$f_0(980)$

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

See the related review(s):

Scalar Mesons below 1 GeV

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

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

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
(980–1010) − i (20–35) OUR ESTIMATE (see Fig. 64.4 in the review)				
$(1002 \pm 9)-i(23 \pm 8)$	[1] HOFERICHT...	24	RVUE	Compilation
$(993 \pm 2^{+2}_{-1}) - i(21 \pm 3^{+2}_{-4})$	[2] DANILKIN	21	RVUE	Compilation
$(1014 \pm 8)-i(35 \pm 5)$	SARANTSEV	21	RVUE	$J/\psi(1S) \to \gamma\ (\pi\pi, K\overline{K}, \eta\eta, \omega\phi)$
$(992.8 \pm 1.3) - i(30.7 \pm 2.3)$	[3] ALBRECHT	20	RVUE	0.9 $\overline{p}p \to \pi^0\pi^0\eta, \pi^0\eta\eta, \pi^0 K^+ K^-$
$(1003^{+5}_{-27}) - i(21^{+10}_{-8})$	[4] GARCIA-MAR..	11	RVUE	Compilation
$(996 \pm 7) - i(25^{+10}_{-6})$	[5] GARCIA-MAR..	11	RVUE	Compilation
$(996^{+4}_{-14}) - i(24^{+11}_{-3})$	[6] MOUSSALLAM	11	RVUE	Compilation
$(981 \pm 43) - i(18 \pm 11)$	[7] MENNESSIER	10	RVUE	Compilation
$(1030^{+30}_{-10}) - i(35^{+10}_{-16})$	[8] ANISOVICH	09	RVUE	0.0 $\overline{p}p$, πN
$(973^{+39}_{-127}) - i(11^{+189}_{-11})$	[9] PELAEZ	04A	RVUE	$\pi\pi \to \pi\pi$

[1] Using the GKPY equations as GARCIA-MARTIN 11, but with different treatment of kaon thresholds and input for $\pi\pi/K\overline{K}$ T-matrix from HOFERICHTER 16.

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

[3] 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.

[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 Roy equations.

[5] 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.

[6] Uses Roy equations.

[7] 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.

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

[9] 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	$p p \to D^{\pm} X$
989.4 ± 1.3	424	ABLIKIM	15P	BES3	$J/\psi \to K^+ K^- 3\pi$
989.9 ± 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	$10.6\ e^+ e^- \to e^+ e^- \pi^0 \pi^0$
$976.8 \pm 0.3^{+10.1}_{-\ 0.6}$	64k	[4] AMBROSINO	07	KLOE	$1.02\ e^+ e^- \to \pi^0 \pi^0 \gamma$
$984.7 \pm 0.4^{+\ 2.4}_{-\ 3.7}$	64k	[5] AMBROSINO	07	KLOE	$1.02\ e^+ e^- \to \pi^0 \pi^0 \gamma$
973 ± 3	262 ± 30	[6] AUBERT	07AK	BABR	$10.6\ e^+ e^- \to \phi \pi^+ \pi^- \gamma$
970 ± 7	54 ± 9	[6] AUBERT	07AK	BABR	$10.6\ e^+ e^- \to \phi \pi^0 \pi^0 \gamma$
953 ± 20	2.6k	[7] BONVICINI	07	CLEO	$D^+ \to \pi^- \pi^+ \pi^+$
$985.6^{+\ 1.2}_{-\ 1.5}{}^{+\ 1.1}_{-\ 1.6}$		[8] MORI	07	BELL	$10.6\ e^+ e^- \to e^+ e^- \pi^+ \pi^-$
$983.0 \pm 0.6^{+\ 4.0}_{-\ 3.0}$		[9] AMBROSINO	06B	KLOE	$1.02\ e^+ e^- \to \pi^+ \pi^- \gamma$
$977.3 \pm 0.9^{+\ 3.7}_{-\ 4.3}$		[10] AMBROSINO	06B	KLOE	$1.02\ e^+ e^- \to \pi^+ \pi^- \gamma$
950 ± 9	4286	[11] GARMASH	06	BELL	$B^+ \to K^+ \pi^+ \pi^-$
965 ± 10		[12] ABLIKIM	05	BES2	$J/\psi \to \phi \pi^+ \pi^-$, $\phi K^+ K^-$
1031 ± 8		[13] ANISOVICH	03	RVUE	
1037 ± 31		TIKHOMIROV	03	SPEC	$40.0\ \pi^- C \to K_S^0 K_S^0 K_L^0 X$
973 ± 1	2438	[14] ALOISIO	02D	KLOE	$e^+ e^- \to \pi^0 \pi^0 \gamma$
$977 \pm 3 \pm 2$	848	[15] AITALA	01A	E791	$D_s^+ \to \pi^- \pi^+ \pi^+$
969.8 ± 4.5	419	[16] ACHASOV	00H	SND	$e^+ e^- \to \pi^0 \pi^0 \gamma$
$985\ ^{+16}_{-12}$	419	[17,18] ACHASOV	00H	SND	$e^+ e^- \to \pi^0 \pi^0 \gamma$
$976 \pm 5 \pm 6$		[19] AKHMETSHIN	99B	CMD2	$e^+ e^- \to \pi^+ \pi^- \gamma$
$977 \pm 3 \pm 6$	268	[19] AKHMETSHIN	99C	CMD2	$e^+ e^- \to \pi^0 \pi^0 \gamma$
$975 \pm 4 \pm 6$		[20] AKHMETSHIN	99C	CMD2	$e^+ e^- \to \pi^0 \pi^0 \gamma$
$975 \pm 4 \pm 6$		[21] AKHMETSHIN	99C	CMD2	$e^+ e^- \to \pi^+ \pi^- \gamma$, $\pi^0 \pi^0 \gamma$
985 ± 10		BARBERIS	99	OMEG	$450\ p p \to p_s p_f K^+ K^-$
982 ± 3		BARBERIS	99B	OMEG	$450\ p p \to p_s p_f \pi^+ \pi^-$
982 ± 3		BARBERIS	99C	OMEG	$450\ p p \to p_s p_f \pi^0 \pi^0$
$987 \pm 6 \pm 6$		[22] BARBERIS	99D	OMEG	$450\ p p \to K^+ K^-$, $\pi^+ \pi^-$
989 ± 15		BELLAZZINI	99	GAM4	$450\ p p \to p p \pi^0 \pi^0$
991 ± 3		[23] KAMINSKI	99	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$, $\sigma\sigma$
~ 980		[23] 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		[23] OLLER	99C	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$, $\eta\eta$
957 ± 6		[24] ACKERSTAFF	98Q	OPAL	$Z \to f_0$ X
960 ± 10		ALDE	98	GAM4	

