

$\Xi(1690)$

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

AUBERT 08AK, in a study of $\Lambda_c^+ \rightarrow \Xi^- \pi^+ K^+$, finds some evidence that the $\Xi(1690)$ has $J^P = 1/2^-$.

DIONISI 78 sees a threshold enhancement in both the neutral and negatively charged $\Sigma \bar{K}$ mass spectra in $K^- p \rightarrow (\Sigma \bar{K}) K \pi$ at 4.2 GeV/c. The data from the $\Sigma \bar{K}$ channels alone cannot distinguish between a resonance and a large scattering length. Weaker evidence at the same mass is seen in the corresponding $\Lambda \bar{K}$ channels, and a coupled-channel analysis yields results consistent with a new Ξ .

BIAGI 81 sees an enhancement at 1700 MeV in the diffractively produced ΛK^- system. A peak is also observed in the $\Lambda \bar{K}^0$ mass spectrum at 1660 MeV that is consistent with a 1720 MeV resonance decaying to $\Sigma^0 \bar{K}^0$, with the γ from the Σ^0 decay not detected.

BIAGI 87 provides further confirmation of this state in diffractive dissociation of Ξ^- into ΛK^- . The significance claimed is 6.7 standard deviations.

ADAMOVICH 98 sees a peak of 1400 ± 300 events in the $\Xi^- \pi^+$ spectrum produced by 345 GeV/c Σ^- -nucleus interactions.

$\Xi(1690)$ MASSES

MIXED CHARGES

VALUE (MeV) DOCUMENT ID

1690 ± 10 OUR ESTIMATE This is only an educated guess; the error given is larger than the error on the average of the published values.

$\Xi(1690)^0$ MASS

| <u>VALUE (MeV)</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|--------------------|-------------|-------------------------|-------------|-------------------------------|
| 1686 ± 4 | 1400 | ADAMOVICH 98 | WA89 | Σ^- nucleus, 345 GeV/c |
| 1699 ± 5 | 175 | ¹ DIONISI 78 | HBC | $K^- p$ 4.2 GeV/c |
| 1684 ± 5 | 183 | ² DIONISI 78 | HBC | $K^- p$ 4.2 GeV/c |

$\Xi(1690)^-$ MASS

| <u>VALUE (MeV)</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|--------------------|-------------|-------------------------|-------------|------------------------|
| 1691.1 ± 1.9 ± 2.0 | 104 | BIAGI 87 | SPEC | Ξ^- Be 116 GeV |
| 1700 ± 10 | 150 | ³ BIAGI 81 | SPEC | Ξ^- H 100, 135 GeV |
| 1694 ± 6 | 45 | ⁴ DIONISI 78 | HBC | $K^- p$ 4.2 GeV/c |

$\Xi(1690)$ WIDTHS

MIXED CHARGES

| <u>VALUE (MeV)</u> | <u>DOCUMENT ID</u> |
|----------------------------|--------------------|
| <30 OUR ESTIMATE | |

$\Xi(1690)^0$ WIDTH

| <u>VALUE (MeV)</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|--------------------|-------------|-------------------------|-------------|-------------------------------|
| 10 ± 6 | 1400 | ADAMOVICH 98 | WA89 | Σ^- nucleus, 345 GeV/c |
| 44 ± 23 | 175 | ¹ DIONISI 78 | HBC | $K^- p$ 4.2 GeV/c |
| 20 ± 4 | 183 | ² DIONISI 78 | HBC | $K^- p$ 4.2 GeV/c |

$\Xi(1690)^-$ WIDTH

| <u>VALUE (MeV)</u> | <u>CL%</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|--------------------|------------|-------------|-------------------------|-------------|------------------------|
| < 8 | 90 | 104 | BIAGI 87 | SPEC | Ξ^- Be 116 GeV |
| 47 ± 14 | | 150 | ³ BIAGI 81 | SPEC | Ξ^- H 100, 135 GeV |
| 26 ± 6 | | 45 | ⁴ DIONISI 78 | HBC | $K^- p$ 4.2 GeV/c |

$\Xi(1690)$ DECAY MODES

| <u>Mode</u> | <u>Fraction (Γ_i/Γ)</u> |
|------------------------------|--|
| $\Gamma_1 \Lambda \bar{K}$ | seen |
| $\Gamma_2 \Sigma \bar{K}$ | seen |
| $\Gamma_3 \Xi \pi$ | seen |
| $\Gamma_4 \Xi^- \pi^+ \pi^0$ | |
| $\Gamma_5 \Xi^- \pi^+ \pi^-$ | possibly seen |
| $\Gamma_6 \Xi(1530) \pi$ | |

