NODE=B050

$\Xi(1820)\ 3/2^-$

$I(J^P) = \frac{1}{2}(\frac{3}{2}^-)$ Status: ∗∗∗

The clearest evidence is an 8-standard-deviation peak in ΛK^- seen by GAY 76C. TEODORO 78 favors $J = 3/2$, but cannot make a parity discrimination. BIAGI 87C is consistent with $J = 3/2$ and favors negative parity for this J value.

NODE=B050

$\Xi(1820)$ MASS

NODE=B050M

We only average the measurements that appear to us to be most significant and best determined.

NODE=B050M

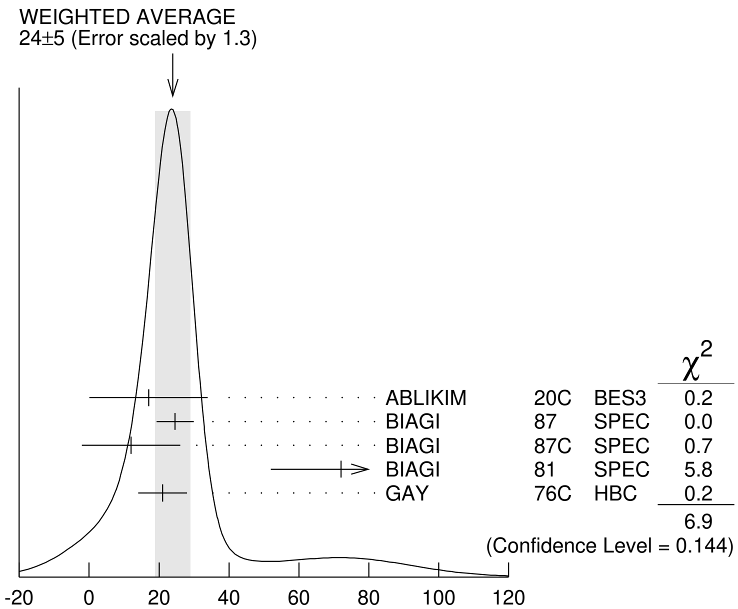
VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*	
							NODE=B050M
1823 ± 5 OUR ESTIMATE							→ UNCHECKED ←
1823.2± 1.3 OUR AVERAGE							
1821 $^{+2}_{-3}$ ±3	776	ABLIKIM	24N	PWA	−	$\psi(3866) \to \Xi(1820)^- \overline{\Xi}^+ \to (K^- \Lambda)\overline{\Xi}^+$	
1825.5± 4.7±4.7	288	ABLIKIM	20C	BES3	−	$e^+ e^- \to \Xi(1820)^- \overline{\Xi}^+$	
1819.4± 3.1±2.0	280	[1] BIAGI	87	SPEC	0	Ξ^- Be → (ΛK^-) X	
1826 ± 3 ±1	54	BIAGI	87C	SPEC	0	Ξ^- Be → $(\Lambda \overline{K}^0)$ X	
1822 ± 6		JENKINS	83	MPS	−	$K^- p \to K^+$ (MM)	
1830 ± 6	300	BIAGI	81	SPEC	−	SPS hyperon beam	
1823 ± 2	130	GAY	76C	HBC	−	$K^- p$ 4.2 GeV/c	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
1817 ± 3		ADAMOVICH	99B	WA89		Σ^- nucleus, 345 GeV	
1797 ±19	74	BRIEFEL	77	HBC	0	$K^- p$ 2.87 GeV/c	
1829 ± 9	68	BRIEFEL	77	HBC	−0	$\Xi(1530)\pi$	OCCUR=2
1860 ±14	39	BRIEFEL	77	HBC	−	$\Sigma^- \overline{K}^0$	OCCUR=3
1870 ± 9	44	BRIEFEL	77	HBC	0	$\Lambda \overline{K}^0$	OCCUR=4
1813 ± 4	57	BRIEFEL	77	HBC	−	ΛK^-	OCCUR=5
1807 ±27		DIBIANCA	75	DBC	−0	$\Xi\pi\pi$, $\Xi^*\pi$	
1762 ± 8	28	[2] BADIER	72	HBC	−0	$\Xi\pi$, $\Xi\pi\pi$, YK	
1838 ± 5	38	[2] BADIER	72	HBC	−0	$\Xi\pi$, $\Xi\pi\pi$, YK	OCCUR=2
1830 ±10	25	[3] CRENNELL	70B	DBC	−0	3.6, 3.9 GeV/c	
1826 ±12		[4] CRENNELL	70B	DBC	−0	3.6, 3.9 GeV/c	OCCUR=2
1830 ±10	40	ALITTI	69	HBC	−	Λ, $\Sigma \overline{K}$	
1814 ± 4	30	BADIER	65	HBC	0	$\Lambda \overline{K}^0$	
1817 ± 7	29	SMITH	65C	HBC	−0	$\Lambda \overline{K}^0$, ΛK^-	
1770		HALSTEINSLID	63	FBC	−0	K^- freon 3.5 GeV/c	

