

$\eta'(958)$

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

$\eta'(958)$ MASS

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
957.78 ± 0.14 OUR AVERAGE				
957.9 ± 0.2 ± 0.6	4800	WURZINGER 96	SPEC	1.68 $pd \rightarrow {}^3\text{He}\eta'$
959 ± 1	630	BELADIDZE 92C	VES	36 $\pi^- \text{Be} \rightarrow \pi^- \eta' \eta \text{Be}$
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	$\pi^- p \rightarrow n\text{MM}$
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

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
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 $pd \rightarrow {}^3\text{He}\eta'$
0.28 ± 0.10	1000	BINNIE 79	MMS	0	$\pi^- p \rightarrow n\text{MM}$

$\eta'(958)$ 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) × 10 ⁻³	
Γ_7 $\mu^+\mu^-\gamma$	(1.04 ± 0.26) × 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}	$\gamma e^+ e^-$	< 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}	$\eta e^+ e^-$	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 $\langle \delta p_i \delta p_j \rangle / (\delta p_i \cdot \delta p_j)$, in percent, from the fit to parameters p_i , including the branching fractions, $x_i \equiv \Gamma_i / \Gamma_{\text{total}}$. 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 \pm 0.008	1.2
Γ_2 $\rho^0 \gamma$ (including non-resonant $\pi^+ \pi^- \gamma$)	0.060 \pm 0.005	1.3
Γ_3 $\pi^0 \pi^0 \eta$	0.042 \pm 0.004	1.6
Γ_4 $\omega \gamma$	0.0061 \pm 0.0008	1.2
Γ_5 $\gamma \gamma$	0.00429 \pm 0.00015	1.1
Γ_6 $3\pi^0$	(3.1 \pm 0.6) $\times 10^{-4}$	1.1

$\eta'(958)$ PARTIAL WIDTHS

$\Gamma(\gamma\gamma)$					Γ_5
VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT	
4.29 \pm 0.15 OUR FIT	Error includes scale factor of 1.1.				
4.28 \pm 0.19 OUR AVERAGE					
4.17 \pm 0.10 \pm 0.27	2000	¹ ACCIARRI	98B L3	$e^+ e^- \rightarrow e^+ e^- \pi^+ \pi^- \gamma$	
4.53 \pm 0.29 \pm 0.51	266	KARCH	92 CBAL	$e^+ e^- \rightarrow e^+ e^- \eta \pi^0 \pi^0$	
3.61 \pm 0.13 \pm 0.48		² BEHREND	91 CELL	$e^+ e^- \rightarrow e^+ e^- \eta'(958)$	
4.6 \pm 1.1 \pm 0.6	23	BARU	90 MD1	$e^+ e^- \rightarrow e^+ e^- \pi^+ \pi^- \gamma$	
4.57 \pm 0.25 \pm 0.44		BUTLER	90 MRK2	$e^+ e^- \rightarrow e^+ e^- \eta'(958)$	
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 ±0.6 ±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 Reevaluated by us using $B(\eta' \rightarrow \rho(770)\gamma) = (30.2 \pm 1.3)\%$.

³ Reevaluated by us using $B(\eta' \rightarrow \gamma\gamma) = (2.11 \pm 0.13)\%$.

⁴ Reevaluated by us using $B(\eta' \rightarrow \gamma\gamma) = (2.11 \pm 0.13)\%$.

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.

