$\Xi(1690)$

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

AUBERT 08AK, in a study of $\Lambda_c^+ \to \Xi^- \pi^+ K^+$, finds some evidence that the $\Xi(1690)$ has $J^P = 1/2^-$.

DIONISI 78 sees a threshold enhancement in both the neutral and negatively charged $\Sigma \overline{K}$ mass spectra in $K^- p \to (\Sigma \overline{K}) K \pi$ at 4.2 GeV/c. The data from the $\Sigma \overline{K}$ channels alone cannot distinguish between a resonance and a large scattering length. Weaker evidence at the same mass is seen in the corresponding $\Lambda \overline{K}$ channels, and a coupled-channel analysis yields results consistent with a new Ξ.

BIAGI 81 sees an enhancement at 1700 MeV in the diffractively produced ΛK^- system. A peak is also observed in the $\Lambda \overline{K}^0$ mass spectrum at 1660 MeV that is consistent with a 1720 MeV resonance decaying to $\Sigma^0 \overline{K}^0$, with the γ from the Σ^0 decay not detected.

BIAGI 87 provides further confirmation of this state in diffractive dissociation of Ξ^- into ΛK^-. The significance claimed is 6.7 standard deviations.

ADAMOVICH 98 sees a peak of 1400 ± 300 events in the $\Xi^- \pi^+$ spectrum produced by 345 GeV/c Σ^--nucleus interactions.

$\Xi(1690)$ MASSES

MIXED CHARGES

VALUE (MeV)	DOCUMENT ID
1690±10 OUR ESTIMATE	This is only an educated guess; the error given is larger than the error on the average of the published values.

$\Xi(1690)^0$ MASS

VALUE (MeV)	EVTS		DOCUMENT ID		TECN	COMMENT
1686±4	1400		ADAMOVICH	98	WA89	Σ^- nucleus, 345 GeV/c
1699±5	175	[1]	DIONISI	78	HBC	$K^- p$ 4.2 GeV/c
1684±5	183	[2]	DIONISI	78	HBC	$K^- p$ 4.2 GeV/c

$\Xi(1690)^-$ MASS

VALUE (MeV)	EVTS		DOCUMENT ID		TECN	COMMENT
1691.1± 1.9±2.0	104		BIAGI	87	SPEC	Ξ^- Be 116 GeV
1700 ±10	150	[3]	BIAGI	81	SPEC	Ξ^- H 100, 135 GeV
1694 ± 6	45	[4]	DIONISI	78	HBC	$K^- p$ 4.2 GeV/c

$\Xi(1690)$ WIDTHS

MIXED CHARGES

VALUE (MeV)	DOCUMENT ID
<30 OUR ESTIMATE	

$\Xi(1690)^0$ WIDTH

VALUE (MeV)	EVTS		DOCUMENT ID		TECN	COMMENT
10 ± 6	1400		ADAMOVICH	98	WA89	Σ^- nucleus, 345 GeV/c
44 ± 23	175	[1]	DIONISI	78	HBC	$K^- p$ 4.2 GeV/c
20 ± 4	183	[2]	DIONISI	78	HBC	$K^- p$ 4.2 GeV/c

$\Xi(1690)^-$ WIDTH

VALUE (MeV)	CL%	EVTS		DOCUMENT ID		TECN	COMMENT
< 8	90	104		BIAGI	87	SPEC	Ξ^- Be 116 GeV
47 ± 14		150	[3]	BIAGI	81	SPEC	Ξ^- H 100, 135 GeV
26 ± 6		45	[4]	DIONISI	78	HBC	$K^- p$ 4.2 GeV/c

$\Xi(1690)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$\Lambda\overline{K}$	seen
Γ_2	$\Sigma\overline{K}$	seen
Γ_3	$\Xi\pi$	seen
Γ_4	$\Xi^-\pi^+\pi^0$	
Γ_5	$\Xi^-\pi^+\pi^-$	possibly seen
Γ_6	$\Xi(1530)\pi$	

$\Xi(1690)$ BRANCHING RATIOS

$\Gamma(\Lambda\overline{K})/\Gamma_{total}$ Γ_1/Γ

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
seen	104	BIAGI	87	SPEC	$-$	Ξ^- Be 116 GeV

$\Gamma(\Sigma\overline{K})/\Gamma(\Lambda\overline{K})$ Γ_2/Γ_1

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
0.75 ± 0.39	75	ABE	02C	BELL		$e^+ e^- \approx \Upsilon(4S)$
2.7 ± 0.9		DIONISI	78	HBC	0	$K^- p$ 4.2 GeV/c
3.1 ± 1.4		DIONISI	78	HBC	$-$	$K^- p$ 4.2 GeV/c

$\Gamma(\Xi\pi)/\Gamma(\Sigma\overline{K})$ Γ_3/Γ_2

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
<0.09	DIONISI	78	HBC	0	$K^- p$ 4.2 GeV/c

$\Gamma(\Xi\pi)/\Gamma_{total}$ Γ_3/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
seen	ADAMOVICH	98	WA89	Σ^- nucleus, 345 GeV/c

$\Gamma(\Xi^-\pi^+\pi^0)/\Gamma(\Sigma\overline{K})$ Γ_4/Γ_2

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
<0.04	DIONISI	78	HBC	0	$K^- p$ 4.2 GeV/c

$\Gamma(\Xi^-\pi^+\pi^-)/\Gamma_{total}$ $\qquad\qquad\qquad$ Γ_5/Γ

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
possibly seen	4	BIAGI	87	SPEC	−	Ξ^- Be 116 GeV

$\Gamma(\Xi^-\pi^+\pi^-)/\Gamma(\Sigma\overline{K})$ $\qquad\qquad\qquad$ Γ_5/Γ_2

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
<0.03	DIONISI	78	HBC	−	$K^- p$ 4.2 GeV/c

$\Gamma(\Xi(1530)\pi)/\Gamma(\Sigma\overline{K})$ $\qquad\qquad\qquad$ Γ_6/Γ_2

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
<0.06	DIONISI	78	HBC	−	$K^- p$ 4.2 GeV/c

$\Xi(1690)$ FOOTNOTES

[1] From a fit to the $\Sigma^+ K^-$ spectrum.
[2] From a coupled-channel analysis of the $\Sigma^+ K^-$ and $\Lambda\overline{K}^0$ spectra.
[3] A fit to the inclusive spectrum from $\Xi^- N \to \Lambda K^- X$.
[4] From a coupled-channel analysis of the $\Sigma^0 K^-$ and ΛK^- spectra.

$\Xi(1690)$ REFERENCES

AUBERT	08AK	PR D78 034008	B. Aubert *et al.*	(BABAR Collab.)
ABE	02C	PL B524 33	K. Abe *et al.*	(KEK BELLE Collab.)
ADAMOVICH	98	EPJ C5 621	M.I. Adamovich *et al.*	(CERN WA89 Collab.)
BIAGI	87	ZPHY C34 15	S.F. Biagi *et al.*	(BRIS, CERN, GEVA+) I
BIAGI	81	ZPHY C9 305	S.F. Biagi *et al.*	(BRIS, CAVE, GEVA+)
DIONISI	78	PL 80B 145	C. Dionisi *et al.*	(CERN, AMST, NIJM+) I