$f_0(980)$

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

See also the minireview on scalar mesons under $f_0(600)$. (See the index for the page number.)

$f_0(980)$ MASS

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
980 ±10 OUR ESTIMATE					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$976.8 \pm 0.3^{+10.1}_{-0.6}$	64k	[1] AMBROSINO	07	KLOE	$1.02\ e^+e^- \to \pi^0\pi^0\gamma$
$984.7 \pm 0.4^{+2.4}_{-3.7}$	64k	[2] AMBROSINO	07	KLOE	$1.02\ e^+e^- \to \pi^0\pi^0\gamma$
973 ± 3	262 ± 30	[3] AUBERT	07AK	BABR	$10.6\ e^+e^- \to \phi\pi^+\pi^-\gamma$
970 ± 7	54 ± 9	[3] AUBERT	07AK	BABR	$10.6\ e^+e^- \to \phi\pi^0\pi^0\gamma$
953 ± 20	2.6k	[4] BONVICINI	07	CLEO	$D^+ \to \pi^-\pi^+\pi^+$
$985.6^{+1.2}_{-1.5}{}^{+1.1}_{-1.6}$		[5] MORI	07	BELL	$10.6\ e^+e^- \to e^+e^-\pi^+\pi^-$
$983.0 \pm 0.6^{+4.0}_{-3.0}$		[6] AMBROSINO	06B	KLOE	$1.02\ e^+e^- \to \pi^+\pi^-\gamma$
$977.3 \pm 0.9^{+3.7}_{-4.3}$		[7] AMBROSINO	06B	KLOE	$1.02\ e^+e^- \to \pi^+\pi^-\gamma$
950 ± 9	4286	[8] GARMASH	06	BELL	$B^+ \to K^+\pi^+\pi^-$
965 ± 10		ABLIKIM	05	BES2	$J/\psi \to \phi\pi^+\pi^-$, ϕK^+K^-
1031 ± 8		[9] ANISOVICH	03	RVUE	
1037 ± 31		TIKHOMIROV	03	SPEC	$40.0\ \pi^- C \to K^0_S K^0_S K^0_L X$
973 ± 1	2438	[10] ALOISIO	02D	KLOE	$e^+e^- \to \pi^0\pi^0\gamma$
$977 \pm 3 \pm 2$	848	[11] AITALA	01A	E791	$D_s^+ \to \pi^-\pi^+\pi^+$
969.8 ± 4.5	419	[12] ACHASOV	00H	SND	$e^+e^- \to \pi^0\pi^0\gamma$
985^{+16}_{-12}	419	[13,14] ACHASOV	00H	SND	$e^+e^- \to \pi^0\pi^0\gamma$
$976 \pm 5 \pm 6$		[15] AKHMETSHIN	99B	CMD2	$e^+e^- \to \pi^+\pi^-\gamma$
$977 \pm 3 \pm 6$	268	[15] AKHMETSHIN	99C	CMD2	$e^+e^- \to \pi^0\pi^0\gamma$
$975 \pm 4 \pm 6$		[16] AKHMETSHIN	99C	CMD2	$e^+e^- \to \pi^0\pi^0\gamma$
$975 \pm 4 \pm 6$		[17] AKHMETSHIN	99C	CMD2	$e^+e^- \to \pi^+\pi^-\gamma$, $\pi^0\pi^0\gamma$
985 ± 10		BARBERIS	99	OMEG	$450\ pp \to p_s p_f K^+K^-$
982 ± 3		BARBERIS	99B	OMEG	$450\ pp \to p_s p_f \pi^+\pi^-$
982 ± 3		BARBERIS	99C	OMEG	$450\ pp \to p_s p_f \pi^0\pi^0$
$987 \pm 6 \pm 6$		[18] BARBERIS	99D	OMEG	$450\ pp \to K^+K^-$, $\pi^+\pi^-$
989 ± 15		BELLAZZINI	99	GAM4	$450\ pp \to pp\pi^0\pi^0$
991 ± 3		[19] KAMINSKI	99	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$, $\sigma\sigma$
~ 980		[19] OLLER	99	RVUE	$\pi\pi \to \pi\pi$, $K\overline{K}$

