

# $f_0(980)$

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

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
<b>980 ±10 OUR ESTIMATE</b>				
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
982.2 ± 1.0 <sup>+</sup> <sub>-8.0</sub>		1 UEHARA	08A BELL	10.6 e <sup>+</sup> e <sup>-</sup> → e <sup>+</sup> e <sup>-</sup> π <sup>0</sup> π <sup>0</sup>
976.8 ± 0.3 <sup>+</sup> <sub>-10.1</sub>	64k	2 AMBROSINO	07 KLOE	1.02 e <sup>+</sup> e <sup>-</sup> → π <sup>0</sup> π <sup>0</sup> γ
984.7 ± 0.4 <sup>+</sup> <sub>-2.4</sub>	64k	3 AMBROSINO	07 KLOE	1.02 e <sup>+</sup> e <sup>-</sup> → π <sup>0</sup> π <sup>0</sup> γ
973 ± 3	262 ± 30	4 AUBERT	07AKBABR	10.6 e <sup>+</sup> e <sup>-</sup> → φπ <sup>+</sup> π <sup>-</sup> γ
970 ± 7	54 ± 9	4 AUBERT	07AKBABR	10.6 e <sup>+</sup> e <sup>-</sup> → φπ <sup>0</sup> π <sup>0</sup> γ
953 ± 20	2.6k	5 BONVICINI	07 CLEO	D <sup>+</sup> → π <sup>-</sup> π <sup>+</sup> π <sup>+</sup>
985.6 <sup>+</sup> <sub>-1.5</sub>		6 MORI	07 BELL	10.6 e <sup>+</sup> e <sup>-</sup> → e <sup>+</sup> e <sup>-</sup> π <sup>+</sup> π <sup>-</sup>
983.0 ± 0.6 <sup>+</sup> <sub>-4.0</sub>		7 AMBROSINO	06B KLOE	1.02 e <sup>+</sup> e <sup>-</sup> → π <sup>+</sup> π <sup>-</sup> γ
977.3 ± 0.9 <sup>+</sup> <sub>-4.3</sub>		8 AMBROSINO	06B KLOE	1.02 e <sup>+</sup> e <sup>-</sup> → π <sup>+</sup> π <sup>-</sup> γ
950 ± 9	4286	9 GARMASH	06 BELL	B <sup>+</sup> → K <sup>+</sup> π <sup>+</sup> π <sup>-</sup>
965 ± 10		ABLIKIM	05 BES2	J/ψ → φπ <sup>+</sup> π <sup>-</sup> , φK <sup>+</sup> K <sup>-</sup>
1031 ± 8		10 ANISOVICH	03 RVUE	
1037 ± 31		TIKHOMIROV	03 SPEC	40.0 π <sup>-</sup> C → K <sup>0</sup> <sub>S</sub> K <sup>0</sup> <sub>S</sub> K <sup>0</sup> <sub>L</sub> X
973 ± 1	2438	11 ALOISIO	02D KLOE	e <sup>+</sup> e <sup>-</sup> → π <sup>0</sup> π <sup>0</sup> γ
977 ± 3 ± 2	848	12 AITALA	01A E791	D <sup>+</sup> <sub>S</sub> → π <sup>-</sup> π <sup>+</sup> π <sup>+</sup>
969.8 ± 4.5	419	13 ACHASOV	00H SND	e <sup>+</sup> e <sup>-</sup> → π <sup>0</sup> π <sup>0</sup> γ
985 <sup>+</sup> <sub>-12</sub>	419	14,15 ACHASOV	00H SND	e <sup>+</sup> e <sup>-</sup> → π <sup>0</sup> π <sup>0</sup> γ
976 ± 5 ± 6		16 AKHMETSHIN	99B CMD2	e <sup>+</sup> e <sup>-</sup> → π <sup>+</sup> π <sup>-</sup> γ
977 ± 3 ± 6	268	16 AKHMETSHIN	99C CMD2	e <sup>+</sup> e <sup>-</sup> → π <sup>0</sup> π <sup>0</sup> γ
975 ± 4 ± 6		17 AKHMETSHIN	99C CMD2	e <sup>+</sup> e <sup>-</sup> → π <sup>0</sup> π <sup>0</sup> γ
975 ± 4 ± 6		18 AKHMETSHIN	99C CMD2	e <sup>+</sup> e <sup>-</sup> → π <sup>+</sup> π <sup>-</sup> γ, π <sup>0</sup> π <sup>0</sup> γ
985 ± 10		BARBERIS	99 OMEG	450 pp → p <sub>S</sub> p <sub>f</sub> K <sup>+</sup> K <sup>-</sup>
982 ± 3		BARBERIS	99B OMEG	450 pp → p <sub>S</sub> p <sub>f</sub> π <sup>+</sup> π <sup>-</sup>
982 ± 3		BARBERIS	99C OMEG	450 pp → p <sub>S</sub> p <sub>f</sub> π <sup>0</sup> π <sup>0</sup>
987 ± 6 ± 6		19 BARBERIS	99D OMEG	450 pp → K <sup>+</sup> K <sup>-</sup> , π <sup>+</sup> π <sup>-</sup>
989 ± 15		BELLAZZINI	99 GAM4	450 pp → ppπ <sup>0</sup> π <sup>0</sup>

