$f_0(980)$

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

See the related review(s):

Scalar Mesons below 1 GeV

$f_0(980)$ T-MATRIX POLE $\sqrt{s}$

Note that $\Gamma = -2\ \text{Im}(\sqrt{s})$.

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
(980–1010) − i (20–35) OUR ESTIMATE (see Fig. 64.4 in the review)			
$(993 \pm 2^{+2}_{-1}) - i(21 \pm 3^{+2}_{-4})$	[1] DANILKIN 21	RVUE	Compilation
$(1014 \pm 8) - i(35 \pm 5)$	SARANTSEV 21	RVUE	$J/\psi(1S) \to \gamma\ (\pi\pi,\ K\overline{K},\ \eta\eta,\ \omega\phi)$
$(992.8 \pm 1.3) - i(30.7 \pm 2.3)$	[2] ALBRECHT 20	RVUE	0.9 $\overline{p}p \to \pi^0\pi^0\eta,\ \pi^0\eta\eta,\ \pi^0K^+K^-$
$(1003^{+\ 5}_{-27}) - i(21^{+10}_{-\ 8})$	[3] GARCIA-MAR..11	RVUE	Compilation
$(996 \pm 7) - i(25^{+10}_{-\ 6})$	[4] GARCIA-MAR..11	RVUE	Compilation
$(996^{+\ 4}_{-14}) - i(24^{+11}_{-\ 3})$	[5] MOUSSALLAM11	RVUE	Compilation
$(981 \pm 43) - i(18 \pm 11)$	[6] MENNESSIER 10	RVUE	Compilation
$(1030^{+30}_{-10}) - i(35^{+10}_{-16})$	[7] ANISOVICH 09	RVUE	0.0 $\overline{p}p,\ \pi N$
$(973^{+\ 39}_{-127}) - i(11^{+189}_{-\ 11})$	[8] PELAEZ 04A	RVUE	$\pi\pi \to \pi\pi$

[1] Data driven analysis using partial-wave dispersion relations .

[2] 5 poles, 5 channels, including scattering data from HYAMS 75 ($\pi\pi$), LONGACRE 86 ($K\overline{K}$), BINON 83 ($\eta\eta$), and BINON 84C ($\eta\eta'$). Based on 18.5k events. Second solution 977.8 ± 1.7 MeV.

[3] Reanalysis of the K_{e4} data of BATLEY 10C and the $\pi N \to \pi\pi N$ data of HYAMS 73, GRAYER 74, and PROTOPOPESCU 73 using Roy equations.

[4] Reanalysis of the K_{e4} data of BATLEY 10C and the $\pi N \to \pi\pi N$ data of HYAMS 73, GRAYER 74, and PROTOPOPESCU 73 using GKPY equations.

[5] Uses Roy equations.

[6] Average of the analyses of three data sets in the K-matrix model. Uses the data of BATLEY 08A, HYAMS 73 , and GRAYER 74 , partially of COHEN 80 or ETKIN 82B.

[7] On sheet II in a 2-pole solution. The other pole is found on sheet III at $(850 - i\ 100)$ MeV.

[8] Reanalysis of data from PROTOPOPESCU 73, ESTABROOKS 74, GRAYER 74, and COHEN 80 in the unitarized ChPT model.

$f_0(980)$ MASS

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
990 ±20 OUR ESTIMATE				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$992.0^{+\ 8.5}_{-\ 7.5} \pm\ 8.6$		[1] AAIJ 19H	LHCB	$pp \to D^{\pm}X$
$989.4 \pm\ 1.3$	424	ABLIKIM 15P	BES3	$J/\psi \to K^+K^-3\pi$
$989.9 \pm\ 0.4$	706	ABLIKIM 12E	BES3	$J/\psi \to \gamma 3\pi$
$977\ ^{+11}_{-\ 9} \pm\ 1$	44	[2] ECKLUND 09	CLEO	4.17 $e^+e^- \to D_s^- D_s^{*+}$ + c.c.