$\Xi(1820)$ WIDTH

NODE=B050W

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*	
							NODE=B050W
24 $^{+15}_{-10}$ OUR ESTIMATE							→ UNCHECKED ←
24 ± 5 OUR AVERAGE						Error includes scale factor of 1.3. See the ideogram below.	
17.0±15.0±7.9	288	ABLIKIM	20C	BES3	−	$e^+ e^- \to \Xi(1820)^- \overline{\Xi}^+$	
24.6± 5.3	280	[1] BIAGI	87	SPEC	0	Ξ^- Be → (ΛK^-) X	
12 ±14 ±1.7	54	BIAGI	87C	SPEC	0	Ξ^- Be → $(\Lambda \overline{K}^0)$ X	
72 ±20	300	BIAGI	81	SPEC	−	SPS hyperon beam	
21 ± 7	130	GAY	76C	HBC	−	$K^- p$ 4.2 GeV/c	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
73 $^{+6}_{-5}$ ±9	776	ABLIKIM	24N	PWA	−	$\psi(3866) \to \Xi(1820)^- \overline{\Xi}^+ \to (K^- \Lambda)\overline{\Xi}^+$	
23 ±13		ADAMOVICH	99B	WA89		Σ^- nucleus, 345 GeV	
99 ±57	74	BRIEFEL	77	HBC	0	$K^- p$ 2.87 GeV/c	
52 ±34	68	BRIEFEL	77	HBC	−0	$\Xi(1530)\pi$	OCCUR=2
72 ±17	39	BRIEFEL	77	HBC	−	$\Sigma^- \overline{K}^0$	OCCUR=3
44 ±11	44	BRIEFEL	77	HBC	0	$\Lambda \overline{K}^0$	OCCUR=4

26 ±11	57		BRIEFEL	77	HBC	−	ΛK^-	OCCUR=5
85 ±58			DIBIANCA	75	DBC	−0	$\Xi\pi\pi$, $\Xi^*\pi$	
51 ±13		[2]	BADIER	72	HBC	−0	Lower mass	
58 ±13		[2]	BADIER	72	HBC	−0	Higher mass	OCCUR=2
103 $^{+38}_{-24}$		[3]	CRENNELL	70B	DBC	−0	3.6, 3.9 GeV/c	
48 $^{+36}_{-19}$		[4]	CRENNELL	70B	DBC	−0	3.6, 3.9 GeV/c	OCCUR=2
55 $^{+40}_{-20}$			ALITTI	69	HBC	−	Λ, $\Sigma\overline{K}$	
12 ± 4			BADIER	65	HBC	0	$\Lambda\overline{K}^0$	
30 ± 7			SMITH	65B	HBC	−0	$\Lambda\overline{K}$	
<80			HALSTEINSLID	63	FBC	−0	K^- freon 3.5 GeV/c	



$\Xi(1820)$ width (MeV)

$\Xi(1820)$ DECAY MODES

NODE=B050215;NODE=B050

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\Lambda\overline{K}$	large	DESIG=1;OUR EST
Γ_2	$\Sigma\overline{K}$	small	DESIG=3;OUR EST
Γ_3	$\Xi\pi$	small	DESIG=2;OUR EST
Γ_4	$\Xi(1530)\pi$	small	DESIG=4;OUR EST
Γ_5	$\Xi\pi\pi$(not $\Xi(1530)\pi$)		DESIG=5

$\Xi(1820)$ BRANCHING RATIOS

NODE=B050220

The dominant modes seem to be $\Lambda\overline{K}$ and (perhaps) $\Xi(1530)\pi$, but the branching fractions are very poorly determined.

