

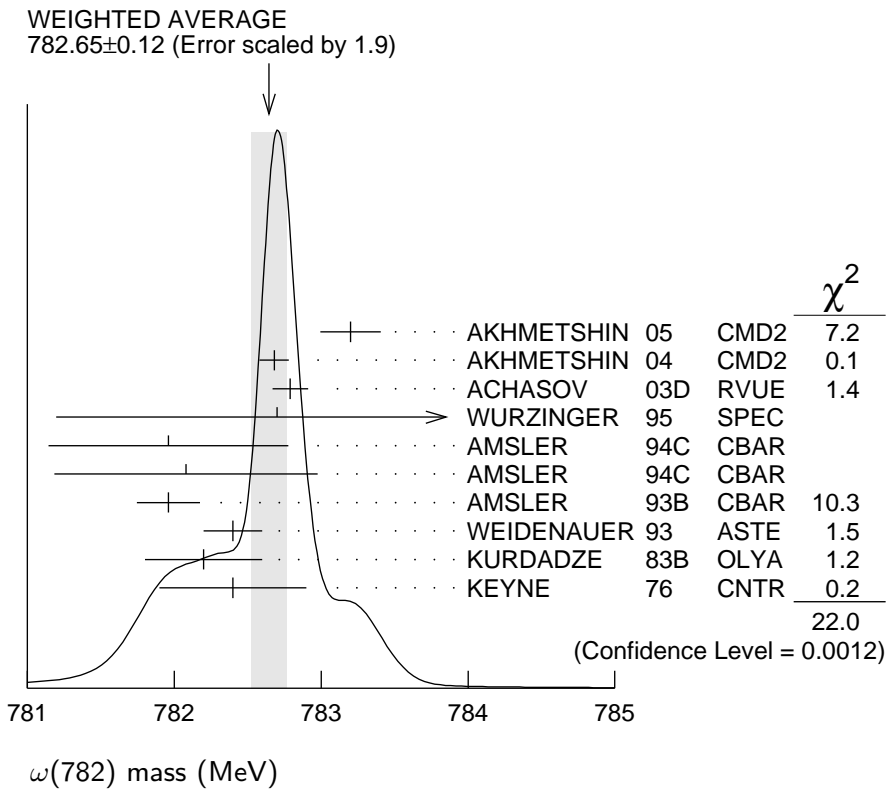
$\omega(782)$

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

 $\omega(782)$ 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 - p 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 $p d \rightarrow {}^3\text{He} \omega$
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 $\pi^+\pi^-\pi^0$	(89.2 ± 0.7) %	
Γ_2 $\pi^0\gamma$	(8.28 ± 0.28) %	S=2.1
Γ_3 $\pi^+\pi^-$	(1.53 ^{+0.11} _{-0.13}) %	S=1.2
Γ_4 neutrals (excluding $\pi^0\gamma$)	(8 ⁺⁸ ₋₅) × 10 ⁻³	S=1.1
Γ_5 $\eta\gamma$	(4.6 ± 0.4) × 10 ⁻⁴	S=1.1
Γ_6 $\pi^0e^+e^-$	(7.7 ± 0.6) × 10 ⁻⁴	
Γ_7 $\pi^0\mu^+\mu^-$	(1.3 ± 0.4) × 10 ⁻⁴	S=2.1
Γ_8 ηe^+e^-		
Γ_9 e^+e^-	(7.28 ± 0.14) × 10 ⁻⁵	S=1.3
Γ_{10} $\pi^+\pi^-\pi^0\pi^0$	< 2 × 10 ⁻⁴	CL=90%
Γ_{11} $\pi^+\pi^-\gamma$	< 3.6 × 10 ⁻³	CL=95%
Γ_{12} $\pi^+\pi^-\pi^+\pi^-$	< 1 × 10 ⁻³	CL=90%
Γ_{13} $\pi^0\pi^0\gamma$	(6.6 ± 1.1) × 10 ⁻⁵	
Γ_{14} $\eta\pi^0\gamma$	< 3.3 × 10 ⁻⁵	CL=90%
Γ_{15} $\mu^+\mu^-$	(9.0 ± 3.1) × 10 ⁻⁵	
Γ_{16} 3γ	< 1.9 × 10 ⁻⁴	CL=95%

Charge conjugation (C) violating modes

Γ_{17} $\eta\pi^0$	C	< 2.1 × 10 ⁻⁴	CL=90%
Γ_{18} $2\pi^0$	C	< 2.1 × 10 ⁻⁴	CL=90%
Γ_{19} $3\pi^0$	C	< 2.3 × 10 ⁻⁴	CL=90%

