



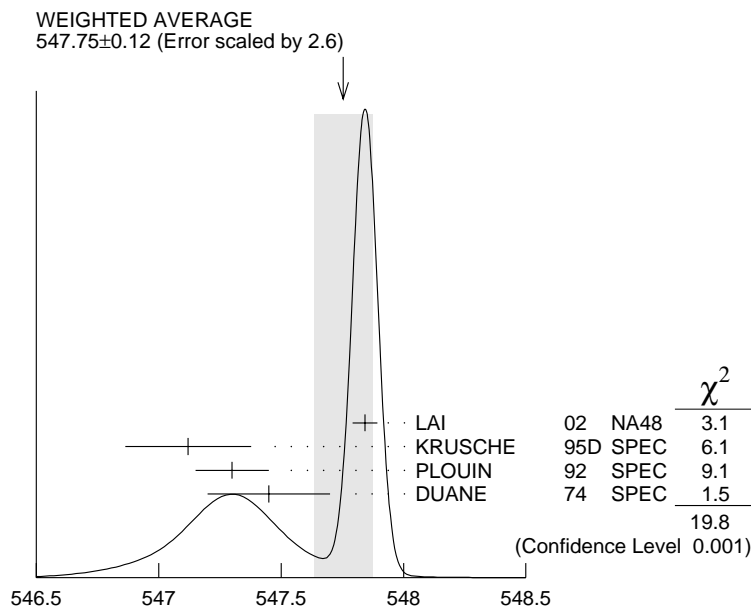
$$I^G(J^{PC}) = 0^+(0^{-+})$$

We have omitted some results that have been superseded by later experiments. The omitted results may be found in our 1988 edition Physics Letters **B204** (1988).

η MASS

We no longer use the bubble-chamber measurements from the 1960's, which seem to have been systematically high by about 1 MeV. Some early results have been omitted altogether.

VALUE (MeV)	EVTs	DOCUMENT ID	TECN	COMMENT
547.75 ± 0.12 OUR NEW AVERAGE		Error includes scale factor of 2.6. See the ideogram below. [547.30 ± 0.12 MeV OUR 2002 AVERAGE]		
547.843 ± 0.030 ± 0.041	1134	LAI	02 NA48	$\eta \rightarrow 3\pi^0$
547.12 ± 0.06 ± 0.25		KRUSCHE	95D SPEC	$\gamma p \rightarrow \eta p$, threshold
547.30 ± 0.15		PLOUIN	92 SPEC	$d p \rightarrow \eta {}^3\text{He}$
547.45 ± 0.25		DUANE	74 SPEC	$\pi^- p \rightarrow n$ neutrals
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
548.2 ± 0.65		FOSTER	65C HBC	
549.0 ± 0.7	148	FOELSCHE	64 HBC	
548.0 ± 1.0	91	ALFF-...	62 HBC	
549.0 ± 1.2	53	BASTIEN	62 HBC	



η mass (MeV)

η WIDTH

This is the partial decay rate $\Gamma(\eta \rightarrow \gamma\gamma)$ divided by the fitted branching fraction for that mode. See the "Note on the Decay Width $\Gamma(\eta \rightarrow \gamma\gamma)$ " in our 1994 edition, Phys. Rev. **D50**, 1 August 1994, Part I, p. 1451.

VALUE (keV) _____ DOCUMENT ID _____
1.18±0.11 OUR FIT Error includes scale factor of 1.8.

η DECAY MODES

Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level
Neutral modes		
Γ_1 neutral modes	(72.0 ± 0.5) %	S=1.3
Γ_2 2γ	[a] (39.43 ± 0.26) %	S=1.2
Γ_3 $3\pi^0$	(32.51 ± 0.29) %	S=1.2
Γ_4 $\pi^0 2\gamma$	(7.2 ± 1.4) × 10 ⁻⁴	
Γ_5 other neutral modes	< 2.8 %	CL=90%
Charged modes		
Γ_6 charged modes	(28.0 ± 0.5) %	S=1.3
Γ_7 $\pi^+\pi^-\pi^0$	(22.6 ± 0.4) %	S=1.3
Γ_8 $\pi^+\pi^-\gamma$	(4.68 ± 0.11) %	S=1.2
Γ_9 $e^+e^-\gamma$	(6.0 ± 0.8) × 10 ⁻³	S=1.4
Γ_{10} $\mu^+\mu^-\gamma$	(3.1 ± 0.4) × 10 ⁻⁴	
Γ_{11} e^+e^-	< 7.7 × 10 ⁻⁵	CL=90%
Γ_{12} $\mu^+\mu^-$	(5.8 ± 0.8) × 10 ⁻⁶	
Γ_{13} $e^+e^-e^+e^-$	< 6.9 × 10 ⁻⁵	CL=90%
Γ_{14} $\pi^+\pi^-e^+e^-$	(4.0 ^{+14.0} _{-2.7}) × 10 ⁻⁴	S=5.8
Γ_{15} $\pi^+\pi^-2\gamma$	< 2.0 × 10 ⁻³	
Γ_{16} $\pi^+\pi^-\pi^0\gamma$	< 5 × 10 ⁻⁴	CL=90%
Γ_{17} $\pi^0\mu^+\mu^-\gamma$	< 3 × 10 ⁻⁶	CL=90%
Charge conjugation (C), Parity (P), Charge conjugation × Parity (CP), or Lepton Family number (LF) violating modes		
Γ_{18} $\pi^+\pi^-$	<i>P,CP</i> < 3.3 × 10 ⁻⁴	CL=90%
Γ_{19} $\pi^0\pi^0$	<i>P,CP</i> < 4.3 × 10 ⁻⁴	CL=90%
Γ_{20} 3γ	<i>C</i> < 5 × 10 ⁻⁴	CL=95%
Γ_{21} $4\pi^0$	<i>P,CP</i> < 6.9 × 10 ⁻⁷	CL=90%
Γ_{22} $\pi^0e^+e^-$	<i>C</i> [b] < 4 × 10 ⁻⁵	CL=90%
Γ_{23} $\pi^0\mu^+\mu^-$	<i>C</i> [b] < 5 × 10 ⁻⁶	CL=90%
Γ_{24} $\mu^+e^- + \mu^-e^+$	<i>LF</i> < 6 × 10 ⁻⁶	CL=90%

[a] See the “Note on the Decay Width $\Gamma(\eta \rightarrow \gamma\gamma)$ ” in our 1994 edition, Phys. Rev. **D50**, 1 August 1994, Part I, p. 1451.

