$f_0(980)$

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

See the review on "Scalar Mesons below 2 GeV."

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

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$(1003^{+5}_{-27}) - i(21^{+10}_{-8})$	[1] GARCIA-MAR..11		RVUE	Compilation
$(996 \pm 7) - i(25^{+10}_{-6})$	[2] GARCIA-MAR..11		RVUE	Compilation
$(973^{+39}_{-127}) - i(11^{+189}_{-11})$	[3] PELAEZ	04A	RVUE	$\pi\pi \to \pi\pi$

[1] 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.

[2] 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.

[3] 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. • • •					
$992.8 \pm 0.8 \pm 1.0$		[1] ALBRECHT	20	RVUE	$0.9\ \overline{p}p \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0 K^+K^-$
$992.0^{+8.5}_{-7.5} \pm 8.6$		[2] AAIJ	19H	LHCB	$pp \to D^\pm X$
989.4 ± 1.3	424	ABLIKIM	15P	BES3	$J/\psi \to K^+K^- 3\pi$
989.9 ± 0.4	706	ABLIKIM	12E	BES3	$J/\psi \to \gamma 3\pi$
$996\ ^{+4}_{-14}$		[3] MOUSSALLAM	11	RVUE	Compilation
981 ± 43		[4] MENNESSIER	10	RVUE	Compilation
$1030\ ^{+30}_{-10}$		[5] ANISOVICH	09	RVUE	$0.0\ \overline{p}p$, πN
$977\ ^{+11}_{-9} \pm 1$	44	[6] ECKLUND	09	CLEO	$4.17\ e^+e^- \to D_s^- D_s^{*+}$ + c.c.
$982.2 \pm 1.0^{+8.1}_{-8.0}$		[7] UEHARA	08A	BELL	$10.6\ e^+e^- \to e^+e^-\pi^0\pi^0$
$976.8 \pm 0.3^{+10.1}_{-0.6}$	64k	[8] AMBROSINO	07	KLOE	$1.02\ e^+e^- \to \pi^0\pi^0\gamma$
$984.7 \pm 0.4^{+2.4}_{-3.7}$	64k	[9] AMBROSINO	07	KLOE	$1.02\ e^+e^- \to \pi^0\pi^0\gamma$
973 ± 3	262 ± 30	[10] AUBERT	07AK	BABR	$10.6\ e^+e^- \to \phi\pi^+\pi^-\gamma$
970 ± 7	54 ± 9	[10] AUBERT	07AK	BABR	$10.6\ e^+e^- \to \phi\pi^0\pi^0\gamma$
953 ± 20	2.6k	[11] BONVICINI	07	CLEO	$D^+ \to \pi^-\pi^+\pi^+$
$985.6^{+1.2}_{-1.5}{}^{+1.1}_{-1.6}$		[12] MORI	07	BELL	$10.6\ e^+e^- \to e^+e^-\pi^+\pi^-$

