$f_4(2300)$

$I^G(J^{PC}) = 0^+(4^{++})$

OMITTED FROM SUMMARY TABLE

> This entry was previously called $U_0(2350)$. Contains results mostly from formation experiments. For further production experiments see the Further States entry. See also $\rho(2150)$, $f_2(2150)$, $\rho_3(2250)$, $\rho_5(2350)$.

$f_4(2300)$ MASS

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

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$			
~ 2314	HASAN 94	RVUE	$\overline{p}p \to \pi\pi$
~ 2300	[1] MARTIN 80B	RVUE	
~ 2300	[1] MARTIN 80C	RVUE	
~ 2340	[2] CARTER 78B	CNTR	$0.7–2.4 \, \overline{p}p \to K^-K^+$
~ 2330	DULUDE 78B	OSPK	$1–2 \, \overline{p}p \to \pi^0\pi^0$
~ 2310	[3] CARTER 77	CNTR	$0.7–2.4 \, \overline{p}p \to \pi\pi$

[1] $I(J^P) = 0(4^+)$ from simultaneous analysis of $p\overline{p} \to \pi^-\pi^+$ and $\pi^0\pi^0$.
[2] $I(J^P) = 0(4^+)$ from Barrelet-zero analysis.
[3] $I(J^P) = 0(4^+)$ from amplitude analysis.

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

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$			
2283 ± 17	[4] ANISOVICH 00J	SPEC	
~ 2380	[5] CUTTS 78B	CNTR	$0.97–3 \, \overline{p}p \to \overline{N}N$
2345 ± 15	[5,6] COUPLAND 77	CNTR	$0.7–2.4 \, \overline{p}p \to \overline{p}p$
2359 ± 2	[5,7] ALSPECTOR 73	CNTR	$\overline{p}p$ S channel
2375 ± 10	ABRAMS 70	CNTR	S channel $\overline{N}N$

[4] From the combined analysis of ANISOVICH 99C and ANISOVICH 99F on $\overline{p}p \to \eta\pi^0\pi^0$, $\pi^0\pi^0$, $\eta\eta$, $\eta\eta'$, $\pi^+\pi^-$.
[5] Isospins 0 and 1 not separated.
[6] From a fit to the total elastic cross section.
[7] Referred to as U or U region by ALSPECTOR 73.

$\pi^-p \to \eta\pi\pi n$

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$			
$2330 \pm 20 \pm 40$	AMELIN 00	VES	$37 \, \pi^-p \to \eta\pi^+\pi^- n$

pp CENTRAL PRODUCTION

VALUE (MeV)	DOCUMENT ID	COMMENT
2320 ± 60 OUR ESTIMATE		
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$		
2332 ± 15	BARBERIS 00F	$450 \, pp \to p_f \omega\omega p_s$

$f_4(2300)$ WIDTH

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

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
~ 278		HASAN	94 RVUE	$\overline{p}p \to \pi\pi$
~ 200	[8]	MARTIN	80C RVUE	
~ 150	[9]	CARTER	78B CNTR	0.7–2.4 $\overline{p}p \to K^-K^+$
~ 210	[10]	CARTER	77 CNTR	0.7–2.4 $\overline{p}p \to \pi\pi$

[8] $I(J^P) = 0(4^+)$ from simultaneous analysis of $p\overline{p} \to \pi^-\pi^+$ and $\pi^0\pi^0$.
[9] $I(J^P) = 0(4^+)$ from Barrelet-zero analysis.
[10] $I(J^P) = 0(4^+)$ from amplitude analysis.

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

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
310 ± 25	[11]	ANISOVICH	00J SPEC	
$135 {+150 \atop -65}$	[12,13]	COUPLAND	77 CNTR	0.7–2.4 $\overline{p}p \to \overline{p}p$
$165 {+18 \atop -8}$	[13]	ALSPECTOR	73 CNTR	$\overline{p}p$ S channel
~ 190		ABRAMS	70 CNTR	S channel $\overline{N}N$

[11] From the combined analysis of ANISOVICH 99C and ANISOVICH 99F on $\overline{p}p \to \eta\pi^0\pi^0$, $\pi^0\pi^0$, $\eta\eta$, $\eta\eta'$, $\pi^+\pi^-$.
[12] From a fit to the total elastic cross section.
[13] Isospins 0 and 1 not separated.

$\pi^-p \to \eta\pi\pi n$

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$235 \pm 50 \pm 40$	AMELIN	00 VES	37 $\pi^-p \to \eta\pi^+\pi^-n$

pp CENTRAL PRODUCTION

VALUE (MeV)	DOCUMENT ID	COMMENT
250 ± 80 OUR ESTIMATE		
• • • We do not use the following data for averages, fits, limits, etc. • • •		
260 ± 57	BARBERIS	00F 450 $pp \to p_f\omega\omega p_s$

$f_4(2300)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$\rho\rho$	seen
Γ_2	$\omega\omega$	seen
Γ_3	$\eta\pi\pi$	seen
Γ_4	$\pi\pi$	seen
Γ_5	$K\overline{K}$	seen
Γ_6	$N\overline{N}$	seen

$f_4(2300)$ BRANCHING RATIOS

$\Gamma(\rho\rho)/\Gamma(\omega\omega)$ $\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ Γ_1/Γ_2

VALUE	DOCUMENT ID		COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
2.8 ± 0.5	BARBERIS	00F	$450\ pp \to p_f\,\omega\omega\,p_s$

$f_4(2300)$ REFERENCES

AMELIN	00	NP A668 83	D. Amelin *et al.*	(VES Collab.)
ANISOVICH	00J	PL B491 47	A.V. Anisovich *et al.*	(RAL, LOQM, PNPI+)
BARBERIS	00F	PL B484 198	D. Barberis *et al.*	(WA 102 Collab.)
ANISOVICH	99C	PL B452 173	A.V. Anisovich *et al.*	
ANISOVICH	99F	NP A651 253	A.V. Anisovich *et al.*	
HASAN	94	PL B334 215	A. Hasan, D.V. Bugg	(LOQM)
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
CARTER	78B	NP B141 467	A.A. Carter	(LOQM)
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
CARTER	77	PL 67B 117	A.A. Carter *et al.*	(LOQM, RHEL) JP
COUPLAND	77	PL 71B 460	M. Coupland *et al.*	(LOQM, RHEL)
ALSPECTOR	73	PRL 30 511	J. Alspector *et al.*	(RUTG, UPNJ)
ABRAMS	70	PR D1 1917	R.J. Abrams *et al.*	(BNL)