pi$
1373 ± 70	177	[3] AKHMETSHIN	00D CMD2	1.2–1.38 $e^+e^- \to \omega\pi^+\pi^-$
1370 ± 25	5095	ANISOVICH	00H SPEC	0.0 $p\overline{p} \to \omega\pi^0\pi^0\pi^0$
1400^{+100}_{-200}		[4] ACHASOV	98H RVUE	$e^+e^- \to \pi^+\pi^-\pi^0$
~ 1400		[5] ACHASOV	98H RVUE	$e^+e^- \to \omega\pi^+\pi^-$
~ 1460		[6] ACHASOV	98H RVUE	$e^+e^- \to K^+K^-$
1440 ± 70		[7] CLEGG	94 RVUE	
1419 ± 31	315	[8] ANTONELLI	92 DM2	1.34–2.4$e^+e^- \to \rho\pi$

→ 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=M125210

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. • • •				
$450\pm 70\pm 70$		AUBERT,B	04N BABR	10.6 $e^+e^- \to \pi^+\pi^-\pi^0\gamma$
$870^{+500}_{-300}\pm450$	1.2M	[9] ACHASOV	03D RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
199 ± 15		[10] HENNER	02 RVUE	1.2–2.0 $e^+e^- \to \rho\pi$, $\omega\pi\pi$
188 ± 45	177	[11] AKHMETSHIN	00D CMD2	1.2–1.38 $e^+e^- \to \omega\pi^+\pi^-$
360^{+100}_{-60}	5095	ANISOVICH	00H SPEC	0.0 $p\overline{p} \to \omega\pi^0\pi^0\pi^0$
240 ± 70		[12] CLEGG	94 RVUE	
174 ± 59	315	[13] ANTONELLI	92 DM2	1.34–2.4$e^+e^- \to \rho\pi$

→ 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

$\Gamma(\rho\pi) \times \Gamma(e^+e^-)/\Gamma^2_{\text{total}}$ $\Gamma_1\Gamma_4/\Gamma^2$

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 ±0.05 ±0.06		AUBERT,B 04N	BABR	10.6 $e^+e^- \to \pi^+\pi^-\pi^0\gamma$
0.65 ±0.13 ±0.21	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

$\Gamma(\omega\pi\pi) \times \Gamma(e^+e^-)/\Gamma^2_{\text{total}}$ $\Gamma_2\Gamma_4/\Gamma^2$

NODE=M125G4
NODE=M125G4

VALUE (units 10^{-8})	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.3±1.3	612	[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

$\Gamma(\pi^0\gamma) \times \Gamma(e^+e^-)/\Gamma^2_{\text{total}}$ $\Gamma_5\Gamma_4/\Gamma^2$

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

$\Gamma(\omega\pi\pi)/\Gamma_{\text{total}}$ 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	[23] 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 $p\overline{p} \to \omega\pi^0\pi^0\pi^0$

$\Gamma(\rho\pi)/\Gamma_{\text{total}}$ 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	[23] 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
NODE=M125R4

VALUE (units 10^{-7})	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$\sim$ 6.6	1.2M	[22,24] ACHASOV	03D RVUE	0.44–2.00 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$
23 $\pm$1		[23] HENNER	02 RVUE	1.2–2.0 $e^+e^- \rightarrow \rho\pi$, $\omega\pi\pi$

[22] Assuming that the $\omega(1420)$ decays into $\rho\pi$ only.

NODE=M125R;LINKAGE=GS

[23] Assuming that the $\omega(1420)$ decays into $\rho\pi$ and $\omega\pi\pi$ only.

NODE=M125R;LINKAGE=AC

[24] Calculated by us from the cross section at the peak.

NODE=M125R;LINKAGE=AW

$\omega(1420)$ REFERENCES

NODE=M125

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	L.M. Barkov *et al.*	(NOVO)	REFID=40280
		Translated from ZETFP 46 132.			
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

OTHER RELATED PAPERS

ACHASOV	02B	PAN 65 153	N.N. Achasov, A.A. Kozhevnikov		REFID=48618
		Translated from YAF 65 158.			
CLOSE	02	PR D65 092003	F.E. Close, A. Donnachie, Yu.S. Kalashnikova		REFID=48838
ACHASOV	00J	PR D62 117503	N.N. Achasov, A.A. Kozhevnikov		REFID=47932
ABELE	99D	PL B468 178	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=47401
BELOZEROVA	98	PPN 29 63	T.S. Belozerova, V.K. Henner		REFID=46350
		Translated from FECAY 29 148.			
ACHASOV	97F	PAN 60 2029	N.N. Achasov, A.A. Kozhevnikov	(NOVM)	REFID=45858
		Translated from YAF 60 2212.			
ATKINSON	87	ZPHY C34 157	M. Atkinson *et al.*	(BONN, CERN, GLAS+)	REFID=40025
ATKINSON	84	NP B231 15	M. Atkinson *et al.*	(BONN, CERN, GLAS+)	REFID=20574
ATKINSON	83B	PL 127B 132	M. Atkinson *et al.*	(BONN, CERN, GLAS+)	REFID=21502

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=M066205

NODE=M066M1

→ NOT CHECKED ←

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT	
≈ 1430 OUR ESTIMATE					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1453 ± 4	[2] VLADIMIRSKY	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	$p p \to p p \pi^+ \pi^-$	
1436^{+26}_{-16}	DAUM	84	CNTR	$17\text{–}18\ \pi^- p \to K^+ K^- n$	
1412 ± 3	DAUM	84	CNTR	$63\ \pi^- p \to K^0_S K^0_S n$, $K^+ K^- n$	OCCUR=2
1439^{+5}_{-6}	[1] BEUSCH	67	OSPK	$5,7,12\ \pi^- p \to K^0_S K^0_S n$	

[1] Not seen by WETZEL 76. NODE=M066M;LINKAGE=C

[2] $J^{PC} = 0^{++}$ or 2^{++}. NODE=M066M;LINKAGE=AC

$f_2(1430)$ WIDTH

NODE=M066210

NODE=M066W1

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
13 ± 5	[4] VLADIMIRSKY	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	$p p \to p p \pi^+ \pi^-$	
81^{+56}_{-29}	DAUM	84	CNTR	$17\text{–}18\ \pi^- p \to K^+ K^- n$	
14 ± 6	DAUM	84	CNTR	$63\ \pi^- p \to K^0_S K^0_S n$, $K^+ K^- n$	OCCUR=2
43^{+17}_{-18}	[3] BEUSCH	67	OSPK	$5,7,12\ \pi^- p \to K^0_S K^0_S n$	

[3] Not seen by WETZEL 76. NODE=M066W;LINKAGE=C

[4] $J^{PC} = 0^{++}$ or 2^{++}. NODE=M066W;LINKAGE=AC

$f_2(1430)$ 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

VLADIMIRSKY	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

$a_0(1450)$ $\quad I^G(J^{PC}) = 1^-(0^{++})$

See minireview on scalar mesons under $f_0(1370)$.

NODE=M149

a_0(1450) MASS

NODE=M149205

NODE=M149M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1474±19 OUR AVERAGE					
1480±30		ABELE	98	CBAR	0.0 $\overline{p}p \to K^0_L K^\pm \pi^\mp$
1470±25		[1] AMSLER	95D	CBAR	0.0 $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1441^{+40}_{-15}	35280	[4] BAKER	03	SPEC	$\overline{p}p \to \omega\pi^+\pi^-\pi^0$
1303±16		[5] BARGIOTTI	03	OBLX	$\overline{p}p$
1296±10		[2] AMSLER	02	CBAR	0.9 $\overline{p}p \to \pi^0\pi^0\eta$
1565±30		[2] ANISOVICH	98B	RVUE	Compilation
1290±10		BERTIN	98B	OBLX	0.0 $\overline{p}p \to K^\pm K_S \pi^\mp$
1450±40		AMSLER	94D	CBAR	0.0 $\overline{p}p \to \pi^0\pi^0\eta$
1435±40		BUGG	94	RVUE	$\overline{p}p \to \eta 2\pi^0$
1410±25		ETKIN	82C	MPS	23 $\pi^- p \to n 2K^0_S$
∼ 1300		MARTIN	78	SPEC	10 $K^\pm p \to K^0_S \pi p$
1255± 5		[3] CASON	76		

[1] Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D. NODE=M149M;LINKAGE=AB
[2] T-matrix pole. NODE=M149M;LINKAGE=AN
[3] Isospin 0 not excluded. NODE=M149M;LINKAGE=CC
[4] From the pole position. NODE=M149M;LINKAGE=PP
[5] Coupled channel analysis of $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, and $K^\pm K^0_S \pi^\mp$. NODE=M149M;LINKAGE=BG

a_0(1450) WIDTH

NODE=M149210

NODE=M149W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
265±13 OUR AVERAGE					
265±15		ABELE	98	CBAR	0.0 $\overline{p}p \to K^0_L K^\pm \pi^\mp$
265±30		[6] AMSLER	95D	CBAR	0.0 $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
110±14	35280	[9] BAKER	03	SPEC	$\overline{p}p \to \omega\pi^+\pi^-\pi^0$
92±16		[10] BARGIOTTI	03	OBLX	$\overline{p}p$
81±21		[7] AMSLER	02	CBAR	0.9 $\overline{p}p \to \pi^0\pi^0\eta$
292±40		[7] ANISOVICH	98B	RVUE	Compilation
80± 5		BERTIN	98B	OBLX	0.0 $\overline{p}p \to K^\pm K_S \pi^\mp$
270±40		AMSLER	94D	CBAR	0.0 $\overline{p}p \to \pi^0\pi^0\eta$
270±40		BUGG	94	RVUE	$\overline{p}p \to \eta 2\pi^0$
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		[8] CASON	76		

[6] Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D. NODE=M149W;LINKAGE=AB
[7] T-matrix pole. NODE=M149W;LINKAGE=AN
[8] Isospin 0 not excluded. NODE=M149W;LINKAGE=CC
[9] From the pole position. NODE=M149W;LINKAGE=PP
[10] Coupled channel analysis of $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, and $K^\pm K^0_S \pi^\mp$. NODE=M149W;LINKAGE=BG

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 ←

$\Gamma(\pi\eta'(958))/\Gamma(\pi\eta)$ — Γ_2/Γ_1

NODE=M149R1

VALUE	DOCUMENT ID		TECN	COMMENT
0.35±0.16	[11] 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 $\overline{p}p \to \pi^0\pi^0\eta'$

[11] Using $\pi^0\eta$ from AMSLER 94D.

NODE=M149R2;LINKAGE=A

$\Gamma(K\overline{K})/\Gamma(\pi\eta)$ — Γ_3/Γ_1

NODE=M149R2

VALUE	DOCUMENT ID		TECN	COMMENT
0.88±0.23	[11] ABELE	98	CBAR	0.0 $\overline{p}p \to K^0_L K^{\pm}\pi^{\mp}$

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

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	[12] BAKER	03	SPEC	$\overline{p}p \to \omega\pi^+\pi^-\pi^0$

[12] 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

$a_0(1450)$ REFERENCES

NODE=M149

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
ABELE	98	PR D57 3860	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=45863
ANISOVICH	98B	UFN 41 419	V.V. Anisovich *et al.*		REFID=46331
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

OTHER RELATED PAPERS

FURMAN	02	PL B538 266	A. Furman, L. Lesniak		REFID=48840
BARBERIS	00H	PL B488 225	D. Barberis *et al.*	(WA 102 Collab.)	REFID=47964
MASONI	99	EPJ C8 385	A. Masoni		REFID=46929
AMSLER	98	RMP 70 1293	C. Amsler		REFID=46601

NODE=M105

$\rho(1450)$

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

See the mini-review under the $\rho(1700)$.

NODE=M105

$\rho(1450)$ MASS

NODE=M105205

NODE=M105M0

→ NOT CHECKED ←

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.	

$\eta\rho^0$ 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	$e^+e^- \rightarrow \eta\gamma$
1421±15	[2] AKHMETSHIN	00D	CMD2	$e^+e^- \rightarrow \eta\pi^+\pi^-$
1470±20	ANTONELLI	88	DM2	$e^+e^- \rightarrow \eta\pi^+\pi^-$
1446±10	FUKUI	88	SPEC	8.95 $\pi^- p \rightarrow \eta\pi^+\pi^- n$

[1] 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=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±17±25	2382	[3] AKHMETSHIN	03B	CMD2	$e^+e \rightarrow \pi^0\pi^0\gamma$
$1349\pm25^{+10}_{-5}$	341	[4] ALEXANDER	01B	CLE2	$B \rightarrow D^{(*)}\omega\pi^-$
1523±10		[5] EDWARDS	00A	CLE2	$\tau^- \rightarrow \omega\pi^-\nu_\tau$
1463±25		[6] CLEGG	94	RVUE	
1250		[7] ASTON	80C	OMEG	20–70 $\gamma p \rightarrow \omega\pi^0 p$
1290±40		[7] BARBER	80C	SPEC	3–5 $\gamma p \rightarrow \omega\pi^0 p$

[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 $\overline{p}n \rightarrow 2\pi^- 2\pi^0\pi^+$
1350±50	ACHASOV	97	RVUE	$e^+e^- \rightarrow 2(\pi^+\pi^-)$
1449± 4	[8] ARMSTRONG	89E	OMEG	300 $pp \rightarrow pp2(\pi^+\pi^-)$

[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. • • •					
1406±15	87k	[9,10] ANDERSON	00A	CLE2	$\tau^- \rightarrow \pi^-\pi^0\nu_\tau$
∼ 1368		[11] ABELE	99C	CBAR	0.0 $\overline{p}d \rightarrow \pi^+\pi^-\pi^- p$
1348±33		BERTIN	98	OBLX	0.05–0.405 $\overline{n}p \rightarrow \pi^+\pi^+\pi^-$
1411±14		[12] ABELE	97	CBAR	$\overline{p}n \rightarrow \pi^-\pi^0\pi^0$
1370^{+90}_{-70}		ACHASOV	97	RVUE	$e^+e^- \rightarrow \pi^+\pi^-$
1380±24		[13] BARATE	97M	ALEP	$\tau^- \rightarrow \pi^-\pi^0\nu_\tau$
1359±40		[10] BERTIN	97C	OBLX	0.0 $\overline{p}p \rightarrow \pi^+\pi^-\pi^0$
1282±37		BERTIN	97D	OBLX	0.05 $\overline{p}p \rightarrow 2\pi^+ 2\pi^-$
1424±25		BISELLO	89	DM2	$e^+e^- \rightarrow \pi^+\pi^-$
1292±17		[14] KURDADZE	83	OLYA	0.64–1.4 $e^+e^- \rightarrow \pi^+\pi^-$

[9] From the GOUNARIS 68 parametrization of the pion form factor. NODE=M105M;LINKAGE=1K

[10] $\rho(1700)$ mass and width fixed at 1700 MeV and 235 MeV, respectively. NODE=M105M5;LINKAGE=A

[11] $\rho(1700)$ mass and width fixed at 1780 MeV and 275 MeV respectively. NODE=M105M5;LINKAGE=C5

[12] T-matrix pole. NODE=M105M5;LINKAGE=QQ

[13] Fixing $\rho(1450)$ width to 310 MeV and $\rho(1700)$ mass and width to 1700 MeV and 235 MeV respectively. NODE=M105M5;LINKAGE=A1

[14] Using for $\rho(1700)$ mass and width 1600 $\pm$ 20 and 300 $\pm$ 10 MeV respectively. NODE=M105M5;LINKAGE=KD

$\phi\pi$ MODE

NODE=M105M4
NODE=M105M4

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1480 ± 40	[15,16] BITYUKOV	87	SPEC	0	32.5 $\pi^- p \rightarrow \phi\pi^0 n$

[15] DONNACHIE 91 suggests this is a different particle. NODE=M105M4;LINKAGE=C

[16] Not seen by ABELE 97H. NODE=M105M4;LINKAGE=D

$K\overline{K}$ 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	[17] ABELE	99D	CBAR	$\pm$	0.0 $\overline{p}p \rightarrow K^+K^-\pi^0$

[17] K-matrix pole. Isospin not determined, could be $\omega(1420)$. NODE=M105M7;LINKAGE=AN

MIXED MODES

NODE=M105M2
NODE=M105M2

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1265.5 ± 75.3	DUBNICKA	89	RVUE	$e^+e^- \rightarrow \pi^+\pi^-$

$\rho(1450)$ WIDTH

NODE=M105210

VALUE (MeV)	DOCUMENT ID

NODE=M105W0

400$\pm$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	[18] AKHMETSHIN	01B	CMD2	$e^+e^- \rightarrow \eta\gamma$
211 ± 31	[19] 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 $\pi^- p \rightarrow \eta\pi^+\pi^- n$

[18] 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

[19] 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

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

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$429\pm42\pm10$	2382	[20] AKHMETSHIN	03B	CMD2	$e^+e \rightarrow \pi^0\pi^0\gamma$
$547\pm86^{+46}_{-45}$	341	[21] ALEXANDER	01B	CLE2	$B \rightarrow D^{(*)}\omega\pi^-$
400 ± 35		[22] EDWARDS	00A	CLE2	$\tau^- \rightarrow \omega\pi^-\nu_\tau$
311 ± 62		[23] CLEGG	94	RVUE	
300		[24] ASTON	80C	OMEG	20–70 $\gamma p \rightarrow \omega\pi^0 p$
320 ± 100		[24] BARBER	80C	SPEC	3–5 $\gamma p \rightarrow \omega\pi^0 p$

[20] 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

[21] Using Breit-Wigner parameterization of the $\rho(1450)$ and assuming the $\omega\pi^-$ mass dependence for the total width. NODE=M105W3;LINKAGE=3Z

[22] Mass-independent width parameterization. $\rho(1700)$ mass and width fixed at 1700 MeV and 235 MeV respectively. NODE=M105W;LINKAGE=E1

[23] Using data from BISELLO 91B, DOLINSKY 86 and ALBRECHT 87L. NODE=M105W3;LINKAGE=B

[24] Not separated from $b_1(1235)$, not pure $J^P = 1^-$ effect. NODE=M105W3;LINKAGE=A

4π MODE

NODE=M105W66

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
325 ± 100	ABELE	01B	CBAR	0.0 $\overline{p}n \to 2\pi^- 2\pi^0 \pi^+$

$\pi\pi$ MODE

NODE=M105W5

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
455 ± 41	87k	[25,26] ANDERSON	00A	CLE2	$\tau^- \to \pi^- \pi^0 \nu_\tau$
~ 374		[27] ABELE	99C	CBAR	0.0 $\overline{p}d \to \pi^+\pi^-\pi^- p$
275 ± 10		BERTIN	98	OBLX	0.05–0.405 $\overline{n}p \to \pi^+\pi^+\pi^-$
343 ± 20		[28] ABELE	97	CBAR	$\overline{p}n \to \pi^-\pi^0\pi^0$
310 ± 40		[26] BERTIN	97C	OBLX	0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$
236 ± 36		BERTIN	97D	OBLX	0.05 $\overline{p}p \to 2\pi^+ 2\pi^-$
269 ± 31		BISELLO	89	DM2	$e^+e^- \to \pi^+\pi^-$
218 ± 46		[29] KURDADZE	83	OLYA	0.64–1.4 $e^+e^- \to \pi^+\pi^-$

[25] From the GOUNARIS 68 parametrization of the pion form factor. NODE=M105W;LINKAGE=1K

[26] $\rho(1700)$ mass and width fixed at 1700 MeV and 235 MeV, respectively. NODE=M105W5;LINKAGE=A

[27] $\rho(1700)$ mass and width fixed at 1780 MeV and 275 MeV respectively. NODE=M105W5;LINKAGE=C5

[28] T-matrix pole. NODE=M105W5;LINKAGE=QQ

[29] Using for $\rho(1700)$ mass and width 1600 ± 20 and 300 ± 10 MeV respectively. NODE=M105W5;LINKAGE=KD

$\phi\pi$ MODE

NODE=M105W4

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
130 ± 60	[30,31] BITYUKOV	87	SPEC	0	32.5 $\pi^- p \to \phi\pi^0 n$

[30] DONNACHIE 91 suggests this is a different particle. NODE=M105W4;LINKAGE=C

[31] Not seen by ABELE 97H. NODE=M105W4;LINKAGE=D

$K\overline{K}$ MODE

NODE=M105W7

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
146.5 ± 10.5	27k	[32] ABELE	99D	CBAR	$\pm$	0.0 $\overline{p}p \to K^+K^-\pi^0$

[32] K-matrix pole. Isospin not determined, could be $\omega(1420)$. NODE=M105W7;LINKAGE=AN

MIXED MODES

NODE=M105W2

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
391 ± 70	DUBNICKA	89	RVUE	$e^+e^- \to \pi^+\pi^-$

$\rho(1450)$ DECAY MODES

NODE=M105215;NODE=M105

	Mode	Fraction (Γ_i/Γ)	Confidence level	
Γ_1	$\pi\pi$	seen		DESIG=1;OUR EST;→ NOT CHECKED ←
Γ_2	4π	seen		DESIG=2;OUR EST;→ NOT CHECKED ←
Γ_3	$\omega\pi$	<2.0 %	95%	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}	$\eta\rho$	<4 %		DESIG=3
Γ_{11}	$a_2(1320)\pi$	not seen		DESIG=8;OUR EST;→ NOT CHECKED ←
Γ_{12}	$\phi\pi$	<1 %		DESIG=5
Γ_{13}	$K\overline{K}$	$<1.6\times10^{-3}$	95%	DESIG=7
Γ_{14}	$\eta\gamma$	possibly seen		DESIG=9;OUR EST;→ NOT CHECKED ←

$\rho(1450)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma(\text{total})$

NODE=M105220

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

NODE=M105G3

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.12	[33] DIEKMAN	88	RVUE	$e^+e^- \to \pi^+\pi^-$
$0.027^{+0.015}_{-0.010}$	[34] KURDADZE	83	OLYA	0.64–1.4 $e^+e^- \to \pi^+\pi^-$

$\Gamma(\eta\rho) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{10}\Gamma_9/\Gamma$

NODE=M105G4

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
74 ± 20	[35] AKHMETSHIN	00D	CMD2	$e^+e^- \to \eta\pi^+\pi^-$
91 ± 19	ANTONELLI	88	DM2	$e^+e^- \to \eta\pi^+\pi^-$

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

NODE=M105G5

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<70	90	[36] AULCHENKO	87B	ND	$e^+e^- \to K^0_S K^0_L \pi^0$

$\Gamma(\eta\gamma) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{14}\Gamma_9/\Gamma$

NODE=M105G6

VALUE (units 10^{-9})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<41.1	[37] AKHMETSHIN	05	CMD2	0.60-1.38 $e^+e^- \to \eta\gamma$
$10.0\pm2.2\pm1.5$	[38] AKHMETSHIN	01B	CMD2	$e^+e^- \to \eta\gamma$

[33] Using total width = 235 MeV. NODE=M105G3;LINKAGE=B

[34] Using for $\rho(1700)$ mass and width 1600 ± 20 and 300 ± 10 MeV respectively. NODE=M105G3;LINKAGE=KD

[35] Using the data of ANTONELLI 88, DOLINSKY 91, and AKHMETSHIN 00D. The energy-independent width of the $\rho(1450)$ and $\rho(1700)$ mesons assumed. NODE=M105G4;LINKAGE=KL

[36] Using mass 1480 ± 40 MeV and total width 130 ± 60 MeV of BITYUKOV 87. NODE=M105G5;LINKAGE=G

[37] From 2γ decay mode of η using 1465 MeV and 310 MeV for the $\rho(1450)$ mass and width. NODE=M105G6;LINKAGE=AK

[38] 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=M105G;LINKAGE=SW

$\rho(1450)$ BRANCHING RATIOS

NODE=M105225

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

NODE=M105R2

VALUE	DOCUMENT ID		TECN
<0.04	DONNACHIE	87B	RVUE

$\Gamma(a_2(1320)\pi)/\Gamma_{total}$ — Γ_{11}/Γ

NODE=M105R9

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	AMELIN	00	VES	37 $\pi^- p \to \eta\pi^+\pi^- n$

$\Gamma(\phi\pi)/\Gamma(\omega\pi)$ — Γ_{12}/Γ_3

NODE=M105R1

VALUE	CL%	DOCUMENT ID		TECN	CHG	COMMENT
>0.5	95	BITYUKOV	87	SPEC	0	32.5 $\pi^- p \to \phi\pi^0 n$

$\Gamma(\omega\pi)/\Gamma(4\pi)$ — Γ_3/Γ_2

NODE=M105R3

VALUE	DOCUMENT ID		TECN
<0.14	CLEGG	88	RVUE

$\Gamma(a_1(1260)\pi)/\Gamma(4\pi)$ — Γ_4/Γ_2

NODE=M105R10

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.27 ± 0.08	[39] ABELE	01B	CBAR	0.0 $\overline{p} n \to 5\pi$

$\Gamma(h_1(1170)\pi)/\Gamma(4\pi)$ — Γ_5/Γ_2

NODE=M105R11

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.08 ± 0.04	[39] ABELE	01B	CBAR	0.0 $\overline{p} n \to 5\pi$

$\Gamma(\pi(1300)\pi)/\Gamma(4\pi)$ — 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	[39] ABELE 01B	CBAR	0.0 $\bar{p}n \to 5\pi$

$\Gamma(\rho\rho)/\Gamma(4\pi)$ — 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	[39] ABELE 01B	CBAR	0.0 $\bar{p}n \to 5\pi$

$\Gamma(\rho(\pi\pi)_{S\text{-wave}})/\Gamma(4\pi)$ — 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	[39] ABELE 01B	CBAR	0.0 $\bar{p}n \to 5\pi$

$\Gamma(\pi\pi)/\Gamma(4\pi)$ — 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	[39,40] ABELE 01B	CBAR	0.0 $\bar{p}n \to 5\pi$

$\Gamma(\eta\rho)/\Gamma(\omega\pi)$ — Γ_{10}/Γ_3

NODE=M105R4
NODE=M105R4

VALUE	DOCUMENT ID	TECN	COMMENT
~ 0.24	[41] DONNACHIE 91	RVUE	
• • • We do not use the following data for averages, fits, limits, etc. • • •			
>2	FUKUI 91	SPEC	8.95 $\pi^- p \to \omega\pi^0 n$

$\Gamma(\omega\pi)/\Gamma_{\text{total}}$ — Γ_3/Γ

NODE=M105R5
NODE=M105R5

VALUE	DOCUMENT ID	TECN
~ 0.21	CLEGG 94	RVUE

$\Gamma(\pi\pi)/\Gamma(\omega\pi)$ — Γ_1/Γ_3

NODE=M105R6
NODE=M105R6

VALUE	DOCUMENT ID	TECN
~ 0.32	CLEGG 94	RVUE

$\Gamma(\phi\pi)/\Gamma_{\text{total}}$ — Γ_{12}/Γ

NODE=M105R7
NODE=M105R7

VALUE	DOCUMENT ID	TECN	COMMENT
<0.01	[41] DONNACHIE 91	RVUE	
• • • We do not use the following data for averages, fits, limits, etc. • • •			
not seen	ABELE 97H	CBAR	$\bar{p}p \to K^0_L K^0_S \pi^0 \pi^0$

$\Gamma(K\overline{K})/\Gamma(\omega\pi)$ — Γ_{13}/Γ_3

NODE=M105R8
NODE=M105R8

VALUE	DOCUMENT ID	TECN
<0.08	[41] DONNACHIE 91	RVUE

[39] $\omega\pi$ not included. NODE=M105R;LINKAGE=BL
[40] Using ABELE 97. NODE=M105R;LINKAGE=LK
[41] Using data from BISELLO 91B, DOLINSKY 86 and ALBRECHT 87L. NODE=M105R;LINKAGE=A

$\rho(1450)$ REFERENCES

NODE=M105

AKHMETSHIN	05	PL B605 26	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=50330
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
ABELE	97H	PL B415 280	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=45765
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 159 101	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
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
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
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

OTHER RELATED PAPERS

AKHMETSHIN	04C	PL B595 101	R.R. Akhmetshin *et al.*	(CMD2 Collab.)	REFID=49743
AMSLER	04A	NP A740 130	C. Amsler *et al.*		REFID=50166
ACHASOV	03C	JETP 96 789	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=49576
		Translated from ZETF 123 899.			
ACHASOV	02B	PAN 65 153	N.N. Achasov, A.A. Kozhevnikov		REFID=48618
		Translated from YAF 65 158.			
CLOSE	02	PR D65 092003	F.E. Close, A. Donnachie, Yu.S. Kalashnikova		REFID=48838
ADAMS	01B	PL B516 264	G.S. Adams *et al.*	(BNL E852 Collab.)	REFID=49649
ACHASOV	00I	PL B486 29	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=47931
ACHASOV	00J	PR D62 117503	N.N. Achasov, A.A. Kozhevnikov		REFID=47932
AULCHENKO	00A	JETP 90 927	V.M. Aulchenko *et al.*	(Novosibirsk SND Collab.)	REFID=47953
		Translated from ZETF 117 1067.			
BELOZEROVA	98	PPN 29 63	T.S. Belozerova, V.K. Henner		REFID=46350
		Translated from FECAY 29 148.			
ABELE	97H	PL B415 280	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=45765
BARNES	97	PR D55 4157	T. Barnes *et al.*	(ORNL, RAL, MCHS)	REFID=45384
CLOSE	97C	PR D56 1584	F.E. Close *et al.*	(RAL, MCHS)	REFID=45546
URHEIM	97	NPBPS 55C 359	J. Urheim	(CLEO Collab.)	REFID=45907
ACHASOV	96B	PAN 59 1262	N.N. Achasov, G.N. Shestakov	(NOVM)	REFID=45177
		Translated from YAF 59 1319.			
MURADOV	94	PAN 57 864	R.K. Muradov	(BAKU)	REFID=44095
LANDSBERG	92	SJNP 55 1051	L.G. Landsberg	(SERP)	REFID=43162
		Translated from YAF 55 1896.			
BRAU	88	PR D37 2379	J.E. Brau *et al.*		REFID=40571
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
BISELLO	85	LAL 85-15	D. Bisello *et al.*	(PADO, LALO, CLER+)	REFID=40031
ABE	84B	PRL 53 751	K. Abe *et al.*		REFID=21503
ATKINSON	84C	NP B243 1	M. Atkinson *et al.*	(BONN, CERN, GLAS+)	REFID=20625
CORDIER	82	PL 109B 129	A. Cordier *et al.*	(LALO)	REFID=21495
BISELLO	81	PL 107B 145	D. Bisello *et al.*	(DM1 Collab.)	REFID=49702
KILLIAN	80	PR D21 3005	T.J. Killian *et al.*	(CORN)	REFID=21484
COSME	76	PL 63B 352	G. Cosme *et al.*	(ORSAY)	REFID=20529
BINGHAM	72B	PL 41B 635	H.H. Bingham *et al.*	(LBL, UCB, SLAC)	REFID=21426
FRENKIEL	72	NP B47 61	P. Frenkiel *et al.*	(CDEF, CERN)	REFID=20599
LAYSSAC	71	NC 6A 134	J. Layssac, F.M. Renard	(MONP)	REFID=40298

NODE=M175

$\eta(1475)$ was $\eta(1440)$

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

See also the $\eta(1405)$.

NODE=M175

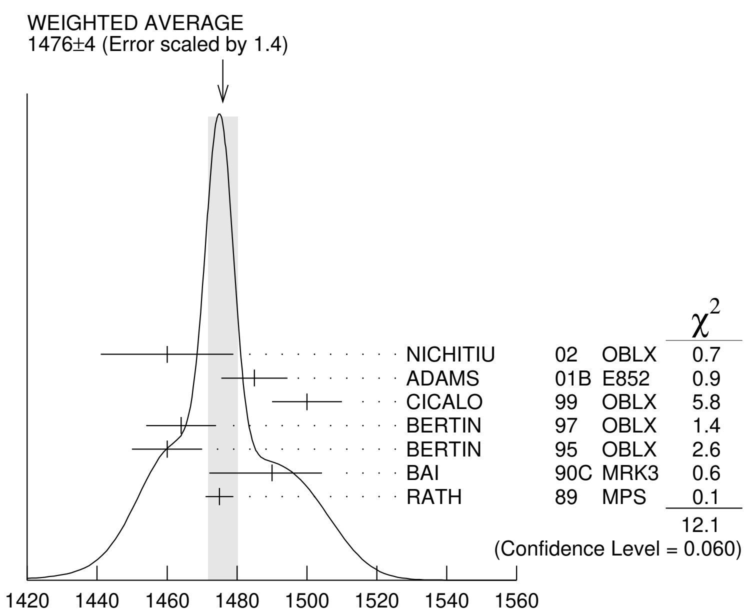
$\eta(1475)$ MASS

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 1.4. See the ideogram below.					
1460 ± 19	3651	NICHITIU 02	OBLX		
$1485 \pm 8 \pm 5$	20k	ADAMS 01B	E852	18 GeV $\pi^- p \to K^+ K^- \pi^0 n$	
1500 ± 10		CICALO 99	OBLX	$0\ \overline{p}p \to K^{\pm} K^0_S \pi^{\mp}\pi^+\pi^-$	
1464 ± 10		BERTIN 97	OBLX	$0\ \overline{p}p \to K^{\pm}(K^0)\pi^{\mp}\pi^+\pi^-$	OCCUR=2
1460 ± 10		BERTIN 95	OBLX	$0\ \overline{p}p \to K\overline{K}\pi\pi\pi$	OCCUR=2
$1490^{+14}_{-8}{}^{+3}_{-16}$	1100	BAI 90C	MRK3	$J/\psi \to \gamma K^0_S K^{\pm}\pi^{\mp}$	
1475 ± 4		RATH 89	MPS	$21.4\ \pi^- p \to n K^0_S K^0_S \pi^0$	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1421 ± 14		AUGUSTIN 92	DM2	$J/\psi \to \gamma K\overline{K}\pi$	OCCUR=2



$\eta(1405)$ mass, $K\overline{K}\pi$ mode ($K^*(892)$ K dominant) (MeV)

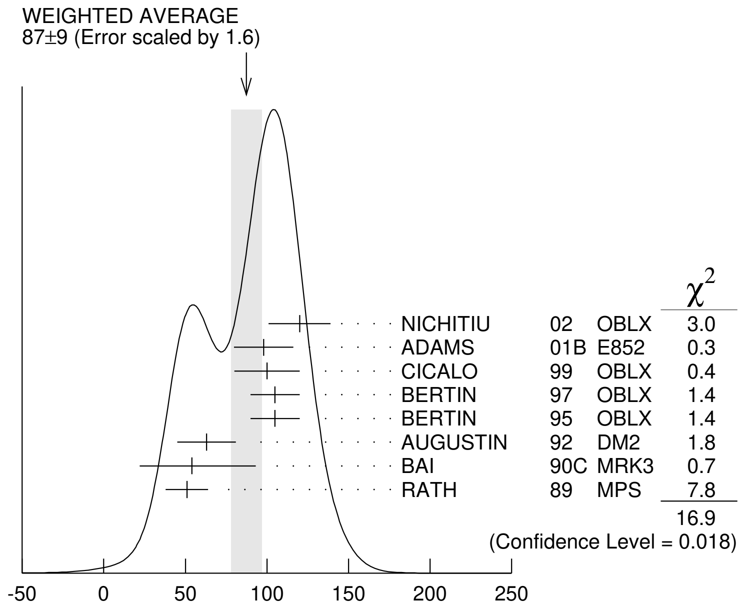
$\eta(1475)$ WIDTH

NODE=M175210

$K\overline{K}\pi$ MODE ($K^*(892)$ K dominant)

NODE=M175W5
NODE=M175W5

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT	
87 ± 9 OUR AVERAGE Error includes scale factor of 1.6. See the ideogram below.					
120 ± 19	3651	NICHITIU 02	OBLX		
$98 \pm 18 \pm 3$	20k	ADAMS 01B	E852	18 GeV $\pi^- p \to K^+ K^- \pi^0 n$	
100 ± 20		CICALO 99	OBLX	$0\ \overline{p}p \to K^{\pm} K^0_S \pi^{\mp}\pi^+\pi^-$	
105 ± 15		BERTIN 97	OBLX	$0.0\ \overline{p}p \to K^{\pm}(K^0)\pi^{\mp}\pi^+\pi^-$	OCCUR=2
105 ± 15		BERTIN 95	OBLX	$0\ \overline{p}p \to K\overline{K}\pi\pi\pi$	OCCUR=2
63 ± 18		AUGUSTIN 92	DM2	$J/\psi \to \gamma K\overline{K}\pi$	OCCUR=2
$54^{+37}_{-21}{}^{+13}_{-24}$		BAI 90C	MRK3	$J/\psi \to \gamma K^0_S K^{\pm}\pi^{\mp}$	
51 ± 13		RATH 89	MPS	$21.4\ \pi^- p \to n K^0_S K^0_S \pi^0$	



$\eta(1405)$ width $K\overline{K}\pi$ mode ($K^*(892)$ K dominant)

η(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 ←

η(1475) $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M175220

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

NODE=M175G2
NODE=M175G2

VALUE (keV)	CL%	DOCUMENT ID		TECN	COMMENT
0.212±0.050±0.023		[1] ACCIARRI	01G	L3	183–202 $e^+e^- \rightarrow e^+e^- K^0_S K^\pm\pi^\mp$
• • • 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] Signal compatible with $K^* K$ decay. NODE=M175G2;LINKAGE=CG
[2] Using $\eta(1475)$ mass and width 1481 MeV and 48 MeV, respectively. NODE=M175G2;LINKAGE=AH
[3] Assuming three-body phase-space decay to $K^0_S K^\pm\pi^\mp$. NODE=M175G2;LINKAGE=B3

η(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 $\overline{p}p \rightarrow K\overline{K}\pi\pi\pi$

$\Gamma(K\overline{K}^*(892)+\text{c.c.})/\left[\Gamma(K\overline{K}^*(892)+\text{c.c.})+\Gamma(a_0(980)\pi)\right]$ $\Gamma_2/(\Gamma_2+\Gamma_3)$

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

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 $f_0(600)$ and on non-$q\overline{q}$ candidates. (See the index for the page number.)

NODE=M152

$f_0(1500)$ MASS

NODE=M152205

NODE=M152M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*	
1507± 5 OUR AVERAGE		Error includes scale factor of 1.2.				
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. • • •						
1493± 7		[5] BINON	05	GAMS	33 $\pi^- p \rightarrow \eta\eta n$	
1491±18	1400	[6] GARMASH	05	BELL	$B^+ \rightarrow K^+ K^+ K^-$	
1489^{+8}_{-4}		[14] ANISOVICH	03	RVUE		
1490±30		[5] ABELE	01	CBAR	0.0 $\overline{p}d \rightarrow \pi^- 4\pi^0 p$	
1497±10		[5] BARBERIS	99	OMEG	450 $pp \rightarrow p_s p_f K^+ K^-$	
1502±10		[5] BARBERIS	99B	OMEG	450 $pp \rightarrow p_s p_f \pi^+\pi^-$	
1502±12±10		[7] BARBERIS	99D	OMEG	450 $pp \rightarrow K^+K^-, \pi^+\pi^-$	
1530±45		[5] BELLAZZINI	99	GAM4	450 $pp \rightarrow pp\pi^0\pi^0$	
1505±18		[5] FRENCH	99		300 $pp \rightarrow p_f(K^+K^-)p_s$	
1447±27		[8] KAMINSKI	99	RVUE	$\pi\pi \rightarrow \pi\pi, K\overline{K}, \sigma\sigma$	
1580±80		[5] 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	[5] AMELIN	96B	VES	37 $\pi^- A \rightarrow \eta\eta\pi^- A$	
1500± 8		BUGG	96	RVUE		
1500±10		[9] 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		[10] ANTINORI	95	OMEG	300,450 $pp \rightarrow pp2(\pi^+\pi^-)$	
1497±30		[5] ANTINORI	95	OMEG	300,450 $pp \rightarrow pp\pi^+\pi^-$	OCCUR=2
∼ 1505		BUGG	95	MRK3	$J/\psi \rightarrow \gamma\pi^+\pi^-\pi^+\pi^-$	
1446± 5		[5] ABATZIS	94	OMEG	450 $pp \rightarrow pp2(\pi^+\pi^-)$	
1545±25		[5] AMSLER	94E	CBAR	0.0 $\overline{p}p \rightarrow \pi^0\eta\eta'$	

1520±25		[1,11] ANISOVICH	94	CBAR	0.0 $\overline{p}p \to 3\pi^0, \pi^0\eta\eta$
1505±20		[1,12] BUGG	94	RVUE	$\overline{p}p \to 3\pi^0, \eta\eta\pi^0, \eta\pi^0\pi^0$
1560±25		[5] AMSLER	92	CBAR	0.0 $\overline{p}p \to \pi^0\eta\eta$
1550±45±30		[5] BELADIDZE	92C	VES	36 π^- Be $\to \pi^-\eta'\eta$ Be
1449± 4		[5] ARMSTRONG	89E	OMEG	300 $pp \to pp2(\pi^+\pi^-)$
1610±20		[5] 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	[5] ALDE	87	GAM4	100 $\pi^- p \to 4\pi^0 n$
1575±45		[13] ALDE	86D	GAM4	100 $\pi^- p \to 2\eta n$
1568±33		[5] BINON	84C	GAM2	38 $\pi^- p \to \eta\eta' n$
1592±25		[5] BINON	83	GAM2	38 $\pi^- p \to 2\eta n$
1525± 5		[5] 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] Breit-Wigner mass. NODE=M152M;LINKAGE=E
[6] Breit-Wigner, solution 2, PWA ambiguous. NODE=M152M;LINKAGE=GA
[7] Supersedes BARBERIS 99 and BARBERIS 99B. NODE=M152M;LINKAGE=BD
[8] T-matrix pole on sheet $--+$. NODE=M152M;LINKAGE=TK
[9] T-matrix pole. Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D. NODE=M152M;LINKAGE=AB
[10] Supersedes ABATZIS 94, ARMSTRONG 89E. Breit-Wigner mass. NODE=M152M;LINKAGE=B
[11] From a simultaneous analysis of the annihilations $\overline{p}p \to 3\pi^0, \pi^0\eta\eta$. NODE=M152M;LINKAGE=A
[12] Reanalysis of ANISOVICH 94 data. NODE=M152M;LINKAGE=C1
[13] From central value and spread of two solutions. Breit-Wigner mass. NODE=M152M;LINKAGE=AZ
[14] 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

f_0(1500) WIDTH

NODE=M152210

NODE=M152W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
109± 7 OUR AVERAGE					
110± 24		[15] BARBERIS	00A		450 $pp \to p_f \eta\eta p_s$
102± 18		[15,16] BARBERIS	00C		450 $pp \to p_f 4\pi p_s$
110± 16		[15] BARBERIS	00E		450 $pp \to p_f \eta\eta p_s$
108± 33		BERTIN	98	OBLX	0.05–0.405 $\overline{n}p \to \pi^+\pi^+\pi^-$
114± 30		[15] BERTIN	97C	OBLX	0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$
105± 15		ABELE	96B	CBAR	0.0 $\overline{p}p \to \pi^0 K^0_L K^0_L$
120± 25		[17] AMSLER	95B	CBAR	0.0 $\overline{p}p \to 3\pi^0$
120± 30		[18] AMSLER	95C	CBAR	0.0 $\overline{p}p \to \eta\eta\pi^0$ OCCUR=2
• • • We do not use the following data for averages, fits, limits, etc. • • •					
90± 15		[19] BINON	05	GAMS	33 $\pi^- p \to \eta\eta n$
145± 29	1400	[20] GARMASH	05	BELL	$B^+ \to K^+K^+K^-$
102± 10		[28] ANISOVICH	03	RVUE	
140± 40		[19] ABELE	01	CBAR	0.0 $\overline{p}d \to \pi^- 4\pi^0 p$
104± 25		[19] BARBERIS	99	OMEG	450 $pp \to p_s p_f K^+K^-$
131± 15		[19] BARBERIS	99B	OMEG	450 $pp \to p_s p_f \pi^+\pi^-$
98± 18±16		[21] BARBERIS	99D	OMEG	450 $pp \to K^+K^-, \pi^+\pi^-$
160± 50		[19] BELLAZZINI	99	GAM4	450 $pp \to pp\pi^0\pi^0$
100± 33		[19] FRENCH	99		300 $pp \to p_f(K^+K^-)p_s$
108± 46		[22] KAMINSKI	99	RVUE	$\pi\pi \to \pi\pi, K\overline{K}, \sigma\sigma$
280±100		[19] ALDE	98	GAM4	100 $\pi^- p \to \pi^0\pi^0 n$
130± 20		[15] ANISOVICH	98B	RVUE	Compilation
120± 35		[15] BARBERIS	97B	OMEG	450 $pp \to pp2(\pi^+\pi^-)$
∼ 100		FRABETTI	97D	E687	$D^\pm_s \to \pi^\mp\pi^\pm\pi^\pm$
∼ 169		ABELE	96	CBAR	0.0 $\overline{p}p \to 5\pi^0$
100± 30	120	[19] AMELIN	96B	VES	37 $\pi^- A \to \eta\eta\pi^- A$

132 ± 15		BUGG	96	RVUE		
154 ± 30		[23] 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		[24] ANTINORI	95	OMEG	300,450 $pp \rightarrow pp2(\pi^+\pi^-)$	
199 ± 30		[19] ANTINORI	95	OMEG	300,450 $pp \rightarrow pp\pi^+\pi^-$	OCCUR=2
56 ± 12		[19] ABATZIS	94	OMEG	450 $pp \rightarrow pp2(\pi^+\pi^-)$	
100 ± 40		[19] AMSLER	94E	CBAR	$0.0\ \overline{p}p \rightarrow \pi^0\eta\eta'$	
148^{+20}_{-25}		[15,25] ANISOVICH	94	CBAR	$0.0\ \overline{p}p \rightarrow 3\pi^0, \pi^0\eta\eta$	
150 ± 20		[15,26] BUGG	94	RVUE	$\overline{p}p \rightarrow 3\pi^0$, $\eta\eta\pi^0$, $\eta\pi^0\pi^0$	
245 ± 50		[19] AMSLER	92	CBAR	$0.0\ \overline{p}p \rightarrow \pi^0\eta\eta$	
$153 \pm 67 \pm 50$		[19] BELADIDZE	92C	VES	$36\ \pi^-\text{Be} \rightarrow \pi^-\eta'\eta\text{Be}$	
78 ± 18		[19] ARMSTRONG	89E	OMEG	300 $pp \rightarrow pp2(\pi^+\pi^-)$	
170 ± 40		[19] ALDE	88	GAM4	$300\ \pi^- N \rightarrow \pi^- N 2\eta$	
150 ± 20	600	[19] ALDE	87	GAM4	$100\ \pi^- p \rightarrow 4\pi^0 n$	
265 ± 65		[27] ALDE	86D	GAM4	$100\ \pi^- p \rightarrow 2\eta n$	
260 ± 60		[19] BINON	84C	GAM2	$38\ \pi^- p \rightarrow \eta\eta' n$	
210 ± 40		[19] BINON	83	GAM2	$38\ \pi^- p \rightarrow 2\eta n$	
101 ± 13		[19] GRAY	83	DBC	$0.0\ \overline{p}N \rightarrow 3\pi$	

[15] T-matrix pole. NODE=M152W;LINKAGE=PP
[16] Average between $\pi^+\pi^-2\pi^0$ and $2(\pi^+\pi^-)$. NODE=M152W;LINKAGE=PC
[17] T-matrix pole, supersedes ANISOVICH 94. NODE=M152W;LINKAGE=D
[18] T-matrix pole, supersedes ANISOVICH 94 and AMSLER 92. NODE=M152W;LINKAGE=D1
[19] Breit-Wigner width. NODE=M152W;LINKAGE=E
[20] Breit-Wigner, solution 2, PWA ambiguous. NODE=M152W;LINKAGE=GA
[21] Supersedes BARBERIS 99 and BARBERIS 99B. NODE=M152W;LINKAGE=BD
[22] T-matrix pole on sheet $--+$. NODE=M152W;LINKAGE=TK
[23] T-matrix pole. Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D. NODE=M152W;LINKAGE=AB
[24] Supersedes ABATZIS 94, ARMSTRONG 89E. Breit-Wigner mass. NODE=M152W;LINKAGE=B
[25] From a simultaneous analysis of the annihilations $\overline{p}p \rightarrow 3\pi^0, \pi^0\eta\eta$. NODE=M152W;LINKAGE=A
[26] Reanalysis of ANISOVICH 94 data. NODE=M152W;LINKAGE=C1
[27] From central value and spread of two solutions. Breit-Wigner mass. NODE=M152W;LINKAGE=AZ
[28] 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

$f_0(1500)$ DECAY MODES

NODE=M152215;NODE=M152

	Mode	Fraction (Γ_i/Γ)	Scale factor	
Γ_1	$\eta\eta'(958)$	(1.9 ± 0.8) %	1.7	DESIG=2
Γ_2	$\eta\eta$	(5.1 ± 0.9) %	1.4	DESIG=1
Γ_3	4π	(49.5 ± 3.3) %	1.2	DESIG=7
Γ_4	$4\pi^0$	seen		DESIG=5;OUR EST;$\rightarrow$ NOT CHECKED $\leftarrow$
Γ_5	$2\pi^+2\pi^-$	seen		DESIG=6;OUR EST;$\rightarrow$ NOT CHECKED $\leftarrow$
Γ_6	$2(\pi\pi)_S$-wave			DESIG=11
Γ_7	$\rho\rho$			DESIG=12
Γ_8	$\pi(1300)\pi$			DESIG=13
Γ_9	$a_1(1260)\pi$			DESIG=14
Γ_{10}	$\pi\pi$	(34.9 ± 2.3) %	1.2	DESIG=8
Γ_{11}	$\pi^+\pi^-$	seen		DESIG=9;OUR EST;$\rightarrow$ NOT CHECKED $\leftarrow$
Γ_{12}	$2\pi^0$	seen		DESIG=3;OUR EST;$\rightarrow$ NOT CHECKED $\leftarrow$
Γ_{13}	$K\overline{K}$	(8.6 ± 1.0) %	1.1	DESIG=4
Γ_{14}	$\gamma\gamma$	not seen		DESIG=10;OUR EST;$\rightarrow$ NOT CHECKED $\leftarrow$

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, $x_i \equiv \Gamma_i/\Gamma_{\text{total}}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_2	29			
x_3	−31	−52		
x_{10}	−5	11	−83	
x_{13}	6	33	−67	39
	x_1	x_2	x_3	x_{10}

$f_0(1500)$ Γ(i)Γ(γγ)/Γ(total)

NODE=M152217

$\Gamma(\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_{10}\Gamma_{14}/\Gamma$

NODE=M152G1
NODE=M152G1

VALUE (keV)	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
not seen		ACCIARRI	01H	L3	$\gamma\gamma \to K^0_S K^0_S$, $E^{ee}_{\text{cm}}=$ 91, 183–209 GeV
<0.46	95	BARATE	00E	ALEP	$\gamma\gamma \to \pi^+\pi^-$

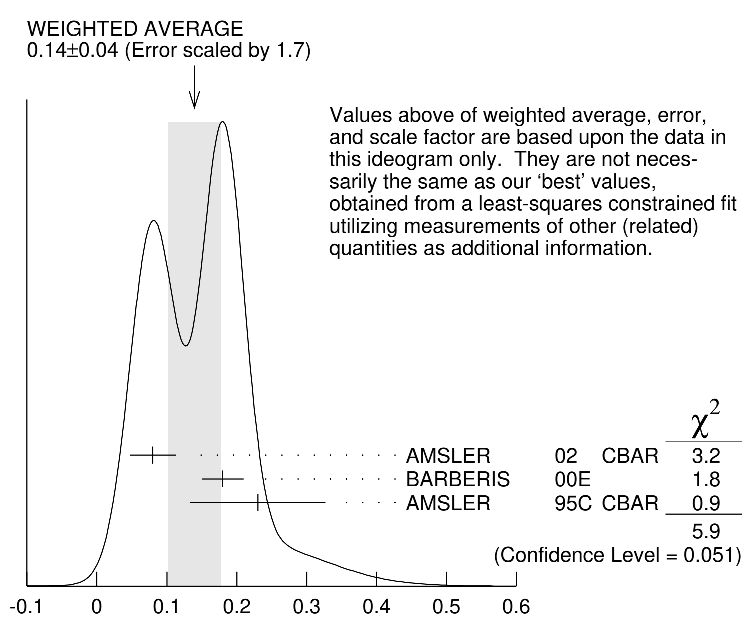
$f_0(1500)$ BRANCHING RATIOS

NODE=M152220

$\Gamma(\eta\eta)/\Gamma(\pi\pi)$ — Γ_2/Γ_{10}

NODE=M152R13
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 $\bar{p}p \to \pi^0\eta\eta$, $\pi^0\pi^0\pi^0$
0.18 ±0.03	BARBERIS	00E		450 $pp \to p_f \eta\eta p_s$
0.230±0.097	[29] AMSLER	95C	CBAR	0.0 $\bar{p}p \to \eta\eta\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.11 ±0.03	[30] ANISOVICH	02D	SPEC	Combined fit
0.078±0.013	[31] ABELE	96C	RVUE	Compilation
0.157±0.060	[32] AMSLER	95D	CBAR	0.0 $\bar{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$



$\Gamma(\eta\eta)/\Gamma(\pi\pi)$ Γ_2/Γ_{10}

$\Gamma(K\overline{K})/\Gamma(\eta\eta)$ Γ_{13}/Γ_2

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		[30] ANISOVICH 02D	SPEC	Combined fit
<0.4	90	[33] PROKOSHKIN 91	GAM4	300 $\pi^- p \to \pi^- p \eta\eta$
<0.6		[34] BINON 83	GAM2	38 $\pi^- p \to 2\eta n$

$\Gamma(K\overline{K})/\Gamma(\pi\pi)$ Γ_{13}/Γ_{10}

NODE=M152R7

VALUE	DOCUMENT ID	TECN	COMMENT
0.246±0.026 OUR FIT			
0.241±0.028 OUR AVERAGE			
0.25 ±0.03	[35] BARGIOTTI 03	OBLX	$\overline{p}p$
0.19 ±0.07	[36] 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. • • •			
0.16 ±0.05	[30] ANISOVICH 02D	SPEC	Combined fit
0.33 ±0.03 ±0.07	BARBERIS 99D	OMEG	450 $pp \to K^+K^-$, $\pi^+\pi^-$
0.20 ±0.08	[37] ABELE 96B	CBAR	0.0 $\overline{p}p \to \pi^0 K^0_L K^0_L$

$\Gamma(\eta\eta'(958))/\Gamma(\pi\pi)$ Γ_1/Γ_{10}

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 $pp \to p_f \eta\eta p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.005±0.003	[30] ANISOVICH 02D	SPEC	Combined fit

$\Gamma(\eta\eta'(958))/\Gamma(\eta\eta)$ Γ_1/Γ_2

NODE=M152R2

VALUE	DOCUMENT ID	TECN	COMMENT
0.38±0.16 OUR FIT Error includes scale factor of 1.9.			
0.29±0.10	[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. • • •			
0.05±0.03	[30] ANISOVICH 02D	SPEC	Combined fit
0.84±0.23	ABELE 96C	RVUE	Compilation
2.7 ±0.8	BINON 84C	GAM2	38 $\pi^- p \to \eta\eta' n$

$\Gamma(\pi\pi)/\Gamma_{total}$ Γ_{10}/Γ

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_{11}/Γ

NODE=M152R10

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 $\overline{n}p \to \pi^+\pi^+\pi^-$
possibly seen	FRABETTI 97D	E687	$D^\pm_s \to \pi^\mp\pi^\pm\pi^\pm$

$\Gamma(K\overline{K})/\Gamma_{total}$ 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

$\Gamma(\eta\eta)/\Gamma_{total}$ Γ_2/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 $\pi^- p \to 2\eta n$

$\Gamma(4\pi)/\Gamma(\pi\pi)$ Γ_3/Γ_{10}

NODE=M152R6
NODE=M152R6

VALUE	DOCUMENT ID		TECN	COMMENT
1.42±0.18 OUR FIT Error includes scale factor of 1.2.				
1.42±0.18 OUR AVERAGE Error includes scale factor of 1.2.				
1.37±0.16	BARBERIS	00D		450 $pp \rightarrow p_f 4\pi p_s$
2.1 ±0.6	[39] AMSLER	98	RVUE	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.1 ±0.2	[30] ANISOVICH	02D	SPEC	Combined fit
3.4 ±0.8	[39] ABELE	96	CBAR	0.0 $\overline{p}p \rightarrow 5\pi^0$

$\Gamma(4\pi^0)/\Gamma(\eta\eta)$ Γ_4/Γ_2

NODE=M152R5
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 $\pi^- p \rightarrow 4\pi^0 n$

$\Gamma(\rho\rho)/\Gamma(2(\pi\pi)_{S\text{-wave}})$ Γ_7/Γ_6

NODE=M152R11
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 $pp \rightarrow p_f \pi^+\pi^- 2\pi^0 p_s$
2.6±0.4	BARBERIS	00C	450 $pp \rightarrow p_f 2(\pi^+\pi^-) p_s$

OCCUR=2

$\Gamma(2(\pi\pi)_{S\text{-wave}})/\Gamma(\pi\pi)$ Γ_6/Γ_{10}

NODE=M152R14
NODE=M152R14

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.42±0.26	[40] ABELE	01	CBAR	0.0 $\overline{p}d \rightarrow \pi^- 4\pi^0 p$

$\Gamma(2(\pi\pi)_{S\text{-wave}})/\Gamma(4\pi)$ Γ_6/Γ_3

NODE=M152R15
NODE=M152R15

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.26±0.07	ABELE	01B	CBAR	0.0 $\overline{p}n \rightarrow 5\pi$

$\Gamma(\rho\rho)/\Gamma(4\pi)$ Γ_7/Γ_3

NODE=M152R16
NODE=M152R16

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.13±0.08	ABELE	01B	CBAR	0.0 $\overline{p}n \rightarrow 5\pi$

$\Gamma(\pi(1300)\pi)/\Gamma(4\pi)$ Γ_8/Γ_3

NODE=M152R17
NODE=M152R17

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.50±0.25	ABELE	01B	CBAR	0.0 $\overline{p}n \rightarrow 5\pi$

$\Gamma(a_1(1260)\pi)/\Gamma(4\pi)$ Γ_9/Γ_3

NODE=M152R18
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 $\overline{p}n \rightarrow 5\pi$

[29] Using AMSLER 95B ($3\pi^0$). NODE=M152R3;LINKAGE=A

[30] 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=M152R;LINKAGE=CH

[31] 2π width determined to be 60 ± 12 MeV. NODE=M152R3;LINKAGE=CM

[32] Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D. NODE=M152R3;LINKAGE=AB

[33] Combining results of GAM4 with those of WA76 on $K\overline{K}$ central production. NODE=M152R4;LINKAGE=BZ

[34] Using ETKIN 82B and COHEN 80. NODE=M152R4;LINKAGE=A

[35] Coupled channel analysis of $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, and $K^\pm K^0_S \pi^\mp$. NODE=M152R;LINKAGE=BG

[36] Using $\pi^0\pi^0$ from AMSLER 95B. NODE=M152R7;LINKAGE=A

[37] Using AMSLER 95B ($3\pi^0$), AMSLER 94C ($2\pi^0\eta$) and SU(3). NODE=M152R7;LINKAGE=D

[38] Using AMSLER 94E ($\eta\eta'\pi^0$). NODE=M152R2;LINKAGE=A

[39] Excluding $\rho\rho$ contribution to 4π. NODE=M152R6;LINKAGE=C

[40] From the combined data of ABELE 96 and ABELE 96C. NODE=M152R;LINKAGE=KZ

$f_0(1500)$ REFERENCES

NODE=M152

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
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	99	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	UFN 41 419	V.V. Anisovich *et al.*		REFID=46331
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	83B	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

OTHER RELATED PAPERS

ABLIKIM	05	PL B607 243	M. Ablikim *et al.*	(BES Collab.)	REFID=50450
CLOSE	05	PR D71 094022	F.E. Close, Q. Zhao		REFID=50788
GIACOSA	05	PR C71 025202	F. Giacosa *et al.*		REFID=50500
LINK	04	PL B585 200	J.M. Link *et al.*	(FNAL FOCUS Collab.)	REFID=49774
ANISOVICH	03B	PAN 66 741	V.V. Anisovich, V.A. Nikonov, A.V. Sarantsev		REFID=49420
		Translated from YAF 66 772.			
DEWITT	03	PR D68 054026	M.A. DeWitt, H.M. Choi, C.R. Ji		REFID=49589
AMSLER	02B	PL B541 22	C. Amsler		REFID=48826
GARMASH	02	PR D65 092005	A. Garmash *et al.*	(BELLE Collab.)	REFID=48634
JIN	02	PR D66 057505	H. Jin, X. Zhang		REFID=48843
KLEEFELD	02	PR D66 034007	F. Kleefeld *et al.*		REFID=48844
RUPP	02	PR D65 078501	G. Rupp, E. vanBeveren, M.D. Scadron		REFID=48851
SHAKIN	02	PR D65 078502	C.M. Shakin, H. Wang		REFID=48853
TESHIMA	02	JPG 28 1391	T. Teshima, I. Kitamura, N. Morisita		REFID=48854
VOLKOV	02	PAN 65 1657	M.K. Volkov, V.L. Yudichev		REFID=48855
		Translated from YAF 65 1701.			
LI	01B	EPJ C19 529	D.-M. Li, H. Yu, Q.-X. Shen		REFID=48333
SUROVTSEV	01	PR D63 054024	Y.S. Surovtsev, D. Krupa, M. Nagy		REFID=48310
BAI	00A	PL B472 207	J.Z. Bai *et al.*	(BES Collab.)	REFID=47426
ANISOVICH	99H	PL B467 289	A.V. Anisovich, V.V. Anisovich		REFID=47399
AMSLER	98	RMP 70 1293	C. Amsler		REFID=46601
STROHMEIER	98	PL B438 21	M. Strohmeier *et al.*		REFID=46382
ANISOVICH	97	PL B395 123	A.V. Anisovich, A.V. Sarantsev	(PNPI)	REFID=45388
KAMINSKI	97B	PL B413 130	R. Kaminski, L. Lesniak, B. Loiseau	(CRAC, IPN)	REFID=45778
PROKOSHKIN	97	SPD 42 117	Y.D. Prokoshkin *et al.*	(SERP)	REFID=45386
		Translated from DANS 353 323.			
AMSLER	96	PR D53 295	C. Amsler, F.E. Close	(ZURI, RAL)	REFID=44635
GASPERO	95	NP A588 861	M. Gaspero	(ROMA)	REFID=45422
SLAUGHTER	88	MPL A3 1361	M.D. Slaughter	(LANL)	REFID=40586
BRIDGES	86B	PRL 56 215	D.L. Bridges *et al.*	(SYRA, CASE)	REFID=21376

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

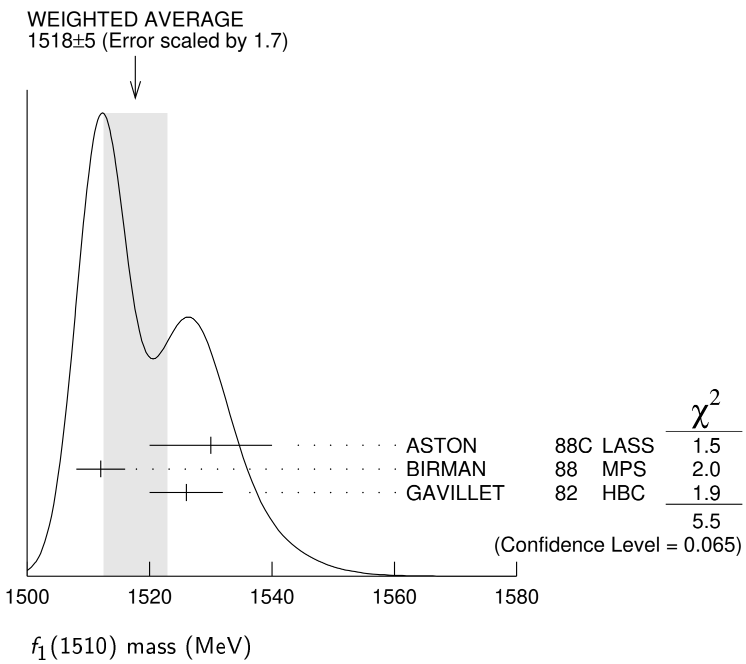
NODE=M084205

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



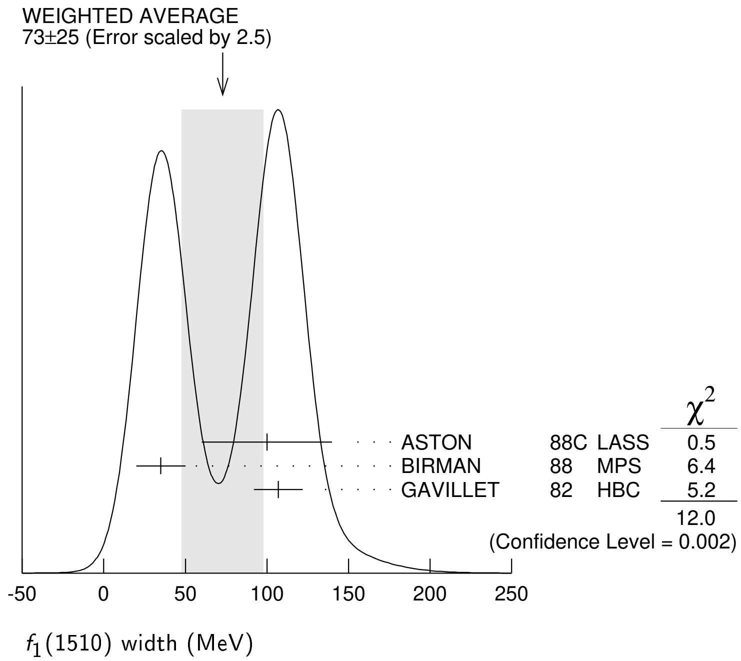
$f_1(1510)$ WIDTH

NODE=M084210

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



$f_1(1510)$ DECAY MODES

NODE=M084215;NODE=M084

	Mode	Fraction (Γ_i/Γ)
Γ_1	$K\overline{K}^*(892)+$ c.c.	seen

DESIG=1;OUR EST;→ NOT CHECKED ←

$f_1(1510)$ REFERENCES

NODE=M084

BAUER	93B	PR D48 3976	D.A. Bauer *et al.*	(SLAC)
AIHARA	88C	PR D38 1	H. Aihara *et al.*	(TPC-2γ Collab.)
ASTON	88C	PL B201 573	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS) JP
BIRMAN	88	PRL 61 1557	A. Birman *et al.*	(BNL, FSU, IND, MASD) JP
GAVILLET	82	ZPHY C16 119	P. Gavillet *et al.*	(CERN, CDEF, PADO+)

REFID=43678
REFID=40564
REFID=40282
REFID=40568
REFID=20877

OTHER RELATED PAPERS

KANADA-EN...	05	PR D71 094005	Y. Kanada-Enyo, O. Morimatsu, T. Nishikawa	
ABELE	97G	PL B415 289	A. Abele *et al.*	
CLOSE	97D	ZPHY C76 469	F.E. Close *et al.*	
KING	91	NPBPS B21 11	E. King *et al.*	(FSU, BNL+)
AIHARA	88C	PR D38 1	H. Aihara *et al.*	(TPC-2γ Collab.)
BITYUKOV	84	SJNP 39 735	S. Bityukov *et al.*	(SERP)
		Translated from YAF 39 1165.		

REFID=50800
REFID=45764
REFID=45762
REFID=45857
REFID=40564
REFID=45856

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
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}		[2] LONGACRE	86	MPS	22 $\pi^- p \to K^0_S K^0_S n$
1496^{+9}_{-8}		[3] 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		[4] CORDEN	79	OMEG	12–15 $\pi^- p \to \pi^+ \pi^- n$
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
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	EVANGELISTA	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. • • •					
1513 ±10		[5] BARKOV	99	SPEC	40 $K^- p \to K^0_S K^0_S y$

PRODUCED IN $e^+ e^-$ ANNIHILATION

NODE=M013M3
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 ± 1 ± 3		ABE	04	BELL	10.6 $e^+ e^- \to e^+ e^- K^+ K^-$
1519 ± 2 $^{+15}_{-5}$		BAI	03G	BES	$J/\psi \to \gamma K \overline{K}$
1523 ± 6	331	[6] ACCIARRI	01H	L3	91, 183–209 $e^+ e^- \to e^+ e^- K^0_S K^0_S$
1535 ± 5 ± 4		ABREU	96C	DLPH	$Z^0 \to K^+ K^- + X$
1516 ± 5 $^{+9}_{-15}$		BAI	96C	BES	$J/\psi \to \gamma K^+ K^-$
1531.6±10.0		AUGUSTIN	88	DM2	$J/\psi \to \gamma K^+ K^-$
1515 ± 5		[7] FALVARD	88	DM2	$J/\psi \to \phi K^+ K^-$
1525 ±10 ±10		BALTRUSAIT...	87	MRK3	$J/\psi \to \gamma K^+ K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1529 ±10		ACCIARRI	95J	L3	Repl. by ACCIARRI 01H
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. • • •				
1508±9	[9] 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 $pp \to p_s p_f K^+ K^-$

PRODUCED IN ep COLLISIONS

NODE=M013M10

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1537^{+9}_{-8}	84	[1] CHEKANOV	04	ZEUS	$ep \to K^0_S K^0_S X$

[1] Systematic errors not estimated. NODE=M013M10;LINKAGE=CH

[2] From a partial-wave analysis of data using a K-matrix formalism with 5 poles. NODE=M013M;LINKAGE=L

[3] CHABAUD 81 is a reanalysis of PAWLICKI 77 data. NODE=M013M;LINKAGE=D

[4] 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

[5] Systematic errors not estimated. NODE=M013M2;LINKAGE=SK

[6] Supersedes ACCIARRI 95J. NODE=M013M;LINKAGE=HA

[7] From an analysis ignoring interference with $f_0(1710)$. NODE=M013M;LINKAGE=F1

[8] From an analysis including interference with $f_0(1710)$. NODE=M013M;LINKAGE=F2

[9] T-matrix pole. NODE=M013M;LINKAGE=TT

$f'_2(1525)$ WIDTH

NODE=M013210

NODE=M013WX

VALUE (MeV)	DOCUMENT ID		COMMENT
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 $\pi^- C \to K^0_S K^0_S K^0_L X$
108^{+5}_{-2}	[11] LONGACRE	86	MPS	22 $\pi^- p \to K^0_S K^0_S n$
69^{+22}_{-16}	[12] CHABAUD	81	ASPK	6 $\pi^- p \to K^+ K^- n$
137^{+23}_{-21}	CHABAUD	81	ASPK	18.4 $\pi^- p \to K^+ K^- n$ OCCUR=2
150^{+83}_{-50}	GORLICH	80	ASPK	17 $\pi^- p$polarized $\to K^+ K^- n$
165±42	[13] CORDEN	79	OMEG	12–15 $\pi^- p \to \pi^+\pi^- n$
92^{+39}_{-22}	[14] POLYCHRO...	79	STRC	7 $\pi^- p \to n K^0_S K^0_S$

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 $K^- p \to K^0_S K^0_S \Lambda$
73 ±18		BOLONKIN	86	SPEC	40 $K^- p \to K^0_S K^0_S Y$
83 ±15		ARMSTRONG	83B	OMEG	18.5 $K^- p \to K^- K^+ \Lambda$
85 ±16	650	AGUILAR-...	81B	HBC	4.2 $K^- p \to \Lambda K^+ K^-$
$80\ ^{+14}_{-11}$	572	ALHARRAN	81	HBC	8.25 $K^- p \to \Lambda K\overline{K}$
72 ±25	166	EVANGELISTA	77	OMEG	10 $K^- p \to K^+ K^- (\Lambda, \Sigma)$
69 ±22	100	AGUILAR-...	72B	HBC	3.9,4.6 $K^- p \to K\overline{K}(\Lambda, \Sigma)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
75 ±20		[15] BARKOV	99	SPEC	40 $K^- p \to K^0_S K^0_S y$
$62\ ^{+19}_{-14}$	123	BARREIRO	77	HBC	4.15 $K^- p \to \Lambda K^0_S K^0_S$
61 ± 8	120	BRANDENB...	76C	ASPK	13 $K^- p \to K^+ K^- (\Lambda, \Sigma)$

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	[16] 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		[17] 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. • • •				
76 ±40		ACCIARRI 95J	L3	Repl. by ACCIARRI 01H
100 ± 3		[18] 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	[19] AMSLER 02	CBAR	0.9 $\overline{p}p \to \pi^0\eta\eta,\ \pi^0\pi^0\pi^0$

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
• • • We do not use the following data for averages, fits, limits, etc. • • •				
50^{+34}_{-22}	84	[10] CHEKANOV 04	ZEUS	$ep \to K^0_S K^0_S X$

[10] Systematic errors not estimated. NODE=M013W10;LINKAGE=CH

[11] From a partial-wave analysis of data using a K-matrix formalism with 5 poles. NODE=M013W;LINKAGE=L

[12] CHABAUD 81 is a reanalysis of PAWLICKI 77 data. NODE=M013W;LINKAGE=D

[13] 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

[14] From a fit to the D with $f_2(1270)$-$f'_2(1525)$ interference. Mass fixed at 1516 MeV. NODE=M013W;LINKAGE=M

[15] Systematic errors not estimated. NODE=M013W2;LINKAGE=SK

[16] Supersedes ACCIARRI 95J. NODE=M013W;LINKAGE=HA

[17] From an analysis ignoring interference with $f_0(1710)$. NODE=M013W;LINKAGE=F1

[18] From an analysis including interference with $f_0(1710)$. NODE=M013W;LINKAGE=F2

[19] T-matrix pole. NODE=M013W;LINKAGE=TT

$f'_2(1525)$ DECAY MODES

NODE=M013215;NODE=M013

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$K\overline{K}$	(88.8 ±3.1) %	DESIG=2
Γ_2	$\eta\eta$	(10.3 ±3.1) %	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 15 measurements and one constraint to determine 5 parameters. The overall fit has a $\chi^2 = 14.0$ for 11 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, $x_i \equiv \Gamma_i/\Gamma_{\text{total}}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_2	−100			
x_3	−3	−1		
x_8	−8	8	1	
Γ	−32	32	−1	−53
	x_1	x_2	x_3	x_8

	Mode	Rate (MeV)	
Γ_1	$K\overline{K}$	$65 \ ^{+5}_{-4}$	DESIG=2
Γ_2	$\eta\eta$	$7.6 \ \pm 2.5$	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
65^{+5}_{-4} OUR FIT				
63^{+6}_{-5}	[20] LONGACRE	86	MPS	$22\ \pi^- p \to K^0_S K^0_S n$

$\Gamma(\pi\pi)$ Γ_3

NODE=M013W5
NODE=M013W5

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
0.60 ± 0.12 OUR FIT				
$1.4 \ ^{+1.0}_{-0.5}$	[20] LONGACRE	86	MPS	$22\ \pi^- p \to K^0_S K^0_S n$

$\Gamma(\eta\eta)$ Γ_2

NODE=M013W7
NODE=M013W7

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
7.6 ± 2.5 OUR FIT				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$24 \ ^{+3}_{-1}$	[20] LONGACRE	86	MPS	$22\ \pi^- p \to K^0_S K^0_S n$

[20] From a partial-wave analysis of data using a K-matrix formalism with 5 poles.

NODE=M013PW;LINKAGE=L

$f_2'(1525)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M013223

$\Gamma(K\overline{K}) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_1\Gamma_8/\Gamma$

NODE=M013G1
NODE=M013G1

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.072 ± 0.007 OUR FIT					
0.072 ± 0.007 OUR AVERAGE					
$0.0564 \pm 0.0048 \pm 0.0116$		ABE	04	BELL	$10.6\ e^+e^- \to e^+e^- K^+K^-$
$0.076 \pm 0.006 \pm 0.011$	331	[23] ACCIARRI	01H	L3	91, 183–209 $e^+e^- \to e^+e^- K^0_S K^0_S$
$0.067 \pm 0.008 \pm 0.015$		[21] ALBRECHT	90G	ARG	$e^+e^- \to e^+e^- K^+K^-$
$0.11 \ ^{+0.03}_{-0.02} \pm 0.02$		BEHREND	89C	CELL	$e^+e^- \to e^+e^- K^0_S K^0_S$

0.10	$^{+0.04}_{-0.03}$	$^{+0.03}_{-0.02}$	BERGER	88	PLUT	$e^+ e^- \rightarrow e^+ e^- K^0_S K^0_S$
0.12	± 0.07	± 0.04	[21] AIHARA	86B	TPC	$e^+ e^- \rightarrow e^+ e^- K^+ K^-$
0.11	± 0.02	± 0.04	[21] ALTHOFF	83	TASS	$e^+ e^- \rightarrow e^+ e^- K \overline{K}$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
0.093	± 0.018	± 0.022	[21] ACCIARRI	95J	L3	Repl. by ACCIA-RRI 01H
0.0314	± 0.0050	± 0.0077	[22] ALBRECHT	90G	ARG	$e^+ e^- \rightarrow e^+ e^- K^+ K^-$

OCCUR=2

[21] Using an incoherent background. NODE=M013G1;LINKAGE=A

[22] Using a coherent background. NODE=M013G1;LINKAGE=B

[23] Supersedes ACCIARRI 95J. NODE=M013G;LINKAGE=HA

f'_2(1525) BRANCHING RATIOS

NODE=M013225

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

NODE=M013R3
NODE=M013R3

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
0.12±0.04 OUR FIT					
0.11±0.04		[24] PROKOSHKIN	91	GAM4	300 $\pi^- p \rightarrow \pi^- p \eta\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.14	90	BARBERIS	00E		450 $p p \rightarrow p_f \eta\eta p_s$
<0.50		BARNES	67	HBC	4.6,5.0 $K^- p$

[24] Combining results of GAM4 with those of WA76 on $K\overline{K}$ central production and results of CBAL, MRK3 and DM2 on $J/\psi \rightarrow \gamma\eta\eta$. 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 $\pi^- p \rightarrow K^+ K^- n$
0.027 $^{+0.071}_{-0.013}$		[25] GORLICH	80	ASPK	17,18 $\pi^- p$
0.0075±0.0025		[25,26] MARTIN	79	RVUE	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.06	95	AGUILAR-...	81B	HBC	4.2 $K^- p \rightarrow \Lambda K^+ K^-$
0.19 ±0.03		CORDEN	79	OMEG	12–15 $\pi^- p \rightarrow \pi^+ \pi^- n$
<0.045	95	BARREIRO	77	HBC	4.15 $K^- p \rightarrow \Lambda K^0_S K^0_S$
0.012 ±0.004		[25] PAWLICKI	77	SPEC	6 $\pi N \rightarrow K^+ K^- N$
<0.063	90	BRANDENB...	76C	ASPK	13 $K^- p \rightarrow K^+ K^- (\Lambda, \Sigma)$
<0.0086		[25] BEUSCH	75B	OSPK	8.9 $\pi^- p \rightarrow K^0 \overline{K}^0 n$

[25] Assuming that the f'_2(1525) is produced by an one-pion exchange production mechanism. NODE=M013R1;LINKAGE=C

[26] MARTIN 79 uses the PAWLICKI 77 data with different input value of the $f'_2(1525) \rightarrow K\overline{K}$ branching ratio. NODE=M013R1;LINKAGE=D

$\Gamma(\pi\pi)/\Gamma(K\overline{K})$ Γ_3/Γ_1

NODE=M013R7
NODE=M013R7

VALUE	DOCUMENT ID		TECN	COMMENT
0.0092±0.0018 OUR FIT				
0.075 ±0.035	AUGUSTIN	87	DM2	$J/\psi \rightarrow \gamma\pi^+\pi^-$

$\Gamma(\pi\pi\eta)/\Gamma(K\overline{K})$ Γ_6/Γ_1

NODE=M013R4
NODE=M013R4

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.41	95	AGUILAR-...	72B	HBC	3.9,4.6 $K^- p$
<0.3	67	AMMAR	67	HBC	

$\left[\Gamma(K\overline{K}^*(892)+\text{c.c.}) + \Gamma(\pi K\overline{K})\right]/\Gamma(K\overline{K})$ $(\Gamma_4+\Gamma_5)/\Gamma_1$

NODE=M013R5
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	

$\Gamma(\pi^+\pi^+\pi^-\pi^-)/\Gamma(K\overline{K})$ 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 $K^- p$

$\Gamma(\eta\eta)/\Gamma_{total}$ Γ_2/Γ

NODE=M013R8

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.10 ± 0.03	[27] PROKOSHKIN 91	GAM4	300 $\pi^- p \to \pi^- p\eta\eta$

[27] 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

$f_2'(1525)$ REFERENCES

NODE=M013

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	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
EVANGELISTA	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

OTHER RELATED PAPERS

LI	01	JPG 27 807	D.-M. Li, H. Yu, Q.-X. Shen		REFID=48306
ALBERICO	98	PL B438 430	A. Alberico *et al.*	(Obelix Collab.)	REFID=46327
JENNI	83	PR D27 1031	P. Jenni *et al.*	(SLAC, LBL)	REFID=20304
ARMSTRONG	82	PL 110B 77	T.A. Armstrong *et al.*	(BARI, BIRM, CERN+)	REFID=21405
ETKIN	82B	PR D25 1786	A. Etkin *et al.*	(BNL, CUNY, TUFTS, VAND)	REFID=20390
ABRAMS	67B	PRL 18 620	G.S. Abrams *et al.*	(UMD)	REFID=21381
BARNES	65	PRL 15 322	V.E. Barnes *et al.*	(BNL, SYRA)	REFID=21379

NODE=M123

$f_2(1565)$

$I^G(J^{PC}) = 0^+(2^{++})$

OMITTED FROM SUMMARY TABLE

Seen in antinucleon-nucleon annihilation at rest. Needs confirmation.

NODE=M123

$f_2(1565)$ MASS

NODE=M123205

NODE=M123M

VALUE (MeV)			DOCUMENT ID		TECN	COMMENT
1546	**±12**	**OUR AVERAGE**	Error includes scale factor of 1.6. See the ideogram below.			
1552	±13		[1] AMSLER	02	CBAR	0.9 $\overline{p}p \to \pi^0\eta\eta$, $\pi^0\pi^0\pi^0$
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		[1] 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. • • •						
1544.7	± 3.0		VLADIMIRSKII	00	SPEC	40 $\pi^- p \to K^0_S K^0_S X$
1598	±11	± 9	BAKER	99B	SPEC	0 $\overline{p}p \to \omega\omega\pi^0$
1534	±20		[2] ABELE	96C	RVUE	Compilation
~ 1552			[3] AMSLER	95D	CBAR	0.0 $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$
1598	±72		BALOSHIN	95	SPEC	40 $\pi^- C \to K^0_S K^0_S X$
1566	$^{+80}_{-50}$		[4] 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		[5] ARMSTRONG	93C	E760	$\overline{p}p \to \pi^0\eta\eta \to 6\gamma$
1508	±10		[5] ARMSTRONG	93D	E760	$\overline{p}p \to 3\pi^0 \to 6\gamma$
1525	±10		[5] ARMSTRONG	93D	E760	$\overline{p}p \to \eta\pi^0\pi^0 \to 6\gamma$
~ 1504			[6] WEIDENAUER	93	ASTE	0.0 $\overline{p}N \to 3\pi^- 2\pi^+$
1540	±15		[5] ADAMO	92	OBLX	$\overline{n}p \to \pi^+\pi^+\pi^-$
1515	±10		[7] 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] T-matrix pole. NODE=M123M;LINKAGE=G

[2] T-matrix pole, large coupling to $\rho\rho$ and $\omega\omega$, could be $f_2(1640)$. NODE=M123M;LINKAGE=AA

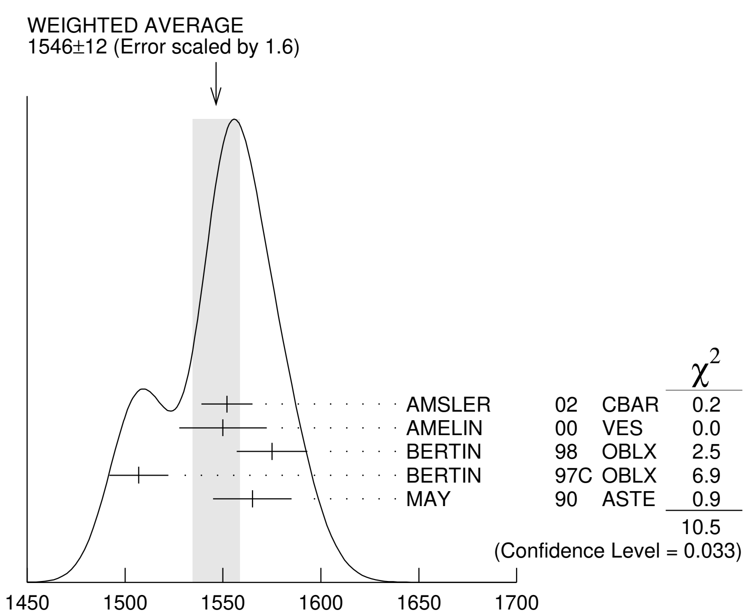
[3] Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D. NODE=M123M;LINKAGE=AB

[4] 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

[5] J^P not determined, could be partly $f_0(1500)$. NODE=M123M;LINKAGE=E

[6] J^P not determined. NODE=M123M;LINKAGE=F

[7] Superseded by AMSLER 95B. NODE=M123M;LINKAGE=BA



$f_2(1565)$ mass (MeV)

$f_2(1565)$ WIDTH

NODE=M123210

NODE=M123W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
126 ± 12 OUR AVERAGE				
113 ± 23	[8] 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	[8] 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. • • •				
10.3 ± 3.0	VLADIMIRSKII	00	SPEC	40 $\pi^- p \to K^0_S K^0_S X$
180 ± 60	[9] ABELE	96C	RVUE	Compilation
∼ 142	[10] AMSLER	95D	CBAR	0.0 $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$
263 ±101	BALOSHIN	95	SPEC	40 π^- C $\to K^0_S K^0_S$ X
166 $^{+80}_{-20}$	[11] ANISOVICH	94	CBAR	0.0 $\overline{p}p \to 3\pi^0, \eta\eta\pi^0$
130 ± 10	[12] ADAMO	93	OBLX	$\overline{n}p \to \pi^+\pi^+\pi^-$
148 ± 27	[13] ARMSTRONG	93C	E760	$\overline{p}p \to \pi^0\eta\eta \to 6\gamma$
103 ± 15	[13] ARMSTRONG	93D	E760	$\overline{p}p \to 3\pi^0 \to 6\gamma$
111 ± 10	[13] ARMSTRONG	93D	E760	$\overline{p}p \to \eta\pi^0\pi^0 \to 6\gamma$
∼ 206	[14] WEIDENAUER	93	ASTE	0.0 $\overline{p}N \to 3\pi^- 2\pi^+$
132 ± 37	[13] ADAMO	92	OBLX	$\overline{n}p \to \pi^+\pi^+\pi^-$
120 ± 10	[15] 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

[8] T-matrix pole. NODE=M123W;LINKAGE=G
[9] T-matrix pole, large coupling to $\rho\rho$ and $\omega\omega$, could be $f_2(1640)$. NODE=M123W;LINKAGE=CC
[10] Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D. NODE=M123W;LINKAGE=AB
[11] 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
[12] Supersedes ADAMO 92. NODE=M123W;LINKAGE=C
[13] J^P not determined, could be partly $f_0(1500)$. NODE=M123W;LINKAGE=E
[14] J^P not determined. NODE=M123W;LINKAGE=F
[15] 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 ←

$f_2(1565)$ 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	[16] ANISOVICH	94B	RVUE	$\overline{p}p \to \pi^+\pi^-\pi^0$
seen	MAY	89	ASTE	$\overline{p}p \to \pi^+\pi^-\pi^0$

[16] ANISOVICH 94B is from a reanalysis of MAY 90. NODE=M123R1;LINKAGE=A

$\Gamma(\pi^+\pi^-)/\Gamma(\rho^0\rho^0)$ 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	$\overline{p}N \to 3\pi^- 2\pi^+$

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

NODE=M123R3
NODE=M123R3

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AMSLER	95B	CBAR	0.0 $\overline{p}p \to 3\pi^0$

$\Gamma(\eta\eta)/\Gamma(\pi^0\pi^0)$ 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. • • •				
$0.024 \pm 0.005 \pm 0.012$	[17] ARMSTRONG	93C	E760	$\overline{p}p \to \pi^0\eta\eta \to 6\gamma$

[17] 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

AMSLER	02	EPJ C23 29	C. Amsler *et al.*		REFID=48580
AMELIN	00	NP A668 83	D. Amelin *et al.*	(VES Collab.)	REFID=47432
VLADIMIRSKII	00	JETPL 26 486	V.V. Vladimirskii *et al.*		REFID=47997
		Translated from ZETFP 72 698.			
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
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=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=M166205

NODE=M166M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
$1594 \pm 15^{+10}_{-60}$	EUGENIO	01	SPEC	18 $\pi^- p \to \omega\eta n$

$h_1(1595)$ WIDTH

NODE=M166210

NODE=M166W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
$384 \pm 60^{+70}_{-100}$	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;$\to$ NOT CHECKED $\leftarrow$

$h_1(1595)$ 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

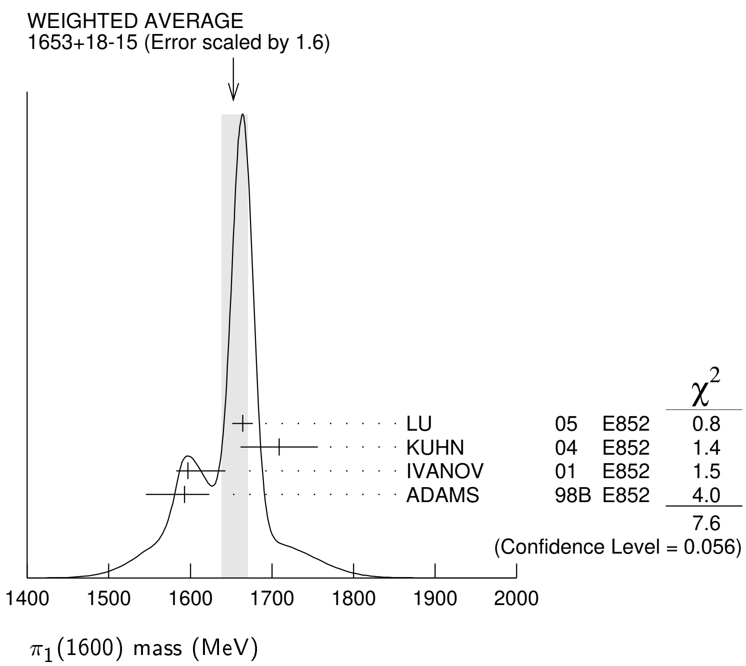
NODE=M164205

NODE=M164M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1653^{+18}_{-15} OUR AVERAGE		Error includes scale factor of 1.6. See the ideogram below.			
$1664 \pm 8 \pm 10$	145k	[1] LU	05	E852	$18\ \pi^- p \to \omega \pi^- \pi^0 p$
$1709 \pm 24 \pm 41$	69k	KUHN	04	E852	$18\ \pi^- p \to \eta \pi^+ \pi^- \pi^- p$
$1597 \pm 10^{+45}_{-10}$		IVANOV	01	E852	$18\ \pi^- p \to \eta' \pi^- p$
$1593 \pm 8^{+29}_{-47}$		[2] ADAMS	98B	E852	$18.3\ \pi^- p \to \pi^+ \pi^- \pi^- p$

[1] May be a different state.
[2] Natural parity exchange.

NODE=M164M;LINKAGE=LU
NODE=M164M;LINKAGE=A



$\pi_1(1600)$ WIDTH

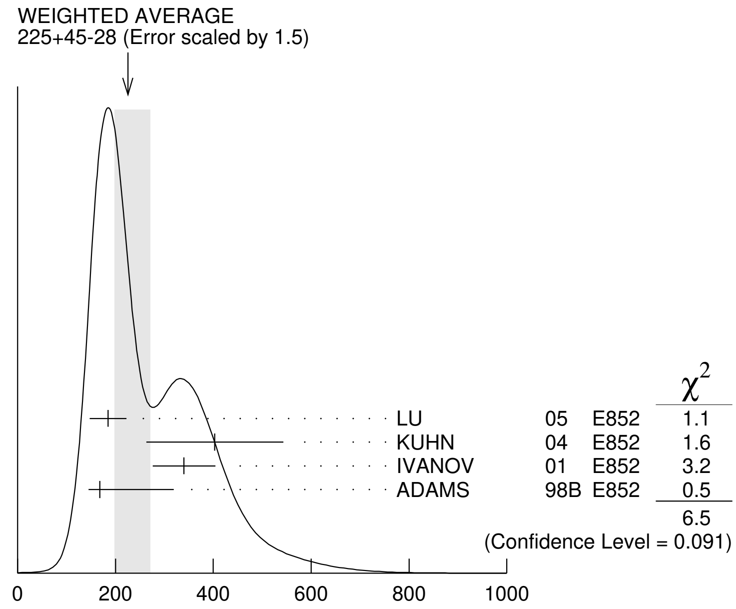
NODE=M164210

NODE=M164W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
225^{+45}_{-28} OUR AVERAGE		Error includes scale factor of 1.5. See the ideogram below.			
$185 \pm 25 \pm 28$	145k	[3] LU	05	E852	$18\ \pi^- p \to \omega \pi^- \pi^0 p$
$403 \pm 80 \pm 115$	69k	KUHN	04	E852	$18\ \pi^- p \to \eta \pi^+ \pi^- \pi^- p$
$340 \pm 40 \pm 50$		IVANOV	01	E852	$18\ \pi^- p \to \eta' \pi^- p$
$168 \pm 20^{+150}_{-12}$		[4] ADAMS	98B	E852	$18.3\ \pi^- p \to \pi^+ \pi^- \pi^- p$

[3] May be a different state.
[4] Natural parity exchange.

NODE=M164W;LINKAGE=LU
NODE=M164W;LINKAGE=A



$\pi_1(1600)$ width (MeV)

$\pi_1(1600)$ DECAY MODES

NODE=M164215;NODE=M164

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\pi\pi\pi$	seen	DESIG=1;OUR EST;→ NOT CHECKED ←
Γ_2	$\rho^0\pi^-$	seen	DESIG=2
Γ_3	$f_2(1270)\pi^-$	not seen	DESIG=4
Γ_4	$b_1(1235)\pi$	seen	DESIG=5
Γ_5	$\eta'(958)\pi^-$	seen	DESIG=3
Γ_6	$f_1(1285)\pi$	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
seen	[5] ADAMS	98B	E852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$

$\Gamma(\eta'(958)\pi^-)/\Gamma_{total}$ Γ_5/Γ

NODE=M164R2
NODE=M164R2

VALUE	DOCUMENT ID		TECN	COMMENT
seen	IVANOV	01	E852	18 $\pi^- p \to \eta'\pi^- p$

$\Gamma(f_2(1270)\pi^-)/\Gamma_{total}$ Γ_3/Γ

NODE=M164R3
NODE=M164R3

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	CHUNG	02	E852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$

$\Gamma(b_1(1235)\pi)/\Gamma_{total}$ Γ_4/Γ

NODE=M164R4
NODE=M164R4

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	35280	[6] 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	E852	18 $\pi^- p \to \omega\pi^-\pi^0 p$

$\Gamma(f_1(1285)\pi)/\Gamma(\eta'(958)\pi^-)$ Γ_6/Γ_5

NODE=M164R5
NODE=M164R5

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
3.80±0.78	69k	[7] KUHN	04	E852	18 $\pi^- p \to \eta\pi^+\pi^-\pi^- p$

[5] Natural parity exchange. NODE=M164R;LINKAGE=A

[6] $B((b_1\pi)_{D-wave})/B((b_1\pi)_{S\text{-wave}})=0.3 \pm 0.1$. NODE=M164R;LINKAGE=RB

[7] Using $\eta'(958)\pi$ data from IVANOV 01. NODE=M164R;LINKAGE=KU

$\pi_1(1600)$ REFERENCES

NODE=M164

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

OTHER RELATED PAPERS

HEDDITCH	05	PR D72 114507	J.N. Hedditch *et al.*	REFID=50998
POPLAWSKI	05	PR D71 056003	N.J. Poplawski, A.P. Szczepaniak, J.T. Londergan	REFID=50809
CLOSE	04A	PR D70 094015	F.E. Close, J.J. Dudek	REFID=50192
BERNARD	03	PR D68 074505	C. Bernard *et al.*	REFID=49623
JIN	03	PR D67 014025	H.Y. Jin, J.G. Korener, T.G. Steele	REFID=49184
SZCZEPANIAK	03B	PRL 91 092002	A.P. Szczepaniak *et al.*	REFID=49575
ZHANG	03	PR D67 074020	A. Zhang, T.G. Steele	REFID=49409
ACHASOV	02J	PAN 65 552 Translated from YAF 65 579.	N.N. Achasov, G.N. Shestakov	REFID=48820
CHUNG	02C	EPL A15 539	S.U. Chung, E. Klempt, J.G. Korener	REFID=49176
ZHANG	02	PR D65 096005	R. Zhang *et al.*	REFID=48856
IDDIR	01	PL B507 183	F. Iddir, A.S. Safir	REFID=48326

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. See the Note under $a_1(1260)$.

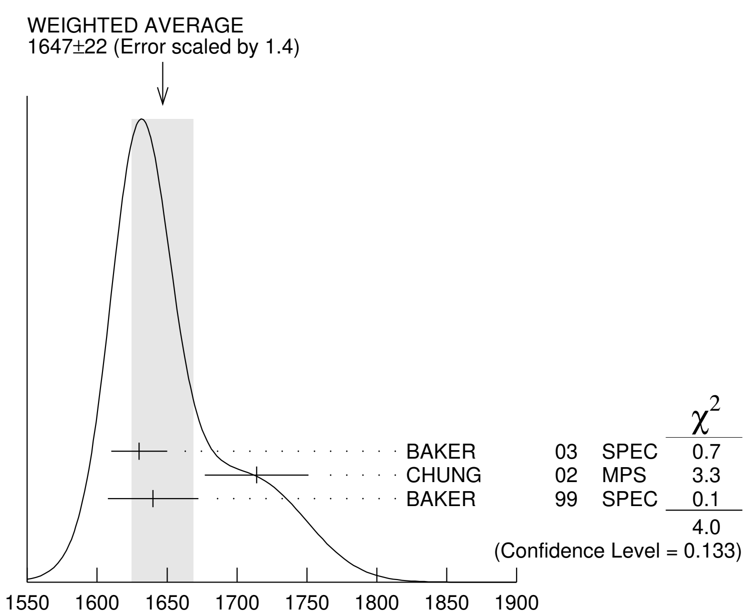
NODE=M161

$a_1(1640)$ MASS

NODE=M161205

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	E852	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=M161210

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	$\overline{p}p \to \omega\pi^+\pi^-\pi^0$
308± 37±62		CHUNG	02	E852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$
300± 22±40		BAKER	99	SPEC	1.94 $\overline{p}p \to 4\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
300±100		BELLINI	85	SPEC	40 $\pi^- A \to \pi^-\pi^+\pi^- A$

[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	E852	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	E852	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	E852	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.			

OTHER RELATED PAPERS

BARNES	97	PR D55 4157	T. Barnes *et al.*	(ORNL, RAL, MCHS)	REFID=45384
GOUZ	92	Dallas HEP 92, p. 572	Yu.P. Gouz *et al.*	(VES Collab.)	REFID=47527
Proceedings XXVI Int. Conf. on High Energy Physics					

NODE=M117

$f_2(1640)$

$I^G(J^{PC}) = 0^+(2^{++})$

OMITTED FROM SUMMARY TABLE

$f_2(1640)$ MASS

NODE=M117205

NODE=M117M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1638± 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	$\overline{n}p \to 3\pi^+2\pi^-$
1590±30	BELADIDZE	92B	VES	36 $\pi^- p \to \omega\omega n$
1635± 7	ALDE	90	GAM2	38 $\pi^- p \to \omega\omega n$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1643± 7	[1] ALDE	89B	GAM2	38 $\pi^- p \to \omega\omega n$

[1] Superseded by ALDE 90.

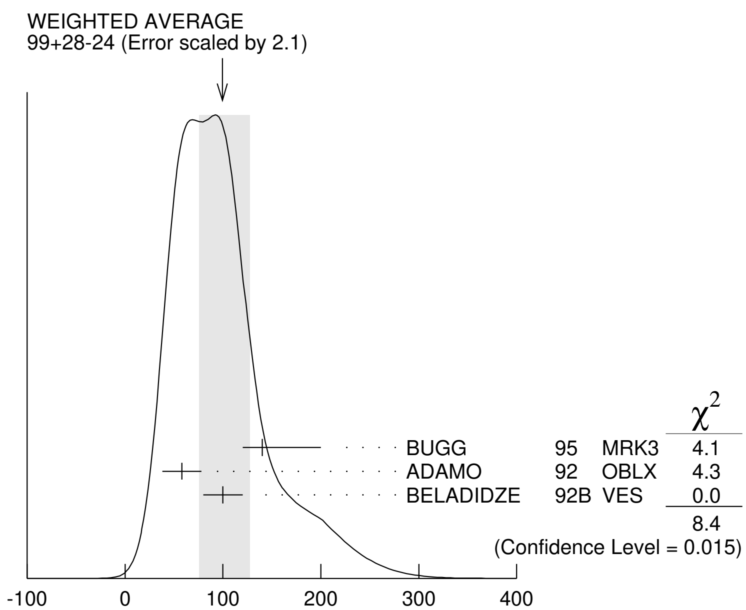
NODE=M117M;LINKAGE=BB

$f_2(1640)$ WIDTH

NODE=M117210

NODE=M117W

VALUE (MeV)	CL%	DOCUMENT ID		TECN	COMMENT
99^{+28}_{-24} OUR AVERAGE Error includes scale factor of 2.1. See the ideogram below.					
140^{+60}_{-20}		BUGG	95	MRK3	$J/\psi \to \gamma\pi^+\pi^-\pi^+\pi^-$
58±20		ADAMO	92	OBLX	$\overline{n}p \to 3\pi^+2\pi^-$
100±20		BELADIDZE	92B	VES	36 $\pi^- p \to \omega\omega n$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 70	90	ALDE	90	GAM2	38 $\pi^- p \to \omega\omega n$



$f_2(1640)$ width (MeV)

$f_2(1640)$ 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 ←

$f_2(1640)$ REFERENCES

NODE=M117

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
BELADIDZE	92B	ZPHY C54 367	G.M. Beladidze *et al.*	(VES Collab.)	REFID=42172
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

OTHER RELATED PAPERS

PROKOSHKIN 99 PAN 62 356 Yu.D. Prokoshkin
Translated from YAF 62 396. REFID=46946

NODE=M154

$\eta_2(1645)$ $I^G(J^{PC}) = 0^+(2^{-+})$

$\eta_2(1645)$ MASS

NODE=M154205

NODE=M154M

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
1617± 5 OUR AVERAGE					
1613± 8	BARBERIS	00B			450 $pp \rightarrow p_f \eta \pi^+ \pi^- p_s$
1617± 8	BARBERIS	00C			450 $pp \rightarrow p_f 4\pi p_s$
1620±20	BARBERIS	97B	OMEG		450 $pp \rightarrow pp2(\pi^+\pi^-)$
1645±14±15	ADOMEIT	96	CBAR	0	1.94 $\overline{p}p \rightarrow \eta 3\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1645± 6±20	ANISOVICH	00E	SPEC		1.94 $\overline{p}p \rightarrow \eta 3\pi^0$

$\eta_2(1645)$ WIDTH

NODE=M154210

NODE=M154W

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
181±11 OUR AVERAGE					
185±17	BARBERIS	00B			450 $pp \rightarrow p_f \eta \pi^+ \pi^- p_s$
177±18	BARBERIS	00C			450 $pp \rightarrow p_f 4\pi p_s$
180±25	BARBERIS	97B	OMEG		450 $pp \rightarrow pp2(\pi^+\pi^-)$
$180^{+40}_{-21}\pm25$	ADOMEIT	96	CBAR	0	1.94 $\overline{p}p \rightarrow \eta 3\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
200±25	ANISOVICH	00E	SPEC		1.94 $\overline{p}p \rightarrow \eta 3\pi^0$

$\eta_2(1645)$ 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 $pp \rightarrow ppK\overline{K}\pi$

[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		COMMENT
13.0±2.7	BARBERIS	00B	450 $pp \rightarrow p_f \eta \pi^+ \pi^- p_s$

$\Gamma(f_2(1270)\eta)/\Gamma_{total}$ 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 $pp \rightarrow p_f \eta \pi^+ \pi^- p_s$

$\eta_2(1645)$ REFERENCES

NODE=M154

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

$\omega(1650)$
was $\omega(1600)$

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

$\omega(1650)$ MASS

NODE=M126205

NODE=M126M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*	
1670± 30 OUR ESTIMATE							→ NOT CHECKED ←
1660± 10± 2		AUBERT,B	04N	BABR		10.6 $e^+e^- \to \pi^+\pi^-\pi^0\gamma$	
1700± 20		EUGENIO	01	SPEC		18 $\pi^- p \to \omega\eta n$	
1705± 26	612	[1] AKHMETSHIN	00D	CMD2		$e^+e^- \to \omega\pi^+\pi^-$	OCCUR=2
1662± 13	750	[2] ANTONELLI	92	DM2		1.34–2.4$e^+e^- \to \rho\pi, \omega\pi\pi$	OCCUR=4
• • • We do not use the following data for averages, fits, limits, etc. • • •							
1770± 50±60	1.2M	[3] ACHASOV	03D	RVUE		0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$	
1619± 5		[4] HENNER	02	RVUE		1.2–2.0 $e^+e^- \to \rho\pi, \omega\pi\pi$	
1820^{+190}_{-150}		[5] ACHASOV	98H	RVUE		$e^+e^- \to \pi^+\pi^-\pi^0$	
1840^{+100}_{-70}		[6] ACHASOV	98H	RVUE		$e^+e^- \to \omega\pi^+\pi^-$	OCCUR=2
1780^{+170}_{-300}		[7] ACHASOV	98H	RVUE		$e^+e^- \to K^+K^-$	OCCUR=3
$\sim$ 2100		[8] ACHASOV	98H	RVUE		$e^+e^- \to K^0_S K^\pm\pi^\mp$	OCCUR=4
1606± 9		[9] CLEGG	94	RVUE			OCCUR=5
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	0	$e^+e^- \to 3\pi$	

[1] Using the data of AKHMETSHIN 00D and ANTONELLI 92. The $\rho\pi$ dominance for the energy dependence of the $\omega(1420)$ and $\omega(1650)$ width assumed. NODE=M126M;LINKAGE=KI

[2] From the combined fit of the $\rho\pi$ and $\omega\pi\pi$ final states. NODE=M126M;LINKAGE=AE

[3] From the combined fit of ANTONELLI 92, ACHASOV 01E, ACHASOV 02E, and ACHASOV 03D data on the $\pi^+\pi^-\pi^0$ and ANTONELLI 92 on the $\omega\pi^+\pi^-$ final states. Supersedes ACHASOV 99E and ACHASOV 02E. NODE=M126M;LINKAGE=VH

[4] Using results of CORDIER 81 and preliminary data of DOLINSKY 91 and ANTONELLI 92. NODE=M126M;LINKAGE=AB

[5] Using data from BARKOV 87, DOLINSKY 91, and ANTONELLI 92. NODE=M126M;LINKAGE=L1

[6] Using the data from ANTONELLI 92. NODE=M126M;LINKAGE=L2

[7] Using the data from IVANOV 81 and BISELLO 88B. NODE=M126M;LINKAGE=L3

[8] Using the data from BISELLO 91C. NODE=M126M;LINKAGE=L4

[9] From a fit to two Breit-Wigner functions and using the data of DOLINSKY 91 and ANTONELLI 92. NODE=M126M;LINKAGE=AD

$\omega(1650)$ WIDTH

NODE=M126210

NODE=M126W

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*	
315± 35 OUR ESTIMATE							→ NOT CHECKED ←
230± 30± 20		AUBERT,B	04N	BABR		10.6 $e^+e^- \to \pi^+\pi^-\pi^0\gamma$	
250± 50		EUGENIO	01	SPEC		18 $\pi^- p \to \omega\eta n$	
370± 25	612	[10] AKHMETSHIN	00D	CMD2		$e^+e^- \to \omega\pi^+\pi^-$	OCCUR=2
280± 24	750	[11] ANTONELLI	92	DM2		1.34–2.4$e^+e^- \to \rho\pi, \omega\pi\pi$	OCCUR=4

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

$490^{+200}_{-150}\pm130$	1.2M	[12] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
$250\pm\ 14$		[13] HENNER	02	RVUE	1.2–2.0 $e^+e^- \to \rho\pi,\ \omega\pi\pi$
$113\pm\ 20$		[14] CLEGG	94	RVUE	
$160\pm\ 20$		ATKINSON	83B	OMEG	20–70 $\gamma p \to 3\pi X$
$136\pm\ 46$		CORDIER	81	DM1	$e^+e^- \to \omega 2\pi$
$99\pm\ 49$	21	ESPOSITO	80	FRAM	$e^+e^- \to 3\pi$
$42\pm\ 17$		COSME	79	OSPK 0	$e^+e^- \to 3\pi$

OCCUR=5

[10] 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

[11] From the combined fit of the $\rho\pi$ and $\omega\pi\pi$ final states. NODE=M126W;LINKAGE=AE

[12] 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

[13] Using results of CORDIER 81 and preliminary data of DOLINSKY 91 and ANTONELLI 92. NODE=M126W;LINKAGE=AB

[14] From a fit to two Breit-Wigner functions and using the data of DOLINSKY 91 and ANTONELLI 92. NODE=M126W;LINKAGE=AD

$\omega(1650)$ 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

$\Gamma(\rho\pi) \times \Gamma(e^+e^-)/\Gamma^2_{\text{total}}$ — $\Gamma_1\Gamma_4/\Gamma^2$

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. • • •					
$1.3\ \pm0.1\ \pm0.1$		AUBERT,B	04N	BABR	10.6 $e^+e^- \to \pi^+\pi^-\pi^0\gamma$
$1.2\ ^{+0.4}_{-0.1}\ \pm0.8$	1.2M	[15,16] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
0.921 ± 0.230		[17,18] CLEGG	94	RVUE	
0.479 ± 0.050	750	[19,20] ANTONELLI	92	DM2	1.34–2.4$e^+e^- \to \rho\pi,\ \omega\pi\pi$

$\Gamma(\omega\pi\pi) \times \Gamma(e^+e^-)/\Gamma^2_{\text{total}}$ — $\Gamma_2\Gamma_4/\Gamma^2$

NODE=M126G4
NODE=M126G4

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.41\ \pm0.09\ \pm0.13$	1.2M	[15,16] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
0.540 ± 0.095		[21] AKHMETSHIN	00D	CMD2	1.2–1.38 $e^+e^- \to \omega\pi^+\pi^-$
0.318 ± 0.080		[17,18] CLEGG	94	RVUE	
0.607 ± 0.061	750	[19,20] ANTONELLI	92	DM2	1.34–2.4$e^+e^- \to \rho\pi,\ \omega\pi\pi$

$\Gamma(\omega\eta) \times \Gamma(e^+e^-)/\Gamma^2_{\text{total}}$ — $\Gamma_3\Gamma_4/\Gamma^2$

NODE=M126G5
NODE=M126G5

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<6	90	[22] AKHMETSHIN	03B	CMD2	$e^+e \to \eta\pi^0\gamma$

[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

$\Gamma(\omega\pi\pi)/\Gamma_{total}$ — 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	[24] ACHASOV 03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
0.620 ± 0.014		[25] HENNER 02	RVUE	1.2–2.0 $e^+e^- \to \rho\pi, \omega\pi\pi$

$\Gamma(\rho\pi)/\Gamma_{total}$ — Γ_1/Γ

NODE=M126R3
NODE=M126R3

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
~ 0.65	1.2M	[24] ACHASOV 03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
0.380 ± 0.014		[25] 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
NODE=M126R4

VALUE (units 10^{-7})	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
~ 18	1.2M	[23,25] ACHASOV 03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
32 ± 1		[25] HENNER 02	RVUE	1.2–2.0 $e^+e^- \to \rho\pi, \omega\pi\pi$

[23] Calculated by us from the cross section at the peak. NODE=M126R;LINKAGE=AW

[24] 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

[25] Assuming that the $\omega(1650)$ decays into $\rho\pi$ and $\omega\pi\pi$ only. NODE=M126R;LINKAGE=AC

$\omega(1650)$ REFERENCES

NODE=M126

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; Translated from ZETFP 46 132.	L.M. Barkov *et al.*	(NOVO)	REFID=40280
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

OTHER RELATED PAPERS

AKHMETSHIN	03	PL B551 27	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=49172
Also	02	PAN 65 1222; Translated from YAF 65 1255.	E.V. Anashkin, V.M. Aulchenko, R.R. Akhmetshin		REFID=48827
ACHASOV	02B	PAN 65 153; Translated from YAF 65 158.	N.N. Achasov, A.A. Kozhevnikov		REFID=48618
CLOSE	02	PR D65 092003	F.E. Close, A. Donnachie, Yu.S. Kalashnikova		REFID=48838
ACHASOV	00J	PR D62 117503	N.N. Achasov, A.A. Kozhevnikov		REFID=47932
ANISOVICH	00H	PL B485 341	A.V. Anisovich *et al.*		REFID=47948
ABELE	99D	PL B468 178	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=47401
BELOZEROVA	98	PPN 29 63; Translated from FECAY 29 148.	T.S. Belozerova, V.K. Henner		REFID=46350
ACHASOV	97F	PAN 60 2029; Translated from YAF 60 2212.	N.N. Achasov, A.A. Kozhevnikov	(NOVM)	REFID=45858
DOLINSKY	91	PRPL 202 99	S.I. Dolinsky *et al.*	(NOVO)	REFID=41369
ATKINSON	87	ZPHY C34 157	M. Atkinson *et al.*	(BONN, CERN, GLAS+)	REFID=40025
ATKINSON	84	NP B231 15	M. Atkinson *et al.*	(BONN, CERN, GLAS+)	REFID=20574

NODE=M045

$\omega_3(1670)$ $I^G(J^{PC}) = 0^-(3^{--})$

ω_3(1670) MASS

NODE=M045205

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. NODE=M045M;LINKAGE=E

[2] From a fit to $I(J^P) = 0(3^-)$ $\rho\pi$ partial wave. NODE=M045M;LINKAGE=P

ω_3(1670) WIDTH

NODE=M045210

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. NODE=M045W;LINKAGE=S

[4] Phase rotation seen for $J^P = 3^-$ $\rho\pi$ wave. NODE=M045W;LINKAGE=E

[5] From a fit to $I(J^P) = 0(3^-)$ $\rho\pi$ partial wave. NODE=M045W;LINKAGE=P

ω_3(1670) DECAY MODES

NODE=M045215;NODE=M045

	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	$b_1(1235)\pi$	possibly seen	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
NODE=M045R5

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
>0.75	68	BAUBILLIER	79	HBC	8.2 $K^- p$ backward

ω_3(1670) REFERENCES

NODE=M045

AMELIN	96	ZPHY C70 71	D.V. Amelin *et al.*	(SERP, TBIL)
BAUBILLIER	79	PL 89B 131	M. Baubillier *et al.*	(BIRM, CERN, GLAS+)
BALTAY	78E	PRL 40 87	C. Baltay, C.V. Cautis, M. Kalelkar	(COLU) JP
CORDEN	78B	NP B138 235	M.J. Corden *et al.*	(BIRM, RHEL, TELA+)
CERRADA	77B	NP B126 241	M. Cerrada *et al.*	(AMST, CERN, NIJM+) JP
WAGNER	75	PL 58B 201	F. Wagner, M. Tabak, D.M. Chew	(LBL) JP
DIAZ	74	PRL 32 260	J. Diaz *et al.*	(CASE, CMU)
MATTHEWS	71D	PR D3 2561	J.A.J. Matthews *et al.*	(TNTO, WISC)
BARNES	69B	PRL 23 142	V.E. Barnes *et al.*	(BNL)
KENYON	69	PRL 23 146	I.R. Kenyon *et al.*	(BNL, UCND, ORNL)
ARMENISE	68B	PL 26B 336	N. Armenise *et al.*	(BARI, BGNA, FIRZ+)

REFID=44649
REFID=21522
REFID=21520
REFID=21269
REFID=20537
REFID=20843
REFID=21248
REFID=21515
REFID=21512
REFID=20800
REFID=20783

OTHER RELATED PAPERS

MATTHEWS	71	LNC 1 361	J.A.J. Matthews *et al.*	(TNTO, WISC)
ARMENISE	70	LNC 4 199	N. Armenise *et al.*	(BARI, BGNA, FIRZ)

REFID=21516
REFID=20693

NODE=M034

$\pi_2(1670)$

$I^G(J^{PC}) = 1^-(2^{-+})$

π_2(1670) MASS

NODE=M034205

NODE=M034M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT	
1672.4± 3.2 OUR AVERAGE		Error includes scale factor of 1.4. See the ideogram below.					
1749 ±10 ±100	145k	LU	05	E852		18 $\pi^- p \to \omega\pi^-\pi^0 p$	
1676 ± 3 ± 8		[1] CHUNG	02	E852		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] EVANGELISTA	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

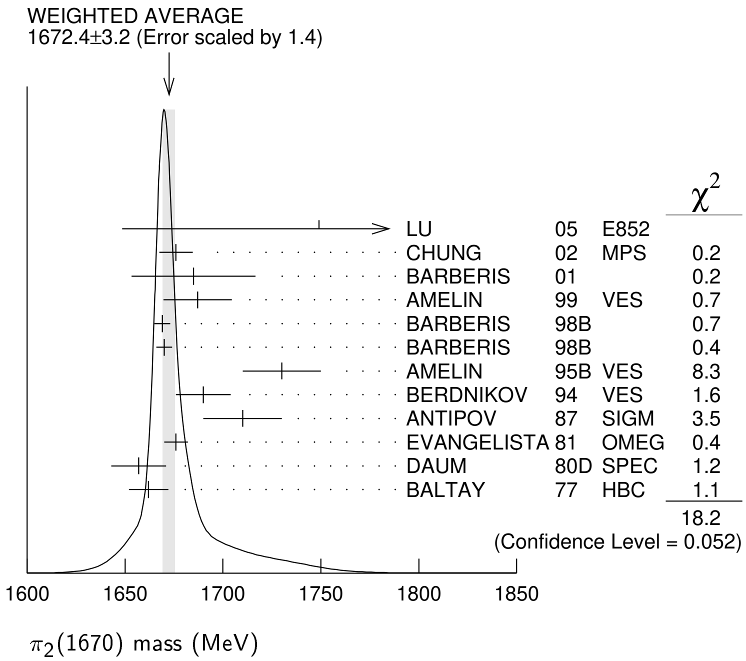
[4] From a fit to $J^P = 2^-$ S-wave $f_2(1270)\pi$ partial wave. NODE=M034M;LINKAGE=P

[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



$\pi_2(1670)$ WIDTH

NODE=M034210

NODE=M034W

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
259± 9 OUR AVERAGE		Error includes scale factor of 1.3. See the ideogram below.			
408± 60±250	145k	LU	05 E852		18 $\pi^- p \to \omega\pi^-\pi^0 p$
254± 3± 31		[9] CHUNG	02 E852		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 π^- Cu $\to \mu^+\mu^-\pi^-$ Cu
260± 20		[12] EVANGELISTA	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 $\pi^- p \to p\pi_2$

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

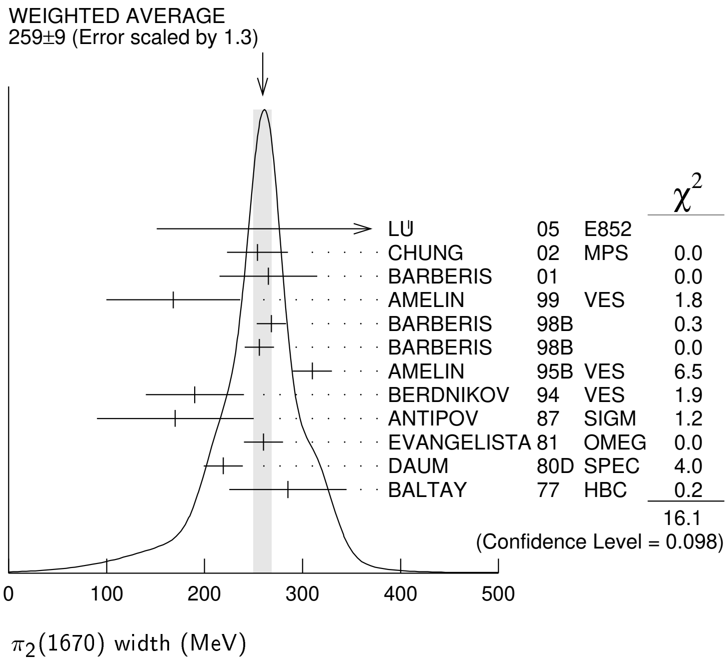
[12] From a fit to $J^P = 2^-$ $f_2(1270)\pi$ partial wave. NODE=M034W;LINKAGE=P

[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	$f_2(1270)\pi$	(56.2 ± 3.2) %		DESIG=8
Γ_5	$\rho\pi$	$(31\ \pm4\ )$ %		DESIG=2
Γ_6	$\sigma\pi$	(10.9 ± 3.4) %		DESIG=13
Γ_7	$(\pi\pi)_{S\text{-wave}}$	$(\ 8.7\pm3.4)$ %		DESIG=11
Γ_8	$K\overline{K}^*(892)+$ c.c.	$(\ 4.2\pm1.4)$ %		DESIG=5
Γ_9	$\omega\rho$	$(\ 2.7\pm1.1)$ %		DESIG=14
Γ_{10}	$\gamma\gamma$			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, $x_i \equiv \Gamma_i/\Gamma_{\text{total}}$. 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

VALUE (keV)	CL%	DOCUMENT ID	TECN	CHG	COMMENT
<0.072	90	[17] ACCIARRI 97T	L3		$e^+e^- \to e^+e^-\pi^+\pi^-\pi^0$
<0.19	90	[17] ALBRECHT 97B	ARG		$e^+e^- \to e^+e^-\pi^+\pi^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1.41 \pm 0.23 \pm 0.28$		ANTREASYAN 90	CBAL	0	$e^+e^- \to e^+e^-\pi^0\pi^0\pi^0$
$0.8 \pm 0.3 \pm 0.12$		[18] BEHREND 90C	CELL	0	$e^+e^- \to e^+e^-\pi^+\pi^-\pi^0$
$1.3 \pm 0.3 \pm 0.2$		[19] BEHREND 90C	CELL	0	$e^+e^- \to e^+e^-\pi^+\pi^-\pi^0$

OCCUR=2

[17] Decaying into $f_2(1270)\pi$ and $\rho\pi$.
[18] Constructive interference between $f_2(1270)\pi$,$\rho\pi$ and background.
[19] Incoherent Ansatz.

