

$f_0(980)$

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

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	$J/\psi \rightarrow \gamma 3\pi$
1003 $\begin{smallmatrix} +5 \\ -27 \end{smallmatrix}$		1,2 GARCIA-MAR..11	RVUE	Compilation
996 ± 7		1,3 GARCIA-MAR..11	RVUE	Compilation
996 $\begin{smallmatrix} +4 \\ -14 \end{smallmatrix}$		4 MOUSSALLAM11	RVUE	Compilation
981 ± 43		5 MENNESSIER 10	RVUE	Compilation
1030 $\begin{smallmatrix} +30 \\ -10 \end{smallmatrix}$		6 ANISOVICH 09	RVUE	0.0 $\bar{p}p, \pi N$
977 $\begin{smallmatrix} +11 \\ -9 \end{smallmatrix} \pm 1$	44	7 ECKLUND 09	CLEO	$4.17 e^+e^- \rightarrow D_s^- D_s^{*+} + c.c.$
982.2 ± 1.0 $\begin{smallmatrix} +8.1 \\ -8.0 \end{smallmatrix}$		8 UEHARA 08A	BELL	$10.6 e^+e^- \rightarrow e^+e^-\pi^0\pi^0$
976.8 ± 0.3 $\begin{smallmatrix} +10.1 \\ -0.6 \end{smallmatrix}$	64k	9 AMBROSINO 07	KLOE	$1.02 e^+e^- \rightarrow \pi^0\pi^0\gamma$
984.7 ± 0.4 $\begin{smallmatrix} +2.4 \\ -3.7 \end{smallmatrix}$	64k	10 AMBROSINO 07	KLOE	$1.02 e^+e^- \rightarrow \pi^0\pi^0\gamma$
973 ± 3	262 ± 30	11 AUBERT 07AKBABR		$10.6 e^+e^- \rightarrow \phi\pi^+\pi^-\gamma$
970 ± 7	54 ± 9	11 AUBERT 07AKBABR		$10.6 e^+e^- \rightarrow \phi\pi^0\pi^0\gamma$
953 ± 20	2.6k	12 BONVICINI 07	CLEO	$D^+ \rightarrow \pi^-\pi^+\pi^+$
985.6 $\begin{smallmatrix} +1.2+1.1 \\ -1.5-1.6 \end{smallmatrix}$		13 MORI 07	BELL	$10.6 e^+e^- \rightarrow e^+e^-\pi^+\pi^-$
983.0 ± 0.6 $\begin{smallmatrix} +4.0 \\ -3.0 \end{smallmatrix}$		14 AMBROSINO 06B	KLOE	$1.02 e^+e^- \rightarrow \pi^+\pi^-\gamma$
977.3 ± 0.9 $\begin{smallmatrix} +3.7 \\ -4.3 \end{smallmatrix}$		15 AMBROSINO 06B	KLOE	$1.02 e^+e^- \rightarrow \pi^+\pi^-\gamma$
950 ± 9	4286	16 GARMASH 06	BELL	$B^+ \rightarrow K^+\pi^+\pi^-$
965 ± 10		17 ABLIKIM 05	BES2	$J/\psi \rightarrow \phi\pi^+\pi^-, \phi K^+K^-$
1031 ± 8		18 ANISOVICH 03	RVUE	
1037 ± 31		TIKHOMIROV 03	SPEC	$40.0 \pi^- C \rightarrow K_S^0 K_S^0 K_L^0 X$
973 ± 1	2438	19 ALOISIO 02D	KLOE	$e^+e^- \rightarrow \pi^0\pi^0\gamma$
977 ± 3 ± 2	848	20 AITALA 01A	E791	$D^+ \rightarrow \pi^-\pi^+\pi^+$
969.8 ± 4.5	419	21 ACHASOV 00H	SND	$e^+e^- \rightarrow \pi^0\pi^0\gamma$
985 $\begin{smallmatrix} +16 \\ -12 \end{smallmatrix}$	419	22,23 ACHASOV 00H	SND	$e^+e^- \rightarrow \pi^0\pi^0\gamma$
976 ± 5 ± 6		24 AKHMETSHIN 99B	CMD2	$e^+e^- \rightarrow \pi^+\pi^-\gamma$
977 ± 3 ± 6	268	24 AKHMETSHIN 99C	CMD2	$e^+e^- \rightarrow \pi^0\pi^0\gamma$

