

# a<sub>2</sub>(1700)

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

## a<sub>2</sub>(1700) T-MATRIX POLE $\sqrt{s}$

Note that  $\Gamma = -2 \text{Im}(\sqrt{s})$ .

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
<b>(1630–1780) – i (60–250) OUR ESTIMATE</b>			
(1686 ± 22 <sup>+19</sup> <sub>-7</sub> ) – i (211 ± 38 <sup>+32</sup> <sub>-29</sub> )	<sup>1</sup> KOPF	21	RVUE 0.9 $p\bar{p} \rightarrow \pi^0\pi^0\eta, \pi^0\eta\eta, \pi^0K^+K^-$ and 191 $\pi^-p \rightarrow \pi^-\pi^-\pi^+p$
(1638.9 ± 2.3 <sup>+57.4</sup> <sub>-0.1</sub> ) – i(112.0 ± 1.3 <sup>+0.9</sup> <sub>-24.2</sub> )	<sup>2</sup> ALBRECHT	20	RVUE 0.9 $\bar{p}p \rightarrow \pi^0\pi^0\eta, \pi^0\eta\eta, \pi^0K^+K^-$
(1722 ± 15 ± 67) – i(124 ± 9 ± 32)	<sup>3</sup> RODAS	19	RVUE 191 $\pi^-p \rightarrow \eta'\pi^-p$
(1698 ± 44) – i (133 ± 28)	AMSLER	02	CBAR 0.9 $\bar{p}p \rightarrow \pi^0\eta\eta$
<sup>1</sup> Based on combined fit of Crystal Barrel and $\pi\pi$ scattering data (ALBRECHT 20), and COMPASS data (ADOLPH 15), using a coupled-channel model of $\eta\pi, \eta'\pi$ and $K\bar{K}$ systems. <sup>2</sup> Based on 2 poles, 2 channels ( $\pi\eta, K\bar{K}$ ). <sup>3</sup> The coupled-channel analysis of both the $\eta\pi$ and $\eta'\pi$ systems using ADOLPH 15 data.			

## a<sub>2</sub>(1700) MASS

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
<b>1706 ± 14 OUR AVERAGE</b> Error includes scale factor of 1.2.				
1681 <sup>+22</sup> <sub>-35</sub>	46M	<sup>1,2</sup> AGHASYAN	18B	COMP 190 $\pi^-p \rightarrow \pi^-\pi^+\pi^-p$
1726 ± 12 ± 25		<sup>2</sup> ABLIKIM	17K	BES3 $\psi(2S) \rightarrow \gamma\eta\pi^+\pi^-$
1722 ± 9 ± 15	18k	<sup>3</sup> SCHEGELSKY	06	RVUE $\gamma\gamma \rightarrow \pi^+\pi^-\pi^0$
1660 ± 40		<sup>2</sup> ABELE	99B	CBAR 1.94 $\bar{p}p \rightarrow \pi^0\eta\eta$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
1720 ± 10 ± 60		<sup>4</sup> JACKURA	18	RVUE $\pi^-p \rightarrow \eta\pi^-p$
1675 ± 25		ANISOVICH	09	RVUE 0.0 $\bar{p}p, \pi N$
1702 ± 7	80k	<sup>5</sup> UMAN	06	E835 5.2 $\bar{p}p \rightarrow \eta\eta\pi^0$
1721 ± 13 ± 44	145k	LU	05	B852 18 $\pi^-p \rightarrow \omega\pi^-\pi^0p$
1737 ± 5 ± 7		ABE	04	BELL 10.6 $e^+e^- \rightarrow e^+e^-K^+K^-$
1767 ± 14	221	<sup>6</sup> ACCIARRI	01H	L3 $\gamma\gamma \rightarrow K_S^0K_S^0, E_{cm}^{ee} = 91, 183\text{--}209 \text{ GeV}$
~ 1775		<sup>7</sup> GRYGOREV	99	SPEC 40 $\pi^-p \rightarrow K_S^0K_S^0n$
1752 ± 21 ± 4		ACCIARRI	97T	L3 $\gamma\gamma \rightarrow \pi^+\pi^-\pi^0$
<sup>1</sup> Statistical error negligible. <sup>2</sup> Breit-Wigner mass. <sup>3</sup> From analysis of L3 data at 183–209 GeV. <sup>4</sup> Superseded by RODAS 19. <sup>5</sup> Statistical error only.				

