Ξ_c^+

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

According to the quark model, the Ξ_c^+ (quark content usc) and Ξ_c^0 form an isospin doublet, and the spin-parity ought to be $J^P = 1/2^+$. None of I, J, or P have actually been measured.

Ξ_c^+ MASS

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

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2465.1± 1.6 OUR FIT					
2465.4± 1.6 OUR AVERAGE					
2464.4± 2.0± 1.4	30	FRABETTI	93B	E687	γ Be $\overline{E}_\gamma$= 220 GeV
2465.1± 3.6± 1.9	30	ALBRECHT	90F	ARG	e^+e^- at $\Upsilon(4S)$
2467 ± 3 ± 4	23	ALAM	89	CLEO	e^+e^- 10.6 GeV
2466.5± 2.7± 1.2	5	BARLAG	89C	ACCM	π^- Cu 230 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2459 ± 5 ±30	56	[1] COTEUS	87	SPEC	$nA \simeq$ 600 GeV
2460 ±25	82	BIAGI	83	SPEC	Σ^- Be 135 GeV

[1] Although COTEUS 87 claims to agree well with BIAGI 83 on the mass and width, there appears to be a discrepancy between the two experiments. BIAGI 83 sees a single peak (stated significance about 6 standard deviations) in the $\Lambda K^- \pi^+ \pi^+$ mass spectrum. COTEUS 87 sees *two* peaks in the same spectrum, one at the Ξ_c^+ mass, the other 75 MeV lower. The latter is attributed to $\Xi_c^+ \rightarrow \Sigma^0 K^- \pi^+ \pi^+ \rightarrow (\Lambda\gamma) K^- \pi^+ \pi^+$, with the γ unseen. The *combined* significance of the double peak is stated to be 5.5 standard deviations. But the absence of any trace of a lower peak in BIAGI 83 seems to us to throw into question the interpretation of the lower peak of COTEUS 87.

Ξ_c^+ MEAN LIFE

VALUE (10^{-12} s)	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.35^{+0.07}_{-0.04}}$ **OUR AVERAGE**					
$0.41^{+0.11}_{-0.08}\pm0.02$	30	FRABETTI	93B	E687	γ Be $\overline{E}_\gamma$= 220 GeV
$0.20^{+0.11}_{-0.06}$	6	BARLAG	89C	ACCM	π^- (K^-) Cu 230 GeV
$0.40^{+0.18}_{-0.12}\pm0.10$	102	COTEUS	87	SPEC	$nA \simeq$ 600 GeV
$0.48^{+0.21}_{-0.15}{}^{+0.20}_{-0.10}$	53	BIAGI	85C	SPEC	Σ^- Be 135 GeV

Ξ_c^+ DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$\Lambda K^- \pi^+ \pi^+$	seen
Γ_2	$\Sigma^+ K^- \pi^+$	seen
Γ_3	$\Sigma^0 K^- \pi^+ \pi^+$	seen
Γ_4	$\Xi^- \pi^+ \pi^+$	seen

Ξ_c^+ BRANCHING RATIOS

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

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	56	COTEUS	87	SPEC	$nA \simeq$ 600 GeV
seen	82	[2] BIAGI	83	SPEC	Σ^- Be 135 GeV

[2] BIAGI 85B look for but do not see the Ξ_c^+ in $pK^-\overline{K}^0\pi^+$ ($\Gamma(pK^-\overline{K}^0\pi^+)$ / $\Gamma(\Lambda K^-\pi^+\pi^+)$ <0.08 with 90% CL), $p2K^-2\pi^+$ ($\Gamma(p2K^-2\pi^+)$ / $\Gamma(\Lambda K^-\pi^+\pi^+)$ <0.03, 90% CL), $\Omega^- K^+ \pi^+$, $\Lambda K^{*0} \pi^+$, and $\Sigma(1385)^+ K^- \pi^+$.

