

# $f_2(1565)$

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

OMITTED FROM SUMMARY TABLE

Seen in antinucleon-nucleon annihilation at rest. Needs confirmation.

## $f_2(1565)$ MASS

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
<b>1562 ±13</b>	<b>OUR AVERAGE</b>		Error includes scale factor of 2.1. See the ideogram below.
1590 ±10	<sup>1</sup> AMELIN	06 VES	36 $\pi^- p \rightarrow \omega \omega n$
1552 ±13	<sup>2</sup> AMSLER	02 CBAR	0.9 $\bar{p} p \rightarrow \pi^0 \eta \eta, \pi^0 \pi^0 \pi^0$
1550 ±10 ±20	AMELIN	00 VES	37 $\pi^- p \rightarrow \eta \pi^+ \pi^- n$
1575 ±18	BERTIN	98 OBLX	0.05–0.405 $\bar{n} p \rightarrow \pi^+ \pi^+ \pi^-$
1507 ±15	<sup>2</sup> BERTIN	97C OBLX	0.0 $\bar{p} p \rightarrow \pi^+ \pi^- \pi^0$
1565 ±20	MAY	90 ASTE	0.0 $\bar{p} p \rightarrow \pi^+ \pi^- \pi^0$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
1544.7 ± 3.0	VLADIMIRSKII	00 SPEC	40 $\pi^- p \rightarrow K_S^0 K_S^0 X$
1598 ±11 ± 9	BAKER	99B SPEC	0 $\bar{p} p \rightarrow \omega \omega \pi^0$
1534 ±20	<sup>3</sup> ABELE	96C RVUE	Compilation
~ 1552	<sup>4</sup> AMSLER	95D CBAR	0.0 $\bar{p} p \rightarrow \pi^0 \pi^0 \pi^0, \pi^0 \eta \eta, \pi^0 \pi^0 \eta$
1598 ±72	BALOSHIN	95 SPEC	40 $\pi^- C \rightarrow K_S^0 K_S^0 X$
1566 <sup>+80</sup> <sub>-50</sub>	<sup>5</sup> ANISOVICH	94 CBAR	0.0 $\bar{p} p \rightarrow 3\pi^0, \eta \eta \pi^0$
1502 ± 9	ADAMO	93 OBLX	$\bar{n} p \rightarrow \pi^+ \pi^+ \pi^-$
1488 ±10	<sup>6</sup> ARMSTRONG	93C E760	$\bar{p} p \rightarrow \pi^0 \eta \eta \rightarrow 6\gamma$
1508 ±10	<sup>6</sup> ARMSTRONG	93D E760	$\bar{p} p \rightarrow 3\pi^0 \rightarrow 6\gamma$
1525 ±10	<sup>6</sup> ARMSTRONG	93D E760	$\bar{p} p \rightarrow \eta \pi^0 \pi^0 \rightarrow 6\gamma$
~ 1504	<sup>7</sup> WEIDENAUER	93 ASTE	0.0 $\bar{p} N \rightarrow 3\pi^- 2\pi^+$
1540 ±15	<sup>6</sup> ADAMO	92 OBLX	$\bar{n} p \rightarrow \pi^+ \pi^+ \pi^-$
1515 ±10	<sup>8</sup> AKER	91 CBAR	0.0 $\bar{p} p \rightarrow 3\pi^0$
1477 ± 5	BRIDGES	86C DBC	0.0 $\bar{p} N \rightarrow 3\pi^- 2\pi^+$

<sup>1</sup> Supersedes the  $\omega\omega$  state of BELADIDZE 92B earlier assigned to the  $f_2(1640)$ .

<sup>2</sup> T-matrix pole.

<sup>3</sup> T-matrix pole, large coupling to  $\rho\rho$  and  $\omega\omega$ , could be  $f_2(1640)$ .

