$f_0(1500)$

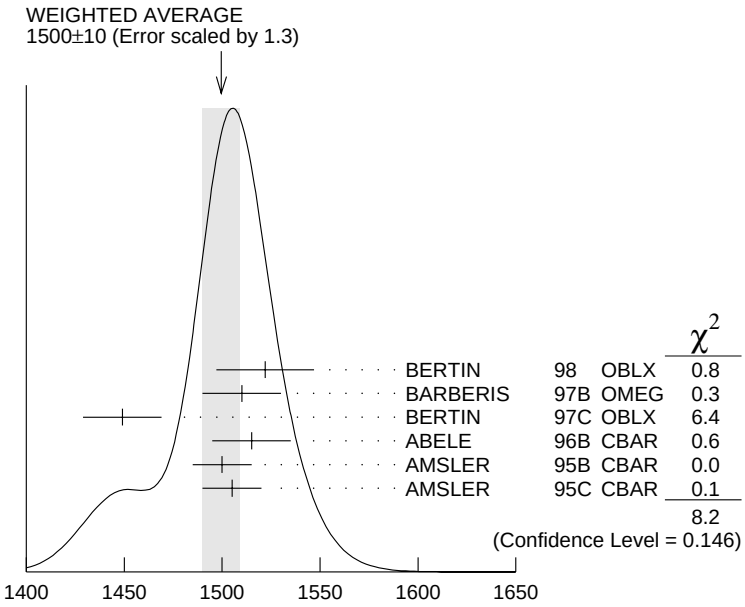
$I^G(J^{PC}) = 0^+(0^{++})$

See also the mini-reviews on scalar mesons under $f_0(1370)$ and on non-$q\overline{q}$ candidates. (See the index for the page number.)

$f_0(1500)$ MASS

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1500±10 OUR AVERAGE		Error includes scale factor of 1.3. See the ideogram below.			
1522±25		BERTIN	98	OBLX	50–405 $\overline{n}p \rightarrow \pi^+\pi^+\pi^-$
1510±20		[1] BARBERIS	97B	OMEG	450 $pp \rightarrow pp2(\pi^+\pi^-)$
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		[2] AMSLER	95B	CBAR	0.0 $\overline{p}p \rightarrow 3\pi^0$
1505±15		[3] AMSLER	95C	CBAR	0.0 $\overline{p}p \rightarrow \eta\eta\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
~ 1475		FRABETTI	97D	E687	$D^\pm_s \rightarrow \pi^\mp\pi^\pm\pi^\pm$
~ 1430		[4] KAMINSKI	97B	RVUE	$\pi^- p$ polar $\rightarrow \pi^+\pi^- n$
~ 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		[6] 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		[7] ANTINORI	95	OMEG	300,450 $pp \rightarrow pp2(\pi^+\pi^-)$
1497±30		[5] ANTINORI	95	OMEG	300,450 $pp \rightarrow pp\pi^+\pi^-$
~ 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		[1,8] ANISOVICH	94	CBAR	0.0 $\overline{p}p \rightarrow 3\pi^0, \pi^0\eta\eta$
1505±20		[1,9] BUGG	94	RVUE	$\overline{p}p \rightarrow 3\pi^0$, $\eta\eta\pi^0$, $\eta\pi^0\pi^0$
1560±25		[5] AMSLER	92	CBAR	0.0 $\overline{p}p \rightarrow \pi^0\eta\eta$
1550±45±30		[5] BELADIDZE	92C	VES	36 π^- Be $\rightarrow \pi^-\eta'\eta$ Be
1449± 4		[5] ARMSTRONG	89E	OMEG	300 $pp \rightarrow pp2(\pi^+\pi^-)$
1610±20		[5] ALDE	88	GAM4	300 $\pi^- N \rightarrow \pi^- N2\eta$
~ 1525		ASTON	88D	LASS	11 $K^- p \rightarrow K^0_S K^0_S \Lambda$
1570±20	600	[5] ALDE	87	GAM4	100 $\pi^- p \rightarrow 4\pi^0 n$
1575±45		[10] ALDE	86D	GAM4	100 $\pi^- p \rightarrow 2\eta n$
1568±33		[5] BINON	84C	GAM2	38 $\pi^- p \rightarrow \eta\eta' n$
1592±25		[5] BINON	83	GAM2	38 $\pi^- p \rightarrow 2\eta n$
1525± 5		[5] GRAY	83	DBC	0.0 $\overline{p}N \rightarrow 3\pi$