991 ± 3		20 KAMINSKI	99 RVUE	$\pi\pi \rightarrow \pi\pi, K\bar{K}, \sigma\sigma$
~ 980		20 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		20 OLLER	99C RVUE	$\pi\pi \rightarrow \pi\pi, K\bar{K}, \eta\eta$
957 ± 6		21 ACKERSTAFF	98Q OPAL	$Z \rightarrow f_0 X$
960 ± 10		ALDE	98 GAM4	
1015 ± 15		20 ANISOVICH	98B RVUE	Compilation
1008		22 LOCHER	98 RVUE	$\pi\pi \rightarrow \pi\pi, K\bar{K}$
955 ± 10		21 ALDE	97 GAM2	$450 p\bar{p} \rightarrow p\bar{p}\pi^0\pi^0$
994 ± 9		23 BERTIN	97C OBLX	$0.0 \bar{p}p \rightarrow \pi^+\pi^-\pi^0$
993.2 ± 6.5 ± 6.9		24 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	25 ALDE	95B GAM2	$38 \pi^- p \rightarrow \pi^0\pi^0 n$
960 ± 10	10k	26 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		27 AMSLER	95D CBAR	$0.0 \bar{p}p \rightarrow \pi^0\pi^0\pi^0,$ $\pi^0\eta\eta, \pi^0\pi^0\eta$
987 ± 6		28 ANISOVICH	95 RVUE	
1015		JANSEN	95 RVUE	$\pi\pi \rightarrow \pi\pi, K\bar{K}$
983		29 BUGG	94 RVUE	$\bar{p}p \rightarrow \eta 2\pi^0$
973 ± 2		30 KAMINSKI	94 RVUE	$\pi\pi \rightarrow \pi\pi, K\bar{K}$
988		31 ZOU	94B RVUE	
988 ± 10		32 MORGAN	93 RVUE	$\pi\pi(K\bar{K}) \rightarrow \pi\pi(K\bar{K}),$ $J/\psi \rightarrow \phi\pi\pi(K\bar{K}),$ $D_s \rightarrow \pi(\pi\pi)$
971.1 ± 4.0		21 AGUILAR-...	91 EHS	400 $p\bar{p}$
979 ± 4		33 ARMSTRONG	91 OMEG	300 $p\bar{p} \rightarrow p\bar{p}\pi\pi,$ $p\bar{p}K\bar{K}$
956 ± 12		BREAKSTONE	90 SFM	$p\bar{p} \rightarrow p\bar{p}\pi^+\pi^-$
959.4 ± 6.5		21 AUGUSTIN	89 DM2	$J/\psi \rightarrow \omega\pi^+\pi^-$
978 ± 9		21 ABACHI	86B HRS	$e^+e^- \rightarrow \pi^+\pi^-\chi$
985.0 <sup>+</sup> <sub>-39.0</sub>		ETKIN	82B MPS	$23 \pi^- p \rightarrow n 2K_S^0$
974 ± 4		33 GIDAL	81 MRK2	$J/\psi \rightarrow \pi^+\pi^-\chi$
975		34 ACHASOV	80 RVUE	
986 ± 10		33 AGUILAR-...	78 HBC	$0.7 \bar{p}p \rightarrow K_S^0 K_S^0$
969 ± 5		33 LEEPER	77 ASPK	$2-2.4 \pi^- p \rightarrow$ $\pi^+\pi^- n, K^+ K^- n$
987 ± 7		33 BINNIE	73 CNTR	$\pi^- p \rightarrow nMM$
1012 ± 6		35 GRAYER	73 ASPK	$17 \pi^- p \rightarrow \pi^+\pi^- n$
1007 ± 20		35 HYAMS	73 ASPK	$17 \pi^- p \rightarrow \pi^+\pi^- n$
997 ± 6		35 PROTOPOP...	73 HBC	$7 \pi^+ p \rightarrow \pi^+ p\pi^+\pi^-$

