

$\Xi(1530) P_{13}$

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

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-SHAFFER 66, this proves also that the parity is $+$.

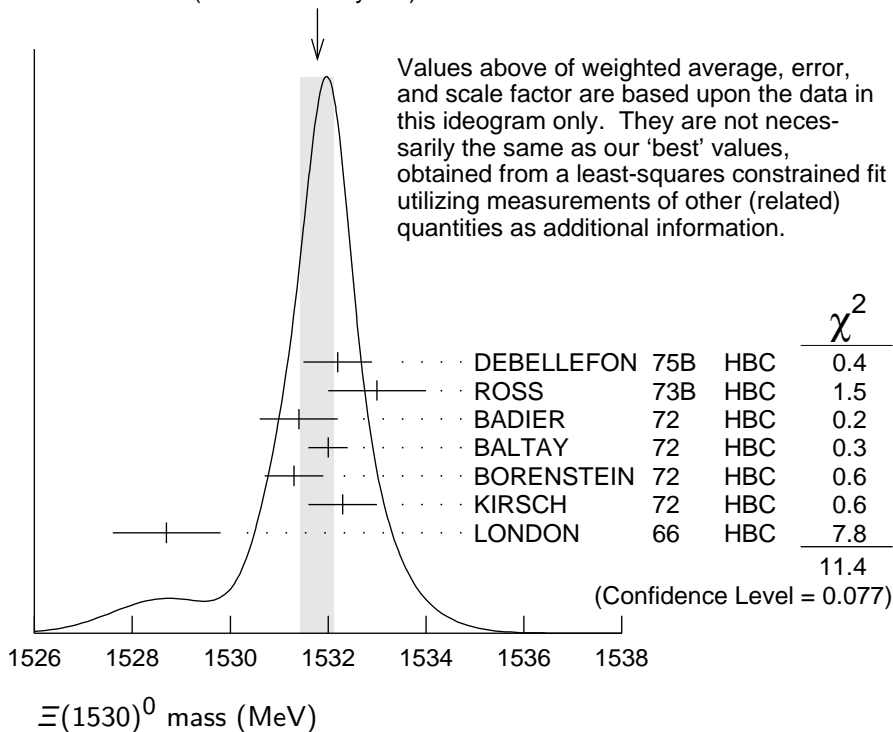
We use only those determinations of the mass and width that are accompanied by some discussion of systematics and resolution.

$\Xi(1530)$ MASSES

$\Xi(1530)^0$ MASS

| VALUE (MeV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---|------|-----------------------------|------|---|
| 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 | $K^- p \rightarrow \Xi^- \bar{K} \pi$ |
| 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 | 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 |

WEIGHTED AVERAGE
 1531.78 ± 0.34 (Error scaled by 1.4)



$\Xi(1530)^-$ 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 | $K^- p \rightarrow \Xi^- \bar{K} \pi$ |
| 1535.3 ± 2.0 | | ROSS 73B | HBC | $K^- p \rightarrow \Xi^- \bar{K} \pi (\pi)$ |
| 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 |

$\Xi(1530)$ WIDTHS

$\Xi(1530)^0$ WIDTH

| <u>VALUE (MeV)</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|-------------|-----------------------------|-------------|---|
| 9.1±0.5 OUR AVERAGE | | | | |
| 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 | 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

| <u>VALUE (MeV)</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|--|--------------------|-------------|---|
| 9.9^{+1.7}_{-1.9} OUR AVERAGE | | | |
| 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 ^{+3.5} _{-7.8} | BALTAY 72 | HBC | $K^- p$ 1.75 GeV/c |
| 16.2±4.6 | KIRSCH 72 | HBC | $\Xi^- \pi^0, \Xi^0 \pi^-$ |

$\Xi(1530)$ 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 ^{+1.75} _{-3.9} | LICHTENBERG74 | Using HABIBI 73 |

$\Xi(1530)$ DECAY MODES

| Mode | Fraction (Γ_i/Γ) | Confidence level |
|-----------------------------|--------------------------------|------------------|
| $\Gamma_1 \quad \Xi \pi$ | 100 % | |
| $\Gamma_2 \quad \Xi \gamma$ | <4 % | 90% |

 $\Xi(1530)$ BRANCHING RATIOS

| $\Gamma(\Xi \gamma)/\Gamma_{\text{total}}$ | Γ_2/Γ | | | |
|--|-------------------|----------------|------|--------------------|
| VALUE | CL% | DOCUMENT ID | TECN | COMMENT |
| <0.04 | 90 | KALBFLEISCH 75 | HBC | $K^- p$ 2.18 GeV/c |

 $\Xi(1530)$ 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.

 $\Xi(1530)$ 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) |
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| 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

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| 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+) |
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