

# $a_2(1320)$

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

## $a_2(1320)$ MASS

VALUE (MeV) DOCUMENT ID

**1318.3<sup>+0.5</sup><sub>-0.6</sub> OUR AVERAGE** Includes data from the 4 datablocks that follow this one.  
 Error includes scale factor of 1.2.

### 3π MODE

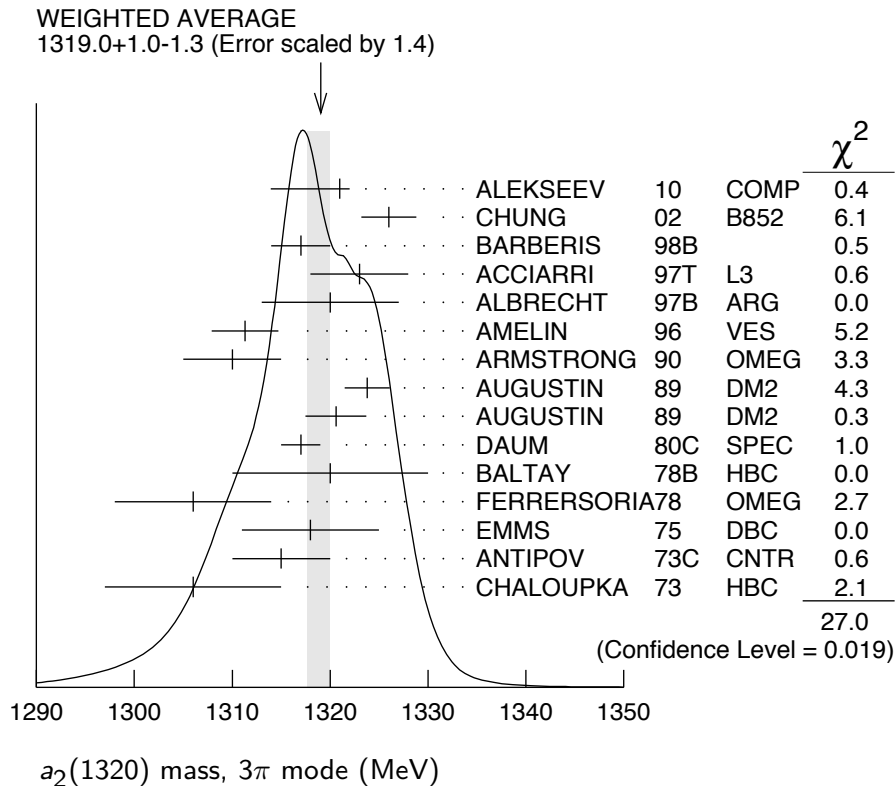
VALUE (MeV) EVTS DOCUMENT ID TECN CHG COMMENT

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

**1319.0<sup>+1.0</sup><sub>-1.3</sub> OUR AVERAGE** Error includes scale factor of 1.4. See the ideogram below.

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

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>3,4</sup> CLELAND	82B	SPEC	+	50 $\pi^+ p \rightarrow K_S^0 K^+ p$
1324 ± 6	5200	<sup>3,4</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>3,5</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>5</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>6</sup> SCHEGELSKY	06A	RVUE	0	$\gamma\gamma \rightarrow K_S^0 K_S^0$
1330 ± 11	1000	<sup>3,4</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>3</sup> From a fit to  $J^P = 2^+$  partial wave.  
<sup>4</sup> Number of events evaluated by us.  
<sup>5</sup> Systematic error in mass scale subtracted.  
<sup>6</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 $pp \rightarrow p_f \eta \pi^0 p_s$
1316 ±9		BARBERIS	00H		450 $pp \rightarrow \Delta_f^{++} \eta \pi^- p_s$
1317 ±1 ±2		THOMPSON	97	MPS	18 $\pi^- p \rightarrow \eta \pi^- p$
1315 ±5 ±2		<sup>7</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>8</sup> KEY	73	OSPK	– 6 $\pi^- p \rightarrow p \pi^- \eta$

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

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>8,9</sup> CONFORTO	73	OSPK	– 6 $\pi^- p \rightarrow p \pi^- \eta$

<sup>7</sup> The systematic error of 2 MeV corresponds to the spread of solutions.

