$\eta(1405)$

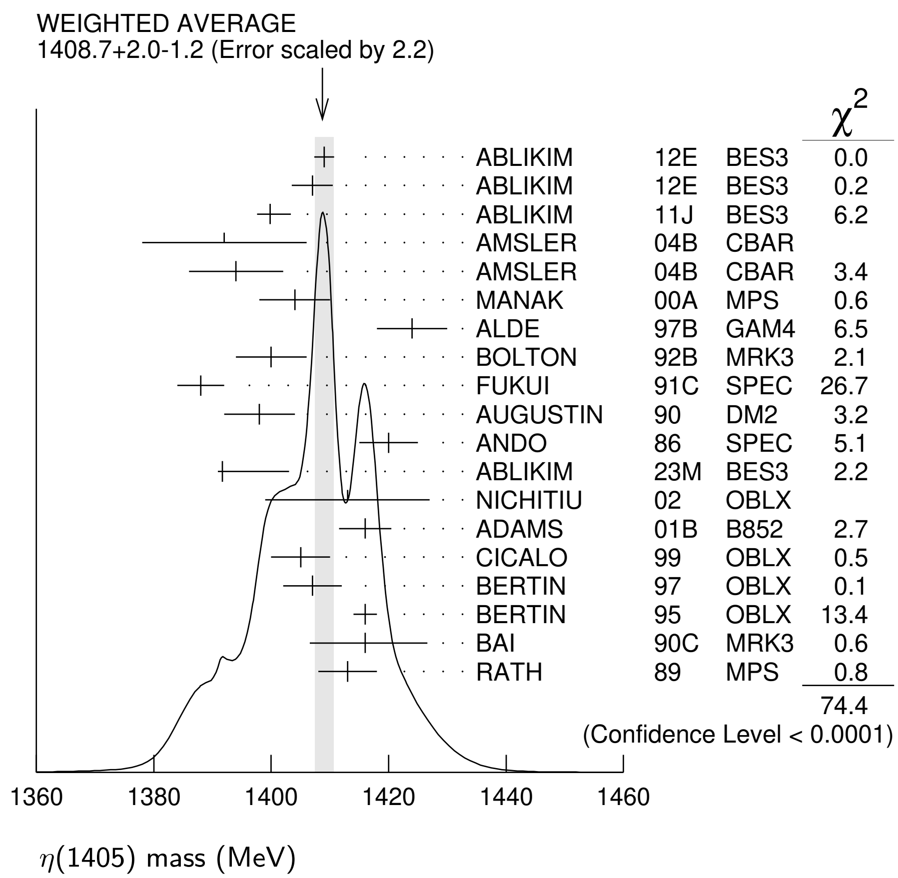
$I^G(J^{PC}) = 0^+(0^{-+})$

See also the $\eta(1475)$.

$\eta(1405)$ MASS

VALUE (MeV)	DOCUMENT ID

$1408.7^{+2.0}_{-1.2}$ OUR AVERAGE Includes data from the 2 datablocks that follow this one. Error includes scale factor of 2.2. 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.				
1405.8± 2.6 OUR AVERAGE	Error includes scale factor of 2.3. See the ideogram below.			
1409.0± 1.7	743	ABLIKIM 12E	BES3	$J/\psi \to \gamma(\pi^+\pi^-\pi^0)$
1407.0± 3.5	198	ABLIKIM 12E	BES3	$J/\psi \to \gamma(\pi^0\pi^0\pi^0)$
$1399.8 \pm 2.2^{+2.8}_{-0.1}$		[1] ABLIKIM 11J	BES3	$J/\psi \to \omega(\eta\pi^+\pi^-)$
1392 ±14	900 ± 375	AMSLER 04B	CBAR	$0\ \overline{p}p \to \pi^+\pi^-\pi^+\pi^-\eta$
1394 ± 8	6.6 ± 2.0k	AMSLER 04B	CBAR	$0\ \overline{p}p \to \pi^+\pi^-\pi^0\pi^0\eta$
1404 ± 6	9082	MANAK 00A	MPS	$18\ \pi^- p \to \eta\pi^+\pi^- n$

1424 ± 6	2200	ALDE 97B	GAM4	100 $\pi^- p \rightarrow \eta \pi^0 \pi^0 n$
1400 ± 6		[2] BOLTON 92B	MRK3	$J/\psi \rightarrow \gamma \eta \pi^+ \pi^-$
1388 ± 4		FUKUI 91C	SPEC	8.95 $\pi^- p \rightarrow \eta \pi^+ \pi^- n$
1398 ± 6	261	[3] AUGUSTIN 90	DM2	$J/\psi \rightarrow \gamma \eta \pi^+ \pi^-$
1420 ± 5		ANDO 86	SPEC	8 $\pi^- p \rightarrow \eta \pi^+ \pi^- n$