NODE=M034W1;LINKAGE=QQ
NODE=M034W1;LINKAGE=C
NODE=M034W1;LINKAGE=G

$\pi_2(1670)$ 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
$0.29 \pm 0.03 \pm 0.05$	[20] BARBERIS 01	450 $pp \to p_f 3\pi^0 p_s$

$\Gamma(\rho\pi)/\Gamma(\pi^\pm\pi^+\pi^-)$ $\frac{1}{2}\Gamma_5/(0.567\Gamma_4+\frac{1}{2}\Gamma_5+0.624\Gamma_7)$

NODE=M034R2

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
0.29 ± 0.04 OUR FIT				
0.29 ± 0.05	[21] 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 $\pi^+ p \to 3\pi p$

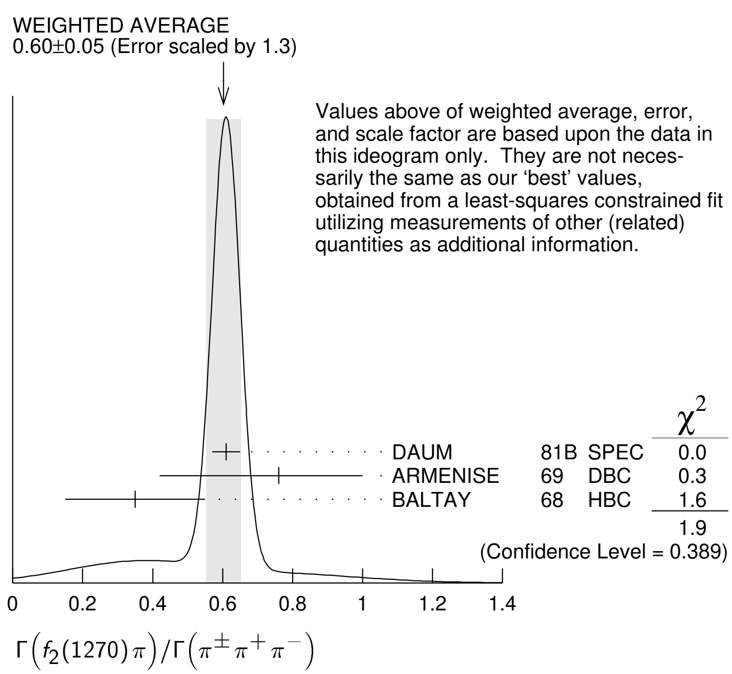
$\Gamma(f_2(1270)\pi)/\Gamma(\pi^\pm\pi^+\pi^-)$ $0.567\Gamma_4/(0.567\Gamma_4+\frac{1}{2}\Gamma_5+0.624\Gamma_7)$

NODE=M034R3

(With $f_2(1270) \to \pi^+\pi^-$.)

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. See the ideogram below.			
0.61 ± 0.04	[21] DAUM 81B	SPEC		63,94 $\pi^- p$
$0.76 {+0.24 \atop -0.34}$	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 $\pi^+ p \to 3\pi p$

NODE=M034R3
NODE=M034R3



$\Gamma(\rho\pi)/\Gamma(f_2(1270)\pi)$ — $\Gamma_5/0.564\Gamma_4$

NODE=M034R16

(With $f_2(1270) \to \pi^+\pi^-$.)

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	E852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$
1.01±0.05	BARBERIS	98B		450 $p p \to p_f \pi^+\pi^-\pi^0 p_s$

$\Gamma(\eta\pi)/\Gamma(\pi^\pm\pi^+\pi^-)$ — $\Gamma_{11}/(0.567\Gamma_4+\frac{1}{2}\Gamma_5+0.624\Gamma_7)$

NODE=M034R5

(All η decays.)

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 $\pi^- p \to f_2\pi^- N$

$\Gamma(\pi^\pm 2\pi^+ 2\pi^-)/\Gamma(\pi^\pm\pi^+\pi^-)$ — $\Gamma_{12}/(0.567\Gamma_4+\frac{1}{2}\Gamma_5+0.624\Gamma_7)$

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

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0019	97.7	AMELIN	99	VES	37 $\pi^- A \to \omega\pi^-\pi^0 A^*$

$\Gamma((\pi\pi)_{S\text{-wave}})/\Gamma(\pi^\pm\pi^+\pi^-)$ — $0.624\Gamma_7/(0.567\Gamma_4+\frac{1}{2}\Gamma_5+0.624\Gamma_7)$

NODE=M034R11

(With $(\pi\pi)_{S\text{-wave}} \to \pi^+\pi^-$.)

VALUE	DOCUMENT ID		TECN	COMMENT
0.10±0.04 OUR FIT				
0.10±0.05	[21] 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	[22] 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	[23] AMELIN	99	VES	37 $\pi^- A \to \omega\pi^-\pi^0 A^*$

$\Gamma(\sigma\pi)/\Gamma(f_2(1270)\pi)$ — 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	E852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$
0.24±0.10	[24,25] BAKER	99	SPEC	1.94 $\overline{p} p \to 4\pi^0$

$\Gamma(f_1(1285)\pi)/\Gamma_{total}$ — Γ_{16}/Γ

NODE=M034R23

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
possibly seen	69k	KUHN	04	E852	18 $\pi^- p \to \eta\pi^+\pi^-\pi^- p$

$\Gamma(a_2(1320)\pi)/\Gamma_{total}$ — Γ_{17}/Γ

NODE=M034R24

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
not seen	69k	KUHN	04	E852	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

VALUE	DOCUMENT ID		TECN	COMMENT
−0.18±0.06	[24] BAKER	99	SPEC	1.94 $\overline{p} p \to 4\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.22±0.10	[21] 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$\pm$0.07$\pm$0.14**	CHUNG	02	E852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$

[20] Using BARBERIS 98B. NODE=M034R;LINKAGE=RB
[21] From a two-resonance fit to four 2^-0^+ waves. NODE=M034R;LINKAGE=L
[22] From a partial-wave analysis of $K^+K^-\pi^-$ system. NODE=M034R13;LINKAGE=M
[23] Normalized to the B($\pi_2(1670) \to f_2\pi$). NODE=M034R;LINKAGE=DM
[24] Using preliminary CBAR data. NODE=M034R;LINKAGE=BK
[25] With the $\sigma\pi$ in L=2 and the $f_2(1270)\pi$ in L=0. NODE=M034R15;LINKAGE=A

$\pi_2(1670)$ REFERENCES

NODE=M034

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
EVANGELISTA	81	NP B178 197	C. Evangelista *et al.*	(BARI, BONN, CERN+)	REFID=20462
Also	81B	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

OTHER RELATED PAPERS

PAGE	03	PL B566 108	P. Page, S. Capstick		REFID=49466
ZAIMIDOROGA	99	PAN 30 1	O.A. Zaimidoroga		REFID=46907
		Translated from SJPN 30 5.			
CHEN	83B	PR D28 2304	T.Y. Chen *et al.*	(ARIZ, FNAL, FLOR, NDAM+)	REFID=21579
LEEDOM	83	PR D27 1426	I.D. Leedom *et al.*	(PURD, TNTO)	REFID=20880
BELLINI	82B	NP B199 1	G. Bellini *et al.*	(CERN, MILA, JINR+)	REFID=20875
DAUM	81B	NP B182 269	C. Daum *et al.*	(AMST, CERN, CRAC, MPIM+)	REFID=20872
PERNEGR	78	NP B134 436	J. Pernegr *et al.*	(ETH, CERN, LOIC+)	REFID=20863
FOCACCI	66	PRL 17 890	M.N. Focacci *et al.*	(CERN)	REFID=20402
LEVRAT	66	PL 22 714	B. Levrat *et al.*		REFID=21154
VETLITSKY	66	PL 21 579	I.A. Vetlitsky *et al.*	(ITEP)	REFID=21527
FORINO	65B	PL 19 68	A. Forino *et al.*	(BGNA, BARI, FIRZ, ORSAY+)	REFID=21146

NODE=M067

$\phi(1680)$ $I^G(J^{PC}) = 0^-(1^{--})$

$\phi(1680)$ MASS

NODE=M067205

e^+e^- PRODUCTION

NODE=M067M1
NODE=M067M1

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1680±20 OUR ESTIMATE					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1623±20	948	[1] AKHMETSHIN	03	CMD2	1.05–1.38 $e^+e^- \to K^0_L K^0_S$
~ 1500		[2] ACHASOV	98H	RVUE	$e^+e^- \to \pi^+\pi^-\pi^0$, $\omega\pi^+\pi^-$, K^+K^-
~ 1900		[3] ACHASOV	98H	RVUE	$e^+e^- \to K^0_S K^\pm\pi^\mp$
1700±20		[4] CLEGG	94	RVUE	$e^+e^- \to K^+K^-$, $K^0_S K\pi$
1657±27	367	BISELLO	91C	DM2	$e^+e^- \to K^0_S K^\pm\pi^\mp$
1655±17		[5] BISELLO	88B	DM2	$e^+e^- \to K^+K^-$
1680±10		[6] BUON	82	DM1	$e^+e^- \to$ hadrons
1677±12		[7] MANE	82	DM1	$e^+e^- \to K^0_S K\pi$

→ NOT CHECKED ←

OCCUR=4

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	[8] LINK	02K	FOCS	20–160 $\gamma p \to K^+K^-p$
1726±22	[8] BUSENITZ	89	TPS	$\gamma p \to K^+K^-X$
1760±20	[8] ATKINSON	85C	OMEG	20–70 $\gamma p \to K\overline{K}X$
1690±10	[8] ASTON	81F	OMEG	25–70 $\gamma p \to K^+K^-X$

[1] 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

[2] Using data from IVANOV 81, BARKOV 87, BISELLO 88B, DOLINSKY 91, and ANTONELLI 92. NODE=M067M1;LINKAGE=L1

[3] Using the data from BISELLO 91C. NODE=M067M1;LINKAGE=L4

[4] Using BISELLO 88B and MANE 82 data. NODE=M067M;LINKAGE=A

[5] 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

[6] 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

[7] Fit to one channel only, neglecting interference with ω, $\rho(1700)$. NODE=M067M;LINKAGE=D

[8] We list here a state decaying into K^+K^- possibly different from $\phi(1680)$. NODE=M067M2;LINKAGE=LK

$\phi(1680)$ WIDTH

NODE=M067210

e^+e^- PRODUCTION

NODE=M067W1
NODE=M067W1

→ NOT CHECKED ←

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
150±50 OUR ESTIMATE This is only an educated guess; the error given is larger than the error on the average of the published values.					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
139±60	948	[9] AKHMETSHIN	03	CMD2	1.05–1.38 $e^+e^- \to K^0_L K^0_S$
300±60		[10] CLEGG	94	RVUE	$e^+e^- \to K^+K^-$, $K^0_S K\pi$
146±55	367	BISELLO	91C	DM2	$e^+e^- \to K^0_S K^\pm\pi^\mp$
207±45		[11] BISELLO	88B	DM2	$e^+e^- \to K^+K^-$
185±22		[12] BUON	82	DM1	$e^+e^- \to$ hadrons
102±36		[13] MANE	82	DM1	$e^+e^- \to K^0_S K\pi$

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	[14] LINK	02K	FOCS	20–160 $\gamma p \to K^+K^-p$
121±47	[14] BUSENITZ	89	TPS	$\gamma p \to K^+K^-X$
80±40	[14] ATKINSON	85C	OMEG	20–70 $\gamma p \to K\overline{K}X$
100±40	[14] ASTON	81F	OMEG	25–70 $\gamma p \to K^+K^-X$

[9] From the combined fit of AKHMETSHIN 03 and MANE 81 also including ρ, ω, and ϕ. Neither isospin nor flavor structure known. NODE=M067W;LINKAGE=HK
[10] Using BISELLO 88B and MANE 82 data. NODE=M067W;LINKAGE=A
[11] From global fit including ρ, ω, ϕ and $\rho(1700)$ NODE=M067W;LINKAGE=E
[12] From global fit of ρ, ω, ϕ and their radial excitations to channels $\omega\pi^+\pi^-$, K^+K^-, $K_S^0K_L^0$, $K_S^0K^\pm\pi^\mp$. Assume mass 1570 MeV and width 510 MeV for ρ radial excitations, mass 1570 and width 500 MeV for ω radial excitation. NODE=M067W;LINKAGE=C
[13] Fit to one channel only, neglecting interference with ω, $\rho(1700)$. NODE=M067W;LINKAGE=D
[14] We list here a state decaying into K^+K^- possibly different from $\phi(1680)$. NODE=M067W2;LINKAGE=LK

$\phi(1680)$ 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	$K_S^0K\pi$	seen	DESIG=5;OUR EST;→ NOT CHECKED ←
Γ_3	$K\overline{K}$	seen	DESIG=3;OUR EST;→ NOT CHECKED ←
Γ_4	$K_L^0K_S^0$		DESIG=33
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	$K^+K^-\pi^0$		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

$\Gamma(K_L^0K_S^0) \times \Gamma(e^+e^-)/\Gamma^2_{\text{total}}$ — $\Gamma_4\Gamma_5/\Gamma^2$

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	[15] AKHMETSHIN	03	CMD2	1.05–1.38 $e^+e^- \to K_L^0K_S^0$

$\Gamma(K\overline{K}^*(892)+\text{c.c.}) \times \Gamma(e^+e^-)/\Gamma^2_{\text{total}}$ — $\Gamma_1\Gamma_5/\Gamma^2$

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. • • •					
3.29 ± 1.57	367	[16] BISELLO	91C	DM2	1.35–2.40 $e^+e^- \to K_S^0K^\pm\pi^\mp$

[15] 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
[16] Recalculated by us with the published value of B($K\overline{K}^*(892)+$ c.c.) $\times$ $\Gamma(e^+e^-)$. NODE=M067G;LINKAGE=GL

$\phi(1680)$ BRANCHING RATIOS

NODE=M067225

$\Gamma(K\overline{K}^*(892)+\text{c.c.})/\Gamma(K_S^0K\pi)$ — Γ_1/Γ_2

NODE=M067R3
NODE=M067R3

VALUE	DOCUMENT ID		TECN	COMMENT
dominant	MANE	82	DM1	$e^+e^- \to K_S^0K^\pm\pi^\mp$

$\Gamma(K\overline{K})/\Gamma(K\overline{K}^*(892)+\text{c.c.})$ — Γ_3/Γ_1

NODE=M067R2
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
NODE=M067R1

VALUE	DOCUMENT ID		TECN	COMMENT
<0.10	BUON	82	DM1	e^+e^-

ϕ(1680) REFERENCES

NODE=M067

AKHMETSHIN	03	PL B551 27	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=49172
Also	02	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

OTHER RELATED PAPERS

CLOSE	02	PR D65 092003	F.E. Close, A. Donnachie, Yu.S. Kalashnikova		REFID=48838
LINK	02K	PL B545 50	J.M. Link *et al.*	(FNAL FOCUS Collab.)	REFID=48845
ABELE	99D	PL B468 178	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=47401
ACHASOV	97F	PAN 60 2029	N.N. Achasov, A.A. Kozhevnikov	(NOVM)	REFID=45858
		Translated from YAF 60 2212.			
ATKINSON	86C	ZPHY C30 541	M. Atkinson *et al.*	(BONN, CERN, GLAS+)	REFID=21597
ATKINSON	84	NP B231 15	M. Atkinson *et al.*	(BONN, CERN, GLAS+)	REFID=20574
ATKINSON	84B	NP B231 1	M. Atkinson *et al.*	(BONN, CERN, GLAS+)	REFID=21504
ATKINSON	83C	NP B229 269	M. Atkinson *et al.*	(BONN, CERN, GLAS+)	REFID=21501
CORDIER	81	PL 106B 155	A. Cordier *et al.*	(ORSAY)	REFID=21586
MANE	81	PL 99B 261	F. Mane *et al.*	(ORSAY)	REFID=21588
ASTON	80F	NP B174 269	D. Aston	(BONN, CERN, EPOL, GLAS, LANC+)	REFID=21582

NODE=M015

$\rho_3(1690)$

$I^G(J^{PC}) = 1^+(3^{--})$

ρ_3(1690) MASS

NODE=M015205

NODE=M015M

VALUE (MeV)	*DOCUMENT ID*
1688.8±2.1 OUR AVERAGE	Includes data from the 5 datablocks that follow this one.

2π MODE

NODE=M015M1

NODE=M015M1

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

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
1686± 4 OUR AVERAGE						
1677±14		EVANGELISTA	81	OMEG	−	12 $\pi^- p \to 2\pi p$
1679±11	476	BALTAY	78B	HBC	0	15 $\pi^+ p \to \pi^+\pi^- n$
1678±12	175	[1] ANTIPOV	77	CIBS	0	25 $\pi^- p \to p 3\pi$
1690± 7	600	[1] ENGLER	74	DBC	0	6 $\pi^+ n \to \pi^+\pi^- p$
1693± 8		[2] GRAYER	74	ASPK	0	17 $\pi^- p \to \pi^+\pi^- n$
1678±12		MATTHEWS	71C	DBC	0	7 $\pi^+ N$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1734±10		[3] CORDEN	79	OMEG		12–15 $\pi^- p \to n 2\pi$
1692±12		[2,4] ESTABROOKS	75	RVUE		17 $\pi^- p \to \pi^+\pi^- n$
1737±23		ARMENISE	70	DBC	0	9 $\pi^+ N$
1650±35	122	BARTSCH	70B	HBC	+	8 $\pi^+ p \to N 2\pi$
1687±21		STUNTEBECK	70	HDBC	0	8 $\pi^- p$, 5.4 $\pi^+ d$
1683±13		ARMENISE	68	DBC	0	5.1 $\pi^+ d$
1670±30		GOLDBERG	65	HBC	0	6 $\pi^+ d$, 8 $\pi^- p$

[1] Mass errors enlarged by us to $\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M015M1;LINKAGE=E

[2] Uses same data as HYAMS 75. NODE=M015M1;LINKAGE=G

[3] From a phase shift solution containing a $f_2'(1525)$ width two times larger than the $K\overline{K}$ result. NODE=M015M1;LINKAGE=M

[4] From phase-shift analysis. Error takes account of spread of different phase-shift solutions. NODE=M015M1;LINKAGE=I

$K\overline{K}$ AND $K\overline{K}\pi$ MODES

NODE=M015M2
NODE=M015M2

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
The data in this block is included in the average printed for a previous datablock.						
1696± 4 OUR AVERAGE						
1699± 5		ALPER	80	CNTR	0	62 $\pi^- p \to K^+ K^- n$
1698±12	6k	[5,6] MARTIN	78D	SPEC		10 $\pi p \to K^0_S K^- p$
1692± 6		BLUM	75	ASPK	0	18.4 $\pi^- p \to n K^+ K^-$
1690±16		ADERHOLZ	69	HBC	+	8 $\pi^+ p \to K\overline{K}\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1694± 8		[7] COSTA...	80	OMEG		10 $\pi^- p \to K^+ K^- n$

[5] From a fit to $J^P = 3^-$ partial wave. NODE=M015M2;LINKAGE=P

[6] Systematic error on mass scale subtracted. NODE=M015M2;LINKAGE=S

[7] They cannot distinguish between $\rho_3(1690)$ and $\omega_3(1670)$. NODE=M015M2;LINKAGE=L

$(4\pi)^\pm$ MODE

NODE=M015M3
NODE=M015M3

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT	
The data in this block is included in the average printed for a previous datablock.							
1686± 5 OUR AVERAGE Error includes scale factor of 1.1.							
1694± 6		[8] EVANGELISTA	81	OMEG	−	12 $\pi^- p \to p4\pi$	
1665±15	177	BALTAY	78B	HBC	+	15 $\pi^+ p \to p4\pi$	
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 $\pi^+ p \to N4\pi$	
1689±20	102	[9] BARTSCH	70B	HBC	+	8 $\pi^+ p \to N2\rho$	OCCUR=3
1705±21		CASO	70	HBC	−	11.2 $\pi^- p \to n\rho 2\pi$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
1718±10		[10] EVANGELISTA	81	OMEG	−	12 $\pi^- p \to p4\pi$	OCCUR=2
1673± 9		[11] EVANGELISTA	81	OMEG	−	12 $\pi^- p \to p4\pi$	OCCUR=3
1733± 9	66	[9] KLIGER	74	HBC	−	4.5 $\pi^- p \to p4\pi$	
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	EVANGELISTA	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 $\pi^- p \rightarrow p$MM	
1700±15	[13,14] FOCACCI	66	MMS	−	7–12 $\pi^- p \rightarrow p$MM	OCCUR=2
1748±15	[13,14] FOCACCI	66	MMS	−	7–12 $\pi^- p \rightarrow p$MM	OCCUR=3

[13] Seen in 2.5–3 GeV/c $\overline{p}p$. $2\pi^+2\pi^-$, with 0, 1, 2 $\pi^+\pi^-$ pairs in ρ band not seen by OREN 74 (2.3 GeV/c $\overline{p}p$) with more statistics. (Jan. 1976) NODE=M015M6;LINKAGE=R

[14] Not seen by BOWEN 72. NODE=M015M6;LINKAGE=N

ρ_3(1690) WIDTH

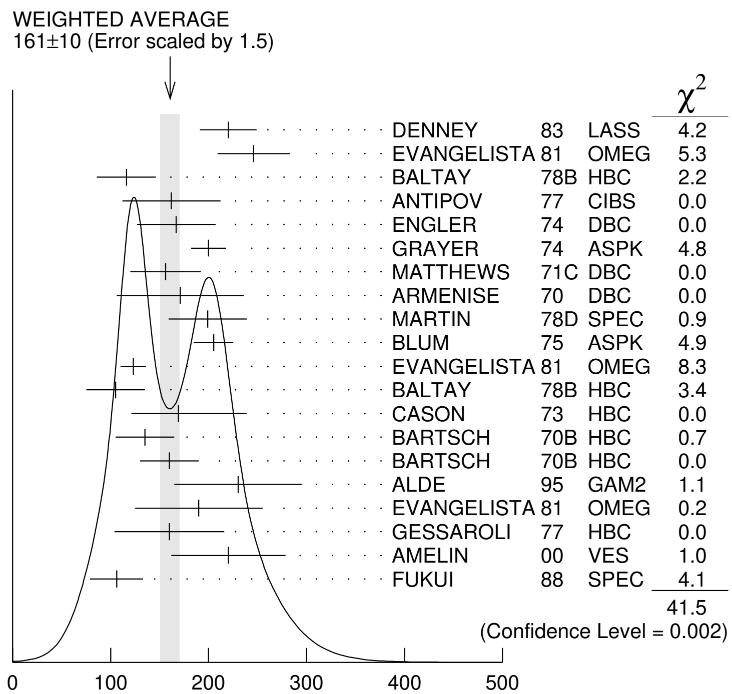
NODE=M015210

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.



ρ_3(1690) width, 2π, $K\overline{K}$, and $K\overline{K}\pi$ modes (MeV)

2π MODE

NODE=M015W1
NODE=M015W1

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

186±14 OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below.

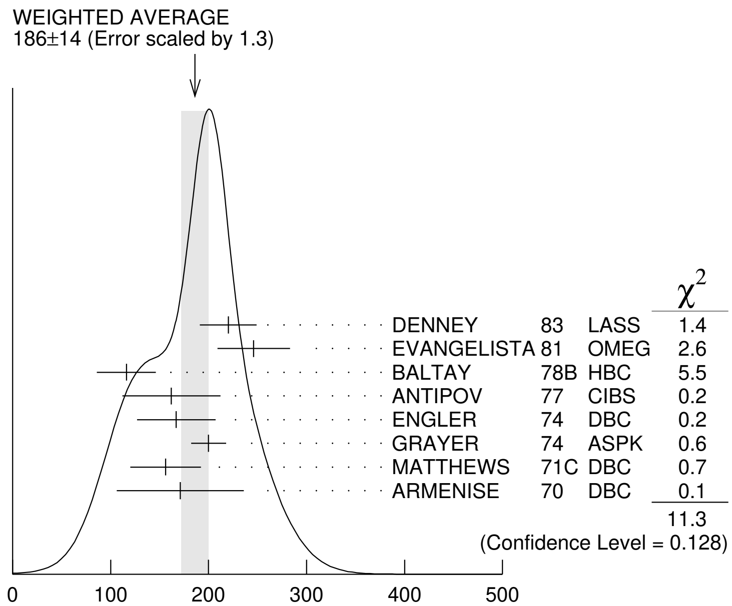
VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
220±29		DENNEY	83	LASS		10 $\pi^+ N$
246±37		EVANGELISTA	81	OMEG	−	12 $\pi^- p \rightarrow 2\pi p$
116±30	476	BALTAY	78B	HBC	0	15 $\pi^+ p \rightarrow \pi^+\pi^- n$
162±50	175	[15] ANTIPOV	77	CIBS	0	25 $\pi^- p \rightarrow p 3\pi$
167±40	600	ENGLER	74	DBC	0	6 $\pi^+ n \rightarrow \pi^+\pi^- p$
200±18		[16] GRAYER	74	ASPK	0	17 $\pi^- p \rightarrow \pi^+\pi^- n$
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 $\pi^- p \rightarrow n 2\pi$
240±30		[16,18] ESTABROOKS	75	RVUE		17 $\pi^- p \rightarrow \pi^+\pi^- n$
180±30	122	BARTSCH	70B	HBC	+	8 $\pi^+ p \rightarrow N 2\pi$

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

VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*CHG*	*COMMENT*

NODE=M015W2

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

VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*CHG*	*COMMENT*

NODE=M015W3

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

129±10 OUR AVERAGE						
123 ± 13		[21] EVANGELISTA	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] EVANGELISTA	81	OMEG	$-$	$12\ \pi^- p \rightarrow\ p 4\pi$	OCCUR=2
184 ± 33		[23] EVANGELISTA	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		$38\ \pi^- p \rightarrow \omega \pi^0 n$
190 ± 65	EVANGELISTA	81	OMEG	$-$	$12\ \pi^- p \rightarrow\ \omega \pi p$
160 ± 56	GESSAROLI	77	HBC		$11\ \pi^- p \rightarrow\ \omega \pi p$
• • • 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	$+$	$10\ K^+ p \rightarrow\ \omega \pi X$

[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.						
$220 \pm 30 \pm 50$	AMELIN	00	VES		$37\ \pi^- p \rightarrow \eta \pi^+ \pi^- n$	
106 ± 27	FUKUI	88	SPEC	0	$8.95\ \pi^- p \rightarrow \eta \pi^+ \pi^- n$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
195	[26] ANDERSON	69	MMS	$-$	$16\ \pi^- p$ backward	
< 21	[26,27] FOCACCI	66	MMS	$-$	$7\text{–}12\ \pi^- p \rightarrow p$MM	
< 30	[26,27] FOCACCI	66	MMS	$-$	$7\text{–}12\ \pi^- p \rightarrow p$MM	OCCUR=2
< 38	[26,27] FOCACCI	66	MMS	$-$	$7\text{–}12\ \pi^- p \rightarrow p$MM	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, $x_i \equiv \Gamma_i/\Gamma_{total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_4	−77		
x_5	−74	17	
x_6	−15	2	0
	x_1	x_4	x_5

$\rho_3(1690)$ BRANCHING RATIOS

NODE=M015220

$\Gamma(\pi\pi)/\Gamma_{total}$ $\qquad\Gamma_4/\Gamma$

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

$\Gamma(\pi\pi)/\Gamma(\pi^\pm\pi^+\pi^-\pi^0)$ $\qquad\Gamma_4/\Gamma_2$

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 $\pi^- p$

$\Gamma(\pi\pi)/\Gamma(4\pi)$ $\qquad\Gamma_4/\Gamma_1$

NODE=M015R3
NODE=M015R3

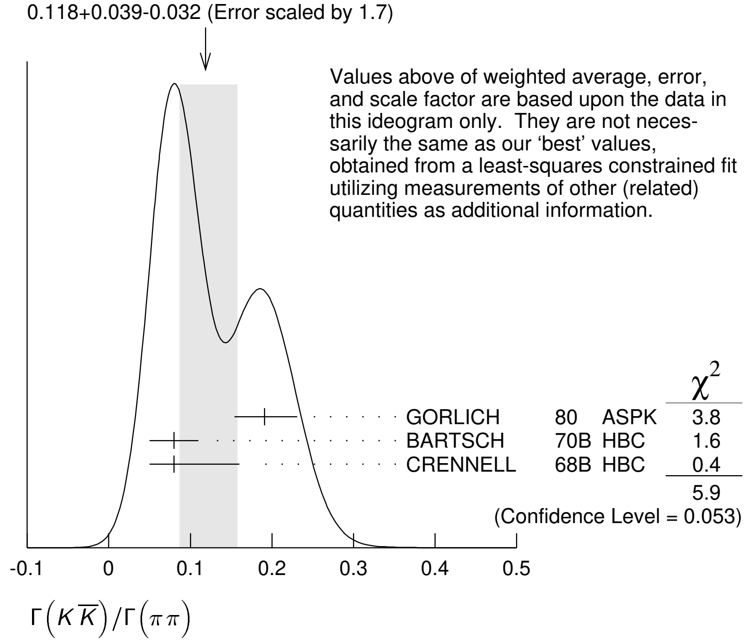
VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.332±0.026 OUR FIT Error includes scale factor of 1.1.					
0.30 ±0.10	BALTAY	78B	HBC	0	15 $\pi^+ p \to p 4\pi$

$\Gamma(K\overline{K})/\Gamma(\pi\pi)$ $\qquad\Gamma_6/\Gamma_4$

NODE=M015R4
NODE=M015R4

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.067±0.011 OUR FIT Error includes scale factor of 1.2.					
$\mathbf{0.118^{+0.039}_{-0.032}}$ **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 $\pi^- p$

WEIGHTED AVERAGE
0.118+0.039-0.032 (Error scaled by 1.7)



$\Gamma(K\overline{K}\pi)/\Gamma(\pi\pi)$ Γ_5/Γ_4

NODE=M015R5

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
0.16±0.05 OUR FIT				
0.16±0.05	[30] BARTSCH 70B	HBC	+	8 $\pi^+ p$

[30] Increased by us to correspond to $B(\rho_3(1690) \to \pi\pi)=0.24$.

NODE=M015R5;LINKAGE=A

$[\Gamma(\pi\pi\rho)+\Gamma(a_2(1320)\pi)+\Gamma(\rho\rho)]/\Gamma(\pi^\pm\pi^+\pi^-\pi^0)$ $(\Gamma_9+\Gamma_{10}+\Gamma_{11})/\Gamma_2$

NODE=M015R6

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
0.94±0.09 OUR AVERAGE				
0.96±0.21	BALTAY 78B	HBC	+	15 $\pi^+ p \to p4\pi$
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

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 $\pi^+ p \to p4\pi$
0.56	66	KLIGER 74	HBC	−	4.5 $\pi^- p \to p4\pi$
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

$\Gamma(\rho\rho)/[\Gamma(\pi\pi\rho)+\Gamma(a_2(1320)\pi)+\Gamma(\rho\rho)]$ $\Gamma_{11}/(\Gamma_9+\Gamma_{10}+\Gamma_{11})$

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

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 $\pi^+ p \to p4\pi$
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 $\pi^+ p$

$\Gamma(K\overline{K})/\Gamma_{\text{total}}$ — 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 $\pi^- p$

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

NODE=M015R17

VALUE	DOCUMENT ID		TECN	COMMENT
seen	FUKUI	88	SPEC	8.95 $\pi^- p \to \eta\pi^+\pi^- n$

$\Gamma(a_2(1320)\pi)/\Gamma(\rho(770)\eta)$ — Γ_{10}/Γ_8

NODE=M015R18

VALUE	DOCUMENT ID		TECN	COMMENT
5.5±2.0	AMELIN	00	VES	37 $\pi^- p \to \eta\pi^+\pi^- n$

$\rho_3(1690)$ REFERENCES

NODE=M015

AMELIN	00	NP A668 83	D. Amelin *et al.*	(VES Collab.)	REFID=47432
ALDE	95	ZPHY C66 379	D.M. Alde *et al.*	(GAMS Collab.) JP	REFID=44371
ALDE	92C	ZPHY C54 553	D.M. Alde *et al.*	(BELG, SERP, KEK, LANL+)	REFID=41859
FUKUI	88	PL B202 441	S. Fukui *et al.*	(SUGI, NAGO, KEK, KYOT+)	REFID=40273
DENNEY	83	PR D28 2726	D.L. Denney *et al.*	(IOWA, MICH)	REFID=20754
EVANGELISTA	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

OTHER RELATED PAPERS

BARNETT	83B	PL 120B 455	B. Barnett *et al.*	(JHU)	REFID=21669
EHRLICH	66	PR 152 1194	R. Ehrlich, W. Selove, H. Yuta	(PENN)	REFID=21152
LEVRAT	66	PL 22 714	B. Levrat *et al.*		REFID=21154
SEGUINOT	66	PL 19 712	J. Seguinot *et al.*		REFID=21605
BELLINI	65	NC 40A 948	G. Bellini *et al.*	(MILA)	REFID=21598
DEUTSCH...	65	PL 18 351	M. Deutschmann *et al.*	(AACH3, BERL, CERN)	REFID=21599
FORINO	65	PL 19 65	A. Forino *et al.*	(BGNA, ORSAY, SACL)	REFID=21600

NODE=M065

$\rho(1700)$ $\qquad I^G(J^{PC}) = 1^+(1^{--})$

A REVIEW GOES HERE – Check our WWW List of Reviews NODE=M065

$\rho(1700)$ MASS NODE=M065205

$\eta\rho^0$ AND $\pi^+\pi^-$ MODES NODE=M065M0

VALUE (MeV)	DOCUMENT ID
1720±20 OUR ESTIMATE	

NODE=M065M0

→ NOT CHECKED ←

$\eta\rho^0$ MODE NODE=M065M6

NODE=M065M6

VALUE (MeV)	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. • • •				
1740±20	ANTONELLI	88	DM2	$e^+e^- \to \eta\pi^+\pi^-$
1701±15	[2] FUKUI	88	SPEC	8.95 $\pi^- p \to \eta\pi^+\pi^- n$

$\pi\pi$ MODE NODE=M065M1

NODE=M065M1

VALUE (MeV)	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. • • •				
$1780\ ^{+37}_{-29}$	[3] ABELE	97	CBAR	$\overline{p}n \to \pi^-\pi^0\pi^0$
1719 ±15	[3] BERTIN	97C	OBLX	0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$
1730 ±30	CLEGG	94	RVUE	$e^+e^- \to \pi^+\pi^-$
1768 ±21	BISELLO	89	DM2	$e^+e^- \to \pi^+\pi^-$
1745.7±91.9	DUBNICKA	89	RVUE	$e^+e^- \to \pi^+\pi^-$
1546 ±26	GESHKEN...	89	RVUE	
1650	[4] ERKAL	85	RVUE	20–70 $\gamma p \to \gamma\pi$
1550 ±70	ABE	84B	HYBR	20 $\gamma p \to \pi^+\pi^- p$
1590 ±20	[5] ASTON	80	OMEG	20–70 $\gamma p \to p 2\pi$
1600 ±10	[6] ATIYA	79B	SPEC	50 γC $\to$ C2π
$1598\ ^{+24}_{-22}$	BECKER	79	ASPK	17 $\pi^- p$ polarized
1659 ±25	[4] LANG	79	RVUE	
1575	[4] MARTIN	78C	RVUE	17 $\pi^- p \to \pi^+\pi^- n$
1610 ±30	[4] FROGGATT	77	RVUE	17 $\pi^- p \to \pi^+\pi^- n$
1590 ±20	[7] HYAMS	73	ASPK	17 $\pi^- p \to \pi^+\pi^- n$

$\pi\omega$ MODE

NODE=M065M8

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1550 to 1620	[8] ACHASOV	00I	SND	$e^+e^- \to \pi^0\pi^0\gamma$
1580 to 1710	[9] ACHASOV	00I	SND	$e^+e^- \to \pi^0\pi^0\gamma$
1710 ± 90	ACHASOV	97	RVUE	$e^+e^- \to \omega\pi^0$

OCCUR=2

$K\overline{K}$ MODE

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	[1] ABELE	99D	CBAR	$\pm$	0.0 $\overline{p}p \to K^+K^-\pi^0$
1582 ± 36	1600	CLELAND	82B	SPEC	$\pm$	50 $\pi p \to K^0_S K^\pm p$

[1] K-matrix pole. Isospin not determined, could be $\omega(1650)$ or $\phi(1680)$.

NODE=M065M2;LINKAGE=AN

$2(\pi^+\pi^-)$ MODE

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 ± 20		[10] CORDIER	82	DM1	$e^+e^- \to 2(\pi^+\pi^-)$
1520 ± 30		[5] ASTON	81E	OMEG	20–70 $\gamma p \to p4\pi$
1654 ± 25		[11] DIBIANCA	81	DBC	$\pi^+d \to pp2(\pi^+\pi^-)$
1666 ± 39		[10] BACCI	80	FRAG	$e^+e^- \to 2(\pi^+\pi^-)$
1780	34	KILLIAN	80	SPEC	11 $e^-p \to 2(\pi^+\pi^-)$
1500		[12] ATIYA	79B	SPEC	50 $\gamma C \to C4\pi^\pm$
1570 ± 60	65	[13] ALEXANDER	75	HBC	7.5 $\gamma p \to p4\pi$
1550 ± 60		[5] CONVERSI	74	OSPK	$e^+e^- \to 2(\pi^+\pi^-)$
1550 ± 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 ± 50	400	BINGHAM	72B	HBC	9.3 $\gamma p \to p4\pi$

OCCUR=2

$\pi^+\pi^-\pi^0\pi^0$ MODE

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

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1730 ± 34	[14] FRABETTI	04	E687	$\gamma p \to 3\pi^+3\pi^-p$
1783 ± 15	CLEGG	90	RVUE	$e^+e^- \to 3(\pi^+\pi^-)2(\pi^+\pi^-\pi^0)$

[2] Assuming $\rho^+ f_0(1370)$ decay mode interferes with $a_1(1260)^+\pi$ background. From a two Breit-Wigner fit. NODE=M065M;LINKAGE=B

[3] T-matrix pole. NODE=M065M;LINKAGE=QQ

[4] From phase shift analysis of HYAMS 73 data. NODE=M065M;LINKAGE=P

[5] Simple relativistic Breit-Wigner fit with constant width. NODE=M065M;LINKAGE=M

[6] 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

[7] Included in BECKER 79 analysis. NODE=M065M;LINKAGE=H

[8] 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

[9] 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

[10] Simple relativistic Breit-Wigner fit with model dependent width. NODE=M065M;LINKAGE=A

[11] One peak fit result. NODE=M065M;LINKAGE=O

[12] Parameters roughly estimated, not from a fit. NODE=M065M;LINKAGE=C

[13] Skew mass distribution compensated by Ross-Stodolsky factor. NODE=M065M;LINKAGE=D

[14] 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

VALUE (MeV)	DOCUMENT ID
250 ± 100 OUR ESTIMATE	

→ NOT CHECKED ←

$\eta\rho^0$ MODE

NODE=M065W6
NODE=M065W6

VALUE (MeV)	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. • • •

150±30	ANTONELLI	88	DM2	$e^+e^- \rightarrow \eta\pi^+\pi^-$
282±44	[16] FUKUI	88	SPEC	8.95 $\pi^- p \rightarrow \eta\pi^+\pi^- n$

$\pi\pi$ MODE

NODE=M065W1
NODE=M065W1

VALUE (MeV)	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. • • •

275 ± 45	[17] ABELE	97	CBAR	$\overline{p}n \rightarrow \pi^-\pi^0\pi^0$
310 ± 40	[17] 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	[18] 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	[19] ASTON	80	OMEG	20–70 $\gamma p \rightarrow p 2\pi$
283 ± 14	[20] ATIYA	79B	SPEC	50 γC $\rightarrow$ C2π
175 $^{+98}_{-53}$	BECKER	79	ASPK	17 $\pi^- p$ polarized
232 ± 34	[18] LANG	79	RVUE	
340	[18] MARTIN	78C	RVUE	17 $\pi^- p \rightarrow \pi^+\pi^- n$
300 ±100	[18] FROGGATT	77	RVUE	17 $\pi^- p \rightarrow \pi^+\pi^- n$
180 ± 50	[21] HYAMS	73	ASPK	17 $\pi^- p \rightarrow \pi^+\pi^- n$

$K\overline{K}$ 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	[15] ABELE	99D	CBAR	±	0.0 $\overline{p}p \rightarrow K^+K^-\pi^0$
265 ±120	1600	CLELAND	82B	SPEC	±	50 $\pi p \rightarrow K^0_S K^\pm p$

[15] 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		[22] CORDIER	82	DM1	$e^+e^- \rightarrow 2(\pi^+\pi^-)$
400± 50		[19] ASTON	81E	OMEG	20–70 $\gamma p \rightarrow p 4\pi$
400±146		[23] DIBIANCA	81	DBC	$\pi^+ d \rightarrow pp2(\pi^+\pi^-)$
700±160		[22] BACCI	80	FRAG	$e^+e^- \rightarrow 2(\pi^+\pi^-)$
100	34	KILLIAN	80	SPEC	11 $e^- p \rightarrow 2(\pi^+\pi^-)$
600		[24] ATIYA	79B	SPEC	50 γC $\rightarrow$ C$4\pi^\pm$
340±160	65	[25] ALEXANDER	75	HBC	7.5 $\gamma p \rightarrow p 4\pi$
360±100		[19] CONVERSI	74	OSPK	$e^+e^- \rightarrow 2(\pi^+\pi^-)$
400±120	160	[26] SCHACHT	74	STRC	5.5–9 $\gamma p \rightarrow p 4\pi$
850±200	340	[26] SCHACHT	74	STRC	9–18 $\gamma p \rightarrow p 4\pi$ OCCUR=2
650±100	400	BINGHAM	72B	HBC	9.3 $\gamma p \rightarrow p 4\pi$

$\pi^+\pi^-\pi^0\pi^0$ 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	[27] ACHASOV	00I	SND	$e^+e^- \rightarrow \pi^0\pi^0\gamma$
490 to 1040	[28] ACHASOV	00I	SND	$e^+e^- \rightarrow \pi^0\pi^0\gamma$ OCCUR=2

$3(\pi^+\pi^-)$ AND $2(\pi^+\pi^-\pi^0)$ MODES

NODE=M065W7

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
315±100	[29] FRABETTI	04	E687	$\gamma p \rightarrow 3\pi^+ 3\pi^- p$
285± 20	CLEGG	90	RVUE	$e^+e^- \rightarrow 3(\pi^+\pi^-)2(\pi^+\pi^-\pi^0)$

[16] Assuming $\rho^+ f_0(1370)$ decay mode interferes with $a_1(1260)^+\pi$ background. From a two Breit-Wigner fit. NODE=M065W;LINKAGE=B

[17] T-matrix pole. NODE=M065W;LINKAGE=QQ

[18] From phase shift analysis of HYAMS 73 data. NODE=M065W;LINKAGE=P

[19] Simple relativistic Breit-Wigner fit with constant width. NODE=M065W;LINKAGE=M

[20] 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

[21] Included in BECKER 79 analysis. NODE=M065W;LINKAGE=H

[22] Simple relativistic Breit-Wigner fit with model-dependent width. NODE=M065W;LINKAGE=A

[23] One peak fit result. NODE=M065W;LINKAGE=O

[24] Parameters roughly estimated, not from a fit. NODE=M065W;LINKAGE=C

[25] Skew mass distribution compensated by Ross-Stodolsky factor. NODE=M065W;LINKAGE=D

[26] Width errors enlarged by us to $4\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M065W;LINKAGE=E

[27] Taking into account both $\rho(1450)$ and $\rho(1700)$ contributions. Using the data of ACHASOV 00I on $e^+e^- \rightarrow \omega\pi^0$ and of EDWARDS 00A on $\tau^- \rightarrow \omega\pi^-\nu_\tau$. $\rho(1450)$ mass and width fixed at 1400 MeV and 500 MeV respectively. NODE=M065W;LINKAGE=I1

[28] Taking into account the $\rho(1700)$ contribution only. Using the data of ACHASOV 00I on $e^+e^- \rightarrow \omega\pi^0$ and of EDWARDS 00A on $\tau^- \rightarrow \omega\pi^-\nu_\tau$. NODE=M065W;LINKAGE=I2

[29] 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

$\Gamma(2(\pi^+\pi^-)) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_2\Gamma_{17}/\Gamma$

NODE=M065G2

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.6 ±0.2	DELCOURT	81B	DM1	$e^+e^- \rightarrow 2(\pi^+\pi^-)$
2.83±0.42	BACCI	80	FRAG	$e^+e^- \rightarrow 2(\pi^+\pi^-)$

$\Gamma(\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{11}\Gamma_{17}/\Gamma$

NODE=M065G4

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.13	[30] DIEKMAN	88	RVUE	$e^+e^- \to \pi^+\pi^-$
$0.029^{+0.016}_{-0.012}$	KURDADZE	83	OLYA	0.64–1.4 $e^+e^- \to \pi^+\pi^-$

[30] Using total width = 220 MeV.

NODE=M065G4;LINKAGE=B

$\Gamma(K\overline{K}^*(892)+ c.c.) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{13}\Gamma_{17}/\Gamma$

NODE=M065G10

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.305 ± 0.071	[31] BIZOT	80	DM1	e^+e^-

$\Gamma(\eta\rho) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{14}\Gamma_{17}/\Gamma$

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

$\Gamma(K\overline{K}) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{16}\Gamma_{17}/\Gamma$

NODE=M065G5

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.035 ± 0.029	[31] BIZOT	80	DM1	e^+e^-

$\Gamma(\rho\pi\pi) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_3\Gamma_{17}/\Gamma$

NODE=M065G12

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
3.510 ± 0.090	[31] BIZOT	80	DM1	e^+e^-

[31] Model dependent.

NODE=M065G;LINKAGE=M

$\rho(1700)$ BRANCHING RATIOS

NODE=M065230

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

NODE=M065R5

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.287^{+0.043}_{-0.042}$	BECKER	79	ASPK	17 $\pi^- p$ polarized
0.15 to 0.30	[32] MARTIN	78C	RVUE	17 $\pi^- p \to \pi^+\pi^- n$
<0.20	[33] COSTA...	77B	RVUE	$e^+e^- \to 2\pi, 4\pi$
0.30 ± 0.05	[32] FROGGATT	77	RVUE	17 $\pi^- p \to \pi^+\pi^- n$
<0.15	[34] EISENBERG	73	HBC	5 $\pi^+ p \to \Delta^{++} 2\pi$
0.25 ± 0.05	[35] HYAMS	73	ASPK	17 $\pi^- p \to \pi^+\pi^- n$

[32] From phase shift analysis of HYAMS 73 data. NODE=M065R5;LINKAGE=P
[33] Estimate using unitarity, time reversal invariance, Breit-Wigner. NODE=M065R5;LINKAGE=C
[34] Estimated using one-pion-exchange model. NODE=M065R5;LINKAGE=E
[35] Included in BECKER 79 analysis. NODE=M065R5;LINKAGE=H

$\Gamma(\pi^+\pi^-)/\Gamma(2(\pi^+\pi^-))$ — Γ_{11}/Γ_2

NODE=M065R3

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.13 ± 0.05	ASTON	80	OMEG	20–70 $\gamma p \to p 2\pi$
<0.14	[36] DAVIER	73	STRC	6–18 $\gamma p \to p 4\pi$
<0.2	[37] BINGHAM	72B	HBC	9.3 $\gamma p \to p 2\pi$

[36] Upper limit is estimate. NODE=M065R3;LINKAGE=E
[37] 2σ upper limit. NODE=M065R3;LINKAGE=S

$\Gamma(\pi\pi)/\Gamma(4\pi)$ — Γ_{12}/Γ_1

NODE=M065R20

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.16 ± 0.04	[42,43] ABELE	01B	CBAR	0.0 $\overline{p} n \to 5\pi$

$\Gamma(K\overline{K}^*(892)+\text{c.c.})/\Gamma(2(\pi^+\pi^-))$ — Γ_{13}/Γ_2

NODE=M065R9

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.15 ± 0.03	[38] DELCOURT	81B	DM1	$e^+e^- \to \overline{K}K\pi$

[38] Assuming $\rho(1700)$ and ω radial excitations to be degenerate in mass.

NODE=M065R9;LINKAGE=D

$\Gamma(\eta\rho)/\Gamma_{\text{total}}$ — Γ_{14}/Γ

NODE=M065R12

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
possibly seen		AKHMETSHIN	00D	CMD2	$e^+e^- \to \eta\pi^+\pi^-$
<0.04		DONNACHIE	87B	RVUE	
<0.02	58	ATKINSON	86B	OMEG	20–70 γp

$\Gamma(a_2(1320)\pi)/\Gamma_{\text{total}}$ — Γ_{15}/Γ

NODE=M065R14

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	AMELIN	00	VES	37 $\pi^- p \to \eta\pi^+\pi^- n$

$\Gamma(\eta\rho)/\Gamma(2(\pi^+\pi^-))$ — Γ_{14}/Γ_2

NODE=M065R8

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.123 ± 0.027	DELCOURT	82	DM1	$e^+e^- \to \pi^+\pi^-$ MM
~ 0.1	ASTON	80	OMEG	20–70 γp

$\Gamma(\pi^+\pi^-\text{ neutrals})/\Gamma(2(\pi^+\pi^-))$ — $(\Gamma_5+\Gamma_6+0.714\Gamma_{14})/\Gamma_2$

NODE=M065R7

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.6 ± 0.4	[39] BALLAM	74	HBC	9.3 γp

[39] Upper limit. Background not subtracted.

NODE=M065R7;LINKAGE=U

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

NODE=M065R13

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
not seen	2382	AKHMETSHIN	03B	CMD2	$e^+e \to \pi^0\pi^0\gamma$
seen		ACHASOV	97	RVUE	$e^+e^- \to \omega\pi^0$

$\Gamma(a_1(1260)\pi)/\Gamma(4\pi)$ — 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 $\overline{p}n \to 5\pi$

$\Gamma(h_1(1170)\pi)/\Gamma(4\pi)$ — 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	[42] ABELE	01B	CBAR	0.0 $\overline{p}n \to 5\pi$

$\Gamma(\pi(1300)\pi)/\Gamma(4\pi)$ — 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	[42] ABELE	01B	CBAR	0.0 $\overline{p}n \to 5\pi$

$\Gamma(\rho\rho)/\Gamma(4\pi)$ — Γ_{10}/Γ_1

NODE=M065R18

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.09 ± 0.03	[42] ABELE	01B	CBAR	0.0 $\overline{p}n \to 5\pi$

$\Gamma(\rho\pi\pi)/\Gamma(4\pi)$ — 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	[42] ABELE	01B	CBAR	0.0 $\overline{p}n \to 5\pi$

$\Gamma(K\overline{K})/\Gamma(2(\pi^+\pi^-))$ Γ_{16}/Γ_2

NODE=M065R4
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		[40] DELCOURT	81B	DM1	$e^+e^- \to \overline{K}K$
<0.04	95	BINGHAM	72B	HBC 0	$9.3\ \gamma p$

[40] 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
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

$\Gamma(\rho^0\pi^+\pi^-)/\Gamma(2(\pi^+\pi^-))$ Γ_4/Γ_2

NODE=M065R1
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	$e^+e^- \to 2(\pi^+\pi^-)$
$0.7\ \pm0.1$	500	SCHACHT 74	STRC	5.5–18 $\gamma p \to p4\pi$
0.80		[41] BINGHAM 72B	HBC	$9.3\ \gamma p \to p4\pi$

[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
NODE=M065R6

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.10	ATKINSON 85B	OMEG		20–70 γp
<0.15	ATKINSON 82	OMEG	0	20–70 $\gamma p \to p4\pi$

[42] $\omega\pi$ not included.
[43] Using ABELE 97.

NODE=M065R;LINKAGE=BL
NODE=M065R;LINKAGE=LK

$\rho(1700)$ REFERENCES

NODE=M065

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 159 101	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
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	82	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

OTHER RELATED PAPERS

AKHMETSHIN	04C	PL B595 101	R.R. Akhmetshin *et al.*	(CMD2 Collab.)	REFID=49743
AMSLER	04A	NP A740 130	C. Amsler *et al.*		REFID=50166
ACHASOV	03C	JETP 96 789	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=49576
		Translated from ZETF 123 899.			
AKHMETSHIN	03	PL B551 27	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=49172
Also	02	PAN 65 1222	E.V. Anashkin, V.M. Aulchenko, R.R. Akhmetshin		REFID=48827
		Translated from YAF 65 1255.			
BARGIOTTI	03B	PL B561 233	M. Bargiotti *et al.*		REFID=49405
ACHASOV	02B	PAN 65 153	N.N. Achasov, A.A. Kozhevnikov		REFID=48618
		Translated from YAF 65 158.			
AGNELLO	02	PL B527 39	M. Agnello *et al.*	(OBELIX Collab.)	REFID=48576
CLOSE	02	PR D65 092003	F.E. Close, A. Donnachie, Yu.S. Kalashnikova		REFID=48838
FRABETTI	01	PL B514 240	P.L. Frabetti *et al.*	(FNAL E687 Collab.)	REFID=48350
ACHASOV	00J	PR D62 117503	N.N. Achasov, A.A. Kozhevnikov		REFID=47932
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
DONNACHIE	99	PR D60 114011	A. Donnachie, Yu.S. Kalashnikova		REFID=47388
KULZINGER	99	EPJ C7 73	G. Kulzinger *et al.*		REFID=46905
ANTONELLI	98	NP B517 3	A. Antonelli *et al.*	(FENICE Collab.)	REFID=46332
BELOZEROVA	98	PPN 29 63	T.S. Belozerova, V.K. Henner		REFID=46350
		Translated from FECAY 29 148.			
BARNES	97	PR D55 4157	T. Barnes *et al.*	(ORNL, RAL, MCHS)	REFID=45384
CLOSE	97C	PR D56 1584	F.E. Close *et al.*	(RAL, MCHS)	REFID=45546
URHEIM	97	NPBPS 55C 359	J. Urheim	(CLEO Collab.)	REFID=45907
ACHASOV	96B	PAN 59 1262	N.N. Achasov, G.N. Shestakov	(NOVM)	REFID=45177
		Translated from YAF 59 1319.			
ANTONELLI	96	PL B365 427	A. Antonelli *et al.*	(FENICE Collab.)	REFID=44633
AMSLER	93B	PL B311 362	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=43602
LANDSBERG	92	SJNP 55 1051	L.G. Landsberg	(SERP)	REFID=43162
		Translated from YAF 55 1896.			
ASTON	91B	NPBPS 21 105	D. Aston *et al.*	(LASS Collab.)	REFID=43671
DONNACHIE	91	ZPHY C51 689	A. Donnachie, A.B. Clegg	(MCHS, LANC)	REFID=41632
ACHASOV	88C	PL B209 373	N.N. Achasov, A.A. Kozhevnikov	(NOVM)	REFID=41007
BRAU	88	PR D37 2379	J.E. Brau *et al.*	JP	REFID=40571
CASTRO	88	Preprint LAL-88-58	A. Castro *et al.*	(DM2 Collab.)	REFID=48606
ERKAL	86	ZPHY C31 615	C. Erkal, M.G. Olsson	(WISC)	REFID=40913
ATKINSON	85	ZPHY C29 333	M. Atkinson *et al.*	(BONN, CERN, GLAS+)	REFID=22000
BARKOV	85	NP B256 365	L.M. Barkov *et al.*	(NOVO)	REFID=20134
ATKINSON	84C	NP B243 1	M. Atkinson *et al.*	(BONN, CERN, GLAS+) JP	REFID=20625
ATKINSON	83B	PL 127B 132	M. Atkinson *et al.*	(BONN, CERN, GLAS+)	REFID=21502
ATKINSON	83C	NP B229 269	M. Atkinson *et al.*	(BONN, CERN, GLAS+)	REFID=21501
AUGUSTIN	83	LAL 83-21	J.E. Augustin *et al.*	(LALO, PADO, FRAS)	REFID=21500
SHAMBROOM	82	PR D26 1	W.D. Shambroom *et al.*	(HARV, EFI, ILL+)	REFID=21499
BISELLO	81	PL 107B 145	D. Bisello *et al.*	(DM1 Collab.)	REFID=49702
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
KILLIAN	80	PR D21 3005	T.J. Killian *et al.*	(CORN)	REFID=21484
COSME	76	PL 63B 352	G. Cosme *et al.*	(ORSAY)	REFID=20529
FRENKIEL	72	NP B47 61	P. Frenkiel *et al.*	(CDEF, CERN)	REFID=20599
ALVENSLEB...	71	PRL 26 273	H. Alvensleben *et al.*	(DESY, MIT) G	REFID=21420
BRAUN	71	NP B30 213	H.M. Braun *et al.*	(STRB) G	REFID=21421
BULOS	71	PRL 26 149	F. Bulos *et al.*	(SLAC, UMD, IBM, LBL) G	REFID=21422
LAYSSAC	71	NC 6A 134	J. Layssac, F.M. Renard	(MONP)	REFID=40298

NODE=M162

$a_2(1700)$

$I^G(J^{PC}) = 1^-(2^{++})$

OMITTED FROM SUMMARY TABLE

$a_2(1700)$ MASS

NODE=M162205

NODE=M162M

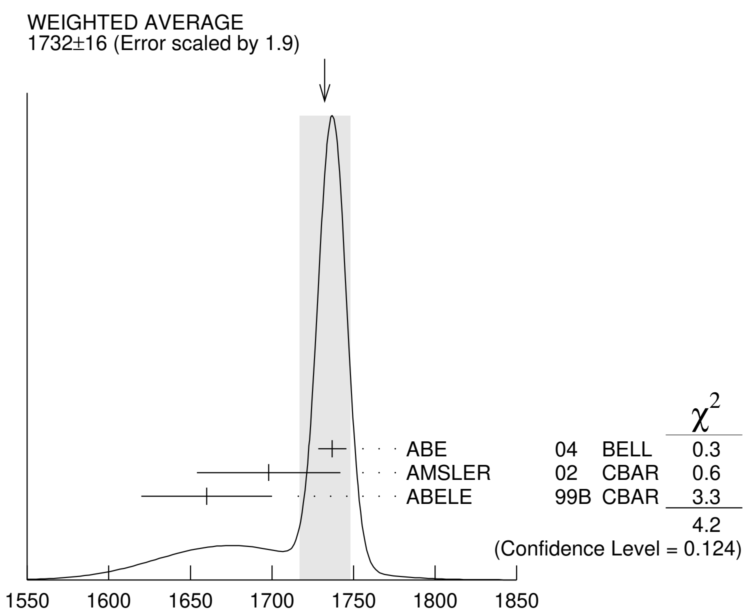
VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1732±16 OUR AVERAGE		Error includes scale factor of 1.9. See the ideogram below.			
1737± 5± 7		ABE	04	BELL	$10.6\ e^+e^- \to e^+e^- K^+K^-$
1698±44		[1] AMSLER	02	CBAR	$0.9\ \overline{p}p \to \pi^0\eta\eta$
1660±40		ABELE	99B	CBAR	$1.94\ \overline{p}p \to \pi^0\eta\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1721±13±44	145k	LU	05	E852	$18\ \pi^- p \to \omega\pi^-\pi^0 p$
~1775		[2] GRYGOREV	99	SPEC	$40\ \pi^- p \to K^0_S K^0_S n$
1752±21± 4		ACCIARRI	97T	L3	$\gamma\gamma \to \pi^+\pi^-\pi^0$

[1] T-matrix pole.

[2] Possibly two $J^P = 2^+$ resonances with isospins 0 and 1.

NODE=M162M;LINKAGE=TT

NODE=M162M;LINKAGE=GR



$a_2(1700)$ mass (MeV)

$a_2(1700)$ WIDTH

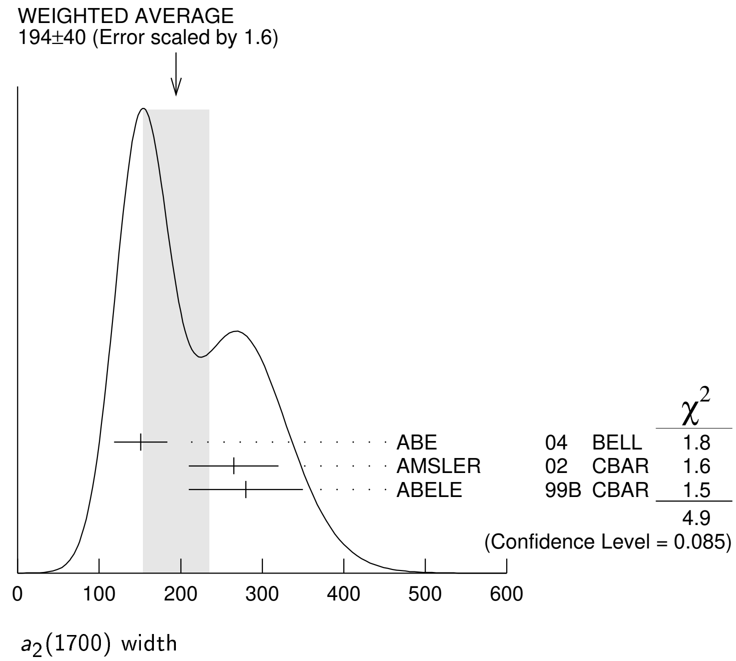
NODE=M162210

NODE=M162W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	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		[3] 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. • • •					
279± 49±66	145k	LU	05	E852	$18\ \pi^- p \to \omega\pi^-\pi^0 p$
150±110±34		ACCIARRI	97T	L3	$\gamma\gamma \to \pi^+\pi^-\pi^0$

[3] T-matrix pole.

NODE=M162W;LINKAGE=TT



$a_2(1700)$ 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 ←

$a_2(1700)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

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)	*DOCUMENT ID*		*TECN*	*COMMENT*
0.29±0.04±0.02	ACCIARRI	97T	L3	$\gamma\gamma \to \pi^+\pi^-\pi^0$

$\Gamma(K\overline{K}) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_5\Gamma_2/\Gamma$

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	[4] ABE	04	BELL	10.6 $e^+e^- \to e^+e^-K^+K^-$

[4] Assuming spin 2.

NODE=M162G2;LINKAGE=AB

$a_2(1700)$ REFERENCES

NODE=M162

LU	05	PRL 94 032002	M. Lu *et al.*	(BNL E852 Collab.)	REFID=50459
ABE	04	EPJ C32 323	K. Abe *et al.*	(BELLE Collab.)	REFID=49650
AMSLER	02	EPJ C23 29	C. Amsler *et al.*		REFID=48580
ABELE	99B	EPJ C8 67	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=46904
GRYGOREV	99	PAN 62 470 Translated from YAF 62 513.	V.K. Grygorev *et al.*		REFID=46909
ACCIARRI	97T	PL B413 147	M. Acciarri *et al.*	(L3 Collab.)	REFID=45761

OTHER RELATED PAPERS

BAKER	03	PL B563 140	C.A. Baker *et al.*		REFID=49414
BARBERIS	00H	PL B488 225	D. Barberis *et al.*	(WA 102 Collab.)	REFID=47964

NODE=M068

$f_0(1710)$ $I^G(J^{PC}) = 0^+(0^{++})$

A REVIEW GOES HERE – Check our WWW List of Reviews NODE=M068

$f_0(1710)$ MASS

NODE=M068205

NODE=M068M

VALUE (MeV)		EVTS	DOCUMENT ID		TECN	COMMENT	
1715± 5	**OUR AVERAGE**						
1738±30			ABLIKIM	04E	BES2	$J/\psi \to \omega K^+ K^-$	
1740± 4	$^{+10}_{-25}$		[1] BAI	03G	BES	$J/\psi \to \gamma K\overline{K}$	
1740^{+30}_{-25}			[1] BAI	00A	BES	$J/\psi \to \gamma(\pi^+\pi^-\pi^+\pi^-)$	
1698±18			[2] BARBERIS	00E		450 $pp \to p_f \eta\eta p_s$	
1710±12	±11		[3] BARBERIS	99D	OMEG	450 $pp \to K^+K^-, \pi^+\pi^-$	
1710±25			[4] FRENCH	99		300 $pp \to p_f(K^+K^-)p_s$	
1707±10			[5] AUGUSTIN	88	DM2	$J/\psi \to \gamma K^+K^-, K^0_S K^0_S$	
1698±15			[5] AUGUSTIN	87	DM2	$J/\psi \to \gamma\pi^+\pi^-$	
1720±10	±10		[6] BALTRUSAIT...	87	MRK3	$J/\psi \to \gamma K^+K^-$	
1742±15			[5] WILLIAMS	84	MPSF	200 $\pi^- N \to 2K^0_S X$	
1670±50			BLOOM	83	CBAL	$J/\psi \to \gamma 2\eta$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
1790^{+40}_{-30}			[7] ABLIKIM	05	BES2	$J/\psi \to \phi\pi^+\pi^-$	
1670±20			[8] BINON	05	GAMS	33 $\pi^- p \to \eta\eta n$	
1726± 7		74	[9] CHEKANOV	04	ZEUS	$ep \to K^0_S K^0_S X$	
1732+15			[10] ANISOVICH	03	RVUE		
1682±16			TIKHOMIROV	03	SPEC	40.0 $\pi^- C \to K^0_S K^0_S K^0_L X$	
1670±26		3651	[1,11] NICHITIU	02	OBLX		
1767±14		221	[12] ACCIARRI	01H	L3	$\gamma\gamma \to K^0_S K^0_S$, E^{ee}_{cm}= 91, 183–209 GeV	
1770±12			[13,14] ANISOVICH	99B	SPEC	0.6–1.2 $p\overline{p} \to \eta\eta\pi^0$	
1730±15			[1] BARBERIS	99	OMEG	450 $pp \to p_s p_f K^+K^-$	
1750±20			[1] BARBERIS	99B	OMEG	450 $pp \to p_s p_f \pi^+\pi^-$	
1750±30			[15] ANISOVICH	98B	RVUE	Compilation	
1720±39			BAI	98H	BES	$J/\psi \to \gamma\pi^0\pi^0$	
1775± 1.5		57	[16] BARKOV	98		$\pi^- p \to K^0_S K^0_S n$	
1690±11			[17] ABREU	96C	DLPH	$Z^0 \to K^+K^- + X$	
1696± 5	$^{+9}_{-34}$		[6] BAI	96C	BES	$J/\psi \to \gamma K^+K^-$	
1781± 8	$^{+10}_{-31}$		[1] BAI	96C	BES	$J/\psi \to \gamma K^+K^-$	OCCUR=2
1768±14			BALOSHIN	95	SPEC	40 $\pi^- C \to K^0_S K^0_S X$	
1750±15			[18] BUGG	95	MRK3	$J/\psi \to \gamma\pi^+\pi^-\pi^+\pi^-$	
1620±16			[6] BUGG	95	MRK3	$J/\psi \to \gamma\pi^+\pi^-\pi^+\pi^-$	OCCUR=2
1748±10			[5] ARMSTRONG	93C	E760	$\overline{p}p \to \pi^0\eta\eta \to 6\gamma$	
∼ 1750			BREAKSTONE	93	SFM	$pp \to pp\pi^+\pi^-\pi^+\pi^-$	
1744±15			[19] ALDE	92D	GAM2	38 $\pi^- p \to \eta\eta n$	
1713±10			[20] ARMSTRONG	89D	OMEG	300 $pp \to ppK^+K^-$	
1706±10			[20] ARMSTRONG	89D	OMEG	300 $pp \to ppK^0_S K^0_S$	OCCUR=2
1700±15			[6] BOLONKIN	88	SPEC	40 $\pi^- p \to K^0_S K^0_S n$	
1720±60			[1] BOLONKIN	88	SPEC	40 $\pi^- p \to K^0_S K^0_S n$	OCCUR=2
1638±10			[21] FALVARD	88	DM2	$J/\psi \to \phi K^+K^-, K^0_S K^0_S$	
1690± 4			[22] FALVARD	88	DM2	$J/\psi \to \phi K^+K^-, K^0_S K^0_S$	OCCUR=2
1755± 8			[23] ALDE	86C	GAM2	38 $\pi^- p \to n2\eta$	
1730^{+2}_{-10}			[24] LONGACRE	86	RVUE	22 $\pi^- p \to n2K^0_S$	

1650±50	BURKE	82	MRK2	$J/\psi \to \gamma 2\rho$
1640±50	[25,26] EDWARDS	82D	CBAL	$J/\psi \to \gamma 2\eta$
1730±10 ±20	[27] ETKIN	82C	MPS	$23\ \pi^- p \to n 2K^0_S$

[1] $J^P = 0^+$. NODE=M068M;LINKAGE=A8
[2] T-matrix pole. NODE=M068M;LINKAGE=TP
[3] Supersedes BARBERIS 99 and BARBERIS 99B. NODE=M068M;LINKAGE=BD
[4] $J^P = 0^+$, supersedes by ARMSTRONG 89D. NODE=M068M;LINKAGE=C3
[5] No J^{PC} determination. NODE=M068M;LINKAGE=A1
[6] $J^P = 2^+$. NODE=M068M;LINKAGE=A3
[7] This state may be different from $f_0(1710)$, see CLOSE 05. NODE=M068M;LINKAGE=AB
[8] Breit-Wigner mass. NODE=M068M;LINKAGE=BW
[9] Systematic errors not estimated. NODE=M068M;LINKAGE=CH
[10] K-matrix pole, assuming $J^P = 0^+$, from combined analysis of $\pi^- p \to \pi^0 \pi^0 n$, $\pi^- p \to K \overline{K} n$, $\pi^+ \pi^- \to \pi^+ \pi^-$, $\overline{p} p \to \pi^0 \pi^0 \pi^0$, $\pi^0 \eta\eta$, $\pi^0 \pi^0 \eta$, $\pi^+ \pi^- \pi^0$, $K^+ K^- \pi^0$, $K^0_S K^0_S \pi^0$, $K^+ K^0_S \pi^-$ at rest, $\overline{p} n \to \pi^- \pi^- \pi^+$, $K^0_S K^- \pi^0$, $K^0_S K^0_S \pi^-$ at rest. NODE=M068M;LINKAGE=KM
[11] Decaying to $f_0(1370)\pi\pi$. NODE=M068M;LINKAGE=NC
[12] Spin 2 dominant, isospin not determined, could also be I=1. NODE=M068M;LINKAGE=HA
[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. NODE=M068M;LINKAGE=A9
[25] $J^P = 2^+$ preferred. NODE=M068M;LINKAGE=B2
[26] From fit neglecting nearby $f'_2(1525)$. Replaced by BLOOM 83. NODE=M068M;LINKAGE=E
[27] Superseded by LONGACRE 86. NODE=M068M;LINKAGE=B1

$f_0(1710)$ WIDTH

NODE=M068210

NODE=M068W

VALUE (MeV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
138 ± 9 OUR AVERAGE			Error includes scale factor of 1.2.			
125 ± 20			ABLIKIM	04E	BES2	$J/\psi \to \omega K^+ K^-$
$166^{+5}_{-8}{}^{+15}_{-10}$			[28] BAI	03G	BES	$J/\psi \to \gamma K \overline{K}$
120^{+50}_{-40}			[28] BAI	00A	BES	$J/\psi \to \gamma(\pi^+\pi^-\pi^+\pi^-)$
120 ± 26			[29] BARBERIS	00E		$450\ pp \to p_f \eta\eta p_s$
126 ± 16 ±18			[30] BARBERIS	99D	OMEG	$450\ pp \to K^+K^-, \pi^+\pi^-$
105 ± 34			[31] FRENCH	99		$300\ pp \to p_f(K^+K^-)p_s$
166.4± 33.2			[32] AUGUSTIN	88	DM2	$J/\psi \to \gamma K^+K^-, K^0_S K^0_S$
136 ± 28			[32] AUGUSTIN	87	DM2	$J/\psi \to \gamma\pi^+\pi^-$
130 ± 20			[33] BALTRUSAIT...	87	MRK3	$J/\psi \to \gamma K^+K^-$
57 ± 38			[5] WILLIAMS	84	MPSF	$200\ \pi^- N \to 2K^0_S X$
160 ± 80			BLOOM	83	CBAL	$J/\psi \to \gamma 2\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
270^{+60}_{-30}			[34] ABLIKIM	05	BES2	$J/\psi \to \phi\pi^+\pi^-$
260 ± 50			[35] BINON	05	GAMS	$33\ \pi^- p \to \eta\eta n$
38^{+20}_{-14}		74	[36] CHEKANOV	04	ZEUS	$ep \to K^0_S K^0_S X$
144 ± 30			[37,38] ANISOVICH	03	RVUE	

$320 \begin{smallmatrix}+50\\-20\end{smallmatrix}$			38,39	ANISOVICH	03	RVUE		OCCUR=2
102 ± 26				TIKHOMIROV	03	SPEC	$40.0\ \pi^- C \to K^0_S K^0_S K^0_L X$	
267 ± 44		3651	28,40	NICHITIU	02	OBLX		
187 ± 60		221	41	ACCIARRI	01H	L3	$\gamma\gamma \to K^0_S K^0_S$, $E^{ee}_{cm} = 91$, 183–209 GeV	
220 ± 40			42,43	ANISOVICH	99B	SPEC	0.6–1.2 $p\overline{p} \to \eta\eta\pi^0$	
100 ± 25			28	BARBERIS	99	OMEG	$450\ pp \to p_s p_f K^+ K^-$	
160 ± 30			28	BARBERIS	99B	OMEG	$450\ pp \to p_s p_f \pi^+ \pi^-$	
250 ± 140			44	ANISOVICH	98B	RVUE	Compilation	
30 ± 7		57	45	BARKOV	98		$\pi^- p \to K^0_S K^0_S n$	
$103 \pm 18 \begin{smallmatrix}+30\\-11\end{smallmatrix}$			33	BAI	96C	BES	$J/\psi \to \gamma K^+ K^-$	
$85 \pm 24 \begin{smallmatrix}+22\\-19\end{smallmatrix}$			28	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			46	BUGG	95	MRK3	$J/\psi \to \gamma\pi^+\pi^-\pi^+\pi^-$	
$160 \begin{smallmatrix}+60\\-20\end{smallmatrix}$			33	BUGG	95	MRK3	$J/\psi \to \gamma\pi^+\pi^-\pi^+\pi^-$	OCCUR=2
264 ± 25			32	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		47	ALDE	92D	GAM2	$38\ \pi^- p \to \eta\eta N^*$	
181 ± 30			48	ARMSTRONG	89D	OMEG	$300\ pp \to ppK^+K^-$	
104 ± 30			48	ARMSTRONG	89D	OMEG	$300\ pp \to ppK^0_S K^0_S$	OCCUR=2
30 ± 20			33	BOLONKIN	88	SPEC	$40\ \pi^- p \to K^0_S K^0_S n$	
350 ± 150			28	BOLONKIN	88	SPEC	$40\ \pi^- p \to K^0_S K^0_S n$	OCCUR=2
148 ± 17			49	FALVARD	88	DM2	$J/\psi \to \phi K^+ K^-$, $K^0_S K^0_S$	
184 ± 6			50	FALVARD	88	DM2	$J/\psi \to \phi K^+ K^-$, $K^0_S K^0_S$	OCCUR=2
$122 \begin{smallmatrix}+74\\-15\end{smallmatrix}$			51	LONGACRE	86	RVUE	$22\ \pi^- p \to n2K^0_S$	
200 ± 100				BURKE	82	MRK2	$J/\psi \to \gamma 2\rho$	
$220 \begin{smallmatrix}+100\\-70\end{smallmatrix}$			52,53	EDWARDS	82D	CBAL	$J/\psi \to \gamma 2\eta$	
$200.0 \begin{smallmatrix}+156.0\\-9.0\end{smallmatrix}$			54	ETKIN	82B	MPS	$23\ \pi^- p \to n2K^0_S$	

[28] $J^P = 0^+$. NODE=M068W;LINKAGE=A8
[29] T-matrix pole. NODE=M068W;LINKAGE=TP
[30] Supersedes BARBERIS 99 and BARBERIS 99B. NODE=M068W;LINKAGE=BD
[31] $J^P = 0^+$, supersedes by ARMSTRONG 89D. NODE=M068W;LINKAGE=C3
[32] No J^{PC} determination. NODE=M068W;LINKAGE=A1
[33] $J^P = 2^+$. NODE=M068W;LINKAGE=A3
[34] This state may be different from $f_0(1710)$, see CLOSE 05. NODE=M068W;LINKAGE=AB
[35] Breit-Wigner width. NODE=M068W;LINKAGE=BW
[36] Systematic errors not estimated. NODE=M068W;LINKAGE=CH
[37] (Solution I) NODE=M068W;LINKAGE=K1
[38] 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
[39] (Solution I) NODE=M068W;LINKAGE=K2
[40] Decaying to $f_0(1370)\pi\pi$. NODE=M068W;LINKAGE=NC
[41] Spin 2 dominant, isospin not determined, could also be I=1. NODE=M068W;LINKAGE=HA
[42] $J^P = 0^+$. NODE=M068W;LINKAGE=AV
[43] Not seen by AMSLER 02. NODE=M068W;LINKAGE=NS
[44] T-matrix pole, assuming $J^P = 0^+$ NODE=M068W;LINKAGE=AN
[45] No J^{PC} determination. NODE=M068W;LINKAGE=4A
[46] From a fit to the 0^+ partial wave. NODE=M068W;LINKAGE=Q0
[47] ALDE 92D combines all the GAMS-2000 data. NODE=M068W;LINKAGE=AA

[48] $J^P = 2^+$, (0^+ excluded). NODE=M068W;LINKAGE=B
[49] From an analysis ignoring interference with $f'_2(1525)$. NODE=M068W;LINKAGE=C
[50] From an analysis including interference with $f'_2(1525)$. NODE=M068W;LINKAGE=D
[51] 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
[52] $J^P = 2^+$ preferred. NODE=M068W;LINKAGE=B2
[53] From fit neglecting nearby $f'_2(1525)$. Replaced by BLOOM 83. NODE=M068W;LINKAGE=E
[54] 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

$f_0(1710)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

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	$\gamma\gamma \to K^0_S K^0_S$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$49\pm11\pm13$		[57] ACCIARRI	01H	L3	$\gamma\gamma \to K^0_S K^0_S$, E^{ee}_{cm}= 91, 183–209 GeV
<480	95	ALBRECHT	90G	ARG	$\gamma\gamma \to K^+K^-$
<280	95	[56] ALTHOFF	85B	TASS	$\gamma\gamma \to K\overline{K}\pi$

$\Gamma(\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_3\Gamma_4/\Gamma$

NODE=M068G3
NODE=M068G3

VALUE (keV)	CL%	DOCUMENT ID		TECN	COMMENT
<0.82	95	[55] BARATE	00E	ALEP	$\gamma\gamma \to \pi^+\pi^-$

[55] Assuming spin 0. NODE=M068G;LINKAGE=Z
[56] Assuming helicity 2. NODE=M068G2;LINKAGE=F
[57] Spin 2 dominant, isospin not determined, could also be I=1. NODE=M068G;LINKAGE=HA

$f_0(1710)$ 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. • • •				
$0.38^{+0.09}_{-0.19}$	[58,59] LONGACRE	86	MPS	$22\ \pi^- p \to n 2K^0_S$

$\Gamma(\eta\eta)/\Gamma_{\text{total}}$ — Γ_2/Γ

NODE=M068R1
NODE=M068R1

VALUE	DOCUMENT ID		TECN
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.18^{+0.03}_{-0.13}$	[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	$0.9\ \overline{p}p \to \pi^0\eta\eta$, $\pi^0\pi^0\pi^0$
$0.039^{+0.002}_{-0.024}$	[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
<0.11	95	[60] ABLIKIM	04E	BES2	$J/\psi \to \omega K^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$5.8\ ^{+9.1}_{-5.5}$		[61] ANISOVICH	02D	SPEC	Combined fit
$0.2\ \pm0.024\pm0.036$		BARBERIS	99D	OMEG	$450\ pp \to K^+K^-$, $\pi^+\pi^-$
0.39 ± 0.14		ARMSTRONG	91	OMEG	$300\ pp \to pp\pi\pi$, $ppK\overline{K}$

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

NODE=M068R7
NODE=M068R7

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
0.48±0.15		BARBERIS 00E		450 $pp \to p_f \eta\eta p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.46^{+0.70}_{-0.38}$		[61] ANISOVICH 02D	SPEC	Combined fit
<0.02	90	[62] PROKOSHKIN 91	GA24	300 $\pi^- p \to \pi^- p \eta\eta$

[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. $p\overline{p} \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$), GAMS ($\pi p \to \pi^0\pi^0 n$, $\eta\eta n$, $\eta\eta' n$), and BNL ($\pi p \to K\overline{K} n$) data. NODE=M068R;LINKAGE=CH

[62] Combining results of GAM4 with those of ARMSTRONG 89D. NODE=M068R;LINKAGE=A

f_0(1710) REFERENCES

NODE=M068

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.			
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
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
ACCIARRI	01H	PL B501 173	M. Acciarri et al.	(L3 Collab.)	REFID=48321
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	UFN 41 419	V.V. Anisovich et al.		REFID=46331
BAI	98H	PRL 81 1179	J.Z. Bai et al.	(BES Collab.)	REFID=46342
BARKOV	98	JEPTL 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	91	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

OTHER RELATED PAPERS

GIACOSA	05	PR C71 025202	F. Giacosa *et al.*		REFID=50500
LINK	04	PL B585 200	J.M. Link *et al.*	(FNAL FOCUS Collab.)	REFID=49774
TESHIMA	04	JPG 30 663	T. Teshima *et al.*		REFID=50161
ANISOVICH	03B	PAN 66 741	V.V. Anisovich, V.A. Nikonov, A.V. Sarantsev		REFID=49420
		Translated from YAF 66 772.			
AMSLER	02B	PL B541 22	C. Amsler		REFID=48826
JIN	02	PR D66 057505	H. Jin, X. Zhang		REFID=48843
KLEEFELD	02	PR D66 034007	F. Kleefeld *et al.*		REFID=48844
RUPP	02	PR D65 078501	G. Rupp, E. vanBeveren, M.D. Scadron		REFID=48851
SHAKIN	02	PR D65 078502	C.M. Shakin, H. Wang		REFID=48853
TESHIMA	02	JPG 28 1391	T. Teshima, I. Kitamura, N. Morisita		REFID=48854
VOLKOV	02	PAN 65 1657	M.K. Volkov, V.L. Yudichev		REFID=48855
		Translated from YAF 65 1701.			
LI	01B	EPJ C19 529	D.-M. Li, H. Yu, Q.-X. Shen		REFID=48333
VOLKOV	01	PAN 64 2006	M.K. Volkov, V.L. Yudichev		REFID=48572
		Translated from YAF 64 2091.			
ANISOVICH	99H	PL B467 289	A.V. Anisovich, V.V. Anisovich		REFID=47399
GRYGOREV	99	PAN 62 470	V.K. Grygorev *et al.*		REFID=46909
		Translated from YAF 62 513.			
PROKOSHKIN	99	PAN 62 356	Yu.D. Prokoshkin		REFID=46946
		Translated from YAF 62 396.			
ANISOVICH	97	PL B395 123	A.V. Anisovich, A.V. Sarantsev	(PNPI)	REFID=45388
LINDENBAUM	92	PL B274 492	S.J. Lindenbaum, R.S. Longacre	(BNL)	REFID=43616
BISELLO	89B	PR D39 701	G. Busetto *et al.*	(DM2 Collab.)	REFID=40575
ASTON	88D	NP B301 525	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)	REFID=40330
AKESSON	86	NP B264 154	T. Akesson *et al.*	(Axial Field Spec. Collab.)	REFID=21123
ARMSTRONG	86B	PL 167B 133	T.A. Armstrong *et al.*	(ATHU, BARI, BIRM+)	REFID=21689
BALTRUSAIT...	86B	PR D33 1222	R.M. Baltrusaitis *et al.*	(Mark III Collab.)	REFID=22100
ALTHOFF	83	PL 121B 216	M. Althoff *et al.*	(TASSO Collab.)	REFID=21408
BARNETT	83B	PL 120B 455	B. Barnett *et al.*	(JHU)	REFID=21669
BARNES	82B	NP B198 380	T. Barnes, F.E. Close, S. Monaghan	(RHEL, OXFTP)	REFID=21338
TANIMOTO	82	PL 116B 198	M. Tanimoto	(BIEL)	REFID=20889

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). Needs confirmation.

NODE=M114

$\eta(1760)$ MASS

NODE=M114205

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1760±11	320	[1] BISELLO	89B	DM2	$J/\psi \to 4\pi\gamma$

NODE=M114M

[1] Estimated by us from various fits.

NODE=M114M;LINKAGE=A

$\eta(1760)$ WIDTH

NODE=M114220

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
60±16	320	[2] BISELLO	89B	DM2	$J/\psi \to 4\pi\gamma$

NODE=M114W

[2] Estimated by us from various fits.

NODE=M114W;LINKAGE=B

$\eta(1760)$ REFERENCES

NODE=M114

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

OTHER RELATED PAPERS

BAI	99	PL B446 356	J.Z. Bai *et al.*	(BES Collab.)	REFID=46606

NODE=M075

$\pi(1800)$

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

See also minireview under non-$q\overline{q}$ candidates. (See the index for the page number.)

NODE=M075

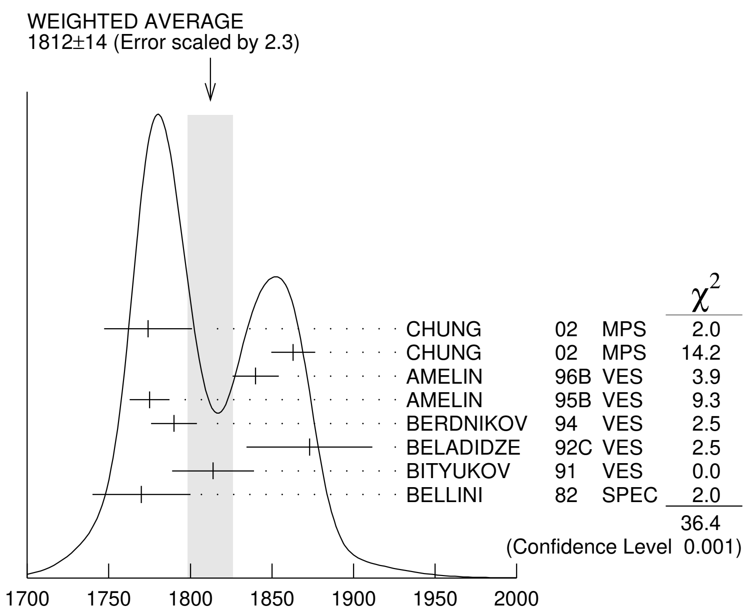
$\pi(1800)$ MASS

NODE=M075205

NODE=M075M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1812±14 OUR AVERAGE		Error includes scale factor of 2.3. See the ideogram below.				
1774±18±20		[1] CHUNG	02	E852		18.3 $\pi^- p \rightarrow \pi^+\pi^-\pi^- p$
1863± 9±10		[2] CHUNG	02	E852		18.3 $\pi^- p \rightarrow \pi^+\pi^-\pi^- p$
1840±10±10	1200	AMELIN	96B	VES	−	37 $\pi^- A \rightarrow \eta\eta\pi^- A$
1775± 7±10		[3] AMELIN	95B	VES	−	36 $\pi^- A \rightarrow \pi^+\pi^-\pi^- A$
1790±14		[4] 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 $\rightarrow$ 3π A
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1737± 5±15		AMELIN	99	VES		37 $\pi^- A \rightarrow \omega\pi^-\pi^0 A^*$

OCCUR=2



$\pi(1800)$ mass (MeV)

[1] In the $f_0(980)\pi$ wave. NODE=M075M;LINKAGE=C1

[2] In the $f_0(600)\pi$ wave. NODE=M075M;LINKAGE=C2

[3] From a fit to $J^{PC} = 0^{-+}$ $f_0(980)\pi$, $f_0(1370)\pi$ waves. NODE=M075M;LINKAGE=AX

[4] 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=M075210

NODE=M075W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
207±13 OUR AVERAGE						
223±48±50		[7] CHUNG	02	E852		18.3 $\pi^- p \rightarrow \pi^+\pi^-\pi^- p$
191±21±20		[8] CHUNG	02	E852		18.3 $\pi^- p \rightarrow \pi^+\pi^-\pi^- p$
210±30±30	1200	AMELIN	96B	VES	−	37 $\pi^- A \rightarrow \eta\eta\pi^- A$
190±15±15		[5] AMELIN	95B	VES	−	36 $\pi^- A \rightarrow \pi^+\pi^-\pi^- A$

OCCUR=2

210±70		[6] BERDNIKOV	94	VES	–	37 $\pi^- A \to K^+ K^- \pi^- A$
225±35±20		BELADIDZE	92C	VES	–	36 π^- Be $\to \pi^- \eta' \eta$ Be
205±18±32	426±57	BITYUKOV	91	VES	–	36 π^- C $\to \pi^- \eta\eta$ C
310±50	1100	BELLINI	82	SPEC	–	40 π^- A $\to$ 3π A
• • • We do not use the following data for averages, fits, limits, etc. • • •						
259±19± 6		AMELIN	99	VES		37 $\pi^- A \to \omega \pi^- \pi^0 A^*$

[5] From a fit to $J^{PC} = 0^{-+}$ $f_0(980)\pi$, $f_0(1370)\pi$ waves. NODE=M075W;LINKAGE=AX

[6] From a fit to $J^{PC} = 0^{-+}$ $K_0^*(1430) K^-$ and $f_0(980)\pi^-$ waves. NODE=M075W;LINKAGE=A

[7] In the $f_0(980)\pi$ wave. NODE=M075W;LINKAGE=C1

[8] In the $f_0(600)\pi$ wave. NODE=M075W;LINKAGE=C2

$\pi(1800)$ 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	$f_0(600)\pi^-$	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;OUR EST;→ NOT CHECKED ←
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	$f_0(1500)\pi^-$	seen	DESIG=6;OUR EST;→ NOT CHECKED ←
Γ_{10}	$\eta\eta'(958)\pi^-$	seen	DESIG=8;OUR EST;→ NOT CHECKED ←
Γ_{11}	$K_0^*(1430) K^-$	seen	DESIG=4
Γ_{12}	$K^*(892) K^-$	not seen	DESIG=9;OUR EST;→ NOT CHECKED ←

$\pi(1800)$ BRANCHING RATIOS

NODE=M075220

$\Gamma(f_0(980)\pi^-)/\Gamma(f_0(600)\pi^-)$ — Γ_3/Γ_2

NODE=M075R11
NODE=M075R11

VALUE	DOCUMENT ID		TECN	COMMENT
0.44±0.08±0.38	[10] CHUNG	02	E852	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

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
1.7±1.3	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 $\to$ 3π A

$\Gamma(f_0(1500)\pi^-)/\Gamma_{total}$ — Γ_5/Γ

NODE=M075R12
NODE=M075R12

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	CHUNG	02	E852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$

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

NODE=M075R8
NODE=M075R8

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
0.5 ±0.1	1200	AMELIN	96B	VES	–	37 $\pi^- A \to \eta\eta\pi^- A$

$\Gamma(f_0(1500)\pi^-)/\Gamma(a_0(980)\eta)$ — Γ_9/Γ_8

NODE=M075R7
NODE=M075R7

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
0.08 ±0.03	1200	[9] AMELIN	96B	VES	–	37 $\pi^- A \to \eta\eta\pi^- A$

[9] Assuming that $f_0(1500)$ decays only to $\eta\eta$ and $a_0(980)$ decays only to $\eta\pi$. NODE=M075R7;LINKAGE=A

$\Gamma(\eta\eta'(958)\pi^-)/\Gamma(\eta\eta\pi^-)$ Γ_{10}/Γ_7

NODE=M075R10

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
0.29±0.06 OUR AVERAGE						
0.29±0.07		BELADIDZE	92C	VES	–	36 π^- Be → $\pi^-\eta'\eta$ Be
0.3 ±0.1	426±57	BITYUKOV	91	VES	–	36 π^- C → $\pi^-\eta\eta$ C

$\Gamma(K_0^*(1430)K^-)/\Gamma_{total}$ Γ_{11}/Γ

NODE=M075R4

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
seen	BERDNIKOV	94	VES	–	37 $\pi^- A \rightarrow K^+K^-\pi^- A$

$\Gamma(K^*(892)K^-)/\Gamma_{total}$ Γ_{12}/Γ

NODE=M075R9

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
not seen	BERDNIKOV	94	VES	–	37 $\pi^- A \rightarrow K^+K^-\pi^- A$

$\Gamma(\rho\pi^-)/\Gamma(f_0(980)\pi^-)$ Γ_6/Γ_3

NODE=M075R6

VALUE	CL%	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.25		CHUNG	02	E852		18.3 $\pi^- p \rightarrow \pi^+\pi^-\pi^- p$
<0.14	90	AMELIN	95B	VES	–	36 $\pi^- A \rightarrow \pi^+\pi^-\pi^- A$

$\Gamma(\rho\pi^-)/\Gamma_{total}$ Γ_6/Γ

NODE=M075R2

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
not seen	BELLINI	82	SPEC	–	40 π^- A → 3π A

[10] Assuming that $f_0(980)$ decays only to $\pi\pi$.

NODE=M075R;LINKAGE=CK

$\pi(1800)$ REFERENCES

NODE=M075

CHUNG	02	PR D65 072001	S.U. Chung *et al.*	(BNL E852 Collab.)	REFID=48837
AMELIN	99	PAN 62 445 Translated from YAF 62 487.	D.V. Amelin *et al.*	(VES Collab.)	REFID=46910
AMELIN	96B	PAN 59 976 Translated from YAF 59 1021.	D.V. Amelin *et al.*	(SERP, TBIL) IGJPC	REFID=44725
AMELIN	95B	PL B356 595	D.V. Amelin *et al.*	(SERP, TBIL)	REFID=44433
BERDNIKOV	94	PL B337 219	E.B. Berdnikov *et al.*	(SERP, TBIL)	REFID=44073
BELADIDZE	92C	SJNP 55 1535 Translated from YAF 55 2748.	G.M. Beladidze, S.I. Bityukov, G.V. Borisov	(SERP+)	REFID=43175
BITYUKOV	91	PL B268 137	S.I. Bityukov *et al.*	(SERP, TBIL)	REFID=41749
BELLINI	82	PRL 48 1697	G. Bellini *et al.*	(MILA, BGNA, JINR)	REFID=21134

OTHER RELATED PAPERS

ZAIMIDOROGA	99	PAN 30 1 Translated from SJPN 30 5.	O.A. Zaimidoroga		REFID=46907
BORISOV	92	SJNP 55 1441 Translated from YAF 55 2583.	G.V. Borisov, S.S. Gershtein, A.M. Zaitsev	(SERP)	REFID=43176

NODE=M038

$f_2(1810)$

$I^G(J^{PC}) = 0^+(2^{++})$

OMITTED FROM SUMMARY TABLE

Needs confirmation.

NODE=M038

$f_2(1810)$ MASS

NODE=M038205

NODE=M038M

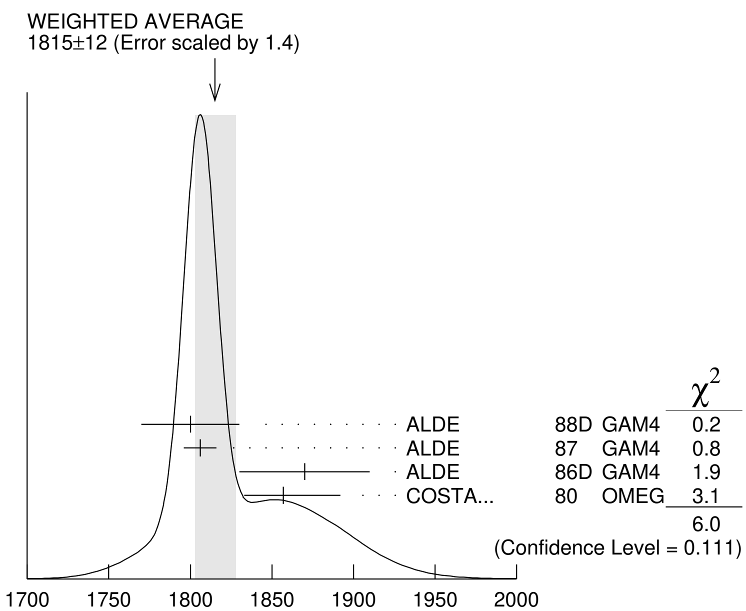
VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1815±12 OUR AVERAGE		Error includes scale factor of 1.4. See the ideogram below.			
1800±30	40	ALDE	88D	GAM4	300 $\pi^- p \to \pi^- p 4\pi^0$
1806±10	1600	ALDE	87	GAM4	100 $\pi^- p \to 4\pi^0 n$
1870±40		[1] ALDE	86D	GAM4	100 $\pi^- p \to \eta\eta n$
1857^{+35}_{-24}		[2] 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}		[3] LONGACRE	86	RVUE	Compilation
1799±15		[4] CASON	82	STRC	8 $\pi^+ p \to \Delta^{++}\pi^0\pi^0$

[1] Seen in only one solution. NODE=M038M;LINKAGE=F

[2] Error increased by spread of two solutions. Included in LONGACRE 86 global analysis. NODE=M038M;LINKAGE=A

[3] 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

[4] 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=M038210

NODE=M038W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
197± 22 OUR AVERAGE		Error includes scale factor of 1.5. See the ideogram below.			
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		[5] ALDE	86D	GAM4	100 $\pi^- p \to \eta\eta n$
185^{+102}_{-139}		[6] 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}		[7] LONGACRE	86	RVUE	Compilation
280^{+42}_{-35}		[8] CASON	82	STRC	8 $\pi^+ p \to \Delta^{++}\pi^0\pi^0$

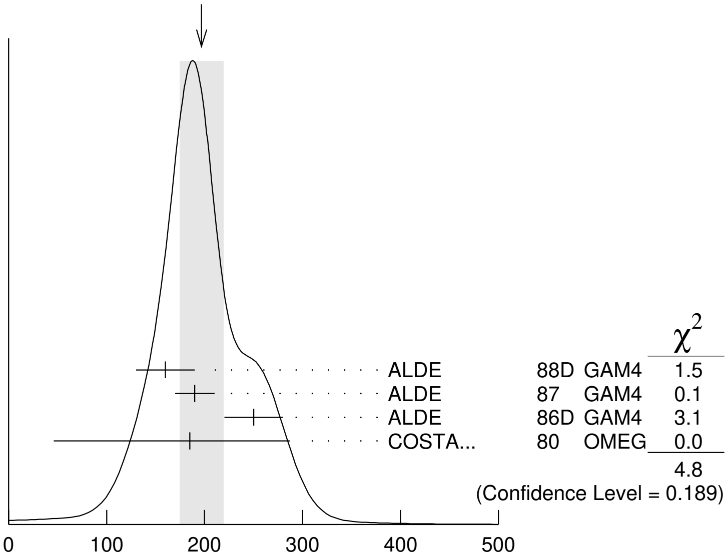
[5] Seen in only one solution. NODE=M038W;LINKAGE=F

[6] Error increased by spread of two solutions. Included in LONGACRE 86 global analysis. NODE=M038W;LINKAGE=A

[7] 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

[8] From an amplitude analysis of the reaction $\pi^+\pi^- \rightarrow 2\pi^0$. The resonance in the $2\pi^0$ final state is not confirmed by PROKOSHKIN 97. NODE=M038W;LINKAGE=P1

WEIGHTED AVERAGE
197±22 (Error scaled by 1.5)



$f_2(1810)$ 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

$f_2(1810)$ BRANCHING RATIOS

NODE=M038220

$\Gamma(\pi\pi)/\Gamma_{\text{total}}$ — Γ_1/Γ

NODE=M038R2
NODE=M038R2

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	AMSLER	02	CBAR	$0.9\ \overline{p}p \rightarrow \pi^0\eta\eta, \pi^0\pi^0\pi^0$
not seen	PROKOSHKIN	97	GAM2	$38\ \pi^-p \rightarrow \pi^0\pi^0 n$
$0.21^{+0.02}_{-0.03}$	[9] LONGACRE	86	RVUE	Compilation
0.44 ± 0.03	[10] CASON	82	STRC	$8\ \pi^+p \rightarrow \Delta^{++}\pi^0\pi^0$

[9] From a partial-wave analysis of data using a K-matrix formalism with 5 poles. Includes compilation of several other experiments. NODE=M038R;LINKAGE=L

[10] Included in LONGACRE 86 global analysis. NODE=M038R;LINKAGE=C

$\Gamma(\eta\eta)/\Gamma_{\text{total}}$ — Γ_2/Γ

NODE=M038R3
NODE=M038R3

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.008^{+0.028}_{-0.003}$	[9] LONGACRE	86	RVUE	Compilation

$\Gamma(\pi\pi)/\Gamma(4\pi^0)$ — Γ_1/Γ_3

NODE=M038R4
NODE=M038R4

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.75	ALDE	87	GAM4	$100\ \pi^-p \rightarrow 4\pi^0 n$

$\Gamma(4\pi^0)/\Gamma(\eta\eta)$ 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	$100\ \pi^- p \rightarrow 4\pi^0 n$

$\Gamma(K^+K^-)/\Gamma_{total}$ Γ_4/Γ

NODE=M038R1

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.003^{+0.019}_{-0.002}$	[9] LONGACRE	86	RVUE	Compilation
seen	COSTA...	80	OMEG	$10\ \pi^- p \rightarrow K^+K^- n$

$f_2(1810)$ REFERENCES

NODE=M038

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

OTHER RELATED PAPERS

AKER	91	PL B260 249	E. Aker *et al.*	(Crystal Barrel Collab.)	REFID=41587
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

NODE=M054

$\phi_3(1850)$

$I^G(J^{PC}) = 0^-(3^{--})$

$\phi_3(1850)$ MASS

NODE=M054205

NODE=M054M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1854± 7 OUR AVERAGE					
1855 ± 10		ASTON	88E	LASS	$11\ K^- p \rightarrow K^- K^+ \Lambda$, $K^0_S K^\pm \pi^\mp \Lambda$
1870^{+30}_{-20}	430	ARMSTRONG	82	OMEG	$18.5\ K^- p \rightarrow K^- K^+ \Lambda$
1850 ± 10	123	ALHARRAN	81B	HBC	$8.25\ K^- p \rightarrow K\overline{K}\Lambda$

$\phi_3(1850)$ WIDTH

NODE=M054210

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	$11\ K^- p \rightarrow K^- K^+ \Lambda$, $K^0_S K^\pm \pi^\mp \Lambda$
160^{+90}_{-50}	430	ARMSTRONG	82	OMEG	$18.5\ K^- p \rightarrow K^- K^+ \Lambda$
80^{+40}_{-30}	123	ALHARRAN	81B	HBC	$8.25\ K^- p \rightarrow K\overline{K}\Lambda$

$\phi_3(1850)$ DECAY MODES

NODE=M054215;NODE=M054

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$K\overline{K}$	seen	DESIG=1;OUR EST;→ NOT CHECKED ←
Γ_2	$K\overline{K}^*(892)+$ c.c.	seen	DESIG=2;OUR EST;→ NOT CHECKED ←

ϕ_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 $K^- p \rightarrow K^- K^+ \Lambda$, $K^0_S K^\pm \pi^\mp \Lambda$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.8 ±0.4	ALHARRAN	81B	HBC	8.25 $K^- p \rightarrow K\overline{K}\pi\Lambda$

ϕ_3(1850) REFERENCES

NODE=M054

ASTON	88E	PL B208 324	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS) IGJPC	REFID=40577
ARMSTRONG	82	PL 110B 77	T.A. Armstrong *et al.*	(BARI, BIRM, CERN+) JP	REFID=21405
ALHARRAN	81B	PL 101B 357	S. Al-Harran *et al.*	(BIRM, CERN, GLAS+)	REFID=21702

OTHER RELATED PAPERS

CORDIER	82B	PL 110B 335	A. Cordier *et al.*	(LALO)	REFID=21704
ASTON	80B	PL 92B 219	D. Aston	(BONN, CERN, EPOL, GLAS, LANC+)	REFID=21701

NODE=M101

η_2(1870) $I^G(J^{PC}) = 0^+(2^{-+})$

OMITTED FROM SUMMARY TABLE

Needs confirmation.

