

1392 ± 14	900 ± 375	AMSLER	04B CBAR	0 $\bar{p}p \rightarrow \pi^+\pi^-\pi^+\pi^-\eta$
1394 ± 8	6.6 ± 2.0k	AMSLER	04B CBAR	0 $\bar{p}p \rightarrow \pi^+\pi^-\pi^0\pi^0\eta$
1404 ± 6	9082	MANAK	00A MPS	18 $\pi^-\rho \rightarrow \eta\pi^+\pi^-n$
1424 ± 6	2200	ALDE	97B GAM4	100 $\pi^-\rho \rightarrow \eta\pi^0\pi^0n$
1400 ± 6		³ BOLTON	92B MRK3	$J/\psi \rightarrow \gamma\eta\pi^+\pi^-$
1388 ± 4		FUKUI	91C SPEC	8.95 $\pi^-\rho \rightarrow \eta\pi^+\pi^-n$
1398 ± 6	261	⁴ AUGUSTIN	90 DM2	$J/\psi \rightarrow \gamma\eta\pi^+\pi^-$
1420 ± 5		ANDO	86 SPEC	8 $\pi^-\rho \rightarrow \eta\pi^+\pi^-n$

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

1404.0 ± 11.0	195	ABLIKIM	19BABES3	$e^+e^- \rightarrow \psi(2S)$
1385 ± 7		BAI	99 BES	$J/\psi \rightarrow \gamma\eta\pi^+\pi^-$
1409 ± 3		⁵ AMSLER	95F CBAR	0 $\bar{p}p \rightarrow \pi^+\pi^-\pi^0\pi^0\eta$

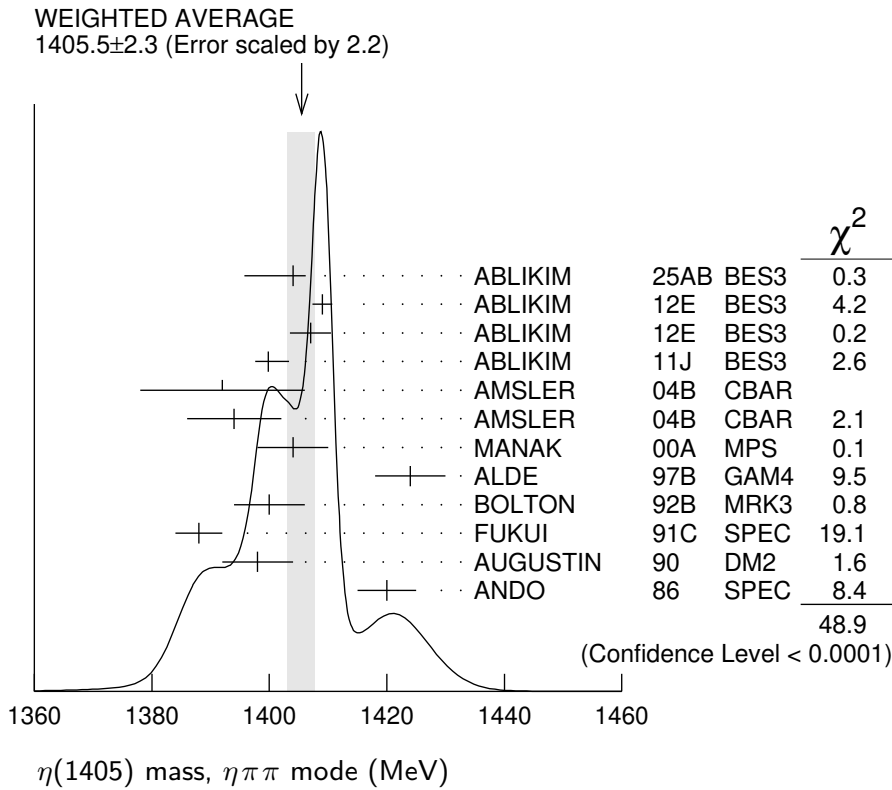
¹ ABLIKIM 25AB measured $J/\psi \rightarrow \gamma\eta(1405) \rightarrow \gamma\pi^0 f_0(980) / 0^{++} PHSP \rightarrow \gamma\pi^0\pi^0\pi^0$. Here $\gamma\pi^0 f_0(980) / 0^{++} PHSP$ indicates an intermediate state which could be either $\gamma\pi^0 f_0(980)$ or $\gamma\pi^0 0^{++}$ phase space.

² The selected process is $J/\psi \rightarrow \omega a_0(980)\pi$.

³ From fit to the $a_0(980)\pi 0^{-+}$ partial wave.

⁴ Best fit with a single Breit Wigner.

⁵ Superseded by AMSLER 04B.



$K\bar{K}\pi$ MODE ($a_0(980)\pi$ or direct $K\bar{K}\pi$)

VALUE (MeV) EVTS DOCUMENT ID TECN COMMENT

The data in this block is included in the average printed for a previous datablock.

1413.5^{+2.0}_{-0.9} OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below.

