

**$\Xi(1690)$**  $I(J^P) = \frac{1}{2}(?)^?$  Status: \*\*\*

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  $\Xi$ .

BIAGI 81 sees an enhancement at 1700 MeV in the diffractively produced  $\Lambda K^-$  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  $\gamma$  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.

ADAMOVIICH 98 sees a peak of  $1400 \pm 300$  events in the  $\Xi^- \pi^+$  spectrum produced by 345 GeV/c  $\Sigma^-$ -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        | ADAMOVIICH 98           | WA89        | $\Sigma^-$ nucleus, 345 GeV/c |
| 1699±5             | 175         | <sup>1</sup> DIONISI 78 | HBC         | $K^- p$ 4.2 GeV/c             |
| 1684±5             | 183         | <sup>2</sup> 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        | $\Xi^-$ Be 116 GeV     |
| 1700 ±10           | 150         | <sup>3</sup> BIAGI 81   | SPEC        | $\Xi^-$ H 100, 135 GeV |
| 1694 ± 6           | 45          | <sup>4</sup> DIONISI 78 | HBC         | $K^- p$ 4.2 GeV/c      |

 **$\Xi(1690)$  WIDTHS****MIXED CHARGES**VALUE (MeV)DOCUMENT ID**<30 OUR ESTIMATE**

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

| <u>VALUE (MeV)</u> | <u>EVTS</u> | <u>DOCUMENT ID</u>      | <u>TECN</u> | <u>COMMENT</u>                |
|--------------------|-------------|-------------------------|-------------|-------------------------------|
| $10 \pm 6$         | 1400        | ADAMOVICH 98            | WA89        | $\Sigma^-$ nucleus, 345 GeV/c |
| $44 \pm 23$        | 175         | <sup>1</sup> DIONISI 78 | HBC         | $K^- p$ 4.2 GeV/c             |
| $20 \pm 4$         | 183         | <sup>2</sup> 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        | $\Xi^-$ Be 116 GeV     |
| $47 \pm 14$        |            | 150         | <sup>3</sup> BIAGI 81   | SPEC        | $\Xi^-$ H 100, 135 GeV |
| $26 \pm 6$         |            | 45          | <sup>4</sup> DIONISI 78 | HBC         | $K^- p$ 4.2 GeV/c      |

 **$\Xi(1690)$  DECAY MODES**

| Mode                           | Fraction ( $\Gamma_i/\Gamma$ ) |
|--------------------------------|--------------------------------|
| $\Gamma_1$ $\Lambda \bar{K}$   | 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**

| $\Gamma(\Lambda \bar{K})/\Gamma_{\text{total}}$ |             |                    |             |            |                    | $\Gamma_1/\Gamma$ |
|---|-------------|--------------------|-------------|------------|--------------------|-------------------|
| <u>VALUE</u>                                    | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>CHG</u> | <u>COMMENT</u>     |                   |
| seen  | 104         | BIAGI 87           | SPEC        | –          | $\Xi^-$ Be 116 GeV |                   |

| $\Gamma(\Sigma \bar{K})/\Gamma(\Lambda \bar{K})$ |             |                    |             |            |                                | $\Gamma_2/\Gamma_1$ |
|--|-------------|--------------------|-------------|------------|--------------------------------|---------------------|
| <u>VALUE</u>                                     | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>CHG</u> | <u>COMMENT</u>                 |                     |
| $0.75 \pm 0.39$                                  | 75          | ABE 02C            | BELL        |            | $e^+ e^- \approx \Upsilon(4S)$ |                     |
| $2.7 \pm 0.9$                                    |             | DIONISI 78         | HBC         | 0          | $K^- p$ 4.2 GeV/c              |                     |
| $3.1 \pm 1.4$                                    |             | DIONISI 78         | HBC         | –          | $K^- p$ 4.2 GeV/c              |                     |

| $\Gamma(\Xi \pi)/\Gamma(\Sigma \bar{K})$ |  |                    |             |            |                   | $\Gamma_3/\Gamma_2$ |
|--|--|--------------------|-------------|------------|-------------------|---------------------|
| <u>VALUE</u>                             |  | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>CHG</u> | <u>COMMENT</u>    |                     |
| <0.09                                    |  | DIONISI 78         | HBC         | 0          | $K^- p$ 4.2 GeV/c |                     |

| $\Gamma(\Xi \pi)/\Gamma_{\text{total}}$ |  |                    |             |                |                               | $\Gamma_3/\Gamma$ |
|---|--|--------------------|-------------|----------------|-------------------------------|-------------------|
| <u>VALUE</u>                            |  | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |                               |                   |
| seen                                    |  | ADAMOVICH 98       | WA89        |                | $\Sigma^-$ nucleus, 345 GeV/c |                   |

| $\Gamma(\Xi^- \pi^+ \pi^0)/\Gamma(\Sigma \bar{K})$ |  |                    |             |            |                   | $\Gamma_4/\Gamma_2$ |
|--|--|--------------------|-------------|------------|-------------------|---------------------|
| <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 |                     |

| $\Gamma(\Xi^- \pi^+ \pi^-) / \Gamma_{\text{total}}$ |             |                    |             |            | $\Gamma_5 / \Gamma$  |
|---|-------------|--------------------|-------------|------------|----------------------|
| <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       | — $\Xi^-$ Be 116 GeV |

  

| $\Gamma(\Xi^- \pi^+ \pi^-) / \Gamma(\Sigma \bar{K})$ |  |                    |             |            | $\Gamma_5 / \Gamma_2$ |
|--|--|--------------------|-------------|------------|-----------------------|
| <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   |

  

| $\Gamma(\Xi(1530)\pi) / \Gamma(\Sigma \bar{K})$ |  |                    |             |            | $\Gamma_6 / \Gamma_2$ |
|---|--|--------------------|-------------|------------|-----------------------|
| <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

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

### $\Xi(1690)$ REFERENCES

|           |     |             |                              |                       |
|-----------|-----|-------------|------------------------------|-----------------------|
| 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 |