

$\omega(782)$

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

$\omega(782)$ MASS

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
782.65 ± 0.12 OUR AVERAGE		Error includes scale factor of 1.9. See the ideogram below.		
783.20 ± 0.13 ± 0.16	18680	AKHMETSHIN 05	CMD2	0.60-1.38 $e^+e^- \rightarrow \pi^0\gamma$
782.68 ± 0.09 ± 0.04	11200	¹ AKHMETSHIN 04	CMD2	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
782.79 ± 0.08 ± 0.09	1.2M	² ACHASOV 03D	RVUE	0.44-2.00 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$
782.7 ± 0.1 ± 1.5	19500	WURZINGER 95	SPEC	1.33 $pd \rightarrow {}^3\text{He}\omega$
781.96 ± 0.17 ± 0.80	11k	³ AMSLER 94C	CBAR	0.0 $\bar{p}p \rightarrow \omega\eta\pi^0$
782.08 ± 0.36 ± 0.82	3463	⁴ AMSLER 94C	CBAR	0.0 $\bar{p}p \rightarrow \omega\eta\pi^0$
781.96 ± 0.13 ± 0.17	15k	AMSLER 93B	CBAR	0.0 $\bar{p}p \rightarrow \omega\pi^0\pi^0$
782.4 ± 0.2	270k	WEIDENAUER 93	ASTE	$\bar{p}p \rightarrow 2\pi^+2\pi^-\pi^0$
782.2 ± 0.4	1488	KURDADZE 83B	OLYA	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
782.4 ± 0.5	7000	⁵ KEYNE 76	CNTR	$\pi^-p \rightarrow \omega n$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
781.78 ± 0.10		⁶ BARKOV 87	CMD	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
783.3 ± 0.4	433	CORDIER 80	DM1	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
782.5 ± 0.8	33260	ROOS 80	RVUE	0.0-3.6 $\bar{p}p$
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 $\bar{p}p \rightarrow 5\pi$
782.7 ± 0.9	535	VANAPEL... 78	HBC	7.2 $\bar{p}p \rightarrow \bar{p}p\omega$
783.5 ± 0.8	2100	GESSAROLI 77	HBC	11 $\pi^-p \rightarrow \omega n$
782.5 ± 0.8	418	AGUILAR-... 72B	HBC	3.9,4.6 K^-p
783.4 ± 1.0	248	BIZZARRI 71	HBC	0.0 $p\bar{p} \rightarrow K^+K^-\omega$
781.0 ± 0.6	510	BIZZARRI 71	HBC	0.0 $p\bar{p} \rightarrow K_1^+K_1^-\omega$
783.7 ± 1.0	3583	⁷ COYNE 71	HBC	3.7 $\pi^+p \rightarrow p\pi^+\pi^+\pi^-\pi^0$
784.1 ± 1.2	750	ABRAMOVI... 70	HBC	3.9 π^-p
783.2 ± 1.6		⁸ BIGGS 70B	CNTR	<4.1 $\gamma C \rightarrow \pi^+\pi^-C$
782.4 ± 0.5	2400	BIZZARRI 69	HBC	0.0 $\bar{p}p$

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 $\eta \rightarrow \gamma\gamma$ decay.

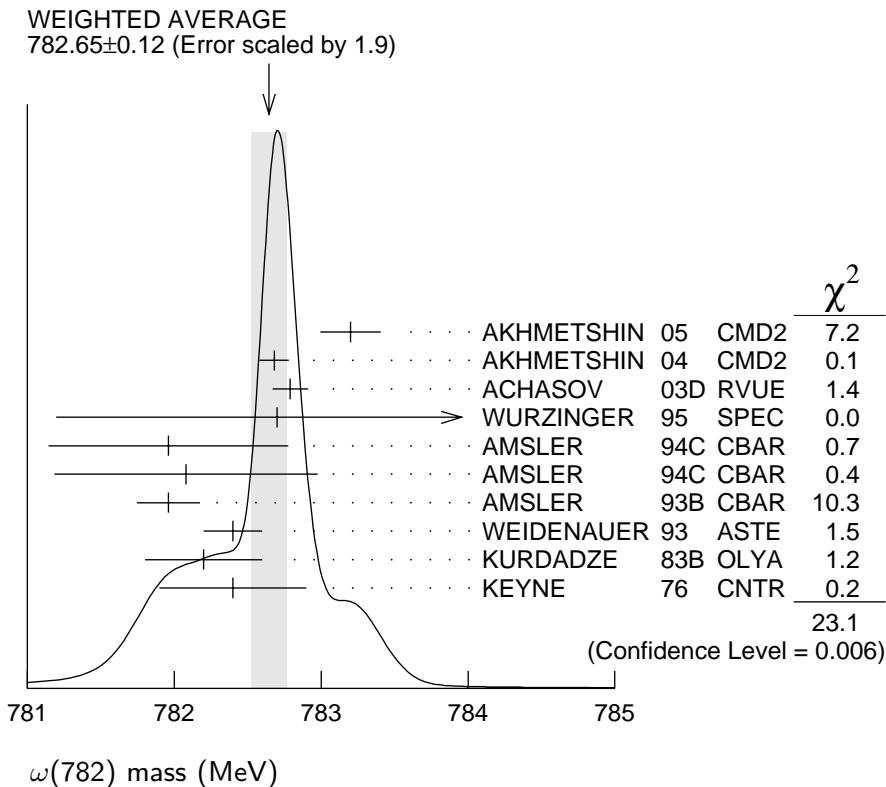
⁴ From the $\eta \rightarrow 3\pi^0$ decay.

