

**$a_2(1320)$** 

$$I^G(J^{PC}) = 1^-(2^{++})$$

 **$a_2(1320)$  MASS**VALUE (MeV)DOCUMENT ID

**$1318.3^{+0.5}_{-0.6}$  OUR AVERAGE** Includes data from the 4 datablocks that follow this one.  
Error includes scale factor of 1.2.

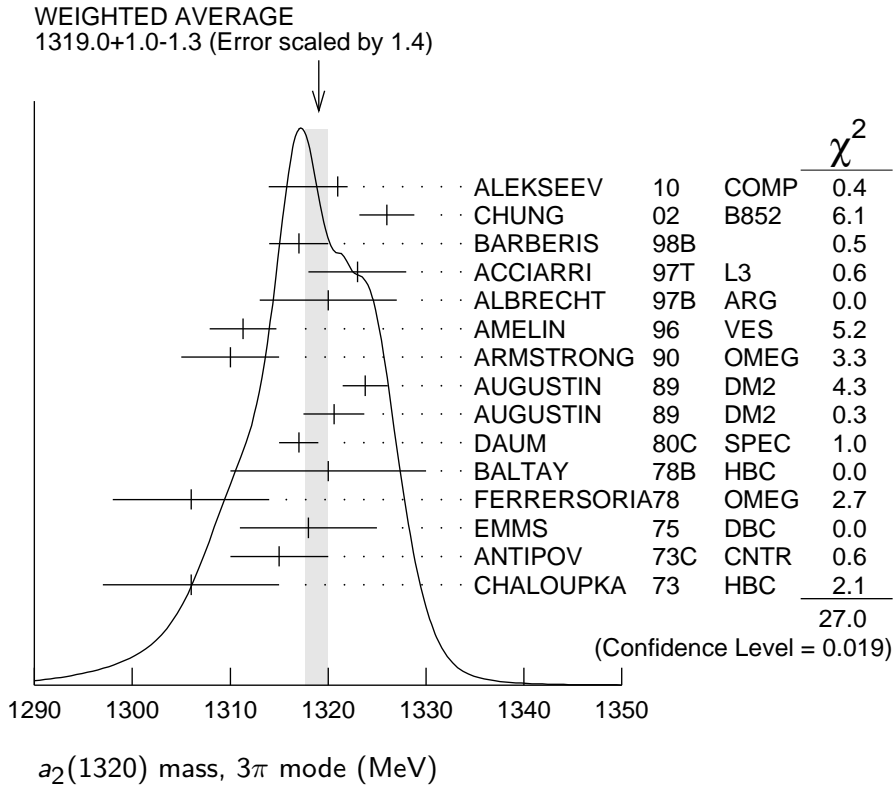
**3 $\pi$  MODE**VALUE (MeV)EVTSDOCUMENT IDTECNCHGCOMMENT

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

**$1319.0^{+1.0}_{-1.3}$  OUR AVERAGE** Error includes scale factor of 1.4. See the ideogram below.

1321	$\pm 1$	$^{+0}_{-7}$	420k	ALEKSEEV	10	COMP	190 $\pi^- Pb \rightarrow$ $\pi^- \pi^- \pi^+ Pb'$
1326	$\pm 2$	$\pm 2$		CHUNG	02	B852	18.3 $\pi^- p \rightarrow$ $\pi^+ \pi^- \pi^- p$
1317	$\pm 3$			BARBERIS	98B		450 $pp \rightarrow$ $p_f \pi^+ \pi^- \pi^0 p_s$
1323	$\pm 4$	$\pm 3$		ACCIARRI	97T	L3	$e^+ e^- \rightarrow$ $e^+ e^- \pi^+ \pi^- \pi^0$
1320	$\pm 7$			ALBRECHT	97B	ARG	$e^+ e^- \rightarrow$ $e^+ e^- \pi^+ \pi^- \pi^0$
1311.3	$\pm 1.6$	$\pm 3.0$	72.4k	AMELIN	96	VES	36 $\pi^- p \rightarrow$ $\pi^+ \pi^- \pi^0 n$
1310	$\pm 5$			ARMSTRONG	90	OMEG 0	300.0 $pp \rightarrow$ $pp \pi^+ \pi^- \pi^0$
1323.8	$\pm 2.3$		4022	AUGUSTIN	89	DM2 $\pm$	$J/\psi \rightarrow \rho^\pm a_2^\mp$
1320.6	$\pm 3.1$		3562	AUGUSTIN	89	DM2 0	$J/\psi \rightarrow \rho^0 a_2^0$
1317	$\pm 2$		25k	<sup>1</sup> DAUM	80C	SPEC -	63,94 $\pi^- p \rightarrow 3\pi p$
1320	$\pm 10$		1097	<sup>1</sup> BALTAY	78B	HBC +0	15 $\pi^+ p \rightarrow p 4\pi$
1306	$\pm 8$			FERRERSORIA	78	OMEG -	9 $\pi^- p \rightarrow p 3\pi$
1318	$\pm 7$		1.6k	<sup>1</sup> EMMS	75	DBC 0	4 $\pi^+ n \rightarrow p(3\pi)^0$
1315	$\pm 5$			<sup>1</sup> ANTIPOV	73C	CNTR -	25,40 $\pi^- p \rightarrow$ $p \eta \pi^-$
1306	$\pm 9$		1580	CHALOUPKA	73	HBC -	3.9 $\pi^- p$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●							
1300	$\pm 2$	$\pm 4$	18k	<sup>2</sup> SCHEGELSKY	06	RVUE 0	$\gamma\gamma \rightarrow \pi^+ \pi^- \pi^0$
1305	$\pm 14$			CONDO	93	SHF	$\gamma p \rightarrow n \pi^+ \pi^+ \pi^-$
1310	$\pm 2$			<sup>1</sup> EVANGELIS...	81	OMEG -	12 $\pi^- p \rightarrow 3\pi p$
1343	$\pm 11$		490	BALTAY	78B	HBC 0	15 $\pi^+ p \rightarrow \Delta 3\pi$
1309	$\pm 5$		5k	BINNIE	71	MMS -	$\pi^- p$ near $a_2$ thresh- old
1299	$\pm 6$		28k	BOWEN	71	MMS -	5 $\pi^- p$
1300	$\pm 6$		24k	BOWEN	71	MMS +	5 $\pi^+ p$
1309	$\pm 4$		17k	BOWEN	71	MMS -	7 $\pi^- p$
1306	$\pm 4$		941	ALSTON-...	70	HBC +	7.0 $\pi^+ p \rightarrow 3\pi p$