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

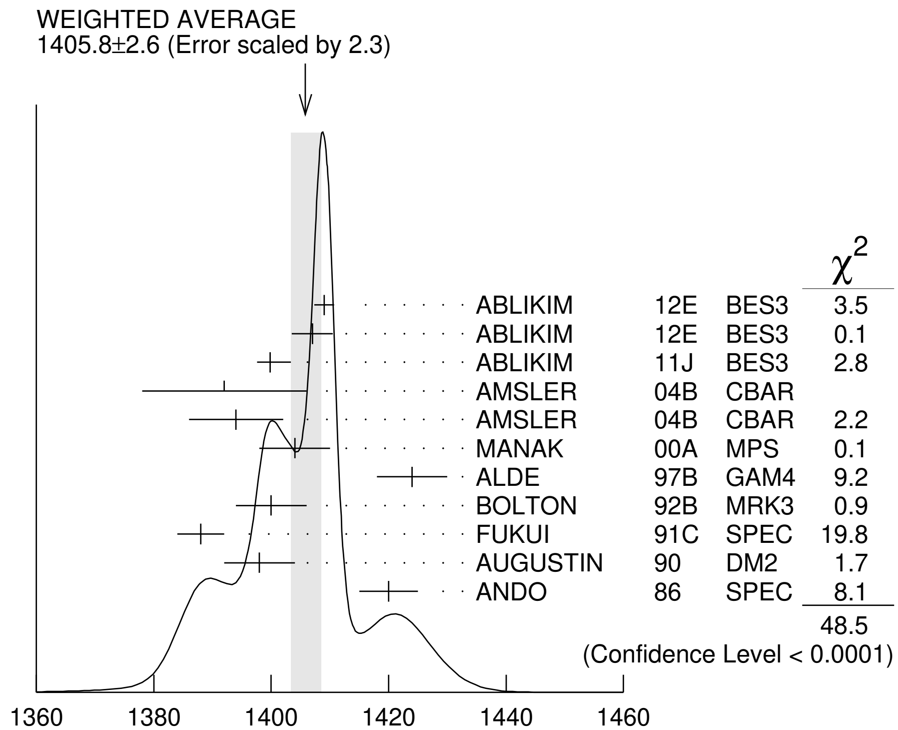
1404.0±11.0	195	ABLIKIM 19BA	BES3	$e^+ e^- \rightarrow \psi(2S)$
1385 ± 7		BAI 99	BES	$J/\psi \rightarrow \gamma \eta \pi^+ \pi^-$
1409 ± 3		[4] AMSLER 95F	CBAR	0 $\overline{p} p \rightarrow \pi^+ \pi^- \pi^0 \pi^0 \eta$

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

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

[3] Best fit with a single Breit Wigner.

[4] Superseded by AMSLER 04B.



$\eta(1405)$ mass, $\eta\pi\pi$ mode (MeV)

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

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.

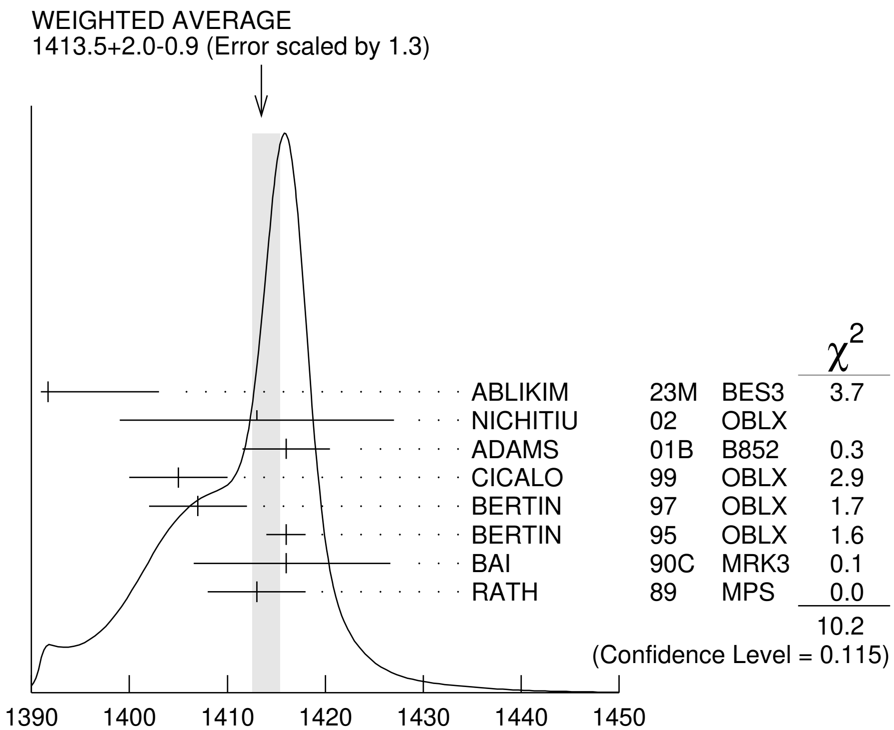
VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
1391.7± $0.7^{+11.3}_{-0.3}$	126k	[1] ABLIKIM 23M	BES3	$J/\psi \rightarrow \gamma K^0_S K^0_S \pi^0$
1413 ±14	3651	[2] NICHITIU 02	OBLX	0 $\overline{p} p \rightarrow K^+ K^- \pi^+ \pi^- \pi^0$
1416 ± 4 ± 2	20k	ADAMS 01B	B852	18 GeV $\pi^- p \rightarrow K^+ K^- \pi^0 n$
1405 ± 5		[3] CICALO 99	OBLX	0 $\overline{p} p \rightarrow K^\pm K^0_S \pi^\mp \pi^+ \pi^-$