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.



$\omega(782)$ 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	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
8.68±0.04±0.15	1.2M	¹⁰ ACHASOV 03D	RVUE	0.44–2.00 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$
8.2 ±0.3	19500	WURZINGER 95	SPEC	1.33 $pd \rightarrow {}^3\text{He}\omega$
8.4 ±0.1		¹¹ AULCHENKO 87	ND	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
8.30±0.40		BARKOV 87	CMD	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
9.8 ±0.9	1488	KURDADZE 83B	OLYA	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
9.0 ±0.8	433	CORDIER 80	DM1	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
9.1 ±0.8	451	BENAKSAS 72B	OSPK	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
12 ±2	1430	COOPER 78B	HBC	0.7–0.8 $\bar{p}p \rightarrow 5\pi$
9.4 ±2.5	2100	GESSAROLI 77	HBC	11 $\pi^-p \rightarrow \omega n$
10.22±0.43	20000	¹² KEYNE 76	CNTR	$\pi^-p \rightarrow \omega n$
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 $\pi^-p \rightarrow nMM$
10.3 ±1.4	510	BIZZARRI 71	HBC	0.0 $p\bar{p} \rightarrow K_1^-K_1^-\omega$
12.8 ±3.0	248	BIZZARRI 71	HBC	0.0 $p\bar{p} \rightarrow K^+K^-\omega$
9.5 ±1.0	3583	COYNE 71	HBC	3.7 $\pi^+p \rightarrow p\pi^+\pi^+\pi^-\pi^0$

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 $\pi^0\gamma$	(8.90 ^{+0.27} _{-0.23}) %	S=1.1
Γ_3 $\pi^+\pi^-$	(1.70 \pm 0.27) %	S=1.4
Γ_4 neutrals (excluding $\pi^0\gamma$)	(1.6 ^{+7.4} _{-1.1}) $\times 10^{-3}$	
Γ_5 $\eta\gamma$	(4.9 \pm 0.5) $\times 10^{-4}$	
Γ_6 $\pi^0e^+e^-$	(7.7 \pm 0.9) $\times 10^{-4}$	S=1.1
Γ_7 $\pi^0\mu^+\mu^-$	(9.6 \pm 2.3) $\times 10^{-5}$	
Γ_8 ηe^+e^-		
Γ_9 e^+e^-	(7.18 \pm 0.12) $\times 10^{-5}$	S=1.1
Γ_{10} $\pi^+\pi^-\pi^0\pi^0$	< 2 %	CL=90%
Γ_{11} $\pi^+\pi^-\gamma$	< 3.6 $\times 10^{-3}$	CL=95%
Γ_{12} $\pi^+\pi^-\pi^+\pi^-$	< 1 $\times 10^{-3}$	CL=90%
Γ_{13} $\pi^0\pi^0\gamma$	(6.7 \pm 1.1) $\times 10^{-5}$	
Γ_{14} $\eta\pi^0\gamma$	< 3.3 $\times 10^{-5}$	CL=90%
Γ_{15} $\mu^+\mu^-$	(9.0 \pm 3.1) $\times 10^{-5}$	
Γ_{16} 3γ	< 1.9 $\times 10^{-4}$	CL=95%
Charge conjugation (C) violating modes		
Γ_{17} $\eta\pi^0$	C < 1 $\times 10^{-3}$	CL=90%
Γ_{18} $3\pi^0$	C < 3 $\times 10^{-4}$	CL=90%

CONSTRAINED FIT INFORMATION

An overall fit to 15 branching ratios uses 47 measurements and one constraint to determine 10 parameters. The overall fit has a $\chi^2 = 33.3$ for 38 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\langle \delta x_i \delta x_j \rangle / (\delta x_i \delta x_j)$, 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	28								
x_3	-36	-10							
x_4	-89	-55	1						
x_5	6	8	-2	-8					
x_6	-1	0	0	0	0				
x_7	0	0	0	0	0	0			
x_9	-44	-53	16	53	-15	1	0		
x_{13}	1	3	0	-2	0	0	0	-2	
x_{15}	0	0	0	0	0	0	0	0	0
	x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_9	x_{13}

$\omega(782)$ PARTIAL WIDTHS

$\Gamma(e^+e^-)$

Γ_9

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
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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	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
0.653 ± 0.003 ± 0.021	1.2M	¹⁵ ACHASOV 03D	RVUE	0.44–2.00 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$
0.600 ± 0.031	10625	DOLINSKY 89	ND	$e^+e^- \rightarrow \pi^0\gamma$

¹³ Using $B(\omega \rightarrow \pi^+\pi^-\pi^0) = 0.891 \pm 0.007$ and $\Gamma_{\text{total}} = 8.44 \pm 0.09$ MeV.