CONSTRAINED FIT INFORMATION

An overall fit to 15 branching ratios uses 51 measurements and one constraint to determine 10 parameters. The overall fit has a $\chi^2 = 51.8$ for 42 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	22								
x_3	-18	-4							
x_4	-92	-56	1						
x_5	7	7	-1	-9					
x_6	-1	0	0	0	0				
x_7	-1	0	0	0	0	0			
x_9	-38	-33	7	44	-21	0	0		
x_{13}	1	4	0	-2	0	0	0	-1	
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

$\Gamma(\pi^0\gamma)$ Γ_2

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
$788 \pm 12 \pm 27$	36500	¹³ ACHASOV 03	SND	$0.60-0.97 e^+e^- \rightarrow \pi^0\gamma$
764 ± 51	10625	DOLINSKY 89	ND	$e^+e^- \rightarrow \pi^0\gamma$

¹³ 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	¹⁴ DOLINSKY 89	ND	$e^+e^- \rightarrow \eta\gamma$

¹⁴ Using $\Gamma_\omega = 8.4 \pm 0.1$ MeV and $B(\omega \rightarrow \eta\gamma)$ from DOLINSKY 89.

$\Gamma(e^+e^-)$ Γ_9

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	^{15,16} AKHMETSHIN 04	CMD2	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
$0.653 \pm 0.003 \pm 0.021$	1.2M	¹⁷ ACHASOV 03D	RVUE	$0.44-2.00 e^+e^- \rightarrow \pi^+\pi^-\pi^0$
0.600 ± 0.031	10625	DOLINSKY 89	ND	$e^+e^- \rightarrow \pi^0\gamma$

¹⁵ Using $B(\omega \rightarrow \pi^+\pi^-\pi^0) = 0.891 \pm 0.007$ and $\Gamma_{\text{total}} = 8.44 \pm 0.09$ MeV.
¹⁶ Update of AKHMETSHIN 00C.
¹⁷ Using ACHASOV 03, ACHASOV 03D and $B(\omega \rightarrow \pi^+\pi^-) = (1.70 \pm 0.28)\%$.

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

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

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

6.49±0.11 OUR FIT Error includes scale factor of 1.3.

6.38±0.10 OUR AVERAGE Error includes scale factor of 1.1.

6.24±0.11±0.08	11.2k	¹⁸ AKHMETSHIN 04	CMD2	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
6.70±0.06±0.27		AUBERT,B 04N	BABR	$10.6 e^+ e^- \rightarrow \pi^+ \pi^- \pi^0 \gamma$
6.74±0.04±0.24	1.2M	^{19,20} ACHASOV 03D	RVUE	$0.44-2.00 e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
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 BENAKSAS 72B	OSPK	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$

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

6.20±0.13		²¹ BENAYOUN 10	RVUE	$0.4-1.05 e^+ e^-$
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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 A simultaneous fit of $e^+ e^- \rightarrow \pi^+ \pi^-, \pi^+ \pi^- \pi^0, \pi^0 \gamma, \eta \gamma$ data.

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

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

6.02±0.20 OUR FIT Error includes scale factor of 1.9.

6.45±0.17 OUR AVERAGE

6.47±0.14±0.39	18680	AKHMETSHIN 05	CMD2	$0.60-1.38 e^+ e^- \rightarrow \pi^0 \gamma$
6.50±0.11±0.20	36500	²² ACHASOV 03	SND	$0.60-0.97 e^+ e^- \rightarrow \pi^0 \gamma$
6.34±0.21±0.21	10625	²³ DOLINSKY 89	ND	$e^+ e^- \rightarrow \pi^0 \gamma$

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

6.80±0.13		²⁴ BENAYOUN 10	RVUE	$0.4-1.05 e^+ e^-$
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²² 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 $(-10.2 \pm 7.0)^\circ$.

²³ Recalculated by us from the cross section in the peak.

²⁴ A simultaneous fit of $e^+ e^- \rightarrow \pi^+ \pi^-, \pi^+ \pi^- \pi^0, \pi^0 \gamma, \eta \gamma$ data.

$\Gamma(e^+ e^-) / \Gamma_{\text{total}} \times \Gamma(\pi^+ \pi^-) / \Gamma_{\text{total}}$ $\Gamma_9 / \Gamma \times \Gamma_3 / \Gamma$

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

1.225±0.058±0.041 800k ²⁵ ACHASOV 06 SND $e^+ e^- \rightarrow \pi^+ \pi^-$

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

1.146±0.057		²⁶ BENAYOUN 10	RVUE	$0.4-1.05 e^+ e^-$
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²⁵ Supersedes ACHASOV 05A.

²⁶ A simultaneous fit of $e^+ e^- \rightarrow \pi^+ \pi^-, \pi^+ \pi^- \pi^0, \pi^0 \gamma, \eta \gamma$ data.