<sup>1</sup> Breit-Wigner mass. Using finite width corrections according to FLATTE 76 and ACHASOV 05, and the ratio  $g_{f_0}^2 K K / g_{f_0}^2 \pi\pi = 0$ .

<sup>2</sup> In the kaon-loop fit.

<sup>3</sup> In the no-structure fit.

<sup>4</sup> Systematic errors not estimated.

<sup>5</sup> FLATTE 76 parameterization.  $g_{f_0 \pi\pi} = 329 \pm 96 \text{ MeV}/c^2$  assuming  $g_{f_0 K\bar{K}}/g_{f_0 \pi\pi} = 2$ .

- <sup>6</sup> Breit-Wigner mass. Using finite width corrections according to FLATTE 76 and ACHASOV 05, and the ratio  $g_{f_0}^2 K K / g_{f_0}^2 \pi \pi = 4.21 \pm 0.25 \pm 0.21$  from ABLIKIM 05.
- <sup>7</sup> In the kaon-loop fit following formalism of ACHASOV 89.
- <sup>8</sup> In the no-structure fit assuming a direct coupling of  $\phi$  to  $f_0 \gamma$ .
- <sup>9</sup> FLATTE 76 parameterization. Supersedes GARMASH 05.
- <sup>10</sup> 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.
- <sup>11</sup> 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.
- <sup>12</sup> Coupled-channel Breit-Wigner, couplings  $g_\pi = 0.09 \pm 0.01 \pm 0.01$ ,  $g_K = 0.02 \pm 0.04 \pm 0.03$ .
- <sup>13</sup> Supersedes ACHASOV 98I. Using the model of ACHASOV 89.
- <sup>14</sup> Supersedes ACHASOV 98I.
- <sup>15</sup> In the “narrow resonance” approximation.
- <sup>16</sup> Assuming  $\Gamma(f_0) = 40$  MeV.
- <sup>17</sup> From a narrow pole fit taking into account  $f_0(980)$  and  $f_0(1200)$  intermediate mechanisms.
- <sup>18</sup> From the combined fit of the photon spectra in the reactions  $e^+ e^- \rightarrow \pi^+ \pi^- \gamma$ ,  $\pi^0 \pi^0 \gamma$ .
- <sup>19</sup> Supersedes BARBERIS 99 and BARBERIS 99B
- <sup>20</sup> T-matrix pole.
- <sup>21</sup> From invariant mass fit.
- <sup>22</sup> On sheet II in a 2 pole solution. The other pole is found on sheet III at (1039–93i) MeV.
- <sup>23</sup> On sheet II in a 2 pole solution. The other pole is found on sheet III at (963–29i) MeV.
- <sup>24</sup> Reanalysis of data from HYAMS 73, GRAYER 74, SRINIVASAN 75, and ROSSELET 77 using the interfering amplitude method.
- <sup>25</sup> At high  $|t|$ .
- <sup>26</sup> At low  $|t|$ .
- <sup>27</sup> 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.
- <sup>28</sup> Combined fit of ALDE 95B, ANISOVICH 94, AMSLER 94D.
- <sup>29</sup> On sheet II in a 2 pole solution. The other pole is found on sheet III at (996–103i) MeV.
- <sup>30</sup> From sheet II pole position.
- <sup>31</sup> 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.
- <sup>32</sup> On sheet II in a 2 pole solution. The other pole is found on sheet III at (978–28i) MeV.
- <sup>33</sup> From coupled channel analysis.
- <sup>34</sup> Coupled channel analysis with finite width corrections.
- <sup>35</sup> Included in AGUILAR-BENITEZ 78 fit.