$983.0 \pm 0.6^{+4.0}_{-3.0}$		13	AMBROSINO	06B	KLOE	$1.02\ e^+ e^- \rightarrow \pi^+ \pi^- \gamma$
$977.3 \pm 0.9^{+3.7}_{-4.3}$		14	AMBROSINO	06B	KLOE	$1.02\ e^+ e^- \rightarrow \pi^+ \pi^- \gamma$
950 ± 9	4286	15	GARMASH	06	BELL	$B^+ \rightarrow K^+ \pi^+ \pi^-$
965 ± 10		16	ABLIKIM	05	BES2	$J/\psi \rightarrow \phi \pi^+ \pi^-, \phi K^+ K^-$
1031 ± 8		17	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	18	ALOISIO	02D	KLOE	$e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$
$977 \pm 3 \pm 2$	848	19	AITALA	01A	E791	$D^+_s \rightarrow \pi^- \pi^+ \pi^+$
969.8 ± 4.5	419	20	ACHASOV	00H	SND	$e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$
$985\ ^{+16}_{-12}$	419	21,22	ACHASOV	00H	SND	$e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$
$976 \pm 5 \pm 6$		23	AKHMETSHIN	99B	CMD2	$e^+ e^- \rightarrow \pi^+ \pi^- \gamma$
$977 \pm 3 \pm 6$	268	23	AKHMETSHIN	99C	CMD2	$e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$
$975 \pm 4 \pm 6$		24	AKHMETSHIN	99C	CMD2	$e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$
$975 \pm 4 \pm 6$		25	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	$450\ p p \rightarrow p_s p_f \pi^0 \pi^0$
$987 \pm 6 \pm 6$		26	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		27	KAMINSKI	99	RVUE	$\pi \pi \rightarrow \pi \pi, K \overline{K}, \sigma \sigma$
~ 980		27	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		27	OLLER	99C	RVUE	$\pi \pi \rightarrow \pi \pi, K \overline{K}, \eta \eta$
957 ± 6		28	ACKERSTAFF	98Q	OPAL	$Z \rightarrow f_0 X$
960 ± 10			ALDE	98	GAM4	
1015 ± 15		27	ANISOVICH	98B	RVUE	Compilation
1008		29	LOCHER	98	RVUE	$\pi \pi \rightarrow \pi \pi , K \overline{K}$
955 ± 10		28	ALDE	97	GAM2	$450\ p p \rightarrow p p \pi^0 \pi^0$
994 ± 9		30	BERTIN	97C	OBLX	$0.0\ \overline{p} p \rightarrow \pi^+ \pi^- \pi^0$
$993.2 \pm 6.5 \pm 6.9$		31	ISHIDA	96	RVUE	$\pi \pi \rightarrow \pi \pi, K \overline{K}$
1006			TORNQVIST	96	RVUE	$\pi \pi \rightarrow \pi \pi, K \overline{K}, K \pi, \eta \pi$
997 ± 5	3k	32	ALDE	95B	GAM2	$38\ \pi^- p \rightarrow \pi^0 \pi^0 n$
960 ± 10	10k	33	ALDE	95B	GAM2	$38\ \pi^- p \rightarrow \pi^0 \pi^0 n$
994 ± 5			AMSLER	95B	CBAR	$0.0\ \overline{p} p \rightarrow 3\pi^0$
~ 996		34	AMSLER	95D	CBAR	$0.0\ \overline{p} p \rightarrow \pi^0 \pi^0 \pi^0, \pi^0 \eta \eta, \pi^0 \pi^0 \eta$
987 ± 6		35	ANISOVICH	95	RVUE	
1015			JANSSEN	95	RVUE	$\pi \pi \rightarrow \pi \pi, K \overline{K}$
983		36	BUGG	94	RVUE	$\overline{p} p \rightarrow \eta 2\pi^0$
973 ± 2		37	KAMINSKI	94	RVUE	$\pi \pi \rightarrow \pi \pi, K \overline{K}$
988		38	ZOU	94B	RVUE	

988 ±10	[39] 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	[28] AGUILAR-...	91	EHS	400 pp
979 ± 4	[40] 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	[28] AUGUSTIN	89	DM2	$J/\psi \to \omega\pi^+\pi^-$
978 ± 9	[28] ABACHI	86B	HRS	$e^+e^- \to \pi^+\pi^-X$
$985.0^{+\ 9.0}_{-39.0}$	ETKIN	82B	MPS	23 $\pi^-p \to n2K^0_S$
974 ± 4	[40] GIDAL	81	MRK2	$J/\psi \to \pi^+\pi^-X$
975	[41] ACHASOV	80	RVUE	
986 ±10	[40] AGUILAR-...	78	HBC	0.7 $\overline{p}p \to K^0_S K^0_S$
969 ± 5	[40] LEEPER	77	ASPK	2–2.4 $\pi^-p \to \pi^+\pi^-n$, K^+K^-n
987 ± 7	[40] BINNIE	73	CNTR	$\pi^-p \to n$MM
1012 ± 6	[42] GRAYER	73	ASPK	17 $\pi^-p \to \pi^+\pi^-n$
1007 ±20	[42] HYAMS	73	ASPK	17 $\pi^-p \to \pi^+\pi^-n$
997 ± 6	[42] PROTOPOP...	73	HBC	7 $\pi^+p \to \pi^+p\pi^+\pi^-$

[1] 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 ($\eta\eta'$). Second solution 977.8 ± 0.6 ± 1.6 MeV.

