

η(1405)

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

See also the η(1475).

See the related review(s):

Pseudoscalar and Pseudovector Mesons in the 1400 MeV Region

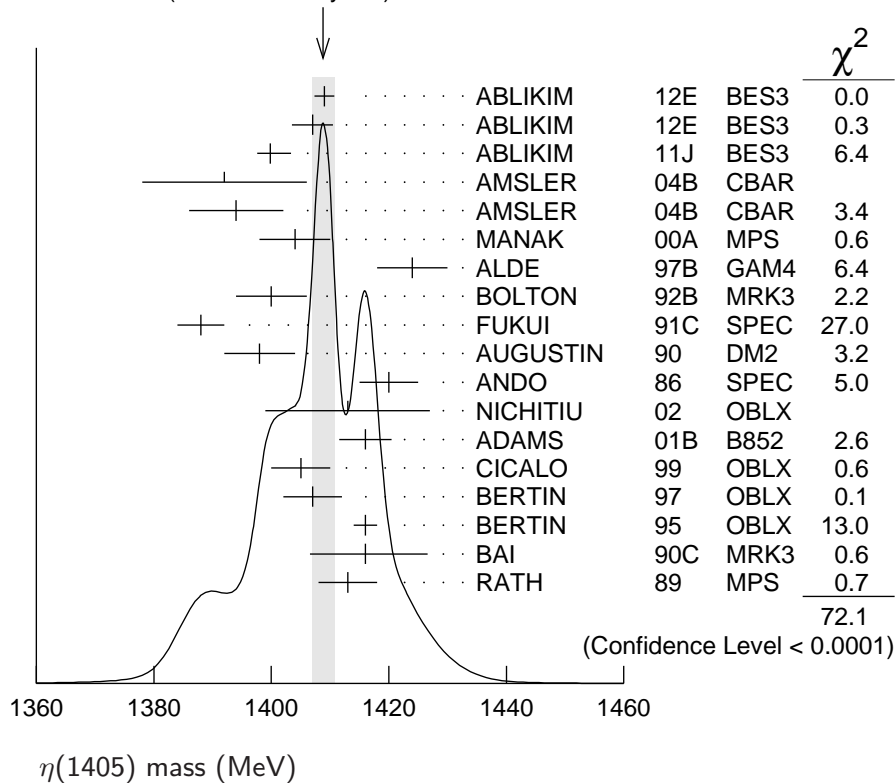
η(1405) MASS

VALUE (MeV)

DOCUMENT ID

1408.8 ± 2.0 OUR AVERAGE Includes data from the 2 datablocks that follow this one. Error includes scale factor of 2.2. See the ideogram below.

WEIGHTED AVERAGE
1408.8 ± 2.0 (Error scaled by 2.2)



ηππ 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	$J/\psi \rightarrow \gamma(\pi^+\pi^-\pi^0)$
1407.0 ± 3.5	198	ABLIKIM	12E BES3	$J/\psi \rightarrow \gamma(\pi^0\pi^0\pi^0)$
1399.8 ± 2.2 ^{+2.8} _{-0.1}		¹ ABLIKIM	11J BES3	$J/\psi \rightarrow \omega(\eta\pi^+\pi^-)$
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 $\pi^- p \rightarrow \eta \pi^+ \pi^- n$
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. • • •

