

$\pi_2(1670)$ 

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

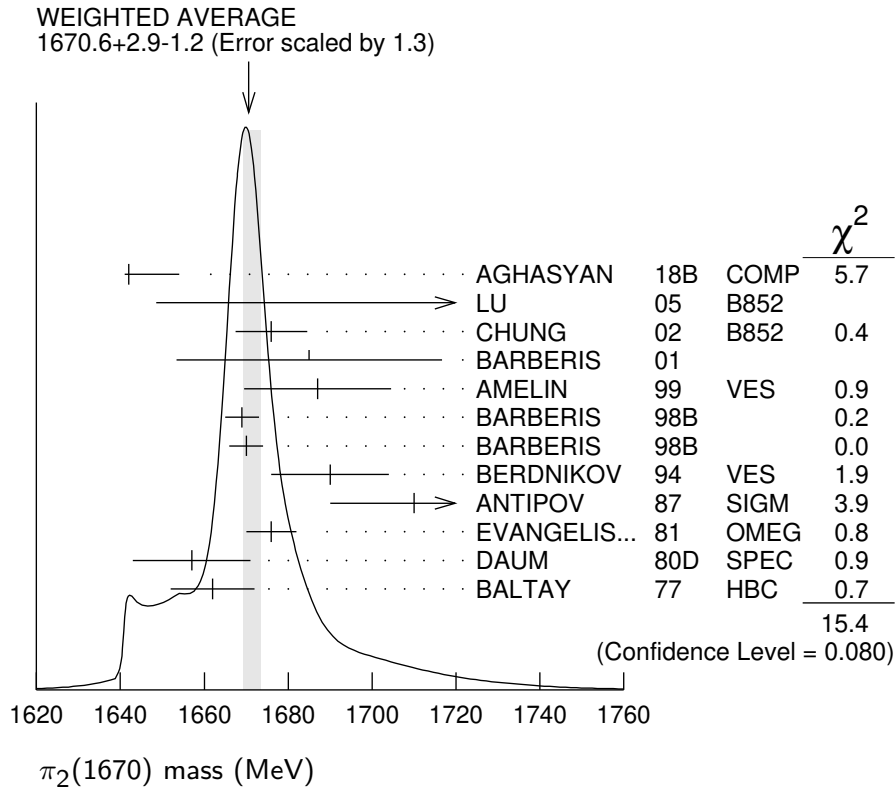
 $\pi_2(1670)$  MASS

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
<b>1670.6<sup>+2.9</sup><sub>-1.2</sub></b>	<b>OUR AVERAGE</b>	Error includes scale factor of 1.3. See the ideogram below.			
1642 <sup>+12</sup> <sub>-1</sub>	46M	<sup>1</sup> AGHASYAN	18B	COMP	190 $\pi^- p \rightarrow \pi^- \pi^+ \pi^- p$
1749 ±10 ±100	145k	LU	05	B852	18 $\pi^- p \rightarrow \omega \pi^- \pi^0 p$
1676 ± 3 ± 8		<sup>2</sup> CHUNG	02	B852	18.3 $\pi^- p \rightarrow \pi^+ \pi^- \pi^- p$
1685 ±10 ± 30		BARBERIS	01		450 $p p \rightarrow p_f 3\pi^0 p_s$
1687 ± 9 ± 15		AMELIN	99	VES	37 $\pi^- A \rightarrow \omega \pi^- \pi^0 A^*$
1669 ± 4		BARBERIS	98B		450 $p p \rightarrow p_f \rho \pi p_s$
1670 ± 4		BARBERIS	98B		450 $p p \rightarrow p_f f_2(1270) \pi p_s$
1690 ±14		<sup>3</sup> BERDNIKOV	94	VES	37 $\pi^- A \rightarrow K^+ K^- \pi^- A$
1710 ±20	700	ANTIPOV	87	SIGM -	50 $\pi^- \text{Cu} \rightarrow \mu^+ \mu^- \pi^- \text{Cu}$
1676 ± 6		<sup>3</sup> EVANGELIS...	81	OMEG -	12 $\pi^- p \rightarrow 3\pi p$
1657 ±14		<sup>3,4</sup> DAUM	80D	SPEC -	63-94 $\pi p \rightarrow 3\pi X$
1662 ±10	2000	<sup>3</sup> BALTAY	77	HBC +	15 $\pi^+ p \rightarrow p 3\pi$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
1658 ± 3 <sup>+24</sup> <sub>-8</sub>	420k	<sup>5</sup> ALEKSEEV	10	COMP	190 $\pi^- Pb \rightarrow \pi^- \pi^- \pi^+ Pb'$
1730 ±20		<sup>6</sup> AMELIN	95B	VES	36 $\pi^- A \rightarrow \pi^+ \pi^- \pi^- A$
1742 ±31 ± 49		ANTREASYAN	90	CBAL	$e^+ e^- \rightarrow e^+ e^- \pi^0 \pi^0 \pi^0$
1624 ±21		<sup>2</sup> BELLINI	85	SPEC	40 $\pi^- A \rightarrow \pi^- \pi^+ \pi^- A$
1622 ±35		<sup>7</sup> BELLINI	85	SPEC	40 $\pi^- A \rightarrow \pi^- \pi^+ \pi^- A$
1693 ±28		<sup>8</sup> BELLINI	85	SPEC	40 $\pi^- A \rightarrow \pi^- \pi^+ \pi^- A$
1710 ±20		<sup>9</sup> DAUM	81B	SPEC -	63,94 $\pi^- p$
1660 ±10		<sup>3</sup> ASCOLI	73	HBC -	5-25 $\pi^- p \rightarrow p \pi_2$

