$\Xi(1530)\ 3/2^+$

$I(J^P) = \frac{1}{2}(\frac{3}{2}^+)$ Status: ∗∗∗∗

This is the only Ξ resonance whose properties are all reasonably well known. Assuming that the Λ_c^+ has $J^P = 1/2^+$, AUBERT 08AK, in a study of $\Lambda_c^+ \rightarrow \Xi^- \pi^+ K^+$, finds conclusively that the spin of the $\Xi(1530)^0$ is 3/2. In conjunction with SCHLEIN 63B and BUTTON-SHAFER 66, this proves also that the parity is +.

We use only those determinations of the mass and width that are accompanied by some discussion of systematics and resolution.

$\Xi(1530)$ POLE POSITIONS

$\Xi(1530)^0$ REAL PART

VALUE	*DOCUMENT ID*	*COMMENT*
1531.6±0.4	LICHTENBERG74	Using HABIBI 73

$\Xi(1530)^0$ IMAGINARY PART

VALUE	*DOCUMENT ID*	*COMMENT*
4.45±0.35	LICHTENBERG74	Using HABIBI 73

$\Xi(1530)^-$ REAL PART

VALUE	*DOCUMENT ID*	*COMMENT*
1534.4±1.1	LICHTENBERG74	Using HABIBI 73

$\Xi(1530)^-$ IMAGINARY PART

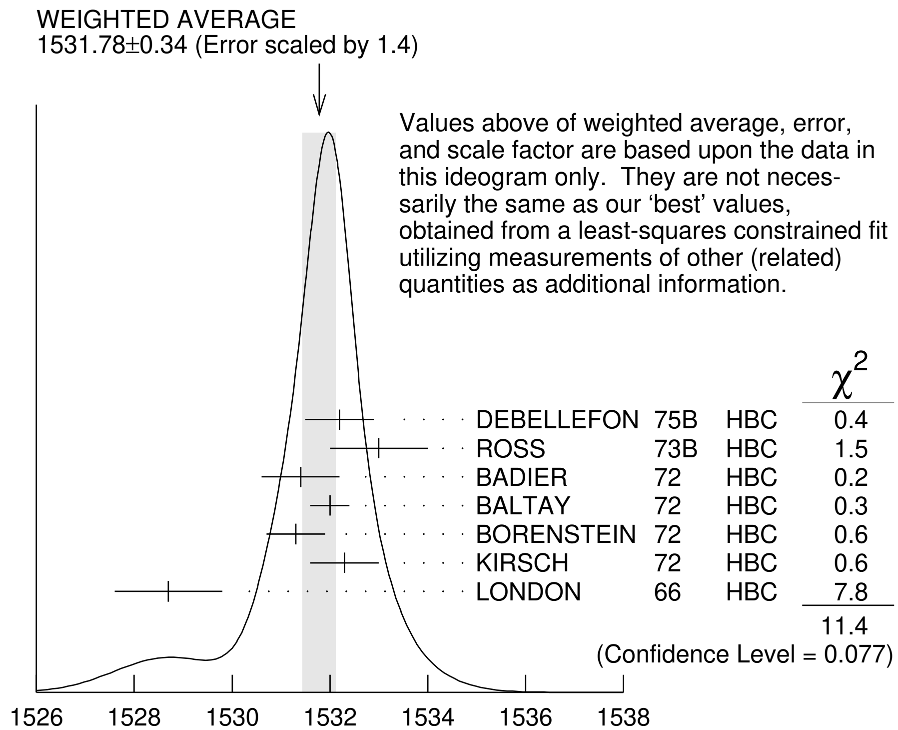
VALUE	*DOCUMENT ID*	*COMMENT*
$3.9^{+1.75}_{-3.9}$	LICHTENBERG74	Using HABIBI 73

