$K_2^*(1430)$

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

We consider that phase-shift analyses provide more reliable determinations of the mass and width.

$K_2^*(1430)$ MASS

CHARGED ONLY, WITH FINAL STATE $K\pi$

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1425.6± 1.5 OUR AVERAGE		Error includes scale factor of 1.1.				
1420 ± 4	1587	BAUBILLIER	84B	HBC	−	8.25 $K^- p \to \overline{K}^0 \pi^- p$
1436 ± 5.5	400	[1,2] CLELAND	82	SPEC	+	30 $K^+ p \to K_S^0 \pi^+ p$
1430 ± 3.2	1500	[1,2] CLELAND	82	SPEC	+	50 $K^+ p \to K_S^0 \pi^+ p$
1430 ± 3.2	1200	[1,2] CLELAND	82	SPEC	−	50 $K^+ p \to K_S^0 \pi^- p$
1423 ± 5	935	TOAFF	81	HBC	−	6.5 $K^- p \to \overline{K}^0 \pi^- p$
1428.0± 4.6		[3] MARTIN	78	SPEC	+	10 $K^\pm p \to K_S^0 \pi p$
1423.8± 4.6		[3] MARTIN	78	SPEC	−	10 $K^\pm p \to K_S^0 \pi p$
1420.0± 3.1	1400	AGUILAR-...	71B	HBC	−	3.9,4.6 $K^- p$
1425 ± 8.0	225	[1,2] BARNHAM	71C	HBC	+	$K^+ p \to K^0 \pi^+ p$
1416 ±10	220	CRENNELL	69D	DBC	−	3.9 $K^- N \to \overline{K}^0 \pi^- N$
1414 ±13.0	60	[1] LIND	69	HBC	+	9 $K^+ p \to K^0 \pi^+ p$
1427 ±12	63	[1] SCHWEING...	68	HBC	−	5.5 $K^- p \to \overline{K} \pi N$
1423 ±11.0	39	[1] BASSANO	67	HBC	−	4.6–5.0 $K^- p \to \overline{K}^0 \pi^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1423.4± 2 ±3	24809± 820	[4] BIRD	89	LASS	−	11 $K^- p \to \overline{K}^0 \pi^- p$

NEUTRAL ONLY

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1432.4± 1.3 OUR AVERAGE					
1431.2± 1.8± 0.7		[5] ASTON	88	LASS	11 $K^- p \to K^- \pi^+ n$
1434 ± 4 ± 6		[5] ASTON	87	LASS	11 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$
1433 ± 6 ±10		[5] ASTON	84B	LASS	11 $K^- p \to \overline{K}^0 2\pi n$
1471 ±12		[5] BAUBILLIER	82B	HBC	8.25 $K^- p \to N K_S^0 \pi\pi$
1428 ± 3		[5] ASTON	81C	LASS	11 $K^- p \to K^- \pi^+ n$
1434 ± 2		[5] ESTABROOKS	78	ASPK	13 $K^\pm p \to p K \pi$
1440 ±10		[5] BOWLER	77	DBC	5.5 $K^+ d \to K \pi p p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1428.5± 3.9	1786± 127	[6] AUBERT	07AK	BABR	10.6 $e^+ e^- \to K^{*0} K^\pm \pi^\mp \gamma$
1420 ± 7	300	HENDRICK	76	DBC	8.25 $K^+ N \to K^+ \pi N$
1421.6± 4.2	800	MCCUBBIN	75	HBC	3.6 $K^- p \to K^- \pi^+ n$
1420.1± 4.3		[7] LINGLIN	73	HBC	2–13 $K^+ p \to K^+ \pi^- X$
1419.1± 3.7	1800	AGUILAR-...	71B	HBC	3.9,4.6 $K^- p$
1416 ± 6	600	CORDS	71	DBC	9 $K^+ n \to K^+ \pi^- p$
1421.1± 2.6	2200	DAVIS	69	HBC	12 $K^+ p \to K^+ \pi^- X$

[1] Errors enlarged by us to $\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass.
[2] Number of events in peak re-evaluated by us.
[3] Systematic error added by us.
[4] From a partial wave amplitude analysis.
[5] From phase shift or partial-wave analysis.
[6] Systematic errors not estimated.
[7] From pole extrapolation, using world $K^+ p$ data summary tape.