1391.7 ± 0.7 ^{+11.3} _{-0.3}	126k	¹ ABLIKIM	23M	BES3	$J/\psi \rightarrow \gamma K_S^0 K_S^0 \pi^0$
1413 ± 14	3651	² NICHITIU	02	OBLX	$0 \bar{p} p \rightarrow K^+ K^- \pi^+ \pi^- \pi^0$
1416 ± 4 ± 2	20k	ADAMS	01B	B852	$18 \text{ GeV } \pi^- p \rightarrow K^+ K^- \pi^0 n$
1405 ± 5		³ CICALO	99	OBLX	$0 \bar{p} p \rightarrow K^\pm K_S^0 \pi^\mp \pi^+ \pi^-$
1407 ± 5		³ BERTIN	97	OBLX	$0 \bar{p} p \rightarrow K^\pm (K^0) \pi^\mp \pi^+ \pi^-$
1416 ± 2		³ BERTIN	95	OBLX	$0 \bar{p} p \rightarrow K\bar{K} \pi \pi \pi$
1416 ± 8 ⁺⁷ ₋₅	700	⁴ BAI	90C	MRK3	$J/\psi \rightarrow \gamma K_S^0 K^\pm \pi^\mp$
1413 ± 5		⁴ RATH	89	MPS	$21.4 \pi^- p \rightarrow n K_S^0 K_S^0 \pi^0$

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

1459 ± 5		⁵ AUGUSTIN	92	DM2	$J/\psi \rightarrow \gamma K\bar{K} \pi$
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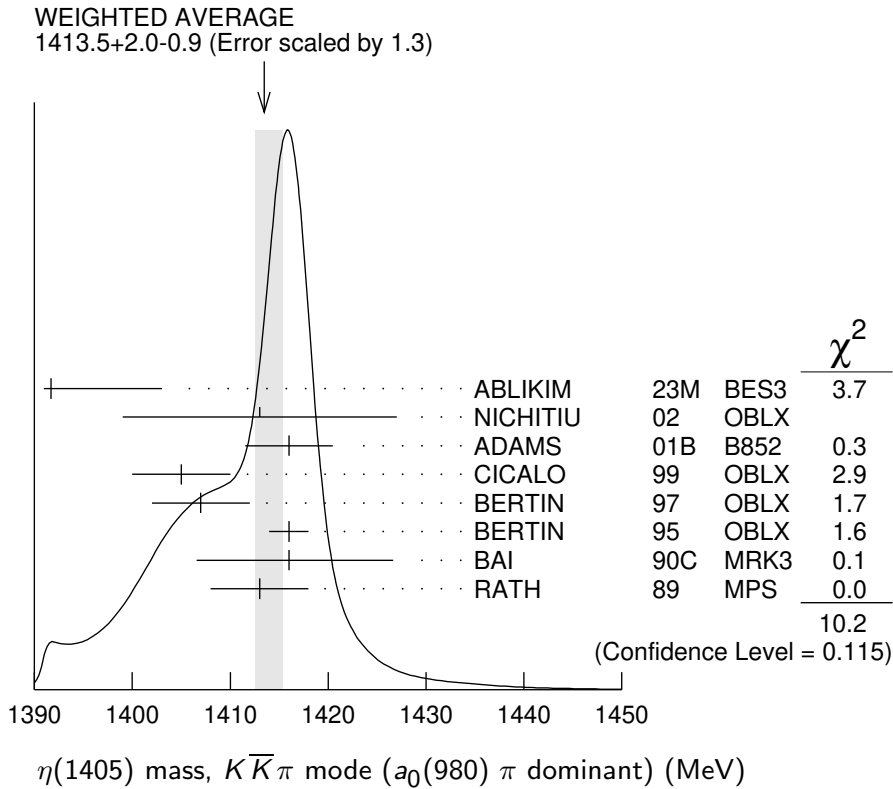
¹ ABLIKIM 23M reports for this state a significance from the fit much higher than 35 σ .

² Decaying dominantly directly to $K^+ K^- \pi^0$.

³ Decaying into $(K\bar{K})_S \pi$, $(K\pi)_S \bar{K}$, and $a_0(980)\pi$.

⁴ From fit to the $a_0(980)\pi 0^-+$ partial wave. Cannot rule out a $a_0(980)\pi 1^++$ partial wave.

⁵ Excluded from averaging because averaging would be meaningless.



$\pi\pi\gamma$ MODE

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
1403 ± 17	OUR AVERAGE	Error includes scale factor of 1.8.		
1390 ± 12	235 ± 91	AMSLER	04B CBAR	$0 \bar{p}p \rightarrow \pi^+ \pi^- \pi^+ \pi^- \eta$
$1424 \pm 10 \pm 11$	547	BAI	04J BES2	$J/\psi \rightarrow \gamma \gamma \pi^+ \pi^-$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
1401 ± 18		^{1,2} AUGUSTIN	90 DM2	$J/\psi \rightarrow \pi^+ \pi^- \gamma \gamma$
1432 ± 8		² COFFMAN	90 MRK3	$J/\psi \rightarrow \pi^+ \pi^- 2\gamma$

¹ Best fit with a single Breit Wigner.

² This peak in the $\gamma\rho$ channel may not be related to the $\eta(1405)$.

4π MODE

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
1420 ± 20		BUGG	95 MRK3	$J/\psi \rightarrow \gamma \pi^+ \pi^- \pi^+ \pi^-$
1489 ± 12	3270	¹ BISELLO	89B DM2	$J/\psi \rightarrow 4\pi \gamma$

¹ Estimated by us from various fits.

$\phi\gamma$ MODE

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
$1422.0 \pm 2.1^{+5.9}_{-7.8}$	¹ ABLIKIM	25P BES3	$J/\psi \rightarrow \gamma \gamma \phi$

¹ From a partial wave analysis of $J/\psi \rightarrow \gamma \gamma \phi$ with significance 18.9σ .

