$f_0(980)$

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

See also the minireview on scalar mesons under $f_0(500)$. (See the index for the page number.)

$f_0(980)$ MASS

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
990 ±20 OUR ESTIMATE					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
989.9± 0.4	706	ABLIKIM	12E	BES3	$J/\psi \to \gamma 3\pi$
1003 $^{+5}_{-27}$		[1,2] GARCIA-MAR...	11	RVUE	Compilation
996 ± 7		[1,3] GARCIA-MAR...	11	RVUE	Compilation
996 $^{+4}_{-14}$		[4] MOUSSALLAM	11	RVUE	Compilation
981 ±43		[5] MENNESSIER	10	RVUE	Compilation
1030 $^{+30}_{-10}$		[6] ANISOVICH	09	RVUE	0.0 $\overline{p}p$, πN
977 $^{+11}_{-9}$ ± 1	44	[7] ECKLUND	09	CLEO	4.17 $e^+e^- \to D_s^- D_s^{*+}$ + c.c.
982.2± 1.0$^{+8.1}_{-8.0}$		[8] UEHARA	08A	BELL	10.6 $e^+e^- \to e^+e^-\pi^0\pi^0$
976.8± 0.3$^{+10.1}_{-0.6}$	64k	[9] AMBROSINO	07	KLOE	1.02 $e^+e^- \to \pi^0\pi^0\gamma$
984.7± 0.4$^{+2.4}_{-3.7}$	64k	[10] AMBROSINO	07	KLOE	1.02 $e^+e^- \to \pi^0\pi^0\gamma$
973 ± 3	262 ± 30	[11] AUBERT	07AK	BABR	10.6 $e^+e^- \to \phi\pi^+\pi^-\gamma$
970 ± 7	54 ± 9	[11] AUBERT	07AK	BABR	10.6 $e^+e^- \to \phi\pi^0\pi^0\gamma$
953 ±20	2.6k	[12] BONVICINI	07	CLEO	$D^+ \to \pi^-\pi^+\pi^+$
985.6$^{+1.2}_{-1.5}$$^{+1.1}_{-1.6}$		[13] MORI	07	BELL	10.6 $e^+e^- \to e^+e^-\pi^+\pi^-$
983.0± 0.6$^{+4.0}_{-3.0}$		[14] AMBROSINO	06B	KLOE	1.02 $e^+e^- \to \pi^+\pi^-\gamma$
977.3± 0.9$^{+3.7}_{-4.3}$		[15] AMBROSINO	06B	KLOE	1.02 $e^+e^- \to \pi^+\pi^-\gamma$
950 ± 9	4286	[16] GARMASH	06	BELL	$B^+ \to K^+\pi^+\pi^-$
965 ±10		[17] ABLIKIM	05	BES2	$J/\psi \to \phi\pi^+\pi^-$, ϕK^+K^-
1031 ± 8		[18] 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	[19] ALOISIO	02D	KLOE	$e^+e^- \to \pi^0\pi^0\gamma$
977 ± 3 ± 2	848	[20] AITALA	01A	E791	$D_s^+ \to \pi^-\pi^+\pi^+$
969.8± 4.5	419	[21] ACHASOV	00H	SND	$e^+e^- \to \pi^0\pi^0\gamma$
985 $^{+16}_{-12}$	419	[22,23] ACHASOV	00H	SND	$e^+e^- \to \pi^0\pi^0\gamma$
976 ± 5 ± 6		[24] AKHMETSHIN	99B	CMD2	$e^+e^- \to \pi^+\pi^-\gamma$
977 ± 3 ± 6	268	[24] AKHMETSHIN	99C	CMD2	$e^+e^- \to \pi^0\pi^0\gamma$

