$f_0(1500)$

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

See the review on "Spectroscopy of Light Meson Resonances."

$f_0(1500)$ MASS

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
1506 ± 6 OUR AVERAGE				Error includes scale factor of 1.4. See the ideogram below.
1515 ±12		[1] BARBERIS 00A		450 $pp \to p_f \eta\eta p_s$
1511 ± 9		[1,2] BARBERIS 00C		450 $pp \to p_f 4\pi p_s$
1510 ± 8		[1] BARBERIS 00E		450 $pp \to p_f \eta\eta p_s$
1522 ±25		[1] BERTIN 98	OBLX	0.05–0.405 $\overline{n}p \to \pi^+\pi^+\pi^-$
1449 ±20		[1] BERTIN 97C	OBLX	0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$
1500 ±10		[3] AMSLER 95D	CBAR	0.0 $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1450 ±10		[4] RODAS 22	RVUE	$J/\psi(1S) \to \gamma(\pi\pi, K\overline{K})$
1483 ±15		[1] SARANTSEV 21	RVUE	$J/\psi(1S) \to \gamma(\pi\pi, K\overline{K}, \eta\eta, \omega\phi)$
1496 ± $1.2^{+4.4}_{-26.4}$		[5] ALBRECHT 20	RVUE	0.9 $\overline{p}p \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0K^+K^-$
1465 ±18		[6] ROPERTZ 18	RVUE	$\overline{B}^0_s \to J/\psi(\pi^+\pi^- / K^+K^-)$
1447 ±16 ± 13	163	[7,8] DOBBS 15		$J/\psi \to \gamma\pi^+\pi^-$
1442 ± 9 ± 4	261	[7,8] DOBBS 15		$\psi(2S) \to \gamma\pi^+\pi^-$
1460.9± 2.9		[9] AAIJ 14BR	LHCB	$\overline{B}^0_s \to J/\psi\pi^+\pi^-$
1468 $^{+14}_{-15}$ $^{+23}_{-74}$	5.5k	[10] ABLIKIM 13N	BES3	$e^+e^- \to J/\psi \to \gamma\eta\eta$
1486 ±10		[1] ANISOVICH 09	RVUE	0.0 $\overline{p}p$, πN
1470 ±60	568	[11] KLEMPT 08	E791	$D^+_s \to \pi^-\pi^+\pi^+$
1470 $^{+6}_{-7}$ $^{+72}_{-255}$		[12] UEHARA 08A	BELL	10.6 $e^+e^- \to e^+e^-\pi^0\pi^0$
1466 ± 6 ± 20		[13] ABLIKIM 06V	BES2	$e^+e^- \to J/\psi \to \gamma\pi^+\pi^-$
1495 ± 4		AMSLER 06	CBAR	0.9 $\overline{p}p \to K^+K^-\pi^0$
1539 ±20	9.9k	AUBERT 06O	BABR	$B^+ \to K^+K^+K^-$
1473 ± 5	80k	[13,14] UMAN 06	E835	5.2 $\overline{p}p \to \eta\eta\pi^0$
1478 ± 6		VLADIMIRSK...06	SPEC	40 $\pi^-p \to K^0_S K^0_S n$
1493 ± 7		[13] BINON 05	GAMS	33 $\pi^-p \to \eta\eta n$
1524 ±14	1400	[15] GARMASH 05	BELL	$B^+ \to K^+K^+K^-$
1489 $^{+8}_{-4}$		[16] ANISOVICH 03	RVUE	
1490 ±30		[13] ABELE 01	CBAR	0.0 $\overline{p}d \to \pi^- 4\pi^0 p$
1497 ±10		[13] BARBERIS 99	OMEG	450 $pp \to p_s p_f K^+K^-$
1502 ±10		[13] BARBERIS 99B	OMEG	450 $pp \to p_s p_f \pi^+\pi^-$
1502 ±12 ± 10		[17] BARBERIS 99D	OMEG	450 $pp \to K^+K^-$, $\pi^+\pi^-$