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

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±0.04±0.13		BEHREND	91 CELL	$e^+e^- \rightarrow e^+e^-\rho(770)^0\gamma$
1.35±0.09±0.21		AIHARA	87 TPC	$e^+e^- \rightarrow e^+e^-\rho\gamma$
1.13±0.04±0.13	867	ALBRECHT	87B ARG	$e^+e^- \rightarrow e^+e^-\rho\gamma$
1.53±0.09±0.21		ALTHOFF	84E TASS	$e^+e^- \rightarrow e^+e^-\rho\gamma$
1.14±0.08±0.11	243	BERGER	84B PLUT	$e^+e^- \rightarrow e^+e^-\rho\gamma$
1.73±0.34±0.35	95	JENNI	83 MRK2	$e^+e^- \rightarrow e^+e^-\rho\gamma$
1.49±0.13±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±0.31±0.24	43	BEHREND	83B CELL	$e^+e^- \rightarrow e^+e^-\rho\gamma$

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

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±0.05±0.08	⁸ KARCH	90 CBAL	$e^+e^- \rightarrow e^+e^-\eta\pi^0\pi^0$
1.00±0.08±0.10	^{8,9} ANTREASYAN	87 CBAL	$e^+e^- \rightarrow e^+e^-\eta\pi^0\pi^0$
⁷ Reevaluated by us using $B(\eta \rightarrow \gamma\gamma) = (39.21 \pm 0.34)\%$. Supersedes ANTREASYAN 87 and KARCH 90.			
⁸ Superseded by KARCH 92.			
⁹ Using $BR(\eta \rightarrow 2\gamma) = (38.9 \pm 0.5)\%$.			

$\eta'(958) \alpha$ PARAMETER

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

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

$\eta'(958) \beta$ PARAMETER

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

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

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

$\eta'(958)$ BRANCHING RATIOS

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

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

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

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

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

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

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

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

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

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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 $\pi^- p \rightarrow n\chi^0$
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**

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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 $K^- p$

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

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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**

<u>VALUE (units 10⁻³)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.9	90	BRIERE	00 CLEO	10.6 $e^+ e^-$

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

<u>VALUE (units 10⁻³)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
< 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**

<u>VALUE (units 10⁻³)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
< 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**

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

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

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

$\Gamma(6\pi)/\Gamma_{\text{total}}$					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 $K^- p$		

$\Gamma(\gamma\gamma)/\Gamma_{\text{total}}$					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	$\pi^- p \rightarrow nMM$	
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.

$\Gamma(e^+e^-)/\Gamma_{\text{total}}$					Γ_{18}/Γ
VALUE (units 10^{-7})	CL%	DOCUMENT ID	TECN	COMMENT	
<2.1	90	VOROBYEV	88 ND	$e^+e^- \rightarrow \pi^+\pi^-\eta$	

$\Gamma(\pi^+\pi^-)/\Gamma_{\text{total}}$					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 $K^- p \rightarrow \Lambda X^0$	

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

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.01	95	DANBURG	73 HBC	2.2 $K^- p \rightarrow \Lambda X^0$
• • • 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

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

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

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

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

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

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

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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 $\pi^- \text{Be} \rightarrow \pi^- \eta' \eta \text{Be}$
0.92 ± 0.14	473	DANBURG	73 HBC	2.2 $K^- p \rightarrow \Lambda X^0$
1.11 ± 0.18	192	JACOBS	73 HBC	2.9 $K^- p \rightarrow \Lambda X^0$