NODE=M101

η_2(1870) MASS

NODE=M101205

NODE=M101M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1842± 8 OUR AVERAGE						
1835±12		BARBERIS	00B			450 $pp \rightarrow p_f \eta\pi^+\pi^- p_s$
1844±13		BARBERIS	00C			450 $pp \rightarrow p_f 4\pi p_s$
1840±25		BARBERIS	97B	OMEG		450 $pp \rightarrow pp2(\pi^+\pi^-)$
1875±20±35		ADOMEIT	96	CBAR	0	1.94 $\overline{p}p \rightarrow \eta 3\pi^0$
1881±32±40	26	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. • • •						
1860± 5±15		ANISOVICH	00E	SPEC		1.94 $\overline{p}p \rightarrow \eta 3\pi^0$
1840±15		BAI	99	BES		$J/\psi \rightarrow \gamma\eta\pi^+\pi^-$

η_2(1870) WIDTH

NODE=M101220

NODE=M101W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
225±14 OUR AVERAGE						
235±22		BARBERIS	00B			450 $pp \rightarrow p_f \eta\pi^+\pi^- p_s$
228±23		BARBERIS	00C			450 $pp \rightarrow p_f 4\pi p_s$
200±40		BARBERIS	97B	OMEG		450 $pp \rightarrow pp2(\pi^+\pi^-)$
200±25±45		ADOMEIT	96	CBAR	0	1.94 $\overline{p}p \rightarrow \eta 3\pi^0$
221±92±44	26	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. • • •						
$250\pm25^{+50}_{-35}$		ANISOVICH	00E	SPEC		1.94 $\overline{p}p \rightarrow \eta 3\pi^0$
170±40		BAI	99	BES		$J/\psi \rightarrow \gamma\eta\pi^+\pi^-$

$\eta_2(1870)$ DECAY MODES

NODE=M101225;NODE=M101

	Mode	
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

$\eta_2(1870)$ 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*	*CHG*	*COMMENT*
6 ±5 OUR AVERAGE Error includes scale factor of 2.3.					
20.4±6.6	BARBERIS	00B			450 $pp \rightarrow p_f \eta\pi^+\pi^- p_s$
4.1±2.3	ADOMEIT	96	CBAR	0	1.94 $\overline{p}p \rightarrow \eta 3\pi^0$

$\Gamma(a_2(1320)\pi)/\Gamma(a_0(980)\pi)$ Γ_2/Γ_4

NODE=M101R4
NODE=M101R4

VALUE	*DOCUMENT ID*		*COMMENT*
32.6±12.6	BARBERIS	00B	450 $pp \rightarrow p_f \eta\pi^+\pi^- p_s$

$\eta_2(1870)$ REFERENCES

NODE=M101

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

OTHER RELATED PAPERS

KARCH 90 PL B249 353 K. Karch *et al.* (Crystal Ball Collab.) REFID=41377

NODE=M170

$\rho(1900)$

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

OMITTED FROM SUMMARY TABLE

See the mini-review under the $\rho(1700)$.

NODE=M170

$\rho(1900)$ MASS

NODE=M170205

NODE=M170M

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1910±10	[1,2] FRABETTI	04	E687	$\gamma p \rightarrow 3\pi^+ 3\pi^- p$
1870±10	ANTONELLI	96	SPEC	$e^+e^- \rightarrow$ hadrons

[1] From a fit with two resonances with the JACOB 72 continuum. NODE=M170M;LINKAGE=PI
[2] Supersedes FRABETTI 01. NODE=M170M;LINKAGE=RS

$\rho(1900)$ WIDTH

NODE=M170220

NODE=M170W

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
37±13	[3,4] FRABETTI	04	E687	$\gamma p \rightarrow 3\pi^+ 3\pi^- p$
10± 5	ANTONELLI	96	SPEC	$e^+e^- \rightarrow$ hadrons

[3] From a fit with two resonances with the JACOB 72 continuum. NODE=M170W;LINKAGE=PI
[4] Supersedes FRABETTI 01. NODE=M170W;LINKAGE=RS

$\rho(1900)$ 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	hadrons	seen	DESIG=2;OUR EST;→ NOT CHECKED ←
Γ_4	e^+e^-	seen	DESIG=3;OUR EST;→ NOT CHECKED ←
Γ_5	$\overline{N}N$	not seen	DESIG=4;OUR EST;→ NOT CHECKED ←

$\rho(1900)$ BRANCHING RATIOS

NODE=M170230

$\Gamma(6\pi)/\Gamma_{total}$ — Γ_1/Γ

NODE=M170R1
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

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

OTHER RELATED PAPERS

DATTA	03B	PL B567 273	A. Datta, P.J. O'Donnell		REFID=49471
PAGE	99	PR D59 034016	P.R. Page, E.S. Swanson, A.P. Szczepaniak		REFID=46617
CLEGG	90	ZPHY C45 677	A.B. Clegg, A. Donnachie	(LANC, MCHS)	REFID=41355
CASTRO	88	Preprint LAL-88-58	A. Castro *et al.*	(DM2 Collab.)	REFID=48606

NODE=M142

$f_2(1910)$

$I^G(J^{PC}) = 0^+(2^{++})$

OMITTED FROM SUMMARY TABLE

We list here two different peaks with close masses and widths seen in the mass distributions of $\omega\omega$ and $\eta\eta'$ final states. ALDE 91B argues that they are of different nature.

NODE=M142

$f_2(1910)$ MASS

NODE=M142205

NODE=M142MX

$f_2(1910)$ $\omega\omega$ MODE

NODE=M142M2
NODE=M142M2

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1915± 7 OUR AVERAGE	Error includes scale factor of 1.2.			
1934±20	ANISOVICH	00J	SPEC	
1897±11	BARBERIS	00F		450 $pp \to p_f \omega\omega p_s$
1920±10	BELADIDZE	92B	VES	36 $\pi^- p \to \omega\omega n$
1924±14	ALDE	90	GAM2	38 $\pi^- p \to \omega\omega n$

$f_2(1910)$ $\eta\eta'$ MODE

NODE=M142M3
NODE=M142M3

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1934±16	[1] 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 $\pi^- p \to \eta\eta' n$

[1] Also compatible with $J^{PC}=1^{-+}$.

NODE=M142M3;LINKAGE=KS

$f_2(1910)$ WIDTH

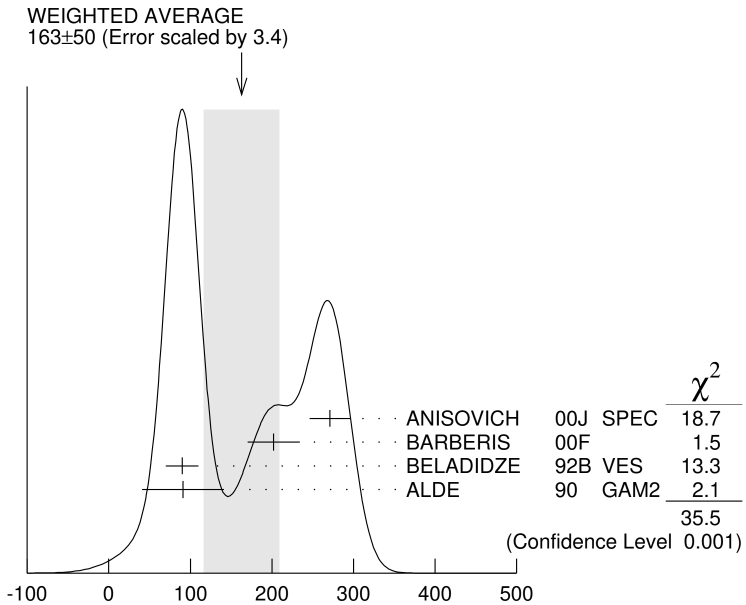
NODE=M142210

NODE=M142WX

$f_2(1910)$ $\omega\omega$ MODE

NODE=M142W2
NODE=M142W2

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
163±50 OUR AVERAGE	Error includes scale factor of 3.4. See the ideogram below.			
271±25	ANISOVICH	00J	SPEC	
202±32	BARBERIS	00F		450 $pp \to p_f \omega\omega p_s$
90±20	BELADIDZE	92B	VES	36 $\pi^- p \to \omega\omega n$
91±50	ALDE	90	GAM2	38 $\pi^- p \to \omega\omega n$



$f_2(1910)$ $\omega\omega$ MODE WIDTH(MeV)

$f_2(1910)$ $\eta\eta'$ MODE

NODE=M142W3
NODE=M142W3

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
141±41	[2] BARBERIS	00A		450 $pp \to p_f \eta\eta' p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
90±35	ALDE	91B	GAM2	38 $\pi^- p \to \eta\eta' n$

[2] Also compatible with $J^{PC}=1^{-+}$.

NODE=M142W3;LINKAGE=KS

$f_2(1910)$ DECAY MODES

NODE=M142215;NODE=M142

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\pi^0\pi^0$		DESIG=6
Γ_2	$K^0_S K^0_S$		DESIG=8
Γ_3	$\eta\eta$	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;OUR EST;→ NOT CHECKED ←
Γ_6	$\eta'\eta'$		DESIG=9
Γ_7	$\rho\rho$	seen	DESIG=10;OUR EST;→ NOT CHECKED ←

$f_2(1910)$ BRANCHING RATIOS

NODE=M142225

$\Gamma(\pi^0\pi^0)/\Gamma(\eta\eta')$ Γ_1/Γ_5

NODE=M142R4
NODE=M142R4

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.1	ALDE	89	GAM2	38$\pi^- p \to \eta\eta' n$

$\Gamma(\eta\eta)/\Gamma(\eta\eta')$ Γ_3/Γ_5

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 $\pi^- p \to \eta\eta' n$

$\Gamma(K^0_S K^0_S)/\Gamma(\eta\eta')$ Γ_2/Γ_5

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$\pi p \to K^0_S K^0_S n$

$\Gamma(\eta'\eta')/\Gamma_{total}$ Γ_6/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_7/Γ_4

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 $pp \to p_f \omega\omega p_s$

$\Gamma(\omega\omega)/\Gamma(\eta\eta')$ Γ_4/Γ_5

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 $pp \to p_f \omega\omega p_s$

f_2(1910) REFERENCES

NODE=M142

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
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	92	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	88E	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.			

OTHER RELATED PAPERS

LEE	94	PL B323 227	J.H. Lee *et al.*	(BNL, IND, KYUN, MASD+)	REFID=44092

NODE=M135

$f_2(1950)$

$I^G(J^{PC}) = 0^+(2^{++})$

f_2(1950) MASS

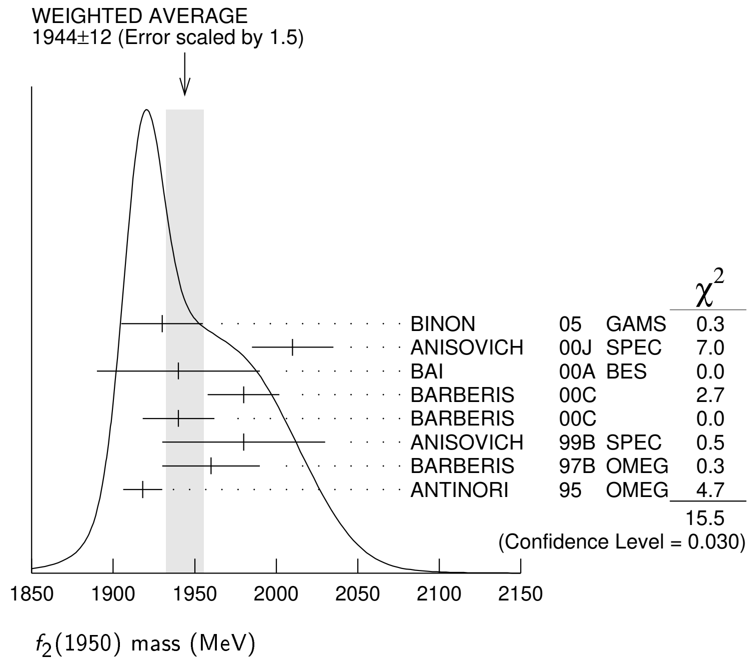
NODE=M135205

NODE=M135M

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
1944±12 OUR NEW AVERAGE Error includes scale factor of 1.5. See the ideogram below. [1945 ± 13 MeV OUR 2005 AVERAGE Scale factor = 1.6]					
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 $pp \to pp2\pi 2\pi^0$
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. • • •					
$1980\pm\ 2\pm14$	ABE	04	BELL		10.6 $e^+e^- \to e^+e^- K^+K^-$
1867 ± 46	[4] AMSLER	02	CBAR		0.9 $\overline{p}p \to \pi^0\eta\eta,\ \pi^0\pi^0\pi^0$
~ 1996	HASAN	94	RVUE		$\overline{p}p \to \pi\pi$
~ 1990	[5] OAKDEN	94	RVUE		0.36–1.55 $\overline{p}p \to \pi\pi$
1950 ± 15	[6] ASTON	91	LASS	0	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] T-matrix pole. NODE=M135M;LINKAGE=TT
[5] 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
[6] Cannot determine spin to be 2. NODE=M135M;LINKAGE=A



$f_2(1950)$ WIDTH

NODE=M135210

NODE=M135W

VALUE (MeV)	*DOCUMENT ID*	*TECN*	*CHG*	*COMMENT*
472± 18 OUR NEW AVERAGE	[475 ± 19 MeV OUR 2005 AVERAGE]			
450± 50	[7] 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	[8] BARBERIS 00C			450 $pp \to pp4\pi$
485± 55	[9] BARBERIS 00C			450 $pp \to pp4\pi$
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. • • •				
297± 12±6	ABE 04	BELL		10.6 $e^+e^- \to e^+e^-K^+K^-$
385± 58	[10] AMSLER 02	CBAR		0.9 $\overline{p}p \to \pi^0\eta\eta, \pi^0\pi^0\pi^0$
~ 134	HASAN 94	RVUE		$\overline{p}p \to \pi\pi$
~ 100	[11] OAKDEN 94	RVUE		0.36–1.55 $\overline{p}p \to \pi\pi$
250± 50	[12] ASTON 91	LASS	0	11 $K^-p \to \Lambda K\overline{K}\pi\pi$

OCCUR=2

[7] First solution, PWA is ambiguous. NODE=M135W;LINKAGE=BI

[8] Decaying into $\pi^+\pi^-2\pi^0$. NODE=M135W;LINKAGE=A4

[9] Decaying into $2(\pi^+\pi^-)$. NODE=M135W;LINKAGE=B4

[10] T-matrix pole. NODE=M135W;LINKAGE=TT

[11] 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

[12] 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	$\pi^+\pi^-$	seen	DESIG=2;OUR EST;→ NOT CHECKED ←
Γ_3	4π	seen	DESIG=7;OUR EST;→ NOT CHECKED ←
Γ_4	$\pi^+\pi^-\pi^+\pi^-$		DESIG=3
Γ_5	$a_2(1320)\pi$		DESIG=4
Γ_6	$f_2(1270)\pi\pi$		DESIG=5
Γ_7	$\eta\eta$	seen	DESIG=6;OUR EST;→ NOT CHECKED ←
Γ_8	$K\overline{K}$	seen	DESIG=8;OUR EST;→ NOT CHECKED ←
Γ_9	$\gamma\gamma$	seen	DESIG=9;OUR EST;→ NOT CHECKED ←

$f_2(1950)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(total)$

NODE=M135225

$\Gamma(K\overline{K}) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_8\Gamma_9/\Gamma$

NODE=M135G1
NODE=M135G1

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$122 \pm 4 \pm 26$	[13] ABE	04	BELL	10.6 $e^+e^- \rightarrow e^+e^-K^+K^-$

[13] Assuming spin 2.

NODE=M135G1;LINKAGE=AB

$f_2(1950)$ BRANCHING RATIOS

NODE=M135220

$\Gamma(K^*(892)\overline{K}^*(892))/\Gamma_{total}$ — Γ_1/Γ

NODE=M135R1
NODE=M135R1

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
seen	ASTON	91	LASS	0	11 $K^-p \rightarrow \Lambda K\overline{K}\pi\pi$

$\Gamma(a_2(1320)\pi)/\Gamma_{total}$ — Γ_5/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 $pp \rightarrow p_f\eta\pi^+\pi^-p_s$
not seen	BARBERIS	00C		450 $pp \rightarrow p_f 4\pi p_s$
possibly seen	BARBERIS	97B	OMEG	450 $pp \rightarrow pp2(\pi^+\pi^-)$

$\Gamma(\eta\eta)/\Gamma(4\pi)$ — Γ_7/Γ_3

NODE=M135R5
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 $pp \rightarrow p_f\eta\eta p_s$

$\Gamma(\eta\eta)/\Gamma(\pi^+\pi^-)$ — Γ_7/Γ_2

NODE=M135R6
NODE=M135R6

VALUE	DOCUMENT ID		TECN	COMMENT
0.14 ± 0.05	AMSLER	02	CBAR	0.9 $\overline{p}p \rightarrow \pi^0\eta\eta, \pi^0\pi^0\pi^0$

$f_2(1950)$ REFERENCES

NODE=M135

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
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
ASTON	91	NPBPS B21 5	D. Aston *et al.*	(LASS Collab.)	REFID=41746

OTHER RELATED PAPERS

LONGACRE	04	PR D70 094041	R.S. Longacre, S.J. Lindenbaum		REFID=50341
ALBRECHT	88N	PL B212 528	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=41576
ALBRECHT	87Q	PL B198 255	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=41575
ARMSTRONG	87C	ZPHY C34 33	T.A. Armstrong *et al.*	(CERN, BIRM, BARI+)	REFID=41577

NODE=M167

$\rho_3(1990)$

$I^G(J^{PC}) = 1^+(3^{--})$

OMITTED FROM SUMMARY TABLE

$\rho_3(1990)$ MASS

NODE=M167205

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		

[1] From the combined analysis of ANISOVICH 00J, ANISOVICH 01D, ANISOVICH 01E, and ANISOVICH 02. NODE=M167M;LINKAGE=AY

$\rho_3(1990)$ WIDTH

NODE=M167210

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 $p\overline{p} \to \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$
~ 267	HASAN	94		

[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

$f_2(2010)$

$I^G(J^{PC}) = 0^+(2^{++})$

See also the mini-review under non-$q\overline{q}$ candidates. (See the index for the page number.) NODE=M106

$f_2(2010)$ MASS

NODE=M106205

NODE=M106M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
2011^{+62}_{-76}	[1] ETKIN	88	MPS	22 $\pi^- p \to \phi\phi n$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1980 ± 20	[2] BOLONKIN	88	SPEC	40 $\pi^- p \to K^0_S K^0_S n$
2050^{+90}_{-50}	ETKIN	85	MPS	22 $\pi^- p \to 2\phi n$
2120^{+20}_{-120}	LINDENBAUM	84	RVUE	
2160 ± 50	ETKIN	82	MPS	22 $\pi^- p \to 2\phi n$

[1] Includes data of ETKIN 85. The percentage of the resonance going into $\phi\phi$ 2^{++} S_2, D_2, and D_0 is 98^{+1}_{-3}, 0^{+1}_{-0}, and 2^{+2}_{-1}, respectively. NODE=M106M;LINKAGE=C

[2] Statistically very weak, only 1.4 s.d. NODE=M106M;LINKAGE=E

$f_2(2010)$ WIDTH

NODE=M106210

NODE=M106W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
202^{+67}_{-62}	[3] ETKIN	88	MPS	22 $\pi^- p \to \phi\phi n$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
145 ± 50	[4] BOLONKIN	88	SPEC	40 $\pi^- p \to K^0_S K^0_S n$
200^{+160}_{-50}	ETKIN	85	MPS	22 $\pi^- p \to 2\phi n$
300^{+150}_{-50}	LINDENBAUM	84	RVUE	
310 ± 70	ETKIN	82	MPS	22 $\pi^- p \to 2\phi n$

[3] Includes data of ETKIN 85. NODE=M106W;LINKAGE=C
[4] Statistically very weak, only 1.4 s.d. NODE=M106W;LINKAGE=E

f_2(2010) DECAY MODES

NODE=M106215;NODE=M106

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\phi\phi$	seen	DESIG=1;OUR EST;→ NOT CHECKED ←

f_2(2010) REFERENCES

NODE=M106

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	83	Brighton Conf. 351	S.J. Lindenbaum	(BNL, CUNY)	REFID=21867

OTHER RELATED PAPERS

LONGACRE	04	PR D70 094041	R.S. Longacre, S.J. Lindenbaum		REFID=50341
ANISOVICH	99D	PL B452 180	A.V. Anisovich *et al.*		REFID=46901
Also	99F	NP A651 253	A.V. Anisovich *et al.*		REFID=46926
ANISOVICH	99F	NP A651 253	A.V. Anisovich *et al.*		REFID=46926
LANDBERG	96	PR D53 2839	C. Landberg *et al.*	(BNL, CUNY, RPI)	REFID=44740
GREEN	86	PRL 56 1639	D.R. Green *et al.*	(FNAL, ARIZ, FSU+)	REFID=21872
BOOTH	84	NP B242 51	P.S.L. Booth *et al.*	(LIVP, GLAS, CERN)	REFID=21868
EISENHAND...	75	NP B96 109	E. Eisenhandler *et al.*	(LOQM, LIVP, DARE+)	REFID=21821

NODE=M156

$f_0(2020)$

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

OMITTED FROM SUMMARY TABLE

Needs confirmation. NODE=M156

f_0(2020) MASS

NODE=M156205

NODE=M156M

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
1992±16	[1,2] BARBERIS	00C		450 $pp \to p_f 4\pi p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2040±38	ANISOVICH	00J	SPEC	
2010±60	ALDE	98	GAM4	100 $\pi^- p \to \pi^0\pi^0 n$
2020±35	BARBERIS	97B	OMEG	450 $pp \to pp2(\pi^+\pi^-)$

[1] Average between $\pi^+\pi^- 2\pi^0$ and $2(\pi^+\pi^-)$. NODE=M156M;LINKAGE=PC
[2] T-matrix pole. NODE=M156M;LINKAGE=PP

f_0(2020) WIDTH

NODE=M156210

NODE=M156W

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
442± 60	[3,4] BARBERIS	00C		450 $pp \to p_f 4\pi p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
405± 40	ANISOVICH	00J	SPEC	
240±100	ALDE	98	GAM4	100 $\pi^- p \to \pi^0\pi^0 n$
410± 50	BARBERIS	97B	OMEG	450 $pp \to pp2(\pi^+\pi^-)$

[3] Average between $\pi^+\pi^- 2\pi^0$ and $2(\pi^+\pi^-)$. NODE=M156W;LINKAGE=PC
[4] T-matrix pole. NODE=M156W;LINKAGE=PP

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 ←

$f_0(2020)$ BRANCHING RATIOS

NODE=M156220

$\Gamma(\rho\rho)/\Gamma(\omega\omega)$ — Γ_3/Γ_4

NODE=M156R1
NODE=M156R1

VALUE	DOCUMENT ID		COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
~ 3	BARBERIS	00F	450 $pp \to p_f \omega\omega p_s$

$f_0(2020)$ REFERENCES

NODE=M156

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	99	PAN 62 405 (Translated from YAF 62 446.)	D. Alde *et al.*	(GAMS Collab.)	REFID=46914
BARBERIS	97B	PL B413 217	D. Barberis *et al.*	(WA 102 Collab.)	REFID=45758

NODE=M017

$a_4(2040)$

$I^G(J^{PC}) = 1^-(4^{++})$

$a_4(2040)$ MASS

NODE=M017205

NODE=M017M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
2001±10 OUR AVERAGE						
1985±10±13	145k	LU	05	E852		18 $\pi^- p \to \omega\pi^-\pi^0 p$
1996±25±43		CHUNG	02	E852		18.3 $\pi^- p \to 3\pi p$
$2000\pm40^{+60}_{-20}$		IVANOV	01	E852		18 $\pi^- p \to \eta'\pi^- p$
1944± 8±50		[1] AMELIN	99	VES		37 $\pi^- A \to \omega\pi^-\pi^0 A^*$
2005±25		ANISOVICH	99E	SPEC		
2010±20		[2] DONSKOV	96	GAM2	0	38 $\pi^- p \to \eta\pi^0 n$
2040±30		[3] CLELAND	82B	SPEC	±	50 $\pi p \to K^0_S K^\pm p$
2030±50		[4] CORDEN	78C	OMEG	0	15 $\pi^- p \to 3\pi n$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
2005^{+25}_{-45}		ANISOVICH	01F	SPEC		2.0 $\overline{p}p \to 3\pi^0, \pi^0\eta, \pi^0\eta'$
1903±10		[5] BALDI	78	SPEC	−	10 $\pi^- p \to pK^0_S K^-$

[1] May be a different state. NODE=M017M;LINKAGE=DM
[2] From a simultaneous fit to the G_+ and G_0 wave intensities. NODE=M017M;LINKAGE=A
[3] From an amplitude analysis. NODE=M017M;LINKAGE=C
[4] $J^P = 4^+$ is favored, though $J^P = 2^+$ cannot be excluded. NODE=M017M;LINKAGE=M
[5] From a fit to the Y^0_8 moment. Limited by phase space. NODE=M017M;LINKAGE=Y

$a_4(2040)$ WIDTH

NODE=M017210

NODE=M017W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
313± 31 OUR AVERAGE						
231± 30±46	145k	LU	05	E852		18 $\pi^- p \to \omega\pi^-\pi^0 p$
298± 81±85		CHUNG	02	E852		18.3 $\pi^- p \to 3\pi p$
$350\pm100^{+70}_{-50}$		IVANOV	01	E852		18 $\pi^- p \to \eta'\pi^- p$
324± 26±75		[6] AMELIN	99	VES		37 $\pi^- A \to \omega\pi^-\pi^0 A^*$
360± 80		ANISOVICH	99E	SPEC		
370± 80		[7] DONSKOV	96	GAM2	0	38 $\pi^- p \to \eta\pi^0 n$
380±150		[8] CLELAND	82B	SPEC	±	50 $\pi p \to K^0_S K^\pm p$
510±200		[9] CORDEN	78C	OMEG	0	15 $\pi^- p \to 3\pi n$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
180± 30		ANISOVICH	01F	SPEC		2.0 $\overline{p}p \to 3\pi^0, \pi^0\eta, \pi^0\eta'$
166± 43		[10] BALDI	78	SPEC	−	10 $\pi^- p \to pK^0_S K^-$

[6] May be a different state. NODE=M017W;LINKAGE=DM
[7] From a simultaneous fit to the G_+ and G_0 wave intensities. NODE=M017W;LINKAGE=A
[8] From an amplitude analysis. NODE=M017W;LINKAGE=C
[9] $J^P = 4^+$ is favored, though $J^P = 2^+$ cannot be excluded. NODE=M017W;LINKAGE=M
[10] From a fit to the Y^0_8 moment. Limited by phase space. NODE=M017W;LINKAGE=Y

$a_4(2040)$ 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 $\pm$0.2 $\pm$0.2	CHUNG	02	E852	$18.3\ \pi^- p \rightarrow 3\pi p$

$\Gamma(\eta\pi^0)/\Gamma_{total}$ — 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	E852	$18\ \pi^- p \rightarrow \omega\pi^-\pi^0 p$

$a_4(2040)$ REFERENCES

NODE=M017

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 Translated from YAF 62 487.	D.V. Amelin *et al.*	(VES Collab.)	REFID=46910
ANISOVICH	99E	PL B452 187	A.V. Anisovich *et al.*		REFID=46902
DONSKOV	96	PAN 59 982 Translated from YAF 59 1027.	S.V. Donskov *et al.*	(GAMS Collab.) IGJPC	REFID=45207
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

OTHER RELATED PAPERS

DELFOSSE	81	NP B183 349	A. Delfosse *et al.*	(GEVA, LAUS)	REFID=21277

NODE=M016

$f_4(2050)$

$I^G(J^{PC}) = 0^+(4^{++})$

f_4(2050) MASS

NODE=M016205

NODE=M016M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2025±10 OUR NEW AVERAGE		Error includes scale factor of 1.8. See the ideogram below. [2034 ± 11 MeV OUR 2005 AVERAGE Scale factor = 1.6]			
2005±10		[1] BINON	05	GAMS	33 $\pi^- p \rightarrow \eta\eta n$
1998±15		ALDE	98	GAM4	100 $\pi^- p \rightarrow \pi^0\pi^0 n$
1970±30		BELADIDZE	92B	VES	36 $\pi^- p \rightarrow \omega\omega n$
2060±20		ALDE	90	GAM2	38 $\pi^- p \rightarrow \omega\omega n$
2038±30		AUGUSTIN	87	DM2	$J/\psi \rightarrow \gamma\pi^+\pi^-$
2086±15		BALTRUSAIT...	87	MRK3	$J/\psi \rightarrow \gamma\pi^+\pi^-$
2000±60		ALDE	86D	GAM4	100 $\pi^- p \rightarrow n 2\eta$
2020±20	40k	[2] BINON	84B	GAM2	38 $\pi^- p \rightarrow n 2\pi^0$
2015±28		[3] CASON	82	STRC	8 $\pi^+ p \rightarrow \Delta^{++}\pi^0\pi^0$
2031^{+25}_{-36}		ETKIN	82B	MPS	23 $\pi^- p \rightarrow n 2K^0_S$
2020±30	700	APEL	75	NICE	40 $\pi^- p \rightarrow n 2\pi^0$
2050±25		BLUM	75	ASPK	18.4 $\pi^- p \rightarrow n K^+ K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2018± 6		ANISOVICH	00J	SPEC	2.0 $\overline{p}p \rightarrow \eta\pi^0\pi^0$, $\pi^0\pi^0$, $\eta\eta$, $\eta\eta'$, $\pi\pi$
~ 2000		[4] MARTIN	98	RVUE	$N\overline{N} \rightarrow \pi\pi$
~ 2010		[5] MARTIN	97	RVUE	$\overline{N}N \rightarrow \pi\pi$
~ 2040		[6] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \rightarrow \pi\pi$
~ 1990		[7] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \rightarrow \pi\pi$
1978± 5		[8] ALPER	80	CNTR	62 $\pi^- p \rightarrow K^+ K^- n$
2040±10		[8] ROZANSKA	80	SPRK	18 $\pi^- p \rightarrow p\overline{p}n$
1935±13		[8] CORDEN	79	OMEG	12–15 $\pi^- p \rightarrow n 2\pi$
1988± 7		EVANGELISTA	79B	OMEG	10 $\pi^- p \rightarrow K^+ K^- n$
1922±14		[9] ANTIPOV	77	CIBS	25 $\pi^- p \rightarrow p 3\pi$

OCCUR=2

[1] First solution, PWA is ambiguous. 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 $\pi^+\pi^- \rightarrow 2\pi^0$. NODE=M016M;LINKAGE=NN

[4] Energy-dependent analysis. NODE=M016M;LINKAGE=RB

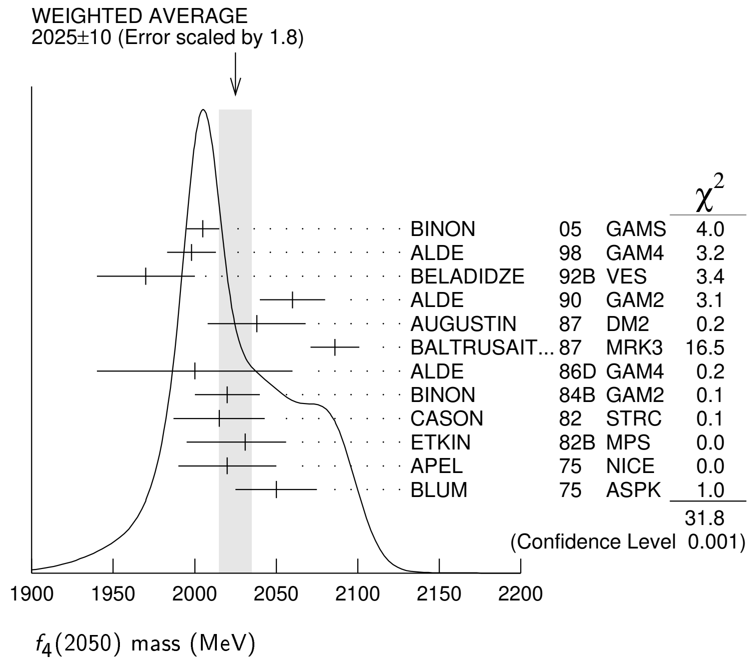
[5] Single energy analysis. NODE=M016M;LINKAGE=BR

[6] From solution A of amplitude analysis of data on $\overline{p}p \rightarrow \pi\pi$. 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

[7] From solution B of amplitude analysis of data on $\overline{p}p \rightarrow \pi\pi$. 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

[8] $I(J^P) = 0(4^+)$ from amplitude analysis assuming one-pion exchange. NODE=M016M;LINKAGE=M

[9] 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=M016210

NODE=M016W

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
225± 18 OUR NEW AVERAGE Error includes scale factor of 1.7. See the ideogram below. [222 ± 19 MeV OUR 2005 AVERAGE Scale factor = 1.8]					
340± 80		[10] BINON	05	GAMS	33 $\pi^- p \to \eta\eta n$
395± 40		ALDE	98	GAM4	100 $\pi^- p \to \pi^0\pi^0 n$
300± 50		BELADIDZE	92B	VES	36 $\pi^- p \to \omega\omega n$
170± 60		ALDE	90	GAM2	38 $\pi^- p \to \omega\omega n$
304± 60		AUGUSTIN	87	DM2	$J/\psi \to \gamma\pi^+\pi^-$
210± 63		BALTRUSAIT...	87	MRK3	$J/\psi \to \gamma\pi^+\pi^-$
400±100		ALDE	86D	GAM4	100 $\pi^- p \to n2\eta$
240± 40	40k	[11] BINON	84B	GAM2	38 $\pi^- p \to n2\pi^0$
190± 14		DENNEY	83	LASS	10 $\pi^+ n/\pi^+ p$
186^{+103}_{-58}		[12] CASON	82	STRC	8 $\pi^+ p \to \Delta^{++}\pi^0\pi^0$
305^{+36}_{-119}		ETKIN	82B	MPS	23 $\pi^- p \to n2K^0_S$
180± 60	700	APEL	75	NICE	40 $\pi^- p \to n2\pi^0$
225^{+120}_{-70}		BLUM	75	ASPK	18.4 $\pi^- p \to nK^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
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		[13] MARTIN	98	RVUE	$N\overline{N} \to \pi\pi$
~ 200		[14] MARTIN	97	RVUE	$\overline{N}N \to \pi\pi$
~ 60		[15] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \to \pi\pi$
~ 80		[16] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \to \pi\pi$
243± 16		[17] ALPER	80	CNTR	62 $\pi^- p \to K^+K^- n$
140± 15		[17] ROZANSKA	80	SPRK	18 $\pi^- p \to p\overline{p}n$
263± 57		[17] CORDEN	79	OMEG	12–15 $\pi^- p \to n2\pi$
100± 28		EVANGELISTA	79B	OMEG	10 $\pi^- p \to K^+K^- n$
107± 56		[18] ANTIPOV	77	CIBS	25 $\pi^- p \to p3\pi$

OCCUR=2

[10] First solution, PWA is ambiguous. NODE=M016W;LINKAGE=BI

[11] From a partial-wave analysis of the data. NODE=M016W;LINKAGE=N

[12] From an amplitude analysis of the reaction $\pi^+\pi^- \to 2\pi^0$. NODE=M016W;LINKAGE=NN

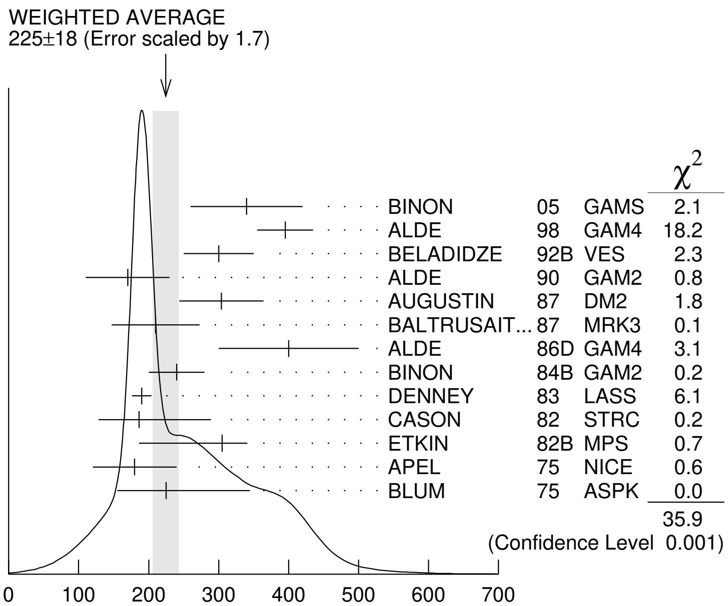
[13] Energy-dependent analysis. NODE=M016W;LINKAGE=RB

[14] Single energy analysis. NODE=M016W;LINKAGE=BR

[15] 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

[16] 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

[17] $I(J^P) = 0(4^+)$ from amplitude analysis assuming one-pion exchange. NODE=M016W;LINKAGE=M
[18] Width errors enlarged by us to $4\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M016W;LINKAGE=T



$f_4(2050)$ WIDTH

$f_4(2050)$ DECAY MODES

NODE=M016215;NODE=M016

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\omega\omega$	not seen	DESIG=6;OUR EST;→ NOT CHECKED ←
Γ_2	$\pi\pi$	(17.0 ± 1.5) %	DESIG=1
Γ_3	$K\overline{K}$	$(6.8^{+3.4}_{-1.8})\times10^{-3}$	DESIG=2
Γ_4	$\eta\eta$	$(2.1\pm0.8)\times10^{-3}$	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;OUR EST;→ NOT CHECKED ←

$f_4(2050)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M016220

$\Gamma(K\overline{K}) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_3\Gamma_6/\Gamma$

NODE=M016G2
NODE=M016G2

VALUE (keV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.29	95	ALTHOFF	85B	TASS	$\gamma\gamma \to K\overline{K}\pi$

$\Gamma(\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_2\Gamma_6/\Gamma$

NODE=M016G3
NODE=M016G3

VALUE (keV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<1.1	95	13 ± 4	OEST	90	JADE	$e^+e^- \to e^+e^-\pi^0\pi^0$

$f_4(2050)$ BRANCHING RATIOS

NODE=M016225

$\Gamma(\omega\omega)/\Gamma_{\text{total}}$ Γ_1/Γ

NODE=M016R7
NODE=M016R7

VALUE	DOCUMENT ID		COMMENT
• • • 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
NODE=M016R5

VALUE	DOCUMENT ID		TECN	COMMENT
1.5 ±0.3	ALDE	90	GAM2	38 $\pi^-p \to \omega\omega n$

$\Gamma(\pi\pi)/\Gamma_{total}$ Γ_2/Γ

NODE=M016R1
NODE=M016R1

VALUE	DOCUMENT ID		TECN	COMMENT
0.170±0.015 OUR AVERAGE				
0.18 ±0.03	[19] BINON	83C	GAM2	38 $\pi^- p \rightarrow n 4\gamma$
0.16 ±0.03	[19] CASON	82	STRC	8 $\pi^+ p \rightarrow \Delta^{++}\pi^0\pi^0$
0.17 ±0.02	[19] CORDEN	79	OMEG	12–15 $\pi^- p \rightarrow n 2\pi$

[19] Assuming one pion exchange.

NODE=M016R1;LINKAGE=A

$\Gamma(K\overline{K})/\Gamma(\pi\pi)$ Γ_3/Γ_2

NODE=M016R2
NODE=M016R2

VALUE	DOCUMENT ID		TECN	COMMENT
$0.04^{+0.02}_{-0.01}$	ETKIN	82B	MPS	23 $\pi^- p \rightarrow n 2K^0_S$

$\Gamma(\eta\eta)/\Gamma_{total}$ Γ_4/Γ

NODE=M016R3
NODE=M016R3

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
2.1±0.8	ALDE	86D	GAM4	100 $\pi^- p \rightarrow n 4\gamma$

$\Gamma(4\pi^0)/\Gamma_{total}$ Γ_5/Γ

NODE=M016R4
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
NODE=M016R6

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	AMELIN	00	VES	37 $\pi^- p \rightarrow \eta\pi^+\pi^- n$

$f_4(2050)$ REFERENCES

NODE=M016

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	99	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
BELADIDZE	92B	ZPHY C54 367	G.M. Beladidze *et al.*	(VES Collab.)	REFID=42172
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
EVANGELISTA	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

OTHER RELATED PAPERS

ANISOVICH	99D	PL B452 180	A.V. Anisovich *et al.*		REFID=46901
Also	99F	NP A651 253	A.V. Anisovich *et al.*		REFID=46926
ANISOVICH	99F	NP A651 253	A.V. Anisovich *et al.*		REFID=46926
PROKOSHKIN	97	SPD 42 117	Y.D. Prokoshkin *et al.*	(SERP)	REFID=45386
		Translated from DANS 353 323.			
CASON	83	PR D28 1586	N.M. Cason *et al.*	(NDAM, ANL)	REFID=20752
GOTTESMAN	80	PR D22 1503	S.R. Gottesman *et al.*	(SYRA, BRAN, BNL+)	REFID=21099
EISENHAND...	75	NP B96 109	E. Eisenhandler *et al.*	(LOQM, LIVP, DARE+)	REFID=21821
WAGNER	74	London Conf. 2 27	F. Wagner	(MPIM)	REFID=21767

NODE=M020

$\pi_2(2100)$ $\qquad I^G(J^{PC}) = 1^-(2^{-+})$

OMITTED FROM SUMMARY TABLE

Needs confirmation.

NODE=M020

$\pi_2(2100)$ MASS

NODE=M020205

NODE=M020M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
2090± 29 OUR AVERAGE				
2090± 30	[1] AMELIN	95B	VES	36 $\pi^- A \to \pi^+\pi^-\pi^- A$
2100±150	[2] DAUM	81B	CNTR	63,94 $\pi^- p \to 3\pi X$

[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=M020210

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 $\pi^- A \to \pi^+\pi^-\pi^- A$
651± 50	[4] DAUM	81B	CNTR	63,94 $\pi^- p \to 3\pi X$

[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

$\Gamma(\rho\pi)/\Gamma(3\pi)$ $\qquad \Gamma_2/\Gamma_1$

NODE=M020R1

NODE=M020R1

VALUE	DOCUMENT ID		TECN	COMMENT
0.19±0.05	[5] DAUM	81B	CNTR	63,94 $\pi^- p$

$\Gamma(f_2(1270)\pi)/\Gamma(3\pi)$ $\qquad \Gamma_3/\Gamma_1$

NODE=M020R2

NODE=M020R2

VALUE	DOCUMENT ID		TECN	COMMENT
0.36±0.09	[5] DAUM	81B	CNTR	63,94 $\pi^- p$

$\Gamma((\pi\pi)_S\pi)/\Gamma(3\pi)$ $\qquad \Gamma_4/\Gamma_1$

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 $\pi_2(2100) \to f_2(1270)\pi$

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=M168205

NODE=M168M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
2103± 7 OUR AVERAGE				
2105±15	ANISOVICH	00B	SPEC	
2102±13	ANISOVICH	00J	SPEC	2.0 $\overline{p}p \to \eta\pi^0\pi^0$, $\pi^0\pi^0$, $\eta\eta$, $\eta\eta'$, $\pi^+\pi^-$
2090±30	BAI	00A	BES	$J/\psi \to \gamma(\pi^+\pi^-\pi^+\pi^-)$
2105±10	ANISOVICH	99K	SPEC	0.6–1.94 $\overline{p}p \to \eta\eta$, $\eta\eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
~ 2104	BUGG	95		

$f_0(2100)$ WIDTH

NODE=M168210

NODE=M168W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
206± 15 OUR AVERAGE				
200± 25	ANISOVICH	00B	SPEC	
211± 29	ANISOVICH	00J	SPEC	2.0 $\overline{p}p \to \eta\pi^0\pi^0$, $\pi^0\pi^0$, $\eta\eta$, $\eta\eta'$, $\pi^+\pi^-$
330±100	BAI	00A	BES	$J/\psi \to \gamma(\pi^+\pi^-\pi^+\pi^-)$
200± 25	ANISOVICH	99K	SPEC	0.6–1.94 $\overline{p}p \to \eta\eta$, $\eta\eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
~ 203	BUGG	95		

$f_0(2100)$ REFERENCES

NODE=M168

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

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)	DOCUMENT ID
2156±11 OUR AVERAGE	Includes data from the 2 datablocks that follow this one.

$\eta\eta$ 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	[1] ABELE	99B	CBAR	
seen	[2] ANISOVICH	99B	SPEC	1.35–1.94 $\overline{p}p \to \eta\eta\pi^0$
2105±10	[2] ANISOVICH	99K	RVUE	0.6–1.94 $\overline{p}p \to \eta\eta$, $\eta\eta'$
2104±20	[3] ARMSTRONG	93C	E760	$\overline{p}p \to \pi^0\eta\eta \to 6\gamma$

[1] Spin not determined. NODE=M042M3;LINKAGE=K3

[2] $J^{PC} = 0^{++}$. NODE=M042M3;LINKAGE=AK

[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.					
2135±20±45	ADOMEIT	96	CBAR	0	1.94 $\overline{p}p \to \eta 3\pi^0$

$\overline{p}p \to \pi\pi$

NODE=M042M1
NODE=M042M1

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
∼ 2226	HASAN	94	RVUE	$\overline{p}p \to \pi\pi$
∼ 2090	[4] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \to \pi\pi$
∼ 2120	[5] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \to \pi\pi$
∼ 2170	[6] MARTIN	80B	RVUE	
∼ 2150	[6] MARTIN	80C	RVUE	
∼ 2150	[7] DULUDE	78B	OSPK	1–2 $\overline{p}p \to \pi^0\pi^0$

OCCUR=2

[4] 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

[5] From solution B of amplitude analysis of data on $\overline{p}p \to \pi\pi$. NODE=M042M1;LINKAGE=BB

[6] $I(J^P) = 0(2^+)$ from simultaneous analysis of $p\overline{p} \to \pi^-\pi^+$ and $\pi^0\pi^0$. NODE=M042M1;LINKAGE=P

[7] $I^G(J^P) = 0^+(2^+)$ 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}	[8] EVANGELISTA	97	SPEC		0.6-2.4 $\overline{p}p \to K^0_S K^0_S$
∼ 2190	[8] CUTTS	78B	CNTR		0.97–3 $\overline{p}p \to \overline{N}N$
2155±15	[8,9] COUPLAND	77	CNTR	0	0.7–2.4 $\overline{p}p \to \overline{p}p$
2193± 2	[8,10] ALSPECTOR	73	CNTR		$\overline{p}p$ S channel

[8] Isospins 0 and 1 not separated. NODE=M042M2;LINKAGE=I

[9] From a fit to the total elastic cross section. NODE=M042M2;LINKAGE=E

[10] Referred to as T or T region by ALSPECTOR 73. NODE=M042M2;LINKAGE=M

$K\overline{K}$ MODE

NODE=M042M5
NODE=M042M5

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2150±20	ABLIKIM	04E	BES2	$J/\psi \to \omega K^+ K^-$
2130±35	BARBERIS	99	OMEG	450 $pp \to p_s p_f K^+ K^-$

$f_2(2150)$ WIDTH

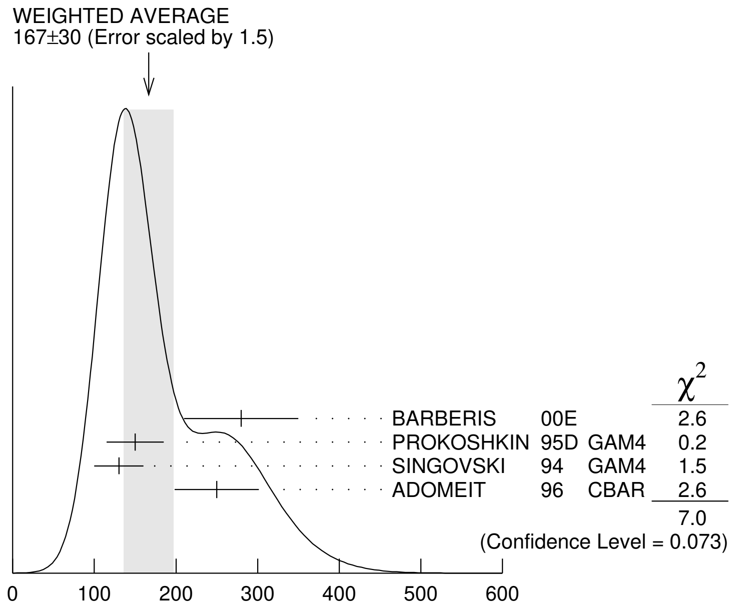
NODE=M042210

$f_2(2150)$ WIDTH, COMBINED MODES (MeV)

NODE=M042W
NODE=M042W

VALUE (MeV)	DOCUMENT ID

167±30 OUR AVERAGE Includes data from the 2 datablocks that follow this one. Error includes scale factor of 1.5. See the ideogram below.



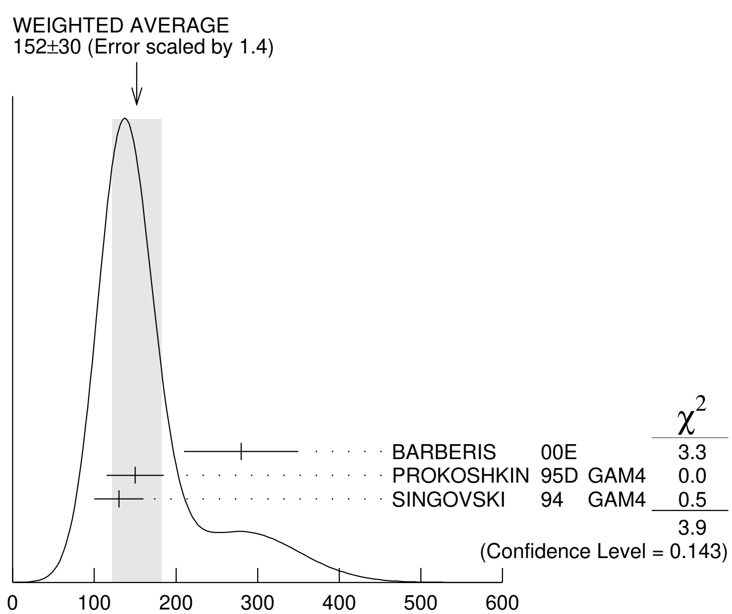
$f_2(2150)$ WIDTH, COMBINED MODES (MeV)

$\eta\eta$ MODE

NODE=M042W3
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 $pp \to p_f \eta\eta p_s$
150±35		PROKOSHKIN	95D	GAM4	300 $\pi^- N \to \pi^- N 2\eta$, 450 $pp \to pp2\eta$
130±30		SINGOVSKI	94	GAM4	450 $pp \to pp2\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
310±50	[11]	ABELE	99B	CBAR	
seen	[12]	ANISOVICH	99B	SPEC	1.35–1.94 $\overline{p}p \to \eta\eta\pi^0$
200±25	[13]	ANISOVICH	99K	RVUE	0.6–1.94 $\overline{p}p \to \eta\eta$, $\eta\eta'$
203±10	[14]	ARMSTRONG	93C	E760	$\overline{p}p \to \pi^0\eta\eta \to 6\gamma$

[11] Spin not determined. NODE=M042W3;LINKAGE=K3
[12] $J^{PC} = 0^{++}$ NODE=M042W3;LINKAGE=J1
[13] PWA gives $J^{PC} = 0^{++}$. NODE=M042W3;LINKAGE=AK
[14] No J^{PC} determination. NODE=M042W3;LINKAGE=A



$f_2(2150)$ WIDTH, $\eta\eta$ MODE (MeV)

$\eta\pi\pi$ MODE

NODE=M042W4
NODE=M042W4

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
The data in this block is included in the average printed for a previous datablock.					
250±25±45	ADOMEIT	96	CBAR	0	1.94 $\overline{p}p \rightarrow \eta 3\pi^0$

$\overline{p}p \rightarrow \pi\pi$

NODE=M042W1
NODE=M042W1

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
250 OUR ESTIMATE				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
∼ 226	HASAN	94	RVUE	$\overline{p}p \rightarrow \pi\pi$
∼ 70	[15] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \rightarrow \pi\pi$
∼ 250	[16] MARTIN	80B	RVUE	
∼ 250	[16] MARTIN	80C	RVUE	
∼ 250	[17] DULUDE	78B	OSPK	1–2 $\overline{p}p \rightarrow \pi^0\pi^0$

→ NOT CHECKED ←

[15] 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

[16] $I(J^P) = 0(2^+)$ from simultaneous analysis of $p\overline{p} \rightarrow \pi^-\pi^+$ and $\pi^0\pi^0$.

NODE=M042W1;LINKAGE=P

[17] $I^G(J^P) = 0^+(2^+)$ from partial-wave amplitude analysis.

NODE=M042W1;LINKAGE=L

S-CHANNEL $\overline{p}p$, $\overline{N}N$ or $\overline{K}K$

NODE=M042W2
NODE=M042W2

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
56^{+31}_{-16}	[18] EVANGELISTA	97	SPEC		0.6-2.4 $\overline{p}p \rightarrow K^0_S K^0_S$
135±75	[19,20] COUPLAND	77	CNTR	0	0.7–2.4 $\overline{p}p \rightarrow \overline{p}p$
98± 8	[20] ALSPECTOR	73	CNTR		$\overline{p}p$ S channel

[18] Isospin 0 and 2 not separated.

NODE=M042W2;LINKAGE=F

[19] From a fit to the total elastic cross section.

NODE=M042W2;LINKAGE=E

[20] Isospins 0 and 1 not separated.

NODE=M042W2;LINKAGE=I

$K\overline{K}$ MODE

NODE=M042W5
NODE=M042W5

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
150±30	ABLIKIM	04E	BES2	$J/\psi \rightarrow \omega K^+K^-$
270±50	BARBERIS	99	OMEG	450 $pp \rightarrow p_s p_f K^+K^-$

$f_2(2150)$ DECAY MODES

NODE=M042215;NODE=M042

	Mode	Fraction (Γ_i/Γ)
Γ_1	$\pi\pi$	
Γ_2	$\eta\eta$	seen
Γ_3	$K\overline{K}$	seen
Γ_4	$f_2(1270)\eta$	seen
Γ_5	$a_2(1320)\pi$	seen

DESIG=1
DESIG=2;OUR EST;→ NOT CHECKED ←
DESIG=3;OUR EST;→ NOT CHECKED ←
DESIG=4;OUR EST;→ NOT CHECKED ←
DESIG=5;OUR EST;→ NOT CHECKED ←

$f_2(2150)$ 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 $pp \rightarrow p_f \eta\eta p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.1	95	[21] PROKOSHKIN	95D	GAM4	300 $\pi^- N \rightarrow \pi^- N 2\eta$, 450 $pp \rightarrow pp2\eta$

[21] Using data from ARMSTRONG 89D.

NODE=M042R1;LINKAGE=A

$\Gamma(\pi\pi)/\Gamma(\eta\eta)$ — Γ_1/Γ_2

NODE=M042R2
NODE=M042R2

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.33	95	[22] PROKOSHKIN	95D	GAM4	300 $\pi^- N \rightarrow \pi^- N 2\eta$, 450 $pp \rightarrow pp2\eta$

[22] 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	[23] ADOMEIT	96	CBAR	1.94 $\overline{p}p \to \eta 3\pi^0$

[23] Using B($a_2(1320) \to \eta\pi$) = 0.145

NODE=M042R3;LINKAGE=A

f_2(2150) REFERENCES

NODE=M042

ABLIKIM	04E	PL B603 138	M. Ablikim *et al.*	(BES Collab.)	REFID=50174
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
ANISOVICH	99B	PL B449 154	A.V. Anisovich *et al.*		REFID=46886
ANISOVICH	99K	PL B468 309	A.V. Anisovich *et al.*		REFID=47472
BARBERIS	99	PL B453 305	D. Barberis *et al.*	(Omega Expt.)	REFID=46921
EVANGELISTA	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

OTHER RELATED PAPERS

EISENHAND...	75	NP B96 109	E. Eisenhandler *et al.*	(LOQM, LIVP, DARE+)	REFID=21821
FIELDS	71	PRL 27 1749	T. Fields *et al.*	(ANL, OXF)	REFID=20202
YOH	71	PRL 26 922	J.K. Yoh *et al.*	(CIT, BNL, ROCH)	REFID=21810

NODE=M032

$\rho(2150)$

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

OMITTED FROM SUMMARY TABLE

This entry was previously called $T_1(2190)$.

NODE=M032

ρ(2150) MASS

NODE=M032205

$e^+e^- \to \pi^+\pi^-, K^+K^-, 6\pi$

NODE=M032M3
NODE=M032M3

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
2149±17 OUR AVERAGE	Includes data from the datablock that follows this one.				
2153±37	BIAGINI	91	RVUE		$e^+e^- \to \pi^+\pi^-, K^+K^-$
2110±50	[2] CLEGG	90	RVUE	0	$e^+e^- \to 3(\pi^+\pi^-), 2(\pi^+\pi^-\pi^0)$

$\overline{p}p \to \pi\pi$

NODE=M032M1
NODE=M032M1

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
~ 2191	HASAN	94	RVUE	$\overline{p}p \to \pi\pi$
~ 1988	HASAN	94	RVUE	$\overline{p}p \to \pi\pi$
~ 2070	[1] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \to \pi\pi$
~ 2170	[3] MARTIN	80B	RVUE	
~ 2100	[3] MARTIN	80C	RVUE	

OCCUR=2

[1] See however KLOET 96 who fit $\pi^+\pi^-$ only and find waves only up to $J = 3$ to be important but not significantly resonant.

NODE=M032M1;LINKAGE=CC

S-CHANNEL $\overline{N}N$

NODE=M032M2
NODE=M032M2

VALUE (MeV)	DOCUMENT ID		TECN	CHG	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	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 $\pi^- p \to \omega\pi^0 n$

[2] Includes ATKINSON 85. NODE=M032M3;LINKAGE=A
[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

$e^+e^- \to \pi^+\pi^-, K^+K^-, 6\pi$

NODE=M032W3

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
363± 50 OUR AVERAGE	Includes data from the datablock that follows this one.				
389± 79	BIAGINI	91	RVUE		$e^+e^- \to \pi^+\pi^-, K^+K^-$
410±100	[10] CLEGG	90	RVUE	0	$e^+e^- \to 3(\pi^+\pi^-), 2(\pi^+\pi^-\pi^0)$

$\overline{p}p \to \pi\pi$

NODE=M032W1

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
~ 296	HASAN	94	RVUE	$\overline{p}p \to \pi\pi$
~ 244	HASAN	94	RVUE	$\overline{p}p \to \pi\pi$ OCCUR=2
~ 40	[9] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \to \pi\pi$
~ 250	[11] MARTIN	80B	RVUE	
~ 200	[11] MARTIN	80C	RVUE	

[9] 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

S-CHANNEL $\overline{N}N$

NODE=M032W2

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
230±50	[12] ANISOVICH	02	SPEC		0.6–1.9 $p\overline{p} \to \omega\pi^0, \omega\eta\pi^0, \pi^+\pi^-$
135±75	[13,14] COUPLAND	77	CNTR	0	0.7–2.4 $\overline{p}p \to \overline{p}p$
98± 8	[14] ALSPECTOR	73	CNTR		$\overline{p}p$ S channel
~ 85	[15] ABRAMS	70	CNTR		S channel $\overline{p}N$

$\pi^- p \to \omega\pi^0 n$

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 $\pi^- p \to \omega\pi^0 n$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
~ 300	ALDE	92C	GAM4	100 $\pi^- p \to \omega\pi^0 n$

[10] Includes ATKINSON 85. NODE=M032W3;LINKAGE=A
[11] $I(J^P) = 1(1^-)$ from simultaneous analysis of $p\overline{p} \to \pi^-\pi^+$ 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

$\rho(2150)$ REFERENCES

NODE=M032

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

OTHER RELATED PAPERS

AMELIN	00	NP A668 83	D. Amelin *et al.*	(VES Collab.)	REFID=47432
EISENHAND...	75	NP B96 109	E. Eisenhandler *et al.*	(LOQM, LIVP, DARE+)	REFID=21821
BRICMAN	69	PL 29B 451	C. Bricman *et al.*	(CERN, CAEN, SACL)	REFID=21806
ABRAMS	67C	PRL 18 1209	R.J. Abrams *et al.*	(BNL)	REFID=21804

NODE=M112

$f_0(2200)$

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

OMITTED FROM SUMMARY TABLE

Seen at DCI in the $K^0_S K^0_S$ system. Not seen in Υ radiative decays (BARU 89). Needs confirmation.

NODE=M112

$f_0(2200)$ MASS

NODE=M112205

NODE=M112M

VALUE (MeV)	*DOCUMENT ID*	*TECN*	*CHG*	*COMMENT*
2198±16 OUR NEW AVERAGE	[2197 ± 17 MeV OUR 2005 AVERAGE]			
2210±50	[1] BINON 05	GAMS		33 $\pi^- p \to \eta\eta n$
2197±17	[2] AUGUSTIN 88	DM2	0	$J/\psi \to \gamma K^0_S K^0_S$
• • • 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=M112220

NODE=M112W

VALUE (MeV)	*DOCUMENT ID*	*TECN*	*CHG*	*COMMENT*
245±80 OUR NEW AVERAGE	Error includes scale factor of 1.7. [201 ± 50 MeV OUR 2005 AVERAGE]			
380±90	[3] BINON 05	GAMS		33 $\pi^- p \to \eta\eta n$
201±51	[4] AUGUSTIN 88	DM2	0	$J/\psi \to \gamma K^0_S K^0_S$
• • • 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

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

OTHER RELATED PAPERS

EISENHAND...	75	NP B96 109	E. Eisenhandler *et al.*	(LOQM, LIVP, DARE+)	REFID=21821

NODE=M082

$f_J(2220)$

$I^G(J^{PC}) = 0^+(2^{++} \text{ or } 4^{++})$

OMITTED FROM SUMMARY TABLE

Needs confirmation. NODE=M082

A REVIEW GOES HERE – Check our WWW List of Reviews NODE=M082

$f_J(2220)$ MASS

NODE=M082205

NODE=M082M

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT	
2231.1± 3.5 OUR AVERAGE					
2235 ± 4 ± 6	74	BAI 96B	BES	$e^+e^- \to J/\psi \to \gamma\pi^+\pi^-$	
2230 $^{+6}_{-7}$ ±16	46	BAI 96B	BES	$e^+e^- \to J/\psi \to \gamma K^+K^-$	OCCUR=2
2232 $^{+8}_{-7}$ ±15	23	BAI 96B	BES	$e^+e^- \to J/\psi \to \gamma K^0_S K^0_S$	OCCUR=3
2235 ± 4 ± 5	32	BAI 96B	BES	$e^+e^- \to J/\psi \to \gamma p\overline{p}$	OCCUR=4
2209 $^{+17}_{-15}$ ±10		ASTON 88F	LASS	11 $K^-p \to K^+K^-\Lambda$	
2230 ±20		BOLONKIN 88	SPEC	40 $\pi^-p \to K^0_S K^0_S n$	
2220 ±10	41	[1] ALDE 86B	GA24	38–100 $\pi p \to n\eta\eta'$	
2230 ± 6 ±14	93	BALTRUSAIT...86D	MRK3	$e^+e^- \to \gamma K^+K^-$	
2232 ± 7 ± 7	23	BALTRUSAIT...86D	MRK3	$e^+e^- \to \gamma K^0_S K^0_S$	OCCUR=2
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2246 ±36		BAI 98H	BES	$J/\psi \to \gamma\pi^0\pi^0$	

[1] ALDE 86B uses data from both the GAMS-2000 and GAMS-4000 detectors. NODE=M082M;LINKAGE=A

$f_J(2220)$ WIDTH

NODE=M082210

NODE=M082W

VALUE (MeV)	CL%	EVTS	DOCUMENT ID	TECN	COMMENT	
23 $^{+8}_{-7}$ OUR AVERAGE						
19 $^{+13}_{-11}$ ±12		74	BAI 96B	BES	$e^+e^- \to J/\psi \to \gamma\pi^+\pi^-$	
20 $^{+20}_{-15}$ ±17		46	BAI 96B	BES	$e^+e^- \to J/\psi \to \gamma K^+K^-$	OCCUR=2
20 $^{+25}_{-16}$ ±14		23	BAI 96B	BES	$e^+e^- \to J/\psi \to \gamma K^0_S K^0_S$	OCCUR=3
15 $^{+12}_{-9}$ ± 9		32	BAI 96B	BES	$e^+e^- \to J/\psi \to \gamma p\overline{p}$	OCCUR=4
60 $^{+107}_{-57}$			ASTON 88F	LASS	11 $K^-p \to K^+K^-\Lambda$	
80 ± 30			BOLONKIN 88	SPEC	40 $\pi^-p \to K^0_S K^0_S n$	
26 $^{+20}_{-16}$ ±17		93	BALTRUSAIT...86D	MRK3	$e^+e^- \to \gamma K^+K^-$	
18 $^{+23}_{-15}$ ±10		23	BALTRUSAIT...86D	MRK3	$e^+e^- \to \gamma K^0_S K^0_S$	OCCUR=2
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<80	90		ALDE 87C	GAM2	38 $\pi^-p \to \eta'\eta n$	

$f_J(2220)$ 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 ←

$f_J(2220)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M082220

$\Gamma(K\overline{K}) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_3\Gamma_5/\Gamma$

NODE=M082G1
NODE=M082G1

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
< 1.4	95	[2] ACCIARRI	01H	L3	$\gamma\gamma \to K^0_S K^0_S$, E^{ee}_{cm}= 91, 183–209 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 5.6	95	[2] GODANG	97	CLE2	$\gamma\gamma \to K^0_S K^0_S$
< 86	95	[2] ALBRECHT	90G	ARG	$\gamma\gamma \to K^+ K^-$
<1000	95	[3] ALTHOFF	85B	TASS	$\gamma\gamma$, $K\overline{K}\pi$

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

NODE=M082G3
NODE=M082G3

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<2.5	95	ALAM	98C	CLE2	$\gamma\gamma \to \pi^+\pi^-$

[2] Assuming $J^P = 2^+$.
NODE=M082G1;LINKAGE=D

[3] True for $J^P = 0^+$ and $J^P = 2^+$.
NODE=M082G1;LINKAGE=C

$f_J(2220)$ $\Gamma(i)\Gamma(p\overline{p})/\Gamma^2(\text{total})$

NODE=M082223

$\Gamma(p\overline{p}) \times \Gamma(\pi\pi)/\Gamma^2_{\text{total}}$ $\Gamma_4\Gamma_1/\Gamma^2$

NODE=M082GG1
NODE=M082GG1

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<18	95	[4] AMSLER	01	CBAR	1.4–1.5 $p\overline{p} \to \pi^0\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<(11–42)	99	[5] HASAN	96	SPEC	1.35–1.55 $p\overline{p} \to \pi^+\pi^-$

$\Gamma(p\overline{p}) \times \Gamma(\phi\phi)/\Gamma^2_{\text{total}}$ $\Gamma_4\Gamma_7/\Gamma^2$

NODE=M082GG2
NODE=M082GG2

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<6	95	[6] EVANGELISTA	98	SPEC	1.1-2.0 $p\overline{p} \to \phi\phi$

$\Gamma(p\overline{p}) \times \Gamma(\eta\eta)/\Gamma^2_{\text{total}}$ $\Gamma_4\Gamma_8/\Gamma^2$

NODE=M082GG3
NODE=M082GG3

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<4	95	[4] AMSLER	01	CBAR	1.4–1.5 $p\overline{p} \to \eta\eta$

[4] For $J^P = 2^+$ in the mass range 2222–2240 MeV and the total width between 10 and 20 MeV.
NODE=M082GG;LINKAGE=A

[5] For $J^P = 2^+$ and $J^P = 4^+$ in the mass range 2220–2245 MeV and the total width of 15 MeV.
NODE=M082GG;LINKAGE=B

[6] For $J^P = 2^+$, the mass of 2235 MeV and the total width of 15 MeV.
NODE=M082GG;LINKAGE=C

$f_J(2220)$ BRANCHING RATIOS

NODE=M082225

$\Gamma(p\overline{p})/\Gamma_{\text{total}}$ 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		WANG	05A	BELL	$B^+ \to \overline{p}pK^+$
<3.0	95	[8] EVANGELISTA	97	SPEC	1.96-2.40 $\overline{p}p \to K^0_S K^0_S$
<1.1	99.7	[7] BARNES	93	SPEC	1.3-1.57 $\overline{p}p \to K^0_S K^0_S$
<2.6	99.7	[7] BARDIN	87	CNTR	1.3-1.5 $\overline{p}p \to K^+K^-$
<3.6	99.7	[7] SCULLI	87	CNTR	1.29-1.55 $\overline{p}p \to K^+K^-$

[7] Assuming Γ = 30-35 MeV, $J^P = 2^+$ and B($f_J(2220) \to K\overline{K}$) = 100%.
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	$e^+e^- \to J/\psi \to \gamma 2\pi, K\overline{K}$

$\Gamma(p\overline{p})/\Gamma(K\overline{K})$ Γ_4/Γ_3

NODE=M082R3
NODE=M082R3

VALUE	DOCUMENT ID		TECN	COMMENT
0.17±0.09	BAI	96B	BES	$e^+e^- \to J/\psi \to \gamma p\overline{p}, K\overline{K}$

[8] Assuming Γ ~20 MeV, $J^P = 2^+$ and B($f_J(2220) \to K\overline{K}$) = 100%.
NODE=M082R1;LINKAGE=C

$f_J(2220)$ REFERENCES

NODE=M082

WANG	05A	PL B617 141	M.-Z. Wang *et al.*	(BELLE Collab.)	REFID=50651
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
EVANGELISTA	98	PR D57 5370	C. Evangelista *et al.*	(JETSET Collab.)	REFID=46365
EVANGELISTA	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, P. Birien, W.H. Breunlich		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 Translated from YAF 45 405.	D. Alde *et al.*		REFID=47474
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

CHUA	02	PL B544 139	C.-K. Chua, W.-S. Hou, S.U. Tsai		REFID=48836
MASEK	02	PR D65 072002	G. Masek *et al.*	(CLEO Collab.)	REFID=48846
LIU	00A	JPG 26 L59	L.C. Liu, W.H. Ma		REFID=47988
WANG	00A	PR D62 017503	Z. Wang		REFID=47995
ANISOVICH	99D	PL B452 180	A.V. Anisovich *et al.*		REFID=46901
Also	99F	NP A651 253	A.V. Anisovich *et al.*		REFID=46926
ANISOVICH	99F	NP A651 253	A.V. Anisovich *et al.*		REFID=46926
PROKOSHKIN	99	PAN 62 356 Translated from YAF 62 396.	Yu.D. Prokoshkin		REFID=46946
HUANG	96	PL B380 189	T. Huang *et al.*	(BHEP, BEIJ)	REFID=45007
BARDIN	87	PL B195 292	G. Bardin *et al.*	(SACL, FERR, CERN, PADO+)	REFID=40235
LEYAOUANC	85	ZPHY C28 309	A. Le Yaouanc *et al.*	(ORSAY, TOKY)	REFID=21863
GODFREY	84	PL 141B 439	S. Godfrey, R. Kokoski, N. Isgur	(TNTO)	REFID=21858
SHATZ	84	PL 138B 209	M.P. Shatz	(CIT)	REFID=21859
WILLEY	84	PRL 52 585	R.S. Willey	(PITT)	REFID=21860
EISENHAND...	75	NP B96 109	E. Eisenhandler *et al.*	(LOQM, LIVP, DARE+)	REFID=21821

NODE=M115

$\eta(2225)$

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

OMITTED FROM SUMMARY TABLE

Seen in $J/\psi \to \gamma\phi\phi$. Needs confirmation.

NODE=M115

$\eta(2225)$ MASS

NODE=M115205

NODE=M115M

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*	
2220±18 OUR AVERAGE					
2230±25±15	BAI	90B	MRK3	$J/\psi \to \gamma K^+ K^- K^+ K^-$	
2214±20±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=M115220

NODE=M115W

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
$\mathbf{150^{+300}_{-\ 60}\pm 60}$	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

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		$\overline{p}p \rightarrow \pi\pi$	
~ 2007	HASAN	94	RVUE		$\overline{p}p \rightarrow \pi\pi$	OCCUR=2
~ 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		$\overline{p}p \rightarrow \pi\pi$	
~ 287	HASAN	94	RVUE		$\overline{p}p \rightarrow \pi\pi$	OCCUR=2
~ 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 $p\overline{p} \to \pi^-\pi^+$ 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
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
NODE=M044W3

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$230 \pm 50 \pm 80$	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

OTHER RELATED PAPERS

MARTIN	79B	PL 86B 93	A.D. Martin, M.R. Pennington	(DURH)	REFID=21836
CARTER	78	NP B132 176	A.A Carter	(LOQM) JP	REFID=21732
CARTER	77B	PL 67B 122	A.A. Carter	(LOQM) JP	REFID=21828
CARTER	77C	NP B127 202	A.A. Carter *et al.*	(LOQM, DARE, RHEL)	REFID=21829
ZEMANY	76	NP B103 537	P.D. Zemany *et al.*	(MSU)	REFID=21826
EISENHAND...	75	NP B96 109	E. Eisenhandler *et al.*	(LOQM, LIVP, DARE+)	REFID=21821
BERTANZA	74	NC 23A 209	L. Bertanza *et al.*	(PISA, PADO, TORI)	REFID=21818
BETTINI	73	NC 15A 563	A. Bettini *et al.*	(PADO, LBL, PISA+)	REFID=21815
DONNACHIE	73	LNC 7 285	A. Donnachie, P.R. Thomas	(MCHS)	REFID=21880
NICHOLSON	73	PR D7 2572	H. Nicholson *et al.*	(CIT, ROCH, BNL)	REFID=21817
FIELDS	71	PRL 27 1749	T. Fields *et al.*	(ANL, OXF)	REFID=20202
YOH	71	PRL 26 922	J.K. Yoh *et al.*	(CIT, BNL, ROCH)	REFID=21810
ABRAMS	67C	PRL 18 1209	R.J. Abrams *et al.*	(BNL)	REFID=21804

NODE=M107

$f_2(2300)$ $I^G(J^{PC}) = 0^+(2^{++})$

See also the mini-review under non-$q\overline{q}$ candidates. (See the index for the page number.) NODE=M107

$f_2(2300)$ MASS

NODE=M107205

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
2297±28	[1] ETKIN	88	MPS	22 $\pi^- p \rightarrow \phi\phi n$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2327± 9±6	ABE	04	BELL	10.6 $e^+e^- \rightarrow e^+e^-K^+K^-$
2240±15	ANISOVICH	00J	SPEC	$p\overline{p} \rightarrow \pi^0\pi^0\eta$
2231±10	BOOTH	86	OMEG	85 π^- Be $\rightarrow$ 2ϕBe
2220^{+90}_{-20}	LINDENBAUM	84	RVUE	
2320±40	ETKIN	82	MPS	22 $\pi^- p \rightarrow 2\phi n$

NODE=M107M; OCCUR=2

[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=M107210

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
149±41	[2] ETKIN	88	MPS	22 $\pi^- p \rightarrow \phi\phi n$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
275±36±20	ABE	04	BELL	10.6 $e^+e^- \rightarrow e^+e^-K^+K^-$
241±30	ANISOVICH	00J	SPEC	$p\overline{p} \rightarrow \pi^0\pi^0\eta$
133±50	BOOTH	86	OMEG	85 π^- Be $\rightarrow$ 2ϕBe
200±50	LINDENBAUM	84	RVUE	
220±70	ETKIN	82	MPS	22 $\pi^- p \rightarrow 2\phi n$

NODE=M107W; OCCUR=2

[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 ←

$f_2(2300)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M107225

$\Gamma(K\overline{K}) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_2\Gamma_3/\Gamma$

NODE=M107G1
NODE=M107G1

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
44±6±12	[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

ABE	04	EPJ C32 323	K. Abe *et al.*	(BELLE Collab.)	REFID=49650
ANISOVICH	00J	PL B491 47	A.V. Anisovich *et al.*		REFID=47950
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

OTHER RELATED PAPERS

LONGACRE	04	PR D70 094041	R.S. Longacre, S.J. Lindenbaum		REFID=50341
AMELIN	00	NP A668 83	D. Amelin *et al.*	(VES Collab.)	REFID=47432
BOLONKIN	00	JETPL 72 166	B.V. Bolonkin *et al.*		REFID=47968
		Translated from ZETFP 72 240.			
BARBERIS	98	PL B432 436	D. Barberis *et al.*	(Omega Expt.)	REFID=46344
LANDBERG	96	PR D53 2839	C. Landberg *et al.*	(BNL, CUNY, RPI)	REFID=44740
GREEN	86	PRL 56 1639	D.R. Green *et al.*	(FNAL, ARIZ, FSU+)	REFID=21872
BOOTH	84	NP B242 51	P.S.L. Booth *et al.*	(LIVP, GLAS, CERN)	REFID=21868
EISENHAND...	75	NP B96 109	E. Eisenhandler *et al.*	(LOQM, LIVP, DARE+)	REFID=21821

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 $\rho(2150)$, $f_2(2150)$, $\rho_3(2250)$, $\rho_5(2350)$.

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	ANISOVICH	00J	SPEC	
∼ 2380	[4] CUTTS	78B	CNTR	0.97–3 $\overline{p}p \rightarrow \overline{N}N$
2345±15	[4,5] COUPLAND	77	CNTR	0.7–2.4 $\overline{p}p \rightarrow \overline{p}p$
2359± 2	[4,6] ALSPECTOR	73	CNTR	$\overline{p}p$ S channel
2375±10	ABRAMS	70	CNTR	S channel $\overline{N}N$

[4] Isospins 0 and 1 not separated.
NODE=M041M2;LINKAGE=I

[5] From a fit to the total elastic cross section.
NODE=M041M2;LINKAGE=E

[6] Referred to as U or U region by ALSPECTOR 73.
NODE=M041M2;LINKAGE=M

$\pi^- p \rightarrow \eta\pi\pi n$

NODE=M041M3
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
NODE=M041M4

VALUE (MeV)	DOCUMENT ID		COMMENT
2332±15	BARBERIS	00F	450 $pp \rightarrow p_f \omega\omega p_s$

$f_4(2300)$ WIDTH

NODE=M041210

$\overline{p}p \rightarrow \pi\pi$ or $\overline{K}K$

NODE=M041W1
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	[7] MARTIN	80C	RVUE	
∼ 150	[8] CARTER	78B	CNTR	0.7–2.4 $\overline{p}p \rightarrow K^- K^+$
∼ 210	[9] CARTER	77	CNTR	0.7–2.4 $\overline{p}p \rightarrow \pi\pi$

[7] $I(J^P) = 0(4^+)$ from simultaneous analysis of $p\overline{p} \rightarrow \pi^-\pi^+$ and $\pi^0\pi^0$.
NODE=M041W1;LINKAGE=P

[8] $I(J^P) = 0(4^+)$ from Barrelet-zero analysis.
NODE=M041W1;LINKAGE=K

[9] $I(J^P) = 0(4^+)$ 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		ANISOVICH	00J	SPEC	
135^{+150}_{-65}	[10,11]	COUPLAND	77	CNTR	0.7–2.4 $\overline{p}p \rightarrow \overline{p}p$
165^{+18}_{-8}	[11]	ALSPECTOR	73	CNTR	$\overline{p}p$ S channel
~ 190		ABRAMS	70	CNTR	S channel $\overline{N}N$

[10] From a fit to the total elastic cross section. NODE=M041W2;LINKAGE=E
[11] 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. • • •				
$235 \pm 50 \pm 40$	AMELIN	00	VES	37 $\pi^- p \rightarrow \eta\pi^+\pi^- n$

pp CENTRAL PRODUCTION NODE=M041W4

VALUE (MeV)	DOCUMENT ID		COMMENT
260 ± 57	BARBERIS	00F	450 $pp \rightarrow p_f \omega\omega p_s$

$f_4(2300)$ 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
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

OTHER RELATED PAPERS

ANISOVICH	99D	PL B452 180	A.V. Anisovich *et al.*		REFID=46901
Also	99F	NP A651 253	A.V. Anisovich *et al.*		REFID=46926
ANISOVICH	99F	NP A651 253	A.V. Anisovich *et al.*		REFID=46926
EISENHAND...	75	NP B96 109	E. Eisenhandler *et al.*	(LOQM, LIVP, DARE+)	REFID=21821
FIELDS	71	PRL 27 1749	T. Fields *et al.*	(ANL, OXF)	REFID=20202
YOH	71	PRL 26 922	J.K. Yoh *et al.*	(CIT, BNL, ROCH)	REFID=21810
BRICMAN	69	PL 29B 451	C. Bricman *et al.*	(CERN, CAEN, SACL)	REFID=21806

NODE=M108

$f_2(2340)$

$I^G(J^{PC}) = 0^+(2^{++})$

See also the mini-review under non-$q\overline{q}$ candidates. (See the index for the page number.)

NODE=M108

$f_2(2340)$ MASS

NODE=M108205

NODE=M108M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
2339±55	[1] ETKIN	88	MPS	22 $\pi^- p \rightarrow \phi\phi n$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2392±10	BOOTH	86	OMEG	85 π^- Be $\rightarrow$ 2ϕBe
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

$f_2(2340)$ WIDTH

NODE=M108210

NODE=M108W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
$\mathbf{319^{+\ 81}_{-\ 69}}$	[2] ETKIN	88	MPS	22 $\pi^- p \rightarrow \phi\phi n$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
198± 50	BOOTH	86	OMEG	85 π^- Be $\rightarrow$ 2ϕBe
$150^{+150}_{-\ 50}$	LINDENBAUM	84	RVUE	

[2] Includes data of ETKIN 85.

NODE=M108W;LINKAGE=C

$f_2(2340)$ DECAY MODES

NODE=M108215;NODE=M108

	Mode	Fraction (Γ_i/Γ)
Γ_1	$\phi\phi$	seen

DESIG=1;OUR EST;→ NOT CHECKED ←

$f_2(2340)$ REFERENCES

NODE=M108

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

OTHER RELATED PAPERS

BUGG	04A	EPJ C36 161	D.V. Bugg		REFID=50158
LONGACRE	04	PR D70 094041	R.S. Longacre, S.J. Lindenbaum		REFID=50341
BOLONKIN	00	JETPL 72 166	B.V. Bolonkin *et al.*		REFID=47968
		Translated from ZETFP 72 240.			
ANISOVICH	99D	PL B452 180	A.V. Anisovich *et al.*		REFID=46901
Also	99F	NP A651 253	A.V. Anisovich *et al.*		REFID=46926
ANISOVICH	99F	NP A651 253	A.V. Anisovich *et al.*		REFID=46926
LANDBERG	96	PR D53 2839	C. Landberg *et al.*	(BNL, CUNY, RPI)	REFID=44740
GREEN	86	PRL 56 1639	D.R. Green *et al.*	(FNAL, ARIZ, FSU+)	REFID=21872
BOOTH	84	NP B242 51	P.S.L. Booth *et al.*	(LIVP, GLAS, CERN)	REFID=21868
EISENHAND...	75	NP B96 109	E. Eisenhandler *et al.*	(LOQM, LIVP, DARE+)	REFID=21821

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 the Further States entry. See also $\rho(2150)$, $f_2(2150)$, $\rho_3(2250)$, $f_4(2300)$.

NODE=M033

$\rho_5(2350)$ MASS

NODE=M033205

NODE=M033M

$\pi^- p \to \omega\pi^0 n$

NODE=M033M3

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
2330±35	ALDE	95	GAM2	38 $\pi^- p \to \omega\pi^0 n$

NODE=M033M1

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
~ 2303	HASAN	94	RVUE		$\overline{p}p \to \pi\pi$
~ 2300	[1] MARTIN	80B	RVUE		
~ 2250	[1] MARTIN	80C	RVUE		
~ 2500	[2] CARTER	78B	CNTR	0	0.7–2.4 $\overline{p}p \to K^- K^+$
~ 2480	[3] CARTER	77	CNTR	0	0.7–2.4 $\overline{p}p \to \pi\pi$

S-CHANNEL $\overline{N}N$

NODE=M033M2

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2300±45	[4] ANISOVICH	02	SPEC		0.6–1.9 $p\overline{p} \to \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$
2295±30	ANISOVICH	00J	SPEC		
~ 2380	[5] CUTTS	78B	CNTR		0.97–3 $\overline{p}p \to \overline{N}N$
2345±15	[5,6] COUPLAND	77	CNTR	0	0.7–2.4 $\overline{p}p \to \overline{p}p$
2359± 2	[5,7] ALSPECTOR	73	CNTR		$\overline{p}p$ S channel
2350±10	[8] ABRAMS	70	CNTR		S channel $\overline{N}N$
2360±25	[9] OH	70B	HDBC	−0	$\overline{p}(pn)$, $K^* K 2\pi$

$\pi^- p \to K^+ K^- n$

NODE=M033M4

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2307±6	ALPER	80	CNTR	0	62 $\pi^- p \to K^+ K^- n$

[1] $I(J^P) = 1(5^-)$ from simultaneous analysis of $p\overline{p} \to \pi^-\pi^+$ and $\pi^0\pi^0$. NODE=M033M1;LINKAGE=P

[2] $I = 0(1)$; $J^P = 5^-$ from Barrelet-zero analysis. NODE=M033M1;LINKAGE=K

[3] $I(J^P) = 1(5^-)$ from amplitude analysis. NODE=M033M1;LINKAGE=J

[4] From the combined analysis of ANISOVICH 00J, ANISOVICH 01D, ANISOVICH 01E, and ANISOVICH 02. NODE=M033M2;LINKAGE=AY

[5] Isospins 0 and 1 not separated. NODE=M033M2;LINKAGE=I

[6] From a fit to the total elastic cross section. NODE=M033M2;LINKAGE=E

[7] Referred to as U or U region by ALSPECTOR 73. NODE=M033M2;LINKAGE=M

[8] For $I = 1$ $\overline{N}N$. NODE=M033M2;LINKAGE=A

[9] No evidence for this bump seen in the $\overline{p}p$ data of CHAPMAN 71B. Narrow state not confirmed by OH 73 with more data. NODE=M033M2;LINKAGE=N

$\rho_5(2350)$ WIDTH

NODE=M033210

$\pi^- p \to \omega\pi^0 n$

NODE=M033W3

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
400±100	ALDE	95	GAM2	38 $\pi^- p \to \omega\pi^0 n$

$\overline{p}p \to \pi\pi$ or $\overline{K}K$

NODE=M033W1

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
~ 169	HASAN	94	RVUE		$\overline{p}p \to \pi\pi$
~ 250	[10] MARTIN	80B	RVUE		
~ 300	[10] MARTIN	80C	RVUE		
~ 150	[11] CARTER	78B	CNTR	0	0.7–2.4 $\overline{p}p \to K^- K^+$
~ 210	[12] CARTER	77	CNTR	0	0.7–2.4 $\overline{p}p \to \pi\pi$

S-CHANNEL $\overline{N}N$

NODE=M033W2
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
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

OTHER RELATED PAPERS

EISENHAND...	75	NP B96 109	E. Eisenhandler *et al.*	(LOQM, LIVP, DARE+)	REFID=21821
CASO	70	LNC 3 707	C. Caso *et al.*	(GENO, HAMB, MILA, SACL)	REFID=20590
BRICMAN	69	PL 29B 451	C. Bricman *et al.*	(CERN, CAEN, SACL)	REFID=21806

NODE=M024

$a_6(2450)$

$I^G(J^{PC}) = 1^-(6^{++})$

OMITTED FROM SUMMARY TABLE

Needs confirmation.

NODE=M024

$a_6(2450)$ MASS

NODE=M024205

NODE=M024M

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
2450±130	[1] CLELAND	82B	SPEC	±	$50\ \pi p \rightarrow K^0_S K^\pm p$

[1] From an amplitude analysis.

NODE=M024M;LINKAGE=C

$a_6(2450)$ WIDTH

NODE=M024210

NODE=M024W

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
400±250	[2] CLELAND	82B	SPEC	±	$50\ \pi p \rightarrow K^0_S K^\pm p$

[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=M089205

NODE=M089M

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
2465±50 OUR AVERAGE	Error includes scale factor of 2.1.			
2420±30	ALDE	98	GAM4	$100\ \pi^- p \rightarrow \pi^0 \pi^0 n$
2510±30	BINON	84B	GAM2	$38\ \pi^- p \rightarrow n 2\pi^0$

$f_6(2510)$ WIDTH

NODE=M089210

NODE=M089W

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
255±40 OUR AVERAGE				
270±60	ALDE	98	GAM4	$100\ \pi^- p \rightarrow \pi^0 \pi^0 n$
240±60	BINON	84B	GAM2	$38\ \pi^- p \rightarrow n 2\pi^0$

$f_6(2510)$ 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	[1] BINON	83C	GAM2	$38\ \pi^- p \rightarrow n 4\gamma$

[1] Assuming one pion exchange and using data of BOLOTOV 74.

NODE=M089R1;LINKAGE=A

f_6(2510) REFERENCES

NODE=M089

ALDE	98	EPJ A3 361	D. Alde *et al.*	(GAM4 Collab.)	REFID=46605
Also	99	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 RELATED PAPERS

BOLONKIN	00	JETPL 72 166	B.V. Bolonkin *et al.*		REFID=47968
		Translated from ZETFP 72 240.			
PROKOSHKIN	99	PAN 62 356	Yu.D. Prokoshkin		REFID=46946
		Translated from YAF 62 396.			
EISENHAND...	75	NP B96 109	E. Eisenhandler *et al.*	(LOQM, LIVP, DARE+)	REFID=21821

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. Publications that exclude earlier claims in this section are listed under 'Other Related Papers.'

NODE=M300

QUANTUM NUMBERS, MASSES, WIDTHS, AND BRANCHING RATIOS

X(1110) $I^G(J^{PC}) = 0^+(\text{even}\,^{++})$

NODE=M300J30

MASS (MeV)	*WIDTH* (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
1107±4	111 ± 8 ± 15	DAFTARI	87	DBC	0. $\overline{p}n \to \rho^- \pi^+ \pi^-$

f_0(1200–1600) $I^G(J^{PC}) = 0^+(0^{++})$

NODE=M300J98

MASS (MeV)	*WIDTH* (MeV)	*DOCUMENT ID*		*TECN*
1480^{+100}_{-150}	1030^{+80}_{-170}	[5] ANISOVICH	03	SPEC
1530^{+90}_{-250}	560 ± 40	[6] ANISOVICH	03	SPEC

OCCUR=2

X(1420) $I^G(J^{PC}) = 2^+(0^{++})$

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(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 $e^+e^- \to e^+e^- 2(\pi^+\pi^-)$

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(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

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(1855) $I^G(J^{PC}) = ?^?(?^{??})$

NODE=M300J31

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1856.6±5	20 ± 5	BRIDGES	86D	SPEC	0. $\overline{p} d \to \pi\pi N$

X(1860) $I^G(J^{PC}) = ?^?(?^{??})$

NODE=M300J96

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1859^{+6}_{-27}	<30	BAI	03F	BES2	$J/\psi \to \gamma p \overline{p}$

X(1870) $I^G(J^{PC}) = ?^?(?^{??})$

NODE=M300J32

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
∼ 1870	∼ 10	DALKAROV	97	RVUE	0.0 $\overline{p} d \to p 3\pi^- 2\pi^+$

X(1870) $I^G(J^{PC}) = ?^?(2^{??})$

NODE=M300J45

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1870±40	250 ± 30	ALDE	86D	GAM4	100 $\pi^- p \to 2\eta X$

$a_3(1875)$ $I^G(J^{PC}) = 1^-(3^{++})$

NODE=M300J95

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1874±43±96	385 ± 121 ± 114	CHUNG	02	E852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$

$B(a_3(1875) \to f_2(1270)\pi)/B(a_3(1875) \to \rho\pi)$

NODE=M300B7

VALUE	DOCUMENT ID		TECN	COMMENT
0.8±0.2	[8] CHUNG	02	E852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$

$B(a_3(1875) \to \rho_3(1690)\pi)/B(a_3(1875) \to \rho\pi)$

NODE=M300B8

VALUE	DOCUMENT ID		TECN	COMMENT
0.9±0.3	[8] CHUNG	02	E852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$

$\pi_2(1880)$ $I^G(J^{PC}) = 1^-(2^{-+})$

NODE=M300J63

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1876±11± 67	146 ± 17 ± 62	145k	LU	05	E852	18 $\pi^- p \to \omega\pi^-\pi^0 p$
2003±88±148	306 ± 132 ± 121	69k	KUHN	04	E852	18 $\pi^- p \to \eta\pi^+\pi^-\pi^- p$
1880±20	255 ± 45		ANISOVICH	01B		$\overline{p} p \to (a_2(1320)\eta)\pi^0$

B($\pi_2(1880) \to a_2(1320)\eta$) / B($\pi_2(1880) \to f_1(1285)\pi$)

NODE=M300B02
NODE=M300B02

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
22.7±7.3	69k	KUHN	04	E852	18 $\pi^- p \to \eta\pi^+\pi^-\pi^- p$

$a_1(1930)$ $I^G(J^{PC}) = 1^-(1^{++})$

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	EVANGELISTA	79	OMEG	10,16 $\pi^- p \to \overline{p}pn$

$\rho_2(1940)$ $I^G(J^{PC}) = 1^+(2^{--})$

NODE=M300J85
NODE=M300J85

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1940±40	155 ± 40	[9] ANISOVICH	02	SPEC	0.6–1.9 $p\overline{p} \to \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$

$\omega_3(1945)$ $I^G(J^{PC}) = 0^-(3^{--})$

NODE=M300J65
NODE=M300J65

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1945±20	115 ± 22	[10] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \to \omega\eta$, $\omega\pi^0\pi^0$

$\omega(1960)$ $I^G(J^{PC}) = 0^-(1^{--})$

NODE=M300J79
NODE=M300J79

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1960±25	195 ± 60	[10] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \to \omega\eta$, $\omega\pi^0\pi^0$

$b_1(1960)$ $I^G(J^{PC}) = 1^+(1^{+-})$

NODE=M300J67
NODE=M300J67

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1960±35	230 ± 50	[9] ANISOVICH	02	SPEC	0.6–1.9 $p\overline{p} \to \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$

$\rho(1965)$ $I^G(J^{PC}) = 1^+(1^{--})$

NODE=M300J68
NODE=M300J68

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1970±30	260 ± 45	[9] ANISOVICH	02	SPEC	0.6–1.9 $p\overline{p} \to \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$
2000±30	295 ± 85	ANISOVICH	00J	SPEC	

$h_1(1965)$ $I^G(J^{PC}) = 0^-(1^{+-})$

NODE=M300J64
NODE=M300J64

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1965±45	345 ± 75	[10] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \to \omega\eta$, $\omega\pi^0\pi^0$

$f_1(1970)$ $I^G(J^{PC}) = 0^+(1^{++})$

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 $K^+ p \to 2K^0_S 2\pi X$

X(1975) $I^G(J^{PC}) = ?^?(?^{??})$ NODE=M300J47

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1973±15	80	30	CASO	70	HBC	11.2 $\pi^- p \to \rho 2\pi$

ω_2(1975) $I^G(J^{PC}) = 0^-(2^{--})$ NODE=M300J81

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1975±20	175 ± 25	[10] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \to \omega\eta$, $\omega\pi^0\pi^0$

a_2(1990) $I^G(J^{PC}) = 1^-(2^{++})$ NODE=M300J2

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2003±10±19	249 ± 23 ± 32	LU	05	E852	18 $\pi^- p \to \omega\pi^-\pi^0 p$
1990^{+15}_{-30}	190 ± 50	ANISOVICH	99C	SPEC	

ρ(2000) $I^G(J^{PC}) = 1^+(1^{--})$ NODE=M300J77

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2000±30	295 ± 85	ANISOVICH	00J	SPEC

f_2(2000) $I^G(J^{PC}) = 0^+(2^{++})$ NODE=M300J25

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2001±10	312 ± 32	ANISOVICH	00J	SPEC

X(2000) $I^G(J^{PC}) = 1^-(?^{?+})$ NODE=M300K01

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
1964±35	225 ± 50	[11] ARMSTRONG	93D	E760		$\overline{p}p \to 3\pi^0 \to 6\gamma$
∼ 2100	∼ 500	[11] ANTIPOV	77	CIBS	−	25 $\pi^- p \to p\pi^-\rho_3$
2214±15	355 ± 21	[12] BALTAY	77	HBC	0	15 $\pi^- p \to \Delta^{++} 3\pi$
2080±40	340 ± 80	KALELKAR	75	HBC	+	15 $\pi^+ p \to p\pi^+\rho_3$

X(2000) $I^G(J^{PC}) = ?^?(4^{++})$ NODE=M300J97

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1998±3±5	<15	VLADIMIRSKY	03	SPEC	$\pi^- p \to K^0_S K^0_S MM$

π_2(2005) $I^G(J^{PC}) = 1^-(2^{-+})$ NODE=M300J71

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1974±14±83	341 ± 61 ± 139	145k	LU	05	E852	18 $\pi^- p \to \omega\pi^-\pi^0 p$
2005±15	200 ± 40		ANISOVICH	01F	SPEC	2.0 $\overline{p}p \to 3\pi^0$, $\pi^0\eta$, $\pi^0\eta'$

η(2010) $I^G(J^{PC}) = 0^+(0^{-+})$ NODE=M300J5

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2010^{+35}_{-60}	270 ± 60	ANISOVICH	00J	SPEC

π_1(2015) $I^G(J^{PC}) = 1^-(1^{-+})$ NODE=M300J05

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2013±25 OUR AVERAGE						
2014±20±16	230 ± 32 ± 73	145k	LU	05	E852	18 $\pi^- p \to \omega\pi^-\pi^0 p$

$2001\pm30\pm92$	$333\pm52\pm49$	69k	KUHN	04	E852	18 $\pi^- p \rightarrow \eta\pi^+\pi^-\pi^- p$

$a_0(2020)$ $I^G(J^{PC}) = 1^-(0^{++})$

NODE=M300J6

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2025 ± 30	330 ± 75	ANISOVICH	99C	SPEC

$X(2020)$ $I^G(J^{PC}) = ?^?(?^{??})$

NODE=M300J34

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2015 ± 3	10 ± 4	FERRER	99	RVUE	$\pi p \rightarrow p p \overline{p} \pi(\pi)$

$h_3(2025)$ $I^G(J^{PC}) = 0^-(3^{+-})$

NODE=M300J78

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2025 ± 20	145 ± 30	[10] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \rightarrow \omega\eta, \omega\pi^0\pi^0$

$b_3(2025)$ $I^G(J^{PC}) = 1^+(3^{+-})$

NODE=M300J69

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2032 ± 12	117 ± 11	[9] ANISOVICH	02	SPEC	0.6–1.9 $p\overline{p} \rightarrow \omega\pi^0, \omega\eta\pi^0, \pi^+\pi^-$

$\eta_2(2030)$ $I^G(J^{PC}) = 0^+(2^{-+})$

NODE=M300J8

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
$2030\pm5\pm15$	$205\pm10\pm15$	ANISOVICH	00E	SPEC

$B(a_2\pi)_{L=0}/B(a_2\pi)_{L=2}$

NODE=M300B1

VALUE	DOCUMENT ID		TECN
0.74 ± 0.17	[13] ANISOVICH	00E	SPEC

$B(a_0\pi)/B(a_2\pi)_{L=2}$

NODE=M300B2

VALUE	DOCUMENT ID		TECN
0.072 ± 0.016	[13] ANISOVICH	00E	SPEC

$B(f_2\eta)/B(a_2\pi)_{L=2}$

NODE=M300B3

VALUE	DOCUMENT ID		TECN
0.074 ± 0.026	[13] ANISOVICH	00E	SPEC

$f_3(2050)$ $I^G(J^{PC}) = 0^+(3^{++})$

NODE=M300J7

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2048 ± 8	213 ± 34	ANISOVICH	00J	SPEC

$f_0(2060)$ $I^G(J^{PC}) = 0^+(0^{++})$

NODE=M300J59

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT	
~ 2050	~ 120	[14] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \rightarrow \pi\pi$	
~ 2060	~ 50	[14] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \rightarrow \pi\pi$	OCCUR=2

$\pi(2070)$ $I^G(J^{PC}) = 0^-(0^{-+})$

NODE=M300J91

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2070 ± 35	310^{+100}_{-50}	ANISOVICH	01F	SPEC	2.0 $\overline{p}p \rightarrow 3\pi^0, \pi^0\eta, \pi^0\eta'$

$a_3(2070)$ $I^G(J^{PC}) = 1^-(3^{++})$

NODE=M300J9

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2070 ± 20	170 ± 40	ANISOVICH	99C	SPEC

$X(2075)$ $I^G(J^{PC}) = ?^?(?^{??})$

NODE=M300J01

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
$2075\pm12\pm5$	**$90\pm35\pm9$**	[1] ABLIKIM	04J	BES2	$J/\psi \rightarrow K^- p \overline{\Lambda}$

[1] From a fit in the region $M_{p\overline{\Lambda}} - M_p - M_\Lambda < 150$ MeV. S-wave in the $p\overline{\Lambda}$ system preferred. NODE=M300J01;LINKAGE=AB

a_2(2080) $I^G(J^{PC}) = 1^-(2^{++})$ NODE=M300J10

MASS (MeV)	*WIDTH* (MeV)	*DOCUMENT ID*		*TECN*
2060 ± 20	195 ± 30	ANISOVICH	99C	SPEC
2100^{+10}_{-30}	360^{+40}_{-100}	ANISOVICH	99E	SPEC

X(2080) $I^G(J^{PC}) = ?^?(?^{??})$ NODE=M300J35

MASS (MeV)	*WIDTH* (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
2080 ± 10	110 ± 20	KREYMER	80	STRC	13 $\pi^- d \to p\overline{p}n(n_s)$

X(2080) $I^G(J^{PC}) = ?^?(3^{-?})$ NODE=M300J37

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

MASS (MeV)	*WIDTH* (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
2096± 17±121	**451 ± 41 ± 81**	69k	KUHN	04	E852	18 $\pi^- p \to \eta\pi^+\pi^-\pi^- p$

B(a_1(2095) → f_1(1285)π) / B(a_1(2095) → a_1(1260)) NODE=M300B03

VALUE	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
3.18±0.64	69k	KUHN	04	E852	18 $\pi^- p \to \eta\pi^+\pi^-\pi^- p$

η(2100) $I^G(J^{PC}) = 0^+(0^{-+})$ NODE=M300J48

MASS (MeV)	*WIDTH* (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
2103 ± 50	187 ± 75	586	[15] BISELLO	89B	DM2	$J/\psi \to 4\pi\gamma$

X(2100) $I^G(J^{PC}) = ?^?(0^{??})$ NODE=M300J49

MASS (MeV)	*WIDTH* (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
2100 ± 40	250 ± 40	ALDE	86D	GAM4	100 $\pi^- p \to 2\eta X$

X(2110) $I^G(J^{PC}) = 1^+(3^{-?})$ NODE=M300J36

MASS (MeV)	*WIDTH* (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
2110 ± 10	330 ± 20	EVANGELISTA	79	OMEG	10,16 $\pi^- p \to \overline{p}pn$

f_2(2140) $I^G(J^{PC}) = 0^+(2^{++})$ NODE=M300J50

MASS (MeV)	*WIDTH* (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
2141 ± 12	49 ± 28	389	GREEN	86	MPSF	400 $pA \to 4KX$

ω(2145) $I^G(J^{PC}) = 0^-(1^{--})$ NODE=M300J26

MASS (MeV)	*WIDTH* (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
2150 ± 20	235 ± 30	ANISOVICH	01C	SPEC	0.6–1.9 $\overline{p}p \to \omega\eta$
2145 ± 20	200 ± 25	ANISOVICH	00D	SPEC	

X(2150) $I^G(J^{PC}) = ?^?(2^{+?})$ NODE=M300J38

MASS (MeV)	*WIDTH* (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
2150 ± 10	260 ± 10	ROZANSKA	80	SPRK	18 $\pi^- p \to p\overline{p}n$

$a_2(2175)$ $I^G(J^{PC}) = 0^-(2^{++})$

NODE=M300J88

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID	TECN	COMMENT
2175 ± 40	310^{+90}_{-45}	ANISOVICH 01F	SPEC	2.0 $\overline{p}p \rightarrow 3\pi^0$, $\pi^0\eta$, $\pi^0\eta'$

$\eta(2190)$ $I^G(J^{PC}) = 0^+(0^{-+})$

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

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID	TECN	COMMENT
2195 ± 30	225 ± 40	[10] ANISOVICH 02B	SPEC	0.6–1.9 $p\overline{p} \rightarrow \omega\eta$, $\omega\pi^0\pi^0$

$\omega(2205)$ $I^G(J^{PC}) = 0^-(1^{--})$

NODE=M300J80

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID	TECN	COMMENT
2205 ± 30	350 ± 90	[10] ANISOVICH 02B	SPEC	0.6–1.9 $p\overline{p} \rightarrow \omega\eta$, $\omega\pi^0\pi^0$

$X(2210)$ $I^G(J^{PC}) = ?^?(?^{??})$

NODE=M300J39

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID	TECN	COMMENT
2210^{+79}_{-21}	203^{+437}_{-87}	EVANGELISTA 79B	OMEG	10 $\pi^- p \rightarrow K^+K^-n$

$X(2210)$ $I^G(J^{PC}) = ?^?(?^{??})$

NODE=M300J51

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID	TECN	COMMENT
2207 ± 22	130	CASO 70	HBC	11.2 $\pi^- p$

$h_1(2215)$ $I^G(J^{PC}) = 0^-(1^{+-})$

NODE=M300J27

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID	TECN	COMMENT
2215 ± 40	325 ± 55	[10] ANISOVICH 02B	SPEC	0.6–1.9 $p\overline{p} \rightarrow \omega\eta$, $\omega\pi^0\pi^0$

$b_1(2240)$ $I^G(J^{PC}) = 1^+(1^{+-})$

NODE=M300J87

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID	TECN	COMMENT
2240 ± 35	320 ± 85	[9] ANISOVICH 02	SPEC	0.6–1.9 $p\overline{p} \rightarrow \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$

$\rho_2(2240)$ $I^G(J^{PC}) = 1^+(2^{--})$

NODE=M300J70

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID	TECN	COMMENT
2225 ± 35	335^{+100}_{-50}	[9] ANISOVICH 02	SPEC	0.6–1.9 $p\overline{p} \rightarrow \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$

$\rho_4(2240)$ $I^G(J^{PC}) = 1^+(4^{--})$

NODE=M300J74

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID	TECN	COMMENT
2230 ± 25	210 ± 30	[9] ANISOVICH 02	SPEC	0.6–1.9 $p\overline{p} \rightarrow \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$

$\pi_2(2245)$ $I^G(J^{PC}) = 0^-(2^{-+})$

NODE=M300J89

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID	TECN	COMMENT
2245 ± 60	320^{+100}_{-40}	ANISOVICH 01F	SPEC	2.0 $\overline{p}p \rightarrow 3\pi^0$, $\pi^0\eta$, $\pi^0\eta'$

η_2(2250) $I^G(J^{PC}) = 0^+(2^{-+})$ NODE=M300J17

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2248 ± 20	280 ± 20	ANISOVICH	00I	SPEC
2267 ± 14	290 ± 50	ANISOVICH	00J	SPEC

π_4(2250) $I^G(J^{PC}) = 1^-(4^{-+})$ NODE=M300J73

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2250 ± 15	215 ± 25	ANISOVICH	01F	SPEC	2.0 $\overline{p}p \to 3\pi^0$, $\pi^0\eta$, $\pi^0\eta'$

ω_4(2250) $I^G(J^{PC}) = 0^-(4^{--})$ NODE=M300J84

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2250 ± 30	150 ± 50	[10] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \to \omega\eta$, $\omega\pi^0\pi^0$

ω_3(2255) $I^G(J^{PC}) = 0^-(3^{--})$ NODE=M300J66

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2255 ± 15	175 ± 30	[10] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \to \omega\eta$, $\omega\pi^0\pi^0$

X(2260) $I^G(J^{PC}) = 0^+(4^{+?})$ NODE=M300J40

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2260 ± 20	400 ± 100	EVANGELISTA	79	OMEG	10,16 $\pi^- p \to \overline{p}pn$

ρ(2265) $I^G(J^{PC}) = 1^+(1^{--})$ NODE=M300J86

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2265 ± 40	325 ± 80	[9] ANISOVICH	02	SPEC	0.6–1.9 $p\overline{p} \to \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$

a_1(2270) $I^G(J^{PC}) = 1^-(1^{++})$ NODE=M300J72

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2270^{+55}_{-40}	305^{+70}_{-40}	ANISOVICH	01F	SPEC	2.0 $\overline{p}p \to 3\pi^0$, $\pi^0\eta$, $\pi^0\eta'$

a_2(2270) $I^G(J^{PC}) = 1^-(2^{++})$ NODE=M300J15

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2265 ± 20	235^{+60}_{-35}	ANISOVICH	99C	SPEC
2280 ± 30	280 ± 50	ANISOVICH	99E	SPEC

h_3(2275) $I^G(J^{PC}) = 0^-(3^{+-})$ NODE=M300J28

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2275 ± 25	190 ± 45	[10] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \to \omega\eta$, $\omega\pi^0\pi^0$

a_4(2280) $I^G(J^{PC}) = 1^-(4^{++})$ NODE=M300J16

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2300 ± 20	230 ± 40	ANISOVICH	99C	SPEC
2260 ± 15	180 ± 20	ANISOVICH	99E	SPEC

η(2280) $I^G(J^{PC}) = 0^+(0^{-+})$ NODE=M300J18

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2285 ± 20	325 ± 30	ANISOVICH	00J	SPEC
2320 ± 15	230 ± 35	[16] ANISOVICH	00M	SPEC

$\rho(2280)$ $I^G(J^{PC}) = 1^+(1^{--})$

NODE=M300J52

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2280±50	440 ± 110	ATKINSON	85	OMEG	20–70 $\gamma p \to p\omega\pi^+\pi^-\pi^0$

NODE=M300J52

$\omega_3(2285)$ $I^G(J^{PC}) = 0^-(3^{--})$

NODE=M300J83

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2285±60	230 ± 40	[10] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \to \omega\eta, \omega\pi^0\pi^0$

NODE=M300J83

$X(2290)$ $I^G(J^{PC}) = 0^-(1^{--})$

NODE=M300J02

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2290±20	**275 ± 35**	[2] BUGG	04A	RVUE

NODE=M300J02

[2] Partial wave analysis of the data on $p\overline{p} \to \overline{\Lambda}\Lambda$ from BARNES 00.

