Citation: K. Hagiwara *et al.* (Particle Data Group), Phys. Rev. D **66**, 010001 (2002) and 2003 partial update for edition 2004 (URL: http://pdg.lbl.gov)

$\eta'(958)$

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

$\eta'(958)$ MASS

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
957.78±0.14 OUR AVERAGE					
957.9 ±0.2 ±0.6	4800	WURZINGER	96	SPEC	1.68 $pd \rightarrow {}^3\mathrm{He}\eta'$
959 ±1	630	BELADIDZE	92C	VES	36 $\pi^- \mathrm{Be} \rightarrow \pi^- \eta' \eta \mathrm{Be}$
958 ±1	340	ARMSTRONG	91B	OMEG	300 $pp \rightarrow pp\eta\pi^+\pi^-$
958.2 ±0.4	622	AUGUSTIN	90	DM2	$J/\psi \rightarrow \gamma\eta\pi^+\pi^-$
957.8 ±0.2	2420	AUGUSTIN	90	DM2	$J/\psi \rightarrow \gamma\gamma\pi^+\pi^-$
956.3 ±1.0	143	GIDAL	87	MRK2	$e^+e^- \rightarrow e^+e^-\eta\pi^+\pi^-$
957.46±0.33		DUANE	74	MMS	$\pi^- p \rightarrow n\mathrm{MM}$
958.2 ±0.5	1414	DANBURG	73	HBC	2.2 $K^- p \rightarrow \Lambda X^0$
958 ±1	400	JACOBS	73	HBC	2.9 $K^- p \rightarrow \Lambda X^0$
956.1 ±1.1	3415	BASILE	71	CNTR	1.6 $\pi^- p \rightarrow nX^0$
957.4 ±1.4	535	BASILE	71	CNTR	1.6 $\pi^- p \rightarrow nX^0$
957 ±1		RITTENBERG	69	HBC	1.7–2.7 $K^- p$

$\eta'(958)$ WIDTH

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
0.202±0.016 OUR FIT Error includes scale factor of 1.3.						
0.30 ±0.09 OUR AVERAGE						
0.40 ±0.22	4800	WURZINGER	96	SPEC		1.68 $pd \rightarrow {}^3\mathrm{He}\eta'$
0.28 ±0.10	1000	BINNIE	79	MMS	0	$\pi^- p \rightarrow n\mathrm{MM}$

$\eta'(958)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level
Γ_1	$\pi^+\pi^-\eta$	(44.3 ±1.5) %	S=1.2
Γ_2	$\rho^0\gamma$ (including non-resonant $\pi^+\pi^-\gamma$)	(29.5 ±1.0) %	S=1.2
Γ_3	$\pi^0\pi^0\eta$	(20.9 ±1.2) %	S=1.2
Γ_4	$\omega\gamma$	(3.03±0.31) %	
Γ_5	$\gamma\gamma$	(2.12±0.14) %	S=1.3
Γ_6	$3\pi^0$	(1.56±0.26) $\times 10^{-3}$	
Γ_7	$\mu^+\mu^-\gamma$	(1.04±0.26) $\times 10^{-4}$	
Γ_8	$\pi^+\pi^-\pi^0$	< 5 %	CL=90%
Γ_9	$\pi^0\rho^0$	< 4 %	CL=90%
Γ_{10}	$\pi^+\pi^+\pi^-\pi^-$	< 1 %	CL=90%

Γ_{11}	$\pi^+\pi^+\pi^-\pi^-$ neutrals			$<$	1	%	CL=95%
Γ_{12}	$\pi^+\pi^+\pi^-\pi^-\pi^0$			$<$	1	%	CL=90%
Γ_{13}	6π			$<$	1	%	CL=90%
Γ_{14}	$\pi^+\pi^-e^+e^-$			$<$	6	$\times 10^{-3}$	CL=90%
Γ_{15}	γe^+e^-			$<$	9	$\times 10^{-4}$	CL=90%
Γ_{16}	$\pi^0\gamma\gamma$			$<$	8	$\times 10^{-4}$	CL=90%
Γ_{17}	$4\pi^0$			$<$	5	$\times 10^{-4}$	CL=90%
Γ_{18}	e^+e^-			$<$	2.1	$\times 10^{-7}$	CL=90%

