# $f_J(1710)$

$I^G(J^{PC}) = 0^+(\text{even}\ {+}{+})$

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## $f_J(1710)$ MASS

| *VALUE* (MeV) | | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|---|
| **1697± 4 OUR AVERAGE** | Error includes scale factor of 1.4. See the ideogram below. | | | | |
| 1713±10 | | ARMSTRONG | 89D | OMEG | 300 $pp \to ppK^+K^-$ |
| 1706±10 | | ARMSTRONG | 89D | OMEG | 300 $pp \to ppK^0_S K^0_S$ |
| 1707±10 | | AUGUSTIN | 88 | DM2 | $J/\psi \to \gamma K^+K^-$ |
| 1690± 4 | 1 | FALVARD | 88 | DM2 | $J/\psi \to \phi K^+K^-$ |
| 1698±15 | | AUGUSTIN | 87 | DM2 | $J/\psi \to \gamma\pi^+\pi^-$ |
| 1720±10±10 | | BALTRUSAIT... | 87 | MRK3 | $J/\psi \to \gamma K^+K^-$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| 1690±11 | | ABREU | 96C | DLPH | $E^{ee}_{\text{cm}}$= 91.2 GeV |
| 1768±14 | | BALOSHIN | 95 | SPEC | 40 $\pi^-$ C $\to K^0_S K^0_S$ X |
| 1750±15 | 2 | BUGG | 95 | MRK3 | $J/\psi \to \gamma\pi^+\pi^-\pi^+\pi^-$ |
| 1748±10 | | ARMSTRONG | 93C | SPEC | $\overline{p}p \to \pi^0\eta\eta \to 6\gamma$ |
| ~ 1750 | | BREAKSTONE | 93 | SFM | $pp \to pp\pi^+\pi^-\pi^+\pi^-$ |
| 1710±20 | | CHEN | 91 | MRK3 | $J/\psi \to \gamma\pi^+\pi^-, \gamma K\overline{K}$ |
| 1700±15 | | BOLONKIN | 88 | SPEC | 40 $\pi^- p \to K^0_S K^0_S n$ |
| 1720±60 | | BOLONKIN | 88 | SPEC | 40 $\pi^- p \to K^0_S K^0_S n$ |
| 1638±10 | 3 | FALVARD | 88 | DM2 | $J/\psi \to \phi K^+K^-$ |
| $1730^{+\ 2}_{-10}$ | 4,5 | LONGACRE | 86 | MPS | 22 $\pi^- p \to n2K^0_S$ |
| 1742±15 | | WILLIAMS | 84 | MPSF | 200 $\pi^- N \to 2K^0_S$ X |
| 1670±50 | | BLOOM | 83 | CBAL | $J/\psi \to \gamma 2\eta$ |
| 1700±45 | | EDWARDS | 83B | CBAL | $J/\psi \to \eta\gamma 2\pi$ |
| 1650±50 | | BURKE | 82 | MRK2 | $J/\psi \to \gamma 2\rho$ |
| 1730±10±20 | | ETKIN | 82C | MPS | 23 $\pi^- p \to n2K^0_S$ |
| 1708±30 | | FRANKLIN | 82 | MRK2 | $e^+e^- \to \gamma K^+K^-$ |

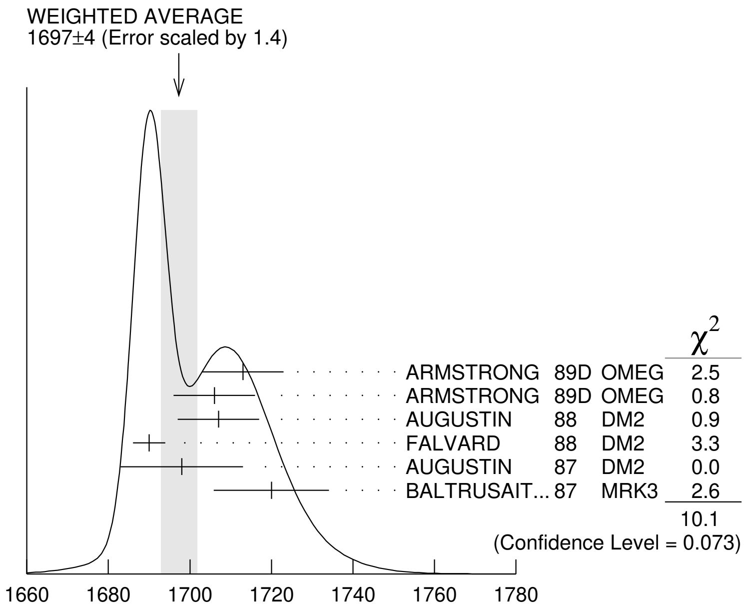
[1] From an analysis including interference with $f'_2(1525)$.