<sup>1</sup> Statistical error negligible.<sup>2</sup> From  $f_2(1270)\pi$  decay.<sup>3</sup> From a fit to  $J^P = 2^- S$ -wave  $f_2(1270)\pi$  partial wave.<sup>4</sup> Clear phase rotation seen in  $2^- S$ ,  $2^- P$ ,  $2^- D$  waves. We quote central value and spread of single-resonance fits to three channels.<sup>5</sup> Superseded by AGHASYAN 2018B.<sup>6</sup>  $J^{PC}$  ambiguous.<sup>7</sup> From  $\rho\pi$  decay.

<sup>8</sup> From  $\sigma\pi$  decay.

<sup>9</sup> From a two-resonance fit to four  $2^-0^+$  waves. This should not be averaged with all the single resonance fits.



### $\pi_2(1670)$ WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
<b>258<sup>+8</sup><sub>-9</sub></b>		<b>OUR AVERAGE</b>			Error includes scale factor of 1.2.
311 <sup>+12</sup> <sub>-23</sub>	46M	<sup>10</sup> AGHASYAN	18B	COMP	190 $\pi^- p \rightarrow \pi^- \pi^+ \pi^- p$
408 ± 60 ± 250	145k	LU	05	B852	18 $\pi^- p \rightarrow \omega \pi^- \pi^0 p$
254 ± 3 ± 31		<sup>11</sup> CHUNG	02	B852	18.3 $\pi^- p \rightarrow \pi^+ \pi^- \pi^- p$
265 ± 30 ± 40		BARBERIS	01		450 $pp \rightarrow p_f 3\pi^0 p_s$
168 ± 43 ± 53		AMELIN	99	VES	37 $\pi^- A \rightarrow \omega \pi^- \pi^0 A^*$
268 ± 15		BARBERIS	98B		450 $pp \rightarrow p_f \rho \pi p_s$
256 ± 15		BARBERIS	98B		450 $pp \rightarrow p_f f_2(1270) \pi p_s$
190 ± 50		<sup>12</sup> BERDNIKOV	94	VES	37 $\pi^- A \rightarrow K^+ K^- \pi^- A$
170 ± 80	700	ANTIPOV	87	SIGM	- 50 $\pi^- Cu \rightarrow \mu^+ \mu^- \pi^- Cu$
260 ± 20		<sup>12</sup> EVANGELIS...	81	OMEG	- 12 $\pi^- p \rightarrow 3\pi p$
219 ± 20		<sup>12,13</sup> DAUM	80D	SPEC	- 63-94 $\pi p \rightarrow 3\pi X$
285 ± 60	2000	<sup>12</sup> BALTAY	77	HBC	+ 15 $\pi^+ p \rightarrow p 3\pi$

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

271 ± 9 <sup>+</sup> <sub>24</sub>	22	420k	14 ALEKSEEV	10	COMP	190	$\pi^- Pb \rightarrow \pi^- \pi^- \pi^+ Pb'$
310 ± 20			15 AMELIN	95B	VES	36	$\pi^- A \rightarrow \pi^+ \pi^- \pi^- A$
236 ± 49 ± 36			ANTREASYAN	90	CBAL		$e^+ e^- \rightarrow e^+ e^- \pi^0 \pi^0 \pi^0$
304 ± 22			11 BELLINI	85	SPEC	40	$\pi^- A \rightarrow \pi^- \pi^+ \pi^- A$
404 ± 108			16 BELLINI	85	SPEC	40	$\pi^- A \rightarrow \pi^- \pi^+ \pi^- A$
330 ± 90			17 BELLINI	85	SPEC	40	$\pi^- A \rightarrow \pi^- \pi^+ \pi^- A$
312 ± 50			18 DAUM	81B	SPEC	–	63,94 $\pi^- p$
270 ± 60			12 ASCOLI	73	HBC	–	5–25 $\pi^- p \rightarrow p \pi_2$

<sup>10</sup> Statistical error negligible.

