

Ξ(2030)

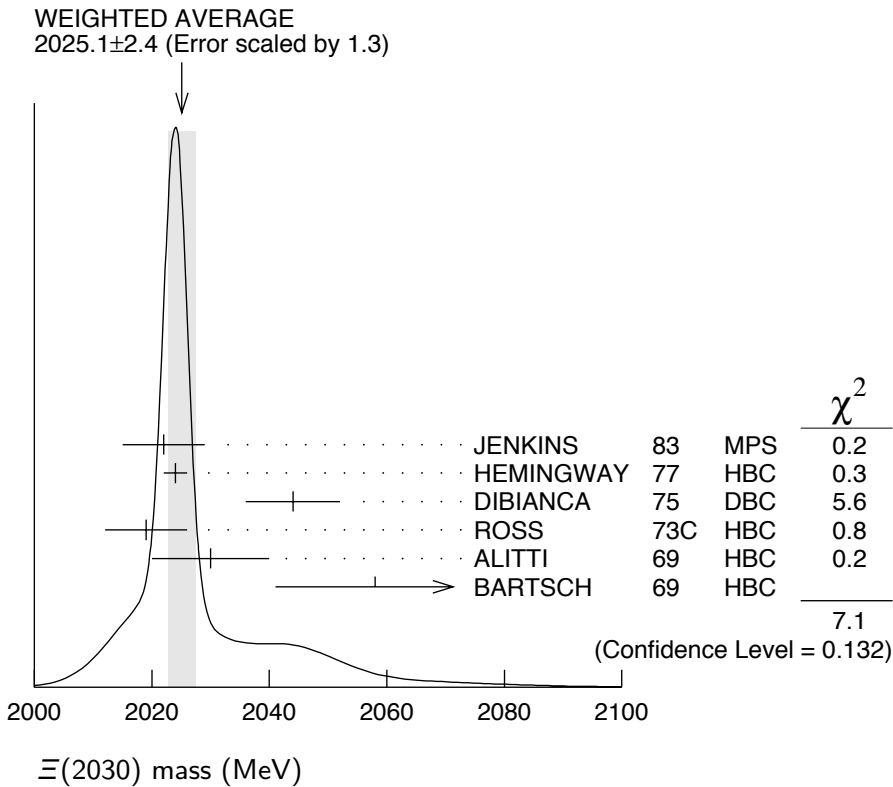
$$I(J^P) = \frac{1}{2}(\geq \frac{5}{2}) \text{ Status: } ***$$

The evidence for this state has been much improved by HEMINGWAY 77, who see an eight standard deviation enhancement in $\Sigma \bar{K}$ and a weaker coupling to $\Lambda \bar{K}$. ALITTI 68 and HEMINGWAY 77 observe no signals in the $\Xi \pi \pi$ (or $\Xi(1530)\pi$) channel, in contrast to DIBIANCA 75. The decay $(\Lambda/\Sigma)\bar{K}\pi$ reported by BARTSCH 69 is also not confirmed by HEMINGWAY 77.

A moments analysis of the HEMINGWAY 77 data indicates at a level of three standard deviations that $J \geq 5/2$.

