Ξ_c^0

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

According to the quark model, the Ξ_c^0 (quark content dsc) and Ξ_c^+ form an isospin doublet, and the spin-parity ought to be $J^P = 1/2^+$. None of I, 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*
$2470.87^{+0.28}_{-0.31}$ OUR FIT					
$2470.99^{+0.30}_{-0.50}$ OUR AVERAGE					
$2470.85 \pm 0.24 \pm 0.55$	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	$e^+ e^-$, $\Upsilon(4S)$
$2470.0 \pm 2.8 \pm 2.6$	85	FRABETTI	98B	E687	γ Be, $\overline{E}_\gamma = 220$ GeV
$2469 \pm 2 \pm 3$	9	HENDERSON	92B	CLEO	$\Omega^- K^+$
$2472.1 \pm 2.7 \pm 1.6$	54	ALBRECHT	90F	ARG	$e^+ e^-$ at $\Upsilon(4S)$
$2473.3 \pm 1.9 \pm 1.2$	4	BARLAG	90	ACCM	π^- (K^-) Cu 230 GeV
$2472 \pm 3 \pm 4$	19	ALAM	89	CLEO	$e^+ e^-$ 10.6 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$2462.1 \pm 3.1 \pm 1.4$	42	[2] FRABETTI	93C	E687	See FRABETTI 98B
$2471 \pm 3 \pm 4$	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*
3.00 ± 0.24 OUR FIT					
2.91 ± 0.26 OUR AVERAGE					
$2.85 \pm 0.30 \pm 0.04$	5.1/3.4k	AALTONEN	14B	CDF	$p\overline{p}$ at 1.96 TeV
2.9 ± 0.5		LESIAK	05	BELL	$e^+ e^-$, $\Upsilon(4S)$
$7.0 \pm 4.5 \pm 2.2$		ALBRECHT	90F	ARG	$e^+ e^-$ at $\Upsilon(4S)$
$6.8 \pm 3.3 \pm 0.5$		BARLAG	90	ACCM	π^- (K^-) Cu 230 GeV
$5 \pm 4 \pm 1$		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
112^{+13}_{-10} OUR AVERAGE					
$118^{+14}_{-12}\pm5$	110	LINK	02H	FOCS	γ nucleus, ≈ 180 GeV
$101^{+25}_{-17}\pm5$	42	FRABETTI	93C	E687	γBe, $\overline{E}_\gamma = 220$ GeV
82^{+59}_{-30}	4	BARLAG	90	ACCM	π^- (K^-) Cu 230 GeV

Ξ_c^0 DECAY MODES

No absolute branching fractions have been measured. Several measurements of ratios of fractions may be found in the Listings that follow.

	Mode	Fraction (Γ_i/Γ)
	No absolute branching fractions have been measured. The following are branching *ratios* relative to $\Xi^-\pi^+$.	
	Cabibbo-favored (S = −2) decays — relative to $\Xi^-\pi^+$	
Γ_1	$pK^-K^-\pi^+$	0.34 ± 0.04
Γ_2	$pK^-\overline{K}^*(892)^0$	0.21 ± 0.05
Γ_3	$pK^-K^-\pi^+$ (no $\overline{K}^{*0}$)	0.21 ± 0.04
Γ_4	ΛK^0_S	0.210 ± 0.028
Γ_5	$\Lambda K^-\pi^+$	1.07 ± 0.14
Γ_6	$\Lambda\overline{K}^0\pi^+\pi^-$	seen
Γ_7	$\Lambda K^-\pi^+\pi^+\pi^-$	seen
Γ_8	$\Xi^-\pi^+$	**DEFINED AS 1**
Γ_9	$\Xi^-\pi^+\pi^+\pi^-$	3.3 ± 1.4
Γ_{10}	Ω^-K^+	0.297 ± 0.024
Γ_{11}	$\Xi^-e^+\nu_e$	3.1 ± 1.1
Γ_{12}	$\Xi^-\ell^+$ anything	1.0 ± 0.5
	Cabibbo-suppressed decays — relative to $\Xi^-\pi^+$	
Γ_{13}	Ξ^-K^+	0.028 ± 0.006
Γ_{14}	ΛK^+K^- (no ϕ)	0.029 ± 0.007
Γ_{15}	$\Lambda\phi$	0.034 ± 0.007

Ξ_c^0 BRANCHING RATIOS

Cabibbo-favored (S = −2) decays

$\Gamma(pK^-K^-\pi^+)/\Gamma(\Xi^-\pi^+)$ **Γ_1/Γ_8**

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.34±0.04 OUR AVERAGE					
$0.33\pm0.03\pm0.03$	1908 ± 62	LESIAK	05	BELL	e^+e^-, $\Upsilon(4S)$
$0.35\pm0.06\pm0.03$	148 ± 18	DANKO	04	CLEO	e^+e^-

$\Gamma(pK^-\overline{K}^*(892)^0)/\Gamma(\Xi^-\pi^+)$ — Γ_2/Γ_8

Unseen decay modes of the $\overline{K}^*(892)^0$ are included.

VALUE	DOCUMENT ID		TECN	COMMENT
0.210±0.045±0.015	DANKO	04	CLEO	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	BARLAG	90	ACCM	π^- (K^-) Cu 230 GeV

$\Gamma(pK^-K^-\pi^+(\text{no }\overline{K}^{*0}))/\Gamma(\Xi^-\pi^+)$ — Γ_3/Γ_8

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

$\Gamma(\Lambda K^0_S)/\Gamma(\Xi^-\pi^+)$ — Γ_4/Γ_8

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.21±0.02±0.02	465 ± 37	LESIAK	05	BELL	e^+e^-, $\Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	7	ALBRECHT	95B	ARG	$e^+e^- \approx 10.4$ GeV

$\Gamma(\Lambda K^-\pi^+)/\Gamma(\Xi^-\pi^+)$ — Γ_5/Γ_8

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
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

$\Gamma(\Xi^-\pi^+)/\Gamma(\Xi^-\pi^+\pi^+\pi^-)$ — 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
0.297±0.024 OUR AVERAGE					
0.294±0.018±0.016	650	AUBERT,B	05M	BABR	$e^+e^- \approx \Upsilon(4S)$
0.50 ±0.21 ±0.05	9	HENDERSON	92B	CLEO	$e^+e^- \approx 10.6$ GeV

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

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{3.1\pm1.0^{+0.3}_{-0.5}}$	54	ALEXANDER	95B	CLE2	$e^+e^- \approx \Upsilon(4S)$

$\Gamma(\Xi^-\ell^+\text{anything})/\Gamma(\Xi^-\pi^+)$ — Γ_{12}/Γ_8

The ratio is for the *average* (not the sum) of the Ξ^-e^+ anything and $\Xi^-\mu^+$ anything modes.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.96±0.43±0.18	18	ALBRECHT	93B	ARG	$e^+e^- \approx 10.4$ GeV

$\Gamma(\Xi^- \ell^+ \text{anything})/\Gamma(\Xi^- \pi^+ \pi^+ \pi^-)$ — Γ_{12}/Γ_9

The ratio is for the *average* (not the sum) of the $\Xi^- e^+$ anything and $\Xi^- \mu^+$ anything modes.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.29±0.12±0.04	18	ALBRECHT	93B	ARG	$e^+ e^- \approx 10.4$ GeV

Cabibbo-suppressed decays

$\Gamma(\Xi^- K^+)/\Gamma(\Xi^- \pi^+)$ — 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

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.)
ALBRECHT	95B	PL B342 397	H. Albrecht *et al.*	(ARGUS 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.)