

**$f_2(1565)$** 

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

OMITTED FROM SUMMARY TABLE

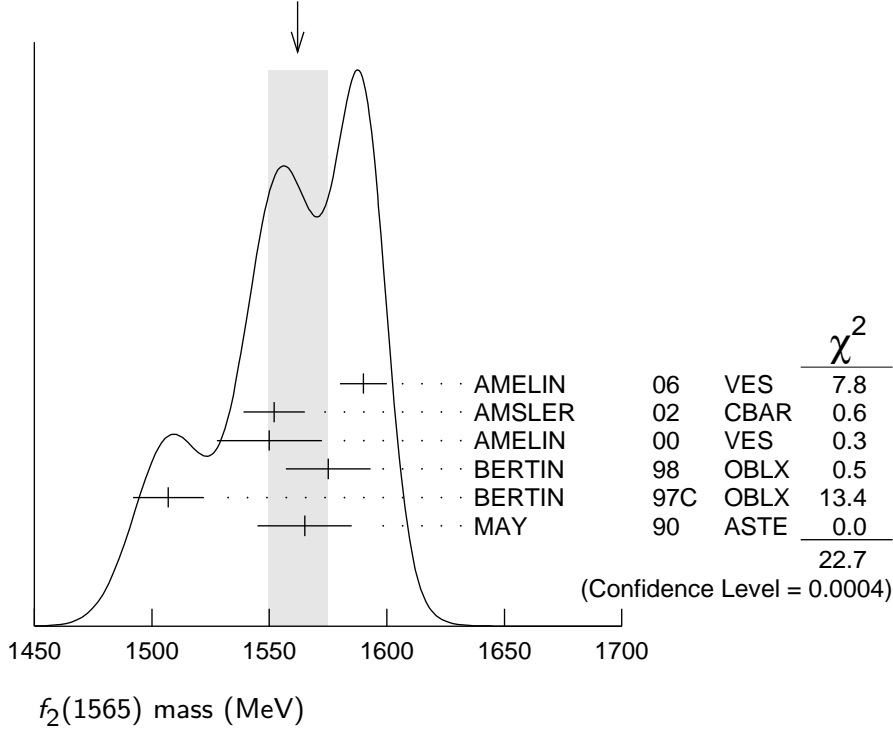
Seen mostly in antinucleon-nucleon annihilation. Needs confirmation in other channels.

 **$f_2(1565)$  MASS**

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
<b>1562 ± 13 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. • • •			
1560 ± 15	<sup>3</sup> ANISOVICH	09 RVUE	0.0 $\bar{p} p, \pi N$
1598 ± 11 ± 9	BAKER	99B SPEC	0 $\bar{p} p \rightarrow \omega \omega \pi^0$
1534 ± 20	<sup>4</sup> ABELE	96C RVUE	Compilation
~ 1552	<sup>5</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>6</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>7</sup> ARMSTRONG	93C E760	$\bar{p} p \rightarrow \pi^0 \eta \eta \rightarrow 6\gamma$
1508 ± 10	<sup>7</sup> ARMSTRONG	93D E760	$\bar{p} p \rightarrow 3\pi^0 \rightarrow 6\gamma$
1525 ± 10	<sup>7</sup> ARMSTRONG	93D E760	$\bar{p} p \rightarrow \eta \pi^0 \pi^0 \rightarrow 6\gamma$
~ 1504	<sup>8</sup> WEIDENAUER	93 ASTE	0.0 $\bar{p} N \rightarrow 3\pi^- 2\pi^+$
1540 ± 15	<sup>7</sup> ADAMO	92 OBLX	$\bar{n} p \rightarrow \pi^+ \pi^+ \pi^-$
1515 ± 10	<sup>9</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> On sheet II in a two-pole solution.<sup>4</sup> T-matrix pole, large coupling to  $\rho \rho$  and  $\omega \omega$ , could be  $f_2(1640)$ .<sup>5</sup> Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D.<sup>6</sup> From a simultaneous analysis of the annihilations  $\bar{p} p \rightarrow 3\pi^0, \pi^0 \eta \eta$  including AKER 91 data.<sup>7</sup>  $J^P$  not determined, could be partly  $f_0(1500)$ .<sup>8</sup>  $J^P$  not determined.<sup>9</sup> Superseded by AMSLER 95B.

WEIGHTED AVERAGE  
 $1562 \pm 13$  (Error scaled by 2.1)