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

CONSTRAINED FIT INFORMATION

An overall fit to a decay rate and 18 branching ratios uses 42 measurements and one constraint to determine 9 parameters. The overall fit has a $\chi^2 = 29.7$ for 34 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_3	46							
x_4	2	2						
x_7	-79	-82	-5					
x_8	-63	-66	-4	68				
x_9	-8	-8	0	-7	-6			
x_{10}	0	0	0	-1	0	0		
x_{14}	-7	-8	0	-17	-13	-1	0	
Γ	-7	-3	0	6	5	1	0	1
	x_2	x_3	x_4	x_7	x_8	x_9	x_{10}	x_{14}

Mode	Rate (keV)	Scale factor
Γ_2 2γ	[a] 0.46 ± 0.04	1.8
Γ_3 $3\pi^0$	0.383 ± 0.035	1.8
Γ_4 $\pi^0 2\gamma$	$(8.5 \pm 1.9) \times 10^{-4}$	1.1
Γ_7 $\pi^+ \pi^- \pi^0$	0.267 ± 0.025	1.8
Γ_8 $\pi^+ \pi^- \gamma$	0.055 ± 0.005	1.7
Γ_9 $e^+ e^- \gamma$	0.0071 ± 0.0011	1.5
Γ_{10} $\mu^+ \mu^- \gamma$	$(3.7 \pm 0.6) \times 10^{-4}$	1.1
Γ_{14} $\pi^+ \pi^- e^+ e^-$	$(0.47 \pm 1.70 \mp 0.32) \times 10^{-3}$	5.8

η DECAY RATES

$\Gamma(2\gamma)$

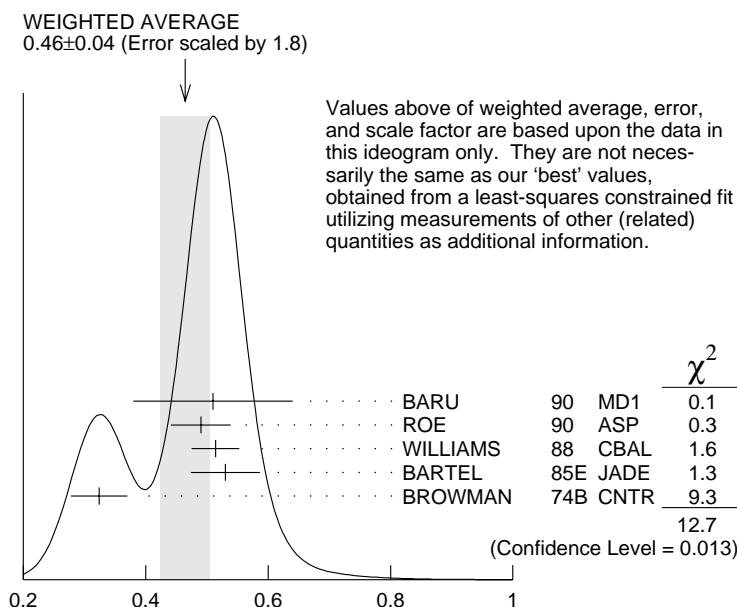
Γ_2

See the table immediately above giving the fitted decay rates. See also the “Note on the Decay Width $\Gamma(\eta \rightarrow \gamma\gamma)$,” in our 1994 edition, Phys. Rev. **D50**, 1 August 1994, Part I, p. 1451.

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
0.46 ± 0.04 OUR FIT	Error	includes scale factor of 1.8.		
0.46 ± 0.04 OUR AVERAGE	Error	includes scale factor of 1.8.	See the ideogram below.	
$0.51 \pm 0.12 \pm 0.05$	36	BARU	90 MD1	$e^+ e^- \rightarrow e^+ e^- \eta$
$0.490 \pm 0.010 \pm 0.048$	2287	ROE	90 ASP	$e^+ e^- \rightarrow e^+ e^- \eta$

$0.514 \pm 0.017 \pm 0.035$	1295	WILLIAMS	88	CBAL	$e^+ e^- \rightarrow e^+ e^- \eta$
$0.53 \pm 0.04 \pm 0.04$		BARTEL	85E	JADE	$e^+ e^- \rightarrow e^+ e^- \eta$
0.324 ± 0.046		BROWMAN	74B	CNTR	Primakoff effect
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
$0.64 \pm 0.14 \pm 0.13$		AIHARA	86	TPC	$e^+ e^- \rightarrow e^+ e^- \eta$
0.56 ± 0.16	56	WEINSTEIN	83	CBAL	$e^+ e^- \rightarrow e^+ e^- \eta$
1.00 ± 0.22		¹ BEMPORAD	67	CNTR	Primakoff effect

¹ BEMPORAD 67 gives $\Gamma(2\gamma) = 1.21 \pm 0.26$ keV assuming $\Gamma(2\gamma)/\Gamma(\text{total}) = 0.314$. Bemporad private communication gives $\Gamma(2\gamma)^2/\Gamma(\text{total}) = 0.380 \pm 0.083$. We evaluate this using $\Gamma(2\gamma)/\Gamma(\text{total}) = 0.38 \pm 0.01$. Not included in average because the uncertainty resulting from the separation of the coulomb and nuclear amplitudes has apparently been underestimated.



