Citation: S. Navas et al. (Particle Data Group), Phys. Rev. D 110, 030001 (2024)

$a_2(1700)$

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

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

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

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 $p\overline{p} \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0 K^+ K^-$ and 191 $\pi^- p \to \pi^-\pi^-\pi^+ p$
$(1638.9 \pm 2.3^{+57.4}_{-0.1}) - i(112.0 \pm 1.3^{+0.9}_{-24.2})$	[2] ALBRECHT	20	RVUE	0.9 $\overline{p}p \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0 K^+ K^-$
$(1722 \pm 15 \pm 67) - i(124 \pm 9 \pm 32)$	[3] RODAS	19	RVUE	191 $\pi^- p \to \eta'\pi^- p$
$(1698 \pm 44) - i\,(133 \pm 28)$	AMSLER	02	CBAR	0.9 $\overline{p}p \to \pi^0\eta\eta$

[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 $K\overline{K}$ systems.
[2] Based on 2 poles, 2 channels ($\pi\eta$, $K\overline{K}$).
[3] The coupled-channel analysis of both the $\eta\pi$ and $\eta'\pi$ systems using ADOLPH 15 data.

$a_2(1700)$ MASS

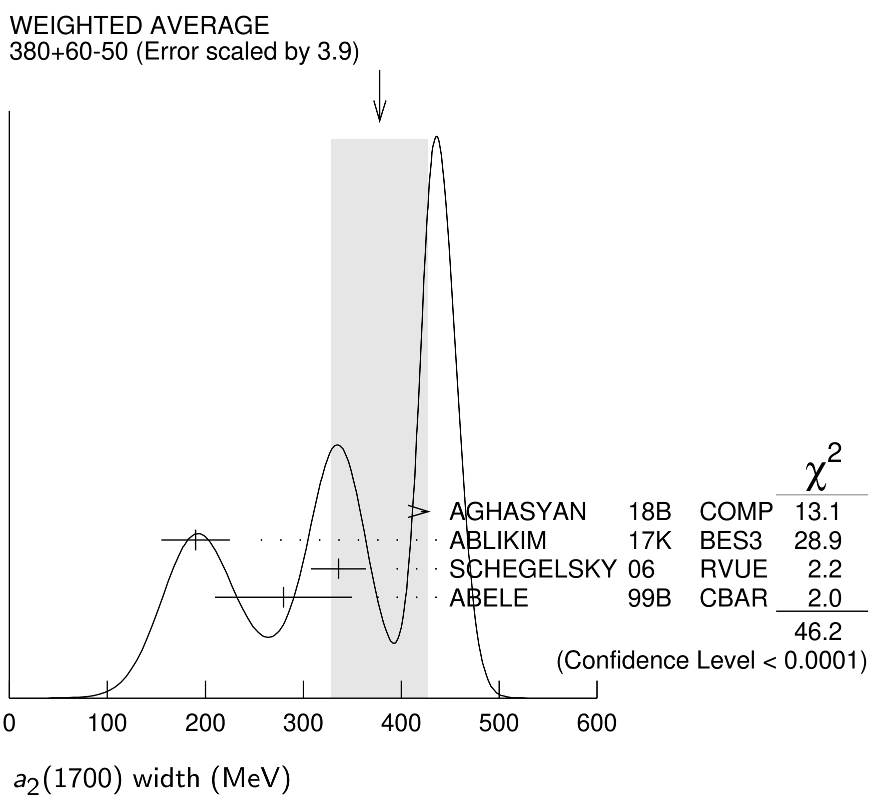
VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1706±14 OUR AVERAGE		Error includes scale factor of 1.2.			
1681^{+22}_{-35}	46M	[1,2] AGHASYAN	18B	COMP	190 $\pi^- p \to \pi^-\pi^+\pi^- p$
1726±12±25		[2] ABLIKIM	17K	BES3	$\psi(2S) \to \gamma\eta\pi^+\pi^-$
1722± 9±15	18k	[3] SCHEGELSKY	06	RVUE	$\gamma\gamma \to \pi^+\pi^-\pi^0$
1660±40		[2] ABELE	99B	CBAR	1.94 $\overline{p}p \to \pi^0\eta\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1720±10±60		[4] JACKURA	18	RVUE	$\pi^- p \to \eta\pi^- p$
1675±25		ANISOVICH	09	RVUE	0.0 $\overline{p}p$, πN
1702± 7	80k	[5] UMAN	06	E835	5.2 $\overline{p}p \to \eta\eta\pi^0$
1721±13±44	145k	LU	05	B852	18 $\pi^- p \to \omega\pi^-\pi^0 p$
1737± 5± 7		ABE	04	BELL	10.6 $e^+e^- \to e^+e^- K^+K^-$
1767±14	221	[6] ACCIARRI	01H	L3	$\gamma\gamma \to K^0_S K^0_S$, E^{ee}_{cm}= 91, 183–209 GeV
∼ 1775		[7] GRYGOREV	99	SPEC	40 $\pi^- p \to K^0_S K^0_S n$
1752±21± 4		ACCIARRI	97T	L3	$\gamma\gamma \to \pi^+\pi^-\pi^0$

