$\omega(782)$

$I^G(J^{PC}) = 0^-(1^{--})$

$\omega(782)$ MASS

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
782.59±0.11 OUR AVERAGE		Error includes scale factor of 1.7. See the ideogram below.			
782.68±0.09±0.04	11200	[1] AKHMETSHIN	04	CMD2	$e^+e^- \to \pi^+\pi^-\pi^0$
782.79±0.08±0.09	1.2M	[2] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
782.7 ±0.1 ±1.5	19500	WURZINGER	95	SPEC	1.33 $pd \to {}^3\mathrm{He}\omega$
781.96±0.17±0.80	11k	[3] AMSLER	94C	CBAR	0.0 $\overline{p}p \to \omega\eta\pi^0$
782.08±0.36±0.82	3463	[4] AMSLER	94C	CBAR	0.0 $\overline{p}p \to \omega\eta\pi^0$
781.96±0.13±0.17	15k	AMSLER	93B	CBAR	0.0 $\overline{p}p \to \omega\pi^0\pi^0$
782.4 ±0.2	270k	WEIDENAUER	93	ASTE	$\overline{p}p \to 2\pi^+2\pi^-\pi^0$
782.2 ±0.4	1488	KURDADZE	83B	OLYA	$e^+e^- \to \pi^+\pi^-\pi^0$
782.4 ±0.5	7000	[5] KEYNE	76	CNTR	$\pi^- p \to \omega n$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
781.78±0.10		[6] BARKOV	87	CMD	$e^+e^- \to \pi^+\pi^-\pi^0$
783.3 ±0.4	433	CORDIER	80	DM1	$e^+e^- \to \pi^+\pi^-\pi^0$
782.5 ±0.8	33260	ROOS	80	RVUE	0.0–3.6 $\overline{p}p$
782.6 ±0.8	3000	BENKHEIRI	79	OMEG	9–12 $\pi^\pm p$
781.8 ±0.6	1430	COOPER	78B	HBC	0.7–0.8 $\overline{p}p \to 5\pi$
782.7 ±0.9	535	VANAPEL...	78	HBC	7.2 $\overline{p}p \to \overline{p}p\omega$
783.5 ±0.8	2100	GESSAROLI	77	HBC	11 $\pi^- p \to \omega n$
782.5 ±0.8	418	AGUILAR-...	72B	HBC	3.9,4.6 $K^- p$
783.4 ±1.0	248	BIZZARRI	71	HBC	0.0 $p\overline{p} \to K^+K^-\omega$
781.0 ±0.6	510	BIZZARRI	71	HBC	0.0 $p\overline{p} \to K_1K_1\omega$
783.7 ±1.0	3583	[7] COYNE	71	HBC	3.7 $\pi^+ p \to p\pi^+\pi^+\pi^-\pi^0$
784.1 ±1.2	750	ABRAMOVI...	70	HBC	3.9 $\pi^- p$
783.2 ±1.6		[8] BIGGS	70B	CNTR	$<$4.1 $\gamma\mathrm{C} \to \pi^+\pi^-\mathrm{C}$
782.4 ±0.5	2400	BIZZARRI	69	HBC	0.0 $\overline{p}p$

[1] Update of AKHMETSHIN 00C.

[2] From the combined fit of ANTONELLI 92, ACHASOV 01E, ACHASOV 02E, and ACHASOV 03D data on the $\pi^+\pi^-\pi^0$ and ANTONELLI 92 on the $\omega\pi^+\pi^-$ final states. Supersedes ACHASOV 99E and ACHASOV 02E.

[3] From the $\eta \to \gamma\gamma$ decay.

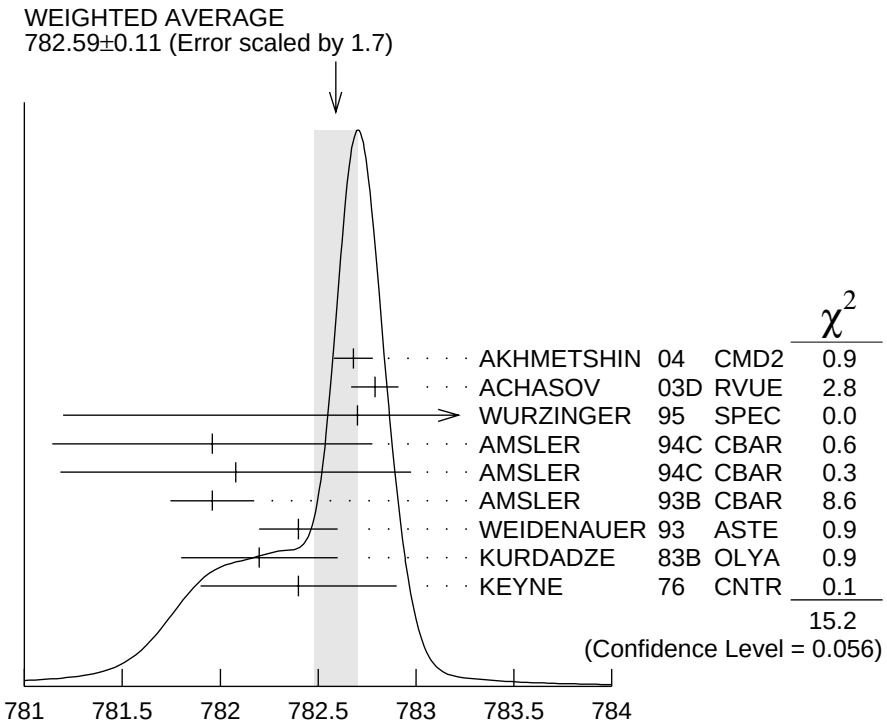
[4] From the $\eta \to 3\pi^0$ decay.