<sup>11</sup> From  $f_2(1270)\pi$  decay.

<sup>12</sup> From a fit to  $J^P = 2^- f_2(1270)\pi$  partial wave.

<sup>13</sup> Clear phase rotation seen in  $2^- S, 2^- P, 2^- D$  waves. We quote central value and spread of single-resonance fits to three channels.

<sup>14</sup> Superseded by AGHASYAN 2018B.

<sup>15</sup>  $J^{PC}$  ambiguous.

<sup>16</sup> From  $\rho\pi$  decay.

<sup>17</sup> From  $\sigma\pi$  decay.

<sup>18</sup> From a two-resonance fit to four  $2^- 0^+$  waves. This should not be averaged with all the single resonance fits.

### $\pi_2(1670)$ DECAY MODES

Mode	Fraction ( $\Gamma_i/\Gamma$ )	Confidence level
$\Gamma_1$ $3\pi$	(95.8 ± 1.4) %	
$\Gamma_2$ $\pi^+ \pi^- \pi^0$		
$\Gamma_3$ $\pi^0 \pi^0 \pi^0$		
$\Gamma_4$ $f_2(1270)\pi$	(56.3 ± 3.2) %	
$\Gamma_5$ $\rho\pi$	(31 ± 4) %	
$\Gamma_6$ $\sigma\pi$	(10 ± 4) %	
$\Gamma_7$ $\pi(\pi\pi)S$ -wave	(8.7 ± 3.4) %	
$\Gamma_8$ $\pi^\pm \pi^+ \pi^-$	(53 ± 4) %	
$\Gamma_9$ $K\bar{K}^*(892) + c.c.$	(4.2 ± 1.4) %	
$\Gamma_{10}$ $\omega\rho$	(2.7 ± 1.1) %	
$\Gamma_{11}$ $\pi^\pm \gamma$	(7.0 ± 1.2) × 10 <sup>-4</sup>	
$\Gamma_{12}$ $\gamma\gamma$	< 2.8 × 10 <sup>-7</sup>	90%
$\Gamma_{13}$ $\eta\pi$	< 5 %	
$\Gamma_{14}$ $\pi^\pm 2\pi^+ 2\pi^-$	< 5 %	
$\Gamma_{15}$ $\rho(1450)\pi$	< 3.6 × 10 <sup>-3</sup>	97.7%
$\Gamma_{16}$ $b_1(1235)\pi$	< 1.9 × 10 <sup>-3</sup>	97.7%
$\Gamma_{17}$ $\eta 3\pi$		
$\Gamma_{18}$ $f_1(1285)\pi$	possibly seen	
$\Gamma_{19}$ $a_2(1320)\pi$	not seen	

## CONSTRAINED FIT INFORMATION

An overall fit to 4 branching ratios uses 6 measurements and one constraint to determine 4 parameters. The overall fit has a  $\chi^2 = 1.9$  for 3 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.

$x_5$	-53		
$x_7$	-29	-59	
$x_9$	-8	-21	-9
	$x_4$	$x_5$	$x_7$

### $\pi_2(1670)$ PARTIAL WIDTHS

$\Gamma(\pi^\pm \gamma)$						$\Gamma_{11}$
<u>VALUE (keV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>		
<b>181 ± 11 ± 27</b>	<sup>19</sup> ADOLPH	14	COMP	-	190 $\pi^- \text{Pb} \rightarrow \pi^+ \pi^- \pi^- \text{Pb}'$	
<sup>19</sup> Primakoff reaction. Assumes incoherent $f_2(1270)\pi$ contribution to $3\pi$ final state and uses $B(\pi_2(1670) \rightarrow f_2\pi) = 56\%$ .						