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

<u>VALUE (units 10^{-8})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
3.32±0.28 OUR FIT	Error includes scale factor of 1.1.			
3.18±0.28 OUR AVERAGE				
3.10±0.31±0.11	33k	²⁷ ACHASOV 07B	SND	0.6–1.38 $e^+e^- \rightarrow \eta\gamma$
3.17 ^{+1.85} _{-1.31} ±0.21	17.4k	²⁸ AKHMETSHIN 05	CMD2	0.60–1.38 $e^+e^- \rightarrow \eta\gamma$
3.41±0.52±0.21	23k	^{29,30} AKHMETSHIN 01B	CMD2	$e^+e^- \rightarrow \eta\gamma$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
4.50±0.10		³¹ BENAYOUN 10	RVUE	0.4–1.05 e^+e^-
²⁷ From a combined fit of $\sigma(e^+e^- \rightarrow \eta\gamma)$ with $\eta \rightarrow 3\pi^0$ and $\eta \rightarrow \pi^+\pi^-\pi^0$, and fixing $B(\eta \rightarrow 3\pi^0) / B(\eta \rightarrow \pi^+\pi^-\pi^0) = 1.44 \pm 0.04$. Recalculated by us from the cross section at the peak. Supersedes ACHASOV 00D and ACHASOV 06A.				
²⁸ From the $\eta \rightarrow 2\gamma$ decay and using $B(\eta \rightarrow \gamma\gamma) = 39.43 \pm 0.26\%$.				
²⁹ From the $\eta \rightarrow 3\pi^0$ decay and using $B(\eta \rightarrow 3\pi^0) = (32.24 \pm 0.29) \times 10^{-2}$.				
³⁰ 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).				
³¹ A simultaneous fit of $e^+e^- \rightarrow \pi^+\pi^-, \pi^+\pi^-\pi^0, \pi^0\gamma, \eta\gamma$ data.				

$\omega(782)$ BRANCHING RATIOS

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

<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. ● ● ●				
0.9024±0.0019		³² AMBROSINO 08G	KLOE	1.0–1.03 $e^+e^- \rightarrow \pi^+\pi^-2\pi^0, 2\pi^0\gamma$
0.8965±0.0016±0.0048	1.2M	^{33,34} ACHASOV 03D	RVUE	0.44–2.00 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$
0.880 ±0.020 ±0.032	11200	^{34,35} AKHMETSHIN 00C	CMD2	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
0.8942±0.0062		³⁴ DOLINSKY 89	ND	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
³² Not independent of $\Gamma(\pi^0\gamma) / \Gamma(\pi^+\pi^-\pi^0)$ from AMBROSINO 08G.				
³³ Using ACHASOV 03, ACHASOV 03D and $B(\omega \rightarrow \pi^+\pi^-) = (1.70 \pm 0.28)\%$.				
³⁴ Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}^2$.				
³⁵ Using $\Gamma(e^+e^-) = 0.60 \pm 0.02$ keV.				

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

<u>VALUE (units 10^{-2})</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. ● ● ●				
8.09±0.14		³⁶ AMBROSINO 08G	KLOE	$e^+e^- \rightarrow \pi^+\pi^-2\pi^0, 2\pi^0\gamma$
9.06±0.20±0.57	18680	^{37,38} AKHMETSHIN 05	CMD2	0.60–1.38 $e^+e^- \rightarrow \pi^0\gamma$
9.34±0.15±0.31	36500	³⁸ ACHASOV 03	SND	0.60–0.97 $e^+e^- \rightarrow \pi^0\gamma$
8.65±0.16±0.42	1.2M	^{39,40} ACHASOV 03D	RVUE	0.44–2.00 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$
8.39±0.24	9975	⁴¹ BENAYOUN 96	RVUE	$e^+e^- \rightarrow \pi^0\gamma$
8.88±0.62	10625	³⁸ DOLINSKY 89	ND	$e^+e^- \rightarrow \pi^0\gamma$

³⁶ Not independent of $\Gamma(\pi^0\gamma) / \Gamma(\pi^+\pi^-\pi^0)$ from AMBROSINO 08G.

³⁷ Using $B(\omega \rightarrow e^+e^-) = (7.14 \pm 0.13) \times 10^{-5}$.

³⁸ Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\pi^0\gamma) / \Gamma_{\text{total}}^2$.

³⁹ Using ACHASOV 03, ACHASOV 03D and $B(\omega \rightarrow \pi^+\pi^-) = (1.70 \pm 0.28)\%$.

⁴⁰ Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\pi^+\pi^-\pi^0) / \Gamma_{\text{total}}^2$.

⁴¹ Reanalysis of DRUZHININ 84, DOLINSKY 89, DOLINSKY 91 taking into account the triangle anomaly contributions.