1530 ±45		[13] BELLAZZINI	99	GAM4	450 $pp \to pp\pi^0\pi^0$
1505 ±18		[13] FRENCH	99		300 $pp \to p_f(K^+K^-)p_s$
1447 ±27		[18] KAMINSKI	99	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$, $\sigma\sigma$
1580 ±80		[13] ALDE	98	GAM4	100 $\pi^- p \to \pi^0\pi^0 n$
1499 ± 8		[1] ANISOVICH	98B	RVUE	Compilation
∼ 1520		REYES	98	SPEC	800 $pp \to p_s p_f K^0_S K^0_S$
1510 ±20		[1] BARBERIS	97B	OMEG	450 $pp \to pp2(\pi^+\pi^-)$
∼ 1475		FRABETTI	97D	E687	$D^\pm_s \to \pi^\mp\pi^\pm\pi^\pm$
∼ 1505		ABELE	96	CBAR	0.0 $\overline{p}p \to 5\pi^0$
1515 ±20		ABELE	96B	CBAR	0.0 $\overline{p}p \to \pi^0 K^0_L K^0_L$
1500 ± 8		[1] ABELE	96C	RVUE	Compilation
1460 ±20	120	[13] AMELIN	96B	VES	37 $\pi^- A \to \eta\eta\pi^- A$
1500 ± 8		BUGG	96	RVUE	
1500 ±15		[19] AMSLER	95B	CBAR	0.0 $\overline{p}p \to 3\pi^0$
1505 ±15		[20] AMSLER	95C	CBAR	0.0 $\overline{p}p \to \eta\eta\pi^0$
1445 ± 5		[21] ANTINORI	95	OMEG	300,450 $pp \to pp2(\pi^+\pi^-)$
1497 ±30		[13] ANTINORI	95	OMEG	300,450 $pp \to pp\pi^+\pi^-$
∼ 1505		BUGG	95	MRK3	$J/\psi \to \gamma\pi^+\pi^-\pi^+\pi^-$
1446 ± 5		[13] ABATZIS	94	OMEG	450 $pp \to pp2(\pi^+\pi^-)$
1545 ±25		[13] AMSLER	94E	CBAR	0.0 $\overline{p}p \to \pi^0\eta\eta'$
1520 ±25		[1,22] ANISOVICH	94	CBAR	0.0 $\overline{p}p \to 3\pi^0, \pi^0\eta\eta$
1505 ±20		[1,23] BUGG	94	RVUE	$\overline{p}p \to 3\pi^0$, $\eta\eta\pi^0$, $\eta\pi^0\pi^0$
1560 ±25		[13] AMSLER	92	CBAR	0.0 $\overline{p}p \to \pi^0\eta\eta$
1550 ±45 ± 30		[13] BELADIDZE	92C	VES	36 π^- Be $\to \pi^-\eta'\eta$ Be
1449 ± 4		[13] ARMSTRONG	89E	OMEG	300 $pp \to pp2(\pi^+\pi^-)$
1610 ±20		[13] 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	[13] ALDE	87	GAM4	100 $\pi^- p \to 4\pi^0 n$
1575 ±45		[24] ALDE	86D	GAM4	100 $\pi^- p \to 2\eta n$
1568 ±33		[13] BINON	84C	GAM2	38 $\pi^- p \to \eta\eta' n$
1592 ±25		[13] BINON	83	GAM2	38 $\pi^- p \to 2\eta n$
1525 ± 5		[13] GRAY	83	DBC	0.0 $\overline{p}N \to 3\pi$

[1] T-matrix pole.

[2] Average between $\pi^+\pi^-2\pi^0$ and $2(\pi^+\pi^-)$.

[3] T-matrix pole. Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D.

[4] T-matrix pole from coupled channel K-matrix fit to data on $J/\psi \to \gamma\pi^0\pi^0$ (ABLIKIM 15AE) and $J/\psi \to \gamma K^0_S K^0_S$ (ABLIKIM 18AA).

[5] T-matrix pole, 5 poles, 5 channels, including scattering data from HYAMS 75 ($\pi\pi$), LONGACRE 86 ($K\overline{K}$), BINON 83 ($\eta\eta$), and BINON 84C ($\eta\eta'$).