$\Gamma(2\gamma)$ (keV)

η BRANCHING RATIOS

Neutral modes

$\Gamma(\text{neutral modes})/\Gamma_{\text{total}}$		$\Gamma_1/\Gamma = (\Gamma_2 + \Gamma_3 + \Gamma_4)/\Gamma$		
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.720 ± 0.005 OUR FIT	Error includes scale factor of 1.3.			
0.705 ± 0.008	16k	BASILE	71D CNTR	MM spectrometer
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
0.79 ± 0.08		BUNIATOV	67	OSPK

$\Gamma(2\gamma)/\Gamma_{\text{total}}$					Γ_2/Γ
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
0.3943±0.0026 OUR FIT				Error includes scale factor of 1.2.	
0.3949±0.0017±0.0030	65k	ABEGG	96 SPEC	$pd \rightarrow {}^3\text{He}\eta$	

$\Gamma(2\gamma)/\Gamma(\text{neutral modes})$					$\Gamma_2/\Gamma_1 = \Gamma_2/(\Gamma_2+\Gamma_3+\Gamma_4)$
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
0.5475±0.0021 OUR FIT				Error includes scale factor of 1.1.	
0.549 ±0.004 OUR AVERAGE					
0.549 ±0.004		ALDE	84 GAM2		
0.535 ±0.018		BUTTRAM	70 OSPK		
0.59 ±0.033		BUNIATOV	67 OSPK		
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
0.52 ±0.09	88	ABROSIMOV	80 HLBC		
0.60 ±0.14	113	KENDALL	74 OSPK		
0.57 ±0.09		STRUGALSKI	71 HLBC		
0.579 ±0.052		FELDMAN	67 OSPK		
0.416 ±0.044		DIGIUGNO	66 CNTR	Error doubled	
0.44 ±0.07		GRUNHAUS	66 OSPK		
0.39 ±0.06		² JONES	66 CNTR		

² This result from combining cross sections from two different experiments.

$\Gamma(3\pi^0)/\Gamma(\text{neutral modes})$					$\Gamma_3/\Gamma_1 = \Gamma_3/(\Gamma_2+\Gamma_3+\Gamma_4)$
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
0.4515±0.0021 OUR FIT				Error includes scale factor of 1.1.	
0.450 ±0.004 OUR AVERAGE					
0.450 ±0.004		ALDE	84 GAM2		
0.439 ±0.024		BUTTRAM	70 OSPK		
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
0.44 ±0.08	75	ABROSIMOV	80 HLBC		
0.32 ±0.09		STRUGALSKI	71 HLBC		
0.41 ±0.033		BUNIATOV	67 OSPK	Not indep. of $\Gamma(2\gamma)/\Gamma(\text{neutral modes})$	
0.177 ±0.035		FELDMAN	67 OSPK		
0.209 ±0.054		DIGIUGNO	66 CNTR	Error doubled	
0.29 ±0.10		GRUNHAUS	66 OSPK		

$\Gamma(3\pi^0)/\Gamma(2\gamma)$					Γ_3/Γ_2
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>		
0.825±0.007 OUR FIT				Error includes scale factor of 1.1.	
0.832±0.011 OUR AVERAGE					
0.826±0.024	³ ACHASOV	00D SND	$e^+e^- \rightarrow \phi \rightarrow \eta\gamma$		
0.832±0.005±0.012	KRUSCHE	95D SPEC	$\gamma p \rightarrow \eta p$, threshold		
0.841±0.034	AMSLER	93 CBAR	$\bar{p}p \rightarrow \pi^+\pi^-\eta$ at rest		
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
0.796±0.016±0.016	ACHASOV	00 SND	See ACHASOV 00D		
0.822±0.009	⁴ ALDE	84 GAM2			
0.91 ±0.14	COX	70B HBC			
0.75 ±0.09	DEVONS	70 OSPK			
0.88 ±0.16	BALTAY	67D DBC			
1.1 ±0.2	CENCE	67 OSPK			
1.25 ±0.39	BACCI	63 CNTR	Inverse BR reported		

³This is a corrected result: see ACHASOV 02C.

⁴This result is not independent of other ALDE 84 results in this Listing, and so is omitted from the fit and average.

$\Gamma(\pi^0 2\gamma)/\Gamma(\text{neutral modes})$ $\Gamma_4/\Gamma_1 = \Gamma_4/(\Gamma_2+\Gamma_3+\Gamma_4)$

<u>VALUE (units 10⁻³)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>
1.00±0.20 OUR FIT		
1.0 ±0.2	ALDE	84 GAM2

$\Gamma(\pi^0 2\gamma)/\Gamma_{\text{total}}$ Γ_4/Γ

Early results are summarized in the review by LANDSBERG 85.

<u>VALUE (units 10⁻⁴)</u>	<u>CL%</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
7.2±1.4 OUR FIT					

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

< 8.4	90	7	ACHASOV	01D SND	$e^+e^- \rightarrow \phi \rightarrow \eta\gamma$
9.5±2.3		70	BINON	82 GAM2	See ALDE 84
<30	90	0	DAVYDOV	81 GAM2	$\pi^- p \rightarrow \eta n$

$\Gamma(\text{neutral modes})/[\Gamma(\pi^+\pi^-\pi^0) + \Gamma(\pi^+\pi^-\gamma) + \Gamma(e^+e^-\gamma)]$
 $\Gamma_1/(\Gamma_7+\Gamma_8+\Gamma_9) = (\Gamma_2+\Gamma_3+\Gamma_4)/(\Gamma_7+\Gamma_8+\Gamma_9)$

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>
2.58±0.06 OUR FIT	Error includes scale factor of 1.3.		
2.64±0.23		BALTAY	67B DBC

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

4.5 ±1.0	280	⁵ JAMES	66 HBC
3.20±1.26	53	⁵ BASTIEN	62 HBC
2.5 ±1.0	10	⁵ PICKUP	62 HBC

⁵These experiments are not used in the averages as they do not separate clearly $\eta \rightarrow \pi^+\pi^-\pi^0$ and $\eta \rightarrow \pi^+\pi^-\gamma$ from each other. The reported values thus probably contain some unknown fraction of $\eta \rightarrow \pi^+\pi^-\gamma$.

