$\phi(2170)$

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

Observed by AUBERT,BE 06D in the initial-state radiation process $e^+e^- \to \phi f_0(980)\gamma$.

$\phi(2170)$ MASS

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$2135 \pm 8 \pm 9$	95	ABLIKIM	19I	BES3	$e^+e^- \to \eta\phi f_0(980)$
$2239.2 \pm 7.1 \pm 11.3$		[1] ABLIKIM	19L	BES3	$e^+e^- \to K^+K^-$
$2200 \pm 6 \pm 5$	471	ABLIKIM	15H	BES3	$J/\psi \to \eta\phi\pi^+\pi^-$
$2180 \pm 8 \pm 8$		[2,3] LEES	12F	BABR	10.6 $e^+e^- \to \phi\pi^+\pi^-\gamma$
$2079 \pm 13\ ^{+79}_{-28}$	4.8k	[4] SHEN	09	BELL	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\gamma$
$2186 \pm 10 \pm 6$	52	ABLIKIM	08F	BES	$J/\psi \to \eta\phi f_0(980)$
$2125 \pm 22 \pm 10$	483	AUBERT	08S	BABR	10.6 $e^+e^- \to \phi\eta\gamma$
2192 ± 14	116	[5] AUBERT	07AK	BABR	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\gamma$
2169 ± 20	149	[5] AUBERT	07AK	BABR	10.6 $e^+e^- \to K^+K^-\pi^0\pi^0\gamma$
$2175 \pm 10 \pm 15$	201	[3,6] AUBERT,BE	06D	BABR	10.6 $e^+e^- \to K^+K^-\pi\pi\gamma$

[1] The observed structure can be due to both the $\phi(2170)$ and $\rho(2150)$.
[2] Fit includes interference with the $\phi(1680)$.
[3] From the $\phi f_0(980)$ component.
[4] From a fit with two incoherent Breit-Wigners.
[5] From the $K^+K^- f_0(980)$ component.
[6] Superseded by LEES 12F.

$\phi(2170)$ WIDTH

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$104 \pm 24 \pm 12$	95	ABLIKIM	19I	BES3	$e^+e^- \to \eta\phi f_0(980)$
$139.8 \pm 12.3 \pm 20.6$		[7] ABLIKIM	19L	BES3	$e^+e^- \to K^+K^-$
$104 \pm 15 \pm 15$	471	ABLIKIM	15H	BES3	$J/\psi \to \eta\phi\pi^+\pi^-$
$77 \pm 15 \pm 10$		[8,9] LEES	12F	BABR	10.6 $e^+e^- \to \phi\pi^+\pi^-\gamma$
$192 \pm 23\ ^{+25}_{-61}$	4.8k	[10] SHEN	09	BELL	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\gamma$
$65 \pm 23 \pm 17$	52	ABLIKIM	08F	BES	$J/\psi \to \eta\phi f_0(980)$
$61 \pm 50 \pm 13$	483	AUBERT	08S	BABR	10.6 $e^+e^- \to \phi\eta\gamma$
71 ± 21	116	[11] AUBERT	07AK	BABR	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\gamma$
102 ± 27	149	[11] AUBERT	07AK	BABR	10.6 $e^+e^- \to K^+K^-\pi^0\pi^0\gamma$
$58 \pm 16 \pm 20$	201	[9,12] AUBERT,BE	06D	BABR	10.6 $e^+e^- \to K^+K^-\pi\pi\gamma$

[7] The observed structure can be due to both the $\phi(2170)$ and $\rho(2150)$.
[8] Fit includes interference with the $\phi(1680)$.

[9] From the $\phi f_0(980)$ component.
[10] From a fit with two incoherent Breit-Wigners.
[11] From the $K^+K^-f_0(980)$ component.
[12] Superseded by LEES 12F.

