

$K_0^*(700)$

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

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 $\pi K \rightarrow \pi K$
$(670 \pm 18) - i(295 \pm 28)$	³ PELAEZ	17	RVUE $\pi K \rightarrow \pi K$
$(764 \pm 63^{+71}_{-54}) - i(306 \pm 149^{+143}_{-85})$	⁴ ABLIKIM	11B	BES2 1.3k $J/\psi \rightarrow K_S^0 K_S^0 \pi^+ \pi^-$
$(665 \pm 9) - i(268^{+21}_{-6})$	⁵ GUO	11B	RVUE
$(849 \pm 77^{+18}_{-14}) - i(256 \pm 40^{+46}_{-22})$	⁴ ABLIKIM	10E	BES2 1.4k $J/\psi \rightarrow K^\pm K_S^0 \pi^\mp \pi^0$
$(663 \pm 8 \pm 34) - i(329 \pm 5 \pm 22)$	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 $D^+ \rightarrow K^- \pi^+ \pi^+$
$(841 \pm 30^{+81}_{-73}) - i(309 \pm 45^{+48}_{-72})$	⁴ ABLIKIM	06C	BES2 25k $J/\psi \rightarrow \bar{K}^*(892)^0 K^+ \pi^-$
$(750^{+30}_{-55}) - i(342 \pm 60)$	⁸ BUGG	06	RVUE
$(658 \pm 13) - i(279 \pm 12)$	⁹ DESCOTES-G.	06	RVUE $\pi K \rightarrow \pi K$
$(757 \pm 33) - i(279 \pm 41)$	¹⁰ GUO	06	RVUE
$(694 \pm 53) - i(303 \pm 30)$	¹¹ ZHOU	06	RVUE $K p \rightarrow K^- \pi^+ n$
$(594 \pm 79) - i(362 \pm 166)$	¹¹ ZHENG	04	RVUE $K^- p \rightarrow K^- \pi^+ n$
$(722 \pm 60) - i(386 \pm 50)$	¹¹ BUGG	03	RVUE 11 $K^- p \rightarrow K^- \pi^+ n$
$(875 \pm 75) - i(335 \pm 110)$	¹² ISHIDA	97B	RVUE 11 $K^- p \rightarrow K^- \pi^+ n$
$727 - i 263$	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

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

- ¹ The Breit-Wigner parameters from a fit with seven intermediate resonances. The S -matrix pole position is $(764 \pm 63 \overset{+71}{-54}) - i(306 \pm 149 \overset{+143}{-85})$ 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 $\tau^- \rightarrow K_S^0 \pi^- \nu_\tau$ decay studied by EPIFANOV 07. Averaged value from different parameterizations.
- ⁴ Not seen by KOPP 01 using 7070 events of $D^0 \rightarrow K^- \pi^+ \pi^0$. 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 $D^+ \rightarrow K^- \pi^+ \mu^+ \nu_\mu$.
- ⁵ AUBERT 07T does not find evidence for the charged $K_0^*(700)$ using 11k events of $D^0 \rightarrow K^- K^+ \pi^0$.
- 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	$J/\psi \rightarrow K_S^0 K_S^0 \pi^+ \pi^-$
536 ± 87	$^{+106}_{-47}$	1.4k	² ABLIKIM	10E BES2	$J/\psi \rightarrow K^\pm K_S^0 \pi^\mp \pi^0$
464 ± 28	± 22	54k	LINK	07B FOCS	$D^+ \rightarrow K^- \pi^+ \pi^+$
499 ± 52	$^{+55}_{-87}$	25k	³ ABLIKIM	06C BES2	$J/\psi \rightarrow \bar{K}^*(892)^0 K^+ \pi^-$
410 ± 43	± 87	15k	^{4,5} AITALA	02 E791	$D^+ \rightarrow K^- \pi^+ \pi^+$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
550.4 ± 11.8		141k	⁶ BONVICINI	08A CLEO	$D^+ \rightarrow K^- \pi^+ \pi^+$
251 ± 48		0.6k	⁷ CAWLFIELD	06A CLEO	$D^0 \rightarrow K^+ K^- \pi^0$
545	$^{+235}_{-110}$		⁸ ISHIDA	97B RVUE	11 $K^- p \rightarrow K^- \pi^+ n$

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 $\tau^- \rightarrow K_S^0 \pi^- \nu_\tau$ decay studied by EPIFANOV 07. Averaged value from different parameterizations.