¹⁴ Update of AKHMETSHIN 00c.

¹⁵ Using ACHASOV 03, ACHASOV 03D and $B(\omega \rightarrow \pi^+\pi^-) = (1.70 \pm 0.28)\%$.

$\Gamma(\pi^0\gamma)$

Γ_2

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

788 ± 12 ± 27	36500	¹⁶ ACHASOV 03	SND	0.60–0.97 $e^+e^- \rightarrow \pi^0\gamma$
764 ± 51	10625	DOLINSKY 89	ND	$e^+e^- \rightarrow \pi^0\gamma$

¹⁶ Using $\Gamma_{\omega} = 8.44 \pm 0.09$ MeV and $B(\omega \rightarrow \pi^0\gamma)$ 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 $e^+e^- \rightarrow \eta\gamma$

¹⁷ Using $\Gamma_\omega = 8.4 \pm 0.1$ MeV and $B(\omega \rightarrow \eta\gamma)$ from DOLINSKY 89.

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

$\Gamma(e^+e^-) \times \Gamma(\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}^2$ $\Gamma_9\Gamma_1/\Gamma^2$

VALUE (units 10^{-5}) EVTS DOCUMENT ID TECN COMMENT

6.39 \pm 0.10 OUR FIT Error includes scale factor of 1.1.

6.38 \pm 0.10 OUR AVERAGE Error includes scale factor of 1.1.

$6.24 \pm 0.11 \pm 0.08$ 11200 ¹⁸ AKHMETSHIN 04 CMD2 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$

$6.70 \pm 0.06 \pm 0.27$ AUBERT,B 04N BABR $10.6 e^+e^- \rightarrow \pi^+\pi^-\pi^0\gamma$

$6.74 \pm 0.04 \pm 0.24$ 1.2M ^{19,20} ACHASOV 03D RVUE $0.44\text{--}2.00 e^+e^- \rightarrow \pi^+\pi^-\pi^0$

6.37 ± 0.35 ¹⁹ DOLINSKY 89 ND $e^+e^- \rightarrow \pi^+\pi^-\pi^0$

6.45 ± 0.24 ¹⁹ BARKOV 87 CMD $e^+e^- \rightarrow \pi^+\pi^-\pi^0$

5.79 ± 0.42 1488 ¹⁹ KURDADZE 83B OLYA $e^+e^- \rightarrow \pi^+\pi^-\pi^0$

5.89 ± 0.54 433 ¹⁹ CORDIER 80 DM1 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$

7.54 ± 0.84 451 ¹⁹ BENAJSAS 72B OSPK $e^+e^- \rightarrow \pi^+\pi^-\pi^0$

$\Gamma(e^+e^-) \times \Gamma(\pi^0\gamma)/\Gamma_{\text{total}}^2$ $\Gamma_9\Gamma_2/\Gamma^2$

VALUE (units 10^{-6}) EVTS DOCUMENT ID TECN COMMENT

6.39 $^{+0.16}_{-0.14}$ OUR FIT

6.45 \pm 0.17 OUR AVERAGE

$6.47 \pm 0.14 \pm 0.39$ 18680 AKHMETSHIN 05 CMD2 $0.60\text{--}1.38 e^+e^- \rightarrow \pi^0\gamma$

$6.50 \pm 0.11 \pm 0.20$ 36500 ²¹ ACHASOV 03 SND $0.60\text{--}0.97 e^+e^- \rightarrow \pi^0\gamma$

$6.34 \pm 0.21 \pm 0.21$ 10625 ¹⁹ DOLINSKY 89 ND $e^+e^- \rightarrow \pi^0\gamma$

$\Gamma(e^+e^-) \times \Gamma(\eta\gamma)/\Gamma_{\text{total}}^2$ $\Gamma_9\Gamma_5/\Gamma^2$

VALUE (units 10^{-8}) EVTS DOCUMENT ID TECN COMMENT

3.51 \pm 0.35 OUR FIT

3.3 \pm 0.4 OUR AVERAGE

$3.17^{+1.85}_{-1.31} \pm 0.21$ 17400 ²² AKHMETSHIN 05 CMD2 $0.60\text{--}1.38 e^+e^- \rightarrow \eta\gamma$

$3.41 \pm 0.52 \pm 0.21$ 23k ^{23,24} AKHMETSHIN 01B CMD2 $e^+e^- \rightarrow \eta\gamma$

$3.25 \pm 0.51 \pm 0.10$ 312 ²⁵ ACHASOV 00D SND $e^+e^- \rightarrow \eta\gamma$

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

²² From the $\eta \rightarrow 2\gamma$ decay and using $B(\eta \rightarrow \gamma\gamma) = 39.43 \pm 0.26\%$.

