$f_2(1565)$

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

Seen mostly in antinucleon-nucleon annihilation. See the review on "Spectroscopy of Light Meson Resonances."

$f_2(1565)$ T-MATRIX POLE $\sqrt{s}$

Note that $\Gamma = -2\ \text{Im}(\sqrt{s})$.

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
(1495–1560) − i (40–110) OUR ESTIMATE				
$(1560 \pm 15) - i\ (140 \pm 20)$	[1] ANISOVICH	09	RVUE	0.0 $\overline{p}p$, πN
$(1552 \pm 13) - i\ (57 \pm 12)$	AMSLER	02	CBAR	0.9 $\overline{p}p \to \pi^0\eta\eta$, $\pi^0\pi^0\pi^0$
$(1507 \pm 15) - i\ (65 \pm 10)$	BERTIN	97C	OBLX	0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$
$(1534 \pm 20) - i\ (90 \pm 30)$	[2] ABELE	96C	RVUE	Compilation
$(\sim 1552) - i\ (\sim 71)$	[3] AMSLER	95D	CBAR	0.0 $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$

[1] On sheet II in a two-pole solution.
[2] T-matrix pole, large coupling to $\rho\rho$ and $\omega\omega$, could be $f_2(1640)$.
[3] Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D.

$f_2(1565)$ MASS

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1571±13 OUR AVERAGE				
1575±18	[1] BERTIN	98	OBLX	0.05–0.405 $\overline{n}p \to \pi^+\pi^+\pi^-$
1565±20	[1] MAY	90	ASTE	0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1590±10	AMELIN	06	VES	36 $\pi^- p \to \omega\omega n$
1550±10±20	AMELIN	00	VES	37 $\pi^- p \to \eta\pi^+\pi^- n$
1598±11± 9	BAKER	99B	SPEC	0 $\overline{p}p \to \omega\omega\pi^0$
1598±72	BALOSHIN	95	SPEC	40 π^- C $\to K^0_S K^0_S$ X
1566^{+80}_{-50}	[2] ANISOVICH	94	CBAR	0.0 $\overline{p}p \to 3\pi^0, \eta\eta\pi^0$
1502± 9	ADAMO	93	OBLX	$\overline{n}p \to \pi^+\pi^+\pi^-$
1488±10	[3] ARMSTRONG	93C	E760	$\overline{p}p \to \pi^0\eta\eta \to 6\gamma$
1508±10	[3] ARMSTRONG	93D	E760	$\overline{p}p \to 3\pi^0 \to 6\gamma$
1525±10	[3] ARMSTRONG	93D	E760	$\overline{p}p \to \eta\pi^0\pi^0 \to 6\gamma$
∼ 1504	[4] WEIDENAUER	93	ASTE	0.0 $\overline{p}N \to 3\pi^- 2\pi^+$
1540±15	[3] ADAMO	92	OBLX	$\overline{n}p \to \pi^+\pi^+\pi^-$
1515±10	[5] AKER	91	CBAR	0.0 $\overline{p}p \to 3\pi^0$
1477± 5	BRIDGES	86C	DBC	0.0 $\overline{p}N \to 3\pi^- 2\pi^+$

[1] Breit-Wigner mass.
[2] From a simultaneous analysis of the annihilations $\overline{p}p \to 3\pi^0, \pi^0\eta\eta$ including AKER 91 data.
[3] J^P not determined, could be partly $f_0(1500)$.
[4] J^P not determined.
[5] Superseded by AMSLER 95B.

