

$f_0(1500)$

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

See also the mini-reviews on scalar mesons under $f_0(500)$ (see the index for the page number) and on non- $q\bar{q}$ candidates in PDG 06, Journal of Physics, G **33** 1 (2006).

$f_0(1500)$ MASS

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
1505 ± 6 OUR AVERAGE		Error includes scale factor of 1.3. See the ideogram below.		
1466 ± 6 ± 20		ABLIKIM	06V BES2	$e^+e^- \rightarrow J/\psi \rightarrow \gamma\pi^+\pi^-$
1515 ± 12		¹ BARBERIS	00A	450 $p\rho \rightarrow \rho_f \eta \eta p_S$
1511 ± 9		^{1,2} BARBERIS	00C	450 $p\rho \rightarrow \rho_f 4\pi p_S$
1510 ± 8		¹ BARBERIS	00E	450 $p\rho \rightarrow \rho_f \eta \eta p_S$
1522 ± 25		BERTIN	98 OBLX	0.05–0.405 $\bar{n}p \rightarrow \pi^+\pi^+\pi^-$
1449 ± 20		¹ BERTIN	97C OBLX	0.0 $\bar{p}p \rightarrow \pi^+\pi^-\pi^0$
1515 ± 20		ABELE	96B CBAR	0.0 $\bar{p}p \rightarrow \pi^0 K_L^0 K_L^0$
1500 ± 15		³ AMSLER	95B CBAR	0.0 $\bar{p}p \rightarrow 3\pi^0$
1505 ± 15		⁴ AMSLER	95C CBAR	0.0 $\bar{p}p \rightarrow \eta \eta \pi^0$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
1486 ± 10		¹ ANISOVICH	09 RVUE	0.0 $\bar{p}p, \pi N$
1470 ± 60	568	⁵ KLEMP	08 E791	$D_s^+ \rightarrow \pi^-\pi^+\pi^+$
1470 ⁺ _− 6 ⁺ _{7−255}		⁶ UEHARA	08A BELL	10.6 $e^+e^- \rightarrow e^+e^-\pi^0\pi^0$
1495 ± 4		AMSLER	06 CBAR	0.9 $\bar{p}p \rightarrow K^+K^-\pi^0$
1539 ± 20	9.9k	AUBERT	06O BABR	$B^+ \rightarrow K^+K^+K^-$
1473 ± 5	80k	^{7,8} UMAN	06 E835	5.2 $\bar{p}p \rightarrow \eta \eta \pi^0$
1478 ± 6		VLADIMIRSK...	06 SPEC	40 $\pi^-p \rightarrow K_S^0 K_S^0 n$
1493 ± 7		⁷ BINON	05 GAMS	33 $\pi^-p \rightarrow \eta \eta n$
1524 ± 14	1400	⁹ GARMASH	05 BELL	$B^+ \rightarrow K^+K^+K^-$
1489 ⁺ _− 8 ₄		¹⁰ ANISOVICH	03 RVUE	
1490 ± 30		⁷ ABELE	01 CBAR	0.0 $\bar{p}d \rightarrow \pi^- 4\pi^0 p$
1497 ± 10		⁷ BARBERIS	99 OMEG	450 $p\rho \rightarrow p_S \rho_f K^+ K^-$
1502 ± 10		⁷ BARBERIS	99B OMEG	450 $p\rho \rightarrow p_S \rho_f \pi^+ \pi^-$
1502 ± 12 ± 10		¹¹ BARBERIS	99D OMEG	450 $p\rho \rightarrow K^+K^-, \pi^+\pi^-$
1530 ± 45		⁷ BELLAZZINI	99 GAM4	450 $p\rho \rightarrow p\rho \pi^0 \pi^0$
1505 ± 18		⁷ FRENCH	99	300 $p\rho \rightarrow \rho_f (K^+ K^-) p_S$
1447 ± 27		¹² KAMINSKI	99 RVUE	$\pi\pi \rightarrow \pi\pi, K\bar{K}, \sigma\sigma$
1580 ± 80		⁷ ALDE	98 GAM4	100 $\pi^-p \rightarrow \pi^0 \pi^0 n$
1499 ± 8		¹ ANISOVICH	98B RVUE	Compilation
~ 1520		REYES	98 SPEC	800 $p\rho \rightarrow p_S \rho_f K_S^0 K_S^0$
1510 ± 20		¹ BARBERIS	97B OMEG	450 $p\rho \rightarrow p\rho 2(\pi^+\pi^-)$
~ 1475		FRABETTI	97D E687	$D_s^\pm \rightarrow \pi^\mp \pi^\pm \pi^\pm$
~ 1505		ABELE	96 CBAR	0.0 $\bar{p}p \rightarrow 5\pi^0$
1500 ± 8		¹ ABELE	96C RVUE	Compilation
1460 ± 20	120	⁷ AMELIN	96B VES	37 $\pi^-A \rightarrow \eta \eta \pi^- A$

