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$K_0^*(700)$

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

also known as κ; was $K_0^*(800)$

See the related review(s):

Scalar Mesons below 1 GeV

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

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
(630–730) − i (260–340) OUR ESTIMATE (see Fig. 64.1 in the review)				
$(702 \pm 12^{+4}_{-5}) - i\,(285 \pm 16^{+8}_{-13})$	[1] DANILKIN	21	RVUE	Compilation
$(648 \pm 7) - i\,(280 \pm 16)$	[2] PELAEZ	20	RVUE	$\pi K \to \pi K$
$(670 \pm 18) - i\,(295 \pm 28)$	[3] PELAEZ	17	RVUE	$\pi K \to \pi K$
$(764 \pm 63^{+71}_{-54}) - i\,(306 \pm 149^{+143}_{-85})$	[4] ABLIKIM	11B	BES2	1.3k $J/\psi \to K^0_S K^0_S \pi^+ \pi^-$
$(665 \pm 9) - i\,(268^{+21}_{-6})$	[5] GUO	11B	RVUE	
$(849 \pm 77^{+18}_{-14}) - i\,(256 \pm 40^{+46}_{-22})$	[4] ABLIKIM	10E	BES2	1.4k $J/\psi \to K^\pm K^0_S \pi^\mp \pi^0$
$(663 \pm 8 \pm 34) - i\,(329 \pm 5 \pm 22)$	[6] BUGG	10	RVUE	S-matrix pole
$(706.0 \pm 1.8 \pm 22.8) - i\,(319.4 \pm 2.2 \pm 20.2)$	[7] BONVICINI	08A	CLEO	141k $D^+ \to K^- \pi^+ \pi^+$
$(841 \pm 30^{+81}_{-73}) - i\,(309 \pm 45^{+48}_{-72})$	[4] ABLIKIM	06C	BES2	25k $J/\psi \to \overline{K}^*(892)^0 K^+ \pi^-$
$(750^{+30}_{-55}) - i\,(342 \pm 60)$	[8] BUGG	06	RVUE	
$(658 \pm 13) - i\,(279 \pm 12)$	[9] DESCOTES-G..	06	RVUE	$\pi K \to \pi K$
$(757 \pm 33) - i\,(279 \pm 41)$	[10] GUO	06	RVUE	
$(694 \pm 53) - i\,(303 \pm 30)$	[11] ZHOU	06	RVUE	$K p \to K^- \pi^+ n$
$(594 \pm 79) - i\,(362 \pm 166)$	[11] ZHENG	04	RVUE	$K^- p \to K^- \pi^+ n$
$(722 \pm 60) - i\,(386 \pm 50)$	[11] BUGG	03	RVUE	11 $K^- p \to K^- \pi^+ n$
$(875 \pm 75) - i\,(335 \pm 110)$	[12] ISHIDA	97B	RVUE	11 $K^- p \to K^- \pi^+ n$
$727 - i\,263$	[13] VANBEVEREN	86	RVUE	

[1] Data driven analysis using partial-wave dispersion relations.

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

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

[4] Extracted from Breit-Wigner parameters.

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

[6] 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.

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

[8] Reanalysis of ASTON 88, AITALA 02, and ABLIKIM 06C using for the κ an s-dependent width with an Adler zero near threshold.
[9] Using Roy-Steiner equations (ROY 71) consistent with unitarity, analyticity and crossing symmetry constraints.
[10] From UChPT fitted to MERCER 71, BINGHAM 72 and ESTABROOKS 78. Amplitude shown to be consistent with data of ABLIKIM 06C.
[11] Reanalysis of ASTON 88 data.
[12] Reanalysis of ASTON 88 using interfering Breit-Wigner amplitudes. Extracted from Breit-Wigner parameters.
[13] Unitarized Quark Model.