- <sup>1</sup> From a fit to  $J^P = 2^+ \rho\pi$  partial wave.  
<sup>2</sup> From analysis of L3 data at 183–209 GeV.



**$K\bar{K}$  MODE**

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

**1318.1± 0.7 OUR AVERAGE**

1319 ± 5	4700	<sup>1,2</sup> CLELAND	82B	SPEC	+	50 $\pi^+ p \rightarrow K_S^0 K^+ p$
1324 ± 6	5200	<sup>1,2</sup> CLELAND	82B	SPEC	-	50 $\pi^- p \rightarrow K_S^0 K^- p$
1320 ± 2	4000	CHABAUD	80	SPEC	-	17 $\pi^- A \rightarrow K_S^0 K^- A$
1312 ± 4	11000	CHABAUD	78	SPEC	-	9.8 $\pi^- p \rightarrow K^- K_S^0 p$
1316 ± 2	4730	CHABAUD	78	SPEC	-	18.8 $\pi^- p \rightarrow K^- K_S^0 p$
1318 ± 1		<sup>1,3</sup> MARTIN	78D	SPEC	-	10 $\pi^- p \rightarrow K_S^0 K^- p$
1320 ± 2	2724	MARGULIE	76	SPEC	-	23 $\pi^- p \rightarrow K^- K_S^0 p$
1313 ± 4	730	FOLEY	72	CNTR	-	20.3 $\pi^- p \rightarrow K^- K_S^0 p$
1319 ± 3	1500	<sup>3</sup> GRAYER	71	ASPK	-	17.2 $\pi^- p \rightarrow K^- K_S^0 p$

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

1304 ± 10	870	<sup>4</sup> SCHEGELSKY	06A	RVUE	0	$\gamma\gamma \rightarrow K_S^0 K_S^0$
1330 ± 11	1000	<sup>1,2</sup> CLELAND	82B	SPEC	+	30 $\pi^+ p \rightarrow K_S^0 K^+ p$
1324 ± 5	350	HYAMS	78	ASPK	+	12.7 $\pi^+ p \rightarrow K^+ K_S^0 p$

- <sup>1</sup> From a fit to  $J^P = 2^+$  partial wave.  
<sup>2</sup> Number of events evaluated by us.  
<sup>3</sup> Systematic error in mass scale subtracted.  
<sup>4</sup> From analysis of L3 data at 91 and 183–209 GeV.

**$\eta\pi$  MODE**

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

**1317.7 ± 1.4 OUR AVERAGE**

1308 ± 9		BARBERIS	00H		450 $p p \rightarrow p_f \eta \pi^0 p_S$
1316 ± 9		BARBERIS	00H		450 $p p \rightarrow \Delta_f^{++} \eta \pi^- p_S$
1317 ± 1 ± 2		THOMPSON	97	MPS	18 $\pi^- p \rightarrow \eta \pi^- p$
1315 ± 5 ± 2		<sup>1</sup> AMSLER	94D	CBAR	0.0 $\bar{p} p \rightarrow \pi^0 \pi^0 \eta$
1325.1 ± 5.1		AOYAGI	93	BKEI	$\pi^- p \rightarrow \eta \pi^- p$
1317.7 ± 1.4 ± 2.0		BELADIDZE	93	VES	37 $\pi^- N \rightarrow \eta \pi^- N$
1323 ± 8	1000	<sup>2</sup> KEY	73	OSPK	– 6 $\pi^- p \rightarrow p \pi^- \eta$