1500 ± 8		BUGG	96	RVUE	
1500 ± 10		¹³ AMSLER	95D	CBAR	0.0 $\bar{p}p \rightarrow \pi^0\pi^0\pi^0, \pi^0\eta\eta,$ $\pi^0\pi^0\eta$
1445 ± 5		¹⁴ ANTINORI	95	OMEG	300,450 $pp \rightarrow pp2(\pi^+\pi^-)$
1497 ± 30		⁷ ANTINORI	95	OMEG	300,450 $pp \rightarrow pp\pi^+\pi^-$
~ 1505		BUGG	95	MRK3	$J/\psi \rightarrow \gamma\pi^+\pi^-\pi^+\pi^-$
1446 ± 5		⁷ ABATZIS	94	OMEG	450 $pp \rightarrow pp2(\pi^+\pi^-)$
1545 ± 25		⁷ AMSLER	94E	CBAR	0.0 $\bar{p}p \rightarrow \pi^0\eta\eta'$
1520 ± 25		^{1,15} ANISOVICH	94	CBAR	0.0 $\bar{p}p \rightarrow 3\pi^0, \pi^0\eta\eta$
1505 ± 20		^{1,16} BUGG	94	RVUE	$\bar{p}p \rightarrow 3\pi^0, \eta\eta\pi^0, \eta\pi^0\pi^0$
1560 ± 25		⁷ AMSLER	92	CBAR	0.0 $\bar{p}p \rightarrow \pi^0\eta\eta$
1550 ± 45 ± 30		⁷ BELADIDZE	92C	VES	36 $\pi^- \text{Be} \rightarrow \pi^- \eta' \eta \text{Be}$
1449 ± 4		⁷ ARMSTRONG	89E	OMEG	300 $pp \rightarrow pp2(\pi^+\pi^-)$
1610 ± 20		⁷ ALDE	88	GAM4	300 $\pi^- N \rightarrow \pi^- N2\eta$
~ 1525		ASTON	88D	LASS	11 $K^- p \rightarrow K_S^0 K_S^0 \Lambda$
1570 ± 20	600	⁷ ALDE	87	GAM4	100 $\pi^- p \rightarrow 4\pi^0 n$
1575 ± 45		¹⁷ ALDE	86D	GAM4	100 $\pi^- p \rightarrow 2\eta n$
1568 ± 33		⁷ BINON	84C	GAM2	38 $\pi^- p \rightarrow \eta\eta' n$
1592 ± 25		⁷ BINON	83	GAM2	38 $\pi^- p \rightarrow 2\eta n$
1525 ± 5		⁷ GRAY	83	DBC	0.0 $\bar{p}N \rightarrow 3\pi$

¹ T-matrix pole.

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

³ T-matrix pole, supersedes ANISOVICH 94.

⁴ T-matrix pole, supersedes ANISOVICH 94 and AMSLER 92.

⁵ Reanalysis of AITALA 01A data. This state could also be $f_0(1370)$.

⁶ Breit-Wigner mass. May also be the $f_0(1370)$.

⁷ Breit-Wigner mass.

⁸ Statistical error only.

⁹ Breit-Wigner, solution 1, PWA ambiguous.

¹⁰ K-matrix pole from combined analysis of $\pi^- p \rightarrow \pi^0\pi^0 n, \pi^- p \rightarrow K\bar{K}n,$
 $\pi^+\pi^- \rightarrow \pi^+\pi^-, \bar{p}p \rightarrow \pi^0\pi^0\pi^0, \pi^0\eta\eta, \pi^0\pi^0\eta, \pi^+\pi^-\pi^0, K^+K^-\pi^0, K_S^0 K_S^0\pi^0,$
 $K^+K_S^0\pi^-$ at rest, $\bar{p}n \rightarrow \pi^-\pi^-\pi^+, K_S^0 K^-\pi^0, K_S^0 K_S^0\pi^-$ at rest.