Charge conjugation (*C*), Parity (*P*), Lepton family number (*LF*) violating modes

Γ_{19}	$\pi^+\pi^-$	*P,CP*		$<$	2	%	CL=90%
Γ_{20}	$\pi^0\pi^0$	*P,CP*		$<$	9	$\times 10^{-4}$	CL=90%
Γ_{21}	$\pi^0 e^+e^-$	*C*	[a]	$<$	1.4	$\times 10^{-3}$	CL=90%
Γ_{22}	ηe^+e^-	*C*	[a]	$<$	2.4	$\times 10^{-3}$	CL=90%
Γ_{23}	3γ	*C*		$<$	1.0	$\times 10^{-4}$	CL=90%
Γ_{24}	$\mu^+\mu^-\pi^0$	*C*	[a]	$<$	6.0	$\times 10^{-5}$	CL=90%
Γ_{25}	$\mu^+\mu^-\eta$	*C*	[a]	$<$	1.5	$\times 10^{-5}$	CL=90%
Γ_{26}	$e\mu$	*LF*		$<$	4.7	$\times 10^{-4}$	CL=90%

[*a*] *C* parity forbids this to occur as a single-photon process.

CONSTRAINED FIT INFORMATION

An overall fit to the total width, a partial width, 2 combinations of partial widths obtained from integrated cross section, and 16 branching ratios uses 48 measurements and one constraint to determine 7 parameters. The overall fit has a $\chi^2 = 35.6$ for 42 degrees of freedom.

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

x_2	−39					
x_3	−74	−29				
x_4	−33	−24	32			
x_5	−25	−12	26	8		
x_6	−27	−11	35	11	9	
Γ	32	−3	−24	−5	−88	−8
	x_1	x_2	x_3	x_4	x_5	x_6

	Mode	Rate (MeV)	Scale factor
Γ_1	$\pi^+\pi^-\eta$	0.090 ±0.008	1.2
Γ_2	$\rho^0\gamma$(including non-resonant $\pi^+\pi^-\gamma$)	0.060 ±0.005	1.3
Γ_3	$\pi^0\pi^0\eta$	0.042 ±0.004	1.6
Γ_4	$\omega\gamma$	0.0061 ±0.0008	1.2
Γ_5	$\gamma\gamma$	0.00429±0.00015	1.1
Γ_6	$3\pi^0$	(3.1 ±0.6) × 10^{-4}	1.1

$\eta'(958)$ PARTIAL WIDTHS

$\Gamma(\gamma\gamma)$ — Γ_5

VALUE (keV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
4.29±0.15 OUR FIT Error includes scale factor of 1.1.					
4.28±0.19 OUR AVERAGE					
4.17±0.10±0.27	2000	[1] ACCIARRI	98B	L3	$e^+e^- \to e^+e^-\pi^+\pi^-\gamma$
4.53±0.29±0.51	266	KARCH	92	CBAL	$e^+e^- \to e^+e^-\eta\pi^0\pi^0$
3.61±0.13±0.48		[2] BEHREND	91	CELL	$e^+e^- \to e^+e^-\eta'(958)$
4.6 ±1.1 ±0.6	23	BARU	90	MD1	$e^+e^- \to e^+e^-\pi^+\pi^-\gamma$
4.57±0.25±0.44		BUTLER	90	MRK2	$e^+e^- \to e^+e^-\eta'(958)$