1015 $\pm$15		[23] ANISOVICH	98B	RVUE	Compilation
1008		[25] LOCHER	98	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$
955 $\pm$10		[24] ALDE	97	GAM2	450 $pp \to pp\pi^0\pi^0$
994 $\pm$ 9		[26] BERTIN	97C	OBLX	0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$
993.2$\pm$ 6.5$\pm$ 6.9		[27] 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 $\pm$ 5	3k	[28] ALDE	95B	GAM2	38 $\pi^- p \to \pi^0\pi^0 n$
960 $\pm$10	10k	[29] ALDE	95B	GAM2	38 $\pi^- p \to \pi^0\pi^0 n$
994 $\pm$ 5		AMSLER	95B	CBAR	0.0 $\overline{p}p \to 3\pi^0$
$\sim$ 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 $\pm$ 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 $\pm$ 2		[33] KAMINSKI	94	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$
988		[34] ZOU	94B	RVUE	
988 $\pm$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$\pm$ 4.0		[24] AGUILAR-...	91	EHS	400 pp
979 $\pm$ 4		[36] ARMSTRONG	91	OMEG	300 $pp \to pp\pi\pi$, $ppK\overline{K}$
956 $\pm$12		BREAKSTONE	90	SFM	$pp \to pp\pi^+\pi^-$
959.4$\pm$ 6.5		[24] AUGUSTIN	89	DM2	$J/\psi \to \omega\pi^+\pi^-$
978 $\pm$ 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 $\pm$ 4		[36] GIDAL	81	MRK2	$J/\psi \to \pi^+\pi^- X$
975		[37] ACHASOV	80	RVUE	
986 $\pm$10		[36] AGUILAR-...	78	HBC	0.7 $\overline{p}p \to K^0_S K^0_S$
969 $\pm$ 5		[36] LEEPER	77	ASPK	2–2.4 $\pi^- p \to \pi^+\pi^- n$, $K^+K^- n$
987 $\pm$ 7		[36] BINNIE	73	CNTR	$\pi^- p \to n$MM
1012 $\pm$ 6		[38] GRAYER	73	ASPK	17 $\pi^- p \to \pi^+\pi^- n$
1007 $\pm$20		[38] HYAMS	73	ASPK	17 $\pi^- p \to \pi^+\pi^- n$
997 $\pm$ 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 ± 0.25 ± 0.21.

[13] 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.

[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±0.01±0.01, g_K=0.02±0.04±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 $e^+e^- \rightarrow \pi^+\pi^-\gamma$, $\pi^0\pi^0\gamma$.