$982.2 \pm 1.0 ^{+8.1}_{-8.0}$		[3]	UEHARA	08A	BELL	$10.6\ e^+ e^- \rightarrow e^+ e^- \pi^0 \pi^0$
$976.8 \pm 0.3 ^{+10.1}_{-0.6}$	64k	[4]	AMBROSINO	07	KLOE	$1.02\ e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$
$984.7 \pm 0.4 ^{+2.4}_{-3.7}$	64k	[5]	AMBROSINO	07	KLOE	$1.02\ e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$
973 ± 3	262 ± 30	[6]	AUBERT	07AK	BABR	$10.6\ e^+ e^- \rightarrow \phi \pi^+ \pi^- \gamma$
970 ± 7	54 ± 9	[6]	AUBERT	07AK	BABR	$10.6\ e^+ e^- \rightarrow \phi \pi^0 \pi^0 \gamma$
953 ± 20	2.6k	[7]	BONVICINI	07	CLEO	$D^+ \rightarrow \pi^- \pi^+ \pi^+$
$985.6 ^{+1.2}_{-1.5} {}^{+1.1}_{-1.6}$		[8]	MORI	07	BELL	$10.6\ e^+ e^- \rightarrow e^+ e^- \pi^+ \pi^-$
$983.0 \pm 0.6 ^{+4.0}_{-3.0}$		[9]	AMBROSINO	06B	KLOE	$1.02\ e^+ e^- \rightarrow \pi^+ \pi^- \gamma$
$977.3 \pm 0.9 ^{+3.7}_{-4.3}$		[10]	AMBROSINO	06B	KLOE	$1.02\ e^+ e^- \rightarrow \pi^+ \pi^- \gamma$
950 ± 9	4286	[11]	GARMASH	06	BELL	$B^+ \rightarrow K^+ \pi^+ \pi^-$
965 ± 10		[12]	ABLIKIM	05	BES2	$J/\psi \rightarrow \phi \pi^+ \pi^-$, $\phi K^+ K^-$
1031 ± 8		[13]	ANISOVICH	03	RVUE	
1037 ± 31			TIKHOMIROV	03	SPEC	$40.0\ \pi^- C \rightarrow K^0_S K^0_S K^0_L X$
973 ± 1	2438	[14]	ALOISIO	02D	KLOE	$e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$
$977 \pm 3 \pm 2$	848	[15]	AITALA	01A	E791	$D_s^+ \rightarrow \pi^- \pi^+ \pi^+$
969.8 ± 4.5	419	[16]	ACHASOV	00H	SND	$e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$
$985 ^{+16}_{-12}$	419	[17,18]	ACHASOV	00H	SND	$e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$
$976 \pm 5 \pm 6$		[19]	AKHMETSHIN	99B	CMD2	$e^+ e^- \rightarrow \pi^+ \pi^- \gamma$
$977 \pm 3 \pm 6$	268	[19]	AKHMETSHIN	99C	CMD2	$e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$
$975 \pm 4 \pm 6$		[20]	AKHMETSHIN	99C	CMD2	$e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$
$975 \pm 4 \pm 6$		[21]	AKHMETSHIN	99C	CMD2	$e^+ e^- \rightarrow \pi^+ \pi^- \gamma$, $\pi^0 \pi^0 \gamma$
985 ± 10			BARBERIS	99	OMEG	$450\ p p \rightarrow p_s p_f K^+ K^-$
982 ± 3			BARBERIS	99B	OMEG	$450\ p p \rightarrow p_s p_f \pi^+ \pi^-$
982 ± 3			BARBERIS	99C	OMEG	$450\ p p \rightarrow p_s p_f \pi^0 \pi^0$
$987 \pm 6 \pm 6$		[22]	BARBERIS	99D	OMEG	$450\ p p \rightarrow K^+ K^-$, $\pi^+ \pi^-$
989 ± 15			BELLAZZINI	99	GAM4	$450\ p p \rightarrow p p \pi^0 \pi^0$
991 ± 3		[23]	KAMINSKI	99	RVUE	$\pi \pi \rightarrow \pi \pi$, $K \overline{K}$, $\sigma \sigma$
~ 980		[23]	OLLER	99	RVUE	$\pi \pi \rightarrow \pi \pi$, $K \overline{K}$
~ 993.5			OLLER	99B	RVUE	$\pi \pi \rightarrow \pi \pi$, $K \overline{K}$
~ 987		[23]	OLLER	99C	RVUE	$\pi \pi \rightarrow \pi \pi$, $K \overline{K}$, $\eta \eta$
957 ± 6		[24]	ACKERSTAFF	98Q	OPAL	$Z \rightarrow f_0 X$
960 ± 10			ALDE	98	GAM4	
1015 ± 15		[23]	ANISOVICH	98B	RVUE	Compilation
1008		[25]	LOCHER	98	RVUE	$\pi \pi \rightarrow \pi \pi$, $K \overline{K}$
955 ± 10		[24]	ALDE	97	GAM2	$450\ p p \rightarrow p p \pi^0 \pi^0$
994 ± 9		[26]	BERTIN	97C	OBLX	$0.0\ \overline{p} p \rightarrow \pi^+ \pi^- \pi^0$
$993.2 \pm 6.5 \pm 6.9$		[27]	ISHIDA	96	RVUE	$\pi \pi \rightarrow \pi \pi$, $K \overline{K}$