$K\bar{K}\pi$ MODE (unresolved)

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
1452.7 ± 3.3	191	^{1,2} ABLIKIM	13M BES3	$\psi(2S) \rightarrow \omega K K \pi$
1437.6 ± 3.2	249 ± 35	^{1,2} ABLIKIM	08E BES2	$J/\psi \rightarrow \omega K_S^0 K^+ \pi^- + \text{c.c.}$
1445.9 ± 5.7	62 ± 18	^{1,2} ABLIKIM	08E BES2	$J/\psi \rightarrow \omega K^+ K^- \pi^0$
1442 ± 10	410	¹ BAI	98C BES	$J/\psi \rightarrow \gamma K^+ K^- \pi^0$
1445 ± 8	693	¹ AUGUSTIN	90 DM2	$J/\psi \rightarrow \gamma K_S^0 K^\pm \pi^\mp$
1433 ± 8	296	¹ AUGUSTIN	90 DM2	$J/\psi \rightarrow \gamma K^+ K^- \pi^0$
1413 ± 8	500	¹ DUCH	89 ASTE	$\bar{p}p \rightarrow \pi^+ \pi^- K^\pm \pi^\mp K^0$
1453 ± 7	170	¹ RATH	89 MPS	$21.4 \pi^- p \rightarrow K_S^0 K_S^0 \pi^0 n$
1419 ± 1	8800	¹ BIRMAN	88 MPS	$8 \pi^- p \rightarrow K^+ \bar{K}^0 \pi^- n$
1424 ± 3	620	¹ REEVES	86 SPEC	$6.6 p\bar{p} \rightarrow K \bar{K} \pi X$
1421 ± 2		¹ CHUNG	85 SPEC	$8 \pi^- p \rightarrow K \bar{K} \pi n$
1440^{+20}_{-15}	174	¹ EDWARDS	82E CBAL	$J/\psi \rightarrow \gamma K^+ K^- \pi^0$
1440^{+10}_{-15}		¹ SCHARRE	80 MRK2	$J/\psi \rightarrow \gamma K_S^0 K^\pm \pi^\mp$
1425 ± 7	800	^{1,3} BAILLON	67 HBC	$0 \bar{p}p \rightarrow K \bar{K} \pi \pi$

¹ These experiments identify only one pseudoscalar in the 1400–1500 range. Data could also refer to $\eta(1475)$.

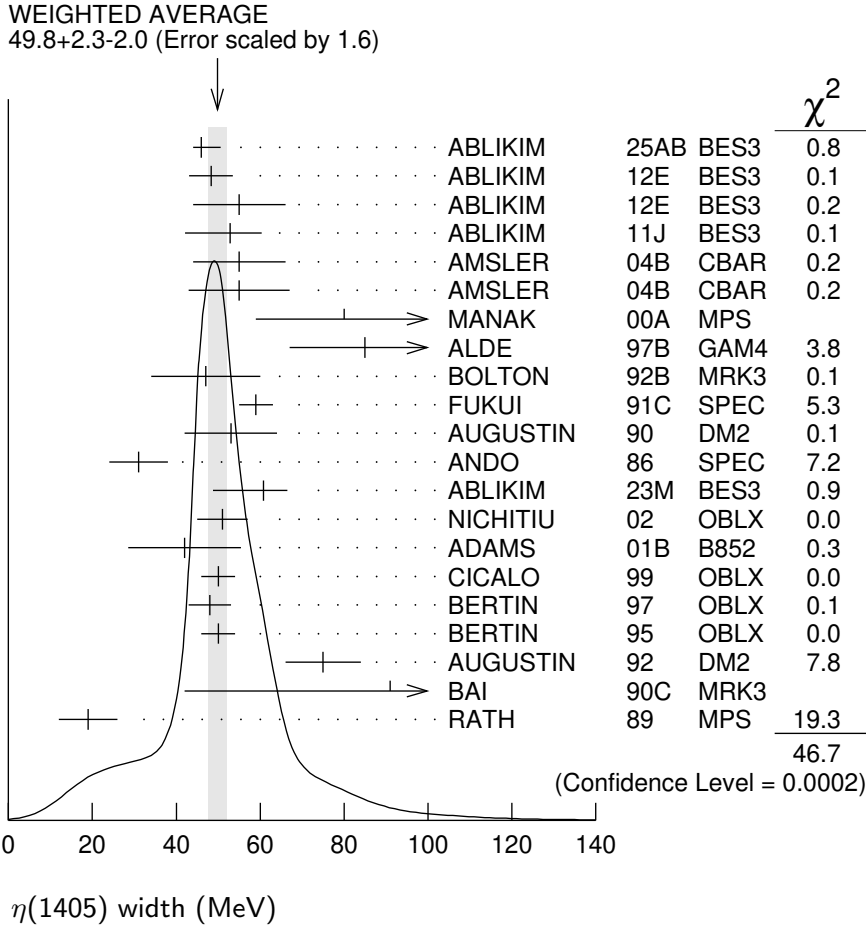
² Systematic uncertainty not evaluated.

³ From best fit of 0^- partial wave, 50% $K^*(892)K$, 50% $a_0(980)\pi$.

$\eta(1405)$ WIDTH

VALUE (MeV) DOCUMENT ID

49.8^{+2.3}_{-2.0} OUR AVERAGE Includes data from the 2 datablocks that follow this one. Error includes scale factor of 1.6. See the ideogram below.



$\eta\pi\pi$ MODE

VALUE (MeV) EVTS DOCUMENT ID TECN COMMENT

The data in this block is included in the average printed for a previous datablock.

51.1^{+2.8}_{-2.1} OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below.