$f_2(1565)$ WIDTH

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
132± 23 OUR AVERAGE	Error includes scale factor of 1.1.			
119± 24	[1] BERTIN	98	OBLX	0.05–0.405 $\overline{n}p \to \pi^+\pi^+\pi^-$
170± 40	[1] MAY	90	ASTE	0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
140± 11	[1,2] AMELIN	06	VES	36 $\pi^- p \to \omega\omega n$
130± 20±40	[1] AMELIN	00	VES	37 $\pi^- p \to \eta\pi^+\pi^- n$
263±101	BALOSHIN	95	SPEC	40 π^- C $\to K^0_S K^0_S$ X
166^{+80}_{-20}	[3] ANISOVICH	94	CBAR	0.0 $\overline{p}p \to 3\pi^0, \eta\eta\pi^0$
130± 10	[4] ADAMO	93	OBLX	$\overline{n}p \to \pi^+\pi^+\pi^-$
148± 27	[5] ARMSTRONG	93C	E760	$\overline{p}p \to \pi^0\eta\eta \to 6\gamma$
103± 15	[5] ARMSTRONG	93D	E760	$\overline{p}p \to 3\pi^0 \to 6\gamma$
111± 10	[5] ARMSTRONG	93D	E760	$\overline{p}p \to \eta\pi^0\pi^0 \to 6\gamma$
∼ 206	[6] WEIDENAUER	93	ASTE	0.0 $\overline{p}N \to 3\pi^- 2\pi^+$
132± 37	[5] ADAMO	92	OBLX	$\overline{n}p \to \pi^+\pi^+\pi^-$
120± 10	[7] AKER	91	CBAR	0.0 $\overline{p}p \to 3\pi^0$
116± 9	BRIDGES	86C	DBC	0.0 $\overline{p}N \to 3\pi^- 2\pi^+$

[1] Breit-Wigner width.
[2] Supersedes the $\omega\omega$ state of BELADIDZE 92B earlier assigned to the $f_2(1640)$.
[3] From a simultaneous analysis of the annihilations $\overline{p}p \to 3\pi^0, \pi^0\eta\eta$ including AKER 91 data.
[4] Supersedes ADAMO 92.
[5] J^P not determined, could be partly $f_0(1500)$.
[6] J^P not determined.
[7] Superseded by AMSLER 95B.

$f_2(1565)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$\pi\pi$	seen
Γ_2	$\pi^+\pi^-$	seen
Γ_3	$\pi^0\pi^0$	seen
Γ_4	$\rho^0\rho^0$	seen
Γ_5	$2\pi^+ 2\pi^-$	seen
Γ_6	$\eta\eta$	seen
Γ_7	$\omega\omega$	seen
Γ_8	$K\overline{K}$	seen
Γ_9	$\gamma\gamma$	seen

$f_2(1565)$ PARTIAL WIDTHS

$\Gamma(\eta\eta)$ — Γ_6

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.2 ± 0.3	870	[1] SCHEGELSKY	06A	RVUE	$\gamma\gamma\rightarrow K^0_S K^0_S$

[1] From analysis of L3 data at 91 and 183–209 GeV, using $f_2(1565)$ mass of 1570 MeV, width of 160 MeV, $\Gamma(\pi\pi)$ = 25 MeV, and SU(3) relations.

$\Gamma(K\overline{K})$ — Γ_8

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.0 ± 1.0	870	[1] SCHEGELSKY	06A	RVUE	$\gamma\gamma\rightarrow K^0_S K^0_S$

[1] From analysis of L3 data at 91 and 183–209 GeV, using $f_2(1565)$ mass of 1570 MeV, width of 160 MeV, $\Gamma(\pi\pi)$ = 25 MeV, and SU(3) relations.

$\Gamma(\gamma\gamma)$ — Γ_9

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.70 ± 0.14	870	[1] SCHEGELSKY	06A	RVUE	$\gamma\gamma\rightarrow K^0_S K^0_S$

[1] From analysis of L3 data at 91 and 183–209 GeV, using $f_2(1565)$ mass of 1570 MeV, width of 160 MeV, $\Gamma(\pi\pi)$ = 25 MeV, and SU(3) relations.

$f_2(1565)$ BRANCHING RATIOS

$\Gamma(\pi\pi)/\Gamma_{total}$ — Γ_1/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	BAKER	99B	SPEC	$0\ \overline{p}p\rightarrow\omega\omega\pi^0$

$\Gamma(\pi^+\pi^-)/\Gamma_{total}$ — Γ_2/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	BERTIN	98	OBLX	0.05–0.405 $\overline{n}p\rightarrow\pi^+\pi^+\pi^-$
not seen	[1] ANISOVICH	94B	RVUE	$\overline{p}p\rightarrow\pi^+\pi^-\pi^0$
seen	MAY	89	ASTE	$\overline{p}p\rightarrow\pi^+\pi^-\pi^0$

[1] ANISOVICH 94B is from a reanalysis of MAY 90.