[1] T-matrix pole.
[2] T-matrix pole, supersedes ANISOVICH 94.
[3] T-matrix pole, supersedes ANISOVICH 94 and AMSLER 92.
[4] Reanalysis of SRINIVASAN 75, ROSSELET 77, BECKER 79, and COHEN 80 using a three coupled channel analysis ($\pi\pi$, $K\overline{K}$, and $\sigma\sigma$).
[5] Breit-Wigner mass.
[6] T-matrix pole. Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D.
[7] Supersedes ABATZIS 94, ARMSTRONG 89E. Breit-Wigner mass.
[8] From a simultaneous analysis of the annihilations $\overline{p}p \to 3\pi^0, \pi^0\eta\eta$.
[9] Reanalysis of ANISOVICH 94 data.
[10] From central value and spread of two solutions. Breit-Wigner mass.



$f_0(1500)$ mass (MeV)

$f_0(1500)$ WIDTH

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
112±10 OUR AVERAGE					
108±33		BERTIN	98	OBLX	50–405 $\overline{n}p \to \pi^+\pi^+\pi^-$
120±35		[11] BARBERIS	97B	OMEG	450 $pp \to pp2(\pi^+\pi^-)$
114±30		[11] 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		[12] AMSLER	95B	CBAR	0.0 $\overline{p}p \to 3\pi^0$
120±30		[13] 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. • • •

~ 100			FRABETTI	97D	E687	$D_s^{\pm} \to \pi^{\mp}\pi^{\pm}\pi^{\pm}$
~ 135		[14]	KAMINSKI	97B	RVUE	$\pi^- p$ polar $\to \pi^+\pi^- n$
~ 169			ABELE	96	CBAR	0.0 $\overline{p}p \to 5\pi^0$
100 ± 30	120	[15]	AMELIN	96B	VES	37 $\pi^- A \to \eta\eta\pi^- A$
132 ± 15			BUGG	96	RVUE	
154 ± 30		[16]	AMSLER	95D	CBAR	0.0 $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$
65 ± 10		[17]	ANTINORI	95	OMEG	300,450 $pp \to pp2(\pi^+\pi^-)$
199 ± 30		[15]	ANTINORI	95	OMEG	300,450 $pp \to pp\pi^+\pi^-$
56 ± 12		[15]	ABATZIS	94	OMEG	450 $pp \to pp2(\pi^+\pi^-)$
100 ± 40		[15]	AMSLER	94E	CBAR	0.0 $\overline{p}p \to \pi^0\eta\eta'$
148^{+20}_{-25}		[11,18]	ANISOVICH	94	CBAR	0.0 $\overline{p}p \to 3\pi^0, \pi^0\eta\eta$
150 ± 20		[11,19]	BUGG	94	RVUE	$\overline{p}p \to 3\pi^0$, $\eta\eta\pi^0$, $\eta\pi^0\pi^0$
245 ± 50		[15]	AMSLER	92	CBAR	0.0 $\overline{p}p \to \pi^0\eta\eta$
$153\pm67\pm50$		[15]	BELADIDZE	92C	VES	36 π^- Be $\to \pi^-\eta'\eta$ Be
78 ± 18		[15]	ARMSTRONG	89E	OMEG	300 $pp \to pp2(\pi^+\pi^-)$
170 ± 40		[15]	ALDE	88	GAM4	300 $\pi^- N \to \pi^- N2\eta$
150 ± 20	600	[15]	ALDE	87	GAM4	100 $\pi^- p \to 4\pi^0 n$
265 ± 65		[20]	ALDE	86D	GAM4	100 $\pi^- p \to 2\eta n$
260 ± 60		[15]	BINON	84C	GAM2	38 $\pi^- p \to \eta\eta' n$
210 ± 40		[15]	BINON	83	GAM2	38 $\pi^- p \to 2\eta n$
101 ± 13		[15]	GRAY	83	DBC	0.0 $\overline{p}N \to 3\pi$

[11] T-matrix pole.
[12] T-matrix pole, supersedes ANISOVICH 94.
[13] T-matrix pole, supersedes ANISOVICH 94 and AMSLER 92.
[14] Reanalysis of SRINIVASAN 75, ROSSELET 77, BECKER 79, and COHEN 80 using a three coupled channel analysis ($\pi\pi$, $K\overline{K}$, and $\sigma\sigma$).
[15] Breit-Wigner mass.
[16] T-matrix pole. Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D.
[17] Supersedes ABATZIS 94, ARMSTRONG 89E. Breit-Wigner mass.
[18] From a simultaneous analysis of the annihilations $\overline{p}p \to 3\pi^0, \pi^0\eta\eta$.
[19] Reanalysis of ANISOVICH 94 data.
[20] From central value and spread of two solutions. Breit-Wigner mass.