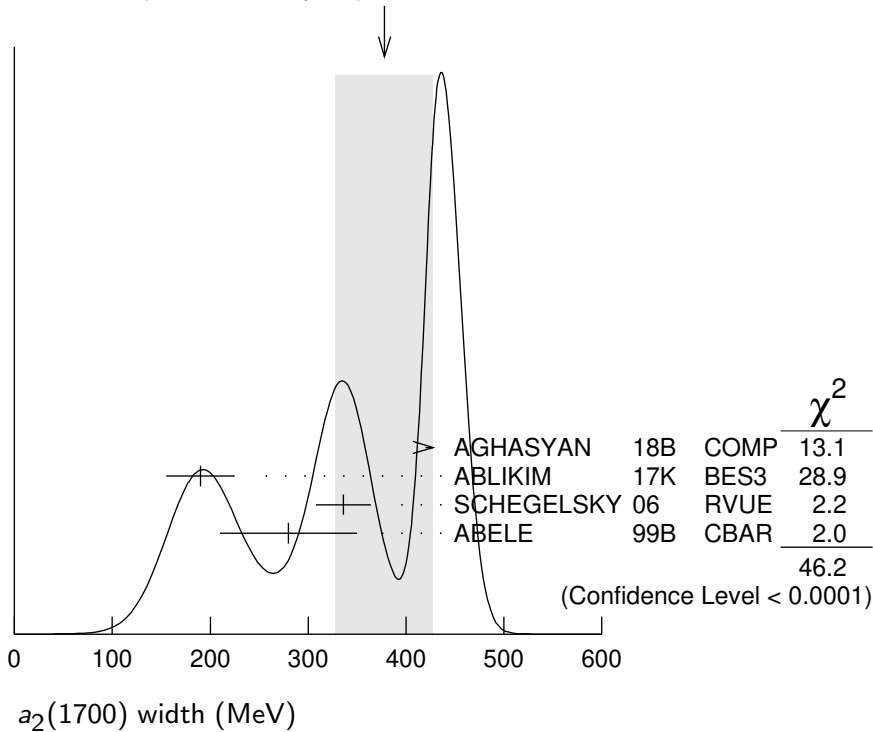
<sup>6</sup> Spin 2 dominant, isospin not determined, could also be  $I=1$ .

<sup>7</sup> Possibly two  $J^P = 2^+$  resonances with isospins 0 and 1.

### $a_2(1700)$ WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
<b>380<sup>+</sup><sub>-50</sub></b>	<b>60</b>	<b>OUR AVERAGE</b>		Error includes scale factor of 3.9. See the ideogram below.
436 <sup>+</sup> <sub>-16</sub>	46M	1,2 AGHASYAN	18B	COMP 190 $\pi^- p \rightarrow \pi^- \pi^+ \pi^- p$
190 ± 18 ± 30		2 ABLIKIM	17K	BES3 $\psi(2S) \rightarrow \gamma \eta \pi^+ \pi^-$
336 ± 20 ± 20	18k	3 SCHEGELSKY	06	RVUE $\gamma \gamma \rightarrow \pi^+ \pi^- \pi^0$
280 ± 70		2 ABELE	99B	CBAR 1.94 $\bar{p} p \rightarrow \pi^0 \eta \eta$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
280 ± 10 ± 70		4 JACKURA	18	RVUE $\pi^- p \rightarrow \eta \pi^- p$
270 <sup>+</sup> <sub>-20</sub>		ANISOVICH	09	RVUE 0.0 $\bar{p} p, \pi N$
417 ± 19	80k	5 UMAN	06	E835 5.2 $\bar{p} p \rightarrow \eta \eta \pi^0$
279 ± 49 ± 66	145k	LU	05	B852 18 $\pi^- p \rightarrow \omega \pi^- \pi^0 p$
151 ± 22 ± 24		ABE	04	BELL 10.6 $e^+ e^- \rightarrow e^+ e^- K^+ K^-$
187 ± 60	221	6 ACCIARRI	01H	L3 $\gamma \gamma \rightarrow K_S^0 K_S^0, E_{cm} = 91, 183-209 \text{ GeV}$
150 ± 110 ± 34		ACCIARRI	97T	L3 $\gamma \gamma \rightarrow \pi^+ \pi^- \pi^0$

WEIGHTED AVERAGE  
380+60-50 (Error scaled by 3.9)



<sup>1</sup> Statistical error negligible.