[5] Observed by threshold-crossing technique. Mass resolution = 4.8 MeV FWHM.

[6] Systematic uncertainties underestimated.

[7] From best-resolution sample of COYNE 71.

[8] From ω-ρ interference in the $\pi^+\pi^-$ mass spectrum assuming ω width 12.6 MeV.



ω(782) WIDTH

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
8.49±0.08 OUR AVERAGE					
8.68±0.23±0.10	11200	[9] AKHMETSHIN	04	CMD2	$e^+e^- \to \pi^+\pi^-\pi^0$
8.68±0.04±0.15	1.2M	[10] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
8.2 ±0.3	19500	WURZINGER	95	SPEC	1.33 $pd \to {}^3\mathrm{He}\omega$
8.4 ±0.1		[11] AULCHENKO	87	ND	$e^+e^- \to \pi^+\pi^-\pi^0$
8.30±0.40		BARKOV	87	CMD	$e^+e^- \to \pi^+\pi^-\pi^0$
9.8 ±0.9	1488	KURDADZE	83B	OLYA	$e^+e^- \to \pi^+\pi^-\pi^0$
9.0 ±0.8	433	CORDIER	80	DM1	$e^+e^- \to \pi^+\pi^-\pi^0$
9.1 ±0.8	451	BENAKSAS	72B	OSPK	$e^+e^- \to \pi^+\pi^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
12 ±2	1430	COOPER	78B	HBC	0.7–0.8 $\overline{p}p \to 5\pi$
9.4 ±2.5	2100	GESSAROLI	77	HBC	11 $\pi^- p \to \omega n$
10.22±0.43	20000	[12] KEYNE	76	CNTR	$\pi^- p \to \omega n$
13.3 ±2	418	AGUILAR-...	72B	HBC	3.9,4.6 $K^- p$
10.5 ±1.5		BORENSTEIN	72	HBC	2.18 $K^- p$
7.70±0.9 ±1.15	940	BROWN	72	MMS	2.5 $\pi^- p \to n\mathrm{MM}$
10.3 ±1.4	510	BIZZARRI	71	HBC	0.0 $p\overline{p} \to K_1 K_1 \omega$
12.8 ±3.0	248	BIZZARRI	71	HBC	0.0 $p\overline{p} \to K^+ K^- \omega$
9.5 ±1.0	3583	COYNE	71	HBC	3.7 $\pi^+ p \to p\pi^+\pi^+\pi^-\pi^0$

[9] Update of AKHMETSHIN 00C.
[10] From the combined fit of ANTONELLI 92, ACHASOV 01E, ACHASOV 02E, and ACHASOV 03D data on the $\pi^+\pi^-\pi^0$ and ANTONELLI 92 on the $\omega\pi^+\pi^-$ final states. Supersedes ACHASOV 99E and ACHASOV 02E.
[11] Relativistic Breit-Wigner includes radiative corrections.
[12] Observed by threshold-crossing technique. Mass resolution = 4.8 MeV FWHM.

$\omega(782)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level
Γ_1	$\pi^+\pi^-\pi^0$	(89.1 $\pm$0.7) %	S=1.1
Γ_2	$\pi^0\gamma$	($8.92^{+0.28}_{-0.24}$) %	S=1.1
Γ_3	$\pi^+\pi^-$	(1.70$\pm$0.27) %	S=1.4
Γ_4	neutrals (excluding $\pi^0\gamma$)	($1.4\ ^{+7.0}_{-0.9}$) $\times 10^{-3}$	
Γ_5	$\eta\gamma$	(4.9 $\pm$0.5) $\times 10^{-4}$	
Γ_6	$\pi^0 e^+ e^-$	(5.9 $\pm$1.9) $\times 10^{-4}$	
Γ_7	$\pi^0\mu^+\mu^-$	(9.6 $\pm$2.3) $\times 10^{-5}$	
Γ_8	e^+e^-	(7.14$\pm$0.13) $\times 10^{-5}$	S=1.1
Γ_9	$\pi^+\pi^-\pi^0\pi^0$	$<$ 2 %	CL=90%
Γ_{10}	$\pi^+\pi^-\gamma$	$<$ 3.6 $\times 10^{-3}$	CL=95%
Γ_{11}	$\pi^+\pi^-\pi^+\pi^-$	$<$ 1 $\times 10^{-3}$	CL=90%
Γ_{12}	$\pi^0\pi^0\gamma$	(6.7 $\pm$1.1) $\times 10^{-5}$	
Γ_{13}	$\eta\pi^0\gamma$	$<$ 3.3 $\times 10^{-5}$	CL=90%
Γ_{14}	$\mu^+\mu^-$	(9.0 $\pm$3.1) $\times 10^{-5}$	
Γ_{15}	3γ	$<$ 1.9 $\times 10^{-4}$	CL=95%
	Charge conjugation (C) violating modes		
Γ_{16}	$\eta\pi^0$ C	$<$ 1 $\times 10^{-3}$	CL=90%
Γ_{17}	$3\pi^0$ C	$<$ 3 $\times 10^{-4}$	CL=90%

