

$f_2(2150)$

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

This entry was previously called T_0 . **$f_2(2150)$ MASS** **$f_2(2150)$ MASS, COMBINED MODES (MeV)**

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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2157±12 OUR AVERAGE Includes data from the datablock that follows this one.

• • • We do not use the following data for averages, fits, limits, etc. • • •

2170±6	80k	¹ UMAN	06 E835	5.2 $\bar{p}p \rightarrow \eta\eta\pi^0$
2123 ⁺¹⁵ ₋₃₃		² LONGACRE	04 RVUE	22 $\pi^- p \rightarrow \phi\phi n$, 450 $pp \rightarrow p_f 4\pi p_s$

¹Statistical error only.²From a four pole K-matrix reanalysis of ETKIN 88 and BARBERIS 00C data. **$\eta\eta$ MODE**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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The data in this block is included in the average printed for a previous datablock.

2157±12 OUR AVERAGE

2151±16	BARBERIS	00E	450 $pp \rightarrow p_f \eta\eta p_s$
2175±20	PROKOSHKIN	95D GAM4	300 $\pi^- N \rightarrow \pi^- N 2\eta$, 450 $pp \rightarrow pp 2\eta$
2130±35	SINGOVSKI	94 GAM4	450 $pp \rightarrow pp 2\eta$

• • • We do not use the following data for averages, fits, limits, etc. • • •

2140±30	³ ABELE	99B CBAR	1.94 $\bar{p}p \rightarrow \pi^0 \eta\eta$
2104±20	⁴ ARMSTRONG	93C E760	$\bar{p}p \rightarrow \pi^0 \eta\eta \rightarrow 6\gamma$

³Spin not determined.⁴No J^{PC} determination. **$\eta\pi\pi$ MODE**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
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• • • We do not use the following data for averages, fits, limits, etc. • • •

2135±20±45	⁵ ADOMEIT	96 CBAR	0	1.94 $\bar{p}p \rightarrow \eta 3\pi^0$
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⁵ANISOVICH 00E recommends to withdraw ADOMEIT 96 that assumed a single $J^P = 2^+$ resonance. **$\bar{p}p \rightarrow \pi\pi$**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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• • • We do not use the following data for averages, fits, limits, etc. • • •

~ 2090	⁶ OAKDEN	94 RVUE	0.36–1.55 $\bar{p}p \rightarrow \pi\pi$
~ 2120	⁷ OAKDEN	94 RVUE	0.36–1.55 $\bar{p}p \rightarrow \pi\pi$
~ 2170	⁸ MARTIN	80B RVUE	
~ 2150	⁸ MARTIN	80C RVUE	
~ 2150	⁹ DULUDE	78B OSPK	1–2 $\bar{p}p \rightarrow \pi^0 \pi^0$

⁶OAKDEN 94 makes an amplitude analysis of LEAR data on $\bar{p}p \rightarrow \pi\pi$ 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.

⁷ From solution B of amplitude analysis of data on $\bar{p}p \rightarrow \pi\pi$.

⁸ $I(J^P) = 0(2^+)$ from simultaneous analysis of $p\bar{p} \rightarrow \pi^-\pi^+$ and $\pi^0\pi^0$.

⁹ $I^G(J^P) = 0^+(2^+)$ from partial-wave amplitude analysis.

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

VALUE (MeV)	DOCUMENT ID	TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2139^{+8}_{-9}	¹⁰ EVANGELIS...	97	SPEC	0.6-2.4 $\bar{p}p \rightarrow K_S^0 K_S^0$
~ 2190	¹⁰ CUTTS	78B	CNTR	0.97-3 $\bar{p}p \rightarrow \bar{N}N$
2155 ± 15	^{10,11} COUPLAND	77	CNTR 0	0.7-2.4 $\bar{p}p \rightarrow \bar{p}p$
2193 ± 2	^{10,12} ALSPECTOR	73	CNTR	$\bar{p}p$ S channel

¹⁰ Isospins 0 and 1 not separated.

¹¹ From a fit to the total elastic cross section.

¹² Referred to as T or T region by ALSPECTOR 73.