$\Gamma(\text{neutral modes})/\Gamma(\pi^+\pi^-\pi^0)$ $\Gamma_1/\Gamma_7 = (\Gamma_2+\Gamma_3+\Gamma_4)/\Gamma_7$

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>
3.18±0.08 OUR FIT	Error includes scale factor of 1.3.		
3.26±0.30 OUR AVERAGE			

2.54±1.89	74	KENDALL	74 OSPK
3.4 ±1.1	29	AGUILAR-...	72B HBC
2.83±0.80	70	⁶ BLOODWO...	72B HBC
3.6 ±0.6	244	FLATTE	67B HBC
2.89±0.56		ALFF-...	66 HBC
3.6 ±0.8	50	KRAEMER	64 DBC
3.8 ±1.1		PAULI	64 DBC

⁶Error increased from published value 0.5 by Bloodworth (private communication).

$\Gamma(2\gamma)/[\Gamma(\pi^+\pi^-\pi^0) + \Gamma(\pi^+\pi^-\gamma) + \Gamma(e^+e^-\gamma)]$ $\Gamma_2/(\Gamma_7+\Gamma_8+\Gamma_9)$

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>
1.412±0.033 OUR FIT	Error includes scale factor of 1.3.		
1.1 ±0.4 OUR AVERAGE			
1.51 ±0.93	75	KENDALL	74 OSPK
0.99 ±0.48		CRAWFORD	63 HBC

$\Gamma(2\gamma)/\Gamma(\pi^+\pi^-\pi^0)$					Γ_2/Γ_7
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
1.74±0.04 OUR FIT	Error includes scale factor of 1.3.				
1.75±0.13 OUR AVERAGE					
1.78±0.10±0.13	1077	AMSLER	95	CBAR	$\bar{p}p \rightarrow \pi^+\pi^-\eta$ at rest
1.72±0.25	401	BAGLIN	69	HLBC	
1.61±0.39		FOSTER	65	HBC	

$\Gamma(3\pi^0)/\Gamma(\pi^+\pi^-\pi^0)$					Γ_3/Γ_7
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
1.44±0.04 OUR FIT	Error includes scale factor of 1.3.				
1.49±0.06 OUR AVERAGE					
1.52±0.04±0.08	23k	⁷ AKHMETSHIN 01B	CMD2		$e^+e^- \rightarrow \phi \rightarrow \eta\gamma$
1.44±0.09±0.10	1627	AMSLER	95	CBAR	$\bar{p}p \rightarrow \pi^+\pi^-\eta$ at rest
1.50 ^{+0.15} _{-0.29}	199	BAGLIN	69	HLBC	
1.47 ^{+0.20} _{-0.17}		BULLOCK	68	HLBC	

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

1.3 ±0.4		BAGLIN	67B	HLBC
0.90±0.24		FOSTER	65	HBC
2.0 ±1.0		FOELSCHE	64	HBC
0.83±0.32		CRAWFORD	63	HBC

⁷ AKHMETSHIN 01B uses results from AKHMETSHIN 99F.

$\Gamma(\text{other neutral modes})/\Gamma_{\text{total}}$					Γ_5/Γ
<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<0.028	90	ABEGG	96	SPEC	$pd \rightarrow {}^3\text{He}\eta$

These are neutral modes other than $\gamma\gamma$, $3\pi^0$, and $\pi^0\gamma\gamma$. Nearly any such mode one can think of would violate P , or C , or both.

————— Charged modes —————

$\Gamma(\pi^+\pi^-\pi^0)/[\Gamma(2\gamma) + \Gamma(3\pi^0)]$					$\Gamma_7/(\Gamma_2+\Gamma_3)$
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>		
0.315 ±0.007 OUR FIT	Error includes scale factor of 1.3.				
0.304 ±0.012	⁸ ACHASOV	00D	SND	$e^+e^- \rightarrow \phi \rightarrow \eta\gamma$	
0.3141±0.0081±0.0058	ACHASOV	00B	SND	See ACHASOV 00D	

⁸ This is a corrected result: see ACHASOV 02C

$\Gamma(\pi^+\pi^-\gamma)/\Gamma(\pi^+\pi^-\pi^0)$					Γ_8/Γ_7
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
0.207±0.004 OUR FIT	Error includes scale factor of 1.1.				
0.207±0.004 OUR AVERAGE	Error includes scale factor of 1.1.				
0.209±0.004	18k	THALER	73	ASPK	
0.201±0.006	7250	GORMLEY	70	ASPK	
0.28 ±0.04		BALTAY	67B	DBC	
0.25 ±0.035		LITCHFIELD	67	DBC	
0.30 ±0.06		CRAWFORD	66	HBC	
0.196±0.041		FOSTER	65C	HBC	

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

<u>VALUE (units 10^{-3})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
6.0 ± 0.8 OUR FIT				Error includes scale factor of 1.4.
6.3 ± 1.0 OUR AVERAGE				Error includes scale factor of 1.6.
5.15 ± 0.62 ± 0.74	283	ACHASOV	01B SND	$e^+e^- \rightarrow \phi \rightarrow \eta\gamma$
7.10 ± 0.64 ± 0.46	323	AKHMETSHIN 01	CMD2	$e^+e^- \rightarrow \phi \rightarrow \eta\gamma$

$\Gamma(e^+e^-\gamma)/\Gamma(\pi^+\pi^-\pi^0)$ **Γ_9/Γ_7**

<u>VALUE (units 10^{-2})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
2.65 ± 0.35 OUR FIT				Error includes scale factor of 1.5.
2.1 ± 0.5	80	JANE	75B OSPK	See the erratum

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

<u>VALUE (units 10^{-4})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
3.1 ± 0.4 OUR FIT				
3.1 ± 0.4	600	DZHELYADIN 80	SPEC	$\pi^-p \rightarrow \eta n$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.5 ± 0.75	100	BUSHNIN	78 SPEC	See DZHELYADIN 80