<sup>2</sup> Breit-Wigner width.

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

<sup>4</sup> Superseded by RODAS 19.

<sup>5</sup> Statistical error only.

<sup>6</sup> Spin 2 dominant, isospin not determined, could also be  $I=1$ .

### $a_2(1700)$ DECAY MODES

Mode	Fraction ( $\Gamma_i/\Gamma$ )
$\Gamma_1$ $\eta\pi$	$(2.5 \pm 0.6) \%$
$\Gamma_2$ $\eta'\pi$	seen
$\Gamma_3$ $\gamma\gamma$	$(7.9 \pm 1.7) \times 10^{-7}$
$\Gamma_4$ $\rho\pi$	seen
$\Gamma_5$ $f_2(1270)\pi$	seen
$\Gamma_6$ $K\bar{K}$	$(1.3 \pm 0.8) \%$
$\Gamma_7$ $\omega\pi^-\pi^0$	seen
$\Gamma_8$ $\omega\rho$	seen

### $a_2(1700)$ PARTIAL WIDTHS

$\Gamma(\eta\pi)$   $\Gamma_1$

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
<b><math>9.5 \pm 2.0</math></b>	870	<sup>1</sup> SCHEGELSKY 06A	RVUE	$\gamma\gamma \rightarrow K_S^0 K_S^0$

<sup>1</sup> From analysis of L3 data at 91 and 183–209 GeV, using  $a_2(1700)$  mass of 1730 MeV and width of 340 MeV, and SU(3) relations.

$\Gamma(\gamma\gamma)$   $\Gamma_3$

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
<b><math>0.30 \pm 0.05</math></b>	870	<sup>1</sup> SCHEGELSKY 06A	RVUE	$\gamma\gamma \rightarrow K_S^0 K_S^0$

<sup>1</sup> From analysis of L3 data at 91 and 183–209 GeV, using  $a_2(1700)$  mass of 1730 MeV and width of 340 MeV, and SU(3) relations.

$\Gamma(K\bar{K})$   $\Gamma_6$

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
<b><math>5.0 \pm 3.0</math></b>	870	<sup>1</sup> SCHEGELSKY 06A	RVUE	$\gamma\gamma \rightarrow K_S^0 K_S^0$

<sup>1</sup> From analysis of L3 data at 91 and 183–209 GeV, using  $a_2(1700)$  mass of 1730 MeV and width of 340 MeV, and SU(3) relations.

### $a_2(1700)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

$[\Gamma(\rho\pi) + \Gamma(f_2(1270)\pi)] \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$   $(\Gamma_4 + \Gamma_5)\Gamma_3/\Gamma$

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
<b><math>0.29 \pm 0.04 \pm 0.02</math></b>		ACCIARRI	97T L3	$\gamma\gamma \rightarrow \pi^+\pi^-\pi^0$

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

$0.37^{+0.12}_{-0.08} \pm 0.10$	18k	<sup>1</sup> SCHEGELSKY 06	RVUE	$\gamma\gamma \rightarrow \pi^+\pi^-\pi^0$
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<sup>1</sup> From analysis of L3 data at 183–209 GeV.

$\Gamma(K\bar{K}) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$   $\Gamma_6\Gamma_3/\Gamma$

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

$20.6 \pm 4.2 \pm 4.6$	<sup>1</sup> ABE	04 BELL	$10.6 e^+ e^- \rightarrow e^+ e^- K^+ K^-$
$49 \pm 11 \pm 13$	<sup>2</sup> ACCIARRI	01H L3	$\gamma\gamma \rightarrow K_S^0 K_S^0, E_{\text{cm}}^{ee} = 91, 183-209 \text{ GeV}$

<sup>1</sup> Assuming spin 2.

<sup>2</sup> Spin 2 dominant, isospin not determined, could also be  $l=1$ .

**$a_2(1700)$  BRANCHING RATIOS**

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

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

$3.4 \pm 0.4 \pm 0.1$	18k	<sup>1</sup> SCHEGELSKY 06	RVUE	$\gamma\gamma \rightarrow \pi^+ \pi^- \pi^0$
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<sup>1</sup> From analysis of L3 data at 183–209 GeV.