$K\bar{K}$ MODE

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
2200 ± 13	VLADIMIRSK..06	SPEC	40 $\pi^- p \rightarrow K_S^0 K_S^0 n$
2150 ± 20	ABLIKIM	04E	BES2 $J/\psi \rightarrow \omega K^+ K^-$
2130 ± 35	BARBERIS	99	OMEG 450 $p\bar{p} \rightarrow p_S p_f K^+ K^-$

$f_2(2150)$ WIDTH

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

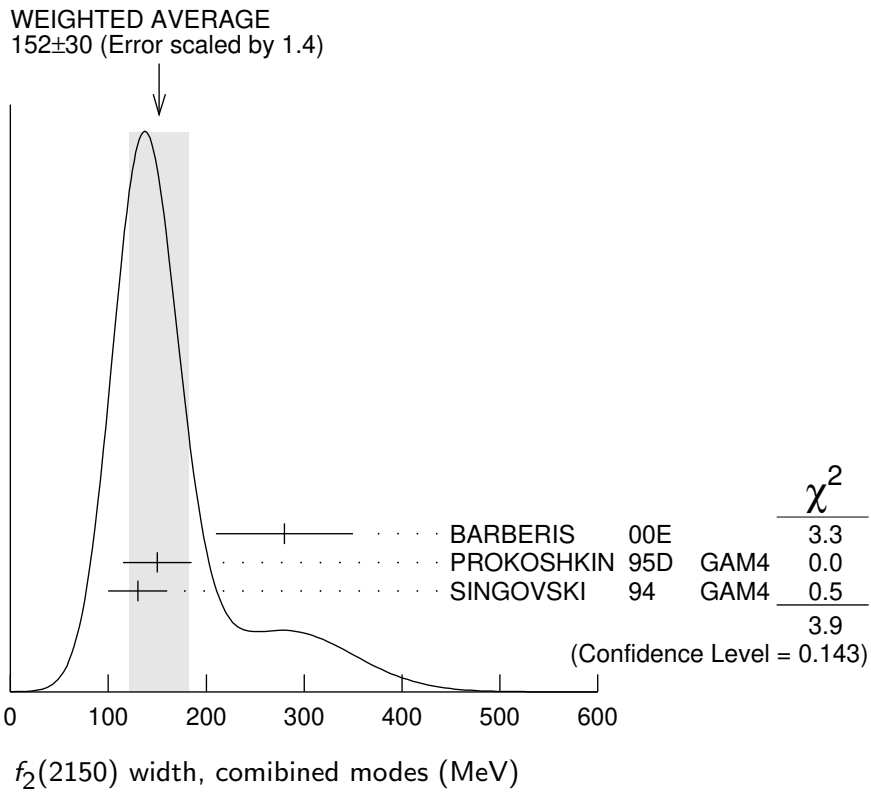
VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
152 ± 30 OUR AVERAGE				Includes data from the datablock that follows this one. Error includes scale factor of 1.4. See the ideogram below.

• • • We do not use the following data for averages, fits, limits, etc. • • •

182 ± 11	80k	¹³ UMAN	06	E835	5.2 $\bar{p}p \rightarrow \eta\eta\pi^0$
294^{+56}_{-55}		¹⁴ LONGACRE	04	RVUE	22 $\pi^- p \rightarrow \phi\phi n$, 450 $p\bar{p} \rightarrow p_f 4\pi p_S$

¹³ Statistical error only.

¹⁴ From a four pole K-matrix reanalysis of ETKIN 88 and BARBERIS 00C data.



$\eta\eta$ MODE

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
The data in this block is included in the average printed for a previous datablock.			

152 ± 30 OUR AVERAGE Error includes scale factor of 1.4. See the ideogram below.

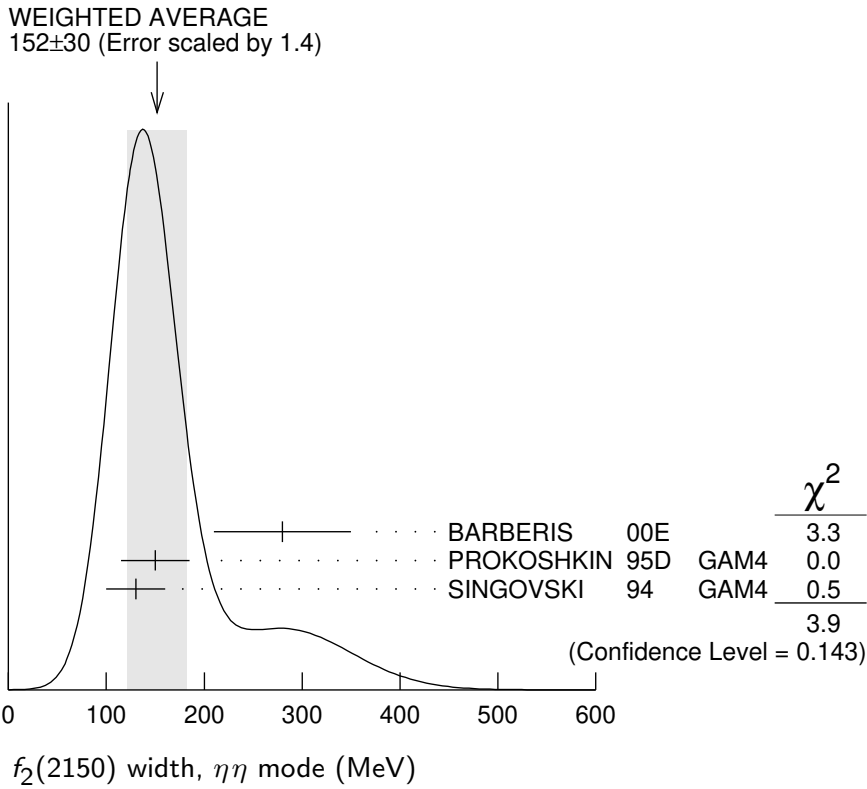
280 ± 70	BARBERIS	00E	450 $pp \rightarrow p_f \eta \eta p_s$
150 ± 35	PROKOSHKIN	95D	GAM4 300 $\pi^- N \rightarrow \pi^- N 2\eta$, 450 $pp \rightarrow pp 2\eta$
130 ± 30	SINGOVSKI	94	GAM4 450 $pp \rightarrow pp 2\eta$

