

$a_2(1700)$

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

$a_2(1700)$ T-MATRIX POLE $\sqrt{s}$

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

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

$a_2(1700)$ MASS

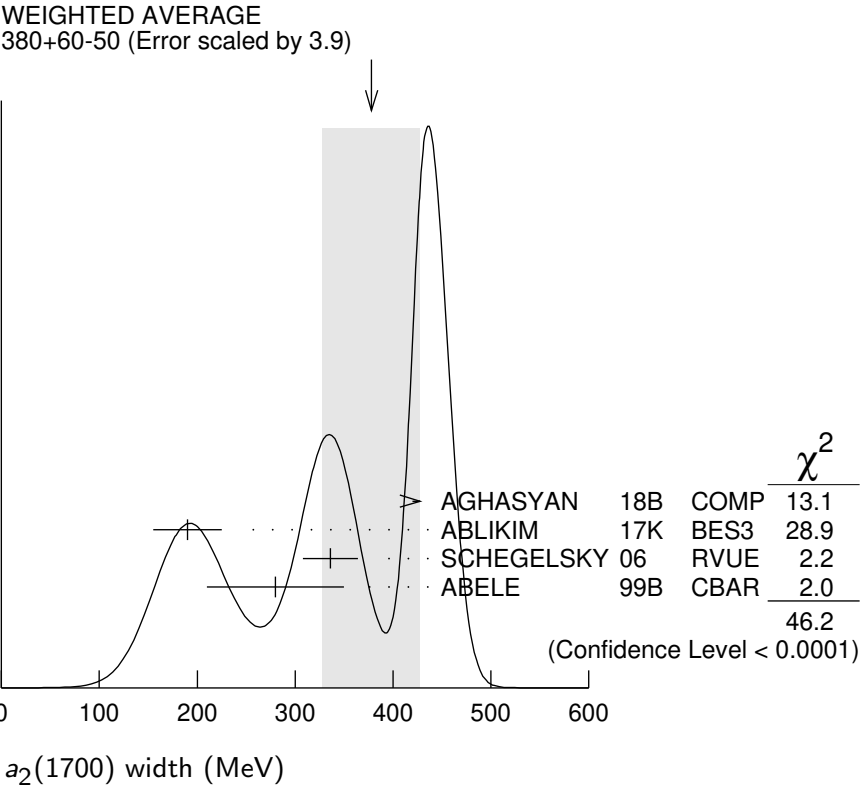
VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
1706 ± 14 OUR AVERAGE		Error includes scale factor of 1.2.		
1681^{+22}_{-35}	46M	^{1,2} AGHASYAN	18B	COMP 190 $\pi^-p \rightarrow \pi^-\pi^+\pi^-p$
$1726 \pm 12 \pm 25$		² ABLIKIM	17K	BES3 $\psi(2S) \rightarrow \gamma\eta\pi^+\pi^-$
$1722 \pm 9 \pm 15$	18k	³ SCHEGELSKY	06	RVUE $\gamma\gamma \rightarrow \pi^+\pi^-\pi^0$
1660 ± 40		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. ● ● ●				
$1720 \pm 10 \pm 60$		⁴ JACKURA	18	RVUE $\pi^-p \rightarrow \eta\pi^-p$
1675 ± 25		ANISOVICH	09	RVUE 0.0 $\bar{p}p, \pi N$
1702 ± 7	80k	⁵ UMAN	06	E835 5.2 $\bar{p}p \rightarrow \eta\eta\pi^0$
$1721 \pm 13 \pm 44$	145k	LU	05	B852 18 $\pi^-p \rightarrow \omega\pi^-\pi^0p$
$1737 \pm 5 \pm 7$		ABE	04	BELL 10.6 $e^+e^- \rightarrow e^+e^-K^+K^-$
1767 ± 14	221	⁶ ACCIARRI	01H	L3 $\gamma\gamma \rightarrow K_S^0K_S^0, E_{\text{cm}}^{\text{ee}} = 91, 183\text{--}209 \text{ GeV}$
~ 1775		⁷ GRYGOREV	99	SPEC 40 $\pi^-p \rightarrow K_S^0K_S^0n$
$1752 \pm 21 \pm 4$		ACCIARRI	97T	L3 $\gamma\gamma \rightarrow \pi^+\pi^-\pi^0$

¹ Statistical error negligible.
² Breit-Wigner mass.
³ From analysis of L3 data at 183–209 GeV.
⁴ Superseded by RODAS 19.
⁵ Statistical error only.
⁶ Spin 2 dominant, isospin not determined, could also be $I=1$.
⁷ Possibly two $J^P = 2^+$ resonances with isospins 0 and 1.

