# $\Xi(1690)$

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

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

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

BIAGI 87 provides further confirmation of this state in diffractive dissociation of $\Xi^-$ into $\Lambda K^-$. The significance claimed is 6.7 standard deviations.

## $\Xi(1690)$ 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

| *VALUE* (MeV) | *EVTS* | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|---|
| 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

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

## $\Xi(1690)$ WIDTHS

### MIXED CHARGES

| *VALUE* (MeV) | *DOCUMENT ID* |
|---|---|
| **<50 OUR ESTIMATE** | |

### $\Xi(1690)^0$ WIDTH

| *VALUE* (MeV) | *EVTS* | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|---|
| 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

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

## $\Xi(1690)$ DECAY MODES

| | Mode | Fraction ($\Gamma_i/\Gamma$) |
|---|---|---|
| $\Gamma_1$ | $\Lambda\overline{K}$ | seen |
| $\Gamma_2$ | $\Sigma\overline{K}$ | seen |
| $\Gamma_3$ | $\Xi\pi$ | |
| $\Gamma_4$ | $\Xi^-\pi^+\pi^0$ | |
| $\Gamma_5$ | $\Xi^-\pi^+\pi^-$ | possibly seen |
| $\Gamma_6$ | $\Xi(1530)\pi$ | |

## $\Xi(1690)$ BRANCHING RATIOS

### $\Gamma(\Lambda\overline{K})/\Gamma_{total}$ — $\Gamma_1/\Gamma$

| VALUE | EVTS | DOCUMENT ID | | TECN | CHG | COMMENT |
|---|---|---|---|---|---|---|
| **seen** | 104 | BIAGI | 87 | SPEC | – | $\Xi^-$ Be 116 GeV |

### $\Gamma(\Sigma\overline{K})/\Gamma(\Lambda\overline{K})$ — $\Gamma_2/\Gamma_1$

| VALUE | DOCUMENT ID | | TECN | CHG | COMMENT |
|---|---|---|---|---|---|
| $2.7 \pm 0.9$ | DIONISI | 78 | HBC | 0 | $K^- p$ 4.2 GeV/$c$ |
| $3.1 \pm 1.4$ | DIONISI | 78 | HBC | – | $K^- p$ 4.2 GeV/$c$ |

### $\Gamma(\Xi\pi)/\Gamma(\Sigma\overline{K})$ — $\Gamma_3/\Gamma_2$

| VALUE | DOCUMENT ID | | TECN | CHG | COMMENT |
|---|---|---|---|---|---|
| $<0.09$ | DIONISI | 78 | HBC | 0 | $K^- p$ 4.2 GeV/$c$ |

### $\Gamma(\Xi^-\pi^+\pi^0)/\Gamma(\Sigma\overline{K})$ — $\Gamma_4/\Gamma_2$

| VALUE | DOCUMENT ID | | TECN | CHG | COMMENT |
|---|---|---|---|---|---|
| $<0.04$ | DIONISI | 78 | HBC | 0 | $K^- p$ 4.2 GeV/$c$ |

### $\Gamma(\Xi^-\pi^+\pi^-)/\Gamma_{total}$ — $\Gamma_5/\Gamma$

| VALUE | EVTS | DOCUMENT ID | | TECN | CHG | COMMENT |
|---|---|---|---|---|---|---|
| **possibly seen** | 4 | BIAGI | 87 | SPEC | – | $\Xi^-$ Be 116 GeV |

### $\Gamma(\Xi^-\pi^+\pi^-)/\Gamma(\Sigma\overline{K})$ — $\Gamma_5/\Gamma_2$

| VALUE | DOCUMENT ID | | TECN | CHG | COMMENT |
|---|---|---|---|---|---|
| $<0.03$ | DIONISI | 78 | HBC | – | $K^- p$ 4.2 GeV/$c$ |

### $\Gamma(\Xi(1530)\pi)/\Gamma(\Sigma\overline{K})$ — $\Gamma_6/\Gamma_2$

| VALUE | DOCUMENT ID | | TECN | CHG | COMMENT |
|---|---|---|---|---|---|
| $<0.06$ | DIONISI | 78 | HBC | – | $K^- p$ 4.2 GeV/$c$ |

## Ξ(1690) FOOTNOTES

[1] From a fit to the $\Sigma^+ K^-$ spectrum.
[2] From a coupled-channel analysis of the $\Sigma^+ K^-$ and $\Lambda \overline{K}^0$ 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 $\Lambda K^-$ spectra.

## Ξ(1690) REFERENCES


| | | | | |
|---|---|---|---|---|
| BIAGI | 87 | ZPHY C34 15 | + | (BRIS, CERN, GEVA, HEIDP, LAUS, LOQM, RAL) I |
| BIAGI | 81 | ZPHY C9 305 | + | (BRIS, CAVE, GEVA, HEIDP, LAUS, LOQM, RHEL) |
| DIONISI | 78 | PL 80B 145 | +Diaz, Armenteros+ | (CERN, AMST, NIJM, OXF) I |