$\omega(1650)$

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

$\omega(1650)$ 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	$e^+e^- \to K^+K^-$
~ 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 $e^+ e^- \rightarrow \omega \pi^+ \pi^- \gamma$
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^{+200}_{-150}±130	1.2M	[10] ACHASOV 03D	RVUE	0.44–2.00 $e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
250± 14		[11] 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	[12] AKHMETSHIN 00D	CMD2	$e^+ e^- \rightarrow \omega \pi^+ \pi^-$
113± 20		[13] CLEGG 94	RVUE	
280± 24	750	[14] 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	$e^+ e^- \rightarrow 3\pi$

[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 (Γ_i/Γ)
Γ_1	$\rho\pi$	seen
Γ_2	$\omega\pi\pi$	seen
Γ_3	$\omega\eta$	seen
Γ_4	$e^+ e^-$	seen

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

$\Gamma(\rho\pi) \times \Gamma(e^+ e^-)/\Gamma^2_{\text{total}}$ — $\Gamma_1\Gamma_4/\Gamma^2$

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 $e^+ e^- \rightarrow \pi^+ \pi^- \pi^0 \gamma$
1.2 $^{+0.4}_{-0.1}$ ±0.8	1.2M	[15,16] ACHASOV 03D	RVUE	0.44–2.00 $e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
0.921±0.230		[17,18] CLEGG 94	RVUE	
0.479±0.050	750	[19,20] ANTONELLI 92	DM2	1.34–2.4$e^+ e^- \rightarrow \rho\pi, \omega\pi\pi$

$\Gamma(\omega\pi\pi) \times \Gamma(e^+e^-)/\Gamma^2_{total}$ — $\Gamma_2\Gamma_4/\Gamma^2$

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 $e^+e^- \rightarrow \rho\pi$, $\omega\pi\pi$

$\Gamma(\omega\eta) \times \Gamma(e^+e^-)/\Gamma^2_{total}$ — $\Gamma_3\Gamma_4/\Gamma^2$

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.

ω(1650) BRANCHING RATIOS

$\Gamma(\omega\pi\pi)/\Gamma_{total}$ — Γ_2/Γ

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 $e^+e^- \rightarrow \rho\pi$, $\omega\pi\pi$

$\Gamma(\rho\pi)/\Gamma_{total}$ — Γ_1/Γ

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 $e^+e^- \rightarrow \rho\pi$, $\omega\pi\pi$

$\Gamma(e^+e^-)/\Gamma_{total}$ Γ_4/Γ

VALUE (units 10^{-7})	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
~ 18	1.2M	[24,25] ACHASOV	03D RVUE	0.44–2.00 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$
32 ± 1		[24] HENNER	02 RVUE	1.2–2.0 $e^+e^- \rightarrow \rho\pi$, $\omega\pi\pi$

[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

AUBERT	07AU	PR D76 092005	B. Aubert et al.	(BABAR Collab.)
AUBERT	06D	PR D73 052003	B. Aubert et al.	(BABAR Collab.)
AUBERT,B	04N	PR D70 072004	B. Aubert et al.	(BABAR Collab.)
ACHASOV	03D	PR D68 052006	M.N. Achasov et al.	(Novosibirsk SND Collab.)
AKHMETSHIN	03B	PL B562 173	R.R. Akhmetshin et al.	(Novosibirsk CMD-2 Collab.)
ACHASOV	02E	PR D66 032001	M.N. Achasov et al.	(Novosibirsk SND Collab.)
HENNER	02	EPJ C26 3	V.K. Henner et al.	
ACHASOV	01E	PR D63 072002	M.N. Achasov et al.	(Novosibirsk SND Collab.)
EUGENIO	01	PL B497 190	P. Eugenio et al.	
AKHMETSHIN	00D	PL B489 125	R.R. Akhmetshin et al.	(Novosibirsk CMD-2 Collab.)
ACHASOV	99E	PL B462 365	M.N. Achasov et al.	(Novosibirsk SND Collab.)
ACHASOV	98H	PR D57 4334	N.N. Achasov, A.A. Kozhevnikov	
CLEGG	94	ZPHY C62 455	A.B. Clegg, A. Donnachie	(LANC, MCHS)
ANTONELLI	92	ZPHY C56 15	A. Antonelli et al.	(DM2 Collab.)
BISELLO	91C	ZPHY C52 227	D. Bisello et al.	(DM2 Collab.)
DOLINSKY	91	PRPL 202 99	S.I. Dolinsky et al.	(NOVO)
BISELLO	88B	ZPHY C39 13	D. Bisello et al.	(PADO, CLER, FRAS+)
BARKOV	87	JETPL 46 164	L.M. Barkov et al.	(NOVO)
		Translated from ZETFP 46 132.		
ATKINSON	83B	PL 127B 132	M. Atkinson et al.	(BONN, CERN, GLAS+)
CORDIER	81	PL 106B 155	A. Cordier et al.	(ORSAY)
IVANOV	81	PL 107B 297	P.M. Ivanov et al.	(NOVO)
ESPOSITO	80	LNC 28 195	B. Esposito et al.	(FRAS, NAPL, PADO+)
COSME	79	NP B152 215	G. Cosme et al.	(IPN)

OTHER RELATED PAPERS

ACHASOV	07A	PR D76 072012	M.N. Achasov et al.	(SND Collab.)
AKHMETSHIN	03	PL B551 27	R.R. Akhmetshin et al.	(Novosibirsk CMD-2 Collab.)
Also		PAN 65 1222	E.V. Anashkin, V.M. Aulchenko, R.R. Akhmetshin	
		Translated from YAF 65 1255.		
ACHASOV	02B	PAN 65 153	N.N. Achasov, A.A. Kozhevnikov	
		Translated from YAF 65 158.		
CLOSE	02	PR D65 092003	F.E. Close, A. Donnachie, Yu.S. Kalashnikova	
ACHASOV	00J	PR D62 117503	N.N. Achasov, A.A. Kozhevnikov	
ANISOVICH	00H	PL B485 341	A.V. Anisovich et al.	
ABELE	99D	PL B468 178	A. Abele et al.	(Crystal Barrel Collab.)
BELOZEROVA	98	PPN 29 63	T.S. Belozerova, V.K. Henner	
		Translated from FECAY 29 148.		
ACHASOV	97F	PAN 60 2029	N.N. Achasov, A.A. Kozhevnikov	(NOVM)
		Translated from YAF 60 2212.		
DOLINSKY	91	PRPL 202 99	S.I. Dolinsky et al.	(NOVO)
ATKINSON	87	ZPHY C34 157	M. Atkinson et al.	(BONN, CERN, GLAS+)
ATKINSON	84	NP B231 15	M. Atkinson et al.	(BONN, CERN, GLAS+)