CONSTRAINED FIT INFORMATION

An overall fit to 15 branching ratios uses 43 measurements and one constraint to determine 10 parameters. The overall fit has a $\chi^2 = 30.7$ for 34 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\left\langle \delta x_i \delta x_j \right\rangle / (\delta x_i \cdot \delta x_j)$, in percent, from the fit to the branching fractions, $x_i \equiv \Gamma_i / \Gamma_{\text{total}}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_2	27								
x_3	−36	−10							
x_4	−88	−56	1						
x_5	6	7	−2	−8					
x_6	−3	−1	0	0	0				
x_7	0	0	0	0	0	0			
x_8	−43	−50	16	52	−15	1	0		
x_{12}	1	3	0	−2	0	0	0	−2	
x_{14}	0	0	0	0	0	0	0	0	0
	x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_{12}

$\omega(782)$ PARTIAL WIDTHS

$\Gamma(e^+e^-)$ Γ_8

VALUE (keV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.60 ±0.02 OUR EVALUATION					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.591±0.015	11200	[13,14] AKHMETSHIN	04	CMD2	$e^+e^- \to \pi^+\pi^-\pi^0$
0.653±0.003±0.021	1.2M	[15] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
0.600±0.031	10625	DOLINSKY	89	ND	$e^+e^- \to \pi^0\gamma$

[13] Using B($\omega \to \pi^+\pi^-\pi^0$) = 0.891 ± 0.007 and Γ_{total} = 8.44 ± 0.09 MeV.
[14] Update of AKHMETSHIN 00C.
[15] Using ACHASOV 03, ACHASOV 03D and B($\omega \to \pi^+\pi^-$) = (1.70 ± 0.28)%.

$\Gamma(\pi^0\gamma)$ Γ_2

VALUE (keV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
788±12±27	36500	[16] ACHASOV	03	SND	0.60–0.97 $e^+e^- \to \pi^0\gamma$
764±51	10625	DOLINSKY	89	ND	$e^+e^- \to \pi^0\gamma$

[16] Using Γ_ω = 8.44 ± 0.09 MeV and B($\omega \to \pi^0\gamma$) from ACHASOV 03.

$\Gamma(\eta\gamma)$ Γ_5

VALUE (keV)	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
6.1±2.5	[17] DOLINSKY	89	ND	$e^+e^- \to \eta\gamma$

[17] Using Γ_ω = 8.4 ± 0.1 MeV and B($\omega \to \eta\gamma$) from DOLINSKY 89.

$\omega(782)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma^2(\text{total})$

$\Gamma(e^+e^-) \times \Gamma(\pi^+\pi^-\pi^0)/\Gamma^2_{\text{total}}$ $\Gamma_8\Gamma_1/\Gamma^2$

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
6.36±0.10 OUR FIT Error includes scale factor of 1.1.					
6.35±0.10 OUR AVERAGE Error includes scale factor of 1.1.					
6.24±0.11±0.08	11200	[18] AKHMETSHIN	04	CMD2	$e^+e^- \to \pi^+\pi^-\pi^0$
6.74±0.04±0.24	1.2M	[19,20] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
6.37±0.35		[19] DOLINSKY	89	ND	$e^+e^- \to \pi^+\pi^-\pi^0$
6.45±0.24		[19] BARKOV	87	CMD	$e^+e^- \to \pi^+\pi^-\pi^0$
5.79±0.42	1488	[19] KURDADZE	83B	OLYA	$e^+e^- \to \pi^+\pi^-\pi^0$
5.89±0.54	433	[19] CORDIER	80	DM1	$e^+e^- \to \pi^+\pi^-\pi^0$
7.54±0.84	451	[19] BENAKSAS	72B	OSPK	$e^+e^- \to \pi^+\pi^-\pi^0$

$\Gamma(e^+e^-) \times \Gamma(\pi^0\gamma)/\Gamma^2_{\text{total}}$ $\Gamma_8\Gamma_2/\Gamma^2$