46	$+1.8+4.2$ $-2.0-0.0$	1	ABLIKIM	25AB BES3	$J/\psi \rightarrow \gamma\pi^0 f_0(980) \rightarrow$ $\gamma\pi^0\pi^0\pi^0$
48.3	± 5.2	743	ABLIKIM	12E BES3	$J/\psi \rightarrow \gamma(\pi^+\pi^-\pi^0)$
55.0	± 11.0	198	ABLIKIM	12E BES3	$J/\psi \rightarrow \gamma(\pi^0\pi^0\pi^0)$
52.8	$\pm 7.6+0.1$ -7.6		2	ABLIKIM	11J BES3 $J/\psi \rightarrow \omega(\eta\pi^+\pi^-)$
55	± 11	900	AMSLER	04B CBAR	$0\bar{p}p \rightarrow \pi^+\pi^-\pi^+\pi^-\eta$
55	± 12	6.6k	AMSLER	04B CBAR	$0\bar{p}p \rightarrow \pi^+\pi^-\pi^0\pi^0\gamma$
80	± 21	9.0k	MANAK	00A MPS	$18\pi^-p \rightarrow \eta\pi^+\pi^-n$

85 ±18	2.2k	ALDE	97B	GAM4	100	$\pi^- p \rightarrow \eta \pi^0 \pi^0 n$
47 ±13		³ BOLTON	92B	MRK3		$J/\psi \rightarrow \gamma \eta \pi^+ \pi^-$
59 ± 4		FUKUI	91C	SPEC	8.95	$\pi^- p \rightarrow \eta \pi^+ \pi^- n$
53 ±11		⁴ AUGUSTIN	90	DM2		$J/\psi \rightarrow \gamma \eta \pi^+ \pi^-$
31 ± 7		ANDO	86	SPEC	8	$\pi^- p \rightarrow \eta \pi^+ \pi^- n$

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

79.0±16.0	195	ABLIKIM	19BA	BES3		$e^+ e^- \rightarrow \psi(2S)$
86 ±10		⁵ AMSLER	95F	CBAR	0	$\bar{p} p \rightarrow \pi^+ \pi^- \pi^0 \pi^0 \eta$

¹ ABLIKIM 25AB measured $J/\psi \rightarrow \gamma \eta(1405) \rightarrow \gamma \pi^0 f_0(980) / 0^{++} PHSP \rightarrow \gamma \pi^0 \pi^0 \pi^0$. Here $\gamma \pi^0 f_0(980) / 0^{++} PHSP$ indicates an intermediate state which could be either $\gamma \pi^0 f_0(980)$ or $\gamma \pi^0 0^{++}$ phase space.

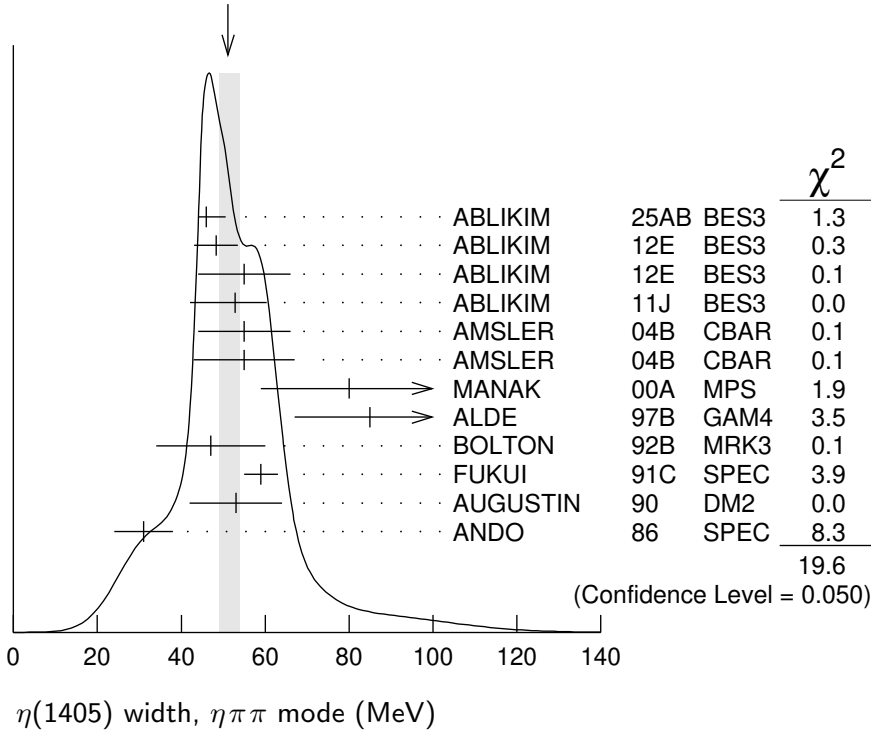
² The selected process is $J/\psi \rightarrow \omega a_0(980) \pi$.

³ From fit to the $a_0(980) \pi 0^{-+}$ partial wave.

⁴ From $\eta \pi^+ \pi^-$ mass distribution - mainly $a_0(980) \pi$ - no spin-parity determination available.

⁵ Superseded by AMSLER 04B.

WEIGHTED AVERAGE
51.1+2.8-2.1 (Error scaled by 1.3)



$K \bar{K} \pi$ MODE ($a_0(980) \pi$ or direct $K \bar{K} \pi$)

VALUE (MeV) EVTS DOCUMENT ID TECN COMMENT
The data in this block is included in the average printed for a previous datablock.

49 ± 4 OUR AVERAGE Error includes scale factor of 2.0. See the ideogram below.

60.8 ± 1.2 ^{+5.5} _{-12.0}	126k	ABLIKIM	23M	BES3		$J/\psi \rightarrow \gamma K_S^0 K_S^0 \pi^0$
51 ± 6	3651	¹ NICHITIU	02	OBLX	0	$\bar{p} p \rightarrow K^+ K^- \pi^+ \pi^- \pi^0$
42 ±10 ± 9	20k	ADAMS	01B	B852	18 GeV	$\pi^- p \rightarrow K^+ K^- \pi^0 n$

