

# Ξ(2030)

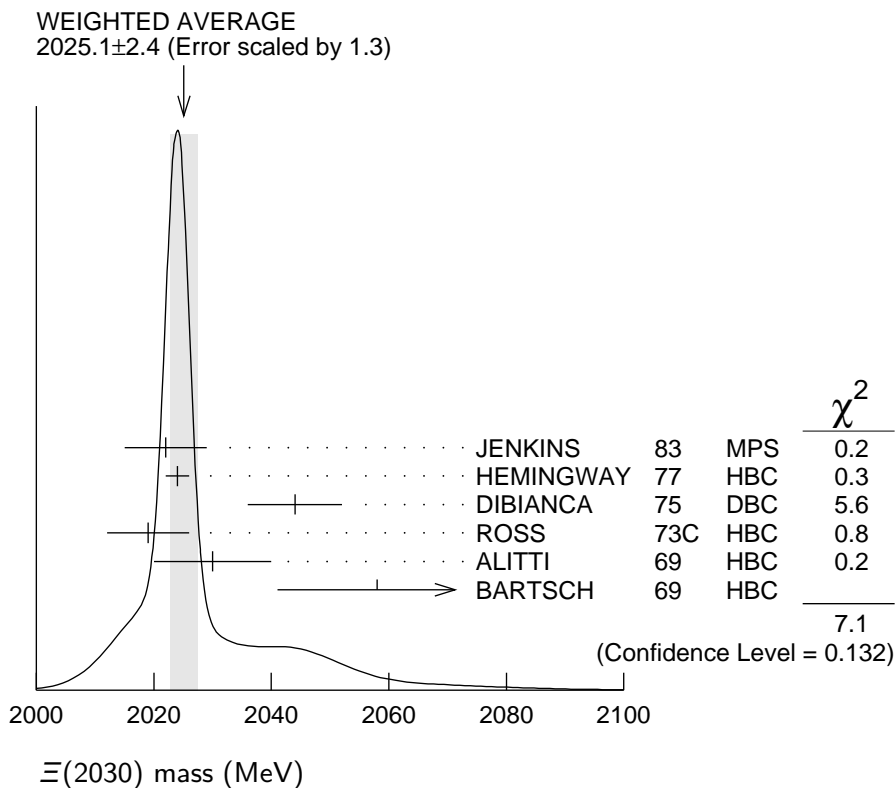
$$I(J^P) = \frac{1}{2}(\geq \frac{5}{2}?) \quad \text{Status: } ***$$

