$K_0^*(700)$

$I(J^P) = \frac{1}{2}(0^+)$

also known as κ; was $K_0^*(800)$

See the review on "Scalar Mesons below 2 GeV."

$K_0^*(700)$ T-Matrix Pole $\sqrt{s}$

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
(630–730) − i (260–340) OUR EVALUATION				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$(648 \pm 7) - i\,(280 \pm 16)$	[1] PELAEZ	20	RVUE	$\pi K \rightarrow \pi K$
$(670 \pm 18) - i\,(295 \pm 28)$	[2] PELAEZ	17	RVUE	$\pi K \rightarrow \pi K$
$(764 \pm 63^{+71}_{-54}) - i\,(306 \pm 149^{+143}_{-85})$	[3] ABLIKIM	11B	BES2	1.3k $J/\psi \rightarrow K^0_S K^0_S \pi^+ \pi^-$
$(665 \pm 9) - i\,(268^{+21}_{-6})$	[4] GUO	11B	RVUE	
$(849 \pm 77^{+18}_{-14}) - i\,(256 \pm 40^{+46}_{-22})$	[3] ABLIKIM	10E	BES2	1.4k $J/\psi \rightarrow K^\pm K^0_S \pi^\mp \pi^0$
$(663 \pm 8 \pm 34) - i\,(329 \pm 5 \pm 22)$	[5] BUGG	10	RVUE	S-matrix pole
$(706.0 \pm 1.8 \pm 22.8) - i\,(319.4 \pm 2.2 \pm 20.2)$	[6] BONVICINI	08A	CLEO	141k $D^+ \rightarrow K^- \pi^+ \pi^+$
$(841 \pm 30^{+81}_{-73}) - i\,(309 \pm 45^{+48}_{-72})$	[3] ABLIKIM	06C	BES2	25k $J/\psi \rightarrow \overline{K}^*(892)^0 K^+ \pi^-$
$(750^{+30}_{-55}) - i\,(342 \pm 60)$	[7] BUGG	06	RVUE	
$(658 \pm 13) - i\,(279 \pm 12)$	[8] DESCOTES-G..	06	RVUE	$\pi K \rightarrow \pi K$
$(757 \pm 33) - i\,(279 \pm 41)$	[9] GUO	06	RVUE	
$(694 \pm 53) - i\,(303 \pm 30)$	[10] ZHOU	06	RVUE	$K p \rightarrow K^- \pi^+ n$
$(594 \pm 79) - i\,(362 \pm 166)$	[10] ZHENG	04	RVUE	$K^- p \rightarrow K^- \pi^+ n$
$(722 \pm 60) - i\,(386 \pm 50)$	[10] BUGG	03	RVUE	11 $K^- p \rightarrow K^- \pi^+ n$
$(875 \pm 75) - i\,(335 \pm 110)$	[11] ISHIDA	97B	RVUE	11 $K^- p \rightarrow K^- \pi^+ n$
$727 - i\,263$	[12] VANBEVEREN	86	RVUE	

[1] Extracted employing πK partial wave analysis from ESTABROOKS 78 and ASTON 88, Roy-Steiner equations and once subtracted forward dispersion relations.

[2] Reanalysis of ESTABROOKS 78 and ASTON 88 satisfying Forward Dispersion Relations and using sequences of Pade approximants.

[3] Extracted from Breit-Wigner parameters.

[4] Fit to scattering phase shifts using UChPT amplitudes with explicit resonances.

[5] Supersedes BUGG 06. Combined analysis of ASTON 88, ABLIKIM 06C, AITALA 06, and LINK 09 using an s-dependent width with couplings to $K\pi$ and $K\eta'$, and the Adler zero near thresholds.

[6] From a complex pole included in the fit. Using parameters from the model that fits data best.

[7] Reanalysis of ASTON 88, AITALA 02, and ABLIKIM 06C using for the κ an s-dependent width with an Adler zero near threshold.

[8] Using Roy-Steiner equations (ROY 71) consistent with unitarity, analyticity and crossing symmetry constraints.

[9] From UChPT fitted to MERCER 71, BINGHAM 72 and ESTABROOKS 78. Amplitude shown to be consistent with data of ABLIKIM 06C.

[10] Reanalysis of ASTON 88 data.
[11] Reanalysis of ASTON 88 using interfering Breit-Wigner amplitudes. Extracted from Breit-Wigner parameters.
[12] Unitarized Quark Model.