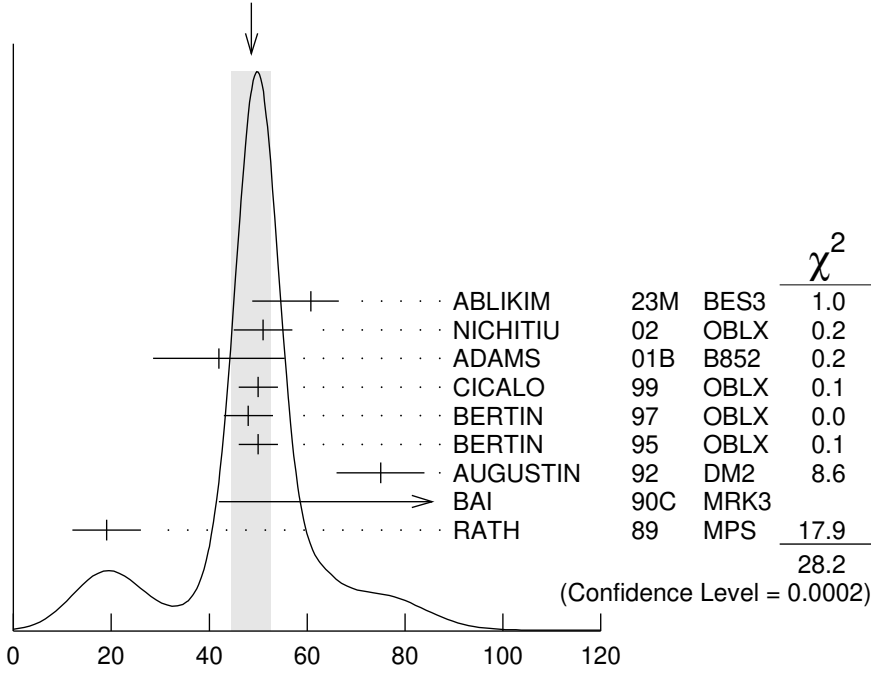
50 ± 4	CICALO	99	OBLX	0	$\bar{p}p \rightarrow K^\pm K_S^0 \pi^\mp \pi^+ \pi^-$
48 ± 5	² BERTIN	97	OBLX	0.0	$\bar{p}p \rightarrow K^\pm (K^0) \pi^\mp \pi^+ \pi^-$
50 ± 4	² BERTIN	95	OBLX	0	$\bar{p}p \rightarrow K \bar{K} \pi \pi \pi$
75 ± 9	AUGUSTIN	92	DM2		$J/\psi \rightarrow \gamma K \bar{K} \pi$
91 +67 -31 +15 -38	³ BAI	90c	MRK3		$J/\psi \rightarrow \gamma K_S^0 K^\pm \pi^\mp$
19 ± 7	³ RATH	89	MPS	21.4	$\pi^- p \rightarrow n K_S^0 K_S^0 \pi^0$

¹ Decaying dominantly directly to $K^+ K^- \pi^0$.

² Decaying into $(K \bar{K})_S \pi$, $(K \pi)_S \bar{K}$, and $a_0(980) \pi$.

³ From fit to the $a_0(980) \pi^0 \pi^+ \pi^-$ partial wave, but $a_0(980) \pi^1 \pi^+ \pi^-$ cannot be excluded.

WEIGHTED AVERAGE
49±4 (Error scaled by 2.0)



$\eta(1405)$ width, $K \bar{K} \pi$ mode ($a_0(980) \pi$ dominant) (MeV)

$\pi\pi\gamma$ MODE

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
89 ± 17	OUR AVERAGE	Error includes scale factor of 1.7.		
64 ± 18	235 ± 91	AMSLER	04B CBAR	$0 \bar{p}p \rightarrow \pi^+ \pi^- \pi^+ \pi^- \gamma$
101.0 ± 8.8 ± 8.8	547	BAI	04J BES2	$J/\psi \rightarrow \gamma \gamma \pi^+ \pi^-$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
174 ± 44		AUGUSTIN	90 DM2	$J/\psi \rightarrow \pi^+ \pi^- \gamma \gamma$
90 ± 26		¹ COFFMAN	90 MRK3	$J/\psi \rightarrow \pi^+ \pi^- 2\gamma$

¹ This peak in the $\gamma\rho$ channel may not be related to the $\eta(1405)$.

4 π MODE

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
160 ± 30		BUGG	95 MRK3	$J/\psi \rightarrow \gamma \pi^+ \pi^- \pi^+ \pi^-$
144 ± 13	3270	¹ BISELLO	89B DM2	$J/\psi \rightarrow 4\pi \gamma$

¹ Estimated by us from various fits.

$\phi\gamma$ MODE

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
$86.3 \pm 2.7^{+6.6}_{-17.4}$	¹ ABLIKIM	25P BES3	$J/\psi \rightarrow \gamma\gamma\phi$

¹ From a partial wave analysis of $J/\psi \rightarrow \gamma\gamma\phi$ with significance 18.9σ .

$K\bar{K}\pi$ MODE (unresolved)

VALUE (MeV)	EVTs	DOCUMENT ID	TECN	COMMENT
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
45.9 ± 8.2	191	^{1,2} ABLIKIM	13M BES3	$\psi(2S) \rightarrow \omega K K \pi$
48.9 ± 9.0	249 ± 35	^{1,2} ABLIKIM	08E BES2	$J/\psi \rightarrow \omega K_S^0 K^+ \pi^- + \text{c.c.}$
34.2 ± 18.5	62 ± 18	^{1,2} ABLIKIM	08E BES2	$J/\psi \rightarrow \omega K^+ K^- \pi^0$
93 ± 14	296	¹ AUGUSTIN	90 DM2	$J/\psi \rightarrow \gamma K^+ K^- \pi^0$
105 ± 10	693	¹ AUGUSTIN	90 DM2	$J/\psi \rightarrow \gamma K_S^0 K^\pm \pi^\mp$
62 ± 16	500	¹ DUCH	89 ASTE	$\bar{p}p \rightarrow K\bar{K}\pi\pi\pi$
100 ± 11	170	¹ RATH	89 MPS	$21.4 \pi^- p \rightarrow K_S^0 K_S^0 \pi^0 n$
66 ± 2	8800	¹ BIRMAN	88 MPS	$8 \pi^- p \rightarrow K^+ \bar{K}^0 \pi^- n$
60 ± 10	620	¹ REEVES	86 SPEC	$6.6 p\bar{p} \rightarrow K K \pi X$
60 ± 10		¹ CHUNG	85 SPEC	$8 \pi^- p \rightarrow K\bar{K}\pi n$
55^{+20}_{-30}	174	¹ EDWARDS	82E CBAL	$J/\psi \rightarrow \gamma K^+ K^- \pi^0$
50^{+30}_{-20}		¹ SCHARRE	80 MRK2	$J/\psi \rightarrow \gamma K_S^0 K^\pm \pi^\mp$
80 ± 10	800	^{1,3} BAILLON	67 HBC	$0.0 \bar{p}p \rightarrow K\bar{K}\pi\pi\pi$