NODE=B050220

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

NODE=B050R1
NODE=B050R1

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.25±0.05 OUR AVERAGE					
0.24±0.05	ANISOVICH	12A	DPWA		Multichannel
0.30±0.15	ALITTI	69	HBC	−	$K^- p$ 3.9–5 GeV/c

$\Gamma(\Xi\pi)/\Gamma_{total}$ Γ_3/Γ

NODE=B050R2
NODE=B050R2

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.10±0.10	ALITTI	69	HBC	−	$K^- p$ 3.9–5 GeV/c

$\Gamma(\Xi\pi)/\Gamma(\Lambda\overline{K})$ Γ_3/Γ_1

NODE=B050R21
NODE=B050R21

VALUE	CL%	DOCUMENT ID		TECN	CHG	COMMENT
<0.36	95	GAY	76C	HBC	−	$K^- p$ 4.2 GeV/c
0.20±0.20		BADIER	65	HBC	0	$K^- p$ 3 GeV/c

$\Gamma(\Xi\pi)/\Gamma(\Xi(1530)\pi)$ — Γ_3/Γ_4

NODE=B050R22

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
$1.5^{+0.6}_{-0.4}$	APSELL	70	HBC	0	$K^- p$ 2.87 GeV/c

$\Gamma(\Sigma\overline{K})/\Gamma_{total}$ — Γ_2/Γ

NODE=B050R3

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.30±0.15	ALITTI	69	HBC	–	$K^- p$ 3.9–5 GeV/c
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.02	TRIPP	67	RVUE		Use SMITH 65C

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

NODE=B050R31

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.24±0.10	GAY	76C	HBC	–	$K^- p$ 4.2 GeV/c

$\Gamma(\Xi(1530)\pi)/\Gamma_{total}$ — Γ_4/Γ

NODE=B050R4

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.30±0.15	ALITTI	69	HBC	–	$K^- p$ 3.9–5 GeV/c
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	ASTON	85B	LASS		$K^- p$ 11 GeV/c
not seen	[5] HASSALL	81	HBC		$K^- p$ 6.5 GeV/c
<0.25	[6] DAUBER	69	HBC		$K^- p$ 2.7 GeV/c

$\Gamma(\Xi(1530)\pi)/\Gamma(\Lambda\overline{K})$ — Γ_4/Γ_1

NODE=B050R41

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.38±0.27 OUR AVERAGE	Error includes scale factor of 2.3.				
1.0 ±0.3	GAY	76C	HBC	–	$K^- p$ 4.2 GeV/c
0.26±0.13	SMITH	65C	HBC	–0	$K^- p$ 2.45–2.7 GeV/c

$\Gamma(\Xi\pi\pi(\text{not }\Xi(1530)\pi))/\Gamma(\Lambda\overline{K})$ — Γ_5/Γ_1

NODE=B050R51

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.30±0.20	BIAGI	87	SPEC	–	Ξ^- Be 116 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.14	[7] BADIER	65	HBC	0	1 st. dev. limit
>0.1	SMITH	65C	HBC	–0	$K^- p$ 2.45–2.7 GeV/c

$\Gamma(\Xi\pi\pi(\text{not }\Xi(1530)\pi))/\Gamma(\Xi(1530)\pi)$ — Γ_5/Γ_4

NODE=B050R52

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
consistent with zero	GAY	76C	HBC	–	$K^- p$ 4.2 GeV/c
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.3±0.5	[8] APSELL	70	HBC	0	$K^- p$ 2.87 GeV/c

$\Xi(1820)$ FOOTNOTES

NODE=B050

[1] BIAGI 87 also sees weak signals in the in the $\Xi^-\pi^+\pi^-$ channel at 1782.6 ± 1.4 MeV (Γ = 6.0 ± 1.5 MeV) and 1831.9 ± 2.8 MeV (Γ = 9.6 ± 9.9 MeV). NODE=B050;LINKAGE=J

[2] BADIER 72 adds all channels and divides the peak into lower and higher mass regions. The data can also be fitted with a single Breit-Wigner of mass 1800 MeV and width 150 MeV. NODE=B050;LINKAGE=C

[3] From a fit to inclusive $\Xi\pi$, $\Xi\pi\pi$, and ΛK^- spectra. NODE=B050;LINKAGE=A