⁴ Not seen by KOPP 01 using 7070 events of $D^0 \rightarrow K^- \pi^+ \pi^0$. 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 $D^+ \rightarrow K^- \pi^+ \mu^+ \nu_\mu$.

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

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)
$\Gamma_1 \quad K \pi$	100 %

$K_0^*(700)$ REFERENCES

DANILKIN	21	PR D103 114023	I. Danilkin, O. Deineka, M. Vanderhaeghen	(MAINZ)
PELAEZ	20	PRL 124 172001	J.R. Pelaez <i>et al.</i>	
PELAEZ	17	EPJ C77 91	J.R. Pelaez, A.Rodas, J.R. de Elvira	
ABLIKIM	11B	PL B698 183	M. Ablikim <i>et al.</i>	(BES II Collab.)
GUO	11B	PR D84 034005	Z.-H. Guo, J.A. Oller	
ABLIKIM	10E	PL B693 88	M. Ablikim <i>et al.</i>	(BES II Collab.)
BUGG	10	PR D81 014002	D.V. Bugg	(LOQM)
LINK	09	PL B681 14	J.M. Link <i>et al.</i>	(FNAL FOCUS Collab.)
BONVICINI	08A	PR D78 052001	G. Bonvicini <i>et al.</i>	(CLEO Collab.)
AUBERT	07T	PR D76 011102	B. Aubert <i>et al.</i>	(BABAR Collab.)
EPIFANOV	07	PL B654 65	D. Epifanov <i>et al.</i>	(BELLE Collab.)
LINK	07B	PL B653 1	J.M. Link <i>et al.</i>	(FNAL FOCUS Collab.)
ABLIKIM	06C	PL B633 681	M. Ablikim <i>et al.</i>	(BES Collab.)
AITALA	06	PR D73 032004	E.M. Aitala <i>et al.</i>	(FNAL E791 Collab.)
Also		PR D74 059901 (errat.)	E.M. Aitala <i>et al.</i>	(FNAL E791 Collab.)
BUGG	06	PL B632 471	D.V. Bugg	(LOQM)
CAWLFIELD	06A	PR D74 031108	C. Cawfield <i>et al.</i>	(CLEO Collab.)
DESCOTES-G...	06	EPJ C48 553	S. Descotes-Genon, B. Moussallam	
GUO	06	NP A773 78	F.K. Guo <i>et al.</i>	
ZHOU	06	NP A775 212	Z.Y. Zhou, H.Q. Zheng	
LINK	05I	PL B621 72	J.M. Link <i>et al.</i>	(FNAL FOCUS Collab.)
ZHENG	04	NP A733 235	H.Q. Zheng <i>et al.</i>	
BUGG	03	PL B572 1	D.V. Bugg	
AITALA	02	PRL 89 121801	E.M. Aitala <i>et al.</i>	(FNAL E791 Collab.)
LINK	02E	PL B535 43	J.M. Link <i>et al.</i>	(FNAL FOCUS Collab.)
KOPP	01	PR D63 092001	S. Kopp <i>et al.</i>	(CLEO Collab.)
ISHIDA	97B	PTP 98 621	S. Ishida <i>et al.</i>	
ASTON	88	NP B296 493	D. Aston <i>et al.</i>	(SLAC, NAGO, CINC, INUS)
VANBEVEREN	86	ZPHY C30 615	E. van Beveren <i>et al.</i>	(NIJM, BIEL)
ESTABROOKS	78	NP B133 490	P.G. Estabrooks <i>et al.</i>	(MCGI, CARL, DURH+)
BINGHAM	72	NP B41 1	H.H. Bingham <i>et al.</i>	(International K^+ Collab.)
MERCER	71	NP B32 381	R. Mercer <i>et al.</i>	(JHU)
ROY	71	PL 36B 353	S.M. Roy	