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 ±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
153 ± 6 OUR AVERAGE Error includes scale factor of 2.4.					
154.5± 2.4±1.1	22k	[1] AAIJ	19AG	LHCB	$\Xi_c^0 \to pK^-K^-\pi^+$
118 $^{+14}_{-12}$ ±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 = (1.040 $\pm$ 0.007) $\times$ 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	$p K^- K^- \pi^+$	$(4.8 \pm 1.2) \times 10^{-3}$	1.1
Γ_2	$p K^- \overline{K}^*(892)^0$, $\overline{K}^{*0} \to K^- \pi^+$	$(2.0 \pm 0.6) \times 10^{-3}$	
Γ_3	$p K^- K^- \pi^+$ (no $\overline{K}^{*0}$)	$(3.0 \pm 0.9) \times 10^{-3}$	
Γ_4	ΛK_S^0	$(3.0 \pm 0.8) \times 10^{-3}$	
Γ_5	$\Lambda K^- \pi^+$	(1.45 ± 0.33) %	1.1
Γ_6	$\Lambda \overline{K}^0 \pi^+ \pi^-$	seen	
Γ_7	$\Lambda K^- \pi^+ \pi^+ \pi^-$	seen	
Γ_8	$\Xi^- \pi^+$	(1.43 ± 0.32) %	1.1
Γ_9	$\Xi^- \pi^+ \pi^+ \pi^-$	(4.8 ± 2.3) %	
Γ_{10}	$\Omega^- K^+$	$(4.2 \pm 1.0) \times 10^{-3}$	
Γ_{11}	$\Xi^- e^+ \nu_e$	(1.8 ± 1.2) %	
	Cabibbo-suppressed decays		
Γ_{12}	$\Lambda_c^+ \pi^-$	$(5.5 \pm 1.8) \times 10^{-3}$	
Γ_{13}	$\Xi^- K^+$	$(3.9 \pm 1.2) \times 10^{-4}$	
Γ_{14}	$\Lambda K^+ K^-$ (no ϕ)	$(4.1 \pm 1.4) \times 10^{-4}$	
Γ_{15}	$\Lambda \phi$	$(4.9 \pm 1.5) \times 10^{-4}$	

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_8	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_8

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_8

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_8

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_8

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
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_8

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^-, $\Upsilon(4S)$

$\Gamma(\Lambda\overline{K}^0\pi^+\pi^-)/\Gamma_{\text{total}}$ — Γ_6/Γ

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

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

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

$\Gamma(\Xi^-\pi^+)/\Gamma_{\text{total}}$ — Γ_8/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_8/Γ_9

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_{10}/Γ_8

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

$\Gamma(\Xi^-e^+\nu_e)/\Gamma(\Xi^-\pi^+)$ — Γ_{11}/Γ_8

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
1.3 ±0.8 OUR AVERAGE Error includes scale factor of 1.8.					
$3.1 \pm 1.0 ^{+0.3}_{-0.5}$	54	ALEXANDER	95B	CLE2	$e^+e^- \approx \Upsilon(4S)$
0.96±0.43±0.18	18	[1] ALBRECHT	93B	ARG	$e^+e^- \approx 10.4$ GeV

[1] 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.

Cabibbo-suppressed decays

$\Gamma(\Lambda_c^+\pi^-)/\Gamma_{\text{total}}$ — Γ_{12}/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($\Xi_c^0 \rightarrow \Lambda_c^+\pi^-$) using two different normalization modes: $\Lambda_c^+ \rightarrow pK^-\pi^+$ and $\Xi_c^+ \rightarrow pK^-\pi^+$. 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($\Lambda_c^+ \rightarrow pK^-\pi^+$) = $(6.23 \pm 0.33) \times 10^{-2}$ and B($\Xi_c^+ \rightarrow pK^-\pi^+$) = $(4.5 \pm 2.1 \pm 0.7) \times 10^{-3}$ (from LI 19C). Its correlation with B($\Xi_c^+ \rightarrow pK^-\pi^+$), as measured in AAIJ 20AH, is 0.414.

$\Gamma(\Xi^-K^+)/\Gamma(\Xi^-\pi^+)$ — Γ_{13}/Γ_8

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_{14}/Γ_8

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_{15}/Γ_8

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
$\mathbf{-0.56 \pm 0.39^{+0.10}_{-0.09}}$	138	CHAN	01	CLE2	$e^+ e^- \approx \Upsilon(4S)$

Ξ_c^0 REFERENCES

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.)