# $f_0(1710)$

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

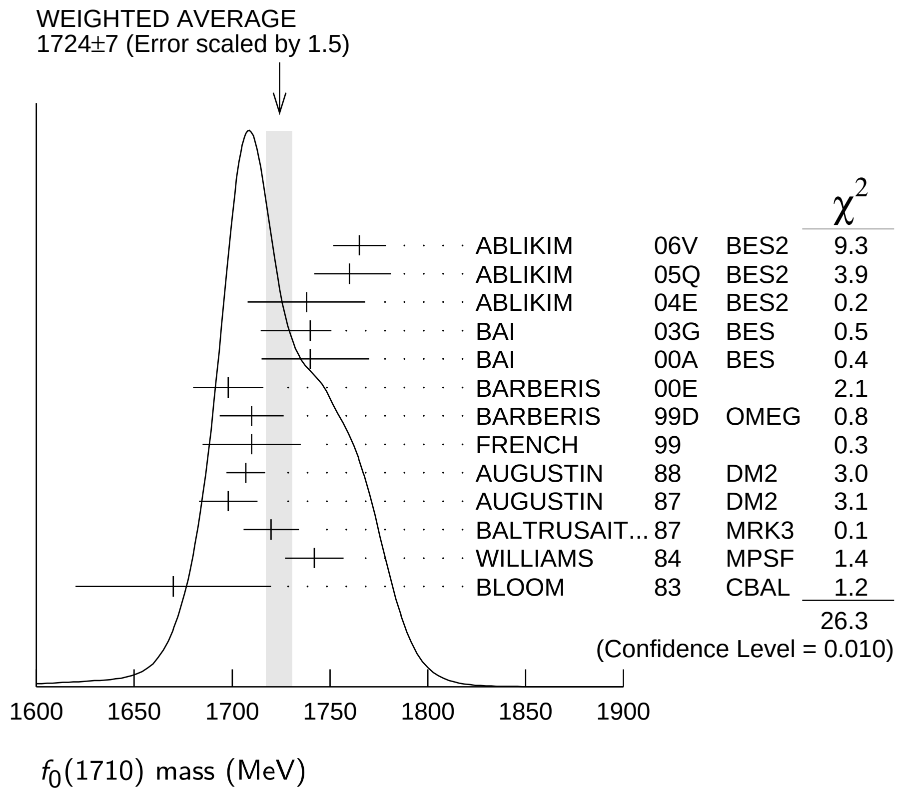
See our mini-review in the 2004 edition of this *Review*, PDG 04.