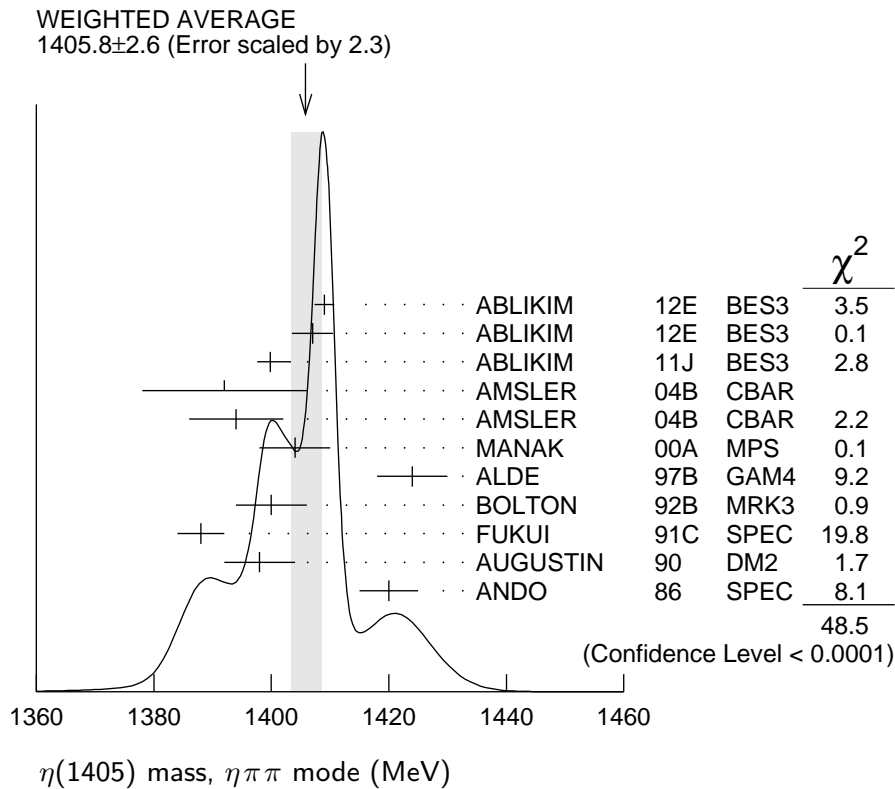
1404.0 ± 11.0	195	ABLIKIM	19BABES3	$e^+ e^- \rightarrow \psi(2S)$
1385 ± 7		BAI	99 BES	$J/\psi \rightarrow \gamma \eta \pi^+ \pi^-$
1409 ± 3		⁴ AMSLER	95F CBAR	0 $\bar{p} p \rightarrow \pi^+ \pi^- \pi^0 \pi^0 \eta$

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⁴ Superseded by AMSLER 04B.



$K \bar{K} \pi$ 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.

1413.9 ± 1.7 OUR AVERAGE Error includes scale factor of 1.1.

1413 ± 14	3651	¹ NICHITIU	02 OBLX	0 $\bar{p} p \rightarrow K^+ K^- \pi^+ \pi^- \pi^0$
1416 ± 4 ± 2	20k	ADAMS	01B B852	18 GeV $\pi^- p \rightarrow K^+ K^- \pi^0 n$
1405 ± 5		² CICALO	99 OBLX	0 $\bar{p} p \rightarrow K^\pm K_S^0 \pi^\mp \pi^+ \pi^-$
1407 ± 5		² BERTIN	97 OBLX	0 $\bar{p} p \rightarrow K^\pm (K^0) \pi^\mp \pi^+ \pi^-$

1416 ± 2		² BERTIN	95	OBLX	0	$\bar{p}p \rightarrow K\bar{K}\pi\pi\pi$
1416 ± 8	$\begin{smallmatrix} +7 \\ -5 \end{smallmatrix}$	700	³ BAI	90C	MRK3	$J/\psi \rightarrow \gamma K_S^0 K^\pm \pi^\mp$
1413 ± 5		³ RATH	89	MPS	21.4	$\pi^- p \rightarrow n K_S^0 K_S^0 \pi^0$
1459 ± 5		⁴ AUGUSTIN	92	DM2		$J/\psi \rightarrow \gamma K\bar{K}\pi$

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

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 $a_0(980)\pi 0^- +$ partial wave. Cannot rule out a $a_0(980)\pi 1^+ +$ partial wave.

⁴ 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±10±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 $\eta(1405)$.

4 π 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.

$K\bar{K}\pi$ 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		$J/\psi \rightarrow \omega K_S^0 K^+ \pi^- + c.c.$
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 $\begin{smallmatrix} +20 \\ -15 \end{smallmatrix}$	174	¹ EDWARDS	82E	CBAL		$J/\psi \rightarrow \gamma K^+ K^- \pi^0$
1440 $\begin{smallmatrix} +10 \\ -15 \end{smallmatrix}$		¹ SCHARRE	80	MRK2		$J/\psi \rightarrow \gamma K_S^0 K^\pm \pi^\mp$
1425 ± 7	800	^{1,3} BAILLON	67	HBC	0	$\bar{p}p \rightarrow K\bar{K}\pi\pi\pi$

