$\phi(1680)$

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

$\phi(1680)$ MASS

e^+e^- PRODUCTION

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1680±20 OUR ESTIMATE					
1681± 8 OUR AVERAGE					
1700±20		[1] CLEGG	94	RVUE	$e^+e^- \to K^+K^-$, $K^0_S K\pi$
1657±27	367	BISELLO	91C	DM2	$e^+e^- \to K^0_S K^\pm\pi^\mp$
1680±10		[2] BUON	82	DM1	$e^+e^- \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1623±20	948	[3] AKHMETSHIN	03	CMD2	1.05–1.38 $e^+e^- \to K^0_L K^0_S$
~ 1500		[4] ACHASOV	98H	RVUE	$e^+e^- \to \pi^+\pi^-\pi^0$, $\omega\pi^+\pi^-$, K^+K^-
~ 1900		[5] ACHASOV	98H	RVUE	$e^+e^- \to K^0_S K^\pm\pi^\mp$
1655±17		[6] BISELLO	88B	DM2	$e^+e^- \to K^+K^-$
1677±12		[7] MANE	82	DM1	$e^+e^- \to K^0_S K\pi$

PHOTOPRODUCTION

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1726±22	BUSENITZ	89	TPS	$\gamma p \to K^+K^-X$
1760±20	ATKINSON	85C	OMEG	20–70 $\gamma p \to K\overline{K}X$
1690±10	ASTON	81F	OMEG	25–70 $\gamma p \to K^+K^-X$

[1] Using BISELLO 88B and MANE 82 data.

[2] From global fit of ρ, ω, ϕ and their radial excitations to channels $\omega\pi^+\pi^-$, K^+K^-, $K^0_S K^0_L$, $K^0_S K^\pm\pi^\mp$. Assume mass 1570 MeV and width 510 MeV for ρ radial excitations, mass 1570 and width 500 MeV for ω radial excitation.

[3] From the combined fit of AKHMETSHIN 03 and MANE 81 also including ρ, ω, and ϕ. Neither isospin nor flavor structure known.

[4] Using data from IVANOV 81, BARKOV 87, BISELLO 88B, DOLINSKY 91, and ANTONELLI 92.

[5] Using the data from BISELLO 91C.

[6] From global fit including ρ, ω, ϕ and $\rho(1700)$ assume mass 1570 MeV and width 510 MeV for ρ radial excitation.

[7] Fit to one channel only, neglecting interference with ω, $\rho(1700)$.

$\phi(1680)$ WIDTH

e^+e^- PRODUCTION

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
150±50 OUR ESTIMATE This is only an educated guess; the error given is larger than the error on the average of the published values.				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
139±60	948	[8] AKHMETSHIN 03	CMD2	1.05–1.38 $e^+e^- \to K^0_L K^0_S$
300±60		[9] CLEGG 94	RVUE	$e^+e^- \to K^+K^-$, $K^0_S K\pi$
146±55	367	BISELLO 91C	DM2	$e^+e^- \to K^0_S K^\pm \pi^\mp$
207±45		[10] BISELLO 88B	DM2	$e^+e^- \to K^+K^-$
185±22		[11] BUON 82	DM1	$e^+e^- \to$ hadrons
102±36		[12] MANE 82	DM1	$e^+e^- \to K^0_S K\pi$

PHOTOPRODUCTION

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
121±47	BUSENITZ 89	TPS	$\gamma p \to K^+K^-X$
80±40	ATKINSON 85C	OMEG	20–70 $\gamma p \to K\overline{K}X$
100±40	ASTON 81F	OMEG	25–70 $\gamma p \to K^+K^-X$

[8] From the combined fit of AKHMETSHIN 03 and MANE 81 also including ρ, ω, and ϕ. Neither isospin nor flavor structure known.
[9] Using BISELLO 88B and MANE 82 data.
[10] From global fit including ρ, ω, ϕ and $\rho(1700)$
[11] From global fit of ρ, ω, ϕ and their radial excitations to channels $\omega\pi^+\pi^-$, K^+K^-, $K^0_S K^0_L$, $K^0_S K^\pm\pi^\mp$. Assume mass 1570 MeV and width 510 MeV for ρ radial excitations, mass 1570 and width 500 MeV for ω radial excitation.
[12] Fit to one channel only, neglecting interference with ω, $\rho(1700)$.