1006		TORNQVIST	96	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$, $K\pi$, $\eta\pi$
997 ± 5	3k	[28] ALDE	95B	GAM2	38 $\pi^- p \to \pi^0 \pi^0 n$
960 ±10	10k	[29] ALDE	95B	GAM2	38 $\pi^- p \to \pi^0 \pi^0 n$
994 ± 5		AMSLER	95B	CBAR	0.0 $\overline{p} p \to 3\pi^0$
∼ 996		[30] 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		[31] ANISOVICH	95	RVUE	
1015		JANSSEN	95	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$
983		[32] BUGG	94	RVUE	$\overline{p} p \to \eta 2\pi^0$
973 ± 2		[33] KAMINSKI	94	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$
988		[34] ZOU	94B	RVUE	
988 ±10		[35] 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		[24] AGUILAR-...	91	EHS	400 pp
979 ± 4		[36] 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		[24] AUGUSTIN	89	DM2	$J/\psi \to \omega\pi^+\pi^-$
978 ± 9		[24] ABACHI	86B	HRS	$e^+ e^- \to \pi^+\pi^- X$
$985.0^{+\ 9.0}_{-39.0}$		ETKIN	82B	MPS	23 $\pi^- p \to n 2K^0_S$
974 ± 4		[36] GIDAL	81	MRK2	$J/\psi \to \pi^+\pi^- X$
975		[37] ACHASOV	80	RVUE	
986 ±10		[36] AGUILAR-...	78	HBC	0.7 $\overline{p} p \to K^0_S K^0_S$
969 ± 5		[36] LEEPER	77	ASPK	2–2.4 $\pi^- p \to \pi^+\pi^- n$, $K^+ K^- n$
987 ± 7		[36] BINNIE	73	CNTR	$\pi^- p \to n$MM
1012 ± 6		[38] GRAYER	73	ASPK	17 $\pi^- p \to \pi^+\pi^- n$
1007 ±20		[38] HYAMS	73	ASPK	17 $\pi^- p \to \pi^+\pi^- n$
997 ± 6		[38] PROTOPOP...	73	HBC	7 $\pi^+ p \to \pi^+ p \pi^+ \pi^-$

[1] From the $D^\pm \to K^\pm K^+ K^-$ Dalitz plot fit with the Triple-M amplitude in the multi-meson model of AOUDE 18.

[2] Using a relativistic Breit-Wigner function and taking into account the finite D_s mass.

[3] Breit-Wigner mass. Using finite width corrections according to FLATTE 76 and ACHASOV 05, and the ratio $g_{f_0 KK}/g_{f_0 \pi\pi} = 0$.

[4] In the kaon-loop fit.

[5] In the no-structure fit.

[6] Systematic errors not estimated.

[7] FLATTE 76 parameterization. $g_{f_0 \pi\pi} = 329 \pm 96$ MeV/c^2 assuming $g_{f_0 K\overline{K}}/g_{f_0 \pi\pi}$=2.

[8] Breit-Wigner mass. Using finite width corrections according to FLATTE 76 and ACHASOV 05, and the ratio $g_{f_0 KK}/g_{f_0 \pi\pi} = 4.21 \pm 0.25 \pm 0.21$ from ABLIKIM 05.

[9] In the kaon-loop fit following formalism of ACHASOV 89.

