Ξ_c^0

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

Neither J or P has actually been measured.

Ξ_c^0 MASS

The fit uses the Ξ_c^0 and Ξ_c^+ mass and mass-difference measurements.

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2470.44±0.28 OUR FIT Error includes scale factor of 1.2.					
$2470.99^{+0.30}_{-0.50}$ OUR AVERAGE					
2470.85±0.24±0.55	3.4k	AALTONEN	14B	CDF	$p\overline{p}$ at 1.96 TeV
$2471.0 \pm 0.3 {}^{+0.2}_{-1.4}$	8.6k	[1] LESIAK	05	BELL	e^+e^-, $\Upsilon(4S)$
2470.0 ±2.8 ±2.6	85	FRABETTI	98B	E687	γ Be, $\overline{E}_\gamma$ = 220 GeV
2469 ±2 ±3	9	HENDERSON	92B	CLEO	$\Omega^- K^+$
2472.1 ±2.7 ±1.6	54	ALBRECHT	90F	ARG	e^+e^- at $\Upsilon(4S)$
2473.3 ±1.9 ±1.2	4	BARLAG	90	ACCM	π^- (K^-) Cu 230 GeV
2472 ±3 ±4	19	ALAM	89	CLEO	e^+e^- 10.6 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2462.1 ±3.1 ±1.4	42	[2] FRABETTI	93C	E687	See FRABETTI 98B
2471 ±3 ±4	14	AVERY	89	CLEO	See ALAM 89

[1] The systematic error was (wrongly) given the other way round in LESIAK 05.
[2] The FRABETTI 93C mass is well below the other measurements.

$\Xi_c^0 - \Xi_c^+$ MASS DIFFERENCE

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2.72±0.23 OUR FIT Error includes scale factor of 1.1.					
2.91±0.26 OUR AVERAGE					
2.85±0.30±0.04	5.1/3.4k	AALTONEN	14B	CDF	$p\overline{p}$ at 1.96 TeV
2.9 ±0.5		LESIAK	05	BELL	e^+e^-, $\Upsilon(4S)$
7.0 ±4.5 ±2.2		ALBRECHT	90F	ARG	e^+e^- at $\Upsilon(4S)$
6.8 ±3.3 ±0.5		BARLAG	90	ACCM	π^- (K^-) Cu 230 GeV
5 ±4 ±1		ALAM	89	CLEO	$\Xi_c^0 \to \Xi^-\pi^+$, $\Xi_c^+ \to \Xi^-\pi^+\pi^+$

Ξ_c^0 MEAN LIFE

VALUE (10^{-15} s)	EVTS	DOCUMENT ID		TECN	COMMENT
151.9± 2.4 OUR AVERAGE					
153.4± 2.4±0.7	22k	[1] AAIJ	19AG	LHCB	$\Xi_c^0 \to pK^-K^-\pi^+$
$118 {}^{+14}_{-12} \pm 5$	110	LINK	02H	FOCS	γ nucleus, ≈ 180 GeV

101 $^{+25}_{-17}$	± 5	42	FRABETTI	93C	E687	γ Be, $\overline{E}_{\gamma}$= 220 GeV
82 $^{+59}_{-30}$		4	BARLAG	90	ACCM	π^- (K^-) Cu 230 GeV

[1] AAIJ 19AG reports [Ξ_c^0 MEAN LIFE] / [$D^{\pm}$ MEAN LIFE] = $0.1485 \pm 0.0017 \pm 0.0016$ which we multiply by our best value $D^{\pm}$ MEAN LIFE = $(1.033 \pm 0.005) \times 10^{-12}$ s. Our first error is their experiment's error and our second error is the systematic error from using our best value.

