

$\Xi_c(2970)$

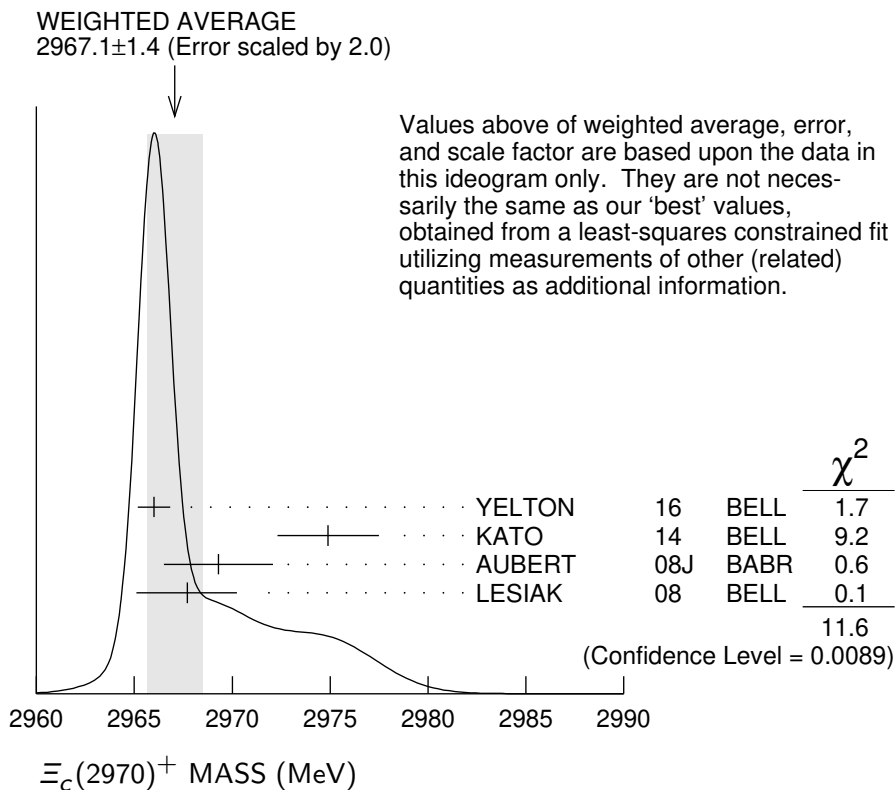
$$I(J^P) = \frac{1}{2}(??) \quad \text{Status: } ***$$

was $\Xi_c(2980)$

$\Xi_c(2970)$ MASSES

$\Xi_c(2970)^+$ MASS

| VALUE (MeV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---|-----------|-------------|----------|--|
| 2964.3±1.5 OUR FIT | | | | Error includes scale factor of 3.9. |
| 2967.1±1.4 OUR AVERAGE | | | | Error includes scale factor of 2.0. See the ideogram below. |
| 2966.0±0.8±0.2 | 0.9k | YELTON | 16 BELL | $e^+e^- \rightarrow \Upsilon(4S), \Upsilon(5S)$ and continuum |
| 2974.9±1.5±2.1 | 244 ± 39 | KATO | 14 BELL | $e^+e^- \Upsilon(1S)$ to $\Upsilon(5S)$ |
| 2969.3±2.2±1.7 | 756 ± 206 | AUBERT | 08J BABR | $e^+e^- \approx 10.58$ GeV |
| 2967.7±2.3 ^{+1.1} _{-1.2} | 78 ± 13 | LESIK | 08 BELL | $e^+e^- \approx \Upsilon(4S)$ |
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● | | | | |
| 2978.5±2.1±2.0 | 405 ± 51 | CHISTOV | 06 BELL | See KATO 14 |



$\Xi_c(2970)^0$ MASS

The evidence is statistically weaker for this charge state.

