$f_2(2150)$

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

This entry was previously called T_0.

$f_2(2150)$ MASS

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

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
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 $\overline{p}p \to \eta\eta\pi^0$
2123^{+15}_{-33}		[2] LONGACRE	04	RVUE	22 $\pi^- p \to \phi\phi n$, 450 $pp \to p_f 4\pi p_s$

[1] Statistical error only.
[2] 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.				
2157±12 OUR AVERAGE				
2151±16	BARBERIS	00E		450 $pp \to p_f \eta\eta p_s$
2175±20	PROKOSHKIN	95D	GAM4	300 $\pi^- N \to \pi^- N 2\eta$, 450 $pp \to pp2\eta$
2130±35	SINGOVSKI	94	GAM4	450 $pp \to pp2\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2140±30	[3] ABELE	99B	CBAR	1.94 $\overline{p}p \to \pi^0\eta\eta$
2104±20	[4] ARMSTRONG	93C	E760	$\overline{p}p \to \pi^0\eta\eta \to 6\gamma$

[3] Spin not determined.
[4] 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. • • •					
2135±20±45	[5] ADOMEIT	96	CBAR	0	1.94 $\overline{p}p \to \eta 3\pi^0$

[5] ANISOVICH 00E recommends to withdraw ADOMEIT 96 that assumed a single $J^P = 2^+$ resonance.

$\overline{p}p \to \pi\pi$

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
~ 2090	[6] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \to \pi\pi$
~ 2120	[7] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \to \pi\pi$
~ 2170	[8] MARTIN	80B	RVUE	
~ 2150	[8] MARTIN	80C	RVUE	
~ 2150	[9] DULUDE	78B	OSPK	1–2 $\overline{p}p \to \pi^0\pi^0$

[6] OAKDEN 94 makes an amplitude analysis of LEAR data on $\overline{p}p \to \pi\pi$ 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 $\overline{p}p \to \pi\pi$.
[8] $I(J^P) = 0(2^+)$ from simultaneous analysis of $p\overline{p} \to \pi^-\pi^+$ and $\pi^0\pi^0$.
[9] $I^G(J^P) = 0^+(2^+)$ 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. • • •						
$2139^{+\ 8}_{-\ 9}$		[10] EVANGELIS...	97	SPEC		0.6-2.4 $\overline{p}p \to K^0_S K^0_S$
~ 2190		[10] CUTTS	78B	CNTR		0.97–3 $\overline{p}p \to \overline{N}N$
2155 ± 15		[10,11] COUPLAND	77	CNTR	0	0.7–2.4 $\overline{p}p \to \overline{p}p$
2193 ± 2		[10,12] ALSPECTOR	73	CNTR		$\overline{p}p$ 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.

$K\overline{K}$ MODE

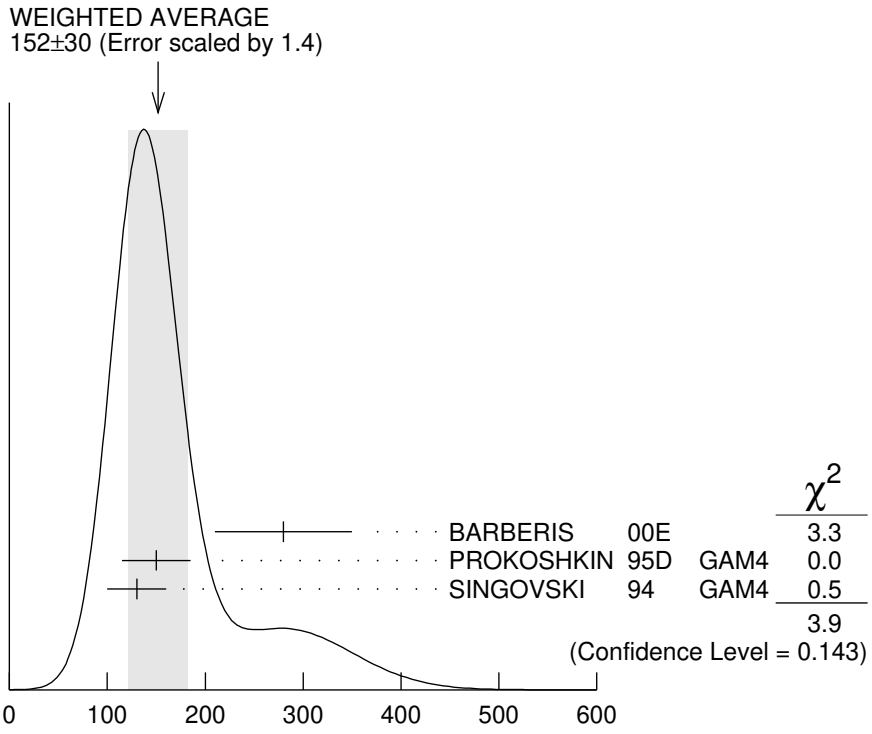
VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2200 ± 13	VLADIMIRSK...06		SPEC	40 $\pi^- p \to K^0_S K^0_S n$
2150 ± 20	ABLIKIM	04E	BES2	$J/\psi \to \omega K^+ K^-$
2130 ± 35	BARBERIS	99	OMEG	450 $pp \to p_s p_f K^+ K^-$

