



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

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 has actually been measured.

Ξ_c^+ MASS

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

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
2466.3 ± 1.4 OUR FIT				
2466.4 ± 1.5 OUR AVERAGE				
2465.8 ± 1.9 ± 2.5	90	FRABETTI	98 E687	γ Be, $\bar{E}_\gamma = 220$ GeV
2467.0 ± 1.6 ± 2.0	147	EDWARDS	96 CLE2	$e^+e^- \approx \Upsilon(4S)$
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. ● ● ●				
2464.4 ± 2.0 ± 1.4	30	FRABETTI	93B E687	See FRABETTI 98
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

<u>VALUE (10^{-12} s)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.33^{+0.06}_{-0.04} OUR AVERAGE				
0.34 ^{+0.07} _{-0.05} ± 0.02	56	FRABETTI	98 E687	γ Be, $\bar{E}_\gamma = 220$ GeV
0.20 ^{+0.11} _{-0.06}	6	BARLAG	89C ACCM	π^- (K^-) Cu 230 GeV
0.40 ^{+0.18} _{-0.12} ± 0.10	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
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
0.41 ^{+0.11} _{-0.08} ± 0.02	30	FRABETTI	93B E687	See FRABETTI 98

Ξ_c^+ DECAY MODES

Mode	Fraction (Γ_i/Γ)
Γ_1 $\Lambda K^- \pi^+ \pi^+$	seen
Γ_2 $\Lambda \bar{K}^*(892)^0 \pi^+$	not seen
Γ_3 $\Sigma(1385)^+ K^- \pi^+$	not seen
Γ_4 $\Sigma^+ K^- \pi^+$	seen
Γ_5 $\Sigma^+ \bar{K}^*(892)^0$	seen
Γ_6 $\Sigma^0 K^- \pi^+ \pi^+$	seen
Γ_7 $\Xi^0 \pi^+$	seen
Γ_8 $\Xi^- \pi^+ \pi^+$	seen
Γ_9 $\Xi(1530)^0 \pi^+$	not seen
Γ_{10} $\Xi^0 \pi^+ \pi^0$	seen
Γ_{11} $\Xi^0 \pi^+ \pi^+ \pi^-$	seen
Γ_{12} $\Xi^0 e^+ \nu_e$	seen

Ξ_c^+ BRANCHING RATIOS

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

²BIAGI 85B looks for but does not see the Ξ_c^+ in $pK^- \bar{K}^0 \pi^+$ ($\Gamma(pK^- \bar{K}^0 \pi^+) / \Gamma(\Lambda K^- \pi^+ \pi^+) < 0.08$ 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 $\Sigma(1385)^+ K^- \pi^+$.

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

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
$0.58 \pm 0.16 \pm 0.07$	61	BERGFELD	96	CLE2 $e^+ e^- \approx \Upsilon(4S)$

$\Gamma(\Lambda \bar{K}^*(892)^0 \pi^+)/\Gamma(\Lambda K^- \pi^+ \pi^+)$ Γ_2/Γ_1

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

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
< 0.5	90	BERGFELD	96	CLE2 $e^+ e^- \approx \Upsilon(4S)$

$\Gamma(\Sigma(1385)^+ K^- \pi^+)/\Gamma(\Lambda K^- \pi^+ \pi^+)$ Γ_3/Γ_1

Unseen decay modes of the $\Sigma(1385)^+$ are included.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
< 0.7	90	BERGFELD	96	CLE2 $e^+ e^- \approx \Upsilon(4S)$

$\Gamma(\Sigma^+ K^- \pi^+)/\Gamma(\Xi^- \pi^+ \pi^+)$ Γ_4/Γ_8

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
$1.18 \pm 0.26 \pm 0.17$	119	BERGFELD	96	CLE2 $e^+ e^- \approx \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.09^{+0.13+0.03}_{-0.06-0.02}$	5	BARLAG	89c	ACCM $2 \Sigma^+ K^- \pi^+, 3 \Xi^- \pi^+ \pi^+$
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$\Gamma(\Sigma^+ \bar{K}^*(892)^0) / \Gamma(\Xi^- \pi^+ \pi^+)$ Γ_5 / Γ_8