[10] In the no-structure fit assuming a direct coupling of ϕ to $f_0 \gamma$.

[11] FLATTE 76 parameterization. Supersedes GARMASH 05.

[12] FLATTE 76 parameterization, $g_{f_0 K\overline{K}}/g_{f_0 \pi\pi} = 4.21 \pm 0.25 \pm 0.21$.

[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] From the negative interference with the $f_0(500)$ meson of AITALA 01B using the ACHASOV 89 parameterization for the $f_0(980)$, a Breit-Wigner for the $f_0(500)$, and ACHASOV 01F for the $\rho\pi$ contribution.
[15] Coupled-channel Breit-Wigner, couplings g_π=0.09$\pm$0.01$\pm$0.01, g_K=0.02$\pm$0.04$\pm$0.03.
[16] Supersedes ACHASOV 98I. Using the model of ACHASOV 89.
[17] Supersedes ACHASOV 98I.
[18] In the "narrow resonance" approximation.
[19] Assuming $\Gamma(f_0)$= 40 MeV.
[20] From a narrow pole fit taking into account $f_0(980)$ and $f_0(1200)$ intermediate mechanisms.
[21] From the combined fit of the photon spectra in the reactions $e^+e^- \to \pi^+\pi^-\gamma$, $\pi^0\pi^0\gamma$.
[22] Supersedes BARBERIS 99 and BARBERIS 99B
[23] T-matrix pole.
[24] From invariant mass fit.
[25] On sheet II in a 2 pole solution. The other pole is found on sheet III at (1039$-$93i) MeV.
[26] On sheet II in a 2 pole solution. The other pole is found on sheet III at (963-29i) MeV.
[27] Reanalysis of data from HYAMS 73, GRAYER 74, SRINIVASAN 75, and ROSSELET 77 using the interfering amplitude method.
[28] At high $|t|$.
[29] At low $|t|$.
[30] On sheet II in a 4-pole solution, the other poles are found on sheet III at (953$-$55i) MeV and on sheet IV at (938$-$35i) MeV.
[31] Combined fit of ALDE 95B, ANISOVICH 94, AMSLER 94D.
[32] On sheet II in a 2 pole solution. The other pole is found on sheet III at (996$-$ 103i) MeV.
[33] From sheet II pole position.
[34] On sheet II in a 2 pole solution. The other pole is found on sheet III at (797$-$185i) MeV and can be interpreted as a shadow pole.
[35] On sheet II in a 2 pole solution. The other pole is found on sheet III at (978$-$ 28i) MeV.
[36] From coupled channel analysis.
[37] Coupled channel analysis with finite width corrections.
[38] Included in AGUILAR-BENITEZ 78 fit.

$f_0(980)$ WIDTH

Width determination very model dependent. Peak width in $\pi\pi$ is about 50 MeV, but decay width can be much larger.

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
10 to 100 OUR ESTIMATE					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
15.3$\pm$ 4.7	424	ABLIKIM	15P	BES3	$J/\psi \to K^+K^-3\pi$
9.5$\pm$ 1.1	706	ABLIKIM	12E	BES3	$J/\psi \to \gamma 3\pi$
91 $^{+30}_{-22}$ $\pm$ 3	44	[1] ECKLUND	09	CLEO	4.17 $e^+e^- \to D_s^- D_s^{*+}$ + c.c.
66.9$\pm$ 2.2$^{+17.6}_{-12.5}$		[2] UEHARA	08A	BELL	10.6 $e^+e^- \to e^+e^-\pi^0\pi^0$
65 $\pm$ 13	262 $\pm$ 30	[3] AUBERT	07AK	BABR	10.6 $e^+e^- \to \phi\pi^+\pi^-\gamma$
81 $\pm$ 21	54 $\pm$ 9	[3] AUBERT	07AK	BABR	10.6 $e^+e^- \to \phi\pi^0\pi^0\gamma$
51.3$^{+20.8}_{-17.7}$$^{+13.2}_{-3.8}$		[4] MORI	07	BELL	10.6 $e^+e^- \to e^+e^-\pi^+\pi^-$