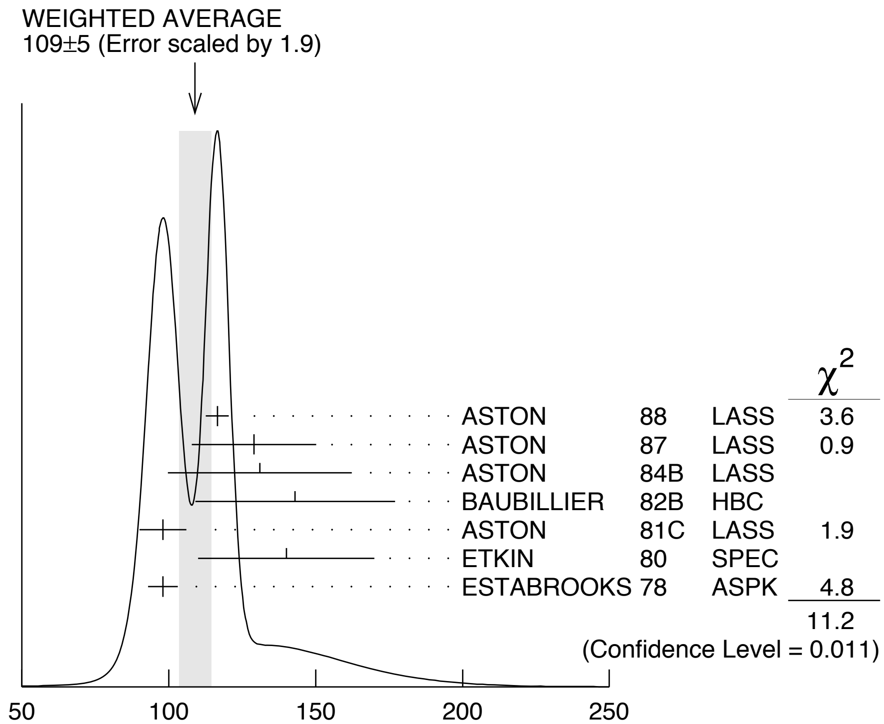
$K_2^*(1430)$ WIDTH

CHARGED ONLY, WITH FINAL STATE $K\pi$

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
98.5± 2.7 OUR FIT	Error includes scale factor of 1.1.					
98.5± 2.9 OUR AVERAGE	Error includes scale factor of 1.1.					
109 ±22	400	[8,9] CLELAND	82	SPEC	+	30 $K^+ p \to K_S^0 \pi^+ p$
124 ±12.8	1500	[8,9] CLELAND	82	SPEC	+	50 $K^+ p \to K_S^0 \pi^+ p$
113 ±12.8	1200	[8,9] CLELAND	82	SPEC	−	50 $K^+ p \to K_S^0 \pi^- p$
85 ±16	935	TOAFF	81	HBC	−	6.5 $K^- p \to \overline{K}^0 \pi^- p$
96.5± 3.8		MARTIN	78	SPEC	+	10 $K^\pm p \to K_S^0 \pi p$
97.7± 4.0		MARTIN	78	SPEC	−	10 $K^\pm p \to K_S^0 \pi p$
$94.7^{+15.1}_{-12.5}$	1400	AGUILAR-...	71B	HBC	−	3.9,4.6 $K^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
98 ± 4 ±4	24809±820	[10] BIRD	89	LASS	−	11 $K^- p \to \overline{K}^0 \pi^- p$

NEUTRAL ONLY

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
109 ± 5 OUR AVERAGE	Error includes scale factor of 1.9. See the ideogram below.				
116.5± 3.6± 1.7		[11] ASTON	88	LASS	11 $K^- p \to K^- \pi^+ n$
129 ±15 ±15		[11] ASTON	87	LASS	11 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$
131 ±24 ±20		[11] ASTON	84B	LASS	11 $K^- p \to \overline{K}^0 2\pi n$
143 ±34		[11] BAUBILLIER	82B	HBC	8.25 $K^- p \to N K_S^0 \pi\pi$
98 ± 8		[11] ASTON	81C	LASS	11 $K^- p \to K^- \pi^+ n$
140 ±30		[11] ETKIN	80	SPEC	6 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$
98 ± 5		[11] ESTABROOKS	78	ASPK	13 $K^\pm p \to p K \pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
113.7± 9.2	1786±127	[12] AUBERT	07AK	BABR	10.6 $e^+ e^- \to K^{*0} K^\pm \pi^\mp \gamma$
125 ±29	300	[8] HENDRICK	76	DBC	8.25 $K^+ N \to K^+ \pi N$
116 ±18	800	MCCUBBIN	75	HBC	3.6 $K^- p \to K^- \pi^+ n$
61 ±14		[13] LINGLIN	73	HBC	2–13 $K^+ p \to K^+ \pi^- X$
$116.6^{+10.3}_{-15.5}$	1800	AGUILAR-...	71B	HBC	3.9,4.6 $K^- p$
144 ±24.0	600	[8] CORDS	71	DBC	9 $K^+ n \to K^+ \pi^- p$
101 ±10	2200	DAVIS	69	HBC	12 $K^+ p \to K^+ \pi^- \pi^+ p$