## $f_0(1710)$ MASS

| VALUE (MeV) | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **1724± 7 OUR AVERAGE** | | Error includes scale factor of 1.5. See the ideogram below. | | | |
| $1765^{+4}_{-3}\pm13$ | | ABLIKIM | 06V | BES2 | $e^+e^- \to J/\psi \to \gamma\pi^+\pi^-$ |
| $1760\pm15^{+15}_{-10}$ | | [1] ABLIKIM | 05Q | BES2 | $\psi(2S) \to \gamma\pi^+\pi^-K^+K^-$ |
| $1738\pm30$ | | ABLIKIM | 04E | BES2 | $J/\psi \to \omega K^+K^-$ |
| $1740\pm4^{+10}_{-25}$ | | [2] BAI | 03G | BES | $J/\psi \to \gamma K\overline{K}$ |
| $1740^{+30}_{-25}$ | | [2] BAI | 00A | BES | $J/\psi \to \gamma(\pi^+\pi^-\pi^+\pi^-)$ |
| $1698\pm18$ | | [3] BARBERIS | 00E | | 450 $pp \to p_f\eta\eta p_s$ |
| $1710\pm12\pm11$ | | [4] BARBERIS | 99D | OMEG | 450 $pp \to K^+K^-, \pi^+\pi^-$ |
| $1710\pm25$ | | [5] FRENCH | 99 | | 300 $pp \to p_f(K^+K^-)p_s$ |
| $1707\pm10$ | | [6] AUGUSTIN | 88 | DM2 | $J/\psi \to \gamma K^+K^-, K^0_S K^0_S$ |
| $1698\pm15$ | | [6] AUGUSTIN | 87 | DM2 | $J/\psi \to \gamma\pi^+\pi^-$ |
| $1720\pm10\pm10$ | | [7] BALTRUSAIT... | 87 | MRK3 | $J/\psi \to \gamma K^+K^-$ |
| $1742\pm15$ | | [6] WILLIAMS | 84 | MPSF | 200 $\pi^-N \to 2K^0_S X$ |
| $1670\pm50$ | | BLOOM | 83 | CBAL | $J/\psi \to \gamma 2\eta$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| $1750\pm13$ | | AMSLER | 06 | CBAR | 1.64 $\overline{p}p \to K^+K^-\pi^0$ |
| $1747\pm5$ | 80k | [8,9] UMAN | 06 | E835 | 5.2 $\overline{p}p \to \eta\eta\pi^0$ |
| $1776\pm15$ | | VLADIMIRSK... | 06 | SPEC | 40 $\pi^-p \to K^0_S K^0_S n$ |
| $1790^{+40}_{-30}$ | | [1] ABLIKIM | 05 | BES2 | $J/\psi \to \phi\pi^+\pi^-$ |
| $1670\pm20$ | | [8] BINON | 05 | GAMS | 33 $\pi^-p \to \eta\eta n$ |
| $1726\pm7$ | 74 | [9] CHEKANOV | 04 | ZEUS | $ep \to K^0_S K^0_S X$ |
| $1732+15$ | | [10] ANISOVICH | 03 | RVUE | |
| $1682\pm16$ | | TIKHOMIROV | 03 | SPEC | 40.0 $\pi^-C \to K^0_S K^0_S K^0_L X$ |
| $1670\pm26$ | 3651 | [2,11] NICHITIU | 02 | OBLX | |
| $1767\pm14$ | 221 | [12] ACCIARRI | 01H | L3 | $\gamma\gamma \to K^0_S K^0_S$, $E^{ee}_{cm}$= 91, 183–209 GeV |
| $1770\pm12$ | | [13,14] ANISOVICH | 99B | SPEC | 0.6–1.2 $p\overline{p} \to \eta\eta\pi^0$ |
| $1730\pm15$ | | [2] BARBERIS | 99 | OMEG | 450 $pp \to p_s p_f K^+K^-$ |
| $1750\pm20$ | | [2] BARBERIS | 99B | OMEG | 450 $pp \to p_s p_f \pi^+\pi^-$ |
| $1750\pm30$ | | [15] ANISOVICH | 98B | RVUE | Compilation |
| $1720\pm39$ | | BAI | 98H | BES | $J/\psi \to \gamma\pi^0\pi^0$ |
| $1775\pm1.5$ | 57 | [16] BARKOV | 98 | | $\pi^-p \to K^0_S K^0_S n$ |
| $1690\pm11$ | | [17] ABREU | 96C | DLPH | $Z^0 \to K^+K^- + X$ |
| $1696\pm5^{+9}_{-34}$ | | [7] BAI | 96C | BES | $J/\psi \to \gamma K^+K^-$ |
| $1781\pm8^{+10}_{-31}$ | | [2] BAI | 96C | BES | $J/\psi \to \gamma K^+K^-$ |