$61 \pm 9 \ ^{+14}_{-8}$	2584	[5] GARMASH	05	BELL	$B^+ \to K^+ \pi^+ \pi^-$
64 ± 16		[6] ANISOVICH	03	RVUE	
121 ± 23		TIKHOMIROV	03	SPEC	$40.0\ \pi^- C \to K^0_S K^0_S K^0_L X$
~ 70		[7] BRAMON	02	RVUE	$1.02\ e^+ e^- \to \pi^0 \pi^0 \gamma$
$44 \pm 2 \pm 2$	848	[8] AITALA	01A	E791	$D^+_s \to \pi^- \pi^+ \pi^+$
201 ± 28	419	[9] ACHASOV	00H	SND	$e^+ e^- \to \pi^0 \pi^0 \gamma$
122 ± 13	419	[10,11] ACHASOV	00H	SND	$e^+ e^- \to \pi^0 \pi^0 \gamma$
56 ± 20		[12] AKHMETSHIN	99C	CMD2	$e^+ e^- \to \pi^0 \pi^0 \gamma$
65 ± 20		BARBERIS	99	OMEG	$450\ p p \to p_s p_f K^+ K^-$
80 ± 10		BARBERIS	99B	OMEG	$450\ p p \to p_s p_f \pi^+ \pi^-$
80 ± 10		BARBERIS	99C	OMEG	$450\ p p \to p_s p_f \pi^0 \pi^0$
$48 \pm 12 \pm 8$		[13] BARBERIS	99D	OMEG	$450\ p p \to K^+ K^-, \pi^+ \pi^-$
65 ± 25		BELLAZZINI	99	GAM4	$450\ p p \to p p \pi^0 \pi^0$
71 ± 14		[14] KAMINSKI	99	RVUE	$\pi \pi \to \pi \pi, K \overline{K}, \sigma \sigma$
~ 28		[14] OLLER	99	RVUE	$\pi \pi \to \pi \pi, K \overline{K}$
~ 25		OLLER	99B	RVUE	$\pi \pi \to \pi \pi, K \overline{K}$
~ 14		[14] OLLER	99C	RVUE	$\pi \pi \to \pi \pi, K \overline{K}, \eta \eta$
70 ± 20		ALDE	98	GAM4	
86 ± 16		[14] ANISOVICH	98B	RVUE	Compilation
54		[15] LOCHER	98	RVUE	$\pi \pi \to \pi \pi\ , K \overline{K}$
69 ± 15		[16] ALDE	97	GAM2	$450\ p p \to p p \pi^0 \pi^0$
38 ± 20		[17] BERTIN	97C	OBLX	$0.0\ \overline{p} p \to \pi^+ \pi^- \pi^0$
~ 100		[18] 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	[19] ALDE	95B	GAM2	$38\ \pi^- p \to \pi^0 \pi^0 n$
95 ± 20	10k	[20] ALDE	95B	GAM2	$38\ \pi^- p \to \pi^0 \pi^0 n$
26 ± 10		AMSLER	95B	CBAR	$0.0\ \overline{p} p \to 3\pi^0$
~ 112		[21] 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		[22] ANISOVICH	95	RVUE	
30		JANSSEN	95	RVUE	$\pi \pi \to \pi \pi, K \overline{K}$
74		[23] BUGG	94	RVUE	$\overline{p} p \to \eta 2\pi^0$
29 ± 2		[24] KAMINSKI	94	RVUE	$\pi \pi \to \pi \pi, K \overline{K}$
46		[25] ZOU	94B	RVUE	
48 ± 12		[26] 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		[16] AGUILAR-...	91	EHS	$400\ p p$
72 ± 8		[27] ARMSTRONG	91	OMEG	$300\ p p \to p p \pi \pi, p p K \overline{K}$
110 ± 30		BREAKSTONE	90	SFM	$p p \to p p \pi^+ \pi^-$
29 ± 13		[16] ABACHI	86B	HRS	$e^+ e^- \to \pi^+ \pi^- X$