• • • We do not use the following data for averages, fits, limits, etc. • • •

310 ± 50	¹⁵ ABELE	99B	CBAR 1.94 $\bar{p}p \rightarrow \pi^0 \eta \eta$
203 ± 10	¹⁶ ARMSTRONG	93C	E760 $\bar{p}p \rightarrow \pi^0 \eta \eta \rightarrow 6\gamma$

¹⁵ Spin not determined.

¹⁶ No J^{PC} determination.



$\eta\pi\pi$ MODE

VALUE (MeV)	DOCUMENT ID	TECN	CHG	COMMENT
••• We do not use the following data for averages, fits, limits, etc. •••				
250±25±45	¹⁷ ADOMEIT 96	CBAR	0	1.94 $\bar{p}p \rightarrow \eta 3\pi^0$
	¹⁷ ANISOVICH 00E			recommends to withdraw ADOMEIT 96 that assumed a single $J^P = 2^+$ resonance.

$\bar{p}p \rightarrow \pi\pi$

VALUE (MeV)	DOCUMENT ID	TECN	CHG	COMMENT
250 OUR ESTIMATE				
••• We do not use the following data for averages, fits, limits, etc. •••				
~ 70	¹⁸ OAKDEN 94	RVUE	0.36–1.55	$\bar{p}p \rightarrow \pi\pi$
~ 250	¹⁹ MARTIN 80B	RVUE		
~ 250	¹⁹ MARTIN 80C	RVUE		
~ 250	²⁰ DULUDE 78B	OSPK	1–2	$\bar{p}p \rightarrow \pi^0\pi^0$
	¹⁸ KLOET 96			See however KLOET 96 who fit $\pi^+\pi^-$ only and find waves only up to $J = 3$ to be important but not significantly resonant.
	¹⁹ $I(J^P) = 0(2^+)$			from simultaneous analysis of $p\bar{p} \rightarrow \pi^-\pi^+$ and $\pi^0\pi^0$.
	²⁰ $I^G(J^P) = 0^+(2^+)$			from partial-wave amplitude analysis.

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

VALUE (MeV)	DOCUMENT ID	TECN	CHG	COMMENT
••• We do not use the following data for averages, fits, limits, etc. •••				
56 ⁺³¹ ₋₁₆	²¹ EVANGELIS... 97	SPEC		0.6–2.4 $\bar{p}p \rightarrow K_S^0 K_S^0$
135±75	^{22,23} COUPLAND 77	CNTR	0	0.7–2.4 $\bar{p}p \rightarrow \bar{p}p$
98± 8	²³ ALSPECTOR 73	CNTR		$\bar{p}p$ S channel

- ²¹ Isospin 0 and 2 not separated.
²² From a fit to the total elastic cross section.
²³ Isospins 0 and 1 not separated.

$K\bar{K}$ MODE

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
91 ± 62	VLADIMIRSK...06	SPEC	$40 \pi^- p \rightarrow K_S^0 K_S^0 n$
150 ± 30	ABLIKIM	04E	$J/\psi \rightarrow \omega K^+ K^-$
270 ± 50	BARBERIS	99	OMEG $450 p p \rightarrow p_S p_f K^+ K^-$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$f_2(2150)$ DECAY MODES

Mode	Fraction (Γ_i/Γ)
$\Gamma_1 \quad \pi\pi$	
$\Gamma_2 \quad \phi\phi$	
$\Gamma_3 \quad \eta\eta$	seen
$\Gamma_4 \quad K\bar{K}$	seen
$\Gamma_5 \quad f_2(1270)\eta$	seen
$\Gamma_6 \quad a_2(1320)\pi$	seen
$\Gamma_7 \quad p\bar{p}$	seen

$f_2(2150)$ BRANCHING RATIOS

$\Gamma(K\bar{K})/\Gamma(\eta\eta)$					Γ_4/Γ_3
VALUE	CL%	DOCUMENT ID	TECN	COMMENT	
1.28 ± 0.23		BARBERIS	00E	$450 p p \rightarrow p_f \eta \eta p_S$	

• • • We do not use the following data for averages, fits, limits, etc. • • •

<0.1	95	²⁴ PROKOSHKIN 95D	GAM4	$300 \pi^- N \rightarrow \pi^- N 2\eta,$ $450 p p \rightarrow p p 2\eta$
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²⁴ Using data from ARMSTRONG 89D.