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

Γ_2 / Γ_1

VALUE (units 10^{-2})	DOCUMENT ID	TECN	COMMENT
9.28 ± 0.31 OUR FIT	Error includes scale factor of 2.3.		
9.05 ± 0.27 OUR AVERAGE	Error includes scale factor of 1.8.		
8.97 ± 0.16	AMBROSINO 08G	KLOE	$e^+e^- \rightarrow \pi^+\pi^-2\pi^0, 2\pi^0\gamma$
9.94 ± 0.36 ± 0.38	⁴² AULCHENKO 00A	SND	$e^+e^- \rightarrow \pi^+\pi^-2\pi^0, 2\pi^0\gamma$
8.4 ± 1.3	KEYNE 76	CNTR	$\pi^-p \rightarrow \omega n$
10.9 ± 2.5	BENAKSAS 72C	OSPK	$e^+e^- \rightarrow \pi^0\gamma$
8.1 ± 2.0	BALDIN 71	HLBC	2.9 π^+p
13 ± 4	JACQUET 69B	HLBC	2.05 $\pi^+p \rightarrow \pi^+p\omega$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
9.7 ± 0.2 ± 0.5	^{43,44} ACHASOV 03D	RVUE	0.44–2.00 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$
9.9 ± 0.7	⁴³ DOLINSKY 89	ND	$e^+e^- \rightarrow \pi^0\gamma$
⁴² From $\sigma_0^{\omega\pi^0 \rightarrow \pi^0\pi^0\gamma}(m_\phi) / \sigma_0^{\omega\pi^0 \rightarrow \pi^+\pi^-\pi^0}(m_\phi)$ with a phase-space correction factor of 1/1.023.			
⁴³ Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\pi^0\gamma) / \Gamma_{\text{total}}^2$.			
⁴⁴ Using ACHASOV 03. Based on 1.2M events.			

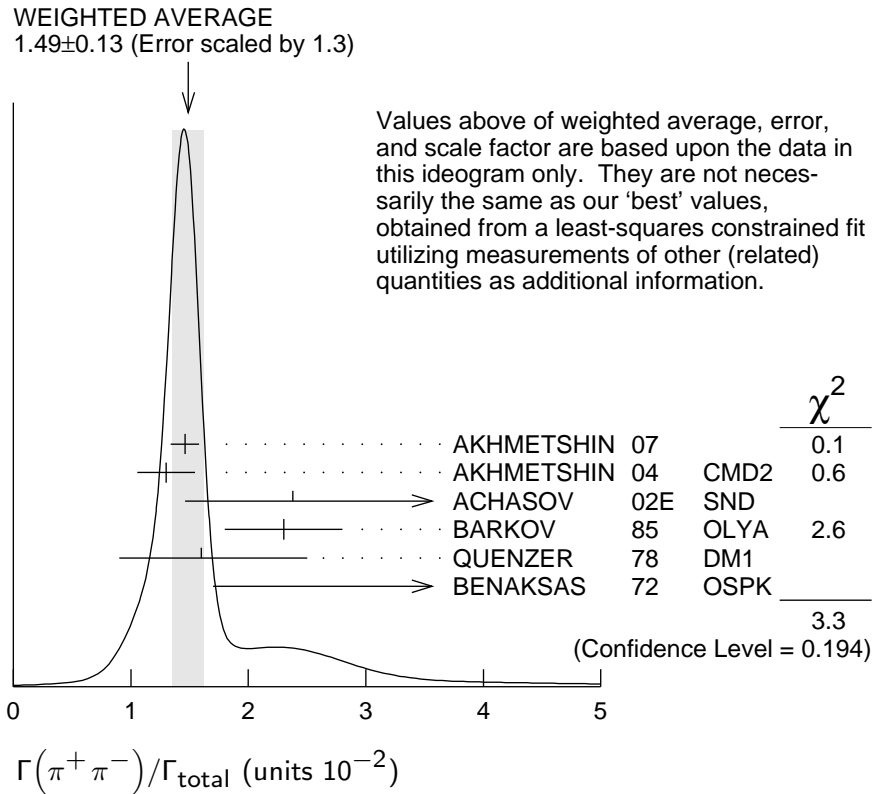
$\Gamma(\pi^+\pi^-) / \Gamma_{\text{total}}$