NODE=M300J02;LINKAGE=BU

$f_3(2300)$ $I^G(J^{PC}) = 0^+(3^{++})$

NODE=M300J19

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2303±15	214 ± 29	ANISOVICH	00J	SPEC

NODE=M300J19

$\rho_3(2300)$ $I^G(J^{PC}) = 1^+(3^{--})$

NODE=M300J93

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2300^{+50}_{-80}	340 ± 50	ANISOVICH	00J	SPEC

NODE=M300J93

$a_3(2310)$ $I^G(J^{PC}) = 1^-(3^{++})$

NODE=M300J20

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2310±40	$180^{+120}_{-\ 60}$	ANISOVICH	99C	SPEC

NODE=M300J20

$f_1(2310)$ $I^G(J^{PC}) = 0^+(1^{++})$

NODE=M300J23

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2310±60	255 ± 70	ANISOVICH	00J	SPEC

NODE=M300J23

$\eta_4(2320)$ $I^G(J^{PC}) = 0^+(4^{-+})$

NODE=M300J22

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2328±38	240 ± 90	ANISOVICH	00J	SPEC

NODE=M300J22

$f_0(2330)$ $I^G(J^{PC}) = 0^+(0^{++})$

NODE=M300K02

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2337±14	217 ± 33	ANISOVICH	00J	SPEC
∼ 2321	∼ 223	HASAN	94	

NODE=M300K02

$\omega(2330)$ $I^G(J^{PC}) = 0^-(1^{--})$

NODE=M300J53

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2330±30	435 ± 75	ATKINSON	88	OMEG	25–50 $\gamma p \to \rho^{\pm}\rho^0\pi^{\mp}$

NODE=M300J53

$a_1(2340)$ $I^G(J^{PC}) = 1^-(1^{++})$

NODE=M300J24

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2340±40	230 ± 70	ANISOVICH	99E	SPEC

NODE=M300J24

$X(2340)$ $I^G(J^{PC}) = ?^?(?^{??})$

NODE=M300J54

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2340±20	180 ± 60	126	[17] BALTAY	75	HBC	15 $\pi^+ p \to p 5\pi$

NODE=M300J54

$\pi(2360)$ $I^G(J^{PC}) = 0^-(0^{-+})$ NODE=M300J90

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2360±25	300^{+100}_{-50}	ANISOVICH	01F	SPEC	2.0 $\overline{p}p \rightarrow 3\pi^0$, $\pi^0\eta$, $\pi^0\eta'$

$X(2360)$ $I^G(J^{PC}) = ?^?(4^{+?})$ NODE=M300J42

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2360±10	430 ± 30	ROZANSKA	80	SPRK	18 $\pi^- p \rightarrow p\overline{p}n$

$X(2440)$ $I^G(J^{PC}) = ?^?(5^{-?})$ NODE=M300J43

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2440±10	310 ± 20	ROZANSKA	80	SPRK	18 $\pi^- p \rightarrow p\overline{p}n$

$X(2632)$ $I^G(J^{PC}) = ?^?(?^{??})$ NODE=M300J03

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT	
2632.6±1.8 OUR AVERAGE						
2635.2±3.3		[3] EVDOKIMOV	04	SELX	$X(2632) \rightarrow D_s^+\eta$	
2631.6±2.1	< 17	[4] EVDOKIMOV	04	SELX	$X(2632) \rightarrow D^0K^+$	OCCUR=2

[3] From a mass difference to D_s^+ of 666.9 ± 3.3 MeV. NODE=M300J03;LINKAGE=EV

[4] From a mass difference to D^0 of 767.0 ± 2.0 MeV. NODE=M300J03;LINKAGE=ED

$B(X(2632) \rightarrow D^0K^+)/B(X(2632) \rightarrow D_s^+\eta)$ NODE=M300B01

VALUE	DOCUMENT ID		TECN
0.14±0.06	EVDOKIMOV	04	SELX

$X(2680)$ $I^G(J^{PC}) = ?^?(?^{??})$ NODE=M300J55

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2676±27	150	CASO	70	HBC	11.2 $\pi^- p \rightarrow \rho^-\pi^+\pi^- p$

$X(2710)$ $I^G(J^{PC}) = ?^?(6^{+?})$ NODE=M300J44

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2710±20	170 ± 40	ROZANSKA	80	SPRK	18 $\pi^- p \rightarrow p\overline{p}n$

$X(2750)$ $I^G(J^{PC}) = ?^?(7^{-?})$ NODE=M300J56

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2747±32	195 ± 75	DENNEY	83	LASS	10 $\pi^+ p \rightarrow K^+K^-\pi^+ p$

$f_6(3100)$ $I^G(J^{PC}) = 0^+(6^{++})$ NODE=M300J06

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
3100±100	**700 ± 130**	BINON	05	GAMS	33 $\pi^- p \rightarrow \eta\eta n$

$X(3250)$ $I^G(J^{PC}) = ?^?(?^{??})$ 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	$X(3250) \rightarrow \overline{\Lambda}pK^-$	OCCUR=2

$X(3250)$ $I^G(J^{PC}) = ?^?(?^{??})$ 4-Body Decays NODE=M300J58

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT	
3245±8±20	25 ± 11	ALEEV	93	BIS2	$X(3250) \rightarrow \Lambda\overline{p}K^+\pi^\pm$	
3250±9±20	50 ± 20	ALEEV	93	BIS2	$X(3250) \rightarrow \overline{\Lambda}pK^-\pi^\mp$	OCCUR=2
3270±8±20	25 ± 11	ALEEV	93	BIS2	$X(3250) \rightarrow K_S^0 p\overline{p}K^\pm$	OCCUR=3

FOOTNOTES for Further States
NODE=M300

[5] 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

[6] 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

[7] Our estimate. NODE=M300J99;LINKAGE=A

[8] Using the observable fractions of 50.0% $\rho \pi$, 56.5% $f_2 \pi$, and 11.8% $\rho_3 \pi$. NODE=M300B;LINKAGE=C1

[9] From the combined analysis of ANISOVICH 00J, ANISOVICH 01D, ANISOVICH 01E, and ANISOVICH 02. NODE=M300;LINKAGE=AY

[10] From the combined analysis of ANISOVICH 00D, ANISOVICH 01C, and ANISOVICH 02B. NODE=M300;LINKAGE=AZ

[11] Cannot determine spin to be 3. NODE=M300K01;LINKAGE=AA

[12] BALTAY 77 favors $J^P = ,3^+$. NODE=M300K01;LINKAGE=B

[13] Corrected for all decay modes. NODE=M300;LINKAGE=A

[14] See SEMENOV 99 and KLOET 96. NODE=M300J;LINKAGE=A

[15] ASTON 81B sees no peak, has 850 events in Ajinenko+Barth bins. ARESTOV 80 sees no peak. NODE=M300J;LINKAGE=A1

[16] Combined fit along with data of ANISOVICH 00J. NODE=M300;LINKAGE=B

[17] 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

REFERENCES for Further States
NODE=M300

BINON	05	PAN 68 960	F. Binon *et al.*		REFID=50780
		Translated from YAF 68 998.			
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	04A	EPJ C36 161	D.V. Bugg		REFID=50158
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
BAI	03F	PRL 91 022001	J.Z. Bai *et al.*	(BES Collab.)	REFID=49473
VLADIMIRSKY	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	01B	PL B500 222	A.V. Anisovich *et al.*		REFID=48318
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	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
ANISOVICH	99C	PL B452 173	A.V. Anisovich *et al.*		REFID=46903
ANISOVICH	99E	PL B452 187	A.V. Anisovich *et al.*		REFID=46902
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.			
DALKAROV	97	PL B392 229	O.D. Dalkarov *et al.*	(LEBD)	REFID=45564
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
EVANGELISTA	79	NP B153 253	C. Evangelista *et al.*	(BARI, BONN, CERN+)	REFID=21966
EVANGELISTA	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

OTHER RELATED PAPERS

CHANG	05B	PL B623 218	C.-H. Chang, C.S. Kim, G. Wang	REFID=50787
HUANG	05A	PR D71 114015	M.Q. Huang, D.W. Wang	REFID=50795
MAIANI	05	PR D71 014028	L. Maiani *et al.*	REFID=50460
YAN	05	PR C71 025204	Y. Yan *et al.*	REFID=50501
ANISOVICH	04	SPU 47 45	V.V. Anisovich	REFID=50320
		Translated from UFN 174 49.		

BARNES	04A	PL B600 223	T. Barnes *et al.*		REFID=50171
BUGG	04B	PL B598 8	D.V. Bugg		REFID=50169
BUGG	04C	PRPL 397 257	D.V. Bugg		REFID=50203
CHAO	04A	PL B599 43	K.-T. Chao		REFID=50170
CHEN	04C	PRL 93 232001	Y.-Q. Chen, X.-Q. Li		REFID=50334
DAI	04	JHEP 0411 043	Y.-B. Dai *et al.*		REFID=50335
GAO	04	CTP 42 844	G.-S. Gao, S.-L. Zhu		REFID=50520
KERBIKOV	04	PR C69 055205	B. Kerbikov *et al.*		REFID=50178
LIU	04A	PR D70 094009	Y.-R. Liu		REFID=50191
MAIANI	04	PR D70 054009	L. Maiani *et al.*		REFID=50181
SIMONOV	04	PR D70 114013	Yu.A. Simonov, J.A. Tjon		REFID=50348
SWANSON	04	PL B582 167	E. Swanson		REFID=49780
VANBEVEREN	04A	PRL 93 202001	E. Vanbeveren, G. Rupp		REFID=50202
ZOU	04	PR D69 034004	B.S. Zou, H.C. Chiang		REFID=49784
DATTA	03B	PL B567 273	A. Datta, P.J. O'Donnell		REFID=49471
ROSNER	03B	PR D68 014004	J.L. Rosner		REFID=49475
WANG	03	PRL 90 201802	M.-Z. Wang *et al.*	(BELLE Collab.)	REFID=49437
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
ANISOVICH	01E	PL B513 281	A.V. Anisovich *et al.*		REFID=48349
ABELE	00B	EPJ C17 583	A. Abele *et al.*		REFID=47926
BARNES	00	PR C62 055203	P.D. Barnes *et al.*		REFID=47965
BOLONKIN	00	JETPL 72 166	B.V. Bolonkin *et al.*		REFID=47968
		Translated from ZETFP 72 240.			
ANISOVICH	99F	NP A651 253	A.V. Anisovich *et al.*		REFID=46926
CHIBA	99	PR C60 035204	M. Chiba *et al.*		REFID=47384
BUZZO	97	ZPHY C76 475	A. Buzzo *et al.*	(JETSET Collab.)	REFID=45757
CHIBA	97	PR D55 40	M. Chiba *et al.*	(FUKI, INUS, KEK, SANG+)	REFID=45419
BARNES	94	PL B331 203	P.D. Barnes *et al.*	(PS185 Collab.)	REFID=44079
CARBONELL	93	PL B306 407	J. Carbonell, K.V. Protasov, O.D. Dalkarov	(ISNG+)	REFID=43586
FERRER	93	NP A558 191c	A. Ferrer, A.A. Grigorian	(WA56 Collab.)	REFID=44642
CHIBA	91	PR D44 1933	M. Chiba *et al.*	(FUKI, KEK, SANG, OSAK+)	REFID=41635
GRAF	91	PR D44 1945	N.A. Graf *et al.*	(UCI, PENN, NMSU, KARLK+)	REFID=41636
TANIMORI	90	PR D41 744	T. Tanimori *et al.*	(KEK, INUS, KYOT+)	REFID=41347
ALBRECHT	89M	PL B217 205	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=41854
BEHREND	89D	PL B218 493	H.J. Behrend *et al.*	(CELLO Collab.)	REFID=41856
BUSENITZ	89	PR D40 1	J.K. Busenitz *et al.*	(ILL, FNAL)	REFID=40927
CHIBA	88	PL B202 447	M. Chiba, K. Doi	(FUKI, INUS, KEK, SANG, OSAK+)	REFID=40284
CHIBA	87	PR D36 3321	M. Chiba *et al.*	(FUKI, INUS, KEK, SANG+)	REFID=40553
FRANKLIN	87	PL B184 111	J. Franklin		REFID=40006
LIU	87	PRL 58 2288	K.F. Liu, B.A. Li	(STON)	REFID=40013
ADIELS	86	PL B182 405	L. Adiels *et al.*	(STOH, BASL, LASL, THES+)	REFID=21980
ANGELOPO...	86	PL B178 441	A. Angelopoulos *et al.*	(ATHU, UCI, KARLK+)	REFID=21981
ARMSTRONG	86C	PL B175 383	T.A. Armstrong *et al.*	(BNL, HOUS, PENN+)	REFID=21765
BRIDGES	86	PRL 56 211	D.L. Bridges *et al.*	(BLSU, BNL, CASE+)	REFID=21375
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
BRIDGES	86D	PL B180 313	D.L. Bridges *et al.*	(SYRA, BNL, CASE+)	REFID=21984
DOVER	86	PRL 57 1207	C.B. Dover *et al.*	(BNL)	REFID=21378
ANGELOPO...	85	PL 159B 210	A. Angelopoulos *et al.*	(ATHU, UCI, UNM+)	REFID=21977
BODENKAMP	85	NP B255 717	J. Bodenkamp *et al.*	(KARLK, KARLE, DESY)	REFID=21762
ADIELS	84	PL 138B 235	L. Adiels *et al.*	(BASL, KARLK, KARLE, STOH+)	REFID=21975
ATKINSON	84F	NP B239 1	M. Atkinson *et al.*	(BONN, CERN, GLAS+)	REFID=21998
AZOOZ	84	NP B244 277	F. Azooz, I. Butterworth	(LOIC, RHEL, SACL+)	REFID=21976
CLOUGH	84	PL 146B 299	A.S. Clough *et al.*	(SURR, LOQM, ANIK+)	REFID=21760
AZOOZ	83	PL 122B 471	F. Azooz, I. Butterworth	(LOIC, RHEL, SACL+)	REFID=21972
BARNETT	83	PR D27 493	B. Barnett *et al.*	(JHU)	REFID=21758
BODENKAMP	83	PL 133B 275	J. Bodenkamp *et al.*	(KARLK, KARLE, DESY)	REFID=21973
RICHTER	83	PL 126B 284	B. Richter, L. Adiels	(BASL, KARLK, KARLE, STOH+)	REFID=21974
AJALTOUNI	82	NP B209 301	Z. Ajaltouni *et al.*	(CERN, NEUC+)	REFID=44640
ASTON	81B	NP B189 205	D. Aston *et al.*	(BONN, CERN, EPOL, GLAS+)	REFID=11553
BANKS	81	PL 100B 191	A.D. Banks *et al.*	(LIVP, CERN)	REFID=40102
CHUNG	81	PRL 46 395	S.U. Chung *et al.*	(BNL, BRAN, CINC+)	REFID=40095
HARRIS	81	ZPHY C9 275	R.M. Harris *et al.*	(SEAT, UCB)	REFID=21800
ARESTOV	80	IHEP 80-165	Y.I. Arestov *et al.*	(SERP)	REFID=22312
ASTON	80D	PL 93B 517	D. Aston	(BONN, CERN, EPOL, GLAS, LANC+)	REFID=21744
BIONTA	80	PRL 44 909	R.M. Bionta *et al.*	(BNL, CMU, FNAL+)	REFID=40103
CARROLL	80	PRL 44 1572	A.S. Carroll *et al.*	(BNL, PRIN)	REFID=40098
DAUM	80E	PL 90B 475	C. Daum *et al.*	(AMST, CERN, CRAC, MPIM+)	REFID=21747
DEFOIX	80	NP B162 12	C. Defoix *et al.*	(CDEF, PISA)	REFID=21748
HAMILTON	80	PRL 44 1179	R.P. Hamilton *et al.*	(LBL, BNL, MTHO)	REFID=21750
HAMILTON	80B	PRL 44 1182	R.P. Hamilton *et al.*	(LBL, BNL, MTHO)	REFID=21751
KREYMER	80	PR D22 36	A.E. Kreymer *et al.*	(IND, PURD, SLAC+)	REFID=21970
ALBERI	79	PL 83B 247	G. Alberi *et al.*	(TRST, CERN, IFRJ)	REFID=21735
ARMSTRONG	79	PL B85 304	T.A. Armstrong *et al.*	(DESY, GLAS)	REFID=44641
BARTALUCCI	79	NC 49A 207	S. Bartalucci *et al.*	(DESY, FRAS)	REFID=20651
DELCOURT	79	PL 86B 395	B. Delcourt *et al.*	(LALO)	REFID=21738
GIBBARD	79	PRL 42 1593	B.G. Gibbard *et al.*	(CORN)	REFID=21739
SAKAMOTO	79	NP B158 410	S. Sakamoto *et al.*	(INUS)	REFID=21742
CARTER	78B	NP B141 467	A.A. Carter	(LOQM)	REFID=21964
ESPOSITO	78	LNC 22 305	B. Esposito, F. Felicetti	(FRAS, NAPL, PADO+)	REFID=40214
PAVLOPO...	78	PL 72B 415	P. Pavlopoulos *et al.*	(KARLK, KARLE, BASL+)	REFID=21965
PETERSON	78	PR D18 3955	D. Peterson *et al.*	(CORN, HARV)	REFID=40082
BENKHEIRI	77	PL 68B 483	P. Benkheiri *et al.*	(CERN, CDEF, EPOL+)	REFID=21728
BRUCKNER	77	PL 67B 222	W. Bruckner *et al.*	(MPIH, HEIDP, CERN)	REFID=21729
ABASHIAN	76	PR D13 5	A. Abashian *et al.*	(ILL, ANL, CHIC+)	REFID=21724
BRAUN	76	PL 60B 481	H.M. Braun *et al.*	(STRB)	REFID=21962
CHALOUPKA	76	PL 61B 487	V. Chaloupka *et al.*	(CERN, LIVP, MONS+)	REFID=21727
ALSTON-...	75	PRL 35 1685	M. Alston-Garnjost *et al.*	(LBL, MTHO)	REFID=21721
D'ANDLAU	75	PL 58B 223	C. d'Andlau *et al.*	(CDEF, PISA)	REFID=21718
KALOGERO...	75	PRL 34 1047	T. Kalogeropoulos, G.S. Tzanakos	(SYRA)	REFID=21722
CARROLL	74	PRL 32 247	A.S. Carroll *et al.*	(BNL)	REFID=21716
THOMPSON	74	NP B69 220	G. Thompson *et al.*	(PURD)	REFID=21650
DONALD	73	NP B61 333	R.A. Donald *et al.*	(LIVP, PARIS)	REFID=21816
ALEXANDER	72	NP B45 29	G. Alexander *et al.*	(TELA)	REFID=21546
ANTIPOV	72	PL 40 147	Y.M. Antipov *et al.*	(SERP)	REFID=40316
TAKAHASHI	72	PR D6 1266	K. Takahashi *et al.*	(TOHOK, PENN, NDAM+)	REFID=20103
BENVENUTI	71	PRL 27 283	A.C. Benvenuti *et al.*	(WISC)	REFID=21708
SABAU	71	LNC 1 514	M. Sabeu, J.L. Uretsky	(BUCH, ANL)	REFID=21991
BAUD	70	PL 31B 549	R. Baud *et al.*	(CERN Boson Spectrometer Collab.)	REFID=21989
ANDERSON	69	PRL 22 1390	E.W. Anderson *et al.*	(BNL, CMU)	REFID=20795
BOESEBECK	68	NP B4 501	K. Boesebeck *et al.*	(AACH, BERL, CERN)	REFID=20585
HUSON	68	PL 28B 208	R. Huson *et al.*	(ORSAY, MILA, UCLA)	REFID=20062
ALLES-...	67B	NC 50A 776	V. Alles-Borelli *et al.*	(CERN, BONN)	REFID=20036
DANYSZ	67B	NC 51A 801	J.A. Danysz, B.R. French, V. Simak	(CERN)	REFID=20045
CHIKOVANI	66	PL 22 233	G.E. Chikovani *et al.*	(SERP)	REFID=40317
FOCACCI	66	PRL 17 890	M.N. Focacci *et al.*	(CERN)	REFID=20402

STRANGE MESONS
($S = \pm1$, $C = B = 0$)

$K^+ = u\overline{s}$, $K^0 = d\overline{s}$, $\overline{K}^0 = \overline{d}s$, $K^- = \overline{u}s$, similarly for K^*'s

NODE=MXXX020

NODE=MXXX020

NODE=M174

$K_0^*(800)$ or κ

$I(J^P) = \frac{1}{2}(0^+)$

OMITTED FROM SUMMARY TABLE

The existence of this state is controversial.

NODE=M174

$K_0^*(800)$ MASS

NODE=M174205

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
753 ± 52		[1] PELAEZ	04A	RVUE	$K\pi \to K\pi$
594 ± 79		[2] ZHENG	04	RVUE	$K^- p \to K^- \pi^+ n$
722 ± 60		[3] BUGG	03	RVUE	11 $K^- p \to K^- \pi^+ n$
$797 \pm 19 \pm 43$	15090	[4] AITALA	02	E791	$D^+ \to K^- \pi^+ \pi^+$
905^{+65}_{-30}		[5] ISHIDA	97B	RVUE	11 $K^- p \to K^- \pi^+ n$

NODE=M174M

[1] T-matrix pole. Reanalysis of data from LINGLIN 73, ESTABROOKS 78, and ASTON 88 in the unitarized ChPT model.
NODE=M174M;LINKAGE=PE

[2] Using ASTON 88.
NODE=M174M;LINKAGE=ZH

[3] T-matrix pole. Reanalysis of ASTON 88 data.
NODE=M174M;LINKAGE=A1

[4] Not seen by KOPP 01 using 7070 events of $D^0 \to K^- \pi^+ \pi^0$. LINK 02E and LINK 05I show clear evidence for a constant non-resonant scalar amplitude rather than $K_0^*(800)$ in their high statistics analysis of $D^+ \to K^- \pi^+ \mu^+ \nu_\mu$.
NODE=M174M;LINKAGE=A

[5] Reanalysis of ASTON 88 using interfering Breit-Wigner amplitudes.
NODE=M174M;LINKAGE=IS

$K_0^*(800)$ WIDTH

NODE=M174210

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
470 ± 66		[6] PELAEZ	04A	RVUE	$K\pi \to K\pi$
724 ± 332		[7] ZHENG	04	RVUE	$K^- p \to K^- \pi^+ n$
772 ± 100		[8] BUGG	03	RVUE	11 $K^- p \to K^- \pi^+ n$
$410 \pm 43 \pm 87$	15090	[9] AITALA	02	E791	$D^+ \to K^- \pi^+ \pi^+$
545^{+235}_{-110}		[10] ISHIDA	97B	RVUE	11 $K^- p \to K^- \pi^+ n$

NODE=M174W

[6] T-matrix pole. Reanalysis of data from LINGLIN 73, ESTABROOKS 78, and ASTON 88 in the unitarized ChPT model.
NODE=M174W;LINKAGE=PE

[7] Using ASTON 88.
NODE=M174W;LINKAGE=ZH

[8] T-matrix pole. Reanalysis of ASTON 88 data.
NODE=M174W;LINKAGE=A1

[9] 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

[10] Reanalysis of ASTON 88 using interfering Breit-Wigner amplitudes.
NODE=M174W;LINKAGE=IS

$K_0^*(800)$ REFERENCES

NODE=M174

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

OTHER RELATED PAPERS

BRITO	05	PL B608 69	T.V. Brito *et al.*		REFID=50456
GARMASH	05	PR D71 092003	A. Garmash *et al.*	(BELLE Collab.)	REFID=50641
ABLIKIM	04E	PL B603 138	M. Ablikim *et al.*	(BES Collab.)	REFID=50174
PELAEZ	04	PRL 92 102001	J.R. Pelaez		REFID=49777
YNDURAIN	04	PL B578 99	F.J. Yndurain		REFID=49783
SEMENOV	03	PAN 66 526 Translated from YAF 66 553.	S.V. Semenov		REFID=49418
LINK	02L	PL B544 89	J.M. Link *et al.*	(FNAL FOCUS Collab.)	REFID=48918
BEVEREN	01B	EPJ C22 493	E. van Beveren		REFID=48569

NODE=M018

$K^*(892)$

$I(J^P) = \frac{1}{2}(1^-)$

$K^*(892)$ MASS

NODE=M018205

CHARGED ONLY

NODE=M018M1
NODE=M018M1

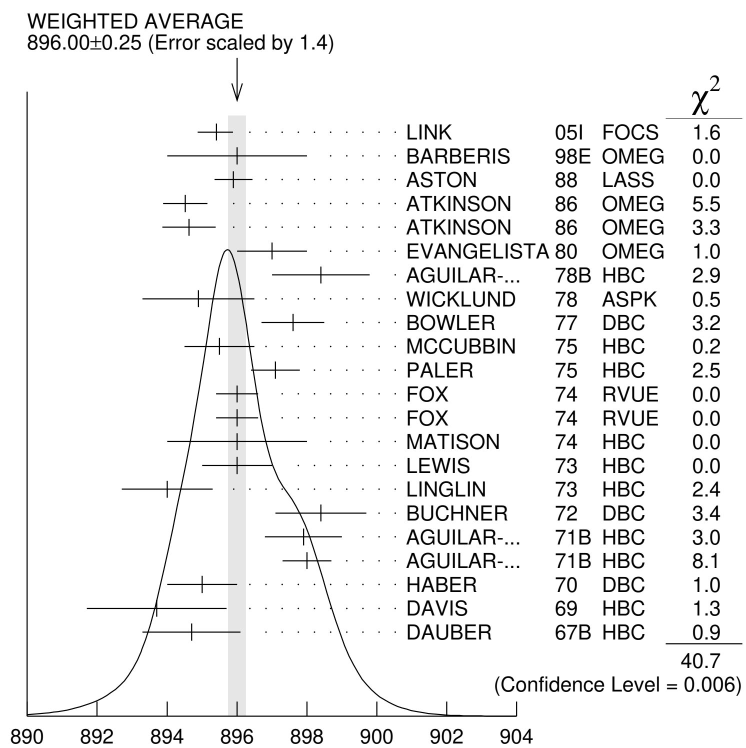
VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*	
891.66±0.26 OUR AVERAGE							
892.6 ±0.5	5840	BAUBILLIER	84B	HBC	−	8.25 $K^- p \to \overline{K}^0 \pi^- p$	
888 ±3		NAPIER	84	SPEC	+	200 $\pi^- p \to 2K^0_S X$	
891 ±1		NAPIER	84	SPEC	−	200 $\pi^- p \to 2K^0_S X$	OCCUR=2
891.7 ±2.1	3700	BARTH	83	HBC	+	70 $K^+ p \to K^0 \pi^+ X$	
891 ±1	4100	TOAFF	81	HBC	−	6.5 $K^- p \to \overline{K}^0 \pi^- p$	
892.8 ±1.6		AJINENKO	80	HBC	+	32 $K^+ p \to K^0 \pi^+ X$	
890.7 ±0.9	1800	AGUILAR-...	78B	HBC	±	0.76 $\overline{p} p \to K^\mp K^0_S \pi^\pm$	
886.6 ±2.4	1225	BALAND	78	HBC	±	12 $\overline{p} p \to (K\pi)^\pm X$	
891.7 ±0.6	6706	COOPER	78	HBC	±	0.76 $\overline{p} p \to (K\pi)^\pm X$	
891.9 ±0.7	9000	[1] PALER	75	HBC	−	14.3 $K^- p \to (K\pi)^- X$	
892.2 ±1.5	4404	AGUILAR-...	71B	HBC	−	3.9,4.6 $K^- p \to (K\pi)^- p$	
891 ±2	1000	CRENNELL	69D	DBC	−	3.9 $K^- N \to K^0 \pi^- X$	
890 ±3.0	720	BARLOW	67	HBC	±	1.2 $\overline{p} p \to (K^0 \pi)^\pm K^\mp$	
889 ±3.0	600	BARLOW	67	HBC	±	1.2 $\overline{p} p \to (K^0 \pi)^\pm K \pi$	OCCUR=2
891 ±2.3	620	[2] DEBAERE	67B	HBC	+	3.5 $K^+ p \to K^0 \pi^+ p$	
891.0 ±1.2	1700	[3] WOJCICKI	64	HBC	−	1.7 $K^- p \to \overline{K}^0 \pi^- p$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
893.5 ±1.1	27k	[4] ABELE	99D	CBAR	±	0.0 $\overline{p} p \to K^+ K^- \pi^0$	
890.4 ±0.2 ±0.5	79709±801	[5] BIRD	89	LASS	−	11 $K^- p \to \overline{K}^0 \pi^- p$	
890.0 ±2.3	800	[2,3] CLELAND	82	SPEC	+	30 $K^+ p \to K^0_S \pi^+ p$	
896.0 ±1.1	3200	[2,3] CLELAND	82	SPEC	+	50 $K^+ p \to K^0_S \pi^+ p$	OCCUR=2
893 ±1	3600	[2,3] CLELAND	82	SPEC	−	50 $K^+ p \to K^0_S \pi^- p$	OCCUR=3
896.0 ±1.9	380	DELFOSSE	81	SPEC	+	50 $K^\pm p \to K^\pm \pi^0 p$	
886.0 ±2.3	187	DELFOSSE	81	SPEC	−	50 $K^\pm p \to K^\pm \pi^0 p$	OCCUR=2
894.2 ±2.0	765	[2] CLARK	73	HBC	−	3.13 $K^- p \to \overline{K}^0 \pi^- p$	
894.3 ±1.5	1150	[2,3] CLARK	73	HBC	−	3.3 $K^- p \to \overline{K}^0 \pi^- p$	OCCUR=2
892.0 ±2.6	341	[2] SCHWEING...	68	HBC	−	5.5 $K^- p \to \overline{K}^0 \pi^- p$	OCCUR=2

NEUTRAL ONLY

NODE=M018M2
NODE=M018M2

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
896.00±0.25 OUR NEW AVERAGE Error includes scale factor of 1.4. See the ideogram below. [896.10 ± 0.27 MeV OUR 2005 AVERAGE Scale factor = 1.4]						
895.41±0.32 $^{+0.35}_{-0.43}$		[6] LINK	05I	FOCS		$D^+ \to K^- \pi^+ \mu^+ \nu_\mu$
896 ±2		BARBERIS	98E	OMEG		450 $p p \to p_f p_s K^* \overline{K}^*$
895.9 ±0.5 ±0.2		ASTON	88	LASS	0	11 $K^- p \to K^- \pi^+ n$
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	EVANGELISTA	80	OMEG	0	10 $\pi^- p \to K^+ \pi^- (\Lambda, \Sigma)$	
898.4 ±1.4	1180	AGUILAR-...	78B	HBC	0	0.76 $\overline{p} p \to K^{\mp} K^0_S \pi^{\pm}$	
894.9 ±1.6		WICKLUND	78	ASPK	0	3,4,6 $K^{\pm} N \to (K\pi)^0 N$	
897.6 ±0.9		BOWLER	77	DBC	0	5.4 $K^+ d \to K^+ \pi^- p p$	
895.5 ±1.0	3600	MCCUBBIN	75	HBC	0	3.6 $K^- p \to K^- \pi^+ n$	
897.1 ±0.7	22k	[1] PALER	75	HBC	0	14.3 $K^- p \to (K\pi)^0 X$	
896.0 ±0.6	10k	FOX	74	RVUE	0	2 $K^- p \to K^- \pi^+ n$	
896.0 ±0.6		FOX	74	RVUE	0	2 $K^+ n \to K^+ \pi^- p$	OCCUR=2
896 ±2		[7] MATISON	74	HBC	0	12 $K^+ p \to K^+ \pi^- \Delta$	
896 ±1	3186	LEWIS	73	HBC	0	2.1–2.7 $K^+ p \to K \pi \pi p$	
894.0 ±1.3		[7] LINGLIN	73	HBC	0	2–13 $K^+ p \to K^+ \pi^- \pi^+ p$	
898.4 ±1.3	1700	[2] BUCHNER	72	DBC	0	4.6 $K^+ n \to K^+ \pi^- p$	
897.9 ±1.1	2934	[2] AGUILAR-...	71B	HBC	0	3.9,4.6 $K^- p \to K^- \pi^+ n$	
898.0 ±0.7	5362	[2] AGUILAR-...	71B	HBC	0	3.9,4.6 $K^- p \to K^- \pi^+ \pi^- p$	OCCUR=2
895 ±1	4300	[3] HABER	70	DBC	0	3 $K^- N \to K^- \pi^+ X$	
893.7 ±2.0	10k	DAVIS	69	HBC	0	12 $K^+ p \to K^+ \pi^- \pi^+ p$	
894.7 ±1.4	1040	[2] 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. • • •							
900.7 ±1.1	5900	BARTH	83	HBC	0	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=M018W1;LINKAGE=AN

[5] From a partial wave amplitude analysis. NODE=M018M1;LINKAGE=F

[6] Fit to $K\pi$ mass spectrum includes a non-resonant scalar component. NODE=M018M2;LINKAGE=LI

[7] From pole extrapolation. NODE=M018M;LINKAGE=C

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NODE=M018209

$m_{K^*(892)^0} - m_{K^*(892)^\pm}$

NODE=M018210

NODE=M018D

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
6.7±1.2 OUR AVERAGE						
7.7±1.7	2980	AGUILAR-...	78B	HBC	±0	0.76 $\overline{p}p \to K^\mp K^0_S \pi^\pm$
5.7±1.7	7338	AGUILAR-...	71B	HBC	−0	3.9,4.6 $K^- p$
6.3±4.1	283	[8] BARASH	67B	HBC		0.0 $\overline{p}p$

[8] Number of events in peak reevaluated by us.

NODE=M018D;LINKAGE=W

$K^*(892)$ RANGE PARAMETER

NODE=M018212

All from partial wave amplitude analyses.

NODE=M018212

NODE=M018R

VALUE (GeV^{-1})	DOCUMENT ID		TECN	CHG	COMMENT
3.4±0.7	ASTON	88	LASS	0	11 $K^- p \to K^- \pi^+ n$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
12.1±3.2±3.0	BIRD	89	LASS	−	11 $K^- p \to \overline{K}^0 \pi^- p$

$K^*(892)$ WIDTH

NODE=M018215

CHARGED ONLY

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 $K^- p \to \overline{K}^0 \pi^- p$	
56 ±4		NAPIER	84	SPEC	−	200 $\pi^- p \to 2K^0_S X$	OCCUR=2
51 ±2	4100	TOAFF	81	HBC	−	6.5 $K^- p \to \overline{K}^0 \pi^- p$	
50.5±5.6		AJINENKO	80	HBC	+	32 $K^+ p \to K^0 \pi^+ X$	
45.8±3.6	1800	AGUILAR-...	78B	HBC	±	0.76 $\overline{p}p \to K^\mp K^0_S \pi^\pm$	
52.0±2.5	6706	[9] COOPER	78	HBC	±	0.76 $\overline{p}p \to (K\pi)^\pm X$	
52.1±2.2	9000	[10] PALER	75	HBC	−	14.3 $K^- p \to (K\pi)^- X$	
46.3±6.7	765	[9] CLARK	73	HBC	−	3.13 $K^- p \to \overline{K}^0 \pi^- p$	
48.2±5.7	1150	[9,11] CLARK	73	HBC	−	3.3 $K^- p \to \overline{K}^0 \pi^- p$	OCCUR=2
54.3±3.3	4404	[9] AGUILAR-...	71B	HBC	−	3.9,4.6 $K^- p \to (K\pi)^- p$	
46 ±5	1700	[9,11] WOJCICKI	64	HBC	−	1.7 $K^- p \to \overline{K}^0 \pi^- p$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
54.8±1.7	27k	[4] ABELE	99D	CBAR	±	0.0 $\overline{p}p \to K^+ K^- \pi^0$	
45.2±1 ±2	79709±801	[12] BIRD	89	LASS	−	11 $K^- p \to \overline{K}^0 \pi^- p$	
42.8±7.1	3700	BARTH	83	HBC	+	70 $K^+ p \to K^0 \pi^+ X$	
64.0±9.2	800	[9,11] CLELAND	82	SPEC	+	30 $K^+ p \to K^0_S \pi^+ p$	
62.0±4.4	3200	[9,11] CLELAND	82	SPEC	+	50 $K^+ p \to K^0_S \pi^+ p$	OCCUR=2
55 ±4	3600	[9,11] CLELAND	82	SPEC	−	50 $K^+ p \to K^0_S \pi^- p$	OCCUR=3
62.6±3.8	380	DELFOSSE	81	SPEC	+	50 $K^\pm p \to K^\pm \pi^0 p$	
50.5±3.9	187	DELFOSSE	81	SPEC	−	50 $K^\pm p \to K^\pm \pi^0 p$	OCCUR=2

NEUTRAL ONLY

NODE=M018W2

NODE=M018W2

50.3 ±0.6 OUR NEW UNCHECKED FIT Error includes scale factor of 1.1. [50.7 ± 0.6 MeV OUR 2005 FIT Scale factor = 1.1]

50.3 ±0.6 OUR NEW AVERAGE Error includes scale factor of 1.1. [50.7 ± 0.6 MeV OUR 2005 AVERAGE Scale factor = 1.1]

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
$47.79\pm0.86^{+1.32}_{-1.06}$		[6] LINK	05I	FOCS		$D^+ \to K^- \pi^+ \mu^+ \nu_\mu$
54 ±3		BARBERIS	98E	OMEG		450 $pp \to p_f p_s K^* \overline{K}^*$
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	EVANGELISTA	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 $K^+ d \to K^+\pi^- pp$
48	$^{+3}_{-2}$	3600		MCCUBBIN	75	HBC	0	3.6 $K^- p \to K^-\pi^+ n$
50.6	±2.5	22k	10	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 $K^+ n \to K^+\pi^- p$
46.0	±3.3	3186	9	LEWIS	73	HBC	0	2.1–2.7 $K^+ p \to K\pi\pi p$
51.4	±5.0	1700	9	BUCHNER	72	DBC	0	4.6 $K^+ n \to K^+\pi^- p$
55.8	$^{+4.2}_{-3.4}$	2934	9	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 $K^- p \to K^-\pi^+\pi^- p$
54.0	±3.3	4300	9,11	HABER	70	DBC	0	3 $K^- N \to K^-\pi^+$ X
53.2	±2.1	10k	9	DAVIS	69	HBC	0	12 $K^+ p \to K^+\pi^-\pi^+ p$
44	±5.5	1040	9	DAUBER	67B	HBC	0	2.0 $K^- p \to K^-\pi^+\pi^- p$

OCCUR=2 (FOX 74, $K^+ n$)
OCCUR=2 (AGUILAR-... 71B, 5362)

[9] Width errors enlarged by us to $4 \times \Gamma/\sqrt{N}$; see note.
[10] Inclusive reaction. Complicated background and phase-space effects.
[11] Number of events in peak reevaluated by us.
[12] From a partial wave amplitude analysis.

NODE=M018W;LINKAGE=D
NODE=M018W;LINKAGE=I
NODE=M018W;LINKAGE=W
NODE=M018W1;LINKAGE=F

$K^*(892)$ 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	$(K\pi)^0$	(99.769±0.020) %		DESIG=12
Γ_4	$K^0\gamma$	(2.31 ±0.20) $\times 10^{-3}$		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 20 measurements and one constraint to determine 3 parameters. The overall fit has a $\chi^2 = 22.6$ for 18 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, $x_i \equiv \Gamma_i/\Gamma_{\text{total}}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_4	−100	
Γ	14	−14
	x_3	x_4

	Mode	Rate (MeV)	Scale factor	
Γ_3	$(K\pi)^0$	50.2 ±0.6	1.1	DESIG=12
Γ_4	$K^0\gamma$	0.117±0.010		DESIG=4

$K^*(892)$ PARTIAL WIDTHS

NODE=M018225

$\Gamma(K^0\gamma)$ Γ_4

NODE=M018W4
NODE=M018W4

VALUE (keV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
116 ±10 OUR FIT						
116.5± 9.9	584	CARLSMITH	86	SPEC	0	$K^0_L A \rightarrow K^0_S \pi^0 A$

$\Gamma(K^\pm\gamma)$ 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

$\Gamma(K^0\gamma)/\Gamma_{\text{total}}$ Γ_4/Γ

NODE=M018R3
NODE=M018R3

VALUE (units 10^{-3})	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
2.31±0.20 OUR NEW UNCHECKED FIT [(2.30 ± 0.20) × 10^{-3} OUR 2005 FIT]					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.5 ±0.7	CARITHERS	75B	CNTR	0	8–16 $\overline{K}^0 A$

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

NODE=M018R2
NODE=M018R2

VALUE (units 10^{-3})	*CL%*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
0.99±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*
<0.0007	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. • • •						
<0.002		WOJCICKI	64	HBC	−	1.7 $K^- p \rightarrow \overline{K}^0 \pi^- p$

$K^*(892)$ REFERENCES

NODE=M018

LINK	05I	PL B621 72	J.M. Link *et al.*	(FNAL FOCUS Collab.)	REFID=50679
ABELE	99D	PL B468 178	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=47401
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
EVANGELISTA	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 135B 484	S.G. Wojcicki	(LRL)	REFID=22379

OTHER RELATED PAPERS

BENAYOUN	99B	PR D59 114027	M. Benayoun *et al.*		REFID=46936
KAMAL	92	PL B284 421	A.N. Kamal, Q.P. Xu	(ALBE)	REFID=43166
NAPIER	84	PL 149B 514	A. Napier *et al.*	(TUFTS, ARIZ, FNAL, FLOR+)	REFID=22460
CLELAND	82	NP B208 189	W.E. Cleland *et al.*	(DURH, GEVA, LAUS+)	REFID=22455
ALEXANDER	62	PRL 8 447	G. Alexander *et al.*	(LRL)	REFID=22375
ALSTON	61	PRL 6 300	M.H. Alston *et al.*	(LRL)	REFID=22374

NODE=M028

$K_1(1270)$

$I(J^P) = \frac{1}{2}(1^+)$

$K_1(1270)$ MASS

NODE=M028205

NODE=M028MX

VALUE (MeV)	*DOCUMENT ID*
1273±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	DAUM	81C	CNTR	−	63 $K^- p \to K^- 2\pi p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
∼ 1276	[1] TORNQVIST	82B	RVUE		
∼ 1300	VERGEEST	79	HBC	−	4.2 $K^- p \to (\overline{K}\pi\pi)^- p$
1289±25	[2] 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] From a unitarized quark-model calculation. NODE=M028M3;LINKAGE=T

[2] 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
• • • We do not use the following data for averages, fits, limits, etc. • • •						
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}		[3] ASTIER	69	HBC	0	$\overline{p}p$
1300	45	CRENNELL	67	HBC	0	$6\ \pi^- p \to \Lambda K 2\pi$

[3] This was called the C meson.

NODE=M028M1;LINKAGE=A

$K_1(1270)$ WIDTH

NODE=M028210

VALUE (MeV)	DOCUMENT ID

NODE=M028WX

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.

→ NOT CHECKED ←

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

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
The data in this block is included in the average printed for a previous datablock.						
75±15	700	GAVILLET	78	HBC	+	$4.2\ K^- p \to \Xi^- K\pi\pi$

PRODUCED BY K BEAMS

NODE=M028W3
NODE=M028W3

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
The data in this block is included in the average printed for a previous datablock.					
90± 8	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	[4] 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	+	$12\ K^+ d$

[4] From a model-dependent fit with Gaussian background to BRANDENBURG 76 data.

NODE=M028W3;LINKAGE=E

PRODUCED BY BEAMS OTHER THAN K MESONS

NODE=M028W1
NODE=M028W1

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
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	$6\ \pi^- p \to \Lambda K 2\pi$

$K_1(1270)$ 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
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	±	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	±	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	[5] DAUM	81C	CNTR	63 $K^- p \to K^- 2\pi p$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
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	[5] DAUM	81C	CNTR	63 $K^- p \to K^- 2\pi p$

$\Gamma(K^*(892)\pi)/\Gamma_{total}$ Γ_3/Γ

NODE=M028R1

VALUE	DOCUMENT ID		TECN	COMMENT
0.16±0.05	[5] DAUM	81C	CNTR	63 $K^- p \to K^- 2\pi p$

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

NODE=M028R3

VALUE	DOCUMENT ID		TECN	COMMENT
0.11 ±0.02	[5] DAUM	81C	CNTR	63 $K^- p \to K^- 2\pi p$

$\Gamma(K\omega)/\Gamma(K\rho)$ 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	[5] 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	[5] DAUM	81C	CNTR	63 $K^- p \to K^- 2\pi p$

[5] Average from low and high t data.

NODE=M028R;LINKAGE=F

$K_1(1270)$ REFERENCES

NODE=M028

ALAVI-HARATI	02B	PRL 89 072001	A. Alavi-Harati *et al.*	(FNAL KTeV Collab.)	REFID=48822
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 26 703	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

OTHER RELATED PAPERS

SUZUKI	93	PR D47 1252	M. Suzuki	(LBL)	REFID=43308
BAUBILLIER	82B	NP B202 21	M. Baubillier *et al.*	(BIRM, CERN, GLAS+)	REFID=22551
FERNANDEZ	82	ZPHY C16 95	C. Fernandez *et al.*	(MADR, CERN, CDEF+) JP	REFID=22552
GAVILLET	82	ZPHY C16 119	P. Gavillet *et al.*	(CERN, CDEF, PADO+)	REFID=20877
SHEN	66	PRL 17 726	B.C. Shen *et al.*	(LRL)	REFID=22469
Also	66	Private Comm.	G. Goldhaber	(LRL)	REFID=22470
ALMEIDA	65	PL 16 184	S.P. Almeida *et al.*	(CAVE)	REFID=22468
ARMENTEROS	64	PL 9 207	R. Armenteros *et al.*	(CERN, CDEF)	REFID=22466
Also	66	PR 145 1095	N. Barash *et al.*	(COLU)	REFID=22467

NODE=M064

$K_1(1400)$

$I(J^P) = \frac{1}{2}(1^+)$

$K_1(1400)$ MASS

NODE=M064205

NODE=M064M

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
1402±7 OUR AVERAGE					
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. • • •					
∼ 1350	[3] 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] From a unitarized quark-model calculation. NODE=M064M;LINKAGE=T

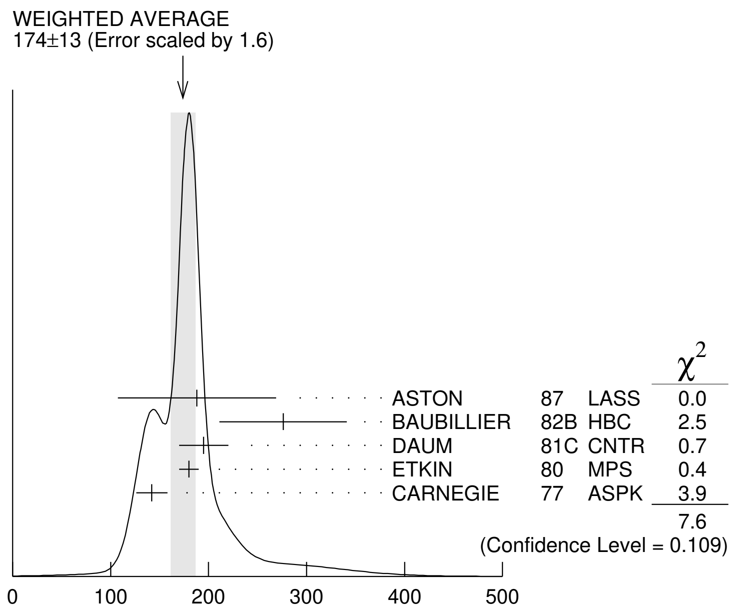
$K_1(1400)$ WIDTH

NODE=M064210

NODE=M064W

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
174±13 OUR AVERAGE Error includes scale factor of 1.6. See the ideogram below.					
188±54±60	[4] 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	[5] 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. • • •					
∼ 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 $K^+ d$

[4] From partial-wave analysis of $K^0 \pi^+ \pi^-$ system. NODE=M064W;LINKAGE=P
[5] From a model-dependent fit with Gaussian background to BRANDENBURG 76 data. NODE=M064W;LINKAGE=E



$K_1(1400)$ 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 $K^\pm p \to (K\pi\pi)^\pm p$

$\Gamma(K\rho)$ Γ_2

NODE=M064W2
NODE=M064W2

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
2 ±1	CARNEGIE	77	ASPK	±	13 $K^\pm p \to (K\pi\pi)^\pm p$

$\Gamma(K\omega)$ Γ_4

NODE=M064W5
NODE=M064W5

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
23±12	CARNEGIE	77	ASPK	±	13 $K^\pm p \to (K\pi\pi)^\pm p$

$\Gamma(\gamma K^0)$ Γ_6

NODE=M064W6
NODE=M064W6

VALUE (keV)	*DOCUMENT ID*		*TECN*	*COMMENT*
280.8±23.2±40.4	ALAVI-HARATI	02B	KTEV	$K + A \to K^* + A$

$K_1(1400)$ 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	[6] DAUM	81C	CNTR	63 $K^- p \to K^- 2\pi p$

$\Gamma(K\rho)/\Gamma_{total}$ Γ_2/Γ

NODE=M064R2
NODE=M064R2

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
0.03 ±0.03	[6] DAUM	81C	CNTR	63 $K^- p \to K^- 2\pi p$

$\Gamma(K f_0(1370))/\Gamma_{total}$ — Γ_3/Γ

NODE=M064R5

VALUE	DOCUMENT ID		TECN	COMMENT
0.02 ±0.02	[6] 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	[6] 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	[6] 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	[6] DAUM	81C	CNTR	63 $K^- p \to K^- 2\pi p$

[6] Average from low and high t data.

NODE=M064R;LINKAGE=F

$K_1(1400)$ REFERENCES

NODE=M064

ALAVI-HARATI	02B	PRL 89 072001	A. Alavi-Harati *et al.*	(FNAL KTeV Collab.)	REFID=48822
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 26 703	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

OTHER RELATED PAPERS

SUZUKI	93	PR D47 1252	M. Suzuki	(LBL)	REFID=43308
FERNANDEZ	82	ZPHY C16 95	C. Fernandez *et al.*	(MADR, CERN, CDEF+)	REFID=22552
SHEN	66	PRL 17 726	B.C. Shen *et al.*	(LRL)	REFID=22469
Also	66	Private Comm.	G. Goldhaber	(LRL)	REFID=22470
ALMEIDA	65	PL 16 184	S.P. Almeida *et al.*	(CAVE)	REFID=22468
ARMENTEROS	64	PL 9 207	R. Armenteros *et al.*	(CERN, CDEF)	REFID=22466
Also	66	PR 145 1095	N. Barash *et al.*	(COLU)	REFID=22467

NODE=M094

$K^*(1410)$

$I(J^P) = \frac{1}{2}(1^-)$

$K^*(1410)$ MASS

NODE=M094205

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. • • •					
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 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$

$K^*(1410)$ WIDTH

NODE=M094210

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. • • •					
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 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$

$K^*(1410)$ 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

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

OTHER RELATED PAPERS

LI	05E	MPL A20 2497	D.-M. Li *et al.*	REFID=50968

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 $f_0(600)$.

NODE=M019

$K_0^*(1430)$ MASS

NODE=M019205

NODE=M019M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1412 ± 6		[1] ASTON	88	LASS	0	11 $K^- p \to K^- \pi^+ n$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1456 ± 8		[2] ZHENG	04	RVUE		$K^- p \to K^- \pi^+ n$
∼ 1419		[3] BUGG	03	RVUE		11 $K^- p \to K^- \pi^+ n$
∼ 1440		[4] LI	03	RVUE		11 $K^- p \to K^- \pi^+ n$
1459 ± 9	15090	[5] AITALA	02	E791		$D^+ \to K^- \pi^+ \pi^+$
∼ 1440		[6] JAMIN	00	RVUE		$K p \to K p$
1436 ± 8		[7] BARBERIS	98E	OMEG		450 $p p \to p_f p_s K^+ K^- \pi^+ \pi^-$
1415 ±25		[3] ANISOVICH	97C	RVUE		11 $K^- p \to K^- \pi^+ n$
∼ 1450		[8] TORNQVIST	96	RVUE		$\pi\pi \to \pi\pi$, $K\overline{K}$, $K\pi$
∼ 1430		BAUBILLIER	84B	HBC	−	8.25 $K^- p \to \overline{K}^0 \pi^- p$
∼ 1425		[9,10] ESTABROOKS	78	ASPK		13 $K^\pm p \to K^\pm \pi^\pm (n, \Delta)$
∼ 1450.0		MARTIN	78	SPEC		10 $K^\pm p \to K_S^0 \pi p$

[1] 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
[2] Using ASTON 88 and assuming $K_0^*(800)$. NODE=M019M;LINKAGE=ZH
[3] T-matrix pole. Reanalysis of ASTON 88 data. NODE=M019M;LINKAGE=A1
[4] Breit-Wigner fit. Using ASTON 88. NODE=M019M;LINKAGE=E
[5] Assuming a low-mass scalar $K\pi$ resonance, $\kappa(800)$. NODE=M019M;LINKAGE=A0
[6] T-matrix pole. Using data from ESTABROOKS 78 and ASTON 88. NODE=M019M;LINKAGE=JM
[7] J^P not determined, could be $K_2^*(1430)$. NODE=M019M;LINKAGE=JP
[8] T-matrix pole. NODE=M019M;LINKAGE=TT
[9] Mass defined by pole position. NODE=M019M;LINKAGE=A
[10] From elastic $K\pi$ partial-wave analysis. NODE=M019M;LINKAGE=C

$K_0^*(1430)$ WIDTH

NODE=M019210

NODE=M019W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
294±23		ASTON	88	LASS	0	11 $K^- p \to K^- \pi^+ n$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
217±31		[11] ZHENG	04	RVUE		$K^- p \to K^- \pi^+ n$
∼ 316		[12] BUGG	03	RVUE		11 $K^- p \to K^- \pi^+ n$
∼ 350		[13] LI	03	RVUE		11 $K^- p \to K^- \pi^+ n$
175±17	15090	[14] AITALA	02	E791		$D^+ \to K^- \pi^+ \pi^+$
∼ 300		[15] JAMIN	00	RVUE		$K p \to K p$
196±45		[16] BARBERIS	98E	OMEG		450 $p p \to p_f p_s K^+ K^- \pi^+ \pi^-$
330±50		[12] ANISOVICH	97C	RVUE		11 $K^- p \to K^- \pi^+ n$
∼ 320		[17] TORNQVIST	96	RVUE		$\pi\pi \to \pi\pi$, $K\overline{K}$, $K\pi$
∼ 200		BAUBILLIER	84B	HBC	−	8.25 $K^- p \to \overline{K}^0 \pi^- p$
200 to 300		[18] ESTABROOKS	78	ASPK		13 $K^\pm p \to K^\pm \pi^\pm (n, \Delta)$

[11] Using ASTON 88 and assuming $K_0^*(800)$. NODE=M019W;LINKAGE=ZH
[12] T-matrix pole. Reanalysis of ASTON 88 data. NODE=M019W;LINKAGE=A1
[13] Breit-Wigner fit. Using ASTON 88. NODE=M019W;LINKAGE=E
[14] Assuming a low-mass scalar $K\pi$ resonance, $\kappa(800)$. NODE=M019W;LINKAGE=A0
[15] T-matrix pole. Using data from ESTABROOKS 78 and ASTON 88. NODE=M019W;LINKAGE=JM
[16] J^P not determined, could be $K_2^*(1430)$. NODE=M019W;LINKAGE=JP
[17] T-matrix pole. NODE=M019W;LINKAGE=TT
[18] 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

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

OTHER RELATED PAPERS

AUBERT,B	04O	PR D70 091103R	B. Aubert *et al.*	(BABAR Collab.)	REFID=50190
AUBERT,B	04P	PR D70 092001	B. Aubert *et al.*	(BABAR Collab.)	REFID=50193
SHAKIN	00	PR D62 114014	C.M. Shakin, H. Wang		REFID=47992
BEVEREN	99	EPJ C10 469	E. Van Beveren, G. Rupp		REFID=47405
OLLER	99	PR D60 099906 (erratum)	J.A. Oller *et al.*		REFID=46899
OLLER	99C	PR D60 074023	J.A. Oller, E. Oset		REFID=47386
TORNQVIST	82	PRL 49 624	N.A. Tornqvist	(HELS)	REFID=20392
GOLDBERG	69	PL 30B 434	J. Goldberg *et al.*	(SABRE Collab.)	REFID=22558
TRIPPE	68	PL 28B 203	T.G. Trippe *et al.*	(UCLA)	REFID=22555

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

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1432.4± 1.3 OUR AVERAGE						
1431.2± 1.8± 0.7		[5] ASTON	88	LASS	0	11 $K^- p \to K^- \pi^+ n$
1434 ± 4 ± 6		[5] ASTON	87	LASS	0	11 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$
1433 ± 6 ±10		[5] ASTON	84B	LASS	0	11 $K^- p \to \overline{K}^0 2\pi n$
1471 ±12		[5] BAUBILLIER	82B	HBC	0	8.25 $K^- p \to N K^0_S \pi\pi$
1428 ± 3		[5] ASTON	81C	LASS	0	11 $K^- p \to K^- \pi^+ n$
1434 ± 2		[5] ESTABROOKS	78	ASPK	0	13 $K^\pm p \to p K \pi$
1440 ±10		[5] BOWLER	77	DBC	0	5.5 $K^+ d \to K \pi p p$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1420 ± 7	300	HENDRICK	76	DBC		8.25 $K^+ N \to K^+ \pi N$
1421.6± 4.2	800	MCCUBBIN	75	HBC	0	3.6 $K^- p \to K^- \pi^+ n$
1420.1± 4.3		[6] LINGLIN	73	HBC	0	2–13 $K^+ p \to K^+ \pi^- X$
1419.1± 3.7	1800	AGUILAR-...	71B	HBC	0	3.9,4.6 $K^- p$
1416 ± 6	600	CORDS	71	DBC	0	9 $K^+ n \to K^+ \pi^- p$
1421.1± 2.6	2200	DAVIS	69	HBC	0	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] 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 $K\pi$

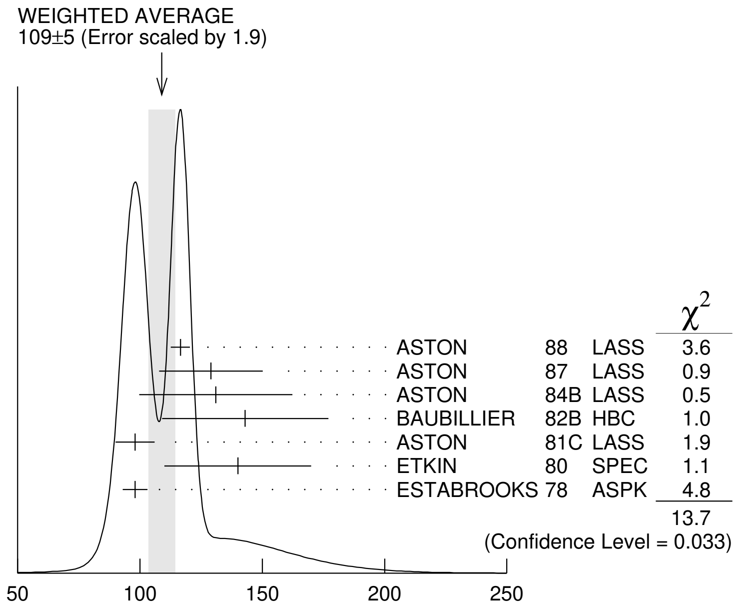
NODE=M022W1

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	[7,8] CLELAND	82	SPEC	+	30 $K^+ p \to K^0_S \pi^+ p$	
124 ±12.8	1500	[7,8] CLELAND	82	SPEC	+	50 $K^+ p \to K^0_S \pi^+ p$	OCCUR=2
113 ±12.8	1200	[7,8] CLELAND	82	SPEC	−	50 $K^+ p \to K^0_S \pi^- p$	OCCUR=3
85 ±16	935	TOAFF	81	HBC	−	6.5 $K^- p \to \overline{K}^0 \pi^- p$	
96.5± 3.8		MARTIN	78	SPEC	+	10 $K^\pm p \to K^0_S \pi p$	
97.7± 4.0		MARTIN	78	SPEC	−	10 $K^\pm p \to K^0_S \pi p$	OCCUR=2
$94.7^{+15.1}_{-12.5}$	1400	AGUILAR-...	71B	HBC	−	3.9,4.6 $K^- p$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
98 ± 4 ±4	24809± 820	[9] BIRD	89	LASS	−	11 $K^- p \to \overline{K}^0 \pi^- p$	

NEUTRAL ONLY

NODE=M022W4

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
109 ± 5 OUR AVERAGE Error includes scale factor of 1.9. See the ideogram below.						
116.5± 3.6± 1.7		[10] ASTON	88	LASS	0	11 $K^- p \to K^- \pi^+ n$
129 ±15 ±15		[10] ASTON	87	LASS	0	11 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$
131 ±24 ±20		[10] ASTON	84B	LASS	0	11 $K^- p \to \overline{K}^0 2\pi n$
143 ±34		[10] BAUBILLIER	82B	HBC	0	8.25 $K^- p \to N K^0_S \pi\pi$
98 ± 8		[10] ASTON	81C	LASS	0	11 $K^- p \to K^- \pi^+ n$
140 ±30		[10] ETKIN	80	SPEC	0	6 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$
98 ± 5		[10] ESTABROOKS	78	ASPK	0	13 $K^\pm p \to p K \pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
125 ±29	300	[7] HENDRICK	76	DBC		8.25 $K^+ N \to K^+ \pi N$
116 ±18	800	MCCUBBIN	75	HBC	0	3.6 $K^- p \to K^- \pi^+ n$
61 ±14		[11] LINGLIN	73	HBC	0	2–13 $K^+ p \to K^+ \pi^- X$
$116.6^{+10.3}_{-15.5}$	1800	AGUILAR-...	71B	HBC	0	3.9,4.6 $K^- p$
144 ±24.0	600	[7] CORDS	71	DBC	0	9 $K^+ n \to K^+ \pi^- p$
101 ±10	2200	DAVIS	69	HBC	0	12 $K^+ p \to K^+ \pi^- \pi^+ p$



$K_2^*(1430)^0$ width (MeV)

[7] Errors enlarged by us to $4\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M022W;LINKAGE=D

[8] Number of events in peak re-evaluated by us. NODE=M022W;LINKAGE=W

[9] From a partial wave amplitude analysis. NODE=M022W;LINKAGE=F

[10] From phase shift or partial-wave analysis. NODE=M022W;LINKAGE=P

[11] 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 χ^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	[12] ASTON	88	LASS	0	11 $K^- p \to K^- \pi^+ n$
0.49 ±0.02	[12] 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

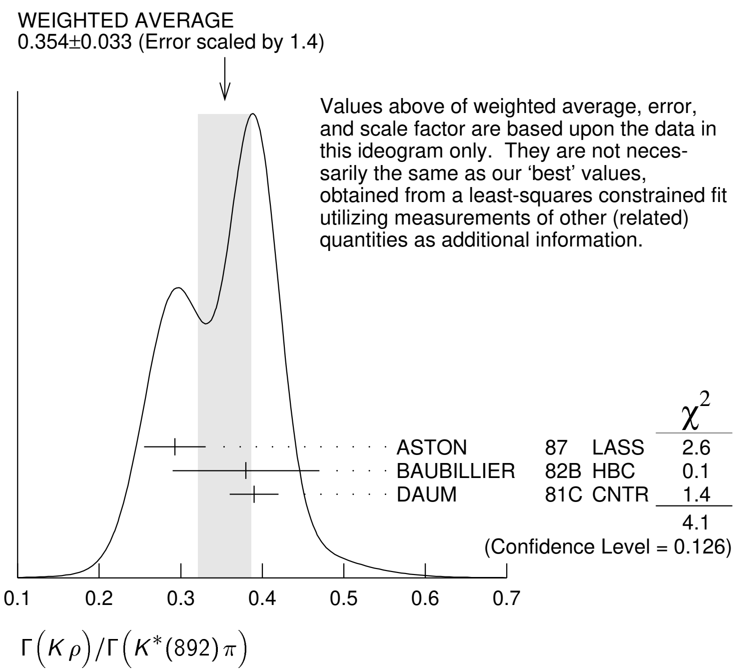
NODE=M022R6
NODE=M022R6

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
$0.006^{+0.014}_{-0.004}$ 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
$0.0030^{+0.0068}_{-0.0020}$ OUR FIT		Error includes scale factor of 1.3.				
0 ±0.0056		[13] 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		[14] 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	[15] 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	[14,15] 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 $K^- p \to p \overline{K}^0 4\pi$

[12] From phase shift analysis. NODE=M022R;LINKAGE=P

[13] 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

[14] Restated by us. NODE=M022R;LINKAGE=R

[15] Assuming $\pi\pi$ system has isospin 1, which is supported by the data. NODE=M022R;LINKAGE=T

$K_2^*(1430)$ REFERENCES

NODE=M022

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	78B	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	67	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

OTHER RELATED PAPERS

AUBERT,B	04O	PR D70 091103R	B. Aubert *et al.*	(BABAR Collab.)	REFID=50190
AUBERT,B	04P	PR D70 092001	B. Aubert *et al.*	(BABAR Collab.)	REFID=50193
BEVEREN	01B	EPJ C22 493	E. van Beveren		REFID=48569
BARBERIS	98E	PL B436 204	D. Barberis *et al.*	(Omega Expt.)	REFID=46348
ATKINSON	86	ZPHY C30 521	M. Atkinson *et al.*	(BONN, CERN, GLAS+)	REFID=20564
BAUBILLIER	82B	NP B202 21	M. Baubillier *et al.*	(BIRM, CERN, GLAS+)	REFID=22551
CHUNG	65	PRL 15 325	S.U. Chung *et al.*	(LRL)	REFID=20667
FOCARDI	65	PL 16 351	S. Focardi *et al.*	(BGNA, SACL)	REFID=22692
HAQUE	65	PL 14 338	N. Haque *et al.*		REFID=40554
HARDY	65	PRL 14 401	L.M. Hardy *et al.*	(LRL)	REFID=22699

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=M021205

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	$\pm$	13 $K^\pm p \to K^+ 2\pi p$

[1] Coupled mainly to $K f_0(1370)$. Decay into $K^*(892)\pi$ seen.

NODE=M021M;LINKAGE=A

$K(1460)$ WIDTH

NODE=M021210

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	$\pm$	13 $K^\pm p \to K^+ 2\pi p$

[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

OTHER RELATED PAPERS

TANIMOTO 82 PL 116B 198 M. Tanimoto (BIEL) REFID=20889

VERGEEST 79 NP B158 265 J.S.M. Vergeest *et al.* (NIJM, AMST, CERN+) REFID=22542

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=M039205

NODE=M039M

VALUE (MeV)	*DOCUMENT ID*		*CHG*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$\sim$ 1580	OTTER	79	$-$	10,14,16 $K^- p$

$K_2(1580)$ WIDTH

NODE=M039210

NODE=M039W

VALUE (MeV)	*DOCUMENT ID*		*CHG*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$\sim$ 110	OTTER	79	$-$	10,14,16 $K^- p$

$K_2(1580)$ DECAY MODES

NODE=M039215;NODE=M039

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$K^*(892)\pi$	seen	DESIG=1
Γ_2	$K_2^*(1430)\pi$	possibly seen	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 $K^- p$

$\Gamma(K_2^*(1430)\pi)/\Gamma_{total}$ 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

OTTER 79 NP B147 1 G. Otter *et al.* (AACH3, BERL, CERN, LOIC+) JP 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=M160205

VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
1629±7	~ 75	KARNAUKHOV98	BC	16.0 $\pi^- p \rightarrow (K^0_S \pi^+ \pi^-) X^+ \pi^- X^0$

NODE=M160M

$K(1630)$ WIDTH

NODE=M160210

VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
$\mathbf{16^{+19}_{-16}}$	~ 75	[1] KARNAUKHOV98	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

OTHER RELATED PAPERS

KARNAUKHOV 00 PAN 63 588 V.M. Karnaukhov, C. Coca, V.I. Moroz
Translated from YAF 63 652.

REFID=47984

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=M099205

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=M099210

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	$K\pi\pi$	DESIG=1
Γ_2	$K\phi$	DESIG=2

$K_1(1650)$ REFERENCES

NODE=M099

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

NODE=M095

$K^*(1680)$

$I(J^P) = \frac{1}{2}(1^-)$

$K^*(1680)$ MASS

NODE=M095205

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=M095210

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	$K\rho$	$(31.4^{+4.7}_{-2.1})$ %	DESIG=3
Γ_3	$K^*(892)\pi$	$(29.9^{+2.2}_{-4.7})$ %	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 $\langle \delta x_i \delta x_j \rangle / (\delta x_i \cdot \delta x_j)$, 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	−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

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

OTHER RELATED PAPERS

LI	05E	MPL A20 2497	D.-M. Li *et al.*	REFID=50968

NODE=M023

$K_2(1770)$

$I(J^P) = \frac{1}{2}(2^-)$

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NODE=M023

$K_2(1770)$ MASS

NODE=M023205

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=M023210

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

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

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

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

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

OTHER RELATED PAPERS

BERLINGHIERI	67	PRL 18 1087	J.C. Berlinghieri *et al.*	(ROCH) I	REFID=22472
CARMONY	67	PRL 18 615	D.D. Carmony, T. Hendricks, R.L. Lander	(UCSD)	REFID=22775
JOBES	67	PL 26B 49	M. Jobes *et al.*	(BIRM, CERN, BRUX)	REFID=22776
BARTSCH	66	PL 22 357	J. Bartsch *et al.*	(AACH, BERL, CERN+)	REFID=22773

NODE=M060

$K_3^*(1780)$

$I(J^P) = \frac{1}{2}(3^-)$

$K_3^*(1780)$ MASS

NODE=M060205

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 $K^- p \to K^0_S 2\pi N$
1784± 9	2060	CLELAND 82	SPEC	±	50 $K^+ p \to K^0_S \pi^\pm p$
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^2_6 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^0_6 moment. NODE=M060M;LINKAGE=J

$K_3^*(1780)$ WIDTH

NODE=M060210

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

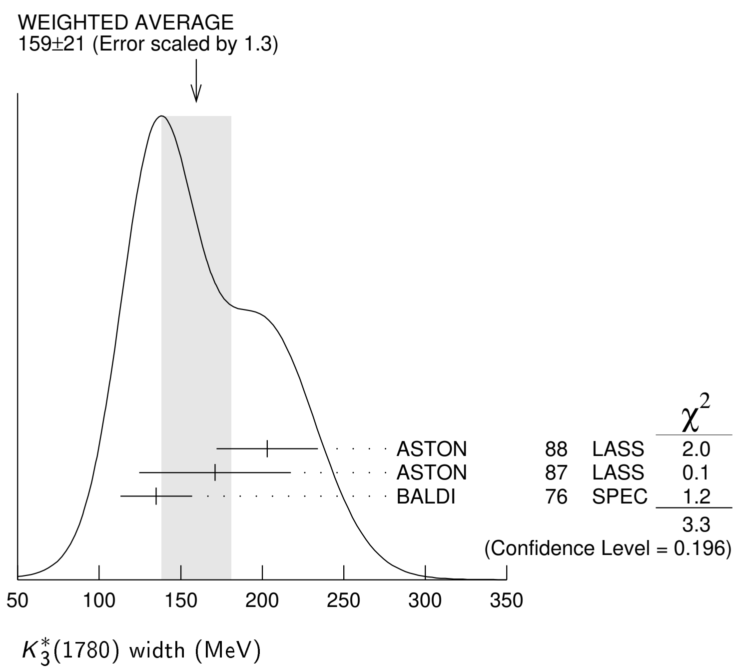
[7] From a fit to Y^2_6 moment. $J^P = 3^-$ found. NODE=M060W;LINKAGE=M

[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



$K_3^*(1780)$ 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, $x_i \equiv \Gamma_i/\Gamma_{\rm total}$. 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 $K^- p \to \overline{K}^0 2\pi n$

$\Gamma(K\pi)/\Gamma_{\rm total}$ — 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	78B	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

OTHER RELATED PAPERS

AGUILAR-...	73	PRL 30 672	M. Aguilar-Benitez *et al.*	(BNL)	REFID=22805
WALUCH	73	PR D8 2837	V. Waluch, S.M. Flatte, J.H. Friedman	(LBL)	REFID=22429
CARMONY	71	PRL 27 1160	D.D. Carmony *et al.*	(PURD, UCD, IUPU)	REFID=22803
FIRESTONE	71	PL 36B 513	A. Firestone *et al.*	(LBL)	REFID=22804

NODE=M146

$K_2(1820)$

$I(J^P) = \frac{1}{2}(2^-)$

Observed by ASTON 93 from a partial wave analysis of the $K^- \omega$ system. See mini-review under $K_2(1770)$.

NODE=M146

$K_2(1820)$ MASS

NODE=M146205

NODE=M146M

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
1816±13	[1] ASTON	93	LASS	$11 K^- p \rightarrow K^- \omega p$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
~ 1840	[2] DAUM	81C	CNTR	$63\ K^- p \rightarrow K^- 2\pi p$

[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=M146210

NODE=M146W

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
276±35	[3] ASTON	93	LASS	$11 K^- p \rightarrow K^- \omega p$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
~ 230	[4] DAUM	81C	CNTR	$63\ K^- p \rightarrow K^- 2\pi p$

[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	$63 K^- p \rightarrow \overline{K} 2\pi p$

$\Gamma(K^*(892)\pi)/\Gamma(K\pi\pi)$ Γ_3/Γ_1

NODE=M146R2

NODE=M146R2

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
~ 0.05	DAUM	81C	CNTR	$63 K^- p \rightarrow \overline{K} 2\pi p$

$\Gamma(K f_2(1270))/\Gamma(K\pi\pi)$ Γ_4/Γ_1

NODE=M146R3

NODE=M146R3

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
~ 0.18	DAUM	81C	CNTR	$63 K^- p \rightarrow \overline{K} 2\pi p$

$K_2(1820)$ REFERENCES

NODE=M146

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=M088205

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 $K^- p \to 3K p$

$K(1830)$ WIDTH

NODE=M088210

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 $K^- p \to 3K p$

$K(1830)$ 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=M134205

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. • • •				
1820±40	[2] ANISOVICH 97C	RVUE		11 $K^- p \to K^- \pi^+ n$

[1] We take the central value of the two solutions and the larger error given.
[2] T-matrix pole. Reanalysis of ASTON 88 data.

NODE=M134M;LINKAGE=A
NODE=M134M;LINKAGE=A1

$K_0^*(1950)$ WIDTH

NODE=M134210

NODE=M134W

VALUE (MeV)	*DOCUMENT ID*	*TECN*	*CHG*	*COMMENT*
201± 34±79	[3] ASTON 88	LASS	0	11 $K^- p \to K^- \pi^+ n$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
250±100	[4] ANISOVICH 97C	RVUE		11 $K^- p \to K^- \pi^+ n$

[3] We take the central value of the two solutions and the larger error given.
[4] T-matrix pole. Reanalysis of ASTON 88 data.

NODE=M134W;LINKAGE=A
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

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.52±0.08±0.12	[5] ASTON	88	LASS	0	11 $K^- p \to K^- \pi^+ n$

[5] We take the central value of the two solutions and the larger error given.

NODE=M134R1;LINKAGE=A

$K_0^*(1950)$ REFERENCES

NODE=M134

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

OTHER RELATED PAPERS

JAMIN 00 NP B587 331 M. Jamin *et al.* — REFID=47983

SHAKIN 00 PR D62 114014 C.M. Shakin, H. Wang — REFID=47992

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=M104205

NODE=M104M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1973± 8±25		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. • • •						
2020±20		TIKHOMIROV	03	SPEC		40.0 $\pi^- C \to K_S^0 K_S^0 K_L^0 X$
1978±40	241±47	BIRD	89	LASS	−	11 $K^- p \to \overline{K}^0 \pi^- p$

$K_2^*(1980)$ WIDTH

NODE=M104210

NODE=M104W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
373±33±60		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. • • •						
180±70		TIKHOMIROV	03	SPEC		40.0 $\pi^- C \to K_S^0 K_S^0 K_L^0 X$
398±47	241±47	BIRD	89	LASS	−	11 $K^- p \to \overline{K}^0 \pi^- p$

$K_2^*(1980)$ DECAY MODES

NODE=M104215;NODE=M104

	Mode	
Γ_1	$K^*(892)\pi$	DESIG=2
Γ_2	$K\rho$	DESIG=3
Γ_3	$K f_2(1270)$	DESIG=4

$K_2^*(1980)$ BRANCHING RATIOS

NODE=M104220

$\Gamma(K\rho)/\Gamma(K^*(892)\pi)$ Γ_2/Γ_1

NODE=M104R1

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
1.49±0.24±0.09	ASTON	87	LASS	0	11 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$

$\Gamma(K f_2(1270))/\Gamma_{total}$ Γ_3/Γ

NODE=M104R3

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
possibly seen	TIKHOMIROV	03	SPEC	40.0 $\pi^- C \to K_S^0 K_S^0 K_L^0 X$

$K_2^*(1980)$ REFERENCES

NODE=M104

TIKHOMIROV	03	PAN 66 828	G.D. Tikhomirov *et al.*		REFID=49423
		Translated from YAF 66 860.			
BIRD	89	SLAC-332	P.F. Bird	(SLAC)	REFID=41002
ASTON	87	NP B292 693	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)	REFID=40234

NODE=M035

$K_4^*(2045)$

$I(J^P) = \frac{1}{2}(4^+)$

$K_4^*(2045)$ MASS

NODE=M035205

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 $K^+ p \to K_S^0 \pi^\pm p$
2070^{+100}_{-40}		[4] ASTON	81C	LASS	0	11 $K^- p \to K^- \pi^+ n$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
2079± 7	431	TORRES	86	MPSF		400 pA $\to$ 4KX
2088± 20	650	BAUBILLIER	82	HBC	−	8.25 $K^- p \to K_S^0 \pi^- p$
2115± 46	488	CARMONY	77	HBC	0	9 $K^+ d \to K^+ \pi$'s X

[1] From a fit to all moments. NODE=M035M;LINKAGE=E
[2] From a fit to 8 moments. NODE=M035M;LINKAGE=B
[3] Number of events evaluated by us. NODE=M035M;LINKAGE=W
[4] From energy-independent partial-wave analysis. NODE=M035M;LINKAGE=D

$K_4^*(2045)$ WIDTH

NODE=M035210

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 $K^+ p \to K_S^0 \pi^\pm p$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
61± 58	431	TORRES	86	MPSF		400 pA $\to$ 4KX
170^{+100}_{-50}	650	BAUBILLIER	82	HBC	−	8.25 $K^- p \to K_S^0 \pi^- p$
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. NODE=M035W;LINKAGE=E
[6] From a fit to 8 moments. NODE=M035W;LINKAGE=B
[7] Number of events evaluated by us. NODE=M035W;LINKAGE=W
[8] From energy-independent partial-wave analysis. 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 34 707	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

OTHER RELATED PAPERS

BROMBERG	80	PR D22 1513	C.M. Bromberg *et al.*	(CIT, FNAL, ILLC+)	REFID=20922
CARMONY	71	PRL 27 1160	D.D. Carmony *et al.*	(PURD, UCD, IUPU)	REFID=22803

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=M040205

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=M040210

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

OTHER RELATED PAPERS

ALEXANDER 68B PRL 20 755 G. Alexander *et al.* (LRL) REFID=22846

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=M090205

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=M090210

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=M098205

NODE=M098M

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
2382±14±19	[1] ASTON	86	LASS	0	11 $K^- p \to K^- \pi^+ n$

[1] From a fit to all the moments.

NODE=M098M;LINKAGE=E

$K_5^*(2380)$ WIDTH

NODE=M098210

NODE=M098W

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
178±37±32	[2] ASTON	86	LASS	0	11 $K^- p \to K^- \pi^+ n$

[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)
ASTON 86 PL B180 308 D. Aston *et al.* (SLAC, NAGO, CINC, INUS)

REFID=40262
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=M091205

NODE=M091M

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
2490±20	[1] CLELAND	81	SPEC	±	50 $K^+ p \to \Lambda \overline{p}$

[1] $J^P = 4^-$ from moments analysis.

NODE=M091M;LINKAGE=R

$K_4(2500)$ WIDTH

NODE=M091210

NODE=M091W

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
~ 250	[2] CLELAND	81	SPEC	±	50 $K^+ p \to \Lambda \overline{p}$

[2] $J^P = 4^-$ from moments analysis.

NODE=M091W;LINKAGE=R

$K_4(2500)$ DECAY MODES

NODE=M091215;NODE=M091

	Mode
Γ_1	$p\overline{\Lambda}$

DESIG=1

$K_4(2500)$ REFERENCES

NODE=M091

CLELAND 81 NP B184 1 W.E. Cleland *et al.* (PITT, GEVA, LAUS+)

REFID=22851

NODE=M129

$K(3100)$

$I^G(J^{PC}) = ?^?(?^{??})$

OMITTED FROM SUMMARY TABLE

NODE=M129

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.

$K(3100)$ 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	$K(3100) \to \Lambda\overline{p}\pi^+$	
3056± 7±20	[1] ALEEV	93	BIS2	$K(3100) \to \overline{\Lambda}p\pi^-$	OCCUR=2
3055± 8±20	[1] ALEEV	93	BIS2	$K(3100) \to \Lambda\overline{p}\pi^-$	OCCUR=3
3045± 8±20	[1] ALEEV	93	BIS2	$K(3100) \to \overline{\Lambda}p\pi^+$	OCCUR=4

4-BODY DECAYS

NODE=M129M2

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT	
3059±11 OUR AVERAGE					
3067± 6±20	[1] ALEEV	93	BIS2	$K(3100) \to \Lambda\overline{p}\pi^+\pi^+$	
3060± 8±20	[1] ALEEV	93	BIS2	$K(3100) \to \Lambda\overline{p}\pi^+\pi^-$	OCCUR=2
3055± 7±20	[1] ALEEV	93	BIS2	$K(3100) \to \overline{\Lambda}p\pi^-\pi^-$	OCCUR=3
3052± 8±20	[1] ALEEV	93	BIS2	$K(3100) \to \overline{\Lambda}p\pi^-\pi^+$	OCCUR=4
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3105±30	BOURQUIN	86	SPEC	$K(3100) \to \Lambda\overline{p}\pi^+\pi^+$	
3115±30	BOURQUIN	86	SPEC	$K(3100) \to \Lambda\overline{p}\pi^+\pi^-$	OCCUR=2

5-BODY DECAYS

NODE=M129M3

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
3095±30	BOURQUIN	86	SPEC	$K(3100) \to \Lambda\overline{p}\pi^+\pi^+\pi^-$

[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	$K(3100) \to \Lambda\overline{p}\pi^+$	
36±15	[2] ALEEV	93	BIS2	$K(3100) \to \overline{\Lambda}p\pi^-$	OCCUR=2
50±18	[2] ALEEV	93	BIS2	$K(3100) \to \Lambda\overline{p}\pi^-$	OCCUR=3
30±15	[2] ALEEV	93	BIS2	$K(3100) \to \overline{\Lambda}p\pi^+$	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	$K(3100) \to \Lambda\overline{p}\pi^+\pi^+$	
28±12		[2] ALEEV	93	BIS2	$K(3100) \to \Lambda\overline{p}\pi^+\pi^-$	OCCUR=2
32±15		[2] ALEEV	93	BIS2	$K(3100) \to \overline{\Lambda}p\pi^-\pi^-$	OCCUR=3
30±15		[2] ALEEV	93	BIS2	$K(3100) \to \overline{\Lambda}p\pi^-\pi^+$	OCCUR=4
<30	90	BOURQUIN	86	SPEC	$K(3100) \to \Lambda\overline{p}\pi^+\pi^+$	
<80	90	BOURQUIN	86	SPEC	$K(3100) \to \Lambda\overline{p}\pi^+\pi^-$	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	$K(3100) \to \Lambda\overline{p}\pi^+\pi^+\pi^-$

[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=M061205

The fit includes $D^\pm$, D^0, $D_s^\pm$, $D^{*\pm}$, D^{*0}, and $D_s^{*\pm}$ mass and mass difference measurements.

NODE=M061205

NODE=M061M

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
2006.7±0.4 OUR FIT Error includes scale factor of 1.1.				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2006 ±1.5	[1] GOLDHABER	77	MRK1	$e^+ e^-$

[1] From simultaneous fit to $D^*(2010)^+$, $D^*(2007)^0$, D^+, and D^0.

NODE=M061M;LINKAGE=G

$m_{D^*(2007)^0} - m_{D^0}$

NODE=M061210

The fit includes $D^\pm$, D^0, $D_s^\pm$, $D^{*\pm}$, D^{*0}, and $D_s^{*\pm}$ mass and mass difference measurements.

NODE=M061210

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=M061215

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) %
Γ_2	$D^0\gamma$	(38.1 ± 2.9) %

DESIG=1
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 $\left\langle\delta x_i \delta x_j\right\rangle/(\delta x_i \cdot \delta x_j)$, 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	-100
	x_1

$D^*(2007)^0$ BRANCHING RATIOS

NODE=M061225

$\Gamma(D^0\pi^0)/\Gamma_{total}$ — 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. • • •					
0.596±0.035±0.028	858	[4] ALBRECHT	95F	ARG	$e^+e^- \to$ hadrons
0.636±0.023±0.033	1097	[4] 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	[4] ALBRECHT	95F	ARG	$e^+e^- \to$ hadrons
0.364±0.023±0.033	621	[4] 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. • • •					
0.47 ±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] 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

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

OTHER RELATED PAPERS

EDWARDS	02	PR D65 012002	K.W. Edwards *et al.*	(CLEO Collab.)	REFID=48512
SEMENOV	99	SPU 42 847 Translated from UFN 42 937.	S.V. Semenov		REFID=47363
KAMAL	92	PL B284 421	A.N. Kamal, Q.P. Xu	(ALBE)	REFID=43166
TRILLING	81	PRPL 75 57	G.H. Trilling	(LBL, UCB)	REFID=11483
GOLDHABER	76	PRL 37 255	G. Goldhaber *et al.*	(Mark I Collab.)	REFID=22872

NODE=M062

$D^*(2010)^\pm$

$I(J^P) = \frac{1}{2}(1^-)$
I, J, P need confirmation.

$D^*(2010)^\pm$ MASS

NODE=M062205

The fit includes $D^\pm$, D^0, $D_s^\pm$, $D^{*\pm}$, D^{*0}, and $D_s^{*\pm}$ mass and mass difference measurements.

NODE=M062205

NODE=M062M

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
2010.0±0.4 OUR FIT	Error includes scale factor of 1.1.				
• • • 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	MRK1	±	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=M062207

The fit includes $D^\pm$, D^0, $D_s^\pm$, $D^{*\pm}$, D^{*0}, and $D_s^{*\pm}$ mass and mass difference measurements.

NODE=M062207

NODE=M062MD

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
140.64±0.10 OUR FIT	Error includes scale factor of 1.1.				
140.64±0.08±0.06	620	BORTOLETTO	92B	CLE2	$e^+e^- \to$ hadrons

$m_{D^*(2010)^+} - m_{D^0}$

NODE=M062210

The fit includes $D^\pm$, D^0, $D_s^\pm$, $D^{*\pm}$, D^{*0}, and $D_s^{*\pm}$ mass and mass difference measurements.

NODE=M062210

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	$D^{*\pm} \to D^0\pi^\pm \to (K\pi)\pi^\pm$	
145.54 ±0.08	611	[3] ADINOLFI	99	BEAT	$D^{*\pm} \to D^0\pi^\pm$	
145.45 ±0.02		[3] BREITWEG	99	ZEUS	$D^{*\pm} \to D^0\pi^\pm \to (K\pi)\pi^\pm$	
145.42 ±0.05		[3] BREITWEG	99	ZEUS	$D^{*\pm} \to D^0\pi^\pm \to (K^-3\pi)\pi^\pm$	OCCUR=2
145.5 ±0.15	103	[4] ADLOFF	97B	H1	$D^{*\pm} \to D^0\pi^\pm$	
145.44 ±0.08	152	[4] BREITWEG	97	ZEUS	$D^{*\pm} \to D^0\pi^\pm$, $D^0 \to K^-3\pi$	
145.42 ±0.11	199	[4] BREITWEG	97	ZEUS	$D^{*\pm} \to D^0\pi^\pm$, $D^0 \to K^-\pi^+$	OCCUR=2
145.4 ±0.2	48	[4] DERRICK	95	ZEUS	$D^{*\pm} \to D^0\pi^\pm$	
145.39 ±0.06 ±0.03		BARLAG	92B	ACCM	π^- 230 GeV	
145.5 ±0.2	115	[4] ALEXANDER	91B	OPAL	$D^{*\pm} \to D^0\pi^\pm$	
145.30 ±0.06		[4] DECAMP	91J	ALEP	$D^{*\pm} \to D^0\pi^\pm$	
145.40 ±0.05 ±0.10		ABACHI	88B	HRS	$D^{*\pm} \to D^0\pi^\pm$	
145.46 ±0.07 ±0.03		ALBRECHT	85F	ARG	$D^{*\pm} \to D^0\pi^+$	
145.5 ±0.3	28	BAILEY	83	SPEC	$D^{*\pm} \to D^0\pi^\pm$	OCCUR=2
145.5 ±0.3	60	FITCH	81	SPEC	π^- A	
145.3 ±0.5	30	FELDMAN	77B	MRK1	$D^{*+} \to D^0\pi^+$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
145.44 ±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=M062215

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	MRK1	$e^+ e^-$

[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=M062220

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	$D^+ \gamma$	$(\ 1.6 \pm 0.4)$ %	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 $\left\langle \delta x_i \delta x_j \right\rangle / (\delta x_i \cdot \delta x_j)$, 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	−62	
x_3	−43	−44
	x_1	x_2

$D^*(2010)^+$ BRANCHING RATIOS

NODE=M062230

$\Gamma(D^0 \pi^+)/\Gamma_{\rm total}$ $\qquad\Gamma_1/\Gamma$

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	$e^+ e^-$

$\Gamma(D^+ \pi^0)/\Gamma_{\rm total}$ $\qquad\Gamma_2/\Gamma$

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	$e^+ e^- \to$ hadrons
0.308 ±0.004 ±0.008	410	[6] BUTLER 92	CLE2	$e^+ e^- \to$ 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 II 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.*	(Mark I Collab.)	REFID=11435

OTHER RELATED PAPERS

AHMED	01	PRL 87 251801	S. Ahmed *et al.*	(CLEO Collab.)	REFID=48554
SEMENOV	99	SPU 42 847 Translated from UFN 42 937.	S.V. Semenov		REFID=47363
NUSSINOV	98	PL B418 383	S. Nussinov		REFID=46375
KAMAL	92	PL B284 421	A.N. Kamal, Q.P. Xu	(ALBE)	REFID=43166
ALTHOFF	83C	PL 126B 493	M. Althoff *et al.*	(TASSO Collab.)	REFID=22869
BEBEK	82	PRL 49 610	C. Bebek *et al.*	(HARV, OSU, ROCH, RUTG+)	REFID=22865
TRILLING	81	PRPL 75 57	G.H. Trilling	(LBL, UCB)	REFID=11483
PERUZZI	76	PRL 37 569	I. Peruzzi *et al.*	(Mark I Collab.)	REFID=11431

NODE=M178

$D_0^*(2400)^0$

$I(J^P) = \frac{1}{2}(0^+)$

OMITTED FROM SUMMARY TABLE

$J = 0^+$ assignment favoured (ABE 04D).

NODE=M178

$D_0^*(2400)^0$ MASS

NODE=M178205

NODE=M178M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2352±50 OUR AVERAGE	Error includes scale factor of 1.8.				
2308±17±32		ABE	04D	BELL	$B^- \to D^+\pi^-\pi^-$
2407±21±35	9.8k	LINK	04A	FOCS	γ A

$D_0^*(2400)^0$ WIDTH

NODE=M178210

NODE=M178W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
261±50 OUR AVERAGE					
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

ABE	04D	PR D69 112002	K. Abe *et al.*	(BELLE Collab.)
LINK	04A	PL B586 11	J.M. Link *et al.*	(FOCUS Collab.)

REFID=50011
REFID=49775

OTHER RELATED PAPERS

ANDERSON	99	CLEO CONF99-6	S. Anderson *et al.*	(CLEO Collab.)
Conference Report				
EICHTEN	93	PRL 71 4116	E.J. Eichten, C.T. Hill, C. Quigg	
GODFREY	85	PR D32 189	S. Godfrey, N. Isgur	
SHURYAK	82	NP B198 83	E.V. Shuryak	

REFID=50539
REFID=50542
REFID=50541
REFID=50540

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=M179205

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=M179210

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

OTHER RELATED PAPERS

ANDERSON 99 CLEO CONF99-6 S. Anderson *et al.* (CLEO Collab.) REFID=50539
Conference Report
EICHTEN 93 PRL 71 4116 E.J. Eichten, C.T. Hill, C. Quigg REFID=50542
GODFREY 85 PR D32 189 S. Godfrey, N. Isgur REFID=50541
SHURYAK 82 NP B198 83 E.V. Shuryak REFID=50540

NODE=M097

$D_1(2420)^0$

$I(J^P) = \frac{1}{2}(1^+)$
I, J, P need confirmation.

Seen in $D^*(2010)^+\pi^-$. $J^P = 1^+$ according to ALBRECHT 89H.

NODE=M097

$D_1(2420)^0$ MASS

NODE=M097205

NODE=M097M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
2421.8±1.3 OUR AVERAGE	Error includes scale factor of 1.1.				
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	$\gamma \mathrm{Be} \to D^{*+}\pi^- X$
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. • • •					
2425 ±3	235	[2] ABREU	98M	DLPH	e^+e^-

[1] Fit includes the contribution from $D_1^*(2430)^0$. NODE=M097M;LINKAGE=AB

[2] No systematic error given. NODE=M097M;LINKAGE=K

$D_1(2420)^0$ WIDTH

NODE=M097210

NODE=M097W

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
$20.8^{+3.3}_{-2.8}$ OUR AVERAGE					
23.7± 2.7± 4.0		[3] 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 ± 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. • • •					
58 ±14 ±10	171	ANJOS	89C	TPS	$\gamma N \to D^{*+}\pi^- X$

[3] Fit includes the contribution from $D_1^*(2430)^0$. NODE=M097W;LINKAGE=AB

$D_1(2420)^0$ 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	$D^+\pi^-$	not seen	DESIG=2;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	$e^+e^- \to D^{*+}\pi^- X$
seen	AVERY	90	CLEO	$e^+e^- \to D^{*+}\pi^- X$
seen	ALBRECHT	89H	ARG	$e^+e^- \to D^*\pi^- X$
seen	ANJOS	89C	TPS	$\gamma N \to D^{*+}\pi^- X$

$\Gamma(D^+\pi^-)/\Gamma(D^*(2010)^+\pi^-)$ Γ_2/Γ_1

NODE=M097R2
NODE=M097R2

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.24	90	AVERY	90	CLEO	$e^+e^- \rightarrow D^+\pi^- X$

$D_1(2420)^0$ REFERENCES

NODE=M097

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

OTHER RELATED PAPERS

ABAZOV	05O	PRL 95 171803	V.M. Abazov *et al.*	(D0 Collab.)	REFID=50834
ACOSTA	05F	PR D71 051103R	D. Acosta *et al.*	(CDF Collab.)	REFID=50623
CLOSE	05C	PR D72 094004	F.E. Close, E.S. Swanson	(OXFTP)	REFID=50962
SEMENOV	99	SPU 42 847	S.V. Semenov		REFID=47363
		Translated from UFN 42 937.			

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=M120205

NODE=M120M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2427±5 OUR AVERAGE	Error includes scale factor of 2.0.				
2425±2±2	146	BERGFELD	94B	CLE2	$e^+e^- \rightarrow D^{*0}\pi^+ X$
2443±7±5	190	ANJOS	89C	TPS	$\gamma N \rightarrow D^0\pi^+ X^0$

$m_{D_1^*(2420)^{\pm}} - m_{D_1^*(2420)^0}$

NODE=M120207

NODE=M120DM

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
$\mathbf{4^{+2}_{-3}\pm3}$	BERGFELD	94B	CLE2	$e^+e^- \rightarrow$ hadrons

$D_1(2420)^{\pm}$ WIDTH

NODE=M120210

NODE=M120W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
28± 8 OUR AVERAGE					
$26^{+\ 8}_{-\ 7}\pm4$	146	BERGFELD	94B	CLE2	$e^+e^- \rightarrow D^{*0}\pi^+ X$
41±19±8	190	ANJOS	89C	TPS	$\gamma N \rightarrow D^0\pi^+ X^0$

$D_1(2420)^{\pm}$ 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	$D^0\pi^+$	not seen	DESIG=2;OUR EVAL;→ 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_2/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	$e^+e^- \to$ hadrons

$D_1(2420)^\pm$ REFERENCES

NODE=M120

BERGFELD 94B PL B340 194 T. Bergfeld *et al.* (CLEO Collab.)
ANJOS 89C PRL 62 1717 J.C. Anjos *et al.* (FNAL E691 Collab.)

REFID=44099
REFID=40737

OTHER RELATED PAPERS

CLOSE 05C PR D72 094004 F.E. Close, E.S. Swanson (OXFTP)
SEMENOV 99 SPU 42 847 S.V. Semenov
Translated from UFN 42 937.

REFID=50962
REFID=47363
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=M180205
NODE=M180M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
2427±26±25	ABE	04D	BELL	$B^- \to D^{*+}\pi^-\pi^-$

$D_1(2430)^0$ WIDTH

NODE=M180210
NODE=M180W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
$\mathbf{384^{+107}_{-\ 75}\pm74}$	ABE	04D	BELL	$B^- \to D^{*+}\pi^-\pi^-$

$D_1(2430)^0$ 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

ABE 04D PR D69 112002 K. Abe *et al.* (BELLE Collab.)

REFID=50011

OTHER RELATED PAPERS

ABAZOV 05O PRL 95 171803 V.M. Abazov *et al.* (D0 Collab.)
CLOSE 05C PR D72 094004 F.E. Close, E.S. Swanson (OXFTP)
ANDERSON 99 CLEO CONF99-6 S. Anderson *et al.* (CLEO Collab.)
Conference Report
EICHTEN 93 PRL 71 4116 E.J. Eichten, C.T. Hill, C. Quigg
GODFREY 85 PR D32 189 S. Godfrey, N. Isgur
SHURYAK 82 NP B198 83 E.V. Shuryak

REFID=50834
REFID=50962
REFID=50539
REFID=50542
REFID=50541
REFID=50540

NODE=M119

$D_2^*(2460)^0$

$I(J^P) = \frac{1}{2}(2^+)$

$J^P = 2^+$ assignment strongly favored(ALBRECHT 89B).

NODE=M119

$D_2^*(2460)0$ MASS

NODE=M119205

NODE=M119M

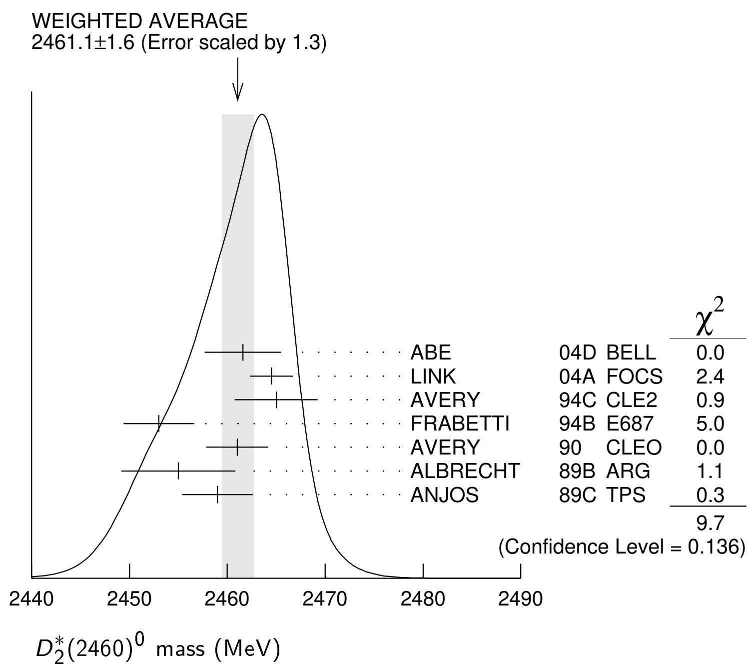
VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2461.1±1.6 OUR AVERAGE		Error includes scale factor of 1.3. See the ideogram below.			
2461.6±2.1±3.3		[1] ABE	04D	BELL	$B^- \to D^+\pi^-\pi^-$
2464.5±1.1±1.9	5.8k	[1] LINK	04A	FOCS	γ A
2465 ±3 ±3	486	AVERY	94C	CLE2	$e^+e^- \to D^+\pi^- X$
2453 ±3 ±2	128	FRABETTI	94B	E687	γBe $\to D^+\pi^- X$
2461 ±3 ±1	440	AVERY	90	CLEO	$e^+e^- \to D^{*+}\pi^- X$
2455 ±3 ±5	337	ALBRECHT	89B	ARG	$e^+e^- \to D^+\pi^- X$
2459 ±3 ±2	153	ANJOS	89C	TPS	$\gamma N \to D^+\pi^- X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2461 ±6	126	[2] ABREU	98M	DLPH	e^+e^-
2466 ±7	1	ASRATYAN	95	BEBC	53,40 $\nu(\overline{\nu}) \to p + X$, $d + X$

[1] Fit includes the contribution from $D_0^*(2400)^0$.

NODE=M119M;LINKAGE=LI

[2] No systematic error given.

NODE=M119M;LINKAGE=K



$D_2^*(2460)^0$ WIDTH

NODE=M119210

NODE=M119W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
32 ± 4 OUR AVERAGE		Error includes scale factor of 1.2.			
45.6± 4.4± 6.7		[3] ABE	04D	BELL	$B^- \to D^+\pi^-\pi^-$
38.7± 5.3± 2.9	5.8k	[3] 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	$\gamma N \to D^+\pi^- X$

[3] Fit includes the contribution from $D_0^*(2400)^0$.

NODE=M119W;LINKAGE=LI

$D_2^*(2460)^0$ 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

$D_2^*(2460)^0$ BRANCHING RATIOS

NODE=M119220

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

NODE=M119R1
NODE=M119R1

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	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	DOCUMENT ID		TECN	COMMENT
2.3±0.6 OUR AVERAGE				
2.2±0.7±0.6	AVERY	94C	CLE2	$e^+e^- \to D^{*+}\pi^-X$
2.3±0.8	AVERY	90	CLEO	e^+e^-
3.0±1.1±1.5	ALBRECHT	89H	ARG	$e^+e^- \to D^*\pi^-X$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.9±0.5	ABE	04D	BELL	$B^- \to D^{(*)+}\pi^-\pi^-$

$D_2^*(2460)^0$ REFERENCES

NODE=M119

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

OTHER RELATED PAPERS

ABAZOV	05O	PRL 95 171803	V.M. Abazov *et al.*	(D0 Collab.)	REFID=50834
ACOSTA	05F	PR D71 051103R	D. Acosta *et al.*	(CDF Collab.)	REFID=50623
CLOSE	05C	PR D72 094004	F.E. Close, E.S. Swanson	(OXFTP)	REFID=50962
SEMENOV	99	SPU 42 847 Translated from UFN 42 937.	S.V. Semenov		REFID=47363

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

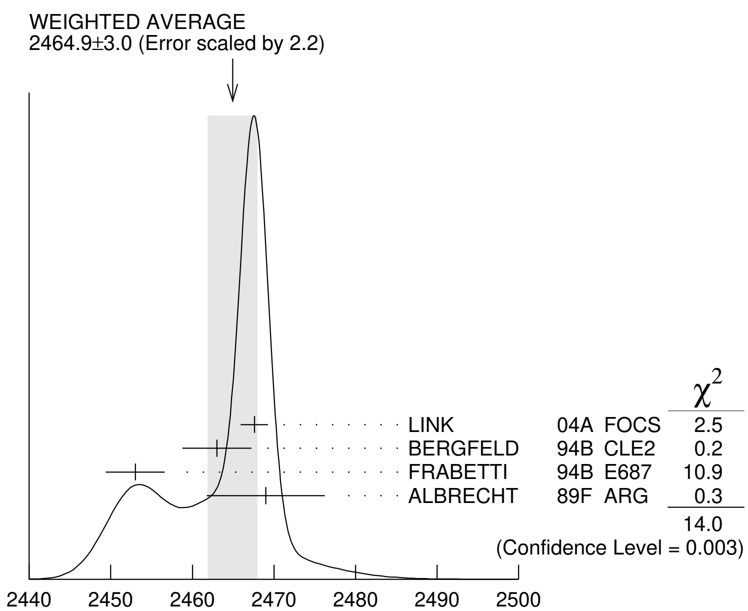
NODE=M150205

NODE=M150M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2464.9±3.0 OUR AVERAGE		Error includes scale factor of 2.2. See the ideogram below.			
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	[1] LINK	04A	FOCS	γ A

[1] 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=LI



$D_2^*(2460)^{\pm}$ mass (MeV)

$m_{D_2^*(2460)^{\pm}} - m_{D_2^*(2460)^0}$

NODE=M150207

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=M150210

NODE=M150W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
29 ± 5 OUR AVERAGE					
34.1± 6.5±4.2	3.5k	[2] LINK	04A	FOCS	γ A
27 $^{+11}_{-8}$ ±5	310	BERGFELD	94B	CLE2	$e^+e^- \rightarrow D^0\pi^+X$
23 ± 9 ±5	185	FRABETTI	94B	E687	γBe $\rightarrow D^0\pi^+X$

[2] Fit includes the contribution from $D_0^*(2400)^{\pm}$.

NODE=M150W;LINKAGE=LI

$D_2^*(2460)^\pm$ 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 ←

$D_2^*(2460)^\pm$ 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

$D_2^*(2460)^\pm$ REFERENCES

NODE=M150

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

OTHER RELATED PAPERS

CLOSE	05C	PR D72 094004	F.E. Close, E.S. Swanson	(OXFTP)	REFID=50962

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. Needs confirmation.

NODE=M158

$D^*(2640)^\pm$ MASS

NODE=M158205

NODE=M158M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2637±2±6	66 ± 14	ABREU	98M	DLPH	$e^+e^- \rightarrow D^{*+}\pi^+\pi^-X$

$D^*(2640)^\pm$ WIDTH

NODE=M158210

NODE=M158W

VALUE (MeV)	CL%	DOCUMENT ID		TECN	COMMENT
<15	95	ABREU	98M	DLPH	$e^+e^- \rightarrow D^{*+}\pi^+\pi^-X$

$D^*(2640)^+$ 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

ABBIENDI	01N	EPJ C20 445	G. Abbiendi *et al.*	(OPAL Collab.)	REFID=48296
ABREU	98M	PL B426 231	P. Abreu *et al.*	(DELPHI Collab.)	REFID=46315

OTHER RELATED PAPERS

CLOSE	05C	PR D72 094004	F.E. Close, E.S. Swanson	(OXFTP)	REFID=50962

CHARMED, STRANGE MESONS ($C = S = \pm1$)

$D_s^+ = c\overline{s}$, $D_s^- = \overline{c}s$, similarly for D_s^*'s

NODE=MXXX040

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=S074205

The fit includes $D^\pm$, D^0, $D_s^\pm$, $D^{*\pm}$, D^{*0}, and $D_s^{*\pm}$ mass and mass difference measurements.

NODE=S074205

NODE=S074M

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
2112.0±0.6 OUR FIT Error includes scale factor of 1.1.				
2106.6±2.1±2.7	[1] BLAYLOCK	87	MRK3	$e^+e^- \rightarrow D_s^\pm \gamma X$

[1] Assuming $D_s^\pm$ mass = 1968.7 ± 0.9 MeV.

NODE=S074M;LINKAGE=E

$m_{D_s^{*\pm}} - m_{D_s^\pm}$

NODE=S074208

The fit includes $D^\pm$, D^0, $D_s^\pm$, $D^{*\pm}$, D^{*0}, and $D_s^{*\pm}$ mass and mass difference measurements.

NODE=S074208

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	$e^+e^- \rightarrow D_s^\pm \gamma X$
139.5 ± 8.3 ±9.7	60	AIHARA	84D	TPC	$e^+e^- \rightarrow$ 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	$e^+e^- \rightarrow D_s^\pm \gamma X$

[2] Result includes data of ALBRECHT 84B.

NODE=S074DM;LINKAGE=A

$D_s^{*\pm}$ WIDTH

NODE=S074210

NODE=S074W

VALUE (MeV)	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
< 1.9	90	GRONBERG	95	CLE2	e^+e^-
< 4.5	90	ALBRECHT	88	ARG	$E_{\rm cm}^{ee}$ = 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	$e^+e^- \rightarrow D_s^\pm \gamma X$

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±2.5) %	DESIG=1
Γ_2	$D_s^+\pi^0$	(5.8±2.5) %	DESIG=2

CONSTRAINED FIT INFORMATION

An overall fit to a branching ratio uses 1 measurements and one constraint to determine 2 parameters. The overall fit has a $\chi^2 =$ 0.0 for 0 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	-100
	x_1

D_s^{*+} BRANCHING RATIOS

NODE=S074220

$\Gamma(D_s^+\gamma)/\Gamma_{\text{total}}$ — Γ_1/Γ

NODE=S074R1
NODE=S074R1

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
0.942±0.026 OUR FIT				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	ASRATYAN	91	HLBC	$\overline{\nu}_\mu$ Ne
seen	ALBRECHT	88	ARG	$e^+e^- \rightarrow D_s^\pm\gamma X$
seen	AIHARA	84D		
seen	ALBRECHT	84B		
seen	BRANDELIK	79		

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

NODE=S074R2
NODE=S074R2

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
0.062±0.029 OUR FIT				
$\mathbf{0.062^{+0.020}_{-0.018}\pm0.022}$	GRONBERG	95	CLE2	e^+e^-

$D_s^{*\pm}$ REFERENCES

NODE=S074

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

OTHER RELATED PAPERS

KAMAL	92	PL B284 421	A.N. Kamal, Q.P. Xu	(ALBE)	REFID=43166
BRANDELIK	78C	PL 76B 361	R. Brandelik *et al.*	(DASP Collab.)	REFID=22232
BRANDELIK	77B	PL 70B 132	R. Brandelik *et al.*	(DASP Collab.)	REFID=11548

NODE=M172

$D^*_{sJ}(2317)^\pm$

$I(J^P) = 0(0^+)$
J, P need confirmation.

NODE=M172

J^P is natural, low mass and decay angular distribution consistent with 0^+.

$D^*_{sJ}(2317)^\pm$ MASS

NODE=M172205

NODE=M172M

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
2317.3±0.6 OUR FIT				
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	$B \to D^{(*)}_{sJ}(2317)^+ \overline{D}^{(*)}$
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 $m_{D^*_{sJ}(2317)} - m_{D_s}$. NODE=M172M;LINKAGE=B1

[4] From $D_s^+ \to K^+K^-\pi^+$ decay. NODE=M172M;LINKAGE=A1

[5] From $D_s^+ \to K^+K^-\pi^+\pi^0$ decay. NODE=M172M;LINKAGE=A2

$m_{D^*_{sJ}(2317)^\pm} - m_{D_s^\pm}$

NODE=M172207

NODE=M172DM

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
349.1±0.6 OUR FIT				
349.2±0.7 OUR AVERAGE				
348.7±0.5±0.7	761	MIKAMI 04	BELL	10.6 e^+e^-
350.0±1.2±1.0	135	BESSON 03	CLE2	10.6 e^+e^-
351.3±2.1±1.9	24	[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 $D_s^+ \to K^+K^-\pi^+$ 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 $D_s^+ \to K^+K^-\pi^+\pi^0$ 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

$D^*_{sJ}(2317)^\pm$ WIDTH

NODE=M172210

NODE=M172W

VALUE (MeV)	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
< 4.6	90	761	MIKAMI 04	BELL	10.6 e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<10			AUBERT 03G	BABR	10.6 e^+e^-
< 7	90	135	BESSON 03	CLE2	10.6 e^+e^-

$D^*_{sJ}(2317)^\pm$ DECAY MODES

NODE=M172215;NODE=M172

$D^*_{sJ}(2317)^-$ modes are charge conjugates of modes below.

