NODE=M042

$f_2(2150)$

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

OMITTED FROM SUMMARY TABLE

This entry was previously called T_0.

NODE=M042

$f_2(2150)$ MASS

NODE=M042205

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

NODE=M042M
NODE=M042M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2156±11 OUR AVERAGE		Includes data from the 2 datablocks that follow this one.			
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2170± 6	80k	[1] UMAN	06	E835	5.2 $\overline{p}p \to \eta\eta\pi^0$

[1] Statistical error only.

NODE=M042M;LINKAGE=ST

$\eta\eta$ MODE

NODE=M042M3
NODE=M042M3

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 $pp \to pp 2\eta$
2130±35	SINGOVSKI	94	GAM4	450 $pp \to pp 2\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2140±30	[2] ABELE	99B	CBAR	
seen	[3] ANISOVICH	99B	SPEC	1.35–1.94 $\overline{p}p \to \eta\eta\pi^0$
2105±10	[3] ANISOVICH	99K	RVUE	0.6–1.94 $\overline{p}p \to \eta\eta, \eta\eta'$
2104±20	[4] ARMSTRONG	93C	E760	$\overline{p}p \to \pi^0\eta\eta \to 6\gamma$

[2] Spin not determined.
NODE=M042M3;LINKAGE=K3

[3] $J^{PC} = 0^{++}$.
NODE=M042M3;LINKAGE=AK

[4] No J^{PC} determination.
NODE=M042M3;LINKAGE=A

$\eta\pi\pi$ MODE

NODE=M042M4
NODE=M042M4

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
The data in this block is included in the average printed for a previous datablock.					
2135±20±45	ADOMEIT	96	CBAR	0	1.94 $\overline{p}p \to \eta 3\pi^0$

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

NODE=M042M1
NODE=M042M1

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
∼ 2226	HASAN	94	RVUE	$\overline{p}p \to \pi\pi$
∼ 2090	[5] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \to \pi\pi$
∼ 2120	[6] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \to \pi\pi$
∼ 2170	[7] MARTIN	80B	RVUE	
∼ 2150	[7] MARTIN	80C	RVUE	
∼ 2150	[8] DULUDE	78B	OSPK	1–2 $\overline{p}p \to \pi^0\pi^0$

OCCUR=2

[5] 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.
NODE=M042M1;LINKAGE=B

[6] From solution B of amplitude analysis of data on $\overline{p}p \to \pi\pi$.
NODE=M042M1;LINKAGE=BB

[7] $I(J^P) = 0(2^+)$ from simultaneous analysis of $p\overline{p} \to \pi^-\pi^+$ and $\pi^0\pi^0$.
NODE=M042M1;LINKAGE=P

[8] $I^G(J^P) = 0^+(2^+)$ from partial-wave amplitude analysis.
NODE=M042M1;LINKAGE=L