$\phi(1680)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$K\overline{K}^*(892)+$ c.c.	dominant
Γ_2	$K^0_S K\pi$	seen
Γ_3	$K\overline{K}$	seen
Γ_4	$K^0_L K^0_S$	
Γ_5	e^+e^-	seen
Γ_6	$\omega\pi\pi$	not seen
Γ_7	$K^+K^-\pi^0$	

$\phi(1680)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma^2(\text{total})$

This combination of a branching ratio into channel (i) and branching ratio into e^+e^- is directly measured and obtained from the cross section at the peak. We list only data that have not been used to determine the branching ratio into (i) or e^+e^-.

$\Gamma(K^0_L K^0_S) \times \Gamma(e^+e^-)/\Gamma^2_{\text{total}}$ — $\Gamma_4\Gamma_5/\Gamma^2$

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.131 ± 0.059	948	[13] AKHMETSHIN 03	CMD2	1.05–1.38 $e^+e^- \to K^0_L K^0_S$

$\Gamma(K\overline{K}^*(892)+\text{c.c.}) \times \Gamma(e^+e^-)/\Gamma^2_{\text{total}}$ — $\Gamma_1\Gamma_5/\Gamma^2$

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
3.29 ± 0.96	367	[14] AKHMETSHIN 03	CMD2	1.05–1.38 $e^+e^- \to K^0_L K^0_S$

[13] From the combined fit of AKHMETSHIN 03 and MANE 81 also including ρ, ω, and ϕ. Neither isospin nor flavor structure known. Recaluculated by us.

[14] Recaluculated by us with the published value of $B(K\overline{K}^*(892) + \text{c.c.}) \times \Gamma(e^+e^-)$.

$\phi(1680)$ BRANCHING RATIOS

$\Gamma(K\overline{K}^*(892)+\text{c.c.})/\Gamma(K^0_S K\pi)$ — Γ_1/Γ_2

VALUE	DOCUMENT ID		TECN	COMMENT
dominant	MANE	82	DM1	$e^+e^- \to K^0_S K^\pm \pi^\mp$

$\Gamma(K\overline{K})/\Gamma(K\overline{K}^*(892)+\text{c.c.})$ — Γ_3/Γ_1

VALUE	DOCUMENT ID		TECN	COMMENT
0.07 ±0.01	BUON	82	DM1	e^+e^-

$\Gamma(\omega\pi\pi)/\Gamma(K\overline{K}^*(892)+\text{c.c.})$ — Γ_6/Γ_1

VALUE	DOCUMENT ID		TECN	COMMENT
<0.10	BUON	82	DM1	e^+e^-

$\phi(1680)$ REFERENCES

AKHMETSHIN	03	PL B551 27	R.R. Akhmetshin et al.	(Novosibirsk CMD-2 Collab.)
Also	02	PAN 65 1222	E.V. Anashkin, V.M. Aulchenko, R.R. Akhmetshin	
		Translated from YAF 65 1255.		
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)
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BARKOV	87	JETPL 46 164	L.M. Barkov et al.	(NOVO)
		Translated from ZETFP 46 132.		
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ATKINSON	86C	ZPHY C30 541	M. Atkinson *et al.*	(BONN, CERN, GLAS+)
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CORDIER	81	PL 106B 155	A. Cordier *et al.*	(ORSAY)
MANE	81	PL 99B 261	F. Mane *et al.*	(ORSAY)
ASTON	80F	NP B174 269	D. Aston	(BONN, CERN, EPOL, GLAS, LANC+)