

K*(1680)

$$I(J^P) = \frac{1}{2}(1^-)$$

K*(1680) MASS

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
1718±18 OUR AVERAGE					
1722±20 ⁺³³ ₋₁₀₉	4289	¹ AAIJ	17C	LHCB	B ⁺ → J/ψ φ K ⁺
1677±10±32		ASTON	88	LASS	0 11 K ⁻ p → K ⁻ π ⁺ n
1735±10±20		ASTON	87	LASS	0 11 K ⁻ p → \bar{K}^0 π ⁺ π ⁻ n
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
1678±64		BIRD	89	LASS	- 11 K ⁻ p → \bar{K}^0 π ⁻ p
1800±70		ETKIN	80	MPS	0 6 K ⁻ p → \bar{K}^0 π ⁺ π ⁻ n
~ 1650		ESTABROOKS	78	ASPK	0 13 K [±] p → K [±] π [±] n

¹ From an amplitude analysis of the decay B⁺ → J/ψ φ K⁺ with a significance of 8.5 σ.

K*(1680) WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
320±110 OUR AVERAGE					
Error includes scale factor of 4.2.					
354±75 ⁺¹⁴⁰ ₋₁₈₁	4289	² AAIJ	17C	LHCB	B ⁺ → J/ψ φ K ⁺
205±16±34		ASTON	88	LASS	0 11 K ⁻ p → K ⁻ π ⁺ n
423±18±30		ASTON	87	LASS	0 11 K ⁻ p → \bar{K}^0 π ⁺ π ⁻ n
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
454±270		BIRD	89	LASS	- 11 K ⁻ p → \bar{K}^0 π ⁻ p
170±30		ETKIN	80	MPS	0 6 K ⁻ p → \bar{K}^0 π ⁺ π ⁻ n
250 to 300		ESTABROOKS	78	ASPK	0 13 K [±] p → K [±] π [±] n

² From an amplitude analysis of the decay B⁺ → J/ψ φ K⁺ with a significance of 8.5 σ.

K*(1680) DECAY MODES

Mode	Fraction (Γ _i /Γ)
Γ ₁ K π	(38.7±2.5) %
Γ ₂ K ρ	(31.4 ^{+5.0} _{-2.1}) %
Γ ₃ K*(892) π	(29.9 ^{+2.2} _{-5.0}) %
Γ ₄ K φ	seen
Γ ₅ K η	(1.4 ^{+1.0} _{-0.8}) %

CONSTRAINED FIT INFORMATION

An overall fit to 4 branching ratios uses 4 measurements and one constraint to determine 3 parameters. The overall fit has a $\chi^2 = 2.9$ for 2 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\langle \delta x_i \delta x_j \rangle / (\delta x_i \delta x_j)$, in percent, from the fit to the branching fractions, $x_i \equiv \Gamma_i / \Gamma_{\text{total}}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_2	-36	
x_3	-39	-72
	x_1	x_2

$K^*(1680)$ BRANCHING RATIOS

$\Gamma(K\pi) / \Gamma_{\text{total}} \qquad \qquad \qquad \Gamma_1 / \Gamma$

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
0.387 ± 0.026 OUR FIT				
$0.388 \pm 0.014 \pm 0.022$	ASTON	88	LASS	0 11 $K^- p \rightarrow K^- \pi^+ n$

$\Gamma(K\pi) / \Gamma(K^*(892)\pi) \qquad \qquad \qquad \Gamma_1 / \Gamma_3$

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
$1.30^{+0.23}_{-0.14}$ OUR FIT				
2.8 ± 1.1	ASTON	84	LASS	0 11 $K^- p \rightarrow \bar{K}^0 2\pi n$

$\Gamma(K\rho) / \Gamma(K\pi) \qquad \qquad \qquad \Gamma_2 / \Gamma_1$

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
$0.81^{+0.14}_{-0.09}$ OUR FIT				
1.2 ± 0.4	ASTON	84	LASS	0 11 $K^- p \rightarrow \bar{K}^0 2\pi n$

