

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

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
2467.87 ± 0.30 OUR FIT		Error includes scale factor of 1.1.		
2467.89⁺₋ 0.34 0.50 OUR AVERAGE				
2468.00 ± 0.18 ± 0.51	5.1k	AALTONEN	14B	CDF $p\bar{p}$ at 1.96 TeV
2468.1 ± 0.4 ⁺ ₋ 0.2 1.4	4.9k	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

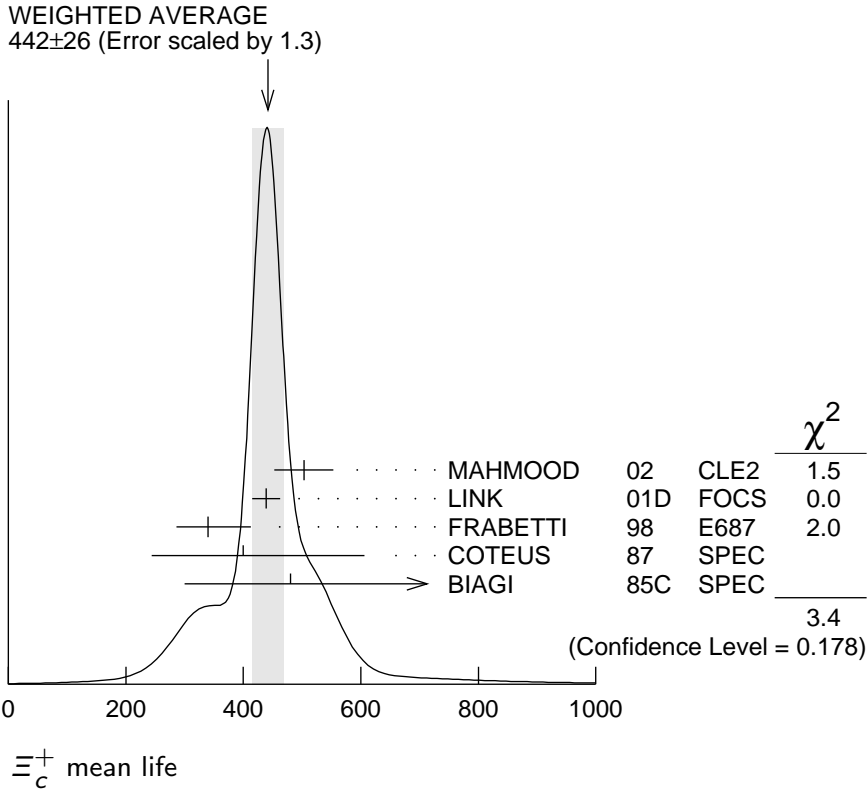
¹ The systematic error was (wrongly) given the other way round in LESIAK 05; see the erratum.

² 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^{-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

$400^{+180}_{-120} \pm 100$	102	COTEUS	87	SPEC	$nA \simeq 600$ GeV
$480^{+210+200}_{-150-100}$	53	BIAGI	85C	SPEC	Σ^- Be 135 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$410^{+110}_{-80} \pm 20$	30	FRABETTI	93B	E687	See FRABETTI 98
200^{+110}_{-60}	6	BARLAG	89C	ACCM	π^- (K^-) Cu 230 GeV



Ξ_c^+ 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 sub-mode fraction $\Xi_c^+ \rightarrow \Sigma^+ \bar{K}^*(892)^0$ seen in $\Xi_c^+ \rightarrow \Sigma^+ K^- \pi^+$ has been multiplied up to include $\bar{K}^*(892)^0 \rightarrow \bar{K}^0 \pi^0$ decays.

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 $\Xi^- 2\pi^+$.

Cabibbo-favored ($S = -2$) decays — relative to $\Xi^- 2\pi^+$

Γ_1	$p2K_S^0$	0.087 ± 0.021
Γ_2	$\Lambda \bar{K}^0 \pi^+$	—
Γ_3	$\Sigma(1385)^+ \bar{K}^0$	[a] 1.0 ± 0.5

Γ_4	$\Lambda K^- 2\pi^+$	0.323 ± 0.033	
Γ_5	$\Lambda \bar{K}^*(892)^0 \pi^+$	[a] < 0.16	90%
Γ_6	$\Sigma(1385)^+ K^- \pi^+$	[a] < 0.23	90%
Γ_7	$\Sigma^+ K^- \pi^+$	0.94 ± 0.10	
Γ_8	$\Sigma^+ \bar{K}^*(892)^0$	[a] 0.81 ± 0.15	
Γ_9	$\Sigma^0 K^- 2\pi^+$	0.27 ± 0.12	
Γ_{10}	$\Xi^0 \pi^+$	0.55 ± 0.16	
Γ_{11}	$\Xi^- 2\pi^+$	DEFINED AS 1	
Γ_{12}	$\Xi(1530)^0 \pi^+$	[a] < 0.10	90%
Γ_{13}	$\Xi^0 \pi^+ \pi^0$	2.3 ± 0.7	
Γ_{14}	$\Xi^0 \pi^- 2\pi^+$	1.7 ± 0.5	
Γ_{15}	$\Xi^0 e^+ \nu_e$	$2.3 \begin{smallmatrix} +0.7 \\ -0.8 \end{smallmatrix}$	
Γ_{16}	$\Omega^- K^+ \pi^+$	0.07 ± 0.04	