∼ 993.5		OLLER	99B	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$
∼ 987		[19] OLLER	99C	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$, $\eta\eta$
957 ± 6		[20] ACKERSTAFF	98Q	OPAL	$Z \rightarrow f_0$ X
960 ±10		ALDE	98	GAM4	
1015 ±15		[19] ANISOVICH	98B	RVUE	Compilation
1008		[21] LOCHER	98	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$
955 ±10		[20] ALDE	97	GAM2	450 $pp \rightarrow pp\pi^0\pi^0$
994 ± 9		[22] BERTIN	97C	OBLX	0.0 $\overline{p}p \rightarrow \pi^+\pi^-\pi^0$
993.2± 6.5± 6.9		[23] 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	[24] ALDE	95B	GAM2	38 $\pi^- p \rightarrow \pi^0\pi^0 n$
960 ±10	10k	[25] 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		[26] 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		[27] ANISOVICH	95	RVUE	
1015		JANSSEN	95	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$
983		[28] BUGG	94	RVUE	$\overline{p}p \rightarrow \eta 2\pi^0$
973 ± 2		[29] KAMINSKI	94	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$
988		[30] ZOU	94B	RVUE	
988 ±10		[31] MORGAN	93	RVUE	$\pi\pi(K\overline{K}) \rightarrow \pi\pi(K\overline{K})$, $J/\psi \rightarrow \phi\pi\pi(K\overline{K})$, $D_s \rightarrow \pi(\pi\pi)$
971.1± 4.0		[20] AGUILAR-...	91	EHS	400 pp
979 ± 4		[32] ARMSTRONG	91	OMEG	300 $pp \rightarrow pp\pi\pi$, $ppK\overline{K}$
956 ±12		BREAKSTONE	90	SFM	$pp \rightarrow pp\pi^+\pi^-$
959.4± 6.5		[20] AUGUSTIN	89	DM2	$J/\psi \rightarrow \omega\pi^+\pi^-$
978 ± 9		[20] ABACHI	86B	HRS	$e^+e^- \rightarrow \pi^+\pi^-$X
$985.0^{+\ 9.0}_{-39.0}$		ETKIN	82B	MPS	23 $\pi^- p \rightarrow n 2K^0_S$
974 ± 4		[32] GIDAL	81	MRK2	$J/\psi \rightarrow \pi^+\pi^-$X
975		[33] ACHASOV	80	RVUE	
986 ±10		[32] AGUILAR-...	78	HBC	0.7 $\overline{p}p \rightarrow K^0_S K^0_S$
969 ± 5		[32] LEEPER	77	ASPK	2–2.4 $\pi^- p \rightarrow \pi^+\pi^- n$, $K^+K^- n$
987 ± 7		[32] BINNIE	73	CNTR	$\pi^- p \rightarrow n$MM
1012 ± 6		[34] GRAYER	73	ASPK	17 $\pi^- p \rightarrow \pi^+\pi^- n$
1007 ±20		[34] HYAMS	73	ASPK	17 $\pi^- p \rightarrow \pi^+\pi^- n$
997 ± 6		[34] PROTOPOP...	73	HBC	7 $\pi^+ p \rightarrow \pi^+ p\pi^+\pi^-$

[1] In the kaon-loop fit.
[2] In the no-structure fit.
[3] Systematic errors not estimated.
[4] 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.
[5] Breit-Wigner mass. Using finite width corrections according to FLATTE 76 and ACHASOV 05, and the ratio $g^2_{f_0 KK}/g^2_{f_0\pi\pi}$ from ABLIKIM 05.
[6] In the kaon-loop fit following formalism of ACHASOV 89.
[7] In the no-structure fit assuming a direct coupling of ϕ to $f_0\gamma$.
[8] FLATTE 76 parameterization. Supersedes GARMASH 05.