$\Gamma(\gamma\gamma)$						$\Gamma_{12}$
<u>VALUE (keV)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>	
<b>&lt;0.072</b>	90	<sup>20</sup> ACCIARRI	97T	L3	$e^+e^- \rightarrow e^+e^-\pi^+\pi^-\pi^0$	
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●						
<0.19	90	<sup>20</sup> ALBRECHT	97B	ARG	$e^+e^- \rightarrow e^+e^-\pi^+\pi^-\pi^0$	
1.41 ± 0.23 ± 0.28		ANTREASYAN	90	CBAL	0	$e^+e^- \rightarrow e^+e^-\pi^0\pi^0\pi^0$
0.8 ± 0.3 ± 0.12		<sup>21</sup> BEHREND	90C	CELL	0	$e^+e^- \rightarrow e^+e^-\pi^+\pi^-\pi^0$
1.3 ± 0.3 ± 0.2		<sup>22</sup> BEHREND	90C	CELL	0	$e^+e^- \rightarrow e^+e^-\pi^+\pi^-\pi^0$

<sup>20</sup> Decaying into  $f_2(1270)\pi$  and  $\rho\pi$ .

<sup>21</sup> Constructive interference between  $f_2(1270)\pi, \rho\pi$  and background.

<sup>22</sup> Incoherent Ansatz.

### $\pi_2(1670)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

$\Gamma(\pi^+ \pi^- \pi^0) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$						$\Gamma_2\Gamma_{12}/\Gamma$
<u>VALUE (keV)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>		
<b>&lt;0.1</b>	95	<sup>23</sup> SCHEGELSKY	06	RVUE	$\gamma\gamma \rightarrow \pi^+\pi^-\pi^0$	
<sup>23</sup> From analysis of L3 data at 183–209 GeV.						

## $\pi_2(1670)$ BRANCHING RATIOS

$$\Gamma(3\pi)/\Gamma_{\text{total}} \qquad \Gamma_1/\Gamma = (\Gamma_4 + \Gamma_5 + \Gamma_7)/\Gamma$$

VALUE	DOCUMENT ID
<b>0.958 ± 0.014 OUR FIT</b>	

$$\Gamma(\pi^0 \pi^0 \pi^0)/\Gamma(\pi^+ \pi^- \pi^0) \qquad \Gamma_3/\Gamma_2$$

VALUE	DOCUMENT ID	COMMENT
<b>0.29 ± 0.03 ± 0.05</b>	BARBERIS 01	450 $p p \rightarrow p_f 3\pi^0 p_s$

$$\Gamma(\rho\pi)/0.565\Gamma(f_2(1270)\pi) \qquad \Gamma_5/0.565\Gamma_4$$

(With  $f_2(1270) \rightarrow \pi^+ \pi^-$ .)

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.97 ± 0.09 OUR AVERAGE</b>	Error includes scale factor of 1.9.		
0.76 ± 0.07 ± 0.10	CHUNG 02	B852	18.3 $\pi^- p \rightarrow \pi^+ \pi^- \pi^- p$
1.01 ± 0.05	BARBERIS 98B		450 $p p \rightarrow p_f \pi^+ \pi^- \pi^0 p_s$

$$\Gamma(\sigma\pi)/\Gamma(f_2(1270)\pi) \qquad \Gamma_6/\Gamma_4$$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.17 ± 0.02 ± 0.07</b>	CHUNG 02	B852	18.3 $\pi^- p \rightarrow \pi^+ \pi^- \pi^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.24 ± 0.10	24,25 BAKER 99	SPEC	1.94 $\bar{p} p \rightarrow 4\pi^0$

$$\frac{1}{2}\Gamma(\rho\pi)/\Gamma(\pi^\pm \pi^+ \pi^-) \qquad \frac{1}{2}\Gamma_5/\Gamma_8 = \frac{1}{2}\Gamma_5/(0.565\Gamma_4 + \frac{1}{2}\Gamma_5 + 0.624\Gamma_7)$$

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
<b>0.29 ± 0.04 OUR FIT</b>				
<b>0.29 ± 0.05</b>	26 DAUM 81B	SPEC		63,94 $\pi^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
< 0.3	BARTSCH 68	HBC	+	8 $\pi^+ p \rightarrow 3\pi p$

$$0.565\Gamma(f_2(1270)\pi)/\Gamma(\pi^\pm \pi^+ \pi^-) \qquad 0.565\Gamma_4/\Gamma_8 = 0.565\Gamma_4/(0.565\Gamma_4 + \frac{1}{2}\Gamma_5 + 0.624\Gamma_7)$$

(With  $f_2(1270) \rightarrow \pi^+ \pi^-$ .)