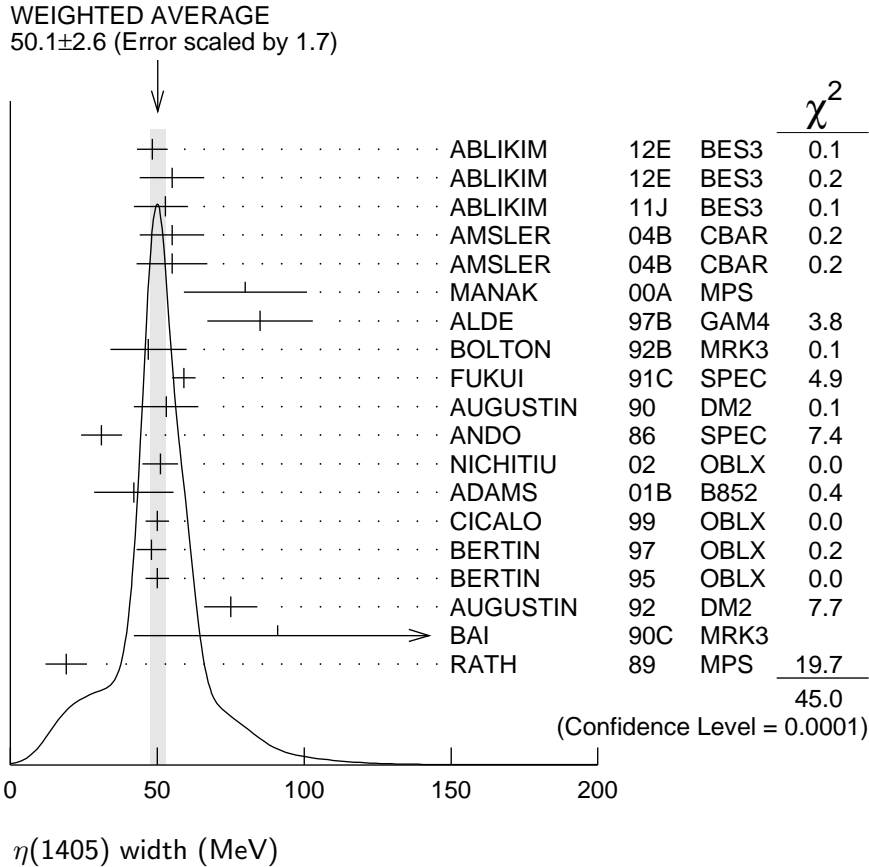
¹ These experiments identify only one pseudoscalar in the 1400–1500 range. Data could also refer to $\eta(1475)$.

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
50.1 ± 2.6 OUR AVERAGE Includes data from the 2 datablocks that follow this one. Error includes scale factor of 1.7. 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	$J/\psi \rightarrow \gamma(\pi^+\pi^-\pi^0)$
55.0 ± 11.0	198	ABLIKIM	12E BES3	$J/\psi \rightarrow \gamma(\pi^0\pi^0\pi^0)$
52.8 ± 7.6 ^{+0.1} _{-7.6}		¹ 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		² 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		³ 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		⁴ AMSLER	95F	CBAR	0	$\bar{p} p \rightarrow \pi^+ \pi^- \pi^0 \pi^0 \eta$