[9] 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.

[10] From the negative interference with the $f_0(600)$ meson of AITALA 01B using the ACHASOV 89 parameterization for the $f_0(980)$, a Breit-Wigner for the $f_0(600)$, and ACHASOV 01F for the $\rho\pi$ contribution.

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

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

[13] Supersedes ACHASOV 98I.

[14] In the "narrow resonance" approximation.

[15] Assuming $\Gamma(f_0)$= 40 MeV.

[16] From a narrow pole fit taking into account $f_0(980)$ and $f_0(1200)$ intermediate mechanisms.

[17] From the combined fit of the photon spectra in the reactions $e^+ e^- \rightarrow \pi^+ \pi^- \gamma$, $\pi^0 \pi^0 \gamma$.

[18] Supersedes BARBERIS 99 and BARBERIS 99B

[19] T-matrix pole.

[20] From invariant mass fit.

[21] On sheet II in a 2 pole solution. The other pole is found on sheet III at (1039−93i) MeV.

[22] On sheet II in a 2 pole solution. The other pole is found on sheet III at (963-29i) MeV.

[23] Reanalysis of data from HYAMS 73, GRAYER 74, SRINIVASAN 75, and ROSSELET 77 using the interfering amplitude method.

[24] At high $|t|$.

[25] At low $|t|$.

[26] 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.

[27] Combined fit of ALDE 95B, ANISOVICH 94, AMSLER 94D.

[28] On sheet II in a 2 pole solution. The other pole is found on sheet III at (996− 103i) MeV.

[29] From sheet II pole position.

[30] 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.

[31] On sheet II in a 2 pole solution. The other pole is found on sheet III at (978− 28i) MeV.

[32] From coupled channel analysis.

[33] Coupled channel analysis with finite width corrections.

[34] 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. • • •					
65 ± 13	262 ± 30	[35] AUBERT	07AK	BABR	10.6 $e^+ e^- \rightarrow \phi \pi^+ \pi^- \gamma$
81 ± 21	54 ± 9	[35] AUBERT	07AK	BABR	10.6 $e^+ e^- \rightarrow \phi \pi^0 \pi^0 \gamma$

$51.3^{+20.8}_{-17.7}{}^{+13.2}_{-3.8}$		[36] MORI	07	BELL	$10.6\ e^+e^- \to e^+e^-\pi^+\pi^-$
$61 \pm 9\ ^{+14}_{-8}$	2584	[37] GARMASH	05	BELL	$B^+ \to K^+\pi^+\pi^-$
64 ± 16		[38] ANISOVICH	03	RVUE	
121 ± 23		TIKHOMIROV	03	SPEC	$40.0\ \pi^- C \to K^0_S K^0_S K^0_L X$
~ 70		[39] BRAMON	02	RVUE	$1.02\ e^+e^- \to \pi^0\pi^0\gamma$
$44 \pm 2 \pm 2$	848	[40] AITALA	01A	E791	$D^+_s \to \pi^-\pi^+\pi^+$
201 ± 28	419	[41] ACHASOV	00H	SND	$e^+e^- \to \pi^0\pi^0\gamma$
122 ± 13	419	[42,43] ACHASOV	00H	SND	$e^+e^- \to \pi^0\pi^0\gamma$
56 ± 20		[44] 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	$450\ pp \to p_s p_f \pi^0\pi^0$
$48 \pm 12 \pm 8$		[45] 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		[46] KAMINSKI	99	RVUE	$\pi\pi \to \pi\pi, K\overline{K}, \sigma\sigma$
~ 28		[46] OLLER	99	RVUE	$\pi\pi \to \pi\pi, K\overline{K}$
~ 25		OLLER	99B	RVUE	$\pi\pi \to \pi\pi, K\overline{K}$
~ 14		[46] OLLER	99C	RVUE	$\pi\pi \to \pi\pi, K\overline{K}, \eta\eta$
70 ± 20		ALDE	98	GAM4	
86 ± 16		[46] ANISOVICH	98B	RVUE	Compilation
54		[47] LOCHER	98	RVUE	$\pi\pi \to \pi\pi, K\overline{K}$
69 ± 15		[48] ALDE	97	GAM2	$450\ pp \to pp\pi^0\pi^0$
38 ± 20		[49] BERTIN	97C	OBLX	$0.0\ \overline{p}p \to \pi^+\pi^-\pi^0$
~ 100		[50] 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	[51] ALDE	95B	GAM2	$38\ \pi^- p \to \pi^0\pi^0 n$
95 ± 20	10k	[52] 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		[53] 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		[54] ANISOVICH	95	RVUE	
30		JANSSEN	95	RVUE	$\pi\pi \to \pi\pi, K\overline{K}$
74		[55] BUGG	94	RVUE	$\overline{p}p \to \eta 2\pi^0$
29 ± 2		[56] KAMINSKI	94	RVUE	$\pi\pi \to \pi\pi, K\overline{K}$
46		[57] ZOU	94B	RVUE	
48 ± 12		[58] 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		[48] AGUILAR-...	91	EHS	$400\ pp$
72 ± 8		[59] ARMSTRONG	91	OMEG	$300\ pp \to pp\pi\pi, ppK\overline{K}$

