

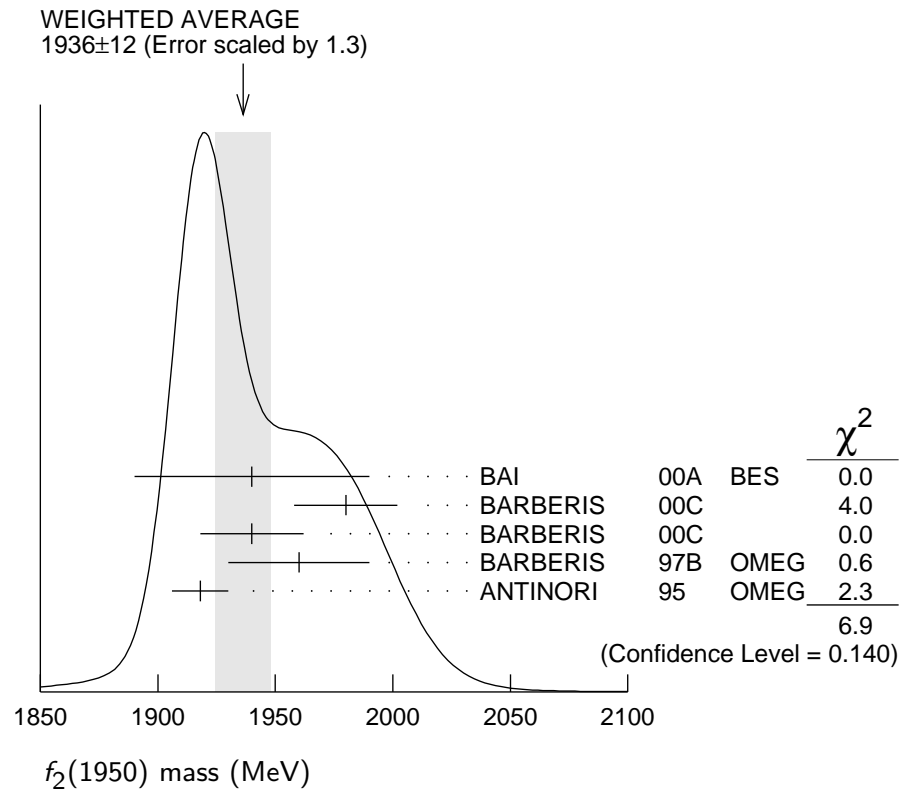
$f_2(1950)$

$$I^G(J^{PC}) = 0^+(2^{++})$$

 $f_2(1950)$ MASS

| VALUE (MeV) | DOCUMENT ID | TECN | COMMENT |
|---|---|------|--|
| 1936±12 OUR AVERAGE | Error includes scale factor of 1.3. See the ideogram below. | | |
| 1940±50 | BAI | 00A | BES $J/\psi \rightarrow \gamma(\pi^+\pi^-\pi^+\pi^-)$ |
| 1980±22 | ¹ BARBERIS | 00C | 450 $pp \rightarrow pp4\pi$ |
| 1940±22 | ² BARBERIS | 00C | 450 $pp \rightarrow pp2\pi2\pi^0$ |
| 1960±30 | BARBERIS | 97B | OMEG 450 $pp \rightarrow pp2(\pi^+\pi^-)$ |
| 1918±12 | ANTINORI | 95 | OMEG 300,450 $pp \rightarrow pp2(\pi^+\pi^-)$ |
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● | | | |
| 2038 ⁺¹³⁺¹² -11-73 | ³ UEHARA | 09 | BELL 10.6 $e^+e^- \rightarrow e^+e^-\pi^0\pi^0$ |
| 1930±25 | ⁴ BINON | 05 | GAMS 33 $\pi^-p \rightarrow \eta\eta n$ |
| 1980± 2±14 | ABE | 04 | BELL 10.6 $e^+e^- \rightarrow e^+e^-K^+K^-$ |
| 1867±46 | ⁵ AMSLER | 02 | CBAR 0.9 $\bar{p}p \rightarrow \pi^0\eta\eta, \pi^0\pi^0\pi^0$ |
| 2010±25 | ANISOVICH | 00J | SPEC |
| 1980±50 | ANISOVICH | 99B | SPEC 1.35–1.94 $p\bar{p} \rightarrow \eta\eta\pi^0$ |
| ~ 1990 | ⁶ OAKDEN | 94 | RVUE 0.36–1.55 $\bar{p}p \rightarrow \pi\pi$ |
| 1950±15 | ⁷ ASTON | 91 | LASS 11 $K^-p \rightarrow \Lambda K\bar{K}\pi\pi$ |

¹ Decaying into $\pi^+\pi^-2\pi^0$.² Decaying into $2(\pi^+\pi^-)$.³ Taking into account $f_4(2050)$.⁴ First solution, PWA is ambiguous.⁵ T-matrix pole.⁶ From solution B of amplitude analysis of data on $\bar{p}p \rightarrow \pi\pi$. See however KLOET 96 who fit $\pi^+\pi^-$ only and find waves only up to $J = 3$ to be important but not significantly resonant.⁷ Cannot determine spin to be 2.