<sup>8</sup> Error includes 5 MeV systematic mass-scale error.

<sup>9</sup> Missing mass with enriched MMS =  $\eta \pi^-$ ,  $\eta = 2\gamma$ .

## $\eta' \pi$ MODE

VALUE (MeV)	DOCUMENT ID	TECN	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 $\begin{smallmatrix} + \\ - \end{smallmatrix}$ $\begin{smallmatrix} 1.6 \\ 1.9 \end{smallmatrix}$ OUR AVERAGE

110 ± 2 $\begin{smallmatrix} +2 \\ -15 \end{smallmatrix}$	420k	ALEKSEEV	10	COMP	190 $\pi^- Pb \rightarrow \pi^- \pi^- \pi^+ Pb'$
108 ± 3 ±15		CHUNG	02	B852	18.3 $\pi^- p \rightarrow \pi^+ \pi^- \pi^- p$
120 ±10		BARBERIS	98B		450 $pp \rightarrow p_f \pi^+ \pi^- \pi^0 p_s$
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 $pp \rightarrow p p \pi^+ \pi^- \pi^0$

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>10</sup> EVANGELIS...	81	OMEG	−	$12 \pi^- p \rightarrow 3\pi p$
96 ± 9	25k	<sup>10</sup> DAUM	80C	SPEC	−	$63,94 \pi^- p \rightarrow 3\pi p$
110 ± 15	1097	<sup>10</sup> BALTAY	78B	HBC	+0	$15 \pi^+ p \rightarrow p 4\pi$
112 ± 18	1.6k	<sup>10</sup> EMMS	75	DBC	0	$4 \pi^+ n \rightarrow p(3\pi)^0$
122 ± 14	1.2k	<sup>10,11</sup> WAGNER	75	HBC	0	$7 \pi^+ p \rightarrow \Delta^{++}(3\pi)^0$
115 ± 15		<sup>10</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>12</sup> SCHEGELSKY	06	RVUE	0	$\gamma\gamma \rightarrow \pi^+\pi^-\pi^0$
120 ± 40		CONDO	93	SHF		$\gamma p \rightarrow \eta\pi^+\pi^+\pi^-$
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>10</sup>From a fit to  $J^P = 2^+ \rho\pi$  partial wave.

<sup>11</sup>Width errors enlarged by us to  $4\Gamma/\sqrt{N}$ ; see the note with the  $K^*(892)$  mass.

<sup>12</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>13,14</sup> CLELAND	82B	SPEC	+	$50 \pi^+ p \rightarrow K_S^0 K^+ p$
120 ± 25	5200	<sup>13,14</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>13,15</sup> MARTIN	78D	SPEC	−	$10 \pi^- p \rightarrow K_S^0 K^- p$
105 ± 8	2724	<sup>15</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>15</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>16</sup> SCHEGELSKY	06A	RVUE	0	$\gamma\gamma \rightarrow K_S^0 K_S^0$
121 ± 51	1000	<sup>13,14</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>13</sup> From a fit to  $J^P = 2^+$  partial wave.

<sup>14</sup> Number of events evaluated by us.

<sup>15</sup> Width errors enlarged by us to  $4\Gamma/\sqrt{N}$ ; see the note with the  $K^*(892)$  mass.

<sup>16</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>17</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. • • •

110 ± 4		ANISOVICH	09	RVUE	$\bar{p} p, \pi N$
127 ± 2 ± 2		<sup>18</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>19</sup> CONFORTO	73	OSPK -	6 $\pi^- p \rightarrow p \pi^- \eta$

<sup>17</sup> The systematic error of 2 MeV corresponds to the spread of solutions.