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
$6.37^{+0.17}_{-0.15}$ OUR FIT					
6.44±0.18 OUR AVERAGE					
6.50±0.11±0.20	36500	[21] ACHASOV	03	SND	0.60–0.97 $e^+e^- \to \pi^0\gamma$
6.34±0.21±0.21	10625	[19] DOLINSKY	89	ND	$e^+e^- \to \pi^0\gamma$

$\Gamma(e^+e^-) \times \Gamma(\eta\gamma)/\Gamma^2_{\text{total}}$ $\Gamma_8\Gamma_5/\Gamma^2$

VALUE (units 10^{-8})	EVTS	DOCUMENT ID		TECN	COMMENT
3.53±0.35 OUR FIT					
3.3 ±0.4 OUR AVERAGE					
3.41±0.52±0.21	23k	[22,23] AKHMETSHIN	01B	CMD2	$e^+e^- \to \eta\gamma$
3.25±0.51±0.10	312	[24] ACHASOV	00D	SND	$e^+e^- \to \eta\gamma$

[18] Update of AKHMETSHIN 00C.

[19] Recalculated by us from the cross section in the peak.

[20] From the combined fit of ANTONELLI 92, ACHASOV 01E, ACHASOV 02E, and ACHASOV 03D data on the $\pi^+\pi^-\pi^0$ and ANTONELLI 92 on the $\omega\pi^+\pi^-$ final states. Supersedes ACHASOV 99E and ACHASOV 02E.

[21] Using $\sigma_{\phi \to \pi^0\gamma}$ from ACHASOV 00 and m_ω= 782.57 MeV in the model with the energy-independent phase of ρ-ω interference equal to $(-10.2 \pm 7.0)^\circ$.

[22] From the $\eta \to 3\pi^0$ decay and using B($\eta \to 3\pi^0$)= $(32.24 \pm 0.29) \times 10^{-2}$.

[23] The combined fit from 600 to 1380 MeV taking into account $\rho(770)$, $\omega(782)$, $\phi(1020)$, and $\rho(1450)$ (mass and width fixed at 1450 MeV and 310 MeV respectively).

[24] From the $\eta \to 3\pi^0$ decay and using B($\eta \to 3\pi^0$) = $(32.2 \pm 0.4) \times 10^{-2}$.

ω(782) BRANCHING RATIOS

Γ(neutrals)/Γ(π⁺π⁻π⁰) (Γ₂+Γ₄)/Γ₁

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.102±0.008 OUR FIT					
0.103 $^{+0.011}_{-0.010}$ OUR AVERAGE					
0.15 ±0.04	46	AGUILAR-...	72B	HBC	3.9,4.6 $K^- p$
0.10 ±0.03	19	BARASH	67B	HBC	0.0 $\overline{p}p$
0.134±0.026	850	DIGIUGNO	66B	CNTR	1.4 $\pi^- p$
0.097±0.016	348	FLATTE	66	HBC	1.4 – 1.7 $K^- p \rightarrow$ ΛMM
0.06 $^{+0.05}_{-0.02}$		JAMES	66	HBC	2.1 $\pi^+ p$
0.08 ±0.03	35	KRAEMER	64	DBC	1.2 $\pi^+ d$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.11 ±0.02	20	BUSCHBECK	63	HBC	1.5 $K^- p$

Γ(π⁺π⁻)/Γ(π⁺π⁻π⁰) Γ₃/Γ₁

See also $\Gamma(\pi^+\pi^-)/\Gamma_{\text{total}}$.

VALUE		DOCUMENT ID		TECN	COMMENT
0.0191±0.0030 OUR FIT Error includes scale factor of 1.4.					
0.026 ±0.005 OUR AVERAGE					
0.021 $^{+0.028}_{-0.009}$	[26]	RATCLIFF	72	ASPK	15 $\pi^- p \rightarrow n2\pi$
0.028 ±0.006		BEHREND	71	ASPK	Photoproduction
0.022 $^{+0.009}_{-0.01}$	[27]	ROOS	70	RVUE	

Γ(π⁰γ)/Γ(π⁺π⁻π⁰) Γ₂/Γ₁

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.1001 $^{+0.0031}_{-0.0026}$ OUR FIT Error includes scale factor of 1.1.					
0.097 ±0.005 OUR AVERAGE					
0.0994±0.0036±0.0038	[28]	AULCHENKO	00A	SND	$e^+e^- \rightarrow$ $\pi^+\pi^-\pi^0\pi^0$, $\pi^0\pi^0\gamma$
0.084 ±0.013		KEYNE	76	CNTR	$\pi^- p \rightarrow \omega n$
0.109 ±0.025		BENAKSAS	72C	OSPK	$e^+e^- \rightarrow \pi^0\gamma$
0.081 ±0.020		BALDIN	71	HLBC	2.9 $\pi^+ p$
0.13 ±0.04		JACQUET	69B	HLBC	2.05 $\pi^+ p \rightarrow \pi^+ p\omega$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.097 ±0.002 ±0.005	1.2M	[29,30] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \rightarrow$ $\pi^+\pi^-\pi^0$
0.099 ±0.007		[29] DOLINSKY	89	ND	$e^+e^- \rightarrow \pi^0\gamma$

