

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

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.

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
2468.0 ± 0.4 OUR FIT				
2467.6^{+0.4}_{-1.0} OUR AVERAGE				
2468.1 ± 0.4 ^{+0.2} _{-1.4}	4950 ± 286	¹ LESIAK	05 BELL	e^+e^- , $\Upsilon(4S)$
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	² COTEUS	87 SPEC	$nA \simeq 600$ GeV
2460 ± 25	82	BIAGI	83 SPEC	Σ^- Be 135 GeV

¹The systematic error was (wrongly) given the other way round in LESIAK 05.

²Although 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.

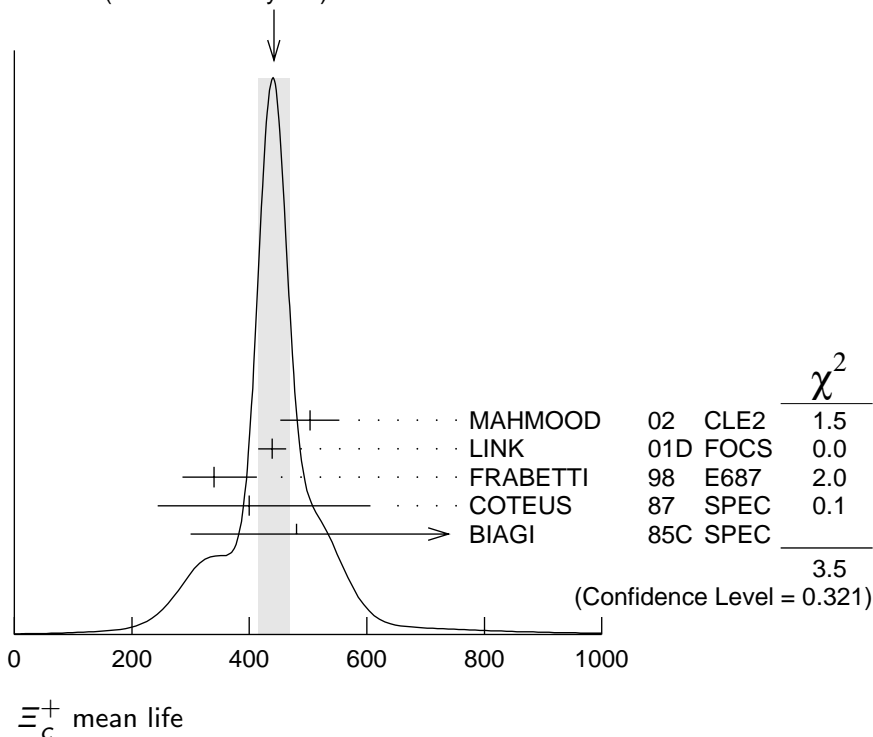
Ξ_c^+ MEAN LIFE

VALUE (10^{-15} s)	EVTS	DOCUMENT ID	TECN	COMMENT
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 ⁺⁷⁰ ₋₅₀ ± 20	56	FRABETTI	98 E687	γ Be, $\bar{E}_\gamma = 220$ GeV
400 ⁺¹⁸⁰ ₋₁₂₀ ± 100	102	COTEUS	87 SPEC	$nA \simeq 600$ GeV
480 ⁺²¹⁰ ₋₁₅₀ ± 200	53	BIAGI	85C SPEC	Σ^- Be 135 GeV

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

$410_{-80}^{+110} \pm 20$	30	FRABETTI	93B E687	See FRABETTI 98
200_{-60}^{+110}	6	BARLAG	89C ACCM	$\pi^- (K^-)$ Cu 230 GeV

WEIGHTED AVERAGE
 442 ± 26 (Error scaled by 1.3)



Ξ_c^+ DECAY MODES

Mode	Fraction (Γ_i/Γ)	Confidence level
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No absolute branching fractions have been measured.
The following are branching *ratios* relative to $\Xi^- \pi^+ \pi^+$.

Cabibbo-favored ($S = -2$) decays

Γ_1	$p K_S^0 K_S^0$	[a]	0.087 ± 0.022	
Γ_2	$\Lambda \bar{K}^0 \pi^+$		—	
Γ_3	$\Sigma(1385)^+ \bar{K}^0$	[a, b]	1.0 ± 0.5	
Γ_4	$\Lambda K^- \pi^+ \pi^+$	[a]	0.323 ± 0.033	
Γ_5	$\Lambda \bar{K}^*(892)^0 \pi^+$	[a, b]	< 0.2	90%
Γ_6	$\Sigma(1385)^+ K^- \pi^+$	[a, b]	< 0.3	90%
Γ_7	$\Sigma^+ K^- \pi^+$	[a]	0.94 ± 0.11	
Γ_8	$\Sigma^+ \bar{K}^*(892)^0$	[a, b]	0.81 ± 0.15	
Γ_9	$\Sigma^0 K^- \pi^+ \pi^+$	[a]	0.29 ± 0.16	

