

**$f_4(2300)$** 

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

## 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	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	<sup>37</sup> $\pi^- p \rightarrow \eta\pi^+\pi^- n$

## $p\bar{p}$ 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**

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

 **$f_4(2300)$  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>	
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)

**OTHER RELATED PAPERS**

ANISOVICH	99D	PL B452 180	A.V. Anisovich <i>et al.</i>	
Also		NP A651 253	A.V. Anisovich <i>et al.</i>	
ANISOVICH	99F	NP A651 253	A.V. Anisovich <i>et al.</i>	
EISENHAND...	75	NP B96 109	E. Eisenhandler <i>et al.</i>	(LOQM, LIVP, DARE+)
FIELDS	71	PRL 27 1749	T. Fields <i>et al.</i>	(ANL, OXF)
YOH	71	PRL 26 922	J.K. Yoh <i>et al.</i>	(CIT, BNL, ROCH)
BRICMAN	69	PL 29B 451	C. Bricman <i>et al.</i>	(CERN, CAEN, SACL)