975 ± 4 ± 6		[25] AKHMETSHIN	99C	CMD2	$e^+ e^- \to \pi^0 \pi^0 \gamma$
975 ± 4 ± 6		[26] 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 ± 6 ± 6		[27] 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		[28] KAMINSKI	99	RVUE	$\pi \pi \to \pi \pi$, $K \overline{K}$, $\sigma \sigma$
∼ 980		[28] 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		[28] OLLER	99C	RVUE	$\pi \pi \to \pi \pi$, $K \overline{K}$, $\eta \eta$
957 ± 6		[29] ACKERSTAFF	98Q	OPAL	$Z \to f_0$ X
960 ±10		ALDE	98	GAM4	
1015 ±15		[28] ANISOVICH	98B	RVUE	Compilation
1008		[30] LOCHER	98	RVUE	$\pi \pi \to \pi \pi$, $K \overline{K}$
955 ±10		[29] ALDE	97	GAM2	450 $p p \to p p \pi^0 \pi^0$
994 ± 9		[31] BERTIN	97C	OBLX	0.0 $\overline{p} p \to \pi^+ \pi^- \pi^0$
993.2± 6.5± 6.9		[32] 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 ± 5	3k	[33] ALDE	95B	GAM2	38 $\pi^- p \to \pi^0 \pi^0 n$
960 ±10	10k	[34] 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		[35] 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		[36] ANISOVICH	95	RVUE	
1015		JANSSEN	95	RVUE	$\pi \pi \to \pi \pi$, $K \overline{K}$
983		[37] BUGG	94	RVUE	$\overline{p} p \to \eta 2\pi^0$
973 ± 2		[38] KAMINSKI	94	RVUE	$\pi \pi \to \pi \pi$, $K \overline{K}$
988		[39] ZOU	94B	RVUE	
988 ±10		[40] 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		[29] AGUILAR-...	91	EHS	400 $p p$
979 ± 4		[41] ARMSTRONG	91	OMEG	300 $p p \to p p \pi \pi$, $p p K \overline{K}$
956 ±12		BREAKSTONE	90	SFM	$p p \to p p \pi^+ \pi^-$
959.4± 6.5		[29] AUGUSTIN	89	DM2	$J/\psi \to \omega \pi^+ \pi^-$
978 ± 9		[29] 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		[41] GIDAL	81	MRK2	$J/\psi \to \pi^+ \pi^-$ X
975		[42] ACHASOV	80	RVUE	
986 ±10		[41] AGUILAR-...	78	HBC	0.7 $\overline{p} p \to K^0_S K^0_S$
969 ± 5		[41] LEEPER	77	ASPK	2–2.4 $\pi^- p \to \pi^+ \pi^- n$, $K^+ K^- n$
987 ± 7		[41] BINNIE	73	CNTR	$\pi^- p \to n$MM
1012 ± 6		[43] GRAYER	73	ASPK	17 $\pi^- p \to \pi^+ \pi^- n$

1007 ±20	[43] HYAMS	73	ASPK	17 $\pi^- p \to \pi^+ \pi^- n$
997 ± 6	[43] PROTOPOP...	73	HBC	7 $\pi^+ p \to \pi^+ p \pi^+ \pi^-$