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
<b>0.604 ± 0.035 OUR FIT</b>				
<b>0.60 ± 0.05 OUR AVERAGE</b>	Error includes scale factor of 1.3.			
0.61 ± 0.04	26 DAUM 81B	SPEC		63,94 $\pi^- p$
0.76 <sup>+0.24</sup> <sub>-0.34</sub>	ARMENISE 69	DBC	+	5.1 $\pi^+ d \rightarrow d 3\pi$
0.35 ± 0.20	BALTAY 68	HBC	+	7-8.5 $\pi^+ p$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.59	BARTSCH 68	HBC	+	8 $\pi^+ p \rightarrow 3\pi p$

$$0.624\Gamma(\pi(\pi\pi)_{S\text{-wave}})/\Gamma(\pi^\pm \pi^+ \pi^-) \qquad 0.624\Gamma_7/\Gamma_8 = 0.624\Gamma_7/(0.565\Gamma_4 + \frac{1}{2}\Gamma_5 + 0.624\Gamma_7)$$

(With  $(\pi\pi)_{S\text{-wave}} \rightarrow \pi^+ \pi^-$ .)

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.10 ± 0.04 OUR FIT</b>			
<b>0.10 ± 0.05</b>	26 DAUM 81B	SPEC	63,94 $\pi^- p$

$\Gamma(K\bar{K}^*(892)+c.c.)/\Gamma(f_2(1270)\pi)$   $\Gamma_9/\Gamma_4$

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
<b>0.075±0.025 OUR FIT</b>				
<b>0.075±0.025</b>	27	ARMSTRONG	82B	OMEG – 16 $\pi^- p \rightarrow K^+ K^- \pi^- p$

$\Gamma(\omega\rho)/\Gamma_{\text{total}}$   $\Gamma_{10}/\Gamma$

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
<b>0.027±0.004±0.010</b>	28	AMELIN	99	VES 37 $\pi^- A \rightarrow \omega \pi^- \pi^0 A^*$

$\Gamma(\eta\pi)/\Gamma(\pi^\pm\pi^+\pi^-)$   $\Gamma_{13}/\Gamma_8 = \Gamma_{13}/(0.565\Gamma_4 + \frac{1}{2}\Gamma_5 + 0.624\Gamma_7)$   
(All  $\eta$  decays.)

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
<b>&lt;0.09</b>	BALTAY	68	HBC	+ 7–8.5 $\pi^+ p$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.10	CRENNELL	70	HBC	– 6 $\pi^- p \rightarrow f_2 \pi^- N$

$\Gamma(\pi^\pm 2\pi^+ 2\pi^-)/\Gamma(\pi^\pm\pi^+\pi^-)$   $\Gamma_{14}/\Gamma_8 = \Gamma_{14}/(0.565\Gamma_4 + \frac{1}{2}\Gamma_5 + 0.624\Gamma_7)$

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
<b>&lt;0.10</b>	CRENNELL	70	HBC	– 6 $\pi^- p \rightarrow f_2 \pi^- N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.1	BALTAY	68	HBC	+ 7,8.5 $\pi^+ p$

$\Gamma(\rho(1450)\pi)/\Gamma_{\text{total}}$   $\Gamma_{15}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;0.0036</b>	97.7	AMELIN	99	VES 37 $\pi^- A \rightarrow \omega \pi^- \pi^0 A^*$

$\Gamma(b_1(1235)\pi)/\Gamma_{\text{total}}$   $\Gamma_{16}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;0.0019</b>	97.7	AMELIN	99	VES 37 $\pi^- A \rightarrow \omega \pi^- \pi^0 A^*$

$\Gamma(f_1(1285)\pi)/\Gamma_{\text{total}}$   $\Gamma_{18}/\Gamma$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>possibly seen</b>	69k	KUHN	04	B852 18 $\pi^- p \rightarrow \eta \pi^+ \pi^- \pi^- p$

$\Gamma(a_2(1320)\pi)/\Gamma_{\text{total}}$   $\Gamma_{19}/\Gamma$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>not seen</b>	69k	KUHN	04	B852 18 $\pi^- p \rightarrow \eta \pi^+ \pi^- \pi^- p$

**D-wave/S-wave RATIO FOR  $\pi_2(1670) \rightarrow f_2(1270)\pi$**

VALUE	DOCUMENT ID	TECN	COMMENT
<b>–0.18±0.06</b>	24	BAKER	99 SPEC 1.94 $\bar{p} p \rightarrow 4\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.22±0.10	26	DAUM	81B SPEC 63,94 $\pi^- p$

**F-wave/P-wave RATIO FOR  $\pi_2(1670) \rightarrow \rho\pi$** 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>-0.72 \pm 0.07 \pm 0.14</math></b>	CHUNG	02 B852	18.3 $\pi^- p \rightarrow \pi^+ \pi^- \pi^- p$

<sup>24</sup> Using preliminary CBAR data.