1407 ± 5		[3] BERTIN	97	OBLX	$0\ \overline{p}p \to K^{\pm}(K^0)\pi^{\mp}\pi^+\pi^-$
1416 ± 2		[3] BERTIN	95	OBLX	$0\ \overline{p}p \to K\overline{K}\pi\pi\pi$
$1416 \pm 8\ ^{+7}_{-5}$	700	[4] BAI	90C	MRK3	$J/\psi \to \gamma K^0_S K^{\pm}\pi^{\mp}$
1413 ± 5		[4] RATH	89	MPS	$21.4\ \pi^- p \to n K^0_S K^0_S \pi^0$

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

1459 ± 5		[5] AUGUSTIN	92	DM2	$J/\psi \to \gamma K\overline{K}\pi$

[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 $(K\overline{K})_S\pi$, $(K\pi)_S\overline{K}$, 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.



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

$\pi\pi\gamma$ 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	$0\ \overline{p}p \to \pi^+\pi^-\pi^+\pi^-\eta$
1424±10±11	547	BAI	04J	BES2	$J/\psi \to \gamma\gamma\pi^+\pi^-$

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

1401±18		[1,2] AUGUSTIN	90	DM2	$J/\psi \to \pi^+\pi^-\gamma\gamma$
1432± 8		[2] COFFMAN	90	MRK3	$J/\psi \to \pi^+\pi^- 2\gamma$

[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.

$K\overline{K}\pi$ 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	$J/\psi \rightarrow \omega K^0_S K^+ \pi^-$ + 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	$J/\psi \rightarrow \gamma K^0_S K^\pm \pi^\mp$
1433 ± 8	296	[1] AUGUSTIN	90	DM2	$J/\psi \rightarrow \gamma K^+ K^- \pi^0$
1413 ± 8	500	[1] DUCH	89	ASTE	$\overline{p} p \rightarrow \pi^+ \pi^- K^\pm \pi^\mp K^0$
1453 ± 7	170	[1] RATH	89	MPS	$21.4\ \pi^- p \rightarrow K^0_S K^0_S \pi^0 n$
1419 ± 1	8800	[1] BIRMAN	88	MPS	$8\ \pi^- p \rightarrow K^+ \overline{K}^0 \pi^- n$
1424 ± 3	620	[1] REEVES	86	SPEC	$6.6\ p\overline{p} \rightarrow K\overline{K}\pi X$
1421 ± 2		[1] CHUNG	85	SPEC	$8\ \pi^- p \rightarrow K\overline{K}\pi n$
$1440 {+20 \atop -15}$	174	[1] EDWARDS	82E	CBAL	$J/\psi \rightarrow \gamma K^+ K^- \pi^0$
$1440 {+10 \atop -15}$		[1] SCHARRE	80	MRK2	$J/\psi \rightarrow \gamma K^0_S K^\pm \pi^\mp$
1425 ± 7	800	[1,3] BAILLON	67	HBC	$0\ \overline{p} p \rightarrow K\overline{K}\pi\pi\pi$