[1] Quoted number refers to real part of pole position.
[2] Analytic continuation using Roy equations. Uses the K_{e4} data of BATLEY 10C and the $\pi N \to \pi \pi N$ data of HYAMS 73, GRAYER 74, and PROTOPOPESCU 73.
[3] Analytic continuation using GKPY equations. Uses the K_{e4} data of BATLEY 10C and the $\pi N \to \pi \pi N$ data of HYAMS 73, GRAYER 74, and PROTOPOPESCU 73.
[4] Pole position. Used Roy equations.
[5] 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.
[6] On sheet II in a 2-pole solution. The other pole is found on sheet III at (850−100*i*) MeV
[7] Using a relativistic Breit-Wigner function and taking into account the finite D_s mass.
[8] Breit-Wigner mass. Using finite width corrections according to FLATTE 76 and ACHASOV 05, and the ratio $g_{f_0 K K}/g_{f_0 \pi\pi} = 0$.
[9] In the kaon-loop fit.
[10] In the no-structure fit.
[11] Systematic errors not estimated.
[12] 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.
[13] Breit-Wigner mass. 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.
[14] In the kaon-loop fit following formalism of ACHASOV 89.
[15] In the no-structure fit assuming a direct coupling of ϕ to $f_0 \gamma$.
[16] FLATTE 76 parameterization. Supersedes GARMASH 05.
[17] FLATTE 76 parameterization, $g_{f_0 K\overline{K}}/g_{f_0 \pi\pi} = 4.21 \pm 0.25 \pm 0.21$.
[18] 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.
[19] 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.
[20] Coupled-channel Breit-Wigner, couplings g_π=0.09±0.01±0.01, g_K=0.02±0.04±0.03.
[21] Supersedes ACHASOV 98I. Using the model of ACHASOV 89.
[22] Supersedes ACHASOV 98I.
[23] In the "narrow resonance" approximation.
[24] Assuming $\Gamma(f_0)$= 40 MeV.
[25] From a narrow pole fit taking into account $f_0(980)$ and $f_0(1200)$ intermediate mechanisms.
[26] From the combined fit of the photon spectra in the reactions $e^+ e^- \to \pi^+\pi^-\gamma$, $\pi^0\pi^0\gamma$.
[27] Supersedes BARBERIS 99 and BARBERIS 99B
[28] T-matrix pole.
[29] From invariant mass fit.
[30] On sheet II in a 2 pole solution. The other pole is found on sheet III at (1039−93*i*) MeV.
[31] On sheet II in a 2 pole solution. The other pole is found on sheet III at (963-29i) MeV.
[32] Reanalysis of data from HYAMS 73, GRAYER 74, SRINIVASAN 75, and ROSSELET 77 using the interfering amplitude method.
[33] At high $|t|$.
[34] At low $|t|$.
[35] On sheet II in a 4-pole solution, the other poles are found on sheet III at (953−55*i*) MeV and on sheet IV at (938−35*i*) MeV.

