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 ± 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*
3.00 ± 0.24 OUR FIT					
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*
112^{+13}_{-10} OUR AVERAGE					
$118^{+14}_{-12}\pm5$	110	LINK	02H	FOCS	γ nucleus, $\approx$ 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

Branching fractions marked with a footnote, e.g. [*a*], have been corrected for decay modes not observed in the experiments. For example, the submode fraction $\Xi_c^0 \to p K^- \overline{K}^*(892)^0$ seen in $\Xi_c^0 \to p K^- K^- \pi^+$ has been multiplied up to include $\overline{K}^*(892)^0 \to \overline{K}^0 \pi^0$ decays.

	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	$p K^- K^- \pi^+$	0.34 $\pm$0.04
Γ_2	$p K^- \overline{K}^*(892)^0$	[*a*] 0.21 $\pm$0.05
Γ_3	$p K^- K^- \pi^+$ (no $\overline{K}^{*0}$)	0.21 $\pm$0.04
Γ_4	ΛK_S^0	0.210$\pm$0.028
Γ_5	$\Lambda K^- \pi^+$	1.07 $\pm$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 $\pm$1.4
Γ_{10}	$\Omega^- K^+$	0.297$\pm$0.024
Γ_{11}	$\Xi^- e^+ \nu_e$	3.1 $\pm$1.1
Γ_{12}	$\Xi^- \ell^+$ anything	1.0 $\pm$0.5
	Cabibbo-suppressed decays — relative to $\Xi^-\pi^+$	
Γ_{13}	$\Xi^- K^+$	0.028$\pm$0.006
Γ_{14}	$\Lambda K^+ K^-$ (no ϕ)	0.029$\pm$0.007
Γ_{15}	$\Lambda\phi$	[*a*] 0.034$\pm$0.007

[*a*] This branching fraction includes all the decay modes of the final-state resonance.

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±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^-

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

$\Gamma(\Lambda K_S^0)/\Gamma(\Xi^-\pi^+)$ **Γ_4/Γ_8**

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.21±0.02±0.02	465 ± 37	LESIAK	05	BELL	e^+e^-, $\Upsilon(4S)$
• • • 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
$3.1 \pm 1.0 \,^{+0.3}_{-0.5}$	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 $\Xi^- e^+$ anything and $\Xi^- \mu^+$ anything modes.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$0.96 \pm 0.43 \pm 0.18$	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
$0.29 \pm 0.12 \pm 0.04$	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
$2.75 \pm 0.51 \pm 0.25$	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
$2.86 \pm 0.61 \pm 0.37$	510 ± 110	CHISTOV	13	BELL	$e^+ e^- \approx \Upsilon(4S)$

$\Gamma(\Lambda \phi)/\Gamma(\Xi^- \pi^+)$ Γ_{15}/Γ_8

Unseen decay modes of the ϕ are included.

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
$3.43 \pm 0.58 \pm 0.32$	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 $\Xi_c^0 \to \Xi^- \pi^+$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$-0.56 \pm 0.39 \,^{+0.10}_{-0.09}$	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.)