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

<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
< 0.77	90	BROWDER	97B CLE2	$e^+e^- \simeq 10.5 \text{ GeV}$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
< 2	90	WHITE	96 SPEC	$pd \rightarrow \eta^3\text{He}$
< 3	90	DAVIES	74 RVUE	Uses ESTEN 67

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

<u>VALUE (units 10^{-6})</u>	<u>CL%</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
5.8 ± 0.8 OUR AVERAGE					
5.7 ± 0.7 ± 0.5		114	ABEGG	94 SPEC	$pd \rightarrow \eta^3\text{He}$
6.5 ± 2.1		27	DZHELYADIN 80B	SPEC	$\pi^-p \rightarrow \eta n$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
5.6 ^{+0.6} _{-0.7} ± 0.5		100	KESSLER	93 SPEC	See ABEGG 94
< 20	95	0	WEHMANN	68 OSPK	

$\Gamma(\mu^+\mu^-)/\Gamma(2\gamma)$ **Γ_{12}/Γ_2**

<u>VALUE (units 10^{-5})</u>	<u>DOCUMENT ID</u>	<u>TECN</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •		
5.9 ± 2.2	HYAMS	69 OSPK

$\Gamma(e^+e^-e^+e^-)/\Gamma_{\text{total}}$ **Γ_{13}/Γ**

<u>VALUE (units 10^{-5})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
< 6.9	90	AKHMETSHIN 01	CMD2	$e^+e^- \rightarrow \phi \rightarrow \eta\gamma$

$\Gamma(\pi^+\pi^-\mathbf{e^+e^-})/\Gamma(\pi^+\pi^-\gamma)$ Γ_{14}/Γ_8

VALUE (units 10⁻²) EVTS DOCUMENT ID TECN

0.9^{+3.1}_{-0.6} OUR FIT Error includes scale factor of 5.9.

2.6±2.6 1 GROSSMAN 66 HBC

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

VALUE (units 10⁻⁴) EVTS DOCUMENT ID TECN COMMENT

4.0^{+14.0}_{-2.7} OUR FIT Error includes scale factor of 5.8.

3.7^{+2.5}_{-1.8}±0.3 4 AKHMETSHIN 01 CMD2 $e^+e^- \rightarrow \phi \rightarrow \eta\gamma$

$\Gamma(\pi^+\pi^-\mathbf{2\gamma})/\Gamma(\pi^+\pi^-\pi^0)$ Γ_{15}/Γ_7

VALUE CL% DOCUMENT ID TECN

<0.009 PRICE 67 HBC

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

<0.016 95 BALTAY 67B DBC

$\Gamma(\pi^+\pi^-\pi^0\mathbf{\gamma})/\Gamma(\pi^+\pi^-\pi^0)$ Γ_{16}/Γ_7

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

<0.24 90 0 THALER 73 ASPK

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

<1.7 90 ARNOLD 68 HLBC

<1.6 95 BALTAY 67B DBC

<7.0 FLATTE 67 HBC

<0.9 PRICE 67 HBC

$\Gamma(\pi^0\mu^+\mu^-\mathbf{\gamma})/\Gamma_{\text{total}}$ Γ_{17}/Γ

VALUE (units 10⁻⁶) CL% DOCUMENT ID TECN COMMENT

<3 90 DZHELYADIN 81 SPEC $\pi^-p \rightarrow \eta n$

————— **Rare or forbidden modes** —————

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

Forbidden by *P* and *CP* invariance.

VALUE (units 10⁻⁴) CL% EVTS DOCUMENT ID TECN COMMENT

< 3.3 90 AKHMETSHIN 99B CMD2 $e^+e^- \rightarrow \phi \rightarrow \eta\gamma$

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

< 9 90 AKHMETSHIN 97C CMD2 See AKHMETSHIN 99B

<15 0 THALER 73 ASPK

$\Gamma(\pi^0\pi^0)/\Gamma_{\text{total}}$ Γ_{19}/Γ

Forbidden by *P* and *CP* invariance.

VALUE (units 10⁻⁴) CL% DOCUMENT ID TECN COMMENT

<4.3 90 AKHMETSHIN 99C CMD2 $e^+e^- \rightarrow \phi \rightarrow \eta\gamma$

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

<6 90 ⁹ACHASOV 98 SND $e^+e^- \rightarrow \phi \rightarrow \eta\gamma$

⁹ACHASOV 98 observes one event in a $\pm 3\sigma$ region around the η mass, while a Monte Carlo calculation gives 10 ± 5 events. The limit here is the Poisson upper limit for one observed event and no background.

$\Gamma(4\pi^0)/\Gamma_{\text{total}}$ **Γ_{21}/Γ**
 Forbidden by P and CP invariance.

<u>VALUE (units 10^{-7})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<6.9	90	PRAKHOV	00	CRYB $\pi^- p \rightarrow n\eta$, 720 MeV/c

$\Gamma(3\gamma)/\Gamma(\text{neutral modes})$ **$\Gamma_{20}/\Gamma_1 = \Gamma_{20}/(\Gamma_2+\Gamma_3+\Gamma_4)$**
 Forbidden by C invariance.

<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>
<7	95	ALDE	84 GAM2

$\Gamma(\pi^0 e^+ e^-)/\Gamma(\pi^+ \pi^- \pi^0)$ **Γ_{22}/Γ_7**
 C parity forbids this to occur as a single-photon process.

<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>
< 1.9	90		JANE	75 OSPK
• • • We do not use the following data for averages, fits, limits, etc. • • •				
< 42	90		BAGLIN	67 HLBC
< 16	90	0	BILLING	67 HLBC
< 77		0	FOSTER	65B HBC
<110			PRICE	65 HBC

$\Gamma(\pi^0 e^+ e^-)/\Gamma_{\text{total}}$ **Γ_{22}/Γ**
 C parity forbids this to occur as a single-photon process.

<u>VALUE (units 10^{-2})</u>	<u>CL%</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.016	90	0	MARTYNOV	76 HLBC
<0.084	90		BAZIN	68 DBC
<0.7			RITTENBERG	65 HBC

$\Gamma(\pi^0 \mu^+ \mu^-)/\Gamma_{\text{total}}$ **Γ_{23}/Γ**
 C parity forbids this to occur as a single-photon process.

