

$\Xi(2030)$

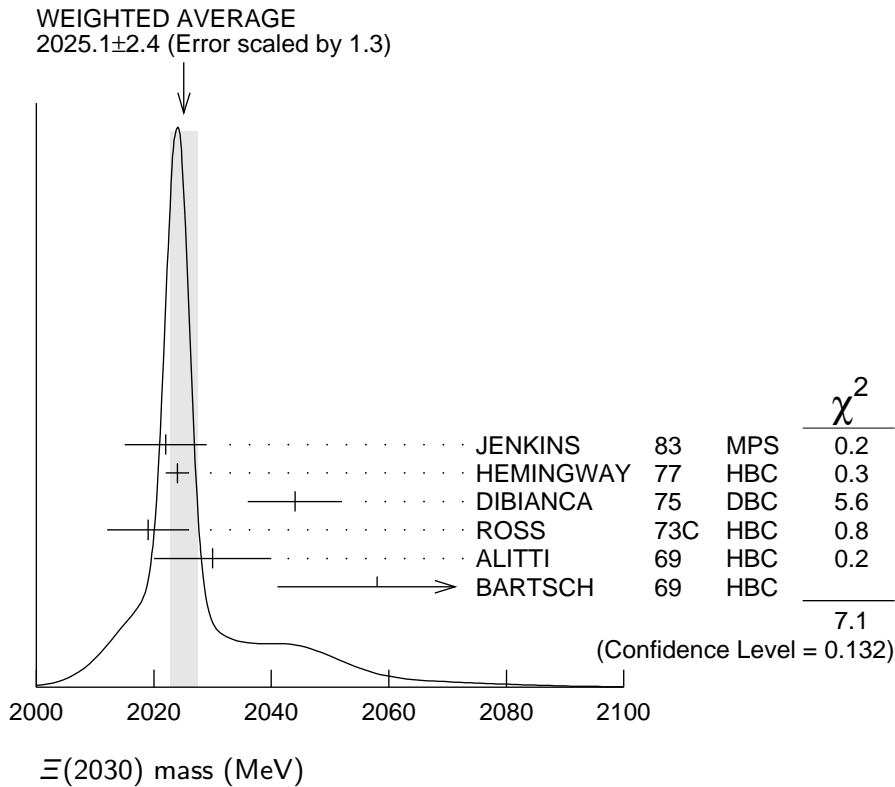
$$I(J^P) = \frac{1}{2}(\geq \frac{5}{2}) \text{ Status: } ***$$

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 $J \geq 5/2$.

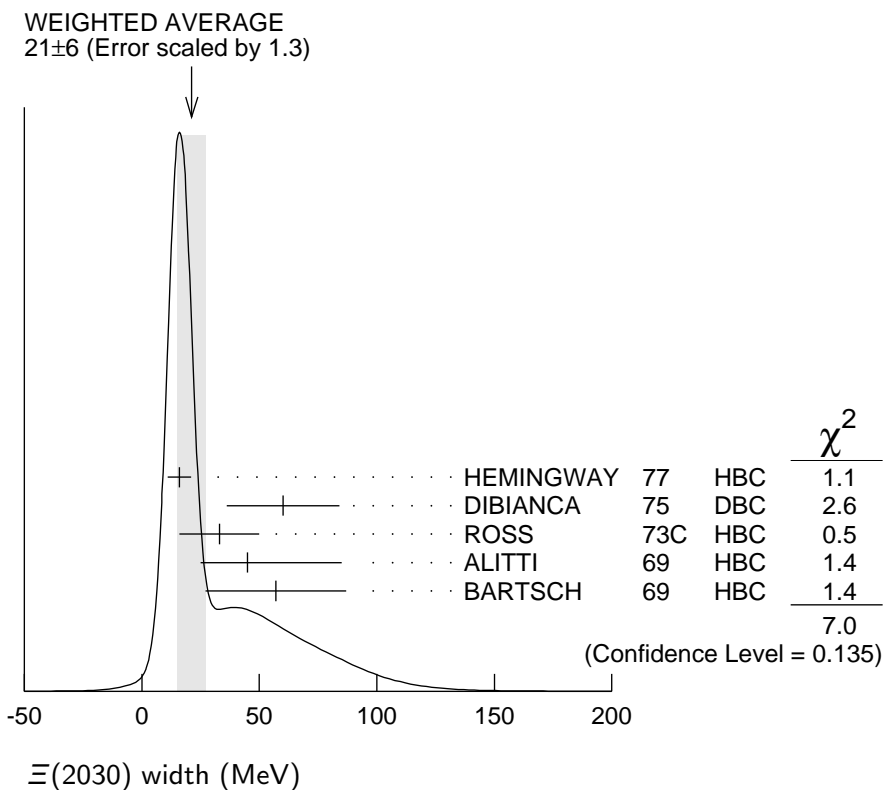
$\Xi(2030)$ MASS

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



$\Xi(2030)$ 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
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••• We do not use the following data for averages, fits, limits, etc. •••

