

$\Xi(1690)$

$I(J^P) = \frac{1}{2}(?)$ 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 $\Sigma \bar{K}$ 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

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
1685 $\begin{smallmatrix} +3 \\ -2 \end{smallmatrix} \pm 12$	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

Ξ(1690) WIDTHS

MIXED CHARGES

VALUE (MeV)	DOCUMENT ID
20±15 OUR ESTIMATE	

Ξ(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

Ξ(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} ±20	464	ABLIKIM 24N	PWA	ψ(3866) → Ξ(1820) [−] Ξ ⁺ → (K [−] Λ)Ξ ⁺
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Ξ(1690) DECAY MODES

Mode	Fraction (Γ _i /Γ)
Γ ₁ ΛK̄	seen
Γ ₂ ΣK̄	seen
Γ ₃ Ξπ	seen
Γ ₄ Ξ [−] π ⁺ π ⁰	
Γ ₅ Ξ [−] π ⁺ π [−]	possibly seen
Γ ₆ Ξ(1530)π	

Ξ(1690) BRANCHING RATIOS

$\Gamma(\Lambda\bar{K})/\Gamma_{\text{total}}$					Γ_1/Γ
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
seen	104	BIAGI 87	SPEC	—	Ξ^- Be 116 GeV

$\Gamma(\Sigma\bar{K})/\Gamma(\Lambda\bar{K})$					Γ_2/Γ_1
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
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

$\Gamma(\Xi\pi)/\Gamma(\Sigma\bar{K})$	Γ_3/Γ_2				
VALUE	DOCUMENT ID	TECN	CHG	COMMENT	
<0.09	DIONISI	78	HBC	0	$K^- p$ 4.2 GeV/c

$\Gamma(\Xi\pi)/\Gamma_{\text{total}}$			Γ_3/Γ		
VALUE			DOCUMENT ID	TECN	COMMENT
seen			ADAMOVICH 98	WA89	Σ^- nucleus, 345 GeV/ <i>c</i>
$\Gamma(\Xi^- \pi^+ \pi^0)/\Gamma(\Sigma\bar{K})$			Γ_4/Γ_2		
VALUE			DOCUMENT ID	TECN	CHG COMMENT
<0.04			DIONISI 78	HBC	0 $K^- p$ 4.2 GeV/ <i>c</i>
$\Gamma(\Xi^- \pi^+ \pi^-)/\Gamma_{\text{total}}$			Γ_5/Γ		
VALUE	EVT		DOCUMENT ID	TECN	CHG COMMENT
possibly seen	4		BIAGI 87	SPEC	— Ξ^- Be 116 GeV
$\Gamma(\Xi^- \pi^+ \pi^-)/\Gamma(\Sigma\bar{K})$			Γ_5/Γ_2		
VALUE			DOCUMENT ID	TECN	CHG COMMENT
<0.03			DIONISI 78	HBC	— $K^- p$ 4.2 GeV/ <i>c</i>
$\Gamma(\Xi(1530)\pi)/\Gamma(\Sigma\bar{K})$			Γ_6/Γ_2		
VALUE			DOCUMENT ID	TECN	CHG COMMENT
<0.06			DIONISI 78	HBC	— $K^- p$ 4.2 GeV/ <i>c</i>

$\Xi(1690)$ 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.

$\Xi(1690)$ 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+)
DIONISI	78	PL 80B 145	C. Dionisi <i>et al.</i>	(CERN, AMST, NIJM+) I