$f_2(1950)$ WIDTH

| VALUE (MeV) | DOCUMENT ID | TECN | COMMENT |
|---|-----------------------|----------|--|
| 464 ± 24 OUR AVERAGE | | | |
| 380^{+120}_{-90} | BAI | 00A BES | $J/\psi \rightarrow \gamma(\pi^+ \pi^- \pi^+ \pi^-)$ |
| 520 ± 50 | ⁸ BARBERIS | 00C | 450 $pp \rightarrow pp4\pi$ |
| 485 ± 55 | ⁹ BARBERIS | 00C | 450 $pp \rightarrow pp4\pi$ |
| 460 ± 40 | BARBERIS | 97B OMEG | 450 $pp \rightarrow pp2(\pi^+ \pi^-)$ |
| 390 ± 60 | ANTINORI | 95 OMEG | 300,450 $pp \rightarrow pp2(\pi^+ \pi^-)$ |
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● | | | |
| $441^{+27+28}_{-25-192}$ | ¹⁰ UEHARA | 09 BELL | 10.6 $e^+ e^- \rightarrow e^+ e^- \pi^0 \pi^0$ |
| 450 ± 50 | ¹¹ BINON | 05 GAMS | 33 $\pi^- p \rightarrow \eta \eta n$ |
| $297 \pm 12 \pm 6$ | ABE | 04 BELL | 10.6 $e^+ e^- \rightarrow e^+ e^- K^+ K^-$ |
| 385 ± 58 | ¹² AMSLER | 02 CBAR | 0.9 $\bar{p} p \rightarrow \pi^0 \eta \eta, \pi^0 \pi^0 \pi^0$ |
| 495 ± 35 | ANISOVICH | 00J SPEC | |
| 500 ± 100 | ANISOVICH | 99B SPEC | 1.35–1.94 $p \bar{p} \rightarrow \eta \eta \pi^0$ |
| ~ 100 | ¹³ OAKDEN | 94 RVUE | 0.36–1.55 $\bar{p} p \rightarrow \pi \pi$ |
| 250 ± 50 | ¹⁴ ASTON | 91 LASS | 11 $K^- p \rightarrow \Lambda K \bar{K} \pi \pi$ |

⁸ Decaying into $\pi^+ \pi^- 2\pi^0$.

⁹ Decaying into $2(\pi^+ \pi^-)$.

¹⁰ Taking into account $f_4(2050)$.

¹¹ First solution, PWA is ambiguous.

¹² T-matrix pole.

¹³ From solution B of amplitude analysis of data on $\bar{p}p \rightarrow \pi\pi$. See however KLOET 96 who fit $\pi^+\pi^-$ only and find waves only up to $J = 3$ to be important but not significantly resonant.

¹⁴ Cannot determine spin to be 2.

$f_2(1950)$ DECAY MODES

| Mode | Fraction (Γ_i/Γ) |
|-------------------------------------|--------------------------------|
| Γ_1 $K^*(892)\bar{K}^*(892)$ | seen |
| Γ_2 $\pi\pi$ | |
| Γ_3 $\pi^+\pi^-$ | seen |
| Γ_4 $\pi^0\pi^0$ | seen |
| Γ_5 4π | seen |
| Γ_6 $\pi^+\pi^-\pi^+\pi^-$ | |
| Γ_7 $a_2(1320)\pi$ | |
| Γ_8 $f_2(1270)\pi\pi$ | |
| Γ_9 $\eta\eta$ | seen |
| Γ_{10} $K\bar{K}$ | seen |
| Γ_{11} $\gamma\gamma$ | seen |
| Γ_{12} $p\bar{p}$ | seen |

$f_2(1950)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

$\Gamma(K\bar{K}) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_{10}\Gamma_{11}/\Gamma$

| VALUE (eV) | DOCUMENT ID | TECN | COMMENT |
|--------------------------------|-------------------|------|---|
| $122 \pm 4 \pm 26$ | ¹⁵ ABE | 04 | BELL 10.6 $e^+e^- \rightarrow e^+e^-K^+K^-$ |
| ¹⁵ Assuming spin 2. | | | |