²³ From the $\eta \rightarrow 3\pi^0$ decay and using $B(\eta \rightarrow 3\pi^0) = (32.24 \pm 0.29) \times 10^{-2}$.

²⁴ 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).

²⁵ From the $\eta \rightarrow 3\pi^0$ decay and using $B(\eta \rightarrow 3\pi^0) = (32.2 \pm 0.4) \times 10^{-2}$.

$\omega(782)$ BRANCHING RATIOS

$\Gamma(\text{neutrals})/\Gamma(\pi^+\pi^-\pi^0)$ $(\Gamma_2+\Gamma_4)/\Gamma_1$

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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 $\bar{p} p$
0.134 ± 0.026	850	DIGIUGNO	66B CNTR	1.4 $\pi^- p$
0.097 ± 0.016	348	FLATTE	66 HBC	1.4 – 1.7 $K^- p \rightarrow \Lambda MM$

0.06 ^{+0.05} _{-0.02}		JAMES	66 HBC	2.1 $\pi^+ p$
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0.08 ± 0.03	35	KRAEMER	64 DBC	1.2 $\pi^+ d$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.11 ± 0.02	20	BUSCHBECK	63 HBC	1.5 $K^- p$
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$\Gamma(\pi^+\pi^-)/\Gamma(\pi^+\pi^-\pi^0)$ Γ_3/Γ_1

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

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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}	27	RATCLIFF	72 ASPK	15 $\pi^- p \rightarrow n2\pi$
0.028 ± 0.006		BEHREND	71 ASPK	Photoproduction
0.022 ^{+0.009} _{-0.01}	28	ROOS	70 RVUE	

$\Gamma(\pi^0\gamma)/\Gamma(\pi^+\pi^-\pi^0)$ Γ_2/Γ_1

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.0999^{+0.0029}_{-0.0025} OUR FIT Error includes scale factor of 1.1.				

0.097 ± 0.005 OUR AVERAGE

0.0994 ± 0.0036 ± 0.0038	29	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	^{30,31} ACHASOV	03D RVUE	0.44–2.00 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$
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0.099 ± 0.007	30	DOLINSKY	89 ND	$e^+e^- \rightarrow \pi^0\gamma$
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$\Gamma(\pi^+\pi^-\gamma)/\Gamma(\pi^+\pi^-\pi^0)$ Γ_{11}/Γ_1

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_{11}/Γ

VALUE CL% DOCUMENT ID TECN COMMENT

<0.0036 95 WEIDENAUER 90 ASTE $p\bar{p} \rightarrow \pi^+\pi^-\pi^+\pi^-\gamma$

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

<0.004	95	BITYUKOV	88B SPEC	32 $\pi^- p \rightarrow \pi^+\pi^-\gamma X$
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$\Gamma(\pi^+\pi^-\pi^+\pi^-)/\Gamma_{total}$ Γ_{12}/Γ

VALUE CL% DOCUMENT ID TECN COMMENT

<1 × 10 ⁻³	90	KURDADZE	88 OLYA	$e^+e^- \rightarrow \pi^+\pi^-\pi^+\pi^-$
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$\Gamma(\pi^+\pi^-\pi^0\pi^0)/\Gamma_{total}$ Γ_{10}/Γ

VALUE (units 10⁻²) CL% DOCUMENT ID TECN COMMENT

<2	90	KURDADZE	86 OLYA	$e^+e^- \rightarrow \pi^+\pi^-\pi^0\pi^0$
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$\Gamma(\mu^+\mu^-)/\Gamma(\pi^+\pi^-\pi^0)$ Γ_{15}/Γ_1

VALUE (units 10⁻³) CL% DOCUMENT ID TECN COMMENT

<0.2	90	WILSON	69 OSPK	12 $\pi^- C \rightarrow Fe$
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••• We do not use the following data for averages, fits, limits, etc. •••

<1.7	74	FLATTE	66 HBC	1.2 – 1.7 $K^- p \rightarrow \Lambda \mu^+ \mu^-$
<1.2		BARBARO-...	65 HBC	2.7 $K^- p$

$\Gamma(\pi^0\pi^0\gamma)/\Gamma_{total}$ Γ_{13}/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} ± 0.8	190	32 AKHMETSHIN 04B	CMD2	0.6–0.97 $e^+e^- \rightarrow \pi^0\pi^0\gamma$
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6.6 ^{+1.4} _{-1.3} ± 0.6	295	ACHASOV	02F SND	0.36–0.97 $e^+e^- \rightarrow \pi^0\pi^0\gamma$
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••• We do not use the following data for averages, fits, limits, etc. •••