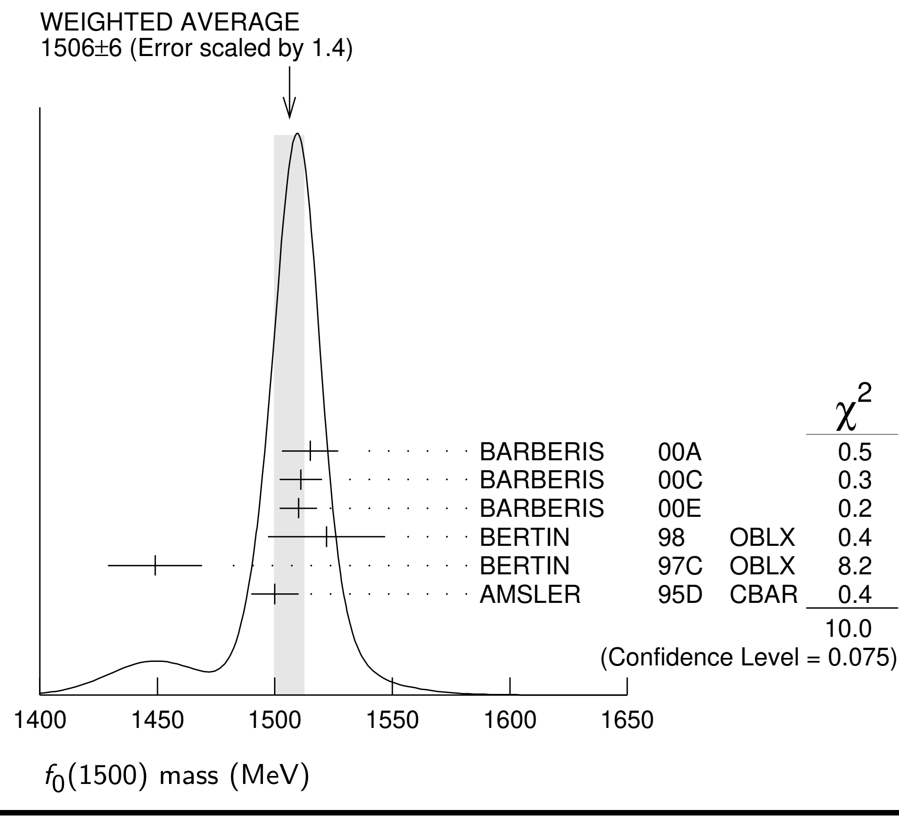
[6] T-matrix pole of 3 channel unitary model fit to data from AAIJ 14BR and AAIJ 17V extracted using Pade approximants.

[7] Using CLEO-c data but not authored by the CLEO Collaboration.

[8] From a fit to a Breit-Wigner line shape with fixed Γ = 109 MeV.

[9] Solution I, statistical error only.

[10] From partial wave analysis including all possible combinations of 0^{++}, 2^{++}, and 4^{++} resonances.
[11] Reanalysis of AITALA 01A data. This state could also be $f_0(1370)$.
[12] Breit-Wigner mass. May also be the $f_0(1370)$.
[13] Breit-Wigner mass.
[14] Statistical error only.
[15] Breit-Wigner, solution 1, PWA ambiguous.
[16] K-matrix pole from combined analysis of $\pi^- p \to \pi^0 \pi^0 n$, $\pi^- p \to K\overline{K} n$, $\pi^+\pi^- \to \pi^+\pi^-$, $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$, $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, $K^0_S K^0_S \pi^0$, $K^+ K^0_S \pi^-$ at rest, $\overline{p}n \to \pi^-\pi^-\pi^+$, $K^0_S K^- \pi^0$, $K^0_S K^0_S \pi^-$ at rest.
[17] Supersedes BARBERIS 99 and BARBERIS 99B.
[18] T-matrix pole on sheet $--+$.
[19] T-matrix pole, supersedes ANISOVICH 94.
[20] T-matrix pole, supersedes ANISOVICH 94 and AMSLER 92.
[21] Supersedes ABATZIS 94, ARMSTRONG 89E. Breit-Wigner mass.
[22] From a simultaneous analysis of the annihilations $\overline{p}p \to 3\pi^0, \pi^0\eta\eta$.
[23] Reanalysis of ANISOVICH 94 data.
[24] From central value and spread of two solutions. Breit-Wigner mass.