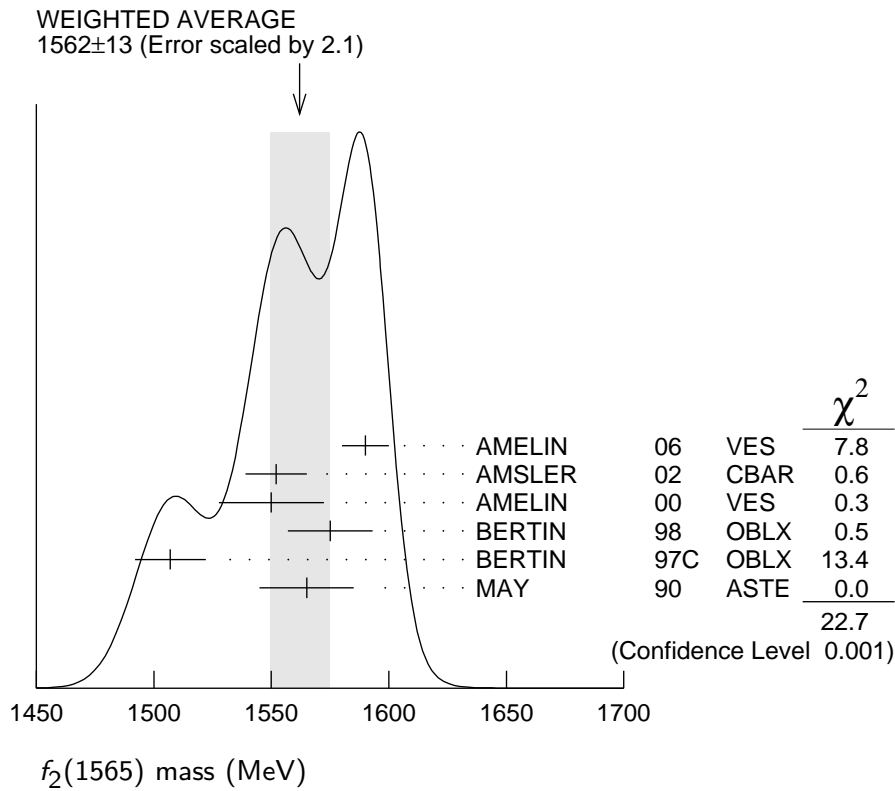
<sup>4</sup> Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D.

<sup>5</sup> From a simultaneous analysis of the annihilations  $\bar{p} p \rightarrow 3\pi^0, \pi^0 \eta \eta$  including AKER 91 data.

<sup>6</sup>  $J^P$  not determined, could be partly  $f_0(1500)$ .

<sup>7</sup>  $J^P$  not determined.

<sup>8</sup> Superseded by AMSLER 95B.



### $f_2(1565)$ WIDTH

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
<b>134 ± 8</b>	<b>OUR AVERAGE</b>		
140 ± 11	<sup>9</sup> AMELIN	06 VES	$36 \pi^- p \rightarrow \omega \omega n$
113 ± 23	<sup>10</sup> AMSLER	02 CBAR	$0.9 \bar{p} p \rightarrow \pi^0 \eta \eta, \pi^0 \pi^0 \pi^0$
130 ± 20 ± 40	AMELIN	00 VES	$37 \pi^- p \rightarrow \eta \pi^+ \pi^- n$
119 ± 24	BERTIN	98 OBLX	$0.05-0.405 \bar{n} p \rightarrow \pi^+ \pi^+ \pi^-$
130 ± 20	<sup>10</sup> BERTIN	97C OBLX	$0.0 \bar{p} p \rightarrow \pi^+ \pi^- \pi^0$
170 ± 40	MAY	90 ASTE	$0.0 \bar{p} p \rightarrow \pi^+ \pi^- \pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
10.3 ± 3.0	VLADIMIRSKII	00 SPEC	$40 \pi^- p \rightarrow K_S^0 K_S^0 X$
180 ± 60	<sup>11</sup> ABELE	96C RVUE	Compilation
~ 142	<sup>12</sup> AMSLER	95D CBAR	$0.0 \bar{p} p \rightarrow \pi^0 \pi^0 \pi^0, \pi^0 \eta \eta, \pi^0 \pi^0 \eta$
263 ± 101	BALOSHIN	95 SPEC	$40 \pi^- C \rightarrow K_S^0 K_S^0 X$
166 + 80 - 20	<sup>13</sup> ANISOVICH	94 CBAR	$0.0 \bar{p} p \rightarrow 3\pi^0, \eta \eta \pi^0$
130 ± 10	<sup>14</sup> ADAMO	93 OBLX	$\bar{n} p \rightarrow \pi^+ \pi^+ \pi^-$
148 ± 27	<sup>15</sup> ARMSTRONG	93C E760	$\bar{p} p \rightarrow \pi^0 \eta \eta \rightarrow 6\gamma$
103 ± 15	<sup>15</sup> ARMSTRONG	93D E760	$\bar{p} p \rightarrow 3\pi^0 \rightarrow 6\gamma$
111 ± 10	<sup>15</sup> ARMSTRONG	93D E760	$\bar{p} p \rightarrow \eta \pi^0 \pi^0 \rightarrow 6\gamma$
~ 206	<sup>16</sup> WEIDENAUER	93 ASTE	$0.0 \bar{p} N \rightarrow 3\pi^- 2\pi^+$
132 ± 37	<sup>15</sup> ADAMO	92 OBLX	$\bar{n} p \rightarrow \pi^+ \pi^+ \pi^-$
120 ± 10	<sup>17</sup> AKER	91 CBAR	$0.0 \bar{p} p \rightarrow 3\pi^0$
116 ± 9	BRIDGES	86C DBC	$0.0 \bar{p} N \rightarrow 3\pi^- 2\pi^+$