11.8 ^{+2.1} _{-1.9} ± 1.4	190	33 AKHMETSHIN 04B	CMD2	0.6–0.97 $e^+e^- \rightarrow \pi^0\pi^0\gamma$
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7.8 ± 2.7 ± 2.0	63	32,34 ACHASOV	00G SND	$e^+e^- \rightarrow \pi^0\pi^0\gamma$
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12.7 ± 2.3 ± 2.5	63	33,34 ACHASOV	00G SND	$e^+e^- \rightarrow \pi^0\pi^0\gamma$
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$\Gamma(\pi^0\pi^0\gamma)/\Gamma(\pi^0\gamma)$			Γ_{13}/Γ_2		
VALUE	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
(7.6 ± 1.3) × 10⁻⁴ OUR FIT					
0.00085 ± 0.00029		40 ± 14	ALDE	94B GAM2	38π ⁻ p → π ⁰ π ⁰ γ n

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

< 0.005	90	DOLINSKY	89	ND	e ⁺ e ⁻ → π ⁰ π ⁰ γ
< 0.18	95	KEYNE	76	CNTR	π ⁻ p → ω n
< 0.15	90	BENAKSAS	72C	OSPK	e ⁺ e ⁻
< 0.14		BALDIN	71	HLBC	2.9 π ⁺ p
< 0.1	90	BARMIN	64	HLBC	1.3–2.8 π ⁻ p

$\Gamma(\eta\pi^0)/\Gamma_{\text{total}}$			Γ_{17}/Γ		
Violates C conservation.					
VALUE	CL%	DOCUMENT ID	TECN	COMMENT	
< 0.001	90	ALDE	94B GAM2	38π ⁻ p → ηπ ⁰ n	

$\Gamma(\eta\pi^0\gamma)/\Gamma_{\text{total}}$			Γ_{14}/Γ		
VALUE (units 10 ⁻⁵)	CL%	DOCUMENT ID	TECN	COMMENT	
< 3.3	90	AKHMETSHIN 04B	CMD2	0.6–0.97 e ⁺ e ⁻ → ηπ ⁰ γ	

$[\Gamma(\eta\gamma) + \Gamma(\eta\pi^0)]/\Gamma(\pi^+\pi^-\pi^0)$			$(\Gamma_5 + \Gamma_{17})/\Gamma_1$		
VALUE	CL%	DOCUMENT ID	TECN	COMMENT	
< 0.016	90	³⁵ FLATTE	66	HBC	1.2 – 1.7 K ⁻ p → Λπ ⁺ π ⁻ MM

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

< 0.045	95	JACQUET	69B	HLBC	2.05 π ⁺ p → π ⁺ p ω
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$\Gamma(\text{neutrals})/\Gamma(\text{charged particles})$			$(\Gamma_2 + \Gamma_4)/(\Gamma_1 + \Gamma_3)$		
VALUE	DOCUMENT ID	TECN	COMMENT		
0.100 ± 0.008 OUR FIT					
0.124 ± 0.021	FELDMAN	67C	OSPK	1.2 π ⁻ p	

$\Gamma(\pi^0\pi^0\gamma)/\Gamma(\pi^+\pi^-\pi^0)$			Γ_{13}/Γ_1		
VALUE	CL%	DOCUMENT ID	TECN	COMMENT	
< 0.00045	90	DOLINSKY	89	ND	e ⁺ e ⁻ → π ⁰ π ⁰ γ

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

< 0.08	95	JACQUET	69B	HLBC	2.05 π ⁺ p → π ⁺ p ω
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$\Gamma(\eta\gamma)/\Gamma(\pi^0\gamma)$			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	³⁶ ALDE	93	GAM2	38π ⁻ p → ω n	
0.0082 ± 0.0033	³⁷ DOLINSKY	89	ND	e ⁺ e ⁻ → ηγ	
0.010 ± 0.045	APEL	72B	OSPK	4–8 π ⁻ p → n3γ	

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

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

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

<u>VALUE (units 10^{-4})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
7.7 ± 0.9 OUR FIT				Error includes scale factor of 1.1.
7.7 ± 0.9 OUR AVERAGE				Error includes scale factor of 1.1.
8.19 ± 0.71 ± 0.62		AKHMETSHIN 05A	CMD2	0.72-0.84 $e^+ e^-$
5.9 ± 1.9	43	DOLINSKY 88	ND	$e^+ e^- \rightarrow \pi^0 e^+ e^-$

$\Gamma(\eta e^+ e^-)/\Gamma_{\text{total}}$ **Γ_8/Γ**

<u>VALUE (units 10^{-5})</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •			
<1.1	AKHMETSHIN 05A	CMD2	0.72-0.84 $e^+ e^-$

