$\Xi(1690)$

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

AUBERT 08AK, in a study of $\Lambda_c^+ \rightarrow \Xi^- \pi^+ K^+$, 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 $K^- p \rightarrow (\Sigma\overline{K}) K \pi$ 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.

SUMIHAMA 19 observes a peak in the $\Xi^- \pi^+$ spectrum with a significance of 4.0 standard deviations.

$\Xi(1690)$ 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
$1685\ ^{+3}_{-2} \pm 12$	464	ABLIKIM	24N	PWA	$\psi(3866) \rightarrow \Xi(1820)^- \overline{\Xi}^+ \rightarrow (K^- \Lambda)\overline{\Xi}^+$
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
20±15 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
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$81^{+10}_{-9}\pm20$		464	ABLIKIM	24N	PWA	$\psi(3866) \to \Xi(1820)^- \overline{\Xi}^+ \to (K^- \Lambda)\overline{\Xi}^+$

$\Xi(1690)$ 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

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

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

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

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

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

ABLIKIM	24N	PR D109 072008	M. Ablikim et al.	(BESIII Collab.)
SUMIHAMA	19	PRL 122 072501	M. Sumihama et al.	(BELLE Collab.)
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