Γ(π⁺π⁻γ)/Γ(π⁺π⁻π⁰) Γ₁₀/Γ₁

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.066	90	KALBFLEISCH	75	HBC	2.18 $K^- p \rightarrow$ $\Lambda\pi^+\pi^-\gamma$
<0.05	90	FLATTE	66	HBC	1.2 – 1.7 $K^- p \rightarrow$ $\Lambda\pi^+\pi^-\gamma$

$\Gamma(\pi^+\pi^-\gamma)/\Gamma_{total}$ Γ_{10}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0036	95	WEIDENAUER	90	ASTE	$p\overline{p} \to \pi^+\pi^-\pi^+\pi^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.004	95	BITYUKOV	88B	SPEC	32 $\pi^- p \to \pi^+\pi^-\gamma X$

$\Gamma(\pi^+\pi^-\pi^+\pi^-)/\Gamma_{total}$ Γ_{11}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1\times10^{-3}$	90	KURDADZE	88	OLYA	$e^+e^- \to \pi^+\pi^-\pi^+\pi^-$

$\Gamma(\pi^+\pi^-\pi^0\pi^0)/\Gamma_{total}$ Γ_9/Γ

VALUE (units 10^{-2})	CL%	DOCUMENT ID		TECN	COMMENT
<2	90	KURDADZE	86	OLYA	$e^+e^- \to \pi^+\pi^-\pi^0\pi^0$

$\Gamma(\mu^+\mu^-)/\Gamma(\pi^+\pi^-\pi^0)$ Γ_{14}/Γ_1

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.2	90	WILSON	69	OSPK	12 π^- C → Fe
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.7	74	FLATTE	66	HBC	1.2 – 1.7 $K^- p \to \Lambda\mu^+\mu^-$
<1.2		BARBARO-...	65	HBC	2.7 $K^- p$

$\Gamma(\pi^0\pi^0\gamma)/\Gamma_{total}$ Γ_{12}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
6.7 ± 1.1 OUR FIT					
6.5 ± 1.2 OUR AVERAGE					
$6.4^{+2.4}_{-2.0}\pm0.8$	190	[31] AKHMETSHIN	04B	CMD2	0.6–0.97 $e^+e^- \to \pi^0\pi^0\gamma$
$6.6^{+1.4}_{-1.3}\pm0.6$	295	ACHASOV	02F	SND	0.36–0.97 $e^+e^- \to \pi^0\pi^0\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$11.8^{+2.1}_{-1.9}\pm1.4$	190	[32] AKHMETSHIN	04B	CMD2	0.6–0.97 $e^+e^- \to \pi^0\pi^0\gamma$
$7.8\pm2.7\pm2.0$	63	[31,33] ACHASOV	00G	SND	$e^+e^- \to \pi^0\pi^0\gamma$
$12.7\pm2.3\pm2.5$	63	[32,33] ACHASOV	00G	SND	$e^+e^- \to \pi^0\pi^0\gamma$

$\Gamma(\pi^0\pi^0\gamma)/\Gamma(\pi^0\gamma)$ Γ_{12}/Γ_2

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$(7.6\quad\pm1.3\quad)\times10^{-4}$ OUR FIT						
0.00085 ± 0.00029		40 ± 14	ALDE	94B	GAM2	$38\pi^- p \to \pi^0\pi^0\gamma n$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 0.005	90		DOLINSKY	89	ND	$e^+e^- \to \pi^0\pi^0\gamma$
< 0.18	95		KEYNE	76	CNTR	$\pi^- p \to \omega n$
< 0.15	90		BENAKSAS	72C	OSPK	e^+e^-
< 0.14			BALDIN	71	HLBC	2.9 $\pi^+ p$
< 0.1	90		BARMIN	64	HLBC	1.3–2.8 $\pi^- p$

$\Gamma(\eta\pi^0)/\Gamma_{total}$ Γ_{16}/Γ

Violates C conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.001	90	ALDE	94B	GAM2	$38\pi^- p \rightarrow \eta\pi^0 n$

$\Gamma(\eta\pi^0\gamma)/\Gamma_{total}$ Γ_{13}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<3.3	90	AKHMETSHIN	04B	CMD2	0.6–0.97 $e^+e^- \rightarrow \eta\pi^0\gamma$

$[\Gamma(\eta\gamma)+\Gamma(\eta\pi^0)]/\Gamma(\pi^+\pi^-\pi^0)$ $(\Gamma_5+\Gamma_{16})/\Gamma_1$

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.016	90	[34] FLATTE	66	HBC	1.2 – 1.7 $K^- p \rightarrow \Lambda\pi^+\pi^-$ MM
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.045	95	JACQUET	69B	HLBC	2.05 $\pi^+ p \rightarrow \pi^+ p\omega$