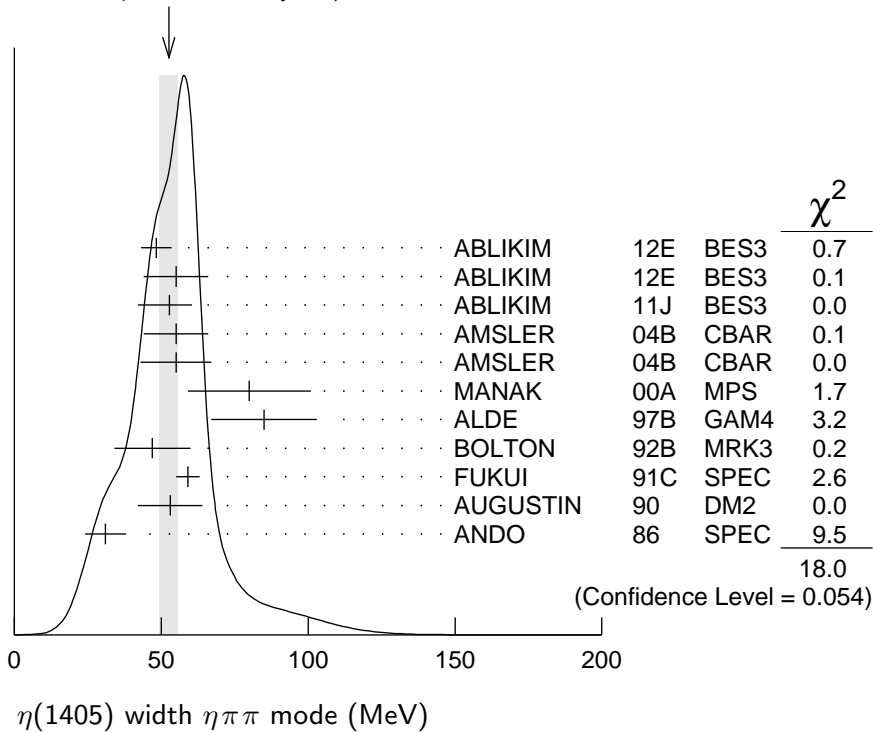
¹ The selected process is $J/\psi \rightarrow \omega a_0(980) \pi$.

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

³ From $\eta \pi^+ \pi^-$ mass distribution - mainly $a_0(980) \pi$ - no spin-parity determination available.

⁴ Superseded by AMSLER 04B.

WEIGHTED AVERAGE
52.6 ± 3.2 (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.

48 ± 4 OUR AVERAGE Error includes scale factor of 2.1. See the ideogram below.

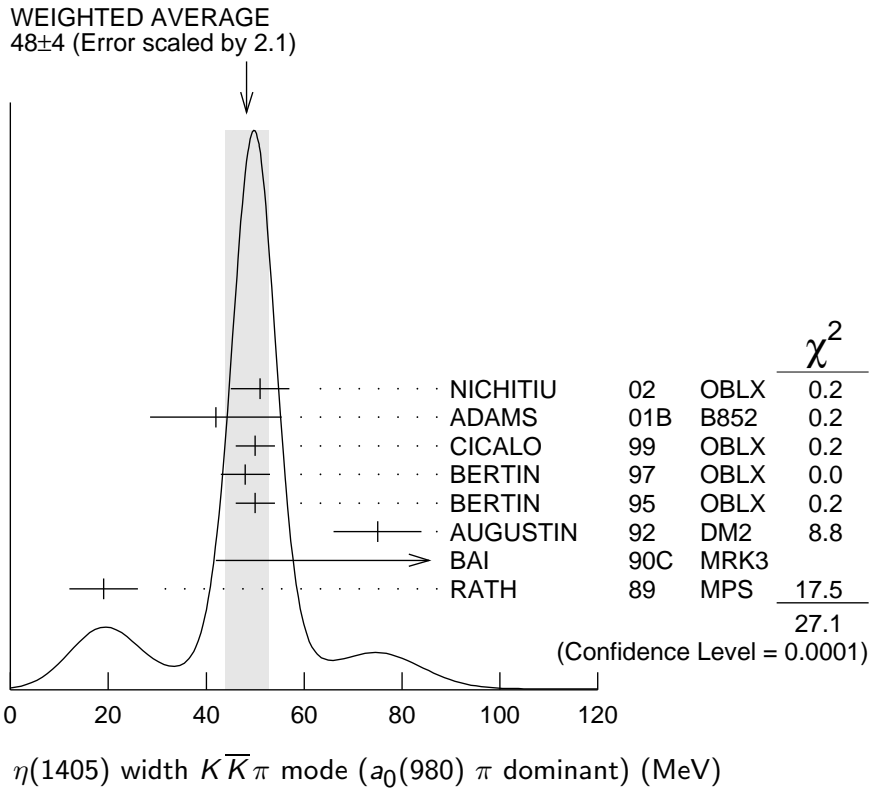
51 ± 6	3651	¹ NICHITIU	02	OBLX	0	$\bar{p} p \rightarrow K^+ K^- \pi^+ \pi^- \pi^0$
42 ± 10 ± 9	20k	ADAMS	01B	B852	18	GeV $\pi^- p \rightarrow K^+ K^- \pi^0 n$
50 ± 4		CICALO	99	OBLX	0	$\bar{p} p \rightarrow K^\pm K_S^0 \pi^\mp \pi^+ \pi^-$
48 ± 5		² BERTIN	97	OBLX	0.0	$\bar{p} p \rightarrow K^\pm (K^0) \pi^\mp \pi^+ \pi^-$

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 $a_0(980)\pi 0^- +$ partial wave, but $a_0(980)\pi 1^{++}$ cannot be excluded.