[2] From a fit to the $0^+$ partial wave.

[3] From an analysis ignoring interference with $f'_2(1525)$.

[4] From a partial-wave analysis of data using a K-matrix formalism with 5 poles, but assuming spin 2.

[5] Fit with constrained inelasticity.



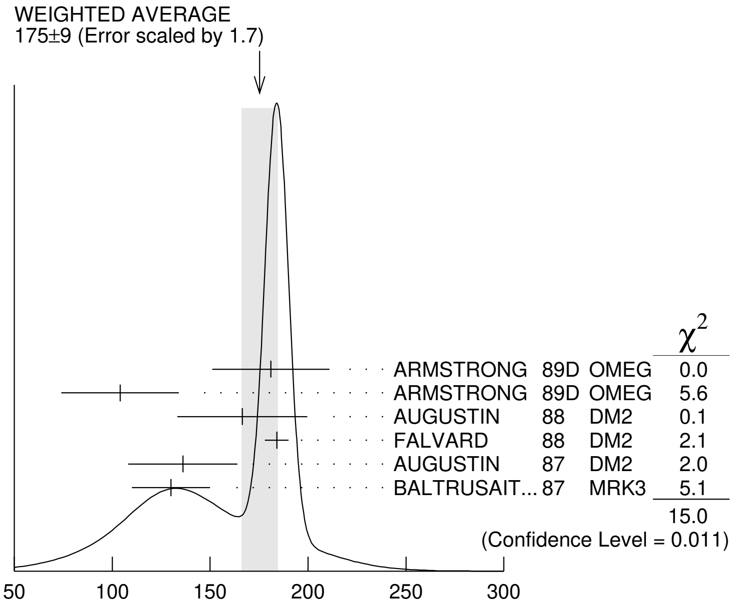

$f_J(1710)$ mass (MeV)

## $f_J(1710)$ WIDTH

| *VALUE* (MeV) | *DOCUMENT ID* | *TECN* | *COMMENT* |
|---|---|---|---|
| **175 ± 9 OUR AVERAGE** | Error includes scale factor of 1.7. See the ideogram below. | | |
| 181 ± 30 | ARMSTRONG 89D | OMEG | 300 $pp \rightarrow ppK^+K^-$ |
| 104 ± 30 | ARMSTRONG 89D | OMEG | 300 $pp \rightarrow ppK^0_S K^0_S$ |
| 166.4 ± 33.2 | AUGUSTIN 88 | DM2 | $J/\psi \rightarrow \gamma K^+ K^-$ |
| 184 ± 6 | [6] FALVARD 88 | DM2 | $J/\psi \rightarrow \phi K^+ K^-$ |
| 136 ± 28 | AUGUSTIN 87 | DM2 | $J/\psi \rightarrow \gamma \pi^+ \pi^-$ |
| 130 ± 20 | BALTRUSAIT...87 | MRK3 | $J/\psi \rightarrow \gamma K^+ K^-$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | |
| 56 ± 19 | BALOSHIN 95 | SPEC | 40 $\pi^-$ C $\rightarrow K^0_S K^0_S$ X |
| 160 ± 40 | [7] BUGG 95 | MRK3 | $J/\psi \rightarrow \gamma \pi^+ \pi^- \pi^+ \pi^-$ |
| 264 ± 25 | ARMSTRONG 93C | SPEC | $\overline{p}p \rightarrow \pi^0 \eta \eta \rightarrow 6\gamma$ |
| 200 to 300 | BREAKSTONE 93 | SFM | $pp \rightarrow pp \pi^+ \pi^- \pi^+ \pi^-$ |
| 186 ± 30 | CHEN 91 | MRK3 | $J/\psi \rightarrow \gamma \pi^+ \pi^-, \gamma K \overline{K}$ |
| 30 ± 20 | BOLONKIN 88 | SPEC | 40 $\pi^- p \rightarrow K^0_S K^0_S n$ |
| 350 ± 150 | BOLONKIN 88 | SPEC | 40 $\pi^- p \rightarrow K^0_S K^0_S n$ |
| 148 ± 17 | [8] FALVARD 88 | DM2 | $J/\psi \rightarrow \phi K^+ K^-$ |