$\Gamma(\text{neutrals})/\Gamma(\text{charged particles})$ $(\Gamma_2+\Gamma_4)/(\Gamma_1+\Gamma_3)$

VALUE	DOCUMENT ID		TECN	COMMENT
0.100±0.008 OUR FIT				
0.124±0.021	FELDMAN	67C	OSPK	1.2 $\pi^- p$

$\Gamma(\pi^0\pi^0\gamma)/\Gamma(\pi^+\pi^-\pi^0)$ Γ_{12}/Γ_1

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.00045	90	DOLINSKY	89	ND	$e^+e^- \rightarrow \pi^0\pi^0\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.08	95	JACQUET	69B	HLBC	2.05 $\pi^+ p \rightarrow \pi^+ p\omega$

$\Gamma(\eta\gamma)/\Gamma(\pi^0\gamma)$ Γ_5/Γ_2

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.0098±0.0024	[35] ALDE	93	GAM2	$38\pi^- p \rightarrow \omega n$
0.0082±0.0033	[36] DOLINSKY	89	ND	$e^+e^- \rightarrow \eta\gamma$
0.010 ±0.045	APEL	72B	OSPK	4–8 $\pi^- p \rightarrow n3\gamma$

$\Gamma(\pi^0\mu^+\mu^-)/\Gamma_{total}$ Γ_7/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
0.96±0.23 OUR FIT				
0.96±0.23	DZHELYADIN	81B	CNTR	25–33 $\pi^- p \rightarrow \omega n$

$\Gamma(\pi^0 e^+e^-)/\Gamma_{total}$ Γ_6/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
5.9±1.9 OUR FIT					
5.9±1.9	43	DOLINSKY	88	ND	$e^+e^- \rightarrow \pi^0 e^+e^-$

$\Gamma(e^+e^-)/\Gamma_{total}$ Γ_8/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.714±0.013 OUR FIT Error includes scale factor of 1.1.					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.700±0.016	11200	[37,38] AKHMETSHIN	04	CMD2	$e^+e^- \to \pi^+\pi^-\pi^0$
0.752±0.004±0.024	1.2M	[37,39] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
0.714±0.036		[37] DOLINSKY	89	ND	$e^+e^- \to \pi^+\pi^-\pi^0$
0.72 ±0.03		[37] BARKOV	87	CMD	$e^+e^- \to \pi^+\pi^-\pi^0$
0.64 ±0.04	1488	[37] KURDADZE	83B	OLYA	$e^+e^- \to \pi^+\pi^-\pi^0$
0.675±0.069	433	[37] CORDIER	80	DM1	$e^+e^- \to \pi^+\pi^-\pi^0$
0.83 ±0.10	451	[37] BENAKSAS	72B	OSPK	$e^+e^- \to \pi^+\pi^-\pi^0$
0.77 ±0.06		[40] AUGUSTIN	69D	OSPK	$e^+e^- \to \pi^+\pi^-\pi^0$
0.65 ±0.13	33	[41] ASTVACAT...	68	OSPK	Assume SU(3)+mixing

$\Gamma(\mu^+\mu^-)/\Gamma_{total}$ Γ_{14}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
9.0±3.1 OUR FIT					
9.0±2.9±1.1	18	HEISTER	02C	ALEP	$Z \to \mu^+\mu^- + X$

$\Gamma(\text{neutrals})/\Gamma_{total}$ $(\Gamma_2+\Gamma_4)/\Gamma$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.091±0.006 OUR FIT					
0.081±0.011 OUR AVERAGE					
0.075±0.025		BIZZARRI	71	HBC	0.0 $p\overline{p}$
0.079±0.019		DEINET	69B	OSPK	1.5 $\pi^- p$
0.084±0.015		BOLLINI	68C	CNTR	2.1 $\pi^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.073±0.018	42	BASILE	72B	CNTR	1.67 $\pi^- p$

$\Gamma(\pi^+\pi^-)/\Gamma_{total}$ Γ_3/Γ

See also $\Gamma(\pi^+\pi^-)/\Gamma(\pi^+\pi^-\pi^0)$.