Γ_3 / Γ

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

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
1.53^{+0.11}_{-0.13} OUR FIT	Error includes scale factor of 1.2.			
1.49 ± 0.13 OUR AVERAGE	Error includes scale factor of 1.3. See the ideogram below.			
1.46 ± 0.12 ± 0.02	900k	⁴⁵ AKHMETSHIN 07		$e^+e^- \rightarrow \pi^+\pi^-$
1.30 ± 0.24 ± 0.05	11.2k	⁴⁶ AKHMETSHIN 04	CMD2	$e^+e^- \rightarrow \pi^+\pi^-$
2.38 ^{+1.77} _{-0.90} ± 0.18	5.4k	⁴⁷ 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. ● ● ●				
1.75 ± 0.11	4.5M	⁴⁸ ACHASOV 05A	SND	$e^+e^- \rightarrow \pi^+\pi^-$
2.01 ± 0.29		⁴⁹ BENAYOUN 03	RVUE	$e^+e^- \rightarrow \pi^+\pi^-$
1.9 ± 0.3		⁵⁰ GARDNER 99	RVUE	$e^+e^- \rightarrow \pi^+\pi^-$
2.3 ± 0.4		⁵¹ BENAYOUN 98	RVUE	$e^+e^- \rightarrow \pi^+\pi^-, \mu^+\mu^-$
1.0 ± 0.11		⁵² 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}		⁵³ BIGGS 70B	CNTR	4.2 $\gamma C \rightarrow \pi^+\pi^- C$

- 45 A combined fit of AKHMETSHIN 07, AULCHENKO 06, and AULCHENKO 05.
- 46 Update of AKHMETSHIN 02.
- 47 From the $m_{\pi^+\pi^-}$ spectrum taking into account the interference of the $\rho\pi$ and $\omega\pi$ amplitudes.
- 48 Using $\Gamma(\omega \rightarrow e^+e^-)$ from the 2004 Edition of this Review (PDG 04).
- 49 Using the data of AKHMETSHIN 02 in the hidden local symmetry model.
- 50 Using the data of BARKOV 85.
- 51 Using the data of BARKOV 85 in the hidden local symmetry model.
- 52 From a model-dependent analysis assuming complete coherence.
- 53 Re-evaluated under $\Gamma(\pi^+\pi^-)/\Gamma(\pi^+\pi^-\pi^0)$ by BEHREND 71 using more accurate $\omega \rightarrow \rho$ photoproduction cross-section ratio.



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

Γ_3/Γ_1

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

VALUE	DOCUMENT ID	TECN	COMMENT
0.0172±0.0014 OUR FIT	Error includes scale factor of 1.2.		
0.026 ±0.005 OUR AVERAGE			
0.021 +0.028 -0.009	54,55 RATCLIFF	72 ASPK	15 $\pi^- p \rightarrow n2\pi$
0.028 ±0.006	54 BEHREND	71 ASPK	Photoproduction
0.022 +0.009 -0.01	56 ROOS	70 RVUE	

- 54 The fitted width of these data is 160 MeV in agreement with present average, thus the ω contribution is overestimated. Assuming ρ width 145 MeV.
- 55 Significant interference effect observed. NB of $\omega \rightarrow 3\pi$ comes from an extrapolation.
- 56 ROOS 70 combines ABRAMOVICH 70 and BIZZARRI 70.

$\Gamma(\pi^+\pi^-)/\Gamma(\pi^0\gamma)$					Γ_3/Γ_2
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
0.20±0.04	1.98M	⁵⁷ ALOISIO	03	KLOE	$1.02 \frac{e^+e^- \rightarrow \pi^+\pi^-\pi^0}{\pi^+\pi^-\pi^0}$

⁵⁷ Using the data of ALOISIO 02D.

$\Gamma(\text{neutrals})/\Gamma_{\text{total}}$					$(\Gamma_2+\Gamma_4)/\Gamma$
<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 $\pi^- p$

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

$\Gamma(\pi^0\gamma)/\Gamma(\text{neutrals})$					$\Gamma_2/(\Gamma_2+\Gamma_4)$
<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
0.78±0.07		⁵⁸ DAKIN	72	OSPK	1.4 $\pi^- p \rightarrow nMM$
>0.81	90	DEINET	69B	OSPK	

⁵⁸ Error statistical only. Authors obtain good fit also assuming $\pi^0\gamma$ as the only neutral decay.

$\Gamma(\text{neutrals})/\Gamma(\text{charged particles})$					$(\Gamma_2+\Gamma_4)/(\Gamma_1+\Gamma_3)$
<u>VALUE</u>		<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
0.100±0.008 OUR FIT					
0.124±0.021		FELDMAN	67C	OSPK	1.2 $\pi^- p$

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

<u>VALUE (units 10^{-4})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
4.6 ± 0.4 OUR FIT				Error includes scale factor of 1.1.
6.3 ± 1.3 OUR AVERAGE				Error includes scale factor of 1.2.
6.6 ± 1.7		⁵⁹ 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}		⁶⁰ ANDREWS	77 CNTR	6.7–10 γCu
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
4.3 ± 0.5 ± 0.1	33k	⁶¹ ACHASOV	07B SND	0.6–1.38 $e^+e^- \rightarrow \eta\gamma$
4.44 ^{+2.59} _{-1.83} ± 0.28	17.4k	^{62,63} AKHMETSHIN	05 CMD2	0.60–1.38 $e^+e^- \rightarrow \eta\gamma$
5.10 ± 0.72 ± 0.34	23k	⁶⁴ AKHMETSHIN	01B CMD2	$e^+e^- \rightarrow \eta\gamma$
0.7 to 5.5		⁶⁵ CASE	00 CBAR	0.0 $p\bar{p} \rightarrow \eta\eta\gamma$
6.56 ^{+2.41} _{-2.55}	3525	^{60,66} BENAYOUN	96 RVUE	$e^+e^- \rightarrow \eta\gamma$
7.3 ± 2.9		^{60,62} DOLINSKY	89 ND	$e^+e^- \rightarrow \eta\gamma$

⁵⁹ No flat $\eta\eta\gamma$ background assumed.