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

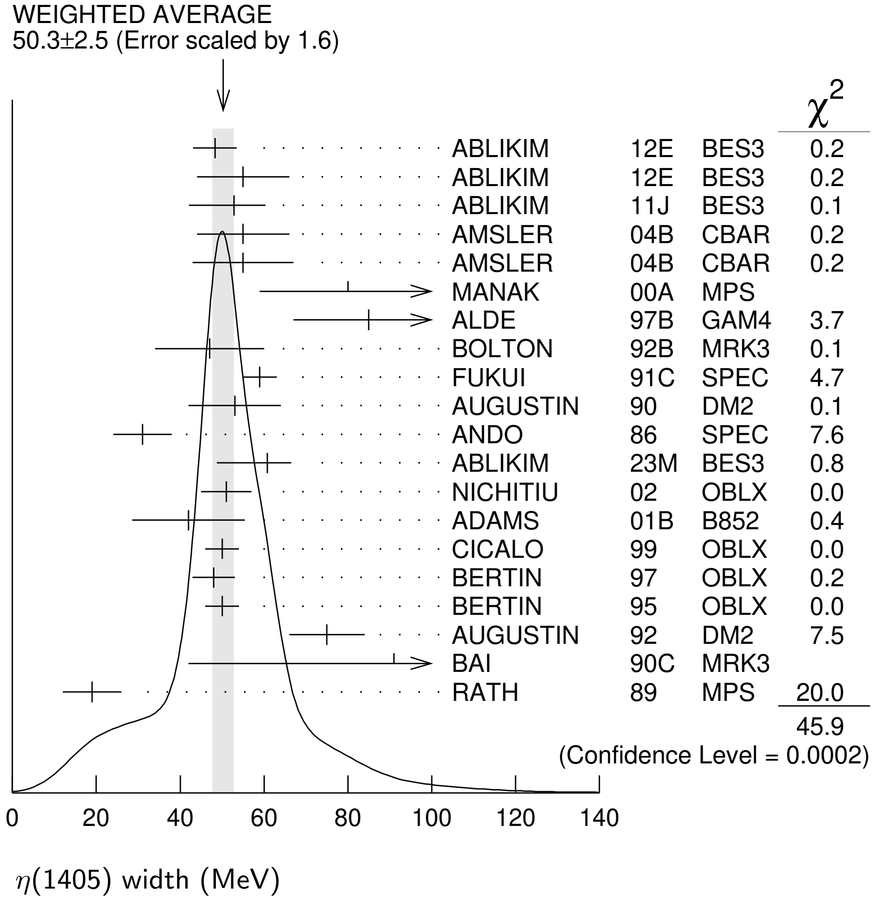
[2] Systematic uncertainty not evaluated.

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

$\eta(1405)$ WIDTH

VALUE (MeV)	DOCUMENT ID

50.3±2.5 OUR AVERAGE Includes data from the 2 datablocks that follow this one. Error includes scale factor of 1.6. See the ideogram below.