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

1315 ± 12		<sup>3</sup> ADOLPH	15	COMP	191 $\pi^- p \rightarrow \eta^{(l)} \pi^- p$
1309 ± 4		ANISOVICH	09	RVUE	$\bar{p} p, \pi N$
1324 ± 5		ARMSTRONG	93C	E760	0 $\bar{p} p \rightarrow \pi^0 \eta \eta \rightarrow 6\gamma$
1336.2 ± 1.7	2561	DELFOSSÉ	81	SPEC	+ $\pi^\pm p \rightarrow p \pi^\pm \eta$
1330.7 ± 2.4	1653	DELFOSSÉ	81	SPEC	– $\pi^\pm p \rightarrow p \pi^\pm \eta$
1324 ± 8	6200	<sup>2,4</sup> CONFORTO	73	OSPK	– 6 $\pi^- p \rightarrow p \pi^- \eta$

<sup>1</sup> The systematic error of 2 MeV corresponds to the spread of solutions.

<sup>2</sup> Error includes 5 MeV systematic mass-scale error.

<sup>3</sup> ADOLPH 15 value is derived from a Breit-Wigner fit with mass-dependent width taking the  $\eta\pi$  and  $\rho\pi$  channels into account.

<sup>4</sup> Missing mass with enriched MMS =  $\eta\pi^-$ ,  $\eta = 2\gamma$ .

 **$\eta'\pi$  MODE**

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

**1322 ± 7 OUR AVERAGE**

1318 ± 8	$\begin{smallmatrix} +3 \\ -5 \end{smallmatrix}$	IVANOV	01	B852	18 $\pi^- p \rightarrow \eta' \pi^- p$
1327.0 ± 10.7		BELADIDZE	93	VES	37 $\pi^- N \rightarrow \eta' \pi^- N$

 **$a_2(1320)$  WIDTH****3 $\pi$  MODE**

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
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**105.0<sup>+1.6</sup><sub>-1.9</sub> OUR AVERAGE**

110 ± 2	$\begin{smallmatrix} +2 \\ -15 \end{smallmatrix}$	420k	ALEKSEEV	10	COMP	190 $\pi^- P b \rightarrow \pi^- \pi^- \pi^+ P b'$
108 ± 3	± 15		CHUNG	02	B852	18.3 $\pi^- p \rightarrow \pi^+ \pi^- \pi^- p$
120 ± 10			BARBERIS	98B	450 $p p \rightarrow p_f \pi^+ \pi^- \pi^0 p_S$	
105 ± 10	± 11		ACCIARRI	97T	L3	$e^+ e^- \rightarrow e^+ e^- \pi^+ \pi^- \pi^0$
120 ± 10			ALBRECHT	97B	ARG	$e^+ e^- \rightarrow e^+ e^- \pi^+ \pi^- \pi^0$

103.0 ± 6.0 ± 3.3	72.4k	AMELIN	96	VES		36 $\pi^- p \rightarrow \pi^+ \pi^- \pi^0 n$
120 ± 10		ARMSTRONG	90	OMEG	0	300.0 $pp \rightarrow pp \pi^+ \pi^- \pi^0$
107.0 ± 9.7	4022	AUGUSTIN	89	DM2	±	$J/\psi \rightarrow \rho^\pm a_2^\mp$
118.5 ± 12.5	3562	AUGUSTIN	89	DM2	0	$J/\psi \rightarrow \rho^0 a_2^0$
97 ± 5		<sup>1</sup> EVANGELIS...	81	OMEG	−	12 $\pi^- p \rightarrow 3\pi p$
96 ± 9	25k	<sup>1</sup> DAUM	80C	SPEC	−	63,94 $\pi^- p \rightarrow 3\pi p$
110 ± 15	1097	<sup>1</sup> BALTAY	78B	HBC	+0	15 $\pi^+ p \rightarrow p 4\pi$
112 ± 18	1.6k	<sup>1</sup> EMMS	75	DBC	0	4 $\pi^+ n \rightarrow p(3\pi)^0$
122 ± 14	1.2k	<sup>1,2</sup> WAGNER	75	HBC	0	7 $\pi^+ p \rightarrow \Delta^{++}(3\pi)^0$
115 ± 15		<sup>1</sup> ANTIPOV	73C	CNTR	−	25,40 $\pi^- p \rightarrow p \eta \pi^-$
99 ± 15	1580	CHALOUPKA	73	HBC	−	3.9 $\pi^- p$
105 ± 5	28k	BOWEN	71	MMS	−	5 $\pi^- p$
99 ± 5	24k	BOWEN	71	MMS	+	5 $\pi^+ p$
103 ± 5	17k	BOWEN	71	MMS	−	7 $\pi^- p$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●						
117 ± 6 ± 20	18k	<sup>3</sup> SCHEGELSKY	06	RVUE	0	$\gamma\gamma \rightarrow \pi^+ \pi^- \pi^0$
120 ± 40		CONDO	93	SHF		$\gamma p \rightarrow n \pi^+ \pi^+ \pi^-$
115 ± 14	490	BALTAY	78B	HBC	0	15 $\pi^+ p \rightarrow \Delta 3\pi$
72 ± 16	5k	BINNIE	71	MMS	−	$\pi^- p$ near $a_2$ threshold
79 ± 12	941	ALSTON-...	70	HBC	+	7.0 $\pi^+ p \rightarrow 3\pi p$

<sup>1</sup> From a fit to  $J^P = 2^+ \rho\pi$  partial wave.