<sup>18</sup> Resolution is not unfolded.

<sup>19</sup> Missing mass with enriched 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 ± 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 ± 1.2) %	
$\Gamma_6$ $\omega\pi\pi$	(10.6 ± 3.2) %	S=1.3
$\Gamma_7$ $K\bar{K}$	( 4.9 ± 0.8 ) %	
$\Gamma_8$ $\eta'(958)\pi$	( 5.3 ± 0.9 ) × 10 <sup>-3</sup>	
$\Gamma_9$ $\pi^\pm\gamma$	( 2.68 ± 0.31 ) × 10 <sup>-3</sup>	
$\Gamma_{10}$ $\gamma\gamma$	( 9.4 ± 0.7 ) × 10 <sup>-6</sup>	
$\Gamma_{11}$ $e^+e^-$	< 5 × 10 <sup>-9</sup>	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 ± 3.0	870	<sup>20</sup> SCHEGELSKY 06A	RVUE	0	$\gamma\gamma \rightarrow K_S^0 K_S^0$
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<sup>20</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 <sup>+2.0</sup> <sub>-1.5</sub>	870	<sup>21</sup> SCHEGELSKY 06A	RVUE	0	$\gamma\gamma \rightarrow K_S^0 K_S^0$
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<sup>21</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
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**287 ± 30 OUR AVERAGE**

284 ± 25 ± 25	7100	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>22</sup> MAY	77	SPEC	± 9.7 $\gamma A$
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<sup>22</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>23</sup> ALTHOFF	86 TASS	0	$e^+e^- \rightarrow e^+e^-3\pi$	
1.14±0.20±0.26		<sup>24</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>23</sup> BEHREND	83B CELL	0	$e^+e^- \rightarrow e^+e^-3\pi$	
0.77±0.18±0.27	22	<sup>24</sup> EDWARDS	82F CBAL	0	$e^+e^- \rightarrow e^+e^-\pi^0\eta$	

<sup>23</sup> From  $\rho\pi$  decay mode.

<sup>24</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	$e^+e^- \rightarrow \pi^0\pi^0$		
<25	90	VOROBYEV	88 ND	$e^+e^- \rightarrow \pi^0\eta$		

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

### $a_2(1320) \Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

$\Gamma(3\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$						$\Gamma_1\Gamma_{10}/\Gamma$
VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT		
0.65±0.02±0.02	18k	<sup>25</sup> SCHEGELSKY	06 RVUE	$\gamma\gamma \rightarrow \pi^+\pi^-\pi^0$		

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

<sup>25</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)	EVTS	DOCUMENT ID	TECN	COMMENT		
0.145 <sup>+0.097</sup> <sub>-0.034</sub>		<sup>26</sup> UEHARA	09A BELL	$e^+e^- \rightarrow e^+e^-\eta\pi^0$		

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

<sup>26</sup> From the  $D_2$ -wave. The fraction of the  $D_0$ -wave is  $3.4^{+2.3}_{-1.1}\%$ .

$\Gamma(K\bar{K}) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$						$\Gamma_7\Gamma_{10}/\Gamma$
<u>VALUE (keV)</u>		<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>	
<b>0.126±0.007±0.028</b>	27	ALBRECHT	90G	ARG	$e^+e^- \rightarrow e^+e^-K^+K^-$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
0.081±0.006±0.027	28	ALBRECHT	90G	ARG	$e^+e^- \rightarrow e^+e^-K^+K^-$	
27 Using an incoherent background.						
28 Using a coherent background.						