NODE=M172

	Mode	
Γ_1	$D_s^+\pi^0$	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

$D^*_{sJ}(2317)^\pm$ BRANCHING RATIOS

NODE=M172220

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

NODE=M172R1
NODE=M172R1

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
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. • • •					
<0.052	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. • • •					
<0.18	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	DOCUMENT ID		TECN	COMMENT
• • • 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. • • •					
<0.019	90	BESSON	03	CLE2	10.6 e^+e^-

$D^*_{sJ}(2317)^\pm$ REFERENCES

NODE=M172

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

OTHER RELATED PAPERS

BICUDO	05	NP A748 537	P. Bicudo		REFID=50455
CLOSE	05C	PR D72 094004	F.E. Close, E.S. Swanson	(OXFTP)	REFID=50962
KIM	05A	PR D72 074012	H. Kim, Y. Oh		REFID=50841
MAIANI	05	PR D71 014028	L. Maiani *et al.*		REFID=50460
BROWDER	04	PL B578 365	T.E. Browder, S. Pakvasa, A.A. Petrov		REFID=49671
CHEN	04A	PR D69 054002	C.-H. Chen		REFID=50180
CHEN	04C	PRL 93 232001	Y.-Q. Chen, X.-Q. Li		REFID=50334
COHEN	04	PL B578 359	T.D. Cohen *et al.*		REFID=49765
DMITRASINOVIC	04	PR D70 096011	V. Dmitrasinovic		REFID=50336
FAYYAZUDDIN	04	PR D69 114008	Fayyazuddin, Riazuddin		REFID=49768;ERROR=2
HWANG	04	PL B601 137	D.S. Hwang, D.-W. Kim		REFID=50172
KOLOMEITSEV	04	PL B582 39	E.E. Kolomeitsev, M.F.M. Lutz		REFID=49772
LIPKIN	04	PL B580 50	H.J. Lipkin		REFID=49776
SADZIKOWSKI	04	PL B579 39	M. Sadzikowski		REFID=49675
SIMONOV	04	PR D70 114013	Yu.A. Simonov, J.A. Tjon		REFID=50348
VANBEVEREN	04	MPL A19 1949	E. Banbeveren, G. Rupp		REFID=50164
BALI	03	PR D68 071501	G.S. Bali		REFID=49622
BARDEEN	03	PR D68 054024	W.A. Bardeen *et al.*		REFID=49626
BARNES	03	PR D68 054006	T. Barnes *et al.*		REFID=49581
CAHN	03	PR D68 037502	R.N. Cahn, J.D. Jackson		REFID=49587
CHENG	03C	PL B566 193	H.-Y. Cheng, W.-S. Hou		REFID=49469
COLANGELO	03B	PL B570 180	P. Colangelo, F. De Fazio		REFID=49588
DATTA	03C	PL B572 164	A. Datta, P.J. O'Donnell		REFID=49590
SZCZEPANIAK	03	PL B567 23	A.P. Szczepaniak		REFID=49470
TERASAKI	03	PR D68 011501	K. Terasaki		REFID=49474
VANBEVEREN	03	PRL 91 012003	E. van Beveren, G. Rupp		REFID=49472

NODE=M173

$D_{sJ}(2460)^{\pm}$

$I(J^P) = 0(1^+)$

NODE=M173

Zero spin excluded by the observation of the decay to $D_s^+ \gamma$, the decay angular distribution consistent with spin 1.

$D_{sJ}(2460)^{\pm}$ MASS

NODE=M173205

NODE=M173M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
2458.9±0.9 OUR FIT	Error includes scale factor of 1.1.					
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. • • •						
2458.9±1.5	112	[1] AUBERT,B	04S	BABR	$B \to D_{sJ}(2460)^+ \overline{D}^{(*)}$	
2461.1±1.6	139	[2] AUBERT,B	04S	BABR	$B \to D_{sJ}(2460)^+ \overline{D}^{(*)}$	OCCUR=2
2456.5±1.3±1.3	126	[3,4] MIKAMI	04	BELL	10.6 e^+e^-	
2459.5±1.3±2.0	152	[5,6] MIKAMI	04	BELL	10.6 e^+e^-	OCCUR=2
2459.9±0.9±1.6	60	[5,6] MIKAMI	04	BELL	10.6 e^+e^-	OCCUR=3
2459.2±1.6±2.0	57	KROKOVNY	03B	BELL	10.6 e^+e^-	

[1] Systematic errors not evaluated. From the decay to $D_s^{*+} \pi^0$. NODE=M173M;LINKAGE=AU

[2] Systematic errors not evaluated. From the decay to $D_s^+ \gamma$. NODE=M173M;LINKAGE=AB

[3] Not independent of the corresponding $m_{D_{sJ}(2460)^{\pm}} - m_{D_s^{*\pm}}$. NODE=M173M;LINKAGE=B1

[4] Using $m_{D_s^{*+}} = 2112.4 \pm 0.7$ MeV. NODE=M173M;LINKAGE=B2

[5] Not independent of the corresponding $m_{D_{sJ}(2460)^{\pm}} - m_{D_s^{\pm}}$. NODE=M173M;LINKAGE=B3

[6] Using $m_{D_s^+} = 1968.5 \pm 0.6$ MeV. NODE=M173M;LINKAGE=B4

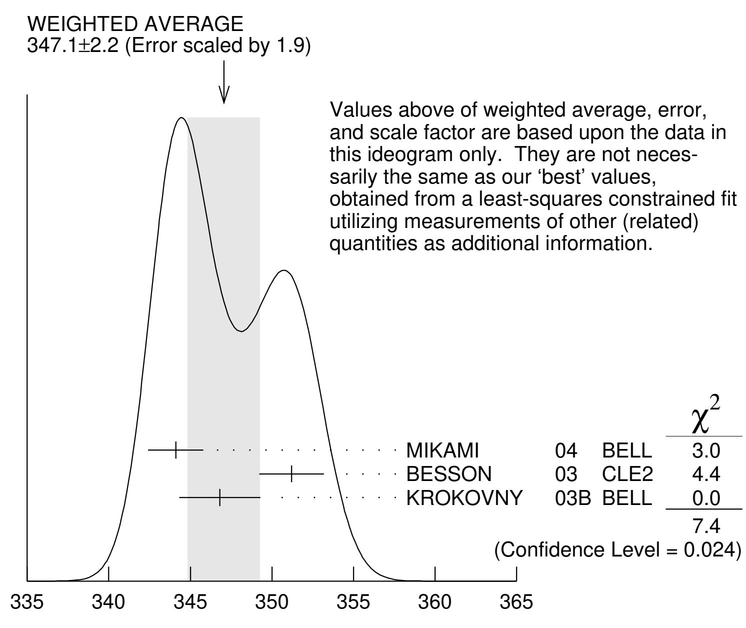
$m_{D_{sJ}(2460)^{\pm}} - m_{D_s^{*\pm}}$

NODE=M173206

NODE=M173MD

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
346.9±1.0 OUR FIT	Error includes scale factor of 1.2.				
347.1±2.2 OUR AVERAGE	Error includes scale factor of 1.9. See the ideogram below.				
344.1±1.3±1.1	126	MIKAMI	04	BELL	10.6 e^+e^-
351.2±1.7±1.0	41	BESSON	03	CLE2	10.6 e^+e^-
346.8±1.6±1.9	57	[7] KROKOVNY	03B	BELL	10.6 e^+e^-

[7] Recalculated by us using $m_{D_s^{*+}} = 2112.4 \pm 0.7$ MeV. NODE=M173MD;LINKAGE=K3



$m_{D_{sJ}(2460)^{\pm}} - m_{D_s^{*\pm}}$

NODE=M173207

$m_{D_{sJ}(2460)^{\pm}} - m_{D_s^{\pm}}$

NODE=M173DM

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
490.7±0.9 OUR FIT Error includes scale factor of 1.2.					
491.3±1.4 OUR AVERAGE					
491.0±1.3±1.9	152	[8] MIKAMI	04	BELL	10.6 e^+e^-
491.4±0.9±1.5	60	[9] MIKAMI	04	BELL	10.6 e^+e^-

OCCUR=2

[8] From the decay to $D_s^{\pm}\gamma$.

NODE=M173DM;LINKAGE=M1

[9] From the decay to $D_s^{\pm}\pi^+\pi^-$.

NODE=M173DM;LINKAGE=M2

$D_{sJ}(2460)^{\pm}$ WIDTH

NODE=M173210

NODE=M173W

VALUE (MeV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
< 5.5	90	126	MIKAMI	04	BELL	10.6 e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<10		195	AUBERT	04E	BABR	10.6 e^+e^-
< 7	90	41	BESSON	03	CLE2	10.6 e^+e^-

$D_{sJ}(2460)^+$ DECAY MODES

NODE=M173215;NODE=M173

$D_{sJ}(2460)^-$ modes are charge conjugates of the modes below.

NODE=M173

	Mode	
Γ_1	$D_s^{*+}\pi^0$	DESIG=1
Γ_2	$D_s^+\gamma$	DESIG=2
Γ_3	$D_s^+\pi^+\pi^-$	DESIG=3
Γ_4	$D_s^{*+}\gamma$	DESIG=4
Γ_5	$D_{sJ}^*(2317)^+\gamma$	DESIG=5

$D_{sJ}(2460)^{\pm}$ BRANCHING RATIOS

NODE=M173220

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

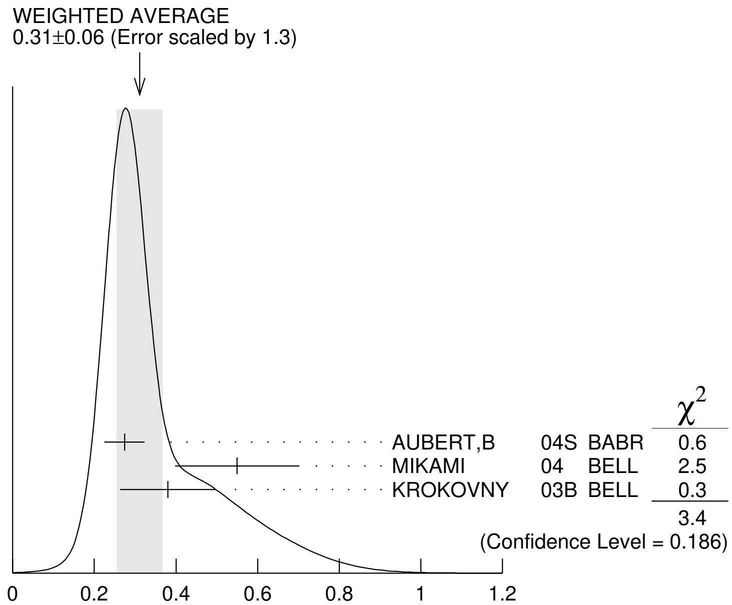
NODE=M173R1
NODE=M173R1

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	41	BESSON	03	CLE2	10.6 e^+e^-

$\Gamma(D_s^+\gamma)/\Gamma(D_s^{*+}\pi^0)$ Γ_2/Γ_1

NODE=M173R2
NODE=M173R2

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.31 ±0.06 OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below.						
0.274±0.045±0.020		251	AUBERT,B	04S	BABR	$B \to D_{sJ}(2460)^+\overline{D}^{(*)}$
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. • • •						
< 0.49	90		BESSON	03	CLE2	10.6 e^+e^-



$\Gamma\left(D_s^+\gamma\right)/\Gamma\left(D_s^{*+}\pi^0\right)$ Γ_2/Γ_1

$\Gamma\left(D_s^+\pi^+\pi^-\right)/\Gamma\left(D_s^{*+}\pi^0\right)$ Γ_3/Γ_1

NODE=M173R3
NODE=M173R3

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
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^-

$\Gamma\left(D_s^{*+}\gamma\right)/\Gamma\left(D_s^{*+}\pi^0\right)$ 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^-

$\Gamma\left(D_{sJ}^*(2317)^+\gamma\right)/\Gamma\left(D_s^{*+}\pi^0\right)$ 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^-

$D_{sJ}(2460)^{\pm}$ REFERENCES

NODE=M173

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

OTHER RELATED PAPERS

BICUDO 05 NP A748 537 P. Bicudo REFID=50455
CLOSE 05C PR D72 094004 F.E. Close, E.S. Swanson (OXFTP) REFID=50962
MAIANI 05 PR D71 014028 L. Maiani *et al.* REFID=50460
BROWDER 04 PL B578 365 T.E. Browder, S. Pakvasa, A.A. Petrov REFID=49671
CHEN 04A PR D69 054002 C.-H. Chen REFID=50180
CHEN 04C PRL 93 232001 Y.-Q. Chen, X.-Q. Li REFID=50334
COHEN 04 PL B578 359 T.D. Cohen *et al.* REFID=49765
DMITRASINOVIC 04 PR D70 096011 V. Dmitrasinovic REFID=50336
FAYYAZUDDIN 04 PR D69 114008 Fayyazuddin, Riazuddin REFID=49768;ERROR=3
KOLOMEITSEV 04 PL B582 39 E.E. Kolomeitsev, M.F.M. Lutz REFID=49772
SADZIKOWSKI 04 PL B579 39 M. Sadzikowski REFID=49675
AUBERT 03G PRL 90 242001 B. Aubert *et al.* (BaBar Collab.) REFID=49417
BARDEEN 03 PR D68 054024 W.A. Bardeen *et al.* REFID=49626
BARNES 03 PR D68 054006 T. Barnes *et al.* REFID=49581
CAHN 03 PR D68 037502 R.N. Cahn, J.D. Jackson REFID=49587
COLANGELO 03B PL B570 180 P. Colangelo, F. De Fazio REFID=49588
DATTA 03C PL B572 164 A. Datta, P.J. O'Donnell REFID=49590

NODE=M121

$D_{s1}(2536)^{\pm}$

$I(J^P) = 0(1^+)$
J, P need confirmation.

Seen in $D^*(2010)^+ K^0$. Not seen in $D^+ K^0$ or $D^0 K^+$. $J^P = 1^+$ assignment strongly favored.

NODE=M121

$D_{s1}(2536)^{\pm}$ MASS

NODE=M121205

NODE=M121M

→ NOT CHECKED ←

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2535.35± 0.34±0.5 OUR EVALUATION					
2535.34± 0.31 OUR AVERAGE					
2535.3 ± 0.7	92	[1] 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	$\gamma \text{Be} \rightarrow D^{*+}K^0 X$, $D^{*0}K^+ X$
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. • • •					
2535 ±28		[2] ASRATYAN	88	HLBC	$\nu N \rightarrow D_s \gamma\gamma X$

OCCUR=2

[1] 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

[2] Not seen in $D^* K$.

NODE=M121M;LINKAGE=B

$m_{D_{s1}(2536)^{\pm}} - m_{D^*_s(2111)}$

NODE=M121208

NODE=M121DM

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
424±28	ASRATYAN	88	HLBC	$D_s^{*\pm}\gamma$

$m_{D_{s1}(2536)^{\pm}} - m_{D^*(2010)^{\pm}}$

NODE=M121225

NODE=M121DN

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
525.3±0.6±0.1	41	HEISTER	02B	ALEP	$e^+e^- \rightarrow D^{*+}K^0 X$

$m_{D_{s1}(2536)^{\pm}} - m_{D^*(2007)^0}$

NODE=M121230

NODE=M121DP

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
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=M121210

NODE=M121W

VALUE (MeV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<2.3	90		ALEXANDER	93	CLEO	$e^+e^- \rightarrow D^{*0}K^+ X$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<3.2	90	75	FRABETTI	94B	E687	$\gamma \text{Be} \rightarrow D^{*+}K^0 X$, $D^{*0}K^+ X$
<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	$D^*_{s1} \rightarrow D^*(2010) K^0$

$D_{s1}(2536)^+$ 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	$D^*(2007)^0 K^+$	seen	DESIG=4;OUR EST;→ NOT CHECKED ←
Γ_3	$D^+ K^0$	not seen	DESIG=2;OUR EST;→ NOT CHECKED ←
Γ_4	$D^0 K^+$	not seen	DESIG=5;OUR EST;→ NOT CHECKED ←
Γ_5	$D_s^{*+}\gamma$	possibly seen	DESIG=3;OUR EST;→ NOT CHECKED ←

$D_{s1}(2536)^+$ BRANCHING RATIOS

NODE=M121220

$\Gamma(D^+ K^0)/\Gamma(D^*(2010)^+ K^0)$ — Γ_3/Γ_1

NODE=M121R1
NODE=M121R1

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.40	90	ALEXANDER	93	CLEO	$e^+e^- \rightarrow D^{*+}K^0 X$
<0.43	90	ALBRECHT	89E	ARG	$D^*_{s1} \rightarrow D^*(2010) K^0$

$\Gamma(D_s^{*+}\gamma)/\Gamma_{total}$ — Γ_5/Γ

NODE=M121R3
NODE=M121R3

VALUE	DOCUMENT ID		TECN	COMMENT
possibly seen	ASRATYAN	88	HLBC	$\nu N \rightarrow D_s \gamma\gamma X$

$\Gamma(D^0 K^+)/\Gamma(D^*(2007)^0 K^+)$ — Γ_4/Γ_2

NODE=M121R4
NODE=M121R4

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.12	90	ALEXANDER	93	CLEO	$e^+e^- \rightarrow D^{*0}K^+ X$

$\Gamma(D_s^{*+}\gamma)/\Gamma(D^*(2007)^0 K^+)$ — Γ_5/Γ_2

NODE=M121R5
NODE=M121R5

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.42	90	ALEXANDER	93	CLEO	$e^+e^- \rightarrow D^{*0}K^+ X$

$\Gamma(D^*(2007)^0 K^+)/\Gamma(D^*(2010)^+ K^0)$ — Γ_2/Γ_1

NODE=M121R6
NODE=M121R6

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
1.27±0.21 OUR AVERAGE					
1.32±0.47±0.23	92	[3] HEISTER	02B	ALEP	$e^+e^- \rightarrow D^{*+}K^0 X$, $D^{*0}K^+ X$
$1.9\ ^{+1.1}_{-0.9}\ \pm0.4$	35	[3] ACKERSTAFF	97W	OPAL	$e^+e^- \rightarrow D^{*0}K^+ X$, $D^{*+}K^0 X$
1.1 ±0.3		ALEXANDER	93	CLEO	$e^+e^- \rightarrow D^{*0}K^+ X, D^{*+}K^0 X$
1.4 ±0.3 ±0.2		[4] ALBRECHT	92R	ARG	$10.4\ e^+e^- \rightarrow D^{*0}K^+ X, D^{*+}K^0 X$

[3] Ratio of the production rates measured in Z^0 decays. NODE=M121R6;LINKAGE=6A

[4] Evaluated by us from published inclusive cross-sections. NODE=M121R6;LINKAGE=A

$D_{s1}(2536)^\pm$ REFERENCES

NODE=M121

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 C 61 563	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

OTHER RELATED PAPERS

CLOSE	05C	PR D72 094004	F.E. Close, E.S. Swanson	(OXFTP)	REFID=50962
SEMENOV	99	SPU 42 847 Translated from UFN 42 937.	S.V. Semenov		REFID=47363

NODE=M148

$D_{s2}(2573)^{\pm}$

$I(J^P) = 0(?^?)$

J^P is natural, width and decay modes consistent with 2^+.

NODE=M148

$D_{s2}(2573)^{\pm}$ MASS

NODE=M148205

NODE=M148M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
2573.5±1.7 OUR AVERAGE						
2574.5±3.3±1.6		ALBRECHT	96	ARG		$e^+e^- \rightarrow D^0K^+X$
$2573.2^{+1.7}_{-1.6}\pm0.9$	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 $\Sigma^-A \rightarrow D^0K^+X$
2568.6±3.2	64	[2] HEISTER	02B	ALEP		$e^+e^- \rightarrow D^0K^+X$

[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

$m_{D_{s2}(2573)^{\pm}} - m_{D^0}$

NODE=M148206

NODE=M148DM

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
704 ±3 ±1	64	HEISTER	02B	ALEP	$e^+e^- \rightarrow D^0K^+X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
705.4±4.3	25	[3] EVDOKIMOV	04	SELX	600 $\Sigma^-A \rightarrow D^0K^+X$

[3] Systematic errors not estimated.

NODE=M148DM;LINKAGE=EV

$D_{s2}(2573)^{\pm}$ WIDTH

NODE=M148210

NODE=M148W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
15^{+5}_{-4} OUR AVERAGE						
10.4±8.3±3.0		ALBRECHT	96	ARG		$e^+e^- \rightarrow D^0K^+X$
$16^{+5}_{-4}\pm3$	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 $\Sigma^-A \rightarrow D^0K^+X$

[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^0K^+	seen
Γ_2	$D^*(2007)^0K^+$	not seen

DESIG=1

DESIG=2;OUR EVAL;→ NOT CHECKED ←

$D_{s2}(2573)^+$ BRANCHING RATIOS

NODE=M148220

$\Gamma(D^0K^+)/\Gamma_{total}$ Γ_1/Γ

NODE=M148R2
NODE=M148R2

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
seen	217	KUBOTA	94	CLE2	±	$e^+e^- \sim$ 10.5 GeV

$\Gamma(D^*(2007)^0K^+)/\Gamma(D^0K^+)$ 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

$D_{s2}(2573)^{\pm}$ REFERENCES

NODE=M148

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

OTHER RELATED PAPERS

CLOSE	05C	PR D72 094004	F.E. Close, E.S. Swanson	(OXFTP)	REFID=50962
SEMENOV	99	SPU 42 847	S.V. Semenov		REFID=47363
		Translated from UFN 42 937.			

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

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NODE=S842

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

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NODE=M826

NODE=M026

$\eta_c(1S)$ $\qquad I^G(J^{PC}) = 0^+(0^{-+})$

$\eta_c(1S)$ MASS

NODE=M026205

NODE=M026M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2980.4± 1.2 OUR AVERAGE		Error includes scale factor of 1.5. See the ideogram below.			
2981.8± 1.3± 1.5	592	ASNER	04	CLEO	$\gamma\gamma \to \eta_c \to K^0_S K^\pm \pi^\mp$
2982.5± 1.1± 0.9	2547 ± 90	AUBERT	04D	BABR	$\gamma\gamma \to \eta_c(1S) \to K\overline{K}\pi$
2984.1± 2.1± 1.0	190	[6] AMBROGIANI	03	E835	$\overline{p}p \to \eta_c \to \gamma\gamma$
2977.5± 1.0± 1.2		[1] BAI	03	BES	$J/\psi \to \gamma\eta_c$
2979.6± 2.3± 1.6	182 ± 25	FANG	03	BELL	$B \to \eta_c K$
2976.3± 2.3± 1.2		[7,8,9] BAI	00F	BES	$J/\psi \to \gamma\eta_c$ and $\psi(2S) \to \gamma\eta_c$
2969 ± 4 ± 4	80	BAI	90B	MRK3	$J/\psi \to \gamma K^+ K^- K^+ K^-$
2984 ± 2.3± 4.0		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. • • •					
2972 ± 7	235	[2] ABE	04G	BELL	10.6 $e^+e^- \to J/\psi(c\overline{c})$
2976.6± 2.9± 1.3	140	[7,8] BAI	00F	BES	$J/\psi \to \gamma\eta_c$
2980.4± 2.3± 0.6		[3] BRANDENB...	00B	CLE2	$\gamma\gamma \to \eta_c \to K^\pm K^0_S \pi^\mp$
2975.8± 3.9± 1.2		[7,8] 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		[7] BISELLO	91	DM2	$J/\psi \to \eta_c\gamma$
2956 ±12 ±12		BAI	90B	MRK3	$J/\psi \to \gamma K^+ K^- K^0_S K^0_L$
$2982.6^{+2.7}_{-2.3}$	12	BAGLIN	87B	SPEC	$\overline{p}p \to \gamma\gamma$
2980.2± 1.6		[7] BALTRUSAIT...	86	MRK3	$J/\psi \to \eta_c\gamma$
2976 ± 8		[4] BALTRUSAIT...	84	MRK3	$J/\psi \to 2\phi\gamma$
2982 ± 8	18	[5] HIMEL	80B	MRK2	e^+e^-
2980 ± 9		[5] PARTRIDGE	80B	CBAL	e^+e^-

OCCUR=2

OCCUR=3

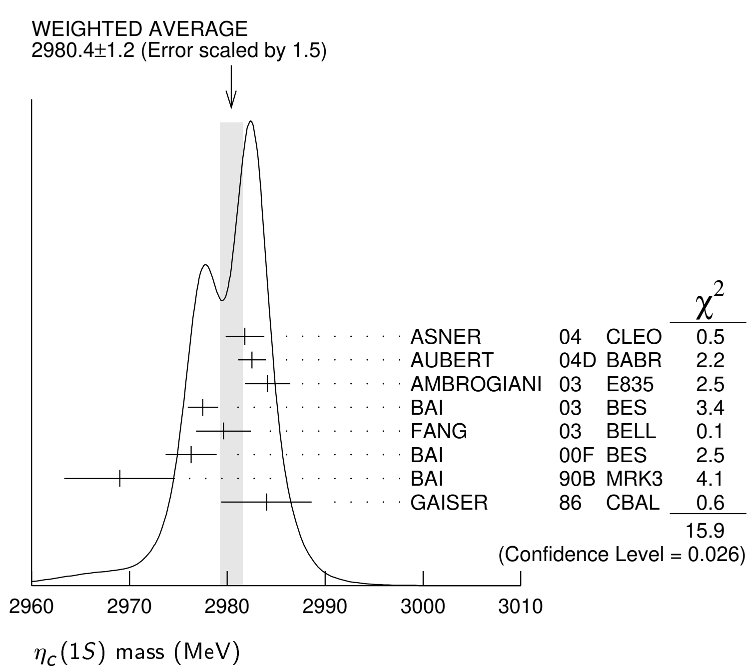
[1] From a simultaneous fit of five decay modes of the η_c. NODE=M026M;LINKAGE=AK

[2] From a fit of the J/ψ recoil mass spectrum. Systematic errors not estimated. NODE=M026M;LINKAGE=AB

[3] Superseded by ASNER 04. NODE=M026M;LINKAGE=NN

[4] $\eta_c \to \phi\phi$. NODE=M026M;LINKAGE=B

[5] Mass adjusted by us to correspond to $J/\psi(1S)$ mass = 3097 MeV. NODE=M026M;LINKAGE=M



[6] Using mass of $\psi(2S)$ = 3686.00 MeV. NODE=M026M;LINKAGE=BG
[7] Average of several decay modes. NODE=M026M;LINKAGE=A
[8] Using an η_c width of 13.2 MeV. NODE=M026M;LINKAGE=C1
[9] Weighted average of the $\psi(2S)$ and $J/\psi(1S)$ samples. NODE=M026M;LINKAGE=KZ

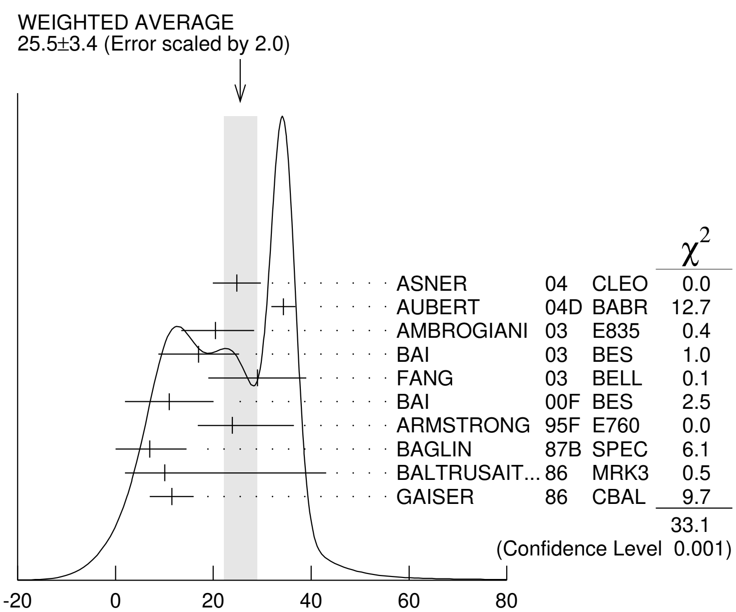
$\eta_c(1S)$ WIDTH

NODE=M026210

NODE=M026W

VALUE (MeV)	*CL%*	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
25.5± 3.4 OUR AVERAGE			Error includes scale factor of 2.0. See the ideogram below.			
24.8± 3.4±3.5		592	ASNER	04	CLEO	$\gamma\gamma \to \eta_c \to K^0_S K^\pm \pi^\mp$
34.3± 2.3±0.9		2547 ± 90	AUBERT	04D	BABR	$\gamma\gamma \to \eta_c(1S) \to K\overline{K}\pi$
$20.4^{+7.7}_{-6.7}$±2.0		190	AMBROGIANI	03	E835	$\overline{p}p \to \eta_c \to \gamma\gamma$
17.0± 3.7±7.4			[10] BAI	03	BES	$J/\psi \to \gamma\eta_c$
29 ± 8 ±6		182 ± 25	FANG	03	BELL	$B \to \eta_c K$
11.0± 8.1±4.1			[13] BAI	00F	BES	$J/\psi \to \gamma\eta_c$ and $\psi(2S) \to \gamma\eta_c$
$23.9^{+12.6}_{-7.1}$			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	[11] BALTRUSAIT...	86	MRK3	$J/\psi \to \gamma p\overline{p}$
11.5± 4.5			GAISER	86	CBAL	$J/\psi \to \gamma X$, $\psi(2S) \to \gamma X$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
27.0± 5.8±1.4			[12] 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^-

[10] From a simultaneous fit of five decay modes of the η_c. NODE=M026W;LINKAGE=AK
[11] Positive and negative errors correspond to 90% confidence level. NODE=M026W;LINKAGE=L
[12] Superseded by ASNER 04. NODE=M026W;LINKAGE=NN



$\eta_c(1S)$ WIDTH

[13] From a fit to the 4-prong invariant mass in $\psi(2S) \to \gamma\eta_c$ and $J/\psi(1S) \to \gamma\eta_c$ decays. NODE=M026W;LINKAGE=KZ

$\eta_c(1S)$ 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	$\rho\rho$	(2.6 ± 0.9) %		DESIG=19
Γ_3	$K^*(892)^0 K^- \pi^+ +$ c.c.	(2.0 ± 0.7) %		DESIG=26
Γ_4	$K^*(892)\overline{K}^*(892)$	$(9.1 \pm 2.6) \times 10^{-3}$		DESIG=18
Γ_5	$\phi K^+ K^-$	$(2.9 \pm 1.4) \times 10^{-3}$		DESIG=28
Γ_6	$\phi\phi$	$(2.6 \pm 0.9) \times 10^{-3}$		DESIG=17
Γ_7	$a_0(980)\pi$	< 2 %	90%	DESIG=21
Γ_8	$a_2(1320)\pi$	< 2 %	90%	DESIG=22
Γ_9	$K^*(892)\overline{K} +$ c.c.	< 1.28 %	90%	DESIG=40
Γ_{10}	$f_2(1270)\eta$	< 1.1 %	90%	DESIG=23
Γ_{11}	$\omega\omega$	$< 3.1 \times 10^{-3}$	90%	DESIG=20
Γ_{12}	$\omega\phi$			DESIG=47
Γ_{13}	$f_2(1270) f_2(1270)$	$(1.0 ^{+0.4}_{-0.5})$ %		DESIG=46

Decays into stable hadrons

NODE=M026;CLUMP=B

Γ_{14}	$K\overline{K}\pi$	(5.7 ± 1.6) %		DESIG=14
Γ_{15}	$\eta\pi\pi$	(4.9 ± 1.8) %		DESIG=16
Γ_{16}	$\pi^+\pi^- K^+ K^-$	(1.5 ± 0.6) %		DESIG=15
Γ_{17}	$2(K^+ K^-)$	$(1.5 \pm 0.7) \times 10^{-3}$		DESIG=27
Γ_{18}	$2(\pi^+\pi^-)$	(1.20 ± 0.30) %		DESIG=11
Γ_{19}	$p\overline{p}$	$(1.3 \pm 0.4) \times 10^{-3}$		DESIG=12
Γ_{20}	$K\overline{K}\eta$	< 3.1 %	90%	DESIG=25
Γ_{21}	$\pi^+\pi^- p\overline{p}$	< 1.2 %	90%	DESIG=13
Γ_{22}	$\Lambda\overline{\Lambda}$	$< 2 \times 10^{-3}$	90%	DESIG=45

Radiative decays

NODE=M026;CLUMP=C

Γ_{23}	$\gamma\gamma$	$(2.9 \pm 1.0) \times 10^{-4}$		DESIG=31

$\eta_c(1S)$ PARTIAL WIDTHS

NODE=M026217

$\Gamma(\gamma\gamma)$ — Γ_{23}

NODE=M026W1
NODE=M026W1

7.4± 0.9± 2.1 OUR EVALUATION Treating systematic errors as correlated.

→ NOT CHECKED ←

$7.0^{+1.0}_{-0.9}$ OUR AVERAGE

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
$7.4 \pm 0.4 \pm 2.3$		[14] 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	[23] ABDALLAH 03J	DLPH	$\gamma\gamma \to \eta_c$
$3.8 ^{+1.1}_{-1.0} {}^{+1.9}_{-1.0}$	190	[15] AMBROGIANI 03	E835	$\overline{p}p \to \eta_c \to \gamma\gamma$
$6.9 \pm 1.7 \pm 2.1$	76	[16] ACCIARRI 99T	L3	$e^+e^- \to e^+e^-\eta_c$
$27 \pm 16 \pm 10$	5	[14] SHIRAI 98	AMY	$58\ e^+e^-$
$6.7 ^{+2.4}_{-1.7} \pm 2.3$		[17] ARMSTRONG 95F	E760	$\overline{p}p \to \gamma\gamma$
11.3 ± 4.2		[18] ALBRECHT 94H	ARG	$e^+e^- \to e^+e^-\eta_c$
$5.9 ^{+2.1}_{-1.8} \pm 1.9$		[15] CHEN 90B	CLEO	$e^+e^- \to e^+e^-\eta_c$
$6.4 ^{+5.0}_{-3.4}$		[19] AIHARA 88D	TPC	$e^+e^- \to e^+e^- X$
$4.3 ^{+3.4}_{-3.7} \pm 2.4$		[17] BAGLIN 87B	SPEC	$\overline{p}p \to \gamma\gamma$
28 ± 15		[14,20] BERGER 86	PLUT	$\gamma\gamma \to K\overline{K}\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$7.6 \pm 0.8 \pm 2.3$		[14,21] BRANDENB... 00B	CLE2	$\gamma\gamma \to \eta_c \to K^\pm K^0_S \pi^\mp$
$8.0 \pm 2.3 \pm 2.4$	17	[22] ADRIANI 93N	L3	$e^+e^- \to e^+e^-\eta_c$

[14] Normalized to B($\eta_c \to K^\pm K^0_S \pi^\mp$). NODE=M026W1;LINKAGE=N2

[15] 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

[16] Normalized to the sum of 9 branching ratios. NODE=M026W1;LINKAGE=N1

[17] Normalized to B($\eta_c \to p\overline{p}$)= $(1.2 \pm 0.4) \times 10^{-3}$. NODE=M026W1;LINKAGE=N3

[18] 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

[19] 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

[20] Re-evaluated by AIHARA 88D. NODE=M026W1;LINKAGE=A

[21] Superseded by ASNER 04. NODE=M026W1;LINKAGE=NN

[22] Superseded by ACCIARRI 99T. NODE=M026W1;LINKAGE=WD

[23] Average of $K^0_S K^\pm \pi^\mp$, $\pi^+\pi^- K^+ K^-$, and $2(K^+ K^-)$ decay modes.

NODE=M026W;LINKAGE=FF

$\eta_c(1S)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M026220

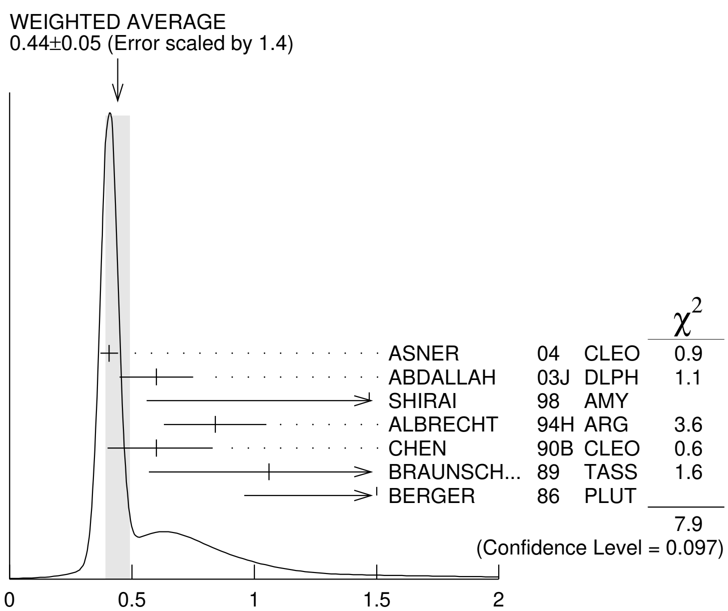
$\Gamma(K\overline{K}\pi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{14}\Gamma_{23}/\Gamma$

NODE=M026G14
NODE=M026G14

VALUE (keV)	*CL%*	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.44 ±0.05 OUR AVERAGE Error includes scale factor of 1.4. See the ideogram below.						
0.407±0.022±0.028			[24,25] ASNER	04	CLEO	$\gamma\gamma \to \eta_c \to K^0_S K^\pm \pi^\mp$
0.60 ±0.12 ±0.09		41	[25,26] ABDALLAH	03J	DLPH	$\gamma\gamma \to K^0_S K^\pm \pi^\mp$
1.47 ±0.87 ±0.27			[25] SHIRAI	98	AMY	$\gamma\gamma \to \eta_c \to K^\pm K^0_S \pi^\mp$
0.84 ±0.21			[25] ALBRECHT	94H	ARG	$\gamma\gamma \to K^\pm K^0_S \pi^\mp$
0.60 $^{+0.23}_{-0.20}$			[25] CHEN	90B	CLEO	$\gamma\gamma \to \eta_c K^\pm K^0_S \pi^\mp$
1.06 ±0.41 ±0.27		11	[25] BRAUNSCH...	89	TASS	$\gamma\gamma \to K\overline{K}\pi$
1.5 $^{+0.60}_{-0.45}$ ±0.3		7	[25] BERGER	86	PLUT	$\gamma\gamma \to K\overline{K}\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
0.418±0.044±0.022			[25,27] BRANDENB...	00B	CLE2	$\gamma\gamma \to \eta_c \to K^\pm K^0_S \pi^\mp$
<0.63	95		[25] BEHREND	89	CELL	$\gamma\gamma \to K^0_S K^\pm \pi^\mp$
<4.4	95		ALTHOFF	85B	TASS	$\gamma\gamma \to K\overline{K}\pi$

[24] Calculated by us from the value reported in ASNER 04 that assumes B($\eta_c \to K\overline{K}\pi$) = 5.5 ± 1.7%

NODE=M026G14;LINKAGE=AA



$\Gamma\left(K\overline{K}\pi\right) \times \Gamma\left(\gamma\gamma\right)/\Gamma_{total}$ $\Gamma_{14}\Gamma_{23}/\Gamma$

$\Gamma(\pi^+\pi^- K^+ K^-) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{16}\Gamma_{23}/\Gamma$

NODE=M026G15
NODE=M026G15

VALUE (keV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.21±0.07 OUR AVERAGE					
0.28±0.10±0.06	42	[28] ABDALLAH	03J	DLPH	$\gamma\gamma \to \pi^+\pi^- K^+ K^-$
0.17±0.08±0.02	13.9 ± 6.6	ALBRECHT	94H	ARG	$\gamma\gamma \to \pi^+\pi^- K^+ K^-$

$\Gamma(2(K^+ K^-)) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{17}\Gamma_{23}/\Gamma$

NODE=M026G27
NODE=M026G27

VALUE (keV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.28 ±0.07 OUR AVERAGE					
0.35 ±0.09 ±0.06	46	[29] ABDALLAH	03J	DLPH	$\gamma\gamma \to 2(K^+ K^-)$
0.231±0.090±0.023	9.1 ± 3.3	[30] ALBRECHT	94H	ARG	$\gamma\gamma \to 2(K^+ K^-)$

$\Gamma(2(\pi^+\pi^-)) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_{18}\Gamma_{23}/\Gamma$

NODE=M026G11

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
0.18±0.07±0.02	21.4 ± 8.6	ALBRECHT 94H	ARG	$\gamma\gamma \to 2(\pi^+\pi^-)$

[25] We have multiplied $K^\pm K^0_S \pi^\mp$ measurement by 3 to obtain $K\overline{K}\pi$. NODE=M026G14;LINKAGE=C

[26] Calculated by us from the value reported in ABDALLAH 03J, which uses B($\eta_c \to K^0_S K^\pm \pi^\mp$) = (1.5 ± 0.4)%. NODE=M026G;LINKAGE=BB

[27] Superseded by ASNER 04. NODE=M026G14;LINKAGE=NN

[28] Calculated by us from the value reported in ABDALLAH 03J, which uses B($\eta_c \to \pi^+\pi^- K^+ K^-$) = (2.0 ± 0.7)%. NODE=M026G;LINKAGE=CC

[29] Calculated by us from the value reported in ABDALLAH 03J, which uses B($\eta_c \to$) $2(K^+K^-)$ = (2.1 ± 1.2)%. NODE=M026G;LINKAGE=DD

[30] Incudes all topological modes except $\eta_c \to \phi\phi$. NODE=M026G;LINKAGE=EE

$\eta_c(1S)$ 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	[31] 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
26 ± 9 OUR EVALUATION (Treating systematicerrors as correlated.)					
18 ± 5 OUR NEW AVERAGE [(25 ± 8) × 10^{-3} OUR 2005 AVERAGE]					
12.6± 3.8±5.1		72	[31] ABLIKIM 05L	BES2	$J/\psi \to \pi^+\pi^-\pi^+\pi^-\gamma$
26.0± 2.4±8.8		113	[31] BISELLO 91	DM2	$J/\psi \to \gamma\rho^0\rho^0$
23.6±10.6±8.2		32	[31] BISELLO 91	DM2	$J/\psi \to \gamma\rho^+\rho^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<14	90		[31] BALTRUSAIT...86	MRK3	$J/\psi \to \eta_c\gamma$

→ NOT CHECKED ←

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	[31] 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
91±26 OUR NEW AVERAGE [(85 ± 31) × 10^{-4} OUR 2005 AVERAGE]				
108±25±44	60	[31] ABLIKIM 05L	BES2	$J/\psi \to K^+K^-\pi^+\pi^-\gamma$
82±28±27	14	[31] BISELLO 91	DM2	$e^+e^- \to \gamma K^+K^-\pi^+\pi^-$
90±50	9	[31] BALTRUSAIT...86	MRK3	$J/\psi \to \eta_c\gamma$

$\Gamma(K^*(892)\overline{K} + \text{c.c.})/\Gamma_{total}$ Γ_9/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	[31] BISELLO 91	DM2	$J/\psi \to \gamma K^+K^-\pi^0$

OCCUR=2

$\Gamma(\phi K^+K^-)/\Gamma_{total}$ Γ_5/Γ

NODE=M026R21

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
$\mathbf{2.9^{+0.9}_{-0.8}\pm1.1}$	$14.1^{+4.4}_{-3.7}$	[32] HUANG 03	BELL	$B^+ \to (\phi K^+K^-) K^+$

$\Gamma(\phi\phi)/\Gamma_{total}$ Γ_6/Γ

NODE=M026R7

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
26 ± 9 OUR EVALUATION (Treating systematic errors as correlated.)				
27 ± 5 OUR NEW AVERAGE [(28 ± 5) × 10^{-4} OUR 2005 AVERAGE]				
25.3± 5.1± 9.1	72	[31] ABLIKIM 05L	BES2	$J/\psi \to K^+K^-K^+K^-\gamma$
26 ± 9	357 ± 64	[31] BAI 04	BES	$J/\psi \to \gamma K^+K^-K^+K^-$
$18\ ^{+8}_{-6}$ ± 7	$7.0^{+3.0}_{-2.3}$	[32] HUANG 03	BELL	$B^+ \to (\phi\phi) K^+$
31 ± 7 ±10	19	[31] BISELLO 91	DM2	$J/\psi \to \gamma K^+K^-K^+K^-$
$30\ ^{+18}_{-12}$ ±10	5	[31] BISELLO 91	DM2	$J/\psi \to \gamma K^+K^-K^0_S K^0_L$
74 ±18 ±24	80	[31] BAI 90B	MRK3	$J/\psi \to \gamma K^+K^-K^+K^-$
67 ±21 ±24		[31] BAI 90B	MRK3	$J/\psi \to \gamma K^+K^-K^0_S K^0_L$

→ NOT CHECKED ←

OCCUR=2

OCCUR=3

$\Gamma(a_0(980)\pi)/\Gamma_{total}$ — Γ_7/Γ

NODE=M026R11
NODE=M026R11

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.02	90	[31,33] BALTRUSAIT...86	MRK3	$J/\psi \to \eta_c\gamma$

$\Gamma(a_2(1320)\pi)/\Gamma_{total}$ — Γ_8/Γ

NODE=M026R12
NODE=M026R12

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.02	90	[31] BALTRUSAIT...86	MRK3	$J/\psi \to \eta_c\gamma$

$\Gamma(f_2(1270)\eta)/\Gamma_{total}$ — Γ_{10}/Γ

NODE=M026R13
NODE=M026R13

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.011	90	[31] BALTRUSAIT...86	MRK3	$J/\psi \to \eta_c\gamma$

$\Gamma(\omega\omega)/\Gamma_{total}$ — Γ_{11}/Γ

NODE=M026R10
NODE=M026R10

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.0031	90	[31] BALTRUSAIT...86	MRK3	$J/\psi \to \eta_c\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.0063	90	[31] ABLIKIM 05L	BES2	$J/\psi \to \pi^+\pi^-\pi^0\pi^+\pi^-\pi^0\gamma$
<0.0063	90	[31] BISELLO 91	DM2	$J/\psi \to \gamma\omega\omega$

$\Gamma(\omega\phi)/\Gamma_{total}$ — Γ_{12}/Γ

NODE=M026R22
NODE=M026R22

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.0017	90	[31] ABLIKIM 05L	BES2	$J/\psi \to \pi^+\pi^-\pi^0K^+K^-\gamma$

$\Gamma(f_2(1270)f_2(1270))/\Gamma_{total}$ — Γ_{13}/Γ

NODE=M026R19
NODE=M026R19

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
$\mathbf{1.02^{+0.33}_{-0.39}\pm0.29}$	91.2 ± 19.8	[34] ABLIKIM 04M	BES	$J/\psi \to \gamma 2\pi^+ 2\pi^-$

$\Gamma(K\overline{K}\pi)/\Gamma_{total}$ — Γ_{14}/Γ

NODE=M026R4
NODE=M026R4

VALUE (units 10^{-2})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
5.7 ±1.6 OUR NEW EVALUATION (Treating systematic errors as correlated.) [0.057 ± 0.016 OUR 2005 EVALUATION]					
5.6 ±0.8 OUR NEW AVERAGE [0.056 ± 0.008 OUR 2005 AVERAGE]					
5.1 ±2.1		609 ± 71	[31] BAI 04	BES	$J/\psi \to \gamma K^\pm\pi^\mp K^0_S$
6.90±1.42±1.32		33	[31] BISELLO 91	DM2	$J/\psi \to \gamma K^+K^-\pi^0$
5.43±0.94±0.94		68	[31] BISELLO 91	DM2	$J/\psi \to \gamma K^\pm\pi^\mp K^0_S$
4.8 ±1.7		95	[31,35] BALTRUSAIT...86	MRK3	$J/\psi \to \eta_c\gamma$
$16.1^{+9.2}_{-7.3}$			[36] HIMEL 80B	MRK2	$\psi(2S) \to \eta_c\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 10.7	90		[31] PARTRIDGE 80B	CBAL	$J/\psi \to \eta_c\gamma$

→ NOT CHECKED ←

OCCUR=2

$\Gamma(\eta\pi\pi)/\Gamma_{total}$ — Γ_{15}/Γ

NODE=M026R6
NODE=M026R6

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.049±0.018 OUR EVALUATION				
0.047±0.015 OUR AVERAGE				
0.054±0.020	75	[31] BALTRUSAIT...86	MRK3	$J/\psi \to \eta_c\gamma$
0.037±0.013±0.020	18	[31] PARTRIDGE 80B	CBAL	$J/\psi \to \eta\pi^+\pi^-\gamma$

→ NOT CHECKED ←

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

NODE=M026R5
NODE=M026R5

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.015 ±0.006 OUR EVALUATION				
0.0142±0.0033 OUR AVERAGE				
0.012 ±0.004	413 ± 54	[31] BAI 04	BES	$J/\psi \to \gamma K^+K^-\pi^+\pi^-$
0.021 ±0.007	110	[31] BALTRUSAIT...86	MRK3	$J/\psi \to \eta_c\gamma$
$0.014^{+0.022}_{-0.009}$		[36] HIMEL 80B	MRK2	$\psi(2S) \to \eta_c\gamma$

→ NOT CHECKED ←

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

NODE=M026R1

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
1.2 ±0.3 OUR NEW EVALUATION [0.012 ± 0.003 OUR 2005 EVALUATION]				
1.15±0.26 OUR NEW AVERAGE [0.0115 ± 0.0026 OUR 2005 AVERAGE]				
1.0 ±0.5	542 ± 75	[31] BAI 04	BES	$J/\psi \to \gamma\, 2(\pi^+\pi^-)$
1.05±0.17±0.34	137	[31] BISELLO 91	DM2	$J/\psi \to \gamma 2\pi^+ 2\pi^-$
1.3 ±0.6	25	[31] BALTRUSAIT...86	MRK3	$J/\psi \to \eta_c \gamma$
$2.0\ ^{+1.5}_{-1.0}$		[36] HIMEL 80B	MRK2	$\psi(2S) \to \eta_c \gamma$

→ NOT CHECKED ←

$\Gamma(2(K^+K^-))/\Gamma_{total}$ — Γ_{17}/Γ

NODE=M026R20

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.0015±0.0007 OUR AVERAGE				
$0.0014^{+0.0005}_{-0.0004}\pm0.0006$	$14.5^{+4.6}_{-3.0}$	[32] HUANG 03	BELL	$B^+ \to 2(K^+K^-)K^+$
0.021 ±0.010 ±0.006		[37] ALBRECHT 94H	ARG	$\gamma\gamma \to K^+K^-K^+K^-$

$\Gamma(p\overline{p})/\Gamma_{total}$ — Γ_{19}/Γ

NODE=M026R2

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
13 ± 4 OUR EVALUATION (Treating systematic errors as correlated.)				
12.5± 3.2 OUR AVERAGE				
15 ± 6	213 ± 33	[31] BAI 04	BES	$J/\psi \to \gamma p\overline{p}$
10 ± 3 ±4	18	[31] BISELLO 91	DM2	$J/\psi \to \gamma p\overline{p}$
11 ± 6	23	[31] BALTRUSAIT...86	MRK3	$J/\psi \to \eta_c \gamma$
$29\ ^{+29}_{-15}$		[36] HIMEL 80B	MRK2	$\psi(2S) \to \eta_c \gamma$

→ NOT CHECKED ←

$\Gamma(K\overline{K}\eta)/\Gamma_{total}$ — Γ_{20}/Γ

NODE=M026R15

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.031	90	[31] BALTRUSAIT...86	MRK3	$J/\psi \to \eta_c \gamma$

$\Gamma(\pi^+\pi^- p\overline{p})/\Gamma_{total}$ — Γ_{21}/Γ

NODE=M026R3

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.012	90	HIMEL 80B	MRK2	$\psi(2S) \to \eta_c \gamma$

$\Gamma(\Lambda\overline{\Lambda})/\Gamma_{total}$ — Γ_{22}/Γ

NODE=M026R18

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.002	90	[31] BISELLO 91	DM2	$e^+e^- \to \gamma\Lambda\overline{\Lambda}$

$\Gamma_i\Gamma_f/\Gamma^2_{total}$ in $p\overline{p} \to \eta_c(1S) \to \phi\phi$ — $\Gamma_{19}\Gamma_6/\Gamma^2$

NODE=M026R33

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
$\mathbf{4.0^{+3.5}_{-3.2}}$	BAGLIN 89	SPEC	$\overline{p}p \to K^+K^-K^+K^-$

[31] The quoted branching ratios use $B(J/\psi(1S) \to \gamma\eta_c(1S)) = 0.0127 \pm 0.0036$. Where relevant, the error in this branching ratio is treated as a common systematic in computing averages. NODE=M026R;LINKAGE=E

[32] Using $B(B^+ \to \eta_c K^+) = (1.25 \pm 0.12^{+0.10}_{-0.12}) \times 10^{-3}$ from FANG 03 and $B(\eta_c \to K\overline{K}\pi) = (5.5 \pm 1.7) \times 10^{-2}$. NODE=M026R;LINKAGE=BB

[33] We are assuming $B(a_0(980) \to \eta\pi) > 0.5$. NODE=M026R;LINKAGE=F

[34] ABLIKIM 04M reports $[B(\eta_c(1S) \to f_2(1270) f_2(1270)) \times B(J/\psi(1S) \to \gamma\eta_c(1S))] = (1.3 \pm 0.3^{+0.3}_{-0.4}) \times 10^{-4}$. We divide by our best value $B(J/\psi(1S) \to \gamma\eta_c(1S)) = (1.3 \pm 0.4) \times 10^{-2}$. 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

[35] Average from $K^+K^-\pi^0$ and $K^\pm K^0_S\pi^\mp$ decay channels. NODE=M026R;LINKAGE=D

[36] Estimated using $B(\psi(2S) \to \gamma\eta_c(1S)) = 0.0028 \pm 0.0006$. NODE=M026R;LINKAGE=A

[37] 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=M026R;LINKAGE=AL

RADIATIVE DECAYS

NODE=M026310

$\Gamma(\gamma\gamma)/\Gamma_{total}$ — Γ_{23}/Γ

NODE=M026R31

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT

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

$2.80^{+0.67}_{-0.58}\pm1.0$		[38] ARMSTRONG	95F	E760	$\overline{p}p \to \gamma\gamma$
<9	90	[31] BISELLO	91	DM2	$J/\psi \to \gamma\gamma\gamma$
$6\ ^{+4}_{-3}\ \pm4$		[38] BAGLIN	87B	SPEC	$\overline{p}p \to \gamma\gamma$
<18	90	[39] BLOOM	83	CBAL	$J/\psi \to \eta_c\gamma$

[38] Not independent from the values of the total and two-photon width quoted by the same experiment. NODE=M026R31;LINKAGE=AB

[39] Using B($J/\psi(1S) \to \gamma\eta_c(1S)$) = 0.0127 ± 0.0036. NODE=M026R31;LINKAGE=C

$\Gamma_i\Gamma_f/\Gamma^2_{total}$ in $p\overline{p} \to \eta_c(1S) \to \gamma\gamma$ $\Gamma_{19}\Gamma_{23}/\Gamma^2$

NODE=M026R32
NODE=M026R32

VALUE (units 10^{-6})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.26 ±0.05 OUR AVERAGE	Error includes scale factor of 1.4.				
$0.224^{+0.038}_{-0.037}\pm0.020$	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	$\overline{p}p \to \gamma\gamma$

$\eta_c(1S)$ REFERENCES

NODE=M026

ABLIKIM	05L	PR D72 072005	M. Ablikim *et al.*	(BES Collab.)	REFID=50837
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
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
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

OTHER RELATED PAPERS

ARMSTRONG	89	PL B221 216	T.A. Armstrong *et al.*	(CERN, CDEF, BIRM+)	REFID=40729

NODE=M070

$J/\psi(1S)$

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

$J/\psi(1S)$ MASS

NODE=M070205

NODE=M070M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
3096.916±0.011 OUR AVERAGE					
3096.917±0.010±0.007		AULCHENKO	03	KEDR	$e^+e^- \to$ hadrons
3096.89 ±0.09	502	[1] ARTAMONOV	00	OLYA	$e^+e^- \to$ hadrons
3096.91 ±0.03 ±0.01		[2] ARMSTRONG	93B	E760	$\overline{p}p \to e^+e^-$
3096.95 ±0.1 ±0.3	193	BAGLIN	87	SPEC	$\overline{p}p \to e^+e^-X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3097.5 ±0.3		GRIBUSHIN	96	FMPS	515 π^- Be $\to 2\mu X$
3098.4 ±2.0	38k	LEMOIGNE	82	GOLI	190 π^- Be $\to 2\mu$
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=M070210

NODE=M070W

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
91.0± 3.2 OUR AVERAGE					
94.7± 4.4	7.8k	[5] AUBERT	04	BABR	$e^+e^- \to \mu^+\mu^-\gamma$
84.4± 8.9		BAI	95B	BES	e^+e^-
99 ±12 ±6		ARMSTRONG	93B	E760	$\overline{p}p \to e^+e^-$
$85.5^{+6.1}_{-5.8}$		[6] HSUEH	92	RVUE	See Υ mini-review

[5] From a direct measurement of $\Gamma(e^+e^-)\times B(\mu^+\mu^-)$. NODE=M070W;LINKAGE=AA

[6] Using data from COFFMAN 92, BALDINI-CELIO 75, BOYARSKI 75, ESPOSITO 75B, BRANDELIK 79C. NODE=M070W;LINKAGE=A

$J/\psi(1S)$ DECAY MODES

NODE=M070215;NODE=M070

	Mode		Fraction (Γ_i/Γ)	Scale factor/ Confidence level	
Γ_1	hadrons		(87.7 ±0.5) %		DESIG=3
Γ_2	virtual $\gamma \to$ hadrons		(13.50±0.30) %		DESIG=4
Γ_3	e^+e^-		(5.93±0.10) %		DESIG=1
Γ_4	$\mu^+\mu^-$		(5.88±0.10) %		DESIG=2
	Decays involving hadronic resonances				NODE=M070;CLUMP=A
Γ_5	$\rho\pi$		(1.69±0.15) %	S=2.4	DESIG=20
Γ_6	$\rho^0\pi^0$		(5.6 ±0.7) $\times 10^{-3}$		DESIG=21
Γ_7	$a_2(1320)\rho$		(1.09±0.22) %		DESIG=43
Γ_8	$\omega\pi^+\pi^+\pi^-\pi^-$		(8.5 ±3.4) $\times 10^{-3}$		DESIG=26
Γ_9	$\omega\pi^+\pi^-$		(7.2 ±1.0) $\times 10^{-3}$		DESIG=24
Γ_{10}	$\omega f_2(1270)$		(4.3 ±0.6) $\times 10^{-3}$		DESIG=28
Γ_{11}	$K^*(892)^0\overline{K}{}^*_2(1430)^0 +$ c.c.		(6.7 ±2.6) $\times 10^{-3}$		DESIG=48
Γ_{12}	$\omega K^*(892)\overline{K} +$ c.c.		(5.3 ±2.0) $\times 10^{-3}$		DESIG=102
Γ_{13}	$K^+\overline{K}{}^*(892)^- +$ c.c.		(5.0 ±0.4) $\times 10^{-3}$		DESIG=121
Γ_{14}	$K^0\overline{K}{}^*(892)^0 +$ c.c.		(4.2 ±0.4) $\times 10^{-3}$		DESIG=122
Γ_{15}	$K_1(1400)^\pm K^\mp$		(3.8 ±1.4) $\times 10^{-3}$		DESIG=132
Γ_{16}	$\omega\pi^0\pi^0$		(3.4 ±0.8) $\times 10^{-3}$		DESIG=140
Γ_{17}	$b_1(1235)^\pm\pi^\mp$	[a]	(3.0 ±0.5) $\times 10^{-3}$		DESIG=49
Γ_{18}	$\omega K^\pm K^0_S\pi^\mp$	[a]	(2.9 ±0.7) $\times 10^{-3}$		DESIG=101
Γ_{19}	$b_1(1235)^0\pi^0$		(2.3 ±0.6) $\times 10^{-3}$		DESIG=160
Γ_{20}	$\phi K^*(892)\overline{K} +$ c.c.		(2.04±0.28) $\times 10^{-3}$		DESIG=104
Γ_{21}	$\omega K\overline{K}$		(1.9 ±0.4) $\times 10^{-3}$		DESIG=27

Γ_{22}	$\omega f_0(1710) \to \omega K \overline{K}$		$(4.8 \pm 1.1) \times 10^{-4}$		DESIG=130
Γ_{23}	$\phi 2(\pi^+\pi^-)$		$(1.60 \pm 0.32) \times 10^{-3}$		DESIG=35
Γ_{24}	$\Delta(1232)^{++} \overline{p} \pi^-$		$(1.6 \pm 0.5) \times 10^{-3}$		DESIG=70
Γ_{25}	$\omega \eta$		$(1.58 \pm 0.16) \times 10^{-3}$		DESIG=30
Γ_{26}	$\phi K \overline{K}$		$(1.83 \pm 0.24) \times 10^{-3}$	S=1.5	DESIG=36
Γ_{27}	$\phi f_0(1710) \to \phi K \overline{K}$		$(3.6 \pm 0.6) \times 10^{-4}$		DESIG=129
Γ_{28}	$p \overline{p} \omega$		$(1.30 \pm 0.25) \times 10^{-3}$	S=1.3	DESIG=58
Γ_{29}	$\Delta(1232)^{++} \overline{\Delta}(1232)^{--}$		$(1.10 \pm 0.29) \times 10^{-3}$		DESIG=66
Γ_{30}	$\Sigma(1385)^- \overline{\Sigma}(1385)^+$ (or c.c.)	[a]	$(1.03 \pm 0.13) \times 10^{-3}$		DESIG=67
Γ_{31}	$p \overline{p} \eta'(958)$		$(9 \pm 4) \times 10^{-4}$	S=1.7	DESIG=59
Γ_{32}	$\phi f_2'(1525)$		$(8 \pm 4) \times 10^{-4}$	S=2.7	DESIG=40
Γ_{33}	$\phi \pi^+ \pi^-$		$(9.4 \pm 1.5) \times 10^{-4}$	S=1.7	DESIG=34
Γ_{34}	$\phi K^\pm K_S^0 \pi^\mp$	[a]	$(7.2 \pm 0.9) \times 10^{-4}$		DESIG=103
Γ_{35}	$\omega f_1(1420)$		$(6.8 \pm 2.4) \times 10^{-4}$		DESIG=105
Γ_{36}	$\phi \eta$		$(6.5 \pm 0.7) \times 10^{-4}$		DESIG=37
Γ_{37}	$\Xi(1530)^- \overline{\Xi}^+$		$(5.9 \pm 1.5) \times 10^{-4}$		DESIG=107
Γ_{38}	$p K^- \overline{\Sigma}(1385)^0$		$(5.1 \pm 3.2) \times 10^{-4}$		DESIG=74
Γ_{39}	$\omega \pi^0$		$(4.2 \pm 0.6) \times 10^{-4}$	S=1.4	DESIG=32
Γ_{40}	$\phi \eta'(958)$		$(3.3 \pm 0.4) \times 10^{-4}$		DESIG=38
Γ_{41}	$\phi f_0(980)$		$(3.2 \pm 0.9) \times 10^{-4}$	S=1.9	DESIG=41
Γ_{42}	$\Xi(1530)^0 \overline{\Xi}^0$		$(3.2 \pm 1.4) \times 10^{-4}$		DESIG=108
Γ_{43}	$\Sigma(1385)^- \overline{\Sigma}^+$ (or c.c.)	[a]	$(3.1 \pm 0.5) \times 10^{-4}$		DESIG=68
Γ_{44}	$\phi f_1(1285)$		$(2.6 \pm 0.5) \times 10^{-4}$	S=1.1	DESIG=106
Γ_{45}	$\rho \eta$		$(1.93 \pm 0.23) \times 10^{-4}$		DESIG=22
Γ_{46}	$\omega \eta'(958)$		$(1.67 \pm 0.25) \times 10^{-4}$		DESIG=31
Γ_{47}	$\omega f_0(980)$		$(1.4 \pm 0.5) \times 10^{-4}$		DESIG=150
Γ_{48}	$\rho \eta'(958)$		$(1.05 \pm 0.18) \times 10^{-4}$		DESIG=23
Γ_{49}	$p \overline{p} \phi$		$(4.5 \pm 1.5) \times 10^{-5}$		DESIG=127
Γ_{50}	$a_2(1320)^\pm \pi^\mp$	[a]	$< 4.3 \times 10^{-3}$	CL=90%	DESIG=42
Γ_{51}	$K \overline{K}_2^*(1430)+$ c.c.		$< 4.0 \times 10^{-3}$	CL=90%	DESIG=45
Γ_{52}	$K_1(1270)^\pm K^\mp$		$< 3.0 \times 10^{-3}$	CL=90%	DESIG=131
Γ_{53}	$K_2^*(1430)^0 \overline{K}_2^*(1430)^0$		$< 2.9 \times 10^{-3}$	CL=90%	DESIG=47
Γ_{54}	$K^*(892)^0 \overline{K}^*(892)^0$		$< 5 \times 10^{-4}$	CL=90%	DESIG=46
Γ_{55}	$\phi f_2(1270)$		$< 3.7 \times 10^{-4}$	CL=90%	DESIG=39
Γ_{56}	$p \overline{p} \rho$		$< 3.1 \times 10^{-4}$	CL=90%	DESIG=57
Γ_{57}	$\phi \eta(1405) \to \phi \eta \pi \pi$		$< 2.5 \times 10^{-4}$	CL=90%	DESIG=128
Γ_{58}	$\omega f_2'(1525)$		$< 2.2 \times 10^{-4}$	CL=90%	DESIG=29
Γ_{59}	$\Sigma(1385)^0 \overline{\Lambda}$		$< 2 \times 10^{-4}$	CL=90%	DESIG=111
Γ_{60}	$\Delta(1232)^+ \overline{p}$		$< 1 \times 10^{-4}$	CL=90%	DESIG=112
Γ_{61}	$\Theta(1540) \overline{\Theta}(1540) \to K_S^0 p K^- \overline{n}+$ c.c.		$< 1.1 \times 10^{-5}$	CL=90%	DESIG=205
Γ_{62}	$\Theta(1540) K^- \overline{n} \to K_S^0 p K^- \overline{n}$		$< 2.1 \times 10^{-5}$	CL=90%	DESIG=206
Γ_{63}	$\Theta(1540) K_S^0 \overline{p} \to K_S^0 \overline{p} K^+ n$		$< 1.6 \times 10^{-5}$	CL=90%	DESIG=207
Γ_{64}	$\overline{\Theta}(1540) K^+ n \to K_S^0 \overline{p} K^+ n$		$< 5.6 \times 10^{-5}$	CL=90%	DESIG=208
Γ_{65}	$\overline{\Theta}(1540) K_S^0 p \to K_S^0 p K^- \overline{n}$		$< 1.1 \times 10^{-5}$	CL=90%	DESIG=209
Γ_{66}	$\Sigma^0 \overline{\Lambda}$		$< 9 \times 10^{-5}$	CL=90%	DESIG=110
Γ_{67}	$\phi \pi^0$		$< 6.8 \times 10^{-6}$	CL=90%	DESIG=33

Decays into stable hadrons

NODE=M070;CLUMP=B

Γ_{68}	$2(\pi^+\pi^-)\pi^0$		(3.37 ± 0.26) %		DESIG=9
Γ_{69}	$3(\pi^+\pi^-)\pi^0$		(2.9 ± 0.6) %		DESIG=11
Γ_{70}	$\pi^+\pi^-\pi^0$		(2.02 ± 0.14) %	S=1.7	DESIG=7
Γ_{71}	$\pi^+\pi^-\pi^0 K^+ K^-$		(1.20 ± 0.30) %		DESIG=18
Γ_{72}	$4(\pi^+\pi^-)\pi^0$		$(9.0 \pm 3.0) \times 10^{-3}$		DESIG=12
Γ_{73}	$\pi^+\pi^- K^+ K^-$		$(7.2 \pm 2.3) \times 10^{-3}$		DESIG=16
Γ_{74}	$K \overline{K} \pi$		$(6.1 \pm 1.0) \times 10^{-3}$		DESIG=15
Γ_{75}	$p \overline{p} \pi^+ \pi^-$		$(6.0 \pm 0.5) \times 10^{-3}$	S=1.3	DESIG=54
Γ_{76}	$2(\pi^+\pi^-)$		$(3.57 \pm 0.30) \times 10^{-3}$		DESIG=8
Γ_{77}	$3(\pi^+\pi^-)$		$(4.0 \pm 2.0) \times 10^{-3}$		DESIG=10
Γ_{78}	$2(\pi^+\pi^-)\eta$		$(2.26 \pm 0.28) \times 10^{-3}$		DESIG=201
Γ_{79}	$3(\pi^+\pi^-)\eta$		$(7.2 \pm 1.5) \times 10^{-4}$		DESIG=202

Γ_{80}	$n\overline{n}\pi^+\pi^-$		$(4 \pm 4) \times 10^{-3}$		DESIG=65
Γ_{81}	$\Sigma^0\overline{\Sigma}^0$		$(1.31\pm0.10) \times 10^{-3}$		DESIG=63
Γ_{82}	$2(\pi^+\pi^-)K^+K^-$		$(3.1 \pm 1.3) \times 10^{-3}$		DESIG=17
Γ_{83}	$p\overline{p}\pi^+\pi^-\pi^0$	[b]	$(2.3 \pm 0.9) \times 10^{-3}$	S=1.9	DESIG=55
Γ_{84}	$p\overline{p}$		$(2.17\pm0.08) \times 10^{-3}$		DESIG=50
Γ_{85}	$p\overline{p}\eta$		$(2.09\pm0.18) \times 10^{-3}$		DESIG=56
Γ_{86}	$p\overline{n}\pi^-$		$(2.00\pm0.10) \times 10^{-3}$		DESIG=53
Γ_{87}	$n\overline{n}$		$(2.2 \pm 0.4) \times 10^{-3}$		DESIG=64
Γ_{88}	$\Xi\overline{\Xi}$		$(1.8 \pm 0.4) \times 10^{-3}$	S=1.8	DESIG=62
Γ_{89}	$\Lambda\overline{\Lambda}$		$(1.54\pm0.19) \times 10^{-3}$	S=2.2	DESIG=60
Γ_{90}	$p\overline{p}\pi^0$		$(1.09\pm0.09) \times 10^{-3}$		DESIG=52
Γ_{91}	$\Lambda\overline{\Sigma}^-\pi^+$ (or c.c.)	[a]	$(1.06\pm0.12) \times 10^{-3}$		DESIG=71
Γ_{92}	$pK^-\overline{\Lambda}$		$(8.9 \pm 1.6) \times 10^{-4}$		DESIG=72
Γ_{93}	$2(K^+K^-)$		$(9.2 \pm 3.3) \times 10^{-4}$	S=1.3	DESIG=19
Γ_{94}	$pK^-\overline{\Sigma}^0$		$(2.9 \pm 0.8) \times 10^{-4}$		DESIG=73
Γ_{95}	K^+K^-		$(2.37\pm0.31) \times 10^{-4}$		DESIG=13
Γ_{96}	$K^0_S K^0_L$		$(1.46\pm0.26) \times 10^{-4}$	S=2.7	DESIG=75
Γ_{97}	$\Lambda\overline{\Lambda}\pi^0$		$(2.2 \pm 0.6) \times 10^{-4}$		DESIG=109
Γ_{98}	$\pi^+\pi^-$		$(1.47\pm0.23) \times 10^{-4}$		DESIG=6
Γ_{99}	$\Lambda\overline{\Sigma}$+ c.c.		$< 1.5 \times 10^{-4}$	CL=90%	DESIG=61
Γ_{100}	$K^0_S K^0_S$		$< 1 \times 10^{-6}$	CL=95%	DESIG=14

Radiative decays

NODE=M070;CLUMP=C

Γ_{101}	$\gamma\eta_c(1S)$		(1.3 ± 0.4) %		DESIG=85
Γ_{102}	$\gamma\pi^+\pi^-2\pi^0$		$(8.3 \pm 3.1) \times 10^{-3}$		DESIG=99
Γ_{103}	$\gamma\eta\pi\pi$		$(6.1 \pm 1.0) \times 10^{-3}$		DESIG=96
Γ_{104}	$\gamma\eta(1405/1475) \rightarrow \gamma K\overline{K}\pi$	[c]	$(2.8 \pm 0.6) \times 10^{-3}$	S=1.6	DESIG=89
Γ_{105}	$\gamma\eta(1405/1475) \rightarrow \gamma\gamma\rho^0$		$(6.4 \pm 1.4) \times 10^{-5}$		DESIG=171
Γ_{106}	$\gamma\eta(1405/1475) \rightarrow \gamma\eta\pi^+\pi^-$		$(3.0 \pm 0.5) \times 10^{-4}$		DESIG=170
Γ_{107}	$\gamma\rho\rho$		$(4.5 \pm 0.8) \times 10^{-3}$		DESIG=94
Γ_{108}	$\gamma\eta_2(1870) \rightarrow \gamma\pi^+\pi^-$		$(6.2 \pm 2.4) \times 10^{-4}$		DESIG=142
Γ_{109}	$\gamma\eta'(958)$		$(4.31\pm0.30) \times 10^{-3}$		DESIG=84
Γ_{110}	$\gamma 2\pi^+2\pi^-$		$(2.8 \pm 0.5) \times 10^{-3}$	S=1.9	DESIG=95
Γ_{111}	$\gamma f_2(1270) f_2(1270)$		$(9.5 \pm 1.7) \times 10^{-4}$		DESIG=203
Γ_{112}	$\gamma f_2(1270) f_2(1270)$ (non resonant)		$(8.2 \pm 1.9) \times 10^{-4}$		DESIG=204
Γ_{113}	$\gamma K^+K^-\pi^+\pi^-$		$(2.1 \pm 0.6) \times 10^{-3}$		DESIG=143
Γ_{114}	$\gamma f_4(2050)$		$(2.7 \pm 0.7) \times 10^{-3}$		DESIG=100
Γ_{115}	$\gamma\omega\omega$		$(1.59\pm0.33) \times 10^{-3}$		DESIG=97
Γ_{116}	$\gamma\eta(1405/1475) \rightarrow \gamma\rho^0\rho^0$		$(1.7 \pm 0.4) \times 10^{-3}$	S=1.3	DESIG=124
Γ_{117}	$\gamma f_2(1270)$		$(1.38\pm0.14) \times 10^{-3}$		DESIG=86
Γ_{118}	$\gamma f_0(1710) \rightarrow \gamma K\overline{K}$		$(8.5 {}^{+1.2}_{-0.9}) \times 10^{-4}$	S=1.2	DESIG=91
Γ_{119}	$\gamma f_0(1710) \rightarrow \gamma\pi\pi$				DESIG=135
Γ_{120}	$\gamma\eta$		$(8.6 \pm 0.8) \times 10^{-4}$		DESIG=83
Γ_{121}	$\gamma f_1(1420) \rightarrow \gamma K\overline{K}\pi$		$(7.9 \pm 1.3) \times 10^{-4}$		DESIG=175
Γ_{122}	$\gamma f_1(1285)$		$(6.1 \pm 0.8) \times 10^{-4}$		DESIG=88
Γ_{123}	$\gamma f_1(1510) \rightarrow \gamma\eta\pi^+\pi^-$		$(4.5 \pm 1.2) \times 10^{-4}$		DESIG=141
Γ_{124}	$\gamma f'_2(1525)$		$(4.5 {}^{+0.7}_{-0.4}) \times 10^{-4}$		DESIG=87
Γ_{125}	$\gamma f_2(1950) \rightarrow \gamma K^*(892)\overline{K}^*(892)$		$(7.0 \pm 2.2) \times 10^{-4}$		DESIG=144
Γ_{126}	$\gamma K^*(892)\overline{K}^*(892)$		$(4.0 \pm 1.3) \times 10^{-3}$		DESIG=145
Γ_{127}	$\gamma\phi\phi$		$(4.0 \pm 1.2) \times 10^{-4}$	S=2.1	DESIG=98
Γ_{128}	$\gamma p\overline{p}$		$(3.8 \pm 1.0) \times 10^{-4}$		DESIG=90
Γ_{129}	$\gamma\eta(2225)$		$(2.9 \pm 0.6) \times 10^{-4}$		DESIG=126
Γ_{130}	$\gamma\eta(1760) \rightarrow \gamma\rho^0\rho^0$		$(1.3 \pm 0.9) \times 10^{-4}$		DESIG=125

Γ_{131}	$\gamma(K\overline{K}\pi)_{J^{PC}=0-+}$		$(7 \pm 4) \times 10^{-4}$	S=2.1	DESIG=176
Γ_{132}	$\gamma\pi^0$		$(3.9 \pm 1.3) \times 10^{-5}$		DESIG=82
Γ_{133}	$\gamma p\overline{p}\pi^+\pi^-$		$< 7.9 \times 10^{-4}$	CL=90%	DESIG=93
Γ_{134}	$\gamma\gamma$		$< 5 \times 10^{-4}$	CL=90%	DESIG=80
Γ_{135}	$\gamma\Lambda\overline{\Lambda}$		$< 1.3 \times 10^{-4}$	CL=90%	DESIG=200
Γ_{136}	3γ		$< 5.5 \times 10^{-5}$	CL=90%	DESIG=81
Γ_{137}	$\gamma f_0(2200)$				DESIG=123
Γ_{138}	$\gamma f_J(2220)$		$> 2.50 \times 10^{-3}$	CL=99.9%	DESIG=92
Γ_{139}	$\gamma f_J(2220) \to \gamma\pi\pi$		$(8 \pm 4) \times 10^{-5}$		DESIG=136
Γ_{140}	$\gamma f_J(2220) \to \gamma K\overline{K}$		$(8.1 \pm 3.0) \times 10^{-5}$		DESIG=137
Γ_{141}	$\gamma f_J(2220) \to \gamma p\overline{p}$		$(1.5 \pm 0.8) \times 10^{-5}$		DESIG=138
Γ_{142}	$\gamma f_0(1500)$		$>(5.7 \pm 0.8) \times 10^{-4}$		DESIG=172;OUR EST; → NOT CHECKED ←
Γ_{143}	γe^+e^-		$(8.8 \pm 1.4) \times 10^{-3}$		DESIG=5

Lepton Family number (*LF*) violating modes NODE=M070;CLUMP=D

Γ_{144}	$e^\pm\mu^\mp$	*LF*	$< 1.1 \times 10^{-6}$	CL=90%	DESIG=177
Γ_{145}	$e^\pm\tau^\mp$	*LF*	$< 8.3 \times 10^{-6}$	CL=90%	DESIG=178
Γ_{146}	$\mu^\pm\tau^\mp$	*LF*	$< 2.0 \times 10^{-6}$	CL=90%	DESIG=179

[*a*] The value is for the sum of the charge states or particle/antiparticle states indicated. LINKAGE=SG

[*b*] Includes $p\overline{p}\pi^+\pi^-\gamma$ and excludes $p\overline{p}\eta$, $p\overline{p}\omega$, $p\overline{p}\eta'$. LINKAGE=MF

[*c*] See the "Note on the $\eta(1405)$" in the $\eta(1405)$ Particle Listings. LINKAGE=MG

J/ψ(1*S*) 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^-

Γ(e^+e^-) Γ_3

NODE=M070W1
NODE=M070W1

VALUE (keV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
5.40±0.15±0.07 OUR EVALUATION					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
5.61 ± 0.20	7.8k	[7] AUBERT	04	BABR	$e^+e^- \to \mu^+\mu^-\gamma$
5.14 ± 0.39		BAI	95B	BES	e^+e^-
$5.36^{+0.29}_{-0.28}$		[8] HSUEH	92	RVUE	See Υ mini-review
4.72 ± 0.35		ALEXANDER	89	RVUE	See Υ mini-review
4.4 ± 0.6		[8] BRANDELIK	79C	DASP	e^+e^-
4.6 ± 0.8		[9] 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 ←

[7] From a direct measurement of $\Gamma(e^+e^-)\times B(\mu^+\mu^-)$. NODE=M070W1;LINKAGE=AA

[8] From a simultaneous fit to e^+e^-, $\mu^+\mu^-$, and hadronic channels assuming $\Gamma(e^+e^-) = \Gamma(\mu^+\mu^-)$. NODE=M070W1;LINKAGE=F

[9] Assuming equal partial widths for e^+e^- and $\mu^+\mu^-$. NODE=M070W1;LINKAGE=B

Γ($\mu^+\mu^-$) Γ_4

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^-

Γ($\gamma\gamma$) Γ_{134}

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

$\Gamma(\text{hadrons}) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_1\Gamma_3/\Gamma$

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	[10] BALDINI-...	75	FRAG	e^+e^-
3.9±0.8	[10] ESPOSITO	75B	FRAM	e^+e^-

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

NODE=M070G1
NODE=M070G1

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.35±0.02	BRANDELIK	79C	DASP	e^+e^-
0.32±0.07	[10] BALDINI-...	75	FRAG	e^+e^-
0.34±0.09	[10] ESPOSITO	75B	FRAM	e^+e^-
0.36±0.10	[10] FORD	75	SPEC	e^+e^-

$\Gamma(\mu^+\mu^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_4\Gamma_3/\Gamma$

NODE=M070G2
NODE=M070G2

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.3301±0.0077±0.0073	7.8k	AUBERT	04	BABR	$e^+e^- \to \mu^+\mu^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.51 ±0.09		DASP	75	DASP	e^+e^-
0.38 ±0.05		[10] ESPOSITO	75B	FRAM	e^+e^-

$\Gamma(\pi^+\pi^-\pi^0) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_{70}\Gamma_3/\Gamma$

NODE=M070S44
NODE=M070S44

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
0.122±0.005±0.008	AUBERT,B	04N	BABR	10.6 $e^+e^- \to \pi^+\pi^-\pi^0\gamma$

$\Gamma(p\overline{p}) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_{84}\Gamma_3/\Gamma$

NODE=M070G4
NODE=M070G4

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
11.6±0.9 OUR NEW AVERAGE Error includes scale factor of 1.2. [9.7 ± 1.7 eV OUR 2005 AVERAGE]					
12.0±0.6±0.5	438	AUBERT	06B		$e^+e^- \to p\overline{p}\gamma$
9.7±1.7		[11] ARMSTRONG	93B	E760	$\overline{p}p \to e^+e^-$

[10] Data redundant with branching ratios or partial widths above.

NODE=M070G;LINKAGE=S

[11] Using $\Gamma_{\text{total}} = 85.5^{+6.1}_{-5.8}$ MeV.

NODE=M070G;LINKAGE=A

$J/\psi(1S)$ BRANCHING RATIOS

NODE=M070230

For the first four branching ratios, see also the partial widths, and (partial widths) $\times\ \Gamma(e^+e^-)/\Gamma_{\text{total}}$ above.

NODE=M070300

$\Gamma(\text{hadrons})/\Gamma_{\text{total}}$ — Γ_1/Γ

NODE=M070R3
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^-

$\Gamma(\text{virtual}\gamma \to \text{hadrons})/\Gamma_{\text{total}}$ — Γ_2/Γ

NODE=M070R4
NODE=M070R4

VALUE	DOCUMENT ID		TECN	COMMENT
0.135 ±0.003	[12,13] SETH	04	RVUE	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.17 ±0.02	[12] BOYARSKI	75	MRK1	e^+e^-

[12] Included in $\Gamma(\text{hadrons})/\Gamma_{\text{total}}$.

NODE=M070R4;LINKAGE=C

[13] 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

$\Gamma(e^+e^-)/\Gamma_{total}$ Γ_3/Γ

NODE=M070R1
NODE=M070R1

VALUE	DOCUMENT ID		TECN	COMMENT
0.0593±0.0010 OUR AVERAGE				
0.0590±0.0005±0.0010	BAI	98D	BES	$\psi(2S) \to J/\psi \pi^+\pi^-$
0.0609±0.0033	BAI	95B	BES	e^+e^-
0.0592±0.0015±0.0020	COFFMAN	92	MRK3	$\psi(2S) \to J/\psi \pi^+\pi^-$
0.069 ±0.009	BOYARSKI	75	MRK1	e^+e^-

$\Gamma(\mu^+\mu^-)/\Gamma_{total}$ Γ_4/Γ

NODE=M070R2
NODE=M070R2

VALUE	DOCUMENT ID		TECN	COMMENT
0.0588±0.0010 OUR AVERAGE				
0.0584±0.0006±0.0010	BAI	98D	BES	$\psi(2S) \to J/\psi \pi^+\pi^-$
0.0608±0.0033	BAI	95B	BES	e^+e^-
0.0590±0.0015±0.0019	COFFMAN	92	MRK3	$\psi(2S) \to J/\psi \pi^+\pi^-$
0.069 ±0.009	BOYARSKI	75	MRK1	e^+e^-

$\Gamma(e^+e^-)/\Gamma(\mu^+\mu^-)$ Γ_3/Γ_4

NODE=M070R5
NODE=M070R5

VALUE	DOCUMENT ID		TECN	COMMENT
• • • 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^-

HADRONIC DECAYS

NODE=M070305

$\Gamma(\rho\pi)/\Gamma_{total}$ Γ_5/Γ

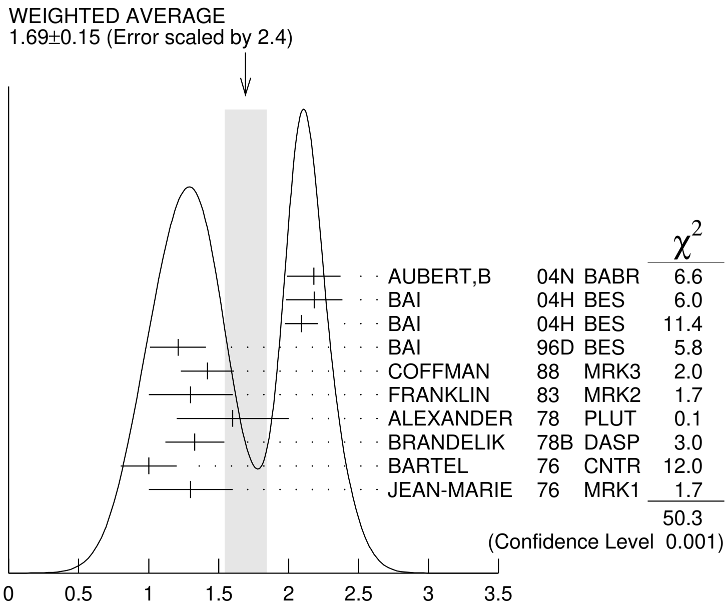
NODE=M070R20
NODE=M070R20

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		[14,15] AUBERT,B	04N	BABR	10.6 $e^+e^- \to \pi^+\pi^-\pi^0\gamma$
2.184±0.005±0.201	220k	[15,16] BAI	04H	BES	$e^+e^- \to J/\psi \to \pi^+\pi^-\pi^0$
2.091±0.021±0.116		[15,17] 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

[14] From the ratio of $\Gamma(e^+e^-)$ B($\pi^+\pi^-\pi^0$) and $\Gamma(e^+e^-)$ B($\mu^+\mu^-$) (AUBERT 04).
[15] Not independent of their B($\pi^+\pi^-\pi^0$).
[16] From $J/\psi \to \pi^+\pi^-\pi^0$ events directly.
[17] Obtained comparing the rates for $\pi^+\pi^-\pi^0$ and $\mu^+\mu^-$, using J/ψ events produced via $\psi(2S) \to \pi^+\pi^- J/\psi$ and with B($J/\psi \to \mu^+\mu^-$) = 5.88 ± 0.10%.

NODE=M070R20;LINKAGE=AU
NODE=M070R20;LINKAGE=BU
NODE=M070R20;LINKAGE=BA
NODE=M070R20;LINKAGE=BI



$\Gamma(\rho\pi)/\Gamma_{total}$ Γ_5/Γ

$\Gamma(\rho^0\pi^0)/\Gamma(\rho\pi)$ Γ_6/Γ_5

NODE=M070R21
NODE=M070R21

VALUE	DOCUMENT ID		TECN	COMMENT
0.328±0.005±0.027	COFFMAN	88	MRK3	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.35 ±0.08	ALEXANDER	78	PLUT	e^+e^-
0.32 ±0.08	BRANDELIK	78B	DASP	e^+e^-
0.39 ±0.11	BARTEL	76	CNTR	e^+e^-
0.37 ±0.09	JEAN-MARIE	76	MRK1	e^+e^-

$\Gamma(a_2(1320)\rho)/\Gamma_{total}$ Γ_7/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	$e^+e^- \to 2(\pi^+\pi^-)\pi^0$

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

NODE=M070R26
NODE=M070R26

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
85±34	140	VANNUCCI	77	MRK1	$e^+e^- \to 3(\pi^+\pi^-)\pi^0$

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

NODE=M070R24
NODE=M070R24

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
7.2±1.0 OUR AVERAGE					
7.0±1.6	18058	AUGUSTIN	89	DM2	$J/\psi \to 2(\pi^+\pi^-)\pi^0$
7.8±1.6	215	BURMESTER	77D	PLUT	e^+e^-
6.8±1.9	348	VANNUCCI	77	MRK1	$e^+e^- \to 2(\pi^+\pi^-)\pi^0$

$\Gamma(\omega\pi^+\pi^-)/\Gamma(2(\pi^+\pi^-)\pi^0)$ Γ_9/Γ_{68}

NODE=M070R25
NODE=M070R25

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.3	[18] JEAN-MARIE	76	MRK1	e^+e^-

[18] Final state $(\pi^+\pi^-)\pi^0$ under the assumption that $\pi\pi$ is isospin 0.

NODE=M070R25;LINKAGE=J

$\Gamma(K^*(892)^0\overline{K}{}^*_2(1430)^0 + \text{c.c.})/\Gamma_{total}$ Γ_{11}/Γ

NODE=M070R48
NODE=M070R48

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
67±26	40	VANNUCCI	77	MRK1	$e^+e^- \to \pi^+\pi^-K^+K^-$

$\Gamma(\omega K^*(892)\overline{K} + \text{c.c.})/\Gamma_{total}$ Γ_{12}/Γ

NODE=M070S2
NODE=M070S2

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
53±14±14	530 ± 140	BECKER	87	MRK3	$e^+e^- \to$ hadrons

$\Gamma(\omega f_2(1270))/\Gamma_{total}$ — Γ_{10}/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	$e^+e^- \rightarrow 2(\pi^+\pi^-)\pi^0$

$\Gamma(K^+\overline{K}^*(892)^- + \text{c.c.})/\Gamma_{total}$ — Γ_{13}/Γ

NODE=M070S15
NODE=M070S15

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
5.0 ±0.4 OUR AVERAGE					
4.57±0.17±0.70	2285	JOUSSET	90	DM2	$J/\psi \rightarrow$ hadrons
5.26±0.13±0.53		COFFMAN	88	MRK3	$J/\psi \rightarrow K^\pm K^0_S\pi^\mp$, $K^+K^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.6 ±0.6	24	FRANKLIN	83	MRK2	$J/\psi \rightarrow K^+K^-\pi^0$
3.2 ±0.6	48	VANNUCCI	77	MRK1	$J/\psi \rightarrow K^\pm K^0_S\pi^\mp$
4.1 ±1.2	39	BRAUNSCH...	76	DASP	$J/\psi \rightarrow K^\pm X$

$\Gamma(K^0\overline{K}^*(892)^0 + \text{c.c.})/\Gamma_{total}$ — Γ_{14}/Γ

NODE=M070S16
NODE=M070S16

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
4.2 ±0.4 OUR AVERAGE					
3.96±0.15±0.60	1192	JOUSSET	90	DM2	$J/\psi \rightarrow$ hadrons
4.33±0.12±0.45		COFFMAN	88	MRK3	$J/\psi \rightarrow K^\pm K^0_S\pi^\mp$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.7 ±0.6	45	VANNUCCI	77	MRK1	$J/\psi \rightarrow K^\pm K^0_S\pi^\mp$

$\Gamma(K^0\overline{K}^*(892)^0 + \text{c.c.})/\Gamma(K^+\overline{K}^*(892)^- + \text{c.c.})$ — Γ_{14}/Γ_{13}

NODE=M070S17
NODE=M070S17

VALUE	DOCUMENT ID		TECN	COMMENT
0.82±0.05±0.09	COFFMAN	88	MRK3	$J/\psi \rightarrow K\overline{K}^*(892)$+c.c.

$\Gamma(K_1(1400)^\pm K^\mp)/\Gamma_{total}$ — Γ_{15}/Γ

NODE=M070S35
NODE=M070S35

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
3.8±0.8±1.2	[19] BAI	99C	BES	e^+e^-

[19] Assuming B($K_1(1400) \rightarrow K^*\pi$)=0.94 ± 0.06

NODE=M070S35;LINKAGE=M3

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

NODE=M070S26
NODE=M070S26

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
3.4±0.3±0.7	509	AUGUSTIN	89	DM2	$J/\psi \rightarrow \pi^+\pi^-3\pi^0$

$\Gamma(b_1(1235)^\pm\pi^\mp)/\Gamma_{total}$ — Γ_{17}/Γ

NODE=M070R49
NODE=M070R49

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
30±5 OUR AVERAGE					
31±6	4600	AUGUSTIN	89	DM2	$J/\psi \rightarrow 2(\pi^+\pi^-)\pi^0$
29±7	87	BURMESTER	77D	PLUT	e^+e^-

$\Gamma(\omega K^\pm K^0_S\pi^\mp)/\Gamma_{total}$ — Γ_{18}/Γ

NODE=M070S1
NODE=M070S1

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
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_{19}/Γ

NODE=M070S28
NODE=M070S28

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
23±3±5	229	AUGUSTIN	89	DM2	e^+e^-

$\Gamma(\phi K^*(892)\overline{K} + \text{c.c.})/\Gamma_{total}$ — Γ_{20}/Γ

NODE=M070S4
NODE=M070S4

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
20.4±2.8 OUR AVERAGE					
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

$\Gamma(\omega K\overline{K})/\Gamma_{total}$ — Γ_{21}/Γ

NODE=M070R27
NODE=M070R27

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
19 ± 4 OUR AVERAGE					
19.8± 2.1±3.9		[20] FALVARD	88	DM2	$J/\psi \to$ hadrons
16 ±10	22	FELDMAN	77	MRK1	e^+e^-

[20] Addition of ωK^+K^- and $\omega K^0\overline{K}^0$ branching ratios.

NODE=M070R27;LINKAGE=B

$\Gamma(\omega f_0(1710) \to \omega K\overline{K})/\Gamma_{total}$ — Γ_{22}/Γ

NODE=M070S25
NODE=M070S25

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
4.8±1.1±0.3	[21,22] FALVARD	88	DM2	$J/\psi \to$ hadrons

[21] Includes unknown branching fraction $f_0(1710) \to K\overline{K}$.
[22] Addition of $f_0(1710) \to K^+K^-$ and $f_0(1710) \to K^0\overline{K}^0$ branching ratios.

NODE=M070S25;LINKAGE=F
NODE=M070S25;LINKAGE=G

$\Gamma(\phi 2(\pi^+\pi^-))/\Gamma_{total}$ — Γ_{23}/Γ

NODE=M070R35
NODE=M070R35

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
16.0±1.0±3.0	FALVARD	88	DM2	$J/\psi \to$ hadrons

$\Gamma(\Delta(1232)^{++}\overline{p}\pi^-)/\Gamma_{total}$ — Γ_{24}/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_{25}/Γ

NODE=M070R30
NODE=M070R30

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.58±0.16 OUR AVERAGE					
1.43±0.10±0.21	378	JOUSSET	90	DM2	$J/\psi \to$ hadrons
1.71±0.08±0.20		COFFMAN	88	MRK3	$e^+e^- \to 3\pi\eta$

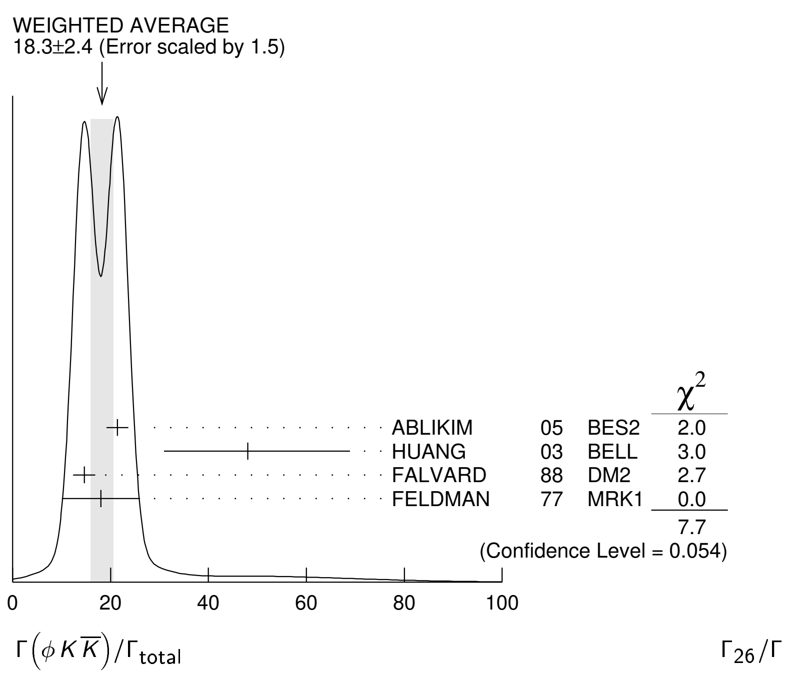
$\Gamma(\phi K\overline{K})/\Gamma_{total}$ — Γ_{26}/Γ

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	$9.0^{+3.7}_{-3.0}$	[34,35] HUANG	03	BELL	$B^+ \to (\phi K^+K^-)K^+$
14.6± 0.8±2.1		[23] FALVARD	88	DM2	$J/\psi \to$ hadrons
18 ± 8	14	FELDMAN	77	MRK1	e^+e^-

[23] 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_{27}/Γ

NODE=M070S24
NODE=M070S24

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
3.6±0.2±0.6	[24,25] FALVARD	88	DM2	$J/\psi \to$ hadrons

[24] Including interference with $f'_2(1525)$.
[25] Includes unknown branching fraction $f_0(1710) \to K\overline{K}$.

NODE=M070S24;LINKAGE=D
NODE=M070S24;LINKAGE=E

$\Gamma(p\overline{p}\omega)/\Gamma_{total}$ Γ_{28}/Γ

NODE=M070R58
NODE=M070R58

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.30±0.25 OUR AVERAGE	Error includes scale factor of 1.3.				
1.10±0.17±0.18	486	EATON	84	MRK2	e^+e^-
1.6 ±0.3	77	PERUZZI	78	MRK1	e^+e^-

$\Gamma(\Delta(1232)^{++}\overline{\Delta}(1232)^{--})/\Gamma_{total}$ Γ_{29}/Γ

NODE=M070R66
NODE=M070R66

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.10±0.09±0.28	233	EATON	84	MRK2	e^+e^-

$\Gamma(\Sigma(1385)^{-}\overline{\Sigma}(1385)^{+}$ (or c.c.)$)/\Gamma_{total}$ Γ_{30}/Γ

NODE=M070R67
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	$e^+e^- \rightarrow \Sigma^{*-}$
1.19±0.04±0.25	754 ± 27	HENRARD	87	DM2	$e^+e^- \rightarrow \Sigma^{*+}$
0.86±0.18±0.22	56	EATON	84	MRK2	$e^+e^- \rightarrow \Sigma^{*-}$
1.03±0.24±0.25	68	EATON	84	MRK2	$e^+e^- \rightarrow \Sigma^{*+}$

OCCUR=2
OCCUR=2

$\Gamma(p\overline{p}\eta'(958))/\Gamma_{total}$ Γ_{31}/Γ

NODE=M070R59
NODE=M070R59

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.9 ±0.4 OUR AVERAGE	Error includes scale factor of 1.7.				
0.68±0.23±0.17	19	EATON	84	MRK2	e^+e^-
1.8 ±0.6	19	PERUZZI	78	MRK1	e^+e^-

$\Gamma(\phi f'_2(1525))/\Gamma_{total}$ Γ_{32}/Γ

NODE=M070R40
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		[26,27] FALVARD	88	DM2	$J/\psi \rightarrow$ hadrons
4.8±1.8	46	[26] GIDAL	81	MRK2	$J/\psi \rightarrow K^+K^-K^+K^-$

[26] Re-evaluated using B($f'_2(1525) \rightarrow K\overline{K}$) = 0.713.

NODE=M070R40;LINKAGE=B

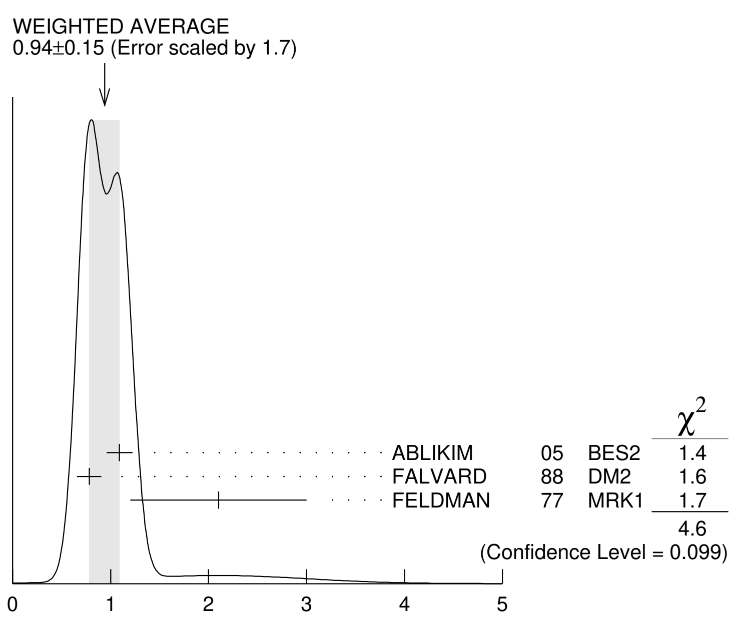
[27] Including interference with $f_0(1710)$.

NODE=M070R40;LINKAGE=C

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

NODE=M070R34
NODE=M070R34

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.94±0.15 OUR AVERAGE	Error includes scale factor of 1.7. See the ideogram below.				
1.09±0.02±0.13		ABLIKIM	05	BES2	$J/\psi \rightarrow \phi\pi^+\pi^-$
0.78±0.03±0.12		FALVARD	88	DM2	$J/\psi \rightarrow$ hadrons
2.1 ±0.9	23	FELDMAN	77	MRK1	e^+e^-



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

$\Gamma(\phi K^\pm K^0_S \pi^\mp)/\Gamma_{total}$ Γ_{34}/Γ

NODE=M070S3
NODE=M070S3

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
7.2±0.9 OUR AVERAGE					
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_{35}/Γ

NODE=M070S5
NODE=M070S5

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
$6.8^{+1.9}_{-1.6}\pm1.7$	111^{+31}_{-26}	BECKER	87	MRK3	$e^+e^- \to$ hadrons

$\Gamma(\phi\eta)/\Gamma_{total}$ Γ_{36}/Γ

NODE=M070R37
NODE=M070R37

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.65 ±0.07 OUR AVERAGE					
0.64 ±0.04 ±0.11	346	JOUSSET	90	DM2	$J/\psi \to$ hadrons
0.661±0.045±0.078		COFFMAN	88	MRK3	$e^+e^- \to K^+K^-\eta$

$\Gamma(\Xi(1530)^-\overline{\Xi}^+)/\Gamma_{total}$ Γ_{37}/Γ

NODE=M070S9
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_{38}/Γ

NODE=M070R74
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_{39}/Γ

NODE=M070R32
NODE=M070R32

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.42 ±0.06 OUR AVERAGE	Error includes scale factor of 1.4.				
0.360±0.028±0.054	222	JOUSSET	90	DM2	$J/\psi \to$ hadrons
0.482±0.019±0.064		COFFMAN	88	MRK3	$e^+e^- \to \pi^0\pi^+\pi^-\pi^0$

$\Gamma(\phi\eta'(958))/\Gamma_{total}$ Γ_{40}/Γ

NODE=M070R38
NODE=M070R38

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.33 ±0.04 OUR AVERAGE						
0.41 ±0.03 ±0.08		167	JOUSSET	90	DM2	$J/\psi \to$ hadrons
0.308±0.034±0.036			COFFMAN	88	MRK3	$e^+e^- \to K^+K^-\eta'$
• • • 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_{41}/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		[28] FALVARD	88	DM2	$J/\psi \to$ hadrons
2.6±0.6	50	[28] GIDAL	81	MRK2	$J/\psi \to K^+K^-K^+K^-$

[28] Assuming B($f_0(980) \to \pi\pi$) = 0.78.

NODE=M070R41;LINKAGE=A

$\Gamma(\Xi(1530)^0\overline{\Xi}^0)/\Gamma_{total}$ Γ_{42}/Γ

NODE=M070S10
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_{43}/Γ

NODE=M070R68
NODE=M070R68

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT	
0.31±0.05 OUR AVERAGE						
0.30±0.03±0.07	74 ± 8	HENRARD	87	DM2	$e^+e^- \to \Sigma^{*-}$	
0.34±0.04±0.07	77 ± 9	HENRARD	87	DM2	$e^+e^- \to \Sigma^{*+}$	OCCUR=2
0.29±0.11±0.10	26	EATON	84	MRK2	$e^+e^- \to \Sigma^{*-}$	
0.31±0.11±0.11	28	EATON	84	MRK2	$e^+e^- \to \Sigma^{*+}$	OCCUR=2

$\Gamma(\phi f_1(1285))/\Gamma_{total}$ Γ_{44}/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	[29] 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

[29] 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

$\Gamma(\rho\eta)/\Gamma_{total}$ Γ_{45}/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_{46}/Γ

NODE=M070R31

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.167±0.025 OUR AVERAGE					
$0.18\ {}^{+0.10}_{-0.08}\ \pm0.03$	6	JOUSSET	90	DM2	$J/\psi \to$ hadrons
0.166±0.017±0.019		COFFMAN	88	MRK3	$e^+e^- \to 3\pi\eta'$

$\Gamma(\omega f_0(980))/\Gamma_{total}$ Γ_{47}/Γ

NODE=M070S27

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
1.41±0.27±0.47	[30] AUGUSTIN	89	DM2	$J/\psi \to 2(\pi^+\pi^-)\pi^0$

[30] Assuming $B(f_0(980) \to \pi\pi) = 0.78$.

NODE=M070S27;LINKAGE=K

$\Gamma(\rho\eta'(958))/\Gamma_{total}$ Γ_{48}/Γ

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	$J/\psi \to \pi^+\pi^-\eta'$

$\Gamma(p\overline{p}\phi)/\Gamma_{total}$ Γ_{49}/Γ

NODE=M070S22

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
0.45±0.13±0.07	FALVARD	88	DM2	$J/\psi \to$ hadrons

$\Gamma(a_2(1320)^\pm\pi^\mp)/\Gamma_{total}$ Γ_{50}/Γ

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_{51}/Γ

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_{52}/Γ

NODE=M070S34

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<3.0	90	[31] BAI	99C	BES	e^+e^-

[31] 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_{53}/Γ

NODE=M070R47

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<29	90	VANNUCCI	77	MRK1	$e^+e^- \to \pi^+\pi^-K^+K^-$

$\Gamma(K^*(892)^0\overline{K}{}^*(892)^0)/\Gamma_{total}$ Γ_{54}/Γ

NODE=M070R46

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<5	90	VANNUCCI	77	MRK1	$e^+e^- \to \pi^+\pi^-K^+K^-$

$\Gamma(\phi f_2(1270))/\Gamma_{total}$ Γ_{55}/Γ

NODE=M070R39

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<3.7	90	VANNUCCI	77	MRK1	$e^+e^- \rightarrow \pi^+\pi^-K^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<4.5	90	FALVARD	88	DM2	$J/\psi \rightarrow$ hadrons

$\Gamma(p\overline{p}\rho)/\Gamma_{total}$ Γ_{56}/Γ

NODE=M070R57

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.31	90	EATON	84	MRK2	$e^+e^- \rightarrow$ hadronsγ

$\Gamma(\phi\eta(1405) \rightarrow \phi\eta\pi\pi)/\Gamma_{total}$ Γ_{57}/Γ

NODE=M070S23

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<2.5	90	[32] FALVARD	88	DM2	$J/\psi \rightarrow$ hadrons

[32] Includes unknown branching fraction $\eta(1405) \rightarrow \eta\pi\pi$.

NODE=M070S23;LINKAGE=A

$\Gamma(\omega f'_2(1525))/\Gamma_{total}$ Γ_{58}/Γ

NODE=M070R29

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<2.2	90	[33] VANNUCCI	77	MRK1	$e^+e^- \rightarrow \pi^+\pi^-\pi^0K^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<2.8	90	[33] FALVARD	88	DM2	$J/\psi \rightarrow$ hadrons

[33] Re-evaluated assuming B($f'_2(1525) \rightarrow K\overline{K}$) = 0.713.

NODE=M070R29;LINKAGE=C

$\Gamma(\Sigma(1385)^0\overline{\Lambda})/\Gamma_{total}$ Γ_{59}/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_{60}/Γ

NODE=M070S14

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.1	90	HENRARD	87	DM2	e^+e^-

$\Gamma(\Sigma^0\overline{\Lambda})/\Gamma_{total}$ Γ_{66}/Γ

NODE=M070S12

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.9	90	HENRARD	87	DM2	e^+e^-

$\Gamma(\phi\pi^0)/\Gamma_{total}$ Γ_{67}/Γ

NODE=M070R33

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.068	90	COFFMAN	88	MRK3	$e^+e^- \rightarrow K^+K^-\pi^0$

$\Gamma(\Theta(1540)\overline{\Theta}(1540) \rightarrow K^0_S pK^-\overline{n} + \text{c.c.})/\Gamma_{total}$ Γ_{61}/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_{62}/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_{63}/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_{64}/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_{65}/Γ

NODE=M070S51

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<1.1	90	BAI	04G	BES2	e^+e^-

[34] We have multiplied K^+K^- measurement by 2 to obtain $K\overline{K}$.

NODE=M070R;LINKAGE=AA

[35] Using B($B^+ \rightarrow J/\psi K^+$) = $(1.01 \pm 0.05) \times 10^{-3}$.

NODE=M070R;LINKAGE=CC

NODE=M070307

$\Gamma(2(\pi^+\pi^-)\pi^0)/\Gamma_{total}$ Γ_{68}/Γ

NODE=M070R9
NODE=M070R9

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0337±0.0026 OUR AVERAGE					
0.0325±0.0049	46055	AUGUSTIN	89	DM2	$J/\psi \to 2(\pi^+\pi^-)\pi^0$
0.0317±0.0042	147	FRANKLIN	83	MRK2	$e^+e^- \to$ hadrons
0.0364±0.0052	1500	BURMESTER	77D	PLUT	e^+e^-
0.04 ±0.01	675	JEAN-MARIE	76	MRK1	e^+e^-

$\Gamma(3(\pi^+\pi^-)\pi^0)/\Gamma_{total}$ Γ_{69}/Γ

NODE=M070R11
NODE=M070R11

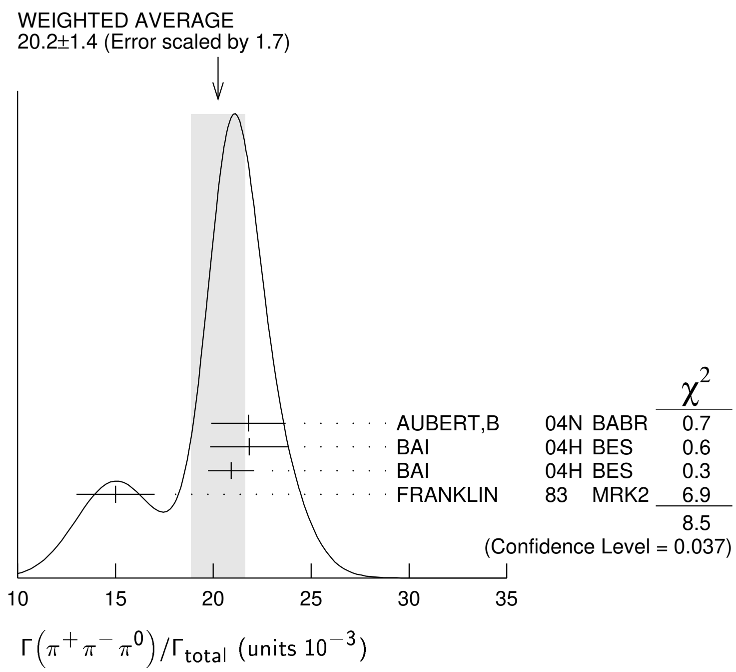
VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.029±0.006 OUR AVERAGE					
0.028±0.009	11	FRANKLIN	83	MRK2	$e^+e^- \to$ hadrons
0.029±0.007	181	JEAN-MARIE	76	MRK1	e^+e^-

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{70}/Γ

NODE=M070R7
NODE=M070R7

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
20.2 ±1.4 OUR AVERAGE	Error includes scale factor of 1.7. See the ideogram below.				
21.8 ±1.9		[39,40] AUBERT,B	04N	BABR	10.6 $e^+e^- \to \pi^+\pi^-\pi^0\gamma$
21.84±0.05±2.01	220k	[40,41] BAI	04H	BES	e^+e^-
20.91±0.21±1.16		[40,42] BAI	04H	BES	e^+e^-
15 ±2	168	FRANKLIN	83	MRK2	e^+e^-

OCCUR=2



$\Gamma(\pi^+\pi^-\pi^0K^+K^-)/\Gamma_{total}$ Γ_{71}/Γ

NODE=M070R18
NODE=M070R18

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.012 ±0.003	309	VANNUCCI	77	MRK1	e^+e^-

$\Gamma(4(\pi^+\pi^-)\pi^0)/\Gamma_{total}$ Γ_{72}/Γ

NODE=M070R12
NODE=M070R12

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
90±30	13	JEAN-MARIE	76	MRK1	e^+e^-

$\Gamma(\pi^+\pi^-K^+K^-)/\Gamma_{total}$ Γ_{73}/Γ

NODE=M070R16
NODE=M070R16

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
72±23	205	VANNUCCI	77	MRK1	e^+e^-

$\Gamma(K\overline{K}\pi)/\Gamma_{total}$ Γ_{74}/Γ

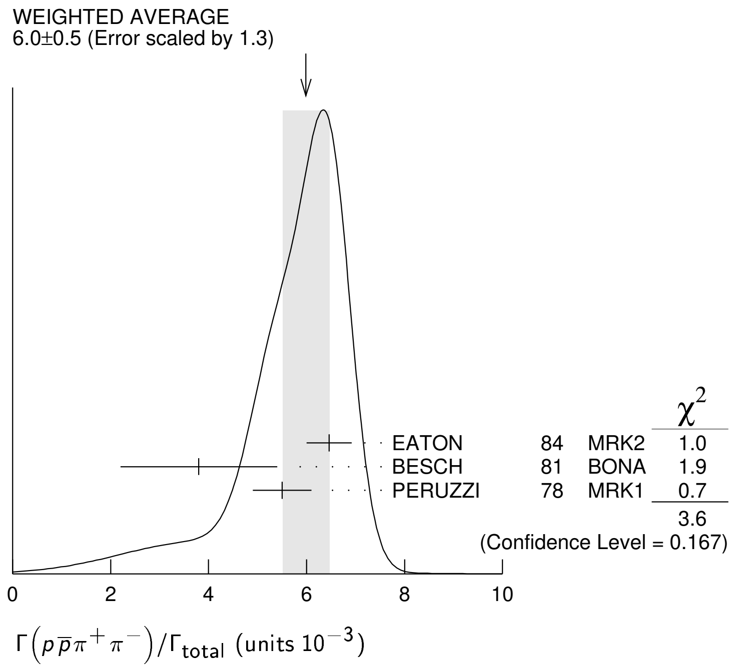
NODE=M070R15
NODE=M070R15

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
61 ±10 OUR AVERAGE					
55.2±12.0	25	FRANKLIN	83	MRK2	$e^+e^- \to K^+K^-\pi^0$
78.0±21.0	126	VANNUCCI	77	MRK1	$e^+e^- \to K^0_S K^\pm\pi^\mp$

$\Gamma(p\overline{p}\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{75}/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^-



$\Gamma(2(\pi^+\pi^-))/\Gamma_{\text{total}}$ Γ_{76}/Γ

NODE=M070R8
NODE=M070R8

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
35.7± 3.0 OUR NEW AVERAGE	[0.0040 ± 0.0010 OUR 2005 AVERAGE]				
35.3± 1.2±2.9	1107	[36] ABLIKIM	05H	BES2	e^+e^-
40 ±10	76	JEAN-MARIE	76	MRK1	e^+e^-

[36] Computed using $B(J/\psi \to \mu^+\mu^-) = 0.0588 \pm 0.0010$.