$f_0(1500)$ WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
112 ± 9 OUR AVERAGE					
110 ± 24		[1] BARBERIS	00A		450 $pp \to p_f \eta\eta p_s$
102 ± 18		[1,2] BARBERIS	00C		450 $pp \to p_f 4\pi p_s$
110 ± 16		[1] BARBERIS	00E		450 $pp \to p_f \eta\eta p_s$

108 ± 33		[1] BERTIN	98	OBLX	0.05–0.405 $\overline{n} p \to \pi^+ \pi^+ \pi^-$
114 ± 30		[1] BERTIN	97C	OBLX	0.0 $\overline{p} p \to \pi^+ \pi^- \pi^0$
154 ± 30		[3] AMSLER	95D	CBAR	0.0 $\overline{p} p \to \pi^0 \pi^0 \pi^0$, $\pi^0 \eta \eta$, $\pi^0 \pi^0 \eta$

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

106 ± 16		[4] RODAS	22	RVUE	$J/\psi(1S) \to \gamma (\pi\pi, K\overline{K})$
116 ± 12		[1] SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma (\pi\pi, K\overline{K}, \eta\eta, \omega\phi)$
$80.8 \pm 0.6^{+20.0}_{-5.0}$		[5] ALBRECHT	20	RVUE	0.9 $\overline{p} p \to \pi^0 \pi^0 \eta$, $\pi^0 \eta \eta$, $\pi^0 K^+ K^-$
100 ± 18		[6] ROPERTZ	18	RVUE	$\overline{B}^0_s \to J/\psi(\pi^+\pi^- / K^+ K^-)$
124 ± 7		[7] AAIJ	14BR	LHCB	$\overline{B}^0_s \to J/\psi \pi^+ \pi^-$
$136^{+41}_{-26}{}^{+28}_{-100}$	5.5k	[8] ABLIKIM	13N	BES3	$e^+ e^- \to J/\psi \to \gamma \eta \eta$
114 ± 10		[1] ANISOVICH	09	RVUE	0.0 $\overline{p} p$, πN
$90^{+2}_{-1}{}^{+50}_{-22}$		[9] UEHARA	08A	BELL	10.6 $e^+ e^- \to e^+ e^- \pi^0 \pi^0$
$108^{+14}_{-11} \pm 25$		[10] ABLIKIM	06V	BES2	$e^+ e^- \to J/\psi \to \gamma \pi^+ \pi^-$
121 ± 8		AMSLER	06	CBAR	0.9 $\overline{p} p \to K^+ K^- \pi^0$
257 ± 33	9.9k	AUBERT	06O	BABR	$B^+ \to K^+ K^+ K^-$
108 ± 9	80k	[10,11] UMAN	06	E835	5.2 $\overline{p} p \to \eta \eta \pi^0$
119 ± 10		VLADIMIRSK...	06	SPEC	40 $\pi^- p \to K^0_S K^0_S n$
90 ± 15		[10] BINON	05	GAMS	33 $\pi^- p \to \eta \eta n$
136 ± 23	1400	[12] GARMASH	05	BELL	$B^+ \to K^+ K^+ K^-$
102 ± 10		[13] ANISOVICH	03	RVUE	
140 ± 40		[10] ABELE	01	CBAR	0.0 $\overline{p} d \to \pi^- 4\pi^0 p$
104 ± 25		[10] BARBERIS	99	OMEG	450 $p p \to p_s p_f K^+ K^-$
131 ± 15		[10] BARBERIS	99B	OMEG	450 $p p \to p_s p_f \pi^+ \pi^-$
98 ± 18 ± 16		[14] BARBERIS	99D	OMEG	450 $p p \to K^+ K^-$, $\pi^+ \pi^-$
160 ± 50		[10] BELLAZZINI	99	GAM4	450 $p p \to p p \pi^0 \pi^0$
100 ± 33		[10] FRENCH	99		300 $p p \to p_f (K^+ K^-) p_s$
108 ± 46		[15] KAMINSKI	99	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$, $\sigma\sigma$
280 ± 100		[10] ALDE	98	GAM4	100 $\pi^- p \to \pi^0 \pi^0 n$
130 ± 20		[1] ANISOVICH	98B	RVUE	Compilation
120 ± 35		[1] BARBERIS	97B	OMEG	450 $p p \to p p 2(\pi^+ \pi^-)$
∼ 100		FRABETTI	97D	E687	$D^\pm_s \to \pi^\mp \pi^\pm \pi^\pm$
∼ 169		ABELE	96	CBAR	0.0 $\overline{p} p \to 5\pi^0$
105 ± 15		ABELE	96B	CBAR	0.0 $\overline{p} p \to \pi^0 K^0_L K^0_L$
100 ± 30	120	[10] AMELIN	96B	VES	37 $\pi^- A \to \eta \eta \pi^- A$
132 ± 15		BUGG	96	RVUE	
120 ± 25		[16] AMSLER	95B	CBAR	0.0 $\overline{p} p \to 3\pi^0$
120 ± 30		[17] AMSLER	95C	CBAR	0.0 $\overline{p} p \to \eta \eta \pi^0$

