

$\Xi(1690)$

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

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 $\Sigma \bar{K}$ mass spectra in $K^- p \rightarrow (\Sigma \bar{K}) K \pi$ at 4.2 GeV/c. The data from the $\Sigma \bar{K}$ channels alone cannot distinguish between a resonance and a large scattering length. Weaker evidence at the same mass is seen in the corresponding $\Lambda \bar{K}$ 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 $\Lambda \bar{K}^0$ mass spectrum at 1660 MeV that is consistent with a 1720 MeV resonance decaying to $\Sigma^0 \bar{K}^0$, 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 $^{+3}_{-2}$ ± 12	464	ABLIKIM 24N	PWA	$\psi(3866) \rightarrow \Xi(1820)^- \Xi^+ \rightarrow (K^- \Lambda) \Xi^+$
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

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$\Xi(1690)^-$ 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. • • •

$81^{+10}_{-9} \pm 20$	464	ABLIKIM	24N	PWA	$\psi(3866) \rightarrow$ $\Xi(1820)^- \Xi^+ \rightarrow$ $(K^- \Lambda) \Xi^+$
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 $\Xi(1690)$ DECAY MODES

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

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 $\Xi(1690)$ BRANCHING RATIOS

$\Gamma(\Lambda \bar{K})/\Gamma_{\text{total}}$	EVTs	DOCUMENT ID	TECN	CHG	COMMENT	Γ_1/Γ
seen	104	BIAGI	87	SPEC	—	Ξ^- Be 116 GeV
$\Gamma(\Sigma \bar{K})/\Gamma(\Lambda \bar{K})$	EVTs	DOCUMENT ID	TECN	CHG	COMMENT	Γ_2/Γ_1
0.75 ± 0.39	75	ABE	02C	BELL	$e^+ e^- \approx \gamma(4S)$	
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	
$\Gamma(\Xi \pi)/\Gamma(\Sigma \bar{K})$	EVTs	DOCUMENT ID	TECN	CHG	COMMENT	Γ_3/Γ_2
<0.09		DIONISI	78	HBC	0 $K^- p$ 4.2 GeV/c	
$\Gamma(\Xi \pi)/\Gamma_{\text{total}}$	EVTs	DOCUMENT ID	TECN	CHG	COMMENT	Γ_3/Γ
seen		ADAMOVICH	98	WA89	Σ^- nucleus, 345 GeV/c	
$\Gamma(\Xi^- \pi^+ \pi^0)/\Gamma(\Sigma \bar{K})$	EVTs	DOCUMENT ID	TECN	CHG	COMMENT	Γ_4/Γ_2
<0.04		DIONISI	78	HBC	0 $K^- p$ 4.2 GeV/c	
$\Gamma(\Xi^- \pi^+ \pi^-)/\Gamma_{\text{total}}$	EVTs	DOCUMENT ID	TECN	CHG	COMMENT	Γ_5/Γ
possibly seen	4	BIAGI	87	SPEC	—	Ξ^- Be 116 GeV
$\Gamma(\Xi^- \pi^+ \pi^-)/\Gamma(\Sigma \bar{K})$	EVTs	DOCUMENT ID	TECN	CHG	COMMENT	Γ_5/Γ_2
<0.03		DIONISI	78	HBC	—	$K^- p$ 4.2 GeV/c
$\Gamma(\Xi(1530) \pi)/\Gamma(\Sigma \bar{K})$	EVTs	DOCUMENT ID	TECN	CHG	COMMENT	Γ_6/Γ_2
<0.06		DIONISI	78	HBC	—	$K^- p$ 4.2 GeV/c

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 $\Xi(1690)$ FOOTNOTES

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

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Ξ(1690) REFERENCES

ABLIKIM	24N	PR D109 072008	M. Ablikim <i>et al.</i>	(BESIII Collab.)
SUMIHAMA	19	PRL 122 072501	M. Sumihama <i>et al.</i>	(BELLE Collab.)
AUBERT	08AK	PR D78 034008	B. Aubert <i>et al.</i>	(BABAR Collab.)
ABE	02C	PL B524 33	K. Abe <i>et al.</i>	(KEK BELLE Collab.)
ADAMOVICH	98	EPJ C5 621	M.I. Adamovich <i>et al.</i>	(CERN WA89 Collab.)
BIAGI	87	ZPHY C34 15	S.F. Biagi <i>et al.</i>	(BRIS, CERN, GEVA+) I
BIAGI	81	ZPHY C9 305	S.F. Biagi <i>et al.</i>	(BRIS, CAVE, GEVA+) I
DIONISI	78	PL 80B 145	C. Dionisi <i>et al.</i>	(CERN, AMST, NIJM+) I

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