

# $\Xi(1530) P_{13}$

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

This is the only  $\Xi$  resonance whose properties are all reasonably well known. Assuming that the  $\Lambda_c^+$  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-SHAFFER 66, this proves also that the parity is  $+$ .

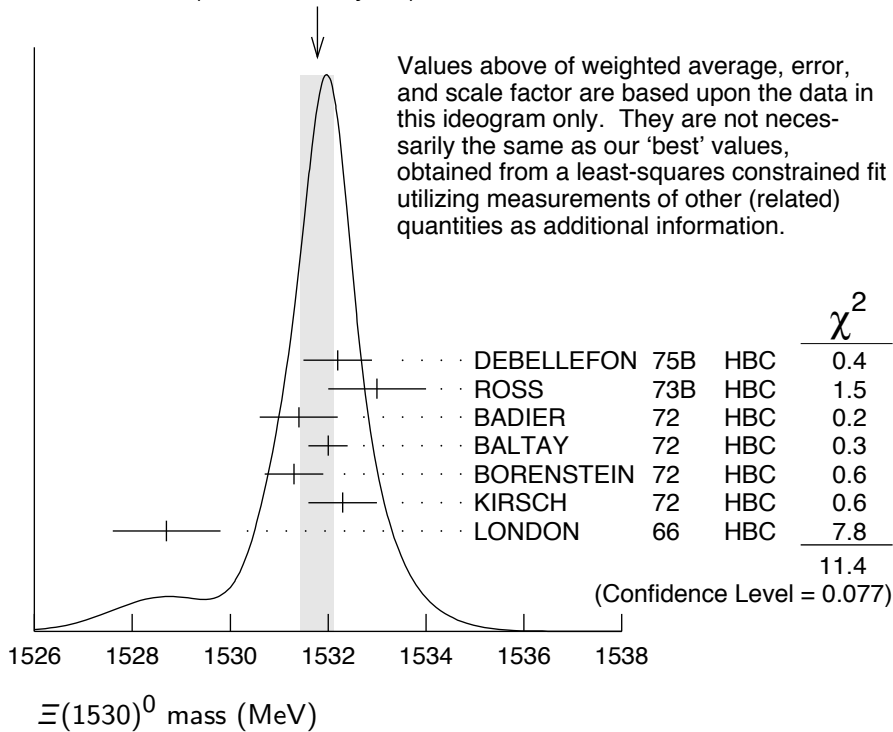
We use only those determinations of the mass and width that are accompanied by some discussion of systematics and resolution.

## $\Xi(1530)$ MASSES

### $\Xi(1530)^0$ MASS

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
<b>1531.80 ± 0.32 OUR FIT</b>				Error includes scale factor of 1.3.
<b>1531.78 ± 0.34 OUR AVERAGE</b>				Error includes scale factor of 1.4. See the ideogram below.
1532.2 ± 0.7		DEBELLEFON 75B	HBC	$K^- p \rightarrow \Xi^- \bar{K} \pi$
1533 ± 1		ROSS 73B	HBC	$K^- p \rightarrow \Xi \bar{K} \pi (\pi)$
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	<sup>1</sup> 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 $\sigma$

WEIGHTED AVERAGE  
 $1531.78 \pm 0.34$  (Error scaled by 1.4)



### $\Xi(1530)^-$ MASS

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

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

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
<b><math>3.2 \pm 0.6</math> OUR FIT</b>			
<b><math>2.9 \pm 0.9</math> OUR AVERAGE</b>			
$2.7 \pm 1.0$	BALTAY 72	HBC	$K^- p$ 1.75 GeV/c
$2.0 \pm 3.2$	MERRILL 66	HBC	$K^- p$ 1.7–2.7 GeV/c
$5.7 \pm 3.0$	PJERROU 65B	HBC	$K^- p$ 1.8–1.95 GeV/c
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
$3.9 \pm 1.8$	<sup>2</sup> KIRSCH 72	HBC	$K^- p$ 2.87 GeV/c
$7 \pm 4$	<sup>2</sup> LONDON 66	HBC	$K^- p$ 2.24 GeV/c

