

$f_2(1950)$

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

$f_2(1950)$ MASS

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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 $pp \rightarrow pp2\pi2\pi^0$
1980 ± 50	ANISOVICH	99B SPEC	1.35–1.94 $p\bar{p} \rightarrow \eta \eta \pi^0$
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⁺¹² ₋₁₁₋₇₃	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 $\bar{p}p \rightarrow \pi^0 \eta \eta, \pi^0 \pi^0 \pi^0$
~ 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 First solution, PWA is ambiguous.

² Decaying into $\pi^+ \pi^- 2\pi^0$.

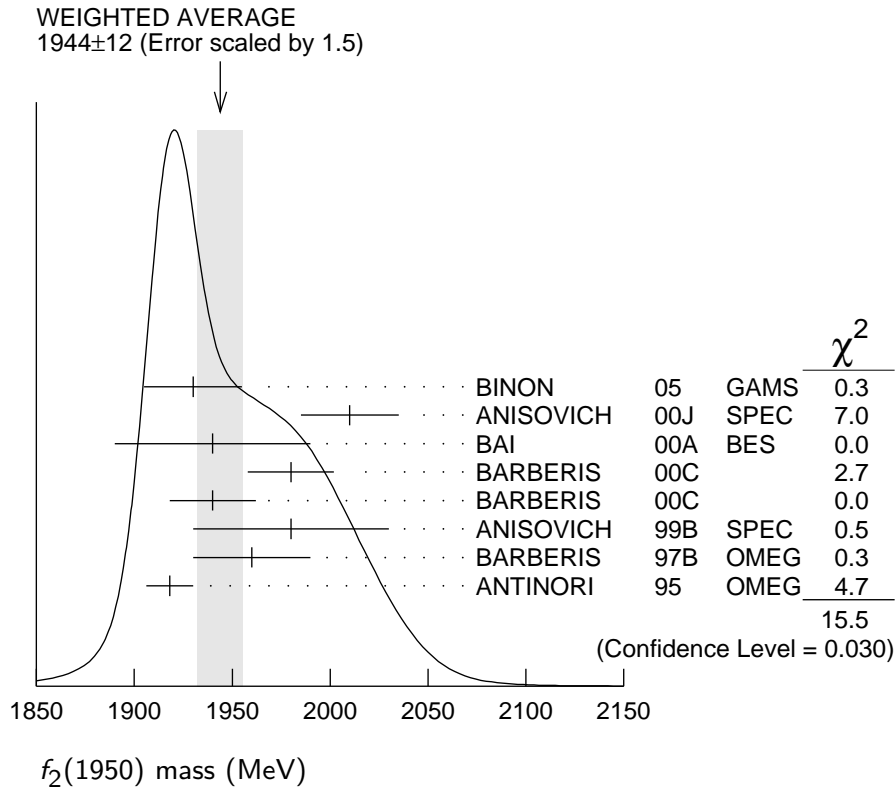
³ Decaying into $2(\pi^+ \pi^-)$.

⁴ Taking into account $f_4(2050)$.

⁵ T-matrix pole.

⁶ From solution B of amplitude analysis of data on $\bar{p}p \rightarrow \pi \pi$. 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
472 ± 18 OUR AVERAGE			
450 ± 50	⁸ BINON	05 GAMS	$33 \pi^- p \rightarrow \eta \eta n$
495 ± 35	ANISOVICH	00J SPEC	
380^{+120}_{-90}	BAI	00A BES	$J/\psi \rightarrow \gamma(\pi^+ \pi^- \pi^+ \pi^-)$
520 ± 50	⁹ BARBERIS	00C	$450 pp \rightarrow pp4\pi$
485 ± 55	¹⁰ BARBERIS	00C	$450 pp \rightarrow pp4\pi$
500 ± 100	ANISOVICH	99B SPEC	$1.35-1.94 p\bar{p} \rightarrow \eta \eta \pi^0$
460 ± 40	BARBERIS	97B OMEG	$450 pp \rightarrow pp2(\pi^+ \pi^-)$
390 ± 60	ANTINORI	95 OMEG	$300,450 pp \rightarrow pp2(\pi^+ \pi^-)$

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$441^{+27+28}_{-25-192}$	¹¹ UEHARA	09 BELL	$10.6 e^+ e^- \rightarrow e^+ e^- \pi^0 \pi^0$
$297 \pm 12 \pm 6$	ABE	04 BELL	$10.6 e^+ e^- \rightarrow e^+ e^- K^+ K^-$
385 ± 58	¹² AMSLER	02 CBAR	$0.9 \bar{p}p \rightarrow \pi^0 \eta \eta, \pi^0 \pi^0 \pi^0$
~ 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 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 $\bar{p}p \rightarrow \pi\pi$. 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}	$\rho\bar{\rho}$	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		

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$122 \pm 4 \pm 26$ 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. • • •

$162^{+69+1137}_{-42-204}$ 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>	
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.)