NODE=B130

$\Xi_c(2970)$

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

was $\Xi_c(2980)$

$J^P = 1/2^+$ is favored by MOON 21.

NODE=B130

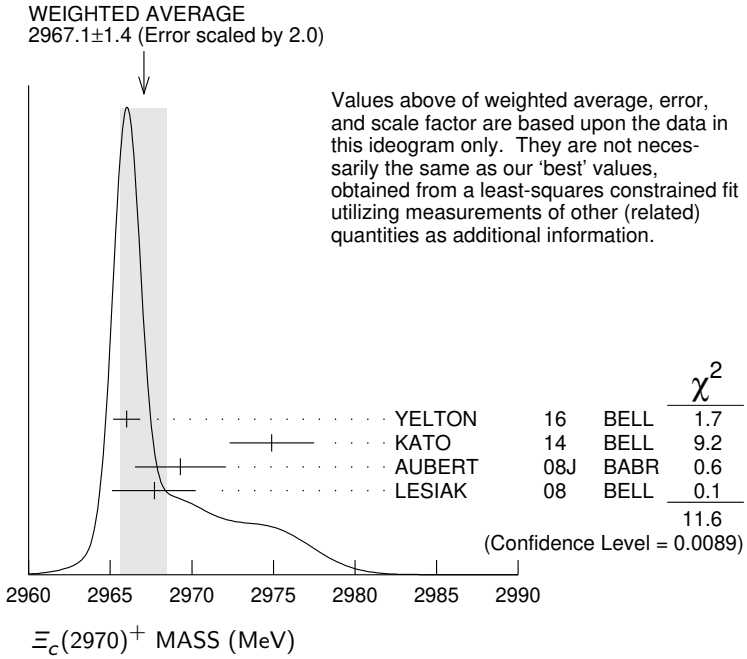
$\Xi_c(2970)$ MASSES

NODE=B130205

$\Xi_c(2970)^+$ MASS

NODE=B130M+
NODE=B130M+

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2964.3±1.5 OUR FIT Error includes scale factor of 3.9.					
2967.1±1.4 OUR AVERAGE Error includes scale factor of 2.0. See the ideogram below.					
2966.0±0.8±0.2	0.9k	YELTON	16	BELL	$e^+e^- \to \Upsilon(4S), \Upsilon(5S)$ and continuum
2974.9±1.5±2.1	244 ± 39	KATO	14	BELL	e^+e^- $\Upsilon(1S)$ to $\Upsilon(5S)$
2969.3±2.2±1.7	756 ± 206	AUBERT	08J	BABR	$e^+e^- \approx$ 10.58 GeV
$2967.7\pm2.3^{+1.1}_{-1.2}$	78 ± 13	LESIAK	08	BELL	$e^+e^- \approx \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2978.5±2.1±2.0	405 ± 51	CHISTOV	06	BELL	See KATO 14



$\Xi_c(2970)^0$ MASS

NODE=B130M0
NODE=B130M0
NODE=B130M0

The evidence is statistically weaker for this charge state.

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2967.1 ±1.7 OUR FIT Error includes scale factor of 6.7.					
2965.9 ±2.2 OUR AVERAGE Error includes scale factor of 7.4.					
2964.88±0.26±0.20	11.7k	[1] AAIJ	20X	LHCB	pp at 13 TeV
2970.8 ±0.7 ±0.2	1.4k	YELTON	16	BELL	$e^+e^- \to \Upsilon(4S)$, $\Upsilon(5S)$, continuum
2972.9 ±4.4 ±1.6	67 ± 44	AUBERT	08J	BABR	$e^+e^- \approx$ 10.58 GeV
$2965.7 \pm2.4\ ^{+1.1}_{-1.2}$	57 ± 13	LESIAK	08	BELL	$e^+e^- \approx \Upsilon(4S)$
2977.1 ±8.8 ±3.5	42 ± 24	CHISTOV	06	BELL	$e^+e^- \approx \Upsilon(4S)$

[1] AAIJ 20X reports 2964.88 ± 0.26 ± 0.14 ± 0.14 MeV where the last uncertainty is due to the Λ_c^+ mass. Further studies are required to establish whether the narrow resonance at 2965 MeV is a different baryon from the narrow resonance at 2970 MeV seen by YELTON 16.