65 ± 10		[18] ANTINORI	95	OMEG	300,450 $pp \to pp2(\pi^+\pi^-)$
199 ± 30		[10] ANTINORI	95	OMEG	300,450 $pp \to pp\pi^+\pi^-$
56 ± 12		[10] ABATZIS	94	OMEG	450 $pp \to pp2(\pi^+\pi^-)$
100 ± 40		[10] AMSLER	94E	CBAR	0.0 $\overline{p}p \to \pi^0\eta\eta'$
148^{+20}_{-25}		[1,19] ANISOVICH	94	CBAR	0.0 $\overline{p}p \to 3\pi^0, \pi^0\eta\eta$
150 ± 20		[1,20] BUGG	94	RVUE	$\overline{p}p \to 3\pi^0$, $\eta\eta\pi^0$, $\eta\pi^0\pi^0$
245 ± 50		[10] AMSLER	92	CBAR	0.0 $\overline{p}p \to \pi^0\eta\eta$
$153 \pm 67 \pm 50$		[10] BELADIDZE	92C	VES	36 π^- Be $\to \pi^-\eta'\eta$Be
78 ± 18		[10] ARMSTRONG	89E	OMEG	300 $pp \to pp2(\pi^+\pi^-)$
170 ± 40		[10] ALDE	88	GAM4	300 $\pi^- N \to \pi^- N 2\eta$
150 ± 20	600	[10] ALDE	87	GAM4	100 $\pi^- p \to 4\pi^0 n$
265 ± 65		[21] ALDE	86D	GAM4	100 $\pi^- p \to 2\eta n$
260 ± 60		[10] BINON	84C	GAM2	38 $\pi^- p \to \eta\eta' n$
210 ± 40		[10] BINON	83	GAM2	38 $\pi^- p \to 2\eta n$
101 ± 13		[10] GRAY	83	DBC	0.0 $\overline{p}N \to 3\pi$

[1] T-matrix pole.
[2] Average between $\pi^+\pi^-2\pi^0$ and $2(\pi^+\pi^-)$.
[3] T-matrix pole. Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D.
[4] T-matrix pole from coupled channel K-matrix fit to data on $J/\psi \to \gamma\pi^0\pi^0$ (ABLIKIM 15AE) and $J/\psi \to \gamma K^0_S K^0_S$ (ABLIKIM 18AA).
[5] T-matrix pole, 5 poles, 5 channels, including scattering data from HYAMS 75 ($\pi\pi$), LONGACRE 86 ($K\overline{K}$), BINON 83 ($\eta\eta$), and BINON 84C ($\eta\eta'$).
[6] T-matrix pole of 3 channel unitary model fit to data from AAIJ 14BR and AAIJ 17V extracted using Pade approximants.
[7] Solution I, statistical error only.
[8] From partial wave analysis including all possible combinations of 0^{++}, 2^{++}, and 4^{++} resonances.
[9] Breit-Wigner width. May also be the $f_0(1370)$.
[10] Breit-Wigner width.
[11] Statistical error only.
[12] Breit-Wigner, solution 1, PWA ambiguous.
[13] K-matrix pole from combined analysis of $\pi^- p \to \pi^0\pi^0 n$, $\pi^- p \to K\overline{K}n$, $\pi^+\pi^- \to \pi^+\pi^-$, $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$, $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, $K^0_S K^0_S\pi^0$, $K^+K^0_S\pi^-$ at rest, $\overline{p}n \to \pi^-\pi^-\pi^+$, $K^0_S K^-\pi^0$, $K^0_S K^0_S\pi^-$ at rest.
[14] Supersedes BARBERIS 99 and BARBERIS 99B.
[15] T-matrix pole on sheet $--+$.
[16] T-matrix pole, supersedes ANISOVICH 94.
[17] T-matrix pole, supersedes ANISOVICH 94 and AMSLER 92.
[18] Supersedes ABATZIS 94, ARMSTRONG 89E. Breit-Wigner mass.
[19] From a simultaneous analysis of the annihilations $\overline{p}p \to 3\pi^0, \pi^0\eta\eta$.
[20] Reanalysis of ANISOVICH 94 data.
[21] From central value and spread of two solutions. Breit-Wigner mass.