Ξ(2030) MASS

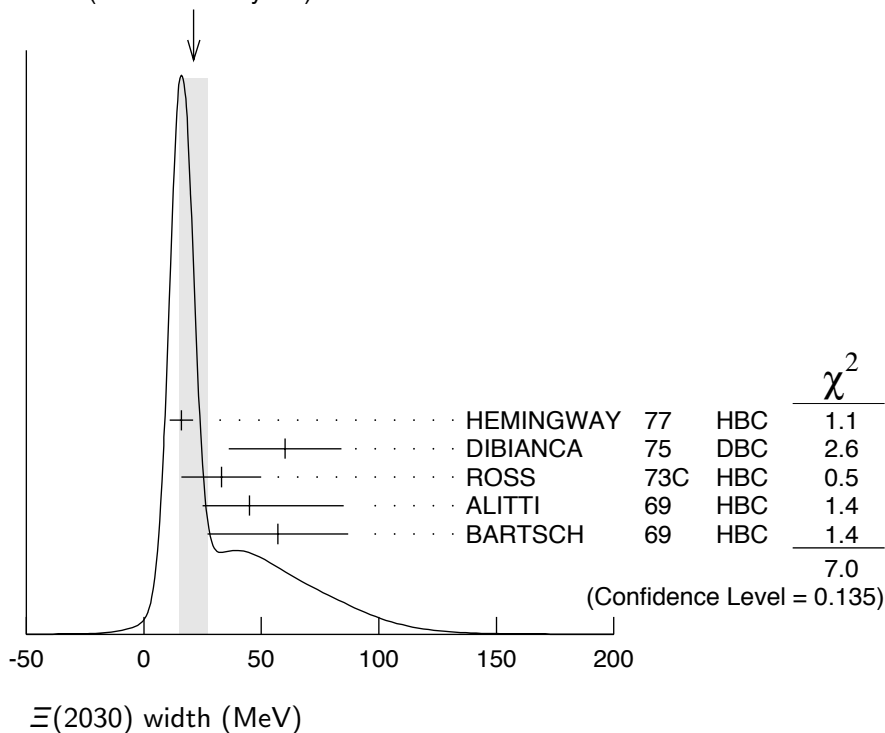
| VALUE (MeV) | EVTS | DOCUMENT ID | TECN | CHG | COMMENT |
|---------------------|------|-------------|------|-----|--|
| 2025 ± 5 | | | | | OUR ESTIMATE |
| 2025.1 ± 2.4 | | | | | OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below. |
| 2022 ± 7 | | JENKINS | 83 | MPS | — $K^- p \rightarrow K^+$ MM |
| 2024 ± 2 | 200 | HEMINGWAY | 77 | HBC | — $K^- p$ 4.2 GeV/c |
| 2044 ± 8 | | DIBIANCA | 75 | DBC | —0 $\Xi \pi \pi, \Xi^* \pi$ |
| 2019 ± 7 | 15 | ROSS | 73C | HBC | —0 $\Sigma \bar{K}$ |
| 2030 ± 10 | 42 | ALITTI | 69 | HBC | — $K^- p$ 3.9–5 GeV/c |
| 2058 ± 17 | 40 | BARTSCH | 69 | HBC | —0 $K^- p$ 10 GeV/c |



$\Xi(2030)$ WIDTH

| VALUE (MeV) | EVTS | DOCUMENT ID | TECN | CHG | COMMENT |
|-----------------------------------|------|--------------|------|-----|--|
| 20^{+15}_{-5} | | | | | OUR ESTIMATE |
| 21 ± 6 | | | | | OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below. |
| 16 ± 5 | 200 | HEMINGWAY 77 | HBC | - | $K^- p$ 4.2 GeV/c |
| 60 ± 24 | | DIBIANCA 75 | DBC | -0 | $\Xi \pi \pi, \Xi^* \pi$ |
| 33 ± 17 | 15 | ROSS 73C | HBC | -0 | $\Sigma \bar{K}$ |
| 45^{+40}_{-20} | | ALITTI 69 | HBC | - | $K^- p$ 3.9-5 GeV/c |
| 57 ± 30 | | BARTSCH 69 | HBC | -0 | $K^- p$ 10 GeV/c |

WEIGHTED AVERAGE
 21 ± 6 (Error scaled by 1.3)



$\Xi(2030)$ DECAY MODES

| Mode | Fraction (Γ_i/Γ) |
|---|--------------------------------|
| Γ_1 $\Lambda \bar{K}$ | $\sim 20\%$ |
| Γ_2 $\Sigma \bar{K}$ | $\sim 80\%$ |
| Γ_3 $\Xi \pi$ | small |
| Γ_4 $\Xi(1530) \pi$ | small |
| Γ_5 $\Xi \pi \pi$ (not $\Xi(1530) \pi$) | small |
| Γ_6 $\Lambda \bar{K} \pi$ | small |
| Γ_7 $\Sigma \bar{K} \pi$ | small |