[2] 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.

[3] Pole position. Used Roy equations.

[4] 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.

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

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

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

[8] In the kaon-loop fit.

[9] In the no-structure fit.

[10] Systematic errors not estimated.

[11] FLATTE 76 parameterization. $g_{f_0\pi\pi} = 329 \pm 96$ MeV/c^2 assuming $g_{f_0K\overline{K}}/g_{f_0\pi\pi}$=2.

[12] Breit-Wigner mass. 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.

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

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

[15] FLATTE 76 parameterization. Supersedes GARMASH 05.

[16] FLATTE 76 parameterization, $g_{f_0K\overline{K}}/g_{f_0\pi\pi} = 4.21 \pm 0.25 \pm 0.21$.

[17] K-matrix pole from combined analysis of $\pi^-p \to \pi^0\pi^0n$, $\pi^-p \to K\overline{K}n$, $\pi^+\pi^- \to \pi^+\pi^-$, $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$, $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, $K^0_SK^0_S\pi^0$, $K^+K^0_S\pi^-$ at rest, $\overline{p}n \to \pi^-\pi^-\pi^+$, $K^0_SK^-\pi^0$, $K^0_SK^0_S\pi^-$ at rest.

[18] 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.

[19] Coupled-channel Breit-Wigner, couplings g_π=0.09±0.01±0.01, g_K=0.02±0.04±0.03.

[20] Supersedes ACHASOV 98I. Using the model of ACHASOV 89.

[21] Supersedes ACHASOV 98I.
[22] In the "narrow resonance" approximation.
[23] Assuming $\Gamma(f_0)$= 40 MeV.
[24] From a narrow pole fit taking into account $f_0(980)$ and $f_0(1200)$ intermediate mechanisms.
[25] From the combined fit of the photon spectra in the reactions $e^+ e^- \rightarrow \pi^+ \pi^- \gamma$, $\pi^0 \pi^0 \gamma$.
[26] Supersedes BARBERIS 99 and BARBERIS 99B
[27] T-matrix pole.
[28] From invariant mass fit.
[29] On sheet II in a 2 pole solution. The other pole is found on sheet III at (1039−93i) MeV.
[30] On sheet II in a 2 pole solution. The other pole is found on sheet III at (963-29i) MeV.
[31] Reanalysis of data from HYAMS 73, GRAYER 74, SRINIVASAN 75, and ROSSELET 77 using the interfering amplitude method.
[32] At high $|t|$.
[33] At low $|t|$.
[34] 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.
[35] Combined fit of ALDE 95B, ANISOVICH 94, AMSLER 94D.
[36] On sheet II in a 2 pole solution. The other pole is found on sheet III at (996−103i) MeV.
[37] From sheet II pole position.
[38] 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.
[39] On sheet II in a 2 pole solution. The other pole is found on sheet III at (978−28i) MeV.
[40] From coupled channel analysis.
[41] Coupled channel analysis with finite width corrections.
[42] 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. • • •					
$61.3 \pm 1.3 \pm 4.4$		[1] ALBRECHT	20	RVUE	0.9 $\overline{p}p \rightarrow \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0 K^+ K^-$
15.3 ± 4.7	424	ABLIKIM	15P	BES3	$J/\psi \rightarrow K^+ K^- 3\pi$
9.5 ± 1.1	706	ABLIKIM	12E	BES3	$J/\psi \rightarrow \gamma 3\pi$
$48 {}^{+22}_{-6}$		[2] MOUSSALLAM	11	RVUE	Compilation
36 ± 22		[3] MENNESSIER	10	RVUE	Compilation
$70 {}^{+20}_{-32}$		[4] ANISOVICH	09	RVUE	0.0 $\overline{p}p$, πN
$91 {}^{+30}_{-22} \pm 3$	44	[5] ECKLUND	09	CLEO	4.17 $e^+ e^- \rightarrow D_s^- D_s^{*+}$ + c.c.
$66.9 \pm 2.2 {}^{+17.6}_{-12.5}$		[6] UEHARA	08A	BELL	10.6 $e^+ e^- \rightarrow e^+ e^- \pi^0 \pi^0$
65 ± 13	262 ± 30	[7] AUBERT	07AK	BABR	10.6 $e^+ e^- \rightarrow \phi\pi^+\pi^-\gamma$
81 ± 21	54 ± 9	[7] AUBERT	07AK	BABR	10.6 $e^+ e^- \rightarrow \phi\pi^0\pi^0\gamma$