$\Gamma(e^+ e^-)/\Gamma_{\text{total}}$ **Γ_9/Γ**

<u>VALUE (units 10^{-4})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.718 ± 0.012 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	38,39 AKHMETSHIN 04	CMD2	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
0.752 ± 0.004 ± 0.024	1.2M	38,40 ACHASOV 03D	RVUE	0.44-2.00 $e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
0.714 ± 0.036		38 DOLINSKY 89	ND	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
0.72 ± 0.03		38 BARKOV 87	CMD	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
0.64 ± 0.04	1488	38 KURDADZE 83B	OLYA	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
0.675 ± 0.069	433	38 CORDIER 80	DM1	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
0.83 ± 0.10	451	38 BENAKSAS 72B	OSPK	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
0.77 ± 0.06		41 AUGUSTIN 69D	OSPK	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
0.65 ± 0.13	33	42 ASTVACAT... 68	OSPK	Assume SU(3)+mixing

$\Gamma(\mu^+ \mu^-)/\Gamma_{\text{total}}$ **Γ_{15}/Γ**

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

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

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.091 ± 0.006 OUR FIT				
0.081 ± 0.011 OUR AVERAGE				
0.075 ± 0.025		BIZZARRI 71	HBC	0.0 $p \bar{p}$
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 $\pi^- p$

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

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

Γ_3/Γ

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	⁴³ AKHMETSHIN 04	CMD2	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
2.38 ^{+1.77} _{-0.90} ±0.18	5.4k	⁴⁴ ACHASOV	02E SND	1.1-1.38 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$
2.3 ±0.5		BARKOV	85 OLYA	$e^+e^- \rightarrow \pi^+\pi^-$
1.6 ^{+0.9} _{-0.7}		QUENZER	78 DM1	$e^+e^- \rightarrow \pi^+\pi^-$
3.6 ±1.9		BENAKSAS	72 OSPK	$e^+e^- \rightarrow \pi^+\pi^-$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
2.01±0.29		⁴⁵ BENAYOUN	03 RVUE	$e^+e^- \rightarrow \pi^+\pi^-$
1.9 ±0.3		⁴⁶ GARDNER	99 RVUE	$e^+e^- \rightarrow \pi^+\pi^-$
2.3 ±0.4		⁴⁷ BENAYOUN	98 RVUE	$e^+e^- \rightarrow \pi^+\pi^-$, $\mu^+\mu^-$
1.0 ±0.11		⁴⁸ 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}		⁴⁹ BIGGS	70B CNTR	4.2 $\gamma C \rightarrow \pi^+\pi^- C$

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

Γ_3/Γ_2

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.20±0.04	1.98M	⁵⁰ ALOISIO	03 KLOE	1.02 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$

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

$\Gamma_{13}/(\Gamma_2+\Gamma_4)$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
0.22±0.07		²⁶ DAKIN	72 OSPK	1.4 $\pi^- p \rightarrow nMM$
<0.19	90	DEINET	69B OSPK	
²⁶ 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		⁵¹ DAKIN	72 OSPK	1.4 $\pi^- p \rightarrow nMM$
>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		⁵² ABELE	97E CBAR	0.0 $\bar{p}p \rightarrow 5\gamma$
8.3 ±2.1		ALDE	93 GAM2	38 $\pi^- p \rightarrow \omega n$
3.0 ^{+2.5} _{-1.8}		⁵³ ANDREWS	77 CNTR	6.7-10 γCu

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

$4.44^{+2.59}_{-1.83} \pm 0.28$	17400	^{54,55}	AKHMETSHIN 05	CMD2	0.60-1.38	$e^+ e^- \rightarrow \eta \gamma$
$5.10 \pm 0.72 \pm 0.34$	23k	⁵⁶	AKHMETSHIN 01B	CMD2		$e^+ e^- \rightarrow \eta \gamma$
$4.60 \pm 0.72 \pm 0.19$	312	^{54,57}	ACHASOV	00D	SND	$e^+ e^- \rightarrow \eta \gamma$
0.7 to 5.5		⁵⁸	CASE	00	CBAR	$0.0 p \bar{p} \rightarrow \eta \eta \gamma$
$6.56^{+2.41}_{-2.55}$	3525	^{53,59}	BENAYOUN	96	RVUE	$e^+ e^- \rightarrow \eta \gamma$
7.3 ± 2.9		^{53,54}	DOLINSKY	89	ND	$e^+ e^- \rightarrow \eta \gamma$

$\Gamma(\pi^0 \mu^+ \mu^-) / \Gamma(\mu^+ \mu^-)$ Γ_7 / Γ_{15}

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

1.2 ± 0.6	30	⁶⁰	DZHELYADIN 79	CNTR	25-33	$\pi^- p$
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$\Gamma(\pi^+ \pi^- \pi^0) / \Gamma_{\text{total}}$ Γ_1 / Γ