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

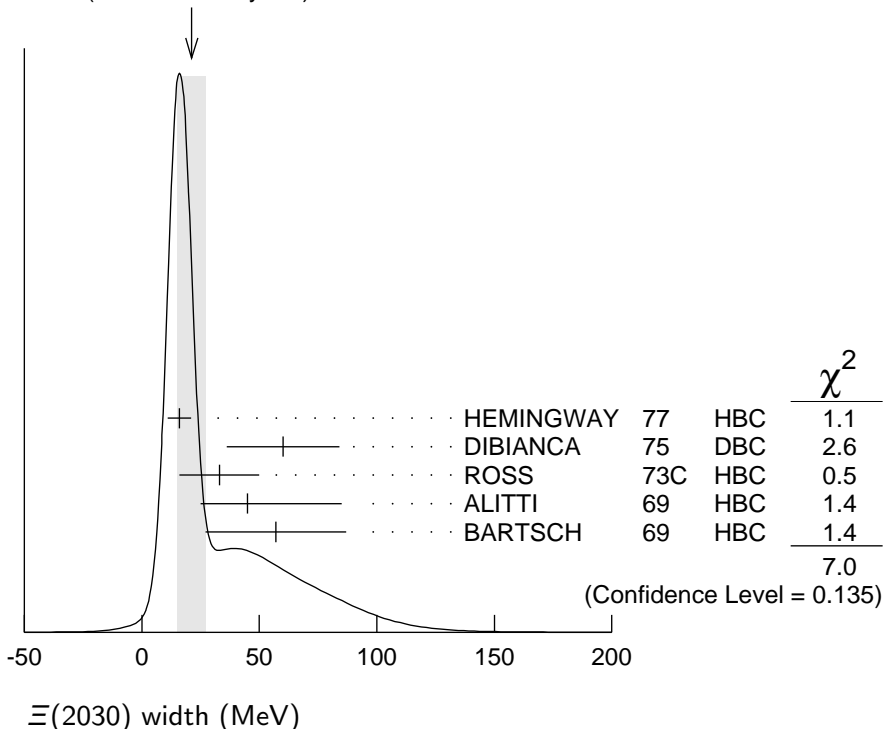
VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
<b>2025 ± 5</b>	<b>OUR ESTIMATE</b>				
<b>2025.1 ± 2.4</b>	<b>OUR AVERAGE</b>	Error includes scale factor of 1.3. See the ideogram below.			
2022 ± 7		JENKINS	83	MPS	— $K^- p \rightarrow K^+$ MM
2024 ± 2	200	HEMINGWAY	77	HBC	— $K^- p$ 4.2 GeV/c
2044 ± 8		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
<b><math>20^{+15}_{-5}</math></b>					<b>OUR ESTIMATE</b>
<b><math>21 \pm 6</math></b>					<b>OUR AVERAGE</b> Error includes scale factor of 1.3. See the ideogram below.
$16 \pm 5$	200	HEMINGWAY 77	HBC	—	$K^- p$ 4.2 GeV/c
$60 \pm 24$		DIBIANCA 75	DBC	—0	$\Xi \pi \pi, \Xi^* \pi$
$33 \pm 17$	15	ROSS 73C	HBC	—0	$\Sigma \bar{K}$
$45^{+40}_{-20}$		ALITTI 69	HBC	—	$K^- p$ 3.9–5 GeV/c
$57 \pm 30$		BARTSCH 69	HBC	—0	$K^- p$ 10 GeV/c

WEIGHTED AVERAGE  
 $21 \pm 6$  (Error scaled by 1.3)



### $\Xi(2030)$ DECAY MODES

Mode	Fraction ( $\Gamma_i/\Gamma$ )
$\Gamma_1$ $\Lambda \bar{K}$	$\sim 20\%$
$\Gamma_2$ $\Sigma \bar{K}$	$\sim 80\%$
$\Gamma_3$ $\Xi \pi$	small
$\Gamma_4$ $\Xi(1530) \pi$	small
$\Gamma_5$ $\Xi \pi \pi$ (not $\Xi(1530) \pi$ )	small
$\Gamma_6$ $\Lambda \bar{K} \pi$	small
$\Gamma_7$ $\Sigma \bar{K} \pi$	small

### $\Xi(2030)$ BRANCHING RATIOS

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

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
<0.30	ALITTI	69	HBC	– 1 standard dev. limit

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

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
<0.19	95	HEMINGWAY	77	HBC	– $K^- p$ 4.2 GeV/c

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

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
$0.25 \pm 0.15$	ALITTI	69	HBC	– $K^- p$ 3.9–5 GeV/c

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

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
$0.22 \pm 0.09$	HEMINGWAY	77	HBC	– $K^- p$ 4.2 GeV/c

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

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
$0.75 \pm 0.20$	ALITTI	69	HBC	– $K^- p$ 3.9–5 GeV/c

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

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
<0.15	ALITTI	69	HBC	– 1 standard dev. limit

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

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
<0.11	95	<sup>1</sup> HEMINGWAY	77	HBC	– $K^- p$ 4.2 GeV/c

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

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
seen	BARTSCH	69	HBC $K^- p$ 10 GeV

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

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
<0.32	95	HEMINGWAY	77	HBC	– $K^- p$ 4.2 GeV/c

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

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
seen	BARTSCH	69	HBC $K^- p$ 10 GeV

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

$\Gamma_7/\Gamma_2$

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

### $\Xi(2030)$ FOOTNOTES

<sup>1</sup> For the decay mode  $\Xi^- \pi^+ \pi^-$  only.

<sup>2</sup> 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+) IJ
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) I
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)