<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.05	90	DZHELYADIN	81	SPEC $\pi^- p \rightarrow \eta n$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<5		WEHMANN	68	OSPK

$[\Gamma(\mu^+ e^-) + \Gamma(\mu^- e^+)]/\Gamma_{\text{total}}$ **Γ_{24}/Γ**
 Forbidden by lepton family number conservation.

<u>VALUE (units 10^{-6})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<6	90	WHITE	96	SPEC $pd \rightarrow \eta {}^3\text{He}$

η C-NONCONSERVING DECAY PARAMETERS

$\pi^+ \pi^- \pi^0$ LEFT-RIGHT ASYMMETRY PARAMETER

Measurements with an error $> 1.0 \times 10^{-2}$ have been omitted.

<u>VALUE (units 10^{-2})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>
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0.09 ± 0.17 OUR AVERAGE

0.28 ± 0.26	165k	JANE	74 OSPK
-0.05 ± 0.22	220k	LAYTER	72 ASPK

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

1.5 ± 0.5	37k	¹⁰ GORMLEY	68C ASPK
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¹⁰The GORMLEY 68C asymmetry is probably due to unmeasured ($\mathbf{E} \times \mathbf{B}$) spark chamber effects. New experiments with ($\mathbf{E} \times \mathbf{B}$) controls don't observe an asymmetry.

$\pi^+ \pi^- \pi^0$ SEXTANT ASYMMETRY PARAMETER

Measurements with an error $> 2.0 \times 10^{-2}$ have been omitted.

<u>VALUE (units 10^{-2})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>
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0.18 ± 0.16 OUR AVERAGE

0.20 ± 0.25	165k	JANE	74 OSPK
0.10 ± 0.22	220k	LAYTER	72 ASPK
0.5 ± 0.5	37k	GORMLEY	68C WIRE

$\pi^+ \pi^- \pi^0$ QUADRANT ASYMMETRY PARAMETER

<u>VALUE (units 10^{-2})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>
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-0.17 ± 0.17 OUR AVERAGE

-0.30 ± 0.25	165k	JANE	74 OSPK
-0.07 ± 0.22	220k	LAYTER	72 ASPK

$\pi^+ \pi^- \gamma$ LEFT-RIGHT ASYMMETRY PARAMETER

Measurements with an error $> 2.0 \times 10^{-2}$ have been omitted.

<u>VALUE (units 10^{-2})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>
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0.9 ± 0.4 OUR AVERAGE

1.2 ± 0.6	35k	JANE	74B OSPK
0.5 ± 0.6	36k	THALER	72 ASPK
1.22 ± 1.56	7257	GORMLEY	70 ASPK

$\pi^+ \pi^- \gamma$ PARAMETER β (*D*-wave)

Sensitive to a *D*-wave contribution: $dN/d\cos\theta = \sin^2\theta (1 + \beta \cos^2\theta)$.

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>
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-0.02 ± 0.07 OUR AVERAGE Error includes scale factor of 1.3.

0.11 ± 0.11	35k	JANE	74B OSPK
-0.060 ± 0.065	7250	GORMLEY	70 WIRE

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

0.12 ± 0.06		¹¹ THALER	72 ASPK
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¹¹The authors don't believe this indicates *D*-wave because the dependence of β on the γ energy is inconsistent with the theoretical prediction. A $\cos^2\theta$ dependence can also come from *P*- and *F*-wave interference.

ENERGY DEPENDENCE OF $\eta \rightarrow 3\pi$ DALITZ PLOTS

PARAMETERS FOR $\eta \rightarrow \pi^+ \pi^- \pi^0$

See the "Note on η Decay Parameters" in our 1994 edition, Phys. Rev. **D50**, 1 August 1994, Part I, p. 1454. The following experiments fit to one or more of the coefficients a , b , c , d , or e for $|\text{matrix element}|^2 = 1 + ay + by^2 + cx + dx^2 + exy$.

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
• • •	We do not use the following data for averages, fits, limits, etc.	• • •		
	3230	¹² ABELE	98D	CBAR $\bar{p}p \rightarrow \pi^0 \pi^0 \eta$ at rest
	1077	¹³ AMSLER	95	CBAR $\bar{p}p \rightarrow \pi^+ \pi^- \eta$ at rest
	81k	LAYTER	73	ASPK
	220k	LAYTER	72	ASPK
	1138	CARPENTER	70	HBC
	349	DANBURG	70	DBC
	7250	GORMLEY	70	WIRE
	526	BAGLIN	69	HLBC
	7170	CNOPS	68	OSPK
	37k	GORMLEY	68C	WIRE
	1300	CLPWY	66	HBC
	705	LARRIBE	66	HBC

¹² ABELE 98D obtains $a = -1.22 \pm 0.07$ and $b = 0.22 \pm 0.11$ when c (our d) is fixed at 0.06.

¹³ AMSLER 95 fits to $(1+ay+by^2)$ and obtains $a = -0.94 \pm 0.15$ and $b = 0.11 \pm 0.27$.

α PARAMETER FOR $\eta \rightarrow 3\pi^0$

See the "Note on η Decay Parameters" in our 1994 edition, Phys. Rev. **D50**, 1 August 1994, Part I, p. 1454. The value here is of α in $|\text{matrix element}|^2 = 1 + 2\alpha z$.