NODE=B130M0;LINKAGE=A

$\Xi_c(2970) - \Xi_c$ MASS DIFFERENCES

NODE=B130207

$m_{\Xi_c(2970)^+} - m_{\Xi_c^+}$

NODE=B130DM+
NODE=B130DM+

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
496.6±1.5 OUR FIT Error includes scale factor of 3.7.					
498.1±0.8±0.2	916	YELTON	16	BELL	e^+e^-, Υ regions

$m_{\Xi_c(2970)^0} - m_{\Xi_c^0}$

NODE=B130DM0
NODE=B130DM0

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
496.7±1.8 OUR FIT	Error includes scale factor of 5.3.				
499.9±0.7±0.2	1.4k	YELTON	16	BELL	e^+e^-, Υ regions

$\Xi_c(2970)^+ - \Xi_c(2970)^0$ MASS DIFFERENCE

NODE=B130D+0

NODE=B130D+0

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
−2.8±1.9 OUR FIT	Error includes scale factor of 4.8.			
−4.8±0.1±0.5	YELTON	16	BELL	916 and 1443 evts

$\Xi_c(2970)$ WIDTHS

NODE=B130210

$\Xi_c(2970)^+$ WIDTH

NODE=B130W+
NODE=B130W+

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$20.9^{+2.4}_{-3.5}$ OUR AVERAGE	Error includes scale factor of 1.2.				
$28.1\pm2.4^{+1.0}_{-5.0}$	916	YELTON	16	BELL	e^+e^-, Υ regions
14.8±2.5±4.1	244 ± 39	KATO	14	BELL	e^+e^- $\Upsilon(1S)$ to $\Upsilon(5S)$
27 ±8 ±2	756 ± 206	AUBERT	08J	BABR	$e^+e^-\approx$ 10.58 GeV
18 ±6 ±3	78 ± 13	LESIAK	08	BELL	$e^+e^-\approx\ \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
43.5±7.5±7.0	405 ± 51	CHISTOV	06	BELL	See KATO 14

$\Xi_c(2970)^0$ WIDTH

NODE=B130W0
NODE=B130W0

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
14.1±0.9±1.3	11.7k	[1] AAIJ	20X	LHCB	pp at 13 TeV
$30.3\pm2.3^{+1.0}_{-1.8}$	1443	YELTON	16	BELL	e^+e^-, Υ regions
• • • We do not use the following data for averages, fits, limits, etc. • • •					
31 ±7 ±8	67 ± 44	AUBERT	08J	BABR	$e^+e^-\approx$ 10.58 GeV
15 ±6 ±3	57 ± 13	LESIAK	08	BELL	$e^+e^-\approx\ \Upsilon(4S)$

[1] Further studies are required to establish whether the narrow resonance at 2965 MeV is a different baryon from the narrow resonance at 2970 MeV seen by YELTON 16.

NODE=B130W0;LINKAGE=A

$\Xi_c(2970)$ DECAY MODES

NODE=B130215;NODE=B130

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\Lambda_c^+\overline{K}\pi$	seen	DESIG=1
Γ_2	$\Sigma_c(2455)\overline{K}$	seen	DESIG=2;OUR EST
Γ_3	$\Lambda_c^+\overline{K}$	not seen	DESIG=3;OUR EST
Γ_4	$\Lambda_c^+K^-$	seen	DESIG=7
Γ_5	$\Xi_c 2\pi$	seen	DESIG=4;OUR EST
Γ_6	$\Xi_c'\pi$	seen	DESIG=6
Γ_7	$\Xi_c(2645)\pi$	seen	DESIG=5