$f_2(2150)$ 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 $\overline{p}p \to \eta\eta\pi^0$
294^{+56}_{-55}		[14] LONGACRE	04	RVUE	22 $\pi^- p \to \phi\phi n$, 450 $pp \to p_f 4\pi p_s$

[13] Statistical error only.
[14] From a four pole K-matrix reanalysis of ETKIN 88 and BARBERIS 00C data.



$f_2(2150)$ width, comibined modes (MeV)

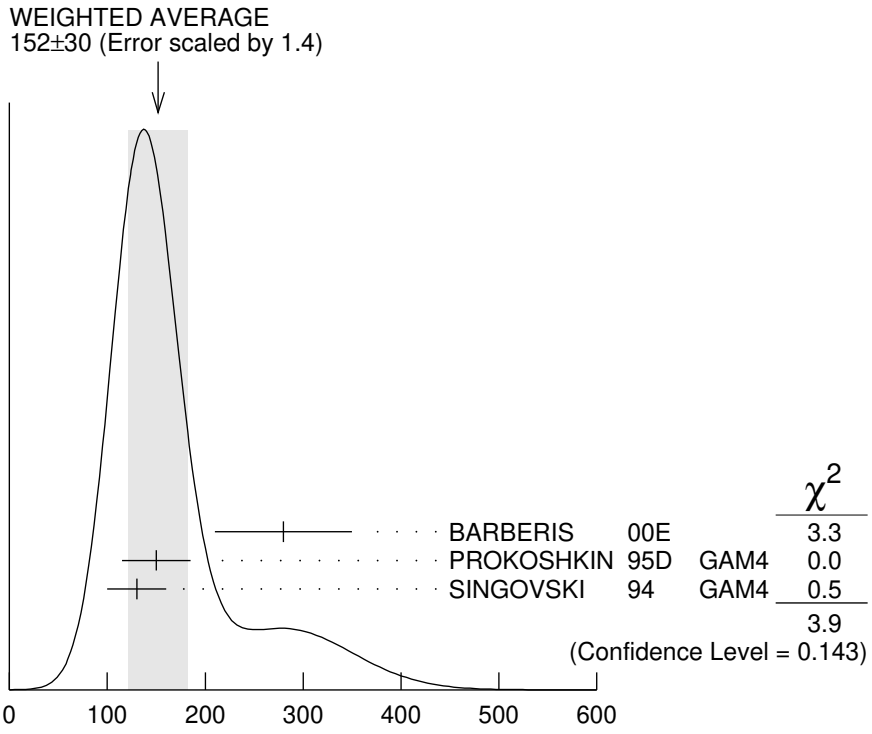
$\eta\eta$ MODE

VALUE (MeV)	*DOCUMENT ID*	*TECN*	*COMMENT*

The data in this block is included in the average printed for a previous datablock.

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 $pp \rightarrow pp2\eta$
130±30	SINGOVSKI	94	GAM4	450 $pp \rightarrow pp2\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
310±50	[15] ABELE	99B	CBAR	1.94 $\overline{p}p \rightarrow \pi^0\eta\eta$
203±10	[16] ARMSTRONG	93C	E760	$\overline{p}p \rightarrow \pi^0\eta\eta \rightarrow 6\gamma$

[15] Spin not determined.
[16] No J^{PC} determination.



$f_2(2150)$ width, $\eta\eta$ mode (MeV)

$\eta\pi\pi$ MODE

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$250\pm25\pm45$	[17] ADOMEIT	96	CBAR	0	1.94 $\overline{p}p \rightarrow \eta 3\pi^0$

[17] ANISOVICH 00E recommends to withdraw ADOMEIT 96 that assumed a single $J^P = 2^+$ resonance.