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### $f_0(980)$ 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
<b>40 to 100 OUR ESTIMATE</b>				

• • • We do not use the following data for averages, fits, limits, etc. • • •

66.9 ± 2.2 <sup>+17.6</sup> <sub>-12.5</sub>		36	UEHARA	08A	BELL	10.6 e <sup>+</sup> e <sup>-</sup> → e <sup>+</sup> e <sup>-</sup> π <sup>0</sup> π <sup>0</sup>
65 ± 13	262 ± 30	37	AUBERT	07AK	BABR	10.6 e <sup>+</sup> e <sup>-</sup> → φπ <sup>+</sup> π <sup>-</sup> γ
81 ± 21	54 ± 9	37	AUBERT	07AK	BABR	10.6 e <sup>+</sup> e <sup>-</sup> → φπ <sup>0</sup> π <sup>0</sup> γ
51.3 <sup>+</sup> <sub>-17.7</sub>	20.8 <sup>+</sup> <sub>-17.7</sub>	38	MORI	07	BELL	10.6 e <sup>+</sup> e <sup>-</sup> → e <sup>+</sup> e <sup>-</sup> π <sup>+</sup> π <sup>-</sup>
61 ± 9	2584	39	GARMASH	05	BELL	B <sup>+</sup> → K <sup>+</sup> π <sup>+</sup> π <sup>-</sup>
64 ± 16		40	ANISOVICH	03	RVUE	
121 ± 23			TIKHOMIROV	03	SPEC	40.0 π <sup>-</sup> C → K <sub>S</sub> <sup>0</sup> K <sub>S</sub> <sup>0</sup> K <sub>L</sub> <sup>0</sup> X
~ 70		41	BRAMON	02	RVUE	1.02 e <sup>+</sup> e <sup>-</sup> → π <sup>0</sup> π <sup>0</sup> γ
44 ± 2 ± 2	848	42	AITALA	01A	E791	D <sub>S</sub> <sup>+</sup> → π <sup>-</sup> π <sup>+</sup> π <sup>+</sup>
201 ± 28	419	43	ACHASOV	00H	SND	e <sup>+</sup> e <sup>-</sup> → π <sup>0</sup> π <sup>0</sup> γ
122 ± 13	419	44,45	ACHASOV	00H	SND	e <sup>+</sup> e <sup>-</sup> → π <sup>0</sup> π <sup>0</sup> γ
56 ± 20		46	AKHMETSHIN	99C	CMD2	e <sup>+</sup> e <sup>-</sup> → π <sup>0</sup> π <sup>0</sup> γ
65 ± 20			BARBERIS	99	OMEG	450 pp → p <sub>S</sub> p <sub>f</sub> K <sup>+</sup> K <sup>-</sup>
80 ± 10			BARBERIS	99B	OMEG	450 pp → p <sub>S</sub> p <sub>f</sub> π <sup>+</sup> π <sup>-</sup>
80 ± 10			BARBERIS	99C	OMEG	450 pp → p <sub>S</sub> p <sub>f</sub> π <sup>0</sup> π <sup>0</sup>
48 ± 12 ± 8		47	BARBERIS	99D	OMEG	450 pp → K <sup>+</sup> K <sup>-</sup> , π <sup>+</sup> π <sup>-</sup>