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
-0.031 ± 0.004 OUR AVERAGE				Error includes scale factor of 1.1.
-0.010 ± 0.021 ± 0.010	12k	ACHASOV	01C	SND $e^+ e^- \rightarrow \phi \rightarrow \eta \gamma$
-0.031 ± 0.004	1M	TIPPENS	01	CRYB $\pi^- p \rightarrow n \eta$, 720 MeV/c
-0.052 ± 0.017 ± 0.010	98k	ABELE	98C	CBAR $\bar{p}p \rightarrow 5\pi^0$
-0.022 ± 0.023	50k	ALDE	84	GAM2
• • •	We do not use the following data for averages, fits, limits, etc.	• • •		
-0.32 ± 0.37	192	BAGLIN	70	HLBC

η REFERENCES

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LAI	02	PL B533 196	A. Lai <i>et al.</i>	(CERN NA48 Collab.)
ACHASOV	01B	PL B504 275	M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)
ACHASOV	01C	JETPL 73 451	M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)
		Translated from ZETFP	73 511.	
ACHASOV	01D	NP B600 3	M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)
AKHMETSHIN	01	PL B501 191	R.R. Akhmetshin <i>et al.</i>	(Novosibirsk CMD-2 Collab.)
AKHMETSHIN	01B	PL B509 217	R.R. Akhmetshin <i>et al.</i>	(Novosibirsk CMD-2 Collab.)
TIPPENS	01	PRL 87 192001	W.B. Tippens <i>et al.</i>	(BNL Crystal Ball Collab.)
ACHASOV	00	EPJ C12 25	M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)
ACHASOV	00B	JETP 90 17	M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)
		Translated from ZETF	117 22.	
ACHASOV	00D	JETPL 72 282	M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)
		Translated from ZETFP	72 411.	

Also	02C	JETPL 72 282	M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)
PRAKHOV	00	PRL 84 4802	S. Prakhov <i>et al.</i>	(BNL Crystal Ball Collab.)
AKHMETSHIN	99B	PL B462 371	R.R. Akhmetshin <i>et al.</i>	(Novosibirsk CMD-2 Collab.)
AKHMETSHIN	99C	PL B462 380	R.R. Akhmetshin <i>et al.</i>	(Novosibirsk CMD-2 Collab.)
AKHMETSHIN	99F	PL B460 242	R.R. Akhmetshin <i>et al.</i>	(Novosibirsk CMD-2 Collab.)
ABELE	98C	PL B417 193	A. Abele <i>et al.</i>	(Crystal Barrel Collab.)
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ACHASOV	98	PL B425 388	M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)
AKHMETSHIN	97C	PL B415 452	R.R. Akhmetshin <i>et al.</i>	(Novosibirsk CMD-2 Collab.)
BROWDER	97B	PR D56 5359	T.E. Browder <i>et al.</i>	(CLEO Collab.)
ABEGG	96	PR D53 11	R. Abegg <i>et al.</i>	(Saturne SPES2 Collab.)
WHITE	96	PR D53 6658	D.B. White <i>et al.</i>	(Saturne SPES2 Collab.)
AMSLER	95	PL B346 203	C. Amsler <i>et al.</i>	(Crystal Barrel Collab.)
KRUSCHE	95D	ZPHY A351 237	B. Krusche <i>et al.</i>	(TAPS + A2 Collab.)
ABEGG	94	PR D50 92	R. Abegg <i>et al.</i>	(Saturne SPES2 Collab.)
AMSLER	93	ZPHY C58 175	C. Amsler <i>et al.</i>	(Crystal Barrel Collab.)
KESSLER	93	PRL 70 892	R.S. Kessler <i>et al.</i>	(Saturne SPES2 Collab.)
PLOUIN	92	PL B276 526	F. Plouin <i>et al.</i>	(Saturne SPES4 Collab.)
BARU	90	ZPHY C48 581	S.E. Baru <i>et al.</i>	(MD-1 Collab.)
ROE	90	PR D41 17	N.A. Roe <i>et al.</i>	(ASP Collab.)
WILLIAMS	88	PR D38 1365	D.A. Williams <i>et al.</i>	(Crystal Ball Collab.)
AIHARA	86	PR D33 844	H. Aihara <i>et al.</i>	(TPC-2 γ Collab.)
BARTEL	85E	PL 160B 421	W. Bartel <i>et al.</i>	(JADE Collab.)
LANDSBERG	85	PRPL 128 310	L.G. Landsberg	(SERP)
ALDE	84	ZPHY C25 225	D.M. Alde <i>et al.</i>	(SERP, BELG, LAPP)
Also	84B	SJNP 40 918	D.M. Alde <i>et al.</i>	(SERP, BELG, LAPP)
		Translated from YAF 40	1447.	
WEINSTEIN	83	PR D28 2896	A.J. Weinstein <i>et al.</i>	(Crystal Ball Collab.)
BINON	82	SJNP 36 391	F.G. Binon <i>et al.</i>	(SERP, BELG, LAPP+)
		Translated from YAF 36	670.	
Also	82B	NC 71A 497	F.G. Binon <i>et al.</i>	(SERP, BELG, LAPP+)
DAVYDOV	81	LNC 32 45	V.A. Davydov <i>et al.</i>	(SERP, BELG, LAPP+)
Also	81B	SJNP 33 825	V.A. Davydov <i>et al.</i>	(SERP, BELG, LAPP+)
		Translated from YAF 33	1534.	
DZHELADIN	81	PL 105B 239	R.I. Dzhelyadin <i>et al.</i>	(SERP)
Also	81C	SJNP 33 822	R.I. Dzhelyadin <i>et al.</i>	(SERP)
		Translated from YAF 33	1529.	
ABROSIMOV	80	SJNP 31 195	A.T. Abrosimov <i>et al.</i>	(JINR)
		Translated from YAF 31	371.	
DZHELADIN	80	PL 94B 548	R.I. Dzhelyadin <i>et al.</i>	(SERP)
Also	80C	SJNP 32 516	R.I. Dzhelyadin <i>et al.</i>	(SERP)
		Translated from YAF 32	998.	
DZHELADIN	80B	PL 97B 471	R.I. Dzhelyadin <i>et al.</i>	(SERP)
Also	80D	SJNP 32 518	R.I. Dzhelyadin <i>et al.</i>	(SERP)
		Translated from YAF 32	1002.	
BUSHNIN	78	PL 79B 147	Y.B. Bushnin <i>et al.</i>	(SERP)
Also	78B	SJNP 28 775	Y.B. Bushnin <i>et al.</i>	(SERP)
		Translated from YAF 28	1507.	
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		Translated from YAF 23	93.	
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Also	78B	PL 73B 503	M.R. Jane	
		Erratum in private communication.		
BROWMAN	74B	PRL 32 1067	A. Browman <i>et al.</i>	(CORN, BING)
DAVIES	74	NC 24A 324	J.D. Davies, J.G. Guy, R.K.P. Zia	(BIRM, RHEL+)
DUANE	74	PRL 32 425	A. Duane <i>et al.</i>	(LOIC, SHMP)
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KENDALL	74	NC 21A 387	B.N. Kendall <i>et al.</i>	(BROW, BARI, MIT)
LAYTER	73	PR D7 2565	J.G. Layter <i>et al.</i>	(COLU)
THALER	73	PR D7 2569	J.J. Thaler <i>et al.</i>	(COLU)
AGUILAR...	72B	PR D6 29	M. Aguilar-Benitez <i>et al.</i>	(BNL)
BLOODWORTH...	72B	NP B39 525	I.J. Bloodworth <i>et al.</i>	(TNT0)
LAYTER	72	PRL 29 316	J.G. Layter <i>et al.</i>	(COLU)
THALER	72	PRL 29 313	J.J. Thaler <i>et al.</i>	(COLU)
BASILE	71D	NC 3A 796	M. Basile <i>et al.</i>	(CERN, BGNA, STRB)
STRUGALSKI	71	NP B27 429	Z.S. Strugalski <i>et al.</i>	(JINR)
BAGLIN	70	NP B22 66	C. Baglin <i>et al.</i>	(EPOL, MADR, STRB)
BUTTRAM	70	PRL 25 1358	M.T. Buttram, M.N. Kreisler, R.E. Mischke	(PRIN)
CARPENTER	70	PR D1 1303	D.W. Carpenter <i>et al.</i>	(DUKE)
COX	70B	PRL 24 534	B. Cox, L. Fortney, J.P. Golson	(DUKE)