$K_2^*(1430)^0$ width (MeV)

[8] Errors enlarged by us to $4\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass.
[9] Number of events in peak re-evaluated by us.
[10] From a partial wave amplitude analysis.
[11] From phase shift or partial-wave analysis.
[12] Systematic errors not estimated.
[13] From pole extrapolation, using world $K^+ p$ data summary tape.

$K_2^*(1430)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level
Γ_1	$K\pi$	(49.9 ± 1.2) %	
Γ_2	$K^*(892)\pi$	(24.7 ± 1.5) %	
Γ_3	$K^*(892)\pi\pi$	(13.4 ± 2.2) %	
Γ_4	$K\rho$	$(\ 8.7\pm0.8)$ %	S=1.2
Γ_5	$K\omega$	$(\ 2.9\pm0.8)$ %	
Γ_6	$K^+\gamma$	$(\ 2.4\pm0.5)\times10^{-3}$	S=1.1
Γ_7	$K\eta$	$(\ 1.5^{+3.4}_{-1.0})\times10^{-3}$	S=1.3
Γ_8	$K\omega\pi$	$<\ 7.2\ \times10^{-4}$	CL=95%
Γ_9	$K^0\gamma$	$<\ 9\ \times10^{-4}$	CL=90%

CONSTRAINED FIT INFORMATION

An overall fit to the total width, a partial width, and 10 branching ratios uses 31 measurements and one constraint to determine 8 parameters. The overall fit has a $\chi^2 = 20.2$ for 24 degrees of freedom.

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

	x_1	x_2	x_3	x_4	x_5	x_6	x_7
x_2	−9						
x_3	−40	−73					
x_4	−8	36	−52				
x_5	−11	−3	−26	−7			
x_6	−1	−1	−1	−1	0		
x_7	−4	−7	−5	−5	−2	0	
Γ	0	0	0	0	0	−13	0

	Mode	Rate (MeV)	Scale factor
Γ_1	$K\pi$	49.1 ± 1.8	
Γ_2	$K^*(892)\pi$	24.3 ± 1.6	
Γ_3	$K^*(892)\pi\pi$	13.2 ± 2.2	
Γ_4	$K\rho$	8.5 ± 0.8	1.2
Γ_5	$K\omega$	2.9 ± 0.8	
Γ_6	$K^+\gamma$	0.24 ± 0.05	1.1
Γ_7	$K\eta$	$0.15^{+0.33}_{-0.10}$	1.3

$K_2^*(1430)$ PARTIAL WIDTHS

$\Gamma(K^+\gamma)$ — Γ_6

VALUE (keV)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
241±50 OUR FIT	Error includes scale factor of 1.1.				
240±45	CIHANGIR	82	SPEC	+	200 $K^+ Z \to Z K^+ \pi^0$, $Z K_S^0 \pi^+$

$\Gamma(K^0\gamma)$ — Γ_9

VALUE (keV)	*CL%*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
< 5.4	90	ALAVI-HARATI	02B	KTEV		$K + A \to K^* + A$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<84	90	CARLSMITH	87	SPEC	0	60–200 $K_L^0 A \to K_S^0 \pi^0 A$

$K_2^*(1430)$ BRANCHING RATIOS

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

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.499±0.012 OUR FIT					
0.488±0.014 OUR AVERAGE					
0.485±0.006±0.020	[14] ASTON	88	LASS	0	11 $K^- p \rightarrow K^- \pi^+ n$
0.49 ±0.02	[14] ESTABROOKS	78	ASPK	±	13 $K^{\pm} p \rightarrow p K \pi$