### $f_2(1565)$ WIDTH

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
<b><math>134 \pm 8</math> OUR AVERAGE</b>			
$140 \pm 11$	10 AMELIN	06 VES	$36 \pi^- p \rightarrow \omega \omega n$
$113 \pm 23$	11 AMSLER	02 CBAR	$0.9 \bar{p} p \rightarrow \pi^0 \eta \eta, \pi^0 \pi^0 \pi^0$
$130 \pm 20 \pm 40$	AMELIN	00 VES	$37 \pi^- p \rightarrow \eta \pi^+ \pi^- n$
$119 \pm 24$	BERTIN	98 OBLX	$0.05-0.405 \bar{n} p \rightarrow \pi^+ \pi^+ \pi^-$
$130 \pm 20$	11 BERTIN	97C OBLX	$0.0 \bar{p} p \rightarrow \pi^+ \pi^- \pi^0$
$170 \pm 40$	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. ● ● ●			
$280 \pm 40$	12 ANISOVICH	09 RVUE	$0.0 \bar{p} p, \pi N$
$180 \pm 60$	13 ABELE	96C RVUE	Compilation
$\sim 142$	14 AMSLER	95D CBAR	$0.0 \bar{p} p \rightarrow \pi^0 \pi^0 \pi^0, \pi^0 \eta \eta, \pi^0 \pi^0 \eta$
$263 \pm 101$	BALOSHIN	95 SPEC	$40 \pi^- C \rightarrow K_S^0 K_S^0 X$
$166^+_{-20}$	15 ANISOVICH	94 CBAR	$0.0 \bar{p} p \rightarrow 3\pi^0, \eta \eta \pi^0$
$130 \pm 10$	16 ADAMO	93 OBLX	$\bar{n} p \rightarrow \pi^+ \pi^+ \pi^-$
$148 \pm 27$	17 ARMSTRONG	93C E760	$\bar{p} p \rightarrow \pi^0 \eta \eta \rightarrow 6\gamma$
$103 \pm 15$	17 ARMSTRONG	93D E760	$\bar{p} p \rightarrow 3\pi^0 \rightarrow 6\gamma$
$111 \pm 10$	17 ARMSTRONG	93D E760	$\bar{p} p \rightarrow \eta \pi^0 \pi^0 \rightarrow 6\gamma$
$\sim 206$	18 WEIDENAUER	93 ASTE	$0.0 \bar{p} N \rightarrow 3\pi^- 2\pi^+$
$132 \pm 37$	17 ADAMO	92 OBLX	$\bar{n} p \rightarrow \pi^+ \pi^+ \pi^-$
$120 \pm 10$	19 AKER	91 CBAR	$0.0 \bar{p} p \rightarrow 3\pi^0$
$116 \pm 9$	BRIDGES	86C DBC	$0.0 \bar{p} N \rightarrow 3\pi^- 2\pi^+$

- <sup>10</sup> Supersedes the  $\omega\omega$  state of BELADIDZE 92B earlier assigned to the  $f_2(1640)$ .  
<sup>11</sup> T-matrix pole.  
<sup>12</sup> On sheet II in a two-pole solution.  
<sup>13</sup> T-matrix pole, large coupling to  $\rho\rho$  and  $\omega\omega$ , could be  $f_2(1640)$ .  
<sup>14</sup> Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D.  
<sup>15</sup> From a simultaneous analysis of the annihilations  $\bar{p}p \rightarrow 3\pi^0, \pi^0\eta\eta$  including AKER 91 data.  
<sup>16</sup> Supersedes ADAMO 92.  
<sup>17</sup>  $J^P$  not determined, could be partly  $f_0(1500)$ .  
<sup>18</sup>  $J^P$  not determined.  
<sup>19</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
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••• We do not use the following data for averages, fits, limits, etc. •••

$1.2 \pm 0.3$	870	<sup>20</sup> SCHEGELSKY 06A	RVUE	$\gamma\gamma \rightarrow K_S^0 K_S^0$
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### $\Gamma(K\bar{K})$ $\Gamma_9$

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
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••• We do not use the following data for averages, fits, limits, etc. •••

$2.0 \pm 1.0$	870	<sup>20</sup> SCHEGELSKY 06A	RVUE	$\gamma\gamma \rightarrow K_S^0 K_S^0$
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### $\Gamma(\gamma\gamma)$ $\Gamma_{10}$

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
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••• We do not use the following data for averages, fits, limits, etc. •••

$0.70 \pm 0.14$	870	<sup>20</sup> SCHEGELSKY 06A	RVUE	$\gamma\gamma \rightarrow K_S^0 K_S^0$
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<sup>20</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** **$\Gamma(\pi\pi)/\Gamma_{\text{total}}$   $\Gamma_1/\Gamma$** 

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

 **$\Gamma(\pi^+\pi^-)/\Gamma_{\text{total}}$   $\Gamma_2/\Gamma$** 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
seen	BERTIN	98 OBLX	$0.05-0.405 \bar{p}p \rightarrow \pi^+\pi^+\pi^-$
not seen	<sup>21</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>21</sup> ANISOVICH 94B is from a reanalysis of MAY 90.			

 **$\Gamma(\pi^0\pi^0)/\Gamma_{\text{total}}$   $\Gamma_3/\Gamma$** 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
seen	AMSLER	95B CBAR	$0.0 \bar{p}p \rightarrow 3\pi^0$

 **$\Gamma(\pi^+\pi^-)/\Gamma(\rho^0\rho^0)$   $\Gamma_2/\Gamma_4$** 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
$0.042 \pm 0.013$	BRIDGES	86B DBC	$\bar{p}N \rightarrow 3\pi^- 2\pi^+$

 **$\Gamma(\eta\eta)/\Gamma(\pi^0\pi^0)$   $\Gamma_6/\Gamma_3$** 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
$0.024 \pm 0.005 \pm 0.012$	<sup>22</sup> ARMSTRONG	93C E760	$\bar{p}p \rightarrow \pi^0\eta\eta \rightarrow 6\gamma$
<sup>22</sup> $J^P$ not determined, could be partly $f_0(1500)$ .			

 **$\Gamma(\omega\omega)/\Gamma_{\text{total}}$   $\Gamma_8/\Gamma$** 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
● ● ● 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**

ANISOVICH	09	IJMP A24 2481	V.V. Anisovich, A.V. Sarantsev	
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.)
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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