

**$\omega(1650)$**

$$I^G(J^{PC}) = 0^-(1^{--})$$

**$\omega(1650)$  MASS**

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
<b>1670 ± 30 OUR ESTIMATE</b>				
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
1667 ± 13 ± 6		AUBERT	07AU BABR	10.6 e <sup>+</sup> e <sup>-</sup> → ωπ <sup>+</sup> π <sup>-</sup> γ
1645 ± 8	13	AUBERT	06D BABR	10.6 e <sup>+</sup> e <sup>-</sup> → ωηγ
1660 ± 10 ± 2		AUBERT,B	04N BABR	10.6 e <sup>+</sup> e <sup>-</sup> → π <sup>+</sup> π <sup>-</sup> π <sup>0</sup> γ
1770 ± 50 ± 60	1.2M	<sup>1</sup> ACHASOV	03D RVUE	0.44–2.00 e <sup>+</sup> e <sup>-</sup> → π <sup>+</sup> π <sup>-</sup> π <sup>0</sup>
1619 ± 5		<sup>2</sup> HENNER	02 RVUE	1.2–2.0 e <sup>+</sup> e <sup>-</sup> → ρπ, ωππ
1700 ± 20		EUGENIO	01 SPEC	18 π <sup>-</sup> p → ωηn
1705 ± 26	612	<sup>3</sup> AKHMETSHIN	00D CMD2	e <sup>+</sup> e <sup>-</sup> → ωπ <sup>+</sup> π <sup>-</sup>
1820 <sup>+190</sup> <sub>-150</sub>		<sup>4</sup> ACHASOV	98H RVUE	e <sup>+</sup> e <sup>-</sup> → π <sup>+</sup> π <sup>-</sup> π <sup>0</sup>
1840 <sup>+100</sup> <sub>-70</sub>		<sup>5</sup> ACHASOV	98H RVUE	e <sup>+</sup> e <sup>-</sup> → ωπ <sup>+</sup> π <sup>-</sup>
1780 <sup>+170</sup> <sub>-300</sub>		<sup>6</sup> ACHASOV	98H RVUE	e <sup>+</sup> e <sup>-</sup> → K <sup>+</sup> K <sup>-</sup>
~ 2100		<sup>7</sup> ACHASOV	98H RVUE	e <sup>+</sup> e <sup>-</sup> → K <sub>S</sub> <sup>0</sup> K <sup>±</sup> π <sup>∓</sup>
1606 ± 9		<sup>8</sup> CLEGG	94 RVUE	
1662 ± 13	750	<sup>9</sup> ANTONELLI	92 DM2	1.34–2.4 e <sup>+</sup> e <sup>-</sup> → ρπ, ωππ
1670 ± 20		ATKINSON	83B OMEG	20–70 γp → 3πX
1657 ± 13		CORDIER	81 DM1	e <sup>+</sup> e <sup>-</sup> → ω2π
1679 ± 34	21	ESPOSITO	80 FRAM	e <sup>+</sup> e <sup>-</sup> → 3π
1652 ± 17		COSME	79 OSPK	e <sup>+</sup> e <sup>-</sup> → 3π

<sup>1</sup>From the combined fit of ANTONELLI 92, ACHASOV 01E, ACHASOV 02E, and ACHASOV 03D data on the π<sup>+</sup>π<sup>-</sup>π<sup>0</sup> and ANTONELLI 92 on the ωπ<sup>+</sup>π<sup>-</sup> final states. Supersedes ACHASOV 99E and ACHASOV 02E.

<sup>2</sup>Using results of CORDIER 81 and preliminary data of DOLINSKY 91 and ANTONELLI 92.

<sup>3</sup>Using the data of AKHMETSHIN 00D and ANTONELLI 92. The ρπ dominance for the energy dependence of the ω(1420) and ω(1650) width assumed.

<sup>4</sup>Using data from BARKOV 87, DOLINSKY 91, and ANTONELLI 92.

<sup>5</sup>Using the data from ANTONELLI 92.

<sup>6</sup>Using the data from IVANOV 81 and BISELLO 88B.

<sup>7</sup>Using the data from BISELLO 91C.

<sup>8</sup>From a fit to two Breit-Wigner functions and using the data of DOLINSKY 91 and ANTONELLI 92.

<sup>9</sup>From the combined fit of the ρπ and ωππ final states.