⁶⁰ Solution corresponding to constructive ω - ρ interference.

⁶¹ ACHASOV 07B reports $[\Gamma(\omega(782) \rightarrow \eta\gamma)/\Gamma_{\text{total}}] \times [B(\omega(782) \rightarrow e^+e^-)] = (3.10 \pm 0.31 \pm 0.11) \times 10^{-8}$ which we divide by our best value $B(\omega(782) \rightarrow e^+e^-) = (7.28 \pm 0.14) \times 10^{-5}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Supersedes ACHASOV 00D and ACHASOV 06A.

⁶² Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\eta\gamma)/\Gamma_{\text{total}}^2$.

⁶³ Using $B(\omega \rightarrow e^+e^-) = (7.14 \pm 0.13) \times 10^{-5}$ and $B(\eta \rightarrow \gamma\gamma) = 39.43 \pm 0.26\%$.

⁶⁴ 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 $\Gamma(e^+e^-) \times \Gamma(\eta\gamma)/\Gamma_{\text{total}}^2$.

⁶⁵ Depending on the degree of coherence with the flat $\eta\eta\gamma$ background and using $B(\omega \rightarrow \pi^0\gamma) = (8.5 \pm 0.5) \times 10^{-2}$.

⁶⁶ Reanalysis of DRUZHININ 84, DOLINSKY 89, DOLINSKY 91 taking into account the triangle anomaly contributions.

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

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
0.0098 ± 0.0024	⁶⁷ ALDE	93 GAM2	$38\pi^- p \rightarrow \omega n$
0.0082 ± 0.0033	⁶⁸ DOLINSKY	89 ND	$e^+e^- \rightarrow \eta\gamma$
0.010 ± 0.045	APEL	72B OSPK	4–8 $\pi^- p \rightarrow n3\gamma$

⁶⁷ Model independent determination.

⁶⁸ Solution corresponding to constructive ω - ρ interference.

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

<u>VALUE (units 10^{-4})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
7.7 ± 0.6 OUR FIT				
7.7 ± 0.6 OUR AVERAGE				
7.61 ± 0.53 ± 0.64		ACHASOV	08 SND	0.36–0.97 $e^+e^- \rightarrow \pi^0 e^+e^-$
8.19 ± 0.71 ± 0.62		AKHMETSHIN	05A CMD2	0.72–0.84 e^+e^-
5.9 ± 1.9	43	DOLINSKY	88 ND	$e^+e^- \rightarrow \pi^0 e^+e^-$

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

<u>VALUE (units 10^{-4})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
1.3 ± 0.4 OUR FIT				Error includes scale factor of 2.1.
1.3 ± 0.4 OUR AVERAGE				Error includes scale factor of 2.1.
1.72 ± 0.25 ± 0.14	3k	ARNALDI	09 NA60	158A In–In collisions
0.96 ± 0.23		DZHELYADIN	81B CNTR	25–33 $\pi^- p \rightarrow \omega n$

$\Gamma(\eta e^+ e^-)/\Gamma_{\text{total}}$ 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>
0.728 ± 0.014 OUR FIT				Error includes scale factor of 1.3.
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.700 ± 0.016	11200	^{69,70} AKHMETSHIN 04	CMD2	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
0.752 ± 0.004 ± 0.024	1.2M	^{70,71} ACHASOV 03D	RVUE	0.44–2.00 $e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
0.714 ± 0.036		⁷⁰ DOLINSKY 89	ND	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
0.72 ± 0.03		⁷⁰ BARKOV 87	CMD	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
0.64 ± 0.04	1488	⁷⁰ KURDADZE 83B	OLYA	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
0.675 ± 0.069	433	⁷⁰ CORDIER 80	DM1	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
0.83 ± 0.10	451	⁷⁰ BENAKSAS 72B	OSPK	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
0.77 ± 0.06		⁷² AUGUSTIN 69D	OSPK	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
0.65 ± 0.13	33	⁷³ ASTVACAT... 68	OSPK	Assume SU(3)+mixing

⁶⁹ Using $B(\omega \rightarrow \pi^+ \pi^- \pi^0) = 0.891 \pm 0.007$. Update of AKHMETSHIN 00C.