110 ± 30	BREAKSTONE	90	SFM	$p p \to p p \pi^+ \pi^-$
29 ± 13	[48] ABACHI	86B	HRS	$e^+ e^- \to \pi^+ \pi^- X$
120 ±281 ±20	ETKIN	82B	MPS	$23\ \pi^- p \to n 2 K^0_S$
28 ± 10	[59] GIDAL	81	MRK2	$J/\psi \to \pi^+ \pi^- X$
70 to 300	[60] ACHASOV	80	RVUE	
100 ± 80	[61] AGUILAR-...	78	HBC	$0.7\ \overline{p} p \to K^0_S K^0_S$
30 ± 8	[59] LEEPER	77	ASPK	$2\text{–}2.4\ \pi^- p \to \pi^+ \pi^- n,\ K^+ K^- n$
48 ± 14	[59] BINNIE	73	CNTR	$\pi^- p \to n$MM
32 ± 10	[62] GRAYER	73	ASPK	$17\ \pi^- p \to \pi^+ \pi^- n$
30 ± 10	[62] HYAMS	73	ASPK	$17\ \pi^- p \to \pi^+ \pi^- n$
54 ± 16	[62] PROTOPOP...	73	HBC	$7\ \pi^+ p \to \pi^+ p \pi^+ \pi^-$

[35] Systematic errors not estimated.

[36] Breit-Wigner $\pi\pi$ width. Using finite width corrections according to FLATTE 76 and ACHASOV 05, and the ratio $g^2_{f_0 K K}/g^2_{f_0 \pi\pi}$ from ABLIKIM 05.

[37] Breit-Wigner, solution 1, PWA ambiguous.

[38] 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.

[39] Using the data of AKHMETSHIN 99C, ACHASOV 00H, and ALOISIO 02D.

[40] Breit-Wigner width.

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

[42] Supersedes ACHASOV 98I.

[43] In the "narrow resonance" approximation.

[44] From the combined fit of the photon spectra in the reactions $e^+ e^- \to \pi^+ \pi^- \gamma$, $\pi^0 \pi^0 \gamma$.

[45] Supersedes BARBERIS 99 and BARBERIS 99B

[46] T-matrix pole.

[47] On sheet II in a 2 pole solution. The other pole is found on sheet III at $(1039-93i)$ MeV.

[48] From invariant mass fit.

[49] On sheet II in a 2 pole solution. The other pole is found on sheet III at (963-29i) MeV.

[50] Reanalysis of data from HYAMS 73, GRAYER 74, SRINIVASAN 75, and ROSSELET 77 using the interfering amplitude method.

