

$\Xi(2030)$

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

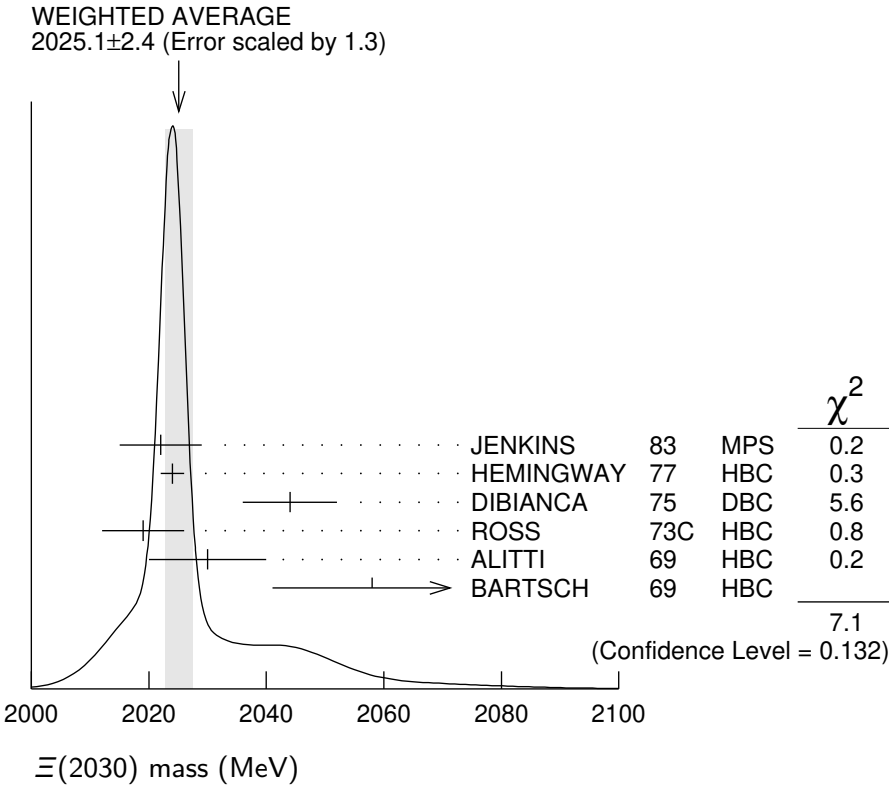
Status: ***

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 $J \geq 5/2$.