| VALUE (MeV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---|---------|-------------------|----------|---|
| 2967.1 ± 1.7 OUR FIT | | | | Error includes scale factor of 6.7. |
| 2965.9 ± 2.2 OUR AVERAGE | | | | Error includes scale factor of 7.4. |
| 2964.88 ± 0.26 ± 0.20 | 11.7k | ¹ AAIJ | 20X LHCB | pp at 13 TeV |
| 2970.8 ± 0.7 ± 0.2 | 1.4k | YELTON | 16 BELL | $e^+e^- \rightarrow \Upsilon(4S), \Upsilon(5S), \text{continuum}$ |
| 2972.9 ± 4.4 ± 1.6 | 67 ± 44 | AUBERT | 08J BABR | $e^+e^- \approx 10.58 \text{ GeV}$ |
| 2965.7 ± 2.4 $\begin{smallmatrix} +1.1 \\ -1.2 \end{smallmatrix}$ | 57 ± 13 | LESLIAK | 08 BELL | $e^+e^- \approx \Upsilon(4S)$ |
| 2977.1 ± 8.8 ± 3.5 | 42 ± 24 | CHISTOV | 06 BELL | $e^+e^- \approx \Upsilon(4S)$ |

¹ AAIJ 20X reports $2964.88 \pm 0.26 \pm 0.14 \pm 0.14 \text{ MeV}$ where the last uncertainty is due to the Λ_c^+ mass. Further studies are required to establish whether the narrow resonance at 2965 MeV is a different baryon from the narrow resonance at 2970 MeV seen by YELTON 16.

 $\Xi_c(2970) - \Xi_c$ MASS DIFFERENCES $m_{\Xi_c(2970)^+} - m_{\Xi_c^+}$

| VALUE (MeV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|----------------------------|------|-------------|---------|-------------------------------------|
| 496.6 ± 1.5 OUR FIT | | | | Error includes scale factor of 3.7. |
| 498.1 ± 0.8 ± 0.2 | 916 | YELTON | 16 BELL | e^+e^- , Υ regions |

 $m_{\Xi_c(2970)^0} - m_{\Xi_c^0}$

| VALUE (MeV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|----------------------------|------|-------------|---------|-------------------------------------|
| 496.7 ± 1.8 OUR FIT | | | | Error includes scale factor of 5.3. |
| 499.9 ± 0.7 ± 0.2 | 1.4k | YELTON | 16 BELL | e^+e^- , Υ regions |

 $\Xi_c(2970)^+ - \Xi_c(2970)^0$ MASS DIFFERENCE

| VALUE (MeV) | DOCUMENT ID | TECN | COMMENT |
|---------------------------|-------------|---------|-------------------------------------|
| -2.8 ± 1.9 OUR FIT | | | Error includes scale factor of 4.8. |
| -4.8 ± 0.1 ± 0.5 | YELTON | 16 BELL | 916 and 1443 evts |

 $\Xi_c(2970)$ WIDTHS $\Xi_c(2970)^+$ WIDTH

| VALUE (MeV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---|-----------|-------------|----------|--|
| 20.9 $\begin{smallmatrix} +2.4 \\ -3.5 \end{smallmatrix}$ OUR AVERAGE | | | | Error includes scale factor of 1.2. |
| 28.1 ± 2.4 $\begin{smallmatrix} +1.0 \\ -5.0 \end{smallmatrix}$ | 916 | YELTON | 16 BELL | e^+e^- , Υ regions |
| 14.8 ± 2.5 ± 4.1 | 244 ± 39 | KATO | 14 BELL | $e^+e^- \Upsilon(1S) \text{ to } \Upsilon(5S)$ |
| 27 ± 8 ± 2 | 756 ± 206 | AUBERT | 08J BABR | $e^+e^- \approx 10.58 \text{ GeV}$ |
| 18 ± 6 ± 3 | 78 ± 13 | LESLIAK | 08 BELL | $e^+e^- \approx \Upsilon(4S)$ |
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● | | | | |
| 43.5 ± 7.5 ± 7.0 | 405 ± 51 | CHISTOV | 06 BELL | See KATO 14 |

$\Xi_c(2970)^0$ WIDTH

| VALUE (MeV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|------------------------------|-------|-------------------|----------|-------------------------------|
| $14.1 \pm 0.9 \pm 1.3$ | 11.7k | ¹ AAIJ | 20X LHCb | pp at 13 TeV |
| $30.3 \pm 2.3^{+1.0}_{-1.8}$ | 1443 | YELTON | 16 BELL | e^+e^- , Υ regions |

• • • We do not use the following data for averages, fits, limits, etc. • • •

| | | | | |
|------------------|-------------|--------|----------|-------------------------------|
| 31 $\pm 7 \pm 8$ | 67 ± 44 | AUBERT | 08J BABR | $e^+e^- \approx 10.58$ GeV |
| 15 $\pm 6 \pm 3$ | 57 ± 13 | LESIAK | 08 BELL | $e^+e^- \approx \Upsilon(4S)$ |

¹ Further studies are required to establish whether the narrow resonance at 2965 MeV is a different baryon from the narrow resonance at 2970 MeV seen by YELTON 16.

