# $f_2(2150)$

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

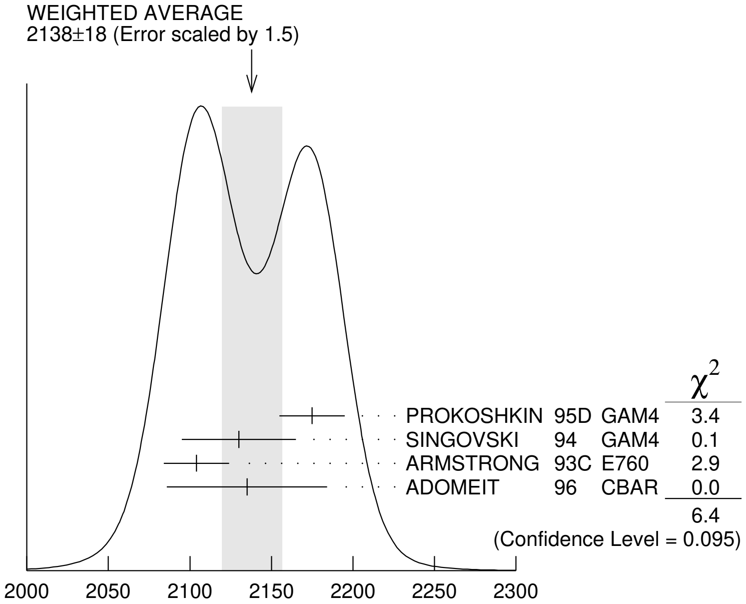
OMITTED FROM SUMMARY TABLE

This entry was previously called $T_0$.

## $f_2(2150)$ MASS

### $f_2(2150)$ MASS, COMBINED MODES (MeV)

| *VALUE* (MeV) | *DOCUMENT ID* |
|---|---|
| **2138±18 OUR AVERAGE** | Includes data from the 2 datablocks that follow this one. Error includes scale factor of 1.5. See the ideogram below. |

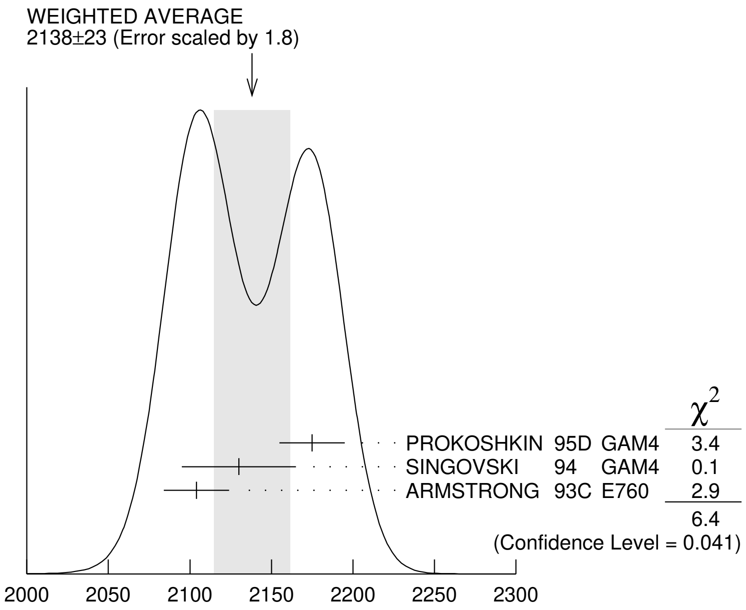



$f_2(2150)$ MASS, COMBINED MODES (MeV)

### $\eta\eta$ MODE

| *VALUE* (MeV) | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|
| The data in this block is included in the average printed for a previous datablock. | | | | |
| **2138±23 OUR AVERAGE** | Error includes scale factor of 1.8. See the ideogram below. | | | |
| 2175±20 | PROKOSHKIN | 95D | GAM4 | 300 $\pi^- N \rightarrow \pi^- N 2\eta$, 450 $pp \rightarrow pp2\eta$ |
| 2130±35 | SINGOVSKI | 94 | GAM4 | 450 $pp \rightarrow pp2\eta$ |
| 2104±20 | [1] ARMSTRONG | 93C | E760 | $\overline{p}p \rightarrow \pi^0\eta\eta \rightarrow 6\gamma$ |

[1] No $J^{PC}$ determination.