$\Xi(2030)$ BRANCHING RATIOS

$$\frac{\Gamma(\Xi\pi)}{[\Gamma(\Lambda\bar{K}) + \Gamma(\Sigma\bar{K}) + \Gamma(\Xi\pi) + \Gamma(\Xi(1530)\pi)]} \quad \Gamma_3/(\Gamma_1+\Gamma_2+\Gamma_3+\Gamma_4)$$

| VALUE | DOCUMENT ID | TECN | CHG | COMMENT |
|-------|-------------|------|-----|---------|
|-------|-------------|------|-----|---------|

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

| | | | | |
|-------|--------|----|-----|-------------------------|
| <0.30 | ALITTI | 69 | HBC | – 1 standard dev. limit |
|-------|--------|----|-----|-------------------------|

$$\frac{\Gamma(\Xi\pi)}{\Gamma(\Sigma\bar{K})} \quad \Gamma_3/\Gamma_2$$

| VALUE | CL% | DOCUMENT ID | TECN | CHG | COMMENT |
|-------|-----|-------------|------|-----|---------|
|-------|-----|-------------|------|-----|---------|

| | | | | | |
|-------|----|-----------|----|-----|---------------------|
| <0.19 | 95 | HEMINGWAY | 77 | HBC | – $K^- p$ 4.2 GeV/c |
|-------|----|-----------|----|-----|---------------------|

$$\frac{\Gamma(\Lambda\bar{K})}{[\Gamma(\Lambda\bar{K}) + \Gamma(\Sigma\bar{K}) + \Gamma(\Xi\pi) + \Gamma(\Xi(1530)\pi)]} \quad \Gamma_1/(\Gamma_1+\Gamma_2+\Gamma_3+\Gamma_4)$$

| VALUE | DOCUMENT ID | TECN | CHG | COMMENT |
|-------|-------------|------|-----|---------|
|-------|-------------|------|-----|---------|

| | | | | |
|-------------|--------|----|-----|-----------------------|
| 0.25 ± 0.15 | ALITTI | 69 | HBC | – $K^- p$ 3.9–5 GeV/c |
|-------------|--------|----|-----|-----------------------|

$$\frac{\Gamma(\Lambda\bar{K})}{\Gamma(\Sigma\bar{K})} \quad \Gamma_1/\Gamma_2$$

| VALUE | DOCUMENT ID | TECN | CHG | COMMENT |
|-------|-------------|------|-----|---------|
|-------|-------------|------|-----|---------|

| | | | | |
|-------------|-----------|----|-----|---------------------|
| 0.22 ± 0.09 | HEMINGWAY | 77 | HBC | – $K^- p$ 4.2 GeV/c |
|-------------|-----------|----|-----|---------------------|

$$\frac{\Gamma(\Sigma\bar{K})}{[\Gamma(\Lambda\bar{K}) + \Gamma(\Sigma\bar{K}) + \Gamma(\Xi\pi) + \Gamma(\Xi(1530)\pi)]} \quad \Gamma_2/(\Gamma_1+\Gamma_2+\Gamma_3+\Gamma_4)$$

| VALUE | DOCUMENT ID | TECN | CHG | COMMENT |
|-------|-------------|------|-----|---------|
|-------|-------------|------|-----|---------|

| | | | | |
|-------------|--------|----|-----|-----------------------|
| 0.75 ± 0.20 | ALITTI | 69 | HBC | – $K^- p$ 3.9–5 GeV/c |
|-------------|--------|----|-----|-----------------------|

$$\frac{\Gamma(\Xi(1530)\pi)}{[\Gamma(\Lambda\bar{K}) + \Gamma(\Sigma\bar{K}) + \Gamma(\Xi\pi) + \Gamma(\Xi(1530)\pi)]} \quad \Gamma_4/(\Gamma_1+\Gamma_2+\Gamma_3+\Gamma_4)$$

| VALUE | DOCUMENT ID | TECN | CHG | COMMENT |
|-------|-------------|------|-----|---------|
|-------|-------------|------|-----|---------|