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

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

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

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

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

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

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

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

$\Gamma(3\pi^0)/\Gamma(\pi^0\pi^0\eta)$					Γ_6/Γ_3
<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
74 ± 12		ALDE	87B	GAM2	$38 \pi^- p \rightarrow n6\gamma$
74 ± 12		BINON	84	GAM2	$30-40 \pi^- p \rightarrow n6\gamma$
74 ± 15					
75 ± 18					
<hr/>					
$\Gamma(\gamma\gamma)/\Gamma(\pi^0\pi^0\eta)$					Γ_5/Γ_3
<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
0.101 ± 0.007		Error includes scale factor of 1.6.			
0.105 ± 0.010		Error includes scale factor of 1.9.			
0.091 ± 0.009		AMSLER	93	CBAR	$0.0 \bar{p}p$
$0.112 \pm 0.002 \pm 0.006$		ALDE	87B	GAM2	$38 \pi^- p \rightarrow n2\gamma$
<hr/>					
$\Gamma(\omega\gamma)/\Gamma(\pi^0\pi^0\eta)$					Γ_4/Γ_3
<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
0.145 ± 0.014					
0.147 ± 0.016		ALDE	87B	GAM2	$38 \pi^- p \rightarrow n4\gamma$
<hr/>					
$\Gamma(3\gamma)/\Gamma(\pi^0\pi^0\eta)$					Γ_{23}/Γ_3
<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<4.6	90	ALDE	87B	GAM2	$38 \pi^- p \rightarrow n3\gamma$
<hr/>					
$\Gamma(\pi^0\gamma\gamma)/\Gamma(\pi^0\pi^0\eta)$					Γ_{16}/Γ_3
<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<37	90	ALDE	87B	GAM2	$38 \pi^- p \rightarrow n4\gamma$
<hr/>					
$\Gamma(\pi^0\pi^0)/\Gamma(\pi^0\pi^0\eta)$					Γ_{20}/Γ_3
<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<45	90	ALDE	87B	GAM2	$38 \pi^- p \rightarrow n4\gamma$
<hr/>					
$\Gamma(4\pi^0)/\Gamma(\pi^0\pi^0\eta)$					Γ_{17}/Γ_3
<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<23	90	ALDE	87B	GAM2	$38 \pi^- p \rightarrow n8\gamma$
<hr/>					
$\Gamma(e\mu)/\Gamma_{\text{total}}$					Γ_{26}/Γ
<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<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 $\pi^+\pi^-\gamma$