<sup>25</sup> With the  $\sigma\pi$  in  $L=2$  and the  $f_2(1270)\pi$  in  $L=0$ .

<sup>26</sup> From a two-resonance fit to four  $2^- 0^+$  waves.

<sup>27</sup> From a partial-wave analysis of  $K^+ K^- \pi^-$  system.

<sup>28</sup> Normalized to the  $B(\pi_2(1670) \rightarrow f_2\pi)$ .

 **$\pi_2(1670)$  REFERENCES**

AGHASYAN	18B	PR D98 092003	M. Aghasyan <i>et al.</i>	(COMPASS Collab.)
ADOLPH	14	EPJ A50 79	C. Adolph <i>et al.</i>	(COMPASS Collab.)
ALEKSEEV	10	PRL 104 241803	M.G. Alekseev <i>et al.</i>	(COMPASS Collab.)
SCHEGELSKY	06	EPJ A27 199	V.A. Schegelsky <i>et al.</i>	
LU	05	PRL 94 032002	M. Lu <i>et al.</i>	(BNL E852 Collab.)
KUHN	04	PL B595 109	J. Kuhn <i>et al.</i>	(BNL E852 Collab.)
CHUNG	02	PR D65 072001	S.U. Chung <i>et al.</i>	(BNL E852 Collab.)
BARBERIS	01	PL B507 14	D. Barberis <i>et al.</i>	
AMELIN	99	PAN 62 445	D.V. Amelin <i>et al.</i>	(VES Collab.)
		Translated from YAF 62 487.		
BAKER	99	PL B449 114	C.A. Baker <i>et al.</i>	
BARBERIS	98B	PL B422 399	D. Barberis <i>et al.</i>	(WA 102 Collab.)
ACCIARRI	97T	PL B413 147	M. Acciarri <i>et al.</i>	(L3 Collab.)
ALBRECHT	97B	ZPHY C74 469	H. Albrecht <i>et al.</i>	(ARGUS Collab.)
AMELIN	95B	PL B356 595	D.V. Amelin <i>et al.</i>	(SERP, TBIL)
BERDNIKOV	94	PL B337 219	E.B. Berdnikov <i>et al.</i>	(SERP, TBIL)
ANTREASYAN	90	ZPHY C48 561	D. Antreasyan <i>et al.</i>	(Crystal Ball Collab.)
BEHREND	90C	ZPHY C46 583	H.J. Behrend <i>et al.</i>	(CELLO Collab.)
ANTIPOV	87	EPL 4 403	Y.M. Antipov <i>et al.</i>	(SERP, JINR, INRM+)
BELLINI	85	SJNP 41 781	D. Bellini <i>et al.</i>	
		Translated from YAF 41 1223.		
ARMSTRONG	82B	NP B202 1	T.A. Armstrong, B. Baccari	(AACH3, BARI, BONN+)
DAUM	81B	NP B182 269	C. Daum <i>et al.</i>	(AMST, CERN, CRAC, MPIM+)
EVANGELIS...	81	NP B178 197	C. Evangelista <i>et al.</i>	(BARI, BONN, CERN+)
Also		NP B186 594	C. Evangelista	
DAUM	80D	PL 89B 285	C. Daum <i>et al.</i>	(AMST, CERN, CRAC, MPIM+) JP
BALTAY	77	PRL 39 591	C. Baltay, C.V. Cautis, M. Kalelkar	(COLU) JP
ASCOLI	73	PR D7 669	G. Ascoli	(ILL, TNTO, GENO, HAMB, MILA+) JP
CRENNELL	70	PRL 24 781	D.J. Crennell <i>et al.</i>	(BNL)
ARMENISE	69	LNC 2 501	N. Armenise <i>et al.</i>	(BARI, BGNA, FIRZ)
BALTAY	68	PRL 20 887	C. Baltay <i>et al.</i>	(COLU, RÖCH, RUTG, YALE) I
BARTSCH	68	NP B7 345	J. Bartsch <i>et al.</i>	(AACH, BERL, CERN) JP