¹¹ Supersedes BARBERIS 99 and BARBERIS 99B.

¹² T-matrix pole on sheet $--+$.

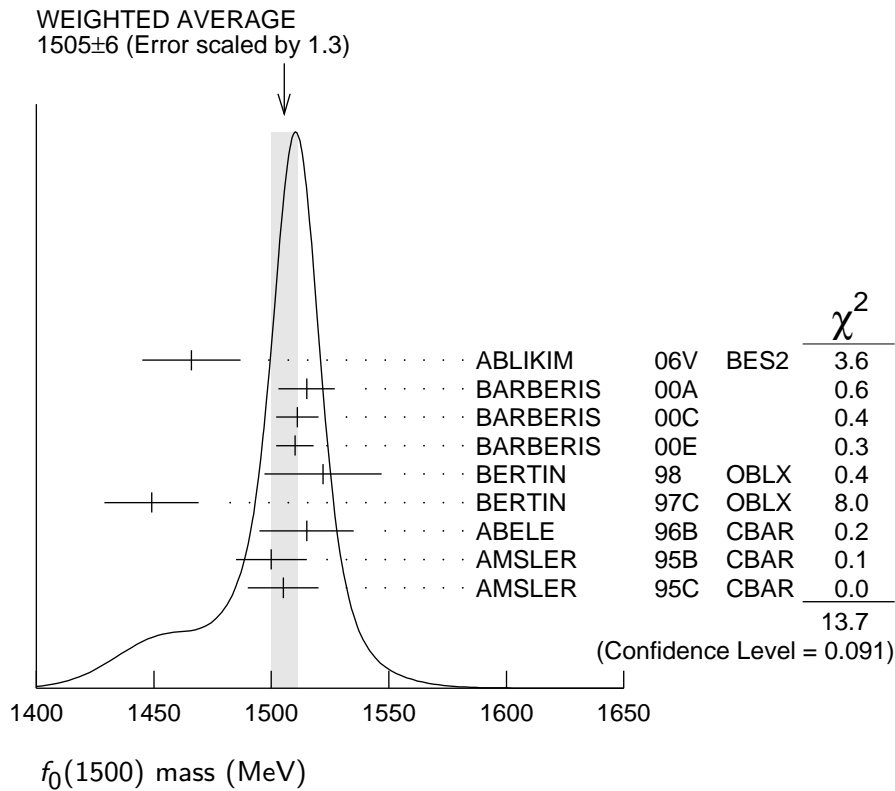
¹³ T-matrix pole. Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D.

¹⁴ Supersedes ABATZIS 94, ARMSTRONG 89E. Breit-Wigner mass.

¹⁵ From a simultaneous analysis of the annihilations $\bar{p}p \rightarrow 3\pi^0, \pi^0\eta\eta$.

¹⁶ Reanalysis of ANISOVICH 94 data.

¹⁷ From central value and spread of two solutions. Breit-Wigner mass.