[51] At high $|t|$.

[52] At low $|t|$.

[53] 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.

[54] Combined fit of ALDE 95B, ANISOVICH 94,

[55] On sheet II in a 2 pole solution. The other pole is found on sheet III at $(996-103i)$ MeV.

[56] From sheet II pole position.

[57] 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.

[58] On sheet II in a 2 pole solution. The other pole is found on sheet III at $(978-28i)$ MeV.

[59] From coupled channel analysis.

[60] Coupled channel analysis with finite width corrections.

[61] 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.

[62] 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
$0.29^{+0.07}_{-0.09}$ OUR AVERAGE				
$0.205^{+0.095}_{-0.083}{}^{+0.147}_{-0.117}$	[63] MORI	07	BELL	10.6 $e^+e^- \rightarrow e^+e^-\pi^+\pi^-$
$0.28^{+0.09}_{-0.13}$	[64] BOGLIONE	99	RVUE	$\gamma\gamma \rightarrow \pi^+\pi^-$, $\pi^0\pi^0$
$0.42 \pm 0.06 \pm 0.18$	[65] OEST	90	JADE	$e^+e^- \rightarrow e^+e^-\pi^0\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.29 \pm 0.07 \pm 0.12$	[66,67] BOYER	90	MRK2	$e^+e^- \rightarrow e^+e^-\pi^+\pi^-$
$0.31 \pm 0.14 \pm 0.09$	[66,67] MARSISKE	90	CBAL	$e^+e^- \rightarrow e^+e^-\pi^0\pi^0$
0.63 ± 0.14	[68] MORGAN	90	RVUE	$\gamma\gamma \rightarrow \pi^+\pi^-$, $\pi^0\pi^0$

[63] Using finite width corrections according to FLATTE 76 and ACHASOV 05, and the ratio $g^2_{f_0 K K}/g^2_{f_0 \pi\pi}$ from ABLIKIM 05.

[64] Supersedes MORGAN 90.

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

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

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

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

$\Gamma(e^+e^-)$ Γ_4

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

$f_0(980)$ BRANCHING RATIOS

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

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.52 ± 0.12	9.9k	[69] AUBERT	06O	BABR	$B^\pm \rightarrow K^\pm\pi^\pm\pi^\mp$
$0.75^{+0.11}_{-0.13}$		[70] ABLIKIM	05Q	BES2	$\chi_{c0} \rightarrow 2\pi^+2\pi^-$, $\pi^+\pi^-K^+K^-$
0.84 ± 0.02		[71] ANISOVICH	02D	SPEC	Combined fit
~ 0.68		OLLER	99B	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\overline{K}$

0.67 ± 0.09	[72] LOVERRE	80	HBC	$4\ \pi^- p \rightarrow n 2K^0_S$
$0.81^{+0.09}_{-0.04}$	[72] CASON	78	STRC	$7\ \pi^- p \rightarrow n 2K^0_S$
0.78 ± 0.03	[72] WETZEL	76	OSPK	$8.9\ \pi^- p \rightarrow n 2K^0_S$

[69] Recalculated by us using $\Gamma(K^+ K^-)$ / $\Gamma(\pi^+ \pi^-) = 0.69 \pm 0.32$ from AUBERT 06O and isospin relations.

[70] Using data from ABLIKIM 04G.

[71] From a combined K-matrix analysis of Crystal Barrel (0. $p\overline{p} \rightarrow \pi^0 \pi^0 \pi^0$, $\pi^0 \eta\eta$, $\pi^0 \pi^0 \eta$), GAMS ($\pi p \rightarrow \pi^0 \pi^0 n$, $\eta\eta n$, $\eta\eta' n$), and BNL ($\pi p \rightarrow K\overline{K} n$) data.