$\Gamma(\pi^0\pi^0)/\Gamma_{total}$ — Γ_3/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AMSLER	95B	CBAR	0.0 $\overline{p}p\rightarrow 3\pi^0$

$\Gamma(\pi^+\pi^-)/\Gamma(\rho^0\rho^0)$ — Γ_2/Γ_4

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.042 ± 0.013	BRIDGES	86B	DBC	$\overline{p}N\rightarrow 3\pi^-2\pi^+$

$\Gamma(\eta\eta)/\Gamma(\pi^0\pi^0)$ — Γ_6/Γ_3

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.024 \pm 0.005 \pm 0.012$	[1] ARMSTRONG 93C	E760	$\overline{p}p \to \pi^0\eta\eta \to 6\gamma$

[1] J^P not determined, could be partly $f_0(1500)$.

$\Gamma(\omega\omega)/\Gamma_{\text{total}}$ — Γ_7/Γ

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
seen	BAKER 99B	SPEC	$0\ \overline{p}p \to \omega\omega\pi^0$

$f_2(1565)$ REFERENCES

ANISOVICH	09	IJMP A24 2481	V.V. Anisovich, A.V. Sarantsev	(PNPI)
AMELIN	06	PAN 69 690	D.V. Amelin *et al.*	(VES Collab.)
		Translated from YAF 69 715.		
SCHEGELSKY	06A	EPJ A27 207	V.A. Schegelsky *et al.*	
AMSLER	02	EPJ C23 29	C. Amsler *et al.*	(Crystal Barrel Collab.)
AMELIN	00	NP A668 83	D. Amelin *et al.*	(VES Collab.)
BAKER	99B	PL B467 147	C.A. Baker *et al.*	
BERTIN	98	PR D57 55	A. Bertin *et al.*	(OBELIX Collab.)
BERTIN	97C	PL B408 476	A. Bertin *et al.*	(OBELIX Collab.)
ABELE	96C	NP A609 562	A. Abele *et al.*	(Crystal Barrel Collab.)
AMSLER	95B	PL B342 433	C. Amsler *et al.*	(Crystal Barrel Collab.)
AMSLER	95C	PL B353 571	C. Amsler *et al.*	(Crystal Barrel Collab.)
AMSLER	95D	PL B355 425	C. Amsler *et al.*	(Crystal Barrel Collab.)
BALOSHIN	95	PAN 58 46	O.N. Baloshin *et al.*	(ITEP)
		Translated from YAF 58 50.		
AMSLER	94D	PL B333 277	C. Amsler *et al.*	(Crystal Barrel Collab.)
ANISOVICH	94	PL B323 233	V.V. Anisovich *et al.*	(Crystal Barrel Collab.)
ANISOVICH	94B	PR D50 1972	V.V. Anisovich *et al.*	(LOQM)
ADAMO	93	NP A558 13C	A. Adamo *et al.*	(OBELIX Collab.)
ARMSTRONG	93C	PL B307 394	T.A. Armstrong *et al.*	(FNAL, FERR, GENO+)
ARMSTRONG	93D	PL B307 399	T.A. Armstrong *et al.*	(FNAL, FERR, GENO+)
WEIDENAUER	93	ZPHY C59 387	P. Weidenauer *et al.*	(ASTERIX Collab.)
ADAMO	92	PL B287 368	A. Adamo *et al.*	(OBELIX Collab.)
BELADIDZE	92B	ZPHY C54 367	G.M. Beladidze *et al.*	(VES Collab.)
AKER	91	PL B260 249	E. Aker *et al.*	(Crystal Barrel Collab.)
MAY	90	ZPHY C46 203	B. May *et al.*	(ASTERIX Collab.)
MAY	89	PL B225 450	B. May *et al.*	(ASTERIX Collab.) IJP
BRIDGES	86B	PRL 56 215	D.L. Bridges *et al.*	(SYRA, CASE)
BRIDGES	86C	PRL 57 1534	D.L. Bridges *et al.*	(SYRA)