$f_2$(2150) MASS, $\eta\eta$ MODE (MeV)

## $\eta\pi\pi$ MODE

| *VALUE* (MeV) | *DOCUMENT ID* | | *TECN* | *CHG* | *COMMENT* |
|---|---|---|---|---|---|
| The data in this block is included in the average printed for a previous datablock. | | | | | |
| **2135±20±45** | ADOMEIT | 96 | CBAR | 0 | 1.94 $\overline{p}p \rightarrow \eta 3\pi^0$ |

## $\overline{p}p \rightarrow \pi\pi$

| *VALUE* (MeV) | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| ~ 2226 | HASAN | 94 | RVUE | $\overline{p}p \rightarrow \pi\pi$ |
| ~ 2090 | [2] OAKDEN | 94 | RVUE | 0.36–1.55 $\overline{p}p \rightarrow \pi\pi$ |
| ~ 2120 | [3] OAKDEN | 94 | RVUE | 0.36–1.55 $\overline{p}p \rightarrow \pi\pi$ |
| ~ 2170 | [4] MARTIN | 80B | RVUE | |
| ~ 2150 | [4] MARTIN | 80C | RVUE | |
| ~ 2150 | [5] DULUDE | 78B | OSPK | 1–2 $\overline{p}p \rightarrow \pi^0\pi^0$ |

[2] OAKDEN 94 makes an amplitude analysis of LEAR data on $\overline{p}p \rightarrow \pi\pi$ using a method based on Barrelet zeros. This is solution A. The amplitude analysis of HASAN 94 includes earlier data as well, and assume that the data can be parametrized in terms of towers of nearly degenerate resonances on the leading Regge trajectory. See also KLOET 96 and MARTIN 97 who make related analyses.

[3] From solution B of amplitude analysis of data on $\overline{p}p \rightarrow \pi\pi$.

[4] $I(J^P) = 0(2^+)$ from simultaneous analysis of $p\overline{p} \rightarrow \pi^-\pi^+$ and $\pi^0\pi^0$.

[5] $I^G(J^P) = 0^+(2^+)$ from partial-wave amplitude analysis.

### *S*-CHANNEL $\overline{p}p$, $\overline{N}N$ or $\overline{K}K$

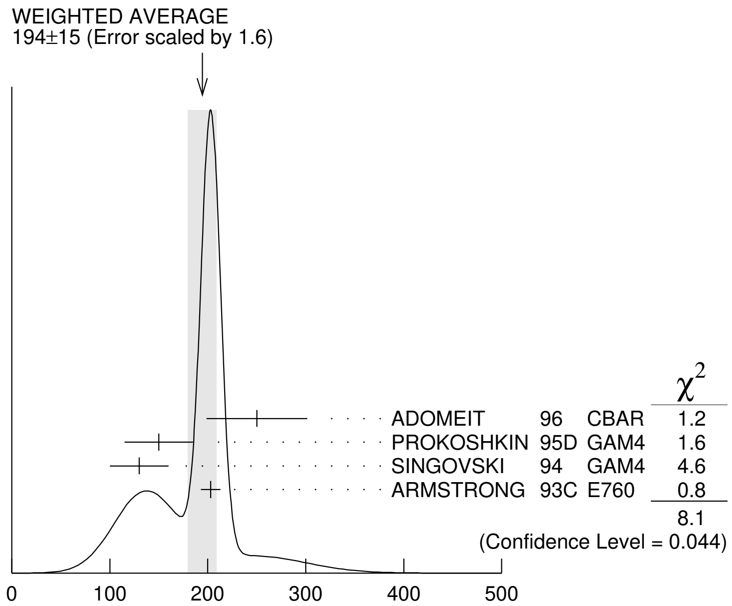
| *VALUE* (MeV) | *DOCUMENT ID* | | *TECN* | *CHG* | *COMMENT* |
|---|---|---|---|---|---|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| $2139^{+\ 8}_{-\ 9}$ | [6] EVANGELISTA | 97 | SPEC | | 0.6-2.4 $\overline{p}p \rightarrow K^0_S K^0_S$ |
| ~ 2190 | [7] CUTTS | 78B | CNTR | | 0.97–3 $\overline{p}p \rightarrow \overline{N}N$ |
| 2155±15 | [7,8] COUPLAND | 77 | CNTR | 0 | 0.7–2.4 $\overline{p}p \rightarrow \overline{p}p$ |
| 2193± 2 | [7,9] ALSPECTOR | 73 | CNTR | | $\overline{p}p$ *S* channel |

[6] Isospin 0 and 2 not separated.
[7] Isospins 0 and 1 not separated.
[8] From a fit to the total elastic cross section.
[9] Referred to as *T* or *T* region by ALSPECTOR 73.