<sup>2</sup> Width errors enlarged by us to  $4\Gamma/\sqrt{N}$ ; see the note with the  $K^*(892)$  mass.

<sup>3</sup> From analysis of L3 data at 183–209 GeV.

## $K\bar{K}$ AND $\eta\pi$ MODES

VALUE (MeV) DOCUMENT ID

**107 ± 5 OUR ESTIMATE**

**110.4 ± 1.7 OUR AVERAGE** Includes data from the 2 datablocks that follow this one.

## $K\bar{K}$ MODE

VALUE (MeV) EVTS DOCUMENT ID TECN CHG COMMENT

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

**109.8 ± 2.4 OUR AVERAGE**

112 ± 20	4700	<sup>1,2</sup> CLELAND	82B	SPEC	+	50 $\pi^+ p \rightarrow K_S^0 K^+ p$
120 ± 25	5200	<sup>1,2</sup> CLELAND	82B	SPEC	−	50 $\pi^- p \rightarrow K_S^0 K^- p$
106 ± 4	4000	CHABAUD	80	SPEC	−	17 $\pi^- A \rightarrow K_S^0 K^- A$
126 ± 11	11000	CHABAUD	78	SPEC	−	9.8 $\pi^- p \rightarrow K^- K_S^0 p$
101 ± 8	4730	CHABAUD	78	SPEC	−	18.8 $\pi^- p \rightarrow K^- K_S^0 p$
113 ± 4		<sup>1,3</sup> MARTIN	78D	SPEC	−	10 $\pi^- p \rightarrow K_S^0 K^- p$
105 ± 8	2724	<sup>3</sup> MARGULIE	76	SPEC	−	23 $\pi^- p \rightarrow K^- K_S^0 p$
113 ± 19	730	FOLEY	72	CNTR	−	20.3 $\pi^- p \rightarrow K^- K_S^0 p$
123 ± 13	1500	<sup>3</sup> GRAYER	71	ASPK	−	17.2 $\pi^- p \rightarrow K^- K_S^0 p$

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

120 ±15	870	<sup>4</sup> SCHEGELSKY 06A	RVUE	0	$\gamma\gamma \rightarrow K_S^0 K_S^0$
121 ±51	1000	<sup>1,2</sup> CLELAND	82B	SPEC +	$30 \pi^+ p \rightarrow K_S^0 K^+ p$
110 ±18	350	HYAMS	78	ASPK +	$12.7 \pi^+ p \rightarrow K^+ K_S^0 p$

<sup>1</sup> From a fit to  $J^P = 2^+$  partial wave.

<sup>2</sup> Number of events evaluated by us.

<sup>3</sup> Width errors enlarged by us to  $4\Gamma/\sqrt{N}$ ; see the note with the  $K^*(892)$  mass.

<sup>4</sup> From analysis of L3 data at 91 and 183–209 GeV.

## $\eta\pi$ MODE

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

### 111.1± 2.4 OUR AVERAGE

115 ±20		BARBERIS	00H		450 $p p \rightarrow p_f \eta \pi^0 p_s$
112 ±14		BARBERIS	00H		450 $p p \rightarrow \Delta_f^{++} \eta \pi^- p_s$
112 ± 3 ±2		<sup>1</sup> AMSLER	94D	CBAR	0.0 $\bar{p} p \rightarrow \pi^0 \pi^0 \eta$
103 ± 6 ±3		BELADIDZE	93	VES	37 $\pi^- N \rightarrow \eta \pi^- N$
112.2± 5.7	2561	DELFOSSÉ	81	SPEC +	$\pi^\pm p \rightarrow p \pi^\pm \eta$
116.6± 7.7	1653	DELFOSSÉ	81	SPEC -	$\pi^\pm p \rightarrow p \pi^\pm \eta$
108 ± 9	1000	KEY	73	OSPK -	6 $\pi^- p \rightarrow p \pi^- \eta$

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

119 ±14		<sup>2</sup> ADOLPH	15	COMP	191 $\pi^- p \rightarrow \eta^{(\prime)} \pi^- p$
110 ± 4		ANISOVICH	09	RVUE	$\bar{p} p, \pi N$
127 ± 2 ±2		<sup>3</sup> THOMPSON	97	MPS	18 $\pi^- p \rightarrow \eta \pi^- p$
118 ±10		ARMSTRONG	93C	E760	0 $\bar{p} p \rightarrow \pi^0 \eta \eta \rightarrow 6\gamma$
104 ± 9	6200	<sup>4</sup> CONFORTO	73	OSPK -	6 $\pi^- p \rightarrow p \text{MM}^-$

<sup>1</sup> The systematic error of 2 MeV corresponds to the spread of solutions.