$f_0(1500)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)	Scale factor
Γ_1	$\pi\pi$	(34.5±2.2) %	1.2
Γ_2	$\pi^+\pi^-$	seen	
Γ_3	$2\pi^0$	seen	
Γ_4	4π	(48.9±3.3) %	1.2
Γ_5	$4\pi^0$	seen	
Γ_6	$2\pi^+2\pi^-$	seen	
Γ_7	$2(\pi\pi)_{S\text{-wave}}$	seen	
Γ_8	$\rho\rho$	seen	
Γ_9	$\pi(1300)\pi$	seen	
Γ_{10}	$a_1(1260)\pi$	seen	
Γ_{11}	$\eta\eta$	(6.0±0.9) %	1.1
Γ_{12}	$\eta\eta'(958)$	(2.2±0.8) %	1.4
Γ_{13}	$K\overline{K}$	(8.5±1.0) %	1.1
Γ_{14}	$\gamma\gamma$	not seen	

CONSTRAINED FIT INFORMATION

An overall fit to 6 branching ratios uses 10 measurements and one constraint to determine 5 parameters. The overall fit has a $\chi^2 =$ 5.6 for 6 degrees of freedom.

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

x_4	−88			
x_{11}	27	−56		
x_{12}	3	−32	26	
x_{13}	43	−64	20	2
	x_1	x_4	x_{11}	x_{12}

$f_0(1500)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

$\Gamma(\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_1\Gamma_{14}/\Gamma$

VALUE (eV)	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$33^{+12}_{-6}{}^{+1809}_{-21}$		[1] UEHARA	08A	BELL	10.6 $e^+e^- \rightarrow e^+e^-\pi^0\pi^0$
not seen		ACCIARRI	01H	L3	$\gamma\gamma \rightarrow K^0_S K^0_S$, E^{ee}_{cm}= 91, 183–209 GeV
<460	95	BARATE	00E	ALEP	$\gamma\gamma \rightarrow \pi^+\pi^-$

[1] May also be the $f_0(1370)$. Multiplied by us by 3 to obtain the $\pi\pi$ value.

$f_0(1500)$ BRANCHING RATIOS

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

VALUE	DOCUMENT ID		TECN
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.454±0.104	BUGG	96	RVUE

$\Gamma(\pi^+\pi^-)/\Gamma_{total}$ — Γ_2/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
seen	BERTIN	98	OBLX	0.05–0.405 $\overline{n}p \to \pi^+\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
possibly seen	FRABETTI	97D	E687	$D_s^\pm \to \pi^\mp\pi^\pm\pi^\pm$

$\Gamma(4\pi)/\Gamma(\pi\pi)$ — Γ_4/Γ_1

VALUE	DOCUMENT ID		TECN	COMMENT
1.42±0.18 OUR FIT Error includes scale factor of 1.2.				
1.42±0.18 OUR AVERAGE Error includes scale factor of 1.2.				
1.37±0.16	BARBERIS	00D		450 $pp \to p_f 4\pi p_s$
2.1 ±0.6	[1] AMSLER	98	RVUE	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.1 ±0.2	[2] ANISOVICH	02D	SPEC	Combined fit
3.4 ±0.8	[1] ABELE	96	CBAR	0.0 $\overline{p}p \to 5\pi^0$

[1] Excluding $\rho\rho$ contribution to 4π.