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

NODE=M042M2
NODE=M042M2

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

[9] Isospins 0 and 1 not separated.
NODE=M042M2;LINKAGE=I

[10] From a fit to the total elastic cross section.
NODE=M042M2;LINKAGE=E

[11] Referred to as T or T region by ALSPECTOR 73.
NODE=M042M2;LINKAGE=M

$K\overline{K}$ MODE

NODE=M042M5
NODE=M042M5

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

f_2(2150) WIDTH

NODE=M042210

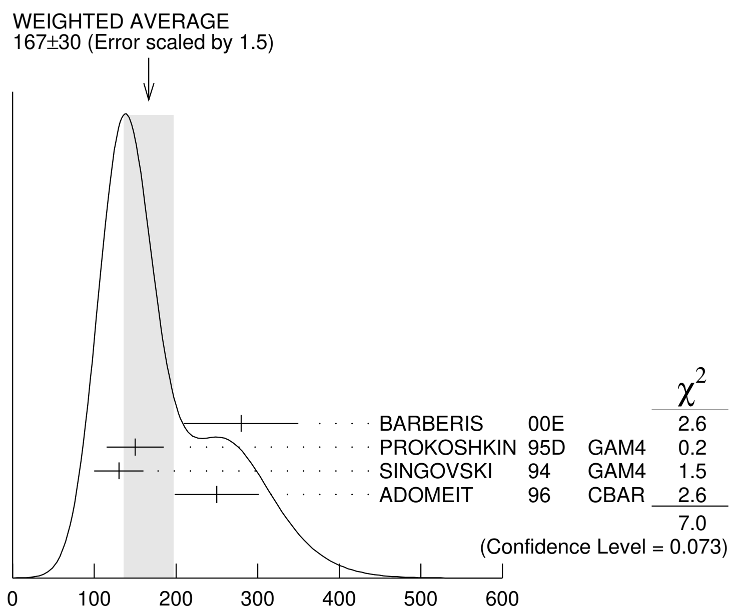
f_2(2150) WIDTH, COMBINED MODES (MeV)

NODE=M042W
NODE=M042W

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
167±30 OUR AVERAGE Includes data from the 2 datablocks that follow this one. Error includes scale factor of 1.5. See the ideogram below.					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
182±11	80k	[12] UMAN	06	E835	5.2 $\overline{p}p \rightarrow \eta\eta\pi^0$

[12] Statistical error only.

NODE=M042W;LINKAGE=ST



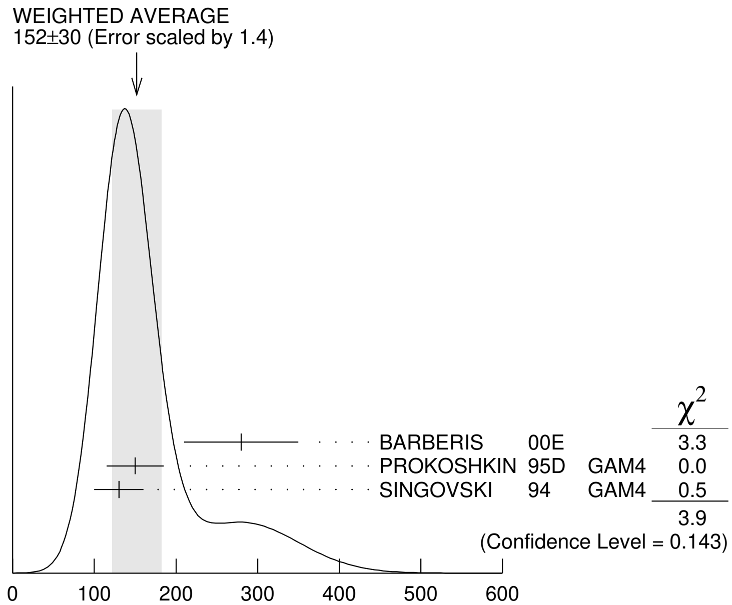
f_2(2150) WIDTH, COMBINED MODES (MeV)

$\eta\eta$ MODE

NODE=M042W3
NODE=M042W3

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	[13] ABELE	99B	CBAR	
seen	[14] ANISOVICH	99B	SPEC	1.35–1.94 $\overline{p}p \rightarrow \eta\eta\pi^0$
200±25	[15] ANISOVICH	99K	RVUE	0.6–1.94 $\overline{p}p \rightarrow \eta\eta, \eta\eta'$
203±10	[16] ARMSTRONG	93C	E760	$\overline{p}p \rightarrow \pi^0\eta\eta \rightarrow 6\gamma$

[13] Spin not determined.
NODE=M042W3;LINKAGE=K3
[14] $J^{PC} = 0^{++}$
NODE=M042W3;LINKAGE=J1
[15] PWA gives $J^{PC} = 0^{++}$.
NODE=M042W3;LINKAGE=AK
[16] No J^{PC} determination.
NODE=M042W3;LINKAGE=A



$f_2(2150)$ WIDTH, $\eta\eta$ MODE (MeV)