$\Gamma(K^*(892)\pi)/\Gamma(K\pi)$ $\qquad\Gamma_2/\Gamma_1$

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.496±0.034 OUR FIT					
0.47 ±0.04 OUR AVERAGE					
0.44 ±0.09	ASTON	84B	LASS	0	11 $K^- p \rightarrow \overline{K}^0 2\pi n$
0.62 ±0.19	LAUSCHER	75	HBC	0	10,16 $K^- p \rightarrow K^- \pi^+ n$
0.54 ±0.16	DEHM	74	DBC	0	4.6 $K^+ N$
0.47 ±0.08	AGUILAR-...	71B	HBC		3.9,4.6 $K^- p$
0.47 ±0.10	BASSANO	67	HBC	−0	4.6,5.0 $K^- p$
0.45 ±0.13	BADIER	65C	HBC	−	3 $K^- p$

$\Gamma(K\omega)/\Gamma(K\pi)$ $\qquad\Gamma_5/\Gamma_1$

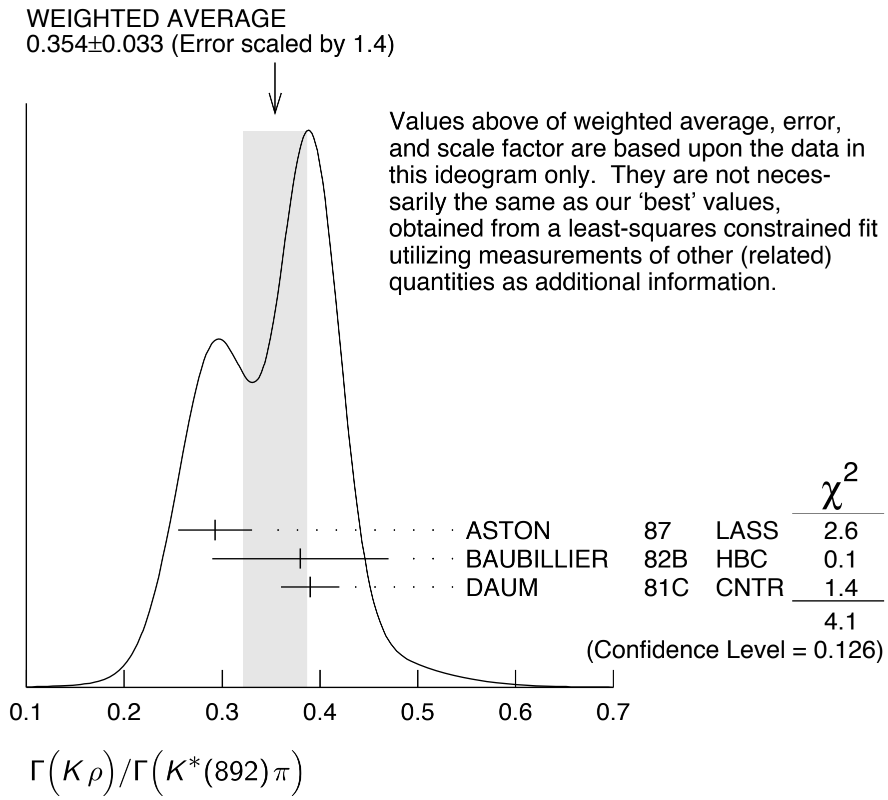
VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.059±0.017 OUR FIT					
0.070±0.035 OUR AVERAGE					
0.05 ±0.04	AGUILAR-...	71B	HBC		3.9,4.6 $K^- p$
0.13 ±0.07	BASSOMPIE...	69	HBC	0	5 $K^+ p$

$\Gamma(K\rho)/\Gamma(K\pi)$ $\qquad\Gamma_4/\Gamma_1$

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.174±0.017 OUR FIT	Error includes scale factor of 1.2.				
$0.150^{+0.029}_{-0.017}$ OUR AVERAGE					
0.18 ±0.05	ASTON	84B	LASS	0	11 $K^- p \rightarrow \overline{K}^0 2\pi n$
$0.02^{+0.10}_{-0.02}$	DEHM	74	DBC	0	4.6 $K^+ N$
0.16 ±0.05	AGUILAR-...	71B	HBC		3.9,4.6 $K^- p$
0.14 ±0.10	BASSANO	67	HBC	−0	4.6,5.0 $K^- p$
0.14 ±0.07	BADIER	65C	HBC	−	3 $K^- p$