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

$\Gamma(2(\pi\pi)_{S\text{-wave}})/\Gamma(\pi\pi)$ — Γ_7/Γ_1

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.42±0.26	[1] ABELE	01	CBAR	0.0 $\overline{p}d \to \pi^- 4\pi^0 p$

[1] From the combined data of ABELE 96 and ABELE 96C.

$\Gamma(2(\pi\pi)_{S\text{-wave}})/\Gamma(4\pi)$ — Γ_7/Γ_4

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.26±0.07	ABELE	01B	CBAR	0.0 $\overline{p}d \to 5\pi p$

$\Gamma(\rho\rho)/\Gamma(4\pi)$ — Γ_8/Γ_4

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.13±0.08	ABELE	01B	CBAR	0.0 $\overline{p}d \to 5\pi p$

$\Gamma(\rho\rho)/\Gamma(2(\pi\pi)_{S\text{-wave}})$ — Γ_8/Γ_7

VALUE	DOCUMENT ID		COMMENT
2.87±0.34 OUR AVERAGE Error includes scale factor of 1.1.			
3.3 ±0.5	BARBERIS	00C	450 $pp \to p_f \pi^+\pi^- 2\pi^0 p_s$
2.6 ±0.4	BARBERIS	00C	450 $pp \to p_f 2(\pi^+\pi^-) p_s$

$\Gamma(\pi(1300)\pi)/\Gamma(4\pi)$ — Γ_9/Γ_4

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.50±0.25	ABELE	01B	CBAR	0.0 $\overline{p}d \to 5\pi p$

$\Gamma(a_1(1260)\pi)/\Gamma(4\pi)$ — Γ_{10}/Γ_4

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.12±0.05	ABELE	01B	CBAR	0.0 $\overline{p}d \to 5\pi p$

$\Gamma(\eta\eta)/\Gamma_{\text{total}}$ — Γ_{11}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
large	ALDE	88	GAM4	300 $\pi^- N \to \eta\eta\pi^- N$
large	BINON	83	GAM2	38 $\pi^- p \to 2\eta n$

$\Gamma(\eta\eta)/\Gamma(\pi\pi)$ — Γ_{11}/Γ_1

VALUE	DOCUMENT ID		TECN	COMMENT
0.173±0.024 OUR FIT Error includes scale factor of 1.1.				
0.175±0.027 OUR AVERAGE				
0.18 ±0.03	BARBERIS	00E		450 $pp \to p_f \eta\eta p_s$
0.157±0.060	[1] AMSLER	95D	CBAR	0.0 $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.080±0.033	AMSLER	02	CBAR	0.9 $\overline{p}p \to \pi^0\eta\eta$, $\pi^0\pi^0\pi^0$
0.11 ±0.03	[2] ANISOVICH	02D	SPEC	Combined fit
0.078±0.013	[3] ABELE	96C	RVUE	Compilation
0.230±0.097	[4] AMSLER	95C	CBAR	0.0 $\overline{p}p \to \eta\eta\pi^0$

[1] Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D.
[2] From a combined K-matrix analysis of Crystal Barrel (0. $p\overline{p} \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$), GAMS ($\pi p \to \pi^0\pi^0 n$, $\eta\eta n$, $\eta\eta' n$), and BNL ($\pi p \to K\overline{K}n$) data.
[3] 2π width determined to be 60 ± 12 MeV.
[4] Using AMSLER 95B ($3\pi^0$).

$\Gamma(4\pi^0)/\Gamma(\eta\eta)$ — Γ_5/Γ_{11}

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.8±0.3	ALDE	87	GAM4	100 $\pi^- p \to 4\pi^0 n$

$\Gamma(\eta\eta'(958))/\Gamma(\pi\pi)$ — Γ_{12}/Γ_1

VALUE	DOCUMENT ID		TECN	COMMENT
0.064±0.022 OUR FIT Error includes scale factor of 1.4.				
0.095±0.026	BARBERIS	00A		450 $pp \to p_f \eta\eta p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.005±0.003	[1] ANISOVICH	02D	SPEC	Combined fit