Γ_{10}	$\Xi^0 \pi^+$	[a]	0.55 ± 0.16	
Γ_{11}	$\Xi^- \pi^+ \pi^+$	[a]	DEFINED AS 1	
Γ_{12}	$\Xi(1530)^0 \pi^+$	[a,b]	<0.1	90%
Γ_{13}	$\Xi^0 \pi^+ \pi^0$	[a]	2.34 ± 0.68	
Γ_{14}	$\Xi^0 \pi^+ \pi^+ \pi^-$	[a]	1.74 ± 0.50	
Γ_{15}	$\Xi^0 e^+ \nu_e$	[a]	$2.3 \begin{matrix} +0.7 \\ -0.9 \end{matrix}$	
Γ_{16}	$\Omega^- K^+ \pi^+$	[a]	0.07 ± 0.04	

Cabibbo-suppressed decays

Γ_{17}	$\rho K^- \pi^+$	[a]	0.21 ± 0.03	
Γ_{18}	$\rho \bar{K}^*(892)^0$	[a,b]	0.12 ± 0.02	
Γ_{19}	$\Sigma^+ K^+ K^-$	[a]	0.15 ± 0.07	
Γ_{20}	$\Sigma^+ \phi$	[a,b]	<0.11	90%
Γ_{21}	$\Xi(1690)^0 K^+, \Xi(1690)^0 \rightarrow \Sigma^+ K^-$	[a]	<0.05	90%

[a] No absolute branching fractions have been measured. The value here is the branching *ratio* relative to $\Xi^- \pi^+ \pi^+$.

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

Ξ_c^+ BRANCHING RATIOS

———— Cabibbo-favored ($S = -2$) decays ————

$\Gamma(\rho K_S^0 K_S^0)/\Gamma(\Xi^- \pi^+ \pi^+)$					Γ_1/Γ_{11}
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
$0.087 \pm 0.016 \pm 0.014$	168 ± 27	LESIK	05 BELL	$e^+ e^-, \gamma(4S)$	

$\Gamma(\Sigma(1385)^+ \bar{K}^0)/\Gamma(\Xi^- \pi^+ \pi^+)$					Γ_3/Γ_{11}
Unseen decay modes of the $\Sigma(1385)^+$ are included.					
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
$1.00 \pm 0.49 \pm 0.24$	20	LINK	03E FOCS	$< 1.72, 90\% \text{ CL}$	

$\Gamma(\Lambda K^- \pi^+ \pi^+)/\Gamma(\Xi^- \pi^+ \pi^+)$					Γ_4/Γ_{11}
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
0.323 ± 0.033 OUR AVERAGE					
$0.32 \pm 0.03 \pm 0.02$	1177 ± 55	LESIK	05 BELL	$e^+ e^-, \gamma(4S)$	
$0.28 \pm 0.06 \pm 0.06$	58	LINK	03E FOCS	γ nucleus, $\bar{E}_\gamma \approx 180$ GeV	
$0.58 \pm 0.16 \pm 0.07$	61	BERGFELD	96 CLE2	$e^+ e^- \approx \gamma(4S)$	

$\Gamma(\Lambda \bar{K}^*(892)^0 \pi^+)/\Gamma(\Lambda K^- \pi^+ \pi^+)$					Γ_5/Γ_4
Unseen decay modes of the $\bar{K}^*(892)^0$ are included.					
<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<0.5	90	BERGFELD	96 CLE2	$e^+ e^- \approx \gamma(4S)$	

$\Gamma(\Sigma(1385)^+ K^- \pi^+)/\Gamma(\Lambda K^- \pi^+ \pi^+)$ Γ_6/Γ_4

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_7/Γ_{11}

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.94±0.11 OUR AVERAGE				
0.91±0.11±0.04	251	LINK	03E FOCS	γ nucleus, $\bar{E}_\gamma \approx 180$ GeV
1.18±0.26±0.17	119	BERGFELD	96 CLE2	$e^+ e^- \approx \Upsilon(4S)$

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

0.92±0.20±0.07	³ JUN	00 SELX		Σ^- nucleus, 600 GeV
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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_8/Γ_{11}

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

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.81±0.15 OUR AVERAGE				
0.78±0.16±0.06	119	LINK	03E FOCS	γ nucleus, $\bar{E}_\gamma \approx 180$ GeV
0.92±0.27±0.14	61	BERGFELD	96 CLE2	$e^+ e^- \approx \Upsilon(4S)$

• • • 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_9/Γ_4

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

⁴See, however, the note on the COTEUS 87 Ξ_c^+ mass measurement.