975 ± 4 ± 6		25 AKHMETSHIN 99C	CMD2	$e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$
975 ± 4 ± 6		26 AKHMETSHIN 99C	CMD2	$e^+ e^- \rightarrow \pi^+ \pi^- \gamma,$ $\pi^0 \pi^0 \gamma$
985 ± 10		BARBERIS 99	OMEG 450	$pp \rightarrow p_s p_f K^+ K^-$
982 ± 3		BARBERIS 99B	OMEG 450	$pp \rightarrow p_s p_f \pi^+ \pi^-$
982 ± 3		BARBERIS 99C	OMEG 450	$pp \rightarrow p_s p_f \pi^0 \pi^0$
987 ± 6 ± 6		27 BARBERIS 99D	OMEG 450	$pp \rightarrow K^+ K^-,$ $\pi^+ \pi^-$
989 ± 15		BELLAZZINI 99	GAM4 450	$pp \rightarrow pp \pi^0 \pi^0$
991 ± 3		28 KAMINSKI 99	RVUE	$\pi\pi \rightarrow \pi\pi, K\bar{K}, \sigma\sigma$
~ 980		28 OLLER 99	RVUE	$\pi\pi \rightarrow \pi\pi, K\bar{K}$
~ 993.5		OLLER 99B	RVUE	$\pi\pi \rightarrow \pi\pi, K\bar{K}$
~ 987		28 OLLER 99C	RVUE	$\pi\pi \rightarrow \pi\pi, K\bar{K}, \eta\eta$
957 ± 6		29 ACKERSTAFF 98Q	OPAL	$Z \rightarrow f_0 X$
960 ± 10		ALDE 98	GAM4	
1015 ± 15		28 ANISOVICH 98B	RVUE	Compilation
1008		30 LOCHER 98	RVUE	$\pi\pi \rightarrow \pi\pi, K\bar{K}$
955 ± 10		29 ALDE 97	GAM2 450	$pp \rightarrow pp \pi^0 \pi^0$
994 ± 9		31 BERTIN 97C	OBLX	$0.0 \bar{p}p \rightarrow \pi^+ \pi^- \pi^0$
993.2 ± 6.5 ± 6.9		32 ISHIDA 96	RVUE	$\pi\pi \rightarrow \pi\pi, K\bar{K}$
1006		TORNQVIST 96	RVUE	$\pi\pi \rightarrow \pi\pi, K\bar{K}, K\pi,$ $\eta\pi$
997 ± 5	3k	33 ALDE 95B	GAM2 38	$\pi^- p \rightarrow \pi^0 \pi^0 n$
960 ± 10	10k	34 ALDE 95B	GAM2 38	$\pi^- p \rightarrow \pi^0 \pi^0 n$
994 ± 5		AMSLER 95B	CBAR	$0.0 \bar{p}p \rightarrow 3\pi^0$
~ 996		35 AMSLER 95D	CBAR	$0.0 \bar{p}p \rightarrow \pi^0 \pi^0 \pi^0,$ $\pi^0 \eta\eta, \pi^0 \pi^0 \eta$
987 ± 6		36 ANISOVICH 95	RVUE	
1015		JANSSEN 95	RVUE	$\pi\pi \rightarrow \pi\pi, K\bar{K}$
983		37 BUGG 94	RVUE	$\bar{p}p \rightarrow \eta 2\pi^0$
973 ± 2		38 KAMINSKI 94	RVUE	$\pi\pi \rightarrow \pi\pi, K\bar{K}$
988		39 ZOU 94B	RVUE	
988 ± 10		40 MORGAN 93	RVUE	$\pi\pi(K\bar{K}) \rightarrow \pi\pi(K\bar{K}),$ $J/\psi \rightarrow \phi\pi\pi(K\bar{K}),$ $D_s \rightarrow \pi(\pi\pi)$
971.1 ± 4.0		29 AGUILAR-... 91	EHS 400	pp
979 ± 4		41 ARMSTRONG 91	OMEG 300	$pp \rightarrow pp\pi\pi,$ $ppK\bar{K}$
956 ± 12		BREAKSTONE 90	SFM	$pp \rightarrow pp\pi^+\pi^-$
959.4 ± 6.5		29 AUGUSTIN 89	DM2	$J/\psi \rightarrow \omega\pi^+\pi^-$
978 ± 9		29 ABACHI 86B	HRS	$e^+ e^- \rightarrow \pi^+ \pi^- X$
985.0 ^{+9.0} _{-39.0}		ETKIN 82B	MPS 23	$\pi^- p \rightarrow n 2K_S^0$
974 ± 4		41 GIDAL 81	MRK2	$J/\psi \rightarrow \pi^+ \pi^- X$
975		42 ACHASOV 80	RVUE	
986 ± 10		41 AGUILAR-... 78	HBC	$0.7 \bar{p}p \rightarrow K_S^0 K_S^0$
969 ± 5		41 LEEPER 77	ASPK	$2-2.4 \pi^- p \rightarrow$ $\pi^+ \pi^- n, K^+ K^- n$
987 ± 7		41 BINNIE 73	CNTR	$\pi^- p \rightarrow nMM$
1012 ± 6		43 GRAYER 73	ASPK 17	$\pi^- p \rightarrow \pi^+ \pi^- n$