$51.3^{+20.8+13.2}_{-17.7-3.8}$		[8] MORI	07	BELL	$10.6\ e^+e^- \to e^+e^-\pi^+\pi^-$
$61 \pm 9\ ^{+14}_{-8}$	2584	[9] GARMASH	05	BELL	$B^+ \to K^+\pi^+\pi^-$
64 ± 16		[10] ANISOVICH	03	RVUE	
121 ± 23		TIKHOMIROV	03	SPEC	$40.0\ \pi^- C \to K^0_S K^0_S K^0_L X$
~ 70		[11] BRAMON	02	RVUE	$1.02\ e^+e^- \to \pi^0\pi^0\gamma$
$44 \pm 2 \pm 2$	848	[12] AITALA	01A	E791	$D^+_s \to \pi^-\pi^+\pi^+$
201 ± 28	419	[13] ACHASOV	00H	SND	$e^+e^- \to \pi^0\pi^0\gamma$
122 ± 13	419	[14,15] ACHASOV	00H	SND	$e^+e^- \to \pi^0\pi^0\gamma$
56 ± 20		[16] AKHMETSHIN	99C	CMD2	$e^+e^- \to \pi^0\pi^0\gamma$
65 ± 20		BARBERIS	99	OMEG	$450\ pp \to p_s p_f K^+K^-$
80 ± 10		BARBERIS	99B	OMEG	$450\ pp \to p_s p_f \pi^+\pi^-$
80 ± 10		BARBERIS	99C	OMEG	$450\ pp \to p_s p_f \pi^0\pi^0$
$48 \pm 12 \pm 8$		[17] BARBERIS	99D	OMEG	$450\ pp \to K^+K^-, \pi^+\pi^-$
65 ± 25		BELLAZZINI	99	GAM4	$450\ pp \to pp\pi^0\pi^0$
71 ± 14		[18] KAMINSKI	99	RVUE	$\pi\pi \to \pi\pi, K\overline{K}, \sigma\sigma$
~ 28		[18] OLLER	99	RVUE	$\pi\pi \to \pi\pi, K\overline{K}$
~ 25		OLLER	99B	RVUE	$\pi\pi \to \pi\pi, K\overline{K}$
~ 14		[18] OLLER	99C	RVUE	$\pi\pi \to \pi\pi, K\overline{K}, \eta\eta$
70 ± 20		ALDE	98	GAM4	
86 ± 16		[18] ANISOVICH	98B	RVUE	Compilation
54		[19] LOCHER	98	RVUE	$\pi\pi \to \pi\pi, K\overline{K}$
69 ± 15		[20] ALDE	97	GAM2	$450\ pp \to pp\pi^0\pi^0$
38 ± 20		[21] BERTIN	97C	OBLX	$0.0\ \overline{p}p \to \pi^+\pi^-\pi^0$
~ 100		[22] 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	[23] ALDE	95B	GAM2	$38\ \pi^- p \to \pi^0\pi^0 n$
95 ± 20	10k	[24] 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		[25] 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		[26] ANISOVICH	95	RVUE	
30		JANSSEN	95	RVUE	$\pi\pi \to \pi\pi, K\overline{K}$
74		[27] BUGG	94	RVUE	$\overline{p}p \to \eta 2\pi^0$
29 ± 2		[28] KAMINSKI	94	RVUE	$\pi\pi \to \pi\pi, K\overline{K}$
46		[29] ZOU	94B	RVUE	
48 ± 12		[30] 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		[20] AGUILAR-...	91	EHS	$400\ pp$
72 ± 8		[31] ARMSTRONG	91	OMEG	$300\ pp \to pp\pi\pi, ppK\overline{K}$
110 ± 30		BREAKSTONE	90	SFM	$pp \to pp\pi^+\pi^-$