$f_0(1500)$ WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
109± 7 OUR AVERAGE				
108 ⁺ ₁₁ ± 25		ABLIKIM	06V BES2	$e^+e^- \rightarrow J/\psi \rightarrow \gamma\pi^+\pi^-$
110± 24	18	BARBERIS	00A	450 $pp \rightarrow p_f\eta\eta p_S$
102± 18	18,19	BARBERIS	00C	450 $pp \rightarrow p_f4\pi p_S$
110± 16	18	BARBERIS	00E	450 $pp \rightarrow p_f\eta\eta p_S$
108± 33		BERTIN	98 OBLX	0.05–0.405 $\bar{n}p \rightarrow \pi^+\pi^+\pi^-$
114± 30	18	BERTIN	97C OBLX	0.0 $\bar{p}p \rightarrow \pi^+\pi^-\pi^0$
105± 15		ABELE	96B CBAR	0.0 $\bar{p}p \rightarrow \pi^0 K_L^0 K_L^0$
120± 25	20	AMSLER	95B CBAR	0.0 $\bar{p}p \rightarrow 3\pi^0$
120± 30	21	AMSLER	95C CBAR	0.0 $\bar{p}p \rightarrow \eta\eta\pi^0$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
114± 10	18	ANISOVICH	09 RVUE	0.0 $\bar{p}p, \pi N$
90 ⁺ ₁ ²⁺⁵⁰ ₁₋₂₂	22	UEHARA	08A BELL	10.6 $e^+e^- \rightarrow e^+e^-\pi^0\pi^0$
121± 8		AMSLER	06 CBAR	0.9 $\bar{p}p \rightarrow K^+K^-\pi^0$
257± 33	9.9k	AUBERT	06O BABR	$B^+ \rightarrow K^+K^+K^-$
108± 9	80k	23,24 UMAN	06 E835	5.2 $\bar{p}p \rightarrow \eta\eta\pi^0$
119± 10		VLADIMIRSK...	06 SPEC	40 $\pi^-p \rightarrow K_S^0 K_S^0 n$
90± 15		23 BINON	05 GAMS	33 $\pi^-p \rightarrow \eta\eta n$
136± 23	1400	25 GARMASH	05 BELL	$B^+ \rightarrow K^+K^+K^-$
102± 10		26 ANISOVICH	03 RVUE	
140± 40		23 ABELE	01 CBAR	0.0 $\bar{p}d \rightarrow \pi^-4\pi^0 p$

104 ± 25		23 BARBERIS	99 OMEG	450 $pp \rightarrow p_S p_f K^+ K^-$
131 ± 15		23 BARBERIS	99B OMEG	450 $pp \rightarrow p_S p_f \pi^+ \pi^-$
98 ± 18 ± 16		27 BARBERIS	99D OMEG	450 $pp \rightarrow K^+ K^-, \pi^+ \pi^-$
160 ± 50		23 BELLAZZINI	99 GAM4	450 $pp \rightarrow pp\pi^0\pi^0$
100 ± 33		23 FRENCH	99	300 $pp \rightarrow p_f(K^+ K^-)p_S$
108 ± 46		28 KAMINSKI	99 RVUE	$\pi\pi \rightarrow \pi\pi, K\bar{K}, \sigma\sigma$
280 ± 100		23 ALDE	98 GAM4	100 $\pi^- p \rightarrow \pi^0\pi^0 n$
130 ± 20		18 ANISOVICH	98B RVUE	Compilation
120 ± 35		18 BARBERIS	97B OMEG	450 $pp \rightarrow pp2(\pi^+ \pi^-)$
~ 100		FRABETTI	97D E687	$D_S^\pm \rightarrow \pi^\mp \pi^\pm \pi^\pm$
~ 169		ABELE	96 CBAR	0.0 $\bar{p}p \rightarrow 5\pi^0$
100 ± 30	120	23 AMELIN	96B VES	37 $\pi^- A \rightarrow \eta\eta\pi^- A$
132 ± 15		BUGG	96 RVUE	
154 ± 30		29 AMSLER	95D CBAR	0.0 $\bar{p}p \rightarrow \pi^0\pi^0\pi^0, \pi^0\eta\eta, \pi^0\pi^0\eta$
65 ± 10		30 ANTINORI	95 OMEG	300,450 $pp \rightarrow pp2(\pi^+ \pi^-)$
199 ± 30		23 ANTINORI	95 OMEG	300,450 $pp \rightarrow pp\pi^+ \pi^-$
56 ± 12		23 ABATZIS	94 OMEG	450 $pp \rightarrow pp2(\pi^+ \pi^-)$
100 ± 40		23 AMSLER	94E CBAR	0.0 $\bar{p}p \rightarrow \pi^0\eta\eta'$
148 ⁺ 20 - 25		18,31 ANISOVICH	94 CBAR	0.0 $\bar{p}p \rightarrow 3\pi^0, \pi^0\eta\eta$
150 ± 20		18,32 BUGG	94 RVUE	$\bar{p}p \rightarrow 3\pi^0, \eta\eta\pi^0, \eta\pi^0\pi^0$
245 ± 50		23 AMSLER	92 CBAR	0.0 $\bar{p}p \rightarrow \pi^0\eta\eta$
153 ± 67 ± 50		23 BELADIDZE	92C VES	36 $\pi^- Be \rightarrow \pi^- \eta' \eta Be$
78 ± 18		23 ARMSTRONG	89E OMEG	300 $pp \rightarrow pp2(\pi^+ \pi^-)$
170 ± 40		23 ALDE	88 GAM4	300 $\pi^- N \rightarrow \pi^- N2\eta$
150 ± 20	600	23 ALDE	87 GAM4	100 $\pi^- p \rightarrow 4\pi^0 n$
265 ± 65		33 ALDE	86D GAM4	100 $\pi^- p \rightarrow 2\eta n$
260 ± 60		23 BINON	84C GAM2	38 $\pi^- p \rightarrow \eta\eta' n$
210 ± 40		23 BINON	83 GAM2	38 $\pi^- p \rightarrow 2\eta n$
101 ± 13		23 GRAY	83 DBC	0.0 $\bar{p}N \rightarrow 3\pi$