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.8965 \pm 0.0016 \pm 0.0048$	1.2M	^{38,40}	ACHASOV	03D	RVUE	$0.44-2.00 e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
$0.880 \pm 0.020 \pm 0.032$	11200	^{38,61}	AKHMETSHIN 00C	CMD2		$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
0.8942 ± 0.0062		³⁸	DOLINSKY	89	ND	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$

$\Gamma(3\pi^0) / \Gamma_{\text{total}}$ Γ_{18} / Γ

Violates C conservation.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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<0.0003	90		PROKOSHKIN 95	GAM2	$38 \pi^- p \rightarrow 3\pi^0 n$
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$\Gamma(3\pi^0) / \Gamma(\pi^+ \pi^- \pi^0)$ Γ_{18} / Γ_1

Violates C conservation.

VALUE	CL%	DOCUMENT ID	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

<0.009	90		BARBERIS 01	450	$p p \rightarrow p_f 3\pi^0 p_s$
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$\Gamma(3\gamma) / \Gamma_{\text{total}}$ Γ_{16} / Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT
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<1.9	95	⁶²	ABELE 97E	CBAR	$0.0 \bar{p} p \rightarrow 5\gamma$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

<2	90	⁶²	PROKOSHKIN 95	GAM2	$38 \pi^- p \rightarrow 3\gamma n$
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$\Gamma(\pi^0 \gamma) / \Gamma_{\text{total}}$ Γ_2 / Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

$9.06 \pm 0.20 \pm 0.57$	18680	^{30,63}	AKHMETSHIN 05	CMD2	0.60-1.38	$e^+ e^- \rightarrow \pi^0 \gamma$
$9.34 \pm 0.15 \pm 0.31$	36500	³⁰	ACHASOV	03	SND	$0.60-0.97 e^+ e^- \rightarrow \pi^0 \gamma$
$8.65 \pm 0.16 \pm 0.42$	1.2M	^{38,40}	ACHASOV	03D	RVUE	$0.44-2.00 e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
8.39 ± 0.24	9975	⁶⁴	BENAYOUN	96	RVUE	$e^+ e^- \rightarrow \pi^0 \gamma$
8.88 ± 0.62	10625	³⁰	DOLINSKY	89	ND	$e^+ e^- \rightarrow \pi^0 \gamma$

- 27 Significant interference effect observed. NB of $\omega \rightarrow 3\pi$ comes from an extrapolation.
- 28 ROOS 70 combines ABRAMOVICH 70 and BIZZARRI 70.
- 29 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.
- 30 Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\pi^0\gamma)/\Gamma_{\text{total}}^2$.
- 31 Using ACHASOV 03.
- 32 In the model assuming the $\rho \rightarrow \pi^0\pi^0\gamma$ decay via the $\omega\pi$ and $f_0(600)\gamma$ mechanisms.
- 33 In the model assuming the $\rho \rightarrow \pi^0\pi^0\gamma$ decay via the $\omega\pi$ mechanism only.
- 34 Superseded by ACHASOV 02F.
- 35 Restated by us using $B(\eta \rightarrow \text{charged modes}) = 29.2\%$.
- 36 Model independent determination.
- 37 Solution corresponding to constructive ω - ρ interference.
- 38 Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}^2$.
- 39 Using $B(\omega \rightarrow \pi^+\pi^-\pi^0) = 0.891 \pm 0.007$. Update of AKHMETSHIN 00C.
- 40 Using ACHASOV 03, ACHASOV 03D and $B(\omega \rightarrow \pi^+\pi^-) = (1.70 \pm 0.28)\%$.
- 41 Rescaled by us to correspond to ω width 8.4 MeV. Systematic errors underestimated.
- 42 Not resolved from ρ decay. Error statistical only.
- 43 Update of AKHMETSHIN 02.
- 44 From the $m_{\pi^+\pi^-}$ spectrum taking into account the interference of the $\rho\pi$ and $\omega\pi$ amplitudes.
- 45 Using the data of AKHMETSHIN 02 in the hidden local symmetry model.
- 46 Using the data of BARKOV 85.
- 47 Using the data of BARKOV 85 in the hidden local symmetry model.
- 48 From a model-dependent analysis assuming complete coherence.
- 49 Re-evaluated under $\Gamma(\pi^+\pi^-)/\Gamma(\pi^+\pi^-\pi^0)$ by BEHREND 71 using more accurate $\omega \rightarrow \rho$ photoproduction cross-section ratio.
- 50 Using the data of ALOISIO 02D.
- 51 Error statistical only. Authors obtain good fit also assuming $\pi^0\gamma$ as the only neutral decay.
- 52 No flat $\eta\eta\gamma$ background assumed.
- 53 Solution corresponding to constructive ω - ρ interference.
- 54 Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\eta\gamma)/\Gamma_{\text{total}}^2$.
- 55 Using $B(\omega \rightarrow e^+e^-) = (7.14 \pm 0.13) \times 10^{-5}$ and $B(\eta \rightarrow \gamma\gamma) = 39.43 \pm 0.26\%$.
- 56 Using $B(\omega \rightarrow e^+e^-) = (7.07 \pm 0.19) \times 10^{-5}$ and using $B(\eta \rightarrow 3\pi^0) = (32.24 \pm 0.29) \times 10^{-2}$. 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 $\Gamma(e^+e^-) \times \Gamma(\eta\gamma)/\Gamma_{\text{total}}^2$.
- 57 Using $B(\omega \rightarrow e^+e^-) = (7.07 \pm 0.19) \times 10^{-5}$ and $B(\eta \rightarrow 3\pi^0) = (32.2 \pm 0.4) \times 10^{-2}$.
- 58 Depending on the degree of coherence with the flat $\eta\eta\gamma$ background and using $B(\omega \rightarrow \pi^0\gamma) = (8.5 \pm 0.5) \times 10^{-2}$.
- 59 Reanalysis of DRUZHININ 84, DOLINSKY 89, DOLINSKY 91 taking into account the triangle anomaly contributions.
- 60 Superseded by DZHELYADIN 81B result above.
- 61 Using $\Gamma(e^+e^-) = 0.60 \pm 0.02$ keV.
- 62 From direct 3γ decay search.
- 63 Using $B(\omega \rightarrow e^+e^-) = (7.14 \pm 0.13) \times 10^{-5}$.
- 64 Reanalysis of DRUZHININ 84, DOLINSKY 89, DOLINSKY 91 taking into account the triangle anomaly contributions.

