# $\omega(1650)$

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

## $\omega(1650)$ MASS

| *VALUE* (MeV) | *EVTS* | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|---|
| **1670± 30 OUR ESTIMATE** | | | | | |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| 1667± 13± 6 | | AUBERT | 07AU | BABR | 10.6 $e^+e^- \to \omega\pi^+\pi^-\gamma$ |
| 1645± 8 | 13 | AUBERT | 06D | BABR | 10.6 $e^+e^- \to \omega\eta\gamma$ |
| 1660± 10± 2 | | AUBERT,B | 04N | BABR | 10.6 $e^+e^- \to \pi^+\pi^-\pi^0\gamma$ |
| 1770± 50±60 | 1.2M | [1] ACHASOV | 03D | RVUE | 0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$ |
| 1619± 5 | | [2] HENNER | 02 | RVUE | 1.2–2.0 $e^+e^- \to \rho\pi$, $\omega\pi\pi$ |
| 1700± 20 | | EUGENIO | 01 | SPEC | 18 $\pi^- p \to \omega\eta n$ |
| 1705± 26 | 612 | [3] AKHMETSHIN | 00D | CMD2 | $e^+e^- \to \omega\pi^+\pi^-$ |
| $1820^{+190}_{-150}$ | | [4] ACHASOV | 98H | RVUE | $e^+e^- \to \pi^+\pi^-\pi^0$ |
| $1840^{+100}_{-\ 70}$ | | [5] ACHASOV | 98H | RVUE | $e^+e^- \to \omega\pi^+\pi^-$ |
| $1780^{+170}_{-300}$ | | [6] ACHASOV | 98H | RVUE | $e^+e^- \to K^+K^-$ |
| $\sim 2100$ | | [7] ACHASOV | 98H | RVUE | $e^+e^- \to K^0_S K^\pm\pi^\mp$ |
| 1606± 9 | | [8] CLEGG | 94 | RVUE | |
| 1662± 13 | 750 | [9] ANTONELLI | 92 | DM2 | 1.34–2.4$e^+e^- \to \rho\pi$, $\omega\pi\pi$ |
| 1670± 20 | | ATKINSON | 83B | OMEG | 20–70 $\gamma p \to 3\pi X$ |
| 1657± 13 | | CORDIER | 81 | DM1 | $e^+e^- \to \omega 2\pi$ |
| 1679± 34 | 21 | ESPOSITO | 80 | FRAM | $e^+e^- \to 3\pi$ |
| 1652± 17 | | COSME | 79 | OSPK | $e^+e^- \to 3\pi$ |

[1] 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.

[2] Using results of CORDIER 81 and preliminary data of DOLINSKY 91 and ANTONELLI 92.

[3] 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.

[4] Using data from BARKOV 87, DOLINSKY 91, and ANTONELLI 92.

[5] Using the data from ANTONELLI 92.

[6] Using the data from IVANOV 81 and BISELLO 88B.

[7] Using the data from BISELLO 91C.

[8] From a fit to two Breit-Wigner functions and using the data of DOLINSKY 91 and ANTONELLI 92.

[9] From the combined fit of the $\rho\pi$ and $\omega\pi\pi$ final states.

## $\omega(1650)$ WIDTH

| *VALUE* (MeV) | *EVTS* | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|---|
| **315± 35 OUR ESTIMATE** | | | | | |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| 222± 25± 20 | | AUBERT | 07AU | BABR | 10.6 $e^+e^- \to \omega\pi^+\pi^-\gamma$ |
| 114± 14 | 13 | AUBERT | 06D | BABR | 10.6 $e^+e^- \to \omega\eta\gamma$ |
| 230± 30± 20 | | AUBERT,B | 04N | BABR | 10.6 $e^+e^- \to \pi^+\pi^-\pi^0\gamma$ |
| $490^{+200}_{-150}\pm130$ | 1.2M | [10] ACHASOV | 03D | RVUE | 0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$ |
| 250± 14 | | [11] HENNER | 02 | RVUE | 1.2–2.0 $e^+e^- \to \rho\pi$, $\omega\pi\pi$ |
| 250± 50 | | EUGENIO | 01 | SPEC | 18 $\pi^- p \to \omega\eta n$ |
| 370± 25 | 612 | [12] AKHMETSHIN | 00D | CMD2 | $e^+e^- \to \omega\pi^+\pi^-$ |
| 113± 20 | | [13] CLEGG | 94 | RVUE | |
| 280± 24 | 750 | [14] ANTONELLI | 92 | DM2 | 1.34–2.4$e^+e^- \to \rho\pi$, $\omega\pi\pi$ |
| 160± 20 | | ATKINSON | 83B | OMEG | 20–70 $\gamma p \to 3\pi X$ |
| 136± 46 | | CORDIER | 81 | DM1 | $e^+e^- \to \omega 2\pi$ |
| 99± 49 | 21 | ESPOSITO | 80 | FRAM | $e^+e^- \to 3\pi$ |
| 42± 17 | | COSME | 79 | OSPK | $e^+e^- \to 3\pi$ |