65 ± 25			BELLAZZINI	99	GAM4	450 pp → ppπ <sup>0</sup> π <sup>0</sup>
71 ± 14		48	KAMINSKI	99	RVUE	ππ → ππ, K $\bar{K}$ , σσ
~ 28		48	OLLER	99	RVUE	ππ → ππ, K $\bar{K}$
~ 25			OLLER	99B	RVUE	ππ → ππ, K $\bar{K}$
~ 14		48	OLLER	99C	RVUE	ππ → ππ, K $\bar{K}$ , ηη
70 ± 20			ALDE	98	GAM4	
86 ± 16		48	ANISOVICH	98B	RVUE	Compilation
54		49	LOCHER	98	RVUE	ππ → ππ, K $\bar{K}$
69 ± 15		50	ALDE	97	GAM2	450 pp → ppπ <sup>0</sup> π <sup>0</sup>
38 ± 20		51	BERTIN	97C	OBLX	0.0 $\bar{p}p$ → π <sup>+</sup> π <sup>-</sup> π <sup>0</sup>
~ 100		52	ISHIDA	96	RVUE	ππ → ππ, K $\bar{K}$
34			TORNQVIST	96	RVUE	ππ → ππ, K $\bar{K}$ , Kπ, ηπ
48 ± 10	3k	53	ALDE	95B	GAM2	38 π <sup>-</sup> p → π <sup>0</sup> π <sup>0</sup> n
95 ± 20	10k	54	ALDE	95B	GAM2	38 π <sup>-</sup> p → π <sup>0</sup> π <sup>0</sup> n
26 ± 10			AMSLER	95B	CBAR	0.0 $\bar{p}p$ → 3π <sup>0</sup>
~ 112		55	AMSLER	95D	CBAR	0.0 $\bar{p}p$ → π <sup>0</sup> π <sup>0</sup> π <sup>0</sup> , π <sup>0</sup> ηη, π <sup>0</sup> π <sup>0</sup> η
80 ± 12		56	ANISOVICH	95	RVUE	
30			JANSSEN	95	RVUE	ππ → ππ, K $\bar{K}$
74		57	BUGG	94	RVUE	$\bar{p}p$ → η2π <sup>0</sup>
29 ± 2		58	KAMINSKI	94	RVUE	ππ → ππ, K $\bar{K}$
46		59	ZOU	94B	RVUE	

48 ± 12	60 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	50 AGUILAR-...	91 EHS	400 $pp$
72 ± 8	61 ARMSTRONG	91 OMEG	300 $pp \rightarrow pp\pi\pi,$ $ppK\bar{K}$
110 ± 30	BREAKSTONE	90 SFM	$pp \rightarrow pp\pi^+\pi^-$
29 ± 13	50 ABACHI	86B HRS	$e^+e^- \rightarrow \pi^+\pi^-X$
120 ± 281 ± 20	ETKIN	82B MPS	23 $\pi^-p \rightarrow n2K_S^0$
28 ± 10	61 GIDAL	81 MRK2	$J/\psi \rightarrow \pi^+\pi^-X$
70 to 300	62 ACHASOV	80 RVUE	
100 ± 80	63 AGUILAR-...	78 HBC	0.7 $\bar{p}p \rightarrow K_S^0K_S^0$
30 ± 8	61 LEEPER	77 ASPK	2-2.4 $\pi^-p \rightarrow$ $\pi^+\pi^-n, K^+K^-n$
48 ± 14	61 BINNIE	73 CNTR	$\pi^-p \rightarrow nMM$
32 ± 10	64 GRAYER	73 ASPK	17 $\pi^-p \rightarrow \pi^+\pi^-n$
30 ± 10	64 HYAMS	73 ASPK	17 $\pi^-p \rightarrow \pi^+\pi^-n$
54 ± 16	64 PROTOPOP...	73 HBC	7 $\pi^+p \rightarrow$ $\pi^+p\pi^+\pi^-$