| | | | | | |
|---|---|---|---|---|---|
| $1768\pm14$ | | BALOSHIN | 95 | SPEC | $40\ \pi^- C \to K^0_S K^0_S X$ |
| $1750\pm15$ | [18] | BUGG | 95 | MRK3 | $J/\psi \to \gamma\pi^+\pi^-\pi^+\pi^-$ |
| $1620\pm16$ | [7] | BUGG | 95 | MRK3 | $J/\psi \to \gamma\pi^+\pi^-\pi^+\pi^-$ |
| $1748\pm10$ | [6] | ARMSTRONG | 93C | E760 | $\overline{p}p \to \pi^0\eta\eta \to 6\gamma$ |
| $\sim 1750$ | | BREAKSTONE | 93 | SFM | $pp \to pp\pi^+\pi^-\pi^+\pi^-$ |
| $1744\pm15$ | [19] | ALDE | 92D | GAM2 | $38\ \pi^- p \to \eta\eta n$ |
| $1713\pm10$ | [20] | ARMSTRONG | 89D | OMEG | $300\ pp \to ppK^+K^-$ |
| $1706\pm10$ | [20] | ARMSTRONG | 89D | OMEG | $300\ pp \to ppK^0_S K^0_S$ |
| $1700\pm15$ | [7] | BOLONKIN | 88 | SPEC | $40\ \pi^- p \to K^0_S K^0_S n$ |
| $1720\pm60$ | [2] | BOLONKIN | 88 | SPEC | $40\ \pi^- p \to K^0_S K^0_S n$ |
| $1638\pm10$ | [21] | FALVARD | 88 | DM2 | $J/\psi \to \phi K^+K^-, K^0_S K^0_S$ |
| $1690\pm\ 4$ | [22] | FALVARD | 88 | DM2 | $J/\psi \to \phi K^+K^-, K^0_S K^0_S$ |
| $1755\pm\ 8$ | [23] | ALDE | 86C | GAM2 | $38\ \pi^- p \to n2\eta$ |
| $1730^{+\ 2}_{-10}$ | [24] | LONGACRE | 86 | RVUE | $22\ \pi^- p \to n2K^0_S$ |
| $1650\pm50$ | | BURKE | 82 | MRK2 | $J/\psi \to \gamma 2\rho$ |
| $1640\pm50$ | [25,26] | EDWARDS | 82D | CBAL | $J/\psi \to \gamma 2\eta$ |
| $1730\pm10\ \ \pm20$ | [27] | ETKIN | 82C | MPS | $23\ \pi^- p \to n2K^0_S$ |

[1] This state may be different from $f_0(1710)$, see CLOSE 05.
[2] $J^P = 0^+$.
[3] T-matrix pole.
[4] Supersedes BARBERIS 99 and BARBERIS 99B.
[5] $J^P = 0^+$, supersedes by ARMSTRONG 89D.
[6] No $J^{PC}$ determination.
[7] $J^P = 2^+$.
[8] Breit-Wigner mass.
[9] Systematic errors not estimated.
[10] K-matrix pole, assuming $J^P = 0^+$, from combined analysis of $\pi^- p \to \pi^0\pi^0 n$, $\pi^- p \to K\overline{K}n$, $\pi^+\pi^- \to \pi^+\pi^-$, $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$, $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, $K^0_S K^0_S \pi^0$, $K^+ K^0_S \pi^-$ at rest, $\overline{p}n \to \pi^-\pi^-\pi^+$, $K^0_S K^-\pi^0$, $K^0_S K^0_S \pi^-$ at rest.
[11] Decaying to $f_0(1370)\pi\pi$.
[12] Spin 2 dominant, isospin not determined, could also be $I$=1.
[13] $J^P = 0^+$.
[14] Not seen by AMSLER 02.
[15] T-matrix pole, assuming $J^P = 0^+$
[16] No $J^{PC}$ determination.
[17] No $J^{PC}$ determination, width not determined.
[18] From a fit to the $0^+$ partial wave.
[19] ALDE 92D combines all the GAMS-2000 data.
[20] $J^P = 2^+$, superseded by FRENCH 99.
[21] From an analysis ignoring interference with $f'_2(1525)$.
[22] From an analysis including interference with $f'_2(1525)$.
[23] Superseded by ALDE 92D.
[24] Uses MRK3 data. From a partial-wave analysis of data using a K-matrix formalism with 5 poles, but assuming spin 2. Fit with constrained inelasticity.
[25] $J^P = 2^+$ preferred.
[26] From fit neglecting nearby $f'_2(1525)$. Replaced by BLOOM 83.
[27] Superseded by LONGACRE 86.