$\eta\pi\pi$ MODE

NODE=M042W4
NODE=M042W4

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
The data in this block is included in the average printed for a previous datablock.					
250±25±45	ADOMEIT	96	CBAR	0	1.94 $\overline{p}p \to \eta 3\pi^0$

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

NODE=M042W1
NODE=M042W1

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
250 OUR ESTIMATE				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$\sim$ 226	HASAN	94	RVUE	$\overline{p}p \to \pi\pi$
$\sim$ 70	[17] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \to \pi\pi$
$\sim$ 250	[18] MARTIN	80B	RVUE	
$\sim$ 250	[18] MARTIN	80C	RVUE	
$\sim$ 250	[19] DULUDE	78B	OSPK	1–2 $\overline{p}p \to \pi^0\pi^0$

→ NOT CHECKED ←

[17] See however KLOET 96 who fit $\pi^+\pi^-$ only and find waves only up to $J = 3$ to be important but not significantly resonant. NODE=M042W1;LINKAGE=CC

[18] $I(J^P) = 0(2^+)$ from simultaneous analysis of $p\overline{p} \to \pi^-\pi^+$ and $\pi^0\pi^0$. NODE=M042W1;LINKAGE=P

[19] $I^G(J^P) = 0^+(2^+)$ from partial-wave amplitude analysis. NODE=M042W1;LINKAGE=L

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

NODE=M042W2
NODE=M042W2

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
56^{+31}_{-16}	[20] EVANGELIS...	97	SPEC		0.6-2.4 $\overline{p}p \to K^0_S K^0_S$
135±75	[21,22] COUPLAND	77	CNTR	0	0.7–2.4 $\overline{p}p \to \overline{p}p$
98± 8	[22] ALSPECTOR	73	CNTR		$\overline{p}p$ S channel

[20] Isospin 0 and 2 not separated. NODE=M042W2;LINKAGE=F

[21] From a fit to the total elastic cross section. NODE=M042W2;LINKAGE=E

[22] Isospins 0 and 1 not separated. NODE=M042W2;LINKAGE=I

$K\overline{K}$ MODE

NODE=M042W5
NODE=M042W5

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

NODE=M042215;NODE=M042

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\pi\pi$		DESIG=1
Γ_2	$\eta\eta$	seen	DESIG=2;OUR EST;→ NOT CHECKED ←
Γ_3	$K\overline{K}$	seen	DESIG=3;OUR EST;→ NOT CHECKED ←
Γ_4	$f_2(1270)\eta$	seen	DESIG=4;OUR EST;→ NOT CHECKED ←
Γ_5	$a_2(1320)\pi$	seen	DESIG=5;OUR EST;→ NOT CHECKED ←

$f_2(2150)$ BRANCHING RATIOS

NODE=M042220

$\Gamma(K\overline{K})/\Gamma(\eta\eta)$ Γ_3/Γ_2

NODE=M042R1
NODE=M042R1

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	[23] PROKOSHKIN	95D	GAM4	300 $\pi^- N \to \pi^- N 2\eta$, 450 $pp \to pp2\eta$

[23] Using data from ARMSTRONG 89D.

NODE=M042R1;LINKAGE=A

$\Gamma(\pi\pi)/\Gamma(\eta\eta)$ Γ_1/Γ_2

NODE=M042R2
NODE=M042R2

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.33	95	[24] PROKOSHKIN	95D	GAM4	300 $\pi^- N \to \pi^- N 2\eta$, 450 $pp \to pp2\eta$

[24] Derived from a $\pi^0\pi^0/\eta\eta$ limit.