¹ These experiments identify only one pseudoscalar in the 1400–1500 range. Data could also refer to $\eta(1475)$.

² Systematic uncertainty not evaluated.

³ From best fit to 0^-+ partial wave, 50% $K^*(892)K$, 50% $a_0(980)\pi$.

$\eta(1405)$ DECAY MODES

Mode	Fraction (Γ_i/Γ)	Confidence level
Γ_1 $K\bar{K}\pi$	seen	
Γ_2 $\eta\pi\pi$	seen	
Γ_3 $a_0(980)\pi$	seen	
Γ_4 $\eta(\pi\pi)_S\text{-wave}$	seen	
Γ_5 $f_0(980)\pi^0 \rightarrow \pi^+\pi^-\pi^0$		
Γ_6 $f_0(980)\eta$	seen	
Γ_7 4π	seen	
Γ_8 $\rho\rho$	<58 %	99.85%
Γ_9 $\gamma\gamma$		
Γ_{10} $\rho^0\gamma$	seen	
Γ_{11} $\phi\gamma$	seen	
Γ_{12} $K^*(892)K$	seen	

$\eta(1405) \Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

$\Gamma(K\bar{K}\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_1\Gamma_9/\Gamma$

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

<0.035	90	^{1,2} AHOHE	05	CLE2 10.6 $e^+e^- \rightarrow e^+e^- K_S^0 K^\pm \pi^\mp$
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¹ Using $\eta(1405)$ mass and width 1410 MeV and 51 MeV, respectively.

² Assuming three-body phase-space decay to $K_S^0 K^\pm \pi^\mp$.

$\Gamma(\eta\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_2\Gamma_9/\Gamma$

VALUE (keV)	CL%	DOCUMENT ID	TECN	COMMENT
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<0.095	95	ACCIARRI	01G L3	183–202 $e^+e^- \rightarrow e^+e^- \eta\pi^+\pi^-$
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$\Gamma(\rho^0\gamma) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_{10}\Gamma_9/\Gamma$

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

<1.5	95	ALTHOFF	84E	TASS $e^+e^- \rightarrow e^+e^- \pi^+\pi^-\gamma$
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$\eta(1405)$ BRANCHING RATIOS

$\Gamma(\eta\pi\pi)/\Gamma(K\bar{K}\pi)$ Γ_2/Γ_1

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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1.09±0.48		¹ AMSLER	04B	CBAR 0 $\bar{p}p \rightarrow \pi^+\pi^-\pi^+\pi^-\eta$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

<0.5	90	EDWARDS	83B	CBAL $J/\psi \rightarrow \eta\pi\pi\gamma$
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<1.1	90	SCHARRE	80	MRK2 $J/\psi \rightarrow \eta\pi\pi\gamma$
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<1.5	95	FOSTER	68B	HBC 0.0 $\bar{p}p$
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¹ Using the data of BAILLON 67 on $\bar{p}p \rightarrow K\bar{K}\pi$.

$\Gamma(\rho^0\gamma)/\Gamma(\eta\pi\pi)$ Γ_{10}/Γ_2

VALUE	DOCUMENT ID	TECN	COMMENT
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0.111±0.064	AMSLER	04B	CBAR 0 $\bar{p}p$
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$\Gamma(a_0(980)\pi)/\Gamma(K\bar{K}\pi)$ Γ_3/Γ_1

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

~ 0.15		¹ BERTIN	95	OBLX 0 $\bar{p}p \rightarrow K\bar{K}\pi\pi\pi$
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~ 0.8	500	¹ DUCH	89	ASTE $\bar{p}p \rightarrow \pi^+\pi^- K^\pm \pi^\mp K^0$
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~ 0.75		¹ REEVES	86	SPEC 6.6 $p\bar{p} \rightarrow KK\pi X$
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¹ Assuming that the $a_0(980)$ decays only into $K\bar{K}$.

$\Gamma(a_0(980)\pi)/\Gamma(\eta\pi\pi)$ Γ_3/Γ_2

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

0.29±0.10		ABELE	98E	CBAR 0 $p\bar{p} \rightarrow \eta\pi^0\pi^0\pi^0$
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0.19±0.04	2200	¹ ALDE	97B	GAM4 100 $\pi^-p \rightarrow \eta\pi^0\pi^0n$
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0.56±0.04±0.03		¹ AMSLER	95F	CBAR 0 $\bar{p}p \rightarrow \pi^+\pi^-\pi^0\pi^0\eta$
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¹ Assuming that the $a_0(980)$ decays only into $\eta\pi$.