<0.30	ALITTI	69	HBC	– 1 standard dev. limit
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$$\frac{\Gamma(\Xi\pi)}{\Gamma(\Sigma\bar{K})} \quad \Gamma_3/\Gamma_2$$

VALUE	CL%	DOCUMENT ID	TECN	CHG	COMMENT
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<0.19	95	HEMINGWAY	77	HBC	– $K^- p$ 4.2 GeV/c
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$$\frac{\Gamma(\Lambda\bar{K})}{[\Gamma(\Lambda\bar{K}) + \Gamma(\Sigma\bar{K}) + \Gamma(\Xi\pi) + \Gamma(\Xi(1530)\pi)]} \quad \Gamma_1/(\Gamma_1+\Gamma_2+\Gamma_3+\Gamma_4)$$

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
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0.25 ± 0.15	ALITTI	69	HBC	– $K^- p$ 3.9–5 GeV/c
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$$\frac{\Gamma(\Lambda\bar{K})}{\Gamma(\Sigma\bar{K})} \quad \Gamma_1/\Gamma_2$$

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0.22 ± 0.09	HEMINGWAY	77	HBC	– $K^- p$ 4.2 GeV/c
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$$\frac{\Gamma(\Sigma\bar{K})}{[\Gamma(\Lambda\bar{K}) + \Gamma(\Sigma\bar{K}) + \Gamma(\Xi\pi) + \Gamma(\Xi(1530)\pi)]} \quad \Gamma_2/(\Gamma_1+\Gamma_2+\Gamma_3+\Gamma_4)$$

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
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0.75 ± 0.20	ALITTI	69	HBC	– $K^- p$ 3.9–5 GeV/c
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$$\frac{\Gamma(\Xi(1530)\pi)}{[\Gamma(\Lambda\bar{K}) + \Gamma(\Sigma\bar{K}) + \Gamma(\Xi\pi) + \Gamma(\Xi(1530)\pi)]} \quad \Gamma_4/(\Gamma_1+\Gamma_2+\Gamma_3+\Gamma_4)$$

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
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••• We do not use the following data for averages, fits, limits, etc. •••

<0.15	ALITTI	69	HBC	– 1 standard dev. limit
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$$\frac{[\Gamma(\Xi(1530)\pi) + \Gamma(\Xi\pi\pi(\text{not } \Xi(1530)\pi))]}{\Gamma(\Sigma\bar{K})} \quad (\Gamma_4+\Gamma_5)/\Gamma_2$$

VALUE	CL%	DOCUMENT ID	TECN	CHG	COMMENT
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<0.11	95	¹ HEMINGWAY	77	HBC	– $K^- p$ 4.2 GeV/c
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$$\frac{\Gamma(\Lambda\bar{K}\pi)}{\Gamma_{\text{total}}} \quad \Gamma_6/\Gamma$$

VALUE	DOCUMENT ID	TECN	COMMENT
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••• We do not use the following data for averages, fits, limits, etc. •••

seen	BARTSCH	69	HBC	$K^- p$ 10 GeV
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$$\frac{\Gamma(\Lambda\bar{K}\pi)}{\Gamma(\Sigma\bar{K})} \quad \Gamma_6/\Gamma_2$$

VALUE	CL%	DOCUMENT ID	TECN	CHG	COMMENT
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<0.32	95	HEMINGWAY	77	HBC	– $K^- p$ 4.2 GeV/c
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$$\frac{\Gamma(\Sigma\bar{K}\pi)}{\Gamma_{\text{total}}} \quad \Gamma_7/\Gamma$$

VALUE	DOCUMENT ID	TECN	COMMENT
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••• We do not use the following data for averages, fits, limits, etc. •••

seen	BARTSCH	69	HBC	$K^- p$ 10 GeV
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$\Gamma(\Sigma\bar{K}\pi)/\Gamma(\Sigma\bar{K})$

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+) 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)