### $a_2(1320)$ BRANCHING RATIOS

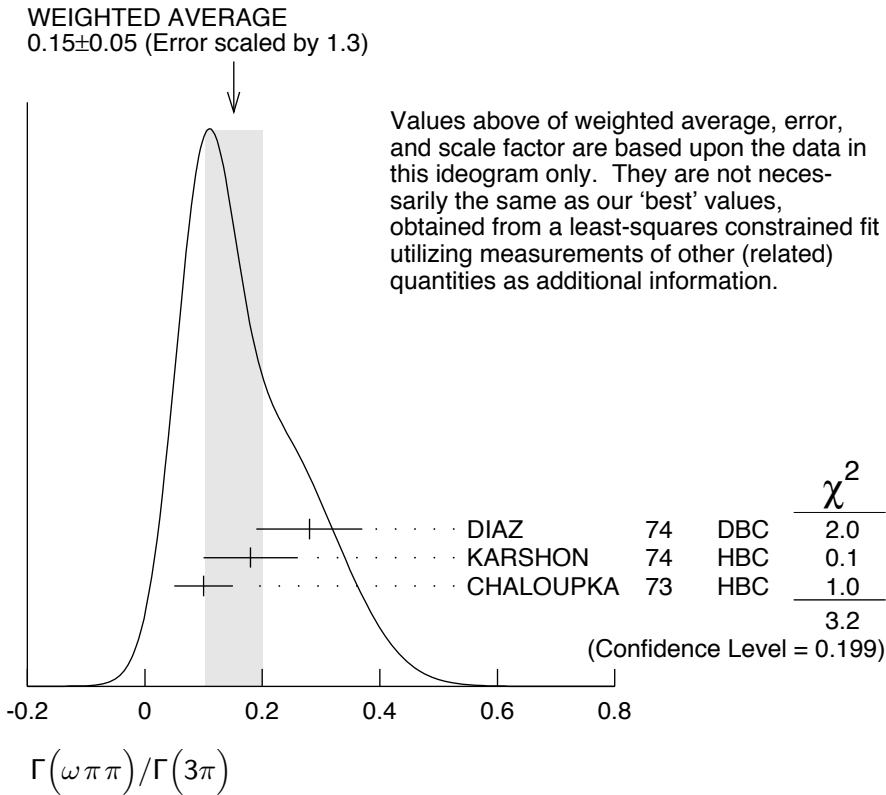
$[\Gamma(f_2(1270)\pi) + \Gamma(\rho(1450)\pi)]/\Gamma(\rho(770)\pi)$						$(\Gamma_3+\Gamma_4)/\Gamma_2$
<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>	
<b>&lt;0.12</b>	90	ABRAMOVI...	70B	HBC	-	3.93 $\pi^-p$

$\Gamma(\eta\pi)/\Gamma(3\pi)$						$\Gamma_5/\Gamma_1$
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>	
<b>0.207±0.018 OUR FIT</b>						
<b>0.213±0.020 OUR AVERAGE</b>						
0.18 ±0.05		FORINO	76	HBC		11 $\pi^-p$
0.22 ±0.05	52	ANTIPOV	73	CNTR	-	40 $\pi^-p$
0.211±0.044	149	CHALOUKKA	73	HBC	-	3.9 $\pi^-p$
0.246±0.042	167	ALSTON-...	71	HBC	+	7.0 $\pi^+p$
0.25 ±0.09	15	BOECKMANN	70	HBC	+	5.0 $\pi^+p$
0.23 ±0.08	22	ASCOLI	68	HBC	-	5 $\pi^-p$
0.12 ±0.08		CHUNG	68	HBC	-	3.2 $\pi^-p$
0.22 ±0.09		CONTE	67	HBC	-	11.0 $\pi^-p$

$\Gamma(\omega\pi\pi)/\Gamma(3\pi)$						$\Gamma_6/\Gamma_1$
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>	
<b>0.15±0.05 OUR FIT</b> Error includes scale factor of 1.3.						
<b>0.15±0.05 OUR AVERAGE</b> Error includes scale factor of 1.3. See the ideogram below.						
0.28±0.09	60	DIAZ	74	DBC	0	6 $\pi^+n$
0.18±0.08	29	KARSHON	74	HBC		Avg. of above two
0.10±0.05	279	CHALOUKKA	73	HBC	-	3.9 $\pi^-p$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
0.29±0.08	140	29 KARSHON	74	HBC	0	4.9 $\pi^+p$
0.10±0.04	60	29 KARSHON	74	HBC	+	4.9 $\pi^+p$
0.19±0.08		DEFOIX	73	HBC	0	0.7 $\bar{p}p$

<sup>29</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.