18 T-matrix pole.

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

20 T-matrix pole, supersedes ANISOVICH 94.

21 T-matrix pole, supersedes ANISOVICH 94 and AMSLER 92.

22 Breit-Wigner width. May also be the $f_0(1370)$.

23 Breit-Wigner width.

24 Statistical error only.

25 Breit-Wigner, solution 1, PWA ambiguous.

26 K-matrix pole from combined analysis of $\pi^- p \rightarrow \pi^0\pi^0 n$, $\pi^- p \rightarrow K\bar{K}n$, $\pi^+ \pi^- \rightarrow \pi^+ \pi^-$, $\bar{p}p \rightarrow \pi^0\pi^0\pi^0, \pi^0\eta\eta, \pi^0\pi^0\eta, \pi^+ \pi^- \pi^0, K^+ K^- \pi^0, K_S^0 K_S^0 \pi^0, K^+ K_S^0 \pi^-$ at rest, $\bar{p}n \rightarrow \pi^- \pi^- \pi^+$, $K_S^0 K^- \pi^0, K_S^0 K_S^0 \pi^-$ at rest.

27 Supersedes BARBERIS 99 and BARBERIS 99B.

28 T-matrix pole on sheet -- +.

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

30 Supersedes ABATZIS 94, ARMSTRONG 89E. Breit-Wigner mass.

31 From a simultaneous analysis of the annihilations $\bar{p}p \rightarrow 3\pi^0, \pi^0\eta\eta$.

32 Reanalysis of ANISOVICH 94 data.

33 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 $\pi\pi$	$(34.9 \pm 2.3) \%$	1.2
Γ_2 $\pi^+\pi^-$	seen	
Γ_3 $2\pi^0$	seen	
Γ_4 4π	$(49.5 \pm 3.3) \%$	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} $\eta\eta$	$(5.1 \pm 0.9) \%$	1.4
Γ_{12} $\eta\eta'(958)$	$(1.9 \pm 0.8) \%$	1.7
Γ_{13} $K\bar{K}$	$(8.6 \pm 1.0) \%$	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 $\chi^2 = 11.4$ for 6 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\langle \delta x_i \delta x_j \rangle / (\delta x_i \delta x_j)$, 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	-83			
x_{11}	11	-52		
x_{12}	-5	-31	29	
x_{13}	39	-67	33	6
	x_1	x_4	x_{11}	x_{12}

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

$\Gamma(\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$	CL%	DOCUMENT ID	TECN	COMMENT	$\Gamma_1\Gamma_{14}/\Gamma$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
$33^{+12+1809}_{-6-21}$		³⁴ UEHARA	08A BELL	$10.6 e^+e^- \rightarrow e^+e^-\pi^0\pi^0$	
not seen		ACCIARRI	01H L3	$\gamma\gamma \rightarrow K_S^0 K_S^0, E_{\text{cm}}^{ee} = 91, 183\text{--}209 \text{ GeV}$	
<460	95	BARATE	00E ALEP	$\gamma\gamma \rightarrow \pi^+\pi^-$	
³⁴ May also be the $f_0(1370)$. Multiplied by us by 3 to obtain the $\pi\pi$ value.					