$\phi(2170)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	e^+e^-	seen
Γ_2	$\phi\eta$	
Γ_3	$\phi\pi\pi$	
Γ_4	$\phi f_0(980)$	seen
Γ_5	$K^+K^-\pi^+\pi^-$	
Γ_6	$K^+K^-f_0(980) \rightarrow K^+K^-\pi^+\pi^-$	seen
Γ_7	$K^+K^-\pi^0\pi^0$	
Γ_8	$K^+K^-f_0(980) \rightarrow K^+K^-\pi^0\pi^0$	seen
Γ_9	$K^{*0}K^\pm\pi^\mp$	not seen
Γ_{10}	$K^*(892)^0\overline{K}^*(892)^0$	not seen

$\phi(2170)$ Γ(i)$\Gamma(e^+e^-)/\Gamma$(total)

$\Gamma(\phi\eta) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\quad \Gamma_2\Gamma_1/\Gamma$

VALUE (eV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1.7\pm0.7\pm1.3$	483	AUBERT	08S	BABR	10.6 $e^+e^- \rightarrow \phi\eta\gamma$

$\Gamma(\phi f_0(980)) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\quad \Gamma_4\Gamma_1/\Gamma$

VALUE (eV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
$2.3\pm0.3\pm0.3$	[13,14]	LEES	12F	BABR	10.6 $e^+e^- \rightarrow \phi\pi^+\pi^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$2.5\pm0.8\pm0.4$	201	[14,15] AUBERT,BE	06D	BABR	10.6 $e^+e^- \rightarrow K^+K^-\pi\pi\gamma$

[13] From a fit with constructive interference with the $\phi(1680)$. In a fit with destructive interference, the value is larger by a factor of 12.
[14] From the $\phi f_0(980)$ component.
[15] Superseded by LEES 12F.

$\phi(2170)$ Γ(i)$\Gamma(e^+e^-)/\Gamma^2$(total)

$\Gamma(\phi\pi\pi)/\Gamma_{\text{total}} \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\quad \Gamma_3/\Gamma \times \Gamma_1/\Gamma$

VALUE (units 10^{-7})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1.65\pm0.15\pm0.18$	4.8k	[16] SHEN	09	BELL	10.6 $e^+e^- \rightarrow K^+K^-\pi^+\pi^-\gamma$

[16] Multiplied by 3/2 to take into account the $\phi\pi^0\pi^0$ mode. Using B($\phi \rightarrow K^+K^-$) = (49.2 ± 0.6)%.

$\phi(2170)$ BRANCHING RATIOS

$\Gamma(K^+K^-f_0(980) \to K^+K^-\pi^+\pi^-)/\Gamma_{total}$ Γ_6/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AUBERT	07AK	BABR	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\gamma$

$\Gamma(K^+K^-f_0(980) \to K^+K^-\pi^0\pi^0)/\Gamma_{total}$ Γ_8/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AUBERT	07AK	BABR	10.6 $e^+e^- \to K^+K^-\pi^0\pi^0\gamma$

$\Gamma(K^{*0}K^{\pm}\pi^{\mp})/\Gamma_{total}$ Γ_9/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	AUBERT	07AK	BABR	10.6 GeV e^+e^-

$\Gamma(K^*(892)^0\overline{K}^*(892)^0)/\Gamma_{total}$ Γ_{10}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	ABLIKIM	10C	BES2	$J/\psi \to \eta K^+\pi^-K^-\pi^+$

$\phi(2170)$ REFERENCES

ABLIKIM	19I	PR D99 012014	M. Ablikim *et al.*	(BES III Collab.)
ABLIKIM	19L	PR D99 032001	M. Ablikim *et al.*	(BES III Collab.)
ABLIKIM	15H	PR D91 052017	M. Ablikim *et al.*	(BES III Collab.)
LEES	12F	PR D86 012008	J.P. Lees *et al.*	(BABAR Collab.)
ABLIKIM	10C	PL B685 27	M. Ablikim *et al.*	(BES II Collab.)
SHEN	09	PR D80 031101	C.P. Shen *et al.*	(BELLE Collab.)
ABLIKIM	08F	PRL 100 102003	M. Ablikim *et al.*	(BES Collab.)
AUBERT	08S	PR D77 092002	B. Aubert *et al.*	(BABAR Collab.)
AUBERT	07AK	PR D76 012008	B. Aubert *et al.*	(BABAR Collab.)
AUBERT,BE	06D	PR D74 091103	B. Aubert *et al.*	(BABAR Collab.)