

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

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

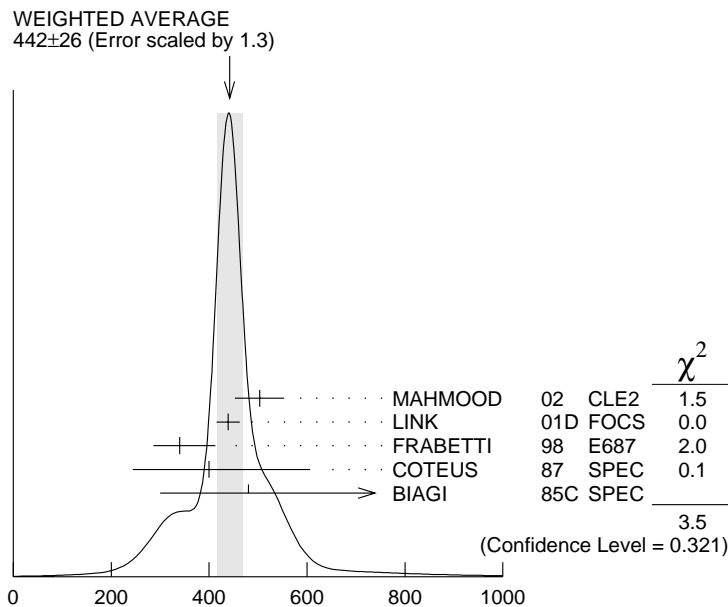
The fit uses the Ξ_c^+ and Ξ_c^0 mass and mass-difference measurements.

<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^{-15} s)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
442 ± 26 OUR AVERAGE	Error	includes scale factor of 1.3. See the ideogram below.		
503 ± 47 ± 18	250	MAHMOOD	02 CLE2	$e^+e^- \approx \Upsilon(4S)$
439 ± 22 ± 9	532	LINK	01D FOCS	γ nucleus, $\bar{E}_\gamma \approx 180$ GeV
340 ⁺ ₅₀ ± 70 ± 20	56	FRABETTI	98 E687	γ Be, $\bar{E}_\gamma = 220$ GeV
400 ⁺ ₁₂₀ ± 180 ± 100	102	COTEUS	87 SPEC	$nA \simeq 600$ GeV
480 ⁺ ₁₅₀ ± 210 ± 200 ± 100	53	BIAGI	85C SPEC	Σ^- Be 135 GeV
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
410 ⁺ ₈₀ ± 110 ± 20	30	FRABETTI	93B E687	See FRABETTI 98
200 ⁺ ₆₀ ± 110	6	BARLAG	89C ACCM	$\pi^- (K^-)$ Cu 230 GeV



Ξ_c^+ mean life

Ξ_c^+ DECAY MODES

No absolute branching fractions have been measured. THE FOLLOWING ARE BRANCHING RATIOS RELATIVE TO $\Xi^- \pi^+ \pi^+$.

Mode	Fraction (Γ_i/Γ)	Confidence level
Γ_1 $\Lambda K^- \pi^+ \pi^+$	[a] 0.58 ± 0.18	
Γ_2 $\Lambda \bar{K}^*(892)^0 \pi^+$	[a,b] < 0.29	90%
Γ_3 $\Sigma(1385)^+ K^- \pi^+$	[a,b] < 0.41	90%
Γ_4 $\Sigma^+ K^- \pi^+$	[a] 1.18 ± 0.31	
Γ_5 $\Sigma^+ \bar{K}^*(892)^0$	[a,b] 0.92 ± 0.30	
Γ_6 $\Sigma^0 K^- \pi^+ \pi^+$	[a] 0.49 ± 0.26	
Γ_7 $\Xi^0 \pi^+$	[a] 0.55 ± 0.16	
Γ_8 $\Xi^- \pi^+ \pi^+$	[a] defined as 1	
Γ_9 $\Xi(1530)^0 \pi^+$	[a,b] < 0.2	90%
Γ_{10} $\Xi^0 \pi^+ \pi^0$	[a] 2.34 ± 0.68	
Γ_{11} $\Xi^0 \pi^+ \pi^+ \pi^-$	[a] 1.74 ± 0.50	
Γ_{12} $\Xi^0 e^+ \nu_e$	[a] $2.3 \begin{smallmatrix} +0.7 \\ -0.9 \end{smallmatrix}$	
Γ_{13} $\rho K^- \pi^+$	[a] 0.21 ± 0.03	
Γ_{14} $\rho \bar{K}^*(892)^0$	[a,b] 0.12 ± 0.02	

[a] No absolute branching fractions have been measured. The following are branching *ratios* relative to $\Xi^- \pi^+ \pi^+$.