$\Gamma(\Xi^0 \pi^+)/\Gamma(\Xi^- \pi^+ \pi^+)$ Γ_{10}/Γ_{11}

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_{11}/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_{12}/Γ_{11}

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

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.1	90	LINK	03E FOCS	γ nucleus, $\bar{E}_\gamma \approx 180$ GeV

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

<0.2	90	BERGFELD	96 CLE2	$e^+ e^- \approx \Upsilon(4S)$
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$\Gamma(\Xi^0 \pi^+ \pi^0)/\Gamma(\Xi^- \pi^+ \pi^+)$					Γ_{13}/Γ_{11}
VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	
$2.34 \pm 0.57 \pm 0.37$	81	EDWARDS	96 CLE2	$e^+ e^- \approx \gamma(4S)$	

$\Gamma(\Xi(1530)^0 \pi^+)/\Gamma(\Xi^0 \pi^+ \pi^0)$					Γ_{12}/Γ_{13}
VALUE	CL%	DOCUMENT ID	TECN	COMMENT	

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

<0.3	90	EDWARDS	96 CLE2	$e^+ e^- \approx \gamma(4S)$	
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$\Gamma(\Xi^0 \pi^+ \pi^+ \pi^-)/\Gamma(\Xi^- \pi^+ \pi^+)$					Γ_{14}/Γ_{11}
VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	
$1.74 \pm 0.42 \pm 0.27$	57	EDWARDS	96 CLE2	$e^+ e^- \approx \gamma(4S)$	

$\Gamma(\Xi^0 e^+ \nu_e)/\Gamma(\Xi^- \pi^+ \pi^+)$					Γ_{15}/Γ_{11}
VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	
$2.3 \pm 0.6^{+0.3}_{-0.6}$	41	ALEXANDER	95B CLE2	$e^+ e^- \approx \gamma(4S)$	

$\Gamma(\Omega^- K^+ \pi^+)/\Gamma(\Xi^- \pi^+ \pi^+)$					Γ_{16}/Γ_{11}
VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	
$0.07 \pm 0.03 \pm 0.03$	14	LINK	03E FOCS	< 0.12, 90% CL	

———— Cabibbo-suppressed decays ————

$\Gamma(\rho K^- \pi^+)/\Gamma(\Sigma^+ K^- \pi^+)$					Γ_{17}/Γ_7
VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	
$0.22 \pm 0.06 \pm 0.03$	76	JUN	00 SELX	Σ^- nucleus, 600 GeV	

$\Gamma(\rho K^- \pi^+)/\Gamma(\Xi^- \pi^+ \pi^+)$					Γ_{17}/Γ_{11}
VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	
0.214 ± 0.034 OUR AVERAGE					
$0.234 \pm 0.047 \pm 0.022$	202	LINK	01B FOCS	γ nucleus	
$0.20 \pm 0.04 \pm 0.02$	76	JUN	00 SELX	Σ^- nucleus, 600 GeV	

$\Gamma(\rho \bar{K}^*(892)^0)/\Gamma(\rho K^- \pi^+)$					Γ_{18}/Γ_{17}
VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	
Unseen decay modes of the $\bar{K}^*(892)^0$ are included.					
$0.54 \pm 0.09 \pm 0.05$		LINK	01B FOCS	γ nucleus	

$\Gamma(\Sigma^+ K^+ K^-)/\Gamma(\Sigma^+ K^- \pi^+)$					Γ_{19}/Γ_7
VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	
$0.16 \pm 0.06 \pm 0.01$	17	LINK	03E FOCS	γ nucleus, $\bar{E}_\gamma \approx 180$ GeV	

$\Gamma(\Sigma^+ \phi)/\Gamma(\Sigma^+ K^- \pi^+)$					Γ_{20}/Γ_7
VALUE	CL%	DOCUMENT ID	TECN	COMMENT	
Unseen decay modes of the ϕ are included.					
<0.12	90	LINK	03E FOCS	γ nucleus, $\bar{E}_\gamma \approx 180$ GeV	

$\Gamma(\Xi(1690)^0 K^+ \times B(\Xi(1690)^0 \rightarrow \Sigma^+ K^-))/\Gamma(\Sigma^+ K^- \pi^+)$					Γ_{21}/Γ_7
VALUE	CL%	DOCUMENT ID	TECN	COMMENT	
<0.05	90	LINK	03E FOCUS	γ nucleus, $\bar{E}_\gamma \approx 180$ GeV	

Ξ_c^+ REFERENCES

LESIAK	05	PL B605 237	T. Lesiak <i>et al.</i>	(BELLE Collab.)
LINK	03E	PL B571 139	J.M. Link <i>et al.</i>	(FNAL FOCUS Collab.)
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	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.)