$a_2(1700)$ WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
380^{+60}_{-50} OUR AVERAGE		Error includes scale factor of 3.9. See the ideogram below.		
436^{+20}_{-16}	46M	^{1,2} AGHASYAN	18B COMP	$190 \pi^- p \rightarrow \pi^- \pi^+ \pi^- p$
$190 \pm 18 \pm 30$		² ABLIKIM	17K BES3	$\psi(2S) \rightarrow \gamma \eta \pi^+ \pi^-$
$336 \pm 20 \pm 20$	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. • • •				
$280 \pm 10 \pm 70$		⁴ JACKURA	18 RVUE	$\pi^- p \rightarrow \eta \pi^- p$
270^{+50}_{-20}		ANISOVICH	09 RVUE	$0.0 \bar{p} p, \pi N$
417 ± 19	80k	⁵ UMAN	06 E835	$5.2 \bar{p} p \rightarrow \eta \eta \pi^0$
$279 \pm 49 \pm 66$	145k	LU	05 B852	$18 \pi^- p \rightarrow \omega \pi^- \pi^0 p$
$151 \pm 22 \pm 24$		ABE	04 BELL	$10.6 e^+ e^- \rightarrow$
187 ± 60	221	⁶ ACCIARRI	01H L3	$e^+ e^- K^+ K^-$ $\gamma \gamma \rightarrow K_S^0 K_S^0, E_{\text{cm}} =$
$150 \pm 110 \pm 34$		ACCIARRI	97T L3	91, 183–209 GeV $\gamma \gamma \rightarrow \pi^+ \pi^- \pi^0$

¹ Statistical error negligible.
² Breit-Wigner width.
³ From analysis of L3 data at 183–209 GeV.
⁴ Superseded by RODAS 19.
⁵ Statistical error only.
⁶ Spin 2 dominant, isospin not determined, could also be $I=1$.



$a_2(1700)$ DECAY MODES

Mode		Fraction (Γ_i/Γ)
Γ_1	$\eta\pi$	$(2.5\pm0.6)\%$
Γ_2	$\eta'\pi$	seen
Γ_3	$\gamma\gamma$	$(7.9\pm1.7)\times10^{-7}$
Γ_4	$\rho\pi$	seen
Γ_5	$f_2(1270)\pi$	seen
Γ_6	$K\bar{K}$	$(1.3\pm0.8)\%$
Γ_7	$\omega\pi^-\pi^0$	seen
Γ_8	$\omega\rho$	seen

$a_2(1700)$ PARTIAL WIDTHS

$\Gamma(\eta\pi)$					Γ_1
VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT	
9.5 ± 2.0	870	¹ SCHEGELSKY 06A	RVUE	$\gamma\gamma \rightarrow K_S^0 K_S^0$	

¹ 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.

$\Gamma(\gamma\gamma)$					Γ_3
VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT	
0.30±0.05	870	¹ SCHEGELSKY 06A	RVUE	$\gamma\gamma \rightarrow K_S^0 K_S^0$	

¹ 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.

$\Gamma(K\bar{K})$					Γ_6
VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT	
5.0±3.0	870	¹ SCHEGELSKY 06A	RVUE	$\gamma\gamma \rightarrow K_S^0 K_S^0$	

¹ 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	
0.29±0.04±0.02		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} ± 0.10 18k ¹ SCHEGELSKY 06 RVUE $\gamma\gamma \rightarrow \pi^+\pi^-\pi^0$

¹ 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		
• • • We do not use the following data for averages, fits, limits, etc. • • •					
20.6 ± 4.2 ± 4.6	¹ ABE 04	BELL	10.6 $e^+e^- \rightarrow e^+e^- K^+ K^-$		
49 ± 11 ± 13	² ACCIARRI 01H	L3	$\gamma\gamma \rightarrow K_S^0 K_S^0, E_{\text{cm}}^{ee} = 91, 183\text{--}209 \text{ GeV}$		

¹ Assuming spin 2.

² Spin 2 dominant, isospin not determined, could also be $I=1$.

$a_2(1700)$ BRANCHING RATIOS

$\Gamma(\rho\pi)/\Gamma(f_2(1270)\pi)$					Γ_4/Γ_5
VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	

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

3.4±0.4±0.1 18k ¹ SCHEGELSKY 06 RVUE $\gamma\gamma \rightarrow \pi^+\pi^-\pi^0$

¹ From analysis of L3 data at 183–209 GeV.

$\Gamma(K\bar{K})/\Gamma(\eta\pi)$					Γ_6/Γ_1
VALUE	DOCUMENT ID	TECN	COMMENT		

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

0.029±0.04^{+0.011}_{-0.012} ¹ KOPF 21 RVUE 0.9 $p\bar{p} \rightarrow \pi^0\pi^0\eta, \pi^0\eta\eta,$
 $\pi^0 K^+ K^-$ and 191 $\pi^-\pi^+ p \rightarrow$
 $\pi^-\pi^-\pi^+ p$

4.134±0.106^{+4.909}_{-2.988} ² ALBRECHT 20 RVUE 0.9 $\bar{p}p \rightarrow \pi^0\pi^0\eta, \pi^0\eta\eta,$
 $\pi^0 K^+ K^-$

¹From 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.

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

$\Gamma(\eta'\pi)/\Gamma(\eta\pi)$				Γ_2/Γ_1
VALUE	DOCUMENT ID	TECN	COMMENT	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.035 \pm 0.044^{+0.069}_{-0.012}$	¹ KOPF	21	RVUE	$0.9 \ p\bar{p} \rightarrow \pi^0 \pi^0 \eta, \pi^0 \eta \eta,$ $\pi^0 K^+ K^-$ and 191 $\pi^- p \rightarrow$ $\pi^- \pi^- \pi^+ p$

¹From 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.)