[36] Combined fit of ALDE 95B, ANISOVICH 94, AMSLER 94D.
[37] On sheet II in a 2 pole solution. The other pole is found on sheet III at (996−103i) MeV.
[38] From sheet II pole position.
[39] 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.
[40] On sheet II in a 2 pole solution. The other pole is found on sheet III at (978−28i) MeV.
[41] From coupled channel analysis.
[42] Coupled channel analysis with finite width corrections.
[43] 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
40 to 100 OUR ESTIMATE					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
9.5 ± 1.1	706	ABLIKIM	12E	BES3	$J/\psi \to \gamma 3\pi$
42^{+20}_{-16}		[1,2] GARCIA-MAR...	11	RVUE	Compilation
50^{+20}_{-12}		[2,3] GARCIA-MAR...	11	RVUE	Compilation
48^{+22}_{-6}		[4] MOUSSALLAM	11	RVUE	Compilation
36 ± 22		[5] MENNESSIER	10	RVUE	Compilation
70^{+20}_{-32}		[6] ANISOVICH	09	RVUE	0.0 $\overline{p}p$, πN
$91^{+30}_{-22} \pm 3$	44	[7] ECKLUND	09	CLEO	4.17 $e^+e^- \to D_s^- D_s^{*+}$ + c.c.
$66.9 \pm 2.2^{+17.6}_{-12.5}$		[8] UEHARA	08A	BELL	10.6 $e^+e^- \to e^+e^-\pi^0\pi^0$
65 ± 13	262 ± 30	[9] AUBERT	07AK	BABR	10.6 $e^+e^- \to \phi\pi^+\pi^-\gamma$
81 ± 21	54 ± 9	[9] AUBERT	07AK	BABR	10.6 $e^+e^- \to \phi\pi^0\pi^0\gamma$
$51.3^{+20.8}_{-17.7}{}^{+13.2}_{-3.8}$		[10] MORI	07	BELL	10.6 $e^+e^- \to e^+e^-\pi^+\pi^-$
$61 \pm 9^{+14}_{-8}$	2584	[11] GARMASH	05	BELL	$B^+ \to K^+\pi^+\pi^-$
64 ± 16		[12] ANISOVICH	03	RVUE	
121 ± 23		TIKHOMIROV	03	SPEC	40.0 $\pi^- C \to K_S^0 K_S^0 K_L^0 X$
~ 70		[13] BRAMON	02	RVUE	1.02 $e^+e^- \to \pi^0\pi^0\gamma$
$44 \pm 2 \pm 2$	848	[14] AITALA	01A	E791	$D_s^+ \to \pi^-\pi^+\pi^+$
201 ± 28	419	[15] ACHASOV	00H	SND	$e^+e^- \to \pi^0\pi^0\gamma$
122 ± 13	419	[16,17] ACHASOV	00H	SND	$e^+e^- \to \pi^0\pi^0\gamma$
56 ± 20		[18] 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 $p p \to p_s p_f \pi^0 \pi^0$
48 ± 12 ± 8		[19] 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		[20] KAMINSKI	99	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$, $\sigma\sigma$
∼ 28		[20] OLLER	99	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$
∼ 25		OLLER	99B	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$
∼ 14		[20] OLLER	99C	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$, $\eta\eta$
70 ± 20		ALDE	98	GAM4	
86 ± 16		[20] ANISOVICH	98B	RVUE	Compilation
54		[21] LOCHER	98	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$
69 ± 15		[22] ALDE	97	GAM2	450 $p p \to p p \pi^0 \pi^0$
38 ± 20		[23] BERTIN	97C	OBLX	0.0 $\overline{p} p \to \pi^+ \pi^- \pi^0$
∼ 100		[24] 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	[25] ALDE	95B	GAM2	38 $\pi^- p \to \pi^0 \pi^0 n$
95 ± 20	10k	[26] 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		[27] 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		[28] ANISOVICH	95	RVUE	
30		JANSSEN	95	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$
74		[29] BUGG	94	RVUE	$\overline{p} p \to \eta 2\pi^0$
29 ± 2		[30] KAMINSKI	94	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$
46		[31] ZOU	94B	RVUE	
48 ± 12		[32] 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		[22] AGUILAR-...	91	EHS	400 $p p$
72 ± 8		[33] 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		[22] 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		[33] GIDAL	81	MRK2	$J/\psi \to \pi^+ \pi^- X$
70 to 300		[34] ACHASOV	80	RVUE	
100 ± 80		[35] AGUILAR-...	78	HBC	0.7 $\overline{p} p \to K^0_S K^0_S$
30 ± 8		[33] LEEPER	77	ASPK	2–2.4 $\pi^- p \to \pi^+ \pi^- n$, $K^+ K^- n$
48 ± 14		[33] BINNIE	73	CNTR	$\pi^- p \to n$MM
32 ± 10		[36] GRAYER	73	ASPK	17 $\pi^- p \to \pi^+ \pi^- n$
30 ± 10		[36] HYAMS	73	ASPK	17 $\pi^- p \to \pi^+ \pi^- n$
54 ± 16		[36] PROTOPOP...	73	HBC	7 $\pi^+ p \to \pi^+ p \pi^+ \pi^-$

[1] Analytic continuation using Roy equations. Uses the K_{e4} data of BATLEY 10C and the $\pi N \to \pi\pi N$ data of HYAMS 73, GRAYER 74, and PROTOPOPESCU 73.
[2] Quoted number refers to twice imaginary part of pole position.

