

**$f_4(2300)$**

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

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**

**$\bar{p}p \rightarrow \pi\pi$  or  $\bar{K}K$**

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
~ 2314	HASAN	94	RVUE $\bar{p}p \rightarrow \pi\pi$
~ 2300	<sup>1</sup> MARTIN	80B	RVUE
~ 2300	<sup>1</sup> MARTIN	80C	RVUE
~ 2340	<sup>2</sup> CARTER	78B	CNTR $0.7-2.4 \bar{p}p \rightarrow K^- K^+$
~ 2330	DULUDE	78B	OSPK $1-2 \bar{p}p \rightarrow \pi^0 \pi^0$
~ 2310	<sup>3</sup> CARTER	77	CNTR $0.7-2.4 \bar{p}p \rightarrow \pi\pi$
<sup>1</sup> $I(J^P) = 0(4^+)$ from simultaneous analysis of $p\bar{p} \rightarrow \pi^- \pi^+$ and $\pi^0 \pi^0$ .			
<sup>2</sup> $I(J^P) = 0(4^+)$ from Barrelet-zero analysis.			
<sup>3</sup> $I(J^P) = 0(4^+)$ from amplitude analysis.			

**S-CHANNEL  $\bar{p}p$  or  $\bar{N}N$**

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
$2283 \pm 17$	<sup>4</sup> ANISOVICH	00J	SPEC
~ 2380	<sup>5</sup> CUTTS	78B	CNTR $0.97-3 \bar{p}p \rightarrow \bar{N}N$
$2345 \pm 15$	<sup>5,6</sup> COUPLAND	77	CNTR $0.7-2.4 \bar{p}p \rightarrow \bar{p}p$
$2359 \pm 2$	<sup>5,7</sup> ALSPECTOR	73	CNTR $\bar{p}p$ S channel
$2375 \pm 10$	ABRAMS	70	CNTR S channel $\bar{N}N$
<sup>4</sup> From the combined analysis of ANISOVICH 99C and ANISOVICH 99F on $\bar{p}p \rightarrow \eta\pi^0\pi^0$ , $\pi^0\pi^0$ , $\eta\eta$ , $\eta\eta'$ , $\pi^+\pi^-$ .			
<sup>5</sup> Isospins 0 and 1 not separated.			
<sup>6</sup> From a fit to the total elastic cross section.			
<sup>7</sup> Referred to as $U$ or $U$ region by ALSPECTOR 73.			

**$\pi^- p \rightarrow \eta\pi\pi n$**

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

**$p\bar{p}$  CENTRAL PRODUCTION**

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
<b>2320±60 OUR ESTIMATE</b>			
• • • We do not use the following data for averages, fits, limits, etc. • • •			
2332±15	BARBERIS	00F	450 $p\bar{p} \rightarrow p_f \omega \omega p_S$

 **$f_4(2300)$  WIDTH** **$\bar{p}p \rightarrow \pi\pi$  or  $\bar{K}K$** 

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
~ 278	HASAN	94	RVUE $\bar{p}p \rightarrow \pi\pi$
~ 200	<sup>8</sup> MARTIN	80C	RVUE
~ 150	<sup>9</sup> CARTER	78B	CNTR 0.7–2.4 $\bar{p}p \rightarrow K^- K^+$
~ 210	<sup>10</sup> CARTER	77	CNTR 0.7–2.4 $\bar{p}p \rightarrow \pi\pi$
<sup>8</sup> $I(J^P) = 0(4^+)$ from simultaneous analysis of $p\bar{p} \rightarrow \pi^- \pi^+$ and $\pi^0 \pi^0$ .			
<sup>9</sup> $I(J^P) = 0(4^+)$ from Barrelet-zero analysis.			
<sup>10</sup> $I(J^P) = 0(4^+)$ from amplitude analysis.			

**S-CHANNEL  $\bar{p}p$  or  $\bar{N}N$** 

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
310± 25	<sup>11</sup> ANISOVICH	00J	SPEC
135 <sup>+150</sup> <sub>-65</sub>	<sup>12,13</sup> COUPLAND	77	CNTR 0.7–2.4 $\bar{p}p \rightarrow \bar{p}p$
165 <sup>+18</sup> <sub>-8</sub>	<sup>13</sup> ALSPECTOR	73	CNTR $\bar{p}p$ S channel
~ 190	ABRAMS	70	CNTR S channel $\bar{N}N$
<sup>11</sup> From the combined analysis of ANISOVICH 99C and ANISOVICH 99F on $\bar{p}p \rightarrow \eta \pi^0 \pi^0$ , $\pi^0 \pi^0$ , $\eta\eta$ , $\eta\eta'$ , $\pi^+ \pi^-$ .			
<sup>12</sup> From a fit to the total elastic cross section.			
<sup>13</sup> Isospins 0 and 1 not separated.			

 **$\pi^- p \rightarrow \eta \pi \pi n$** 

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

 **$p\bar{p}$  CENTRAL PRODUCTION**

VALUE (MeV)	DOCUMENT ID	COMMENT
<b>250±80 OUR ESTIMATE</b>		
• • • We do not use the following data for averages, fits, limits, etc. • • •		
260±57	BARBERIS	00F 450 $p\bar{p} \rightarrow p_f \omega \omega p_S$

### $f_4(2300)$ DECAY MODES

Mode	Fraction ( $\Gamma_i/\Gamma$ )
$\Gamma_1$ $\rho\rho$	seen
$\Gamma_2$ $\omega\omega$	seen
$\Gamma_3$ $\eta\pi\pi$	seen
$\Gamma_4$ $\pi\pi$	seen
$\Gamma_5$ $K\bar{K}$	seen
$\Gamma_6$ $N\bar{N}$	seen

### $f_4(2300)$ BRANCHING RATIOS

$\Gamma(\rho\rho)/\Gamma(\omega\omega)$	DOCUMENT ID	COMMENT	$\Gamma_1/\Gamma_2$
VALUE			
$2.8 \pm 0.5$	BARBERIS 00F	450 $pp \rightarrow p_f \omega \omega p_s$	

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

### $f_4(2300)$ REFERENCES

AMELIN 00	NP A668 83	D. Amelin <i>et al.</i>	(VES Collab.)
ANISOVICH 00J	PL B491 47	A.V. Anisovich <i>et al.</i>	(RAL, LOQM, PNPI+)
BARBERIS 00F	PL B484 198	D. Barberis <i>et al.</i>	(WA 102 Collab.)
ANISOVICH 99C	PL B452 173	A.V. Anisovich <i>et al.</i>	
ANISOVICH 99F	NP A651 253	A.V. Anisovich <i>et al.</i>	
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 <i>et al.</i>	(STON, WISC)
DULUDE 78B	PL 79B 335	R.S. Dulude <i>et al.</i>	(BROW, MIT, BARI) JP
CARTER 77	PL 67B 117	A.A. Carter <i>et al.</i>	(LOQM, RHEL) 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)
ABRAMS 70	PR D1 1917	R.J. Abrams <i>et al.</i>	(BNL)