## $\omega(1650)$ WIDTH

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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### **315 ± 35 OUR ESTIMATE**

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

222 ± 25 ± 20		AUBERT	07AU BABR	10.6 $e^+e^- \rightarrow \omega\pi^+\pi^-\gamma$
114 ± 14	13	AUBERT	06D BABR	10.6 $e^+e^- \rightarrow \omega\eta\gamma$
230 ± 30 ± 20		AUBERT,B	04N BABR	10.6 $e^+e^- \rightarrow \pi^+\pi^-\pi^0\gamma$
490 <sup>+200</sup> <sub>-150</sub> ± 130	1.2M	<sup>10</sup> ACHASOV	03D RVUE	0.44–2.00 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$
250 ± 14		<sup>11</sup> HENNER	02 RVUE	1.2–2.0 $e^+e^- \rightarrow \rho\pi, \omega\pi\pi$
250 ± 50		EUGENIO	01 SPEC	18 $\pi^-p \rightarrow \omega\eta n$
370 ± 25	612	<sup>12</sup> AKHMETSHIN	00D CMD2	$e^+e^- \rightarrow \omega\pi^+\pi^-$
113 ± 20		<sup>13</sup> CLEGG	94 RVUE	
280 ± 24	750	<sup>14</sup> ANTONELLI	92 DM2	1.34–2.4 $e^+e^- \rightarrow \rho\pi, \omega\pi\pi$
160 ± 20		ATKINSON	83B OMEG	20–70 $\gamma p \rightarrow 3\pi X$
136 ± 46		CORDIER	81 DM1	$e^+e^- \rightarrow \omega 2\pi$
99 ± 49	21	ESPOSITO	80 FRAM	$e^+e^- \rightarrow 3\pi$
42 ± 17		COSME	79 OSPK	$e^+e^- \rightarrow 3\pi$

<sup>10</sup>From the combined fit of ANTONELLI 92, ACHASOV 01E, ACHASOV 02E, and ACHASOV 03D data on the  $\pi^+\pi^-\pi^0$  and ANTONELLI 92 on the  $\omega\pi^+\pi^-$  final states. Supersedes ACHASOV 99E and ACHASOV 02E.

<sup>11</sup>Using results of CORDIER 81 and preliminary data of DOLINSKY 91 and ANTONELLI 92.

<sup>12</sup>Using the data of AKHMETSHIN 00D and ANTONELLI 92. The  $\rho\pi$  dominance for the energy dependence of the  $\omega(1420)$  and  $\omega(1650)$  width assumed.

<sup>13</sup>From a fit to two Breit-Wigner functions and using the data of DOLINSKY 91 and ANTONELLI 92.

<sup>14</sup>From the combined fit of the  $\rho\pi$  and  $\omega\pi\pi$  final states.

## $\omega(1650)$ DECAY MODES

Mode	Fraction ( $\Gamma_j/\Gamma$ )
$\Gamma_1$ $\rho\pi$	seen
$\Gamma_2$ $\omega\pi\pi$	seen
$\Gamma_3$ $\omega\eta$	seen
$\Gamma_4$ $e^+e^-$	seen

## $\omega(1650) \Gamma(i)\Gamma(e^+e^-)/\Gamma^2(\text{total})$

$\Gamma(\rho\pi)/\Gamma_{\text{total}} \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$   $\Gamma_1/\Gamma \times \Gamma_4/\Gamma$

<u>VALUE (units <math>10^{-6}</math>)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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• • • We do not use the following data for averages, fits, limits, etc. • • •

1.3 ± 0.1 ± 0.1		AUBERT,B	04N BABR	10.6 $e^+e^- \rightarrow \pi^+\pi^-\pi^0\gamma$
1.2 <sup>+0.4</sup> <sub>-0.1</sub> ± 0.8	1.2M	<sup>15,16</sup> ACHASOV	03D RVUE	0.44–2.00 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$
0.921 ± 0.230		<sup>17,18</sup> CLEGG	94 RVUE	
0.479 ± 0.050	750	<sup>19,20</sup> ANTONELLI	92 DM2	1.34–2.4 $e^+e^- \rightarrow \rho\pi, \omega\pi\pi$

$\Gamma(\omega\pi\pi)/\Gamma_{\text{total}} \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$   $\Gamma_2/\Gamma \times \Gamma_4/\Gamma$