[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[4] Superseded by RODAS 19.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 $\pi^- p \to \pi^- \pi^+ \pi^- p$
$190 \pm 18 \pm 30$		[2] ABLIKIM 17K	BES3	$\psi(2S) \to \gamma \eta \pi^+ \pi^-$
$336 \pm 20 \pm 20$	18k	[3] SCHEGELSKY 06	RVUE	$\gamma\gamma \to \pi^+ \pi^- \pi^0$
280 ± 70		[2] ABELE 99B	CBAR	1.94 $\overline{p} p \to \pi^0 \eta \eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$280 \pm 10 \pm 70$		[4] JACKURA 18	RVUE	$\pi^- p \to \eta \pi^- p$
270^{+50}_{-20}		ANISOVICH 09	RVUE	0.0 $\overline{p} p$, πN
417 ± 19	80k	[5] UMAN 06	E835	5.2 $\overline{p} p \to \eta \eta \pi^0$
$279 \pm 49 \pm 66$	145k	LU 05	B852	18 $\pi^- p \to \omega \pi^- \pi^0 p$
$151 \pm 22 \pm 24$		ABE 04	BELL	10.6 $e^+ e^- \to e^+ e^- K^+ K^-$
187 ± 60	221	[6] ACCIARRI 01H	L3	$\gamma\gamma \to K^0_S K^0_S$, E^{ee}_{cm}= 91, 183–209 GeV
$150 \pm 110 \pm 34$		ACCIARRI 97T	L3	$\gamma\gamma \to \pi^+ \pi^- \pi^0$



[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 ± 0.6) %
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	$K\overline{K}$	(1.3 ± 0.8) %
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	$\gamma\gamma\to K^0_S K^0_S$

[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	$\gamma\gamma\to K^0_S K^0_S$

[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.

$\Gamma(K\overline{K})$ — Γ_6

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
5.0±3.0	870	[1] SCHEGELSKY 06A	RVUE	$\gamma\gamma\to K^0_S K^0_S$

[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	$\gamma\gamma\to\pi^+\pi^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.37^{+0.12}_{-0.08}\pm0.10$	18k	[1] SCHEGELSKY 06	RVUE	$\gamma\gamma\to\pi^+\pi^-\pi^0$

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

$\Gamma(K\overline{K}) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_6\Gamma_3/\Gamma$

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$20.6\pm\ 4.2\pm\ 4.6$	[1] ABE	04	BELL	10.6 $e^+e^- \to e^+e^-K^+K^-$
$49\ \ \pm11\ \ \pm13$	[2] ACCIARRI	01H	L3	$\gamma\gamma \to K^0_S K^0_S$, E^{ee}_{cm}= 91, 183–209 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. • • •					
$3.4\pm0.4\pm0.1$	18k	[1] SCHEGELSKY	06	RVUE	$\gamma\gamma \to \pi^+\pi^-\pi^0$

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

$\Gamma(K\overline{K})/\Gamma(\eta\pi)$ — Γ_6/Γ_1

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.029\pm0.04\ ^{+0.011}_{-0.012}$	[1] KOPF	21	RVUE	0.9 $p\overline{p} \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0K^+K^-$ and 191 $\pi^-p \to \pi^-\pi^-\pi^+p$
$4.134\pm0.106^{+4.909}_{-2.988}$	[2] ALBRECHT	20	RVUE	0.9 $\overline{p}p \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0K^+K^-$

[1] 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 $K\overline{K}$ systems.

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

$\Gamma(\eta'\pi)/\Gamma(\eta\pi)$ — Γ_2/Γ_1

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.035\pm0.044^{+0.069}_{-0.012}$	[1] KOPF	21	RVUE	0.9 $p\overline{p} \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0K^+K^-$ and 191 $\pi^-p \to \pi^-\pi^-\pi^+p$

[1] 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 $K\overline{K}$ systems.

$a_2(1700)$ REFERENCES

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