$f_0(1500)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$\eta\eta'(958)$	seen
Γ_2	$\eta\eta$	seen
Γ_3	4π	seen
Γ_4	$4\pi^0$	seen
Γ_5	$2\pi^+2\pi^-$	seen
Γ_6	2π	seen
Γ_7	$\pi^+\pi^-$	seen
Γ_8	$2\pi^0$	seen
Γ_9	$K\overline{K}$	seen

$f_0(1500)$ BRANCHING RATIOS

$\Gamma(\eta\eta'(958))/\Gamma(\eta\eta)$ Γ_1/Γ_2

VALUE		DOCUMENT ID		TECN	COMMENT
0.29±0.10	[21]	AMSLER	95C	CBAR	0.0 $\overline{p}p \rightarrow \eta\eta\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.84±0.23		ABELE	96C	RVUE	Compilation
2.7 ±0.8		BINON	84C	GAM2	38 $\pi^- p \rightarrow \eta\eta' n$

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

$\Gamma(\eta\eta)/\Gamma_{\text{total}}$ Γ_2/Γ

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

$\Gamma(4\pi^0)/\Gamma(\eta\eta)$ Γ_4/Γ_2

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 $\pi^- p \rightarrow 4\pi^0 n$

$\Gamma(2\pi^0)/\Gamma(\eta\eta)$ Γ_8/Γ_2

VALUE		DOCUMENT ID		TECN	COMMENT
1.45±0.61	[22]	AMSLER	95C	CBAR	0.0 $\overline{p}p \rightarrow \eta\eta\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
4.29±0.72	[23]	ABELE	96C	RVUE	Compilation
2.12±0.81	[24]	AMSLER	95D	CBAR	0.0 $\overline{p}p \rightarrow \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$
<0.3		BINON	83	GAM2	38 $\pi^- p \rightarrow 2\eta n$

[22] Using AMSLER 95B ($3\pi^0$).
[23] 2π width determined to be 60 ± 12 MeV.
[24] Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D.

$\Gamma(K\overline{K})/\Gamma(\eta\eta)$ Γ_9/Γ_2

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.6		[25] BINON	83	GAM2	38 $\pi^- p \rightarrow 2\eta n$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.4	90	[26] PROKOSHKIN	91	GAM4	300 $\pi^- p \rightarrow \pi^- p\eta\eta$

[25] Using ETKIN 82B and COHEN 80.
[26] Combining results of GAM4 with those of WA76 on $K\overline{K}$ central production.

$\Gamma(K\overline{K})/\Gamma_{\text{total}}$ Γ_9/Γ

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

$\Gamma(K\overline{K})/\Gamma(2\pi)$ Γ_9/Γ_6

VALUE	DOCUMENT ID		TECN	COMMENT
0.19 ± 0.07	[27] 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. • • •				
0.20 ± 0.08	[28] ABELE	96B	CBAR	0.0 $\overline{p}p \rightarrow \pi^0 K_L^0 K_L^0$

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

$\Gamma(2\pi)/\Gamma_{\text{total}}$ Γ_6/Γ

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

$\Gamma(4\pi)/\Gamma(2\pi)$ Γ_3/Γ_6

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
3.4 ± 0.8	[29] ABELE	96	CBAR	0.0 $\overline{p}p \rightarrow 5\pi^0$

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

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

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	BERTIN	98	OBLX	50–405 $\overline{n}p \rightarrow$
possibly seen	FRABETTI	97D	E687	$D_s^{\pm} \rightarrow \pi^{\mp}\pi^{\pm}\pi^{\pm}\pi^+\pi^+\pi^-$