$\Gamma(K\rho)/\Gamma(K^*(892)\pi)$ $\qquad\Gamma_4/\Gamma_2$

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.350±0.031 OUR FIT	Error includes scale factor of 1.4.				
0.354±0.033 OUR AVERAGE	Error includes scale factor of 1.4. See the ideogram below.				
0.293±0.032±0.020	ASTON	87	LASS	0	11 $K^- p \rightarrow \overline{K}^0 \pi^+ \pi^- n$
0.38 ±0.09	BAUBILLIER	82B	HBC	0	8.25 $K^- p \rightarrow N K^0_S \pi\pi$
0.39 ±0.03	DAUM	81C	CNTR		63 $K^- p \rightarrow K^- 2\pi p$



$\Gamma(K\omega)/\Gamma(K^*(892)\pi)$ — Γ_5/Γ_2

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.118±0.034 OUR FIT					
0.10 ±0.04	FIELD	67	HBC	−	3.8 $K^- p$

$\Gamma(K\eta)/\Gamma(K^*(892)\pi)$ — Γ_7/Γ_2

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
$0.006^{+0.014}_{-0.004}$ OUR FIT	Error includes scale factor of 1.2.				
0.07 ±0.04	FIELD	67	HBC	−	3.8 $K^- p$

$\Gamma(K\eta)/\Gamma(K\pi)$ — Γ_7/Γ_1

VALUE	CL%	DOCUMENT ID		TECN	CHG	COMMENT
$0.0030^{+0.0070}_{-0.0020}$ OUR FIT		Error includes scale factor of 1.3.				
0 ±0.0056		[15] ASTON	88B	LASS	−	11 $K^- p \rightarrow K^- \eta p$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.04	95	AGUILAR-...	71B	HBC		3.9,4.6 $K^- p$
<0.065		[16] BASSOMPIE...	69	HBC		5.0 $K^+ p$
<0.02		BISHOP	69	HBC		3.5 $K^+ p$

$\Gamma(K^*(892)\pi\pi)/\Gamma_{total}$ — Γ_3/Γ

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.134±0.022 OUR FIT					
0.12 ±0.04	[17] GOLDBERG	76	HBC	−	3 $K^- p \rightarrow p \overline{K}^0 \pi\pi\pi$

$\Gamma(K^*(892)\pi\pi)/\Gamma(K\pi)$ — Γ_3/Γ_1

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
0.27±0.05 OUR FIT				
0.21±0.08	[16,17] JONGEJANS 78	HBC	−	4 $K^- p \to p\overline{K}^0\pi\pi\pi$

$\Gamma(K\omega\pi)/\Gamma_{total}$ — Γ_8/Γ

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<0.72	95	0	JONGEJANS 78	HBC	4 $K^- p \to p\overline{K}^0 4\pi$

[14] From phase shift analysis.

[15] ASTON 88B quote < 0.0092 at CL=95%. We convert this to a central value and 1 sigma error in order to be able to use it in our constrained fit.

[16] Restated by us.

[17] Assuming $\pi\pi$ system has isospin 1, which is supported by the data.

$K_2^*(1430)$ REFERENCES

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ASTON	88B	PL B201 169	D. Aston et al.	(SLAC, NAGO, CINC, INUS)	
ASTON	87	NP B292 693	D. Aston et al.	(SLAC, NAGO, CINC, INUS)	
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BAUBILLIER	84B	ZPHY C26 37	M. Baubillier et al.	(BIRM, CERN, GLAS+)	
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CIHANGIR	82	PL 117B 123	S. Cihangir et al.	(FNAL, MINN, ROCH)	
CLELAND	82	NP B208 189	W.E. Cleland et al.	(DURH, GEVA, LAUS+)	
ASTON	81C	PL 106B 235	D. Aston et al.	(SLAC, CARL, OTTA)	JP
DAUM	81C	NP B187 1	C. Daum et al.	(AMST, CERN, CRAC, MPIM+)	
TOAFF	81	PR D23 1500	S. Toaff et al.	(ANL, KANS)	
ETKIN	80	PR D22 42	A. Etkin et al.	(BNL, CUNY)	JP
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BOWLER	77	NP B126 31	M.G. Bowler et al.	(OXF)	
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BISHOP	69	NP B9 403	J.M. Bishop et al.	(WISC)	
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DAVIS	69	PRL 23 1071	P.J. Davis et al.	(LRL)	
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Also		Thesis	F.L. Schweingruber	(NWES, NWES)	
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