| | | | | |
|---|---|---|---|---|
| $122 \begin{array}{l}+74 \\ -15\end{array}$ | [9,10] LONGACRE | 86 | MPS | $22\ \pi^- p \rightarrow n 2K^0_S$ |
| $57 \pm 38$ | WILLIAMS | 84 | MPSF | $200\ \pi^- N \rightarrow 2K^0_S X$ |
| $160 \pm 80$ | BLOOM | 83 | CBAL | $J/\psi \rightarrow \gamma 2\eta$ |
| $520 \pm 110$ | EDWARDS | 83B | CBAL | $J/\psi \rightarrow \eta \gamma 2\pi$ |
| $200 \pm 100$ | BURKE | 82 | MRK2 | $J/\psi \rightarrow \gamma 2\rho$ |
| $200.0 \begin{array}{l}+156.0 \\ -\ \ \ 9.0\end{array}$ | [11] ETKIN | 82B | MPS | $23\ \pi^- p \rightarrow n 2K^0_S$ |
| $156 \pm 60$ | FRANKLIN | 82 | MRK2 | $e^+ e^- \rightarrow \gamma K^+ K^-$ |

[6] From an analysis including interference with $f'_2(1525)$.
[7] From a fit to the $0^+$ partial wave.
[8] From an analysis ignoring interference with $f'_2(1525)$.
[9] From a partial-wave analysis of data using a K-matrix formalism with 5 poles, but assuming spin 2.
[10] Fit with constrained inelasticity.
[11] From an amplitude analysis of the $K^0_S K^0_S$ system.




$f_J(1710)$ width (MeV)

## $f_J(1710)$ DECAY MODES

| | Mode | Fraction $(\Gamma_i/\Gamma)$ |
|---|---|---|
| $\Gamma_1$ | $K\overline{K}$ | seen |
| $\Gamma_2$ | $\eta\eta$ | seen |
| $\Gamma_3$ | $\pi\pi$ | seen |
| $\Gamma_4$ | $\rho\rho$ | |
| $\Gamma_5$ | $\gamma\gamma$ | |

## $f_J(1710)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\mathrm{total})$

### $\Gamma(K\overline{K}) \times \Gamma(\gamma\gamma)/\Gamma_{\mathrm{total}}$ — $\Gamma_1\Gamma_5/\Gamma$

| VALUE (keV) | CL% | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **<0.11** | 95 | [12] BEHREND | 89C | CELL | $\gamma\gamma \rightarrow K_S^0 K_S^0$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| <0.48 | 95 | ALBRECHT | 90G | ARG | $\gamma\gamma \rightarrow K^+ K^-$ |
| <0.28 | 95 | [12] ALTHOFF | 85B | TASS | $\gamma\gamma \rightarrow K\overline{K}\pi$ |

[12] Assuming helicity 2.

## $f_J(1710)$ BRANCHING RATIOS

### $\Gamma(K\overline{K})/\Gamma_{\mathrm{total}}$ — $\Gamma_1/\Gamma$

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| $0.38^{+0.09}_{-0.19}$ | [13,14] LONGACRE | 86 | MPS | $22\ \pi^- p \rightarrow n 2K_S^0$ |

### $\Gamma(\eta\eta)/\Gamma_{\mathrm{total}}$ — $\Gamma_2/\Gamma$

| VALUE | DOCUMENT ID | | TECN |
|---|---|---|---|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | |
| $0.18^{+0.03}_{-0.13}$ | [13,14] LONGACRE | 86 | RVUE |

### $\Gamma(\pi\pi)/\Gamma_{\mathrm{total}}$ — $\Gamma_3/\Gamma$

| VALUE | DOCUMENT ID | | TECN |
|---|---|---|---|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | |
| $0.039^{+0.002}_{-0.024}$ | [13,14] LONGACRE | 86 | RVUE |

### $\Gamma(\pi\pi)/\Gamma(K\overline{K})$ — $\Gamma_3/\Gamma_1$

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **0.39±0.14** | ARMSTRONG | 91 | OMEG | $300\ pp \rightarrow pp\pi\pi, ppK\overline{K}$ |

### $\Gamma(\eta\eta)/\Gamma(K\overline{K})$ — $\Gamma_2/\Gamma_1$

| VALUE | CL% | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| <0.02 | 90 | [15] PROKOSHKIN | 91 | GA24 | $300\ \pi^- p \rightarrow \pi^- p\eta\eta$ |

[13] From a partial-wave analysis of data using a K-matrix formalism with 5 poles, but assuming spin 2.
[14] Fit with constrained inelasticity.
[15] Combining results of GAM4 with those of ARMSTRONG 89D.