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

$\Gamma(\eta\eta'(958))/\Gamma(\eta\eta)$ — Γ_{12}/Γ_{11}

VALUE	DOCUMENT ID		TECN	COMMENT
0.37±0.13 OUR FIT Error includes scale factor of 1.5.				
0.29±0.10	[1] AMSLER	95C	CBAR	0.0 $\overline{p}p \to \eta\eta\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.05±0.03	[2] ANISOVICH	02D	SPEC	Combined fit
0.84±0.23	ABELE	96C	RVUE	Compilation
2.7 ±0.8	BINON	84C	GAM2	38 $\pi^- p \to \eta\eta' n$

[1] Using AMSLER 94E ($\eta\eta'\pi^0$).

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

$\Gamma(K\overline{K})/\Gamma_{total}$ — Γ_{13}/Γ

VALUE	DOCUMENT ID		TECN
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.044±0.021	BUGG	96	RVUE

$\Gamma(K\overline{K})/\Gamma(\pi\pi)$ — Γ_{13}/Γ_1

VALUE	DOCUMENT ID		TECN	COMMENT
0.246±0.025 OUR FIT				
0.236±0.026 OUR AVERAGE				
0.25 ±0.03	[1] BARGIOTTI	03	OBLX	$\overline{p}p$
0.19 ±0.07	[2] ABELE	98	CBAR	0.0 $\overline{p}p \to K^0_L K^\pm \pi^\mp$
0.20 ±0.08	[3] ABELE	96B	CBAR	0.0 $\overline{p}p \to \pi^0 K^0_L K^0_L$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.16 ±0.05	[4] ANISOVICH	02D	SPEC	Combined fit
0.33 ±0.03 ±0.07	BARBERIS	99D	OMEG	450 $pp \to K^+K^-$, $\pi^+\pi^-$

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

[2] Using $\pi^0\pi^0$ from AMSLER 95B.

[3] Using AMSLER 95B ($3\pi^0$), AMSLER 94C ($2\pi^0\eta$) and SU(3).

[4] 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.

$\Gamma(K\overline{K})/\Gamma(\eta\eta)$ — Γ_{13}/Γ_{11}

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
1.43±0.24 OUR FIT Error includes scale factor of 1.1.					
1.85±0.41		BARBERIS	00E		450 $pp \to p_f \eta\eta p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.5 ±0.6		[1] ANISOVICH	02D	SPEC	Combined fit
<0.4	90	[2] PROKOSHKIN	91	GAM4	300 $\pi^- p \to \pi^- p\eta\eta$
<0.6		[3] BINON	83	GAM2	38 $\pi^- p \to 2\eta n$

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

[2] Combining results of GAM4 with those of WA76 on $K\overline{K}$ central production.

[3] Using ETKIN 82B and COHEN 80.

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ABLIKIM	15AE	PR D92 052003	M. Ablikim *et al.*	(BESIII Collab.)
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AAIJ	14BR	PR D89 092006	R. Aaij *et al.*	(LHCb Collab.)
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ANISOVICH	03	EPJ A16 229	V.V. Anisovich *et al.*	
BARGIOTTI	03	EPJ C26 371	M. Bargiotti *et al.*	(OBELIX Collab.)
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AMSLER	95B	PL B342 433	C. Amsler *et al.*	(Crystal Barrel Collab.)
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BUGG	95	PL B353 378	D.V. Bugg *et al.*	(LOQM, PNPI, WASH)
ABATZIS	94	PL B324 509	S. Abatzis *et al.*	(ATHU, BARI, BIRM+)
AMSLER	94C	PL B327 425	C. Amsler *et al.*	(Crystal Barrel Collab.)
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ARMSTRONG	89E	PL B228 536	T.A. Armstrong, M. Benayoun	(ATHU, BARI, BIRM+)
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ASTON	88D	NP B301 525	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)
ALDE	87	PL B198 286	D.M. Alde *et al.*	(LANL, BRUX, SERP, LAPP)
ALDE	86D	NP B269 485	D.M. Alde *et al.*	(BELG, LAPP, SERP, CERN+)
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BINON	84C	NC 80A 363	F.G. Binon *et al.*	(BELG, LAPP, SERP+)
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