$\Gamma(\Sigma^+ K^- \pi^+)/\Gamma(\Xi^- \pi^+ \pi^+)$ Γ_2/Γ_4

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.09^{+0.13}_{-0.06}{}^{+0.03}_{-0.02}}$	5	BARLAG	89C	ACCM	2 $\Sigma^+ K^- \pi^+$, 3 $\Xi^- \pi^+ \pi^+$

$\Gamma(\Sigma^0 K^- \pi^+ \pi^+)/\Gamma(\Lambda K^- \pi^+ \pi^+)$ Γ_3/Γ_1

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.84±0.36	47	[3] COTEUS	87	SPEC	$nA \simeq$ 600 GeV

[3] See, however, the note on the COTEUS 87 Ξ_c^+ mass measurement.

$\Gamma(\Xi^- \pi^+ \pi^+)/\Gamma_{total}$ Γ_4/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	30	FRABETTI	93B	E687	γ Be $\overline{E}_\gamma$= 220 GeV
seen	30	ALBRECHT	90F	ARG	e^+e^- at $\Upsilon(4S)$
seen	23	ALAM	89	CLEO	e^+e^- 10.6 GeV

Ξ_c^+ REFERENCES

FRABETTI	93B	PRL 70 1381		+Cheung, Cumalat+	(FNAL E687 Collab.)
ALBRECHT	90F	PL B247 121		+Ehrlichmann, Harder, Kruger, Nau+	(ARGUS Collab.)
ALAM	89	PL B226 401		+Katayama, Kim, Li, Lou, Sun+	(CLEO Collab.)
BARLAG	89C	PL B233 522		+Boehringer, Bosman+	(ACCMOR Collab.)
COTEUS	87	PRL 59 1530		+Binkley+	(FNAL E400 Collab.)
BIAGI	85B	ZPHY C28 175		+	(CERN WA62 Collab.)
BIAGI	85C	PL 150B 230		+	(CERN WA62 Collab.)
BIAGI	83	PL 122B 455		+	(CERN WA62 Collab.)

Ξ_c^0

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

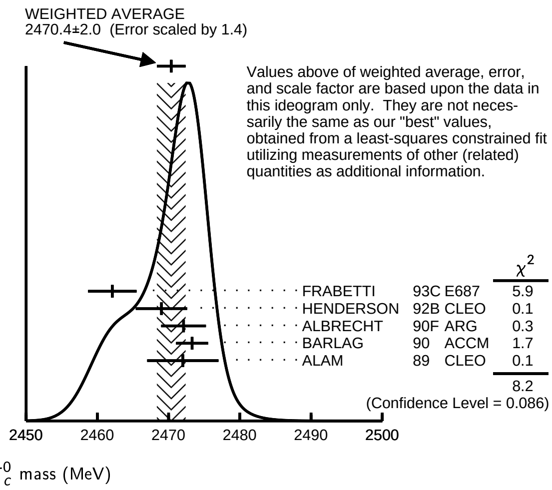
According to the quark model, the Ξ_c^0 (quark content dsc) and Ξ_c^+ form an isospin doublet, and the spin-parity ought to be $J^P = 1/2^+$. None of I, J, or P have actually been measured.

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
2470.3±1.8 OUR FIT Error includes scale factor of 1.3.					
2470.4±2.0 OUR AVERAGE Error includes scale factor of 1.4. See the ideogram below.					
2462.1±3.1±1.4	42	[1] FRABETTI	93C	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. • • •					
2471 ±3 ±4	14	AVERY	89	CLEO	See ALAM 89

[1] The FRABETTI 93C mass is well below the other measurements.



$m_{\Xi_c^0} - m_{\Xi_c^+}$

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
5.2±2.2 OUR FIT Error includes scale factor of 1.1.				
6.3±2.3 OUR AVERAGE				
+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	$\Xi_c^0 \rightarrow \Xi^- \pi^+$, $\Xi_c^+ \rightarrow \Xi^- \pi^+ \pi^+$

Ξ_c^0 MEAN LIFE

VALUE (10^{-12} s)	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.098^{+0.023}_{-0.015}}$ **OUR AVERAGE**					
$0.101^{+0.025}_{-0.017}\pm0.005$	42	FRABETTI	93C	E687	γ Be $\overline{E}_\gamma$= 220 GeV
$0.082^{+0.059}_{-0.030}$	4	BARLAG	90	ACCM	π^- (K^-) Cu 230 GeV