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

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
250 OUR ESTIMATE				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$\sim$ 70	[18] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \rightarrow \pi\pi$
$\sim$ 250	[19] MARTIN	80B	RVUE	
$\sim$ 250	[19] MARTIN	80C	RVUE	
$\sim$ 250	[20] DULUDE	78B	OSPK	1–2 $\overline{p}p \rightarrow \pi^0\pi^0$

[18] 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 $p\overline{p} \rightarrow \pi^-\pi^+$ and $\pi^0\pi^0$.

[20] $I^G(J^P) = 0^+(2^+)$ 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}	[21] EVANGELIS...	97	SPEC		0.6-2.4 $\overline{p}p \rightarrow K^0_S K^0_S$
135 ± 75	[22,23] COUPLAND	77	CNTR	0	0.7–2.4 $\overline{p}p \rightarrow \overline{p}p$
98 ± 8	[23] ALSPECTOR	73	CNTR		$\overline{p}p$ 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.

$K\overline{K}$ MODE

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
91 ± 62	VLADIMIRSK...06		SPEC	40 $\pi^- p \to K^0_S K^0_S n$
150 ± 30	ABLIKIM	04E	BES2	$J/\psi \to \omega K^+ K^-$
270 ± 50	BARBERIS	99	OMEG	450 $pp \to p_s p_f K^+ K^-$

$f_2(2150)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$\pi\pi$	
Γ_2	$\phi\phi$	
Γ_3	$\eta\eta$	seen
Γ_4	$K\overline{K}$	seen
Γ_5	$f_2(1270)\eta$	seen
Γ_6	$a_2(1320)\pi$	seen
Γ_7	$p\overline{p}$	seen

$f_2(2150)$ BRANCHING RATIOS

$\Gamma(K\overline{K})/\Gamma(\eta\eta)$ Γ_4/Γ_3

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
1.28 ± 0.23		BARBERIS	00E		450 $pp \to p_f \eta\eta p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.1	95	[24] PROKOSHKIN	95D	GAM4	300 $\pi^- N \to \pi^- N 2\eta$, 450 $pp \to pp2\eta$

[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 $\pi^- N \to \pi^- N 2\eta$, 450 $pp \to pp2\eta$

[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 $\overline{p}p \to \eta 3\pi^0$

[26] Using B($a_2(1320) \to \eta\pi$) = 0.145

$\Gamma(p\overline{p})/\Gamma_{\text{total}}$ Γ_7/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	73	ALEXANDER	10	CLEO	$\psi(2S) \to \gamma p\overline{p}$

$f_2(2150)$ REFERENCES

ALEXANDER	10	PR D82 092002	J.P. Alexander *et al.*	(CLEO Collab.)
UMAN	06	PR D73 052009	I. Uman *et al.*	(FNAL E835)
VLADIMIRSK...	06	PAN 69 493	V.V. Vladimirsky *et al.*	(ITEP, Moscow)
		Translated from YAF 69 515.		
ABLIKIM	04E	PL B603 138	M. Ablikim *et al.*	(BES Collab.)
LONGACRE	04	PR D70 094041	R.S. Longacre, S.J. Lindenbaum	(BNL, CUNY)
ANISOVICH	00E	PL B477 19	A.V. Anisovich *et al.*	
BARBERIS	00C	PL B471 440	D. Barberis *et al.*	(WA 102 Collab.)
BARBERIS	00E	PL B479 59	D. Barberis *et al.*	(WA 102 Collab.)
ABELE	99B	EPJ C8 67	A. Abele *et al.*	(Crystal Barrel Collab.)
BARBERIS	99	PL B453 305	D. Barberis *et al.*	(Omega Expt.)
EVANGELIS...	97	PR D56 3803	C. Evangelista *et al.*	(LEAR Collab.)
MARTIN	97	PR C56 1114	B.R. Martin, G.C. Oades	(LOUC, AARH)
ADOMEIT	96	ZPHY C71 227	J. Adomeit *et al.*	(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 *et al.*	(FNAL, FERR, GENO+)
ARMSTRONG	89D	PL B227 186	T.A. Armstrong, M. Benayoun	(ATHU, BARI, BIRM+)
ETKIN	88	PL B201 568	A. Etkin *et al.*	(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 *et al.*	(STON, WISC)
DULUDE	78B	PL 79B 335	R.S. Dulude *et al.*	(BROW, MIT, BARI) JP
COUPLAND	77	PL 71B 460	M. Coupland *et al.*	(LOQM, RHEL)
ALSPECTOR	73	PRL 30 511	J. Alspector *et al.*	(RUTG, UPNJ)