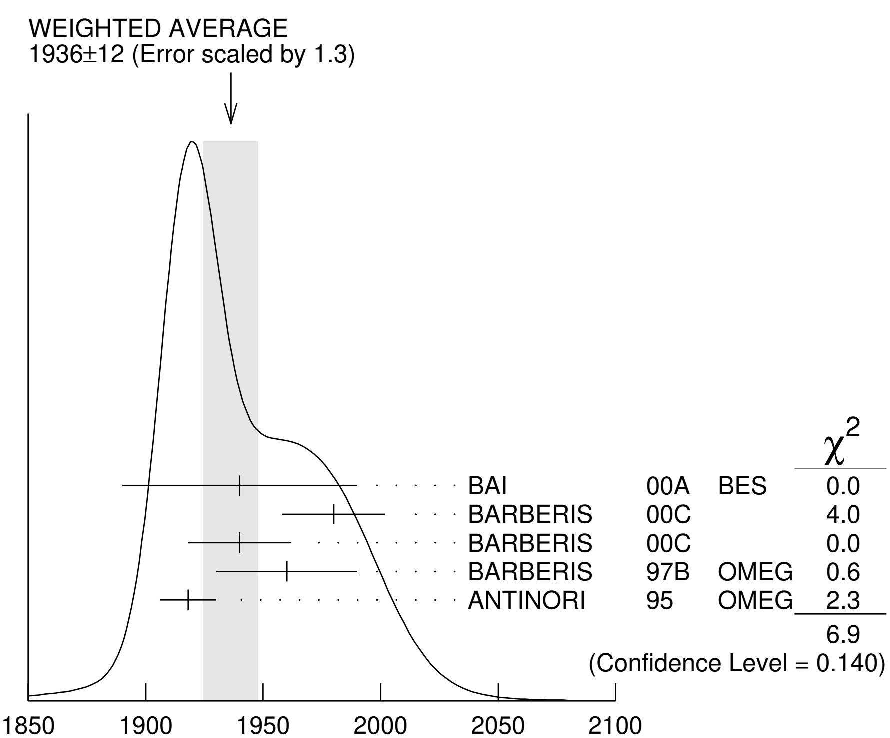
$f_2(1950)$

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

$f_2(1950)$ 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	$J/\psi \to \gamma(\pi^+\pi^-\pi^+\pi^-)$
1980 ±22	[1] BARBERIS	00C		450 $pp \to pp4\pi$
1940 ±22	[2] BARBERIS	00C		450 $pp \to pp2\pi2\pi^0$
1960 ±30	BARBERIS	97B	OMEG	450 $pp \to pp2(\pi^+\pi^-)$
1918 ±12	ANTINORI	95	OMEG	300,450 $pp \to pp2(\pi^+\pi^-)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1955 ±75	[3] RODAS	22	RVUE	$J/\psi(1S) \to \gamma\ (\pi\pi,\ K\overline{K})$
$1978.2 \pm 1.8^{+28.4}_{-16.9}$	[4] ALBRECHT	20	RVUE	0.9 $\overline{p}p \to \pi^0\pi^0\eta,\ \pi^0\eta\eta,\ \pi^0 K^+K^-$
$2038\ ^{+13}_{-11}\ ^{+12}_{-73}$	[5] UEHARA	09	BELL	10.6 $e^+e^- \to e^+e^-\pi^0\pi^0$
1930 ±25	[6] BINON	05	GAMS	33 $\pi^- p \to \eta\eta n$
1980 ± 2 ±14	ABE	04	BELL	10.6 $e^+e^- \to e^+e^- K^+K^-$
1867 ±46	[7] AMSLER	02	CBAR	0.9 $\overline{p}p \to \pi^0\eta\eta,\ \pi^0\pi^0\pi^0$
2010 ±25	ANISOVICH	00J	SPEC	
1980 ±50	ANISOVICH	99B	SPEC	1.35–1.94 $p\overline{p} \to \eta\eta\pi^0$
~ 1990	[8] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \to \pi\pi$
1950 ±15	[9] ASTON	91	LASS	11 $K^- p \to \Lambda K\overline{K}\pi\pi$



[1] Decaying into $\pi^+\pi^-2\pi^0$.

[2] Decaying into $2(\pi^+\pi^-)$.
[3] T-matrix pole from coupled channel K-matrix fit to data on $J/\psi \rightarrow \gamma\pi^0\pi^0$ (ABLIKIM 15AE) and $J/\psi \rightarrow \gamma K^0_S K^0_S$ (ABLIKIM 18AA).
[4] T-matrix pole, 4 poles, 4 channels, including scattering data from HYAMS 75 ($\pi\pi$), LONGACRE 86 ($K\overline{K}$), BINON 83 ($\eta\eta$).
[5] Taking into account $f_4(2050)$.
[6] First solution, PWA is ambiguous.
[7] T-matrix pole.
[8] From solution B of amplitude analysis of data on $\overline{p}p \rightarrow \pi\pi$. See however KLOET 96 who fit $\pi^+\pi^-$ only and find waves only up to $J = 3$ to be important but not significantly resonant.
[9] Cannot determine spin to be 2.