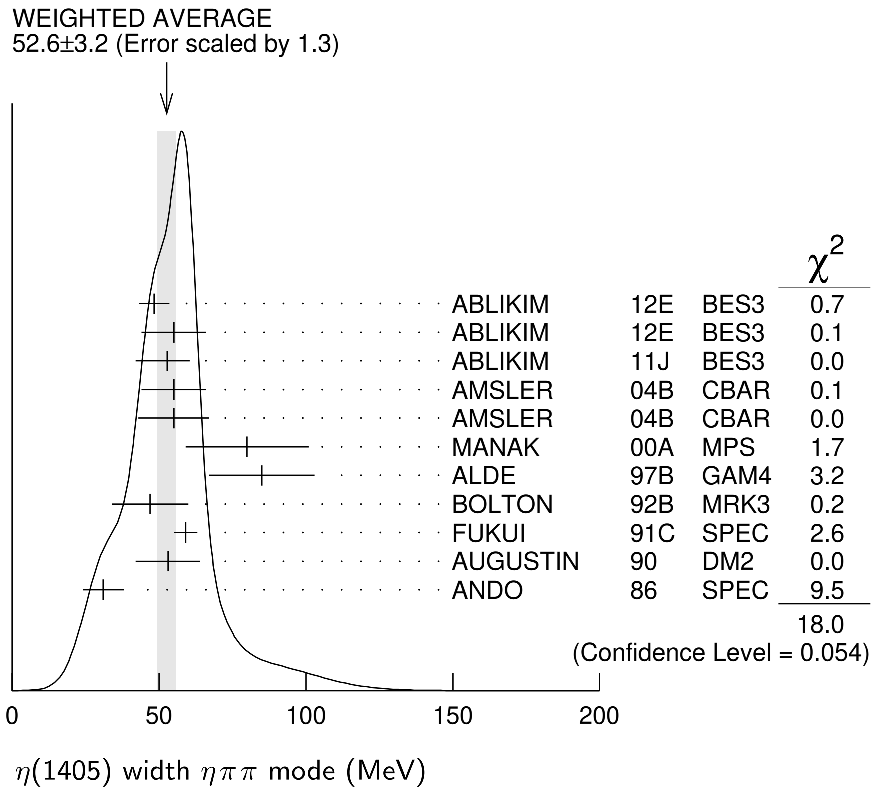
$\eta\pi\pi$ MODE

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
The data in this block is included in the average printed for a previous datablock.				
52.6± 3.2 OUR AVERAGE	Error includes scale factor of 1.3. See the ideogram below.			
48.3± 5.2	743	ABLIKIM	12E BES3	$J/\psi \to \gamma(\pi^+\pi^-\pi^0)$
55.0±11.0	198	ABLIKIM	12E BES3	$J/\psi \to \gamma(\pi^0\pi^0\pi^0)$
$52.8\pm 7.6^{+0.1}_{-7.6}$		[1] ABLIKIM	11J BES3	$J/\psi \to \omega(\eta\pi^+\pi^-)$
55 ±11	900	AMSLER	04B CBAR	$0\ \overline{p}p \to \pi^+\pi^-\pi^+\pi^-\eta$
55 ±12	6.6k	AMSLER	04B CBAR	$0\ \overline{p}p \to \pi^+\pi^-\pi^0\pi^0\gamma$
80 ±21	9.0k	MANAK	00A MPS	$18\ \pi^- p \to \eta\pi^+\pi^- n$
85 ±18	2.2k	ALDE	97B GAM4	$100\ \pi^- p \to \eta\pi^0\pi^0 n$
47 ±13		[2] BOLTON	92B MRK3	$J/\psi \to \gamma\eta\pi^+\pi^-$
59 ± 4		FUKUI	91C SPEC	$8.95\ \pi^- p \to \eta\pi^+\pi^- n$
53 ±11		[3] AUGUSTIN	90 DM2	$J/\psi \to \gamma\eta\pi^+\pi^-$
31 ± 7		ANDO	86 SPEC	$8\ \pi^- p \to \eta\pi^+\pi^- n$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
79.0±16.0	195	ABLIKIM	19BA BES3	$e^+e^- \to \psi(2S)$
86 ±10		[4] AMSLER	95F CBAR	$0\ \overline{p}p \to \pi^+\pi^-\pi^0\pi^0\eta$

[1] The selected process is $J/\psi \to \omega a_0(980)\pi$.

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

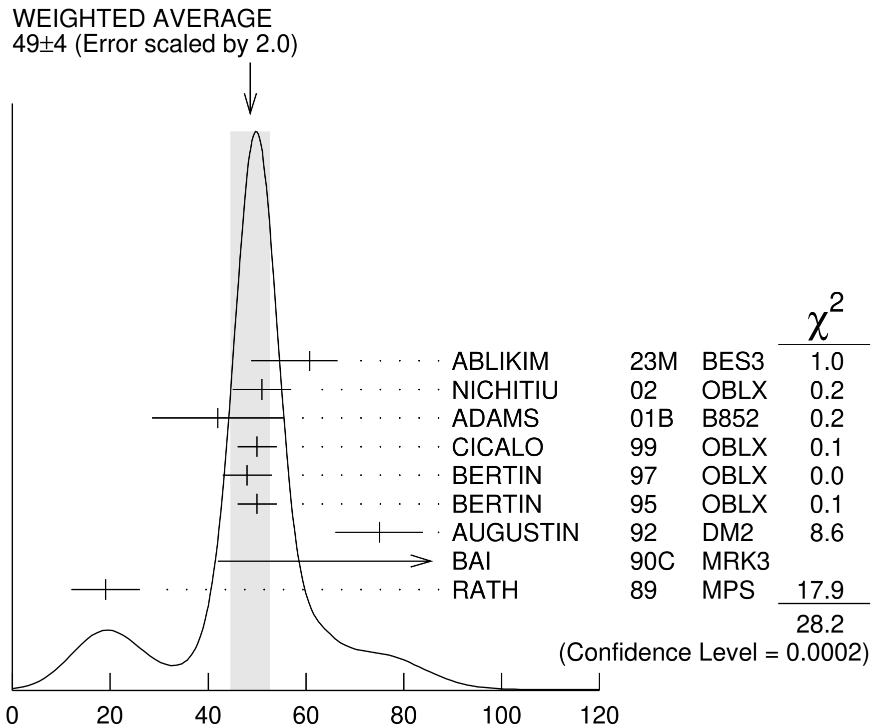
[3] From $\eta\pi^+\pi^-$ mass distribution - mainly $a_0(980)\pi$ - no spin–parity determination available.
[4] Superseded by AMSLER 04B.



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

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.
$60.8 \pm 1.2^{+5.5}_{-12.0}$	126K	ABLIKIM	23M BES3	$J/\psi \to \gamma K^0_S K^0_S \pi^0$
51 ± 6	3651	[1] NICHITIU	02 OBLX	$0\ \overline{p}p \to K^+K^-\pi^+\pi^-\pi^0$
$42 \pm 10 \pm 9$	20k	ADAMS	01B B852	$18\ \text{GeV}\ \pi^- p \to K^+K^-\pi^0 n$
50 ± 4		CICALO	99 OBLX	$0\ \overline{p}p \to K^\pm K^0_S \pi^\mp\pi^+\pi^-$
48 ± 5		[2] BERTIN	97 OBLX	$0.0\ \overline{p}p \to K^\pm(K^0)\pi^\mp\pi^+\pi^-$
50 ± 4		[2] BERTIN	95 OBLX	$0\ \overline{p}p \to K\overline{K}\pi\pi\pi$
75 ± 9		AUGUSTIN	92 DM2	$J/\psi \to \gamma K\overline{K}\pi$
$91\ ^{+67}_{-31}\ ^{+15}_{-38}$		[3] BAI	90C MRK3	$J/\psi \to \gamma K^0_S K^\pm\pi^\mp$
19 ± 7		[3] RATH	89 MPS	$21.4\ \pi^- p \to n K^0_S K^0_S \pi^0$