$\Xi(1690)$ BRANCHING RATIOS

| <u>$\Gamma(\Lambda \bar{K})/\Gamma_{\text{total}}$</u> | <u>VALUE</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>CHG</u> | <u>COMMENT</u> | Γ_1/Γ |
|---|--------------|-------------|--------------------|-------------|------------|--------------------|-------------------|
| seen | | 104 | BIAGI 87 | SPEC | – | Ξ^- Be 116 GeV | |

| <u>$\Gamma(\Sigma \bar{K})/\Gamma(\Lambda \bar{K})$</u> | <u>VALUE</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>CHG</u> | <u>COMMENT</u> | Γ_2/Γ_1 |
|--|--------------|-------------|--------------------|-------------|------------|--------------------------------|---------------------|
| | 0.75 ± 0.39 | 75 | ABE 02C | BELL | | $e^+ e^- \approx \Upsilon(4S)$ | |
| | 2.7 ± 0.9 | | DIONISI 78 | HBC | 0 | $K^- p$ 4.2 GeV/c | |
| | 3.1 ± 1.4 | | DIONISI 78 | HBC | – | $K^- p$ 4.2 GeV/c | |

| <u>$\Gamma(\Xi \pi)/\Gamma(\Sigma \bar{K})$</u> | <u>VALUE</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>CHG</u> | <u>COMMENT</u> | Γ_3/Γ_2 |
|--|--------------|--------------------|-------------|------------|-------------------|---------------------|
| | < 0.09 | DIONISI 78 | HBC | 0 | $K^- p$ 4.2 GeV/c | |

| <u>$\Gamma(\Xi \pi)/\Gamma_{\text{total}}$</u> | <u>VALUE</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> | Γ_3/Γ |
|---|--------------|--------------------|-------------|-------------------------------|-------------------|
| seen | | ADAMOVICH 98 | WA89 | Σ^- nucleus, 345 GeV/c | |

| $\Gamma(\Xi^- \pi^+ \pi^0)/\Gamma(\Sigma \bar{K})$ | | | | | | Γ_4/Γ_2 |
|--|--|--------------------|-------------|------------|----------------|----------------------|
| <u>VALUE</u> | | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>CHG</u> | <u>COMMENT</u> | |
| <0.04 | | DIONISI | 78 | HBC | 0 | $K^- p$ 4.2 GeV/ c |

| $\Gamma(\Xi^- \pi^+ \pi^-)/\Gamma_{\text{total}}$ | | | | | | Γ_5/Γ |
|---|-------------|--------------------|-------------|------------|----------------|---------------------------|
| <u>VALUE</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>CHG</u> | <u>COMMENT</u> | |
| possibly seen | 4 | BIAGI | 87 | SPEC | – | $\Xi^- \text{Be}$ 116 GeV |

| $\Gamma(\Xi^- \pi^+ \pi^-)/\Gamma(\Sigma \bar{K})$ | | | | | | Γ_5/Γ_2 |
|--|--|--------------------|-------------|------------|----------------|----------------------|
| <u>VALUE</u> | | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>CHG</u> | <u>COMMENT</u> | |
| <0.03 | | DIONISI | 78 | HBC | – | $K^- p$ 4.2 GeV/ c |

| $\Gamma(\Xi(1530)\pi)/\Gamma(\Sigma \bar{K})$ | | | | | | Γ_6/Γ_2 |
|---|--|--------------------|-------------|------------|----------------|----------------------|
| <u>VALUE</u> | | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>CHG</u> | <u>COMMENT</u> | |
| <0.06 | | DIONISI | 78 | HBC | – | $K^- p$ 4.2 GeV/ c |

$\Xi(1690)$ FOOTNOTES

- ¹ From a fit to the $\Sigma^+ K^-$ spectrum.
- ² From a coupled-channel analysis of the $\Sigma^+ K^-$ and $\Lambda \bar{K}^0$ spectra.
- ³ A fit to the inclusive spectrum from $\Xi^- N \rightarrow \Lambda K^- X$.
- ⁴ From a coupled-channel analysis of the $\Sigma^0 K^-$ and ΛK^- spectra.

$\Xi(1690)$ REFERENCES

| | | | | |
|-----------|------|---------------|------------------------------|-----------------------|
| AUBERT | 08AK | PR D78 034008 | B. Aubert <i>et al.</i> | (BABAR Collab.) |
| ABE | 02C | PL B524 33 | K. Abe <i>et al.</i> | (KEK BELLE Collab.) |
| ADAMOVICH | 98 | EPJ C5 621 | M.I. Adamovich <i>et al.</i> | (CERN WA89 Collab.) |
| BIAGI | 87 | ZPHY C34 15 | S.F. Biagi <i>et al.</i> | (BRIS, CERN, GEVA+) I |
| BIAGI | 81 | ZPHY C9 305 | S.F. Biagi <i>et al.</i> | (BRIS, CAVE, GEVA+) |
| DIONISI | 78 | PL 80B 145 | C. Dionisi <i>et al.</i> | (CERN, AMST, NIJM+) I |