$\Xi(1530)$ MASSES

$\Xi(1530)^0$ MASS

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1531.80±0.32 OUR FIT Error includes scale factor of 1.3.					
1531.78±0.34 OUR AVERAGE Error includes scale factor of 1.4. See the ideogram below.					
1532.2 ±0.7		DEBELLEFON	75B	HBC	$K^- p \rightarrow \Xi^- \overline{K} \pi$
1533 ±1		ROSS	73B	HBC	$K^- p \rightarrow \Xi \overline{K} \pi (\pi)$
1531.4 ±0.8	59	BADIER	72	HBC	$K^- p$ 3.95 GeV/c
1532.0 ±0.4	1262	BALTAY	72	HBC	$K^- p$ 1.75 GeV/c
1531.3 ±0.6	324	BORENSTEIN	72	HBC	$K^- p$ 2.2 GeV/c
1532.3 ±0.7	286	KIRSCH	72	HBC	$K^- p$ 2.87 GeV/c
1528.7 ±1.1	76	LONDON	66	HBC	$K^- p$ 2.24 GeV/c
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1532.1 ±0.4	1244	ASTON	85B	LASS	$K^- p$ 11 GeV/c
1532.1 ±0.6	2700	[1] BAUBILLIER	81B	HBC	$K^- p$ 8.25 GeV/c
1530 ±1	450	BIAGI	81	SPEC	SPS hyperon beam

1527 ±6	80	SIXEL	79	HBC	$K^- p$ 10 GeV/c
1535 ±4	100	SIXEL	79	HBC	$K^- p$ 16 GeV/c
1533.6 ±1.4	97	BERTHON	74	HBC	Quasi-2-body σ



$\Xi(1530)^0$ mass (MeV)

$\Xi(1530)^-$ MASS

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1535.0±0.6 OUR FIT					
1535.2±0.8 OUR AVERAGE					
1534.5±1.2		DEBELLEFON	75B	HBC	$K^- p \to \Xi^- \overline{K} \pi$
1535.3±2.0		ROSS	73B	HBC	$K^- p \to \Xi \overline{K} \pi (\pi)$
1536.2±1.6	185	KIRSCH	72	HBC	$K^- p$ 2.87 GeV/c
1535.7±3.2	38	LONDON	66	HBC	$K^- p$ 2.24 GeV/c
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1540 ±3	48	BERTHON	74	HBC	Quasi-2-body σ
1534.7±1.1	334	BALTAY	72	HBC	$K^- p$ 1.75 GeV/c

$m_{\Xi(1530)^-} - m_{\Xi(1530)}$

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
3.2±0.6 OUR FIT				
2.9±0.9 OUR AVERAGE				
2.7±1.0	BALTAY	72	HBC	$K^- p$ 1.75 GeV/c
2.0±3.2	MERRILL	66	HBC	$K^- p$ 1.7–2.7 GeV/c
5.7±3.0	PJERROU	65B	HBC	$K^- p$ 1.8–1.95 GeV/c

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

3.9±1.8		[2] KIRSCH	72	HBC	$K^- p$ 2.87 GeV/c
7 ±4		[2] LONDON	66	HBC	$K^- p$ 2.24 GeV/c

Ξ(1530) WIDTHS

$\Xi(1530)^0$ WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
9.1±0.5 OUR AVERAGE					
9.5±1.2		DEBELLEFON	75B	HBC	$K^- p \to \Xi^- \overline{K} \pi$
9.1±2.4		ROSS	73B	HBC	$K^- p \to \Xi \overline{K} \pi (\pi)$
11 ±2		BADIER	72	HBC	$K^- p$ 3.95 GeV/c
9.0±0.7		BALTAY	72	HBC	$K^- p$ 1.75 GeV/c
8.4±1.4		BORENSTEIN	72	HBC	$\Xi^- \pi^+$
11.0±1.8		KIRSCH	72	HBC	$\Xi^- \pi^+$
7 ±7		BERGE	66	HBC	$K^- p$ 1.5–1.7 GeV/c
8.5±3.5		LONDON	66	HBC	$K^- p$ 2.24 GeV/c
7 ±2		SCHLEIN	63B	HBC	$K^- p$ 1.8, 1.95 GeV/c
• • • We do not use the following data for averages, fits, limits, etc. • • •					
12.8±1.0	2700	[1] BAUBILLIER	81B	HBC	$K^- p$ 8.25 GeV/c
19 ±6	80	[3] SIXEL	79	HBC	$K^- p$ 10 GeV/c
14 ±5	100	[3] SIXEL	79	HBC	$K^- p$ 16 GeV/c