## $f_2$(2150) WIDTH

### $f_2$(2150) WIDTH, COMBINED MODES (MeV)

| *VALUE* (MeV) | *DOCUMENT ID* |
|---|---|
| **194±15 OUR AVERAGE** | Includes data from the 2 datablocks that follow this one. Error includes scale factor of 1.6. See the ideogram below. |

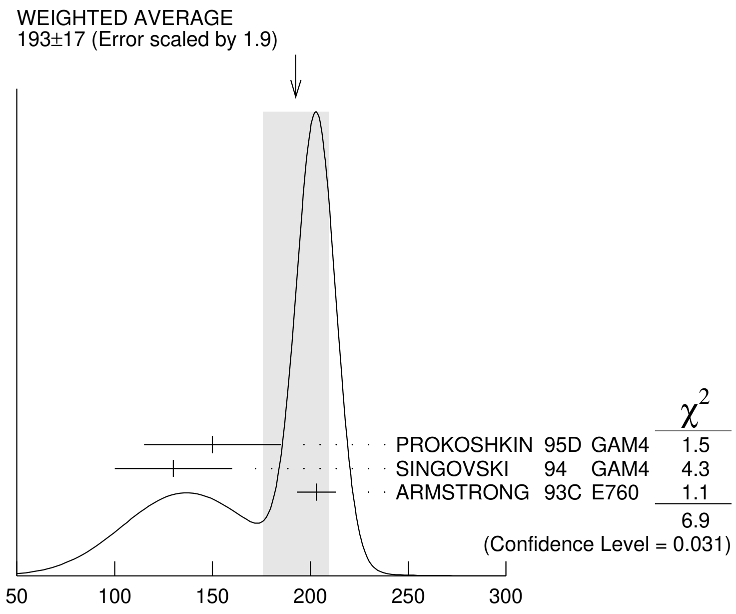



$f_2$(2150) WIDTH, COMBINED MODES (MeV)

## $\eta\eta$ MODE

| VALUE (MeV) | DOCUMENT ID | TECN | COMMENT |
|---|---|---|---|
| The data in this block is included in the average printed for a previous datablock. | | | |
| **193±17 OUR AVERAGE** Error includes scale factor of 1.9. See the ideogram below. | | | |
| 150±35 | PROKOSHKIN 95D | GAM4 | 300 $\pi^- N \rightarrow \pi^- N 2\eta$, 450 $p p \rightarrow p p 2\eta$ |
| 130±30 | SINGOVSKI 94 | GAM4 | 450 $p p \rightarrow p p 2\eta$ |
| 203±10 | [10] ARMSTRONG 93C | E760 | $\overline{p} p \rightarrow \pi^0 \eta\eta \rightarrow 6\gamma$ |

[10] No $J^{PC}$ determination.




$f_2(2150)$ WIDTH, $\eta\eta$ MODE (MeV)

## $\eta\pi\pi$ MODE

| VALUE (MeV) | DOCUMENT ID | TECN | CHG | COMMENT |
|---|---|---|---|---|
| The data in this block is included in the average printed for a previous datablock. | | | | |
| **250±25±45** | ADOMEIT 96 | CBAR | 0 | 1.94 $\overline{p} p \rightarrow \eta 3\pi^0$ |

## $\overline{p} p \rightarrow \pi\pi$

| VALUE (MeV) | DOCUMENT ID | TECN | COMMENT |
|---|---|---|---|
| **250 OUR ESTIMATE** | | | |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | |
| ~ 226 | HASAN 94 | RVUE | $\overline{p} p \rightarrow \pi\pi$ |
| ~ 70 | [11] OAKDEN 94 | RVUE | 0.36–1.55 $\overline{p} p \rightarrow \pi\pi$ |
| ~ 250 | [12] MARTIN 80B | RVUE | |
| ~ 250 | [12] MARTIN 80C | RVUE | |
| ~ 250 | [13] DULUDE 78B | OSPK | 1–2 $\overline{p} p \rightarrow \pi^0 \pi^0$ |

[11] See however KLOET 96 who fit $\pi^+\pi^-$ only and find waves only up to $J = 3$ to be important but not significantly resonant.
[12] $I(J^P) = 0(2^+)$ from simultaneous analysis of $p\overline{p} \rightarrow \pi^-\pi^+$ and $\pi^0\pi^0$.
[13] $I^G(J^P) = 0^+(2^+)$ from partial-wave amplitude analysis.

