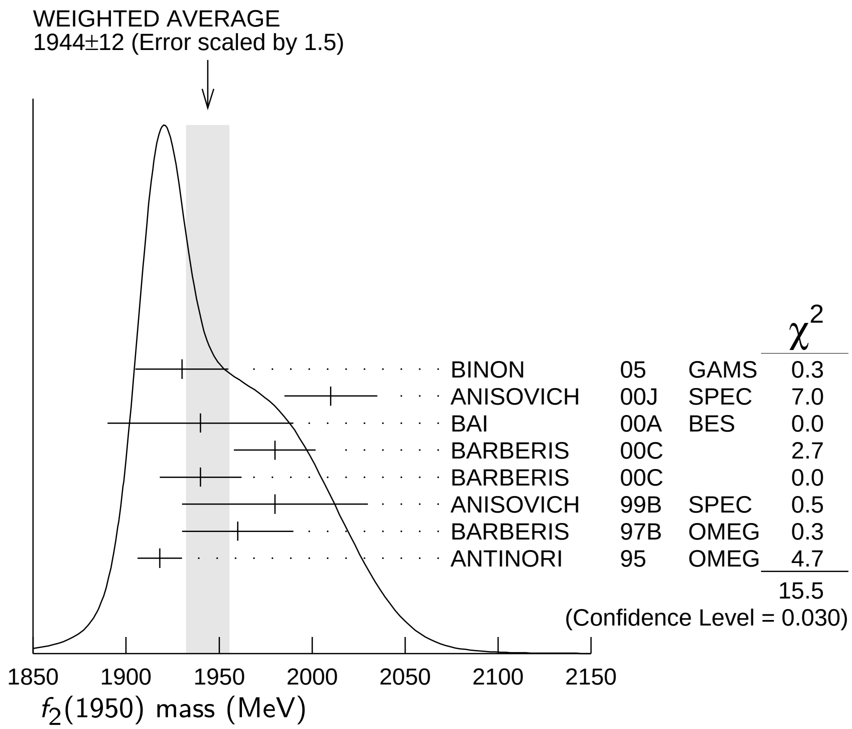
$f_2(1950)$

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

$f_2(1950)$ MASS

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1944±12 OUR AVERAGE	Error includes scale factor of 1.5. See the ideogram below.			
1930±25	[1] BINON	05	GAMS	33 $\pi^- p \rightarrow \eta\eta n$
2010±25	ANISOVICH	00J	SPEC	
1940±50	BAI	00A	BES	$J/\psi \rightarrow \gamma(\pi^+\pi^-\pi^+\pi^-)$
1980±22	[2] BARBERIS	00C		450 $pp \rightarrow pp4\pi$
1940±22	[3] BARBERIS	00C		450 $pp \rightarrow pp2\pi 2\pi^0$
1980±50	ANISOVICH	99B	SPEC	1.35–1.94 $p\overline{p} \rightarrow \eta\eta\pi^0$
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. • • •				
$2038^{+13}_{-11}{}^{+12}_{-73}$	[4] UEHARA	09	BELL	10.6 $e^+e^- \rightarrow e^+e^-\pi^0\pi^0$
1980± 2±14	ABE	04	BELL	10.6 $e^+e^- \rightarrow e^+e^-K^+K^-$
1867±46	[5] AMSLER	02	CBAR	0.9 $\overline{p}p \rightarrow \pi^0\eta\eta$, $\pi^0\pi^0\pi^0$
~ 1990	[6] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \rightarrow \pi\pi$
1950±15	[7] ASTON	91	LASS	11 $K^- p \rightarrow \Lambda K\overline{K}\pi\pi$

[1] First solution, PWA is ambiguous.
[2] Decaying into $\pi^+\pi^- 2\pi^0$.
[3] Decaying into $2(\pi^+\pi^-)$.
[4] Taking into account $f_4(2050)$.
[5] T-matrix pole.
[6] 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.
[7] Cannot determine spin to be 2.



$f_2(1950)$ WIDTH

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
472± 18 OUR AVERAGE				
450± 50	[8] BINON	05	GAMS	33 $\pi^- p \to \eta\eta n$
495± 35	ANISOVICH	00J	SPEC	
380^{+120}_{-90}	BAI	00A	BES	$J/\psi \to \gamma(\pi^+\pi^-\pi^+\pi^-)$
520± 50	[9] BARBERIS	00C		450 $pp \to pp4\pi$
485± 55	[10] BARBERIS	00C		450 $pp \to pp4\pi$
500±100	ANISOVICH	99B	SPEC	1.35–1.94 $p\overline{p} \to \eta\eta\pi^0$
460± 40	BARBERIS	97B	OMEG	450 $pp \to pp2(\pi^+\pi^-)$
390± 60	ANTINORI	95	OMEG	300,450 $pp \to pp2(\pi^+\pi^-)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$441^{+27}_{-25}{}^{+28}_{-192}$	[11] UEHARA	09	BELL	10.6 $e^+e^- \to e^+e^-\pi^0\pi^0$
297± 12± 6	ABE	04	BELL	10.6 $e^+e^- \to e^+e^-K^+K^-$
385± 58	[12] AMSLER	02	CBAR	0.9 $\overline{p}p \to \pi^0\eta\eta$, $\pi^0\pi^0\pi^0$
∼ 100	[13] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \to \pi\pi$
250± 50	[14] ASTON	91	LASS	11 $K^- p \to \Lambda K\overline{K}\pi\pi$

[8] First solution, PWA is ambiguous.
[9] Decaying into $\pi^+\pi^-2\pi^0$.
[10] Decaying into $2(\pi^+\pi^-)$.
[11] Taking into account $f_4(2050)$.
[12] T-matrix pole.
[13] From solution B of amplitude analysis of data on $\overline{p}p \to \pi\pi$. 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	$K^*(892)\overline{K}^*(892)$	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

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

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

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$122 \pm 4 \pm 26$	[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
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$162^{+69}_{-42}{}^{+1137}_{-\ 204}$	[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

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

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

$\Gamma(a_2(1320)\pi)/\Gamma_{\text{total}}$ — 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 $pp \rightarrow p_f \eta \pi^+ \pi^- p_s$
not seen	BARBERIS	00C		450 $pp \rightarrow p_f 4\pi p_s$
possibly seen	BARBERIS	97B	OMEG	450 $pp \rightarrow pp 2(\pi^+ \pi^-)$

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

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

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

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

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

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

$f_2(1950)$ REFERENCES

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	F. Binon *et al.*	
		Translated from YAF 68 998.		
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.*	
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.)