Ξ_c^0 DECAY MODES

	Mode	Fraction (Γ_i/Γ)	Scale factor
	Cabibbo-favored decays		
Γ_1	$pK^-K^-\pi^+$	$(4.8 \pm 1.2) \times 10^{-3}$	1.1
Γ_2	$pK^-\overline{K}^*(892)^0$, $\overline{K}^{*0} \to K^-\pi^+$	$(2.0 \pm 0.6) \times 10^{-3}$	
Γ_3	$pK^-K^-\pi^+$ (no $\overline{K}^{*0}$)	$(3.0 \pm 0.9) \times 10^{-3}$	
Γ_4	ΛK^0_S	$(3.2 \pm 0.7) \times 10^{-3}$	
Γ_5	$\Lambda K^-\pi^+$	(1.45 ± 0.33) %	1.1
Γ_6	$\Lambda \overline{K}^*(892)^0$	$(2.6 \pm 0.7) \times 10^{-3}$	
Γ_7	$\Lambda \overline{K}^0\pi^+\pi^-$	seen	
Γ_8	$\Lambda K^-\pi^+\pi^+\pi^-$	seen	
Γ_9	$\Sigma^0 K^0_S$	$(5.4 \pm 1.6) \times 10^{-4}$	
Γ_{10}	$\Sigma^+ K^-$	$(1.8 \pm 0.4) \times 10^{-3}$	
Γ_{11}	$\Sigma^0 \overline{K}^*(892)^0$	$(9.8 \pm 2.3) \times 10^{-3}$	
Γ_{12}	$\Sigma^+ K^*(892)^-$	$(4.9 \pm 1.4) \times 10^{-3}$	
Γ_{13}	$\Xi^-\pi^+$	(1.43 ± 0.32) %	1.1
Γ_{14}	$\Xi^-\pi^+\pi^+\pi^-$	(4.8 ± 2.3) %	
Γ_{15}	$\Xi^0 K^+K^-$		
Γ_{16}	$\Xi^0\phi$, $\phi \to K^+K^-$	$(5.1 \pm 1.3) \times 10^{-4}$	
Γ_{17}	$\Xi^0 K^+K^-$ nonresonant	$(5.6 \pm 1.4) \times 10^{-4}$	
Γ_{18}	$\Omega^- K^+$	$(4.2 \pm 1.0) \times 10^{-3}$	
Γ_{19}	$\Xi^- e^+\nu_e$	(1.04 ± 0.24) %	
Γ_{20}	$\Xi^-\mu^+\nu_{\mu}$	(1.01 ± 0.25) %	
	Cabibbo-suppressed decays		
Γ_{21}	$\Lambda_c^+\pi^-$	$(5.5 \pm 1.8) \times 10^{-3}$	
Γ_{22}	$\Xi^- K^+$	$(3.9 \pm 1.2) \times 10^{-4}$	
Γ_{23}	ΛK^+K^- (no ϕ)	$(4.1 \pm 1.4) \times 10^{-4}$	
Γ_{24}	$\Lambda\phi$	$(4.9 \pm 1.5) \times 10^{-4}$	

CONSTRAINED FIT INFORMATION

An overall fit to 5 branching ratios uses 6 measurements and one constraint to determine 4 parameters. The overall fit has a χ^2 = 1.4 for 3 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\left\langle\delta x_i \delta x_j\right\rangle/(\delta x_i \cdot \delta x_j)$, in percent, from the fit to the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{\text{total}}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_5	68	
x_{13}	89	76
	x_1	x_5

Ξ_c^0 BRANCHING RATIOS

Cabibbo-favored (S = −2) decays

$\Gamma(pK^-K^-\pi^+)/\Gamma_{\text{total}}$ — Γ_1/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.48±0.12 OUR FIT	Error includes scale factor of 1.1.				
0.58±0.23±0.05	17 ± 5	LI	19A	BELL	e^+e^- at $\Upsilon(4S)$

$\Gamma(pK^-K^-\pi^+)/\Gamma(\Xi^-\pi^+)$ — Γ_1/Γ_{13}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.339±0.035 OUR FIT					
0.34 ±0.04 OUR AVERAGE					
0.33 ±0.03 ±0.03	1908 ± 62	LESIAK	05	BELL	e^+e^-, $\Upsilon(4S)$
0.35 ±0.06 ±0.03	148 ± 18	DANKO	04	CLEO	e^+e^-

$\Gamma(pK^-\overline{K}^*(892)^0,\ \overline{K}^{*0}\to K^-\pi^+)/\Gamma(\Xi^-\pi^+)$ — Γ_2/Γ_{13}

VALUE	DOCUMENT ID		TECN	COMMENT
0.14±0.03±0.01	DANKO	04	CLEO	e^+e^-

$\Gamma(pK^-K^-\pi^+(\text{no }\overline{K}^{*0}))/\Gamma(\Xi^-\pi^+)$ — Γ_3/Γ_{13}

VALUE	DOCUMENT ID		TECN	COMMENT
0.21±0.04±0.02	DANKO	04	CLEO	e^+e^-

$\Gamma(\Lambda K_S^0)/\Gamma(\Xi^-\pi^+)$ — Γ_4/Γ_{13}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.225±0.013 OUR AVERAGE					
0.229±0.008±0.012	5.6k	LI	21F	BELL	e^+e^- at Υ(nS)
0.21 ±0.02 ±0.02	465 ± 37	LESIAK	05	BELL	e^+e^-, $\Upsilon(4S)$