$\Gamma(\pi\pi)/\Gamma(\eta\eta)$					Γ_1/Γ_3
VALUE	CL%	DOCUMENT ID	TECN	COMMENT	

• • • We do not use the following data for averages, fits, limits, etc. • • •

<0.33	95	²⁵ PROKOSHKIN 95D	GAM4	$300 \pi^- N \rightarrow \pi^- N 2\eta,$ $450 p p \rightarrow p p 2\eta$
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²⁵ Derived from a $\pi^0\pi^0/\eta\eta$ limit.

$\Gamma(f_2(1270)\eta)/\Gamma(a_2(1320)\pi)$					Γ_5/Γ_6
VALUE	DOCUMENT ID	TECN	COMMENT		

0.79 ± 0.11	²⁶ ADOMEIT	96	CBAR	$1.94 \bar{p} p \rightarrow \eta 3\pi^0$
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²⁶ Using $B(a_2(1320) \rightarrow \eta\pi) = 0.145$

$\Gamma(p\bar{p})/\Gamma_{\text{total}}$					Γ_7/Γ
VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	

seen	73	ALEXANDER	10	CLEO $\psi(2S) \rightarrow \gamma p\bar{p}$
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$f_2(2150)$ REFERENCES

ALEXANDER	10	PR D82 092002	J.P. Alexander <i>et al.</i>	(CLEO Collab.)
UMAN	06	PR D73 052009	I. Uman <i>et al.</i>	(FNAL E835)
VLADIMIRSK...	06	PAN 69 493	V.V. Vladimisky <i>et al.</i>	(ITEP, Moscow)
		Translated from YAF 69 515.		
ABLIKIM	04E	PL B603 138	M. Ablikim <i>et al.</i>	(BES Collab.)
LONGACRE	04	PR D70 094041	R.S. Longacre, S.J. Lindenbaum	(BNL, CUNY)
ANISOVICH	00E	PL B477 19	A.V. Anisovich <i>et al.</i>	
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.)
ABELE	99B	EPJ C8 67	A. Abele <i>et al.</i>	(Crystal Barrel Collab.)
BARBERIS	99	PL B453 305	D. Barberis <i>et al.</i>	(Omega Expt.)
EVANGELIS...	97	PR D56 3803	C. Evangelista <i>et al.</i>	(LEAR Collab.)
MARTIN	97	PR C56 1114	B.R. Martin, G.C. Oades	(LOUC, AARH)
ADOMEIT	96	ZPHY C71 227	J. Adomeit <i>et al.</i>	(Crystal Barrel Collab.)
KLOET	96	PR D53 6120	W.M. Kloet, F. Myhrer	(RUTG, NORD)
PROKOSHKIN	95D	PD 40 495	Y.D. Prokoshkin	(SERP) IGJPC
		Translated from DANS 344 469.		
HASAN	94	PL B334 215	A. Hasan, D.V. Bugg	(LOQM)
OAKDEN	94	NP A574 731	M.N. Oakden, M.R. Pennington	(DURH)
SINGOVSKI	94	NC A107 1911	A.V. Singovsky	(SERP)
ARMSTRONG	93C	PL B307 394	T.A. Armstrong <i>et al.</i>	(FNAL, FERR, GENO+)
ARMSTRONG	89D	PL B227 186	T.A. Armstrong, M. Benayoun	(ATHU, BARI, BIRM+)
ETKIN	88	PL B201 568	A. Etkin <i>et al.</i>	(BNL, CUNY)
MARTIN	80B	NP B176 355	B.R. Martin, D. Morgan	(LOUC, RHEL) JP
MARTIN	80C	NP B169 216	A.D. Martin, M.R. Pennington	(DURH) JP
CUTTS	78B	PR D17 16	D. Cutts <i>et al.</i>	(STON, WISC)
DULUDE	78B	PL 79B 335	R.S. Dulude <i>et al.</i>	(BROW, MIT, BARI) JP
COUPLAND	77	PL 71B 460	M. Coupland <i>et al.</i>	(LOQM, RHEL)
ALSPECTOR	73	PRL 30 511	J. Alspector <i>et al.</i>	(RUTG, UPNJ)