NODE=M070R8;LINKAGE=AB

$\Gamma(3(\pi^+\pi^-))/\Gamma_{\text{total}}$ Γ_{77}/Γ

NODE=M070R10
NODE=M070R10

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
40±20	32	JEAN-MARIE	76	MRK1	e^+e^-

$\Gamma(2(\pi^+\pi^-)\eta)/\Gamma_{\text{total}}$ Γ_{78}/Γ

NODE=M070S42
NODE=M070S42

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
2.26±0.08±0.27	4839	ABLIKIM	05C	BES2	$e^+e^- \to 2(\pi^+\pi^-)\eta$

$\Gamma(3(\pi^+\pi^-)\eta)/\Gamma_{\text{total}}$ Γ_{79}/Γ

NODE=M070S43
NODE=M070S43

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
7.24±0.96±1.11	616	ABLIKIM	05C	BES2	$e^+e^- \to 3(\pi^+\pi^-)\eta$

$\Gamma(n\overline{n}\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{80}/Γ

NODE=M070R65
NODE=M070R65

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
3.8±3.6	5	BESCH	81	BONA	e^+e^-

$\Gamma(\Sigma^0\overline{\Sigma}^0)/\Gamma_{\text{total}}$ Γ_{81}/Γ

NODE=M070R63
NODE=M070R63

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.31±0.10 OUR NEW AVERAGE	[$(1.27 \pm 0.17) \times 10^{-3}$ OUR 2005 AVERAGE]				
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	$e^+e^- \to \Sigma^+\overline{\Sigma}^-$

$\Gamma(2(\pi^+\pi^-)K^+K^-)/\Gamma_{total}$ Γ_{82}/Γ

NODE=M070R17
NODE=M070R17

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
31±13	30	VANNUCCI	77	MRK1	e^+e^-

$\Gamma(p\overline{p}\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{83}/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^-

$\Gamma(p\overline{p})/\Gamma_{total}$ Γ_{84}/Γ

NODE=M070R50
NODE=M070R50

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
2.17±0.08 OUR AVERAGE					
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	[37] 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^-

[37] Assuming angular distribution $(1+\cos^2\theta)$.

NODE=M070R50;LINKAGE=A

$\Gamma(p\overline{p}\eta)/\Gamma_{total}$ Γ_{85}/Γ

NODE=M070R56
NODE=M070R56

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
2.09±0.18 OUR AVERAGE					
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^-

$\Gamma(p\overline{n}\pi^-)/\Gamma_{total}$ Γ_{86}/Γ

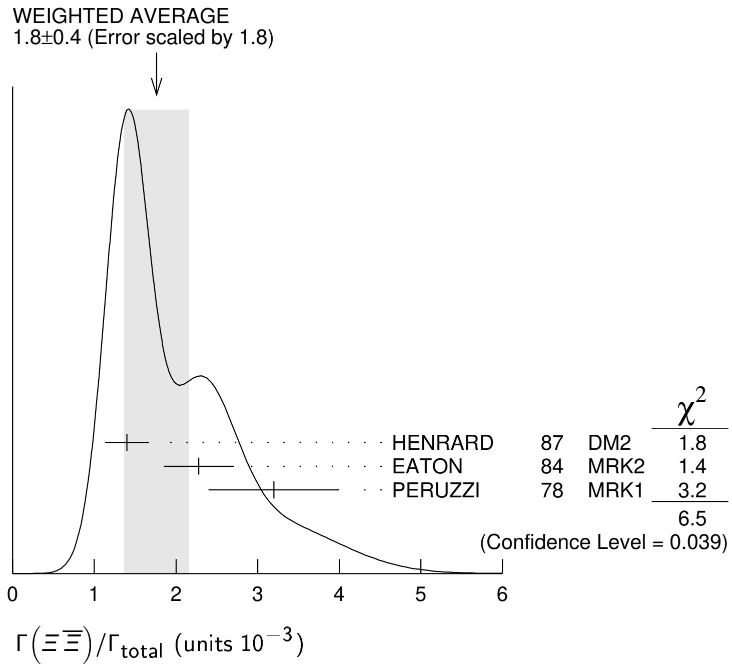
NODE=M070R53
NODE=M070R53

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT	
2.00±0.10 OUR AVERAGE						
2.02±0.07±0.16	1288	EATON	84	MRK2	$e^+e^- \rightarrow p\pi^-$	
1.93±0.07±0.16	1191	EATON	84	MRK2	$e^+e^- \rightarrow \overline{p}\pi^+$	OCCUR=2
1.7 ±0.7	32	BESCH	81	BONA	$e^+e^- \rightarrow p\pi^-$	
1.6 ±1.2	5	BESCH	81	BONA	$e^+e^- \rightarrow \overline{p}\pi^+$	OCCUR=2
2.16±0.29	194	PERUZZI	78	MRK1	$e^+e^- \rightarrow p\pi^-$	
2.04±0.27	204	PERUZZI	78	MRK1	$e^+e^- \rightarrow \overline{p}\pi^+$	OCCUR=2

$\Gamma(\Xi\overline{\Xi})/\Gamma_{total}$ Γ_{88}/Γ

NODE=M070R62
NODE=M070R62

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.8 ±0.4 OUR AVERAGE Error includes scale factor of 1.8. See the ideogram below.					
1.40±0.12±0.24	132 ± 11	HENRARD	87	DM2	$e^+e^- \rightarrow \Xi^-\overline{\Xi}^+$
2.28±0.16±0.40	194	EATON	84	MRK2	$e^+e^- \rightarrow \Xi^-\overline{\Xi}^+$
3.2 ±0.8	71	PERUZZI	78	MRK1	e^+e^-



$\Gamma(n\overline{n})/\Gamma_{total}$ Γ_{87}/Γ

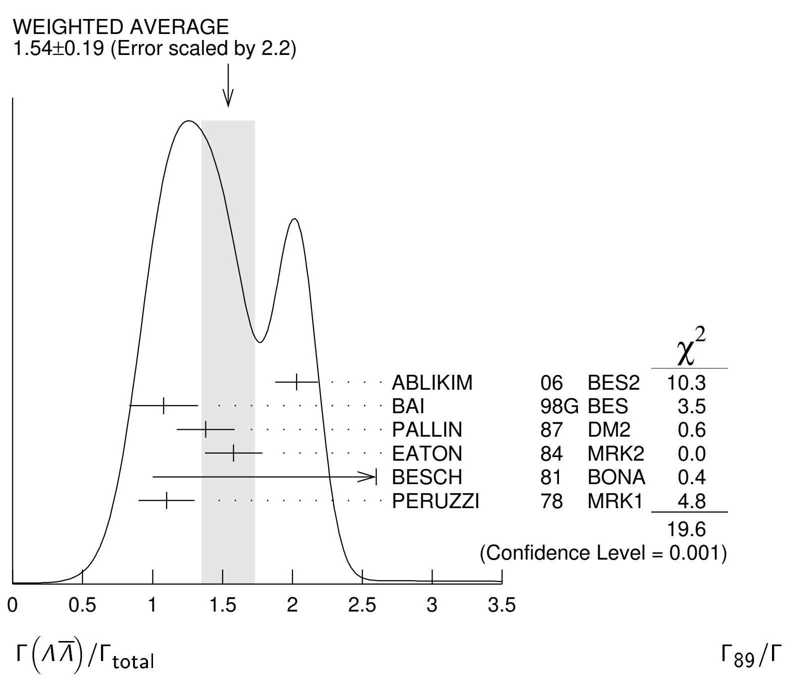
NODE=M070R64
NODE=M070R64

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^-

$\Gamma(\Lambda\overline{\Lambda})/\Gamma_{total}$ Γ_{89}/Γ

NODE=M070R60
NODE=M070R60

VALUE (units 10^{-3})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1.54±0.19 OUR NEW AVERAGE Error includes scale factor of 2.2. See the ideogram below. [$(1.30 \pm 0.12) \times 10^{-3}$ OUR 2005 AVERAGE Scale factor = 1.1]					
2.03±0.03±0.15	8887	ABLIKIM	06	BES2	$J/\psi \to \Lambda\overline{\Lambda}$
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^-



$\Gamma(p\overline{p}\pi^0)/\Gamma_{\rm total}$ Γ_{90}/Γ

NODE=M070R52
NODE=M070R52

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.09±0.09 OUR AVERAGE					
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^-

$\Gamma(\Lambda\overline{\Sigma}^-\pi^+\text{(or c.c.)})/\Gamma_{\rm total}$ Γ_{91}/Γ

NODE=M070R71
NODE=M070R71

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT	
1.06±0.12 OUR AVERAGE						
0.90±0.06±0.16	225 ± 15	HENRARD	87	DM2	$e^+e^- \to \Lambda\overline{\Sigma}^+\pi^-$	
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	$e^+e^- \to \Lambda\overline{\Sigma}^+\pi^-$	
1.38±0.21±0.35	118	EATON	84	MRK2	$e^+e^- \to \Lambda\overline{\Sigma}^-\pi^+$	OCCUR=2

$\Gamma(pK^-\overline{\Lambda})/\Gamma_{\rm total}$ Γ_{92}/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^-

$\Gamma(2(K^+K^-))/\Gamma_{\rm total}$ Γ_{93}/Γ

NODE=M070R19
NODE=M070R19

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
9.2±3.3 OUR AVERAGE Error includes scale factor of 1.3.					
$14\ ^{+5}_{-4}\ \pm2$	$11.0^{+4.3}_{-3.5}$	HUANG [35]	03	BELL	$B^+ \to 2(K^+K^-)\ K^+$
7 ±3		VANNUCCI	77	MRK1	e^+e^-

$\Gamma(pK^-\overline{\Sigma}^0)/\Gamma_{\rm total}$ Γ_{94}/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^-

$\Gamma(K^+K^-)/\Gamma_{\rm total}$ Γ_{95}/Γ

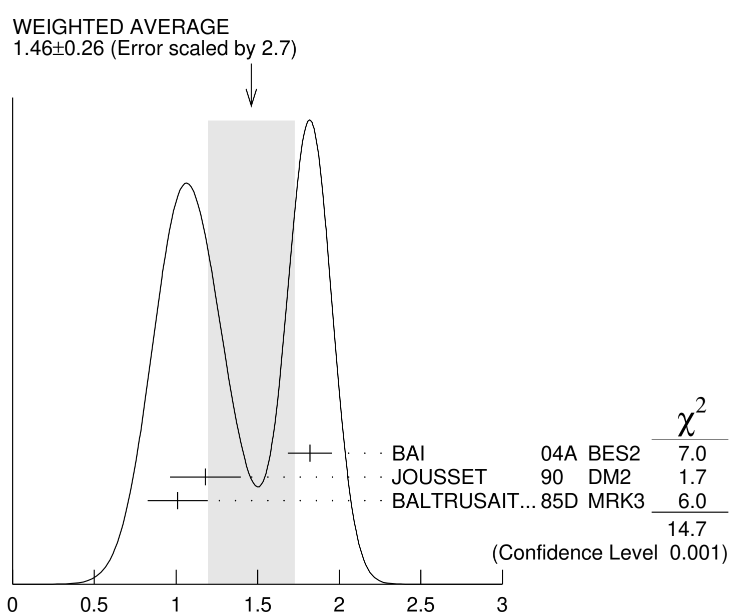
NODE=M070R13
NODE=M070R13

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^-

$\Gamma(K^0_S K^0_L)/\Gamma_{\rm total}$ Γ_{96}/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	BAI [43]	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^-



$\Gamma\left(K^0_S K^0_L\right)/\Gamma_{\rm total}$ Γ_{96}/Γ

$\Gamma(\Lambda\overline{\Lambda}\pi^0)/\Gamma_{total}$ — Γ_{97}/Γ

NODE=M070S11

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.22±0.06 OUR AVERAGE					
0.23±0.07±0.08	11	BAI	98G	BES	e^+e^-
0.22±0.05±0.05	19 ± 4	HENRARD	87	DM2	e^+e^-

$\Gamma(\pi^+\pi^-)/\Gamma_{total}$ — Γ_{98}/Γ

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_{99}/Γ

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_{100}/Γ

NODE=M070R14

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.01	95	[38] BAI	04D	BES	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.052	90	[38] BALTRUSAIT...	85C	MRK3	e^+e^-

[38] Forbidden by CP. NODE=M070R14;LINKAGE=C

[39] From the ratio of $\Gamma(e^+e^-)$ $B(\pi^+\pi^-\pi^0)$ and $\Gamma(e^+e^-)$ $B(\mu^+\mu^-)$ (AUBERT 04). NODE=M070R;LINKAGE=AU

[40] Mostly $\rho\pi$, see also $\rho\pi$ subsection. NODE=M070R;LINKAGE=BU

[41] From $J/\psi \to \pi^+\pi^-\pi^0$ events directly. NODE=M070R;LINKAGE=BA

[42] Obtained comparing the rates for $\pi^+\pi^-\pi^0$ and $\mu^+\mu^-$, using J/ψ events produced via $\psi(2S) \to \pi^+\pi^- J/\psi$ and with $B(J/\psi \to \mu^+\mu^-) = 5.88 \pm 0.10\%$. NODE=M070R;LINKAGE=BI

[43] Using $B(K^0_S \to \pi^+\pi^-) = 0.6868 \pm 0.0027$. NODE=M070R;LINKAGE=HZ

RADIATIVE DECAYS

NODE=M070310

$\Gamma(\gamma\eta_c(1S))/\Gamma_{total}$ — Γ_{101}/Γ

NODE=M070R85

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0127±0.0036		GAISER	86	CBAL	$J/\psi \to \gamma X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	16	BALTRUSAIT...	84	MRK3	$J/\psi \to 2\phi\gamma$

$\Gamma(\gamma\pi^+\pi^- 2\pi^0)/\Gamma_{total}$ — Γ_{102}/Γ

NODE=M070R99

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
8.3±0.2±3.1	[44] BALTRUSAIT...	86B	MRK3	$J/\psi \to 4\pi\gamma$

[44] 4π mass less than 2.0 GeV. NODE=M070R99;LINKAGE=M

$\Gamma(\gamma\eta\pi\pi)/\Gamma_{total}$ — Γ_{103}/Γ

NODE=M070R96

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
6.1 ±1.0 OUR AVERAGE				
5.85±0.3±1.05	[45] EDWARDS	83B	CBAL	$J/\psi \to \eta\pi^+\pi^-$
7.8 ±1.2±2.4	[45] EDWARDS	83B	CBAL	$J/\psi \to \eta 2\pi^0$ (OCCUR=2)

[45] Broad enhancement at 1700 MeV. NODE=M070R96;LINKAGE=M

$\Gamma(\gamma\eta(1405/1475) \to \gamma K\overline{K}\pi)/\Gamma_{total}$ — Γ_{104}/Γ

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	[46,47] BAI	00D	BES	$J/\psi \to \gamma K^\pm K^0_S \pi^\mp$
3.8 ±0.3 ±0.6	[48] AUGUSTIN	90	DM2	$J/\psi \to \gamma K\overline{K}\pi$
4.0 ±0.7 ±1.0	[48] EDWARDS	82E	CBAL	$J/\psi \to K^+K^-\pi^0\gamma$
4.3 ±1.7	[48,49] SCHARRE	80	MRK2	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.78±0.21±0.33	[48,50,51] AUGUSTIN	92	DM2	$J/\psi \to \gamma K\overline{K}\pi$
0.83±0.13±0.18	[48,52,53] AUGUSTIN	92	DM2	$J/\psi \to \gamma K\overline{K}\pi$ (OCCUR=2)
$0.66^{+0.17}_{-0.16}{}^{+0.24}_{-0.15}$	[48,51,54] BAI	90C	MRK3	$J/\psi \to \gamma K^0_S K^\pm\pi^\mp$
$1.03^{+0.21}_{-0.18}{}^{+0.26}_{-0.19}$	[48,53,55] BAI	90C	MRK3	$J/\psi \to \gamma K^0_S K^\pm\pi^\mp$ (OCCUR=2)

[46] 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

[47] 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

[48] Includes unknown branching fraction $\eta(1405) \rightarrow K\overline{K}\pi$. NODE=M070R89;LINKAGE=B

[49] Corrected for spin-zero hypothesis for $\eta(1405)$. NODE=M070R89;LINKAGE=C

[50] From fit to the $a_0(980)\pi$ 0^{-+} partial wave. NODE=M070R89;LINKAGE=H

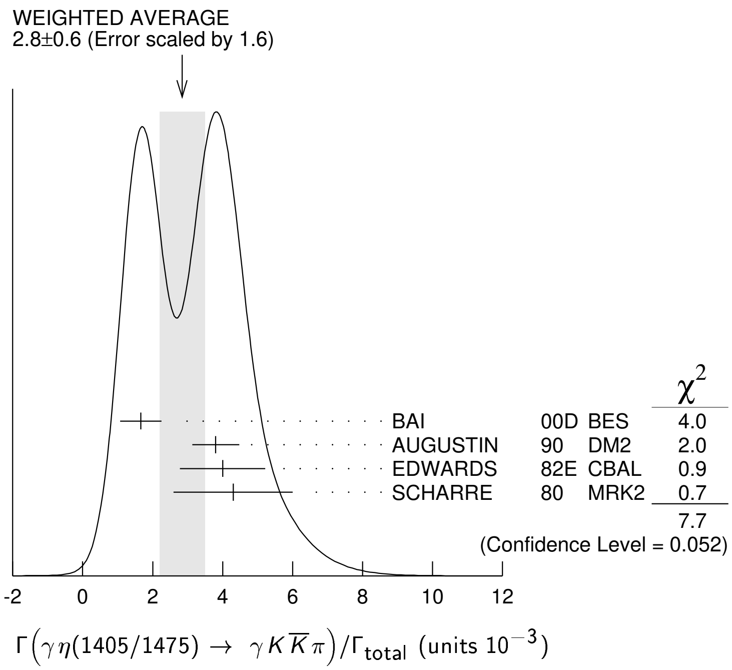
[51] $a_0(980)\pi$ mode. NODE=M070R89;LINKAGE=K9

[52] From fit to the $K^*(892)K$ 0^{-+} partial wave. NODE=M070R89;LINKAGE=J

[53] $K^* K$ mode. NODE=M070R89;LINKAGE=K8

[54] From $a_0(980)\pi$ final state. NODE=M070R89;LINKAGE=D

[55] From $K^*(890)K$ final state. NODE=M070R89;LINKAGE=E



$\Gamma(\gamma\eta(1405/1475) \rightarrow \gamma\gamma\rho^0)/\Gamma_{total}$ Γ_{105}/Γ

NODE=M070S30
NODE=M070S30

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
6.4±1.2±0.7	[56] COFFMAN	90	MRK3	$J/\psi \rightarrow \gamma\gamma\pi^+\pi^-$

[56] Includes unknown branching fraction $\eta(1405) \rightarrow \gamma\rho^0$. NODE=M070S30;LINKAGE=C

$\Gamma(\gamma\eta(1405/1475) \rightarrow \gamma\eta\pi^+\pi^-)/\Gamma_{total}$ Γ_{106}/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	$J/\psi \rightarrow \gamma\eta\pi^+\pi^-$
3.38±0.33±0.64		[57] BOLTON	92B	MRK3	$J/\psi \rightarrow \gamma\eta\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
7.0 ±0.6 ±1.1	261	[58] AUGUSTIN	90	DM2	$J/\psi \rightarrow \gamma\eta\pi^+\pi^-$

[57] Via $a_0(980)\pi$. NODE=M070S29;LINKAGE=RR

[58] Includes unknown branching fraction to $\eta\pi^+\pi^-$. NODE=M070S29;LINKAGE=R

$\Gamma(\gamma\rho\rho)/\Gamma_{total}$ Γ_{107}/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		[59] BALTRUSAIT...	86B	MRK3	$J/\psi \rightarrow 4\pi\gamma$
3.75±1.05±1.20		[60] BURKE	82	MRK2	$J/\psi \rightarrow 4\pi\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.09	90	[61] BISELLO	89B		$J/\psi \rightarrow 4\pi\gamma$

[59] 4π mass less than 2.0 GeV. NODE=M070R94;LINKAGE=N

[60] 4π mass less than 2.0 GeV. We have multiplied $2\rho^0$ measurement by 3 to obtain 2ρ. NODE=M070R94;LINKAGE=M

[61] 4π mass in the range 2.0–25 GeV. NODE=M070R94;LINKAGE=A

$\Gamma(\gamma\eta_2(1870) \rightarrow \gamma\pi^+\pi^-)/\Gamma_{total}$ Γ_{108}/Γ

NODE=M070S37
NODE=M070S37

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
6.2±2.2±0.9	BAI	99	BES	$J/\psi \rightarrow \gamma\eta\pi^+\pi^-$

$\Gamma(\gamma\eta'(958))/\Gamma_{\rm total}$ — Γ_{109}/Γ

NODE=M070R84
NODE=M070R84

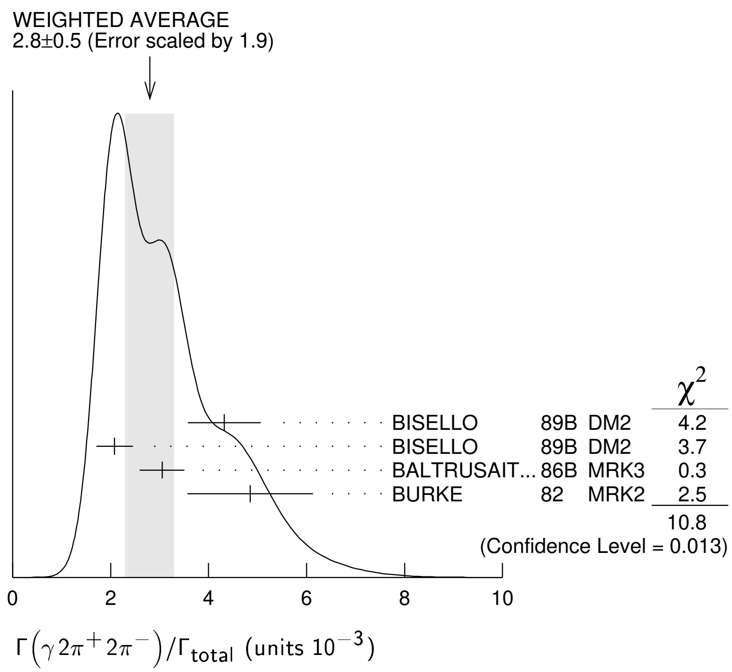
VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT	
4.31±0.30 OUR AVERAGE						
4.50±0.14±0.53		BOLTON	92B	MRK3	$J/\psi \to \gamma\pi^+\pi^-\eta$, $\eta \to \gamma\gamma$	
4.30±0.31±0.71		BOLTON	92B	MRK3	$J/\psi \to \gamma\pi^+\pi^-\eta$, $\eta \to \pi^+\pi^-\pi^0$	OCCUR=2
4.04±0.16±0.85	622	AUGUSTIN	90	DM2	$J/\psi \to \gamma\eta\pi^+\pi^-$	
4.39±0.09±0.66	2420	AUGUSTIN	90	DM2	$J/\psi \to \gamma\gamma\pi^+\pi^-$	OCCUR=2
4.1 ±0.3 ±0.6		BLOOM	83	CBAL	$e^+e^- \to 3\gamma +$ hadrons	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
2.9 ±1.1	6	BRANDELIK	79C	DASP	$e^+e^- \to 3\gamma$	
2.4 ±0.7	57	BARTEL	76	CNTR	$e^+e^- \to 2\gamma\rho$	

$\Gamma(\gamma 2\pi^+ 2\pi^-)/\Gamma_{\rm total}$ — Γ_{110}/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	[62] BISELLO	89B	DM2	$J/\psi \to 4\pi\gamma$	
2.08±0.13±0.35	[63] BISELLO	89B	DM2	$J/\psi \to 4\pi\gamma$	OCCUR=2
3.05±0.08±0.45	[63] BALTRUSAIT...	86B	MRK3	$J/\psi \to 4\pi\gamma$	
4.85±0.45±1.20	[64] BURKE	82	MRK2	e^+e^-	

[62] 4π mass less than 3.0 GeV. NODE=M070R95;LINKAGE=A
[63] 4π mass less than 2.0 GeV. NODE=M070R95;LINKAGE=B
[64] 4π mass less than 2.5 GeV. NODE=M070R95;LINKAGE=M



$\Gamma(\gamma f_2(1270) f_2(1270))/\Gamma_{\rm total}$ — Γ_{111}/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	$J/\psi \to \gamma 2\pi^+ 2\pi^-$

$\Gamma(\gamma f_2(1270) f_2(1270)\,(\text{non resonant}))/\Gamma_{\rm total}$ — Γ_{112}/Γ

NODE=M070S46
NODE=M070S46

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
8.2±0.8±1.7	[65] ABLIKIM	04M	BES	$J/\psi \to \gamma 2\pi^+ 2\pi^-$

[65] Subtracting contribution from intermediate $\eta_c(1S)$ decays. NODE=M070S46;LINKAGE=AB

$\Gamma(\gamma K^+ K^- \pi^+ \pi^-)/\Gamma_{\rm total}$ — Γ_{113}/Γ

NODE=M070B05
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_{114}/Γ

NODE=M070S7
NODE=M070S7

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
2.7±0.5±0.5	[66] BALTRUSAIT...87	MRK3	$J/\psi \to \gamma\pi^+\pi^-$

[66] Assuming branching fraction $f_4(2050) \to \pi\pi/$ total = 0.167.

NODE=M070S7;LINKAGE=V

$\Gamma(\gamma\omega\omega)/\Gamma_{total}$ — Γ_{115}/Γ

NODE=M070R97
NODE=M070R97

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.59±0.33 OUR AVERAGE					
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_{116}/Γ

NODE=M070S19
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	[67,68] BISELLO	89B	DM2	$J/\psi \to 4\pi\gamma$

[67] Estimated by us from various fits.

NODE=M070S19;LINKAGE=A

[68] Includes unknown branching fraction to $\rho^0\rho^0$.

NODE=M070S19;LINKAGE=B

$\Gamma(\gamma f_2(1270))/\Gamma_{total}$ — Γ_{117}/Γ

NODE=M070R86
NODE=M070R86

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1.38±0.14 OUR AVERAGE						
1.33±0.05±0.20		[69] AUGUSTIN	87	DM2		$J/\psi \to \gamma\pi^+\pi^-$
1.36±0.09±0.23		[69] 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	0	e^+e^-
1.2 ±0.6	30	[70] BRANDELIK	78B	DASP		$e^+e^- \to \pi^+\pi^-\gamma$

[69] 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

[70] 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_{118}/Γ

NODE=M070R91
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.						
$9.62\pm029^{+3.51}_{-1.86}$		[71] BAI	03G	BES	$J/\psi \to \gamma K\overline{K}$	
$5.0 \pm 0.8^{+1.8}_{-0.4}$		[72,73] BAI	96C	BES	$J/\psi \to \gamma K^+K^-$	
9.2 ± 1.4±1.4		[73] AUGUSTIN	88	DM2	$J/\psi \to \gamma K^+K^-$	
10.4 ± 1.2±1.6		[73] AUGUSTIN	88	DM2	$J/\psi \to \gamma K^0_S K^0_S$	OCCUR=2
9.6 ± 1.2±1.8		[73] BALTRUSAIT...	87	MRK3	$J/\psi \to \gamma K^+K^-$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$1.6 \pm 0.2^{+0.6}_{-0.2}$		[73,74] BAI	96C	BES	$J/\psi \to \gamma K^+K^-$	OCCUR=2
< 0.8	90	[75] BISELLO	89B		$J/\psi \to 4\pi\gamma$	
1.6 ± 0.4±0.3		[76] BALTRUSAIT...	87	MRK3	$J/\psi \to \gamma\pi^+\pi^-$	OCCUR=2
3.8 ± 1.6		[77] EDWARDS	82D	CBAL	$e^+e^- \to \eta\eta\gamma$	

[71] Includes unknown branching ratio to K^+K^- or $K^0_S K^0_S$.

NODE=M070R91;LINKAGE=K9

[72] Assuming $J^P = 2^+$ for $f_0(1710)$.

NODE=M070R91;LINKAGE=A1

[73] Includes unknown branching fraction to K^+K^- or $K^0_S K^0_S$. We have multiplied K^+K^- measurement by 2, and $K^0_S K^0_S$ by 4 to obtain $K\overline{K}$ result.

NODE=M070R91;LINKAGE=B

[74] Assuming $J^P = 0^+$ for $f_0(1710)$.

NODE=M070R91;LINKAGE=A2

[75] Includes unknown branching fraction to $\rho^0\rho^0$.

NODE=M070R91;LINKAGE=C

[76] Includes unknown branching fraction to $\pi^+\pi^-$.

NODE=M070R91;LINKAGE=Z

[77] Includes unknown branching fraction to $\eta\eta$.

NODE=M070R91;LINKAGE=A

$\Gamma(\gamma f_0(1710) \to \gamma\pi\pi)/\Gamma_{total}$ — Γ_{119}/Γ

NODE=M070B01
NODE=M070B01

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.5±1.6±0.8	BAI	98H	BES	$J/\psi \to \gamma\pi^0\pi^0$

$\Gamma(\gamma\eta)/\Gamma_{total}$ — Γ_{120}/Γ

NODE=M070R83

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.86±0.08 OUR AVERAGE					
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_{121}/Γ

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	$J/\psi \to \gamma K^{\pm} K^0_S \pi^{\mp}$	
0.76±0.15±0.21	[78,79] AUGUSTIN	92	DM2	$J/\psi \to \gamma K\overline{K}\pi$	OCCUR=2
$0.87\pm0.14^{+0.14}_{-0.11}$	[78] BAI	90C	MRK3	$J/\psi \to \gamma K^0_S K^{\pm}\pi^{\mp}$	

[78] Included unknown branching fraction $f_1(1420) \to K\overline{K}\pi$. NODE=M070S31;LINKAGE=A

[79] From fit to the $K^*(892)K$ 1^{++} partial wave. NODE=M070S31;LINKAGE=D

$\Gamma(\gamma f_1(1285))/\Gamma_{total}$ — Γ_{122}/Γ

NODE=M070R88

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.61 ±0.08 OUR AVERAGE				
0.61 ±0.04 ±0.21	[80] BAI	00D	BES	$J/\psi \to \gamma K^{\pm} K^0_S \pi^{\mp}$
0.45 ±0.09 ±0.17	[81] BAI	99	BES	$J/\psi \to \gamma\eta\pi^+\pi^-$
0.625±0.063±0.103	[82] BOLTON	92	MRK3	$J/\psi \to \gamma f_1(1285)$
0.70 ±0.08 ±0.16	[83] BOLTON	92B	MRK3	$J/\psi \to \gamma\eta\pi^+\pi^-$

[80] Assuming $\Gamma(f_1(1285) \to K\overline{K}\pi)/\Gamma_{total} = 0.09 \pm 0.04$. NODE=M070R88;LINKAGE=BD

[81] Assuming $\Gamma(f_1(1285) \to \eta\pi\pi)/\Gamma_{total} = 0.5 \pm 0.18$. NODE=M070R88;LINKAGE=BA

[82] Obtained summing the sequential decay channels NODE=M070R88;LINKAGE=B
$B(J/\psi \to \gamma f_1(1285), f_1(1285) \to \pi\pi\pi\pi) = (1.44 \pm 0.39 \pm 0.27)\times 10^{-4}$;
$B(J/\psi \to \gamma f_1(1285), f_1(1285) \to a_0(980)\pi, a_0(980) \to \eta\pi) = (3.90 \pm 0.42 \pm 0.87)\times 10^{-4}$;
$B(J/\psi \to \gamma f_1(1285), f_1(1285) \to a_0(980)\pi, a_0(980) \to K\overline{K}) = (0.66 \pm 0.26 \pm 0.29)\times 10^{-4}$;
$B(J/\psi \to \gamma f_1(1285), f_1(1285) \to \gamma\rho^0) = (0.25 \pm 0.07 \pm 0.03)\times 10^{-4}$.

[83] 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_{123}/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_{124}/Γ

NODE=M070R87

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT	
$\mathbf{4.5\,^{+0.7}_{-0.4}}$ **OUR AVERAGE**							
$3.85\pm0.17^{+1.91}_{-0.73}$			[84] BAI	03G	BES	$J/\psi \to \gamma K\overline{K}$	
$3.6\pm0.4\,^{+1.4}_{-0.4}$			[84] BAI	96C	BES	$J/\psi \to \gamma K^+K^-$	
5.6 ±1.4 ±0.9			[84] AUGUSTIN	88	DM2	$J/\psi \to \gamma K^+K^-$	OCCUR=3
4.5 ±0.4 ±0.9			[84] AUGUSTIN	88	DM2	$J/\psi \to \gamma K^0_S K^0_S$	OCCUR=4
6.8 ±1.6 ±1.4			[84] 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	[85] BRANDELIK	79C	DASP	$e^+e^- \to \pi^+\pi^-\gamma$	
<2.3	90	3	ALEXANDER	78	PLUT	$e^+e^- \to K^+K^-\gamma$	

[84] Using $B(f'_2(1525) \to K\overline{K}) = 0.888$. NODE=M070R87;LINKAGE=A1

[85] Assuming isotropic production and decay of the $f'_2(1525)$ and isospin. NODE=M070R87;LINKAGE=I

$\Gamma(\gamma f_2(1950) \to \gamma K^*(892)\overline{K}^*(892))/\Gamma_{total}$ — Γ_{125}/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_{126}/Γ

NODE=M070B07
NODE=M070B07

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
4.0±0.3±1.3	320	[86] BAI	00B	BES	$J/\psi \to \gamma K^+ K^0 \pi^+ \pi^-$

[86] Summed over all charges.

NODE=M070R;LINKAGE=B7

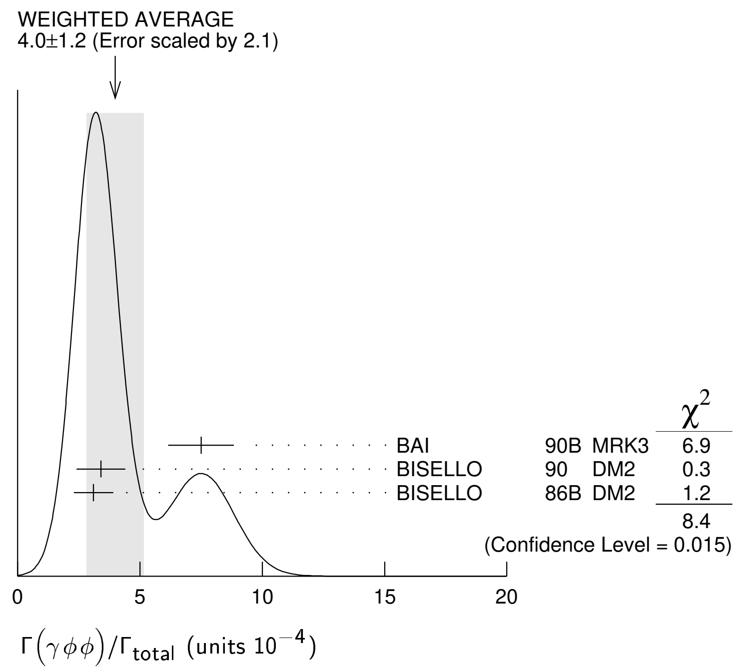
$\Gamma(\gamma\phi\phi)/\Gamma_{total}$ Γ_{127}/Γ

NODE=M070R98
NODE=M070R98

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
4.0±1.2 OUR AVERAGE	Error includes scale factor of 2.1. See the ideogram below.				
7.5±0.6±1.2	168	BAI	90B	MRK3	$J/\psi \to \gamma 4K$
3.4±0.8±0.6	33 ± 7	[87] BISELLO	90	DM2	$J/\psi \to \gamma K^+ K^- K^0_S K^0_L$
3.1±0.7±0.4		[87] BISELLO	86B	DM2	$J/\psi \to \gamma K^+ K^- K^+ K^-$

[87] $\phi\phi$ mass less than 2.9 GeV, η_c excluded.

NODE=M070R98;LINKAGE=C



$\Gamma(\gamma p\overline{p})/\Gamma_{total}$ Γ_{128}/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_{129}/Γ

NODE=M070S21
NODE=M070S21

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.29±0.06 OUR AVERAGE				
0.33±0.08±0.05	[88] BAI	90B	MRK3	$J/\psi \to \gamma K^+ K^- K^+ K^-$
0.27±0.06±0.06	[88] BAI	90B	MRK3	$J/\psi \to \gamma K^+ K^- K^0_S K^0_L$
$0.24^{+0.15}_{-0.10}$	[89,90] BISELLO	89B	DM2	$J/\psi \to 4\pi\gamma$

OCCUR=2

[88] Includes unknown branching fraction to $\phi\phi$.
[89] Estimated by us from various fits.
[90] Includes unknown branching fraction to $\rho^0\rho^0$.

NODE=M070S21;LINKAGE=U
NODE=M070S21;LINKAGE=A
NODE=M070S21;LINKAGE=B

$\Gamma(\gamma\eta(1760) \to \gamma\rho^0\rho^0)/\Gamma_{total}$ Γ_{130}/Γ

NODE=M070S20
NODE=M070S20

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.13±0.09	[91,92] BISELLO	89B	DM2	$J/\psi \to 4\pi\gamma$

[91] Estimated by us from various fits.
[92] Includes unknown branching fraction to $\rho^0\rho^0$.

NODE=M070S20;LINKAGE=A
NODE=M070S20;LINKAGE=B

$\Gamma(\gamma (K\overline{K}\pi)_{J^{PC}=0-+})/\Gamma_{total}$ — Γ_{131}/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	[93] BAI	00D	BES	$J/\psi \rightarrow \gamma K^{\pm} K^0_S \pi^{\mp}$
2.1 ±0.1 ±0.7	[94] BAI	00D	BES	$J/\psi \rightarrow \gamma K^{\pm} K^0_S \pi^{\mp}$

OCCUR=2

[93] For a broad structure around 1800 MeV. NODE=M070S38;LINKAGE=BD
[94] For a broad structure around 2040 MeV. NODE=M070S38;LINKAGE=BE

$\Gamma(\gamma\pi^0)/\Gamma_{total}$ — Γ_{132}/Γ

NODE=M070R82

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.039±0.013 OUR AVERAGE					
0.036±0.011±0.007		BLOOM	83	CBAL	e^+e^-
0.073±0.047	10	BRANDELIK	79C	DASP	e^+e^-

$\Gamma(\gamma p\overline{p}\pi^+\pi^-)/\Gamma_{total}$ — Γ_{133}/Γ

NODE=M070R93

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.79	90	EATON	84	MRK2	e^+e^-

$\Gamma(\gamma\gamma)/\Gamma_{total}$ — Γ_{134}/Γ

NODE=M070R80

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.5	90	BARTEL	77	CNTR	e^+e^-

$\Gamma(\gamma\Lambda\overline{\Lambda})/\Gamma_{total}$ — Γ_{135}/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^-

$\Gamma(3\gamma)/\Gamma_{total}$ — Γ_{136}/Γ

NODE=M070R81

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.055	90	PARTRIDGE	80	CBAL	e^+e^-

$\Gamma(\gamma f_0(2200))/\Gamma_{total}$ — Γ_{137}/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	[95] AUGUSTIN	88	DM2	$J/\psi \rightarrow \gamma K^0_S K^0_S$

[95] Includes unknown branching fraction to $K^0_S K^0_S$. NODE=M070S18;LINKAGE=A

$\Gamma(\gamma f_J(2220))/\Gamma_{total}$ — Γ_{138}/Γ

NODE=M070R92

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
>250	99.9		[96] HASAN	96	SPEC	$\overline{p}p \rightarrow \pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
>300			[97] BAI	96B	BES	$e^+e^- \rightarrow \gamma\overline{p}p,\ K\overline{K}$
< 2.3	95		[98] AUGUSTIN	88	DM2	$J/\psi \rightarrow \gamma K^+K^-$
< 1.6	95		[98] AUGUSTIN	88	DM2	$J/\psi \rightarrow \gamma K^0_S K^0_S$
$12.4^{+6.4}_{-5.2}\pm2.8$		23	[98] BALTRUSAIT...	86D	MRK3	$J/\psi \rightarrow \gamma K^0_S K^0_S$
$8.4^{+3.4}_{-2.8}\pm1.6$		93	[98] BALTRUSAIT...	86D	MRK3	$J/\psi \rightarrow \gamma K^+K^-$

OCCUR=2
OCCUR=2

[96] Using BAI 96B. NODE=M070R92;LINKAGE=M
[97] Using BARNES 93. NODE=M070R92;LINKAGE=A
[98] Includes unknown branching fraction to K^+K^- or $K^0_S K^0_S$. NODE=M070R92;LINKAGE=W

$\Gamma(\gamma f_J(2220) \rightarrow \gamma\pi\pi)/\Gamma_{total}$ — Γ_{139}/Γ

NODE=M070B02

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
0.84±0.26±0.30	BAI	96B	BES	$e^+e^- \rightarrow J/\psi \rightarrow \gamma\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.4 ±0.8 ±0.4	BAI	98H	BES	$J/\psi \rightarrow \gamma\pi^0\pi^0$

$\Gamma(\gamma f_J(2220) \to \gamma K\overline{K})/\Gamma_{total}$ Γ_{140}/Γ

NODE=M070B03

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
8.1±3.0 OUR AVERAGE				
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

$\Gamma(\gamma f_J(2220) \to \gamma p\overline{p})/\Gamma_{total}$ Γ_{141}/Γ

NODE=M070B04

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
1.5±0.6±0.5	BAI	96B	BES	$e^+e^- \to J/\psi \to \gamma p\overline{p}$

$\Gamma(\gamma f_0(1500))/\Gamma_{total}$ Γ_{142}/Γ

NODE=M070S32

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
>5.7±0.8	[99,100] BUGG	95	MRK3	$J/\psi \to \gamma\pi^+\pi^-\pi^+\pi^-$

[99] Including unknown branching ratio for $f_0(1500) \to \pi^+\pi^-\pi^+\pi^-$. NODE=M070S32;LINKAGE=A

[100] Assuming that $f_0(1500)$ decays only to two S-wave dipions. NODE=M070S32;LINKAGE=B

$\Gamma(\gamma e^+e^-)/\Gamma_{total}$ Γ_{143}/Γ

NODE=M070S33

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
8.8±1.3±0.4	[101] ARMSTRONG	96	E760	$\overline{p}p \to e^+e^-\gamma$

[101] For E_γ > 100 MeV. NODE=M070S33;LINKAGE=A

LEPTON FAMILY NUMBER (*LF*) VIOLATING MODES

NODE=M070315

$\Gamma(e^\pm\mu^\mp)/\Gamma_{total}$ Γ_{144}/Γ

NODE=M070S39

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<1.1	90	BAI	03D	BES	$e^+e^- \to J/\psi$

$\Gamma(e^\pm\tau^\mp)/\Gamma_{total}$ Γ_{145}/Γ

NODE=M070S40

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<8.3	90	ABLIKIM	04	BES	$e^+e^- \to J/\psi$

$\Gamma(\mu^\pm\tau^\mp)/\Gamma_{total}$ Γ_{146}/Γ

NODE=M070S41

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<2.0	90	ABLIKIM	04	BES	$e^+e^- \to J/\psi$

$J/\psi(1S)$ REFERENCES

NODE=M070

ABLIKIM	06	PL B632 181	M. Ablikim *et al.*	(BES Collab.)	REFID=50986
AUBERT	06B	PR D73 012005	B. Aubert *et al.*	(BABAR Collab.)	REFID=51026
ABLIKIM	05	PL B607 243	M. Ablikim *et al.*	(BES Collab.)	REFID=50450
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	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	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.*	(BEPC BES Collab.)	REFID=49753
BAI	04H	PR D70 012005	J.Z. Bai *et al.*	(BES Collab.)	REFID=49754
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	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, P. Birien, W.H. Breunlich		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
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...	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	83	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	81	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

OTHER RELATED PAPERS

ABLIKIM	04J	PRL 93 112002	M. Ablikim *et al.*	(BES Collab.)	REFID=50196
DATTA	03B	PL B567 273	A. Datta, P.J. O'Donnell		REFID=49471
LI	03C	EPJ C28 335	D.M. Li *et al.*		REFID=49415
LI	03D	IJMP A18 3335	D.M. Li *et al.*		REFID=49593
BAI	01B	PL B510 75	J.Z. Bai *et al.*	(BEPC BES Collab.)	REFID=48266
CHEN	98	PRL 80 5060	Y.Q. Chen, E. Braaten		REFID=46358
SUZUKI	98	PR D57 5717	M. Suzuki		REFID=46383
BARATE	83	PL 121B 449	R. Barate *et al.*	(SACL, LOIC, SHMP, IND)	REFID=12177
ABRAMS	74	PRL 33 1453	G.S. Abrams *et al.*	(LBL, SLAC)	REFID=22014
ASH	74	LNC 11 705	W.W. Ash *et al.*	(FRAS, UMD, NAPL, PADO+)	REFID=22015
AUBERT	74	PRL 33 1404	J.J. Aubert *et al.*	(MIT, BNL)	REFID=22016
AUGUSTIN	74	PRL 33 1406	J.E. Augustin *et al.*	(SLAC, LBL)	REFID=22017
BACCI	74	PRL 33 1408	C. Bacci *et al.*	(FRAS)	REFID=22018
Also	74B	PRL 33 1649 (erratum)	C. Bacci		REFID=22019
BALDINI-...	74	LNC 11 711	R. Baldini-Celio *et al.*	(FRAS, ROMA)	REFID=22020
BARBIELLINI	74	LNC 11 718	G. Barbiellini *et al.*	(FRAS, NAPL, PISA+)	REFID=22021
BRAUNSCH...	74	PL 53B 393	W. Braunschweig *et al.*	(DASP Collab.)	REFID=22022
CHRISTENS...	70	PRL 25 1523	J.C. Christenson *et al.*	(COLU, BNL, CERN)	REFID=22013

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NODE=M870

NODE=M056

$\chi_{c0}(1P)$

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

$\chi_{c0}(1P)$ MASS

NODE=M056205

NODE=M056M

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
3414.83± 0.33 OUR NEW AVERAGE Error includes scale factor of 1.2. [3415.16 ± 0.35 MeV OUR 2005 AVERAGE]				
3414.21± 0.39±0.27		ABLIKIM	05G BES2	$\psi(2S) \to \gamma\chi_{c0}$
$3414.7\ ^{+0.7}_{-0.6} \pm 0.2$		[1] ANDREOTTI	03 E835	$\overline{p}p \to \chi_{c0} \to \pi^0\pi^0$
3415.4 ± 0.4 ±0.2	392	[1] BAGNASCO	02 E835	$\overline{p}p \to \chi_{c0} \to J/\psi\gamma$
$3417.4\ ^{+1.8}_{-1.9} \pm 0.2$		[1] 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		[1] GAISER	86 CBAL	$\psi(2S) \to \gamma X$
3416 ± 3 ±4		[2] TANENBAUM	78 MRK1	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •				
3407 ±11	89	[3] ABE	04G BELL	$10.6\ e^+e^- \to J/\psi(c\overline{c})$
3416.5 ± 3.0		EISENSTEIN	01 CLE2	$e^+e^- \to e^+e^-\chi_{c0}$
3422 ±10		[2] BARTEL	78B CNTR	$e^+e^- \to J/\psi 2\gamma$
3415 ± 9		[2] BIDDICK	77 CNTR	$e^+e^- \to \gamma X$

[1] Using mass of $\psi(2S)$ = 3686.0 MeV.

NODE=M056M;LINKAGE=C

[2] 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

[3] From a fit of the J/ψ recoil mass spectrum. Systematic errors not estimated.

NODE=M056M;LINKAGE=AB

$\chi_{c0}(1P)$ WIDTH

NODE=M056210

NODE=M056W

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
10.2±0.8 OUR FIT				
10.5±0.9 OUR NEW AVERAGE Error includes scale factor of 1.2. [10.2 ± 0.9 MeV OUR 2005 AVERAGE Scale factor = 1.2]				
$12.6^{+1.5}_{-1.6}{}^{+0.9}_{-1.1}$		ABLIKIM	05G BES2	$\psi(2S) \to \gamma\chi_{c0}$
$8.6^{+1.7}_{-1.3} \pm 0.1$		ANDREOTTI	03 E835	$\overline{p}p \to \chi_{c0} \to \pi^0\pi^0$
9.8±1.0±0.1	392	BAGNASCO	02 E835	$\overline{p}p \to \chi_{c0} \to J/\psi\gamma$
$16.6^{+5.2}_{-3.7} \pm 0.1$		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	$\psi(2S) \to \gamma X,\ \gamma\pi^0\pi^0$

$\chi_{c0}(1P)$ DECAY MODES

NODE=M056215;NODE=M056

	Mode	Fraction (Γ_i/Γ)	Confidence level	
	Hadronic decays			NODE=M056;CLUMP=A
Γ_1	$2(\pi^+\pi^-)$	(2.47±0.25) %		DESIG=3
Γ_2	$f_0(980)f_0(980) \to 2\pi^+2\pi^-$	$(7.2 \pm 2.3) \times 10^{-4}$		DESIG=20
Γ_3	$\pi^+\pi^-K^+K^-$	(2.1 ±0.5) %		DESIG=5
Γ_4	$\rho^0\pi^+\pi^-$	(1.6 ±0.5) %		DESIG=9
Γ_5	$3(\pi^+\pi^-)$	(1.27±0.22) %		DESIG=4
Γ_6	$K^+\overline{K}^*(892)^0\pi^-$ + c.c.	(1.2 ±0.4) %		DESIG=10
Γ_7	$K^*(892)^0\overline{K}^*(892)^0$	$(1.7 \pm 0.4) \times 10^{-3}$		DESIG=21
Γ_8	K^+K^-	$(5.6 \pm 1.5) \times 10^{-3}$		DESIG=2
Γ_9	$\pi\pi$	$(7.1 \pm 0.6) \times 10^{-3}$		DESIG=18
Γ_{10}	$\eta\eta$	$(2.1 \pm 1.1) \times 10^{-3}$		DESIG=13
Γ_{11}	$\omega\omega$	$(2.4 \pm 0.7) \times 10^{-3}$		DESIG=22
Γ_{12}	$K^+K^-K^+K^-$	$(2.3 \pm 0.5) \times 10^{-3}$		DESIG=14
Γ_{13}	$K^0_SK^0_S$	$(2.1 \pm 0.6) \times 10^{-3}$		DESIG=15
Γ_{14}	$\pi^+\pi^-p\overline{p}$	$(2.2 \pm 0.8) \times 10^{-3}$		DESIG=8
Γ_{15}	$\phi\phi$	$(1.0 \pm 0.6) \times 10^{-3}$		DESIG=16
Γ_{16}	$p\overline{p}$	$(2.24 \pm 0.27) \times 10^{-4}$		DESIG=11
Γ_{17}	$\Lambda\overline{\Lambda}$	$(4.7 \pm 1.6) \times 10^{-4}$		DESIG=19
Γ_{18}	$K^0_SK^+\pi^-$ + c.c.	$< 8 \times 10^{-4}$	90%	DESIG=17

Radiative decays

NODE=M056;CLUMP=B

Γ_{19}	$\gamma J/\psi(1S)$	(1.13 ± 0.11) %	DESIG=6
Γ_{20}	$\gamma\gamma$	$(2.5\ \pm0.4\ )\times10^{-4}$	DESIG=7

$\chi_{c0}(1P)$ PARTIAL WIDTHS

NODE=M056217

$\chi_{c0}(1P)$ $\Gamma(i)\Gamma(\gamma J/\psi(1S))/\Gamma(\text{total})$

NODE=M056223

$\Gamma(p\overline{p})\ \times\ \Gamma(\gamma J/\psi(1S))/\Gamma_{\text{total}}$ — $\Gamma_{16}\Gamma_{19}/\Gamma$

NODE=M056G1
NODE=M056G1

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
27.0± 2.8 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$26.6\pm\ 2.6\pm1.4$	392	[4,5] BAGNASCO	02	E835	$\overline{p}p\to\ \chi_{c0}\to\ J/\psi\gamma$
$48.7^{+11.3}_{-\ 8.9}\pm2.4$		[4,5] AMBROGIANI	99B	E835	$\overline{p}p\to\ \gamma J/\psi$

[4] Calculated by us using $B(J/\psi(1S)\to\ e^+e^-) = 0.0593\pm0.0010$. NODE=M056G;LINKAGE=7A

[5] Values in $(\Gamma(p\overline{p})\ \times\ \Gamma(\gamma J/\psi(1S))/\Gamma_{\text{total}})$ and $(\Gamma(p\overline{p})\ \times\ \Gamma(\gamma J/\psi(1S))/\Gamma^2_{\text{total}})$ are not independent. The latter is used in the fit since it is less correlated to the total width. NODE=M056G;LINKAGE=KS

$\chi_{c0}(1P)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M056224

$\Gamma(\pi\pi)\ \times\ \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_9\Gamma_{20}/\Gamma$

NODE=M056G3
NODE=M056G3

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
22.7±3.2±3.5	129 ± 18	[6] NAKAZAWA	05	BELL	$e^+e^-\to\ e^+e^-\chi_{c0}$

$\Gamma(K^+K^-)\ \times\ \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_8\Gamma_{20}/\Gamma$

NODE=M056G4
NODE=M056G4

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
14.3±1.6±2.3	153 ± 17	NAKAZAWA	05	BELL	$e^+e^-\to\ e^+e^-\chi_{c0}$

$\Gamma(2(\pi^+\pi^-))\ \times\ \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_1\Gamma_{20}/\Gamma$

NODE=M056G2
NODE=M056G2

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
64±11 OUR FIT				
75±13±8	EISENSTEIN	01	CLE2	$e^+e^-\to\ e^+e^-\chi_{c0}$

[6] We have multiplied $\pi^+\pi^-$ measurement by 3/2 to obtain $\pi\pi$. NODE=M056G;LINKAGE=NA

$\chi_{c0}(1P)$ BRANCHING RATIOS

NODE=M056220

HADRONIC DECAYS

NODE=M056305

$\Gamma(2(\pi^+\pi^-))/\Gamma_{\text{total}}$ — Γ_1/Γ

NODE=M056R2
NODE=M056R2

VALUE	DOCUMENT ID
0.0247±0.0025 OUR FIT	

$\Gamma(f_0(980)f_0(980)\to\ 2\pi^+2\pi^-)/\Gamma_{\text{total}}$ — Γ_2/Γ

NODE=M056R24
NODE=M056R24

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
7.2±2.3±0.3	36 ± 9	[8] ABLIKIM	04G	BES	$\psi(2S)\to\ \gamma2\pi^+2\pi^-$

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

NODE=M056R3
NODE=M056R3

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
21 ±5 OUR EVALUATION Treating systematic error as correlated.				
21 ±6 OUR AVERAGE Error includes scale factor of 1.9.				
$15.6\pm0.7\pm3.9$	[9] BAI	99B	BES	$\psi(2S)\to\ \gamma\chi_{c0}$
$27.4\pm3.7\pm2.7$	[9] TANENBAUM	78	MRK1	$\psi(2S)\to\ \gamma\chi_{c0}$

→ NOT CHECKED ←

$\Gamma(\rho^0\pi^+\pi^-)/\Gamma_{\text{total}}$ — Γ_4/Γ

NODE=M056R9
NODE=M056R9

VALUE	DOCUMENT ID		TECN	COMMENT
0.016±0.005	[10] TANENBAUM	78	MRK1	$\psi(2S)\to\ \gamma\chi_{c0}$

$\Gamma(3(\pi^+\pi^-))/\Gamma_{\text{total}}$ — Γ_5/Γ

NODE=M056R4
NODE=M056R4

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
12.7±2.2 OUR EVALUATION Treating systematic error as correlated.				
12.7±2.0 OUR AVERAGE				
$12.4\pm1.1\pm2.3$	[9] BAI	99B	BES	$\psi(2S)\to\ \gamma\chi_{c0}$
$13.3\pm3.0\pm1.3$	[9] TANENBAUM	78	MRK1	$\psi(2S)\to\ \gamma\chi_{c0}$

→ NOT CHECKED ←

$\Gamma(K^+ \overline{K}{}^*(892)^0 \pi^- + \text{c.c.})/\Gamma_{total}$ — Γ_6/Γ

NODE=M056R10
NODE=M056R10

VALUE	DOCUMENT ID	TECN	COMMENT
0.012±0.004	[10] TANENBAUM 78	MRK1	$\psi(2S) \to \gamma\chi_{c0}$

$\Gamma(K^*(892)^0 \overline{K}{}^*(892)^0)/\Gamma_{total}$ — Γ_7/Γ

NODE=M056R26
NODE=M056R26

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
1.7±0.4±0.1	30.1 ± 5.7	[11,12] ABLIKIM 04H	BES	$\psi(2S) \to \gamma K^+ K^- \pi^+ \pi^-$

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

NODE=M056R6

NODE=M056R6

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

NODE=M056R22
NODE=M056R22

VALUE (units 10^{-3})	DOCUMENT ID
7.1±0.6 OUR FIT	

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

NODE=M056R13
NODE=M056R13

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
2.1±0.9±0.6	12.7 ± 5.3	[9] BAI 03C	BES	$\psi(2S) \to \gamma\eta\eta \to 5\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.5±0.8±0.8		[13] LEE 85	CBAL	$\psi' \to$ photons

$\Gamma(\eta\eta)/\Gamma(\pi\pi)$ — Γ_{10}/Γ_9

NODE=M056R20
NODE=M056R20

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.24±0.10±0.08	[14] BAI 03C	BES	$\psi(2S) \to 5\gamma$

$\Gamma(\omega\omega)/\Gamma_{total}$ — Γ_{11}/Γ

NODE=M056R27
NODE=M056R27

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
2.4±0.7±0.1	38.1 ± 9.6	[7] ABLIKIM 05N	BES	$\psi(2S) \to \gamma\chi_{c0} \to \gamma 6\pi$

[7] ABLIKIM 05N reports $[B(\chi_{c0}(1P) \to \omega\omega) \times B(\psi(2S) \to \gamma\chi_{c0}(1P))] = (0.212 \pm 0.053 \pm 0.037) \times 10^{-3}$. We divide by our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.0 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M056R27;LINKAGE=AB

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

NODE=M056R14
NODE=M056R14

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
2.27±0.28±0.40	[9] BAI 99B	BES	$\psi(2S) \to \gamma\chi_{c0}$

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

NODE=M056R15
NODE=M056R15

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
2.08±0.30±0.54	[9] BAI 99B	BES	$\psi(2S) \to \gamma\chi_{c0}$

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

NODE=M056R7
NODE=M056R7

→ NOT CHECKED ←

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
2.2 ±0.8 OUR EVALUATION Treating systematic error as correlated.			
2.2 ±1.1 OUR AVERAGE Error includes scale factor of 1.9.			
1.66±0.22±0.58	[9] BAI 99B	BES	$\psi(2S) \to \gamma\chi_{c0}$
4.4 ±1.2 ±0.4	[9] TANENBAUM 78	MRK1	$\psi(2S) \to \gamma\chi_{c0}$

$\Gamma(\phi\phi)/\Gamma_{total}$ — Γ_{15}/Γ

NODE=M056R16
NODE=M056R16

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
1.0±0.4±0.4	[9] BAI 99B	BES	$\psi(2S) \to \gamma\chi_{c0}$

$\Gamma(p\overline{p})/\Gamma_{total}$ — Γ_{16}/Γ

NODE=M056R11
NODE=M056R11

VALUE (units 10^{-4})	DOCUMENT ID
2.36±0.23 OUR FIT	

$\Gamma(\Lambda\overline{\Lambda})/\Gamma_{total}$ — Γ_{17}/Γ

NODE=M056R23
NODE=M056R23

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
4.7±1.3±1.0	$15.2^{+4.2}_{-4.0}$	[9] BAI 03E	BES	$\psi(2S) \to \gamma\chi_{c0} \to \gamma\Lambda\overline{\Lambda}$

$\Gamma(K^0_S K^+ \pi^- + \text{c.c.})/\Gamma_{total}$ — Γ_{18}/Γ

NODE=M056R17
NODE=M056R17

VALUE (units 10^{-3})	CL%	DOCUMENT ID	TECN	COMMENT
<0.8	90	[9] BAI 99B	BES	$\psi(2S) \to \gamma\chi_{c0}$

$\Gamma(p\overline{p}) \times \Gamma(\pi\pi)/\Gamma^2_{total}$ — $\Gamma_{16}\Gamma_9/\Gamma^2$

NODE=M056R21
NODE=M056R21

VALUE (units 10^{-7})	DOCUMENT ID	TECN	COMMENT
16.7±1.8 OUR FIT			
15.3±2.4±0.8	[15] ANDREOTTI 03	E835	$\overline{p}p \to \chi_{c0} \to \pi^0\pi^0$

[8] ABLIKIM 04G reports $[B(\chi_{c0}(1P) \to f_0(980) f_0(980) \to 2\pi^+2\pi^-) \times B(\psi(2S) \to \gamma\chi_{c0}(1P))] = (6.5 \pm 1.6 \pm 1.3) \times 10^{-5}$. We divide by our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.0 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M056R24;LINKAGE=AB

[9] Rescaled by us using $B(\psi(2S) \to \gamma\chi_{c0})= (8.6 \pm 0.7)\%$ and $B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) = 0.317 \pm 0.011$. NODE=M056R;LINKAGE=X1

[10] Calculated using $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = 0.094$; the errors do not contain the uncertainty in the $\psi(2S)$ decay. NODE=M056R;LINKAGE=T

[11] ABLIKIM 04H reports $[B(\chi_{c0}(1P) \to K^*(892)^0 \overline{K}^*(892)^0) \times B(\psi(2S) \to \gamma\chi_{c0}(1P))] = (1.53 \pm 0.29 \pm 0.26) \times 10^{-4}$. We divide by our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.0 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M056R26;LINKAGE=AB

[12] Assumes $B(K^*(892)^0 \to K^-\pi^+) = 2/3$. NODE=M056R26;LINKAGE=AL

[13] Calculated using $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = 0.093 \pm 0.008$. NODE=M056R;LINKAGE=A

[14] We have multiplied $\pi^0\pi^0$ measurement by 3 to obtain $\pi\pi$. NODE=M056R;LINKAGE=D1

[15] 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

RADIATIVE DECAYS

NODE=M056310

$\Gamma(\gamma J/\psi(1S))/\Gamma_{total}$ — Γ_{19}/Γ

NODE=M056R8
NODE=M056R8

VALUE (units 10^{-4})	DOCUMENT ID
113±11 OUR FIT	

$\Gamma(\gamma\gamma)/\Gamma_{total}$ — Γ_{20}/Γ

NODE=M056R1
NODE=M056R1

VALUE (units 10^{-4})	DOCUMENT ID
2.5±0.4 OUR FIT	

$\Gamma(\gamma\gamma)/\Gamma(\gamma J/\psi(1S))$ — Γ_{20}/Γ_{19}

NODE=M056R18
NODE=M056R18

VALUE (units 10^{-2})	DOCUMENT ID	TECN	COMMENT
2.3 ±0.5 OUR FIT			
2.0 ±0.4 OUR AVERAGE			
$2.2 \pm 0.4 ^{+0.1}_{-0.2}$	[16] ANDREOTTI 04	E835	$p\overline{p} \to \chi_{c0} \to \gamma\gamma$
1.45 ± 0.74	[17] AMBROGIANI 00B	E835	$\overline{p}p \to \chi_{c2} \to \gamma\gamma, \gamma J/\psi$

$\Gamma(p\overline{p}) \times \Gamma(\gamma J/\psi(1S))/\Gamma^2_{total}$ — $\Gamma_{16}\Gamma_{19}/\Gamma^2$

NODE=M056R19
NODE=M056R19

VALUE (units 10^{-7})	EVTS	DOCUMENT ID	TECN	COMMENT
26.6±2.0 OUR FIT				
27.5±2.1 OUR AVERAGE				
$27.2 \pm 1.9 \pm 1.3$	392	[17,18] BAGNASCO 02	E835	$\overline{p}p \to \chi_{c0} \to J/\psi\gamma$
$29.3^{+5.7}_{-4.7} \pm 1.5$	89	[17,18] AMBROGIANI 99B		$\overline{p}p \to \chi_{c0} \to J/\psi\gamma$

$\Gamma(p\overline{p}) \times \Gamma(\gamma\gamma)/\Gamma^2_{total}$ — $\Gamma_{16}\Gamma_{20}/\Gamma^2$

NODE=M056R25
NODE=M056R25

VALUE (units 10^{-8})	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$6.52 \pm 1.18 ^{+0.48}_{-0.72}$	[16] ANDREOTTI 04	E835	$p\overline{p} \to \chi_{c0} \to \gamma\gamma$

[16] 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

[17] Calculated by us using $B(J/\psi(1S) \to e^+e^-) = 0.0593 \pm 0.0010$. NODE=M056R;LINKAGE=7A

[18] Values in $(\Gamma(p\overline{p}) \times \Gamma(\gamma J/\psi(1S))/\Gamma_{total})$ and $(\Gamma(p\overline{p}) \times \Gamma(\gamma J/\psi(1S))/\Gamma^2_{total})$ are not independent. The latter is used in the fit since it is less correlated to the total width. NODE=M056R;LINKAGE=KS

$\chi_{c0}(1P)$ CROSS-PARTICLE BRANCHING RATIOS

NODE=M056230

$B(\chi_{c0}(1P) \to p\overline{p}) \times \frac{\Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))}{\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)}$

NODE=M056B1
NODE=M056B1
NODE=M056B1

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
6.7±0.8 OUR FIT			
4.6±1.9	[19] BAI 98I	BES	$\psi(2S) \to \gamma\chi_{c0} \to \gamma\overline{p}p$

NODE=M056B6
NODE=M056B6

$B(\chi_{c0}(1P) \to p\overline{p}) \times B(\psi(2S) \to \gamma\chi_{c0}(1P))$

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
21.3±2.4 OUR FIT				
$\mathbf{23.6^{+3.7}_{-3.4}\pm3.4}$	89.5^{+14}_{-13}	BAI 04F	BES	$\psi(2S) \to \gamma\chi_{c0}(1P) \to \gamma\overline{p}p$

NODE=M056B2
NODE=M056B2
NODE=M056B2

$B(\chi_{c0}(1P) \to \gamma J/\psi(1S)) \times B(\psi(2S) \to \gamma\chi_{c0}(1P))$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
0.102±0.011 OUR FIT				
0.073±0.018 OUR AVERAGE				
0.069±0.018		[20] OREGLIA 82	CBAL	$\psi(2S) \to \gamma\chi_{c0}$
0.4 ±0.3		[21] BRANDELIK 79B	DASP	$\psi(2S) \to \gamma\chi_{c0}$
0.16 ±0.11		[21] BARTEL 78B	CNTR	$\psi(2S) \to \gamma\chi_{c0}$
3.3 ±1.7		[22] BIDDICK 77	CNTR	$e^+e^- \to \gamma X$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.18 ±0.01 ±0.02	172	[23] ADAM 05A	CLEO	$\psi(2S) \to J/\psi\gamma\gamma$

NODE=M056B7
NODE=M056B7

$B(\chi_{c0}(1P) \to \gamma J/\psi) \times \frac{\Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))}{\Gamma(\psi(2S) \to J/\psi(1S) anything)}$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
0.31±0.02±0.03	172	ADAM 05A	CLEO	$\psi(2S) \to J/\psi\gamma\gamma$

NODE=M056B8
NODE=M056B8

$B(\chi_{c0}(1P) \to \gamma J/\psi) \times \frac{\Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))}{\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)}$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.55±0.04±0.06	172	[23] ADAM 05A	CLEO	$\psi(2S) \to J/\psi\gamma\gamma$

NODE=M056B3
NODE=M056B3
NODE=M056B3

$B(\chi_{c0}(1P) \to \gamma\gamma) \times B(\psi(2S) \to \gamma\chi_{c0}(1P))$

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
2.3±0.4 OUR FIT			
3.7±1.8±1.0	LEE 85	CBAL	$\psi(2S) \to \gamma\chi_{c0}$

NODE=M056B5
NODE=M056B5
NODE=M056B5

$B(\chi_{c0}(1P) \to \pi\pi) \times \frac{\Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))}{\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)}$

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
20.1±2.0 OUR FIT				
20.7±1.7 OUR AVERAGE				
23.9±2.7±4.1	97 ± 11	[24] BAI 03C	BES	$\psi(2S) \to \gamma\chi_{c0} \to \gamma\pi^0\pi^0$
20.2±1.1±1.5	720 ± 32	[25] BAI 98I	BES	$\psi(2S) \to \gamma\chi_{c0} \to \gamma\pi^+\pi^-$

NODE=M056B9
NODE=M056B9

$B(\chi_{c0}(1P) \to K^+K^-) \times \frac{\Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))}{\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)}$

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
1.63±0.10±0.15	774 ± 38	[26] BAI 98I	BES	$\psi(2S) \to \gamma K^+K^-$

NODE=M056B4
NODE=M056B4
NODE=M056B4

$B(\chi_{c0}(1P) \to 2(\pi^+\pi^-)) \times \frac{\Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))}{\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)}$

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
7.0±0.8 OUR FIT			
6.9±2.4 OUR AVERAGE Error includes scale factor of 3.8.			
4.4±0.1±0.9	[27] BAI 99B	BES	$\psi(2S) \to \gamma\chi_{c0}$
9.3±0.9	[28] TANENBAUM 78	MRK1	$\psi(2S) \to \gamma\chi_{c0}$

[19] Calculated by us. The value for B($\chi_{c0} \rightarrow p\overline{p}$) reported in BAI 98I is derived using B($\psi(2S) \rightarrow \gamma\chi_{c0}$) = (9.3 ± 0.8)% and B($\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-$) = (32.4 ± 2.6)% [BAI 98D]. NODE=M056B;LINKAGE=B1

[20] Recalculated by us using B($J/\psi(1S) \rightarrow \ell^+\ell^-$) = 0.1181 ± 0.0020. NODE=M056B;LINKAGE=3Q

[21] Recalculated by us using B($J/\psi(1S) \rightarrow \mu^+\mu^-$) = 0.0588 ± 0.0010. NODE=M056B;LINKAGE=2Q

[22] Assumes isotropic gamma distribution. NODE=M056B;LINKAGE=EA

[23] Not independent from other values reported by ADAM 05A. NODE=M056B;LINKAGE=AD

[24] We have multiplied $\pi^0\pi^0$ measurement by 3 to obtain $\pi\pi$. NODE=M056B;LINKAGE=D1

[25] Calculated by us. The value for B($\chi_{c0} \rightarrow \pi^+\pi^-$) reported in BAI 98I is derived using B($\psi' \rightarrow \gamma\chi_{c0}$)= (9.3 ± 0.8)% and B($\psi' \rightarrow J/\psi\pi^+\pi^-$) = (32.4 ± 2.6)% [BAI 98D]. We have multiplied $\pi^+\pi^-$ measurement by 3/2 to obtain $\pi\pi$. NODE=M056B;LINKAGE=D2

[26] Calculated by us. The value for B($\chi_{c0} \rightarrow K^+K^-$) reported by BAI 98I is derived using B($\psi(2S) \rightarrow \gamma\chi_{c0}$) = (9.3 ± 0.8)% and B($\psi(2S) \rightarrow J/\psi\pi^+\pi^-$) = (32.4 ± 2.6)% [BAI 98D]. NODE=M056B9;LINKAGE=BA

[27] Calculated by us. The value for B($\chi_{c0} \rightarrow 2\pi^+2\pi^-$) reported in BAI 99B is derived using B($\psi(2S) \rightarrow \gamma\chi_{c0}$) = (9.3 ± 0.8)% and B($\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-$) = (32.4 ± 2.6)% [BAI 98D]. NODE=M056B;LINKAGE=B2

[28] The value B($\psi(1S) \rightarrow \gamma\chi_{c0}$)×B($\chi_{c0} \rightarrow 2\pi^+2\pi^-$) reported in TANENBAUM 78 is derived using B($\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-$)×B($J/\psi(1S) \rightarrow \ell^+\ell^-$) =$(4.6 \pm 0.7)$%. Calculated by us using B($J/\psi(1S) \rightarrow \ell^+\ell^-$) = 0.1181 ± 0.0020. NODE=M056B;LINKAGE=J1

$\chi_{c0}(1P)$ REFERENCES

NODE=M056

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
ADAM	05A	PRL 94 232002	N.E. Adam *et al.*	(CLEO Collab.)	REFID=50763
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
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
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
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	82	Private Comm.	G. Trilling	(LBL, UCB)	REFID=22113
BIDDICK	77	PRL 38 1324	C.J. Biddick *et al.*	(UCSD, UMD, PAVI+)	REFID=22059

OTHER RELATED PAPERS

BARBERIS	00G	PL B485 357	D. Barberis *et al.*	(Omega Expt.)	REFID=47963
ACCIARRI	99T	PL B461 155	M. Acciarri *et al.*	(L3 Collab.)	REFID=47476
CHEN	90B	PL B243 169	W.Y. Chen *et al.*	(CLEO Collab.)	REFID=41360
AIHARA	88D	PRL 60 2355	H. Aihara *et al.*	(TPC Collab.)	REFID=40588
FELDMAN	75B	PRL 35 821	G.J. Feldman *et al.*	(LBL, SLAC)	REFID=22104
Also Erratum.	75C	PRL 35 1189	G.J. Feldman		REFID=22105
TANENBAUM	75	PRL 35 1323	W.M. Tanenbaum *et al.*	(LBL, SLAC)	REFID=22106

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=M055205

NODE=M055M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
3510.54 ± 0.09 OUR NEW AVERAGE Error includes scale factor of 1.1. [3510.59 ± 0.10 MeV OUR 2005 AVERAGE Scale factor = 1.1]					
3510.30 ± 0.14 ± 0.16		ABLIKIM	05G	BES2	$\psi(2S) \to \gamma\chi_{c1}$
3509.4 ± 0.9		BAI	99B	BES	$\psi(2S) \to \gamma X$
3510.61 ± 0.04 ± 0.09	513	[1] ARMSTRONG	92	E760	$\overline{p}p \to e^+e^-\gamma$
3511.3 ± 0.4 ± 0.4	30	BAGLIN	86B	SPEC	$\overline{p}p \to e^+e^- X$
3512.3 ± 0.3 ± 4.0		[2] GAISER	86	CBAL	$\psi(2S) \to \gamma X$
3507.4 ± 1.7	91	[3] LEMOIGNE	82	GOLI	190 π^- Be $\to \gamma 2\mu$
3510.4 ± 0.6		OREGLIA	82	CBAL	$e^+e^- \to J/\psi 2\gamma$
3510.1 ± 1.1	254	[4] HIMEL	80	MRK2	$e^+e^- \to J/\psi 2\gamma$
3509 ± 11	21	BRANDELIK	79B	DASP	$e^+e^- \to J/\psi 2\gamma$
3507 ± 3		[4] BARTEL	78B	CNTR	$e^+e^- \to J/\psi 2\gamma$
3505.0 ± 4 ± 4		[4,5] TANENBAUM	78	MRK1	e^+e^-
3513 ± 7	367	[4] BIDDICK	77	CNTR	$\psi(2S) \to \gamma X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3500 ± 10	40	TANENBAUM	75	MRK1	Hadrons γ

OCCUR=2

[1] 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=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

$\chi_{c1}(1P)$ WIDTH

NODE=M055210

NODE=M055W

VALUE (MeV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.96 ± 0.12 OUR FIT						
0.90 ± 0.13 OUR NEW AVERAGE [0.88 ± 0.14 MeV OUR 2005 AVERAGE]						
$1.39^{+0.40}_{-0.38}{}^{+0.26}_{-0.77}$			ABLIKIM	05G	BES2	$\psi(2S) \to \gamma\chi_{c1}$
0.88 ± 0.11 ± 0.08		513	ARMSTRONG	92	E760	$\overline{p}p \to e^+e^-\gamma$
• • • 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	$\psi(2S) \to \gamma X$

$\chi_{c1}(1P)$ DECAY MODES

NODE=M055215;NODE=M055

	Mode	Fraction (Γ_i/Γ)	
	Hadronic decays		NODE=M055;CLUMP=A
Γ_1	$3(\pi^+\pi^-)$	$(6.2 \pm 1.6) \times 10^{-3}$	DESIG=6
Γ_2	$2(\pi^+\pi^-)$	$(8.2 \pm 2.9) \times 10^{-3}$	DESIG=5
Γ_3	$\pi^+\pi^- K^+K^-$	$(4.9 \pm 1.1) \times 10^{-3}$	DESIG=7
Γ_4	$\rho^0\pi^+\pi^-$	$(3.9 \pm 3.5) \times 10^{-3}$	DESIG=9
Γ_5	$K^+\overline{K}^*(892)^0\pi^-$ + c.c.	$(3.2 \pm 2.1) \times 10^{-3}$	DESIG=10
Γ_6	$K^*(892)^0\overline{K}^*(892)^0$	$(1.6 \pm 0.4) \times 10^{-3}$	DESIG=21
Γ_7	$K^0_S K^+\pi^-$ + c.c.	$(2.5 \pm 0.7) \times 10^{-3}$	DESIG=17
Γ_8	$\pi^+\pi^- p\overline{p}$	$(5.3 \pm 2.1) \times 10^{-4}$	DESIG=8
Γ_9	$K^+K^-K^+K^-$	$(4.2 \pm 1.9) \times 10^{-4}$	DESIG=14
Γ_{10}	$p\overline{p}$	$(6.7 \pm 0.9) \times 10^{-5}$	DESIG=11
Γ_{11}	$\Lambda\overline{\Lambda}$	$(2.6 \pm 1.2) \times 10^{-4}$	DESIG=19
Γ_{12}	$\pi^+\pi^- + K^+K^-$	$< 2.1 \times 10^{-3}$	DESIG=23

Radiative decays

NODE=M055;CLUMP=B

Γ_{13}	$\gamma J/\psi(1S)$	(31.6 ± 2.3) %	DESIG=1
Γ_{14}	$\gamma\gamma$		DESIG=4

$\chi_{c1}(1P)$ PARTIAL WIDTHS

NODE=M055220

$\chi_{c1}(1P)$ $\Gamma(i)\Gamma(\gamma J/\psi(1S))/\Gamma(\text{total})$

NODE=M055223

$\Gamma(p\overline{p})$ × $\Gamma(\gamma J/\psi(1S))/\Gamma_{\text{total}}$ — $\Gamma_{10}\Gamma_{13}/\Gamma$

NODE=M055G1
NODE=M055G1

VALUE (eV)	*DOCUMENT ID*	*TECN*	*COMMENT*
20.2±2.1 OUR FIT			
21.3±2.2 OUR AVERAGE			
21.8±1.5±2.2	[6] ARMSTRONG 92	E760	$\overline{p}p \to e^+e^-\gamma$
$19.9^{+4.4}_{-4.0}$	[6] BAGLIN 86B	SPEC	$\overline{p}p \to e^+e^-X$

[6] Calculated by us using $B(J/\psi(1S) \to e^+e^-) = 0.0593 \pm 0.0010$.

NODE=M055G;LINKAGE=7A

$\chi_{c1}(1P)$ 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*
6.2±1.6 OUR EVALUATION	Treating systematic error as correlated.		
6.2±1.3 OUR AVERAGE			
5.8±0.7±1.1	[7] BAI 99B	BES	$\psi(2S) \to \gamma\chi_{c1}$
17.2±6.4±1.7	[7] TANENBAUM 78	MRK1	$\psi(2S) \to \gamma\chi_{c1}$

→ NOT CHECKED ←

$\Gamma(2(\pi^+\pi^-))/\Gamma_{\text{total}}$ — Γ_2/Γ

NODE=M055R4
NODE=M055R4

VALUE (units 10^{-3})	*DOCUMENT ID*	*TECN*	*COMMENT*
8.2±2.9 OUR EVALUATION	Treating systematic error as correlated.		
8 ±4 OUR AVERAGE	Error includes scale factor of 1.5.		
4.9±2.2±2.8	[7] BAI 99B	BES	$\psi(2S) \to \gamma\chi_{c1}$
13.5±4.5±1.3	[7] TANENBAUM 78	MRK1	$\psi(2S) \to \gamma\chi_{c1}$

→ NOT CHECKED ←

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

NODE=M055R5
NODE=M055R5

VALUE (units 10^{-3})	*DOCUMENT ID*	*TECN*	*COMMENT*
4.9±1.1 OUR EVALUATION	Treating systematic error as correlated.		
4.9±1.1 OUR AVERAGE			
4.5±0.4±1.1	[7] BAI 99B	BES	$\psi(2S) \to \gamma\chi_{c1}$
7.9±3.2±0.8	[7] TANENBAUM 78	MRK1	$\psi(2S) \to \gamma\chi_{c1}$

→ NOT CHECKED ←

$\Gamma(\rho^0\pi^+\pi^-)/\Gamma_{\text{total}}$ — Γ_4/Γ

NODE=M055R8
NODE=M055R8

VALUE (units 10^{-4})	*DOCUMENT ID*	*TECN*	*COMMENT*
39±35	[8] TANENBAUM 78	MRK1	$\psi(2S) \to \gamma\chi_{c1}$

$\Gamma(K^+\overline{K}^*(892)^0\pi^- + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_5/Γ

NODE=M055R9
NODE=M055R9

VALUE (units 10^{-4})	*DOCUMENT ID*	*TECN*	*COMMENT*
32±21	[8] TANENBAUM 78	MRK1	$\psi(2S) \to \gamma\chi_{c1}$

$\Gamma(K^*(892)^0\overline{K}^*(892)^0)/\Gamma_{\text{total}}$ — Γ_6/Γ

NODE=M055R26
NODE=M055R26

VALUE (units 10^{-3})	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
1.6±0.4±0.1	28.4 ± 5.5	[9,10] ABLIKIM 04H	BES	$\psi(2S) \to \gamma K^+K^-\pi^+\pi^-$

$\Gamma(K^0_S K^+\pi^- + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_7/Γ

NODE=M055R17
NODE=M055R17

VALUE (units 10^{-3})	*DOCUMENT ID*	*TECN*	*COMMENT*
2.5±0.4±0.6	[7] BAI 99B	BES	$\psi(2S) \to \gamma\chi_{c1}$

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

NODE=M055R7
NODE=M055R7

VALUE (units 10^{-3})	*DOCUMENT ID*	*TECN*	*COMMENT*
0.53±0.21 OUR EVALUATION	Treating systematic error as correlated.		
0.53±0.21 OUR AVERAGE			
0.49±0.13±0.17	[7] BAI 99B	BES	$\psi(2S) \to \gamma\chi_{c1}$
1.16±0.82±0.11	[7] TANENBAUM 78	MRK1	$\psi(2S) \to \gamma\chi_{c1}$

→ NOT CHECKED ←

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

NODE=M055R14
NODE=M055R14

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
0.42±0.15±0.12	[7] BAI 99B	BES	$\psi(2S) \to \gamma\chi_{c1}$

$\Gamma(p\overline{p})/\Gamma_{total}$ — Γ_{10}/Γ

NODE=M055R11
NODE=M055R11

VALUE (units 10^{-4})	DOCUMENT ID
0.67±0.09 OUR FIT	

$\Gamma(\Lambda\overline{\Lambda})/\Gamma_{total}$ — Γ_{11}/Γ

NODE=M055R23
NODE=M055R23

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
2.6±1.0±0.6	$9.0^{+3.5}_{-3.1}$	[7] BAI 03E	BES	$\psi(2S) \to \gamma\chi_{c1} \to \gamma\Lambda\overline{\Lambda}$

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

NODE=M055R2
NODE=M055R2

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT
<21		[8] FELDMAN 77	MRK1	$\psi(2S) \to \gamma\chi_{c1}$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<38	90	[8] BRANDELIK 79B	DASP	$\psi(2S) \to \gamma\chi_{c1}$

[7] Rescaled by us using $B(\psi(2S) \to \gamma\chi_{c1}) = (8.4 \pm 0.8)\%$ and $B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) = 0.317 \pm 0.011$. NODE=M055R;LINKAGE=X2

[8] Estimated using $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 0.087$. The errors do not contain the uncertainty in the $\psi(2S)$ decay. NODE=M055R;LINKAGE=T

[9] ABLIKIM 04H reports $[B(\chi_{c1}(1P) \to K^*(892)^0\overline{K}^*(892)^0) \times B(\psi(2S) \to \gamma\chi_{c1}(1P))] = (1.40 \pm 0.27 \pm 0.22) \times 10^{-4}$. We divide by our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (8.7 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M055R26;LINKAGE=AB

[10] Assumes $B(K^*(892)^0 \to K^-\pi^+) = 2/3$. NODE=M055R26;LINKAGE=AL

RADIATIVE DECAYS

NODE=M055310

$\Gamma(\gamma J/\psi(1S))/\Gamma_{total}$ — Γ_{13}/Γ

NODE=M055R1
NODE=M055R1

VALUE	DOCUMENT ID
0.316±0.023 OUR FIT	

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

NODE=M055R3
NODE=M055R3

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.0015	90	[11] YAMADA 77	DASP	$e^+e^- \to 3\gamma$

[11] 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

$B(\chi_{c1}(1P) \to p\overline{p}) \times \frac{\Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))}{\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)}$

NODE=M055B1
NODE=M055B1
NODE=M055B1

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
1.8±0.3 OUR FIT			
1.1±1.0	[13] BAI 98I	BES	$\psi(2S) \to \gamma\chi_{c1} \to \gamma\overline{p}p$

$B(\chi_{c1}(1P) \to \gamma J/\psi(1S)) \times B(\psi(2S) \to \gamma\chi_{c1}(1P))$

NODE=M055B2
NODE=M055B2
NODE=M055B2

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
2.76±0.13 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		[14] OREGLIA 82	CBAL	$\psi(2S) \to \gamma\chi_{c1}$
2.2 ±0.5		[15] BRANDELIK 79B	DASP	$\psi(2S) \to \gamma\chi_{c1}$
2.9 ±0.5		[15] BARTEL 78B	CNTR	$\psi(2S) \to \gamma\chi_{c1}$
5.0 ±1.5		[16] BIDDICK 77	CNTR	$e^+e^- \to \gamma X$
2.8 ±0.9		[14] WHITAKER 76	MRK1	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •				
3.44±0.06±0.13	3.7k	[12] ADAM 05A	CLEO	$\psi(2S) \to J/\psi\gamma\gamma$

[12] Not independent from other values reported by ADAM 05A.

NODE=M055B;LINKAGE=AD

$B(\chi_{c1}(1P) \to \gamma J/\psi) \times \frac{\Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))}{\Gamma(\psi(2S) \to J/\psi(1S) anything)}$

NODE=M055B7
NODE=M055B7

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
5.77±0.10±0.12	3.7k	ADAM	05A	CLEO	$\psi(2S) \to J/\psi\gamma\gamma$

$B(\chi_{c1}(1P) \to \gamma J/\psi(1S)) \times \frac{\Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))}{\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)}$

NODE=M055B3
NODE=M055B3
NODE=M055B3

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
8.7 ±0.6 OUR FIT					
9.5 ±1.8 OUR AVERAGE					
12.6 ±0.3 ±3.8	3k	[17] ABLIKIM	04B	BES	$\psi(2S) \to J/\psi X$
8.5 ±2.1		[18] 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	[12] ADAM	05A	CLEO	$\psi(2S) \to J/\psi\gamma\gamma$

$B(\chi_{c1}(1P) \to p\overline{p}) \times B(\psi(2S) \to \gamma\chi_{c1}(1P))$

NODE=M055B6
NODE=M055B6

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
5.8±0.9 OUR FIT					
$4.8^{+1.4}_{-1.3}\pm0.6$	$18.2^{+5.5}_{-4.9}$	BAI	04F	BES	$\psi(2S) \to \gamma\chi_{c1}(1P) \to \gamma\overline{p}p$

[13] Calculated by us. The value for $B(\chi_{c1} \to p\overline{p})$ reported in BAI 98I is derived using $B(\psi(2S) \to \gamma\chi_{c1}) = (8.7 \pm 0.8)\%$ and $B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D]. NODE=M055B;LINKAGE=J2

[14] Recalculated by us using $B(J/\psi(1S) \to \ell^+\ell^-) = 0.1181 \pm 0.0020$. NODE=M055B;LINKAGE=3Q

[15] Recalculated by us using $B(J/\psi(1S) \to \mu^+\mu^-) = 0.0588 \pm 0.0010$. NODE=M055B;LINKAGE=2Q

[16] Assumes isotropic gamma distribution. NODE=M055B;LINKAGE=EA

[17] From a fit to the J/ψ recoil mass spectra. NODE=M055B;LINKAGE=AB

[18] The value for $B(\psi(2S) \to \gamma\chi_{c1}) \times B(\chi_{c1} \to \gamma J/\psi(1S))$ quoted in HIMEL 80 is derived using $B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) = (33 \pm 3)\%$ and $B(J/\psi(1S) \to \ell^+\ell^-) = 0.138 \pm 0.018$. Calculated by us using $B(J/\psi(1S) \to \ell^+\ell^-) = 0.1181 \pm 0.0020$. NODE=M055B;LINKAGE=J3

MULTIPOLE AMPLITUDES IN $\chi_{c1}(1P) \to \gamma J/\psi(1S)$

NODE=M055240

$a_2 = M2/\sqrt{E1^2 + M2^2}$ Magnetic quadrupole fractional transition amplitude

NODE=M055A1
NODE=M055A1

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$-0.002^{+0.008}_{-0.017}$ OUR AVERAGE					
0.002±0.032±0.004	2090	AMBROGIANI	02	E835	$p\overline{p} \to \chi_{c1} \to J/\psi\gamma$
$-0.002^{+0.008}_{-0.020}$	921	OREGLIA	82	CBAL	$\psi(2S) \to \chi_{c1}\gamma \to J/\psi\gamma\gamma$

$\chi_{c1}(1P)$ REFERENCES

NODE=M055

ABLIKIM	05G	PR D71 092002	M. Ablikim *et al.*	(BES Collab.)	REFID=50756
ADAM	05A	PRL 94 232002	N.E. Adam *et al.*	(CLEO Collab.)	REFID=50763
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
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	93B	PR D47 772	T.A. Armstrong *et al.*	(FNAL E760 Collab.)	REFID=43307
ARMSTRONG	92	NP B373 35	T.A. Armstrong *et al.*	(FNAL, FERR, GENO+)	REFID=41865
Also	92B	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	82B	Private Comm.	M.J. Oreglia	(EFI)	REFID=22143
HIMEL	80	PRL 44 920	T. Himel *et al.*	(LBL, SLAC)	REFID=22119
Also	82	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	82	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

OTHER RELATED PAPERS

BARBERIS	00G	PL B485 357	D. Barberis *et al.*	(Omega Expt.)	REFID=47963
BARATE	83	PL 121B 449	R. Barate *et al.*	(SACL, LOIC, SHMP, IND)	REFID=12177
BRAUNSCH...	75B	PL 57B 407	W. Braunschweig *et al.*	(DASP Collab.)	REFID=22182
SIMPSON	75	PRL 35 699	J.W. Simpson *et al.*	(STAN, PENN)	REFID=22049

NODE=M144

$h_c(1P)$

$I^G(J^{PC}) = ?^?(?^{??})$

OMITTED FROM SUMMARY TABLE
Needs confirmation.

NODE=M144

$h_c(1P)$ MASS

NODE=M144205

NODE=M144M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
3526.03±0.19 OUR NEW AVERAGE [3526.21 ± 0.25 MeV OUR 2005 AVERAGE]					
3525.8 ±0.2 ±0.2		ANDREOTTI	05B	E835	$\overline{p}p \to \eta_c \gamma$
3526.28±0.18±0.19	59	[1] ARMSTRONG	92D	E760	$\overline{p}p \to J/\psi\pi^0$
3525.4 ±0.8 ±0.4	5	BAGLIN	86	SPEC	$\overline{p}p \to J/\psi X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3527 ±8	42	ANTONIAZZI	94	E705	$300\ \pi^{\pm}, p\mathrm{Li} \to J/\psi\pi^0 X$

[1] 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=M144210

NODE=M144W

VALUE (MeV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<1			ANDREOTTI	05B	E835	$\overline{p}p \to \eta_c \gamma$
<1.1	90	59	ARMSTRONG	92D	E760	$\overline{p}p \to J/\psi\pi^0$

$h_c(1P)$ 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	$\eta_c\gamma$		DESIG=4

$h_c(1P)$ PARTIAL WIDTHS

NODE=M144220

$h_c(1P)$ $\Gamma(i)\Gamma(\overline{p}p)/\Gamma(\mathrm{total})$

NODE=M144223

$\Gamma(\eta_c\gamma) \times \Gamma(p\overline{p})/\Gamma_{\mathrm{total}}$ — $\Gamma_4\Gamma_3/\Gamma$

NODE=M144G1
NODE=M144G1

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
12.0±4.5	[2] ANDREOTTI	05B	E835	$\overline{p}p \to \eta_c \gamma$

[2] 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	$\overline{p}p \to J/\psi\pi^0$

$h_c(1P)$ REFERENCES

NODE=M144

ANDREOTTI	05B	PR D72 032001	M. Andreotti *et al.*	(FNAL E835 Collab.)	REFID=50768
AULCHENKO	03	PL B573 63	V.M. Aulchenko *et al.*	(KEDR Collab.)	REFID=49579
ANTONIAZZI	94	PR D50 4258	L. Antoniazzi *et al.*	(E705 Collab.)	REFID=44074
ARMSTRONG	93B	PR D47 772	T.A. Armstrong *et al.*	(FNAL E760 Collab.)	REFID=43307
ARMSTRONG	92D	PRL 69 2337	T.A. Armstrong *et al.*	(FNAL, FERR, GENO+)	REFID=43174
BAGLIN	86	PL B171 135	C. Baglin *et al.*	(LAPP, CERN, TORI, STRB+)	REFID=43180

OTHER RELATED PAPERS

EICHTEN	02	PRL 89 162002	E.J. Eichten, K. Lane, C. Quigg		REFID=48839

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=M057205

NODE=M057M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
3556.24± 0.11 OUR NEW AVERAGE		[3556.26 ± 0.11 MeV OUR 2005 AVERAGE]			
3555.70± 0.59±0.39		ABLIKIM	05G	BES2	$\psi(2S) \to \gamma\chi_{c2}$
3559.9 ± 2.9		EISENSTEIN	01	CLE2	$e^+e^- \to e^+e^-\chi_{c2}$
3556.4 ± 0.7		BAI	99B	BES	$\psi(2S) \to \gamma X$
3556.24± 0.07±0.09	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	190 π^- Be $\to \gamma 2\mu$
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] 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=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=M057210

NODE=M057W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2.25±0.15 OUR FIT					
2.00±0.18 OUR AVERAGE					
1.98±0.17±0.07	585	ARMSTRONG	92	E760	$\overline{p}p \to e^+e^-\gamma$
$2.6\ ^{+1.4}_{-1.0}$	50	BAGLIN	86B	SPEC	$\overline{p}p \to e^+e^- X$
$2.8\ ^{+2.1}_{-2.0}$		[7] GAISER	86	CBAL	$\psi(2S) \to \gamma X$

[7] 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	$2(\pi^+\pi^-)$	(1.21±0.15) %		DESIG=3
Γ_2	$\pi^+\pi^-K^+K^-$	(1.24±0.33) %		DESIG=5
Γ_3	$3(\pi^+\pi^-)$	(1.07±0.24) %		DESIG=4
Γ_4	$\rho^0\pi^+\pi^-$	(7 ±4) $\times 10^{-3}$		DESIG=9
Γ_5	$K^+\overline{K}^*(892)^0\pi^-$ + c.c.	(4.8 ±2.8) $\times 10^{-3}$		DESIG=10
Γ_6	$K^*(892)^0\overline{K}^*(892)^0$	(3.8 ±0.7) $\times 10^{-3}$		DESIG=21
Γ_7	$\phi\phi$	(2.4 ±0.9) $\times 10^{-3}$		DESIG=16
Γ_8	$\omega\omega$	(2.0 ±0.7) $\times 10^{-3}$		DESIG=25
Γ_9	$\pi\pi$	(2.1 ±0.6) $\times 10^{-3}$		DESIG=22
Γ_{10}	$\eta\eta$	< 1.5 $\times 10^{-3}$	90%	DESIG=14
Γ_{11}	$K^+K^-K^+K^-$	(1.8 ±0.5) $\times 10^{-3}$		DESIG=24
Γ_{12}	$\pi^+\pi^-p\overline{p}$	(1.7 ±0.4) $\times 10^{-3}$		DESIG=8
Γ_{13}	K^+K^-	(8.1 ±2.6) $\times 10^{-4}$		DESIG=2
Γ_{14}	$K^0_SK^0_S$	(7.2 ±2.7) $\times 10^{-4}$		DESIG=15
Γ_{15}	$p\overline{p}$	(7.0 ±0.7) $\times 10^{-5}$		DESIG=11
Γ_{16}	$\Lambda\overline{\Lambda}$	(3.4 ±1.7) $\times 10^{-4}$		DESIG=19
Γ_{17}	$J/\psi(1S)\pi^+\pi^-\pi^0$	< 1.5 %	90%	DESIG=12
Γ_{18}	$K^0_SK^+\pi^-$ + c.c.	< 1.3 $\times 10^{-3}$	90%	DESIG=17

Radiative decays

NODE=M057;CLUMP=B

Γ_{19}	$\gamma J/\psi(1S)$	(17.8 ± 0.8) %	DESIG=6
Γ_{20}	$\gamma\gamma$	$(2.40 \pm 0.22) \times 10^{-4}$	DESIG=7

$\chi_{c2}(1P)$ PARTIAL WIDTHS

NODE=M057220

$\chi_{c2}(1P)$ $\Gamma(i)\Gamma(\gamma J/\psi(1S))/\Gamma(\text{total})$

NODE=M057223

$\Gamma(p\overline{p}) \times \Gamma(\gamma J/\psi(1S))/\Gamma_{\text{total}}$ — $\Gamma_{15}\Gamma_{19}/\Gamma$

NODE=M057G1
NODE=M057G1

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
28.2±2.3 OUR FIT				
28.9±2.5 OUR AVERAGE				
28.2±2.6	[8] ARMSTRONG	92	E760	$\overline{p}p \to e^+e^-\gamma$
36 ±8	[8] BAGLIN	86B	SPEC	$\overline{p}p \to e^+e^-X$

$\Gamma(\gamma\gamma) \times \Gamma(\gamma J/\psi(1S))/\Gamma_{\text{total}}$ — $\Gamma_{20}\Gamma_{19}/\Gamma$

NODE=M057G2
NODE=M057G2

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
96± 11 OUR FIT					
121± 13 OUR AVERAGE					
114± 11± 9	136 ± 13.3	[9] ABE	02T	BELL	$e^+e^- \to e^+e^-\chi_{c2}$
139± 55± 21		[10] ACCIARRI	99E	L3	$e^+e^- \to e^+e^-\chi_{c2}$
242± 65± 51		[11] ACKER..,K...	98	OPAL	$e^+e^- \to e^+e^-\chi_{c2}$
150± 42± 36		[12] DOMINICK	94	CLE2	$e^+e^- \to e^+e^-\chi_{c2}$
470±240±120		[13] BAUER	93	TPC	$e^+e^- \to e^+e^-\chi_{c2}$

[8] Calculated by us using $B(J/\psi(1S) \to e^+e^-) = 0.0593 \pm 0.0010$. NODE=M057G;LINKAGE=7A

[9] Using $B(J/\psi \to \ell^+\ell^-) = 0.1181 \pm 0.0020$. All systematic errors added in quadrature. NODE=M057G;LINKAGE=GT

[10] The value for $\Gamma(\chi_{c2} \to \gamma\gamma)$ reported in ACCIARRI 99E is derived using $B(\chi_{c2} \to \gamma J/\psi(1S)) \times B(J/\psi(1S) \to \ell^+\ell^-) = 0.0162 \pm 0.0014$. Calculated by us using $B(J/\psi(1S) \to \ell^+\ell^-) = 0.1181 \pm 0.0020$. NODE=M057G;LINKAGE=J4

[11] 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 $B(J/\psi(1S) \to \ell^+\ell^-) = 0.1203 \pm 0.0038$. Calculated by us using $B(J/\psi(1S) \to \ell^+\ell^-) = 0.1181 \pm 0.0020$. NODE=M057G;LINKAGE=J5

[12] 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 $B(J/\psi(1S) \to \mu^+\mu^-) = 0.0597 \pm 0.0025$. Calculated by us using $B(J/\psi(1S) \to \ell^+\ell^-) = 0.1181 \pm 0.0020$. NODE=M057G;LINKAGE=J6

[13] 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 $B(J/\psi(1S) \to \mu^+\mu^-) = 0.0597 \pm 0.0025$. Calculated by us using $B(J/\psi(1S) \to \ell^+\ell^-) = 0.1181 \pm 0.0020$. NODE=M057G;LINKAGE=J7

$\chi_{c2}(1P)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M057224

$\Gamma(\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_9\Gamma_{20}/\Gamma$

NODE=M057G4
NODE=M057G4

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
1.14±0.21±0.17	54 ± 10	[14] NAKAZAWA	05	BELL	$e^+e^- \to e^+e^-\chi_{c2}$

$\Gamma(K^+K^-) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_{13}\Gamma_{20}/\Gamma$

NODE=M057G5
NODE=M057G5

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.44±0.11±0.07	33 ± 8	NAKAZAWA	05	BELL	$e^+e^- \to e^+e^-\chi_{c2}$

$\Gamma(2(\pi^+\pi^-)) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_1\Gamma_{20}/\Gamma$

NODE=M057G3
NODE=M057G3

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
6.5±1.0 OUR FIT				
6.4±1.8±0.8	EISENSTEIN	01	CLE2	$e^+e^- \to e^+e^-\chi_{c2}$

[14] We have multiplied $\pi^+\pi^-$ measurement by 3/2 to obtain $\pi\pi$. NODE=M057G;LINKAGE=NA

$\chi_{c2}(1P)$ BRANCHING RATIOS

NODE=M057225

HADRONIC DECAYS

NODE=M057305

$\Gamma(2(\pi^+\pi^-))/\Gamma_{\text{total}}$ — Γ_1/Γ

NODE=M057R2
NODE=M057R2

VALUE	DOCUMENT ID
0.0121±0.0015 OUR FIT	

$\Gamma(\pi^+\pi^-K^+K^-)/\Gamma_{total}$ — Γ_2/Γ

NODE=M057R3
NODE=M057R3

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
12.4±3.3 OUR EVALUATION	Treating systematic error as correlated.			
12 ±4 OUR AVERAGE	Error includes scale factor of 2.1.			
9.4±0.7±2.3	[16] BAI	99B	BES	$\psi(2S) \rightarrow \gamma\chi_{c2}$
18.7±3.3±1.8	[16] TANENBAUM	78	MRK1	$\psi(2S) \rightarrow \gamma\chi_{c2}$

→ NOT CHECKED ←

$\Gamma(3(\pi^+\pi^-))/\Gamma_{total}$ — Γ_3/Γ

NODE=M057R4
NODE=M057R4

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
10.7±2.4 OUR EVALUATION	Treating systematic error as correlated.			
10.7±2.4 OUR AVERAGE				
10.7±1.2±2.2	[16] BAI	99B	BES	$\psi(2S) \rightarrow \gamma\chi_{c2}$
10.8±7.4±1.0	[16] TANENBAUM	78	MRK1	$\psi(2S) \rightarrow \gamma\chi_{c2}$

→ NOT CHECKED ←

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

NODE=M057R8
NODE=M057R8

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
68±40	[17] TANENBAUM	78	MRK1	$\psi(2S) \rightarrow \gamma\chi_{c2}$

$\Gamma(K^+\overline{K}^*(892)^0\pi^- + \text{c.c.})/\Gamma_{total}$ — Γ_5/Γ

NODE=M057R9
NODE=M057R9

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
48±28	[17] TANENBAUM	78	MRK1	$\psi(2S) \rightarrow \gamma\chi_{c2}$

$\Gamma(K^*(892)^0\overline{K}^*(892)^0)/\Gamma_{total}$ — Γ_6/Γ

NODE=M057R26
NODE=M057R26

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
3.8±0.7±0.1	57.5 ± 6.4	[18,19] ABLIKIM	04H	BES	$\psi(2S) \rightarrow \gamma K^+K^-\pi^+\pi^-$

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

NODE=M057R20
NODE=M057R20

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
2.4±0.6±0.7	[16] BAI	99B	BES	$\psi(2S) \rightarrow \gamma\chi_{c2}$

$\Gamma(\omega\omega)/\Gamma_{total}$ — Γ_8/Γ

NODE=M057R28
NODE=M057R28

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
2.0±0.7±0.1	27.7 ± 7.4	[15] ABLIKIM	05N	BES	$\psi(2S) \rightarrow \gamma\chi_{c2} \rightarrow \gamma 6\pi$

[15] ABLIKIM 05N reports $[B(\chi_{c2}(1P) \rightarrow \omega\omega) \times B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))] = (0.165 \pm 0.044 \pm 0.032) \times 10^{-3}$. We divide by our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.20 \pm 0.30) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M057R28;LINKAGE=AB

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

NODE=M057R27

NODE=M057R27

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

NODE=M057R16
NODE=M057R16

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<15	90	[16] BAI	03C	BES	$\psi(2S) \rightarrow \gamma\eta\eta \rightarrow 5\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
7.9±4.1±2.4		[20] LEE	85	CBAL	$\psi' \rightarrow$ photons

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

NODE=M057R18
NODE=M057R18

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
1.75±0.31±0.34	[16] BAI	99B	BES	$\psi(2S) \rightarrow \gamma\chi_{c2}$

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

NODE=M057R6
NODE=M057R6

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
1.7 ±0.4 OUR EVALUATION	Treating systematic error as correlated.			
1.7 ±0.6 OUR AVERAGE	Error includes scale factor of 1.3.			
1.46±0.24±0.40	[16] BAI	99B	BES	$\psi(2S) \rightarrow \gamma\chi_{c2}$
3.30±1.28±0.32	[16] TANENBAUM	78	MRK1	$\psi(2S) \rightarrow \gamma\chi_{c2}$

→ NOT CHECKED ←

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

NODE=M057R11

NODE=M057R11

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

NODE=M057R19
NODE=M057R19

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.72±0.20±0.18	[16] BAI	99B	BES	$\psi(2S) \rightarrow \gamma\chi_{c2}$

$\Gamma(p\overline{p})/\Gamma_{total}$ Γ_{15}/Γ

NODE=M057R12

VALUE (units 10^{-4})	DOCUMENT ID
0.70±0.07 OUR FIT	

$\Gamma(\Lambda\overline{\Lambda})/\Gamma_{total}$ Γ_{16}/Γ

NODE=M057R25

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
3.4±1.5±0.7	$8.3^{+3.7}_{-3.4}$	[16] BAI 03E	BES	$\psi(2S) \to \gamma\chi_{c2} \to \gamma\Lambda\overline{\Lambda}$

$\Gamma(J/\psi(1S)\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{17}/Γ

NODE=M057R13

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.015	90	BARATE 81	SPEC	190 GeV π^- Be $\to 2\pi 2\mu$

$\Gamma(K^0_S K^+\pi^- + \text{c.c.})/\Gamma_{total}$ Γ_{18}/Γ

NODE=M057R21

VALUE (units 10^{-3})	CL%	DOCUMENT ID	TECN	COMMENT
<1.3	90	[16] BAI 99B	BES	$\psi(2S) \to \gamma\chi_{c2}$

[16] Rescaled by us using B($\psi(2S) \to \gamma\chi_{c2}$)= (6.4 ± 0.6)% and B($\psi(2S) \to J/\psi(1S)\pi^+\pi^-$) = 0.317 ± 0.011. NODE=M057R;LINKAGE=X3

[17] Estimated using B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = 0.078; the errors do not contain the uncertainty in the $\psi(2S)$ decay. NODE=M057R;LINKAGE=T

[18] ABLIKIM 04H reports [B($\chi_{c2}(1P) \to K^*(892)^0\overline{K}^*(892)^0$) × B($\psi(2S) \to \gamma\chi_{c2}(1P)$)] = (3.11 ± 0.36 ± 0.48) × 10^{-4}. We divide by our best value B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = (8.20 ± 0.30) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M057R26;LINKAGE=AB

[19] Assumes B($K^*(892)^0 \to K^-\pi^+$) = 2/3. NODE=M057R26;LINKAGE=AL

[20] Calculated using B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = 0.078 ± 0.008. NODE=M057R;LINKAGE=B

RADIATIVE DECAYS

NODE=M057310

$\Gamma(\gamma J/\psi(1S))/\Gamma_{total}$ Γ_{19}/Γ

NODE=M057R7

VALUE	DOCUMENT ID
0.178±0.008 OUR FIT	

$\Gamma(\gamma\gamma)/\Gamma_{total}$ Γ_{20}/Γ

NODE=M057R1

VALUE (units 10^{-4})	DOCUMENT ID
2.40±0.22 OUR FIT	

$\Gamma(\gamma\gamma)/\Gamma(\gamma J/\psi(1S))$ Γ_{20}/Γ_{19}

NODE=M057R23

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
1.35±0.15 OUR FIT			
0.99±0.18	[21] AMBROGIANI 00B	E835	$\overline{p}p \to \chi_{c2} \to \gamma\gamma, \gamma J/\psi$

$\Gamma(\gamma\gamma) \times \Gamma(p\overline{p})/\Gamma^2_{total}$ $\Gamma_{20}\Gamma_{15}/\Gamma^2$

NODE=M057R24

VALUE (units 10^{-8})	DOCUMENT ID	TECN	COMMENT
1.68±0.22 OUR FIT			
1.7 ±0.4 OUR AVERAGE			
1.60±0.42	ARMSTRONG 93	E760	$\overline{p}p \to \gamma\gamma X$
9.9 ±4.5	BAGLIN 87B	SPEC	$\overline{p}p \to \gamma\gamma X$

[21] Calculated by us using B($J/\psi(1S) \to e^+e^-$) = 0.0593 ± 0.0010. NODE=M057R;LINKAGE=7A

$\chi_{c2}(1P)$ CROSS-PARTICLE BRANCHING RATIOS

NODE=M057230

$B(\chi_{c2}(1P) \to p\overline{p}) \times \frac{\Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))}{\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)}$

NODE=M057B1

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
1.81±0.19 OUR FIT			
1.4 ±1.1	[23] BAI 98I	BES	$\psi(2S) \to \gamma\chi_{c2} \to \gamma\overline{p}p$

$B(\chi_{c2}(1P) \to p\overline{p}) \times B(\psi(2S) \to \gamma\chi_{c2}(1P))$

NODE=M057B6
NODE=M057B6

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
5.7 ±0.6 OUR FIT				
0.55±0.06 OUR NEW AVERAGE [$(4.4^{+1.7}_{-1.5}) \times 10^{-6}$ OUR 2005 AVERAGE]				
$4.4\ ^{+1.6}_{-1.4}\ \pm0.6$	$14.3^{+5.2}_{-4.7}$	BAI 04F	BES	$\psi(2S) \to \gamma\chi_{c2}(1P) \to \gamma\overline{p}p$
$0.54\pm0.05\pm0.04$	185 ± 16	[24] BAI 98I	BES	$\psi(2S) \to \gamma\pi^+\pi^-$

$B(\chi_{c2}(1P) \to K^+K^-) \times \frac{\Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))}{\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)}$

NODE=M057B8
NODE=M057B8

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
0.190±0.034±0.019	115 ± 13	[25] BAI 98I	BES	$\psi(2S) \to \gamma K^+K^-$

$B(\chi_{c2}(1P) \to \gamma J/\psi(1S)) \times B(\psi(2S) \to \gamma\chi_{c2}(1P))$

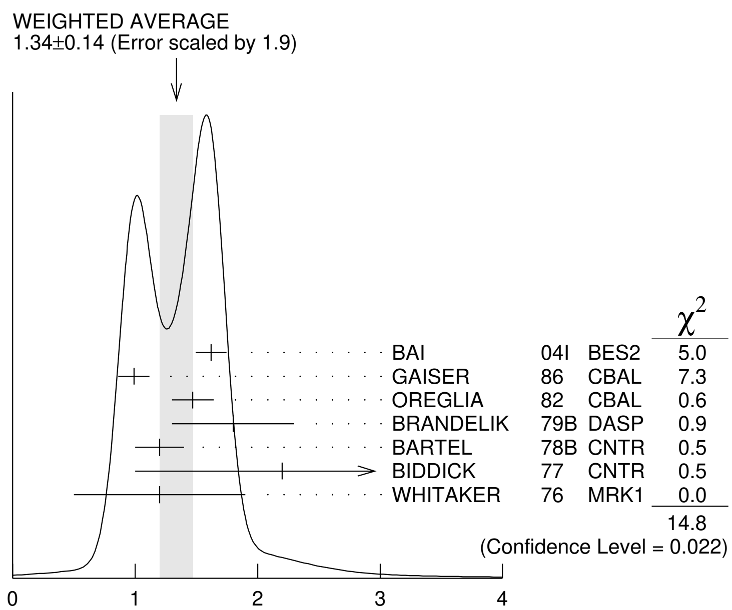
NODE=M057B2
NODE=M057B2

NODE=M057B2

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
1.45±0.09 OUR FIT				
1.34±0.14 OUR AVERAGE Error includes scale factor of 1.9. See the ideogram below.				
$1.62\pm0.04\pm0.12$	5.8k	BAI 04I	BES2	$\psi(2S) \to J/\psi\gamma\gamma$
$0.99\pm0.10\pm0.08$		GAISER 86	CBAL	$\psi(2S) \to \gamma X$
1.47 ± 0.17		[26] OREGLIA 82	CBAL	$\psi(2S) \to \gamma\chi_{c2}$
$1.8\ \pm0.5$		[27] BRANDELIK 79B	DASP	$\psi(2S) \to \gamma\chi_{c2}$
$1.2\ \pm0.2$		[27] BARTEL 78B	CNTR	$\psi(2S) \to \gamma\chi_{c2}$
$2.2\ \pm1.2$		[28] BIDDICK 77	CNTR	$e^+e^- \to \gamma X$
$1.2\ \pm0.7$		[26] WHITAKER 76	MRK1	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$1.85\pm0.04\pm0.07$	1.9k	[22] ADAM 05A	CLEO	$\psi(2S) \to J/\psi\gamma\gamma$

[22] Not independent from other values reported by ADAM 05A.