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DEVONS	70	PR D1 1936	S. Devons <i>et al.</i>	(COLU, SYRA)
GORMLEY	70	PR D2 501	M. Gormley <i>et al.</i>	(COLU, BNL)
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BAGLIN	69	PL 29B 445	C. Baglin <i>et al.</i>	(EPOL, UCB, MADR, STRB)
Also	70	NP B22 66	C. Baglin <i>et al.</i>	(EPOL, MADR, STRB)
HYAMS	69	PL 29B 128	B.D. Hyams <i>et al.</i>	(CERN, MPIM)
ARNOLD	68	PL 27B 466	R.G. Arnold <i>et al.</i>	(STRB, MADR, EPOL+)
BAZIN	68	PRL 20 895	M.J. Bazin <i>et al.</i>	(PRIN, QUKI)
BULLOCK	68	PL 27B 402	F.W. Bullock <i>et al.</i>	(LOUC)
CNOPS	68	PRL 21 1609	A.M. Cnops <i>et al.</i>	(BNL, ORNL, UCND+)
GORMLEY	68C	PRL 21 402	M. Gormley <i>et al.</i>	(COLU, BNL)
WEHMANN	68	PRL 20 748	A.W. Wehmann <i>et al.</i>	(HARV, CASE, SLAC+)
BAGLIN	67	PL 24B 637	C. Baglin <i>et al.</i>	(EPOL, UCB)
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BILLING	67	PL 25B 435	K.D. Billing <i>et al.</i>	(LOUC, OXF)
BUNIATOV	67	PL 25B 560	S.A. Bunyatov <i>et al.</i>	(CERN, KARL)
CENCE	67	PRL 19 1393	R.J. Cence <i>et al.</i>	(HAWA, LRL)
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PRICE	67	PRL 18 1207	L.R. Price, F.S. Crawford	(LRL)
ALFF-...	66	PR 145 1072	C. Alff-Steinberger <i>et al.</i>	(COLU, RUTG)
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CRAWFORD	66	PRL 16 333	F.S. Crawford, L.R. Price	(LRL)
DIGIUGNO	66	PRL 16 767	G. di Giugno <i>et al.</i>	(NAPL, TRST, FRAS)
GROSSMAN	66	PR 146 993	R.A. Grossman, L.R. Price, F.S. Crawford	(LRL)
GRUNHAUS	66	Thesis	J. Grunhaus	(COLU)
JAMES	66	PR 142 896	F.E. James, H.L. Kraybill	(YALE, BNL)
JONES	66	PL 23 597	W.G. Jones <i>et al.</i>	(LOIC, RHEL)
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FOSTER	65	PR 138B 652	M. Foster <i>et al.</i>	(WISC, PURD)
FOSTER	65B	Athens Conf.	M. Foster, M. Good, M. Meer	(WISC)
FOSTER	65C	Thesis	M. Foster	(WISC)
PRICE	65	PRL 15 123	L.R. Price, F.S. Crawford	(LRL)
RITTENBERG	65	PRL 15 556	A. Rittenberg, G.R. Kalbfleisch	(LRL, BNL)
FOELSCH	64	PR 134B 1138	H.W.J. Foelsche, H.L. Kraybill	(YALE)
KRAEMER	64	PR 136B 496	R.W. Kraemer <i>et al.</i>	(JHU, NWES, WOOD)
PAULI	64	PL 13 351	E. Pauli, A. Muller	(SACL)
BACCI	63	PRL 11 37	C. Bacci <i>et al.</i>	(ROMA, FRAS)
CRAWFORD	63	PRL 10 546	F.S.Jr. Crawford, L.J. Lloyd, E.C. Fowler	(LRL+)
Also	66B	PRL 16 907	F.S. Crawford, L.J. Lloyd, E.C. Fowler	(LRL+)
ALFF-...	62	PRL 9 322	C. Alff-Steinberger <i>et al.</i>	(COLU, RUTG)
BASTIEN	62	PRL 8 114	P.L. Bastien <i>et al.</i>	(LRL)
PICKUP	62	PRL 8 329	E. Pickup, D.K. Robinson, E.O. Salant	(CNRC+)