$\Gamma(\Lambda K^-\pi^+)/\Gamma_{\text{total}}$ — Γ_5/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
1.45±0.33 OUR FIT	Error includes scale factor of 1.1.				
1.17±0.37±0.09	24 ± 6	LI	19A	BELL	e^+e^- at $\Upsilon(4S)$

$\Gamma(\Lambda K^-\pi^+)/\Gamma(\Xi^-\pi^+)$ — Γ_5/Γ_{13}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
1.02±0.15 OUR FIT	Error includes scale factor of 1.2.				
1.07±0.12±0.07	2979 ± 211	LESIAK	05	BELL	e^+e^-, $\Upsilon(4S)$

$\Gamma(\Lambda \overline{K}^*(892)^0)/\Gamma(\Xi^- \pi^+)$ — Γ_6/Γ_{13}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.18±0.02±0.01	4k	JIA	21	BELL	$e^+ e^-$ at Υ(nS)

$\Gamma(\Lambda \overline{K}^0 \pi^+ \pi^-)/\Gamma_{total}$ — Γ_7/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
seen	FRABETTI	98B	E687	γ Be, $\overline{E}_\gamma$ = 220 GeV

$\Gamma(\Lambda K^- \pi^+ \pi^+ \pi^-)/\Gamma_{total}$ — Γ_8/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
seen	FRABETTI	98B	E687	γ Be, $\overline{E}_\gamma$ = 220 GeV

$\Gamma(\Sigma^0 K^0_S)/\Gamma(\Xi^- \pi^+)$ — Γ_9/Γ_{13}

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
3.8±0.6±0.4	279	LI	21F	BELL	$e^+ e^-$ at Υ(nS)

$\Gamma(\Sigma^+ K^-)/\Gamma(\Xi^- \pi^+)$ — Γ_{10}/Γ_{13}

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
12.3±0.7±1.0	889	LI	21F	BELL	$e^+ e^-$ at Υ(nS)

$\Gamma(\Sigma^0 \overline{K}^*(892)^0)/\Gamma(\Xi^- \pi^+)$ — Γ_{11}/Γ_{13}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.69±0.03±0.03	6.3k	JIA	21	BELL	$e^+ e^-$ at Υ(nS)

$\Gamma(\Sigma^+ K^*(892)^-)/\Gamma(\Xi^- \pi^+)$ — Γ_{12}/Γ_{13}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.34±0.06±0.02	373	JIA	21	BELL	$e^+ e^-$ at Υ(nS)

$\Gamma(\Xi^- \pi^+)/\Gamma_{total}$ — Γ_{13}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
1.43±0.32 OUR FIT	Error includes scale factor of 1.1.				
1.80±0.50±0.14	45 ± 7	LI	19A	BELL	$e^+ e^-$ at $\Upsilon(4S)$

$\Gamma(\Xi^- \pi^+)/\Gamma(\Xi^- \pi^+ \pi^+ \pi^-)$ — Γ_{13}/Γ_{14}

VALUE	DOCUMENT ID		TECN	COMMENT
0.30±0.12±0.05	ALBRECHT	90F	ARG	$e^+ e^-$ at $\Upsilon(4S)$

$\Gamma(\Omega^- K^+)/\Gamma(\Xi^- \pi^+)$ — Γ_{18}/Γ_{13}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.294±0.018±0.016	650	AUBERT,B	05M	BABR	$e^+ e^- \approx \Upsilon(4S)$

$\Gamma(\Xi^0 \phi,\ \phi \to K^+ K^-)/\Gamma(\Xi^- \pi^+)$ — Γ_{16}/Γ_{13}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.036±0.004±0.002	311	[1] MCNEIL	21	BELL	$e^+ e^-$ at Υ(nS)

[1] MCNEIL 21 assumes an azimuthally symmetric amplitude model to recover resonant and nonresonant contributions to $\Xi^0_c \to \Xi^0 K^+ K^-$.

$\Gamma(\Xi^0 K^+ K^- \text{nonresonant})/\Gamma(\Xi^- \pi^+)$ — Γ_{17}/Γ_{13}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.039±0.004±0.002	311	[1] MCNEIL	21	BELL	$e^+ e^-$ at Υ(nS)

[1] MCNEIL 21 assumes an azimuthally symmetric amplitude model to recover resonant and nonresonant contributions to $\Xi_c^0 \to \Xi^0 K^+ K^-$.