<sup>2</sup> ADOLPH 15 value is derived from a Breit-Wigner fit with mass-dependent width taking the  $\eta\pi$  and  $\rho\pi$  channels into account.

<sup>3</sup> Resolution is not unfolded.

<sup>4</sup> Missing mass with enriched  $\text{MMS} = \eta \pi^-$ ,  $\eta = 2\gamma$ .

## $\eta'\pi$ MODE

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
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### 119±25 OUR AVERAGE

140±35±20	IVANOV	01	B852	18 $\pi^- p \rightarrow \eta' \pi^- p$
106±32	BELADIDZE	93	VES	37 $\pi^- N \rightarrow \eta' \pi^- N$

**$a_2(1320)$  DECAY MODES**

Mode	Fraction ( $\Gamma_i/\Gamma$ )	Scale factor/ Confidence level
$\Gamma_1$ $3\pi$	$(70.1 \pm 2.7) \%$	S=1.2
$\Gamma_2$ $\rho(770)\pi$		
$\Gamma_3$ $f_2(1270)\pi$		
$\Gamma_4$ $\rho(1450)\pi$		
$\Gamma_5$ $\eta\pi$	$(14.5 \pm 1.2) \%$	
$\Gamma_6$ $\omega\pi\pi$	$(10.6 \pm 3.2) \%$	S=1.3
$\Gamma_7$ $K\bar{K}$	$(4.9 \pm 0.8) \%$	
$\Gamma_8$ $\eta'(958)\pi$	$(5.5 \pm 0.9) \times 10^{-3}$	
$\Gamma_9$ $\pi^\pm\gamma$	$(2.91 \pm 0.27) \times 10^{-3}$	
$\Gamma_{10}$ $\gamma\gamma$	$(9.4 \pm 0.7) \times 10^{-6}$	
$\Gamma_{11}$ $e^+e^-$	$< 5 \times 10^{-9}$	CL=90%

**CONSTRAINED FIT INFORMATION**

An overall fit to 5 branching ratios uses 18 measurements and one constraint to determine 4 parameters. The overall fit has a  $\chi^2 = 9.3$  for 15 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.

$x_5$	10		
$x_6$	-89	-46	
$x_7$	-1	-2	-24
	$x_1$	$x_5$	$x_6$

 **$a_2(1320)$  PARTIAL WIDTHS** **$\Gamma(\eta\pi)$   $\Gamma_5$** 

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

$18.5 \pm 3.0$	870	<sup>1</sup> SCHEGELSKY 06A	RVUE	0	$\gamma\gamma \rightarrow K_S^0 K_S^0$
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<sup>1</sup> From analysis of L3 data at 91 and 183–209 GeV, using  $\Gamma(a_2(1320) \rightarrow \gamma\gamma) = 0.91$  keV and SU(3) relations.

 **$\Gamma(K\bar{K})$   $\Gamma_7$** 

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

$7.0^{+2.0}_{-1.5}$	870	<sup>1</sup> SCHEGELSKY 06A	RVUE	0	$\gamma\gamma \rightarrow K_S^0 K_S^0$
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<sup>1</sup> From analysis of L3 data at 91 and 183–209 GeV, using  $\Gamma(a_2(1320) \rightarrow \gamma\gamma) = 0.91$  keV and SU(3) relations.

$\Gamma(\pi^\pm\gamma)$  $\Gamma_9$ 

VALUE (keV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
<b>311± 25 OUR AVERAGE</b>					
358± 6±42		<sup>1</sup> ADOLPH	14	COMP	- 190 $\pi^-$ Pb $\rightarrow$ $\pi^+\pi^-\pi^-\text{Pb}'$
284± 25±25	7.1k	MOLCHANOV	01	SELX	600 $\pi^-$ A $\rightarrow$ $\pi^+\pi^-\pi^-$ A
295± 60		CIHANGIR	82	SPEC	+ 200 $\pi^+$ A
• • • We do not use the following data for averages, fits, limits, etc. • • •					
461±110		<sup>2</sup> MAY	77	SPEC	± 9.7 $\gamma$ A

<sup>1</sup> Primakoff reaction using  $a_2(1320) \rightarrow 3\pi$  branching ratio of 70.1%.<sup>2</sup> Assuming one-pion exchange. $\Gamma(\gamma\gamma)$  $\Gamma_{10}$ 