$\Xi_c(2970)$ BRANCHING RATIOS

NODE=B130220

$\Gamma(\Lambda_c^+\overline{K}\pi)/\Gamma_{\text{total}}$ Γ_1/Γ

NODE=B130R00
NODE=B130R00

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AUBERT	08J	BABR	$e^+e^-\approx\ \Upsilon(4S)$
seen	CHISTOV	06	BELL	$e^+e^-\approx\ \Upsilon(4S)$

$\Gamma(\Lambda_c^+K^-)/\Gamma_{\text{total}}$ Γ_4/Γ

NODE=B130R04
NODE=B130R04

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	11.7k	[1] AAIJ	20X	LHCB	pp at 13 TeV

[1] Further studies are required to establish whether the narrow resonance at 2965 MeV is a different baryon from the narrow resonance at 2970 MeV seen by YELTON 16.

NODE=B130R04;LINKAGE=A

$\Gamma(\Sigma_c(2455)\overline{K})/\Gamma(\Lambda_c^+\overline{K}\pi)$ Γ_2/Γ_1

NODE=B130R01
NODE=B130R01

VALUE	DOCUMENT ID		TECN	COMMENT
0.55±0.07±0.13	AUBERT	08J	BABR	$e^+e^-\approx\ \Upsilon(4S)$

$\Gamma(\Xi_c'\pi)/\Gamma_{\text{total}}$ Γ_6/Γ

NODE=B130R03
NODE=B130R03

VALUE	DOCUMENT ID		TECN	COMMENT
seen	YELTON	16	BELL	e^+e^-, Υ regions

$\Gamma(\Xi_c(2645)\pi)/\Gamma_{\text{total}}$ Γ_7/Γ

NODE=B130R02
NODE=B130R02

VALUE	DOCUMENT ID		TECN	COMMENT
seen	LESIAK	08	BELL	$e^+e^- \approx \Upsilon(4S)$

$\Gamma(\Xi_c'\pi)/\Gamma(\Xi_c(2645)\pi)$ Γ_6/Γ_7

NODE=B130R05
NODE=B130R05

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{1.67 \pm 0.29 ^{+0.15}_{-0.09} \pm 0.25}$	778	[1] MOON	21	BELL	e^+e^- at Υ(nS)

[1] Measurement of the ratio of $\Xi_c(2970)^+ \to \Xi_c(2645)^0\pi^+$ versus $\Xi_c(2970)^+ \to \Xi_c'^0\pi^+$. The last uncertainty is from possible isospin-symmetry-breaking effects. MOON 21 determines from an angular analysis of the $\Xi_c^+\pi^+\pi^-$ final state that the spin of the $\Xi_c(2970)^+$ is strongly compatible with $J = 1/2$, assuming domination by the lowest partial wave in $\Xi_c(2970)^+ \to \Xi_c(2645)^0\pi^+$. When further combined with the size of this ratio, MOON 21 determines from heavy quark symmetry that the spin-parity of the $\Xi_c(2970)^+$ is favored to be $J^P = 1/2^+$, with light degrees of freedom in the 0^+ state.

NODE=B130R05;LINKAGE=A

$\Xi_c(2970)$ REFERENCES

NODE=B130

MOON	21	PR D103 L111101	T.J. Moon *et al.*	(BELLE Collab.) JP
AAIJ	20X	PRL 124 222001	R. Aaij *et al.*	(LHCb Collab.)
YELTON	16	PR D94 052011	J. Yelton *et al.*	(BELLE Collab.)
KATO	14	PR D89 052003	Y. Kato *et al.*	(BELLE Collab.)
AUBERT	08J	PR D77 012002	B. Aubert *et al.*	(BABAR Collab.)
LESIAK	08	PL B665 9	T. Lesiak *et al.*	(BELLE Collab.)
CHISTOV	06	PRL 97 162001	R. Chistov *et al.*	(BELLE Collab.)

REFID=61122
REFID=60564
REFID=57432
REFID=55801
REFID=52168
REFID=52460
REFID=51431