36 Breit-Wigner  $\pi\pi$  width. Using finite width corrections according to FLATTE 76 and ACHASOV 05, and the ratio  $g_{f_0}^2 K K / g_{f_0}^2 \pi\pi = 0$ .

37 Systematic errors not estimated.

38 Breit-Wigner  $\pi\pi$  width. Using finite width corrections according to FLATTE 76 and ACHASOV 05, and the ratio  $g_{f_0}^2 K K / g_{f_0}^2 \pi\pi = 4.21 \pm 0.25 \pm 0.21$  from ABLIKIM 05.

39 Breit-Wigner, solution 1, PWA ambiguous.

40 K-matrix pole from combined analysis of  $\pi^-p \rightarrow \pi^0\pi^0n, \pi^-p \rightarrow K\bar{K}n,$   
 $\pi^+\pi^- \rightarrow \pi^+\pi^-, \bar{p}p \rightarrow \pi^0\pi^0\pi^0, \pi^0\eta\eta, \pi^0\pi^0\eta, \pi^+\pi^-\pi^0, K^+K^-\pi^0, K_S^0K_S^0\pi^0,$   
 $K^+K_S^0\pi^-$  at rest,  $\bar{p}n \rightarrow \pi^-\pi^-\pi^+, K_S^0K^-\pi^0, K_S^0K_S^0\pi^-$  at rest.

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

42 Breit-Wigner width.

43 Supersedes ACHASOV 98I. Using the model of ACHASOV 89.

44 Supersedes ACHASOV 98I.

45 In the "narrow resonance" approximation.

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

47 Supersedes BARBERIS 99 and BARBERIS 99B

48 T-matrix pole.

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

50 From invariant mass fit.

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

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

53 At high  $|t|$ .

54 At low  $|t|$ .

55 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.

56 Combined fit of ALDE 95B, ANISOVICH 94,

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

58 From sheet II pole position.

- <sup>59</sup> 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.  
<sup>60</sup> On sheet II in a 2 pole solution. The other pole is found on sheet III at (978–28*i*) MeV.  
<sup>61</sup> From coupled channel analysis.  
<sup>62</sup> Coupled channel analysis with finite width corrections.  
<sup>63</sup> 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.  
<sup>64</sup> Included in AGUILAR-BENITEZ 78 fit.

### $f_0(980)$ DECAY MODES

Mode	Fraction ( $\Gamma_i/\Gamma$ )
$\Gamma_1$ $\pi\pi$	dominant
$\Gamma_2$ $K\bar{K}$	seen
$\Gamma_3$ $\gamma\gamma$	seen
$\Gamma_4$ $e^+e^-$	