⁷⁰ Not independent of the corresponding $\Gamma(e^+ e^-) \times \Gamma(\pi^+ \pi^- \pi^0)/\Gamma_{\text{total}}^2$.

⁷¹ Using ACHASOV 03, ACHASOV 03D and $B(\omega \rightarrow \pi^+ \pi^-) = (1.70 \pm 0.28)\%$.

⁷² Rescaled by us to correspond to ω width 8.4 MeV. Systematic errors underestimated.

⁷³ Not resolved from ρ decay. Error statistical only.

$\Gamma(\pi^+ \pi^- \pi^0 \pi^0)/\Gamma_{\text{total}}$ Γ_{10}/Γ

<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
< 2	90	ACHASOV 09A	SND	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0 \pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<200	90	KURDADZE 86	OLYA	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0 \pi^0$

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

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<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 $\pi^- p \rightarrow \pi^+ \pi^- \gamma X$

$\Gamma(\pi^+\pi^-\gamma)/\Gamma(\pi^+\pi^-\pi^0)$ Γ_{11}/Γ_1

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
● ● ● 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 $K^- p \rightarrow \Lambda \pi^+ \pi^- \gamma$

$\Gamma(\pi^+\pi^-\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{12}/Γ

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$<1 \times 10^{-3}$	90	KURDADZE 88	OLYA	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^+ \pi^-$

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

<u>VALUE (units 10^{-5})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
6.6 ± 1.1 OUR FIT				
6.5 ± 1.2 OUR AVERAGE				

$6.4^{+2.4}_{-2.0} \pm 0.8$	190	⁷⁴ AKHMETSHIN 04B	CMD2	0.6-0.97 $e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$
$6.6^{+1.4}_{-1.3} \pm 0.6$	295	ACHASOV 02F	SND	0.36-0.97 $e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$

● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
$11.8^{+2.1}_{-1.9} \pm 1.4$	190	⁷⁵ AKHMETSHIN 04B	CMD2	0.6-0.97 $e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$
$7.8 \pm 2.7 \pm 2.0$	63	^{74,76} ACHASOV 00G	SND	$e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$
$12.7 \pm 2.3 \pm 2.5$	63	^{75,76} ACHASOV 00G	SND	$e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$

⁷⁴ In the model assuming the $\rho \rightarrow \pi^0 \pi^0 \gamma$ decay via the $\omega \pi$ and $f_0(500) \gamma$ mechanisms.

⁷⁵ In the model assuming the $\rho \rightarrow \pi^0 \pi^0 \gamma$ decay via the $\omega \pi$ mechanism only.

⁷⁶ Superseded by ACHASOV 02F.

$\Gamma(\pi^0\pi^0\gamma)/\Gamma(\pi^+\pi^-\pi^0)$ Γ_{13}/Γ_1

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<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 $\pi^+ p \rightarrow \pi^+ p \omega$

$\Gamma(\pi^0\pi^0\gamma)/\Gamma(\pi^0\gamma)$ Γ_{13}/Γ_2

<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
8.0 ± 1.3 OUR FIT					
8.5 ± 2.9		40 ± 14	ALDE 94B	GAM2	38 $\pi^- p \rightarrow \pi^0 \pi^0 \gamma n$

● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
< 50	90	DOLINSKY 89	ND	$e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$	
<1800	95	KEYNE 76	CNTR	$\pi^- p \rightarrow \omega n$	
<1500	90	BENAKSAS 72C	OSPK	$e^+ e^-$	
<1400		BALDIN 71	HLBC	2.9 $\pi^+ p$	
<1000	90	BARMIN 64	HLBC	1.3-2.8 $\pi^- p$	

$\Gamma(\pi^0\pi^0\gamma)/\Gamma(\text{neutrals})$ $\Gamma_{13}/(\Gamma_2+\Gamma_4)$

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

0.22 ± 0.07		⁷⁷ DAKIN	72	OSPK	$1.4 \pi^- p \rightarrow nMM$
<0.19	90	DEINET	69B	OSPK	

⁷⁷ See $\Gamma(\pi^0\gamma)/\Gamma(\text{neutrals})$.