VALUE (keV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
<b>1.00±0.06 OUR AVERAGE</b>					
0.98±0.05±0.09		ACCIARRI	97T	L3	$e^+e^- \rightarrow$ $e^+e^-\pi^+\pi^-\pi^0$
0.96±0.03±0.13		ALBRECHT	97B	ARG	$e^+e^- \rightarrow$ $e^+e^-\pi^+\pi^-\pi^0$
1.26±0.26±0.18	36	BARU	90	MD1	$e^+e^- \rightarrow$ $e^+e^-\pi^+\pi^-\pi^0$
1.00±0.07±0.15	415	BEHREND	90C	CELL	0 $e^+e^- \rightarrow$ $e^+e^-\pi^+\pi^-\pi^0$
1.03±0.13±0.21		BUTLER	90	MRK2	$e^+e^- \rightarrow$ $e^+e^-\pi^+\pi^-\pi^0$
1.01±0.14±0.22	85	OEST	90	JADE	$e^+e^- \rightarrow e^+e^-\pi^0\eta$
0.90±0.27±0.15	56	<sup>1</sup> ALTHOFF	86	TASS	0 $e^+e^- \rightarrow e^+e^-3\pi$
1.14±0.20±0.26		<sup>2</sup> ANTREASYAN	86	CBAL	0 $e^+e^- \rightarrow e^+e^-\pi^0\eta$
1.06±0.18±0.19		BERGER	84C	PLUT	0 $e^+e^- \rightarrow e^+e^-3\pi$

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

0.81±0.19<sup>+0.42</sup><sub>-0.11</sub> 35 <sup>1</sup> BEHREND 82C CELL 0  $e^+e^- \rightarrow e^+e^-3\pi$ 0.77±0.18±0.27 22 <sup>2</sup> EDWARDS 82F CBAL 0  $e^+e^- \rightarrow e^+e^-\pi^0\eta$ <sup>1</sup> From  $\rho\pi$  decay mode.<sup>2</sup> From  $\eta\pi^0$  decay mode. $\Gamma(e^+e^-)$  $\Gamma_{11}$ 

VALUE (eV)	CL%	DOCUMENT ID	TECN	COMMENT
< 0.56	90	ACHASOV	00K	SND $e^+e^- \rightarrow \pi^0\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<25	90	VOROBYEV	88	ND $e^+e^- \rightarrow \pi^0\eta$

 $a_2(1320) \Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$  $\Gamma(3\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$  $\Gamma_1\Gamma_{10}/\Gamma$ 

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.65±0.02±0.02	18k	<sup>1</sup> SCHEGELSKY	06	RVUE $\gamma\gamma \rightarrow \pi^+\pi^-\pi^0$

<sup>1</sup> From analysis of L3 data at 183–209 GeV.

$\Gamma(\eta\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$   $\Gamma_5\Gamma_{10}/\Gamma$

VALUE (keV)                      DOCUMENT ID    TECN    COMMENT

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

0.145<sup>+0.097</sup><sub>-0.034</sub>                      <sup>1</sup>UEHARA      09A    BELL    e<sup>+</sup>e<sup>-</sup> → e<sup>+</sup>e<sup>-</sup>ηπ<sup>0</sup>

<sup>1</sup>From the D<sub>2</sub>-wave. The fraction of the D<sub>0</sub>-wave is 3.4<sup>+2.3</sup><sub>-1.1</sub>%.

$\Gamma(K\bar{K}) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$   $\Gamma_7\Gamma_{10}/\Gamma$

VALUE (keV)                      DOCUMENT ID    TECN    COMMENT

**0.126±0.007±0.028**                      <sup>1</sup>ALBRECHT    90G    ARG    e<sup>+</sup>e<sup>-</sup> → e<sup>+</sup>e<sup>-</sup>K<sup>+</sup>K<sup>-</sup>

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

0.081±0.006±0.027                      <sup>2</sup>ALBRECHT    90G    ARG    e<sup>+</sup>e<sup>-</sup> → e<sup>+</sup>e<sup>-</sup>K<sup>+</sup>K<sup>-</sup>

<sup>1</sup>Using an incoherent background.

<sup>2</sup>Using a coherent background.

**a<sub>2</sub>(1320) BRANCHING RATIOS**

$[\Gamma(f_2(1270)\pi) + \Gamma(\rho(1450)\pi)]/\Gamma(\rho(770)\pi)$   $(\Gamma_3+\Gamma_4)/\Gamma_2$

VALUE                      CL%                      DOCUMENT ID    TECN    CHG    COMMENT

**<0.12**                      90                      ABRAMOVI... 70B    HBC    -    3.93 π<sup>-</sup>p

$\Gamma(\eta\pi)/\Gamma(3\pi)$   $\Gamma_5/\Gamma_1$

VALUE                      EVTS                      DOCUMENT ID    TECN    CHG    COMMENT

**0.207±0.018 OUR FIT**

**0.213±0.020 OUR AVERAGE**

0.18 ±0.05                      FORINO      76    HBC                      11 π<sup>-</sup>p  
 0.22 ±0.05                      52                      ANTIPOV    73    CNTR    -    40 π<sup>-</sup>p  
 0.211±0.044                      149                      CHALOUPKA 73    HBC    -    3.9 π<sup>-</sup>p  
 0.246±0.042                      167                      ALSTON-... 71    HBC    +    7.0 π<sup>+</sup>p  
 0.25 ±0.09                      15                      BOECKMANN 70    HBC    +    5.0 π<sup>+</sup>p  
 0.23 ±0.08                      22                      ASCOLI      68    HBC    -    5 π<sup>-</sup>p  
 0.12 ±0.08                      CHUNG      68    HBC    -    3.2 π<sup>-</sup>p  
 0.22 ±0.09                      CONTE      67    HBC    -    11.0 π<sup>-</sup>p