$f_0(1500)$ BRANCHING RATIOS **$\Gamma(\pi\pi)/\Gamma_{\text{total}}$** **$\Gamma_1/\Gamma$**

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.454±0.104	BUGG	96	RVUE

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

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

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
seen	BERTIN	98	OBLX 0.05–0.405 $\bar{p}p \rightarrow \pi^+\pi^+\pi^-$
possibly seen	FRABETTI	97D E687	$D_S^\pm \rightarrow \pi^\mp\pi^\pm\pi^\pm$

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

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

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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	³⁵ AMSLER	98	RVUE
2.1 ±0.2	³⁶ ANISOVICH	02D	SPEC Combined fit
3.4 ±0.8	³⁵ ABELE	96	CBAR 0.0 $\bar{p}p \rightarrow 5\pi^0$

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

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

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.42±0.26	³⁷ ABELE	01	CBAR 0.0 $\bar{p}d \rightarrow \pi^- 4\pi^0 p$

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

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

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.26±0.07	ABELE	01B	CBAR 0.0 $\bar{p}d \rightarrow 5\pi p$

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

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

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.13±0.08	ABELE	01B	CBAR 0.0 $\bar{p}d \rightarrow 5\pi p$

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

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

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>COMMENT</u>
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 $pp \rightarrow p_f 2(\pi^+ \pi^-) p_S$

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

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

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.50±0.25	ABELE	01B	CBAR 0.0 $\bar{p}d \rightarrow 5\pi p$

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

$\Gamma(a_1(1260)\pi)/\Gamma(4\pi)$

Γ_{10}/Γ_4

VALUE	DOCUMENT ID	TECN	COMMENT
0.12 ± 0.05	ABELE	01B	CBAR $0.0 \bar{p}d \rightarrow 5\pi p$

$\Gamma(\eta\eta)/\Gamma_{total}$

Γ_{11}/Γ

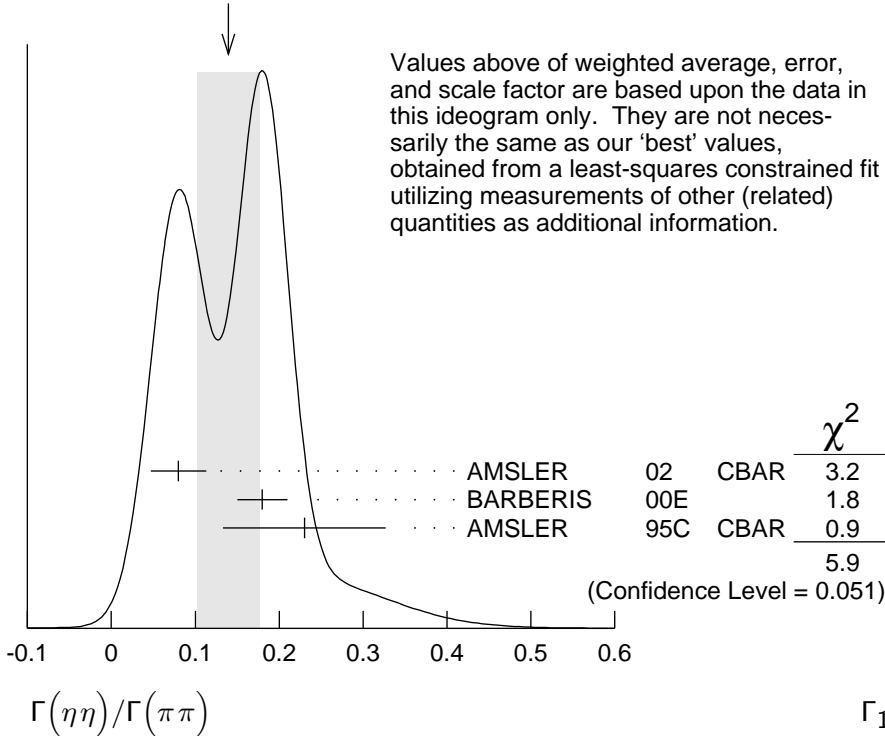
VALUE	DOCUMENT ID	TECN	COMMENT
large	ALDE	88	GAM4 $300 \pi^- N \rightarrow \eta\eta\pi^- N$
large	BINON	83	GAM2 $38 \pi^- p \rightarrow 2\eta n$