[1] Decaying dominantly directly to $K^+K^-\pi^0$.
[2] Decaying into $(K\overline{K})_S\pi$, $(K\pi)_S\overline{K}$, and $a_0(980)\pi$.
[3] From fit to the $a_0(980)\pi\ 0^{-+}$ partial wave , but $a_0(980)\pi\ 1^{++}$ cannot be excluded.



$\eta(1405)$ width $K\overline{K}\pi$ 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	$0\ \overline{p}p \to \pi^+\pi^-\pi^+\pi^-\gamma$
101.0± 8.8±8.8	547	BAI 04J	BES2	$J/\psi \to \gamma\gamma\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
174 ±44		AUGUSTIN 90	DM2	$J/\psi \to \pi^+\pi^-\gamma\gamma$
90 ±26		[1] COFFMAN 90	MRK3	$J/\psi \to \pi^+\pi^- 2\gamma$

[1] 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. • • •				
160±30		BUGG 95	MRK3	$J/\psi \to \gamma\pi^+\pi^-\pi^+\pi^-$
144±13	3270	[1] BISELLO 89B	DM2	$J/\psi \to 4\pi\gamma$

[1] Estimated by us from various fits.

$K\overline{K}\pi$ 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	$\psi(2S) \to \omega K K \pi$
48.9± 9.0	249 ± 35	[1,2] ABLIKIM 08E	BES2	$J/\psi \to \omega K^0_S K^+\pi^-$ + c.c.
34.2±18.5	62 ± 18	[1,2] ABLIKIM 08E	BES2	$J/\psi \to \omega K^+ K^- \pi^0$
93 ±14	296	[1] AUGUSTIN 90	DM2	$J/\psi \to \gamma K^+ K^- \pi^0$
105 ±10	693	[1] AUGUSTIN 90	DM2	$J/\psi \to \gamma K^0_S K^\pm \pi^\mp$
62 ±16	500	[1] DUCH 89	ASTE	$\overline{p}p \to K\overline{K}\pi\pi\pi$

100	± 11	170	[1] RATH	89	MPS	$21.4\ \pi^- p \to K^0_S K^0_S \pi^0 n$
66	$\pm\ 2$	8800	[1] BIRMAN	88	MPS	$8\ \pi^- p \to K^+ \overline{K}^0 \pi^- n$
60	± 10	620	[1] REEVES	86	SPEC	$6.6\ p\overline{p} \to K K \pi X$
60	± 10		[1] CHUNG	85	SPEC	$8\ \pi^- p \to K \overline{K} \pi n$
55	$^{+20}_{-30}$	174	[1] EDWARDS	82E	CBAL	$J/\psi \to \gamma K^+ K^- \pi^0$
50	$^{+30}_{-20}$		[1] SCHARRE	80	MRK2	$J/\psi \to \gamma K^0_S K^\pm \pi^\mp$
80	± 10	800	[1,3] BAILLON	67	HBC	$0.0\ \overline{p} p \to K \overline{K} \pi \pi \pi$

[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	$K \overline{K} \pi$	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	$f_0(980) \pi^0 \to \pi^+ \pi^- \pi^0$		
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}	$\phi \gamma$		
Γ_{12}	$K^*(892) K$	seen	

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

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

VALUE (keV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.035	90	[1,2] AHOHE	05	CLE2	$10.6\ e^+ e^- \to e^+ e^- K^0_S K^\pm \pi^\mp$

[1] Using $\eta(1405)$ mass and width 1410 MeV and 51 MeV, respectively.
[2] Assuming three-body phase-space decay to $K^0_S K^\pm \pi^\mp$.

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

VALUE (keV)	CL%	DOCUMENT ID		TECN	COMMENT
<0.095	95	ACCIARRI	01G	L3	$183\text{–}202\ e^+ e^- \to e^+ e^- \eta \pi^+ \pi^-$

$\Gamma(\rho^0\gamma) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_{10}\Gamma_9/\Gamma$

VALUE (keV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.5	95	ALTHOFF	84E	TASS	$e^+ e^- \to e^+ e^- \pi^+ \pi^- \gamma$

$\eta(1405)$ BRANCHING RATIOS

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
1.09±0.48		[1] AMSLER	04B	CBAR	$0\ \overline{p}p \rightarrow \pi^+\pi^-\pi^+\pi^-\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.5	90	EDWARDS	83B	CBAL	$J/\psi \rightarrow \eta\pi\pi\gamma$
<1.1	90	SCHARRE	80	MRK2	$J/\psi \rightarrow \eta\pi\pi\gamma$
<1.5	95	FOSTER	68B	HBC	$0.0\ \overline{p}p$

[1] Using the data of BAILLON 67 on $\overline{p}p \rightarrow K\overline{K}\pi$.