NODE=M057B;LINKAGE=AD



$B(\chi_{c2}(1P) \to \gamma J/\psi(1S)) \times B(\psi(2S) \to \gamma\chi_{c2}(1P))$

$B(\chi_{c2}(1P) \to \gamma J/\psi) \times \frac{\Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))}{\Gamma(\psi(2S) \to J/\psi(1S) anything)}$

NODE=M057B7
NODE=M057B7

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
3.11±0.07±0.07	1.9k	ADAM 05A	CLEO	$\psi(2S) \to J/\psi\gamma\gamma$

$B(\chi_{c2}(1P) \to \gamma J/\psi(1S)) \times \frac{\Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))}{\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)}$

NODE=M057B3
NODE=M057B3
NODE=M057B3

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
4.59±0.38 OUR FIT					
4.2 ±1.1 OUR AVERAGE					
6.0 ±2.8	1.3k	[29] ABLIKIM	04B	BES	$\psi(2S) \to J/\psi X$
3.9 ±1.2		[30] 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	[22] ADAM	05A	CLEO	$\psi(2S) \to J/\psi\gamma\gamma$

$B(\chi_{c2}(1P) \to \gamma\gamma) \times B(\psi(2S) \to \gamma\chi_{c2}(1P))$

NODE=M057B4
NODE=M057B4
NODE=M057B4

VALUE (units 10^{-5})	*DOCUMENT ID*		*TECN*	*COMMENT*
1.96±0.20 OUR FIT				
7.0 ±2.1 ±2.0	LEE	85	CBAL	$\psi(2S) \to \gamma\chi_{c2}$

$B(\chi_{c2}(1P) \to \pi\pi) \times \frac{\Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))}{\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)}$

NODE=M057B9
NODE=M057B9

VALUE (units 10^{-3})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.66±0.18±0.37	21 ± 6	[31] BAI	03C	BES	$\psi(2S) \to \gamma\pi^0\pi^0$

$B(\chi_{c2}(1P) \to 2(\pi^+\pi^-)) \times \frac{\Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))}{\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)}$

NODE=M057B5
NODE=M057B5
NODE=M057B5

VALUE (units 10^{-3})	*DOCUMENT ID*		*TECN*	*COMMENT*
3.1±0.4 OUR FIT				
3.1±1.0 OUR AVERAGE Error includes scale factor of 2.5.				
2.3±0.1±0.5	[32] BAI	99B	BES	$\psi(2S) \to \gamma\chi_{c2}$
4.3±0.6	[33] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c2}$

[23] Calculated by us. The value for $B(\chi_{c2} \to p\overline{p})$ reported in BAI 98I is derived using $B(\psi(2S) \to \gamma\chi_{c2}) = (7.8 \pm 0.8)\%$ and $B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D]. NODE=M057B;LINKAGE=J8

[24] 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

[25] Calculated by us. The value for $B(\chi_{c2} \to K^+K^-)$ reported by BAI 98I is derived using $B(\psi(2S) \to \gamma\chi_{c2}) = (7.8 \pm 0.8)\%$ and $B(\psi(2S) \to J/\psi\pi^+\pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D]. NODE=M057B;LINKAGE=BI

[26] Recalculated by us using $B(J/\psi(1S) \to \ell^+\ell^-) = 0.1181 \pm 0.0020$. NODE=M057B;LINKAGE=3Q

[27] Recalculated by us using $B(J/\psi(1S) \to \mu^+\mu^-) = 0.0588 \pm 0.0010$. NODE=M057B;LINKAGE=2Q

[28] Assumes isotropic gamma distribution. NODE=M057B;LINKAGE=EA

[29] From a fit to the J/ψ recoil mass spectra. NODE=M057B;LINKAGE=AB

[30] 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

[31] We have multiplied $\pi^0\pi^0$ measurement by 3 to obtain $\pi\pi$. NODE=M057B;LINKAGE=BM

[32] Calculated by us. The value for $B(\chi_{c2} \to 2\pi^+2\pi^-)$ reported in BAI 99B is derived using $B(\psi(2S) \to \gamma\chi_{c2}) = (7.8 \pm 0.8)\%$ and $B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D]. NODE=M057B;LINKAGE=K1

[33] The value for $B(\psi(2S) \to \gamma\chi_{c2})\times B(\chi_{c2} \to 2\pi^+\pi^-)$ reported in TANENBAUM 78 is derived using $B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)\times B(J/\psi(1S)\ell^+\ell^-) = (4.6 \pm 0.7)\%$. Calculated by us using $B(J/\psi(1S) \to \ell^+\ell^-) = 0.1181 \pm 0.0020$. NODE=M057B;LINKAGE=K2

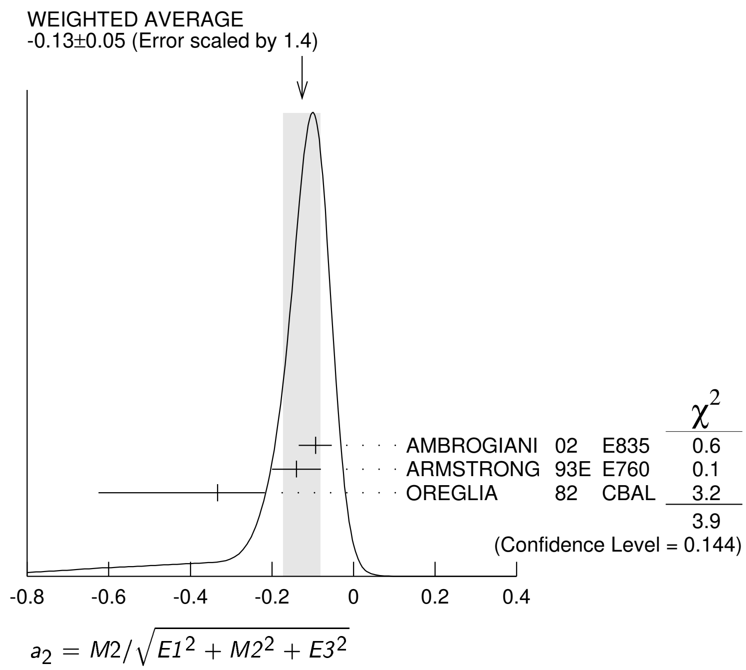
MULTIPOLE AMPLITUDES IN $\chi_{c2}(1P) \to \gamma J/\psi(1S)$ RADIATIVE DECAY

NODE=M057240

$a_2 = M2/\sqrt{E1^2 + M2^2 + E3^2}$ Magnetic quadrupole fractional transition amplitude

NODE=M057A1
NODE=M057A1

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
−0.13 ±0.05 OUR AVERAGE		Error includes scale factor of 1.4. See the ideogram below.		
$-0.093^{+0.039}_{-0.041} \pm 0.006$	5908	[34] AMBROGIANI 02	E835	$p\overline{p} \to \chi_{c2} \to J/\psi\gamma$
-0.14 ± 0.06	1904	[34] ARMSTRONG 93E	E760	$p\overline{p} \to \chi_{c2} \to J/\psi\gamma$
$-0.333^{+0.116}_{-0.292}$	441	[34] OREGLIA 82	CBAL	$\psi(2S) \to \chi_{c1}\gamma \to J/\psi\gamma\gamma$



$a_3 = M2/\sqrt{E1^2 + M2^2 + E3^2}$ Electric octupole fractional transition amplitude

NODE=M057A2
NODE=M057A2

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
$0.011^{+0.041}_{-0.033}$ OUR AVERAGE				
$0.020^{+0.055}_{-0.044} \pm 0.009$	5908	AMBROGIANI 02	E835	$p\overline{p} \to \chi_{c2} \to J/\psi\gamma$
$0.00\ ^{+0.06}_{-0.05}$	1904	ARMSTRONG 93E	E760	$p\overline{p} \to \chi_{c2} \to J/\psi\gamma$

[34] Assuming a_3=0.

NODE=M057A1;LINKAGE=A

$\chi_{c2}(1P)$ REFERENCES

NODE=M057

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
ADAM	05A	PRL 94 232002	N.E. Adam *et al.*	(CLEO Collab.)	REFID=50763
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
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	93B	PR D47 772	T.A. Armstrong *et al.*	(FNAL E760 Collab.)	REFID=43307
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	92B	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	82B	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	82	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	82	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

OTHER RELATED PAPERS

ABLIKIM	04I	PR D70 092004	M. Ablikim *et al.*	(BES Collab.)	REFID=50189
BARBERIS	00G	PL B485 357	D. Barberis *et al.*	(Omega Expt.)	REFID=47963
ACCIARRI	99T	PL B461 155	M. Acciarri *et al.*	(L3 Collab.)	REFID=47476
CHEN	90B	PL B243 169	W.Y. Chen *et al.*	(CLEO Collab.)	REFID=41360
AIHARA	88D	PRL 60 2355	H. Aihara *et al.*	(TPC Collab.)	REFID=40588
BARATE	83	PL 121B 449	R. Barate *et al.*	(SACL, LOIC, SHMP, IND)	REFID=12177
FELDMAN	75B	PRL 35 821	G.J. Feldman *et al.*	(LBL, SLAC)	REFID=22104
Also Erratum.	75C	PRL 35 1189	G.J. Feldman		REFID=22105
TANENBAUM	75	PRL 35 1323	W.M. Tanenbaum *et al.*	(LBL, SLAC)	REFID=22106

NODE=M059

$\eta_c(2S)$

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

Quantum numbers are quark model predictions. NODE=M059

$\eta_c(2S)$ MASS

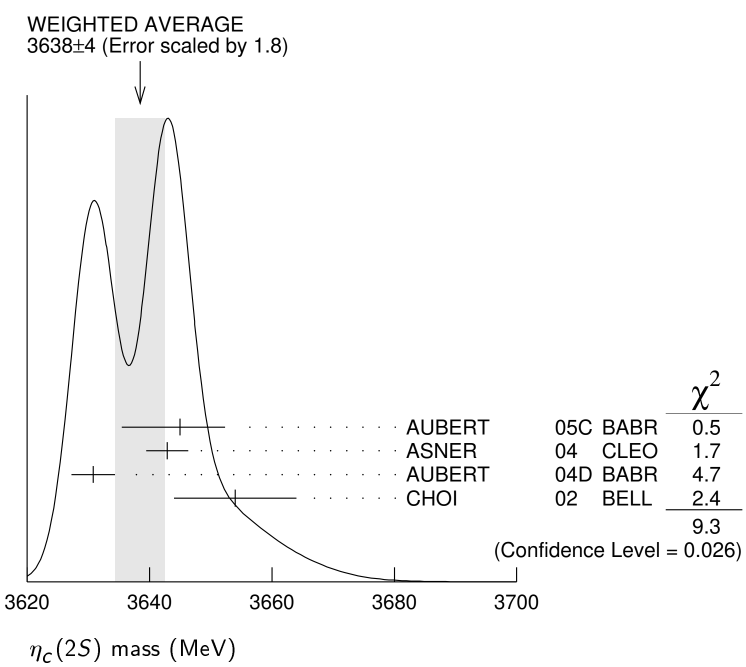
NODE=M059205

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
3638 ± 4 OUR NEW AVERAGE Error includes scale factor of 1.8. See the ideogram below. [3638 ± 5 MeV OUR 2005 AVERAGE Scale factor = 2.1]					
$3645.0 \pm 5.5^{+4.9}_{-7.8}$	121 ± 27	AUBERT	05C	BABR	$e^+e^- \to J/\psi c\overline{c}$
$3642.9 \pm 3.1 \pm 1.5$	61	ASNER	04	CLEO	$\gamma\gamma \to \eta_c \to K^0_S K^\pm \pi^\mp$
$3630.8 \pm 3.4 \pm 1.0$	112 ± 24	AUBERT	04D	BABR	$\gamma\gamma \to \eta_c(2S) \to K\overline{K}\pi$
$3654 \pm 6 \pm 8$	39 ± 11	CHOI	02	BELL	$B \to K K_S K^- \pi^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3630 ± 8	164	[1] ABE	04G	BELL	$10.6\ e^+e^- \to J/\psi(c\overline{c})$
3622 ± 12	42	[1] ABE,K	02	BELL	$10.6\ e^+e^- \to J/\psi + X$
3594 ± 5		[2] EDWARDS	82C	CBAL	$e^+e^- \to \gamma X$

NODE=M059M

[1] From a fit of the J/ψ recoil mass spectrum. Systematic errors not estimated. NODE=M059M;LINKAGE=AK

[2] Assuming mass of $\psi(2S)$ = 3686 MeV. NODE=M059M;LINKAGE=A



$\eta_c(2S)$ WIDTH

NODE=M059210

NODE=M059W

VALUE (MeV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
15 ± 6 OUR NEW AVERAGE			[14 ± 7 MeV OUR 2005 AVERAGE]			
22 ±14		121 ± 27	AUBERT	05C	BABR	$e^+ e^- \to J/\psi c\overline{c}$
6.3±12.4±4.0		61	ASNER	04	CLEO	$\gamma\gamma \to \eta_c \to K_S^0 K^\pm \pi^\mp$
17.0± 8.3±2.5		112 ± 24	AUBERT	04D	BABR	$\gamma\gamma \to \eta_c(2S) \to K\overline{K}\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<55	90	39 ± 11	[3] CHOI	02	BELL	$B \to K K_S K^- \pi^+$
<8.0	95		[4] EDWARDS	82C	CBAL	$e^+ e^- \to \gamma X$

[3] For a mass value of 3654 ± 6 MeV NODE=M059W;LINKAGE=W2

[4] For a mass value of 3594 ± 5 MeV NODE=M059W;LINKAGE=W

$\eta_c(2S)$ DECAY MODES

NODE=M059215;NODE=M059

	Mode	
Γ_1	hadrons	DESIG=1
Γ_2	$K\overline{K}\pi$	DESIG=4
Γ_3	$p\overline{p}$	DESIG=3
Γ_4	$\gamma\gamma$	DESIG=2

$\eta_c(2S)$ PARTIAL WIDTHS

NODE=M059216

$\Gamma(\gamma\gamma)$ Γ_4

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	[5] ASNER	04	CLEO	$\gamma\gamma \to \eta_c \to K_S^0 K^\pm \pi^\mp$

[5] They measure $\Gamma(\eta_c(2S)\gamma\gamma)$ B$(\eta_c(2S) \to K\overline{K}\pi) = (0.18 \pm 0.05 \pm 0.02)$ $\Gamma(\eta_c(1S)\gamma\gamma)$ 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 $\Gamma(\eta_c(1S) \to \gamma\gamma) = 7.4 \pm 0.4 \pm 2.3$ keV. NODE=M059W1;LINKAGE=AS

$\eta_c(2S)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma^2(total)$

NODE=M059217

$\Gamma(p\overline{p}) \times \Gamma(\gamma\gamma)/\Gamma^2_{total}$ $\Gamma_3\Gamma_4/\Gamma^2$

NODE=M059G1
NODE=M059G1

VALUE (units 10^{-8})	CL%	DOCUMENT ID		TECN	COMMENT	
< 5.6	90	[6,7,8] AMBROGIANI	01	E835	$\overline{p}p \to \gamma\gamma$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 8.0	90	[6,7,9] AMBROGIANI	01	E835	$\overline{p}p \to \gamma\gamma$	OCCUR=2
<12.0	90	[7,9] AMBROGIANI	01	E835	$\overline{p}p \to \gamma\gamma$	OCCUR=3

[6] Including the measurements of of ARMSTRONG 95F in the AMBROGIANI 01 analysis. NODE=M059G1;LINKAGE=A

[7] For a total width Γ=5 MeV. NODE=M059G1;LINKAGE=B

[8] For the resonance mass region 3589–3599 MeV/c^2. NODE=M059G1;LINKAGE=C1

[9] For the resonance mass region 3575–3660 MeV/c^2. NODE=M059G1;LINKAGE=C2

$\eta_c(2S)$ BRANCHING RATIOS

NODE=M059220

$\Gamma(\text{hadrons})/\Gamma_{total}$ Γ_1/Γ

NODE=M059R1
NODE=M059R1

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	ABREU	98O	DLPH	$e^+ e^- \to e^+ e^-$ +hadrons
seen	[10] EDWARDS	82C	CBAL	$e^+ e^- \to \gamma X$

$\Gamma(K\overline{K}\pi)/\Gamma_{total}$ Γ_2/Γ

NODE=M059R3
NODE=M059R3

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	39 ± 11	[11] CHOI	02	BELL	$B \to K K_S K^- \pi^+$

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

NODE=M059R2
NODE=M059R2

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.01	90	LEE	85	CBAL	$\psi' \to$ photons

[10] For a mass value of 3594 ± 5 MeV
[11] For a mass value of 3654 ± 6 MeV

NODE=M059R;LINKAGE=W
NODE=M059R;LINKAGE=W2

$\eta_c(2S)$ REFERENCES

NODE=M059

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

OTHER RELATED PAPERS

BADALIAN	03	PR D67 071901	A.M. Badalian, B.L.G. Bakker		REFID=49408
EICHTEN	02	PRL 89 162002	E.J. Eichten, K. Lane, C. Quigg		REFID=48839
ACCIARRI	99T	PL B461 155	M. Acciarri *et al.*	(L3 Collab.)	REFID=47476
OREGLIA	82	PR D25 2259	M.J. Oreglia *et al.*	(SLAC, CIT, HARV+)	REFID=22120
PORTER	81	SLAC Summer Inst. 355	F.C. Porter *et al.*	(CIT, HARV, PRIN+)	REFID=22172
BARTEL	78B	PL 79B 492	W. Bartel *et al.*	(DESY, HEIDP)	REFID=22111

NODE=M071

$\psi(2S)$

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

See the Review on "$\psi(2S)$ and χ_c branching ratios" before the $\chi_{c0}(1P)$ Listings.

NODE=M071

$\psi(2S)$ MASS

NODE=M071205

NODE=M071M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
3686.093±0.034 OUR AVERAGE Error includes scale factor of 1.4. See the ideogram below.					
3686.111±0.025±0.009		AULCHENKO	03	KEDR	$e^+e^- \to$ hadrons
3685.95 ±0.10	413	[1] ARTAMONOV	00	OLYA	$e^+e^- \to$ hadrons
3685.98 ±0.09 ±0.04		[2] ARMSTRONG	93B	E760	$\overline{p}p \to e^+e^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3684 ±2		GRIBUSHIN	96	FMPS	515 π^- Be $\to 2\mu X$
3683 ±5	77	ANTONIAZZI	94	E705	300 $\pi^\pm$, pLi $\to J/\psi\pi^+\pi^-$X
3686.00 ±0.10	413	[3] ZHOLENTZ	80	OLYA	e^+e^-

[1] Reanalysis of ZHOLENTZ 80 using new electron mass (COHEN 87) and radiative corrections (KURAEV 85).

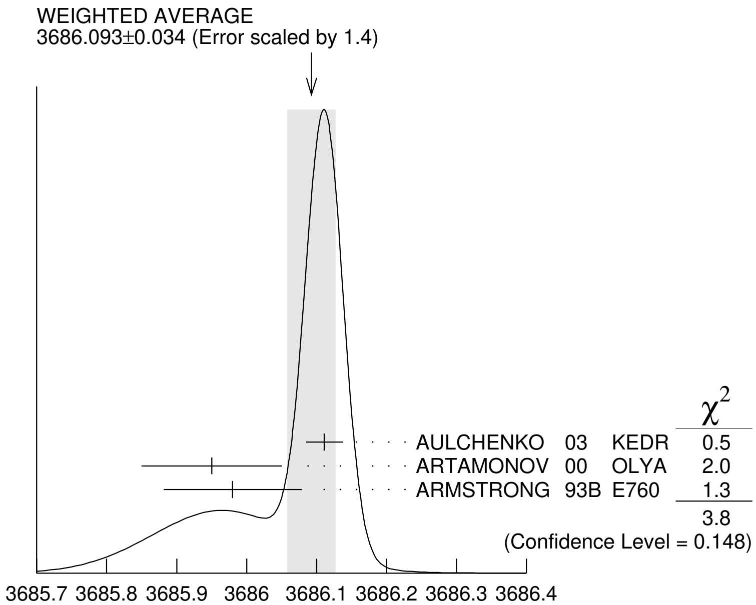
NODE=M071M;LINKAGE=AR

[2] 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

[3] Superseded by ARTAMONOV 00.

NODE=M071M;LINKAGE=RZ



$\psi(2S)$ mass (MeV)

$m_{\psi(2S)} - m_{J/\psi(1S)}$

NODE=M071210

NODE=M071DM

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
589.188±0.028 OUR AVERAGE			
589.194±0.027±0.011	[4] AULCHENKO 03	KEDR	$e^+e^- \to$ hadrons
589.7 ±1.2	LEMOIGNE 82	GOLI	190 π^- Be $\to$ 2μ
589.07 ±0.13	[4] 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	[5] BAI 98E	BES	e^+e^-

[4] Redundant with data in mass above. NODE=M071DM;LINKAGE=R

[5] Systematic errors not evaluated. NODE=M071DM;LINKAGE=BD

$\psi(2S)$ WIDTH

NODE=M071215

NODE=M071W

VALUE (keV)	DOCUMENT ID	TECN	COMMENT
283±17 OUR FIT			
277±22 OUR AVERAGE			
264±27	[6] BAI 02B	BES	e^+e^-
306±36±16	ARMSTRONG 93B	E760	$\overline{p}p \to e^+e^-$

[6] 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. NODE=M071W;LINKAGE=BC

$\psi(2S)$ DECAY MODES

NODE=M071220;NODE=M071

	Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	
Γ_1	$\psi(2S) \to$ hadrons	(97.85±0.13) %		DESIG=3
Γ_2	$\psi(2S) \to$ virtual$\gamma \to$ hadrons	(1.73±0.14) %	S=1.5	DESIG=4
Γ_3	$\psi(2S) \to e^+e^-$	(7.41±0.28) $\times 10^{-3}$		DESIG=1
Γ_4	$\psi(2S) \to \mu^+\mu^-$	(7.3 ±0.8) $\times 10^{-3}$		DESIG=2
Γ_5	$\psi(2S) \to \tau^+\tau^-$	(2.8 ±0.7) $\times 10^{-3}$		DESIG=68
	Decays into $J/\psi(1S)$ and anything			NODE=M071;CLUMP=A
Γ_6	$\psi(2S) \to J/\psi(1S)$ anything	(57.6 ±1.9) %		DESIG=11
Γ_7	$\psi(2S) \to J/\psi(1S)$ neutrals	(24.6 ±0.9) %		DESIG=12
Γ_8	$\psi(2S) \to J/\psi(1S)\pi^+\pi^-$	(31.7 ±1.1) %		DESIG=13
Γ_9	$\psi(2S) \to J/\psi(1S)\pi^0\pi^0$	(18.6 ±0.8) %		DESIG=14
Γ_{10}	$\psi(2S) \to J/\psi(1S)\eta$	(3.08±0.17) %		DESIG=15
Γ_{11}	$\psi(2S) \to J/\psi(1S)\pi^0$	(1.26±0.13) $\times 10^{-3}$	S=1.3	DESIG=18

Hadronic decays

NODE=M071;CLUMP=B

Γ_{12}	$\psi(2S) \to 3(\pi^+\pi^-)\pi^0$	$(3.5 \pm 1.6) \times 10^{-3}$		DESIG=37
Γ_{13}	$\psi(2S) \to 2(\pi^+\pi^-)\pi^0$	$(3.0 \pm 0.8) \times 10^{-3}$		DESIG=25
Γ_{14}	$\psi(2S) \to \rho a_2(1320)$	$(2.6 \pm 0.9) \times 10^{-4}$		DESIG=65
Γ_{15}	$\psi(2S) \to \omega\pi^+\pi^-$	$(4.8 \pm 0.9) \times 10^{-4}$		DESIG=75
Γ_{16}	$\psi(2S) \to b_1^\pm\pi^\mp$	$(3.6 \pm 0.6) \times 10^{-4}$		DESIG=40
Γ_{17}	$\psi(2S) \to b_1^0\pi^0$	$(2.4 \pm 0.6) \times 10^{-4}$		DESIG=193
Γ_{18}	$\psi(2S) \to \omega f_2(1270)$	$(2.0 \pm 0.6) \times 10^{-4}$		DESIG=64
Γ_{19}	$\psi(2S) \to \pi^+\pi^-K^+K^-$	$(1.6 \pm 0.4) \times 10^{-3}$		DESIG=26
Γ_{20}	$\psi(2S) \to K^*(892)^0\overline{K}_2^*(1430)^0$	$(1.9 \pm 0.5) \times 10^{-4}$		DESIG=66
Γ_{21}	$\psi(2S) \to K_1(1270)^\pm K^\mp$	$(1.00 \pm 0.28) \times 10^{-3}$		DESIG=41
Γ_{22}	$\psi(2S) \to \pi^+\pi^-p\overline{p}$	$(8.0 \pm 2.0) \times 10^{-4}$		DESIG=31
Γ_{23}	$\psi(2S) \to K^+\overline{K}^*(892)^0\pi^-$ + c.c.	$(6.7 \pm 2.5) \times 10^{-4}$		DESIG=34
Γ_{24}	$\psi(2S) \to 2(\pi^+\pi^-)$	$(4.5 \pm 1.0) \times 10^{-4}$		DESIG=24
Γ_{25}	$\psi(2S) \to \rho^0\pi^+\pi^-$	$(4.2 \pm 1.5) \times 10^{-4}$		DESIG=33
Γ_{26}	$\psi(2S) \to \omega K^+K^-$	$(1.5 \pm 0.4) \times 10^{-4}$		DESIG=76
Γ_{27}	$\psi(2S) \to \overline{p}p$	$(2.07 \pm 0.31) \times 10^{-4}$		DESIG=27
Γ_{28}	$\psi(2S) \to \Lambda\overline{\Lambda}$	$(1.81 \pm 0.34) \times 10^{-4}$		DESIG=28
Γ_{29}	$\psi(2S) \to 3(\pi^+\pi^-)$	$(3.5 \pm 2.0) \times 10^{-4}$	S=2.8	DESIG=32
Γ_{30}	$\psi(2S) \to \overline{p}p\pi^0$	$(1.33 \pm 0.17) \times 10^{-4}$		DESIG=35
Γ_{31}	$\psi(2S) \to \omega p\overline{p}$	$(8.0 \pm 3.2) \times 10^{-5}$		DESIG=77
Γ_{32}	$\psi(2S) \to \eta p\overline{p}$	$(5.8 \pm 1.3) \times 10^{-5}$		DESIG=200
Γ_{33}	$\psi(2S) \to \Delta^{++}\overline{\Delta}^{--}$	$(1.28 \pm 0.35) \times 10^{-4}$		DESIG=70
Γ_{34}	$\psi(2S) \to \Sigma^0\overline{\Sigma}^0$	$(1.2 \pm 0.6) \times 10^{-4}$		DESIG=71
Γ_{35}	$\psi(2S) \to \Sigma^{*+}\overline{\Sigma}^{*-}$	$(1.1 \pm 0.4) \times 10^{-4}$		DESIG=72
Γ_{36}	$\psi(2S) \to K^+K^-$	$(1.0 \pm 0.7) \times 10^{-4}$		DESIG=23
Γ_{37}	$\psi(2S) \to K_S^0K_L^0$	$(5.2 \pm 0.7) \times 10^{-5}$		DESIG=85
Γ_{38}	$\psi(2S) \to \pi^+\pi^-\pi^0$	$(1.68 \pm 0.26) \times 10^{-4}$	S=1.4	DESIG=36
Γ_{39}	$\psi(2S) \to \rho(2150)\pi \to \pi^+\pi^-\pi^0$	$(1.9\ ^{+1.2}_{-0.4}) \times 10^{-4}$		DESIG=201
Γ_{40}	$\psi(2S) \to \rho(770)\pi \to \pi^+\pi^-\pi^0$	$(3.2 \pm 1.2) \times 10^{-5}$	S=1.8	DESIG=22
Γ_{41}	$\psi(2S) \to \pi^+\pi^-$	$(8 \pm 5) \times 10^{-5}$		DESIG=21
Γ_{42}	$\psi(2S) \to \Xi^-\overline{\Xi}^+$	$(9.4 \pm 3.1) \times 10^{-5}$		DESIG=29
Γ_{43}	$\psi(2S) \to K_1(1400)^\pm K^\mp$	$< 3.1 \times 10^{-4}$	CL=90%	DESIG=42
Γ_{44}	$\psi(2S) \to \Xi^{*0}\overline{\Xi}^{*0}$	$< 8.1 \times 10^{-5}$	CL=90%	DESIG=73
Γ_{45}	$\psi(2S) \to \Omega^-\overline{\Omega}^+$	$< 7.3 \times 10^{-5}$	CL=90%	DESIG=74
Γ_{46}	$\psi(2S) \to K^+K^-\pi^0$	$< 2.96 \times 10^{-5}$	CL=90%	DESIG=38
Γ_{47}	$\psi(2S) \to K^+\overline{K}^*(892)^-$ + c.c.	$(1.7\ ^{+0.8}_{-0.7}) \times 10^{-5}$		DESIG=39
Γ_{48}	$\psi(2S) \to K^*(892)^0\overline{K}^0$ + c.c.	$(1.09 \pm 0.20) \times 10^{-4}$		DESIG=194
Γ_{49}	$\psi(2S) \to \phi\pi^+\pi^-$	$(1.50 \pm 0.28) \times 10^{-4}$		DESIG=78
Γ_{50}	$\psi(2S) \to \phi f_0(980) \to \pi^+\pi^-$	$(6.0 \pm 2.2) \times 10^{-5}$		DESIG=81
Γ_{51}	$\psi(2S) \to \phi K^+K^-$	$(6.0 \pm 2.2) \times 10^{-5}$		DESIG=79
Γ_{52}	$\psi(2S) \to \phi\eta$	$(2.8\ ^{+1.0}_{-0.8}) \times 10^{-5}$		DESIG=89
Γ_{53}	$\psi(2S) \to \phi\eta'$	$(3.1 \pm 1.6) \times 10^{-5}$		DESIG=90
Γ_{54}	$\psi(2S) \to \omega\eta'$	$(3.2\ ^{+2.5}_{-2.1}) \times 10^{-5}$		DESIG=91
Γ_{55}	$\psi(2S) \to \omega\pi^0$	$(2.1 \pm 0.6) \times 10^{-5}$		DESIG=92
Γ_{56}	$\psi(2S) \to \rho\eta'$	$(1.9\ ^{+1.7}_{-1.2}) \times 10^{-5}$		DESIG=93
Γ_{57}	$\psi(2S) \to \rho\eta$	$(2.2 \pm 0.6) \times 10^{-5}$	S=1.1	DESIG=94
Γ_{58}	$\psi(2S) \to \omega\eta$	$< 1.1 \times 10^{-5}$	CL=90%	DESIG=95
Γ_{59}	$\psi(2S) \to \phi\pi^0$	$< 4 \times 10^{-6}$	CL=90%	DESIG=96
Γ_{60}	$\psi(2S) \to \phi p\overline{p}$	$< 2.6 \times 10^{-5}$	CL=90%	DESIG=80
Γ_{61}	$\psi(2S) \to \phi f_2'(1525)$	$(4.4 \pm 1.6) \times 10^{-5}$		DESIG=67
Γ_{62}	$J/\psi(2S) \to \Theta(1540)\overline{\Theta}(1540) \to K_S^0pK^-\overline{n}$ + c.c.	$< 8.8 \times 10^{-6}$	CL=90%	DESIG=195
Γ_{63}	$J/\psi(2S) \to \Theta(1540)K^-\overline{n} \to K_S^0pK^-\overline{n}$	$< 1.0 \times 10^{-5}$	CL=90%	DESIG=196
Γ_{64}	$J/\psi(2S) \to \Theta(1540)K_S^0\overline{p} \to K_S^0\overline{p}K^+n$	$< 7.0 \times 10^{-6}$	CL=90%	DESIG=197
Γ_{65}	$J/\psi(2S) \to \overline{\Theta}(1540)K^+n \to K_S^0\overline{p}K^+n$	$< 2.6 \times 10^{-5}$	CL=90%	DESIG=198
Γ_{66}	$J/\psi(2S) \to \overline{\Theta}(1540)K_S^0p \to K_S^0pK^-\overline{n}$	$< 6.0 \times 10^{-6}$	CL=90%	DESIG=199
Γ_{67}	$\psi(2S) \to K_S^0K_S^0$	$< 4.6 \times 10^{-6}$		DESIG=86

Radiative decays

NODE=M071;CLUMP=C

Γ_{68}	$\psi(2S) \to \gamma\chi_{c0}(1P)$	(9.0 ±0.4) %			DESIG=56
Γ_{69}	$\psi(2S) \to \gamma\chi_{c1}(1P)$	(8.7 ±0.5) %			DESIG=58
Γ_{70}	$\psi(2S) \to \gamma\chi_{c2}(1P)$	(8.20±0.30) %			DESIG=59
Γ_{71}	$\psi(2S) \to \gamma\eta_c(1S)$	(2.6 ±0.4) $\times 10^{-3}$			DESIG=61
Γ_{72}	$\psi(2S) \to \gamma\eta_c(2S)$	< 2.0	$\times 10^{-3}$	CL=90%	DESIG=63
Γ_{73}	$\psi(2S) \to \gamma\pi^0$				DESIG=52
Γ_{74}	$\psi(2S) \to \gamma\eta'(958)$	(1.5 ±0.4) $\times 10^{-4}$			DESIG=54
Γ_{75}	$\psi(2S) \to \gamma f_2(1270)$	(2.1 ±0.4) $\times 10^{-4}$			DESIG=82
Γ_{76}	$\psi(2S) \to \gamma f_0(1710) \to \gamma\pi\pi$	(3.0 ±1.3) $\times 10^{-5}$			DESIG=83
Γ_{77}	$\psi(2S) \to \gamma f_0(1710) \to \gamma K\overline{K}$	(6.0 ±1.6) $\times 10^{-5}$			DESIG=84
Γ_{78}	$\psi(2S) \to \gamma\gamma$	< 1.5	$\times 10^{-4}$	CL=90%	DESIG=51
Γ_{79}	$\psi(2S) \to \gamma\eta$	< 9	$\times 10^{-5}$	CL=90%	DESIG=53
Γ_{80}	$\psi(2S) \to \gamma\eta(1405) \to \gamma K\overline{K}\pi$	< 1.2	$\times 10^{-4}$	CL=90%	DESIG=62

$\psi(2S)$ 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	BES	e^+e^-
224±56	LUTH	75	MRK1	e^+e^-

$\Gamma(e^+e^-)$ Γ_3

NODE=M071W1
NODE=M071W1

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
2.10±0.12 OUR FIT				
2.14±0.21	ALEXANDER	89	RVUE	See Υ mini-review
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.44±0.21	[8] BAI	02B	BES	e^+e^-
2.0 ±0.3	BRANDELIK	79C	DASP	e^+e^-
2.1 ±0.3	[7] LUTH	75	MRK1	e^+e^-

[7] 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_{78}

NODE=M071W51
NODE=M071W51

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<43	90	BRANDELIK	79C	DASP	e^+e^-

[8] 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

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

NODE=M071230

This combination of a partial width with the partial width into e^+e^- and with the total width is obtained from the integrated cross section into channel$_I$ in the e^+e^- annihilation. We list only data that have not been used to determine the partial width $\Gamma(I)$ or the branching ratio $\Gamma(I)$/total.

NODE=M071230

Γ(hadrons) × $\Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_1\Gamma_3/\Gamma$

NODE=M071G3
NODE=M071G3

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.2±0.4	ABRAMS	75	MRK1	e^+e^-

$\Gamma(J/\psi(1S)\pi^+\pi^-)$ × $\Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_8\Gamma_3/\Gamma$

NODE=M071G1
NODE=M071G1

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
0.66±0.05 OUR FIT				
0.68±0.09	[9] BAI	98E	BES	e^+e^-

$\Gamma(\overline{p}p)$ × $\Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{27}\Gamma_3/\Gamma$

NODE=M071G2
NODE=M071G2

VALUE (eV)	EVTS	DOCUMENT ID		COMMENT
0.70±0.17±0.03	22	AUBERT	06B	$e^+e^- \to p\overline{p}\gamma$

[9] 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 ± 0.0038. Recalculated by us using B($J/\psi(1S) \to \ell^+\ell^-$)= 0.1181 ± 0.0020.

NODE=M071G1;LINKAGE=A

$\psi(2S)$ BRANCHING RATIOS

NODE=M071235

$\Gamma(\text{hadrons})/\Gamma_{\text{total}}$ — Γ_1/Γ

NODE=M071R3
NODE=M071R3

VALUE	DOCUMENT ID	TECN	COMMENT
0.9785±0.0013 OUR AVERAGE			
0.9779±0.0015	[10] BAI 02B	BES	e^+e^-
0.981 ±0.003	[10] LUTH 75	MRK1	e^+e^-

$\Gamma(\text{virtual}\gamma \to \text{hadrons})/\Gamma_{\text{total}}$ — Γ_2/Γ

NODE=M071R5
NODE=M071R5

VALUE	DOCUMENT ID	TECN	COMMENT
0.0173±0.0014 OUR AVERAGE Error includes scale factor of 1.5.			
0.0166±0.0010	[11,12] SETH 04	RVUE	e^+e^-
0.0199±0.0019	[11] BAI 02B	BES	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.029 ±0.004	[11] LUTH 75	MRK1	e^+e^-

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

NODE=M071R1
NODE=M071R1

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
74.1± 2.8 OUR FIT			
• • • We do not use the following data for averages, fits, limits, etc. • • •			
88 ±13	[13] FELDMAN 77	RVUE	e^+e^-

$\Gamma(\mu^+\mu^-)/\Gamma_{\text{total}}$ — Γ_4/Γ

NODE=M071R2
NODE=M071R2

VALUE (units 10^{-4})	DOCUMENT ID
73±8 OUR FIT	

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

NODE=M071R75
NODE=M071R75

VALUE (units 10^{-4})	DOCUMENT ID
28±7 OUR FIT	

$\Gamma(\mu^+\mu^-)/\Gamma(e^+e^-)$ — Γ_4/Γ_3

NODE=M071R4
NODE=M071R4

VALUE	DOCUMENT ID	TECN	COMMENT
0.99±0.13 OUR FIT			
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.89±0.16	BOYARSKI 75C	MRK1	e^+e^-

[10] Includes cascade decay into $J/\psi(1S)$. NODE=M071R;LINKAGE=P

[11] Included in $\Gamma(\text{hadrons})/\Gamma_{\text{total}}$. NODE=M071R;LINKAGE=Z

[12] Using $B(\psi(2S) \to \ell^+\ell^-) = (0.73 \pm 0.04)\%$ from RPP-2002 and $R = 2.28 \pm 0.04$ determined by a fit to data from BAI 00 and BAI 02C. NODE=M071R5;LINKAGE=SE

[13] 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

DECAYS INTO $J/\psi(1S)$ AND ANYTHING

NODE=M071305

$\Gamma(J/\psi(1S)\,\text{anything})/\Gamma_{\text{total}}$ — Γ_6/Γ

NODE=M071R10
NODE=M071R10

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.576 ±0.019 OUR FIT				
0.592 ±0.018 OUR NEW AVERAGE [0.55 ± 0.07 OUR 2005 AVERAGE]				
0.5950±0.0015±0.0190	151k	ADAM 05A	CLEO	$e^+e^- \to \psi(2S)$
0.51 ±0.12		BRANDELIK 79C	DASP	$e^+e^- \to \mu^+\mu^- X$
0.57 ±0.08		ABRAMS 75B	MRK1	$e^+e^- \to \mu^+\mu^- X$

$\Gamma(J/\psi(1S)\,\text{neutrals})/\Gamma_{\text{total}}$ — Γ_7/Γ

NODE=M071R18
NODE=M071R18

VALUE	DOCUMENT ID
0.246±0.009 OUR FIT	

$\Gamma(J/\psi(1S)\pi^+\pi^-)/\Gamma_{\text{total}}$ — Γ_8/Γ

NODE=M071R12
NODE=M071R12

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.317 ±0.011 OUR FIT				
0.323 ±0.013 OUR AVERAGE				
0.323 ±0.014		BAI 02B	BES	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±0.0011	60k	[14] ADAM 05A	CLEO	$e^+e^- \to \psi(2S)$

[14] Not independent from other values reported by ADAM 05A. NODE=M071R;LINKAGE=AD

$\Gamma(J/\psi(1S)\pi^0\pi^0)/\Gamma_{total}$ Γ_9/Γ

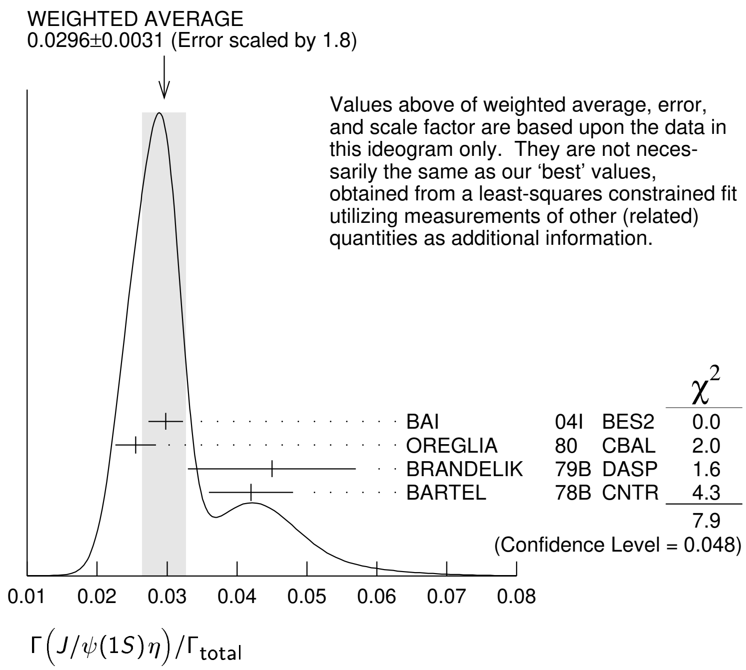
NODE=M071R17

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.186 ±0.008 OUR FIT				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.1652±0.0014±0.0058	13.4k	[14] ADAM	05A CLEO	$e^+e^- \to \psi(2S)$

$\Gamma(J/\psi(1S)\eta)/\Gamma_{total}$ Γ_{10}/Γ

NODE=M071R15

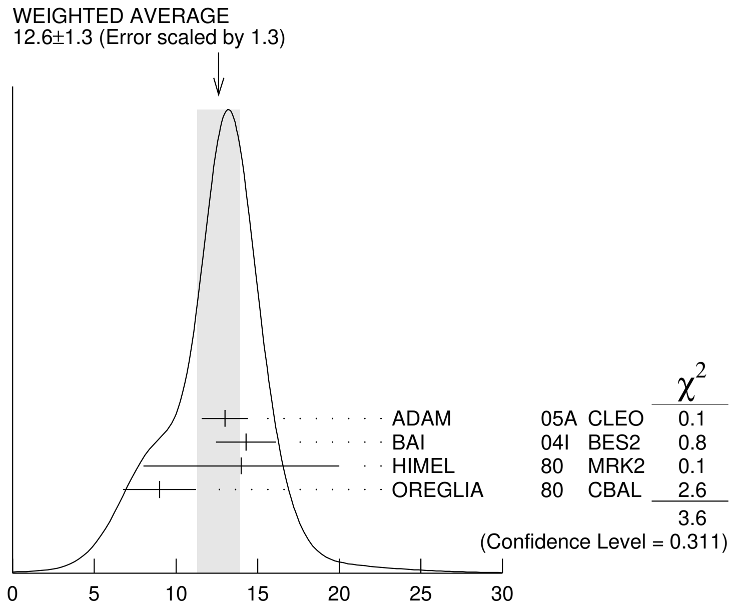
VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.0308±0.0017 OUR FIT				
0.0296±0.0031 OUR AVERAGE Error includes scale factor of 1.8. See the ideogram below.				
0.0298±0.0009±0.0023	5.7k	BAI	04I BES2	$\psi(2S) \to J/\psi\gamma\gamma$
0.0255±0.0029	386	[16] OREGLIA	80 CBAL	$e^+e^- \to J/\psi 2\gamma$
0.045 ±0.012	17	[17] BRANDELIK	79B DASP	$e^+e^- \to J/\psi 2\gamma$
0.042 ±0.006	164	[17] BARTEL	78B CNTR	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.0325±0.0006±0.0011	2.8k	[14] ADAM	05A CLEO	$e^+e^- \to \psi(2S)$
0.043 ±0.008	44	TANENBAUM	76 MRK1	e^+e^-



$\Gamma(J/\psi(1S)\pi^0)/\Gamma_{total}$ Γ_{11}/Γ

NODE=M071R16

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
12.6±1.3 OUR NEW AVERAGE Error includes scale factor of 1.3. See the ideogram below. [$(12.3 \pm 1.8) \times 10^{-4}$ OUR 2005 AVERAGE Scale factor = 1.3]				
13 ±1 ±1	88	ADAM	05A CLEO	$e^+e^- \to \psi(2S)$
14.3±1.4±1.2	280	BAI	04I BES2	$\psi(2S) \to J/\psi\gamma\gamma$
14 ±6	7	HIMEL	80 MRK2	e^+e^-
9 ±2 ±1	23	[16] OREGLIA	80 CBAL	$\psi(2S) \to J/\psi 2\gamma$



$\Gamma\big(J/\psi(1S)\pi^0\big)/\Gamma_{\text{total}}$ (units 10^{-4})

$\Gamma\big(J/\psi(1S)\,\text{neutrals}\big)/\Gamma\big(J/\psi(1S)\pi^+\pi^-\big)$ Γ_7/Γ_8

NODE=M071R11
NODE=M071R11

VALUE	DOCUMENT ID	TECN	COMMENT
0.776±0.021 OUR FIT			
0.73 ±0.09	TANENBAUM 76	MRK1	e^+e^-

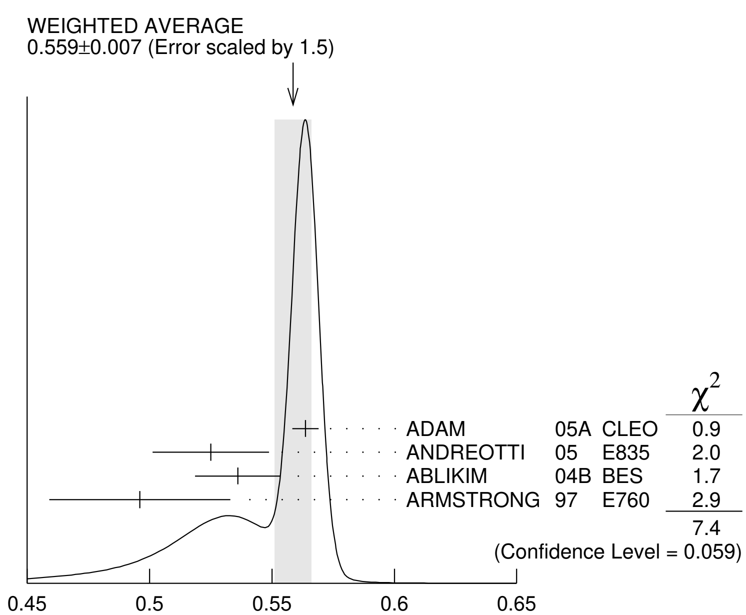
$\Gamma\big(J/\psi(1S)\pi^+\pi^-\big)/\Gamma\big(J/\psi(1S)\,\text{anything}\big)$ Γ_8/Γ_6

NODE=M071R70
NODE=M071R70

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.550 ±0.006 OUR FIT				
0.559 ±0.007 OUR NEW AVERAGE Error includes scale factor of 1.5. See the ideogram below. [0.528 ± 0.013 OUR 2005 AVERAGE]				
0.5637±0.0027±0.0046	60k	ADAM 05A	CLEO	$e^+e^- \to \psi(2S)$
0.525 ±0.009 ±0.022	4090 ± 67	ANDREOTTI 05	E835	$\psi(2S) \to J/\psi X$
0.536 ±0.007 ±0.016	20k	[15,18] ABLIKIM 04B	BES	$\psi(2S) \to J/\psi X$
0.496 ±0.037		ARMSTRONG 97	E760	$\overline{p}p \to \psi(2S)$

[15] ABLIKIM 04B quotes B($\psi(2S) \to J/\psi X$) / B($\psi(2S) \to J/\psi\pi^+\pi^-$).

NODE=M071R;LINKAGE=AL

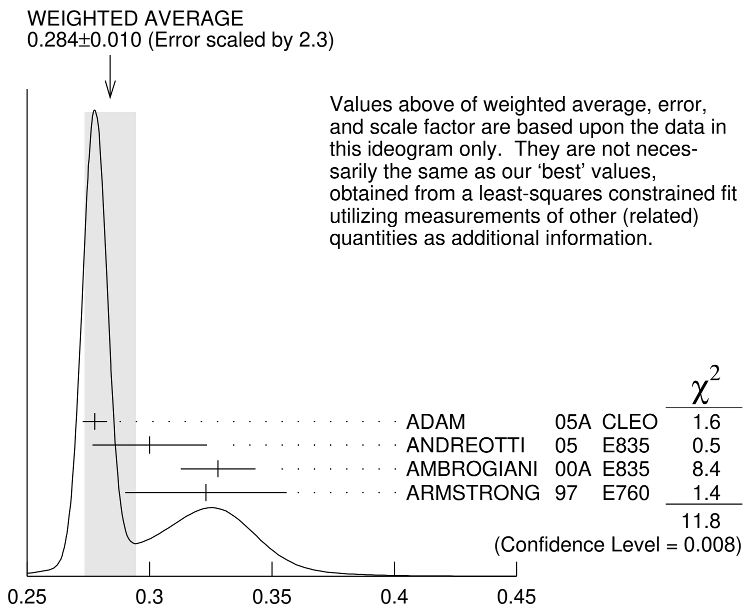


$\Gamma\big(J/\psi(1S)\pi^+\pi^-\big)/\Gamma\big(J/\psi(1S)\,\text{anything}\big)$ Γ_8/Γ_6

$\Gamma(J/\psi(1S)\pi^0\pi^0)/\Gamma(J/\psi(1S)\,\text{anything})$ — Γ_9/Γ_6

NODE=M071R69
NODE=M071R69

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.323 ±0.007 OUR FIT				
0.284 ±0.010 OUR NEW AVERAGE Error includes scale factor of 2.3. See the ideogram below. [0.320 ± 0.012 OUR 2005 AVERAGE]				
0.2776±0.0025±0.0043	13.4k	ADAM 05A	CLEO	$e^+e^- \to \psi(2S)$
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	$\overline{p}p \to \psi(2S)$



$\Gamma(J/\psi(1S)\pi^0\pi^0)/\Gamma(J/\psi(1S)\,\text{anything})$ Γ_9/Γ_6

$\Gamma(J/\psi(1S)\pi^0\pi^0)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ — Γ_9/Γ_8

NODE=M071R14
NODE=M071R14

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.59 ±0.04 OUR FIT				
0.570 ±0.009 ±0.026	14k	[18] 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	13.4k	[14] ADAM 05A	CLEO	$e^+e^- \to \psi(2S)$
0.571 ±0.018 ±0.044		[19] ANDREOTTI 05	E835	$\psi(2S) \to J/\psi X$
0.53 ±0.06		TANENBAUM 76	MRK1	e^+e^-
0.64 ±0.15		[20] HILGER 75	SPEC	e^+e^-

$\Gamma(J/\psi(1S)\eta)/\Gamma(J/\psi(1S)\,\text{anything})$ — Γ_{10}/Γ_6

NODE=M071R68
NODE=M071R68

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.054 ±0.003 OUR FIT				
0.0548±0.0012 OUR NEW AVERAGE [0.058 ± 0.007 OUR 2005 AVERAGE Scale factor = 1.4]				
0.0546±0.0010±0.0007	2.8k	ADAM 05A	CLEO	$e^+e^- \to \psi(2S)$
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	$\overline{p}p \to \psi(2S)$

OCCUR=2

$\Gamma(J/\psi(1S)\eta)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ — Γ_{10}/Γ_8

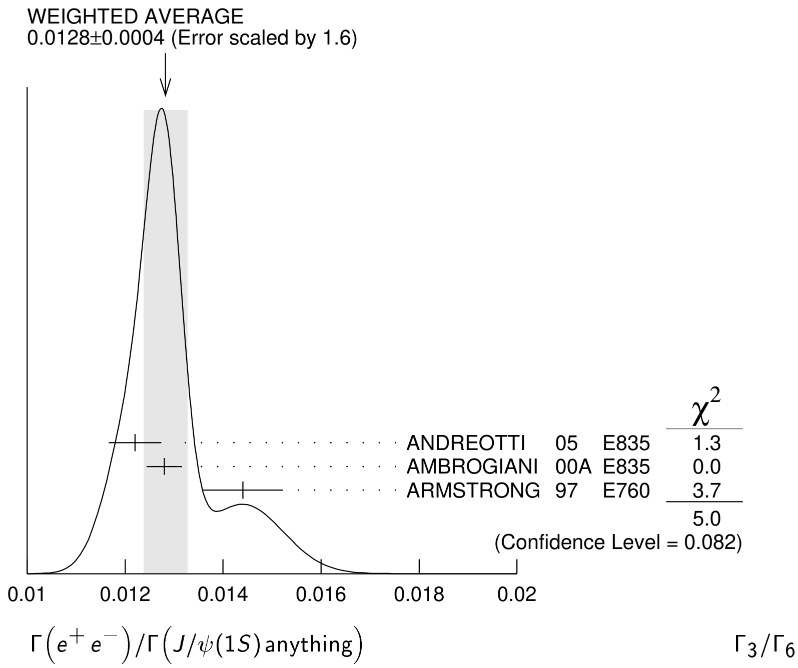
NODE=M071R71
NODE=M071R71

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.097 ±0.007 OUR FIT				
0.096 ±0.010 OUR AVERAGE				
0.098 ±0.005 ±0.010	2k	[18] ABLIKIM 04B	BES	$\psi(2S) \to J/\psi X$
0.091 ±0.021		[21] HIMEL 80	MRK2	$e^+e^- \to \psi(2S)X$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.0968±0.0019±0.0013	2.8k	[14] ADAM 05A	CLEO	$e^+e^- \to \psi(2S)$
0.095 ±0.007 ±0.007		[19] ANDREOTTI 05	E835	$\psi(2S) \to J/\psi X$

$\Gamma(e^+e^-)/\Gamma(J/\psi(1S)\,\text{anything})$ Γ_3/Γ_6

NODE=M071R72

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.0129±0.0007 OUR FIT				
0.0128±0.0004 OUR AVERAGE Error includes scale factor of 1.6. See the ideogram below.				
0.0122±0.0002±0.0005	5097 ± 73	[22] ANDREOTTI 05	E835	$p\overline{p} \to \psi(2S) \to e^+e^-$
0.0128±0.0003±0.0002		[22] AMBROGIANI 00A	E835	$p\overline{p} \to \psi(2S)$
0.0144±0.0008±0.0002		[22] ARMSTRONG 97	E760	$\overline{p}p \to \psi(2S)$



$\Gamma(e^+e^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ Γ_3/Γ_8

NODE=M071R73

VALUE	DOCUMENT ID	TECN	COMMENT
0.0234±0.0016 OUR FIT			
0.0252±0.0028±0.0011	[22] AUBERT 02B	BABR	e^+e^-

$\Gamma(\mu^+\mu^-)/\Gamma(J/\psi(1S)\,\text{anything})$ Γ_4/Γ_6

NODE=M071R74

VALUE	DOCUMENT ID	TECN	COMMENT
0.0127±0.0031 OUR FIT			
0.014 ±0.003	HILGER 75	SPEC	e^+e^-

$\Gamma(\mu^+\mu^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ Γ_4/Γ_8

NODE=M071R63

VALUE	DOCUMENT ID	TECN	COMMENT
0.0231±0.0030 OUR FIT			
0.0224±0.0029 OUR AVERAGE			
0.0216±0.0026±0.0014	[23] AUBERT 02B	BABR	e^+e^-
0.0327±0.0077±0.0072	[23] GRIBUSHIN 96	FMPS	$515\ \pi^-\text{Be} \to 2\mu X$

$\Gamma(\tau^+\tau^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ Γ_5/Γ_8

NODE=M071R76

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
8.7 ±2.2 OUR FIT			
8.73±1.39±1.57	BAI 02	BES	e^+e^-

[16] Recalculated by us using $B(J/\psi(1S) \to \ell^+\ell^-) = 0.1181 \pm 0.0020$. NODE=M071R;LINKAGE=3Q

[17] Recalculated by us using $B(J/\psi(1S) \to \mu^+\mu^-) = 0.0588 \pm 0.0010$. NODE=M071R;LINKAGE=2Q

[18] From a fit to the J/ψ recoil mass spectra. NODE=M071R;LINKAGE=AB

[19] Not independent from other values reported by ANDREOTTI 05. NODE=M071R;LINKAGE=AN

[20] Ignoring the $J/\psi(1S)\eta$ and $J/\psi(1S)\gamma\gamma$ decays. NODE=M071R;LINKAGE=I

[21] The value for $B(\psi(2S) \to J/\psi(1s)\eta)$ reported in HIMEL 80 is derived using $B(\psi(2S)) \to J/\psi(1S)\pi^+\pi^-) = (33\pm3))\%$ and $B(J/\psi(1S) \to \ell^+\ell^-) = 0.138\pm0.018$. Calculated by us using $B(J/\psi(1S) \to \ell^+\ell^-) = (0.1181 \pm 0.0020)$. NODE=M071R;LINKAGE=8H

[22] Using $B(J/\psi(1S) \to e^+e^-) = 0.0593 \pm 0.0010$. NODE=M071R;LINKAGE=7A

[23] Using $B(J/\psi(1S) \to \mu^+\mu^-) = 0.0588 \pm 0.0010$. NODE=M071R;LINKAGE=Q2

HADRONIC DECAYS

NODE=M071310

$\Gamma(3(\pi^+\pi^-)\pi^0)/\Gamma_{total}$ — Γ_{12}/Γ

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_{13}/Γ

NODE=M071R22

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
30±8	42	FRANKLIN	83	MRK2	e^+e^-

$\Gamma(\rho a_2(1320))/\Gamma_{total}$ — Γ_{14}/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^-

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

NODE=M071R77

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
4.8±0.6±0.7	100 ± 22	[26] BAI	03B	BES	$\psi(2S) \to 2(\pi^+\pi^-)\pi^0$

$\Gamma(b_1^{\pm}\pi^{\mp})/\Gamma_{total}$ — Γ_{16}/Γ

NODE=M071R40

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.6 ±0.6 OUR AVERAGE					
$4.18^{+0.43}_{-0.42}\pm0.92$	170	ADAM	05	CLEO	$e^+e^- \to \psi(2S)$
3.2 ±0.6 ±0.5	61 ± 11	[26,27] 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		[27] BAI	99C	BES	Repl. by BAI 03B

$\Gamma(b_1^0\pi^0)/\Gamma_{total}$ — Γ_{17}/Γ

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_{18}/Γ

NODE=M071R64

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
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		[26] BAI	03B	BES	$\psi(2S) \to 2(\pi^+\pi^-)\pi^0$
<1.7	90		BAI	98J	BES	Repl. by BAI 03B

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

NODE=M071R24

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
16±4	[28] TANENBAUM	78	MRK1	e^+e^-

$\Gamma(K^*(892)^0\overline{K}^*_2(1430)^0)/\Gamma_{total}$ — Γ_{20}/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^-

$\Gamma(K_1(1270)^{\pm}K^{\mp})/\Gamma_{total}$ — Γ_{21}/Γ

NODE=M071R41

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
10.0±1.8±2.1	[29] BAI	99C	BES	e^+e^-

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

NODE=M071R31

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
8 ±2	[28] TANENBAUM	78	MRK1	e^+e^-

$\Gamma(K^+\overline{K}^*(892)^0\pi^- + c.c.)/\Gamma_{total}$ — Γ_{23}/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_{24}/Γ

NODE=M071R27

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
4.5±1.0	TANENBAUM 78	MRK1	e^+e^-

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

NODE=M071R33

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
4.2±1.5	TANENBAUM 78	MRK1	e^+e^-

$\Gamma(\omega K^+K^-)/\Gamma_{total}$ — Γ_{26}/Γ

NODE=M071R78

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
1.5±0.3±0.2	23.0 ± 5.2	[26] BAI 03B	BES	$\psi(2S) \to K^+K^-\pi^+\pi^-\pi^0$

$\Gamma(\overline{p}p)/\Gamma_{total}$ — Γ_{27}/Γ

NODE=M071R25

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
2.07±0.31 OUR AVERAGE				
2.16±0.15±0.36	201	[30] BAI 01	BES	$e^+e^- \to \psi(2S)$
1.4 ±0.8	4	BRANDELIK 79C	DASP	e^+e^-
2.3 ±0.7		FELDMAN 77	MRK1	e^+e^-

$\Gamma(\Lambda\overline{\Lambda})/\Gamma_{total}$ — Γ_{28}/Γ

NODE=M071R28

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
1.81±0.20±0.27		80	[30] BAI 01	BES	$e^+e^- \to \psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<4	90		FELDMAN 77	MRK1	e^+e^-

$\Gamma(3(\pi^+\pi^-))/\Gamma_{total}$ — Γ_{29}/Γ

NODE=M071R32

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
3.5 ±2.0 OUR NEW AVERAGE Error includes scale factor of 2.8. [$(1.5 \pm 1.0) \times 10^{-4}$ OUR 2005 AVERAGE]				
5.45±0.42±0.87	645	ABLIKIM 05H	BES2	e^+e^-
1.5 ±1.0		[28] TANENBAUM 78	MRK1	e^+e^-

$\Gamma(\overline{p}p\pi^0)/\Gamma_{total}$ — Γ_{30}/Γ

NODE=M071R35

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
1.33±0.17 OUR NEW AVERAGE [$(1.4 \pm 0.5) \times 10^{-4}$ OUR 2005 AVERAGE]				
1.32±0.10±0.15	256 ± 18	[24] ABLIKIM 05E	BES2	e^+e^-
1.4 ±0.5	9	FRANKLIN 83	MRK2	e^+e^-

[24] Computed using $B(\pi^0 \to \gamma\gamma) = (98.80 \pm 0.03)\%$.

NODE=M071R35;LINKAGE=AB

$\Gamma(\omega p\overline{p})/\Gamma_{total}$ — Γ_{31}/Γ

NODE=M071R79

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
8.0±3.2 OUR NEW AVERAGE [$(0.80 \pm 0.32) \times 10^{-4}$ OUR 2005 AVERAGE]				
8 ±3 ±1	14.9 ± 0.1	[26] BAI 03B	BES	$\psi(2S) \to p\overline{p}\pi^+\pi^-\pi^0$

$\Gamma(\eta p\overline{p})/\Gamma_{total}$ — Γ_{32}/Γ

NODE=M071R56

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
0.58±0.11±0.07	44.8 ± 8.5	[25] ABLIKIM 05E	BES2	e^+e^-

[25] Computed using $B(\eta \to \gamma\gamma) = (39.43 \pm 0.26)\%$.

NODE=M071R56;LINKAGE=AB

$\Gamma(\Delta^{++}\overline{\Delta}^{--})/\Gamma_{total}$ — Γ_{33}/Γ

NODE=M071R50

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
12.8±1.0±3.4	157	[30] BAI 01	BES	$e^+e^- \to \psi(2S)$

$\Gamma(\Sigma^0\overline{\Sigma}^0)/\Gamma_{total}$ — Γ_{34}/Γ

NODE=M071R51

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
12±4±4	8	[30] BAI 01	BES	$e^+e^- \to \psi(2S)$

$\Gamma(\Sigma^{*+}\overline{\Sigma}^{*-})/\Gamma_{total}$ — Γ_{35}/Γ

NODE=M071R52

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
11±3±3	14	[30] BAI 01	BES	$e^+e^- \to \psi(2S)$

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

NODE=M071R23
NODE=M071R23

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
1.0±0.7		BRANDELIK	79C	DASP	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.5	90	FELDMAN	77	MRK1	e^+e^-

$\Gamma(K^0_S K^0_L)/\Gamma_{total}$ Γ_{37}/Γ

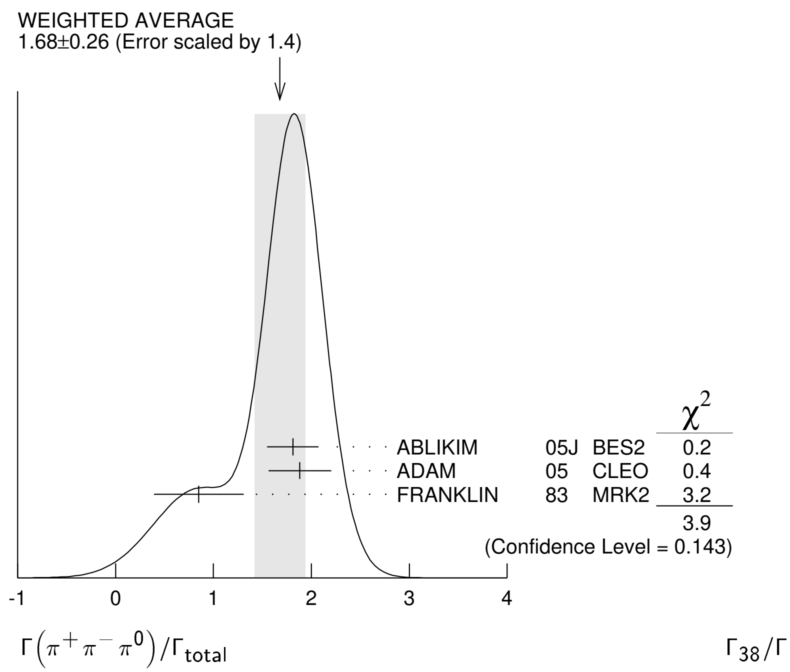
NODE=M071R87
NODE=M071R87

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
5.24±0.47±0.48	156 ± 14	[31] BAI	04B	BES2	$\psi(2S) \to K^0_S K^0_L \to \pi^+\pi^- X$

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{38}/Γ

NODE=M071R36
NODE=M071R36

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.68±0.26 OUR NEW AVERAGE Error includes scale factor of 1.4. See the ideogram below. [$(1.5 \pm 0.5) \times 10^{-4}$ OUR 2005 AVERAGE Scale factor = 1.8]					
1.81±0.18±0.19		[32] ABLIKIM	05J	BES2	$e^+e^- \to \psi(2S)$
$1.88^{+0.16}_{-0.15}\pm0.28$	194	ADAM	05	CLEO	$e^+e^- \to \psi(2S)$
0.85±0.46	4	FRANKLIN	83	MRK2	$e^+e^- \to$ hadrons



$\Gamma(\rho(2150)\pi \to \pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{39}/Γ

NODE=M071R57
NODE=M071R57

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
$1.94\pm0.25^{+1.15}_{-0.34}$	[32] ABLIKIM	05J	BES2	$\psi(2S) \to \rho(2150)\pi \to \pi^+\pi^-\pi^0$

$\Gamma(\rho(770)\pi \to \pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{40}/Γ

NODE=M071R26
NODE=M071R26

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.32±0.12 OUR NEW AVERAGE Error includes scale factor of 1.8. [$(0.24^{+0.08}_{-0.07}) \times 10^{-4}$ OUR 2005 AVERAGE]						
0.51±0.07±0.11			[32] ABLIKIM	05J	BES2	$\psi(2S) \to \rho(770)\pi \to \pi^+\pi^-\pi^0$
$0.24^{+0.08}_{-0.07}\pm0.02$		22	ADAM	05	CLEO	$e^+e^- \to \psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.83	90	1	FRANKLIN	83	MRK2	e^+e^-
<10	90		BARTEL	76	CNTR	e^+e^-
<10	90		[33] ABRAMS	75	MRK1	e^+e^-

$\Gamma(\pi^+\pi^-)/\Gamma_{total}$ Γ_{41}/Γ

NODE=M071R20
NODE=M071R20

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
0.8±0.5		BRANDELIK	79C	DASP	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.5	90	FELDMAN	77	MRK1	e^+e^-

$\Gamma(\Xi^-\overline{\Xi}^+)/\Gamma_{total}$ Γ_{42}/Γ

NODE=M071R29
NODE=M071R29

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
9.4±2.7±1.5		12	[30] BAI	01	BES	$e^+e^- \to \psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<20	90		FELDMAN	77	MRK1	e^+e^-

$\Gamma(K_1(1400)^\pm K^\mp)/\Gamma_{total}$ Γ_{43}/Γ

NODE=M071R45
NODE=M071R45

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<3.1	90	[34] BAI	99C	BES	e^+e^-

$\Gamma(\Xi^{*0}\overline{\Xi}^{*0})/\Gamma_{total}$ Γ_{44}/Γ

NODE=M071R53
NODE=M071R53

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<8.1	90	[30] BAI	01	BES	$e^+e^- \to \psi(2S)$

$\Gamma(\Omega^-\overline{\Omega}^+)/\Gamma_{total}$ Γ_{45}/Γ

NODE=M071R54
NODE=M071R54

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<7.3	90	[30] BAI	01	BES	$e^+e^- \to \psi(2S)$

$\Gamma(K^+K^-\pi^0)/\Gamma_{total}$ Γ_{46}/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_{47}/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^-
$1.3^{+1.0}_{-0.7}\pm0.3$		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_{48}/Γ

NODE=M071R30
NODE=M071R30

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
10.9±2.0 OUR NEW AVERAGE [$(9.2^{+2.8}_{-2.4})\times10^{-5}$ OUR 2005 AVERAGE]					
$13.3^{+2.4}_{-2.8}\pm1.7$	65.6 ± 9.0	ABLIKIM	05I	BES2	e^+e^-
$9.2^{+2.7}_{-2.2}\pm0.9$	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_{47}/Γ_{48}

NODE=M071R46
NODE=M071R46

VALUE	DOCUMENT ID		TECN	COMMENT
0.16±0.06 OUR NEW AVERAGE [$0.14^{+0.08}_{-0.06}$ OUR 2005 AVERAGE]				
$0.22^{+0.10}_{-0.14}$	ABLIKIM	05I	BES2	e^+e^-
$0.14^{+0.08}_{-0.06}$	ADAM	05	CLEO	$e^+e^- \to \psi(2S)$

$\Gamma(\phi\pi^+\pi^-)/\Gamma_{total}$ Γ_{49}/Γ

NODE=M071R80
NODE=M071R80

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.5 ±0.2 ±0.2	51.5 ± 8.3	[26] BAI	03B	BES	$\psi(2S) \to K^+K^-\pi^+\pi^-$

$\Gamma(\phi f_0(980) \to \pi^+\pi^-)/\Gamma_{total}$ Γ_{50}/Γ

NODE=M071R83
NODE=M071R83

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.6 ±0.2 ±0.1	18.4 ± 6.4	[26] BAI	03B	BES	$\psi(2S) \to K^+K^-\pi^+\pi^-$

$\Gamma(\phi K^+ K^-)/\Gamma_{total}$ — Γ_{51}/Γ

NODE=M071R81

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.6 ±0.2 ±0.1	16.1 ± 5.0	[26] BAI	03B	BES	$\psi(2S) \to 2(K^+ K^-)$

$\Gamma(\phi\eta)/\Gamma_{total}$ — Γ_{52}/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	$e^+e^- \to \psi(2S)$
$3.3\pm1.1\pm0.5$	17	ABLIKIM	04K	BES	$e^+e^- \to \psi(2S)$

$\Gamma(\phi\eta')/\Gamma_{total}$ — Γ_{53}/Γ

NODE=M071R90

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$3.1\pm1.4\pm0.7$	8	[35] ABLIKIM	04K	BES	$e^+e^- \to \psi(2S)$

$\Gamma(\omega\eta')/\Gamma_{total}$ — Γ_{54}/Γ

NODE=M071R91

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$3.2^{+2.4}_{-2.0}\pm0.7$	4	[35] ABLIKIM	04K	BES	$e^+e^- \to \psi(2S)$

$\Gamma(\omega\pi^0)/\Gamma_{total}$ — Γ_{55}/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_{56}/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_{57}/Γ

NODE=M071R94

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
2.2 ±0.6 OUR AVERAGE Error includes scale factor of 1.1.					
$3.0\ ^{+1.1}_{-0.9}\ \pm0.2$	18	ADAM	05	CLEO	$e^+e^- \to \psi(2S)$
$1.78^{+0.67}_{-0.62}\pm0.17$	13	ABLIKIM	04L	BES	$e^+e^- \to \psi(2S)$

$\Gamma(\omega\eta)/\Gamma_{total}$ — Γ_{58}/Γ

NODE=M071R95

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<1.1	90	ADAM	05	CLEO	$e^+e^- \to \psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<3.1	90	ABLIKIM	04K	BES	$e^+e^- \to \psi(2S)$

$\Gamma(\phi\pi^0)/\Gamma_{total}$ — Γ_{59}/Γ

NODE=M071R96

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<0.4	90	ABLIKIM	04K	BES	$e^+e^- \to \psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.7	90	ADAM	05	CLEO	$e^+e^- \to \psi(2S)$

$\Gamma(\phi p\overline{p})/\Gamma_{total}$ — Γ_{60}/Γ

NODE=M071R82

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.26	90	[26] BAI	03B	BES	$\psi(2S) \to K^+K^- p\overline{p}$

$\Gamma(\phi f_2'(1525))/\Gamma_{total}$ — Γ_{61}/Γ

NODE=M071R67

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$0.44\pm0.12\pm0.11$		20 ± 6	BAI	04C		$\psi(2S) \to 2(K^+K^-)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.45	90		BAI	98J	BES	$e^+e^- \to 2(K^+K^-)$

$\Gamma(\Theta(1540)\overline{\Theta}(1540) \rightarrow K^0_S p K^- \overline{n} + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{62}/Γ

NODE=M071S01

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<0.88	90	BAI	04G	BES2	$e^+ e^-$

$\Gamma(\Theta(1540) K^- \overline{n} \rightarrow K^0_S p K^- \overline{n})/\Gamma_{\text{total}}$ Γ_{63}/Γ

NODE=M071S02

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<1.0	90	BAI	04G	BES2	$e^+ e^-$

$\Gamma(\Theta(1540) K^0_S \overline{p} \rightarrow K^0_S \overline{p} K^+ n)/\Gamma_{\text{total}}$ Γ_{64}/Γ

NODE=M071S03

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<0.70	90	BAI	04G	BES2	$e^+ e^-$

$\Gamma(\overline{\Theta}(1540) K^+ n \rightarrow K^0_S \overline{p} K^+ n)/\Gamma_{\text{total}}$ Γ_{65}/Γ

NODE=M071S04

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<2.6	90	BAI	04G	BES2	$e^+ e^-$

$\Gamma(\overline{\Theta}(1540) K^0_S p \rightarrow K^0_S p K^- \overline{n})/\Gamma_{\text{total}}$ Γ_{66}/Γ

NODE=M071S05

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<0.60	90	BAI	04G	BES2	$e^+ e^-$

$\Gamma(K^0_S K^0_S)/\Gamma_{\text{total}}$ Γ_{67}/Γ

NODE=M071R88

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
<0.046	[36] BAI	04D	BES	$e^+ e^-$

[26] Normalized to $B(\psi(2S) \rightarrow J/\psi \pi^+ \pi^-) = 0.305 \pm 0.016$. NODE=M071R;LINKAGE=B3
[27] Assuming $B(b_1 \rightarrow \omega\pi)=1$. NODE=M071R;LINKAGE=M1
[28] Assuming entirely strong decay. NODE=M071R;LINKAGE=K
[29] Assuming $B(K_1(1270) \rightarrow K\rho)=0.42 \pm 0.06$ NODE=M071R;LINKAGE=M2
[30] Estimated using $B(\psi(2S) \rightarrow J/\psi \pi^+ \pi^-)= 0.310 \pm 0.028$. NODE=M071R;LINKAGE=PP
[31] Using $B(K^0_S \rightarrow \pi^+ \pi^-) = 0.6860 \pm 0.0027$. NODE=M071R;LINKAGE=KZ
[32] From a PW analysis of $\psi(2S) \rightarrow \pi^+ \pi^- \pi^0$. NODE=M071R;LINKAGE=AK
[33] Final state $\rho^0 \pi^0$. NODE=M071R;LINKAGE=N
[34] Assuming $B(K_1(1400) \rightarrow K^* \pi)=0.94 \pm 0.06$ NODE=M071R;LINKAGE=M3
[35] Calculated combining $\eta' \rightarrow \gamma\rho$ and $\eta\pi^+\pi^-$ channels. NODE=M071R;LINKAGE=AI
[36] Forbidden by *CP*. NODE=M071R;LINKAGE=BA

RADIATIVE DECAYS

NODE=M071315

$\Gamma(\gamma \chi_{c0}(1P))/\Gamma_{\text{total}}$ Γ_{68}/Γ

NODE=M071R55

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
9.0 ±0.4 OUR FIT					
9.2 ±0.4 OUR NEW AVERAGE [$(9.3 \pm 0.5) \times 10^{-2}$ OUR 2005 AVERAGE]					
9.22±0.11±0.46	72600	ATHAR	04	CLEO	$e^+ e^- \rightarrow \gamma X$
9.9 ±0.5 ±0.8		[37] GAISER	86	CBAL	$e^+ e^- \rightarrow \gamma X$
7.2 ±2.3		[37] BIDDICK	77	CNTR	$e^+ e^- \rightarrow \gamma X$
7.5 ±2.6		[37] WHITAKER	76	MRK1	$e^+ e^-$

$\Gamma(\gamma \chi_{c1}(1P))/\Gamma_{\text{total}}$ Γ_{69}/Γ

NODE=M071R58

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
8.7 ±0.5 OUR FIT					
8.9 ±0.5 OUR AVERAGE					
9.07±0.11±0.54	76700	ATHAR	04	CLEO	$e^+ e^- \rightarrow \gamma X$
9.0 ±0.5 ±0.7		[38] GAISER	86	CBAL	$e^+ e^- \rightarrow \gamma X$
7.1 ±1.9		[39] BIDDICK	77	CNTR	$e^+ e^- \rightarrow \gamma X$

$\Gamma(\gamma \chi_{c2}(1P))/\Gamma_{\text{total}}$ Γ_{70}/Γ

NODE=M071R59

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
8.2 ±0.3 OUR FIT					
8.8 ±0.5 OUR NEW AVERAGE Error includes scale factor of 1.1. [$(8.9 \pm 0.4) \times 10^{-2}$ OUR 2005 AVERAGE Scale factor = 1.1]					
9.33±0.14±0.61	79300	ATHAR	04	CLEO	$e^+ e^- \rightarrow \gamma X$
8.0 ±0.5 ±0.7		[40] GAISER	86	CBAL	$e^+ e^- \rightarrow \gamma X$
7.0 ±2.0		[39] BIDDICK	77	CNTR	$e^+ e^- \rightarrow \gamma X$

$[\Gamma(\gamma\chi_{c0}(1P)) + \Gamma(\gamma\chi_{c1}(1P)) + \Gamma(\gamma\chi_{c2}(1P))]/\Gamma_{total}$ $(\Gamma_{68}+\Gamma_{69}+\Gamma_{70})/\Gamma$

NODE=M071R19

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$27.6\pm0.3\pm2.0$	[41] ATHAR	04	CLEO	$e^+e^- \rightarrow \gamma X$

$\Gamma(\gamma\chi_{c0}(1P))/\Gamma(\gamma\chi_{c1}(1P))$ Γ_{68}/Γ_{69}

NODE=M071R97

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$1.02\pm0.01\pm0.07$	[41] ATHAR	04	CLEO	$e^+e^- \rightarrow \gamma X$

$\Gamma(\gamma\chi_{c2}(1P))/\Gamma(\gamma\chi_{c1}(1P))$ Γ_{70}/Γ_{69}

NODE=M071R98

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$1.03\pm0.02\pm0.03$	[41] ATHAR	04	CLEO	$e^+e^- \rightarrow \gamma X$

$\Gamma(\gamma\chi_{c0}(1P))/\Gamma(\gamma\chi_{c2}(1P))$ Γ_{68}/Γ_{70}

NODE=M071R99

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.99\pm0.02\pm0.08$	[41] ATHAR	04	CLEO	$e^+e^- \rightarrow \gamma X$

$\Gamma(\gamma\eta_c(1S))/\Gamma_{total}$ Γ_{71}/Γ

NODE=M071R60

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
0.27 ± 0.04 OUR AVERAGE					
0.25 ± 0.06	2560	[42] ATHAR	04	CLEO	$e^+e^- \rightarrow \gamma X$
0.28 ± 0.06		GAISER	86	CBAL	$e^+e^- \rightarrow \gamma X$

$\Gamma(\gamma\eta_c(2S))/\Gamma_{total}$ Γ_{72}/Γ

NODE=M071R62

VALUE (units 10^{-2})	CL%	DOCUMENT ID		TECN	COMMENT
<0.20	90	ATHAR	04	CLEO	$e^+e^- \rightarrow \gamma X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.2 to 1.3	95	EDWARDS	82C	CBAL	$e^+e^- \rightarrow \gamma X$

$\Gamma(\gamma\pi^0)/\Gamma_{total}$ Γ_{73}/Γ

NODE=M071R42

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 54	95	[43] LIBERMAN	75	SPEC	e^+e^-
<100	90	WIIK	75	DASP	e^+e^-

$\Gamma(\gamma\eta'(958))/\Gamma_{total}$ Γ_{74}/Γ

NODE=M071R44

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$1.54\pm0.31\pm0.20$		~ 43	BAI	98F	BES	$\psi(2S) \rightarrow \pi^+\pi^-2\gamma, \pi^+\pi^-3\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<60	90		[44] BRAUNSCH...	77	DASP	e^+e^-
<11	90		[45] BARTEL	76	CNTR	e^+e^-

$\Gamma(\gamma f_2(1270))/\Gamma_{total}$ Γ_{75}/Γ

NODE=M071R84

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
$2.12\pm0.19\pm0.32$		[46,47] BAI	03C	BES	$\psi(2S) \rightarrow \gamma\pi\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$2.08\pm0.19\pm0.33$	200.6 ± 18.8	[46] BAI	03C	BES	$\psi(2S) \rightarrow \gamma\pi^+\pi^-$
$2.90\pm1.08\pm1.07$	29.9 ± 11.1	[46] BAI	03C	BES	$\psi(2S) \rightarrow \gamma\pi^0\pi^0$

OCCUR=2
OCCUR=3

$\Gamma(\gamma f_0(1710) \rightarrow \gamma\pi\pi)/\Gamma_{total}$ Γ_{76}/Γ

NODE=M071R85

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
$0.301\pm0.041\pm0.124$	35.6 ± 4.8	[46] BAI	03C	BES	$\psi(2S) \rightarrow \gamma\pi^+\pi^-$

$\Gamma(\gamma f_0(1710) \rightarrow \gamma K\overline{K})/\Gamma_{total}$ Γ_{77}/Γ

NODE=M071R86

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$0.604\pm0.090\pm0.132$		39.6 ± 5.9	[46,48] 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	[46,48] BAI	03C	BES	$\psi(2S) \rightarrow \gamma K^0_S K^0_S$

OCCUR=2

$\Gamma(\gamma\eta)/\Gamma_{total}$ Γ_{79}/Γ

NODE=M071R43
NODE=M071R43

VALUE (units 10^{-4})	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<0.9	90	BAI	98F	BES	$\psi(2S) \to \pi^+\pi^- 3\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<2	90	YAMADA	77	DASP	$e^+e^- \to 3\gamma$

$\Gamma(\gamma\eta(1405) \to \gamma K\overline{K}\pi)/\Gamma_{total}$ Γ_{80}/Γ

NODE=M071R61
NODE=M071R61

VALUE (units 10^{-3})	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<0.12	90	[49] SCHARRE	80	MRK1	e^+e^-

[37] Angular distribution $(1+\cos^2\theta)$ assumed. NODE=M071R;LINKAGE=A
[38] Angular distribution $(1-0.189\ \cos^2\theta)$ assumed. NODE=M071R;LINKAGE=G
[39] Valid for isotropic distribution of the photon. NODE=M071R;LINKAGE=B
[40] Angular distribution $(1-0.052\ \cos^2\theta)$ assumed. NODE=M071R;LINKAGE=F
[41] Not independent from ATHAR 04 measurements of $B(\gamma\chi_{cJ})$. NODE=M071R;LINKAGE=AH
[42] Using $\Gamma_{\eta_c}(1S) = (11.5 \pm 4.5)$ MeV. NODE=M071R;LINKAGE=AT
[43] Restated by us using $B(\psi(2S) \to \mu^+\mu^-) = 0.0077$. NODE=M071R;LINKAGE=U
[44] Restated by us using total decay width 228 keV. NODE=M071R;LINKAGE=R
[45] The value is normalized to the branching ratio for $\Gamma(J/\psi(1S)\eta)/\Gamma_{total}$. NODE=M071R;LINKAGE=C
[46] Normalized to $B(\psi(2S) \to J/\psi\pi^+\pi^-) = 0.305 \pm 0.016$. NODE=M071R;LINKAGE=3B
[47] Combining the results from $\pi^+\pi^-$ and $\pi^0\pi^0$ decay modes. NODE=M071R;LINKAGE=B9
[48] 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
[49] Includes unknown branching fraction $\eta(1405) \to K\overline{K}\pi$. NODE=M071R;LINKAGE=E

$\psi(2S)$ CROSS-PARTICLE BRANCHING RATIOS

NODE=M071240

For measurements involving $B(\psi(2S) \to \gamma\chi_{cJ}(1P))\times B(\chi_{cJ}(1P) \to X)$ see the corresponding entries in the $\chi_{cJ}(1P)$ sections.

NODE=M071240

$\psi(2S)$ REFERENCES

NODE=M071

AUBERT	06B	PR D73 012005	B. Aubert *et al.*	(BABAR Collab.)	REFID=51026
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
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
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.*	(CLEO3 Collab.)	REFID=50331
BAI	04B	PRL 92 052001	J.Z. Bai *et al.*	(BES2 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.*	(BEPC BES Collab.)	REFID=49753
BAI	04I	PR D70 012006	J.Z. Bai *et al.*	(BES Collab.)	REFID=49755
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
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
ANTONIAZZI	94	PR D50 4258	L. Antoniazzi *et al.*	(E705 Collab.)	REFID=44074
ARMSTRONG	93B	PR D47 772	T.A. Armstrong *et al.*	(FNAL E760 Collab.)	REFID=43307
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	81	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

OTHER RELATED PAPERS

AMBROGIANI	05	PL B610 177	M. Ambrogiani *et al.*	(FNAL E853 Collab.)	REFID=50765
GUO	05	NP A761 269	F.-K. Guo *et al.*		REFID=50828
ABLIKIM	04I	PR D70 092004	M. Ablikim *et al.*	(BES Collab.)	REFID=50189
ABLIKIM	04J	PRL 93 112002	M. Ablikim *et al.*	(BES Collab.)	REFID=50196
LIU	04B	PR D70 094001	K.-Y. Liu, K.-.T. Chao		REFID=50340
WANG	04C	PR D70 077505	P. Wang, X.H. Mo, C.Z. Yuan		REFID=50186
BAI	00E	PR D62 032002	J. Bai *et al.*	(BES Collab.)	REFID=47955
CHEN	98	PRL 80 5060	Y.Q. Chen, E. Braaten		REFID=46358
SUZUKI	98	PR D57 5717	M. Suzuki		REFID=46383
BARATE	83	PL 121B 449	R. Barate *et al.*	(SACL, LOIC, SHMP, IND)	REFID=12177
AUBERT	75B	PRL 33 1624	J.J. Aubert *et al.*	(MIT, BNL)	REFID=22178
BRAUNSCH...	75B	PL 57B 407	W. Braunschweig *et al.*	(DASP Collab.)	REFID=22182
CAMERINI	75	PRL 35 483	U. Camerini *et al.*	(WISC, SLAC)	REFID=22033
FELDMAN	75B	PRL 35 821	G.J. Feldman *et al.*	(LBL, SLAC)	REFID=22104
GRECO	75	PL 56B 367	M. Greco, G. Pancheri-Srivastava, Y. Srivastava		REFID=22041
JACKSON	75	NIM 128 13	J.D. Jackson, D.L. Scharre	(LBL)	REFID=22043
SIMPSON	75	PRL 35 699	J.W. Simpson *et al.*	(STAN, PENN)	REFID=22049
ABRAMS	74	PRL 33 1453	G.S. Abrams *et al.*	(LBL, SLAC)	REFID=22014

NODE=M053

$\psi(3770)$

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

$\psi(3770)$ MASS

NODE=M053205

NODE=M053M

→ NOT CHECKED ←

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
3770.0±2.4 OUR EVALUATION Error includes scale factor of 1.8. From $m_{\psi(2S)}$ and mass difference below.					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3778.4±3.0±1.3	34	[1] CHISTOV	04	BELL	$B^+ \to \psi(3770) K^+$
3766.1±2.0		[1] SCHINDLER	80	MRK2	$e^+ e^-$
3772.1±2.0		[1] BACINO	78	DLCO	$e^+ e^-$
3774.1±3.0		[1] RAPIDIS	77	MRK1	$e^+ e^-$

[1] Recalculated by us from $m_{\psi(2S)}$= 3686.093 ± 0.034 MeV and mass difference below.

NODE=M053M;LINKAGE=E

$m_{\psi(3770)} - m_{\psi(2S)}$

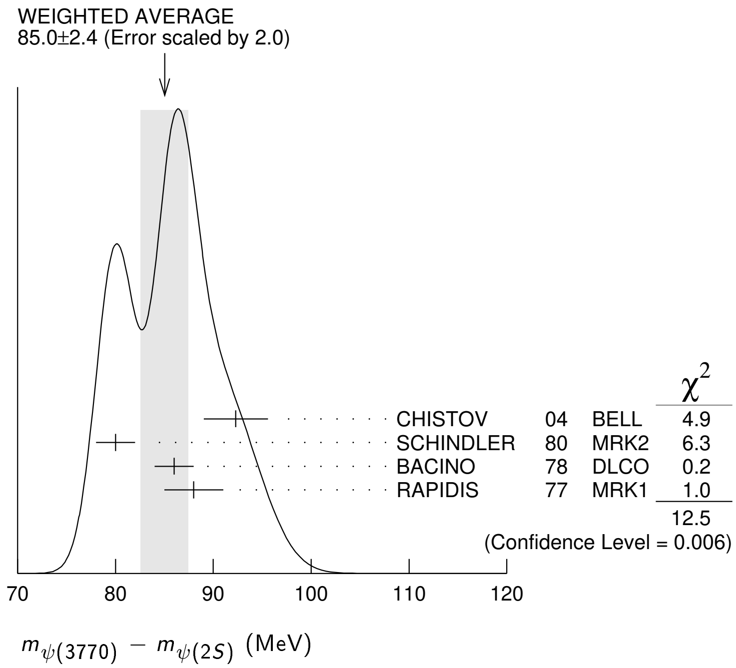
NODE=M053210

NODE=M053DM

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
85.0±2.4 OUR AVERAGE Error includes scale factor of 2.0. See the ideogram below.					
92.3±3.0±1.3	34	CHISTOV	04	BELL	$B^+ \to \psi(3770) K^+$
80 ±2		SCHINDLER	80	MRK2	$e^+ e^-$
86 ±2		[2] BACINO	78	DLCO	$e^+ e^-$
88 ±3		RAPIDIS	77	MRK1	$e^+ e^-$

[2] SPEAR $\psi(2S)$ mass subtracted (see SCHINDLER 80).

NODE=M053DM;LINKAGE=S



$\psi(3770)$ WIDTH

NODE=M053215

NODE=M053W

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
23.6±2.7 OUR FIT Error includes scale factor of 1.1.				
25.3±2.9 OUR AVERAGE				
24 ±5	SCHINDLER	80	MRK2	e^+e^-
24 ±5	BACINO	78	DLCO	e^+e^-
28 ±5	RAPIDIS	77	MRK1	e^+e^-

$\psi(3770)$ DECAY MODES

NODE=M053220;NODE=M053

	Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	
Γ_1	$D\overline{D}$	dominant		DESIG=2
Γ_2	$D^0\overline{D}^0$	seen		DESIG=5;OUR EVAL;→ NOT CHECKED ←
Γ_3	D^+D^-	seen		DESIG=6;OUR EVAL;→ NOT CHECKED ←
Γ_4	e^+e^-	$(1.12\pm0.17)\times10^{-5}$	S=1.2	DESIG=1
Γ_5	$K^0_S K^0_L$	$< 2.1 \times 10^{-4}$	CL=90%	DESIG=3
Γ_6	$J/\psi\pi^+\pi^-$	$(3.4\pm1.7)\times10^{-3}$		DESIG=4

$\psi(3770)$ PARTIAL WIDTHS

NODE=M053225

$\Gamma(e^+e^-)$ Γ_4

NODE=M053W1
NODE=M053W1

VALUE (keV)	*DOCUMENT ID*		*TECN*	*COMMENT*
0.26 ±0.04 OUR FIT Error includes scale factor of 1.2.				
0.24 ±0.05 OUR AVERAGE Error includes scale factor of 1.2.				
0.276±0.050	SCHINDLER	80	MRK2	e^+e^-
0.18 ±0.06	BACINO	78	DLCO	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.37 ±0.09	[3] RAPIDIS	77	MRK1	e^+e^-

[3] See also $\Gamma(e^+e^-)/\Gamma_{total}$ below.

NODE=M053W1;LINKAGE=R

$\psi(3770)$ BRANCHING RATIOS

NODE=M053230

$\Gamma(D\overline{D})/\Gamma_{total}$ Γ_1/Γ

NODE=M053R1
NODE=M053R1

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
dominant	PERUZZI	77	MRK1	$e^+e^- \to D\overline{D}$

$\Gamma(D^0\overline{D}^0)/\Gamma(D^+D^-)$ Γ_2/Γ_3

NODE=M053R5
NODE=M053R5

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
2.43±1.50±0.43	34	[4] CHISTOV	04	BELL	$B^+ \to \psi(3770)K^+$

[4] See ADLER 88C for older measurements of this quantity.

NODE=M053R5;LINKAGE=CH

$\Gamma(e^+e^-)/\Gamma_{total}$ Γ_4/Γ

NODE=M053R2
NODE=M053R2

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
1.12±0.17 OUR FIT Error includes scale factor of 1.2.				
1.3 ±0.2	RAPIDIS	77	MRK1	e^+e^-

$\Gamma(K^0_S K^0_L)/\Gamma_{total}$ Γ_5/Γ

NODE=M053R3
NODE=M053R3

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<2.1	90	[5] ABLIKIM	04F	BES	e^+e^-

[5] Using B($K^0_S \to \pi^+\pi^-$) = 0.6860 ± 0.0027.

NODE=M053R3;LINKAGE=AB

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

NODE=M053R4
NODE=M053R4

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
0.34±0.14±0.09	17.8 ± 4.8	BAI	05	BES2	$e^+e^- \to J/\psi\pi^+\pi^-$

$\psi(3770)$ REFERENCES

NODE=M053

BAI	05	PL B605 63	J.Z. Bai *et al.*	(BES Collab.)	REFID=50332
ABLIKIM	04F	PR D70 077101	M. Ablikim *et al.*	(BES Collab.)	REFID=50185
CHISTOV	04	PRL 93 051803	R. Chistov *et al.*	(BELLE Collab.)	REFID=50002
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
PERUZZI	77	PRL 39 1301	I. Peruzzi *et al.*	(Mark I Collab.)	REFID=11435
RAPIDIS	77	PRL 39 526	P.A. Rapidis *et al.*	(Mark I Collab.)	REFID=22220

OTHER RELATED PAPERS

ABLIKIM	05K	NP B727 395	M. Ablikim *et al.*	(BEPC BES Collab.)	REFID=50829
ABLIKIM	04D	PL B603 130	M. Ablikim *et al.*	(BES Collab.)	REFID=50173
LIU	04B	PR D70 094001	K.-Y. Liu, K.-T. Chao		REFID=50340
WANG	04C	PR D70 077505	P. Wang, X.H. Mo, C.Z. Yuan		REFID=50186
WANG	04D	PR D70 114014	P. Wang, C.Z. Yuan, X.H. Mo		REFID=50351

NODE=M159

$\psi(3836)$

$I^G(J^{PC}) = 0^-(2^{--})$

OMITTED FROM SUMMARY TABLE

Quantum numbers are not established.

NODE=M159

Seen in $\pi^\pm$Li interactions by ANTONIAZZI 94 as a peak in the invariant mass of the $J/\psi(1S)\pi^+\pi^-$ system. Possibly seen also in pLi interactions. Interpretation as a $^3D_2$ (2^{--}) charmonium state favored. Not seen by BAI 98E in e^+e^- interactions. Needs confirmation.

$\psi(3836)$ MASS

NODE=M159205

NODE=M159M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
3836±13	58 ± 21	ANTONIAZZI	94	E705	$\pi^\pm\text{Li} \to J/\psi\pi^+\pi^- X$

$\psi(3836)$ DECAY MODES

NODE=M159215;NODE=M159

	Mode	Fraction (Γ_i/Γ)
Γ_1	$J/\psi(1S)\pi^+\pi^-$	seen

DESIG=1;OUR EST;→ NOT CHECKED ←

$\psi(3836)$ REFERENCES

NODE=M159

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=M176

$X(3872)$

$I^G(J^P) = ?^?(?^?)$

OMITTED FROM SUMMARY TABLE

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.

Quantum numbers are not established.

$X(3872)$ MASS

NODE=M176205

NODE=M176M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
3871.7±0.6 OUR AVERAGE					
3871.3±0.7±0.4	730	[1] ACOSTA	04	CDF2	$p\overline{p} \to J/\psi\pi^+\pi^- X$
3872.0±0.6±0.5	36	CHOI	03	BELL	$B \to K\pi^+\pi^- J/\psi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3871.8±3.1±3.0	522	[1,2] ABAZOV	04F	D0	$p\overline{p} \to J/\psi\pi^+\pi^- X$

[1] Width consistent with detector resolution.

NODE=M176M;LINKAGE=AC

[2] Calculated from the corresponding $m_{X(3872)} - m_{J/\psi}$ using $m_{J/\psi}$=3096.916 MeV.

NODE=M176M;LINKAGE=AB

$m_{X(3872)^\pm} - m_{J/\psi}$

NODE=M176207

NODE=M176DM

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
774.9±3.1±3.0	522	ABAZOV	04F	D0	$p\overline{p} \to J/\psi\pi^+\pi^- X$

$X(3872)$ WIDTH

NODE=M176210

NODE=M176W

VALUE (MeV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<2.3	90	36	CHOI	03	BELL	$B \to K\pi^+\pi^- J/\psi$

$X(3872)$ DECAY MODES

NODE=M176215;NODE=M176

	Mode	Fraction (Γ_i/Γ)	
Γ_1	e^+e^-		DESIG=1
Γ_2	$\pi^+\pi^- J/\psi(1S)$	seen	DESIG=2;OUR EVAL;→ NOT CHECKED ←
Γ_3	$\gamma\gamma$		DESIG=5
Γ_4	$D^0\overline{D}^0$	not seen	DESIG=6;OUR EVAL;→ NOT CHECKED ←
Γ_5	D^+D^-	not seen	DESIG=7;OUR EVAL;→ NOT CHECKED ←
Γ_6	$D^0\overline{D}^0\pi^0$	not seen	DESIG=8;OUR EVAL;→ NOT CHECKED ←
Γ_7	$\gamma\chi_{c1}$		DESIG=3
Γ_8	$\eta J/\psi$		DESIG=4

$X(3872)$ 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	[3] YUAN	04	RVUE	$e^+e^- \to \pi^+\pi^- J/\psi$

[3] 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

NODE=M176230

$X(3872)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma(\text{total})$

NODE=M176G1

$\Gamma(e^+e^-) \times \Gamma(\pi^+\pi^- J/\psi(1S))/\Gamma_{total}$ — $\Gamma_1\Gamma_2/\Gamma$

NODE=M176G1

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 8.3	90	[4] DOBBS	05	CLE3	$e^+e^- \to \pi^+\pi^- J/\psi$
<10	90	[5] YUAN	04	RVUE	$e^+e^- \to \pi^+\pi^- J/\psi$

[4] Assuming $X(3872)$ has $J^{PC} = 1^{--}$. NODE=M176G1;LINKAGE=DO

[5] Using BAI 98E data on $e^+e^- \to \pi^+\pi^-\ell^+\ell^-$. From theoretical calculation of the production cross section and using B($J/\psi \to \mu^+\mu^-$) = (5.88 ± 0.10)%. NODE=M176G1;LINKAGE=A

NODE=M176232

$X(3872)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M176H1

$\Gamma(\gamma\gamma) \times \Gamma(\pi^+\pi^- J/\psi(1S))/\Gamma_{total}$ — $\Gamma_3\Gamma_2/\Gamma$

NODE=M176H1

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<12.9	90	[6] DOBBS	05	CLE3	$e^+e^- \to \pi^+\pi^- J/\psi\gamma$

[6] Assuming $X(3872)$ has positive C parity and spin 0. NODE=M176H1;LINKAGE=DO

NODE=M176235

$X(3872)$ BRANCHING RATIOS

NODE=M176R1

$\Gamma(\gamma\chi_{c1})/\Gamma(\pi^+\pi^- J/\psi(1S))$ — Γ_7/Γ_2

NODE=M176R1

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.89	90	CHOI	03	BELL	$B \to K\pi^+\pi^- J/\psi$

NODE=M176R2

$\Gamma(\eta J/\psi)/\Gamma(\pi^+\pi^- J/\psi(1S))$ — Γ_8/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	$B \to K\eta J/\psi$

NODE=M176R3

$\Gamma(D^0\overline{D}^0)/\Gamma(\pi^+\pi^- J/\psi(1S))$ — Γ_4/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	$B \to KD^0\overline{D}^0$

NODE=M176R4

$\Gamma(D^+D^-)/\Gamma(\pi^+\pi^- J/\psi(1S))$ — Γ_5/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	$B \to KD^+D^-$

NODE=M176R5

$\Gamma(D^0\overline{D}^0\pi^0)/\Gamma(\pi^+\pi^- J/\psi(1S))$ — Γ_6/Γ_2

NODE=M176R5

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	CHISTOV	04	BELL	$B \to KD^0\overline{D}^0\pi$

NODE=M176

$X(3872)$ REFERENCES

AUBERT	05B	PR D71 031501R	B. Aubert *et al.*	(BABAR Collab.)	REFID=50498
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
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

OTHER RELATED PAPERS

EICHTEN	06	PR D73 014014	E.J. Eichten, K. Lane, C. Quigg	REFID=51027
BUGG	05	PR D71 016006	D. Bugg	REFID=50457
KIM	05	PR D71 034025	T. Kim, P. Ko	REFID=50499
LI	05	PL B605 306	B.A. Li	REFID=50339
MAIANI	05	PR D71 014028	L. Maiani *et al.*	REFID=50460
SETH	05	PL B612 1	K.K. Seth	REFID=50814
BARNES	04	PR D69 054008	T. Barnes, S. Godfrey	REFID=49756
BRAATEN	04	PR D69 074005	E. Braaten *et al.*	REFID=49760
BRAATEN	04A	PR D69 114012	E. Braaten, M. Kusunoki	REFID=49761
BRAATEN	04B	PRL 93 162001	E. Braaten, M. Kusunoki, S. Nussinov	REFID=50199
BUGG	04B	PL B598 8	D.V. Bugg	REFID=50169
CLOSE	04	PL B578 119	F.E. Close, P.R. Page	REFID=49673
EICHTEN	04	PR D69 094019	E. Eichten, K. Lane, C. Quigg	REFID=49767
PAKVASA	04	PL B579 67	S. Pakvasa, M. Suzuki	REFID=49674
ROSNER	04	PR D70 094023	J.L. Rosner	REFID=50495
SWANSON	04A	PL B588 189	E. Swanson	REFID=49781
SWANSON	04B	PL B598 197	E. Swanson	REFID=50168
TORNQVIST	04	PL B590 209	N. Tornqvist	REFID=49782
VOLOSHIN	04	PL B579 316	M.B. Voloshin	REFID=49676
VOLOSHIN	04A	PL B604 69	M.B. Voloshin	REFID=50205
WONG	04	PR C69 055202	C. Wong	REFID=50177

NODE=M050

$\chi_{c2}(2P)$

$I^G(J^{PC}) = 0^+(2^{++})$

OMITTED FROM SUMMARY TABLE

$\chi_{c2}(2P)$ MASS

NODE=M050205

NODE=M050M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
3929±5±2	64	UEHARA	06	BELL	10.6 $e^+e^- \to e^+e^- D\overline{D}$

$\chi_{c2}(2P)$ WIDTH

NODE=M050210

NODE=M050W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
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	$D\overline{D}$	DESIG=2
Γ_3	D^+D^-	DESIG=3
Γ_4	$D^0\overline{D}^0$	DESIG=4

$\chi_{c2}(2P)$ PARTIAL WIDTHS

NODE=M050220

$\chi_{c2}(2P)$ $\Gamma(\gamma\gamma)\Gamma(i)/\Gamma(\text{total})$

NODE=M050222

$\Gamma(\gamma\gamma) \times \Gamma(D\overline{D})/\Gamma_{\text{total}}$ $\Gamma_1\Gamma_2/\Gamma$

NODE=M050G1
NODE=M050G1

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
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_3/Γ_4

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

UEHARA 06 PRL 96 082003 S. Uehara *et al.* (BELLE Collab.) REFID=51039

OTHER RELATED PAPERS

EICHTEN 06 PR D73 014014 E.J. Eichten, K. Lane, C. Quigg REFID=51027

NODE=M072

$\psi(4040)$

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

$\psi(4040)$ MASS

NODE=M072205

NODE=M072M

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
4040±10	BRANDELIK	78C	DASP	e^+e^-

$\psi(4040)$ WIDTH

NODE=M072210

NODE=M072W

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
52±10	BRANDELIK	78C	DASP	e^+e^-

$\psi(4040)$ DECAY MODES

NODE=M072215;NODE=M072

	Mode	Fraction (Γ_i/Γ)	
Γ_1	e^+e^-	$(1.4\pm0.4)\times10^{-5}$	DESIG=5
Γ_2	$D^0\overline{D}^0$	seen	DESIG=1;OUR EST;→ NOT CHECKED ←
Γ_3	$D^*(2007)^0\overline{D}^0$ + c.c.	seen	DESIG=2;OUR EST;→ NOT CHECKED ←
Γ_4	$D^*(2007)^0\overline{D}^*(2007)^0$	seen	DESIG=3;OUR EST;→ NOT CHECKED ←
Γ_5	$J/\psi(1S)$ hadrons		DESIG=4
Γ_6	$\mu^+\mu^-$		DESIG=6

$\psi(4040)$ PARTIAL WIDTHS

NODE=M072220

$\Gamma(e^+e^-)$ — Γ_1

NODE=M072W5
NODE=M072W5

VALUE (keV)	*DOCUMENT ID*		*TECN*	*COMMENT*
0.75±0.15	BRANDELIK	78C	DASP	e^+e^-

$\psi(4040)$ BRANCHING RATIOS

NODE=M072225

$\Gamma(e^+e^-)/\Gamma_{total}$ — 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^-

$\Gamma(D^0\overline{D}^0)/\Gamma(D^*(2007)^0\overline{D}^0 + \text{c.c.})$ — Γ_2/Γ_3

NODE=M072R1
NODE=M072R1

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
0.05 ±0.03	[1] GOLDHABER	77	MRK1	e^+e^-

$\Gamma(D^*(2007)^0\overline{D}^*(2007)^0)/\Gamma(D^*(2007)^0\overline{D}^0 + \text{c.c.})$ — Γ_4/Γ_3

NODE=M072R2
NODE=M072R2

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
32.0±12.0	[1] GOLDHABER	77	MRK1	e^+e^-

[1] Phase-space factor (p^3) explicitly removed.