$K_0^*(700)$ Breit-Wigner Mass

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
845 ±17 OUR AVERAGE					
826 ±49 $^{+49}_{-34}$	1.3k	[1] ABLIKIM	11B	BES2	$J/\psi \to K^0_S K^0_S \pi^+ \pi^-$
810 ±68 $^{+15}_{-24}$	1.4k	[2] ABLIKIM	10E	BES2	$J/\psi \to K^\pm K^0_S \pi^\mp \pi^0$
856 ±17 ±13	54k	LINK	07B	FOCS	$D^+ \to K^- \pi^+ \pi^+$
878 ±23 $^{+64}_{-55}$	25k	[3] ABLIKIM	06C	BES2	$J/\psi \to \overline{K}^*(892)^0 K^+ \pi^-$
797 ±19 ±43	15k	[4,5] AITALA	02	E791	$D^+ \to K^- \pi^+ \pi^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
888.0± 1.9	141k	[6] BONVICINI	08A	CLEO	$D^+ \to K^- \pi^+ \pi^+$
855 ±15	0.6k	[7] CAWLFIELD	06A	CLEO	$D^0 \to K^+ K^- \pi^0$
905 $^{+65}_{-30}$		[8] ISHIDA	97B	RVUE	11 $K^- p \to K^- \pi^+ n$

[1] The Breit-Wigner parameters from a fit with seven intermediate resonances. The S-matrix pole position is $(764 \pm 63^{+71}_{-54}) - i\,(306 \pm 149^{+143}_{-85})$ MeV.
[2] From a fit including ten additional resonances and energy-independent Breit-Wigner width.
[3] A fit in the $K_0^*(700) + K^*(892) + K^*(1410)$ model with mass and width of the $K_0^*(700)$ from ABLIKIM 06C well describes the left slope of the $K^0_S \pi^-$ invariant mass spectrum in $\tau^- \to K^0_S \pi^- \nu_\tau$ decay studied by EPIFANOV 07. Averaged value from different parameterizations.
[4] Not seen by KOPP 01 using 7070 events of $D^0 \to K^- \pi^+ \pi^0$. LINK 02E and LINK 05I show clear evidence for a constant non-resonant scalar amplitude rather than $K_0^*(700)$ in their high statistics analysis of $D^+ \to K^- \pi^+ \mu^+ \nu_\mu$.
[5] AUBERT 07T does not find evidence for the charged $K_0^*(700)$ using 11k events of $D^0 \to K^- K^+ \pi^0$.
[6] Using parameters from the model that fits data best.
[7] Breit-Wigner parameters. A significant S-wave can be also modeled as a non-resonant contribution.
[8] Reanalysis of ASTON 88 using interfering Breit-Wigner amplitudes.

$K_0^*(700)$ Breit-Wigner Width

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
468 ± 30 OUR AVERAGE					
449 ±156 $^{+144}_{-81}$	1.3k	[1] ABLIKIM	11B	BES2	$J/\psi \to K^0_S K^0_S \pi^+ \pi^-$
536 ± 87 $^{+106}_{-47}$	1.4k	[2] ABLIKIM	10E	BES2	$J/\psi \to K^\pm K^0_S \pi^\mp \pi^0$
464 ± 28 ± 22	54k	LINK	07B	FOCS	$D^+ \to K^- \pi^+ \pi^+$
499 ± 52 $^{+55}_{-87}$	25k	[3] ABLIKIM	06C	BES2	$J/\psi \to \overline{K}^*(892)^0 K^+ \pi^-$
410 ± 43 ± 87	15k	[4,5] AITALA	02	E791	$D^+ \to K^- \pi^+ \pi^+$

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

550.4± 11.8	141k	[6] BONVICINI	08A	CLEO	$D^+ \to K^- \pi^+ \pi^+$
251 ± 48	0.6k	[7] CAWLFIELD	06A	CLEO	$D^0 \to K^+ K^- \pi^0$
545 $^{+235}_{-110}$		[8] ISHIDA	97B	RVUE	$11\ K^- p \to K^- \pi^+ n$

[1] The Breit-Wigner parameters from a fit with seven intermediate resonances. The S-matrix pole position is $(764 \pm 63^{+71}_{-54}) - i\,(306 \pm 149^{+143}_{-\ 85})$ MeV.