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.111±0.064	AMSLER	04B	CBAR	$0\ \overline{p}p$

$\Gamma(a_0(980)\pi)/\Gamma(K\overline{K}\pi)$ — Γ_3/Γ_1

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
∼ 0.15		[1] BERTIN	95	OBLX	$0\ \overline{p}p \rightarrow K\overline{K}\pi\pi\pi$
∼ 0.8	500	[1] DUCH	89	ASTE	$\overline{p}p \rightarrow \pi^+\pi^-K^\pm\pi^\mp K^0$
∼ 0.75		[1] REEVES	86	SPEC	$6.6\ p\overline{p} \rightarrow KK\pi X$

[1] Assuming that the $a_0(980)$ decays only into $K\overline{K}$.

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

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.29±0.10		ABELE	98E	CBAR	$0\ p\overline{p} \rightarrow \eta\pi^0\pi^0\pi^0$
0.19±0.04	2200	[1] ALDE	97B	GAM4	$100\ \pi^- p \rightarrow \eta\pi^0\pi^0 n$
0.56±0.04±0.03		[1] AMSLER	95F	CBAR	$0\ \overline{p}p \rightarrow \pi^+\pi^-\pi^0\pi^0\eta$

[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
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.91±0.12		ANISOVICH	01	SPEC	$0.0\ \overline{p}p \rightarrow \eta\pi^+\pi^-\pi^+\pi^-$
0.15±0.04	9082	[1] MANAK	00A	MPS	$18\ \pi^- p \rightarrow \eta\pi^+\pi^- n$
0.70±0.12±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 $\eta\pi$.

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

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

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

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.78 × 10^{-3}	90	[1] ABLIKIM	18O	BES3	$\psi(2S) \to \pi^+\pi^-\gamma\gamma\gamma$

[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
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.81 ± 0.04	2200	ALDE	97B	GAM4	$100\ \pi^- p \to \eta\pi^0\pi^0 n$

$\Gamma(f_0(980)\eta)/\Gamma(\eta\pi\pi)$ — Γ_6/Γ_2

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.32 ± 0.07	[1] ANISOVICH	00	SPEC	0.9–1.2 $\overline{p}p \to \eta 3\pi^0$

[1] Using preliminary Crystal Barrel data.

$\Gamma(f_0(980)\pi^0 \to \pi^+\pi^-\pi^0)/\Gamma_{\rm total}$ — Γ_5/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	203	[1] ABLIKIM	24I	BES3	$J/\psi \to e^+e^-\eta(1405)$
seen	743	[2] ABLIKIM	12E	BES3	$J/\psi \to \gamma\eta(1405)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
not seen		[3] ABLIKIM	17AJ	BES3	$\psi(2S) \to \gamma\pi^+\pi^-\pi^0$

[1] ABLIKIM 24I reports B($J/\psi \to e^+e^-\eta(1405) \to f_0(980)\pi^0 \to \pi^+\pi^-\pi^0$) = ($2.04 \pm 0.20 \pm 0.08) \times 10^{-7}$.

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

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

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

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

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

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

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.084 ± 0.024	[1] ADAMS	01B	B852	18 GeV $\pi^- p \to K^+K^-\pi^0 n$

[1] Statistical error only.

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.09 ± 0.03		[1] ABLIKIM	18I	BES3	$J/\psi \to \gamma\gamma\phi(1020)$
0.13 ± 0.04		[2] ABLIKIM	18I	BES3	$J/\psi \to \gamma\gamma\phi(1020)$
<0.77	95	[3] BAI	04J	BES2	$J/\psi \to \gamma\gamma K^+K^-$

[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 $\mathrm{B}(J/\psi \rightarrow \eta(1405)\gamma \rightarrow \phi\gamma\gamma) < 0.82 \times 10^{-4}$ and $\mathrm{B}(J/\psi \rightarrow \eta(1405)\gamma \rightarrow \rho^0\gamma\gamma) = (1.07 \pm 0.17 \pm 0.11) \times 10^{-4}$.