- <sup>9</sup> Supersedes the  $\omega\omega$  state of BELADIDZE 92B earlier assigned to the  $f_2(1640)$ .
- <sup>10</sup> T-matrix pole.
- <sup>11</sup> T-matrix pole, large coupling to  $\rho\rho$  and  $\omega\omega$ , could be  $f_2(1640)$ .
- <sup>12</sup> Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D.
- <sup>13</sup> From a simultaneous analysis of the annihilations  $\bar{p}p \rightarrow 3\pi^0, \pi^0\eta\eta$  including AKER 91 data.
- <sup>14</sup> Supersedes ADAMO 92.
- <sup>15</sup>  $J^P$  not determined, could be partly  $f_0(1500)$ .
- <sup>16</sup>  $J^P$  not determined.
- <sup>17</sup> Superseded by AMSLER 95B.

## $f_2(1565)$ DECAY MODES

Mode	Fraction ( $\Gamma_i/\Gamma$ )
$\Gamma_1$ $\pi\pi$	seen
$\Gamma_2$ $\pi^+\pi^-$	seen
$\Gamma_3$ $\pi^0\pi^0$	seen
$\Gamma_4$ $\rho^0\rho^0$	seen
$\Gamma_5$ $2\pi^+2\pi^-$	seen
$\Gamma_6$ $\eta\eta$	seen
$\Gamma_7$ $a_2(1320)\pi$	
$\Gamma_8$ $\omega\omega$	seen
$\Gamma_9$ $K\bar{K}$	
$\Gamma_{10}$ $\gamma\gamma$	

## $f_2(1565)$ PARTIAL WIDTHS

### $\Gamma(\eta\eta)$ $\Gamma_6$

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
$1.2 \pm 0.3$	870	<sup>18</sup> SCHEGELSKY 06A	RVUE	$\gamma\gamma \rightarrow K_S^0 K_S^0$

### $\Gamma(K\bar{K})$ $\Gamma_9$

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
$2.0 \pm 1.0$	870	<sup>18</sup> SCHEGELSKY 06A	RVUE	$\gamma\gamma \rightarrow K_S^0 K_S^0$

### $\Gamma(\gamma\gamma)$ $\Gamma_{10}$

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
$0.70 \pm 0.14$	870	<sup>18</sup> SCHEGELSKY 06A	RVUE	$\gamma\gamma \rightarrow K_S^0 K_S^0$

<sup>18</sup> 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

$\Gamma(\pi\pi)/\Gamma_{\text{total}}$   $\Gamma_1/\Gamma$   
VALUE DOCUMENT ID TECN COMMENT

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

seen BAKER 99B SPEC  $0 \bar{p}p \rightarrow \omega\omega\pi^0$

$\Gamma(\pi^+\pi^-)/\Gamma_{\text{total}}$   $\Gamma_2/\Gamma$   
VALUE DOCUMENT ID TECN COMMENT

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

seen BERTIN 98 OBLX  $0.05\text{--}0.405 \bar{p}p \rightarrow \pi^+\pi^+\pi^-$   
 not seen <sup>19</sup> ANISOVICH 94B RVUE  $\bar{p}p \rightarrow \pi^+\pi^-\pi^0$   
 seen MAY 89 ASTE  $\bar{p}p \rightarrow \pi^+\pi^-\pi^0$

<sup>19</sup> ANISOVICH 94B is from a reanalysis of MAY 90.