$5.08 \pm 0.24 \pm 0.71$	547	[3] ROE	90	ASP	$e^+ e^- \rightarrow e^+ e^- 2\gamma$
$3.8 \pm 0.7 \pm 0.6$	34	AIHARA	88C	TPC	$e^+ e^- \rightarrow e^+ e^- \eta \pi^+ \pi^-$
$4.9 \pm 0.5 \pm 0.5$	136	[4] WILLIAMS	88	CBAL	$e^+ e^- \rightarrow e^+ e^- 2\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$4.7 \pm 0.6 \pm 0.9$	143	[5] GIDAL	87	MRK2	$e^+ e^- \rightarrow e^+ e^- \eta \pi^+ \pi^-$
4.0 ± 0.9		[6] BARTEL	85E	JADE	$e^+ e^- \rightarrow e^+ e^- 2\gamma$

[1] No non-resonant $\pi^+ \pi^-$ contribution found.
[2] Revaluated by us using B($\eta' \rightarrow \rho(770)\gamma$) = (30.2 ± 1.3)%.
[3] Revaluated by us using B($\eta' \rightarrow \gamma\gamma$) = (2.11 ± 0.13)%.
[4] Revaluated by us using B($\eta' \rightarrow \gamma\gamma$) = (2.11 ± 0.13)%.
[5] Superseded by BUTLER 90.
[6] Systematic error not evaluated.

$\eta'(958)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

This combination of a partial width with the partial width into $\gamma\gamma$ and with the total width is obtained from the integrated cross section into channel(i) in the $\gamma\gamma$ annihilation.

$\Gamma(\gamma\gamma) \times \Gamma(\rho^0\gamma(\text{including non-resonant } \pi^+\pi^-\gamma))/\Gamma_{\text{total}}$ — $\Gamma_5\Gamma_2/\Gamma$

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
1.27±0.05 OUR FIT Error includes scale factor of 1.2.					
1.26±0.07 OUR AVERAGE Error includes scale factor of 1.2.					
$1.09 \pm 0.04 \pm 0.13$		BEHREND	91	CELL	$e^+ e^- \rightarrow e^+ e^- \rho(770)^0 \gamma$
$1.35 \pm 0.09 \pm 0.21$		AIHARA	87	TPC	$e^+ e^- \rightarrow e^+ e^- \rho\gamma$
$1.13 \pm 0.04 \pm 0.13$	867	ALBRECHT	87B	ARG	$e^+ e^- \rightarrow e^+ e^- \rho\gamma$
$1.53 \pm 0.09 \pm 0.21$		ALTHOFF	84E	TASS	$e^+ e^- \rightarrow e^+ e^- \rho\gamma$
$1.14 \pm 0.08 \pm 0.11$	243	BERGER	84B	PLUT	$e^+ e^- \rightarrow e^+ e^- \rho\gamma$
$1.73 \pm 0.34 \pm 0.35$	95	JENNI	83	MRK2	$e^+ e^- \rightarrow e^+ e^- \rho\gamma$
$1.49 \pm 0.13 \pm 0.027$	213	BARTEL	82B	JADE	$e^+ e^- \rightarrow e^+ e^- \rho\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1.85 \pm 0.31 \pm 0.24$	43	BEHREND	83B	CELL	$e^+ e^- \rightarrow e^+ e^- \rho\gamma$

$\Gamma(\gamma\gamma) \times \Gamma(\pi^0\pi^0\eta)/\Gamma_{\text{total}}$ — $\Gamma_5\Gamma_3/\Gamma$

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
0.90±0.06 OUR FIT Error includes scale factor of 1.2.				
0.92±0.06±0.11	[7] KARCH	92	CBAL	$e^+ e^- \rightarrow e^+ e^- \eta \pi^0 \pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.95 \pm 0.05 \pm 0.08$	[8] KARCH	90	CBAL	$e^+ e^- \rightarrow e^+ e^- \eta \pi^0 \pi^0$
$1.00 \pm 0.08 \pm 0.10$	[8,9] ANTREASYAN	87	CBAL	$e^+ e^- \rightarrow e^+ e^- \eta \pi^0 \pi^0$

[7] Revaluated by us using B($\eta \rightarrow \gamma\gamma$) = (39.21 ± 0.34)%. Supersedes ANTREASYAN 87 and KARCH 90.
[8] Superseded by KARCH 92.
[9] Using BR($\eta \rightarrow 2\gamma$)=(38.9 ± 0.5)%.