NODE=M072R;LINKAGE=P

$\psi(4040)$ REFERENCES

NODE=M072

BRANDELIK	78C	PL 76B 361	R. Brandelik *et al.*	(DASP Collab.)	REFID=22232
Also	79C	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

OTHER RELATED PAPERS

HEIKKILA	84	PR D29 110	K. Heikkila, N.A. Tornqvist, S. Ono	(HELS, AACHT)	REFID=22237
ONO	84	ZPHY C26 307	S. Ono	(ORSAY)	REFID=22238
SIEGRIST	82	PR D26 969	J.L. Siegrist *et al.*	(SLAC, LBL)	REFID=22236
AUGUSTIN	75	PRL 34 764	J.E. Augustin *et al.*	(SLAC, LBL)	REFID=22223
BACCI	75	PL 58B 481	C. Bacci *et al.*	(ROMA, FRAS)	REFID=22224
BOYARSKI	75B	PRL 34 762	A.M. Boyarski *et al.*	(SLAC, LBL)	REFID=22225
ESPOSITO	75	PL 58B 478	B. Esposito *et al.*	(FRAS, NAPL, PADO+)	REFID=22226

NODE=M025

$\psi(4160)$

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

ψ(4160) MASS

NODE=M025205

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
4159±20	BRANDELIK	78C	DASP	e^+e^-

NODE=M025M

ψ(4160) WIDTH

NODE=M025210

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
78±20	BRANDELIK	78C	DASP	e^+e^-

NODE=M025W

ψ(4160) DECAY MODES

NODE=M025215;NODE=M025

	Mode	Fraction (Γ_i/Γ)
Γ_1	e^+e^-	$(10\pm4)\times10^{-6}$

DESIG=1

ψ(4160) PARTIAL WIDTHS

NODE=M025220

$\Gamma(e^+e^-)$ **Γ_1**

NODE=M025W1
NODE=M025W1

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
0.77±0.23	BRANDELIK	78C	DASP	e^+e^-

ψ(4160) REFERENCES

NODE=M025

BRANDELIK 78C PL 76B 361 R. Brandelik *et al.* (DASP Collab.) REFID=22232

OTHER RELATED PAPERS

IDDIR 98 PL B433 125 F. Iddir *et al.* REFID=46368
ONO 84 ZPHY C26 307 S. Ono (ORSAY) REFID=22238
BURMESTER 77 PL 66B 395 J. Burmester *et al.* (DESY, HAMB, SIEG+) REFID=22198

NODE=M074

$Y(4260)$

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

OMITTED FROM SUMMARY TABLE

Seen by AUBERT,B 05I in radiative return from e^+e^- collisions at the 10.6 GeV center-of-mass energy. Interpretation as due to two interfering resonances is not excluded.

NODE=M074

Y(4260) MASS

NODE=M074205

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$4259\pm 8^{+2}_{-6}$	125	[1] AUBERT,B	05I	BABR	$10.58\ e^+e^-\to\gamma\pi^+\pi^-J/\psi$

NODE=M074M

[1] From a single-resonance fit. Two interfering resonances, one with close mass and a width of 50 MeV and another narrow at 4330 MeV, are not excluded.

NODE=M074M;LINKAGE=AU

Y(4260) WIDTH

NODE=M074210

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$88\pm23^{+6}_{-4}$	125	[2] AUBERT,B	05I	BABR	$10.58\ e^+e^-\to\gamma\pi^+\pi^-J/\psi$

NODE=M074W

[2] From a single-resonance fit. Two interfering resonances, one with close mass and a width of 50 MeV and another narrow at 4330 MeV, are not excluded.

NODE=M074W;LINKAGE=AU

$Y(4260)$ DECAY MODES

NODE=M074215;NODE=M074

	Mode	Fraction (Γ_i/Γ)	
Γ_1	e^+e^-		DESIG=1
Γ_2	$\pi^+\pi^- J/\psi$	seen	DESIG=2;OUR EVAL;→ NOT CHECKED ←
Γ_3	$p\overline{p}$		DESIG=3

$Y(4260)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma(\text{total})$

NODE=M074230

$\Gamma(\pi^+\pi^- J/\psi) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_2\Gamma_1/\Gamma$

NODE=M074G1
NODE=M074G1

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{5.5\pm1.0^{+0.8}_{-0.7}}$	125	[3] AUBERT,B	05I	BABR	10.58 $e^+e^- \rightarrow \gamma\pi^+\pi^- J/\psi$

[3] From a single-resonance fit. Two interfering resonances, one with close mass and a width of 50 MeV and another narrow at 4330 MeV, are not excluded.

NODE=M074G1;LINKAGE=AU

$Y(4260)$ BRANCHING RATIOS

NODE=M074240

$\Gamma(p\overline{p})/\Gamma(\pi^+\pi^- J/\psi)$ Γ_3/Γ_2

NODE=M074R1
NODE=M074R1

VALUE	CL%	DOCUMENT ID		COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.13	90	[4] AUBERT	06B	$e^+e^- \rightarrow p\overline{p}\gamma$

[4] Using 4259 ± 10 MeV for the mass and 88 ± 24 MeV for the width of $Y(4260)$.

NODE=M074R1;LINKAGE=AU

$Y(4260)$ REFERENCES

NODE=M074

AUBERT	06B	PR D73 012005	B. Aubert *et al.*	(BABAR Collab.)	REFID=51026
AUBERT,B	05I	PRL 95 142001	B. Aubert *et al.*	(BABAR Collab.)	REFID=50776

OTHER RELATED PAPERS

CLOSE	05A	PL B628 215	F.E. Close, P.R. Page	REFID=50830
KOU	05	PL B631 164	E. Kou	REFID=50967
LIU	05	PR D72 054023	X. Liu, X.Q. Zeng, X.Q. Li	REFID=50805
LLANES-EST...	05	PR D72 031503	F. Llanes-Estrada	REFID=50796
MAIANI	05A	PR D72 031502R	L. Maiani *et al.*	REFID=50806
ZHU	05	PL B625 212	S.-L. Zhu	REFID=50822

NODE=M073

$\psi(4415)$

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

$\psi(4415)$ MASS

NODE=M073205

NODE=M073M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
4415± 6 OUR AVERAGE				
4417±10	BRANDELIK	78C	DASP	e^+e^-
4414± 7	SIEGRIST	76	MRK1	e^+e^-

$\psi(4415)$ WIDTH

NODE=M073210

NODE=M073W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
43±15 OUR AVERAGE Error includes scale factor of 1.8.				
66±15	BRANDELIK	78C	DASP	e^+e^-
33±10	SIEGRIST	76	MRK1	e^+e^-

$\psi(4415)$ DECAY MODES

NODE=M073215;NODE=M073

	Mode	Fraction (Γ_i/Γ)	
Γ_1	hadrons	dominant	DESIG=2
Γ_2	e^+e^-	$(1.1\pm0.4)\times10^{-5}$	DESIG=1

$\psi(4415)$ PARTIAL WIDTHS

NODE=M073220

$\Gamma(e^+e^-)$ Γ_2

NODE=M073W1

NODE=M073W1

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
0.47±0.10 OUR AVERAGE				
0.49±0.13	BRANDELIK	78C	DASP	e^+e^-
0.44±0.14	SIEGRIST	76	MRK1	e^+e^-

$\psi(4415)$ BRANCHING RATIOS

NODE=M073225

$\Gamma(\text{hadrons})/\Gamma_{\text{total}}$ Γ_1/Γ

NODE=M073R2

NODE=M073R2

VALUE	DOCUMENT ID		TECN	COMMENT
dominant	SIEGRIST	76	MRK1	e^+e^-

$\psi(4415)$ REFERENCES

NODE=M073

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

OTHER RELATED PAPERS

BURMESTER 77 PL 66B 395 J. Burmester *et al.* (DESY, HAMB, SIEG+) REFID=22198

LUTH 77 PL 70B 120 V. Luth *et al.* (LBL, SLAC) REFID=22231

$b\overline{b}$ 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. One event is observed with the expected background of one. Needs confirmation.

NODE=M171

$\eta_b(1S)$ MASS

NODE=M171205

NODE=M171M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
9300±20±20	HEISTER	02D	ALEP	181–209 e^+e^-

$\eta_b(1S)$ DECAY MODES

NODE=M171225;NODE=M171

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$3h^+3h^-$	seen	DESIG=1;OUR EST;→ NOT CHECKED ←
Γ_2	$2h^+2h^-$	not seen	DESIG=2;OUR EST;→ NOT CHECKED ←
Γ_3	$\gamma\gamma$	seen	DESIG=3;OUR EST;→ NOT CHECKED ←

$\eta_b(1S)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M171230

$\Gamma(3h^+3h^-) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_1\Gamma_3/\Gamma$

NODE=M171G1

NODE=M171G1

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<132	95	HEISTER	02D	ALEP	181–209 e^+e^-

$\Gamma(2h^+2h^-) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_2\Gamma_3/\Gamma$

NODE=M171G2
NODE=M171G2

VALUE (eV)	CL%	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<48	95	HEISTER 02D	ALEP	181–209 e^+e^-

$\eta_b(1S)$ REFERENCES

NODE=M171

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=M049205

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).
[2] Superseding BARU 86.
[3] Superseded by ARTAMONOV 00.
[4] Value includes data of ARTAMONOV 82.

NODE=M049M;LINKAGE=AR
NODE=M049M;LINKAGE=A
NODE=M049M;LINKAGE=RZ
NODE=M049M;LINKAGE=G

$\Upsilon(1S)$ WIDTH

NODE=M049210

NODE=M049W
→ NOT CHECKED ←

VALUE (keV)	DOCUMENT ID
53.0±1.5 OUR EVALUATION	See the Note on Width Determinations of the Υ states

$\Upsilon(1S)$ DECAY MODES

NODE=M049215;NODE=M049

	Mode	Fraction (Γ_i/Γ)	Confidence level	
Γ_1	$\tau^+\tau^-$	$(2.67^{+0.14}_{-0.16})$ %		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	$\eta'(958)$ anything	(2.8 ± 0.4) %		DESIG=73
Γ_5	$J/\psi(1S)$ anything	$(6.5 \pm0.7) \times 10^{-4}$		DESIG=12
Γ_6	χ_{c0} anything	$< 5 \times 10^{-3}$	90%	DESIG=5
Γ_7	χ_{c1} anything	$(2.3 \pm0.7) \times 10^{-4}$		DESIG=6
Γ_8	χ_{c2} anything	$(3.4 \pm1.0) \times 10^{-4}$		DESIG=7
Γ_9	$\psi(2S)$ anything	$(2.7 \pm0.9) \times 10^{-4}$		DESIG=8
Γ_{10}	$\rho\pi$	$< 2 \times 10^{-4}$	90%	DESIG=11
Γ_{11}	$\pi^+\pi^-$	$< 5 \times 10^{-4}$	90%	DESIG=23
Γ_{12}	K^+K^-	$< 5 \times 10^{-4}$	90%	DESIG=24
Γ_{13}	$p\overline{p}$	$< 5 \times 10^{-4}$	90%	DESIG=25
Γ_{14}	$\pi^0\pi^+\pi^-$	$< 1.84 \times 10^{-5}$	90%	DESIG=72
Γ_{15}	$D^*(2010)^\pm$ anything			DESIG=30

Radiative decays

NODE=M049;CLUMP=B

Γ_{16}	$\gamma \pi^+ \pi^-$	$(6.3 \pm 1.8) \times 10^{-5}$		DESIG=70
Γ_{17}	$\gamma \pi^0 \pi^0$	$(1.7 \pm 0.7) \times 10^{-5}$		DESIG=71
Γ_{18}	$\gamma 2h^+ 2h^-$	$(7.0 \pm 1.5) \times 10^{-4}$		DESIG=20
Γ_{19}	$\gamma 3h^+ 3h^-$	$(5.4 \pm 2.0) \times 10^{-4}$		DESIG=21
Γ_{20}	$\gamma 4h^+ 4h^-$	$(7.4 \pm 3.5) \times 10^{-4}$		DESIG=22
Γ_{21}	$\gamma \pi^+ \pi^- K^+ K^-$	$(2.9 \pm 0.9) \times 10^{-4}$		DESIG=14
Γ_{22}	$\gamma 2\pi^+ 2\pi^-$	$(2.5 \pm 0.9) \times 10^{-4}$		DESIG=13
Γ_{23}	$\gamma 3\pi^+ 3\pi^-$	$(2.5 \pm 1.2) \times 10^{-4}$		DESIG=17
Γ_{24}	$\gamma 2\pi^+ 2\pi^- K^+ K^-$	$(2.4 \pm 1.2) \times 10^{-4}$		DESIG=18
Γ_{25}	$\gamma \pi^+ \pi^- p \overline{p}$	$(1.5 \pm 0.6) \times 10^{-4}$		DESIG=15
Γ_{26}	$\gamma 2\pi^+ 2\pi^- p \overline{p}$	$(4 \pm 6) \times 10^{-5}$		DESIG=19
Γ_{27}	$\gamma 2K^+ 2K^-$	$(2.0 \pm 2.0) \times 10^{-5}$		DESIG=16
Γ_{28}	$\gamma \eta'(958)$	$< 1.6 \times 10^{-5}$	90%	DESIG=55
Γ_{29}	$\gamma \eta$	$< 2.1 \times 10^{-5}$	90%	DESIG=54
Γ_{30}	$\gamma f'_2(1525)$	$< 1.4 \times 10^{-4}$	90%	DESIG=52
Γ_{31}	$\gamma f_2(1270)$	$(8 \pm 4) \times 10^{-5}$		DESIG=51
Γ_{32}	$\gamma \eta(1405)$	$< 8.2 \times 10^{-5}$	90%	DESIG=65
Γ_{33}	$\gamma f_0(1710) \rightarrow \gamma K \overline{K}$	$< 2.6 \times 10^{-4}$	90%	DESIG=53
Γ_{34}	$\gamma f_0(2200) \rightarrow \gamma K^+ K^-$	$< 2 \times 10^{-4}$	90%	DESIG=69
Γ_{35}	$\gamma f_J(2220) \rightarrow \gamma K^+ K^-$	$< 1.5 \times 10^{-5}$	90%	DESIG=60
Γ_{36}	$\gamma f_J(2220) \rightarrow \gamma \pi^+ \pi^-$	$< 1.2 \times 10^{-5}$	90%	DESIG=61
Γ_{37}	$\gamma f_J(2220) \rightarrow \gamma p \overline{p}$	$< 1.6 \times 10^{-5}$	90%	DESIG=62
Γ_{38}	$\gamma \eta(2225) \rightarrow \gamma \phi \phi$	$< 3 \times 10^{-3}$	90%	DESIG=68
Γ_{39}	γX (X = pseudoscalar with $m <$ 7.2 GeV)	$< 3 \times 10^{-5}$	90%	DESIG=66
Γ_{40}	$\gamma X \overline{X}$ ($X \overline{X}$ = vectors with $m <$ 3.1 GeV)	$< 1 \times 10^{-3}$	90%	DESIG=67

$\Upsilon(1S)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma(\text{total})$

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
1.216±0.027 OUR AVERAGE				
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. NODE=M049G2;LINKAGE=B
[6] Radiative corrections reevaluated by BUCHMUELLER 88 following KURAEV 85. NODE=M049G2;LINKAGE=R
[7] Radiative corrections reevaluated by ALEXANDER 89 using B($\mu\mu$) = 0.026. NODE=M049G2;LINKAGE=P

$\Upsilon(1S)$ PARTIAL WIDTHS

NODE=M049220

$\Gamma(e^+e^-)$ — Γ_2

NODE=M049W2
NODE=M049W2

VALUE (keV)	DOCUMENT ID
1.314±0.029 OUR EVALUATION	

→ NOT CHECKED ←

$\Upsilon(1S)$ BRANCHING RATIOS

NODE=M049225

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

NODE=M049R3
NODE=M049R3

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.0267^{+0.0014}_{-0.0016}}$ **OUR AVERAGE**					
$0.0261 \pm 0.0012 ^{+0.0009}_{-0.0013}$	25k	CINABRO	94B	CLE2	$e^+e^- \rightarrow \tau^+\tau^-$
0.027 ±0.004 ±0.002		[8] ALBRECHT	85C	ARG	$\Upsilon(2S) \rightarrow \pi^+\pi^-\tau^+\tau^-$
0.034 ±0.004 ±0.004		GILES	83	CLEO	$e^+e^- \rightarrow \tau^+\tau^-$

[8] Using B($\Upsilon(1S) \rightarrow ee$) = B($\Upsilon(1S) \rightarrow \mu\mu$) = 0.0256; not used for width evaluations. NODE=M049R3;LINKAGE=A

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

NODE=M049R1
NODE=M049R1

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0248±0.0005 OUR AVERAGE					
0.0249±0.0002±0.0007	345k	ADAMS	05	CLEO	$e^+e^- \to \mu^+\mu^-$
0.0249±0.0008±0.0013		ALEXANDER	98	CLE2	$\Upsilon(2S) \to \pi^+\pi^-\mu^+\mu^-$
0.0212±0.0020±0.0010		[9] BARU	92	MD1	$e^+e^- \to \mu^+\mu^-$
0.0231±0.0012±0.0010		[9] KOBEL	92	CBAL	$e^+e^- \to \mu^+\mu^-$
0.0252±0.0007±0.0007		CHEN	89B	CLEO	$e^+e^- \to \mu^+\mu^-$
0.0261±0.0009±0.0011		KAARSBERG	89	CSB2	$e^+e^- \to \mu^+\mu^-$
0.0230±0.0025±0.0013	86	ALBRECHT	87	ARG	$\Upsilon(2S) \to \pi^+\pi^-\mu^+\mu^-$
0.029 ±0.003 ±0.002	864	BESSON	84	CLEO	$\Upsilon(2S) \to \pi^+\pi^-\mu^+\mu^-$
0.027 ±0.003 ±0.003		ANDREWS	83	CLEO	$e^+e^- \to \mu^+\mu^-$
0.032 ±0.013 ±0.003		ALBRECHT	82	DASP	$e^+e^- \to \mu^+\mu^-$
0.038 ±0.015 ±0.002		NICZYPORUK	82	LENA	$e^+e^- \to \mu^+\mu^-$
0.014 $^{+0.034}_{-0.014}$		BOCK	80	CNTR	$e^+e^- \to \mu^+\mu^-$
0.022 ±0.020		BERGER	79	PLUT	$e^+e^- \to \mu^+\mu^-$

[9] Taking into account interference between the resonance and continuum.

NODE=M049R1;LINKAGE=G

$\Gamma(e^+e^-)/\Gamma_{total}$ Γ_2/Γ

NODE=M049R2
NODE=M049R2

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0238±0.0011 OUR AVERAGE					
0.0229±0.0008±0.0011		ALEXANDER	98	CLE2	$\Upsilon(2S) \to \pi^+\pi^-e^+e^-$
0.0242±0.0014±0.0014	307	ALBRECHT	87	ARG	$\Upsilon(2S) \to \pi^+\pi^-e^+e^-$
0.028 ±0.003 ±0.002	826	BESSON	84	CLEO	$\Upsilon(2S) \to \pi^+\pi^-e^+e^-$
0.051 ±0.030		BERGER	80C	PLUT	$e^+e^- \to e^+e^-$

$\Gamma(\eta'(958)\text{ anything})/\Gamma_{total}$ Γ_4/Γ

NODE=M049R73
NODE=M049R73

VALUE	DOCUMENT ID		TECN	COMMENT
0.028±0.004±0.002	ARTUSO	03	CLE2	$\Upsilon(1S) \to \eta'$ anything

$\Gamma(J/\psi(1S)\text{ anything})/\Gamma_{total}$ Γ_5/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	$e^+e^- \to J/\psi X$
1.1 ±0.4 ±0.2			[10] FULTON	89	CLEO	$e^+e^- \to \mu^+\mu^- X$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.68	90		ALBRECHT	92J	ARG	$e^+e^- \to e^+e^- X$, $e^+e^- \to \mu^+\mu^- X$
<1.7	90		MASCHMANN	90	CBAL	$e^+e^- \to$ hadrons
<20	90		NICZYPORUK	83	LENA	

[10] Using $B((J/\psi) \to \mu^+\mu^-) = (6.9 \pm 0.9)\%$.

NODE=M049R12;LINKAGE=K

$\Gamma(\chi_{c0}\text{ anything})/\Gamma(J/\psi(1S)\text{ anything})$ Γ_6/Γ_5

NODE=M049R25
NODE=M049R25

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<7.4	90	BRIERE	04	CLEO	$e^+e^- \to J/\psi X$

$\Gamma(\chi_{c1}\text{ anything})/\Gamma(J/\psi(1S)\text{ anything})$ Γ_7/Γ_5

NODE=M049R26
NODE=M049R26

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.35±0.08±0.06	52 ± 12	BRIERE	04	CLEO	$e^+e^- \to J/\psi X$

$\Gamma(\chi_{c2}\text{ anything})/\Gamma(J/\psi(1S)\text{ anything})$ Γ_8/Γ_5

NODE=M049R27
NODE=M049R27

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.52±0.12±0.09	47 ± 11	BRIERE	04	CLEO	$e^+e^- \to J/\psi X$

$\Gamma(\psi(2S)\text{ anything})/\Gamma(J/\psi(1S)\text{ anything})$ Γ_9/Γ_5

NODE=M049R28
NODE=M049R28

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.41±0.11±0.08	42 ± 11	BRIERE	04	CLEO	$e^+e^- \rightarrow J/\psi\pi^+\pi^- X$

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

NODE=M049R57
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_{12}/Γ

NODE=M049R58
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_{13}/Γ

NODE=M049R59
NODE=M049R59

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<5	90	[11] BARU	96	MD1	$\Upsilon(1S) \rightarrow p\overline{p}$

[11] Supersedes BARU 92 in this node.

NODE=M049R59;LINKAGE=A

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

NODE=M049R72
NODE=M049R72

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<1.84	90	ANASTASSOV	99	CLE2	$e^+e^- \rightarrow$ hadrons

$\Gamma(\gamma X)/\Gamma_{total}$ Γ_{39}/Γ

NODE=M049R60

(X = pseudoscalar with $m<$ 7.2 GeV)

NODE=M049R60
NODE=M049R60

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<3	90	[12] BALEST	95	CLEO	$e^+e^- \rightarrow \gamma + X$

[12] For a noninteracting pseudoscalar X with mass $<$ 7.2 GeV.

NODE=M049R60;LINKAGE=A

$\Gamma(\gamma X\overline{X})/\Gamma_{total}$ Γ_{40}/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	[13] BALEST	95	CLEO	$e^+e^- \rightarrow \gamma + X\overline{X}$

[13] For a noninteracting vector X with mass $<$ 3.1 GeV.

NODE=M049R61;LINKAGE=A

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

NODE=M049R70
NODE=M049R70

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
6.3±1.2±1.3	[14] ANASTASSOV	99	CLE2	$e^+e^- \rightarrow$ hadrons

[14] For $m_{\pi\pi}$ >1 GeV.

NODE=M049R70;LINKAGE=A

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

NODE=M049R71
NODE=M049R71

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
1.7±0.6±0.3	[15] ANASTASSOV	99	CLE2	$e^+e^- \rightarrow$ hadrons

[15] For $m_{\pi\pi}$ >1 GeV.

NODE=M049R71;LINKAGE=A

$\Gamma(\gamma 2\pi^+ 2\pi^-)/\Gamma_{total}$ Γ_{22}/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

$\Gamma(\gamma\pi^+\pi^- K^+K^-)/\Gamma_{total}$ Γ_{21}/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

$\Gamma(\gamma\pi^+\pi^- p\overline{p})/\Gamma_{total}$ Γ_{25}/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

$\Gamma(\gamma 2K^+ 2K^-)/\Gamma_{total}$ Γ_{27}/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

$\Gamma(\gamma 3\pi^+ 3\pi^-)/\Gamma_{total}$ Γ_{23}/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_{24}/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

$\Gamma(\gamma 2\pi^+ 2\pi^- p\overline{p})/\Gamma_{total}$ Γ_{26}/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

$\Gamma(\gamma 2h^+ 2h^-)/\Gamma_{total}$ Γ_{18}/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_{19}/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_{20}/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

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

NODE=M049R11
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	$\Upsilon(1S) \rightarrow \rho^0 \pi^0$

$\Gamma(D^*(2010)^\pm \text{ anything})/\Gamma_{total}$ Γ_{15}/Γ

NODE=M049R32
NODE=M049R32

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<19	90	[16] ALBRECHT	92J	ARG	$e^+ e^- \rightarrow D^0 \pi^\pm X$

[16] For $x_p > 0.2$.

NODE=M049R32;LINKAGE=B

$\Gamma(\gamma\eta(1405))/\Gamma_{total}$ Γ_{32}/Γ

NODE=M049R23
NODE=M049R23

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<8.2	90	[17] FULTON	90B	CLEO	$\Upsilon(1S) \rightarrow \gamma K^\pm \pi^\mp K^0_S$

[17] Includes unknown branching ratio of $\eta(1405) \rightarrow K^\pm \pi^\mp K^0_S$.

NODE=M049R23;LINKAGE=J

$\Gamma(\gamma\eta'(958))/\Gamma_{total}$ Γ_{28}/Γ

NODE=M049R55
NODE=M049R55

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
< 1.6	90	RICHICHI	01B	CLE2	$\Upsilon(1S) \rightarrow \gamma\eta' \rightarrow \gamma\eta\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<130	90	SCHMITT	88	CBAL	$\Upsilon(1S) \rightarrow \gamma X$

$\Gamma(\gamma\eta)/\Gamma_{total}$ Γ_{29}/Γ

NODE=M049R54
NODE=M049R54

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT	
< 2.1	90	MASEK	02	CLEO	$\Upsilon(1S) \rightarrow \gamma\eta$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<28.2	90	MASEK	02	CLEO	$\eta \rightarrow \gamma\gamma$	OCCUR=2
< 6.7	90	MASEK	02	CLEO	$\eta \rightarrow \pi^0\pi^0\pi^0$	OCCUR=3
< 2.6	90	MASEK	02	CLEO	$\eta \rightarrow \pi^+\pi^-\pi^0$	OCCUR=4
<35	90	SCHMITT	88	CBAL	$\Upsilon(1S) \rightarrow \gamma X$	

$\Gamma(\gamma f'_2(1525))/\Gamma_{total}$ Γ_{30}/Γ

NODE=M049R52
NODE=M049R52

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<14	90	[18] FULTON	90B	CLEO	$\Upsilon(1S) \rightarrow \gamma K^+ K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<19.4	90	[18] ALBRECHT	89	ARG	$\Upsilon(1S) \rightarrow \gamma K^+ K^-$

[18] Assuming B($f'_2(1525) \rightarrow K\overline{K}$) = 0.71.

NODE=M049R52;LINKAGE=D

$\Gamma(\gamma f_0(1710) \to \gamma K\overline{K})/\Gamma_{total}$ — Γ_{33}/Γ

NODE=M049R53

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 2.6	90	[19] ALBRECHT	89	ARG	$\Upsilon(1S) \to \gamma K^+ K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 6.3	90	[19] FULTON	90B	CLEO	$\Upsilon(1S) \to \gamma K^+ K^-$
<19	90	[19] FULTON	90B	CLEO	$\Upsilon(1S) \to \gamma K^0_S K^0_S$
< 8	90	[20] ALBRECHT	89	ARG	$\Upsilon(1S) \to \gamma \pi^+ \pi^-$
<24	90	[21] SCHMITT	88	CBAL	$\Upsilon(1S) \to \gamma X$

OCCUR=2
OCCUR=2

[19] Assuming B($f_0(1710) \to K\overline{K}$) = 0.38. NODE=M049R53;LINKAGE=E

[20] Assuming B($f_0(1710) \to \pi\pi$) = 0.04. NODE=M049R53;LINKAGE=F

[21] Assuming B($f_0(1710) \to \eta\eta$) = 0.18. NODE=M049R53;LINKAGE=A

$\Gamma(\gamma f_2(1270))/\Gamma_{total}$ — Γ_{31}/Γ

NODE=M049R51

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
$8.1 \pm 2.3^{+2.9}_{-2.7}$		[22] ANASTASSOV	99	CLE2	$e^+ e^- \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<21	90	[22] FULTON	90B	CLEO	$\Upsilon(1S) \to \gamma \pi^+ \pi^-$
<13	90	[22] ALBRECHT	89	ARG	$\Upsilon(1S) \to \gamma \pi^+ \pi^-$
<81	90	SCHMITT	88	CBAL	$\Upsilon(1S) \to \gamma X$

[22] Using B($f_2(1270) \to \pi\pi$) = 0.84. NODE=M049R51;LINKAGE=C

$\Gamma(\gamma f_J(2220) \to \gamma K^+ K^-)/\Gamma_{total}$ — Γ_{35}/Γ

NODE=M049R56

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
< 1.6	90	MASEK	02	CLEO	$\Upsilon(1S) \to \gamma K^+ K^-$
< 1.5	90	[23] FULTON	90B	CLEO	$\Upsilon(1S) \to \gamma K^+ K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 2.9	90	[23] ALBRECHT	89	ARG	$\Upsilon(1S) \to \gamma K^+ K^-$
<20	90	[23] BARU	89	MD1	$\Upsilon(1S) \to \gamma K^+ K^-$

[23] Including unknown branching ratio of $f_J(2220) \to K^+ K^-$. NODE=M049R56;LINKAGE=H

$\Gamma(\gamma f_J(2220) \to \gamma \pi^+ \pi^-)/\Gamma_{total}$ — Γ_{36}/Γ

NODE=M049R41

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<1.2	90	MASEK	02	CLEO	$\Upsilon(1S) \to \gamma \pi^+ \pi^-$

$\Gamma(\gamma f_J(2220) \to \gamma p\overline{p})/\Gamma_{total}$ — Γ_{37}/Γ

NODE=M049R42

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<1.6	90	MASEK	02	CLEO	$\Upsilon(1S) \to \gamma p\overline{p}$

$\Gamma(\gamma\eta(2225) \to \gamma\phi\phi)/\Gamma_{total}$ — Γ_{38}/Γ

NODE=M049R62

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.003	90	[24] BARU	89	MD1	$\Upsilon(1S) \to \gamma K^+ K^- K^+ K^-$

[24] Assuming that the $\eta(2225)$ decays only into $\phi\phi$. NODE=M049R62;LINKAGE=A

$\Gamma(\gamma f_0(2200) \to \gamma K^+ K^-)/\Gamma_{total}$ — Γ_{34}/Γ

NODE=M049R63

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0002	90	[25] BARU	89	MD1	$\Upsilon(1S) \to \gamma K^+ K^-$

[25] Assuming that the $f_0(2200)$ decays only into $K^+ K^-$. NODE=M049R63;LINKAGE=A

$\Upsilon(1S)$ REFERENCES

NODE=M049

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

OTHER RELATED PAPERS

KOENIGS...	86	DESY 86/136	K. Koenigsmann	(DESY)	REFID=40032
ALBRECHT	84	PL 134B 137	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=22277
ARTAMONOV	84	PL 137B 272	A.S. Artamonov *et al.*	(NOVO)	REFID=22278
ARTAMONOV	82	PL 118B 225	A.S. Artamonov *et al.*	(NOVO)	REFID=22271
BERGER	78	PL 76B 243	C. Berger *et al.*	(PLUTO Collab.)	REFID=22251
BIENLEIN	78	PL 78B 360	J.K. Bienlein *et al.*	(DESY, HAMB, HEIDP+)	REFID=22252
DARDEN	78	PL 76B 246	C.W. Darden *et al.*	(DESY, DORT, HEIDH+)	REFID=22253
GARELICK	78	PR D18 945	D.A. Garelick *et al.*	(NEAS, WASH, TUFTS)	REFID=22254
KAPLAN	78	PRL 40 435	D.M. Kaplan *et al.*	(STON, FNAL, COLU)	REFID=22255
YOH	78	PRL 41 684	J.K. Yoh *et al.*	(COLU, FNAL, STON)	REFID=22256
COBB	77	PL 72B 273	J.H. Cobb *et al.*	(BNL, CERN, SYRA, YALE)	REFID=22248
HERB	77	PRL 39 252	S.W. Herb *et al.*	(COLU, FNAL, STON)	REFID=22249
INNES	77	PRL 39 1240	W.R. Innes *et al.*	(COLU, FNAL, STON)	REFID=22250

NODE=M076

$\chi_{b0}(1P)$

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

Observed in radiative decay of the $\Upsilon(2S)$, therefore $C = +$. Branching ratio requires E1 transition, M1 is strongly disfavored, therefore $P = +$. NODE=M076

$\chi_{b0}(1P)$ MASS

NODE=M076205

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	NODE=M076M → NOT CHECKED ←

γ ENERGY IN $\Upsilon(2S)$ DECAY

NODE=M076210

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	$\gamma\,\Upsilon(1S)$	<6 %	90%	DESIG=1

$\chi_{b0}(1P)$ BRANCHING RATIOS

NODE=M076220

$\Gamma(\gamma\Upsilon(1S))/\Gamma_{total}$ **Γ_1/Γ**

NODE=M076R1
NODE=M076R1

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.06	90	WALK	86	CBAL	$\Upsilon(2S) \to \gamma\gamma\ell^+\ell^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.11	90	PAUSS	83	CUSB	$\Upsilon(2S) \to \gamma\gamma\ell^+\ell^-$

$\chi_{b0}(1P)$ REFERENCES

NODE=M076

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=M077205

NODE=M077M

→ NOT CHECKED ←

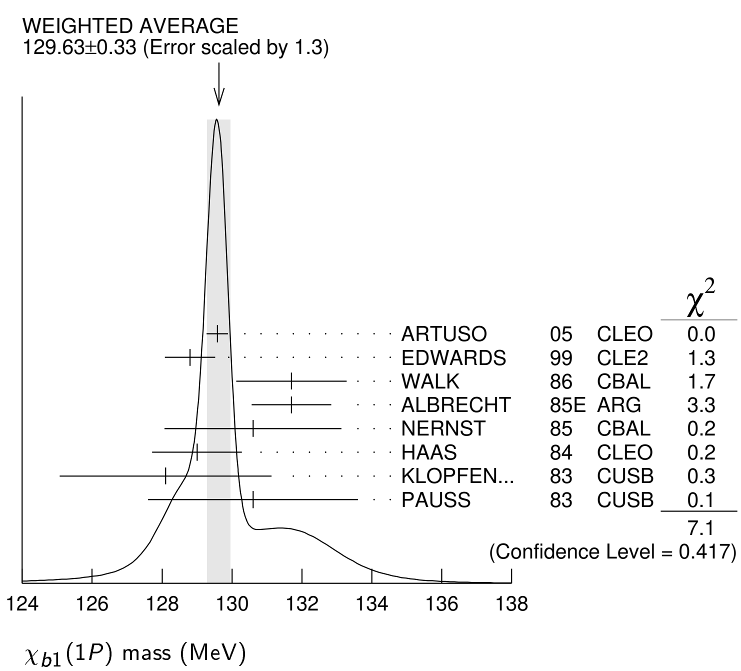
VALUE (MeV)	DOCUMENT ID
9892.78±0.26±0.31 OUR EVALUATION	From average γ energy below, using $\Upsilon(2S)$ mass = 10023.26 ± 0.31 MeV

γ ENERGY IN $\Upsilon(2S)$ DECAY

NODE=M077210

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	$\Upsilon(2S) \to \gamma\gamma\ell^+\ell^-$



$\chi_{b1}(1P)$ DECAY MODES

NODE=M077215;NODE=M077

	Mode	Fraction (Γ_i/Γ)
Γ_1	$\gamma\,\Upsilon(1S)$	(35 ± 8) %

DESIG=1

$\chi_{b1}(1P)$ BRANCHING RATIOS

NODE=M077220

$\Gamma(\gamma\,\Upsilon(1S))/\Gamma_{total}$ — Γ_1/Γ

NODE=M077R1
NODE=M077R1

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
0.35±0.08 OUR AVERAGE				
0.32±0.06±0.07	WALK	86	CBAL	$\Upsilon(2S)\to\gamma\gamma\ell^+\ell^-$
0.47±0.18	KLOPFEN...	83	CUSB	$\Upsilon(2S)\to\gamma\gamma\ell^+\ell^-$

$\chi_{b1}(1P)$ REFERENCES

NODE=M077

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=M078

$\boxed{\chi_{b2}(1P)}$

$I^G(J^{PC}) = 0^+(2^{++})$
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=M078205

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

NODE=M078M
→ NOT CHECKED ←

γ ENERGY IN $\Upsilon(2S)$ DECAY

NODE=M078210

NODE=M078DM

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
110.44±0.29 OUR AVERAGE	Error includes scale factor of 1.1.			
110.58±0.08±0.30	ARTUSO	05	CLEO	$\Upsilon(2S)\to\gamma X$
110.8 ±0.3 ±0.6	EDWARDS	99	CLE2	$\Upsilon(2S)\to\gamma\chi(1P)$
107.0 ±1.1 ±1.3	WALK	86	CBAL	$\Upsilon(2S)\to\gamma\gamma\ell^+\ell^-$
110.6 ±0.3 ±0.9	ALBRECHT	85E	ARG	$\Upsilon(2S)\to$ conv.γX
110.4 ±0.8 ±2.2	NERNST	85	CBAL	$\Upsilon(2S)\to\gamma$X
109.5 ±0.7 ±1.0	HAAS	84	CLEO	$\Upsilon(2S)\to$ conv.γX
108.2 ±0.3 ±2.0	KLOPFEN...	83	CUSB	$\Upsilon(2S)\to\gamma$X
108.8 ±4.0	PAUSS	83	CUSB	$\Upsilon(2S)\to\gamma\gamma\ell^+\ell^-$

$\chi_{b2}(1P)$ DECAY MODES

NODE=M078215;NODE=M078

	Mode	Fraction (Γ_i/Γ)
Γ_1	$\gamma\,\Upsilon(1S)$	(22 ± 4) %

DESIG=1

$\chi_{b2}(1P)$ BRANCHING RATIOS

NODE=M078220

$\Gamma(\gamma\,\Upsilon(1S))/\Gamma_{total}$ — Γ_1/Γ

NODE=M078R1
NODE=M078R1

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
0.22±0.04 OUR AVERAGE				
0.27±0.06±0.06	WALK	86	CBAL	$\Upsilon(2S)\to\gamma\gamma\ell^+\ell^-$
0.20±0.05	KLOPFEN...	83	CUSB	$\Upsilon(2S)\to\gamma\gamma\ell^+\ell^-$

$\chi_{b2}(1P)$ REFERENCES

NODE=M078

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

$\Upsilon(2S)$

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

NODE=M052

$\Upsilon(2S)$ MASS

NODE=M052205

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

$\Upsilon(2S)$ WIDTH

NODE=M052210

NODE=M052W

VALUE (keV)	DOCUMENT ID
30.6±2.3 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	$\Upsilon(1S)\pi^+\pi^-$	(18.8 ±0.6) %		DESIG=4
Γ_2	$\Upsilon(1S)\pi^0\pi^0$	(9.0 ±0.8) %		DESIG=5
Γ_3	$\tau^+\tau^-$	(1.7 ±1.6) %		DESIG=3
Γ_4	$\mu^+\mu^-$	(1.93±0.17) %	S=2.2	DESIG=1
Γ_5	e^+e^-	(1.92±0.17) %		DESIG=2
Γ_6	$\Upsilon(1S)\pi^0$	$< 1.1 \times 10^{-3}$	CL=90%	DESIG=10
Γ_7	$\Upsilon(1S)\eta$	$< 2 \times 10^{-3}$	CL=90%	DESIG=6
Γ_8	$J/\psi(1S)$ anything	$< 6 \times 10^{-3}$	CL=90%	DESIG=20
	Radiative decays			NODE=M052;CLUMP=A
Γ_9	$\gamma\chi_{b1}(1P)$	(6.9 ±0.4) %		DESIG=8
Γ_{10}	$\gamma\chi_{b2}(1P)$	(7.15±0.35) %		DESIG=7
Γ_{11}	$\gamma\chi_{b0}(1P)$	(3.8 ±0.4) %		DESIG=9
Γ_{12}	$\gamma f_0(1710)$	$< 5.9 \times 10^{-4}$	CL=90%	DESIG=13
Γ_{13}	$\gamma f_2'(1525)$	$< 5.3 \times 10^{-4}$	CL=90%	DESIG=12
Γ_{14}	$\gamma f_2(1270)$	$< 2.41 \times 10^{-4}$	CL=90%	DESIG=11
Γ_{15}	$\gamma f_J(2220)$			DESIG=14
Γ_{16}	$\gamma\eta_b(1S)$	$< 5.1 \times 10^{-4}$	CL=90%	DESIG=102

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

NODE=M052218

$\Gamma(e^+e^-) \times \Gamma(\mu^+\mu^-)/\Gamma_{\text{total}}$ $\Gamma_5\Gamma_4/\Gamma$

NODE=M052G1

NODE=M052G1

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
6.5±1.5±1.0	KOBEL	92	CBAL	$e^+e^- \to \mu^+\mu^-$

$\Gamma(\text{hadrons}) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_0\Gamma_5/\Gamma$

NODE=M052G2
NODE=M052G2

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
0.553±0.023 OUR AVERAGE				
0.552±0.031±0.017	[4] BARU	96	MD1	$e^+e^- \to$ hadrons
0.54 ±0.04 ±0.02	[4] JAKUBOWSKI	88	CBAL	$e^+e^- \to$ hadrons
0.58 ±0.03 ±0.04	[5] GILES	84B	CLEO	$e^+e^- \to$ hadrons
0.60 ±0.12 ±0.07	[5] ALBRECHT	82	DASP	$e^+e^- \to$ hadrons
0.54 ±0.07 $^{+0.09}_{-0.05}$	[5] NICZYPORUK	81C	LENA	$e^+e^- \to$ hadrons
0.41 ±0.18	[5] BOCK	80	CNTR	$e^+e^- \to$ hadrons

[4] Radiative corrections evaluated following KURAEV 85. NODE=M052G2;LINKAGE=P

[5] Radiative corrections reevaluated by BUCHMUELLER 88 following KURAEV 85. NODE=M052G2;LINKAGE=R

$\Upsilon(2S)$ PARTIAL WIDTHS

NODE=M052220

$\Gamma(e^+e^-)$ — Γ_5

NODE=M052W2
NODE=M052W2

VALUE (keV)	DOCUMENT ID
0.587±0.025 OUR EVALUATION	

→ NOT CHECKED ←

$\Upsilon(2S)$ BRANCHING RATIOS

NODE=M052225

$\Gamma(J/\psi(1S)\text{ anything})/\Gamma_{total}$ — Γ_8/Γ

NODE=M052R16
NODE=M052R16

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.006	90	MASCHMANN	90	CBAL	$e^+e^- \to$ hadrons

$\Gamma(\Upsilon(1S)\pi^+\pi^-)/\Gamma_{total}$ — Γ_1/Γ

NODE=M052R4
NODE=M052R4

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.188±0.006 OUR AVERAGE					
0.192±0.002±0.010	52.6k	[6] ALEXANDER	98	CLE2	$\pi^+\pi^-\ell^+\ell^-$, $\pi^+\pi^-$ MM
0.181±0.005±0.010	11.6k	ALBRECHT	87	ARG	$e^+e^- \to \pi^+\pi^-$ MM
0.169±0.040		GELPHMAN	85	CBAL	$e^+e^- \to e^+e^-\pi^+\pi^-$
0.191±0.012±0.006		BESSON	84	CLEO	$\pi^+\pi^-$ MM
0.189±0.026		FONSECA	84	CUSB	$e^+e^- \to \ell^+\ell^-\pi^+\pi^-$
0.21 ±0.07	7	NICZYPORUK	81B	LENA	$e^+e^- \to \ell^+\ell^-\pi^+\pi^-$

[6] Using B($\Upsilon(1S) \to e^+e^-$) = (2.52 ± 0.17)% and B($\Upsilon(1S) \to \mu^+\mu^-$) = (2.48 ± 0.07)%. NODE=M052R4;LINKAGE=T

$\Gamma(\Upsilon(1S)\pi^0\pi^0)/\Gamma_{total}$ — Γ_2/Γ

NODE=M052R5
NODE=M052R5

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.090±0.008 OUR AVERAGE					
0.092±0.006±0.008	275	[7] ALEXANDER	98	CLE2	$e^+e^- \to \ell^+\ell^-\pi^0\pi^0$
0.095±0.019±0.019	25	ALBRECHT	87	ARG	$e^+e^- \to \pi^0\pi^0\ell^+\ell^-$
0.080±0.015		GELPHMAN	85	CBAL	$e^+e^- \to \ell^+\ell^-\pi^0\pi^0$
0.103±0.023		FONSECA	84	CUSB	$e^+e^- \to \ell^+\ell^-\pi^0\pi^0$

[7] Using B($\Upsilon(1S) \to e^+e^-$) = (2.52 ± 0.17)% and B($\Upsilon(1S) \to \mu^+\mu^-$) = (2.48 ± 0.07)%. NODE=M052R5;LINKAGE=T

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

NODE=M052R3
NODE=M052R3

VALUE	DOCUMENT ID		TECN	COMMENT
0.017±0.015±0.006	HAAS	84B	CLEO	$e^+e^- \to \tau^+\tau^-$

$\Gamma(\mu^+\mu^-)/\Gamma_{total}$ — Γ_4/Γ

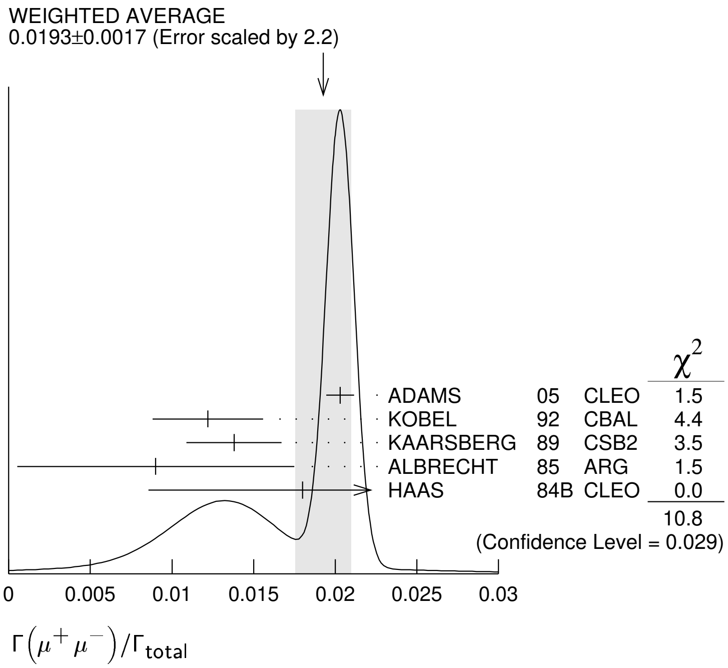
NODE=M052R1
NODE=M052R1

0.0193±0.0017 OUR AVERAGE Error includes scale factor of 2.2. See the ideogram below.

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.0203±0.0003±0.0008		120k	ADAMS	05	CLEO	$e^+e^- \to \mu^+\mu^-$
0.0122±0.0028±0.0019			[8] 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			[9] 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	$e^+e^- \to \mu^+\mu^-$

[8] Taking into account interference between the resonance and continuum. NODE=M052R1;LINKAGE=A

[9] Re-evaluated using B($\Upsilon(1S) \to \mu^+ \mu^-$) = 0.026. NODE=M052R1;LINKAGE=R



$\Gamma(\Upsilon(1S)\pi^0)/\Gamma_{total}$ Γ_6/Γ

NODE=M052R10
NODE=M052R10

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0011	90	ALEXANDER	98	CLE2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.008	90	LURZ	87	CBAL	$e^+e^- \to \ell^+\ell^-\gamma\gamma$

$\Gamma(\Upsilon(1S)\eta)/\Gamma_{total}$ Γ_7/Γ

NODE=M052R6
NODE=M052R6

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.002	90	FONSECA	84	CUSB	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.0028	90	ALEXANDER	98	CLE2	$e^+e^- \to \ell^+\ell^-\eta$
<0.005	90	ALBRECHT	87	ARG	$e^+e^- \to \pi^+\pi^-\ell^+\ell^-$ MM
<0.007	90	LURZ	87	CBAL	$e^+e^- \to \ell^+\ell^-(\gamma\gamma, 3\pi^0)$
<0.010	90	BESSON	84	CLEO	

$\Gamma(\gamma\chi_{b1}(1P))/\Gamma_{total}$ Γ_9/Γ

NODE=M052R8
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_{10}/Γ

NODE=M052R7
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_{11}/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_{12}/Γ

NODE=M052R13

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<59	90	[10] ALBRECHT	89	ARG	$\Upsilon(2S) \to \gamma K^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 5.9	90	[11] ALBRECHT	89	ARG	$\Upsilon(2S) \to \gamma\pi^+\pi^-$

OCCUR=2

[10] Re-evaluated assuming B($f_0(1710) \to K^+K^-$) = 0.19. NODE=M052R13;LINKAGE=M

[11] Includes unknown branching ratio of $f_0(1710) \to \pi^+\pi^-$. NODE=M052R13;LINKAGE=N

$\Gamma(\gamma f'_2(1525))/\Gamma_{total}$ Γ_{13}/Γ

NODE=M052R12

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<53	90	[12] ALBRECHT	89	ARG	$\Upsilon(2S) \to \gamma K^+K^-$

[12] 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_{14}/Γ

NODE=M052R11

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<24.1	90	[13] ALBRECHT	89	ARG	$\Upsilon(2S) \to \gamma\pi^+\pi^-$

[13] Using B($f_2(1270) \to \pi\pi$) = 0.84. NODE=M052R11;LINKAGE=K

$\Gamma(\gamma f_J(2220))/\Gamma_{total}$ Γ_{15}/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	[14] ALBRECHT	89	ARG	$\Upsilon(2S) \to \gamma K^+K^-$

[14] Includes unknown branching ratio of $f_J(2220) \to K^+K^-$. NODE=M052R14;LINKAGE=S

$\Gamma(\gamma\eta_b(1S))/\Gamma_{total}$ Γ_{16}/Γ

NODE=M052R15

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<5.1	90	ARTUSO	05	CLEO	$e^+e^- \to \gamma X$

$\Upsilon(2S)$ REFERENCES

NODE=M052

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	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 D11 2893	D. Gelphman *et al.*	(Crystal Ball Collab.)	REFID=22336
KURAEV	85	SJNP 41 466	E.A. Kuraev, V.S. Fadin	(NOVO)	REFID=40033
		Translated from YAF 41 733.			
NERNST	85	PRL 54 2195	R. Nernst *et al.*	(Crystal Ball Collab.)	REFID=22289
ARTAMONOV	84	PL 137B 272	A.S. Artamonov *et al.*	(NOVO)	REFID=22278
BARBER	84	PL 135B 498	D.P. Barber *et al.*		REFID=22327
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

OTHER RELATED PAPERS

GUO	05	NP A761 269	F.-K. Guo *et al.*		REFID=50828
ALEXANDER	89	NP B320 45	J.P. Alexander *et al.*	(LBL, MICH, SLAC)	REFID=40345
WALK	86	PR D34 2611	W.S. Walk *et al.*	(Crystal Ball Collab.)	REFID=22290
ALBRECHT	84	PL 134B 137	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=22277
ARTAMONOV	84	PL 137B 272	A.S. Artamonov *et al.*	(NOVO)	REFID=22278
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
BIENLEIN	78	PL 78B 360	J.K. Bienlein *et al.*	(DESY, HAMB, HEIDP+)	REFID=22252
DARDEN	78	PL 76B 246	C.W. Darden *et al.*	(DESY, DORT, HEIDH+)	REFID=22253
KAPLAN	78	PRL 40 435	D.M. Kaplan *et al.*	(STON, FNAL, COLU)	REFID=22255
YOH	78	PRL 41 684	J.K. Yoh *et al.*	(COLU, FNAL, STON)	REFID=22256
COBB	77	PL 72B 273	J.H. Cobb *et al.*	(BNL, CERN, SYRA, YALE)	REFID=22248
HERB	77	PRL 39 252	S.W. Herb *et al.*	(COLU, FNAL, STON)	REFID=22249
INNES	77	PRL 39 1240	W.R. Innes *et al.*	(COLU, FNAL, STON)	REFID=22250

NODE=M177

$\Upsilon(1D)$

$I^G(J^{PC}) = 0^-(2^{--})$

OMITTED FROM SUMMARY TABLE

J needs confirmation.

NODE=M177

$\Upsilon(1D)$ MASS

NODE=M177205

NODE=M177M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
10161.1±0.6±1.6	38	BONVICINI	04	CLE3	$\Upsilon(3S) \to \gamma X$

$\Upsilon(1D)$ 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	$\gamma\chi_{bJ}(1P)$		DESIG=2
Γ_3	$\eta\,\Upsilon(1S)$		DESIG=3
Γ_4	$\pi^+\pi^-\,\Upsilon(1S)$		DESIG=4

$\Upsilon(2S)$ 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	$\Upsilon(3S) \to \gamma X$

$\Gamma(\pi^+\pi^-\,\Upsilon(1S))/\Gamma(\gamma\gamma\,\Upsilon(1S))$ — Γ_4/Γ_1

NODE=M177R02
NODE=M177R02

VALUE	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<1.2	90	[1] BONVICINI	04	CLE3	$\Upsilon(3S) \to \gamma X$

[1] Assuming $J = 2$.

NODE=M177R02;LINKAGE=BO

$\Upsilon(1D)$ REFERENCES

NODE=M177

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.

NODE=M079

Observed in radiative decay of the $\Upsilon(3S)$, therefore $C = +$. Branching ratio requires E1 transition, M1 is strongly disfavored, therefore $P = +$.

$\chi_{b0}(2P)$ MASS

NODE=M079205

NODE=M079M
→ NOT CHECKED ←

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

γ ENERGY IN $\Upsilon(3S)$ DECAY

NODE=M079210

NODE=M079DM
→ NOT CHECKED ←

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	$e^+e^- \to \gamma X$

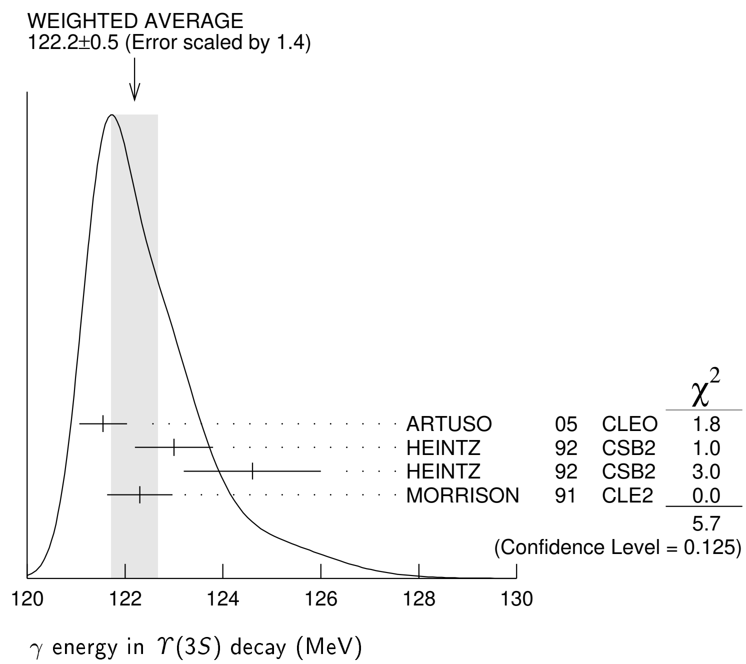
OCCUR=2

[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



$\chi_{b0}(2P)$ DECAY MODES

NODE=M079215;NODE=M079

	Mode	Fraction (Γ_i/Γ)
Γ_1	$\gamma\,\Upsilon(2S)$	(4.6±2.1) %
Γ_2	$\gamma\,\Upsilon(1S)$	(9 ±6) × 10^{-3}

DESIG=2
DESIG=1

$\chi_{b0}(2P)$ BRANCHING RATIOS

NODE=M079220

$\Gamma(\gamma\,\Upsilon(2S))/\Gamma_{\text{total}}$ — Γ_1/Γ

NODE=M079R2
NODE=M079R2

VALUE	*CL%*	*DOCUMENT ID*	*TECN*	*COMMENT*
<0.089	90	[3] CRAWFORD 92B	CLE2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$
0.046±0.020±0.007		[4] HEINTZ 92	CSB2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$

[3] 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

[4] 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

$\Gamma(\gamma\Upsilon(1S))/\Gamma_{total}$ — Γ_2/Γ

NODE=M079R1

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.025	90	[5] CRAWFORD	92B	CLE2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$
0.009±0.006±0.001		[6] HEINTZ	92	CSB2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$

[5] 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

[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

$\chi_{b0}(2P)$ REFERENCES

NODE=M079

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

OTHER RELATED PAPERS

EIGEN	82	PRL 49 1616	G. Eigen *et al.*	(CUSB Collab.)	REFID=22340
HAN	82	PRL 49 1612	K. Han *et al.*	(CUSB Collab.)	REFID=22341

NODE=M080

$\chi_{b1}(2P)$

$I^G(J^{PC}) = 0^+(1^{++})$
J needs confirmation.

Observed in radiative decay of the $\Upsilon(3S)$, therefore $C = +$. Branching ratio requires E1 transition, M1 is strongly disfavored, therefore $P = +$. NODE=M080

$\chi_{b1}(2P)$ MASS

NODE=M080205

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	

→ NOT CHECKED ←

$m_{\chi_{b1}(2P)} - m_{\chi_{b0}(2P)}$

NODE=M080206

NODE=M080M2

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
23.5±0.7±0.7	[1] HEINTZ	92	CSB2	$e^+e^- \to \gamma X, \ell^+\ell^-\gamma\gamma$

[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=M080210

NODE=M080DM

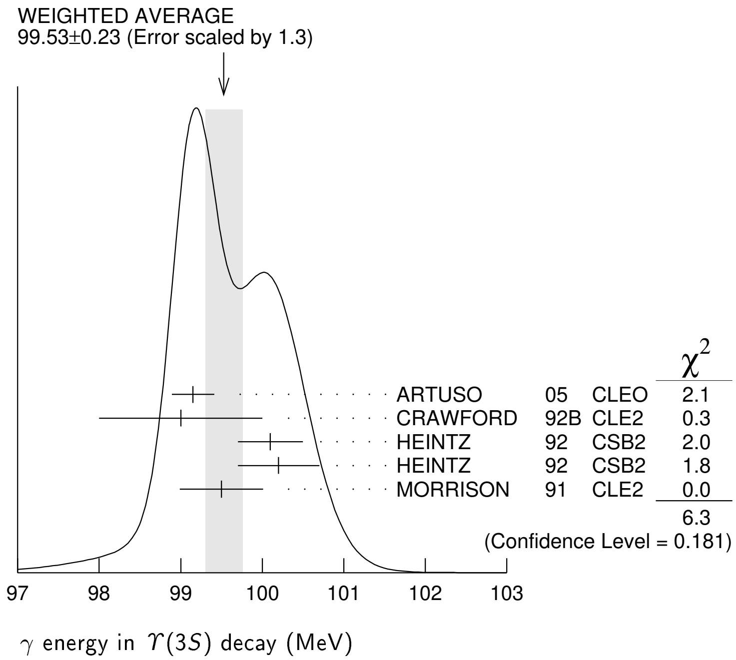
VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
99.26±0.22 OUR EVALUATION Treating systematic errors as correlated					
99.53±0.23 OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below.					
99.15±0.07±0.25		ARTUSO	05	CLEO	$\Upsilon(3S) \to \gamma X$
99 ±1	169	CRAWFORD	92B	CLE2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$
100.1 ±0.4	11147	[2] HEINTZ	92	CSB2	$e^+e^- \to \gamma X$
100.2 ±0.5	223	[3] HEINTZ	92	CSB2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$
99.5 ±0.1 ±0.5	25759	MORRISON	91	CLE2	$e^+e^- \to \gamma X$

→ 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



$\chi_{b1}(2P)$ DECAY MODES

NODE=M080215;NODE=M080

	Mode	Fraction (Γ_i/Γ)	Scale factor	
Γ_1	$\omega\,\Upsilon(1S)$	$(1.63^{+0.38}_{-0.34})$ %		DESIG=3
Γ_2	$\gamma\,\Upsilon(2S)$	(21 ± 4) %	1.5	DESIG=2
Γ_3	$\gamma\,\Upsilon(1S)$	(8.5 ± 1.3) %	1.3	DESIG=1

$\chi_{b1}(2P)$ 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
$\mathbf{1.63^{+0.35}_{-0.31}{}^{+0.16}_{-0.15}}$	$32.6^{+6.9}_{-6.1}$	[4] CRONIN-HEN..04	CLE3	$\Upsilon(3S) \to \gamma\omega\,\Upsilon(1S)$

[4] Using B($\Upsilon(3S) \to \gamma\chi_{b1}(2P)$) = 11.3 ± 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	DOCUMENT ID	TECN	COMMENT
0.21 ±0.04 OUR AVERAGE	Error includes scale factor of 1.5.		
$0.356 \pm 0.042 \pm 0.092$	[5] CRAWFORD 92B	CLE2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$
$0.199 \pm 0.020 \pm 0.022$	[6] HEINTZ 92	CSB2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$

[5] Using B($\Upsilon(2S) \to \mu^+\mu^-$) = ($1.37 \pm 0.26$)%, B($\Upsilon(3S) \to \gamma\gamma\,\Upsilon(2S)$)×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

[6] 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	DOCUMENT ID	TECN	COMMENT
0.085±0.013 OUR AVERAGE	Error includes scale factor of 1.3.		
$0.120 \pm 0.021 \pm 0.021$	[7] CRAWFORD 92B	CLE2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$
$0.080 \pm 0.009 \pm 0.007$	[8] HEINTZ 92	CSB2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$

[7] Using B($\Upsilon(1S) \to \mu^+\mu^-$) = ($2.57 \pm 0.07$)%, B($\Upsilon(3S) \to \gamma\gamma\,\Upsilon(1S)$)×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

[8] 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

$\chi_{b1}(2P)$ REFERENCES

NODE=M080

ARTUSO	05	PRL 94 032001	M. Artuso *et al.*	(CLEO Collab.)	REFID=50454
CRONIN-HEN...	04	PRL 92 222002	D. Cronin-Hennessy *et al.*	(CLEO3 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

——— OTHER RELATED PAPERS ———

EIGEN	82	PRL 49 1616	G. Eigen *et al.*	(CUSB Collab.)	REFID=22340
HAN	82	PRL 49 1612	K. Han *et al.*	(CUSB Collab.)	REFID=22341

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=M081205

VALUE (GeV)	*DOCUMENT ID*
10.26865±0.00022±0.00050 OUR EVALUATION From γ energy below, using $\Upsilon(3S)$ mass = 10355.2 ± 0.5 MeV	

NODE=M081M
→ NOT CHECKED ←

$m_{\chi_{b2}(2P)} - m_{\chi_{b1}(2P)}$

NODE=M081206

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
13.5±0.4±0.5	[1] HEINTZ	92	CSB2	$e^+e^- \to \gamma X, \ell^+\ell^-\gamma\gamma$

NODE=M081M2

[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=M081210

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
86.19±0.22 OUR EVALUATION Treating systematic errors as correlated					
86.40±0.18 OUR AVERAGE					
86.04±0.06±0.27		ARTUSO	05	CLEO	$\Upsilon(3S) \to \gamma X$
86 ±1	101	CRAWFORD	92B	CLE2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$
86.7 ±0.4	10319	[2] HEINTZ	92	CSB2	$e^+e^- \to \gamma X$
86.9 ±0.4	157	[3] HEINTZ	92	CSB2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$
86.4 ±0.1 ±0.4	30741	MORRISON	91	CLE2	$e^+e^- \to \gamma X$

NODE=M081DM
→ NOT CHECKED ←
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)	
Γ_1	$\omega\,\Upsilon(1S)$	$(1.10^{+0.34}_{-0.30})$ %	DESIG=3
Γ_2	$\gamma\,\Upsilon(2S)$	(16.2 ±2.4) %	DESIG=2
Γ_3	$\gamma\,\Upsilon(1S)$	(7.1 ±1.0) %	DESIG=1

$\chi_{b2}(2P)$ BRANCHING RATIOS

NODE=M081220

$\Gamma(\omega\,\Upsilon(1S))/\Gamma_{\text{total}}$ Γ_1/Γ

NODE=M081R3
NODE=M081R3

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
$\mathbf{1.10^{+0.32}_{-0.28}{}^{+0.11}_{-0.10}}$	$20.1^{+5.8}_{-5.1}$	[4] CRONIN-HEN..04	CLE3	$\Upsilon(3S) \to \gamma\omega\,\Upsilon(1S)$

[4] Using $B(\Upsilon(3S) \to \gamma\chi_{b2}(2P)) = 11.4 \pm 0.8\%$ and $B(\Upsilon(1S) \to \ell^+\ell^-) = 2\,B(\Upsilon(1S) \to \mu^+\mu^-) = 2\,(2.48 \pm 0.06)\%$.

NODE=M081R3;LINKAGE=CR

$\Gamma(\gamma\Upsilon(2S))/\Gamma_{total}$ — Γ_2/Γ

NODE=M081R2
NODE=M081R2

VALUE	DOCUMENT ID		TECN	COMMENT
0.162±0.024 OUR AVERAGE				
0.135±0.025±0.035	[5] CRAWFORD	92B	CLE2	$e^+e^- \rightarrow \ell^+\ell^-\gamma\gamma$
0.173±0.021±0.019	[6] HEINTZ	92	CSB2	$e^+e^- \rightarrow \ell^+\ell^-\gamma\gamma$

[5] Using B($\Upsilon(2S) \rightarrow \mu^+\mu^-$) = (1.37 ± 0.26)%, B($\Upsilon(3S) \rightarrow \gamma\gamma\Upsilon(2S)$)×2 B($\Upsilon(2S) \rightarrow \mu^+\mu^-$) = $(4.98 \pm 0.94 \pm 0.62) \times 10^{-4}$, and B($\Upsilon(3S) \rightarrow \gamma\chi_{b2}(2P)$) = 0.135 ± 0.003 ± 0.017. NODE=M081R2;LINKAGE=B

[6] Using B($\Upsilon(2S) \rightarrow \mu^+\mu^-$) = (1.44 ± 0.10)%, B($\Upsilon(3S) \rightarrow \gamma\chi_{b2}(2P)$) = (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	DOCUMENT ID		TECN	COMMENT
0.071±0.010 OUR AVERAGE				
0.072±0.014±0.013	[7] CRAWFORD	92B	CLE2	$e^+e^- \rightarrow \ell^+\ell^-\gamma\gamma$
0.070±0.010±0.006	[8] HEINTZ	92	CSB2	$e^+e^- \rightarrow \ell^+\ell^-\gamma\gamma$

[7] Using B($\Upsilon(1S) \rightarrow \mu^+\mu^-$) = (2.57 ± 0.07)%, B($\Upsilon(3S) \rightarrow \gamma\gamma\Upsilon(2S)$)×2 B($\Upsilon(1S) \rightarrow \mu^+\mu^-$) = $(5.03 \pm 0.94 \pm 0.63) \times 10^{-4}$, and B($\Upsilon(3S) \rightarrow \gamma\chi_{b2}(2P)$) = 0.135 ± 0.003 ± 0.017. NODE=M081R1;LINKAGE=B

[8] Using B($\Upsilon(1S) \rightarrow \mu^+\mu^-$) = (2.57 ± 0.07)%, B($\Upsilon(3S) \rightarrow \gamma\chi_{b2}(2P)$) = (11.1 ± 0.5 ± 0.4)% and assuming $e\mu$ universality. Supersedes HEINTZ 91. NODE=M081R1;LINKAGE=C

$\chi_{b2}(2P)$ REFERENCES

NODE=M081

ARTUSO	05	PRL 94 032001	M. Artuso *et al.*	(CLEO Collab.)	REFID=50454
CRONIN-HEN...	04	PRL 92 222002	D. Cronin-Hennessy *et al.*	(CLEO3 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

OTHER RELATED PAPERS

EIGEN	82	PRL 49 1616	G. Eigen *et al.*	(CUSB Collab.)	REFID=22340
HAN	82	PRL 49 1612	K. Han *et al.*	(CUSB Collab.)	REFID=22341

NODE=M048

$\Upsilon(3S)$

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

$\Upsilon(3S)$ MASS

NODE=M048205

NODE=M048M

VALUE (GeV)	DOCUMENT ID		TECN	COMMENT
10.3552±0.0005	[1] ARTAMONOV	00	MD1	$e^+e^- \rightarrow$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •				
10.3553±0.0005	[2,3] BARU	86B	REDE	$e^+e^- \rightarrow$ hadrons

[1] Reanalysis of BARU 86B using new electron mass (COHEN 87). NODE=M048M;LINKAGE=AR

[2] Reanalysis of ARTAMONOV 84. NODE=M048M;LINKAGE=C

[3] Superseded by ARTAMONOV 00. NODE=M048M;LINKAGE=RZ

$\Upsilon(3S)$ WIDTH

NODE=M048210

NODE=M048W

VALUE (keV)	DOCUMENT ID
22.1±2.7 OUR EVALUATION	See the Note on Width Determinations of the Υ states

→ 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	$\Upsilon(2S)\pi^+\pi^-$	(2.8 ±0.6) %	S=2.2	DESIG=4
Γ_3	$\Upsilon(2S)\pi^0\pi^0$	(2.00±0.32) %		DESIG=10
Γ_4	$\Upsilon(2S)\gamma\gamma$	(5.0 ±0.7) %		DESIG=12
Γ_5	$\Upsilon(1S)\pi^+\pi^-$	(4.48±0.21) %		DESIG=3
Γ_6	$\Upsilon(1S)\pi^0\pi^0$	(2.06±0.28) %		DESIG=11
Γ_7	$\Upsilon(1S)\eta$	$< 2.2 \times 10^{-3}$	CL=90%	DESIG=9
Γ_8	$\mu^+\mu^-$	(2.18±0.21) %	S=2.1	DESIG=1
Γ_9	e^+e^-	seen		DESIG=2;OUR EVAL;→ NOT CHECKED ←

Radiative decays

NODE=M048;CLUMP=B

Γ_{10}	$\gamma \chi_{b2}(2P)$	(13.1 ± 1.6) %	S=3.4	DESIG=5
Γ_{11}	$\gamma \chi_{b1}(2P)$	(12.6 ± 1.2) %	S=2.4	DESIG=6
Γ_{12}	$\gamma \chi_{b0}(2P)$	(5.9 ± 0.6) %	S=1.4	DESIG=7
Γ_{13}	$\gamma \chi_{b0}(1P)$	$(3.0 \pm 1.1) \times 10^{-3}$		DESIG=13
Γ_{14}	$\gamma \eta_b(2S)$	$< 6.2 \times 10^{-4}$	CL=90%	DESIG=14
Γ_{15}	$\gamma \eta_b(1S)$	$< 4.3 \times 10^{-4}$	CL=90%	DESIG=15

$\Upsilon(3S)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma(\text{total})$

NODE=M048218

$\Gamma(\text{hadrons}) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_0\Gamma_9/\Gamma$

NODE=M048G2
NODE=M048G2

VALUE (keV)	*DOCUMENT ID*		*TECN*	*COMMENT*
$0.45 \pm 0.03 \pm 0.03$	[4] GILES	84B	CLEO	$e^+e^- \to$ hadrons

[4] Radiative corrections reevaluated by BUCHMUELLER 88 following KURAEV 85.

NODE=M048G2;LINKAGE=R

$\Upsilon(3S)$ BRANCHING RATIOS

NODE=M048225

$\Gamma(\Upsilon(2S)\,\text{anything})/\Gamma_{\text{total}}$ — Γ_1/Γ

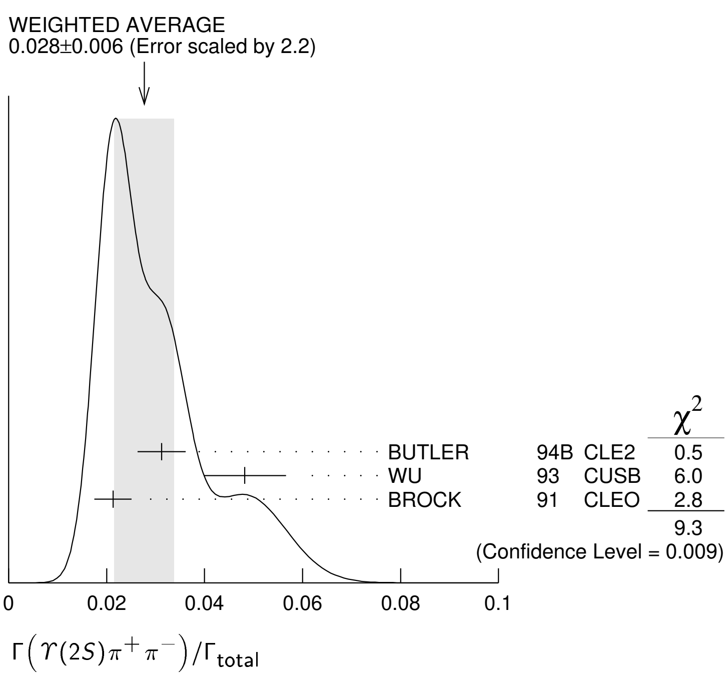
NODE=M048R8
NODE=M048R8

VALUE	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.106 ±0.008 OUR AVERAGE					
0.1023 ± 0.0105	4625	[5,6,7] BUTLER	94B	CLE2	$e^+e^- \to \ell^+\ell^- X$
0.111 ± 0.012	4891	[6,7,8] BROCK	91	CLEO	$e^+e^- \to \pi^+\pi^- X$, $\pi^+\pi^-\ell^+\ell^-$

$\Gamma(\Upsilon(2S)\pi^+\pi^-)/\Gamma_{\text{total}}$ — Γ_2/Γ

NODE=M048R4
NODE=M048R4

VALUE	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.028 ±0.006 OUR AVERAGE Error includes scale factor of 2.2. See the ideogram below.					
0.0312 ± 0.0049	980	[5,9] BUTLER	94B	CLE2	$e^+e^- \to \pi^+\pi^-\ell^+\ell^-$
$0.0482 \pm 0.0065 \pm 0.0053$	138	[8] WU	93	CUSB	$\Upsilon(3S) \to \pi^+\pi^-\ell^+\ell^-$
0.0213 ± 0.0038	974	[8] 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. • • •					
0.031 ± 0.020	5	MAGERAS	82	CUSB	$\Upsilon(3S) \to \pi^+\pi^-\ell^+\ell^-$



$\Gamma(\Upsilon(2S)\pi^0\pi^0)/\Gamma_{\text{total}}$ — Γ_3/Γ

NODE=M048R10
NODE=M048R10

VALUE	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.0200 ± 0.0032 OUR AVERAGE					
0.0216 ± 0.0039		[9,10] BUTLER	94B	CLE2	$e^+e^- \to \ell^+\ell^-\pi^0\pi^0$
$0.017 \pm 0.005 \pm 0.002$	10	[11] HEINTZ	92	CSB2	$e^+e^- \to \ell^+\ell^-\pi^0\pi^0$

$\Gamma(\Upsilon(2S)\gamma\gamma)/\Gamma_{total}$ Γ_4/Γ

NODE=M048R12
NODE=M048R12

VALUE	DOCUMENT ID		TECN	COMMENT
0.0502±0.0069	[9] BUTLER	94B	CLE2	$e^+e^- \rightarrow \ell^+\ell^- 2\gamma$

$\Gamma(\Upsilon(1S)\pi^+\pi^-)/\Gamma_{total}$ Γ_5/Γ

NODE=M048R3
NODE=M048R3

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0448±0.0021 OUR AVERAGE					
0.0452±0.0035	11830	[6] BUTLER	94B	CLE2	$e^+e^- \rightarrow \pi^+\pi^- X, \pi^+\pi^-\ell^+\ell^-$
0.0446±0.0034±0.0050	451	[6] WU	93	CUSB	$\Upsilon(3S) \rightarrow \pi^+\pi^-\ell^+\ell^-$
0.0446±0.0030	11221	[6] BROCK	91	CLEO	$e^+e^- \rightarrow \pi^+\pi^- X, \pi^+\pi^-\ell^+\ell^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.049 ±0.010	22	GREEN	82	CLEO	$\Upsilon(3S) \rightarrow \pi^+\pi^-\ell^+\ell^-$
0.039 ±0.013	26	MAGERAS	82	CUSB	$\Upsilon(3S) \rightarrow \pi^+\pi^-\ell^+\ell^-$

$\Gamma(\Upsilon(1S)\pi^0\pi^0)/\Gamma_{total}$ Γ_6/Γ

NODE=M048R11
NODE=M048R11

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0206±0.0028 OUR AVERAGE					
0.0199±0.0034	56	[6] BUTLER	94B	CLE2	$e^+e^- \rightarrow \ell^+\ell^-\pi^0\pi^0$
0.022 ±0.004 ±0.003	33	[12] HEINTZ	92	CSB2	$e^+e^- \rightarrow \ell^+\ell^-\pi^0\pi^0$

$\Gamma(\Upsilon(1S)\eta)/\Gamma_{total}$ Γ_7/Γ

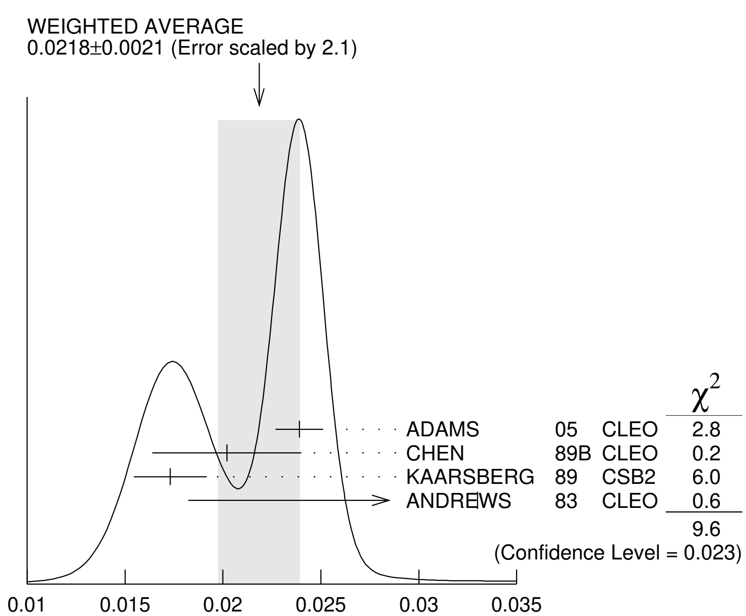
NODE=M048R9
NODE=M048R9

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0022	90	BROCK	91	CLEO	$e^+e^- \rightarrow \pi^+\pi^-\pi^0\ell^+\ell^-$

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

NODE=M048R1
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	$e^+e^- \rightarrow \mu^+\mu^-$
0.0202±0.0019±0.0033		CHEN	89B	CLEO	$e^+e^- \rightarrow \mu^+\mu^-$
0.0173±0.0015±0.0011		KAARSBERG	89	CSB2	$e^+e^- \rightarrow \mu^+\mu^-$
0.033 ±0.013 ±0.007	1096	ANDREWS	83	CLEO	$e^+e^- \rightarrow \mu^+\mu^-$

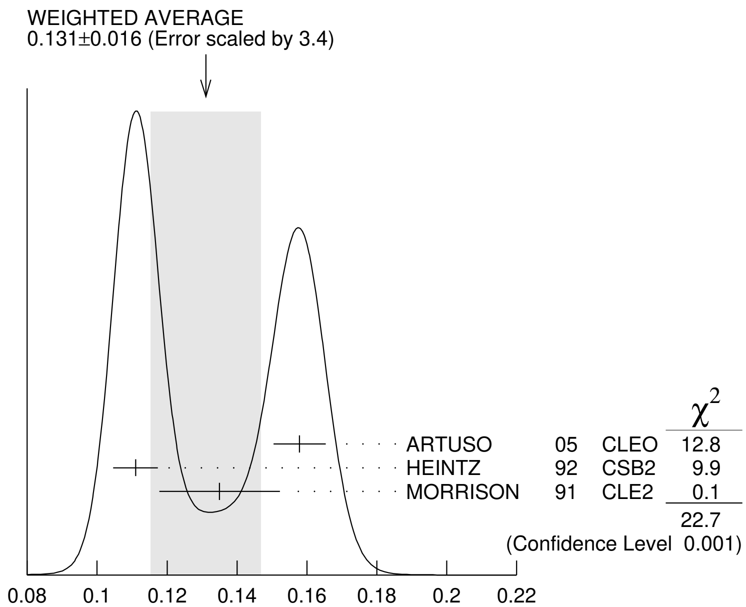


$\Gamma(\mu^+\mu^-)/\Gamma_{total}$ Γ_8/Γ

$\Gamma(\gamma \chi_{b2}(2P))/\Gamma_{total}$ Γ_{10}/Γ

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	[13] HEINTZ	92	CSB2	$e^+ e^- \rightarrow \gamma X$
0.135 ±0.003 ±0.017	30741	MORRISON	91	CLE2	$e^+ e^- \rightarrow \gamma X$

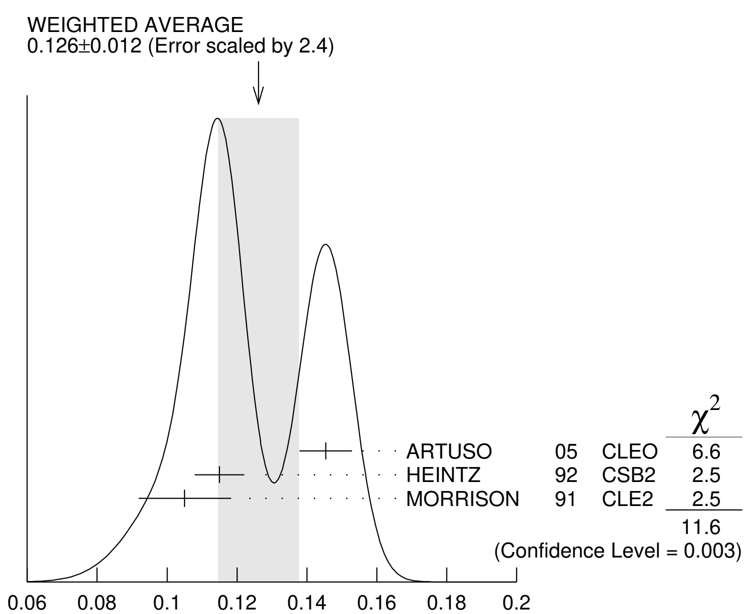


$\Gamma(\gamma \chi_{b2}(2P))/\Gamma_{total}$ Γ_{10}/Γ

$\Gamma(\gamma \chi_{b1}(2P))/\Gamma_{total}$ Γ_{11}/Γ

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	[13] HEINTZ	92	CSB2	$e^+ e^- \rightarrow \gamma X$
0.105 $^{+0.003}_{-0.002}$ ±0.013	25759	MORRISON	91	CLE2	$e^+ e^- \rightarrow \gamma X$

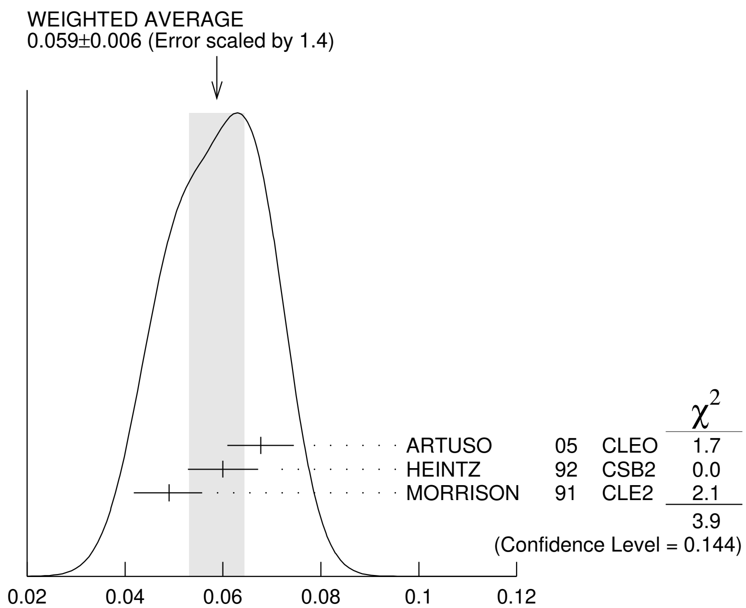


$\Gamma(\gamma \chi_{b1}(2P))/\Gamma_{total}$ Γ_{11}/Γ

$\Gamma(\gamma\chi_{b0}(2P))/\Gamma_{total}$ Γ_{12}/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	[13] HEINTZ	92	CSB2	$e^+e^- \rightarrow \gamma X$
0.049 $^{+0.003}_{-0.004}$ ±0.006	9903	MORRISON	91	CLE2	$e^+e^- \rightarrow \gamma X$



$\Gamma\Big(\gamma\chi_{b0}(2P)\Big)/\Gamma_{total}$ Γ_{12}/Γ

$\Gamma(\gamma\chi_{b0}(1P))/\Gamma_{total}$ Γ_{13}/Γ

NODE=M048R15
NODE=M048R15

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
0.30±0.04±0.10	8.7k	ARTUSO	05	CLEO	$e^+e^- \rightarrow \gamma X$

$\Gamma(\gamma\eta_b(2S))/\Gamma_{total}$ Γ_{14}/Γ

NODE=M048R16
NODE=M048R16

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<6.2	90	ARTUSO	05	CLEO	$e^+e^- \rightarrow \gamma X$

$\Gamma(\gamma\eta_b(1S))/\Gamma_{total}$ Γ_{15}/Γ

NODE=M048R17
NODE=M048R17

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<4.3	90	ARTUSO	05	CLEO	$e^+e^- \rightarrow \gamma X$

[5] 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

[6] Using B($\Upsilon(1S) \rightarrow \mu^+\mu^-$) = (2.48 ± 0.06)%. With the assumption of $e\mu$ universality. NODE=M048R;LINKAGE=B

[7] Using B($\Upsilon(2S) \rightarrow \Upsilon(1S)\pi^+\pi^-$) = (18.5 ± 0.8)%. NODE=M048R;LINKAGE=D

[8] 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

[9] From the exclusive mode. NODE=M048R;LINKAGE=M

[10] B($\Upsilon(2S) \rightarrow \mu^+\mu^-$) = (1.31 ± 0.21)% and assuming $e\mu$ universality. NODE=M048R;LINKAGE=K

[11] B($\Upsilon(2S) \rightarrow \mu^+\mu^-$) = (1.44 ± 0.10)% and assuming $e\mu$ universality. Supersedes HEINTZ 91. NODE=M048R;LINKAGE=G

[12] Using B($\Upsilon(1S) \rightarrow \mu^+\mu^-$) = (2.57 ± 0.07)% and assuming $e\mu$ universality. Supersedes HEINTZ 91. NODE=M048R;LINKAGE=I

[13] Supersedes NARAIN 91. NODE=M048R;LINKAGE=H

$\Upsilon(3S)$ REFERENCES

NODE=M048

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	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

OTHER RELATED PAPERS

GUO	05	NP A761 269	F.-K. Guo *et al.*		REFID=50828
ROSNER	03	PR D67 097504	J.L. Rosner		REFID=49425
ALEXANDER	89	NP B320 45	J.P. Alexander *et al.*	(LBL, MICH, SLAC)	REFID=40345
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
HAN	82	PRL 49 1612	K. Han *et al.*	(CUSB Collab.)	REFID=22341
PETERSON	82	PL 114B 277	D. Peterson *et al.*	(CUSB Collab.)	REFID=22360
KAPLAN	78	PRL 40 435	D.M. Kaplan *et al.*	(STON, FNAL, COLU)	REFID=22255
YOH	78	PRL 41 684	J.K. Yoh *et al.*	(COLU, FNAL, STON)	REFID=22256
COBB	77	PL 72B 273	J.H. Cobb *et al.*	(BNL, CERN, SYRA, YALE)	REFID=22248
HERB	77	PRL 39 252	S.W. Herb *et al.*	(COLU, FNAL, STON)	REFID=22249
INNES	77	PRL 39 1240	W.R. Innes *et al.*	(COLU, FNAL, STON)	REFID=22250

NODE=M047

$\Upsilon(4S)$ or $\Upsilon(10580)$

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

$\Upsilon(4S)$ MASS

NODE=M047205

NODE=M047M

VALUE (GeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
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

[1] Reanalysis of BESSON 85. NODE=M047M;LINKAGE=C

[2] No systematic error given. NODE=M047M;LINKAGE=B

$\Upsilon(4S)$ WIDTH

NODE=M047210

NODE=M047W

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
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

$\Upsilon(4S)$ 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^-	(50.6 ± 0.8) %		DESIG=10
Γ_3	$B^0\overline{B}^0$	(49.4 ± 0.8) %		DESIG=11
Γ_4	non-$B\overline{B}$	< 4 %	95%	DESIG=6
Γ_5	e^+e^-	$(2.8\pm0.7)\times10^{-5}$		DESIG=1
Γ_6	$J/\psi(1S)$anything	$< 1.9 \times10^{-4}$	95%	DESIG=2
Γ_7	D^{*+}anything + c.c.	< 7.4 %	90%	DESIG=3
Γ_8	ϕanything	$< 2.3 \times10^{-3}$	90%	DESIG=4
Γ_9	$\Upsilon(1S)$anything	$< 4 \times10^{-3}$	90%	DESIG=5
Γ_{10}	$\Upsilon(1S)\pi^+\pi^-$	$< 1.2 \times10^{-4}$	90%	DESIG=7
Γ_{11}	$\Upsilon(2S)\pi^+\pi^-$	$< 3.9 \times10^{-4}$	90%	DESIG=9

$\Upsilon(4S)$ PARTIAL WIDTHS

NODE=M047220

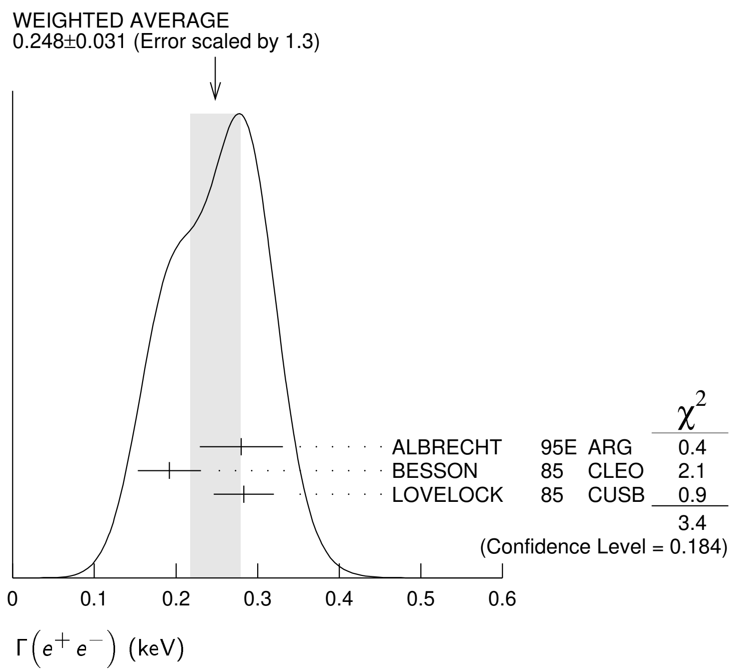
$\Gamma(e^+e^-)$ Γ_5

NODE=M047W1
NODE=M047W1

VALUE (keV)	*DOCUMENT ID*	*TECN*	*COMMENT*
0.248±0.031 OUR AVERAGE	Error includes scale factor of 1.3. See the ideogram below.		
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

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.

$\Gamma(B^+B^-)/\Gamma(B^0\overline{B}^0)$ Γ_2/Γ_3

NODE=M047R10
NODE=M047R10

→ NOT CHECKED ←

VALUE	*DOCUMENT ID*	*TECN*	*COMMENT*
1.026±0.032 OUR NEW EVALUATION	[1.029 ± 0.035 OUR 2005 EVALUATION]		
1.006±0.036±0.031	[4] AUBERT 04F	BABR	$\Upsilon(4S) \to B\overline{B} \to J/\psi K$
1.01 ±0.03 ±0.09	[4] HASTINGS 03	BELL	$\Upsilon(4S) \to B\overline{B} \to$ dileptons
1.058±0.084±0.136	[5] ATHAR 02	CLEO	$\Upsilon(4S) \to B\overline{B} \to D^*\ell\nu$
1.10 ±0.06 ±0.05	[6] AUBERT 02	BABR	$\Upsilon(4S) \to B\overline{B} \to (c\overline{c})K^*$
1.04 ±0.07 ±0.04	[7] ALEXANDER 01	CLEO	$\Upsilon(4S) \to B\overline{B} \to J/\psi K^*$

[4] HASTINGS 03 and AUBERT 04F assume $\tau(B^+)$ / $\tau(B^0)$ = 1.083 ± 0.017. NODE=M047R10;LINKAGE=F

[5] ATHAR 02 assumes $\tau(B^+)$ / $\tau(B^0)$ = 1.074 ± 0.028. Supersedes BARISH 95. NODE=M047R10;LINKAGE=D

[6] AUBERT 02 assumes $\tau(B^+)$ / $\tau(B^0)$ = 1.062 ± 0.029. NODE=M047R10;LINKAGE=E

[7] ALEXANDER 01 assumes $\tau(B^+)$ / $\tau(B^0)$ = 1.066 ± 0.024. NODE=M047R10;LINKAGE=C

$\Gamma(B^+B^-)/\Gamma_{total}$ Γ_2/Γ

NODE=M047R11
NODE=M047R11

→ NOT CHECKED ←

VALUE	*DOCUMENT ID*
0.506±0.008 OUR NEW EVALUATION	Assuming B($\Upsilon(4S) \to B\overline{B}$) = 1 [0.507±0.008 OUR 2005 EVALUATION]

$\Gamma(B^0\overline{B}^0)/\Gamma_{total}$ Γ_3/Γ

NODE=M047R12
NODE=M047R12

VALUE	DOCUMENT ID	TECN	COMMENT
0.494±0.008 OUR NEW EVALUATION Assuming B($\Upsilon(4S) \to B\overline{B}$) = 1 [0.493 ± 0.008 OUR 2005 EVALUATION]			
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.487±0.010±0.008	[8] AUBERT,B 05H	BABR	$\Upsilon(4S) \to \overline{B}B \to D^* \ell \nu_\ell$

→ NOT CHECKED ←

[8] 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

non-$B\overline{B}$ DECAYS

NODE=M047NBB

$\Gamma(e^+e^-)/\Gamma_{total}$ Γ_5/Γ

NODE=M047R5
NODE=M047R5

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
2.77±0.50±0.49	[9] ALBRECHT 95E	ARG	$e^+e^- \to$ hadrons

[9] Using LEYAOUANC 77 parametrization of $\Gamma(s)$.

NODE=M047R5;LINKAGE=A

$\left[\Gamma(D^{*+}\text{anything}) + \Gamma(\text{c.c.})\right]/\Gamma_{total}$ Γ_7/Γ

NODE=M047R2
NODE=M047R2

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.074	90	[10] ALEXANDER 90C	CLEO	e^+e^-

[10] For $x >$ 0.473.

NODE=M047R2;LINKAGE=A

$\Gamma(\phi\text{anything})/\Gamma_{total}$ Γ_8/Γ

NODE=M047R3
NODE=M047R3

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.0023	90	[11] ALEXANDER 90C	CLEO	e^+e^-

[11] For $x >$ 0.52.

NODE=M047R3;LINKAGE=A

$\Gamma(J/\psi(1S)\text{anything})/\Gamma_{total}$ Γ_6/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

$\Gamma(\Upsilon(1S)\text{anything})/\Gamma_{total}$ Γ_9/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_{10}/Γ

NODE=M047R7
NODE=M047R7

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT
<1.2	90	GLENN 99	CLE2	e^+e^-

$\Gamma(\Upsilon(2S)\pi^+\pi^-)/\Gamma_{total}$ Γ_{11}/Γ

NODE=M047R9
NODE=M047R9

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT
<3.9	90	GLENN 99	CLE2	e^+e^-

$\Gamma(\text{non-}B\overline{B})/\Gamma_{total}$ Γ_4/Γ

NODE=M047R6
NODE=M047R6

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.04	95	BARISH 96B	CLEO	e^+e^-

$\Upsilon(4S)$ REFERENCES

NODE=M047

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

OTHER RELATED PAPERS

ABE	01J	PR D64 072001	K. Abe *et al.*	(BELLE Collab.)	REFID=48342
HENDERSON	92	PR D45 2212	S. Henderson *et al.*	(CLEO Collab.)	REFID=42014
ANDREWS	80B	PRL 45 219	D. Andrews *et al.*	(CLEO Collab.)	REFID=11576
FINOCCHI...	80	PRL 45 222	G. Finocchiaro *et al.*	(CUSB Collab.)	REFID=11577

NODE=M092

$\Upsilon(10860)$

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

Υ(10860) MASS

NODE=M092205

NODE=M092M

VALUE (GeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
10.865±0.008 OUR AVERAGE	Error includes scale factor of 1.1.			
10.868±0.006±0.005	BESSON	85	CLEO	$e^+e^- \to$ hadrons
10.845±0.020	LOVELOCK	85	CUSB	$e^+e^- \to$ hadrons

Υ(10860) WIDTH

NODE=M092210

NODE=M092W

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
110±13 OUR AVERAGE				
112±17±23	BESSON	85	CLEO	$e^+e^- \to$ hadrons
110±15	LOVELOCK	85	CUSB	$e^+e^- \to$ hadrons

Υ(10860) DECAY MODES

NODE=M092215;NODE=M092

	Mode	Fraction (Γ_i/Γ)
Γ_1	e^+e^-	$(2.8\pm0.7)\times10^{-6}$

DESIG=1

Υ(10860) PARTIAL WIDTHS

NODE=M092220

$\Gamma(e^+e^-)$ Γ_1

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	$e^+e^- \to$ hadrons
0.365±0.070	LOVELOCK	85	CUSB	$e^+e^- \to$ hadrons

Υ(10860) REFERENCES

NODE=M092

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=M093205

NODE=M093M

VALUE (GeV)	DOCUMENT ID		TECN	COMMENT
11.019±0.008 OUR AVERAGE				
11.019±0.005±0.007	BESSON	85	CLEO	$e^+e^- \rightarrow$ hadrons
11.020±0.030	LOVELOCK	85	CUSB	$e^+e^- \rightarrow$ hadrons

$\Upsilon(11020)$ WIDTH

NODE=M093210

NODE=M093W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
79±16 OUR AVERAGE				
61±13±22	BESSON	85	CLEO	$e^+e^- \rightarrow$ hadrons
90±20	LOVELOCK	85	CUSB	$e^+e^- \rightarrow$ hadrons

$\Upsilon(11020)$ 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	$e^+e^- \rightarrow$ hadrons
0.156±0.040	LOVELOCK	85	CUSB	$e^+e^- \rightarrow$ hadrons

$\Upsilon(11020)$ REFERENCES

NODE=M093

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

NON-$q\overline{q}$ CANDIDATES

NODE=MXXX050

We include here mini-reviews and reference lists on gluonium and other non-$q\overline{q}$ candidates. See also the section on Further States for possible bound states.

NODE=MXXX050

A REVIEW GOES HERE – Check our WWW List of Reviews

NODE=MXXX050

Non-$q\overline{q}$ Candidates

NODE=M201

OMITTED FROM SUMMARY TABLE

NON-$q\overline{q}$ CANDIDATES REFERENCES

NODE=M201

KOCHELEV 06 PL B633 283 N. Kochelev, D-P. Min REFID=51000
ANIKIN 05 PL B626 86 I.V. Anikin, B. Pire, O.V. Teryaev REFID=50770
AUBERT 05B PR D71 031501R B. Aubert *et al.* (BABAR Collab.) REFID=50498
AUBERT,B 05I PRL 95 142001 B. Aubert *et al.* (BABAR Collab.) REFID=50776
BICUDO 05 NP A748 537 P. Bicudo REFID=50455
BRITO 05 PL B608 69 T.V. Brito *et al.* REFID=50456
CHANG 05B PL B623 218 C.-H. Chang, C.S. Kim, G. Wang REFID=50787
CLOSE 05A PL B628 215 F.E. Close, P.R. Page REFID=50830
GIACOSA 05 PR C71 025202 F. Giacosa *et al.* REFID=50500
GUO 05 NP A761 269 F.-K. Guo *et al.* REFID=50828
HEDDITCH 05 PR D72 114507 J.N. Hedditch *et al.* REFID=50998
HUANG 05A PR D71 114015 M.Q. Huang, D.W. Wang REFID=50795
JAFFE 05 PRPL 409 1 R.L. Jaffe REFID=50502
KANADA-EN... 05 PR D71 094005 Y. Kanada-Enyo, O. Morimatsu, T. Nishikawa REFID=50800
KIM 05 PR D71 034025 T. Kim, P. Ko REFID=50499
KIM 05A PR D72 074012 H. Kim, Y. Oh REFID=50841
KOU 05 PL B631 164 E. Kou REFID=50967
LI 05 PL B605 306 B.A. Li REFID=50339
LI 05E MPL A20 2497 D.-M. Li *et al.* REFID=50968

LIU	05	PR D72 054023	X. Liu, X.Q. Zeng, X.Q. Li		REFID=50805
LU	05	PRL 94 032002	M. Lu *et al.*	(BNL E852 Collab.)	REFID=50459
MAIANI	05A	PR D72 031502R	L. Maiani *et al.*		REFID=50806
POPLAWSKI	05	PR D71 056003	N.J. Poplawski, A.P. Szczepaniak, J.T. Londergan		REFID=50809
SETH	05	PL B612 1	K.K. Seth		REFID=50814
WANG	05A	PL B617 141	M.-Z. Wang *et al.*	(BELLE Collab.)	REFID=50651
ZHANG	05	PR D71 011502R	Z.F. Zhang, H.Y. Jin		REFID=50461
ZHU	05	PL B625 212	S.-L. Zhu		REFID=50822
ABE	04	EPJ C32 323	K. Abe *et al.*	(BELLE Collab.)	REFID=49650
AMSLER	04	PRPL 389 61	C. Amsler, N.A. Tornqvist		REFID=49701
AMSLER	04A	NP A740 130	C. Amsler *et al.*		REFID=50166
BARNES	04	PR D69 054008	T. Barnes, S. Godfrey		REFID=49756
BARNES	04A	PL B600 223	T. Barnes *et al.*		REFID=50171
BARU	04	PL B586 53	V. Baru *et al.*		REFID=49757
BRAATEN	04	PR D69 074005	E. Braaten *et al.*		REFID=49760
BRAATEN	04B	PRL 93 162001	E. Braaten, M. Kusunoki, S. Nussinov		REFID=50199
BUGG	04C	PRPL 397 257	D.V. Bugg		REFID=50203
CHAO	04A	PL B599 43	K.-T. Chao		REFID=50170
CHEN	04	PR D69 076003	J.-X. Chen, J.-C. Su		REFID=49764
CHEN	04A	PR D69 054002	C.-H. Chen		REFID=50180
CHEN	04C	PRL 93 232001	Y.-Q. Chen, X.-Q. Li		REFID=50334
CLOSE	04A	PR D70 094015	F.E. Close, J.J. Dudek		REFID=50192
CLOSE	04B	PR D69 034010	F.E. Close, J.J. Dudek		REFID=50318
COHEN	04	PL B578 359	T.D. Cohen *et al.*		REFID=49765
DAI	04	JHEP 0411 043	Y.-B. Dai *et al.*		REFID=50335
DMITRASINOVIC	04	PR D70 096011	V. Dmitrasinovic		REFID=50336
FADDEEV	04	PR D70 114033	L. Faddeev *et al.*		REFID=50338
FARIBORZ	04	IJMP A19 2095	A.H. Fariborz		REFID=50160
GLOZMAN	04	PL B587 69	L.Ya. Glozman		REFID=49770
KUHN	04	PL B595 109	J. Kuhn *et al.*	(BNL E852 Collab.)	REFID=49773
LIPKIN	04	PL B580 50	H.J. Lipkin		REFID=49776
LIU	04A	PR D70 094009	Y.-R. Liu		REFID=50191
LONGACRE	04	PR D70 094041	R.S. Longacre, S.J. Lindenbaum		REFID=50341
MAIANI	04	PR D70 054009	L. Maiani *et al.*		REFID=50181
NAPSUCIALE	04A	PR D70 094043	N.N. Napsuciale, S. Rodriguez		REFID=50345
PELAEZ	04	PRL 92 102001	J.R. Pelaez		REFID=49777
PELAEZ	04A	MPL A19 2879	J.R. Pelaez		REFID=50347
SWANSON	04	PL B582 167	E. Swanson		REFID=49780
SWANSON	04A	PL B588 189	E. Swanson		REFID=49781
SWANSON	04B	PL B598 197	E. Swanson		REFID=50168
TESHIMA	04	JPG 30 663	T. Teshima *et al.*		REFID=50161
TORNQVIST	04	PL B590 209	N. Tornqvist		REFID=49782
VANBEVEREN	04	MPL A19 1949	E. Banbeveren, G. Rupp		REFID=50164
VOLOSHIN	04A	PL B604 69	M.B. Voloshin		REFID=50205
WONG	04	PR C69 055202	C. Wong		REFID=50177
ZOU	04	PR D69 034004	B.S. Zou, H.C. Chiang		REFID=49784
AUBERT	03G	PRL 90 242001	B. Aubert *et al.*	(BaBar Collab.)	REFID=49417
BARNES	03	PR D68 054006	T. Barnes *et al.*		REFID=49581
BESSON	03	PR D68 032002	D. Besson *et al.*	(CLEO Collab.)	REFID=49583
CHENG	03B	PR D67 054021	H.Y. Cheng		REFID=49397
CHENG	03C	PL B566 193	H.-Y. Cheng, W.-S. Hou		REFID=49469
TERASAKI	03	PR D68 011501	K. Terasaki		REFID=49474
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
AMSLER	02	EPJ C23 29	C. Amsler *et al.*		REFID=48580
AMSLER	02B	PL B541 22	C. Amsler		REFID=48826
CHUNG	02C	EPL A15 539	S.U. Chung, E. Klempt, J.G. Korener		REFID=49176
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
AMSLER	01	PL B520 175	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=48558
CLOSE	01B	EPJ C21 531	F.E. Close, A. Kirk		REFID=48357
IDDIR	01	PL B507 183	F. Iddir, A.S. Safir		REFID=48326
IVANOV	01	PRL 86 3977	E.I. Ivanov *et al.*	(BNL E852 Collab.)	REFID=48317
ACHASOV	00F	PL B479 53	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=47928
ALFORD	00	NP B578 367	M. Alford, R.L. Jaffe		REFID=47938
BARATE	00E	PL B472 189	R. Barate *et al.*	(ALEPH Collab.)	REFID=47428
BARBERIS	00C	PL B471 440	D. Barberis *et al.*	(WA 102 Collab.)	REFID=47959
KIRK	00	PL B489 29	A. Kirk		REFID=47985
ABELE	99	PL B446 349	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=46602
BAKER	99	PL B449 114	C.A. Baker *et al.*		REFID=46888
BARBERIS	99D	PL B462 462	D. Barberis *et al.*	(Omega Expt.)	REFID=47395
CHUNG	99	PR D60 092001	S.U. Chung *et al.*	(BNL E852 Collab.)	REFID=47387
DELBOURGO	99	PL B446 332	R. Delbourgo, D. Liu, M. Scadron		REFID=46607
DONNACHIE	99	PR D60 114011	A. Donnachie, Yu.S. Kalashnikova		REFID=47388
DUENNWEBER	99	NP A 663 + 664, 592C	W. Duennweber		REFID=47548
Proc. XV Particles and Nuclei Int. Conf., Uppsala					
MINKOWSKI	99	EPJ C9 283	P. Minkowski, W. Ochs		REFID=46928
MORNINGSTAR	99	PR D60 034509	C.J. Morningstar, M. Peardon		REFID=46933
PAGE	99	PR D59 034016	P.R. Page, E.S. Swanson, A.P. Szczepaniak		REFID=46617
ABELE	98B	PL B423 175	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=45864
ADAMS	98B	PRL 81 5760	G.S. Adams *et al.*	(BNL E852 Collab.)	REFID=46610
AMSLER	98	RMP 70 1293	C. Amsler		REFID=46601
BARBERIS	98	PL B432 436	D. Barberis *et al.*	(Omega Expt.)	REFID=46344
BERTIN	98	PR D57 55	A. Bertin *et al.*	(OBELIX Collab.)	REFID=45782
CLOSE	98B	PL B419 387	F.E. Close		REFID=46361
DONNACHIE	98	PR D58 114012	A. Donnachie *et al.*		REFID=46598
EVANGELISTA	98	PR D57 5370	C. Evangelista *et al.*	(JETSET Collab.)	REFID=46365
LOCHER	98	EPJ C4 317	M.P. Locher *et al.*	(PSI)	REFID=46372
ANISOVICH	97	PL B395 123	A.V. Anisovich, A.V. Sarantsev	(PNPI)	REFID=45388
BARBERIS	97B	PL B413 217	D. Barberis *et al.*	(WA 102 Collab.)	REFID=45758
BARNES	97	PR D55 4157	T. Barnes *et al.*	(ORNL, RAL, MCHS)	REFID=45384

BERNARD	97	PR D56 7039	C. Bernard *et al.*	(MILC Collab.)	REFID=47516
BOGLIONE	97	PRL 79 1998	M. Boglione *et al.*		REFID=45694
CLOSE	97	PL B397 333	F. Close *et al.*	(RAL, BIRM)	REFID=45390
FRABETTI	97	PL B391 235	P.L. Frabetti *et al.*	(FNAL E687 Collab.)	REFID=45246
LACOCK	97	PL B401 308	P. Lacock *et al.*	(EDIN, LIVP)	REFID=45773
MICHAEL	97	Hadron 97 Conf.	C. Michael		REFID=47550
AIP Conf. Proc.		432 657			
OLLER	97B	Hadron 97 Conf.	J.A. Oller, E. Oset		REFID=47551
AIP Conf. Proc.		432 413			
THOMPSON	97	PRL 79 1630	D.R. Thompson *et al.*	(E852 Collab.)	REFID=45584
WEINGARTEN	97	NPPS 53 232	D. Weingarten		REFID=47553
ABELE	96B	PL B385 425	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=45038
ADOMEIT	96	ZPHY C71 227	J. Adomeit *et al.*	(Crystal Barrel Collab.)	REFID=45202
AMSLER	96	PR D53 295	C. Amsler, F.E. Close	(ZURI, RAL)	REFID=44635
BAI	96B	PRL 76 3502	J.Z. Bai *et al.*	(BES Collab.)	REFID=44736
TORNQVIST	96	PRL 76 1575	N.A. Tornqvist, M. Roos	(HELS)	REFID=44507
AMELIN	95B	PL B356 595	D.V. Amelin *et al.*	(SERP, TBIL)	REFID=44433
CLOSE	95	NP B443 233	F.E. Close, P.R. Page	(RAL)	REFID=44643
PROKOSHKIN	95B	PAN 58 606	Y.D. Prokoshkin, S.A. Sadovsky	(SERP)	REFID=44619
		Translated from YAF 58 662.			
PROKOSHKIN	95C	PAN 58 853	Y.D. Prokoshkin, S.A. Sadovsky	(SERP)	REFID=44620
		Translated from YAF 58 921.			
SEXTON	95	PRL 75 4563	J. Sexton *et al.*	(IBM)	REFID=44634
LEE	94	PL B323 227	J.H. Lee *et al.*	(BNL, IND, KYUN, MASD+)	REFID=44092
BALI	93	PL B309 378	G.S. Bali *et al.*	(LIVP)	REFID=43607
BELADIDZE	93	PL B313 276	G.M. Beladidze *et al.*	(VES Collab.)	REFID=43598
ADAMO	92	PL B287 368	A. Adamo *et al.*	(OBELIX Collab.)	REFID=42177
GOUZ	92	Dallas HEP 92, p. 572	Yu.P. Gouz *et al.*	(VES Collab.)	REFID=47527
Proceedings XXVI Int. Conf. on High Energy Physics					
KARCH	92	ZPHY C54 33	K. Karch *et al.*	(Crystal Ball Collab.)	REFID=42170
ALDE	90	PL B241 600	D.M. Alde *et al.*	(SERP, BELG, LANL, LAPP+)	REFID=40935
MAY	90	ZPHY C46 203	B. May *et al.*	(ASTERIX Collab.)	REFID=41365
WEINSTEIN	90	PR D41 2236	J. Weinstein, N. Isgur	(TNTO)	REFID=43674
ALDE	88B	PL B205 397	D.M. Alde *et al.*	(SERP, BELG, LANL, LAPP)	REFID=40558
ASTON	88D	NP B301 525	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)	REFID=40330
ETKIN	88	PL B201 568	A. Etkin *et al.*	(BNL, CUNY)	REFID=40285
CLOSE	87B	PL B196 245	F.E. Close, H.J. Lipkin		REFID=47547
BOOTH	86	NP B273 677	P.S.L. Booth *et al.*	(LIVP, GLAS, CERN)	REFID=21870
BARNES	85	PL B165 434	T. Barnes		REFID=47526
ISGUR	85	PRL 54 869	N. Isgur, R. Kokoski, J. Paton	(TNTO)	REFID=43675
JAFFE	77	PR D15 267,281	R. Jaffe	(MIT)	REFID=43673