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

$f_0(980)$ REFERENCES

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 051101R	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.)
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)
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.
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)

OTHER RELATED PAPERS

ACHASOV 07C PR D76 077501 N.N. Achasov, A.V. Kiselev
CHEN 07E PR D76 094025 H.-X. Chen, A. Hosaka, S.L. Zhu
GARMASH 07 PR D75 012006 A. Garmash *et al.* (BELLE Collab.)
GIACOSA 07 PR D75 054007 F. Giacosa
GUO 07B PR D76 056004 X.-H. Guo, X.-H. Wu
HANHART 07 PR D75 074015 C. Hanhart *et al.*
HANHART 07B PR D76 074028 C. Hanhart, B. Kubis, J.R. Pelaez
LEMMER 07 PL B650 152 R.H. Lemmer
SANTOPINTO 07 PR C75 045206 E. Santopinto, G. Galata
TESHIMA 07 PR D76 054002 T. Teshima, I. Kitamara, N. Morisita
ACHASOV 06B PR D73 054029 N.N. Achasov, A. V. Kiselev
BUGG 06A EPJ C47 45 D.V. Bugg
Translated from YAF 69 542.
CHENG 06 PR D73 014017 H.-Y. Cheng, C.-K. Chua, K.-C. Yang
FARIBORZ 06 PR D74 054030 A.H. Fariborz
KALASHNIK... 06 PR C73 045203 Yu. Kalashnikova *et al.*
ROSNER 06C PR D74 076006 J.L. Rosner
WANG 06B PR D74 114010 W. Wang *et al.*
ANISOVICH 05B PAN 68 1554 A.V. Anisovich, V.V. Anisovich, V.N. Markov
Translated from YAF 68 1614.
AUBERT,B 05G PR D72 052002 B. Aubert *et al.* (BABAR Collab.)
BARU 05 EPJ A23 523 V.V. Baru, J. Haidenbauer, C. Hanhart
BRITO 05 PL B608 69 T.V. Brito *et al.*
KALASHNIK... 05 EPJ A24 437 Yu.S. Kalashnikova, A.E. Kudryavtsev, A.V. Nefediev
LI 05B EPJ A25 263 D.-M. Li, K.-W. Wei, H. Yu
RODRIGUEZ 05 PR D71 074008 S. Rodriguez, M. Napsuciale
TESHIMA 05 NP A759 131 T. Teshima, I. Kitamura, N. Morisita
VIJANDE 05 PR D72 034025 J. Vijande, A. Valarce, F. Fernandez
WANG 05C EPJ C42 89 Z.-G. Wang, W.-M. Yang
ABLIKIM 04A PL B598 149 M. Ablikim *et al.* (BES Collab.)
AUBERT,B 04P PR D70 092001 B. Aubert *et al.* (BABAR Collab.)
BARU 04 PL B586 53 V. Baru *et al.*