$\eta'(958)$ α PARAMETER

$\left|\text{MATRIX ELEMENT}\right|^2 = (1 + \alpha y)^2 + cx^2$

VALUE	DOCUMENT ID		TECN	COMMENT
$-$0.058$\pm$0.013	[10] ALDE	86	GAM2	38 $\pi^- p \to n \eta 2\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$-$0.08 $\pm$0.03	[10] KALBFLEISCH	74	RVUE	$\eta' \to \eta \pi^+ \pi^-$

[10] May not necessarily be the same for $\eta' \to \eta \pi^+ \pi^-$ and $\eta' \to \eta \pi^0 \pi^0$.

$\eta'(958)$ β PARAMETER

See the "Note on η Decay Parameters" in our 1994 edition Physical Review **D50** 1173 (1994), p. 1454.

$\left|\text{MATRIX ELEMENT}\right|^2 = (1 + 2\beta Z)$

VALUE	DOCUMENT ID		TECN	COMMENT
$-$0.1 $\pm$0.3	ALDE	87B	GAM2	38 $\pi^- p \to n 3\pi^0$

$\eta'(958)$ BRANCHING RATIOS

$\Gamma(\pi^+\pi^-\eta(\text{neutral decay}))/\Gamma_{\text{total}}$ — $0.714\Gamma_1/\Gamma$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.316$\pm$0.010 OUR FIT	Error includes scale factor of 1.2.				
0.314$\pm$0.026	281	RITTENBERG	69	HBC	1.7–2.7 $K^- p$

$\Gamma(\pi^+\pi^-\text{neutrals})/\Gamma_{\text{total}}$ — $(0.714\Gamma_1+0.286\Gamma_3+0.89\Gamma_4)/\Gamma$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.403$\pm$0.008 OUR FIT	Error includes scale factor of 1.2.				
0.36 $\pm$0.05 OUR AVERAGE					
0.4 $\pm$0.1	39	LONDON	66	HBC	2.24 $K^- p \to \Lambda \pi^+ \pi^-$ neutrals
0.35 $\pm$0.06	33	BADIER	65B	HBC	3 $K^- p$

$\Gamma(\pi^+\pi^-\eta(\text{charged decay}))/\Gamma_{\text{total}}$ — $0.286\Gamma_1/\Gamma$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.127$\pm$0.004 OUR FIT	Error includes scale factor of 1.2.				
0.116$\pm$0.013 OUR AVERAGE					
0.123$\pm$0.014	107	RITTENBERG	69	HBC	1.7–2.7 $K^- p$
0.10 $\pm$0.04	10	LONDON	66	HBC	2.24 $K^- p \to \Lambda \pi^+ \pi^- \pi^+ \pi^- \pi^0$
0.07 $\pm$0.04	7	BADIER	65B	HBC	3 $K^- p$

$\left[\Gamma(\pi^0\pi^0\eta(\text{charged decay})) + \Gamma(\omega(\text{charged decay})\gamma)\right]/\Gamma_{\text{total}}$ — $(0.286\Gamma_3+0.89\Gamma_4)/\Gamma$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.087$\pm$0.005 OUR FIT	Error includes scale factor of 1.2.				
0.045$\pm$0.029	42	RITTENBERG	69	HBC	1.7–2.7 $K^- p$