$\Gamma(a_0(980)\pi)/\Gamma(\eta(\pi\pi)_{S\text{-wave}})$ Γ_3/Γ_4

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

0.91 ± 0.12		ANISOVICH	01	SPEC	$0.0 \bar{p}p \rightarrow \eta\pi^+\pi^-\pi^+\pi^-$
0.15 ± 0.04	9082	¹ MANAK	00A	MPS	$18 \pi^-p \rightarrow \eta\pi^+\pi^-n$
$0.70 \pm 0.12 \pm 0.20$		² BAI	99	BES	$J/\psi \rightarrow \gamma\eta\pi^+\pi^-$

¹ Statistical error only.

² Assuming that the $a_0(980)$ decays only into $\eta\pi$.

 $\Gamma(\rho^0\gamma)/\Gamma(K\bar{K}\pi)$ Γ_{10}/Γ_1

VALUE	DOCUMENT ID	TECN	COMMENT
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0.0152 ± 0.0038 ¹ COFFMAN 90 MRK3 $J/\psi \rightarrow \gamma\gamma\pi^+\pi^-$

¹ Using $B(J/\psi \rightarrow \gamma\eta(1405) \rightarrow \gamma K\bar{K}\pi) = 4.2 \times 10^{-3}$ and $B(J/\psi \rightarrow \gamma\eta(1405) \rightarrow \gamma\gamma\rho^0) = 6.4 \times 10^{-5}$.

 $\Gamma(\gamma\gamma)/\Gamma(K\bar{K}\pi)$ Γ_9/Γ_1

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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$< 1.78 \times 10^{-3}$ 90 ¹ ABLIKIM 180 BES3 $\psi(2S) \rightarrow \pi^+\pi^-\gamma\gamma$

¹ Using results from BAI 00D.

 $\Gamma(\eta(\pi\pi)_{S\text{-wave}})/\Gamma(\eta\pi\pi)$ Γ_4/Γ_2

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

0.81 ± 0.04	2200	ALDE	97B	GAM4	$100 \pi^-p \rightarrow \eta\pi^0\pi^0n$
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 $\Gamma(f_0(980)\eta)/\Gamma(\eta\pi\pi)$ Γ_6/Γ_2

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

0.32 ± 0.07		¹ ANISOVICH	00	SPEC	$0.9\text{--}1.2 \bar{p}p \rightarrow \eta 3\pi^0$
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¹ Using preliminary Crystal Barrel data.

 $\Gamma(f_0(980)\pi^0 \rightarrow \pi^+\pi^-\pi^0)/\Gamma_{\text{total}}$ Γ_5/Γ

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
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seen 203 ¹ ABLIKIM 24I BES3 $J/\psi \rightarrow e^+e^-\eta(1405)$

seen 743 ² ABLIKIM 12E BES3 $J/\psi \rightarrow \gamma\eta(1405)$

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

not seen		³ ABLIKIM	17AJ	BES3	$\psi(2S) \rightarrow \gamma\pi^+\pi^-\pi^0$
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¹ ABLIKIM 24I reports $B(J/\psi \rightarrow e^+e^-\eta(1405) \rightarrow f_0(980)\pi^0 \rightarrow \pi^+\pi^-\pi^0) = (2.04 \pm 0.20 \pm 0.08) \times 10^{-7}$.

² ABLIKIM 12E reports $B(J/\psi \rightarrow \gamma\eta(1405) \rightarrow f_0(980)\pi^0 \rightarrow \pi^+\pi^-\pi^0) = (1.5 \pm 0.11 \pm 0.11) \times 10^{-5}$ and $B(J/\psi \rightarrow \gamma\eta(1405) \rightarrow f_0(980)\pi^0 \rightarrow \pi^0\pi^0\pi^0) = (7.10 \pm 0.82 \pm 0.72) \times 10^{-6}$.

³ ABLIKIM 17AJ reports $B(\psi(2S) \rightarrow \gamma\eta(1405) \rightarrow \gamma f_0(980)\pi^0 \rightarrow \gamma\pi^+\pi^-\pi^0) < 5.0 \times 10^{-7}$.

$\Gamma(\rho\rho)/\Gamma_{\text{total}}$ Γ_8/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.58	99.85	1,2 AMSLER	04B CBAR	0 $\bar{p}\rho$

¹ Assuming that the $\eta(1405)$ decays are saturated by the $\pi\pi\eta$, $K\bar{K}\pi$ and $\rho\rho$ modes.
² Using the data of BAILLON 67 on $\bar{p}\rho \rightarrow K\bar{K}\pi$.

$\Gamma(K^*(892)K)/\Gamma(a_0(980)\pi)$ Γ_{12}/Γ_3

VALUE	DOCUMENT ID	TECN	COMMENT
0.084 ± 0.024	¹ ADAMS	01B B852	18 GeV $\pi^- p \rightarrow K^+ K^- \pi^0 n$

• • • We do not use the following data for averages, fits, limits, etc. • • •
¹ Statistical error only.

$\Gamma(\phi\gamma)/\Gamma_{\text{total}}$ Γ_{11}/Γ

VALUE	DOCUMENT ID	TECN	COMMENT
seen	¹ ABLIKIM	25P BES3	$J/\psi \rightarrow \gamma\gamma\phi$

¹ From a partial wave analysis of $J/\psi \rightarrow \gamma\gamma\phi$ with significance 18.9 σ .