$\Xi(1530)^-$ WIDTH

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
$9.9^{+1.7}_{-1.9}$ OUR AVERAGE				
9.6±2.8	DEBELLEFON	75B	HBC	$K^- p \to \Xi^- \overline{K} \pi$
8.3±3.6	ROSS	73B	HBC	$K^- p \to \Xi \overline{K} \pi (\pi)$
$7.8^{+3.5}_{-7.8}$	BALTAY	72	HBC	$K^- p$ 1.75 GeV/c
16.2±4.6	KIRSCH	72	HBC	$\Xi^- \pi^0$, $\Xi^0 \pi^-$

Ξ(1530) DECAY MODES

	Mode	Fraction (Γ_i/Γ)	Confidence level
Γ_1	$\Xi \pi$	100 %	
Γ_2	$\Xi \gamma$	<3.7 %	90%

Ξ(1530) BRANCHING RATIOS

$\Gamma(\Xi\gamma)/\Gamma_{total}$ — Γ_2/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.037	90	ABLIKIM	20	BES3	$J/\psi \to \Xi(1530)^- \overline{\Xi}^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.04	90	KALBFLEISCH	75	HBC	$K^- p$ 2.18 GeV/c

Ξ(1530) FOOTNOTES

[1] BAUBILLIER 81B is a fit to the inclusive spectrum. The resolution (5 MeV) is not unfolded.
[2] Redundant with data in the mass Listings.
[3] SIXEL 79 doesn't unfold the experimental resolution of 15 MeV.

Ξ(1530) REFERENCES

ABLIKIM	20	PR D101 012004	M. Ablikim *et al.*	(BESIII Collab.)
AUBERT	08AK	PR D78 034008	B. Aubert *et al.*	(BABAR Collab.)
ASTON	85B	PR D32 2270	D. Aston *et al.*	(SLAC, CARL, CNRC, CINC)
BAUBILLIER	81B	NP B192 1	M. Baubillier *et al.*	(BIRM, CERN, GLAS+)
BIAGI	81	ZPHY C9 305	S.F. Biagi *et al.*	(BRIS, CAVE, GEVA+)
SIXEL	79	NP B159 125	P. Sixel *et al.*	(AACH3, BERL, CERN, LOIC+)
DEBELLEFON	75B	NC 28A 289	A. de Bellefon *et al.*	(CDEF, SACL)
KALBFLEISCH	75	PR D11 987	G.R. Kalbfleisch, R.C. Strand, J.W. Chapman	(BNL+)
BERTHON	74	NC 21A 146	A. Berthon *et al.*	(CDEF, RHEL, SACL+)
LICHTENBERG	74	PR D10 3865	D.B. Lichtenberg	(IND)
Also		Private Comm.	D.B. Lichtenberg	(IND)
HABIBI	73	Thesis Nevis 199	M. Habibi	(COLU)
ROSS	73B	Purdue Conf. 355	R.T. Ross, J.L. Lloyd, D. Radojicic	(OXF)
BADIER	72	NP B37 429	J. Badier *et al.*	(EPOL)
BALTAY	72	PL 42B 129	C. Baltay *et al.*	(COLU, BING)
BORENSTEIN	72	PR D5 1559	S.R. Borenstein *et al.*	(BNL, MICH) I
KIRSCH	72	NP B40 349	L.E. Kirsch *et al.*	(BRAN, UMD, SYRA+) I
BERGE	66	PR 147 945	J.P. Berge *et al.*	(LRL) I
BUTTON-...	66	PR 142 883	J. Button-Shafer *et al.*	(LRL) JP
LONDON	66	PR 143 1034	G.W. London *et al.*	(BNL, SYRA) IJ
MERRILL	66	Thesis UCRL 16455	D.W. Merrill	(LRL) JP
PJERROU	65B	PRL 14 275	G.M. Pjerrou *et al.*	(UCLA)
SCHLEIN	63B	PRL 11 167	P.E. Schlein *et al.*	(UCLA) IJP

OTHER RELATED PAPERS

MAZZUCATO	81	NP B178 1	M. Mazzucato *et al.*	(AMST, CERN, NIJM+)
BRIEFEL	77	PR D16 2706	E. Briefel *et al.*	(BRAN, UMD, SYRA+)
BRIEFEL	75	PR D12 1859	E. Briefel *et al.*	(BRAN, UMD, SYRA+)
HUNGERBU...	74	PR D10 2051	V. Hungerbuhler *et al.*	(YALE, FNAL, BNL+)
BUTTON-...	66	PR 142 883	J. Button-Shafer *et al.*	(LRL) JP