29 ± 13	[20] ABACHI	86B	HRS	$e^+e^- \rightarrow \pi^+\pi^-X$
120 ±281 ±20	ETKIN	82B	MPS	$23\ \pi^- p \rightarrow n2K^0_S$
28 ± 10	[31] GIDAL	81	MRK2	$J/\psi \rightarrow \pi^+\pi^-X$
70 to 300	[32] ACHASOV	80	RVUE	
100 ± 80	[33] AGUILAR-...	78	HBC	$0.7\ \overline{p}p \rightarrow K^0_S K^0_S$
30 ± 8	[31] LEEPER	77	ASPK	2–2.4 $\pi^- p \rightarrow \pi^+\pi^- n,\ K^+K^- n$
48 ± 14	[31] BINNIE	73	CNTR	$\pi^- p \rightarrow n$MM
32 ± 10	[34] GRAYER	73	ASPK	$17\ \pi^- p \rightarrow \pi^+\pi^- n$
30 ± 10	[34] HYAMS	73	ASPK	$17\ \pi^- p \rightarrow \pi^+\pi^- n$
54 ± 16	[34] PROTOPOP...	73	HBC	$7\ \pi^+ p \rightarrow \pi^+ p \pi^+\pi^-$

[1] 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 ($\eta\eta'$). Second solution 97.8 ± 1.2 ± 5.4 MeV.
[2] Pole position. Used Roy equations.
[3] 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.
[4] On sheet II in a 2-pole solution. The other pole is found on sheet III at (850−100i) MeV
[5] Using a relativistic Breit-Wigner function and taking into account the finite D_s mass.
[6] Breit-Wigner $\pi\pi$ width. Using finite width corrections according to FLATTE 76 and ACHASOV 05, and the ratio $g_{f_0 KK}/g_{f_0 \pi\pi} = 0$.
[7] Systematic errors not estimated.
[8] 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.
[9] Breit-Wigner, solution 1, PWA ambiguous.
[10] K-matrix pole from combined analysis of $\pi^- p \rightarrow \pi^0\pi^0 n$, $\pi^- p \rightarrow K\overline{K} n$, $\pi^+\pi^- \rightarrow \pi^+\pi^-$, $\overline{p}p \rightarrow \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$, $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, $K^0_S K^0_S \pi^0$, $K^+K^0_S\pi^-$ at rest, $\overline{p}n \rightarrow \pi^-\pi^-\pi^+$, $K^0_S K^-\pi^0$, $K^0_S K^0_S \pi^-$ at rest.
[11] Using the data of AKHMETSHIN 99C, ACHASOV 00H, and ALOISIO 02D.
[12] Breit-Wigner width.
[13] Supersedes ACHASOV 98I. Using the model of ACHASOV 89.
[14] Supersedes ACHASOV 98I.
[15] In the "narrow resonance" approximation.
[16] From the combined fit of the photon spectra in the reactions $e^+e^- \rightarrow \pi^+\pi^-\gamma$, $\pi^0\pi^0\gamma$.
[17] Supersedes BARBERIS 99 and BARBERIS 99B
[18] T-matrix pole.
[19] On sheet II in a 2 pole solution. The other pole is found on sheet III at (1039−93i) MeV.
[20] From invariant mass fit.
[21] On sheet II in a 2 pole solution. The other pole is found on sheet III at (963-29i) MeV.
[22] Reanalysis of data from HYAMS 73, GRAYER 74, SRINIVASAN 75, and ROSSELET 77 using the interfering amplitude method.
[23] At high $|t|$.
[24] At low $|t|$.
[25] 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.
[26] Combined fit of ALDE 95B, ANISOVICH 94,
[27] On sheet II in a 2 pole solution. The other pole is found on sheet III at (996−103i) MeV.
[28] From sheet II pole position.