[2] From a fit including ten additional resonances and energy-independent Breit-Wigner width.

[3] A fit in the $K_0^*(700) + K^*(892) + K^*(1410)$ model with mass and width of the $K_0^*(700)$ from ABLIKIM 06C well describes the left slope of the $K_S^0 \pi^-$ invariant mass spectrum in $\tau^- \to K_S^0 \pi^- \nu_\tau$ decay studied by EPIFANOV 07. Averaged value from different parameterizations.

[4] Not seen by KOPP 01 using 7070 events of $D^0 \to K^- \pi^+ \pi^0$. LINK 02E and LINK 05I show clear evidence for a constant non-resonant scalar amplitude rather than $K_0^*(700)$ in their high statistics analysis of $D^+ \to K^- \pi^+ \mu^+ \nu_\mu$.

[5] AUBERT 07T does not find evidence for the charged $K_0^*(700)$ using 11k events of $D^0 \to K^- K^+ \pi^0$.

[6] Using parameters from the model that fits data best.

[7] Statistical error only. A fit to the Dalitz plot including the $K_0^*(700)^\pm$, $K^*(892)^\pm$, and ϕ resonances modeled as Breit-Wigners. A significant S-wave can be also modeled as a non-resonant contribution.

[8] Reanalysis of ASTON 88 using interfering Breit-Wigner amplitudes.

$K_0^*(700)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$K\pi$	100 %

$K_0^*(700)$ REFERENCES

PELAEZ	20	PRL 124 172001	J.R. Pelaez et al.	
PELAEZ	17	EPJ C77 91	J.R. Pelaez, A.Rodas, J.R. de Elvira	
ABLIKIM	11B	PL B698 183	M. Ablikim et al.	(BES II Collab.)
GUO	11B	PR D84 034005	Z.-H. Guo, J.A. Oller	
ABLIKIM	10E	PL B693 88	M. Ablikim et al.	(BES II Collab.)
BUGG	10	PR D81 014002	D.V. Bugg	(LOQM)
LINK	09	PL B681 14	J.M. Link et al.	(FNAL FOCUS Collab.)
BONVICINI	08A	PR D78 052001	G. Bonvicini et al.	(CLEO Collab.)
AUBERT	07T	PR D76 011102	B. Aubert et al.	(BABAR Collab.)
EPIFANOV	07	PL B654 65	D. Epifanov et al.	(BELLE Collab.)
LINK	07B	PL B653 1	J.M. Link et al.	(FNAL FOCUS Collab.)
ABLIKIM	06C	PL B633 681	M. Ablikim et al.	(BES Collab.)
AITALA	06	PR D73 032004	E.M. Aitala et al.	(FNAL E791 Collab.)
Also		PR D74 059901 (errat.)	E.M. Aitala et al.	(FNAL E791 Collab.)
BUGG	06	PL B632 471	D.V. Bugg	(LOQM)
CAWLFIELD	06A	PR D74 031108	C. Cawlfield et al.	(CLEO Collab.)
DESCOTES-G...	06	EPJ C48 553	S. Descotes-Genon, B. Moussallam	
GUO	06	NP A773 78	F.K. Guo et al.	
ZHOU	06	NP A775 212	Z.Y. Zhou, H.Q. Zheng	
LINK	05I	PL B621 72	J.M. Link et al.	(FNAL FOCUS Collab.)
ZHENG	04	NP A733 235	H.Q. Zheng et al.	
BUGG	03	PL B572 1	D.V. Bugg	
AITALA	02	PRL 89 121801	E.M. Aitala et al.	(FNAL E791 Collab.)
LINK	02E	PL B535 43	J.M. Link et al.	(FNAL FOCUS Collab.)

KOPP	01	PR D63 092001	S. Kopp *et al.*	(CLEO Collab.)
ISHIDA	97B	PTP 98 621	S. Ishida *et al.*	
ASTON	88	NP B296 493	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)
VANBEVEREN	86	ZPHY C30 615	E. van Beveren *et al.*	(NIJM, BIEL)
ESTABROOKS	78	NP B133 490	P.G. Estabrooks *et al.*	(MCGI, CARL, DURH+)
BINGHAM	72	NP B41 1	H.H. Bingham *et al.*	(International K^+ Collab.)
MERCER	71	NP B32 381	R. Mercer *et al.*	(JHU)
ROY	71	PL 36B 353	S.M. Roy	