# $\phi(1680)$

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

## $\phi(1680)$ 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. • • • | | | | | |
| 1655±17 | | [3] BISELLO | 88B | DM2 | $e^+e^- \to K^+K^-$ |
| 1677±12 | | [4] MANE | 82 | DM1 | $e^+e^- \to K^0_S K\pi$ |

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

### 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 $\gamma p \to K^+K^-X$ |

[2] From global fit of $\rho$, $\omega$, $\phi$ 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 $\rho$ radial excitations, mass 1570 and width 500 MeV for $\omega$ radial excitation.

[3] From global fit including $\rho$, $\omega$, $\phi$ and $\rho(1700)$ assume mass 1570 MeV and width 510 MeV for $\rho$ radial excitation.

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

## $\phi(1680)$ 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. • • • | | | | | |
| 300±60 | | [5] 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 | | [6] BISELLO | 88B | DM2 | $e^+e^- \to K^+K^-$ |
| 185±22 | | [7] BUON | 82 | DM1 | $e^+e^- \to$ hadrons |
| 102±36 | | [8] MANE | 82 | DM1 | $e^+e^- \to K^0_S K\pi$ |

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

### 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 $\gamma p \to K^+K^-X$ |

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

[7] From global fit of $\rho$, $\omega$, $\phi$ 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 $\rho$ radial excitations, mass 1570 and width 500 MeV for $\omega$ radial excitation.

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

## $\phi(1680)$ DECAY MODES

| | Mode | Fraction ($\Gamma_i/\Gamma$) |
|---|---|---|
| $\Gamma_1$ | $K\overline{K}^*(892)+$ c.c. | dominant |
| $\Gamma_2$ | $K^0_S K\pi$ | seen |
| $\Gamma_3$ | $K\overline{K}$ | seen |
| $\Gamma_4$ | $e^+e^-$ | seen |
| $\Gamma_5$ | $\omega\pi\pi$ | not seen |
| $\Gamma_6$ | $K^+K^-\pi^0$ | |

## $\phi(1680)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma(total)$

This combination of a partial width with the partial width into $e^+e^-$ and with the total width is obtained from the integrated cross section into channel ($i$) in $e^+e^-$ annihilation. We list only data that have not been used to determine the partial width $\Gamma(i)$ or the branching ratio $\Gamma(i)$/total.

### $\Gamma(K\overline{K}^*(892)+\text{c.c.}) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\quad \Gamma_1\Gamma_4/\Gamma$

| VALUE (keV) | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| $0.48\pm0.14$ | 367 | BISELLO | 91C | DM2 | $e^+e^- \to K^0_S K^\pm\pi^\mp$ |

## $\phi(1680)$ BRANCHING RATIOS

### $\Gamma(K\overline{K}^*(892)+\text{c.c.})/\Gamma(K^0_S K\pi)$ $\quad \Gamma_1/\Gamma_2$

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

### $\Gamma(K\overline{K})/\Gamma(K\overline{K}^*(892)+\text{c.c.})$ $\quad \Gamma_3/\Gamma_1$

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

### $\Gamma(\omega\pi\pi)/\Gamma(K\overline{K}^*(892)+\text{c.c.})$ $\quad \Gamma_5/\Gamma_1$

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

## $\phi(1680)$ REFERENCES


| | | | | |
|---|---|---|---|---|
| CLEGG | 94 | ZPHY C62 455 | +Donnachie | (LANC, MCHS) |
| BISELLO | 91C | ZPHY C52 227 | +Busetto, Castro, Nigro, Pescara+ | (DM2 Collab.) |
| BUSENITZ | 89 | PR D40 1 | +Olszewski, Callahan+ | (ILL, FNAL) |
| BISELLO | 88B | ZPHY C39 13 | +Busetto+ | (PADO, CLER, FRAS, LALO) |
| ATKINSON | 85C | ZPHY C27 233 | + | (BONN, CERN, GLAS, LANC, MCHS, CURIN+) |
| BUON | 82 | PL 118B 221 | +Bisello, Bizot, Cordier, Delcourt+ | (LALO, MONP) |
| MANE | 82 | PL 112B 178 | +Bisello, Bizot, Buon, Delcourt, Fayard+ | (LALO) |
| ASTON | 81F | PL 104B 231 | | (BONN, CERN, EPOL, GLAS, LANC, MCHS+) |


### OTHER RELATED PAPERS


| | | | | |
|---|---|---|---|---|
| ATKINSON | 86C | ZPHY C30 541 | + | (BONN, CERN, GLAS, LANC, MCHS, CURIN+) |
| ATKINSON | 84 | NP B231 15 | + | (BONN, CERN, GLAS, LANC, MCHS, CURIN+) |
| ATKINSON | 84B | NP B231 1 | + | (BONN, CERN, GLAS, LANC, MCHS, CURIN+) |
| ATKINSON | 83C | NP B229 269 | + | (BONN, CERN, GLAS, LANC, MCHS, CURIN+) |
| CORDIER | 81 | PL 106B 155 | +Bisello, Bizot, Buon, Delcourt, Mane | (ORSAY) |
| MANE | 81 | PL 99B 261 | +Bisello, Bizot, Buon, Cordier, Delcourt | (ORSAY) |
| ASTON | 80F | NP B174 269 | | (BONN, CERN, EPOL, GLAS, LANC, MCHS+) |