120 $\pm$281 $\pm$20	ETKIN	82B	MPS	23 $\pi^- p \to n 2K^0_S$
28 $\pm$ 10	[27] GIDAL	81	MRK2	$J/\psi \to \pi^+\pi^-$X
70 to 300	[28] ACHASOV	80	RVUE	
100 $\pm$ 80	[29] AGUILAR-...	78	HBC	0.7 $\overline{p}p \to K^0_S K^0_S$
30 $\pm$ 8	[27] LEEPER	77	ASPK	2–2.4 $\pi^- p \to \pi^+\pi^- n$, $K^+K^- n$
48 $\pm$ 14	[27] BINNIE	73	CNTR	$\pi^- p \to n$MM
32 $\pm$ 10	[30] GRAYER	73	ASPK	17 $\pi^- p \to \pi^+\pi^- n$
30 $\pm$ 10	[30] HYAMS	73	ASPK	17 $\pi^- p \to \pi^+\pi^- n$
54 $\pm$ 16	[30] PROTOPOP...	73	HBC	7 $\pi^+ p \to \pi^+ p \pi^+\pi^-$

[1] Using a relativistic Breit-Wigner function and taking into account the finite D_s mass.
[2] Breit-Wigner $\pi\pi$ width. Using finite width corrections according to FLATTE 76 and ACHASOV 05, and the ratio $g_{f_0 K K}/g_{f_0 \pi\pi} = 0$.
[3] Systematic errors not estimated.
[4] Breit-Wigner $\pi\pi$ width. Using finite width corrections according to FLATTE 76 and ACHASOV 05, and the ratio $g_{f_0 K K}/g_{f_0 \pi\pi} = 4.21 \pm 0.25 \pm 0.21$ from ABLIKIM 05.
[5] Breit-Wigner, solution 1, PWA ambiguous.
[6] 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.
[7] Using the data of AKHMETSHIN 99C, ACHASOV 00H, and ALOISIO 02D.
[8] Breit-Wigner width.
[9] Supersedes ACHASOV 98I. Using the model of ACHASOV 89.
[10] Supersedes ACHASOV 98I.
[11] In the "narrow resonance" approximation.
[12] From the combined fit of the photon spectra in the reactions $e^+e^- \to \pi^+\pi^-\gamma$, $\pi^0\pi^0\gamma$.
[13] Supersedes BARBERIS 99 and BARBERIS 99B
[14] T-matrix pole.
[15] On sheet II in a 2 pole solution. The other pole is found on sheet III at (1039−93i) MeV.
[16] From invariant mass fit.
[17] On sheet II in a 2 pole solution. The other pole is found on sheet III at (963-29i) MeV.
[18] Reanalysis of data from HYAMS 73, GRAYER 74, SRINIVASAN 75, and ROSSELET 77 using the interfering amplitude method.
[19] At high $|t|$.
[20] At low $|t|$.
[21] 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.
[22] Combined fit of ALDE 95B, ANISOVICH 94,
[23] On sheet II in a 2 pole solution. The other pole is found on sheet III at (996−103i) MeV.
[24] From sheet II pole position.
[25] 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.
[26] On sheet II in a 2 pole solution. The other pole is found on sheet III at (978−28i) MeV.
[27] From coupled channel analysis.
[28] Coupled channel analysis with finite width corrections.
[29] 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.
[30] Included in AGUILAR-BENITEZ 78 fit.

$f_0(980)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$\pi\pi$	seen
Γ_2	$K\overline{K}$	seen
Γ_3	$\gamma\gamma$	seen
Γ_4	e^+e^-	

$f_0(980)$ PARTIAL WIDTHS

$\Gamma(\gamma\gamma)$ Γ_3

VALUE (keV)	DOCUMENT ID	TECN	COMMENT
0.29 $^{+0.11}_{-0.06}$ OUR AVERAGE			
$0.286\pm0.017^{+0.211}_{-0.070}$	[1] UEHARA 08A	BELL	$10.6\ e^+e^- \rightarrow e^+e^-\pi^0\pi^0$
$0.205^{+0.095}_{-0.083}{}^{+0.147}_{-0.117}$	[2] MORI 07	BELL	$10.6\ e^+e^- \rightarrow e^+e^-\pi^+\pi^-$
$0.42\pm0.06\pm0.18$	[3] OEST 90	JADE	$e^+e^- \rightarrow e^+e^-\pi^0\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.32 ± 0.05	[4] DAI 14A	RVUE	Compilation
0.16 ± 0.01	[5] MENNESSIER 11	RVUE	
$0.29\pm0.21^{+0.02}_{-0.07}$	[6] MOUSSALLAM 11	RVUE	Compilation
0.42	[7,8] PENNINGTON 08	RVUE	Compilation
0.10	[8,9] PENNINGTON 08	RVUE	Compilation
$0.28^{+0.09}_{-0.13}$	[10] BOGLIONE 99	RVUE	$\gamma\gamma \rightarrow \pi^+\pi^-, \pi^0\pi^0$
$0.29\pm0.07\pm0.12$	[11,12] BOYER 90	MRK2	$e^+e^- \rightarrow e^+e^-\pi^+\pi^-$
$0.31\pm0.14\pm0.09$	[11,12] MARSISKE 90	CBAL	$e^+e^- \rightarrow e^+e^-\pi^0\pi^0$
0.63 ± 0.14	[13] MORGAN 90	RVUE	$\gamma\gamma \rightarrow \pi^+\pi^-, \pi^0\pi^0$