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
-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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ACCIARRI	98B	PL B418 389	M. Acciarri <i>et al.</i>	(L3 Collab.)
BARBERIS	98C	PL B440 225	D. Barberis <i>et al.</i>	(WA 102 Collab.)
WURZINGER	96	PL B374 283	R. Wurzinger <i>et al.</i>	(BONN, ORSAY, SACL+)
PDG	94	PR D50 1173	L. Montanet <i>et al.</i>	(CERN, LBL, BOST+)
AMSLER	93	ZPHY C58 175	C. Amsler <i>et al.</i>	(Crystal Barrel Collab.)
BELADIDZE	92C	SJNP 55 1535	G.M. Beladidze, S.I. Bityukov, G.V. Borisov	(SERP+)
		Translated from YAF 55 2748.		
KARCH	92	ZPHY C54 33	K. Karch <i>et al.</i>	(Crystal Ball Collab.)
ARMSTRONG	91B	ZPHY C52 389	T.A. Armstrong <i>et al.</i>	(ATHU, BARI, BIRM+)
BEHREND	91	ZPHY C49 401	H.J. Behrend <i>et al.</i>	(CELLO Collab.)
AUGUSTIN	90	PR D42 10	J.E. Augustin <i>et al.</i>	(DM2 Collab.)
BARU	90	ZPHY C48 581	S.E. Baru <i>et al.</i>	(MD-1 Collab.)
BUTLER	90	PR D42 1368	F. Butler <i>et al.</i>	(Mark II Collab.)
KARCH	90	PL B249 353	K. Karch <i>et al.</i>	(Crystal Ball Collab.)
ROE	90	PR D41 17	N.A. Roe <i>et al.</i>	(ASP Collab.)
AIHARA	88C	PR D38 1	H. Aihara <i>et al.</i>	(TPC-2 γ Collab.)
VOROBYEV	88	SJNP 48 273	P.V. Vorobiev <i>et al.</i>	(NOVO)
		Translated from YAF 48 436.		
WILLIAMS	88	PR D38 1365	D.A. Williams <i>et al.</i>	(Crystal Ball Collab.)
AIHARA	87	PR D35 2650	H. Aihara <i>et al.</i>	(TPC-2 γ Collab.) JP
ALBRECHT	87B	PL B199 457	H. Albrecht <i>et al.</i>	(ARGUS Collab.)
ALDE	87B	ZPHY C36 603	D.M. Alde <i>et al.</i>	(LANL, BELG, SERP, LAPP)
ANTREASYAN	87	PR D36 2633	D. Antreasyan <i>et al.</i>	(Crystal Ball Collab.)
GIDAL	87	PRL 59 2012	G. Gidal <i>et al.</i>	(LBL, SLAC, HARV)
ALDE	86	PL B177 115	D.M. Alde <i>et al.</i>	(SERP, BELG, LANL, LAPP)
BARTEL	85E	PL 160B 421	W. Bartel <i>et al.</i>	(JADE Collab.)
ALTHOFF	84E	PL 147B 487	M. Althoff <i>et al.</i>	(TASSO Collab.)
BERGER	84B	PL 142B 125	C. Berger	(PLUTO Collab.)
BINON	84	PL 140B 264	F.G. Binon <i>et al.</i>	(SERP, BELG, LAPP+)
BEHREND	83B	PL 125B 518	H.J. Behrend <i>et al.</i>	(CELLO Collab.)
Also	82C	PL 114B 378	H.J. Behrend <i>et al.</i>	(CELLO Collab.)
JENNI	83	PR D27 1031	P. Jenni <i>et al.</i>	(SLAC, LBL)
BARTEL	82B	PL 113B 190	W. Bartel <i>et al.</i>	(JADE Collab.)
DZHELADIN	81	PL 105B 239	R.I. Dzhelyadin <i>et al.</i>	(SERP)
STANTON	80	PL 92 B 353	N.R. Stanton <i>et al.</i>	(OSU, CARL, MCGI+)
VIKTOROV	80	SJNP 32 520	V.A. Viktorov <i>et al.</i>	(SERP)
		Translated from YAF 32 1005.		
APEL	79	PL 83B 131	W.D. Apel, K.H. Augenstein, E. Bertolucci	(KARLK+)
BINNIE	79	PL 83B 141	D.M. Binnie <i>et al.</i>	(LOIC)
ZANFINO	77	PRL 38 930	C. Zanfino <i>et al.</i>	(CARL, MCGI, OHIO+)
GRIGORIAN	75	NP B91 232	A. Grigorian <i>et al.</i>	(+)
KALBFLEISCH	75	PR D11 987	G.R. Kalbfleisch, R.C. Strand, J.W. Chapman	(BNL+)
DUANE	74	PRL 32 425	A. Duane <i>et al.</i>	(LOIC, SHMP)
KALBFLEISCH	74	PR D10 916	G.R. Kalbfleisch	(BNL)
DANBURG	73	PR D8 3744	J.S. Danburg <i>et al.</i>	(BNL, MICH) JP
JACOBS	73	PR D8 18	S.M. Jacobs <i>et al.</i>	(BRAN, UMD, SYRA+) JP

APEL	72	PL 40B 680	W.D. Apel <i>et al.</i>	(KARLK, KARLE, PISA)
DALPIAZ	72	PL 42B 377	P.F. Dalpiaz <i>et al.</i>	(CERN)
BASILE	71	NC 3A 371	M. Basile <i>et al.</i>	(CERN, BGNA, STRB)
HARVEY	71	PRL 27 885	E.H. Harvey <i>et al.</i>	(MINN, MICH)
BENSINGER	70	PL 33B 505	J.R. Bensinger <i>et al.</i>	(WISC)
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DAVIS	68	PL 27B 532	R. Davis <i>et al.</i>	(NWES, ANL)
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KAMAL	92	PL B284 421	A.N. Kamal, Q.P. Xu	(ALBE)
BICKERSTAFF	82	ZPHY C16 171	R.P. Bickerstaff, B.H.J. McKellar	(MELB)
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KALBFLEISCH	64B	PRL 13 349	G.R. Kalbfleisch, O.I. Dahl, A. Rittenberg	(LRL) JP