## $f_0(1710)$ WIDTH

| *VALUE* (MeV) | *EVTS* | *DOCUMENT ID* | *TECN* | *COMMENT* |
|---|---|---|---|---|
| **137 ± 8 OUR AVERAGE** | | Error includes scale factor of 1.1. | | |
| 145 ± 8 ± 69 | | ABLIKIM | 06V BES2 | $e^+ e^- \to J/\psi \to \gamma \pi^+ \pi^-$ |
| 125 ± 25 $^{+10}_{-15}$ | | [28] ABLIKIM | 05Q BES2 | $\psi(2S) \to \gamma \pi^+ \pi^- K^+ K^-$ |
| 125 ± 20 | | ABLIKIM | 04E BES2 | $J/\psi \to \omega K^+ K^-$ |
| 166 $^{+5}_{-8}$ $^{+15}_{-10}$ | | [29] BAI | 03G BES | $J/\psi \to \gamma K \overline{K}$ |
| 120 $^{+50}_{-40}$ | | [29] BAI | 00A BES | $J/\psi \to \gamma(\pi^+ \pi^- \pi^+ \pi^-)$ |
| 120 ± 26 | | [30] BARBERIS | 00E | 450 $p p \to p_f \eta \eta p_s$ |
| 126 ± 16 ± 18 | | [31] BARBERIS | 99D OMEG | 450 $p p \to K^+ K^-, \pi^+ \pi^-$ |
| 105 ± 34 | | [32] FRENCH | 99 | 300 $p p \to p_f (K^+ K^-) p_s$ |
| 166.4 ± 33.2 | | [33] AUGUSTIN | 88 DM2 | $J/\psi \to \gamma K^+ K^-, K^0_S K^0_S$ |
| 136 ± 28 | | [33] AUGUSTIN | 87 DM2 | $J/\psi \to \gamma \pi^+ \pi^-$ |
| 130 ± 20 | | [34] BALTRUSAIT... | 87 MRK3 | $J/\psi \to \gamma K^+ K^-$ |
| 57 ± 38 | | [6] WILLIAMS | 84 MPSF | 200 $\pi^- N \to 2K^0_S X$ |
| 160 ± 80 | | BLOOM | 83 CBAL | $J/\psi \to \gamma 2\eta$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| 148 $^{+40}_{-30}$ | | AMSLER | 06 CBAR | 1.64 $\overline{p} p \to K^+ K^- \pi^0$ |
| 188 ± 13 | 80k | [28,35] UMAN | 06 E835 | 5.2 $\overline{p} p \to \eta \eta \pi^0$ |