$\Gamma(\Xi^- e^+ \nu_e)/\Gamma(\Xi^- \pi^+)$ — Γ_{19}/Γ_{13}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.730±0.021±0.039		[1] LI	21C	BELL	$e^+ e^-$ at 10.52, 10.58 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.38 ±0.14 ±0.22		ACHARYA	21A	ALCE	pp at 13 TeV
3.1 ±1.0 $^{+0.3}_{-0.5}$	54	ALEXANDER	95B	CLE2	$e^+ e^- \approx \Upsilon(4S)$
0.96 ±0.43 ±0.18	18	[2] ALBRECHT	93B	ARG	$e^+ e^- \approx 10.4$ GeV

[1] LI 21C measures ratio B($\Xi_c^0 \to \Xi^- e^+ \nu_e$) / B($\Xi_c^0 \to \Xi^- \mu^+ \nu_\mu$) = 1.03 ± 0.05 ± 0.07.

[2] This ALBRECHT 93B value is the average of the ($\Xi^- e^+$ anything)/$\Xi^- \pi^+$ and ($\Xi^- \mu^+$ anything)/$\Xi^- \pi^+$ ratios. Here we average it with the $\Xi^- e^+ \nu_e / \Xi^- \pi^+$ ratio.

$\Gamma(\Xi^- \mu^+ \nu_\mu)/\Gamma(\Xi^- \pi^+)$ — Γ_{20}/Γ_{13}

VALUE	DOCUMENT ID		TECN	COMMENT
0.708±0.033±0.056	[1] LI	21C	BELL	$e^+ e^-$ at 10.52, 10.58 GeV

[1] LI 21C measures ratio B($\Xi_c^0 \to \Xi^- e^+ \nu_e$) / B($\Xi_c^0 \to \Xi^- \mu^+ \nu_\mu$) = 1.03 ± 0.05 ± 0.07.

$\Gamma(\Xi^- e^+ \nu_e)/\Gamma(\Xi^- \mu^+ \nu_\mu)$ — Γ_{19}/Γ_{20}

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.03±0.05±0.07	[1] LI	21C	BELL	$e^+ e^-$ at 10.52, 10.58 GeV

[1] LI 21C value is not independent from other quoted measurements.

Cabibbo-suppressed decays

$\Gamma(\Lambda_c^+ \pi^-)/\Gamma_{\text{total}}$ — Γ_{21}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
5.5±0.2±1.8	6.3k	[1] AAIJ	20AH	LHCB	pp at 13 TeV

[1] AAIJ 20AH extracts B($\Xi_c^0 \to \Lambda_c^+ \pi^-$) using two different normalization modes: $\Lambda_c^+ \to p K^- \pi^+$ and $\Xi_c^+ \to p K^- \pi^+$. The mean value of both results, taking their correlations into account, is presented as the final result. The measurement assumes production fraction ratios $f_{\Xi_c^0}/f_{\Lambda_c^+} = (9.7 \pm 0.9 \pm 3.1) \times 10^{-2}$ (from AAIJ 19AB plus heavy quark symmetry arguments) as well as $f_{\Xi_c^0}/f_{\Xi_c^+} = 1.00 \pm 0.01$. It further uses the inputs B($\Lambda_c^+ \to p K^- \pi^+$) = $(6.23 \pm 0.33) \times 10^{-2}$ and B($\Xi_c^+ \to p K^- \pi^+$) = $(4.5 \pm 2.1 \pm 0.7) \times 10^{-3}$ (from LI 19C). Its correlation with B($\Xi_c^+ \to p K^- \pi^+$), as measured in AAIJ 20AH, is 0.414.

$\Gamma(\Xi^- K^+)/\Gamma(\Xi^- \pi^+)$ — Γ_{22}/Γ_{13}

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
2.75±0.51±0.25	314 ± 58	CHISTOV	13	BELL	$e^+e^- \approx \Upsilon(4S)$

$\Gamma(\Lambda K^+ K^- (\text{no}\,\phi))/\Gamma(\Xi^- \pi^+)$ — Γ_{23}/Γ_{13}

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
2.86±0.61±0.37	510 ± 110	CHISTOV	13	BELL	$e^+e^- \approx \Upsilon(4S)$

$\Gamma(\Lambda\phi)/\Gamma(\Xi^- \pi^+)$ — Γ_{24}/Γ_{13}

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
3.43±0.58±0.32	316 ± 54	CHISTOV	13	BELL	$e^+e^- \approx \Upsilon(4S)$

Ξ_c^0 DECAY PARAMETERS

See the note on "Baryon Decay Parameters" in the neutron Listings.