$\Gamma(\text{neutrals})/\Gamma_{\text{total}}$ — $(0.714\Gamma_3+0.09\Gamma_4+\Gamma_5)/\Gamma$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.173±0.009 OUR FIT Error includes scale factor of 1.2.					
0.187±0.017 OUR AVERAGE					
0.185±0.022	535	BASILE	71	CNTR	1.6 $\pi^- p \rightarrow nX^0$
0.189±0.026	123	RITTENBERG	69	HBC	1.7–2.7 $K^- p$

$\Gamma(\rho^0\gamma(\text{including non-resonant }\pi^+\pi^-\gamma))/\Gamma_{\text{total}}$ — Γ_2/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.295±0.010 OUR FIT Error includes scale factor of 1.2.					
0.319±0.030 OUR AVERAGE					
0.329±0.033	298	RITTENBERG	69	HBC	1.7–2.7 $K^- p$
0.2 ±0.1	20	LONDON	66	HBC	2.24 $K^- p \rightarrow \Lambda\pi^+\pi^-\gamma$
0.34 ±0.09	35	BADIER	65B	HBC	3 $K^- p$

$\Gamma(\rho^0\gamma(\text{including non-resonant }\pi^+\pi^-\gamma))/\Gamma(\pi\pi\eta)$ — $\Gamma_2/(\Gamma_1+\Gamma_3)$

VALUE	DOCUMENT ID		TECN	COMMENT
0.453±0.022 OUR FIT Error includes scale factor of 1.2.				
0.426±0.028 OUR AVERAGE				
0.43 ±0.02 ±0.02	BARBERIS	98C	OMEG	450 $pp \rightarrow p_f \eta' p_s$
0.31 ±0.15	DAVIS	68	HBC	5.5 $K^- p$

$\Gamma(\gamma e^+ e^-)/\Gamma_{\text{total}}$ — Γ_{15}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.9	90	BRIERE	00	CLEO	10.6 e^+e^-

$\Gamma(\pi^0 e^+ e^-)/\Gamma_{\text{total}}$ — Γ_{21}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
< 1.4	90	BRIERE	00	CLEO	10.6 e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<13	90	RITTENBERG	65	HBC	2.7 $K^- p$

$\Gamma(\eta e^+ e^-)/\Gamma_{\text{total}}$ — Γ_{22}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
< 2.4	90	BRIERE	00	CLEO	10.6 e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<11	90	RITTENBERG	65	HBC	2.7 $K^- p$

$\Gamma(\pi^0\rho^0)/\Gamma_{\text{total}}$ — Γ_9/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.04	90	RITTENBERG	65	HBC	2.7 $K^- p$

$\Gamma(\pi^+\pi^- e^+ e^-)/\Gamma_{\text{total}}$ — Γ_{14}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.006	90	RITTENBERG	65	HBC	2.7 $K^- p$

$\Gamma(6\pi)/\Gamma_{total}$ — Γ_{13}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.01	90	LONDON	66	HBC	Compilation

$\Gamma(\omega\gamma)/\Gamma(\pi^+\pi^-\eta)$ — Γ_4/Γ_1

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.069±0.008 OUR FIT	Error includes scale factor of 1.1.				
0.068±0.013	68	ZANFINO	77	ASPK	8.4 $\pi^- p$

$\Gamma(\rho^0\gamma(\text{including non-resonant }\pi^+\pi^-\gamma))/[\Gamma(\pi^+\pi^-\eta)+\Gamma(\pi^0\pi^0\eta)+\Gamma(\omega\gamma)]$ — $\Gamma_2/(\Gamma_1+\Gamma_3+\Gamma_4)$

VALUE	DOCUMENT ID		TECN	COMMENT
0.433±0.021 OUR FIT	Error includes scale factor of 1.2.			
0.25 ±0.14	DAUBER	64	HBC	1.95 $K^- p$

