# $a_2(1700)$

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

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

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

| *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

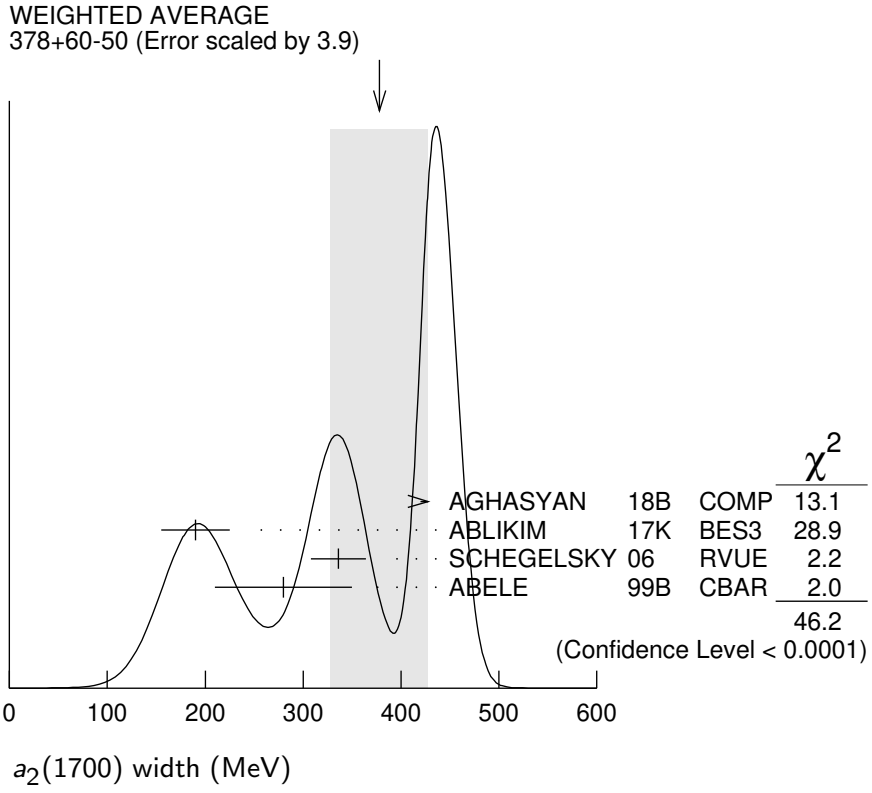
| *VALUE* (MeV) | *EVTS* | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|---|
| **1706±14 OUR AVERAGE** | | Error includes scale factor of 1.2. | | | |
| $1681^{+22}_{-35}$ | 46M | [1,2] AGHASYAN | 18B | COMP | 190 $\pi^- p \to\ \pi^-\pi^+\pi^- p$ |
| 1726±12±25 | | [2] ABLIKIM | 17K | 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 $\overline{p}p$, $\pi N$ |
| 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 | $\gamma\gamma \to\ K^0_S K^0_S$, $E^{ee}_{\rm cm}$= 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* |
|---|---|---|---|---|---|
| **$378^{+60}_{-50}$ 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 | $\gamma\gamma \to \pi^+\pi^-\pi^0$ |
| $280 \pm 70$ | | [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 $\overline{p}p$, $\pi N$ |
| $417 \pm 19$ | 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 $e^+e^- \to e^+e^-K^+K^-$ |
| $187 \pm 60$ | 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 ($\Gamma_i/\Gamma$) |
|---|---|---|
| $\Gamma_1$ | $\eta\pi$ | (2.5±0.6) % |
| $\Gamma_2$ | $\eta'\pi$ | seen |
| $\Gamma_3$ | $\gamma\gamma$ | $(7.9\pm1.7)\times10^{-7}$ |
| $\Gamma_4$ | $\rho\pi$ | seen |
| $\Gamma_5$ | $f_2(1270)\pi$ | seen |
| $\Gamma_6$ | $K\overline{K}$ | (1.3±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* |
|---|---|---|---|---|---|
| **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.

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

| *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.

### $\Gamma(K\overline{K})$ $\Gamma_6$

| *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.

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

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

| *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.

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

| *VALUE* (eV) | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| $20.6 \pm 4.2 \pm 4.6$ | [1] ABE | 04 | BELL | 10.6 $e^+e^- \to e^+e^- K^+K^-$ |
| $49 \pm 11 \pm 13$ | [2] ACCIARRI | 01H | L3 | $\gamma\gamma \to K^0_S K^0_S$, $E^{ee}_{\text{cm}}$= 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

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

| *VALUE* | *EVTS* | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|---|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| $3.4 \pm 0.4 \pm 0.1$ | 18k | [1] SCHEGELSKY | 06 | RVUE | $\gamma\gamma \to \pi^+\pi^-\pi^0$ |

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

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

| *VALUE* | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| $0.029 \pm 0.04\ ^{+0.011}_{-0.012}$ | [1] KOPF | 21 | RVUE | 0.9 $p\overline{p} \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0K^+K^-$ and 191 $\pi^-p \to \pi^-\pi^-\pi^+p$ |
| $4.134 \pm 0.106\ ^{+4.909}_{-2.988}$ | [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 ($\pi\eta$, $K\overline{K}$).

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

| *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 $p\overline{p} \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0K^+K^-$ 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


| | | | | |
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| RODAS | 19 | PRL 122 042002 | A. Rodas *et al.* | (JPAC Collab.) |
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| | | Translated from YAF 62 513. | | |
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