# $f_J(1710)$ REFERENCES


| | | | | |
|---|---|---|---|---|
| ABREU | 96C | PL B379 309 | +Adam, Adye+ | (DELPHI Collab.) |
| BALOSHIN | 95 | PAN 58 46 | +Bolonkin, Vladimirskii+ | (ITEP) |
| | | Translated from YAF 58 50. | | |
| BUGG | 95 | PL B353 378 | +Scott, Zoli+ | (LOQM, PNPI, WASH) |
| ARMSTRONG | 93C | PL B307 394 | +Bettoni+ | (FNAL, FERR, GENO, UCI, NWES+) |
| BREAKSTONE | 93 | ZPHY C58 251 | +Campanini+ | (IOWA, CERN, DORT, HEIDH, WARS) |
| ARMSTRONG | 91 | ZPHY C51 351 | +Benayoun+ | (ATHU, BARI, BIRM, CERN, CDEF) |
| CHEN | 91 | Hadron 91 Conf. | | (Mark III Collab.) |
| SLAC-PUB-5669 | | | | |
| PROKOSHKIN | 91 | SPD 36 155 | | (GAM2, GAM4 Collab.) |
| | | Translated from DANS 316 900. | | |
| ALBRECHT | 90G | ZPHY C48 183 | +Ehrlichmann, Harder+ | (ARGUS Collab.) |
| ARMSTRONG | 89D | PL B227 186 | +Benayoun | (ATHU, BARI, BIRM, CERN, CDEF) |
| BEHREND | 89C | ZPHY C43 91 | +Criegee, Dainton+ | (CELLO Collab.) |
| AUGUSTIN | 88 | PRL 60 2238 | +Calcaterra+ | (DM2 Collab.) |
| BOLONKIN | 88 | NP B309 426 | +Bloshenko, Gorin+ | (ITEP, SERP) |
| FALVARD | 88 | PR D38 2706 | +Ajaltouni+ | (CLER, FRAS, LALO, PADO) |
| AUGUSTIN | 87 | ZPHY C36 369 | +Cosme+ | (LALO, CLER, FRAS, PADO) |
| BALTRUSAIT... | 87 | PR D35 2077 | Baltrusaitis, Coffman, Dubois+ | (Mark III Collab.) |
| LONGACRE | 86 | PL B177 223 | +Etkin+ | (BNL, BRAN, CUNY, DUKE, NDAM) |
| ALTHOFF | 85B | ZPHY C29 189 | +Braunschweig, Kirschfink+ | (TASSO Collab.) |
| WILLIAMS | 84 | PR D30 877 | +Diamond+ | (VAND, NDAM, TUFTS, ARIZ, FNAL+) |
| BLOOM | 83 | ARNS 33 143 | +Peck | (SLAC, CIT) |
| EDWARDS | 83B | PRL 51 859 | +Partridge, Peck+ | (CIT, HARV, PRIN, STAN, SLAC) |
| BURKE | 82 | PRL 49 632 | +Trilling, Abrams, Alam, Blocker+ | (LBL, SLAC) |
| ETKIN | 82B | PR D25 1786 | +Foley, Lai+ | (BNL, CUNY, TUFTS, VAND) |
| ETKIN | 82C | PR D25 2446 | +Foley, Lai+ | (BNL, CUNY, TUFTS, VAND) |
| FRANKLIN | 82 | SLAC-254 | | (SLAC) |


## OTHER RELATED PAPERS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|---|---|---|---|---|
| ANISOVICH | 97 | PL B395 123 | +Anisovich, Sarantsev | (PNPI) |
| BISELLO | 89B | PR D39 701 | Busetto+ | (DM2 Collab.) |
| ASTON | 88D | NP B301 525 | +Awaji, Bienz+ | (SLAC, NAGO, CINC, INUS) |
| AKESSON | 86 | NP B264 154 | +Albrow, Almehed+ | (Axial Field Spec. Collab.) |
| ARMSTRONG | 86B | PL 167B 133 | +Bloodworth, Carney+ | (ATHU, BARI, BIRM, CERN) |
| BALTRUSAIT... | 86B | PR D33 1222 | Baltrusaitis, Coffman, Hauser+ | (Mark III Collab.) |
| ALTHOFF | 83 | PL 121B 216 | +Brandelik, Boerner, Burkhardt+ | (TASSO Collab.) |
| BARNETT | 83B | PL 120B 455 | +Blockus, Burka, Chien, Christian+ | (JHU) |
| ALTHOFF | 82 | ZPHY C16 13 | +Boerner, Burkhardt+ | (TASSO Collab.) |
| BARNES | 82 | PL B116 365 | +Close | (RHEL) |
| BARNES | 82B | NP B198 360 | +Close, Monaghan | (RHEL, OXFTP) |
| TANIMOTO | 82 | PL 116B 198 | | (BIEL) |