NODE=M060

$K_3^*(1780)$

$I(J^P) = \frac{1}{2}(3^-)$

$K_3^*(1780)$ T-MATRIX POLE $\sqrt{s}$

NODE=M060PP

Note that $\Gamma = -2\ \mathrm{Im}(\sqrt{s})$.

NODE=M060PP

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
(1754 ± 13)− *i* (119 ± 14) OUR EVALUATION				
(1754 ± 13)− i (119 ± 14)	[1] PELAEZ	17	RVUE	$\pi K \to \pi K$

NODE=M060PP

NODE=M060PP

→ UNCHECKED ←

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

NODE=M060PP;LINKAGE=A

$K_3^*(1780)$ MASS

NODE=M060M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1779± 8 OUR AVERAGE		Error includes scale factor of 1.2.				
$1813 \pm 15^{+65}_{-16}$	18k	[1] ABLIKIM	20F	BES3		$\psi(2S) \to K^+K^-\eta$
1781± 8± 4		[2] ASTON	88	LASS	0	11 $K^-p \to K^-\pi^+n$
1740±14±15		[2] ASTON	87	LASS	0	11 $K^-p \to \overline{K}^0\pi^+\pi^-n$
1779±11		[3] BALDI	76	SPEC	+	10 $K^+p \to K^0\pi^+p$
1776±26		[4] BRANDENB...	76D	ASPK	0	13 $K^\pm p \to K^\pm\pi^\mp N$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1720±10±15	6111	[5] BIRD	89	LASS	−	11 $K^-p \to \overline{K}^0\pi^-p$
1749±10		ASTON	88B	LASS	−	11 $K^-p \to K^-\eta p$
1780± 9	300	BAUBILLIER	84B	HBC	−	8.25 $K^-p \to \overline{K}^0\pi^-p$
1790±15		BAUBILLIER	82B	HBC	0	8.25 $K^-p \to K^0_S 2\pi N$
1784± 9	2060	CLELAND	82	SPEC	±	50 $K^+p \to K^0_S\pi^\pm p$
1786±15		[6] ASTON	81D	LASS	0	11 $K^-p \to K^-\pi^+n$
1762± 9	190	TOAFF	81	HBC	−	6.5 $K^-p \to \overline{K}^0\pi^-p$
1850±50		ETKIN	80	MPS	0	6 $K^-p \to \overline{K}^0\pi^+\pi^-$
1812±28		BEUSCH	78	OMEG		10 $K^-p \to \overline{K}^0\pi^+\pi^-n$
1786± 8		CHUNG	78	MPS	0	6 $K^-p \to K^-\pi^+n$

[1] Seen in $\psi(2S)$ decay with branching ratio $\psi(2S) \to K^\pm X \to K^+K^-\eta = (2.0 \pm 0.4^{+1.9}_{-0.4}) \times 10^{-6}$.

NODE=M060M;LINKAGE=D

[2] From energy-independent partial-wave analysis.

NODE=M060M;LINKAGE=K

[3] From a fit to Y_6^2 moment. $J^P = 3^-$ found.

NODE=M060M;LINKAGE=M

[4] Confirmed by phase shift analysis of ESTABROOKS 78, yields $J^P = 3^-$.

NODE=M060M;LINKAGE=A

[5] From a partial wave amplitude analysis.

NODE=M060M;LINKAGE=F

[6] From a fit to the Y_6^0 moment.

NODE=M060M;LINKAGE=J

$K_3^*(1780)$ WIDTH

NODE=M060W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
161±17 OUR AVERAGE		Error includes scale factor of 1.1.				
$191^{+43}_{-37} \pm 3 \pm 81$	1.8k	[1] ABLIKIM	20F	BES3		$\psi(2S) \to K^+K^-\eta$
203±30± 8		[2] ASTON	88	LASS	0	11 $K^-p \to K^-\pi^+n$
171±42±20		[2] ASTON	87	LASS	0	11 $K^-p \to \overline{K}^0\pi^+\pi^-n$
135±22		[3] BALDI	76	SPEC	+	10 $K^+p \to K^0\pi^+p$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
187±31±20	6111	[4] BIRD	89	LASS	−	11 $K^-p \to \overline{K}^0\pi^-p$
193^{+51}_{-37}		ASTON	88B	LASS	−	11 $K^-p \to K^-\eta p$
99±30	300	BAUBILLIER	84B	HBC	−	8.25 $K^-p \to \overline{K}^0\pi^-p$
∼ 130		BAUBILLIER	82B	HBC	0	8.25 $K^-p \to K^0_S 2\pi N$
191±24	2060	CLELAND	82	SPEC	±	50 $K^+p \to K^0_S\pi^\pm p$
225±60		[5] ASTON	81D	LASS	0	11 $K^-p \to K^-\pi^+n$
∼ 80	190	TOAFF	81	HBC	−	6.5 $K^-p \to \overline{K}^0\pi^-p$
240±50		ETKIN	80	MPS	0	6 $K^-p \to \overline{K}^0\pi^+\pi^-$
181±44		[6] BEUSCH	78	OMEG		10 $K^-p \to \overline{K}^0\pi^+\pi^-n$
96±31		CHUNG	78	MPS	0	6 $K^-p \to K^-\pi^+n$
270±70		[7] BRANDENB...	76D	ASPK	0	13 $K^\pm p \to K^\pm\pi^\mp N$

[1] Seen in $\psi(2S)$ decay with branching ratio $\psi(2S) \to K^{\pm} X \to K^+ K^- \eta = (2.0 \pm 0.4^{+1.9}_{-0.4}) \times 10^{-6}$. NODE=M060W;LINKAGE=A