$\Gamma(\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_2\Gamma_{11}/\Gamma$

| VALUE | DOCUMENT ID | TECN | COMMENT |
|---|----------------------|------|---|
| $162^{+69+1137}_{-42-204}$ | ¹⁶ UEHARA | 09 | BELL 10.6 $e^+e^- \rightarrow e^+e^-\pi^0\pi^0$ |
| ¹⁶ Taking into account $f_4(2050)$. | | | |

$f_2(1950)$ BRANCHING RATIOS

$\Gamma(K^*(892)\bar{K}^*(892))/\Gamma_{\text{total}}$ Γ_1/Γ

| VALUE | DOCUMENT ID | TECN | CHG | COMMENT |
|-------|-------------|------|------|--|
| seen | ASTON | 91 | LASS | 0 11 $K^-p \rightarrow \Lambda K\bar{K}\pi\pi$ |

$\Gamma(a_2(1320)\pi)/\Gamma_{\text{total}}$ Γ_7/Γ

| <u>VALUE</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|--------------------|-------------|---|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | |
| not seen | BARBERIS | 00B | 450 $pp \rightarrow p_f \eta \pi^+ \pi^- p_S$ |
| not seen | BARBERIS | 00C | 450 $pp \rightarrow p_f 4\pi p_S$ |
| possibly seen | BARBERIS | 97B OMEG | 450 $pp \rightarrow p p 2(\pi^+ \pi^-)$ |

 $\Gamma(\eta\eta)/\Gamma(4\pi)$ Γ_9/Γ_5

| <u>VALUE</u> | <u>CL%</u> | <u>DOCUMENT ID</u> | <u>COMMENT</u> |
|---|------------|--------------------|--|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | |
| $<5.0 \times 10^{-3}$ | 90 | BARBERIS | 00E 450 $pp \rightarrow p_f \eta \eta p_S$ |

 $\Gamma(\eta\eta)/\Gamma(\pi^+\pi^-)$ Γ_9/Γ_3

| <u>VALUE</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|------------------|--------------------|-------------|--|
| 0.14±0.05 | AMSLER | 02 | CBAR 0.9 $\bar{p}p \rightarrow \pi^0 \eta \eta, \pi^0 \pi^0 \pi^0$ |

 $\Gamma(p\bar{p})/\Gamma_{\text{total}}$ Γ_{12}/Γ

| <u>VALUE</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|--------------|-------------|--------------------|-------------|--|
| seen | 111 | ALEXANDER | 10 | CLEO $\psi(2S) \rightarrow \gamma p \bar{p}$ |

 $f_2(1950)$ REFERENCES

| | | | | |
|-----------|-----|-----------------------------|------------------------------|------------------------|
| ALEXANDER | 10 | PR D82 092002 | J.P. Alexander <i>et al.</i> | (CLEO Collab.) |
| UEHARA | 09 | PR D79 052009 | S. Uehara <i>et al.</i> | (BELLE Collab.) |
| BINON | 05 | PAN 68 960 | F. Binon <i>et al.</i> | |
| | | Translated from YAF 68 998. | | |
| ABE | 04 | EPJ C32 323 | K. Abe <i>et al.</i> | (BELLE Collab.) |
| AMSLER | 02 | EPJ C23 29 | C. Amsler <i>et al.</i> | |
| ANISOVICH | 00J | PL B491 47 | A.V. Anisovich <i>et al.</i> | (RAL, LOQM, PNPI+) |
| BAI | 00A | PL B472 207 | J.Z. Bai <i>et al.</i> | (BES Collab.) |
| BARBERIS | 00B | PL B471 435 | D. Barberis <i>et al.</i> | (WA 102 Collab.) |
| BARBERIS | 00C | PL B471 440 | D. Barberis <i>et al.</i> | (WA 102 Collab.) |
| BARBERIS | 00E | PL B479 59 | D. Barberis <i>et al.</i> | (WA 102 Collab.) |
| ANISOVICH | 99B | PL B449 154 | A.V. Anisovich <i>et al.</i> | |
| BARBERIS | 97B | PL B413 217 | D. Barberis <i>et al.</i> | (WA 102 Collab.) |
| KLOET | 96 | PR D53 6120 | W.M. Kloet, F. Myhrer | (RUTG, NORD) |
| ANTINORI | 95 | PL B353 589 | F. Antinori <i>et al.</i> | (ATHU, BARI, BIRM+) JP |
| OAKDEN | 94 | NP A574 731 | M.N. Oakden, M.R. Pennington | (DURH) |
| ASTON | 91 | NPBPS B21 5 | D. Aston <i>et al.</i> | (LASS Collab.) |