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

- 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 $\pi N \rightarrow \pi\pi N$ 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 $\pi N \rightarrow \pi\pi N$ 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 (850–100*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. $g_{f_0} \pi\pi = 329 \pm 96 \text{ MeV}/c^2$ assuming $g_{f_0} K \bar{K} / g_{f_0} \pi\pi = 2$.
- 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, $g_{f_0} K \bar{K} / g_{f_0} \pi\pi = 4.21 \pm 0.25 \pm 0.21$.
- ¹⁸ K-matrix pole from combined analysis of $\pi^- p \rightarrow \pi^0 \pi^0 n$, $\pi^- p \rightarrow K \bar{K} n$, $\pi^+ \pi^- \rightarrow \pi^+ \pi^-$, $\bar{p} p \rightarrow \pi^0 \pi^0 \pi^0$, $\pi^0 \eta \eta$, $\pi^0 \pi^0 \eta$, $\pi^+ \pi^- \pi^0$, $K^+ K^- \pi^0$, $K_S^0 K_S^0 \pi^0$, $K^+ K_S^0 \pi^-$ at rest, $\bar{p} n \rightarrow \pi^- \pi^- \pi^+$, $K_S^0 K^- \pi^0$, $K_S^0 K_S^0 \pi^-$ 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 $g_\pi = 0.09 \pm 0.01 \pm 0.01$, $g_K = 0.02 \pm 0.04 \pm 0.03$.
- ²¹ Supersedes ACHASOV 98I. Using the model of ACHASOV 89.
- ²² Supersedes ACHASOV 98I.
- ²³ In the “narrow resonance” approximation.
- ²⁴ Assuming $\Gamma(f_0) = 40 \text{ MeV}$.
- 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 $e^+ e^- \rightarrow \pi^+ \pi^- \gamma$, $\pi^0 \pi^0 \gamma$.
- 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 (963–29*i*) 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 (996–103*i*) 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 (797–185*i*) 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 (978–28*i*) 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	$J/\psi \rightarrow \gamma 3\pi$
42 +20 -16		1,2 GARCIA-MAR..11	RVUE	Compilation
50 +20 -12		2,3 GARCIA-MAR..11	RVUE	Compilation
48 +22 -6		4 MOUSSALLAM11	RVUE	Compilation
36 ± 22		5 MENNESSIER 10	RVUE	Compilation
70 +20 -32		6 ANISOVICH 09	RVUE	0.0 $\bar{p}p, \pi N$
91 +30 ± 3 -22	44	7 ECKLUND 09	CLEO	4.17 $e^+e^- \rightarrow D_s^- D_s^{*+} + c.c.$
66.9 ± 2.2 +17.6 -12.5		8 UEHARA 08A	BELL	10.6 $e^+e^- \rightarrow e^+e^-\pi^0\pi^0$
65 ± 13	262 ± 30	9 AUBERT 07AK	BABR	10.6 $e^+e^- \rightarrow \phi\pi^+\pi^-\gamma$
81 ± 21	54 ± 9	9 AUBERT 07AK	BABR	10.6 $e^+e^- \rightarrow \phi\pi^0\pi^0\gamma$
51.3 +20.8 +13.2 -17.7 -3.8		10 MORI 07	BELL	10.6 $e^+e^- \rightarrow e^+e^-\pi^+\pi^-$
61 ± 9 +14 -8	2584	11 GARMASH 05	BELL	$B^+ \rightarrow K^+\pi^+\pi^-$
64 ± 16		12 ANISOVICH 03	RVUE	
121 ± 23		TIKHOMIROV 03	SPEC	40.0 $\pi^- C \rightarrow K_S^0 K_S^0 K_L^0 X$
~ 70		13 BRAMON 02	RVUE	1.02 $e^+e^- \rightarrow \pi^0\pi^0\gamma$
44 ± 2 ± 2	848	14 AITALA 01A	E791	$D_s^+ \rightarrow \pi^-\pi^+\pi^+$
201 ± 28	419	15 ACHASOV 00H	SND	$e^+e^- \rightarrow \pi^0\pi^0\gamma$
122 ± 13	419	16,17 ACHASOV 00H	SND	$e^+e^- \rightarrow \pi^0\pi^0\gamma$
56 ± 20		18 AKHMETSHIN 99C	CMD2	$e^+e^- \rightarrow \pi^0\pi^0\gamma$
65 ± 20		BARBERIS 99	OMEG	450 $pp \rightarrow \rho_S \rho_F K^+ K^-$
80 ± 10		BARBERIS 99B	OMEG	450 $pp \rightarrow \rho_S \rho_F \pi^+ \pi^-$