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
1.70±0.27 OUR FIT Error includes scale factor of 1.4.					
1.57±0.24 OUR AVERAGE Error includes scale factor of 1.2.					
1.30±0.24±0.05	11200	[42] AKHMETSHIN	04	CMD2	$e^+e^- \to \pi^+\pi^-\pi^0$
$2.38^{+1.77}_{-0.90}\pm0.18$	5.4k	[43] ACHASOV	02E	SND	1.1–1.38 $e^+e^- \to \pi^+\pi^-\pi^0$
2.3 ±0.5		BARKOV	85	OLYA	$e^+e^- \to \pi^+\pi^-$
$1.6\ ^{+0.9}_{-0.7}$		QUENZER	78	DM1	$e^+e^- \to \pi^+\pi^-$
3.6 ±1.9		BENAKSAS	72	OSPK	$e^+e^- \to \pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.01±0.29		[44] BENAYOUN	03	RVUE	$e^+e^- \to \pi^+\pi^-$
1.9 ±0.3		[45] GARDNER	99	RVUE	$e^+e^- \to \pi^+\pi^-$
2.3 ±0.4		[46] BENAYOUN	98	RVUE	$e^+e^- \to \pi^+\pi^-, \mu^+\mu^-$
1.0 ±0.11		[47] WICKLUND	78	ASPK	3,4,6 $\pi^\pm N$
1.22±0.30		ALVENSLEB...	71C	CNTR	Photoproduction
$1.3\ ^{+1.2}_{-0.9}$		MOFFEIT	71	HBC	2.8,4.7 γp
$0.80^{+0.28}_{-0.20}$		[48] BIGGS	70B	CNTR	4.2γC $\to \pi^+\pi^-$C

$\Gamma(\pi^+\pi^-)/\Gamma(\pi^0\gamma)$ Γ_3/Γ_2

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.20±0.04	1.98M	[49] ALOISIO	03	KLOE	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$

$\Gamma(\pi^0\pi^0\gamma)/\Gamma(\text{neutrals})$ $\Gamma_{12}/(\Gamma_2+\Gamma_4)$

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.22±0.07		[25] DAKIN	72	OSPK	1.4 $\pi^- p \to n$MM
<0.19	90	DEINET	69B	OSPK	

[25] See $\Gamma(\pi^0\gamma)/\Gamma(\text{neutrals})$.

$\Gamma(\pi^0\gamma)/\Gamma(\text{neutrals})$ $\Gamma_2/(\Gamma_2+\Gamma_4)$

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.78±0.07		[50] DAKIN	72	OSPK	1.4 $\pi^- p \to n$MM
>0.81	90	DEINET	69B	OSPK	

$\Gamma(\eta\gamma)/\Gamma_{\text{total}}$ Γ_5/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
4.9 ±0.5 OUR FIT					
6.3 ±1.3 OUR AVERAGE Error includes scale factor of 1.2.					
6.6 ±1.7		[51] ABELE	97E	CBAR	0.0 $\bar{p}p \to 5\gamma$
8.3 ±2.1		ALDE	93	GAM2	38$\pi^- p \to \omega n$
$3.0\ ^{+2.5}_{-1.8}$		[52] ANDREWS	77	CNTR	6.7–10 γCu
• • • We do not use the following data for averages, fits, limits, etc. • • •					
5.10±0.72±0.34	23k	[53] AKHMETSHIN	01B	CMD2	$e^+e^- \to \eta\gamma$
4.60±0.72±0.19	312	[54,55] ACHASOV	00D	SND	$e^+e^- \to \eta\gamma$
0.7 to 5.5		[56] CASE	00	CBAR	0.0 $p\bar{p} \to \eta\eta\gamma$
$6.56^{+2.41}_{-2.55}$	3525	[52,57] BENAYOUN	96	RVUE	$e^+e^- \to \eta\gamma$
7.3 ±2.9		[52,55] DOLINSKY	89	ND	$e^+e^- \to \eta\gamma$

$\Gamma(\pi^0\mu^+\mu^-)/\Gamma(\mu^+\mu^-)$ Γ_7/Γ_{14}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.2±0.6	30	[58] DZHELYADIN	79	CNTR	25–33 $\pi^- p$

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}$ Γ_1/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.8965±0.0016±0.0048	1.2M	[37,39] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
0.880 ±0.020 ±0.032	11200	[37,59] AKHMETSHIN	00C	CMD2	$e^+e^- \to \pi^+\pi^-\pi^0$
0.8942±0.0062		[37] DOLINSKY	89	ND	$e^+e^- \to \pi^+\pi^-\pi^0$

$\Gamma(3\pi^0)/\Gamma_{total}$ Γ_{17}/Γ

Violates C conservation.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.0003	90	PROKOSHKIN 95	GAM2	38 $\pi^- p \rightarrow 3\pi^0 n$

$\Gamma(3\pi^0)/\Gamma(\pi^+\pi^-\pi^0)$ Γ_{17}/Γ_1

Violates C conservation.

VALUE	CL%	DOCUMENT ID		COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.009	90	BARBERIS	01	450 $pp \rightarrow p_f 3\pi^0 p_s$

$\Gamma(3\gamma)/\Gamma_{total}$ Γ_{15}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.9	95	[60] ABELE		97E CBAR	0.0 $\overline{p}p \rightarrow 5\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<2	90	[60] PROKOSHKIN	95	GAM2	38 $\pi^- p \rightarrow 3\gamma n$