$f_0(1500)$ REFERENCES

ABELE	98	PR D57 3860	A. Abele, Adomeit, Amsler+	(Crystal Barrel Collab.)
BERTIN	98	PR D57 55	A. Bertin, Bruschi, Capponi+	(OBELIX Collab.)
BARBERIS	97B	PL B413 217	D. Barberis+	(WA102 Collab.)
BERTIN	97C	PL B408 476	A. Bertin, Bruschi+	(OBELIX Collab.)
FRABETTI	97D	PL B407 79	+Cheung, Cumalat+	(FNAL E687 Collab.)
KAMINSKI	97B	PL B413 130	R. Kaminski+	(CRAC, IPN)
ABELE	96	PL B380 453	+Adomeit, Amsler+	(Crystal Barrel Collab.)
ABELE	96B	PL B385 425	+Adomeit, Amsler+	(Crystal Barrel Collab.)
ABELE	96C	NP A609 562	A. Abele, Adomeit, Armstrong+	(Crystal Barrel Collab.)
AMELIN	96B	PAN 59 976	+Berdnikov, Bityukov+	(SERP, TBIL)
		Translated from YAF 59 1021.		
BUGG	96	NP B471 59	+Sarantsev, Zou	(LOQM, PNPI)
AMSLER	95B	PL B342 433	+Armstrong, Brose+	(Crystal Barrel Collab.)
AMSLER	95C	PL B353 571	+Armstrong, Hackman+	(Crystal Barrel Collab.)
AMSLER	95D	PL B355 425	+Armstrong, Spanier+	(Crystal Barrel Collab.)
ANTINORI	95	PL B353 589	+Barberis, Bayes+	(ATHU, BARI, BIRM, CERN, JINR)
BUGG	95	PL B353 378	+Scott, Zoli+	(LOQM, PNPI, WASH)
ABATZIS	94	PL B324 509	+Antinori, Barberis+	(ATHU, BARI, BIRM, CERN, JINR)
AMSLER	94C	PL B327 425	+Armstrong, Ravndal+	(Crystal Barrel Collab.)
AMSLER	94D	PL B333 277	+Anisovich, Spanier+	(Crystal Barrel Collab.)
AMSLER	94E	PL B340 259	+Armstrong, Hackman+	(Crystal Barrel Collab.)
ANISOVICH	94	PL B323 233	+Armstrong+	(Crystal Barrel Collab.)
BUGG	94	PR D50 4412	+Anisovich+	(LOQM)
AMSLER	92	PL B291 347	+Augustin, Baker+	(Crystal Barrel Collab.)
BELADIDZE	92C	SJNP 55 1535	+Bityukov, Borisov	(SERP, TBIL)
		Translated from YAF 55 2748.		
PROKOSHKIN	91	SPD 36 155		(GAM2, GAM4 Collab.)
		Translated from DANS 316 900.		
ARMSTRONG	89E	PL B228 536	+Benayoun	(ATHU, BARI, BIRM, CERN, CDEF, CURIN+)
ALDE	88	PL B201 160	+Bellazzini, Binon+	(SERP, BELG, LANL, LAPP, PISA)
ASTON	88D	NP B301 525	+Awaji, Bienz+	(SLAC, NAGO, CINC, INUS)
ALDE	87	PL B198 286	+Binon, Bricman+	(LANL, BRUX, SERP, LAPP)
ALDE	86D	NP B269 485	+Binon, Bricman+	(BELG, LAPP, SERP, CERN, LANL)
BINON	84C	NC 80A 363	+Bricman, Donskov+	(BELG, LAPP, SERP, CERN)
BINON	83	NC 78A 313	+Donskov, Duteil+	(BELG, LAPP, SERP, CERN)
Also	83B	SJNP 38 561	Binon, Gouanere+	(BELG, LAPP, SERP, CERN)
		Translated from YAF 38 934.		
GRAY	83	PR D27 307	+Kalogeropoulos, Nandy, Roy, Zenone	(SYRA)
ETKIN	82B	PR D25 1786	+Foley, Lai+	(BNL, CUNY, TUFTS, VAND)
COHEN	80	PR D22 2595	+Ayres, Diebold, Kramer, Pawlicki+	(ANL)
BECKER	79	NP B151 46	+Blanar, Blum+	(MPIM, CERN, ZEEM, CRAC)
ROSSELET	77	PR D15 574	+Extermann, Fischer, Guisan+	(GEVA, SACL)
SRINIVASAN	75	PR D12 681	+Helland, Lennox, Klem+	(NDAM, ANL)

OTHER RELATED PAPERS

ANISOVICH	97	PL B395 123	+Sarantsev	(PNPI)
ANISOVICH	97B	ZPHY A357 123	A.V. Anisovich+	(PNPI)
ANISOVICH	97C	PL B413 137		
ANISOVICH	97E	PAN 60 1892	A.V. Anisovich+	(PNPI)
		Translated from YAF 60 2065.		
PROKOSHKIN	97	SPD 42 117	+Kondashov, Sadovsky+	(SERP)
		Translated from DANS 353 323.		
AMSLER	96	PR D53 295	+Close	(ZURI, RAL)
AMSLER	95E	PL B353 385	+Close	(ZURI, RAL)
GASPERO	95	NP A588 861		(ROMA)
SLAUGHTER	88	MPL A3 1361		(LANL)