[4] From a fit to inclusive $\Xi\pi$ and $\Xi\pi\pi$ spectra only. NODE=B050;LINKAGE=B

[5] Including $\Xi\pi\pi$. NODE=B050;LINKAGE=G

[6] DAUBER 69 uses in part the same data as SMITH 65C. NODE=B050;LINKAGE=F

[7] For the decay mode $\Xi^-\pi^+\pi^0$ only. This limit includes $\Xi(1530)\pi$. NODE=B050;LINKAGE=I

[8] Or less. Upper limit for the 3-body decay. NODE=B050;LINKAGE=H

$\Xi(1820)$ REFERENCES

NODE=B050

ABLIKIM	24N	PR D109 072008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=62664
ABLIKIM	20C	PRL 124 032002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60215
ANISOVICH	12A	EPJ A48 15	A.V. Anisovich *et al.*	(BONN, PNPI)	REFID=54041
ADAMOVICH	99B	EPJ C11 271	M.I. Adamovich *et al.*	(CERN WA89 Collab.)	REFID=47312
BIAGI	87	ZPHY C34 15	S.F. Biagi *et al.*	(BRIS, CERN, GEVA+)	REFID=40132
BIAGI	87C	ZPHY C34 175	S.F. Biagi *et al.*	(BRIS, CERN, GEVA+) JP	REFID=40349
ASTON	85B	PR D32 2270	D. Aston *et al.*	(SLAC, CARL, CNRC, CINC)	REFID=12073
JENKINS	83	PRL 51 951	C.M. Jenkins *et al.*	(FSU, BRAN, LBL+)	REFID=32525
BIAGI	81	ZPHY C9 305	S.F. Biagi *et al.*	(BRIS, CAVE, GEVA+)	REFID=32065
HASSALL	81	NP B189 397	J.K. Hassall *et al.*	(CAVE, MSU)	REFID=32505
TEODORO	78	PL 77B 451	D. Teodoro *et al.*	(AMST, CERN, NIJM+) JP	REFID=32532
BRIEFEL	77	PR D16 2706	E. Briefel *et al.*	(BRAN, UMD, SYRA+)	REFID=32345
Also		PRL 23 884	S.P. Apsell *et al.*	(BRAN, UMD, SYRA+)	REFID=32498

GAY	76C	PL 62B 477	J.B. Gay *et al.*	(AMST, CERN, NIJM) IJ	REFID=32520
DIBIANCA	75	NP B98 137	F.A. Dibianca, R.J. Endorf	(CMU)	REFID=12062
BADIER	72	NP B37 429	J. Badier *et al.*	(EPOL)	REFID=32474
APSELL	70	PRL 24 777	S.P. Apsell *et al.*	(BRAN, UMD, SYRA+) I	REFID=32515
CRENNELL	70B	PR D1 847	D.J. Crennell *et al.*	(BNL)	REFID=32516
ALITTI	69	PRL 22 79	J. Alitti *et al.*	(BNL, SYRA) I	REFID=32513
DAUBER	69	PR 179 1262	P.M. Dauber *et al.*	(LRL)	REFID=11783
TRIPP	67	NP B3 10	R.D. Tripp *et al.*	(LRL, SLAC, CERN+)	REFID=30418
BADIER	65	PL 16 171	J. Badier *et al.*	(EPOL, SACL, AMST) I	REFID=32509
SMITH	65B	Athens Conf. 251	G.A. Smith, J.S. Lindsey	(LRL)	REFID=32511
SMITH	65C	PRL 14 25	G.A. Smith *et al.*	(LRL) IJP	REFID=32510
HALSTEINSLID	63	Siena Conf. 1 73	A. Halsteinslid *et al.*	(BERG, CERN, EPOL+) I	REFID=32508

OTHER RELATED PAPERS

TEODORO	78	PL 77B 451	D. Teodoro *et al.*	(AMST, CERN, NIJM+) JP	REFID=32532
BRIEFEL	75	PR D12 1859	E. Briefel *et al.*	(BRAN, UMD, SYRA+)	REFID=32464
SCHMIDT	73	Purdue Conf. 363	P.E. Schmidt	(BRAN)	REFID=32502
MERRILL	68	PR 167 1202	D.W. Merrill, J. Button-Shafer	(LRL)	REFID=11782
SMITH	64	PRL 13 61	G.A. Smith *et al.*	(LRL) IJP	REFID=32527