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

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.92 ± 0.27 ± 0.14	61	BERGFELD	96 CLE2	$e^+ e^- \approx \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	59	AVERY	95 CLE2	$e^+ e^- \approx \gamma(4S)$

$\Gamma(\Sigma^0 K^- \pi^+ \pi^+) / \Gamma(\Lambda K^- \pi^+ \pi^+)$ Γ_6 / Γ_1

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

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

$\Gamma(\Xi^0 \pi^+) / \Gamma(\Xi^- \pi^+ \pi^+)$ Γ_7 / Γ_8

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.55 ± 0.13 ± 0.09	39	EDWARDS	96 CLE2	$e^+ e^- \approx \gamma(4S)$

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

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
seen	131	BERGFELD	96 CLE2	$e^+ e^- \approx \gamma(4S)$
seen	160	AVERY	95 CLE2	$e^+ e^- \approx \gamma(4S)$
seen	30	FRABETTI	93B E687	$\gamma Be, \bar{E}_\gamma = 220$ GeV
seen	30	ALBRECHT	90F ARG	$e^+ e^-$ at $\gamma(4S)$
seen	23	ALAM	89 CLEO	$e^+ e^-$ 10.6 GeV

$\Gamma(\Xi(1530)^0 \pi^+) / \Gamma(\Xi^- \pi^+ \pi^+)$ Γ_9 / Γ_8

Unseen decay modes of the $\Xi(1530)^0$ are included.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
< 0.2	90	BERGFELD	96 CLE2	$e^+ e^- \approx \gamma(4S)$

$\Gamma(\Xi^0 \pi^+ \pi^0) / \Gamma(\Xi^- \pi^+ \pi^+)$ Γ_{10} / Γ_8

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
2.34 ± 0.57 ± 0.37	81	EDWARDS	96 CLE2	$e^+ e^- \approx \gamma(4S)$

$\Gamma(\Xi(1530)^0 \pi^+) / \Gamma(\Xi^0 \pi^+ \pi^0)$ Γ_9 / Γ_{10}

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
< 0.3	90	EDWARDS	96 CLE2	$e^+ e^- \approx \gamma(4S)$

$\Gamma(\Xi^0 \pi^+ \pi^+ \pi^-) / \Gamma(\Xi^- \pi^+ \pi^+)$ Γ_{11} / Γ_8

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
1.74 ± 0.42 ± 0.27	57	EDWARDS	96 CLE2	$e^+ e^- \approx \gamma(4S)$

$\Gamma(\Xi^0 e^+ \nu_e) / \Gamma(\Xi^- \pi^+ \pi^+)$ Γ_{12} / Γ_8

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
2.3 ± 0.6^{+0.3}_{-0.6}	41	ALEXANDER	95B CLE2	$e^+ e^- \approx \gamma(4S)$

Ξ_c^+ REFERENCES

FRABETTI	98	PL B427 211	P.L. Frabetti+	(FNAL E687 Collab.)
BERGFELD	96	PL B365 431	+Eisenstein, Ernst+	(CLEO Collab.)
EDWARDS	96	PL B373 261	+McLean, Ogg+	(CLEO Collab.)
ALEXANDER	95B	PRL 74 3113	+Bebek, Berkelman+	(CLEO Collab.)
Also	95E	PRL 75 4155 (erratum)		
AVERY	95	PRL 75 4364	+Freyberger, Lingel+	(CLEO Collab.)
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	+Bourquin, Britten+	(CERN WA62 Collab.)
BIAGI	85C	PL 150B 230	+Bourquin, Britten+	(CERN WA62 Collab.)
BIAGI	83	PL 122B 455	+Bourquin, Britten+	(CERN WA62 Collab.)