80 ± 10		BARBERIS	99C	OMEG	450	$pp \rightarrow p_s p_f \pi^0 \pi^0$
48 ± 12 ± 8		19 BARBERIS	99D	OMEG	450	$pp \rightarrow K^+ K^-, \pi^+ \pi^-$
65 ± 25		BELLAZZINI	99	GAM4	450	$pp \rightarrow pp \pi^0 \pi^0$
71 ± 14		20 KAMINSKI	99	RVUE		$\pi\pi \rightarrow \pi\pi, K\bar{K}, \sigma\sigma$
~ 28		20 OLLER	99	RVUE		$\pi\pi \rightarrow \pi\pi, K\bar{K}$
~ 25		OLLER	99B	RVUE		$\pi\pi \rightarrow \pi\pi, K\bar{K}$
~ 14		20 OLLER	99C	RVUE		$\pi\pi \rightarrow \pi\pi, K\bar{K}, \eta\eta$
70 ± 20		ALDE	98	GAM4		
86 ± 16		20 ANISOVICH	98B	RVUE		Compilation
54		21 LOCHER	98	RVUE		$\pi\pi \rightarrow \pi\pi, K\bar{K}$
69 ± 15		22 ALDE	97	GAM2	450	$pp \rightarrow pp \pi^0 \pi^0$
38 ± 20		23 BERTIN	97C	OBLX	0.0	$\bar{p}p \rightarrow \pi^+ \pi^- \pi^0$
~ 100		24 ISHIDA	96	RVUE		$\pi\pi \rightarrow \pi\pi, K\bar{K}$
34		TORNQVIST	96	RVUE		$\pi\pi \rightarrow \pi\pi, K\bar{K}, K\pi, \eta\pi$
48 ± 10	3k	25 ALDE	95B	GAM2	38	$\pi^- p \rightarrow \pi^0 \pi^0 n$
95 ± 20	10k	26 ALDE	95B	GAM2	38	$\pi^- p \rightarrow \pi^0 \pi^0 n$
26 ± 10		AMSLER	95B	CBAR	0.0	$\bar{p}p \rightarrow 3\pi^0$
~ 112		27 AMSLER	95D	CBAR	0.0	$\bar{p}p \rightarrow \pi^0 \pi^0 \pi^0, \pi^0 \eta \eta, \pi^0 \pi^0 \eta$
80 ± 12		28 ANISOVICH	95	RVUE		
30		JANSEN	95	RVUE		$\pi\pi \rightarrow \pi\pi, K\bar{K}$
74		29 BUGG	94	RVUE		$\bar{p}p \rightarrow \eta 2\pi^0$
29 ± 2		30 KAMINSKI	94	RVUE		$\pi\pi \rightarrow \pi\pi, K\bar{K}$
46		31 ZOU	94B	RVUE		
48 ± 12		32 MORGAN	93	RVUE		$\pi\pi(K\bar{K}) \rightarrow \pi\pi(K\bar{K}), J/\psi \rightarrow \phi\pi\pi(K\bar{K}), D_s \rightarrow \pi(\pi\pi)$
37.4 ± 10.6		22 AGUILAR-...	91	EHS	400	pp
72 ± 8		33 ARMSTRONG	91	OMEG	300	$pp \rightarrow pp\pi\pi, ppK\bar{K}$
110 ± 30		BREAKSTONE	90	SFM		$pp \rightarrow pp\pi^+\pi^-$
29 ± 13		22 ABACHI	86B	HRS		$e^+e^- \rightarrow \pi^+\pi^- X$
120 ± 281 ± 20		ETKIN	82B	MPS	23	$\pi^- p \rightarrow n 2K_S^0$
28 ± 10		33 GIDAL	81	MRK2		$J/\psi \rightarrow \pi^+\pi^- X$
70 to 300		34 ACHASOV	80	RVUE		
100 ± 80		35 AGUILAR-...	78	HBC	0.7	$\bar{p}p \rightarrow K_S^0 K_S^0$
30 ± 8		33 LEEPER	77	ASPK	2-2.4	$\pi^- p \rightarrow \pi^+\pi^- n, K^+ K^- n$
48 ± 14		33 BINNIE	73	CNTR		$\pi^- p \rightarrow nMM$
32 ± 10		36 GRAYER	73	ASPK	17	$\pi^- p \rightarrow \pi^+\pi^- n$
30 ± 10		36 HYAMS	73	ASPK	17	$\pi^- p \rightarrow \pi^+\pi^- n$
54 ± 16		36 PROTOPOP...	73	HBC	7	$\pi^+ p \rightarrow \pi^+ p \pi^+ \pi^-$