$\Gamma(\omega\pi\pi)/\Gamma(3\pi)$   $\Gamma_6/\Gamma_1$

VALUE                      EVTS                      DOCUMENT ID    TECN    CHG    COMMENT

**0.15±0.05 OUR FIT**    Error includes scale factor of 1.3.

**0.15±0.05 OUR AVERAGE**    Error includes scale factor of 1.3. See the ideogram below.

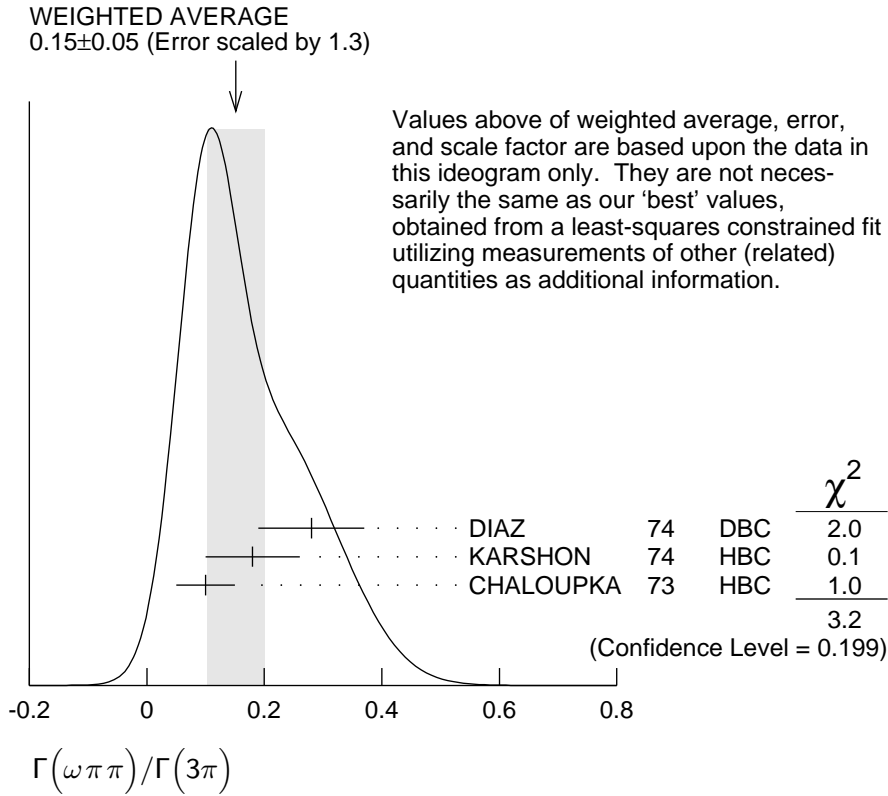
0.28±0.09                      60                      DIAZ      74    DBC    0    6 π<sup>+</sup>n  
 0.18±0.08                      <sup>1</sup>KARSHON    74    HBC                      Avg. of above two  
 0.10±0.05                      279                      <sup>2</sup>CHALOUPKA 73    HBC    -    3.9 π<sup>-</sup>p

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

0.29±0.08                      140                      <sup>1</sup>KARSHON    74    HBC    0    4.9 π<sup>+</sup>p  
 0.10±0.04                      60                      <sup>1</sup>KARSHON    74    HBC    +    4.9 π<sup>+</sup>p  
 0.19±0.08                      DEFOIX      73    HBC    0    0.7 p̄p



- <sup>1</sup> KARSHON 74 suggest an additional  $I = 0$  state strongly coupled to  $\omega\pi\pi$  which could explain discrepancies in branching ratios and masses. We use a central value and a systematic spread.  
<sup>2</sup> Decays to  $b_1(1040)\pi$ ,  $b_1 \rightarrow \omega\pi$ . Error increased to account for possible systematic errors of complicated analysis.



**$\Gamma(K\bar{K})/\Gamma(3\pi)$**

**$\Gamma_7/\Gamma_1$**

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
<b><math>0.070 \pm 0.012</math></b>					<b>OUR FIT</b>
<b><math>0.078 \pm 0.017</math></b>		CHABAUD	78	RVUE	
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
$0.011 \pm 0.003$		<sup>1</sup> BERTIN	98B	OBLX	$0.0 \bar{p}p \rightarrow K^\pm K_S \pi^\mp$
$0.056 \pm 0.014$	50	<sup>2</sup> CHALOUPKA	73	HBC	$- 3.9 \pi^- p$
$0.097 \pm 0.018$	113	<sup>2</sup> ALSTON-...	71	HBC	$+ 7.0 \pi^+ p$
$0.06 \pm 0.03$		<sup>2</sup> ABRAMOVI...	70B	HBC	$- 3.93 \pi^- p$
$0.054 \pm 0.022$		<sup>2</sup> CHUNG	68	HBC	$- 3.2 \pi^- p$

<sup>1</sup> Using  $4\pi$  data from BERTIN 97D.  
<sup>2</sup> Included in CHABAUD 78 review.