| | | | | | |
|---|---|---|---|---|---|
| $250 \pm 30$ | | VLADIMIRSK... | 06 | SPEC | $40\ \pi^- p \to K^0_S K^0_S n$ |
| $270 {}^{+60}_{-30}$ | | [36] ABLIKIM | 05 | BES2 | $J/\psi \to \phi\pi^+\pi^-$ |
| $260 \pm 50$ | | [28] BINON | 05 | GAMS | $33\ \pi^- p \to \eta\eta n$ |
| $38 {}^{+20}_{-14}$ | 74 | [35] CHEKANOV | 04 | ZEUS | $e p \to K^0_S K^0_S X$ |
| $144 \pm 30$ | | [37,38] ANISOVICH | 03 | RVUE | |
| $320 {}^{+50}_{-20}$ | | [38,39] ANISOVICH | 03 | RVUE | |
| $102 \pm 26$ | | TIKHOMIROV | 03 | SPEC | $40.0\ \pi^- C \to K^0_S K^0_S K^0_L X$ |
| $267 \pm 44$ | 3651 | [29,40] NICHITIU | 02 | OBLX | |
| $187 \pm 60$ | 221 | [41] ACCIARRI | 01H | L3 | $\gamma\gamma \to K^0_S K^0_S$, $E^{ee}_{cm}$= 91, 183–209 GeV |
| $220 \pm 40$ | | [42,43] ANISOVICH | 99B | SPEC | 0.6–1.2 $p\overline{p} \to \eta\eta\pi^0$ |
| $100 \pm 25$ | | [29] BARBERIS | 99 | OMEG | $450\ p p \to p_s p_f K^+ K^-$ |
| $160 \pm 30$ | | [29] BARBERIS | 99B | OMEG | $450\ p p \to p_s p_f \pi^+\pi^-$ |
| $250 \pm 140$ | | [44] ANISOVICH | 98B | RVUE | Compilation |
| $30 \pm 7$ | 57 | [45] BARKOV | 98 | | $\pi^- p \to K^0_S K^0_S n$ |
| $103 \pm 18 {}^{+30}_{-11}$ | | [34] BAI | 96C | BES | $J/\psi \to \gamma K^+ K^-$ |
| $85 \pm 24 {}^{+22}_{-19}$ | | [29] BAI | 96C | BES | $J/\psi \to \gamma K^+ K^-$ |
| $56 \pm 19$ | | BALOSHIN | 95 | SPEC | $40\ \pi^- C \to K^0_S K^0_S X$ |
| $160 \pm 40$ | | [46] BUGG | 95 | MRK3 | $J/\psi \to \gamma\pi^+\pi^-\pi^+\pi^-$ |
| $160 {}^{+60}_{-20}$ | | [34] BUGG | 95 | MRK3 | $J/\psi \to \gamma\pi^+\pi^-\pi^+\pi^-$ |
| $264 \pm 25$ | | [33] ARMSTRONG | 93C | E760 | $\overline{p} p \to \pi^0\eta\eta \to 6\gamma$ |
| 200 to 300 | | BREAKSTONE | 93 | SFM | $p p \to p p \pi^+\pi^-\pi^+\pi^-$ |
| $< 80$ 90% CL | | [47] ALDE | 92D | GAM2 | $38\ \pi^- p \to \eta\eta N^*$ |
| $181 \pm 30$ | | [48] ARMSTRONG | 89D | OMEG | $300\ p p \to p p K^+ K^-$ |
| $104 \pm 30$ | | [48] ARMSTRONG | 89D | OMEG | $300\ p p \to p p K^0_S K^0_S$ |
| $30 \pm 20$ | | [34] BOLONKIN | 88 | SPEC | $40\ \pi^- p \to K^0_S K^0_S n$ |
| $350 \pm 150$ | | [29] BOLONKIN | 88 | SPEC | $40\ \pi^- p \to K^0_S K^0_S n$ |
| $148 \pm 17$ | | [49] FALVARD | 88 | DM2 | $J/\psi \to \phi K^+ K^-$, $K^0_S K^0_S$ |
| $184 \pm 6$ | | [50] FALVARD | 88 | DM2 | $J/\psi \to \phi K^+ K^-$, $K^0_S K^0_S$ |
| $122 {}^{+74}_{-15}$ | | [51] LONGACRE | 86 | RVUE | $22\ \pi^- p \to n 2K^0_S$ |
| $200 \pm 100$ | | BURKE | 82 | MRK2 | $J/\psi \to \gamma 2\rho$ |
| $220 {}^{+100}_{-70}$ | | [52,53] EDWARDS | 82D | CBAL | $J/\psi \to \gamma 2\eta$ |
| $200 {}^{+156}_{-9}$ | | [54] ETKIN | 82B | MPS | $23\ \pi^- p \to n 2K^0_S$ |

[28] Breit-Wigner width.
[29] $J^P = 0^+$.
[30] T-matrix pole.
[31] Supersedes BARBERIS 99 and BARBERIS 99B.
[32] $J^P = 0^+$, supersedes by ARMSTRONG 89D.
[33] No $J^{PC}$ determination.
[34] $J^P = 2^+$.
[35] Systematic errors not estimated.
[36] This state may be different from $f_0(1710)$, see CLOSE 05.

[37] (Solution I)
[38] K-matrix pole, assuming $J^P = 0^+$, from combined analysis of $\pi^- p \to \pi^0 \pi^0 n$, $\pi^- p \to K\overline{K} n$, $\pi^+\pi^- \to \pi^+\pi^-$, $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$, $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, $K^0_S K^0_S \pi^0$, $K^+ K^0_S \pi^-$ at rest, $\overline{p}n \to \pi^-\pi^-\pi^+$, $K^0_S K^- \pi^0$, $K^0_S K^0_S \pi^-$ at rest.
[39] (Solution I)
[40] Decaying to $f_0(1370)\pi\pi$.
[41] Spin 2 dominant, isospin not determined, could also be $I$=1.
[42] $J^P = 0^+$.
[43] Not seen by AMSLER 02.
[44] T-matrix pole, assuming $J^P = 0^+$
[45] No $J^{PC}$ determination.
[46] From a fit to the $0^+$ partial wave.
[47] ALDE 92D combines all the GAMS-2000 data.
[48] $J^P = 2^+$, ($0^+$ excluded).
[49] From an analysis ignoring interference with $f'_2(1525)$.
[50] From an analysis including interference with $f'_2(1525)$.
[51] Uses MRK3 data. From a partial-wave analysis of data using a K-matrix formalism with 5 poles, but assuming spin 2. Fit with constrained inelasticity.
[52] $J^P = 2^+$ preferred.
[53] From fit neglecting nearby $f'_2(1525)$. Replaced by BLOOM 83.
[54] From an amplitude analysis of the $K^0_S K^0_S$ system, superseded by LONGACRE 86.