### S-CHANNEL $\overline{p}p$, $\overline{N}N$ or $\overline{K}K$

| VALUE (MeV) | DOCUMENT ID | | TECN | CHG | COMMENT |
|---|---|---|---|---|---|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| $56^{+31}_{-16}$ | [14] EVANGELISTA | 97 | SPEC | | 0.6-2.4 $\overline{p}p \rightarrow K^0_S K^0_S$ |
| $135\pm75$ | [15,16] COUPLAND | 77 | CNTR | 0 | 0.7–2.4 $\overline{p}p \rightarrow \overline{p}p$ |
| $98\pm\ 8$ | [16] ALSPECTOR | 73 | CNTR | | $\overline{p}p$ $S$ channel |

[14] Isospin 0 and 2 not separated.
[15] From a fit to the total elastic cross section.
[16] Isospins 0 and 1 not separated.

## $f_2(2150)$ DECAY MODES

| | Mode |
|---|---|
| $\Gamma_1$ | $\pi\pi$ |
| $\Gamma_2$ | $\eta\eta$ |
| $\Gamma_3$ | $K\overline{K}$ |
| $\Gamma_4$ | $f_2(1270)\eta$ |
| $\Gamma_5$ | $a_2(1320)\pi$ |

## $f_2(2150)$ BRANCHING RATIOS

### $\Gamma(K\overline{K})/\Gamma(\eta\eta)$ — $\Gamma_3/\Gamma_2$

| VALUE | CL% | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| $<0.1$ | 95 | [17] PROKOSHKIN | 95D | GAM4 | 300 $\pi^- N \rightarrow \pi^- N 2\eta$, 450 $pp \rightarrow pp2\eta$ |

[17] Using data from ARMSTRONG 89D.

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

| VALUE | CL% | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| $<0.33$ | 95 | [18] PROKOSHKIN | 95D | GAM4 | 300 $\pi^- N \rightarrow \pi^- N 2\eta$, 450 $pp \rightarrow pp2\eta$ |

[18] Derived from a $\pi^0\pi^0/\eta\eta$ limit.

### $\Gamma(f_2(1270)\eta)/\Gamma(a_2(1320)\pi)$ — $\Gamma_4/\Gamma_5$

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **$0.79\pm0.11$** | [19] ADOMEIT | 96 | CBAR | 1.94 $\overline{p}p \rightarrow \eta 3\pi^0$ |

[19] Using B($a_2(1320) \rightarrow \eta\pi$) = 0.145

## $f_2$(2150) REFERENCES


| | | | | | |
|---|---|---|---|---|---|
| EVANGELISTA | 97 | PR D56 3803 | C. Evangelista, Palano, Drijard+ | (LEAR Collab.) | |
| MARTIN | 97 | PR C56 1114 | B.R. Martin, Oades | (LOUC, AARH) | |
| ADOMEIT | 96 | ZPHY C71 227 | +Amsler, Armstrong+ | (Crystal Barrel Collab.) | |
| KLOET | 96 | PR D53 6120 | +Myhrer | (RUTG, NORD) | |
| PROKOSHKIN | 95D | SPD 40 495 | | (SERP) | IGJPC |
| | | Translated from DANS 344 469. | | | |
| HASAN | 94 | PL B334 215 | +Bugg | (LOQM) | |
| OAKDEN | 94 | NPA 574 731 | +Pennington | (DURH) | |
| SINGOVSKI | 94 | NC 107 1911 | | (SERP) | |
| ARMSTRONG | 93C | PL B307 394 | +Bettoni+ | (FNAL, FERR, GENO, UCI, NWES+) | |
| ARMSTRONG | 89D | PL B227 186 | +Benayoun | (ATHU, BARI, BIRM, CERN, CDEF) | |
| MARTIN | 80B | NP B176 355 | +Morgan | (LOUC, RHEL) | JP |
| MARTIN | 80C | NP B169 216 | +Pennington | (DURH) | JP |
| CUTTS | 78B | PR D17 16 | +Good, Grannis, Green, Lee+ | (STON, WISC) | |
| DULUDE | 78B | PL 79B 335 | +Lanou, Massimo, Peaslee+ | (BROW, MIT, BARI) | JP |
| COUPLAND | 77 | PL 71B 460 | +Eisenhandler, Gibson, Astbury+ | (LOQM, RHEL) | |
| ALSPECTOR | 73 | PRL 30 511 | +Cohen, Cvijanovich+ | (RUTG, UPNJ) | |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