[1] Using finite width corrections according to FLATTE 76 and ACHASOV 05, and the ratio $g_{f_0KK}/g_{f_0\pi\pi} = 0$.

[2] Using finite width corrections according to FLATTE 76 and ACHASOV 05, and the ratio $g_{f_0KK}/g_{f_0\pi\pi} = 4.21 \pm 0.25 \pm 0.21$ from ABLIKIM 05.

[3] OEST 90 quote systematic errors $^{+0.08}_{-0.18}$. We use ±0.18. Observed 60 events.

[4] Using dispersive analysis with phases from GARCIA-MARTIN 11A and BUETTIKER 04 as input.

[5] Uses an analytic K-matrix model. Compilation.

[6] Using dispersion integral with phase input from Roy equations and data from MARSISKE 90, BOYER 90, BEHREND 92, UEHARA 08A, and MORI 07.

[7] Solution A (preferred solution based on χ^2-analysis).

[8] Dispersion theory based amplitude analysis of BOYER 90, MARSISKE 90, BEHREND 92, and MORI 07.

[9] Solution B (worse than solution A; still acceptable when systematic uncertainties are included).

[10] Supersedes MORGAN 90.

[11] From analysis allowing arbitrary background unconstrained by unitarity.

[12] Data included in MORGAN 90, BOGLIONE 99 analyses.

[13] From amplitude analysis of BOYER 90 and MARSISKE 90, data corresponds to resonance parameters $m = 989$ MeV, $\Gamma = 61$ MeV.

$\Gamma(e^+e^-)$ Γ_4

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<8.4	90	VOROBYEV	88	ND	$e^+e^- \rightarrow \pi^0\pi^0$

$f_0(980)$ BRANCHING RATIOS

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

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.52 ± 0.12	9.9k	[1] AUBERT	06O	BABR	$B^\pm \rightarrow K^\pm\pi^\pm\pi^\mp$
$0.75^{+0.11}_{-0.13}$		[2] ABLIKIM	05Q	BES2	$\chi_{c0} \rightarrow 2\pi^+2\pi^-$, $\pi^+\pi^-K^+K^-$
0.84 ± 0.02		[3] ANISOVICH	02D	SPEC	Combined fit
~ 0.68		OLLER	99B	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$
0.67 ± 0.09		[4] LOVERRE	80	HBC	$4\ \pi^-p \rightarrow n2K^0_S$
$0.81^{+0.09}_{-0.04}$		[4] CASON	78	STRC	$7\ \pi^-p \rightarrow n2K^0_S$
0.78 ± 0.03		[4] WETZEL	76	OSPK	$8.9\ \pi^-p \rightarrow n2K^0_S$

[1] Recalculated by us using $\Gamma(K^+K^-)\ /\ \Gamma(\pi^+\pi^-) = 0.69\pm0.32$ from AUBERT 06O and isospin relations.

[2] Using data from ABLIKIM 04G.

[3] From a combined K-matrix analysis of Crystal Barrel ($p\overline{p} \rightarrow \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$), 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.

[4] Measure $\pi\pi$ elasticity assuming two resonances coupled to the $\pi\pi$ and $K\overline{K}$ channels only.

$f_0(980)$ REFERENCES

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BATLEY	08A	EPJ C54 411	J.R. Batley *et al.*	(CERN NA48/2 Collab.)
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