[29] 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.
[30] On sheet II in a 2 pole solution. The other pole is found on sheet III at (978−28i) MeV.
[31] From coupled channel analysis.
[32] Coupled channel analysis with finite width corrections.
[33] 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.
[34] 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, Γ = 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	$4\ \pi^-p \to n2K^0_S$
$0.81^{+0.09}_{-0.04}$		[4] CASON	78	STRC	$7\ \pi^-p \to n2K^0_S$
0.78 ± 0.03		[4] WETZEL	76	OSPK	$8.9\ \pi^-p \to n2K^0_S$

[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

ALBRECHT	20	EPJ C80 453	M. Albrecht et al.	(Crystal Barrel Collab.)
AAIJ	19H	JHEP 1904 063	R. Aaij et al.	(LHCb Collab.)
AOUDE	18	PR D98 056021	R.T. Aoude et al.	
ABLIKIM	15P	PR D92 012007	M. Ablikim et al.	(BESIII Collab.)
DAI	14A	PR D90 036004	L.-Y. Dai, M.R. Pennington	(CEBAF)
ABLIKIM	12E	PRL 108 182001	M. Ablikim et al.	(BESIII Collab.)
GARCIA-MAR...	11	PRL 107 072001	R. Garcia-Martin et al.	(MADR, CRAC)
GARCIA-MAR...	11A	PR D83 074004	R. Garcia-Martin et al.	(MADR, CRAC)
MENNESSIER	11	PL B696 40	G. Mennessier, S. Narison, X.-G. Wang	
MOUSSALLAM	11	EPJ C71 1814	B. Moussallam	
BATLEY	10C	EPJ C70 635	J.R. Batley et al.	(CERN NA48/2 Collab.)
MENNESSIER	10	PL B688 59	G. Mennessier, S. Narison, X.-G. Wang	
ANISOVICH	09	IJMP A24 2481	V.V. Anisovich, A.V. Sarantsev	