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

Γ_{11}/Γ_1

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 $0.9 \bar{p}p \rightarrow \pi^0 \eta\eta, \pi^0 \pi^0 \pi^0$
0.18 ± 0.03	BARBERIS	00E	450 $p p \rightarrow p_f \eta\eta p_s$
0.230 ± 0.097	³⁸ AMSLER	95C	CBAR $0.0 \bar{p}p \rightarrow \eta\eta\pi^0$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
0.11 ± 0.03	³⁶ ANISOVICH	02D	SPEC Combined fit
0.078 ± 0.013	³⁹ ABELE	96C	RVUE Compilation
0.157 ± 0.060	⁴⁰ AMSLER	95D	CBAR $0.0 \bar{p}p \rightarrow \pi^0 \pi^0 \pi^0, \pi^0 \eta\eta, \pi^0 \pi^0 \eta$

WEIGHTED AVERAGE
 0.14 ± 0.04 (Error scaled by 1.7)



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

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

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

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.055 ± 0.024 OUR FIT Error includes scale factor of 1.8.			
0.095 ± 0.026	BARBERIS	00A	450 $pp \rightarrow p_f \eta \eta p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.005 ± 0.003	³⁶ ANISOVICH	02D	SPEC Combined fit

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

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.38 ± 0.16 OUR FIT Error includes scale factor of 1.9.			
0.29 ± 0.10	⁴¹ AMSLER	95C	CBAR 0.0 $\bar{p}p \rightarrow \eta\eta\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.05 ± 0.03	³⁶ ANISOVICH	02D	SPEC Combined fit
0.84 ± 0.23	ABELE	96C	RVUE Compilation
2.7 ± 0.8	BINON	84C	GAM2 38 $\pi^- p \rightarrow \eta\eta' n$

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

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

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

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.246 ± 0.026 OUR FIT			
0.241 ± 0.028 OUR AVERAGE			
0.25 ± 0.03	⁴² BARGIOTTI	03	OBLX $\bar{p}p$
0.19 ± 0.07	⁴³ ABELE	98	CBAR 0.0 $\bar{p}p \rightarrow K_L^0 K^\pm \pi^\mp$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.16 ± 0.05	³⁶ ANISOVICH	02D	SPEC Combined fit
0.33 ± 0.03 ± 0.07	BARBERIS	99D	OMEG 450 $pp \rightarrow K^+ K^-, \pi^+ \pi^-$
0.20 ± 0.08	⁴⁴ ABELE	96B	CBAR 0.0 $\bar{p}p \rightarrow \pi^0 K_L^0 K_L^0$

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

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
1.69 ± 0.33 OUR FIT Error includes scale factor of 1.4.				
1.85 ± 0.41		BARBERIS	00E	450 $pp \rightarrow p_f \eta \eta p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.5 ± 0.6		³⁶ ANISOVICH	02D	SPEC Combined fit
< 0.4	90	⁴⁵ PROKOSHKIN	91	GAM4 300 $\pi^- p \rightarrow \pi^- p \eta \eta$
< 0.6		⁴⁶ BINON	83	GAM2 38 $\pi^- p \rightarrow 2\eta n$

- 35 Excluding $\rho\rho$ contribution to 4π .
 36 From a combined K-matrix analysis of Crystal Barrel ($0^- \rho\bar{\rho} \rightarrow \pi^0\pi^0\pi^0, \pi^0\eta\eta, \pi^0\pi^0\eta$), GAMS ($\pi\rho \rightarrow \pi^0\pi^0n, \eta\eta n, \eta\eta' n$), and BNL ($\pi\rho \rightarrow K\bar{K}n$) data.
 37 From the combined data of ABELE 96 and ABELE 96C.
 38 Using AMSLER 95B ($3\pi^0$).
 39 2π width determined to be 60 ± 12 MeV.
 40 Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D.
 41 Using AMSLER 94E ($\eta\eta'\pi^0$).
 42 Coupled channel analysis of $\pi^+\pi^-\pi^0, K^+K^-\pi^0$, and $K^\pm K_S^0\pi^\mp$.
 43 Using $\pi^0\pi^0$ from AMSLER 95B.
 44 Using AMSLER 95B ($3\pi^0$), AMSLER 94C ($2\pi^0\eta$) and SU(3).
 45 Combining results of GAM4 with those of WA76 on $K\bar{K}$ central production.
 46 Using ETKIN 82B and COHEN 80.

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