## $\Xi(1530)$ WIDTHS

### $\Xi(1530)^0$ WIDTH

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>9.1±0.5 OUR AVERAGE</b>				
9.5±1.2		DEBELLEFON 75B	HBC	$K^- p \rightarrow \Xi^- \bar{K} \pi$
9.1±2.4		ROSS 73B	HBC	$K^- p \rightarrow \Xi \bar{K} \pi (\pi)$
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	<sup>1</sup> BAUBILLIER 81B	HBC	$K^- p$ 8.25 GeV/c
19 ±6	80	<sup>3</sup> SIXEL 79	HBC	$K^- p$ 10 GeV/c
14 ±5	100	<sup>3</sup> SIXEL 79	HBC	$K^- p$ 16 GeV/c

### $\Xi(1530)^-$ WIDTH

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

## $\Xi(1530)$ POLE POSITIONS

### $\Xi(1530)^0$ REAL PART

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>COMMENT</u>
1531.6±0.4	LICHTENBERG74	Using HABIBI 73

### $\Xi(1530)^0$ IMAGINARY PART

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>COMMENT</u>
4.45±0.35	LICHTENBERG74	Using HABIBI 73

### $\Xi(1530)^-$ REAL PART

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>COMMENT</u>
1534.4±1.1	LICHTENBERG74	Using HABIBI 73

### $\Xi(1530)^-$ IMAGINARY PART

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>COMMENT</u>
3.9 <sup>+1.75</sup> <sub>-3.9</sub>	LICHTENBERG74	Using HABIBI 73

**$\Xi(1530)$  DECAY MODES**

Mode	Fraction ( $\Gamma_i/\Gamma$ )	Confidence level
$\Gamma_1 \quad \Xi \pi$	100 %	
$\Gamma_2 \quad \Xi \gamma$	<4 %	90%

 **$\Xi(1530)$  BRANCHING RATIOS**

$\Gamma(\Xi \gamma)/\Gamma_{\text{total}}$	$\Gamma_2/\Gamma$			
VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;0.04</b>	90	KALBFLEISCH 75	HBC	$K^- p$ 2.18 GeV/c

 **$\Xi(1530)$  FOOTNOTES**

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

 **$\Xi(1530)$  REFERENCES**

AUBERT	08AK PR D78 034008	B. Aubert <i>et al.</i>	(BABAR Collab.)
ASTON	85B PR D32 2270	D. Aston <i>et al.</i>	(SLAC, CARL, CNRC, CINC)
BAUBILLIER	81B NP B192 1	M. Baubillier <i>et al.</i>	(BIRM, CERN, GLAS+)
BIAGI	81 ZPHY C9 305	S.F. Biagi <i>et al.</i>	(BRIS, CAVE, GEVA+)
SIXEL	79 NP B159 125	P. Sixel <i>et al.</i>	(AACH3, BERL, CERN, LOIC+)
DEBELLEFON	75B NC 28A 289	A. de Bellefon <i>et al.</i>	(CDEF, SACL)
KALBFLEISCH	75 PR D11 987	G.R. Kalbfleisch, R.C. Strand, J.W. Chapman	(BNL+)
BERTHON	74 NC 21A 146	A. Berthon <i>et al.</i>	(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 <i>et al.</i>	(EPOL)
BALTAY	72 PL 42B 129	C. Baltay <i>et al.</i>	(COLU, BING)
BORENSTEIN	72 PR D5 1559	S.R. Borenstein <i>et al.</i>	(BNL, MICH) I
KIRSCH	72 NP B40 349	L.E. Kirsch <i>et al.</i>	(BRAN, UMD, SYRA+) I
BERGE	66 PR 147 945	J.P. Berge <i>et al.</i>	(LRL) I
BUTTON-...	66 PR 142 883	J. Button-Shafer <i>et al.</i>	(LRL) JP
LONDON	66 PR 143 1034	G.W. London <i>et al.</i>	(BNL, SYRA) IJ
MERRILL	66 Thesis UCRL 16455	D.W. Merrill	(LRL) JP
PJERROU	65B PRL 14 275	G.M. Pjerrou <i>et al.</i>	(UCLA)
SCHLEIN	63B PRL 11 167	P.E. Schlein <i>et al.</i>	(UCLA) IJP

**OTHER RELATED PAPERS**

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