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

| | | | | |
|-------|--------|----|-----|-------------------------|
| <0.15 | ALITTI | 69 | HBC | – 1 standard dev. limit |
|-------|--------|----|-----|-------------------------|

$$\frac{[\Gamma(\Xi(1530)\pi) + \Gamma(\Xi\pi\pi(\text{not } \Xi(1530)\pi))]}{\Gamma(\Sigma\bar{K})} \quad (\Gamma_4+\Gamma_5)/\Gamma_2$$

| VALUE | CL% | DOCUMENT ID | TECN | CHG | COMMENT |
|-------|-----|-------------|------|-----|---------|
|-------|-----|-------------|------|-----|---------|

| | | | | | |
|-------|----|------------------------|----|-----|---------------------|
| <0.11 | 95 | ¹ HEMINGWAY | 77 | HBC | – $K^- p$ 4.2 GeV/c |
|-------|----|------------------------|----|-----|---------------------|

$$\frac{\Gamma(\Lambda\bar{K}\pi)}{\Gamma_{\text{total}}} \quad \Gamma_6/\Gamma$$

| VALUE | DOCUMENT ID | TECN | COMMENT |
|-------|-------------|------|---------|
|-------|-------------|------|---------|

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

| | | | | |
|------|---------|----|-----|----------------|
| seen | BARTSCH | 69 | HBC | $K^- p$ 10 GeV |
|------|---------|----|-----|----------------|

$$\frac{\Gamma(\Lambda\bar{K}\pi)}{\Gamma(\Sigma\bar{K})} \quad \Gamma_6/\Gamma_2$$

| VALUE | CL% | DOCUMENT ID | TECN | CHG | COMMENT |
|-------|-----|-------------|------|-----|---------|
|-------|-----|-------------|------|-----|---------|

| | | | | | |
|-------|----|-----------|----|-----|---------------------|
| <0.32 | 95 | HEMINGWAY | 77 | HBC | – $K^- p$ 4.2 GeV/c |
|-------|----|-----------|----|-----|---------------------|

$$\frac{\Gamma(\Sigma\bar{K}\pi)}{\Gamma_{\text{total}}} \quad \Gamma_7/\Gamma$$

| VALUE | DOCUMENT ID | TECN | COMMENT |
|-------|-------------|------|---------|
|-------|-------------|------|---------|

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

| | | | | |
|------|---------|----|-----|----------------|
| seen | BARTSCH | 69 | HBC | $K^- p$ 10 GeV |
|------|---------|----|-----|----------------|

$\Gamma(\Sigma\bar{K}\pi)/\Gamma(\Sigma\bar{K})$

Γ_7/Γ_2

| <u>VALUE</u> | <u>CL%</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>CHG</u> | <u>COMMENT</u> |
|--------------|------------|---------------------------|-------------|------------|-------------------|
| <0.04 | 95 | ² HEMINGWAY 77 | HBC | - | $K^- p$ 4.2 GeV/c |

$\Xi(2030)$ FOOTNOTES

¹ For the decay mode $\Xi^- \pi^+ \pi^-$ only.

² For the decay mode $\Sigma^\pm K^- \pi^\mp$ only.

$\Xi(2030)$ REFERENCES

| | | | | |
|-----------|-----|------------------|-------------------------------------|---------------------|
| JENKINS | 83 | PRL 51 951 | C.M. Jenkins <i>et al.</i> | (FSU, BRAN, LBL+) |
| HEMINGWAY | 77 | PL 68B 197 | R.J. Hemingway <i>et al.</i> | (AMST, CERN, NIJM+) |
| Also | | PL 62B 477 | J.B. Gay <i>et al.</i> | (AMST, CERN, NIJM) |
| DIBIANCA | 75 | NP B98 137 | F.A. Dibianca, R.J. Endorf | (CMU) |
| ROSS | 73C | Purdue Conf. 345 | R.T. Ross, J.L. Lloyd, D. Radojicic | (OXF) |
| ALITTI | 69 | PRL 22 79 | J. Alitti <i>et al.</i> | (BNL, SYRA) |
| BARTSCH | 69 | PL 28B 439 | J. Bartsch <i>et al.</i> | (AACH, BERL, CERN+) |
| ALITTI | 68 | PRL 21 1119 | J. Alitti <i>et al.</i> | (BNL, SYRA) |