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

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
838 ±11 OUR AVERAGE					
833 ±15		[1] ACHARYA	24C	ALCE	$pp \to K_S^0 \pi^\pm X$, 13 TeV
826 ±49 $^{+49}_{-34}$	1.3k	[2] ABLIKIM	11B	BES2	$J/\psi \to K_S^0 K_S^0 \pi^+ \pi^-$
810 ±68 $^{+15}_{-24}$	1.4k	[3] ABLIKIM	10E	BES2	$J/\psi \to K^\pm K_S^0 \pi^\mp \pi^0$
856 ±17 ±13	54k	LINK	07B	FOCS	$D^+ \to K^- \pi^+ \pi^+$
878 ±23 $^{+64}_{-55}$	25k	[4] ABLIKIM	06C	BES2	$J/\psi \to \overline{K}^*(892)^0 K^+ \pi^-$
797 ±19 ±43	15k	[5,6] 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	[7] BONVICINI	08A	CLEO	$D^+ \to K^- \pi^+ \pi^+$
855 ±15	0.6k	[8] CAWLFIELD	06A	CLEO	$D^0 \to K^+ K^- \pi^0$
905 $^{+65}_{-30}$		[9] ISHIDA	97B	RVUE	11 $K^- p \to K^- \pi^+ n$

[1] Assuming a Gaussian source to the measured two-particle correlation function. Systematic error dominates. For 0–100% multiplicity class.
[2] 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.
[3] From a fit including ten additional resonances and energy-independent Breit-Wigner width.
[4] 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.
[5] 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 $D^+ \to K^- \pi^+ \mu^+ \nu_\mu$.
[6] AUBERT 07T does not find evidence for the charged $K_0^*(700)$ using 11k events of $D^0 \to K^- K^+ \pi^0$.
[7] Using parameters from the model that fits data best.
[8] Breit-Wigner parameters. A significant S-wave can be also modeled as a non-resonant contribution.
[9] Reanalysis of ASTON 88 using interfering Breit-Wigner amplitudes.

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

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
463 ± 27 OUR AVERAGE				
$430\ {}^{+\ 88}_{-\ 53}$		[1] ACHARYA 24C	ALCE	$p p \to K_S^0 \pi^\pm X$, 13 TeV
$449 \pm 156\ {}^{+144}_{-\ 81}$	1.3k	[2] ABLIKIM 11B	BES2	$J/\psi \to K_S^0 K_S^0 \pi^+ \pi^-$
$536 \pm 87\ {}^{+106}_{-\ 47}$	1.4k	[3] ABLIKIM 10E	BES2	$J/\psi \to K^\pm K_S^0 \pi^\mp \pi^0$
$464 \pm 28 \pm 22$	54k	LINK 07B	FOCS	$D^+ \to K^- \pi^+ \pi^+$
$499 \pm 52\ {}^{+\ 55}_{-\ 87}$	25k	[4] ABLIKIM 06C	BES2	$J/\psi \to \overline{K}^*(892)^0 K^+ \pi^-$
$410 \pm 43 \pm 87$	15k	[5,6] 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	[7] BONVICINI 08A	CLEO	$D^+ \to K^- \pi^+ \pi^+$
251 ± 48	0.6k	[8] CAWLFIELD 06A	CLEO	$D^0 \to K^+ K^- \pi^0$
$545\ {}^{+235}_{-110}$		[9] ISHIDA 97B	RVUE	$11\ K^- p \to K^- \pi^+ n$

[1] Assuming a Gaussian source to the measured two-particle correlation function. Systematic error dominates. For 0–100% multiplicity class.

[2] 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.

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

[4] 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.

[5] 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 $D^+ \to K^- \pi^+ \mu^+ \nu_\mu$.

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

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

[8] 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.

[9] 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

ACHARYA	24C	PL B856 138915	S. Acharya *et al.*	(ALICE Collab.)
DANILKIN	21	PR D103 114023	I. Danilkin, O. Deineka, M. Vanderhaeghen	(MAINZ)
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	