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BROWN	72	PL 42B 117	R.M. Brown <i>et al.</i>	(ILL, ILLC)
DAKIN	72	PR D6 2321	J.T. Dakin <i>et al.</i>	(PRIN)
RATCLIFF	72	PL 38B 345	B.N. Ratcliff <i>et al.</i>	(SLAC)
ALVENSLEB...	71C	PRL 27 888	H. Alvensleben <i>et al.</i>	(DESY)
BALDIN	71	SJNP 13 758	A.B. Baldin <i>et al.</i>	(ITEP)
		Translated from YAF 13 1318.		
BEHREND	71	PRL 27 61	H.J. Behrend <i>et al.</i>	(ROCH, CORN, FNAL)
BIZZARRI	71	NP B27 140	R. Bizzarri <i>et al.</i>	(CERN, CDEF)
COYNE	71	NP B32 333	D.G. Coyne <i>et al.</i>	(LRL)
MOFFEIT	71	NP B29 349	K.C. Moffeit <i>et al.</i>	(LRL, UCB, SLAC+)
ABRAMOVI...	70	NP B20 209	M. Abramovich <i>et al.</i>	(CERN)
BIGGS	70B	PRL 24 1201	P.J. Biggs <i>et al.</i>	(DARE)
BIZZARRI	70	PRL 25 1385	R. Bizzarri <i>et al.</i>	(ROMA, SYRA)
ROOS	70	DNPL/R7 173	M. Roos	(CERN)
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AUGUSTIN	69D	PL 28B 513	J.E. Augustin <i>et al.</i>	(ORSAY)
BIZZARRI	69	NP B14 169	R. Bizzarri <i>et al.</i>	(CERN, CDEF)
DEINET	69B	PL 30B 426	W. Deinet <i>et al.</i>	(KARL, CERN)
JACQUET	69B	NC 63A 743	F. Jacquet <i>et al.</i>	(EPOL, BERG)
WILSON	69	Private Comm.	R. Wilson	(HARV)
Also	69	PR 178 2095	A.A. Wehmann <i>et al.</i>	(HARV, CASE, SLAC+)
ASTVACAT...	68	PL 27B 45	R.G. Astvatsaturov <i>et al.</i>	(JINR, MOSU)
BOLLINI	68C	NC 56A 531	D. Bollini <i>et al.</i>	(CERN, BGNA, STRB)
BARASH	67B	PR 156 1399	N. Barash <i>et al.</i>	(COLU)
FELDMAN	67C	PR 159 1219	M. Feldman <i>et al.</i>	(PENN)
DIGIUGNO	66B	NC 44A 1272	G. Di Giugno <i>et al.</i>	(NAPL, FRAS, TRST)
FLATTE	66	PR 145 1050	S.M. Flatte <i>et al.</i>	(LRL)
JAMES	66	PR 142 896	F.E. James, H.L. Kraybill	(YALE, BNL)
BARBARO-...	65	PRL 14 279	A. Barbaro-Galtieri, R.D. Tripp	(LRL)
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		Translated from ZETF 45 1879.		
KRAEMER	64	PR 136B 496	R.W. Kraemer <i>et al.</i>	(JHU, NWES, WOOD)
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GARDNER	98	PR D57 2716	S. Gardner, H.B. O'Connell	
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		Translated from ZETFP 37 613.		
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