NODE=M042R2;LINKAGE=A

$\Gamma(f_2(1270)\eta)/\Gamma(a_2(1320)\pi)$ Γ_4/Γ_5

NODE=M042R3
NODE=M042R3

VALUE	DOCUMENT ID		TECN	COMMENT
0.79±0.11	[25] ADOMEIT	96	CBAR	1.94 $\overline{p}p \to \eta 3\pi^0$

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

NODE=M042R3;LINKAGE=A

$f_2(2150)$ REFERENCES

NODE=M042

UMAN	06	PR D73 052009	I. Uman *et al.*	(FNAL E835)	REFID=51063
VLADIMIRSK...	06	PAN 69 493	V.V. Vladimirsky *et al.*	(ITEP, Moscow)	REFID=51191
		Translated from YAF 69 515.			
ABLIKIM	04E	PL B603 138	M. Ablikim *et al.*	(BES Collab.)	REFID=50174
BARBERIS	00E	PL B479 59	D. Barberis *et al.*	(WA 102 Collab.)	REFID=47961
ABELE	99B	EPJ C8 67	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=46904
ANISOVICH	99B	PL B449 154	A.V. Anisovich *et al.*		REFID=46886
ANISOVICH	99K	PL B468 309	A.V. Anisovich *et al.*		REFID=47472
BARBERIS	99	PL B453 305	D. Barberis *et al.*	(Omega Expt.)	REFID=46921
EVANGELIS...	97	PR D56 3803	C. Evangelista *et al.*	(LEAR Collab.)	REFID=45687
MARTIN	97	PR C56 1114	B.R. Martin, G.C. Oades	(LOUC, AARH)	REFID=45685
ADOMEIT	96	ZPHY C71 227	J. Adomeit *et al.*	(Crystal Barrel Collab.)	REFID=45202
KLOET	96	PR D53 6120	W.M. Kloet, F. Myhrer	(RUTG, NORD)	REFID=45212
PROKOSHKIN	95D	SPD 40 495	Y.D. Prokoshkin	(SERP) IGJPC	REFID=44647
		Translated from DANS 344 469.			
HASAN	94	PL B334 215	A. Hasan, D.V. Bugg	(LOQM)	REFID=44103
OAKDEN	94	NP A574 731	M.N. Oakden, M.R. Pennington	(DURH)	REFID=45210
SINGOVSKI	94	NC 107A 1911	A.V. Singovsky	(SERP)	REFID=44648
ARMSTRONG	93C	PL B307 394	T.A. Armstrong *et al.*	(FNAL, FERR, GENO+)	REFID=43587
ARMSTRONG	89D	PL B227 186	T.A. Armstrong, M. Benayoun	(ATHU, BARI, BIRM+)	REFID=41010
MARTIN	80B	NP B176 355	B.R. Martin, D. Morgan	(LOUC, RHEL) JP	REFID=21838
MARTIN	80C	NP B169 216	A.D. Martin, M.R. Pennington	(DURH) JP	REFID=21837
CUTTS	78B	PR D17 16	D. Cutts *et al.*	(STON, WISC)	REFID=21733
DULUDE	78B	PL 79B 335	R.S. Dulude *et al.*	(BROW, MIT, BARI) JP	REFID=21850
COUPLAND	77	PL 71B 460	M. Coupland *et al.*	(LOQM, RHEL)	REFID=21830
ALSPECTOR	73	PRL 30 511	J. Alspector *et al.*	(RUTG, UPNJ)	REFID=21813

OTHER RELATED PAPERS

ANISOVICH	05	JETPL 80 715	V.V. Anisovich		REFID=50772
		Translated from ZETFP 80 845.			
ANISOVICH	05A	JETPL 81 417	V.V. Anisovich, A.V. Sarantsev		REFID=50771
		Translated from ZETFP 81 531.			
ANISOVICH	05C	IJMP A20 6327	V.V. Anisovich, M.A. Matveev, A.V. Sarantsev		REFID=50959
EISENHAND...	75	NP B96 109	E. Eisenhandler *et al.*	(LOQM, LIVP, DARE+)	REFID=21821
FIELDS	71	PRL 27 1749	T. Fields *et al.*	(ANL, OXF)	REFID=20202
YOH	71	PRL 26 922	J.K. Yoh *et al.*	(CIT, BNL, ROCH)	REFID=21810