 $\Xi_c(2970)$ DECAY MODES

| Mode | Fraction (Γ_j/Γ) |
|------------------------------------|--------------------------------|
| $\Gamma_1 \Lambda_c^+ \bar{K} \pi$ | seen |
| $\Gamma_2 \Sigma_c(2455) \bar{K}$ | seen |
| $\Gamma_3 \Lambda_c^+ \bar{K}$ | not seen |
| $\Gamma_4 \Lambda_c^+ K^-$ | seen |
| $\Gamma_5 \Xi_c 2\pi$ | seen |
| $\Gamma_6 \Xi'_c \pi$ | seen |
| $\Gamma_7 \Xi_c(2645) \pi$ | seen |

 $\Xi_c(2970)$ BRANCHING RATIOS

| $\Gamma(\Lambda_c^+ \bar{K} \pi)/\Gamma_{\text{total}}$ | | | | | Γ_1/Γ |
|---|-------------|----------|-------------------------------|--|-------------------|
| VALUE | DOCUMENT ID | TECN | COMMENT | | |
| seen | AUBERT | 08J BABR | $e^+e^- \approx \Upsilon(4S)$ | | |
| seen | CHISTOV | 06 BELL | $e^+e^- \approx \Upsilon(4S)$ | | |

| $\Gamma(\Lambda_c^+ K^-)/\Gamma_{\text{total}}$ | | | | | Γ_4/Γ |
|---|-------|-------------------|----------|----------------|-------------------|
| VALUE | EVTS | DOCUMENT ID | TECN | COMMENT | |
| seen | 11.7k | ¹ AAIJ | 20X LHCb | pp at 13 TeV | |

¹ Further studies are required to establish whether the narrow resonance at 2965 MeV is a different baryon from the narrow resonance at 2970 MeV seen by YELTON 16.

| $\Gamma(\Sigma_c(2455) \bar{K})/\Gamma(\Lambda_c^+ \bar{K} \pi)$ | | | | | Γ_2/Γ_1 |
|--|-------------|----------|-------------------------------|--|---------------------|
| VALUE | DOCUMENT ID | TECN | COMMENT | | |
| $0.55 \pm 0.07 \pm 0.13$ | AUBERT | 08J BABR | $e^+e^- \approx \Upsilon(4S)$ | | |

| $\Gamma(\Xi'_c \pi)/\Gamma_{\text{total}}$ | | | | | Γ_6/Γ |
|--|-------------|---------|-------------------------------|--|-------------------|
| VALUE | DOCUMENT ID | TECN | COMMENT | | |
| seen | YELTON | 16 BELL | e^+e^- , Υ regions | | |

| $\Gamma(\Xi_c(2645) \pi)/\Gamma_{\text{total}}$ | | | | | Γ_7/Γ |
|---|-------------|---------|-------------------------------|--|-------------------|
| VALUE | DOCUMENT ID | TECN | COMMENT | | |
| seen | LESIAK | 08 BELL | $e^+e^- \approx \Upsilon(4S)$ | | |

$\Xi_c(2970)$ REFERENCES

| | | | | |
|---------|-----|----------------|--------------------------|-----------------|
| AAIJ | 20X | PRL 124 222001 | R. Aaij <i>et al.</i> | (LHCb Collab.) |
| YELTON | 16 | PR D94 052011 | J. Yelton <i>et al.</i> | (BELLE Collab.) |
| KATO | 14 | PR D89 052003 | Y. Kato <i>et al.</i> | (BELLE Collab.) |
| AUBERT | 08J | PR D77 012002 | B. Aubert <i>et al.</i> | (BABAR Collab.) |
| LESIAK | 08 | PL B665 9 | T. Lesiak <i>et al.</i> | (BELLE Collab.) |
| CHISTOV | 06 | PRL 97 162001 | R. Chistov <i>et al.</i> | (BELLE Collab.) |