$\Gamma(\pi^0\pi^0)/\Gamma_{\text{total}}$   $\Gamma_3/\Gamma$   
VALUE DOCUMENT ID TECN COMMENT

seen AMSLER 95B CBAR  $0.0 \bar{p}p \rightarrow 3\pi^0$

$\Gamma(\pi^+\pi^-)/\Gamma(\rho^0\rho^0)$   $\Gamma_2/\Gamma_4$   
VALUE DOCUMENT ID TECN COMMENT

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

$0.042 \pm 0.013$  BRIDGES 86B DBC  $\bar{p}N \rightarrow 3\pi^- 2\pi^+$

$\Gamma(\eta\eta)/\Gamma(\pi^0\pi^0)$   $\Gamma_6/\Gamma_3$   
VALUE DOCUMENT ID TECN COMMENT

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

$0.024 \pm 0.005 \pm 0.012$  <sup>20</sup> ARMSTRONG 93C E760  $\bar{p}p \rightarrow \pi^0\eta\eta \rightarrow 6\gamma$

<sup>20</sup>  $J^P$  not determined, could be partly  $f_0(1500)$ .

$\Gamma(\omega\omega)/\Gamma_{\text{total}}$   $\Gamma_8/\Gamma$   
VALUE DOCUMENT ID TECN COMMENT

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

seen BAKER 99B SPEC  $0 \bar{p}p \rightarrow \omega\omega\pi^0$

## $f_2(1565)$ REFERENCES

AMELIN	06	PAN 69 690	D.V. Amelin <i>et al.</i>	(VES Collab.)
		Translated from YAF 69 715.		
SCHEGELSKY	06A	EPJ A27 207	V.A. Schegelsky <i>et al.</i>	
AMSLER	02	EPJ C23 29	C. Amsler <i>et al.</i>	
AMELIN	00	NP A668 83	D. Amelin <i>et al.</i>	(VES Collab.)
VLADIMIRSKII	00	JETPL 26 486	V.V. Vladimirkii <i>et al.</i>	
		Translated from ZETFP 72 698.		
BAKER	99B	PL B467 147	C.A. Baker <i>et al.</i>	
BERTIN	98	PR D57 55	A. Bertin <i>et al.</i>	(OBELIX Collab.)
BERTIN	97C	PL B408 476	A. Bertin <i>et al.</i>	(OBELIX Collab.)
ABELE	96C	NP A609 562	A. Abele <i>et al.</i>	(Crystal Barrel Collab.)
AMSLER	95B	PL B342 433	C. Amsler <i>et al.</i>	(Crystal Barrel Collab.)
AMSLER	95C	PL B353 571	C. Amsler <i>et al.</i>	(Crystal Barrel Collab.)
AMSLER	95D	PL B355 425	C. Amsler <i>et al.</i>	(Crystal Barrel Collab.)
BALOSHIN	95	PAN 58 46	O.N. Baloshin <i>et al.</i>	(ITEP)
		Translated from YAF 58 50.		

AMSLER	94D	PL B333 277	C. Amsler <i>et al.</i>	(Crystal Barrel Collab.)
ANISOVICH	94	PL B323 233	V.V. Anisovich <i>et al.</i>	(Crystal Barrel Collab.)
ANISOVICH	94B	PR D50 1972	V.V. Anisovich <i>et al.</i>	(LOQM)
ADAMO	93	NP A558 13C	A. Adamo <i>et al.</i>	(OBELIX Collab.)
ARMSTRONG	93C	PL B307 394	T.A. Armstrong <i>et al.</i>	(FNAL, FERR, GENO+)
ARMSTRONG	93D	PL B307 399	T.A. Armstrong <i>et al.</i>	(FNAL, FERR, GENO+)
WEIDENAUER	93	ZPHY C59 387	P. Weidenauer <i>et al.</i>	(ASTERIX Collab.)
ADAMO	92	PL B287 368	A. Adamo <i>et al.</i>	(OBELIX Collab.)
BELADIDZE	92B	ZPHY C54 367	G.M. Beladidze <i>et al.</i>	(VES Collab.)
AKER	91	PL B260 249	E. Aker <i>et al.</i>	(Crystal Barrel Collab.)
MAY	90	ZPHY C46 203	B. May <i>et al.</i>	(ASTERIX Collab.)
MAY	89	PL B225 450	B. May <i>et al.</i>	(ASTERIX Collab.) IJP
BRIDGES	86B	PRL 56 215	D.L. Bridges <i>et al.</i>	(SYRA, CASE)
BRIDGES	86C	PRL 57 1534	D.L. Bridges <i>et al.</i>	(SYRA)

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### OTHER RELATED PAPERS

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ANISOVICH	05	JETPL 80 715	V.V. Anisovich
		Translated from ZETFP 80 845.	

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