VALUE (units $10^{-7}$ )	EVTS	DOCUMENT ID	TECN	COMMENT
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
7.0 ± 0.5		AUBERT	07AU BABR	10.6 $e^+e^- \rightarrow \omega\pi^+\pi^-\gamma$
4.1 ± 0.9 ± 1.3	1.2M	15,16 ACHASOV	03D RVUE	0.44–2.00 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$
5.40 ± 0.95		21 AKHMETSHIN	00D CMD2	1.2–1.38 $e^+e^- \rightarrow \omega\pi^+\pi^-$
3.18 ± 0.80		17,18 CLEGG	94 RVUE	
6.07 ± 0.61	750	19,20 ANTONELLI	92 DM2	1.34–2.4 $e^+e^- \rightarrow \rho\pi, \omega\pi\pi$

$\Gamma(\omega\eta)/\Gamma_{\text{total}} \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$   $\Gamma_3/\Gamma \times \Gamma_4/\Gamma$

VALUE (units $10^{-6}$ )	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
0.57 ± 0.06		13	AUBERT	06D BABR	10.6 $e^+e^- \rightarrow \omega\eta\gamma$
<6	90		22 AKHMETSHIN	03B CMD2	$e^+e^- \rightarrow \eta\pi^0\gamma$

- 15 Calculated by us from the cross section at the peak.
- 16 From the combined fit of ANTONELLI 92, ACHASOV 01E, ACHASOV 02E, and ACHASOV 03D data on the  $\pi^+\pi^-\pi^0$  and ANTONELLI 92 on the  $\omega\pi^+\pi^-$  final states. Supersedes ACHASOV 99E and ACHASOV 02E.
- 17 From a fit to two Breit-Wigner functions and using the data of DOLINSKY 91 and ANTONELLI 92.
- 18 From the partial and leptonic width given by the authors.
- 19 From the combined fit of the  $\rho\pi$  and  $\omega\pi\pi$  final states.
- 20 From the product of the leptonic width and partial branching ratio given by the authors.
- 21 Using the data of AKHMETSHIN 00D and ANTONELLI 92. The  $\rho\pi$  dominance for the energy dependence of the  $\omega(1420)$  and  $\omega(1650)$  width assumed.
- 22  $\omega(1650)$  mass and width fixed at 1700 MeV and 250 MeV, respectively.

**$\omega(1650)$  BRANCHING RATIOS**

$\Gamma(\omega\pi\pi)/\Gamma_{\text{total}}$   $\Gamma_2/\Gamma$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
~ 0.35	1.2M	23 ACHASOV	03D RVUE	0.44–2.00 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$
0.620 ± 0.014		24 HENNER	02 RVUE	1.2–2.0 $e^+e^- \rightarrow \rho\pi, \omega\pi\pi$

$\Gamma(\rho\pi)/\Gamma_{\text{total}}$   $\Gamma_1/\Gamma$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
~ 0.65	1.2M	23 ACHASOV	03D RVUE	0.44–2.00 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$
0.380 ± 0.014		24 HENNER	02 RVUE	1.2–2.0 $e^+e^- \rightarrow \rho\pi, \omega\pi\pi$

$\Gamma(e^+e^-)/\Gamma_{\text{total}}$

$\Gamma_4/\Gamma$

VALUE (units  $10^{-7}$ )    EVTS    DOCUMENT ID    TECN    COMMENT

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

~ 18                    1.2M<sup>24,25</sup> ACHASOV    03D RVUE    0.44–2.00  $e^+e^- \rightarrow \pi^+\pi^-\pi^0$   
 32±1                    24 HENNER        02 RVUE    1.2–2.0  $e^+e^- \rightarrow \rho\pi, \omega\pi\pi$

<sup>23</sup>From the combined fit of ANTONELLI 92, ACHASOV 01E, ACHASOV 02E, and ACHASOV 03D data on the  $\pi^+\pi^-\pi^0$  and ANTONELLI 92 on the  $\omega\pi^+\pi^-$  final states. Supersedes ACHASOV 99E and ACHASOV 02E.

<sup>24</sup>Assuming that the  $\omega(1650)$  decays into  $\rho\pi$  and  $\omega\pi\pi$  only.

<sup>25</sup>Calculated by us from the cross section at the peak.

### $\omega(1650)$ REFERENCES

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AUBERT	06D	PR D73 052003	B. Aubert <i>et al.</i>	(BABAR Collab.)
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BISELLO	91C	ZPHY C52 227	D. Bisello <i>et al.</i>	(DM2 Collab.)
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