[3] Analytic continuation using GKPY equations. Uses the K_{e4} data of BATLEY 10C and the $\pi N \rightarrow \pi\pi N$ data of HYAMS 73, GRAYER 74, and PROTOPOPESCU 73.
[4] Pole position. Used Roy equations.
[5] 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.
[6] On sheet II in a 2-pole solution. The other pole is found on sheet III at ($850-100i$) MeV
[7] Using a relativistic Breit-Wigner function and taking into account the finite D_s mass.
[8] Breit-Wigner $\pi\pi$ width. Using finite width corrections according to FLATTE 76 and ACHASOV 05, and the ratio $g_{f_0 KK}/g_{f_0 \pi\pi} = 0$.
[9] Systematic errors not estimated.
[10] 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.
[11] Breit-Wigner, solution 1, PWA ambiguous.
[12] 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.
[13] Using the data of AKHMETSHIN 99C, ACHASOV 00H, and ALOISIO 02D.
[14] Breit-Wigner width.
[15] Supersedes ACHASOV 98I. Using the model of ACHASOV 89.
[16] Supersedes ACHASOV 98I.
[17] In the "narrow resonance" approximation.
[18] From the combined fit of the photon spectra in the reactions $e^+e^- \rightarrow \pi^+\pi^-\gamma$, $\pi^0\pi^0\gamma$.
[19] Supersedes BARBERIS 99 and BARBERIS 99B
[20] T-matrix pole.
[21] On sheet II in a 2 pole solution. The other pole is found on sheet III at ($1039-93i$) MeV.
[22] From invariant mass fit.
[23] On sheet II in a 2 pole solution. The other pole is found on sheet III at (963-29i) MeV.
[24] Reanalysis of data from HYAMS 73, GRAYER 74, SRINIVASAN 75, and ROSSELET 77 using the interfering amplitude method.
[25] At high $|t|$.
[26] At low $|t|$.
[27] 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.
[28] Combined fit of ALDE 95B, ANISOVICH 94,
[29] On sheet II in a 2 pole solution. The other pole is found on sheet III at ($996-103i$) MeV.
[30] From sheet II pole position.
[31] 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.
[32] On sheet II in a 2 pole solution. The other pole is found on sheet III at ($978-28i$) MeV.
[33] From coupled channel analysis.
[34] Coupled channel analysis with finite width corrections.
[35] 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.
[36] Included in AGUILAR-BENITEZ 78 fit.

$f_0(980)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$\pi\pi$	dominant
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
0.31 $^{+0.05}_{-0.04}$ OUR AVERAGE				
0.32 $\pm$0.05	[1] DAI	14A	RVUE	Compilation
0.286$\pm$0.017$^{+0.211}_{-0.070}$	[2] UEHARA	08A	BELL	10.6 $e^+e^- \rightarrow e^+e^-\pi^0\pi^0$
0.205$^{+0.095}_{-0.083}$$^{+0.147}_{-0.117}$	[3] MORI	07	BELL	10.6 $e^+e^- \rightarrow e^+e^-\pi^+\pi^-$
0.42 $\pm$0.06 $\pm$0.18	[4] OEST	90	JADE	$e^+e^- \rightarrow e^+e^-\pi^0\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.16 $\pm$0.01	[5] MENNESSIER	11	RVUE	
0.29 $\pm$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	$\gamma\gamma \rightarrow \pi^+\pi^-$, $\pi^0\pi^0$
0.29 $\pm$0.07 $\pm$0.12	[11,12] BOYER	90	MRK2	$e^+e^- \rightarrow e^+e^-\pi^+\pi^-$
0.31 $\pm$0.14 $\pm$0.09	[11,12] MARSISKE	90	CBAL	$e^+e^- \rightarrow e^+e^-\pi^0\pi^0$
0.63 $\pm$0.14	[13] MORGAN	90	RVUE	$\gamma\gamma \rightarrow \pi^+\pi^-$, $\pi^0\pi^0$

[1] Using dispersive analysis with phases from GARCIA-MARTIN 11A and BUETTIKER 04 as input.
[2] Using finite width corrections according to FLATTE 76 and ACHASOV 05, and the ratio $g_{f_0 K K}/g_{f_0 \pi\pi} = 0$.
[3] 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.
[4] OEST 90 quote systematic errors $^{+0.08}_{-0.18}$. We use $\pm$0.18. Observed 60 events.
[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	$4\ \pi^- p \to n 2K^0_S$
$0.81^{+0.09}_{-0.04}$		[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 (0. $p\overline{p} \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$), 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

DAI	14A	PR D90 036004	L.-Y. Dai, M.R. Pennington	(CEBAF)
ABLIKIM	12E	PRL 108 182001	M. Ablikim *et al.*	(BES III 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	
ANISOVICH	03	EPJ A16 229	V.V. Anisovich *et al.*	
TIKHOMIROV	03	PAN 66 828 Translated from YAF 66 860.	G.D. Tikhomirov *et al.*	

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+)
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)
SRINIVASAN 75 PR D12 681 V. Srinivasan *et al.* (NDAM, ANL)
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)