[2] From energy-independent partial-wave analysis. NODE=M060W;LINKAGE=K

[3] From a fit to Y_6^2 moment. $J^P = 3^-$ found. NODE=M060W;LINKAGE=M

[4] From a partial wave amplitude analysis. NODE=M060W;LINKAGE=F

[5] From a fit to Y_6^0 moment. NODE=M060W;LINKAGE=J

[6] Errors enlarged by us to $4\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M060W;LINKAGE=D

[7] ESTABROOKS 78 find that BRANDENBURG 76D data are consistent with 175 MeV width. Not averaged. NODE=M060W;LINKAGE=E

$K_3^*(1780)$ DECAY MODES

NODE=M060215;NODE=M060

	Mode	Fraction (Γ_i/Γ)	Confidence level	
Γ_1	$K\rho$	(31 ± 9) %		DESIG=3
Γ_2	$K^*(892)\pi$	(20 ± 5) %		DESIG=2
Γ_3	$K\pi$	(18.8± 1.0) %		DESIG=1
Γ_4	$K\eta$	(30 ±13) %		DESIG=6
Γ_5	$K_2^*(1430)\pi$	< 16 %	95%	DESIG=4

CONSTRAINED FIT INFORMATION

An overall fit to 3 branching ratios uses 4 measurements and one constraint to determine 4 parameters. The overall fit has a $\chi^2 = 0.0$ for 1 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\left\langle \delta x_i \delta x_j \right\rangle / (\delta x_i \cdot \delta x_j)$, 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	85		
x_3	18	21	
x_4	−98	−94	−27
	x_1	x_2	x_3

$K_3^*(1780)$ BRANCHING RATIOS

NODE=M060220

$\Gamma(K\rho)/\Gamma(K^*(892)\pi)$ Γ_1/Γ_2

NODE=M060R5

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
1.52±0.23 OUR FIT					
1.52±0.21±0.10	ASTON	87	LASS	0	11 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$

NODE=M060R5

$\Gamma(K^*(892)\pi)/\Gamma(K\pi)$ Γ_2/Γ_3

NODE=M060R7

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
1.09±0.26 OUR FIT					
1.09±0.26	ASTON	84B	LASS	0	11 $K^- p \to \overline{K}^0 2\pi n$

NODE=M060R7

$\Gamma(K\pi)/\Gamma_{\text{total}}$ Γ_3/Γ

NODE=M060R4

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.188±0.010 OUR FIT					
0.188±0.010 OUR AVERAGE					
0.187±0.008±0.008	ASTON	88	LASS	0	11 $K^- p \to K^- \pi^+ n$
0.19 ±0.02	ESTABROOKS	78	ASPK	0	13 $K^{\pm} p \to K\pi N$

NODE=M060R4

$\Gamma(K\eta)/\Gamma(K\pi)$ Γ_4/Γ_3

NODE=M060R8

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
1.6 ±0.7 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.41±0.050	[1] BIRD	89	LASS	–	11 $K^- p \to \overline{K}^0 \pi^- p$
0.50±0.18	ASTON	88B	LASS	–	11 $K^- p \to K^- \eta p$

[1] This result supersedes ASTON 88B. NODE=M060R8;LINKAGE=H

$\Gamma(K_2^*(1430)\pi)/\Gamma(K^*(892)\pi)$ Γ_5/Γ_2

NODE=M060R6
NODE=M060R6

VALUE	CL%	DOCUMENT ID		TECN	CHG	COMMENT
<0.78	95	ASTON	87	LASS	0	11 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$

$K_3^*(1780)$ REFERENCES

NODE=M060

ABLIKIM	20F	PR D101 032008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60256
PELAEZ	17	EPJ C77 91	J.R. Pelaez, A.Rodas, J.R. de Elvira		REFID=57836
BIRD	89	SLAC-332	P.F. Bird	(SLAC)	REFID=41002
ASTON	88	NP B296 493	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)	REFID=40262
ASTON	88B	PL B201 169	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS) JP	REFID=40281
ASTON	87	NP B292 693	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)	REFID=40234
ASTON	84B	NP B247 261	D. Aston *et al.*	(SLAC, CARL, OTTA)	REFID=22763
BAUBILLIER	84B	ZPHY C26 37	M. Baubillier *et al.*	(BIRM, CERN, GLAS+)	REFID=22459
BAUBILLIER	82B	NP B202 21	M. Baubillier *et al.*	(BIRM, CERN, GLAS+)	REFID=22551
CLELAND	82	NP B208 189	W.E. Cleland *et al.*	(DURH, GEVA, LAUS+)	REFID=22455
ASTON	81D	PL 99B 502	D. Aston *et al.*	(SLAC, CARL, OTTA) JP	REFID=22820
TOAFF	81	PR D23 1500	S. Toaff *et al.*	(ANL, KANS)	REFID=22454
ETKIN	80	PR D22 42	A. Etkin *et al.*	(BNL, CUNY) JP	REFID=22545
BEUSCH	78	PL 74B 282	W. Beusch *et al.*	(CERN, AACH3, ETH) JP	REFID=22537
CHUNG	78	PRL 40 355	S.U. Chung *et al.*	(BNL, BRAN, CUNY+) JP	REFID=22814
ESTABROOKS	78	NP B133 490	P.G. Estabrooks *et al.*	(MCGI, CARL, DURH+) JP	REFID=22443
Also		PR D17 658	P.G. Estabrooks *et al.*	(MCGI, CARL, DURH+)	REFID=22444
BALDI	76	PL 63B 344	R. Baldi *et al.*	(GEVA) JP	REFID=22807
BRANDENB...	76D	PL 60B 478	G.W. Brandenburg *et al.*	(SLAC) JP	REFID=22808