$\eta(1405)$ REFERENCES

ABLIKIM	24I	PR D109 012007	M. Ablikim *et al.*	(BESIII Collab.)	
ABLIKIM	23M	JHEP 2303 121	M. Ablikim *et al.*	(BESIII Collab.)	
ABLIKIM	19BA	PR D100 092003	M. Ablikim *et al.*	(BESIII Collab.)	
ABLIKIM	18I	PR D97 051101	M. Ablikim *et al.*	(BESIII Collab.)	
ABLIKIM	18O	PR D97 072014	M. Ablikim *et al.*	(BESIII Collab.)	
ABLIKIM	17AJ	PR D96 112008	M. Ablikim *et al.*	(BESIII Collab.)	
ABLIKIM	13M	PR D87 092006	M. Ablikim *et al.*	(BESIII Collab.)	
ABLIKIM	12E	PRL 108 182001	M. Ablikim *et al.*	(BESIII Collab.)	
ABLIKIM	11J	PRL 107 182001	M. Ablikim *et al.*	(BESIII Collab.)	
ABLIKIM	08E	PR D77 032005	M. Ablikim *et al.*	(BES Collab.)	
AHOHE	05	PR D71 072001	R. Ahohe *et al.*	(CLEO Collab.)	
AMSLER	04B	EPJ C33 23	C. Amsler *et al.*	(Crystal Barrel Collab.)	
BAI	04J	PL B594 47	J.Z. Bai *et al.*	(BES Collab.)	
NICHITIU	02	PL B545 261	F. Nichitiu *et al.*	(OBELIX Collab.)	
ACCIARRI	01G	PL B501 1	M. Acciarri *et al.*	(L3 Collab.)	
ADAMS	01B	PL B516 264	G.S. Adams *et al.*	(BNL E852 Collab.)	
ANISOVICH	01	NP A690 567	A.V. Anisovich *et al.*		
ANISOVICH	00	PL B472 168	A.V. Anisovich *et al.*		
BAI	00D	PL B476 25	J.Z. Bai *et al.*	(BES Collab.)	
MANAK	00A	PR D62 012003	J.J. Manak *et al.*	(BNL E852 Collab.)	
BAI	99	PL B446 356	J.Z. Bai *et al.*	(BES Collab.)	
CICALO	99	PL B462 453	C. Cicalo *et al.*	(OBELIX Collab.)	
ABELE	98E	NP B514 45	A. Abele *et al.*	(Crystal Barrel Collab.)	
BAI	98C	PL B440 217	J.Z. Bai *et al.*	(BES Collab.)	
ALDE	97B	PAN 60 386	D. Alde *et al.*	(GAMS Collab.)	
		Translated from YAF 60 458.			
BERTIN	97	PL B400 226	A. Bertin *et al.*	(OBELIX Collab.)	
AMSLER	95F	PL B358 389	C. Amsler *et al.*	(Crystal Barrel Collab.)	
BERTIN	95	PL B361 187	A. Bertin *et al.*	(OBELIX Collab.)	
BUGG	95	PL B353 378	D.V. Bugg *et al.*	(LOQM, PNPI, WASH)	
AUGUSTIN	92	PR D46 1951	J.E. Augustin, G. Cosme	(DM2 Collab.)	
BOLTON	92B	PRL 69 1328	T. Bolton *et al.*	(Mark III Collab.)	
FUKUI	91C	PL B267 293	S. Fukui *et al.*	(SUGI, NAGO, KEK, KYOT+)	
AUGUSTIN	90	PR D42 10	J.E. Augustin *et al.*	(DM2 Collab.)	
BAI	90C	PRL 65 2507	Z. Bai *et al.*	(Mark III Collab.)	
COFFMAN	90	PR D41 1410	D.M. Coffman *et al.*	(Mark III Collab.)	
BISELLO	89B	PR D39 701	G. Busetto *et al.*	(DM2 Collab.)	
DUCH	89	ZPHY C45 223	K.D. Duch *et al.*	(ASTERIX Collab.)	JP
RATH	89	PR D40 693	M.G. Rath *et al.*	(NDAM, BRAN, BNL, CUNY+)	
BIRMAN	88	PRL 61 1557	A. Birman *et al.*	(BNL, FSU, IND, MASD)	JP
ANDO	86	PRL 57 1296	A. Ando *et al.*	(KEK, KYOT, NIRS, SAGA+)	IJP
REEVES	86	PR D34 1960	D.F. Reeves *et al.*	(FLOR, BNL, IND+)	JP
CHUNG	85	PRL 55 779	S.U. Chung *et al.*	(BNL, FLOR, IND+)	JP
ALTHOFF	84E	PL 147B 487	M. Althoff *et al.*	(TASSO Collab.)	
EDWARDS	83B	PRL 51 859	C. Edwards *et al.*	(CIT, HARV, PRIN+)	
EDWARDS	82E	PRL 49 259	C. Edwards *et al.*	(CIT, HARV, PRIN+)	
Also		PRL 50 219	C. Edwards *et al.*	(CIT, HARV, PRIN+)	
SCHARRE	80	PL 97B 329	D.L. Scharre *et al.*	(SLAC, LBL)	
FOSTER	68B	NP B8 174	M. Foster *et al.*	(CERN, CDEF)	
BAILLON	67	NC 50A 393	P.H. Baillon *et al.*	(CERN, CDEF, IRAD)	