## $f_0$(1710) DECAY MODES

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

## $f_0$(1710) $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

### $\Gamma(K\overline{K}) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_1\Gamma_4/\Gamma$

| VALUE (eV) | CL% | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **<110** | 95 | [56] BEHREND | 89C | CELL | $\gamma\gamma \to K^0_S K^0_S$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| $49\pm11\pm13$ | | [57] ACCIARRI | 01H | L3 | $\gamma\gamma \to K^0_S K^0_S$, $E^{ee}_{\text{cm}}$= 91, 183–209 GeV |
| <480 | 95 | ALBRECHT | 90G | ARG | $\gamma\gamma \to K^+K^-$ |
| <280 | 95 | [56] ALTHOFF | 85B | TASS | $\gamma\gamma \to K\overline{K}\pi$ |

### $\Gamma(\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_3\Gamma_4/\Gamma$

| VALUE (keV) | CL% | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **<0.82** | 95 | [55] BARATE | 00E | ALEP | $\gamma\gamma \to \pi^+\pi^-$ |

[55] Assuming spin 0.
[56] Assuming helicity 2.
[57] Spin 2 dominant, isospin not determined, could also be $I$=1.

# $f_0(1710)$ BRANCHING RATIOS

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

| VALUE | DOCUMENT ID | TECN | COMMENT |
|---|---|---|---|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | |
| $0.38^{+0.09}_{-0.19}$ | [58,59] LONGACRE 86 | MPS | $22\ \pi^- p \to n 2K^0_S$ |

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

| VALUE | DOCUMENT ID | TECN |
|---|---|---|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | |
| $0.18^{+0.03}_{-0.13}$ | [58,59] LONGACRE 86 | RVUE |

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

| VALUE | DOCUMENT ID | TECN | COMMENT |
|---|---|---|---|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | |
| not seen | AMSLER 02 | CBAR | $0.9\ \overline{p}p \to \pi^0\eta\eta, \pi^0\pi^0\pi^0$ |
| $0.039^{+0.002}_{-0.024}$ | [58,59] LONGACRE 86 | RVUE | |

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

| VALUE | CL% | DOCUMENT ID | TECN | COMMENT |
|---|---|---|---|---|
| $\mathbf{0.41^{+0.11}_{-0.17}}$ | | ABLIKIM 06V | BES2 | $e^+e^- \to J/\psi \to \gamma\pi^+\pi^-$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| $< 0.11$ | 95 | [60] ABLIKIM 04E | BES2 | $J/\psi \to \omega K^+ K^-$ |
| $5.8\ ^{+9.1}_{-5.5}$ | | [61] ANISOVICH 02D | SPEC | Combined fit |
| $0.2\ \pm0.024\pm0.036$ | | BARBERIS 99D | OMEG | $450\ pp \to K^+K^-, \pi^+\pi^-$ |
| $0.39\pm0.14$ | | ARMSTRONG 91 | OMEG | $300\ pp \to pp\pi\pi, ppK\overline{K}$ |

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

| VALUE | CL% | DOCUMENT ID | TECN | COMMENT |
|---|---|---|---|---|
| **0.48±0.15** | | BARBERIS 00E | | $450\ pp \to p_f\eta\eta p_s$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| $0.46^{+0.70}_{-0.38}$ | | [61] ANISOVICH 02D | SPEC | Combined fit |
| $<0.02$ | 90 | [62] PROKOSHKIN 91 | GA24 | $300\ \pi^- p \to \pi^- p\eta\eta$ |

## $\Gamma(\omega\omega)/\Gamma_{total}$ — $\Gamma_5/\Gamma$

| VALUE | EVTS | DOCUMENT ID | TECN | COMMENT |
|---|---|---|---|---|
| **seen** | 180 | ABLIKIM 06H | BES | $J/\psi \to \gamma\omega\omega$ |

[58] From a partial-wave analysis of data using a K-matrix formalism with 5 poles, but assuming spin 2.
[59] Fit with constrained inelasticity.
[60] Using data from ABLIKIM 04A.
[61] From a combined K-matrix analysis of Crystal Barrel (0. $p\overline{p} \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$), GAMS ($\pi p \to \pi^0\pi^0 n$, $\eta\eta n$, $\eta\eta' n$), and BNL ($\pi p \to K\overline{K}n$) data.
[62] Combining results of GAM4 with those of ARMSTRONG 89D.