$\Gamma(K\rho) / \Gamma(K^*(892)\pi) \qquad \qquad \qquad \Gamma_2 / \Gamma_3$

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
$1.05^{+0.27}_{-0.11}$ OUR FIT				
$0.97 \pm 0.09^{+0.30}_{-0.10}$	ASTON	87	LASS	0 11 $K^- p \rightarrow \bar{K}^0 \pi^+ \pi^- n$

$\Gamma(K\phi) / \Gamma_{\text{total}} \qquad \qquad \qquad \Gamma_4 / \Gamma$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
seen	24k	³ AAIJ	21E	LHCB $B^+ \rightarrow J/\psi \phi K^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	4289	^{4,5} AAIJ	17C	LHCB $B^+ \rightarrow J/\psi \phi K^+$

³ From an amplitude analysis of the decay $B^+ \rightarrow J/\psi \phi K^+$ with a significance of 4.7σ .

⁴ From an amplitude analysis of the decay $B^+ \rightarrow J/\psi \phi K^+$ with a significance of 8.5σ .

⁵ Superseded by AAJ 21E.

$\Gamma(K\eta)/\Gamma(K\pi)$					Γ_5/Γ_1
VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	
$0.037 \pm 0.007^{+0.024}_{-0.018}$	116k	⁶ CHEN	20A BELL	$D^0 \rightarrow K^- \pi^+ \eta$	

⁶ CHEN 20A quotes the ratio $\Gamma(K^*(1680)^- \rightarrow K^- \eta)/\Gamma(K^*(1680)^- \rightarrow K^- \pi^0) = 0.11 \pm 0.02^{+0.06}_{-0.04} \pm 0.04(\text{BPDG})$ where the last uncertainty comes from $B(\eta \rightarrow \gamma\gamma) = (39.41 \pm 0.20)\%$. We divide it by 3 taking into account that $\Gamma(K^*(1680)^- \rightarrow K^- \pi^0)/\Gamma(K^*(1680)^- \rightarrow (K\pi)^-) = 1/3$.

$\Gamma(K\eta)/\Gamma_{\text{total}}$					Γ_5/Γ
VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT	

• • • We do not use the following data for averages, fits, limits, etc. • • •

$1.44 \pm 0.21^{+0.96}_{-0.73}$	116k	⁷ CHEN	20A BELL	$D^0 \rightarrow K^- \pi^+ \eta$	
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⁷ From an amplitude analysis of the decay $D^0 \rightarrow K^- \pi^+ \eta$ with a significance of 16σ . Not independent of the CHEN 20A measurement of $\Gamma(K^*(1680) \rightarrow K\eta)/\Gamma(K^*(1680) \rightarrow K\pi)$.

$K^*(1680)$ REFERENCES

AAIJ	21E	PRL 127 082001	R. Aaij <i>et al.</i>	(LHCb Collab.)
CHEN	20A	PR D102 012002	Y.Q. Chen <i>et al.</i>	(BELLE Collab.)
AAIJ	17C	PRL 118 022003	R. Aaij <i>et al.</i>	(LHCb Collab.)
Also		PR D95 012002	R. Aaij <i>et al.</i>	(LHCb Collab.)
BIRD	89	SLAC-332	P.F. Bird	(SLAC)
ASTON	88	NP B296 493	D. Aston <i>et al.</i>	(SLAC, NAGO, CINC, INUS)
ASTON	87	NP B292 693	D. Aston <i>et al.</i>	(SLAC, NAGO, CINC, INUS)
ASTON	84	PL 149B 258	D. Aston <i>et al.</i>	(SLAC, CARL, OTTA) JP
ETKIN	80	PR D22 42	A. Etkin <i>et al.</i>	(BNL, CUNY) JP
ESTABROOKS	78	NP B133 490	P.G. Estabrooks <i>et al.</i>	(MCGI, CARL, DURH+) JP