$\Gamma(\phi\gamma)/\Gamma(\rho^0\gamma)$ Γ_{11}/Γ_{10}

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
0.09 ± 0.03		¹ ABLIKIM	18i BES3	$J/\psi \rightarrow \gamma\gamma\phi(1020)$
0.13 ± 0.04		² ABLIKIM	18i BES3	$J/\psi \rightarrow \gamma\gamma\phi(1020)$
<0.77	95	³ BAI	04J BES2	$J/\psi \rightarrow \gamma\gamma K^+ K^-$

• • • We do not use the following data for averages, fits, limits, etc. • • •
¹ Constructive interference between $X(1835)$ and $\eta(1405)/\eta(1475)$ decays to $\gamma\phi$ is assumed. Also see $\eta(1475)$. ABLIKIM 18i reports the inverse as 11.10 ± 3.5 .
² Destructive interference between $X(1835)$ and $\eta(1405)/\eta(1475)$ decays to $\gamma\phi$ is assumed. Also see $\eta(1475)$. ABLIKIM 18i reports the inverse as 7.53 ± 2.49 .
³ Calculated by us from $B(J/\psi \rightarrow \eta(1405)\gamma \rightarrow \phi\gamma\gamma) < 0.82 \times 10^{-4}$ and $B(J/\psi \rightarrow \eta(1405)\gamma \rightarrow \rho^0\gamma\gamma) = (1.07 \pm 0.17 \pm 0.11) \times 10^{-4}$.

$\eta(1405)$ REFERENCES

ABLIKIM	25AB	PR D112 032007	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	25P	PR D111 052011	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	24I	PR D109 012007	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	23M	JHEP 2303 121	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	19BA	PR D100 092003	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	18I	PR D97 051101	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	18O	PR D97 072014	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	17AJ	PR D96 112008	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	13M	PR D87 092006	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	12E	PRL 108 182001	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	11J	PRL 107 182001	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	08E	PR D77 032005	M. Ablikim <i>et al.</i>	(BES Collab.)
AHOHE	05	PR D71 072001	R. Ahohe <i>et al.</i>	(CLEO Collab.)
AMSLER	04B	EPJ C33 23	C. Amisler <i>et al.</i>	(Crystal Barrel Collab.)
BAI	04J	PL B594 47	J.Z. Bai <i>et al.</i>	(BES Collab.)
NICHITIU	02	PL B545 261	F. Nichitiu <i>et al.</i>	(OBELIX Collab.)
ACCIARRI	01G	PL B501 1	M. Acciarri <i>et al.</i>	(L3 Collab.)
ADAMS	01B	PL B516 264	G.S. Adams <i>et al.</i>	(BNL E852 Collab.)
ANISOVICH	01	NP A690 567	A.V. Anisovich <i>et al.</i>	
ANISOVICH	00	PL B472 168	A.V. Anisovich <i>et al.</i>	
BAI	00D	PL B476 25	J.Z. Bai <i>et al.</i>	(BES Collab.)
MANAK	00A	PR D62 012003	J.J. Manak <i>et al.</i>	(BNL E852 Collab.)
BAI	99	PL B446 356	J.Z. Bai <i>et al.</i>	(BES Collab.)
CICALO	99	PL B462 453	C. Cicalo <i>et al.</i>	(OBELIX Collab.)

ABELE	98E	NP B514 45	A. Abele <i>et al.</i>	(Crystal Barrel Collab.)
BAI	98C	PL B440 217	J.Z. Bai <i>et al.</i>	(BES Collab.)
ALDE	97B	PAN 60 386	D. Alde <i>et al.</i>	(GAMS Collab.)
BERTIN	97	PL B400 226	A. Bertin <i>et al.</i>	(OBELIX Collab.)
AMSLER	95F	PL B358 389	C. AMSler <i>et al.</i>	(Crystal Barrel Collab.)
BERTIN	95	PL B361 187	A. Bertin <i>et al.</i>	(OBELIX Collab.)
BUGG	95	PL B353 378	D.V. Bugg <i>et al.</i>	(LOQM, PNPI, WASH)
AUGUSTIN	92	PR D46 1951	J.E. Augustin, G. Cosme	(DM2 Collab.)
BOLTON	92B	PRL 69 1328	T. Bolton <i>et al.</i>	(Mark III Collab.)
FUKUI	91C	PL B267 293	S. Fukui <i>et al.</i>	(SUGI, NAGO, KEK, KYOT+)
AUGUSTIN	90	PR D42 10	J.E. Augustin <i>et al.</i>	(DM2 Collab.)
BAI	90C	PRL 65 2507	Z. Bai <i>et al.</i>	(Mark III Collab.)
COFFMAN	90	PR D41 1410	D.M. Coffman <i>et al.</i>	(Mark III Collab.)
BISELLO	89B	PR D39 701	G. Busetto <i>et al.</i>	(DM2 Collab.)
DUCH	89	ZPHY C45 223	K.D. Duch <i>et al.</i>	(ASTERIX Collab.) JP
RATH	89	PR D40 693	M.G. Rath <i>et al.</i>	(NDAM, BRAN, BNL, CUNY+)
BIRMAN	88	PRL 61 1557	A. Birman <i>et al.</i>	(BNL, FSU, IND, MASD) JP
ANDO	86	PRL 57 1296	A. Ando <i>et al.</i>	(KEK, KYOT, NIRS, SAGA+) IJP
REEVES	86	PR D34 1960	D.F. Reeves <i>et al.</i>	(FLOR, BNL, IND+) JP
CHUNG	85	PRL 55 779	S.U. Chung <i>et al.</i>	(BNL, FLOR, IND+) JP
ALTHOFF	84E	PL 147B 487	M. Althoff <i>et al.</i>	(TASSO Collab.)
EDWARDS	83B	PRL 51 859	C. Edwards <i>et al.</i>	(CIT, HARV, PRIN+)
EDWARDS	82E	PRL 49 259	C. Edwards <i>et al.</i>	(CIT, HARV, PRIN+)
Also		PRL 50 219	C. Edwards <i>et al.</i>	(CIT, HARV, PRIN+)
SCHARRE	80	PL 97B 329	D.L. Scharre <i>et al.</i>	(SLAC, LBL)
FOSTER	68B	NP B8 174	M. Foster <i>et al.</i>	(CERN, CDEF)
BAILLON	67	NC 50A 393	P.H. Baillon <i>et al.</i>	(CERN, CDEF, IRAD)