¹ Analytic continuation using Roy 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.

² Quoted number refers to twice imaginary part of pole position.

- ³ Analytic continuation using GPKY 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 $\pi^- p \rightarrow \pi^0 \pi^0 n$, $\pi^- p \rightarrow K \bar{K} n$, $\pi^+ \pi^- \rightarrow \pi^+ \pi^-$, $\bar{p} p \rightarrow \pi^0 \pi^0 \pi^0$, $\pi^0 \eta \eta$, $\pi^0 \pi^0 \eta$, $\pi^+ \pi^- \pi^0$, $K^+ K^- \pi^0$, $K_S^0 K_S^0 \pi^0$, $K^+ K_S^0 \pi^-$ at rest, $\bar{p} n \rightarrow \pi^- \pi^- \pi^+$, $K_S^0 K^- \pi^0$, $K_S^0 K_S^0 \pi^-$ 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 $K_S^0 K_S^0$ invariant mass.
 - ³⁶ Included in AGUILAR-BENITEZ 78 fit.
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$f_0(980)$ DECAY MODES

Mode	Fraction (Γ_i/Γ)
Γ_1 $\pi\pi$	dominant
Γ_2 $K\bar{K}$	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 $^{+0.07}_{-0.06}$	OUR AVERAGE				
0.286 \pm 0.017 $^{+0.211}_{-0.070}$	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 $e^+e^- \rightarrow e^+e^-\pi^+\pi^-$		
0.28 $^{+0.09}_{-0.13}$	3 BOGLIONE	99 RVUE	$\gamma\gamma \rightarrow \pi^+\pi^-, \pi^0\pi^0$		
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		
0.29 \pm 0.07 \pm 0.12	10,11 BOYER	90 MRK2	$e^+e^- \rightarrow e^+e^-\pi^+\pi^-$		
0.31 \pm 0.14 \pm 0.09	10,11 MARSISKE	90 CBAL	$e^+e^- \rightarrow e^+e^-\pi^0\pi^0$		
0.63 \pm 0.14	12 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 $g_{f_0 KK}/g_{f_0 \pi\pi} = 0$.

² 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.

³ Supersedes MORGAN 90.

⁴ OEST 90 quote systematic errors $^{+0.08}_{-0.18}$. We use ± 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 From analysis allowing arbitrary background unconstrained by unitarity.

¹¹ Data included in MORGAN 90, BOGLIONE 99 analyses.

¹² 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

$\Gamma(\pi\pi)/[\Gamma(\pi\pi) + \Gamma(K\bar{K})]$					$\Gamma_1/(\Gamma_1+\Gamma_2)$
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	$\pi\pi \rightarrow \pi\pi, K\bar{K}$
0.67 ± 0.09		⁴ LOVERRE	80	HBC	$4 \pi^- p \rightarrow n 2K_S^0$
$0.81^{+0.09}_{-0.04}$		⁴ CASON	78	STRC	$7 \pi^- p \rightarrow n 2K_S^0$
0.78 ± 0.03		⁴ WETZEL	76	OSPK	$8.9 \pi^- p \rightarrow n 2K_S^0$

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 ($0. \rho\bar{p} \rightarrow \pi^0\pi^0\pi^0, \pi^0\eta\eta, \pi^0\pi^0\eta$), GAMS ($\pi p \rightarrow \pi^0\pi^0 n, \eta\eta n, \eta\eta' n$), and BNL ($\pi p \rightarrow K\bar{K}n$) data.

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

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