[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 ± 4.7	424	ABLIKIM	15P	BES3	$J/\psi \to K^+ K^- 3\pi$
9.5 ± 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 ± 13	262 ± 30	[3] AUBERT	07AK	BABR	10.6 $e^+ e^- \to \phi \pi^+ \pi^- \gamma$
81 ± 21	54 ± 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 ± 2 ± 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 ± 12 ± 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 pp
72 ± 8	[27] ARMSTRONG	91	OMEG	300 $pp \to pp\pi\pi$, $ppK\overline{K}$
110 ± 30	BREAKSTONE	90	SFM	$pp \to pp\pi^+\pi^-$
29 ± 13	[16] ABACHI	86B	HRS	$e^+e^- \to \pi^+\pi^- X$
120 ±281 ±20	ETKIN	82B	MPS	23 $\pi^- p \to n 2K^0_S$
28 ± 10	[27] GIDAL	81	MRK2	$J/\psi \to \pi^+\pi^- X$
70 to 300	[28] ACHASOV	80	RVUE	
100 ± 80	[29] AGUILAR-...	78	HBC	0.7 $\overline{p}p \to K^0_S K^0_S$
30 ± 8	[27] LEEPER	77	ASPK	2–2.4 $\pi^- p \to \pi^+\pi^- n$, $K^+K^- n$
48 ± 14	[27] BINNIE	73	CNTR	$\pi^- p \to n$MM
32 ± 10	[30] GRAYER	73	ASPK	17 $\pi^- p \to \pi^+\pi^- n$
30 ± 10	[30] HYAMS	73	ASPK	17 $\pi^- p \to \pi^+\pi^- n$
54 ± 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 $g_{f_0 KK}/g_{f_0 \pi\pi} = 0$.

[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 $g_{f_0 KK}/g_{f_0 \pi\pi} = 4.21 \pm 0.25 \pm 0.21$ 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 (1039−93*i*) 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±0.017$^{+0.211}_{-0.070}$	[1] UEHARA	08A	BELL	10.6 $e^+e^- \to e^+e^-\pi^0\pi^0$
0.205$^{+0.095}_{-0.083}$$^{+0.147}_{-0.117}$	[2] MORI	07	BELL	10.6 $e^+e^- \to e^+e^-\pi^+\pi^-$
0.42 ±0.06 ±0.18	[3] OEST	90	JADE	$e^+e^- \to e^+e^-\pi^0\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.32 ±0.05	[4] DAI	14A	RVUE	Compilation
0.16 ±0.01	[5] MENNESSIER	11	RVUE	
0.29 ±0.21 $^{+0.02}_{-0.07}$	[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	$\gamma\gamma \to \pi^+\pi^-$, $\pi^0\pi^0$
0.29 ±0.07 ±0.12	[11,12] BOYER	90	MRK2	$e^+e^- \to e^+e^-\pi^+\pi^-$
0.31 ±0.14 ±0.09	[11,12] MARSISKE	90	CBAL	$e^+e^- \to e^+e^-\pi^0\pi^0$
0.63 ±0.14	[13] MORGAN	90	RVUE	$\gamma\gamma \to \pi^+\pi^-$, $\pi^0\pi^0$

[1] Using finite width corrections according to FLATTE 76 and ACHASOV 05, and the ratio $g_{f_0 K K}/g_{f_0 \pi\pi} = 0$.
[2] 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.
[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	$e^+ e^- \to \pi^0 \pi^0$

$f_0(980)$ 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	$B^\pm \to K^\pm \pi^\pm \pi^\mp$
$0.75^{+0.11}_{-0.13}$		[2] ABLIKIM	05Q	BES2	$\chi_{c0} \to 2\pi^+ 2\pi^-$, $\pi^+\pi^- K^+ K^-$
0.84 ± 0.02		[3] ANISOVICH	02D	SPEC	Combined fit
~ 0.68		OLLER	99B	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$
0.67 ± 0.09		[4] LOVERRE	80	HBC	$4\ \pi^- p \to n 2K^0_S$
$0.81^{+0.09}_{-0.04}$		[4] CASON	78	STRC	$7\ \pi^- p \to n 2K^0_S$
0.78 ± 0.03		[4] WETZEL	76	OSPK	$8.9\ \pi^- p \to n 2K^0_S$

[1] Recalculated by us using $\Gamma(K^+ K^-)$ / $\Gamma(\pi^+ \pi^-) = 0.69 \pm 0.32$ from AUBERT 06O and isospin relations.
[2] Using data from ABLIKIM 04G.
[3] From a combined K-matrix analysis of Crystal Barrel ($p\overline{p} \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$), 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.
[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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SARANTSEV	21	PL B816 136227	A.V. Sarantsev *et al.*	(BONN, PNPI)
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