# $f_0(1710)$ REFERENCES


| | | | | |
|---|---|---|---|---|
| ABLIKIM | 06H | PR D73 112007 | M. Ablikim *et al.* | (BES Collab.) |
| ABLIKIM | 06V | PL B642 441 | M. Ablikim *et al.* | (BES Collab.) |
| AMSLER | 06 | PL B639 165 | C. Amsler *et al.* | (CBAR Collab.) |
| UMAN | 06 | PR D73 052009 | I. Uman *et al.* | (FNAL E835) |
| VLADIMIRSK... | 06 | PAN 69 493 | V.V. Vladimirsky *et al.* | (ITEP, Moscow) |
| | | Translated from YAF 69 515. | | |
| ABLIKIM | 05 | PL B607 243 | M. Ablikim *et al.* | (BES Collab.) |
| ABLIKIM | 05Q | PR D72 092002 | M. Ablikim *et al.* | (BES Collab.) |
| BINON | 05 | PAN 68 960 | F. Binon *et al.* | |
| | | Translated from YAF 68 998. | | |
| CLOSE | 05 | PR D71 094022 | F.E. Close, Q. Zhao | |
| ABLIKIM | 04A | PL B598 149 | M. Ablikim *et al.* | (BES Collab.) |
| ABLIKIM | 04E | PL B603 138 | M. Ablikim *et al.* | (BES Collab.) |
| CHEKANOV | 04 | PL B578 33 | S. Chekanov *et al.* | (ZEUS Collab.) |
| PDG | 04 | PL B592 1 | S. Eidelman *et al.* | |
| ANISOVICH | 03 | EPJ A16 229 | V.V. Anisovich *et al.* | |
| BAI | 03G | PR D68 052003 | J.Z. Bai *et al.* | (BES Collab.) |
| TIKHOMIROV | 03 | PAN 66 828 | G.D. Tikhomirov *et al.* | |
| | | Translated from YAF 66 860. | | |
| AMSLER | 02 | EPJ C23 29 | C. Amsler *et al.* | |
| ANISOVICH | 02D | PAN 65 1545 | V.V. Anisovich *et al.* | |
| | | Translated from YAF 65 1583. | | |
| NICHITIU | 02 | PL B545 261 | F. Nichitiu *et al.* | (OBELIX Collab.) |
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| BARATE | 00E | PL B472 189 | R. Barate *et al.* | (ALEPH Collab.) |
| BARBERIS | 00E | PL B479 59 | D. Barberis *et al.* | (WA 102 Collab.) |
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| BARBERIS | 99 | PL B453 305 | D. Barberis *et al.* | (Omega Expt.) |
| BARBERIS | 99B | PL B453 316 | D. Barberis *et al.* | (Omega Expt.) |
| BARBERIS | 99D | PL B462 462 | D. Barberis *et al.* | (Omega Expt.) |
| FRENCH | 99 | PL B460 213 | B. French *et al.* | (WA76 Collab.) |
| ANISOVICH | 98B | SPU 41 419 | V.V. Anisovich *et al.* | |
| | | Translated from UFN 168 481. | | |
| BAI | 98H | PRL 81 1179 | J.Z. Bai *et al.* | (BES Collab.) |
| BARKOV | 98 | JETPL 68 764 | B.P. Barkov *et al.* | |
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| | | Translated from YAF 58 50. | | |
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| Also | | SJNP 54 451 | D.M. Alde *et al.* | (GAM2 Collab.) |
| | | Translated from YAF 54 745. | | |
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| | | Translated from DANS 316 900. | | |
| ALBRECHT | 90G | ZPHY C48 183 | H. Albrecht *et al.* | (ARGUS Collab.) |
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| BEHREND | 89C | ZPHY C43 91 | H.J. Behrend *et al.* | (CELLO Collab.) |
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