$\pi\pi\gamma$ 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 $0 \bar{p}p \rightarrow \pi^+ \pi^- \pi^+ \pi^- \gamma$

$101.0 \pm 8.8 \pm 8.8$ 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 $\eta(1405)$.

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 $J/\psi \rightarrow \gamma\pi^+\pi^-\pi^+\pi^-$

144 ± 13 3270 ¹ BISELLO 89B DM2 $J/\psi \rightarrow 4\pi\gamma$

¹ Estimated by us from various fits.

$K\bar{K}\pi$ 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	$8 \pi^- p \rightarrow K\bar{K}\pi n$
$55 \begin{smallmatrix} +20 \\ -30 \end{smallmatrix}$	174	¹ EDWARDS	82E CBAL	$J/\psi \rightarrow \gamma K^+ K^- \pi^0$
$50 \begin{smallmatrix} +30 \\ -20 \end{smallmatrix}$		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 $f_0(980)\pi^0 \rightarrow \pi^+\pi^-\pi^0$	not seen	
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	

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

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

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	$10.6 e^+e^- \rightarrow e^+e^- K_S^0 K^\pm \pi^\mp$

¹ Using $\eta(1405)$ mass and width 1410 MeV and 51 MeV, respectively.

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

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

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

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

VALUE (keV)	CL%	DOCUMENT ID	TECN	COMMENT
<1.5	95	ALTHOFF	84E TASS	$e^+e^- \rightarrow e^+e^-\pi^+\pi^-\gamma$

$\eta(1405)$ BRANCHING RATIOS

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

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
1.09±0.48		¹ AMSLER	04B CBAR	0 $\bar{p}p \rightarrow \pi^+\pi^-\pi^+\pi^-\eta$
<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 $\bar{p}p$

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

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
0.111±0.064	AMSLER	04B CBAR	0 $\bar{p}p$

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

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
~ 0.15		¹ BERTIN	95 OBLX	0 $\bar{p}p \rightarrow K\bar{K}\pi\pi\pi$
~ 0.8	500	¹ DUCH	89 ASTE	$\bar{p}p \rightarrow \pi^+\pi^-K^\pm\pi^\mp K^0$
~ 0.75		¹ REEVES	86 SPEC	6.6 $p\bar{p} \rightarrow KK\pi X$

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
0.29±0.10		ABELE	98E CBAR	0 $p\bar{p} \rightarrow \eta\pi^0\pi^0\pi^0$
0.19±0.04	2200	¹ ALDE	97B GAM4	100 $\pi^-p \rightarrow \eta\pi^0\pi^0n$
0.56±0.04±0.03		¹ AMSLER	95F CBAR	0 $\bar{p}p \rightarrow \pi^+\pi^-\pi^0\pi^0\eta$

¹ Assuming that the $a_0(980)$ decays only into $\eta\pi$.

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

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
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±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 $\eta\pi$.

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

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

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<1.78 × 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

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.81±0.04	2200	ALDE	97B	GAM4 100 $\pi^-p \rightarrow \eta\pi^0\pi^0n$

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

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.32±0.07	¹ ANISOVICH	00	SPEC 0.9–1.2 $\bar{p}p \rightarrow \eta 3\pi^0$
¹ Using preliminary Crystal Barrel data.			

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

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
not seen	¹ ABLIKIM	17AJ	BES3 $\psi(2S) \rightarrow \gamma\pi^+\pi^-\pi^0$
¹ 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

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.58	99.85	^{1,2} AMSLER	04B	CBAR 0 $\bar{p}p$
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 $\bar{p}p \rightarrow K\bar{K}\pi$.				

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

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.084±0.024	¹ ADAMS	01B	B852 18 GeV $\pi^-p \rightarrow K^+K^-\pi^0n$
¹ Statistical error only.			

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

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

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 $J/\psi \rightarrow \gamma\gamma K^+ K^-$

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	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. AMSLER <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.)
		Translated from YAF 60 458.		
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)