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

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0212±0.0014 OUR FIT	Error includes scale factor of 1.3.				
0.0196±0.0015 OUR AVERAGE					
0.0200±0.0018		[11] STANTON	80	SPEC	8.45 $\pi^- p \rightarrow n\pi^+\pi^- 2\gamma$
0.025 ±0.007		DUANE	74	MMS	$\pi^- p \rightarrow n$MM
0.0171±0.0033	68	DALPIAZ	72	CNTR	1.6 $\pi^- p \rightarrow nX^0$
$0.020\ ^{+0.008}_{-0.006}$	31	HARVEY	71	OSPK	3.65 $\pi^- p \rightarrow nX^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.018 ±0.002	6000	[12] APEL	79	NICE	15–40 $\pi^- p \rightarrow n2\gamma$

[11] Includes APEL 79 result.
[12] Data is included in STANTON 80 evaluation.

$\Gamma(e^+e^-)/\Gamma_{total}$ — Γ_{18}/Γ

VALUE (units 10^{-7})	CL%	DOCUMENT ID		TECN	COMMENT
<2.1	90	VOROBYEV	88	ND	$e^+e^- \rightarrow \pi^+\pi^-\eta$

$\Gamma(\pi^+\pi^-)/\Gamma_{total}$ — Γ_{19}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.02	90	RITTENBERG	69	HBC	1.7–2.7 $K^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.08	95	DANBURG	73	HBC	2.2 $K^- p \rightarrow \Lambda X^0$

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_8/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.05	90	RITTENBERG	69	HBC	1.7–2.7 $K^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.09	95	DANBURG	73	HBC	2.2 $K^- p \rightarrow \Lambda X^0$

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

VALUE	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<0.01	95	DANBURG	73	HBC	2.2 $K^- p \to \Lambda X^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.01	90	RITTENBERG	69	HBC	1.7–2.7 $K^- p$

$\Gamma(\pi^+\pi^+\pi^-\pi^-\pi^0)/\Gamma_{\text{total}}$ — Γ_{12}/Γ

VALUE	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<0.01	90	RITTENBERG	69	HBC	1.7–2.7 $K^- p$

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

VALUE	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<0.01	90	RITTENBERG	69	HBC	1.7–2.7 $K^- p$

$\Gamma(\pi^0\pi^0\eta(3\pi^0\text{ decay}))/\Gamma_{\text{total}}$ — $0.321\Gamma_3/\Gamma$

VALUE	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.067±0.004 OUR FIT	Error includes scale factor of 1.2.				
0.11 ±0.06	4	BENSINGER	70	DBC	2.2 $\pi^+ d$

$\Gamma(\rho^0\gamma(\text{including non-resonant }\pi^+\pi^-\gamma))/\Gamma(\pi^+\pi^-\eta(\text{neutral decay}))$ — $\Gamma_2/0.714\Gamma_1$

VALUE	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.93±0.05 OUR FIT	Error includes scale factor of 1.2.				
1.01±0.09 OUR AVERAGE					
1.07±0.17		BELADIDZE	92C	VES	36 $\pi^-\text{Be} \to \pi^-\eta'\eta\text{Be}$
0.92±0.14	473	DANBURG	73	HBC	2.2 $K^- p \to \Lambda X^0$
1.11±0.18	192	JACOBS	73	HBC	2.9 $K^- p \to \Lambda X^0$

$\Gamma(\gamma\gamma)/\Gamma(\pi^0\pi^0\eta(\text{neutral decay}))$ — $\Gamma_5/0.714\Gamma_3$

VALUE	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.142±0.010 OUR FIT	Error includes scale factor of 1.6.				
0.188±0.058	16	APEL	72	OSPK	3.8 $\pi^- p \to n X^0$

$\Gamma(\mu^+\mu^-\gamma)/\Gamma(\gamma\gamma)$ — Γ_7/Γ_5

VALUE (units 10^{-3})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
4.9±1.2	33	VIKTOROV	80	CNTR	25,33 $\pi^- p \to 2\mu\gamma$