$f_2(1950)$ mass (MeV)

$f_2(1950)$ 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	[1] BARBERIS	00C		450 $pp \rightarrow pp4\pi$
485 ± 55	[2] 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. • • •				
350 ± 113	[3] RODAS	22	RVUE	$J/\psi(1S) \rightarrow \gamma\ (\pi\pi,\ K\overline{K})$
$237.6 \pm 1.6\ ^{+\ 41.6}_{-\ 15.5}$	[4] ALBRECHT	20	RVUE	0.9 $\overline{p}p \rightarrow \pi^0\pi^0\eta,\ \pi^0\eta\eta,\ \pi^0K^+K^-$
$441\ ^{+\ 27}_{-\ 25}\ ^{+\ 28}_{-192}$	[5] UEHARA	09	BELL	10.6 $e^+e^- \rightarrow e^+e^-\pi^0\pi^0$
450 ± 50	[6] 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	[7] AMSLER	02	CBAR	0.9 $\overline{p}p \rightarrow \pi^0\eta\eta,\ \pi^0\pi^0\pi^0$
495 ± 35	ANISOVICH	00J	SPEC	
500 ± 100	ANISOVICH	99B	SPEC	1.35–1.94 $p\overline{p} \rightarrow \eta\eta\pi^0$
~ 100	[8] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \rightarrow \pi\pi$
250 ± 50	[9] ASTON	91	LASS	11 $K^-p \rightarrow \Lambda K\overline{K}\pi\pi$

[1] Decaying into $\pi^+\pi^-2\pi^0$.
[2] Decaying into $2(\pi^+\pi^-)$.
[3] T-matrix pole from coupled channel K-matrix fit to data on $J/\psi \rightarrow \gamma\pi^0\pi^0$ (ABLIKIM 15AE) and $J/\psi \rightarrow \gamma K^0_S K^0_S$ (ABLIKIM 18AA).
[4] T-matrix pole, 4 poles, 4 channels, including scattering data from HYAMS 75 ($\pi\pi$), LONGACRE 86 ($K\overline{K}$), BINON 83 ($\eta\eta$).
[5] Taking into account $f_4(2050)$.
[6] First solution, PWA is ambiguous.
[7] T-matrix pole.
[8] From solution B of amplitude analysis of data on $\overline{p}p \rightarrow \pi\pi$. See however KLOET 96 who fit $\pi^+\pi^-$ only and find waves only up to $J = 3$ to be important but not significantly resonant.
[9] Cannot determine spin to be 2.

f_2(1950) DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$K^*(892)\overline{K}^*(892)$	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}	$K\overline{K}$	seen
Γ_{11}	$\gamma\gamma$	seen
Γ_{12}	$p\overline{p}$	seen

f_2(1950) $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma$(total)

$\Gamma(K\overline{K}) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{10}\Gamma_{11}/\Gamma$

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$122\pm4\pm26$	[1] ABE	04	BELL	10.6 $e^+e^- \to e^+e^-K^+K^-$

[1] Assuming spin 2.

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

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$162^{+69}_{-42}{}^{+1137}_{-\ 204}$	[1] UEHARA	09	BELL	10.6 $e^+e^- \to e^+e^-\pi^0\pi^0$

[1] Taking into account f_4(2050).

f_2(1950) BRANCHING RATIOS

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

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

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

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	BARBERIS	00B		450 $pp \to p_f\eta\pi^+\pi^-p_s$
not seen	BARBERIS	00C		450 $pp \to p_f 4\pi p_s$
possibly seen	BARBERIS	97B	OMEG	450 $pp \to pp2(\pi^+\pi^-)$

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

VALUE	CL%	DOCUMENT ID		COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$<5.0\times10^{-3}$	90	BARBERIS	00E	450 $pp \to p_f\eta\eta p_s$

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.14±0.05	AMSLER	02	CBAR	0.9 $\overline{p}p \to \pi^0\eta\eta, \pi^0\pi^0\pi^0$

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

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	111	ALEXANDER	10	CLEO	$\psi(2S) \to \gamma p\overline{p}$

$f_2(1950)$ REFERENCES

RODAS	22	EPJ C82 80	A. Rodas *et al.*	(JPAC Collab.)
ALBRECHT	20	EPJ C80 453	M. Albrecht *et al.*	(Crystal Barrel Collab.)
ABLIKIM	18AA	PR D98 072003	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	15AE	PR D92 052003	M. Ablikim *et al.*	(BESIII Collab.)
ALEXANDER	10	PR D82 092002	J.P. Alexander *et al.*	(CLEO Collab.)
UEHARA	09	PR D79 052009	S. Uehara *et al.*	(BELLE Collab.)
BINON	05	PAN 68 960 Translated from YAF 68 998.	F. Binon *et al.*	
ABE	04	EPJ C32 323	K. Abe *et al.*	(BELLE Collab.)
AMSLER	02	EPJ C23 29	C. Amsler *et al.*	
ANISOVICH	00J	PL B491 47	A.V. Anisovich *et al.*	(RAL, LOQM, PNPI+)
BAI	00A	PL B472 207	J.Z. Bai *et al.*	(BES Collab.)
BARBERIS	00B	PL B471 435	D. Barberis *et al.*	(WA 102 Collab.)
BARBERIS	00C	PL B471 440	D. Barberis *et al.*	(WA 102 Collab.)
BARBERIS	00E	PL B479 59	D. Barberis *et al.*	(WA 102 Collab.)
ANISOVICH	99B	PL B449 154	A.V. Anisovich *et al.*	
BARBERIS	97B	PL B413 217	D. Barberis *et al.*	(WA 102 Collab.)
KLOET	96	PR D53 6120	W.M. Kloet, F. Myhrer	(RUTG, NORD)
ANTINORI	95	PL B353 589	F. Antinori *et al.*	(ATHU, BARI, BIRM+) JP
OAKDEN	94	NP A574 731	M.N. Oakden, M.R. Pennington	(DURH)
ASTON	91	NPBPS B21 5	D. Aston *et al.*	(LASS Collab.)
LONGACRE	86	PL B177 223	R.S. Longacre *et al.*	(BNL, BRAN, CUNY+)
BINON	83	NC 78A 313	F.G. Binon *et al.*	(BELG, LAPP, SERP+)
HYAMS	75	NP B100 205	B.D. Hyams *et al.*	(CERN, MPIM)