BEDIAGA	04	PL B579 59	I. Bediaga *et al.*	
BUGG	04B	PL B598 8	D.V. Bugg	
KREWALD	04	PR D69 016003	S. Krewald, R.H. Lemmer, F.P. Sassen	
LINK	04	PL B585 200	J.M. Link *et al.*	(FNAL FOCUS Collab.)
PELAEZ	04	PRL 92 102001	J.R. Pelaez	
PELAEZ	04A	MPL A19 2879	J.R. Pelaez	
WANG	04B	EPJ C37 223	Z.-G. Wang *et al.*	
ANISOVICH	03B	PAN 66 741	V.V. Anisovich, V.A. Nikonov, A.V. Sarantsev	
		Translated from YAF 66 772.		
ANISOVICH	03D	PAN 66 928	V.V. Anisovich, A.V. Sarantsev	
		Translated from YAF 66 960.		
BEDAIGA	03	PR D68 036001	I. Bedaiga, M. Nielsen	
BOGLIONE	03	EPJ C30 503	M. Boglione, M.R. Pennington	
CHEN	03	PR D67 094011	C.-H. Chen	
COLANGELO	03	PL B559 49	P. Colangelo, F. De Fazio	
PALOMAR	03	NP A729 743	J.E. Palomar *et al.*	
ACHASOV	02G	PL B534 83	N.N Achasov, A.V. Kiselev	
ANISOVICH	02C	PAN 65 497	A.V. Anisovich *et al.*	
		Translated from YAF 65 523.		
BLACK	02	PRL 88 181603	D. Black, M. Harada, J. Schechter	
CLOSE	02B	JPG 28 R249	F.E. Close, N. Tornqvist	
KAMINSKI	02	EPJ Direct C4 1	R. Kaminski, L. Lesniak, K. Rybicki	
KLEEFELD	02	PR D66 034007	F. Kleefeld *et al.*	
RUPP	02	PR D65 078501	G. Rupp, E. vanBeveren, M.D. Scadron	
SHAKIN	02	PR D65 078502	C.M. Shakin, H. Wang	
TESHIMA	02	JPG 28 1391	T. Teshima, I. Kitamura, N. Morisita	
VOLKOV	02	PAN 65 1657	M.K. Volkov, V.L. Yudichev	
		Translated from YAF 65 1701.		
ACHASOV	01F	PR D63 094007	N.N. Achasov, V.V. Gubin	(Novosibirsk SND Collab.)
CLOSE	01	PL B515 13	F.E. Close, A. Kirk	
GOKALP	01	PR D64 053017	A. Gokalp, O. Yilmaz	
SUROVTSEV	01	PR D63 054024	Y.S. Surovtsev, D. Krupa, M. Nagy	
MARKUSHIN	00	EPJ A8 389	V.E. Markushin	
WANG	00A	PR D62 017503	Z. Wang	
ABREU	99J	PL B449 364	P. Abreu *et al.*	(DELPHI Collab.)
ANISOVICH	99D	PL B452 180	A.V. Anisovich *et al.*	
Also		NP A651 253	A.V. Anisovich *et al.*	
ANISOVICH	99H	PL B467 289	A.V. Anisovich, V.V. Anisovich	
BLACK	99	PR D59 074026	D. Black *et al.*	
DELBOURGO	99	PL B446 332	R. Delbourgo, D. Liu, M. Scadron	
MARCO	99	PL B470 20	E. Marco *et al.*	
MINKOWSKI	99	EPJ C9 283	P. Minkowski, W. Ochs	
ACHASOV	98G	JETPL 67 464	N.N. Achasov *et al.*	
ACHASOV	98J	SPU 41 1149	N.N. Achasov	
CHLIAPNIK...	98	PL B423 401	P.V. Chliapnikov, V.A. Uvarov	
PROKOSHKIN	97	SPD 42 117	Y.D. Prokoshkin *et al.*	(SERP)
		Translated from DANS 353 323.		
AU	87	PR D35 1633	K.L. Au, D. Morgan, M.R. Pennington	(DURH, RAL)
AKESSON	86	NP B264 154	T. Akesson *et al.*	(Axial Field Spec. Collab.)
VANBEVEREN	86	ZPHY C30 615	E. van Beveren *et al.*	(NIJM, BIEL)
MENNESSIER	83	ZPHY C16 241	G. Mennessier	(MONP)
BARBER	82	ZPHY C12 1	D.P. Barber *et al.*	(DARE, LANC, SHEF)
ETKIN	82C	PR D25 2446	A. Etkin *et al.*	(BNL, CUNY, TUFTS, VAND)
SRINIVASAN	75	PR D12 681	V. Srinivasan *et al.*	(NDAM, ANL)
BIGI	62	CERN Conf. 247	A. Bigi *et al.*	(CERN)
BINGHAM	62	CERN Conf. 240	H.H. Bingham *et al.*	(EPOL, CERN)
ERWIN	62	PRL 9 34	A.R. Erwin *et al.*	(WISC, BNL)
WANG	61	JETP 13 323	K.-C. Wang *et al.*	(JINR)
		Translated from ZETF 40 464.		