α FOR $\Xi_c^0 \rightarrow \Xi^- \pi^+$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
−0.64±0.05±0.01		LI	21C	BELL	e^+e^- at 10.52, 10.58 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$-0.56\pm0.39^{+0.10}_{-0.09}$	138	CHAN	01	CLE2	$e^+e^- \approx \Upsilon(4S)$

α FOR $\overline{\Xi}_c^0 \rightarrow \overline{\Xi}^+ \pi^-$

VALUE	DOCUMENT ID		TECN	COMMENT
0.61±0.05±0.01	LI	21C	BELL	e^+e^- at 10.52, 10.58 GeV

α FOR $\Xi_c^0 \rightarrow \Lambda \overline{K}^*(892)^0$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.15±0.22±0.04	4k	[1] JIA	21	BELL	e^+e^- at Υ(nS)

[1] JIA 21 measures $\alpha(\Xi_c^0 \rightarrow \Lambda \overline{K}^*(892)^0)\,\alpha(\Lambda \rightarrow p\pi^-) = 0.115 \pm 0.164 \pm 0.031$, and uses $\alpha(\Lambda \rightarrow p\pi^-) = 0.747 \pm 0.010$.

α FOR $\Xi_c^0 \rightarrow \Sigma^+ K^*(892)^-$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
−0.52±0.30±0.02	373	[1] JIA	21	BELL	e^+e^- at Υ(nS)

[1] JIA 21 measures $\alpha(\Xi_c^0 \rightarrow \Sigma^+ \overline{K}^*(892)^-)\,\alpha(\Sigma^+ \rightarrow p\pi^0) = 0.514 \pm 0.295 \pm 0.012$, and uses $\alpha(\Sigma^+ \rightarrow p\pi^0) = -0.980 \pm 0.017$.

Ξ_c^0 REFERENCES

ACHARYA	21A	PRL 127 272001	S. Acharya *et al.*	(ALICE Collab.)
JIA	21	JHEP 2106 160	S. Jia *et al.*	(BELLE Collab.)
LI	21C	PRL 127 121803	Y.B. Li *et al.*	(BELLE Collab.)
LI	21F	PR D105 L011102	Y. Li *et al.*	(BELLE Collab.)
MCNEIL	21	PR D103 112002	J.T. McNeil *et al.*	(BELLE Collab.)
AAIJ	20AH	PR D102 071101	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	19AB	PR D99 052006	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	19AG	PR D100 032001	R. Aaij *et al.*	(LHCb Collab.)
LI	19A	PRL 122 082001	Y.B. Li *et al.*	(BELLE Collab.)

LI	19C	PR D100 031101	Y.B. Li *et al.*	(BELLE Collab.)
AALTONEN	14B	PR D89 072014	T. Aaltonen *et al.*	(CDF Collab.)
CHISTOV	13	PR D88 071103	R. Chistov *et al.*	(BELLE Collab.)
AUBERT,B	05M	PRL 95 142003	B. Aubert *et al.*	(BABAR Collab.)
LESIAK	05	PL B605 237	T. Lesiak *et al.*	(BELLE Collab.)
Also		PL B617 198 (errat.)	T. Lesiak *et al.*	(BELLE Collab.)
DANKO	04	PR D69 052004	I. Danko *et al.*	(CLEO Collab.)
LINK	02H	PL B541 211	J.M. Link *et al.*	(FNAL FOCUS Collab.)
CHAN	01	PR D63 111102	S. Chan *et al.*	(CLEO Collab.)
FRABETTI	98B	PL B426 403	P.L. Frabetti *et al.*	(FNAL E687 Collab.)
ALEXANDER	95B	PRL 74 3113	J. Alexander *et al.*	(CLEO Collab.)
Also		PRL 75 4155 (erratum)	J. Alexander *et al.*	(CLEO Collab.)
ALBRECHT	93B	PL B303 368	H. Albrecht *et al.*	(ARGUS Collab.)
FRABETTI	93C	PRL 70 2058	P.L. Frabetti *et al.*	(FNAL E687 Collab.)
HENDERSON	92B	PL B283 161	S. Henderson *et al.*	(CLEO Collab.)
ALBRECHT	90F	PL B247 121	H. Albrecht *et al.*	(ARGUS Collab.)
BARLAG	90	PL B236 495	S. Barlag *et al.*	(ACCMOR Collab.)
ALAM	89	PL B226 401	M.S. Alam *et al.*	(CLEO Collab.)
AVERY	89	PRL 62 863	P. Avery *et al.*	(CLEO Collab.)