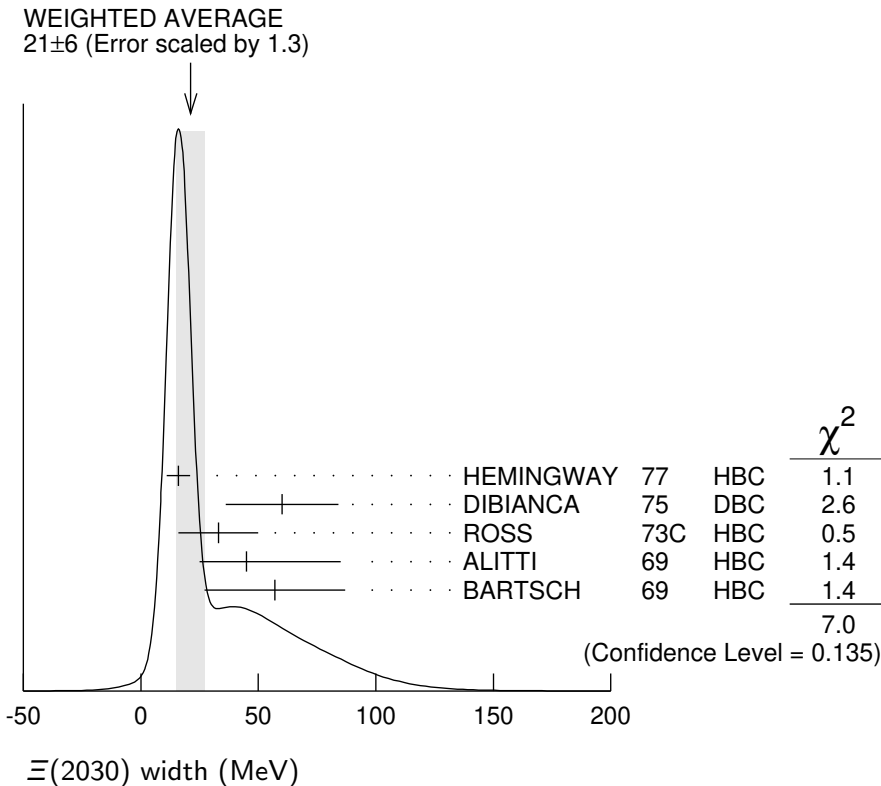
$\Xi(2030)$ MASS

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 Ξ π π, Ξ* π
33±17	15	ROSS	73c	HBC	—0 Σ K̄
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)
$\Gamma_1 \Lambda \bar{K}$	$\sim 20 \%$
$\Gamma_2 \Sigma \bar{K}$	$\sim 80 \%$
$\Gamma_3 \Xi \pi$	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

$\Gamma(\Xi\pi)/[\Gamma(\Lambda\bar{K}) + \Gamma(\Sigma\bar{K}) + \Gamma(\Xi\pi) + \Gamma(\Xi(1530)\pi)]$	$\Gamma_3/(\Gamma_1+\Gamma_2+\Gamma_3+\Gamma_4)$
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
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$\Gamma(\Xi\pi)/\Gamma(\Sigma\bar{K})$	Γ_3/Γ_2
VALUE	CL% DOCUMENT ID TECN CHG COMMENT

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

0.25 ± 0.15	ALITTI	69	HBC	—	$K^- p$ 3.9–5 GeV/c
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$\Gamma(\Lambda\bar{K})/\Gamma(\Sigma\bar{K})$	Γ_1/Γ_2
VALUE	DOCUMENT ID TECN CHG COMMENT

0.22 ± 0.09	HEMINGWAY	77	HBC	—	$K^- p$ 4.2 GeV/c
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$\Gamma(\Sigma\bar{K})/[\Gamma(\Lambda\bar{K}) + \Gamma(\Sigma\bar{K}) + \Gamma(\Xi\pi) + \Gamma(\Xi(1530)\pi)]$	$\Gamma_2/(\Gamma_1+\Gamma_2+\Gamma_3+\Gamma_4)$
VALUE	DOCUMENT ID TECN CHG COMMENT

0.75 ± 0.20	ALITTI	69	HBC	—	$K^- p$ 3.9–5 GeV/c
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$\Gamma(\Xi(1530)\pi)/[\Gamma(\Lambda\bar{K}) + \Gamma(\Sigma\bar{K}) + \Gamma(\Xi\pi) + \Gamma(\Xi(1530)\pi)]$	$\Gamma_4/(\Gamma_1+\Gamma_2+\Gamma_3+\Gamma_4)$
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
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$[\Gamma(\Xi(1530)\pi) + \Gamma(\Xi\pi\pi(\text{not } \Xi(1530)\pi))]/\Gamma(\Sigma\bar{K})$	$(\Gamma_4+\Gamma_5)/\Gamma_2$
VALUE	CL% DOCUMENT ID TECN CHG COMMENT

<0.11	95	¹ HEMINGWAY	77	HBC	—	$K^- p$ 4.2 GeV/c
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$\Gamma(\Lambda\bar{K}\pi)/\Gamma_{\text{total}}$	Γ_6/Γ
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
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$\Gamma(\Lambda\bar{K}\pi)/\Gamma(\Sigma\bar{K})$	Γ_6/Γ_2
VALUE	CL% DOCUMENT ID TECN CHG COMMENT

<0.32	95	HEMINGWAY	77	HBC	—	$K^- p$ 4.2 GeV/c
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$\Gamma(\Sigma\bar{K}\pi)/\Gamma_{\text{total}}$	Γ_7/Γ
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
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$\Gamma(\Sigma\bar{K}\pi)/\Gamma(\Sigma\bar{K})$			Γ_7/Γ_2			
VALUE	CL%	DOCUMENT ID	TECN	CHG	COMMENT	
<0.04	95	² HEMINGWAY 77	HBC	—	$K^- p$ 4.2 GeV/ c	

Ξ (2030) FOOTNOTES

- ¹ For the decay mode $\Xi^- \pi^+ \pi^-$ only.
² For the decay mode $\Sigma^\pm K^- \pi^\mp$ only.

Ξ (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)