### $f_0(980)$ PARTIAL WIDTHS

$\Gamma(\gamma\gamma)$					$\Gamma_3$
VALUE (keV)	DOCUMENT ID	TECN	COMMENT		

**0.29  $^{+0.07}_{-0.06}$  OUR AVERAGE**

0.286 $\pm$ 0.017 $^{+0.211}_{-0.070}$	65 UEHARA	08A BELL	10.6 $e^+e^- \rightarrow e^+e^-\pi^0\pi^0$	
0.205 $^{+0.095}_{-0.083}$ $^{+0.147}_{-0.117}$	66 MORI	07 BELL	10.6 $e^+e^- \rightarrow e^+e^-\pi^+\pi^-$	
0.28 $^{+0.09}_{-0.13}$	67 BOGLIONE	99 RVUE	$\gamma\gamma \rightarrow \pi^+\pi^-, \pi^0\pi^0$	
0.42 $\pm$ 0.06 $\pm$ 0.18	68 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	69,70 BOYER	90 MRK2	$e^+e^- \rightarrow e^+e^-\pi^+\pi^-$	
0.31 $\pm$ 0.14 $\pm$ 0.09	69,70 MARSISKE	90 CBAL	$e^+e^- \rightarrow e^+e^-\pi^0\pi^0$	
0.63 $\pm$ 0.14	71 MORGAN	90 RVUE	$\gamma\gamma \rightarrow \pi^+\pi^-, \pi^0\pi^0$	

<sup>65</sup> Using finite width corrections according to FLATTE 76 and ACHASOV 05, and the ratio  $g_{f_0}^2 K K / g_{f_0}^2 \pi\pi = 0$ .

<sup>66</sup> Using finite width corrections according to FLATTE 76 and ACHASOV 05, and the ratio  $g_{f_0}^2 K K / g_{f_0}^2 \pi\pi = 4.21 \pm 0.25 \pm 0.21$  from ABLIKIM 05.

<sup>67</sup> Supersedes MORGAN 90.

<sup>68</sup> OEST 90 quote systematic errors  $^{+0.08}_{-0.18}$ . We use  $\pm 0.18$ . Observed 60 events.

<sup>69</sup> From analysis allowing arbitrary background unconstrained by unitarity.

<sup>70</sup> Data included in MORGAN 90, BOGLIONE 99 analyses.

<sup>71</sup> From amplitude analysis of BOYER 90 and MARSISKE 90, data corresponds to resonance parameters  $m = 989$  MeV,  $\Gamma = 61$  MeV.

$\Gamma(e^+e^-)$					$\Gamma_4$
VALUE (eV)	CL%	DOCUMENT ID	TECN	COMMENT	
<b>&lt;8.4</b>	90	VOROBYEV	88 ND	$e^+e^- \rightarrow \pi^0\pi^0$	

## $f_0(980)$ BRANCHING RATIOS

$\Gamma(\pi\pi) / [\Gamma(\pi\pi) + \Gamma(K\bar{K})]$	$\Gamma_1 / (\Gamma_1 + \Gamma_2)$
<u>VALUE</u>	<u>COMMENT</u>

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.52 \pm 0.12$	9.9k	<sup>72</sup> AUBERT	060 BABR	$B^\pm \rightarrow K^\pm \pi^\pm \pi^\mp$
$0.75^{+0.11}_{-0.13}$		<sup>73</sup> ABLIKIM	05Q BES2	$\chi_{c0} \rightarrow 2\pi^+ 2\pi^-$ , $\pi^+ \pi^- K^+ K^-$
$0.84 \pm 0.02$		<sup>74</sup> ANISOVICH	02D SPEC	Combined fit
$\sim 0.68$		OLLER	99B RVUE	$\pi\pi \rightarrow \pi\pi, K\bar{K}$
$0.67 \pm 0.09$		<sup>75</sup> LOVERRE	80 HBC	$4 \pi^- p \rightarrow n 2K_S^0$
$0.81^{+0.09}_{-0.04}$		<sup>75</sup> CASON	78 STRC	$7 \pi^- p \rightarrow n 2K_S^0$
$0.78 \pm 0.03$		<sup>75</sup> WETZEL	76 OSPK	$8.9 \pi^- p \rightarrow n 2K_S^0$

<sup>72</sup> Recalculated by us using  $\Gamma(K^+ K^-) / \Gamma(\pi^+ \pi^-) = 0.69 \pm 0.32$  from AUBERT 060 and isospin relations.

<sup>73</sup> Using data from ABLIKIM 04G.

<sup>74</sup> 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.

<sup>75</sup> Measure  $\pi\pi$  elasticity assuming two resonances coupled to the  $\pi\pi$  and  $K\bar{K}$  channels only.

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