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

**$\Gamma_7/\Gamma_5$**

<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. ● ● ●			
$0.08 \pm 0.02$	<sup>1</sup> BERTIN	98B	OBLX $0.0 \bar{p}p \rightarrow K^\pm K_S \pi^\mp$
<sup>1</sup> Using $\eta\pi\pi$ data from AMSLER 94D.			

$\Gamma(\eta\pi)/[\Gamma(3\pi) + \Gamma(\eta\pi) + \Gamma(K\bar{K})]$   $\Gamma_5/(\Gamma_1+\Gamma_5+\Gamma_7)$

VALUE	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
<b>0.162±0.012 OUR FIT</b>					
<b>0.140±0.028 OUR AVERAGE</b>					
0.13 ±0.04		ESPIGAT 72	HBC	±	0.0 $\bar{p}p$
0.15 ±0.04	34	BARNHAM 71	HBC	+	3.7 $\pi^+p$

$\Gamma(K\bar{K})/[\Gamma(3\pi) + \Gamma(\eta\pi) + \Gamma(K\bar{K})]$   $\Gamma_7/(\Gamma_1+\Gamma_5+\Gamma_7)$

VALUE	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
<b>0.054±0.009 OUR FIT</b>					
<b>0.048±0.012 OUR AVERAGE</b>					
0.05 ±0.02		TOET 73	HBC	+	5 $\pi^+p$
0.09 ±0.04		TOET 73	HBC	0	5 $\pi^+p$
0.03 ±0.02	8	<sup>1</sup> DAMERI 72	HBC	-	11 $\pi^-p$
0.06 ±0.03	17	BARNHAM 71	HBC	+	3.7 $\pi^+p$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
0.020±0.004		<sup>2</sup> ESPIGAT 72	HBC	±	0.0 $\bar{p}p$

<sup>1</sup> Montanet agrees. Vlada.

<sup>2</sup> Not averaged because of discrepancy between masses from  $K\bar{K}$  and  $\rho\pi$  modes.

$\Gamma(\eta'(958)\pi)/\Gamma_{\text{total}}$   $\Gamma_8/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	CHG	COMMENT
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
<0.006	95	ALDE 92B	GAM2		38,100 $\pi^-p \rightarrow \eta'\pi^0n$
<0.02	97	BARNHAM 71	HBC	+	3.7 $\pi^+p$
0.004±0.004		<sup>1</sup> BOESEBECK 68	HBC	+	8 $\pi^+p$

<sup>1</sup> No longer valid since  $\Gamma(K\bar{K})/\Gamma(3\pi)$  value has changed (MORRISON 71).

$\Gamma(\eta'(958)\pi)/\Gamma(3\pi)$   $\Gamma_8/\Gamma_1$

VALUE	CL%	DOCUMENT ID	TECN	CHG	COMMENT
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
<0.011	90	EISENSTEIN 73	HBC	-	5 $\pi^-p$
<0.04		ALSTON-... 71	HBC	+	7.0 $\pi^+p$
0.04 $\begin{smallmatrix} +0.03 \\ -0.04 \end{smallmatrix}$		BOECKMANN 70	HBC	0	5.0 $\pi^+p$

$\Gamma(\eta'(958)\pi)/\Gamma(\eta\pi)$   $\Gamma_8/\Gamma_5$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.038±0.005 OUR AVERAGE</b>			
0.05 ±0.02	ADOLPH 15	COMP	191 $\pi^-p \rightarrow \eta^{(\prime)}\pi^-p$
0.032±0.009	ABELE 97C	CBAR	0.0 $\bar{p}p \rightarrow \pi^0\pi^0\eta'$
0.047±0.010±0.004	<sup>1</sup> BELADIDZE 93	VES	37 $\pi^-N \rightarrow a_2^-N$
0.034±0.008±0.005	BELADIDZE 92	VES	36 $\pi^-C \rightarrow a_2^-C$

<sup>1</sup> Using  $B(\eta' \rightarrow \pi^+\pi^-\eta) = 0.441$ ,  $B(\eta \rightarrow \gamma\gamma) = 0.389$  and  $B(\eta \rightarrow \pi^+\pi^-\pi^0) = 0.236$ .

$\Gamma(\pi^\pm \gamma)/\Gamma_{\text{total}}$					$\Gamma_9/\Gamma$
VALUE	DOCUMENT ID	TECN	COMMENT		
$0.005^{+0.005}_{-0.003}$	<sup>1</sup> EISENBERG	72	HBC	4.3,5.25,7.5	$\gamma p$

<sup>1</sup> Pion-exchange model used in this estimation.

$\Gamma(e^+ e^-)/\Gamma_{\text{total}}$					$\Gamma_{11}/\Gamma$
VALUE (units $10^{-9}$ )	CL%	DOCUMENT ID	TECN	COMMENT	
<6	90	ACHASOV	00K	SND	$e^+ e^- \rightarrow \pi^0 \pi^0$

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