$\Gamma(\mu^+\mu^-\eta)/\Gamma_{\text{total}}$ — Γ_{25}/Γ

VALUE (units 10^{-5})	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<1.5	90	DZHELYADIN	81	CNTR	30 $\pi^- p \to \eta' n$

$\Gamma(\mu^+\mu^-\pi^0)/\Gamma_{\text{total}}$ — Γ_{24}/Γ

VALUE (units 10^{-5})	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<6.0	90	DZHELYADIN	81	CNTR	30 $\pi^- p \to \eta' n$

$\Gamma(3\pi^0)/\Gamma(\pi^0\pi^0\eta)$ — Γ_6/Γ_3

VALUE (units 10^{-4})	*DOCUMENT ID*		*TECN*	*COMMENT*
74±12 OUR FIT				
74±12 OUR AVERAGE				
74±15	ALDE	87B	GAM2	38 $\pi^- p \to n6\gamma$
75±18	BINON	84	GAM2	30–40 $\pi^- p \to n6\gamma$

$\Gamma(\gamma\gamma)/\Gamma(\pi^0\pi^0\eta)$ — Γ_5/Γ_3

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
0.101±0.007 OUR FIT Error includes scale factor of 1.6.				
0.105±0.010 OUR AVERAGE Error includes scale factor of 1.9.				
0.091±0.009	AMSLER	93	CBAR	0.0 $\overline{p}p$
0.112±0.002±0.006	ALDE	87B	GAM2	38 $\pi^- p \to n2\gamma$

$\Gamma(\omega\gamma)/\Gamma(\pi^0\pi^0\eta)$ — Γ_4/Γ_3

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
0.145±0.014 OUR FIT				
0.147±0.016	ALDE	87B	GAM2	38 $\pi^- p \to n4\gamma$

$\Gamma(3\gamma)/\Gamma(\pi^0\pi^0\eta)$ — Γ_{23}/Γ_3

VALUE (units 10^{-4})	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<4.6	90	ALDE	87B	GAM2	38 $\pi^- p \to n3\gamma$

$\Gamma(\pi^0\gamma\gamma)/\Gamma(\pi^0\pi^0\eta)$ — Γ_{16}/Γ_3

VALUE (units 10^{-4})	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<37	90	ALDE	87B	GAM2	38 $\pi^- p \to n4\gamma$

$\Gamma(\pi^0\pi^0)/\Gamma(\pi^0\pi^0\eta)$ — Γ_{20}/Γ_3

VALUE (units 10^{-4})	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<45	90	ALDE	87B	GAM2	38 $\pi^- p \to n4\gamma$

$\Gamma(4\pi^0)/\Gamma(\pi^0\pi^0\eta)$ — Γ_{17}/Γ_3

VALUE (units 10^{-4})	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<23	90	ALDE	87B	GAM2	38 $\pi^- p \to n8\gamma$

$\Gamma(e\mu)/\Gamma_{total}$ — Γ_{26}/Γ

VALUE (units 10^{-4})	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<4.7	90	BRIERE	00	CLEO	10.6 e^+e^-

$\eta'(958)$ C-NONCONSERVING DECAY PARAMETER

See the note on η decay parameters in the Stable Particle Particle Listings for definition of this parameter.

DECAY ASYMMETRY PARAMETER FOR $\pi^+\pi^-\gamma$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
−0.01 ±0.04 OUR AVERAGE					
−0.019±0.056		AIHARA	87	TPC	$2\gamma \rightarrow \pi^+\pi^-\gamma$
−0.069±0.078	295	GRIGORIAN	75	STRC	2.1 $\pi^- p$
0.00 ±0.10	103	KALBFLEISCH	75	HBC	2.18 $K^- p \rightarrow \Lambda\pi^+\pi^-\gamma$
0.07 ±0.08	152	RITTENBERG	65	HBC	2.1–2.7 $K^- p$

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ALDE	87B	ZPHY C36 603	D.M. Alde et al.	(LANL, BELG, SERP, LAPP)
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