ECKLUND	09	PR D80 052009	K.M. Ecklund *et al.*	(CLEO Collab.)
BATLEY	08A	EPJ C54 411	J.R. Batley *et al.*	(CERN NA48/2 Collab.)
PENNINGTON	08	EPJ C56 1	M.R. Pennington *et al.*	
UEHARA	08A	PR D78 052004	S. Uehara *et al.*	(BELLE Collab.)
AMBROSINO	07	EPJ C49 473	F. Ambrosino *et al.*	(KLOE Collab.)
AUBERT	07AK	PR D76 012008	B. Aubert *et al.*	(BABAR Collab.)
BONVICINI	07	PR D76 012001	G. Bonvicini *et al.*	(CLEO Collab.)
MORI	07	PR D75 051101	T. Mori *et al.*	(BELLE Collab.)
AMBROSINO	06B	PL B634 148	F. Ambrosino *et al.*	(KLOE Collab.)
AUBERT	06O	PR D74 032003	B. Aubert *et al.*	(BABAR Collab.)
GARMASH	06	PRL 96 251803	A. Garmash *et al.*	(BELLE Collab.)
ABLIKIM	05	PL B607 243	M. Ablikim *et al.*	(BES Collab.)
ABLIKIM	05Q	PR D72 092002	M. Ablikim *et al.*	(BES Collab.)
ACHASOV	05	PR D72 013006	N.N. Achasov, G.N. Shestakov	
GARMASH	05	PR D71 092003	A. Garmash *et al.*	(BELLE Collab.)
ABLIKIM	04G	PR D70 092002	M. Ablikim *et al.*	(BES Collab.)
BUETTIKER	04	EPJ C33 409	P. Buettiker, S. Descotes-Genon, B. Moussallam	
PELAEZ	04A	MPL A19 2879	J.R. Pelaez	(MADU)
ANISOVICH	03	EPJ A16 229	V.V. Anisovich *et al.*	
TIKHOMIROV	03	PAN 66 828	G.D. Tikhomirov *et al.*	
		Translated from YAF 66 860.		
ALOISIO	02D	PL B537 21	A. Aloisio *et al.*	(KLOE Collab.)
ANISOVICH	02D	PAN 65 1545	V.V. Anisovich *et al.*	
		Translated from YAF 65 1583.		
BRAMON	02	EPJ C26 253	A. Bramon *et al.*	
ACHASOV	01F	PR D63 094007	N.N. Achasov, V.V. Gubin	(Novosibirsk SND Collab.)
AITALA	01A	PRL 86 765	E.M. Aitala *et al.*	(FNAL E791 Collab.)
AITALA	01B	PRL 86 770	E.M. Aitala *et al.*	(FNAL E791 Collab.)
ACHASOV	00H	PL B485 349	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)
AKHMETSHIN	99B	PL B462 371	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)
AKHMETSHIN	99C	PL B462 380	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)
BARBERIS	99	PL B453 305	D. Barberis *et al.*	(Omega Expt.)
BARBERIS	99B	PL B453 316	D. Barberis *et al.*	(Omega Expt.)
BARBERIS	99C	PL B453 325	D. Barberis *et al.*	(Omega Expt.)
BARBERIS	99D	PL B462 462	D. Barberis *et al.*	(Omega Expt.)
BELLAZZINI	99	PL B467 296	R. Bellazzini *et al.*	
BOGLIONE	99	EPJ C9 11	M. Boglione, M.R. Pennington	
KAMINSKI	99	EPJ C9 141	R. Kaminski, L. Lesniak, B. Loiseau	(CRAC, PARIN)
OLLER	99	PR D60 099906 (erratum)	J.A. Oller *et al.*	
OLLER	99B	NP A652 407 (erratum)	J.A. Oller, E. Oset	
OLLER	99C	PR D60 074023	J.A. Oller, E. Oset	
ACHASOV	98I	PL B440 442	M.N. Achasov *et al.*	
ACKERSTAFF	98Q	EPJ C4 19	K. Ackerstaff *et al.*	(OPAL Collab.)
ALDE	98	EPJ A3 361	D. Alde *et al.*	(GAM4 Collab.)
Also		PAN 62 405	D. Alde *et al.*	(GAMS Collab.)
		Translated from YAF 62 446.		
ANISOVICH	98B	SPU 41 419	V.V. Anisovich *et al.*	
		Translated from UFN 168 481.		
LOCHER	98	EPJ C4 317	M.P. Locher *et al.*	(PSI)
ALDE	97	PL B397 350	D.M. Alde *et al.*	(GAMS Collab.)
BERTIN	97C	PL B408 476	A. Bertin *et al.*	(OBELIX Collab.)
ISHIDA	96	PTP 95 745	S. Ishida *et al.*	(TOKY, MIYA, KEK)
TORNQVIST	96	PRL 76 1575	N.A. Tornqvist, M. Roos	(HELS)
ALDE	95B	ZPHY C66 375	D.M. Alde *et al.*	(GAMS Collab.)
AMSLER	95B	PL B342 433	C. Amsler *et al.*	(Crystal Barrel Collab.)
AMSLER	95D	PL B355 425	C. Amsler *et al.*	(Crystal Barrel Collab.)
ANISOVICH	95	PL B355 363	V.V. Anisovich *et al.*	(PNPI, SERP)
JANSSEN	95	PR D52 2690	G. Janssen *et al.*	(STON, ADLD, JULI)
AMSLER	94D	PL B333 277	C. Amsler *et al.*	(Crystal Barrel Collab.)
ANISOVICH	94	PL B323 233	V.V. Anisovich *et al.*	(Crystal Barrel Collab.)
BUGG	94	PR D50 4412	D.V. Bugg *et al.*	(LOQM)
KAMINSKI	94	PR D50 3145	R. Kaminski, L. Lesniak, J.P. Maillet	(CRAC+)
ZOU	94B	PR D50 591	B.S. Zou, D.V. Bugg	(LOQM)
MORGAN	93	PR D48 1185	D. Morgan, M.R. Pennington	(RAL, DURH)
BEHREND	92	ZPHY C56 381	H.J. Behrend	(CELLO Collab.)
AGUILAR-...	91	ZPHY C50 405	M. Aguilar-Benitez *et al.*	(LEBC-EHS Collab.)
ARMSTRONG	91	ZPHY C51 351	T.A. Armstrong *et al.*	(ATHU, BARI, BIRM+)
BOYER	90	PR D42 1350	J. Boyer *et al.*	(Mark II Collab.)
BREAKSTONE	90	ZPHY C48 569	A.M. Breakstone *et al.*	(ISU, BGNA, CERN+)
MARSISKE	90	PR D41 3324	H. Marsiske *et al.*	(Crystal Ball Collab.)
MORGAN	90	ZPHY C48 623	D. Morgan, M.R. Pennington	(RAL, DURH)