$\Gamma(\pi^0\gamma)/\Gamma_{total}$ Γ_2/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$9.34 \pm 0.15 \pm 0.31$	36500	[29] ACHASOV	03	SND	0.60–0.97 $e^+e^- \rightarrow \pi^0\gamma$
$8.65 \pm 0.16 \pm 0.42$	1.2M	[37,39] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$
8.39 ± 0.24	9975	[61] BENAYOUN	96	RVUE	$e^+e^- \rightarrow \pi^0\gamma$
8.88 ± 0.62	10625	[29] DOLINSKY	89	ND	$e^+e^- \rightarrow \pi^0\gamma$

[26] Significant interference effect observed. NB of $\omega \rightarrow 3\pi$ comes from an extrapolation.
[27] ROOS 70 combines ABRAMOVICH 70 and BIZZARRI 70.
[28] From $\sigma_0^{\omega\pi^0 \rightarrow \pi^0\pi^0\gamma}(m_\phi)/\sigma_0^{\omega\pi^0 \rightarrow \pi^+\pi^-\pi^0\pi^0}(m_\phi)$ with a phase-space correction factor of 1/1.023.
[29] Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\pi^0\gamma)/\Gamma^2_{total}$.
[30] Using ACHASOV 03.
[31] In the model assuming the $\rho \rightarrow \pi^0\pi^0\gamma$ decay via the $\omega\pi$ and $f_0(600)\gamma$ mechanisms.
[32] In the model assuming the $\rho \rightarrow \pi^0\pi^0\gamma$ decay via the $\omega\pi$ mechanism only.
[33] Superseded by ACHASOV 02F.
[34] Restated by us using B($\eta \rightarrow$ charged modes) = 29.2%.
[35] Model independent determination.
[36] Solution corresponding to constructive ω-ρ interference.
[37] Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\pi^+\pi^-\pi^0)/\Gamma^2_{total}$.
[38] Using B($\omega \rightarrow \pi^+\pi^-\pi^0$) = 0.891 ± 0.007. Update of AKHMETSHIN 00C.
[39] Using ACHASOV 03, ACHASOV 03D and B($\omega \rightarrow \pi^+\pi^-$) = (1.70 ± 0.28)%.
[40] Rescaled by us to correspond to ω width 8.4 MeV. Systematic errors underestimated.
[41] Not resolved from ρ decay. Error statistical only.
[42] Update of AKHMETSHIN 02.
[43] From the $m_{\pi^+\pi^-}$ spectrum taking into account the interference of the $\rho\pi$ and $\omega\pi$ amplitudes.
[44] Using the data of AKHMETSHIN 02 in the hidden local symmetry model.
[45] Using the data of BARKOV 85.
[46] Using the data of BARKOV 85 in the hidden local symmetry model.

[47] From a model-dependent analysis assuming complete coherence.
[48] Re-evaluated under $\Gamma(\pi^+\pi^-)/\Gamma(\pi^+\pi^-\pi^0)$ by BEHREND 71 using more accurate $\omega \to \rho$ photoproduction cross-section ratio.
[49] Using the data of ALOISIO 02D.
[50] Error statistical only. Authors obtain good fit also assuming $\pi^0\gamma$ as the only neutral decay.
[51] No flat $\eta\eta\gamma$ background assumed.
[52] Solution corresponding to constructive ω-ρ interference.
[53] Using $B(\omega \to e^+e^-) = (7.07 \pm 0.19) \times 10^{-5}$ and using $B(\eta \to 3\pi^0) = (32.24 \pm 0.29) \times 10^{-2}$. Solution corresponding to constructive ω-ρ interference. The combined fit from 600 to 1380 MeV taking into account $\rho(770)$, $\omega(782)$, $\phi(1020)$, and $\rho(1450)$ (mass and width fixed at 1450 MeV and 310 MeV respectively). Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\eta\gamma)/\Gamma^2_{\text{total}}$.
[54] Using $B(\omega \to e^+e^-) = (7.07 \pm 0.19) \times 10^{-5}$ and $B(\eta \to 3\pi^0) = (32.2 \pm 0.4) \times 10^{-2}$.
[55] Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\eta\gamma)/\Gamma^2_{\text{total}}$.
[56] Depending on the degree of coherence with the flat $\eta\eta\gamma$ background and using $B(\omega \to \pi^0\gamma) = (8.5 \pm 0.5) \times 10^{-2}$.
[57] Reanalysis of DRUZHININ 84, DOLINSKY 89, DOLINSKY 91 taking into account the triangle anomaly contributions.
[58] Superseded by DZHELYADIN 81B result above.
[59] Using $\Gamma(e^+e^-) = 0.60 \pm 0.02$ keV.
[60] From direct 3γ decay search.
[61] Reanalysis of DRUZHININ 84, DOLINSKY 89, DOLINSKY 91 taking into account the triangle anomaly contributions.

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STEVENSON	62	PR 125 687	M.L. Stevenson *et al.*	(LRL)
MAGLICH	61	PRL 7 178	B.C. Maglich *et al.*	(LRL)
PEVSNER	61	PRL 7 421	A. Pevsner *et al.*	(JHU)
XUONG	61	PRL 7 327	H. Nguyen Ngoc, G.R. Lynch	(LRL)