$\Gamma(K\bar{K})/\Gamma(\eta\pi)$   $\Gamma_6/\Gamma_1$

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

$0.029 \pm 0.04 \begin{smallmatrix} +0.011 \\ -0.012 \end{smallmatrix}$	<sup>1</sup> KOPF	21	RVUE $0.9 p\bar{p} \rightarrow \pi^0 \pi^0 \eta, \pi^0 \eta \eta, \pi^0 K^+ K^-$ and 191 $\pi^- p \rightarrow \pi^- \pi^- \pi^+ p$
$4.134 \pm 0.106 \begin{smallmatrix} +4.909 \\ -2.988 \end{smallmatrix}$	<sup>2</sup> ALBRECHT	20	RVUE $0.9 \bar{p}p \rightarrow \pi^0 \pi^0 \eta, \pi^0 \eta \eta, \pi^0 K^+ K^-$

<sup>1</sup> From T-matrix pole based on combined fit of Crystal Barrel and  $\pi\pi$  scattering data (ALBRECHT 20), and COMPASS data (ADOLPH 15), using a coupled-channel model of  $\eta\pi, \eta'\pi$  and  $K\bar{K}$  systems.

<sup>2</sup> Residues from T-matrix pole, 2 poles, 2 channels ( $\pi\eta, K\bar{K}$ ).

$\Gamma(\eta'\pi)/\Gamma(\eta\pi)$   $\Gamma_2/\Gamma_1$

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

$0.035 \pm 0.044 \begin{smallmatrix} +0.069 \\ -0.012 \end{smallmatrix}$	<sup>1</sup> KOPF	21	RVUE $0.9 p\bar{p} \rightarrow \pi^0 \pi^0 \eta, \pi^0 \eta \eta, \pi^0 K^+ K^-$ and 191 $\pi^- p \rightarrow \pi^- \pi^- \pi^+ p$
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<sup>1</sup> From T-matrix pole based on combined fit of Crystal Barrel and  $\pi\pi$  scattering data (ALBRECHT 20), and COMPASS data (ADOLPH 15), using a coupled-channel model of  $\eta\pi, \eta'\pi$  and  $K\bar{K}$  systems.

## $a_2(1700)$ REFERENCES

KOPF	21	EPJ C81 1056	B. Kopf <i>et al.</i>	(BOCH)
ALBRECHT	20	EPJ C80 453	M. Albrecht <i>et al.</i>	(Crystal Barrel Collab.)
RODAS	19	PRL 122 042002	A. Rodas <i>et al.</i>	(JPAC Collab.)
AGHASYAN	18B	PR D98 092003	M. Aghasyan <i>et al.</i>	(COMPASS Collab.)
JACKURA	18	PL B779 464	A. Jackura <i>et al.</i>	(JPAC and COMPASS Collab.)
ABLIKIM	17K	PR D95 032002	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ADOLPH	15	PL B740 303	M. Adolph <i>et al.</i>	(COMPASS Collab.)
ANISOVICH	09	IJMP A24 2481	V.V. Anisovich, A.V. Sarantsev	(PNPI)
SCHEGELSKY	06	EPJ A27 199	V.A. Schegelsky <i>et al.</i>	
SCHEGELSKY	06A	EPJ A27 207	V.A. Schegelsky <i>et al.</i>	
UMAN	06	PR D73 052009	I. Uman <i>et al.</i>	(FNAL E835)
LU	05	PRL 94 032002	M. Lu <i>et al.</i>	(BNL E852 Collab.)
ABE	04	EPJ C32 323	K. Abe <i>et al.</i>	(BELLE Collab.)
AMSLER	02	EPJ C23 29	C. Amsler <i>et al.</i>	(Crystal Barrel Collab.)
ACCIARRI	01H	PL B501 173	M. Acciarri <i>et al.</i>	(L3 Collab.)
ABELE	99B	EPJ C8 67	A. Abele <i>et al.</i>	(Crystal Barrel Collab.)
GRYGOREV	99	PAN 62 470	V.K. Grygorev <i>et al.</i>	
		Translated from YAF 62 513.		
ACCIARRI	97T	PL B413 147	M. Acciarri <i>et al.</i>	(L3 Collab.)

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