OEST	90	ZPHY C47 343	T. Oest *et al.*	(JADE Collab.)	
ACHASOV	89	NP B315 465	N.N. Achasov, V.N. Ivanchenko		
AUGUSTIN	89	NP B320 1	J.E. Augustin, G. Cosme	(DM2 Collab.)	
VOROBYEV	88	SJNP 48 273	P.V. Vorobiev *et al.*	(NOVO)	
		Translated from YAF 48 436.			
ABACHI	86B	PRL 57 1990	S. Abachi *et al.*	(PURD, ANL, IND, MICH+)	
LONGACRE	86	PL B177 223	R.S. Longacre *et al.*	(BNL, BRAN, CUNY+)	
BINON	84C	NC 80A 363	F.G. Binon *et al.*	(BELG, LAPP, SERP+)	
BINON	83	NC 78A 313	F.G. Binon *et al.*	(BELG, LAPP, SERP+)	
ETKIN	82B	PR D25 1786	A. Etkin *et al.*	(BNL, CUNY, TUFTS, VAND)	
GIDAL	81	PL 107B 153	G. Gidal *et al.*	(SLAC, LBL)	
ACHASOV	80	SJNP 32 566	N.N. Achasov, S.A. Devyanin, G.N. Shestakov	(NOVM)	
		Translated from YAF 32 1098.			
COHEN	80	PR D22 2595	D. Cohen *et al.*	(ANL)	IJP
LOVERRE	80	ZPHY C6 187	P.F. Loverre *et al.*	(CERN, CDEF, MADR+)	IJP
AGUILAR-...	78	NP B140 73	M. Aguilar-Benitez *et al.*	(MADR, BOMB+)	
CASON	78	PRL 41 271	N.M. Cason *et al.*	(NDAM, ANL)	
LEEPER	77	PR D16 2054	R.J. Leeper *et al.*	(ISU)	
ROSSELET	77	PR D15 574	L. Rosselet *et al.*	(GEVA, SACL)	
FLATTE	76	PL 63B 224	S.M. Flatte	(CERN)	
WETZEL	76	NP B115 208	W. Wetzel *et al.*	(ETH, CERN, LOIC)	
HYAMS	75	NP B100 205	B.D. Hyams *et al.*	(CERN, MPIM)	
SRINIVASAN	75	PR D12 681	V. Srinivasan *et al.*	(NDAM, ANL)	
ESTABROOKS	74	NP B79 301	P.G. Estabrooks, A.D. Martin	(DURH)	
GRAYER	74	NP B75 189	G. Grayer *et al.*	(CERN, MPIM)	
BINNIE	73	PRL 31 1534	D.M. Binnie *et al.*	(LOIC, SHMP)	
GRAYER	73	Tallahassee	G. Grayer *et al.*	(CERN, MPIM)	
HYAMS	73	NP B64 134	B.D. Hyams *et al.*	(CERN, MPIM)	
PROTOPOP...	73	PR D7 1279	S.D. Protopopescu *et al.*	(LBL)	