[10] 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.

[11] Using results of CORDIER 81 and preliminary data of DOLINSKY 91 and ANTONELLI 92.

[12] 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.

[13] From a fit to two Breit-Wigner functions and using the data of DOLINSKY 91 and ANTONELLI 92.

[14] From the combined fit of the $\rho\pi$ and $\omega\pi\pi$ final states.

## $\omega(1650)$ DECAY MODES

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

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

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

| *VALUE* (units $10^{-6}$) | *EVTS* | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|---|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| 1.3 ±0.1 ±0.1 | | AUBERT,B | 04N | BABR | 10.6 $e^+e^- \to \pi^+\pi^-\pi^0\gamma$ |
| $1.2\ ^{+0.4}_{-0.1}$ ±0.8 | 1.2M | [15,16] ACHASOV | 03D | RVUE | 0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$ |
| 0.921±0.230 | | [17,18] CLEGG | 94 | RVUE | |
| 0.479±0.050 | 750 | [19,20] ANTONELLI | 92 | DM2 | 1.34–2.4$e^+e^- \to \rho\pi$, $\omega\pi\pi$ |

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

| 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 $e^+e^- \to \omega\pi^+\pi^-\gamma$ |
| 4.1 ±0.9 ±1.3 | 1.2M | [15,16] ACHASOV | 03D | RVUE | 0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$ |
| 5.40±0.95 | | [21] AKHMETSHIN | 00D | CMD2 | 1.2–1.38 $e^+e^- \to \omega\pi^+\pi^-$ |
| 3.18±0.80 | | [17,18] CLEGG | 94 | RVUE | |
| 6.07±0.61 | 750 | [19,20] ANTONELLI | 92 | DM2 | 1.34–2.4 $e^+e^- \to \rho\pi, \omega\pi\pi$ |

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

| 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 $e^+e^- \to \omega\eta\gamma$ |
| <6 | 90 | | [22] AKHMETSHIN | 03B | CMD2 | $e^+e \to \eta\pi^0\gamma$ |

[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

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

| 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 $e^+e^- \to \pi^+\pi^-\pi^0$ |
| 0.620±0.014 | | [24] HENNER | 02 | RVUE | 1.2–2.0 $e^+e^- \to \rho\pi, \omega\pi\pi$ |

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

| 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 $e^+e^- \to \pi^+\pi^-\pi^0$ |
| 0.380±0.014 | | [24] HENNER | 02 | RVUE | 1.2–2.0 $e^+e^- \to \rho\pi, \omega\pi\pi$ |

## $\Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_4/\Gamma$

| *VALUE* (units $10^{-7}$) | *EVTS* | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|---|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| $\sim 18$ | 1.2M | [24,25] ACHASOV | 03D | RVUE | 0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$ |
| $32\pm1$ | | [24] HENNER | 02 | RVUE | 1.2–2.0 $e^+e^- \to \rho\pi,\ \omega\pi\pi$ |

[23] 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.

[24] Assuming that the $\omega(1650)$ decays into $\rho\pi$ and $\omega\pi\pi$ only.

[25] Calculated by us from the cross section at the peak.

## $\omega(1650)$ REFERENCES


| | | | | |
|---|---|---|---|---|
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| ANTONELLI | 92 | ZPHY C56 15 | A. Antonelli *et al.* | (DM2 Collab.) |
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| | | Translated from ZETFP 46 132. | | |
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