$\Gamma(\eta\pi^0\gamma)/\Gamma_{\text{total}}$ Γ_{14}/Γ

<u>VALUE (units 10^{-5})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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<3.3	90	AKHMETSHIN 04B	CMD2	$0.6-0.97 e^+e^- \rightarrow \eta\pi^0\gamma$
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$\Gamma(\mu^+\mu^-)/\Gamma_{\text{total}}$ Γ_{15}/Γ

<u>VALUE (units 10^{-5})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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9.0 ± 3.1 OUR FIT

9.0 ± 2.9 ± 1.1	18	HEISTER	02c	ALEP	$Z \rightarrow \mu^+\mu^- + X$
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$\Gamma(\mu^+\mu^-)/\Gamma(\pi^+\pi^-\pi^0)$ Γ_{15}/Γ_1

<u>VALUE (units 10^{-3})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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<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	$1.2 - 1.7 K^- p \rightarrow \Lambda\mu^+\mu^-$
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<1.2		BARBARO-...	65	HBC	$2.7 K^- p$
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$\Gamma(\pi^0\mu^+\mu^-)/\Gamma(\mu^+\mu^-)$ Γ_7/Γ_{15}

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

1.2 ± 0.6	30	⁷⁸ DZHELYADIN	79	CNTR	$25-33 \pi^- p$
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⁷⁸ Superseded by DZHELYADIN 81B result above.

$\Gamma(3\gamma)/\Gamma_{\text{total}}$ Γ_{16}/Γ

<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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<1.9	95	⁷⁹ 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	⁷⁹ PROKOSHKIN	95	GAM2	$38 \pi^- p \rightarrow 3\gamma n$
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⁷⁹ From direct 3γ decay search.

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

Violates C conservation.

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

<0.001	90	ALDE	94B	GAM2	$38\pi^- p \rightarrow \eta\pi^0 n$
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$[\Gamma(\eta\gamma) + \Gamma(\eta\pi^0)]/\Gamma(\pi^+\pi^-\pi^0)$ $(\Gamma_5+\Gamma_{17})/\Gamma_1$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.016	90	⁸⁰ 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 $\pi^+ p \rightarrow \pi^+ p\omega$
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⁸⁰ Restated by us using $B(\eta \rightarrow \text{charged modes}) = 29.2\%$.

$\Gamma(\eta\pi^0)/\Gamma(\pi^0\gamma)$ Γ_{17}/Γ_2
 Violates C conservation.

VALUE (units 10^{-3})	CL%	DOCUMENT ID	TECN	COMMENT
<2.6	90	⁸¹ STAROSTIN	09 CRYM	$\gamma p \rightarrow \eta\pi^0 p$

⁸¹ STAROSTIN 09 reports $[\Gamma(\omega(782) \rightarrow \eta\pi^0)/\Gamma(\omega(782) \rightarrow \pi^0\gamma)] \times [B(\eta \rightarrow 2\gamma)] < 1.01 \times 10^{-3}$ which we divide by our best value $B(\eta \rightarrow 2\gamma) = 39.31 \times 10^{-2}$.

$\Gamma(2\pi^0)/\Gamma(\pi^0\gamma)$ Γ_{18}/Γ_2
 Violates C conservation and Bose-Einstein statistics.

VALUE (units 10^{-3})	CL%	DOCUMENT ID	TECN	COMMENT
<2.59	90	STAROSTIN	09 CRYM	$\gamma p \rightarrow 2\pi^0 p$

$\Gamma(3\pi^0)/\Gamma_{\text{total}}$ Γ_{19}/Γ
 Violates C conservation.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<3 \times 10^{-4}$	90	PROKOSHKIN	95 GAM2	38 $\pi^- p \rightarrow 3\pi^0 n$

$\Gamma(3\pi^0)/\Gamma(\pi^0\gamma)$ Γ_{19}/Γ_2
 Violates C conservation.

VALUE (units 10^{-3})	CL%	DOCUMENT ID	TECN	COMMENT
<2.72	90	STAROSTIN	09 CRYM	$\gamma p \rightarrow 3\pi^0 p$

$\Gamma(3\pi^0)/\Gamma(\pi^+\pi^-\pi^0)$ Γ_{19}/Γ_1
 Violates C conservation.

VALUE	CL%	DOCUMENT ID	COMMENT
<0.009	90	BARBERIS	01 450 $pp \rightarrow p_f 3\pi^0 p_s$

PARAMETER Λ IN $\omega \rightarrow \pi^0\mu^+\mu^-$ DECAY

In the pole approximation the electromagnetic transition form factor for a resonance of mass M is given by the expression:

$$|F|^2 = (1 - M^2/\Lambda^2)^{-2},$$

where for the parameter Λ vector dominance predicts $\Lambda = M_p \approx 0.770$ GeV. The ARNALDI 09 measurement is in obvious conflict with this expectation. Note that for $\eta \rightarrow \mu^+\mu^-\gamma$ decay ARNALDI 09 and DZHELYADIN 80 obtain the value of Λ consistent with vector dominance.

VALUE (GeV)	EVTS	DOCUMENT ID	TECN	COMMENT
$0.668 \pm 0.009 \pm 0.003$	3k	ARNALDI	09 NA60	158A In–In collisions

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

0.65 ± 0.03		DZHELYADIN	81B CNTR	25–33 $\pi^- p \rightarrow \omega n$
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