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

Ξ_c^+ BRANCHING RATIOS

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

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

seen	56	COTEUS	87	SPEC	$nA \simeq 600$ GeV
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seen	82	² BIAGI	83	SPEC	Σ^- Be 135 GeV
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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
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0.58 ± 0.16 ± 0.07	61	BERGFELD	96	CLE2	$e^+ e^- \approx \Upsilon(4S)$
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$\Gamma(\Lambda \bar{K}^*(892)^0 \pi^+)/\Gamma(\Lambda K^- \pi^+ \pi^+)$ Γ_2/Γ_1

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

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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< 0.5	90	BERGFELD	96	CLE2	$e^+ e^- \approx \Upsilon(4S)$
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$\Gamma(\Sigma(1385)^+ K^- \pi^+)/\Gamma(\Lambda K^- \pi^+ \pi^+)$ Γ_3/Γ_1

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

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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< 0.7	90	BERGFELD	96	CLE2	$e^+ e^- \approx \Upsilon(4S)$
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$\Gamma(\Sigma^+ K^- \pi^+)/\Gamma(\Xi^- \pi^+ \pi^+)$ Γ_4/Γ_8

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
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1.18 ± 0.26 ± 0.17	119	BERGFELD	96	CLE2	$e^+ e^- \approx \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.92 \pm 0.20 \pm 0.07$		³ JUN	00	SELX	Σ^- nucleus, 600 GeV
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$0.09^{+0.13+0.03}_{-0.06-0.02}$	5	BARLAG	89C	ACCM	2 $\Sigma^+ K^- \pi^+$, 3 $\Xi^- \pi^+ \pi^+$
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³This JUN 00 result is redundant with other results given below.

$\Gamma(\Sigma^+ \bar{K}^*(892)^0)/\Gamma(\Xi^- \pi^+ \pi^+)$ Γ_5/Γ_8

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

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

seen	59	AVERY	95	CLE2	$e^+ e^- \approx \Upsilon(4S)$
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$\Gamma(\Sigma^0 K^- \pi^+ \pi^+)/\Gamma(\Lambda K^- \pi^+ \pi^+)$ Γ_6/Γ_1

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.84±0.36	47	⁴ COTEUS	87 SPEC	$nA \approx 600$ GeV

⁴ 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	$e^+ e^- \approx \Upsilon(4S)$

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

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

seen	131	BERGFELD	96 CLE2	$e^+ e^- \approx \Upsilon(4S)$
seen	160	AVERY	95 CLE2	$e^+ e^- \approx \Upsilon(4S)$
seen	30	FRABETTI	93B E687	γ Be, $\bar{E}_\gamma = 220$ GeV
seen	30	ALBRECHT	90F ARG	$e^+ e^-$ at $\Upsilon(4S)$
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	$e^+ e^- \approx \Upsilon(4S)$

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

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

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

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

<0.3	90	EDWARDS	96 CLE2	$e^+ e^- \approx \Upsilon(4S)$
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$\Gamma(\Xi^0 \pi^+ \pi^+ \pi^-)/\Gamma(\Xi^- \pi^+ \pi^+)$ Γ_{11}/Γ_8

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

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

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

$\Gamma(p K^- \pi^+)/\Gamma(\Sigma^+ K^- \pi^+)$ Γ_{13}/Γ_4

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.22±0.06±0.03	76	JUN	00 SELX	Σ^- nucleus, 600 GeV

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

 Γ_{13} / Γ_8

VALUE	EVT5	DOCUMENT ID	TECN	COMMENT
0.214 ± 0.034 OUR AVERAGE				
0.234 ± 0.047 ± 0.022	202	LINK	01B FOCS	γ nucleus
0.20 ± 0.04 ± 0.02	76	JUN	00 SELX	Σ^- nucleus, 600 GeV

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

 $\Gamma_{14} / \Gamma_{13}$

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

VALUE	DOCUMENT ID	TECN	COMMENT
0.54 ± 0.09 ± 0.05	LINK	01B FOCS	γ nucleus

Ξ_c^+ REFERENCES

MAHMOOD	02	PR D65 031102	A.H. Mahmood <i>et al.</i>	(CLEO Collab.)
LINK	01B	PL B512 277	J.M. Link <i>et al.</i>	(FNAL FOCUS Collab.)
LINK	01D	PL B523 53	J.M. Link <i>et al.</i>	(FNAL FOCUS Collab.)
JUN	00	PRL 84 1857	S.Y. Jun <i>et al.</i>	(FNAL SELEX Collab.)
FRABETTI	98	PL B427 211	P.L. Frabetti <i>et al.</i>	(FNAL E687 Collab.)
BERGFELD	96	PL B365 431	T. Bergfeld <i>et al.</i>	(CLEO Collab.)
EDWARDS	96	PL B373 261	K.W. Edwards <i>et al.</i>	(CLEO Collab.)
ALEXANDER	95B	PRL 74 3113	J. Alexander <i>et al.</i>	(CLEO Collab.)
Also	95E	PRL 75 4155 (erratum)	J. Alexander <i>et al.</i>	(CLEO Collab.)
AVERY	95	PRL 75 4364	P. Avery <i>et al.</i>	(CLEO Collab.)
FRABETTI	93B	PRL 70 1381	P.L. Frabetti <i>et al.</i>	(FNAL E687 Collab.)
ALBRECHT	90F	PL B247 121	H. Albrecht <i>et al.</i>	(ARGUS Collab.)
ALAM	89	PL B226 401	M.S. Alam <i>et al.</i>	(CLEO Collab.)
BARLAG	89C	PL B233 522	S. Barlag <i>et al.</i>	(ACCMOR Collab.)
COTEUS	87	PRL 59 1530	P. Coteus <i>et al.</i>	(FNAL E400 Collab.)
BIAGI	85B	ZPHY C28 175	S.F. Biagi <i>et al.</i>	(CERN WA62 Collab.)
BIAGI	85C	PL 150B 230	S.F. Biagi <i>et al.</i>	(CERN WA62 Collab.)
BIAGI	83	PL 122B 455	S.F. Biagi <i>et al.</i>	(CERN WA62 Collab.)