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

$\Gamma_7/\Gamma_1$

VALUE	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
<b>0.070±0.012 OUR FIT</b>					
<b>0.078±0.017</b>		CHABAUD	78	RVUE	
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
0.011±0.003		<sup>30</sup> BERTIN	98B	OBLX	0.0 $\bar{p}p \rightarrow K^\pm K_S \pi^\mp$
0.056±0.014	50	<sup>31</sup> CHALOUPKA	73	HBC	- 3.9 $\pi^- p$
0.097±0.018	113	<sup>31</sup> ALSTON-...	71	HBC	+ 7.0 $\pi^+ p$
0.06 ±0.03		<sup>31</sup> ABRAMOVI...	70B	HBC	- 3.93 $\pi^- p$
0.054±0.022		<sup>31</sup> CHUNG	68	HBC	- 3.2 $\pi^- p$

<sup>30</sup> Using  $4\pi$  data from BERTIN 97D.  
<sup>31</sup> Included in CHABAUD 78 review.

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

$\Gamma_7/\Gamma_5$

VALUE	DOCUMENT ID	TECN	COMMENT
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
0.08±0.02	<sup>32</sup> BERTIN	98B	OBLX 0.0 $\bar{p}p \rightarrow K^\pm K_S \pi^\mp$

<sup>32</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

**0.054±0.009 OUR FIT**  
**0.048±0.012 OUR AVERAGE**

0.05 ±0.02		TOET	73	HBC	+	5 $\pi^+ \rho$
0.09 ±0.04		TOET	73	HBC	0	5 $\pi^+ \rho$
0.03 ±0.02	8	DAMERI	72	HBC	-	11 $\pi^- \rho$
0.06 ±0.03	17	BARNHAM	71	HBC	+	3.7 $\pi^+ \rho$

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

0.020±0.004		<sup>33</sup> ESPIGAT	72	HBC	±	0.0 $\bar{p} \rho$
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<sup>33</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 $\pi^- \rho \rightarrow \eta' \pi^0 n$
<0.02	97	BARNHAM	71	HBC	+	3.7 $\pi^+ \rho$
0.004±0.004		BOESEBECK	68	HBC	+	8 $\pi^+ \rho$

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

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 $\pi^- \rho$
<0.04		ALSTON-...	71	HBC	+	7.0 $\pi^+ \rho$
0.04 $\begin{smallmatrix} +0.03 \\ -0.04 \end{smallmatrix}$		BOECKMANN	70	HBC	0	5.0 $\pi^+ \rho$

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

VALUE DOCUMENT ID TECN COMMENT

**0.037±0.006 OUR AVERAGE**

0.032±0.009		ABELE	97C	CBAR	0.0 $\bar{p} \rho \rightarrow \pi^0 \pi^0 \eta'$
0.047±0.010±0.004	<sup>34</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>34</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

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

0.005 $\begin{smallmatrix} +0.005 \\ -0.003 \end{smallmatrix}$	<sup>35</sup>	EISENBERG	72	HBC	4.3,5.25,7.5 $\gamma \rho$
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<sup>35</sup> Pion-exchange model used in this estimation.

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

VALUE (units 10<sup>-9</sup>) CL% DOCUMENT ID TECN COMMENT

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

<6	90	ACHASOV	00K	SND	$e^+ e^- \rightarrow \pi^0 \pi^0$
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