Cabibbo-suppressed decays — relative to $\Xi^- 2\pi^+$

Γ_{17}	$\rho K^- \pi^+$	0.21 ± 0.04	
Γ_{18}	$\rho \bar{K}^*(892)^0$	[a] 0.116 ± 0.030	
Γ_{19}	$\Sigma^+ \pi^+ \pi^-$	0.48 ± 0.20	
Γ_{20}	$\Sigma^- 2\pi^+$	0.18 ± 0.09	
Γ_{21}	$\Sigma^+ K^+ K^-$	0.15 ± 0.06	
Γ_{22}	$\Sigma^+ \phi$	[a] < 0.11	90%
Γ_{23}	$\Xi(1690)^0 K^+, \Xi^0 \rightarrow \Sigma^+ K^-$	< 0.05	90%

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

Ξ_c^+ BRANCHING RATIOS

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

$\Gamma(\rho 2K_S^0)/\Gamma(\Xi^- 2\pi^+)$	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	LESLIAK	05 BELL	$e^+ e^-, \gamma(4S)$

$\Gamma(\Sigma(1385)^+ \bar{K}^0)/\Gamma(\Xi^- 2\pi^+)$	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	$< 1.72, 90\% \text{ CL}$

$\Gamma(\Lambda K^- 2\pi^+)/\Gamma(\Xi^- 2\pi^+)$	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	LESLIAK	05 BELL	$e^+ e^-, \gamma(4S)$
$0.28 \pm 0.06 \pm 0.06$	58	LINK	03E FOCS	γ nucleus, $\bar{E}_\gamma \approx 180 \text{ GeV}$
$0.58 \pm 0.16 \pm 0.07$	61	BERGFELD	96 CLE2	$e^+ e^- \approx \gamma(4S)$

$\Gamma(\Lambda\bar{K}^*(892)^0\pi^+)/\Gamma(\Lambda K^-2\pi^+)$ Γ_5/Γ_4

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

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

$\Gamma(\Sigma(1385)^+K^-\pi^+)/\Gamma(\Lambda K^-2\pi^+)$ 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 $e^+e^- \approx \Upsilon(4S)$

$\Gamma(\Sigma^+K^-\pi^+)/\Gamma(\Xi^-2\pi^+)$ Γ_7/Γ_{11}

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.94±0.10 OUR AVERAGE				
0.91±0.11±0.04	251	LINK	03E	FOCS γ nucleus, $\bar{E}_\gamma \approx 180$ GeV
0.92±0.20±0.07		³ JUN	00	SELX Σ^- nucleus, 600 GeV
1.18±0.26±0.17	119	BERGFELD	96	CLE2 $e^+e^- \approx \Upsilon(4S)$

³This JUN 00 result is redundant with other results given below.

$\Gamma(\Sigma^+\bar{K}^*(892)^0)/\Gamma(\Xi^-2\pi^+)$ 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 $e^+e^- \approx \Upsilon(4S)$

$\Gamma(\Sigma^0K^-2\pi^+)/\Gamma(\Lambda K^-2\pi^+)$ 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.

$\Gamma(\Xi^0\pi^+)/\Gamma(\Xi^-2\pi^+)$ Γ_{10}/Γ_{11}

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

$\Gamma(\Xi^-2\pi^+)/\Gamma_{\text{total}}$ Γ_{11}/Γ

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
• • • 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

$\Gamma(\Xi(1530)^0\pi^+)/\Gamma(\Xi^-2\pi^+)$ 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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$\Gamma(\Xi^0 \pi^+ \pi^0)/\Gamma(\Xi^- 2\pi^+)$					Γ_{13}/Γ_{11}
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
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_{12}/Γ_{13}
<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	

• • • 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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$\Gamma(\Xi^0 \pi^- 2\pi^+)/\Gamma(\Xi^- 2\pi^+)$					Γ_{14}/Γ_{11}
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
1.74±0.42±0.27	57	EDWARDS	96	CLE2	$e^+ e^- \approx \Upsilon(4S)$

$\Gamma(\Xi^0 e^+ \nu_e)/\Gamma(\Xi^- 2\pi^+)$					Γ_{15}/Γ_{11}
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
2.3±0.6^{+0.3}_{-0.6}	41	ALEXANDER	95B	CLE2	$e^+ e^- \approx \Upsilon(4S)$

$\Gamma(\Omega^- K^+ \pi^+)/\Gamma(\Xi^- 2\pi^+)$					Γ_{16}/Γ_{11}
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
0.07±0.03±0.03	14	LINK	03E	FOCS	< 0.12, 90% CL

———— Cabibbo-suppressed decays ————

$\Gamma(p K^- \pi^+)/\Gamma(\Xi^- 2\pi^+)$					Γ_{17}/Γ_{11}
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
0.21 ±0.04 OUR AVERAGE					
0.194±0.054	47 ± 11	VAZQUEZ-JA...08	SELX		Σ^- nucleus, 600 GeV
0.234±0.047±0.022	202	LINK	01B	FOCS	γ nucleus
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.20 ±0.04 ±0.02	76	JUN	00	SELX	See VAZQUEZ-JAUREGUI 08

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

$\Gamma(\Sigma^+ \pi^+ \pi^-)/\Gamma(\Xi^- 2\pi^+)$					Γ_{19}/Γ_{11}
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
0.48±0.20	21 ± 8	VAZQUEZ-JA...08	SELX	Σ^- nucleus, 600 GeV	

$\Gamma(\Sigma^- 2\pi^+)/\Gamma(\Xi^- 2\pi^+)$					Γ_{20}/Γ_{11}
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
0.18±0.09	10 ± 4	VAZQUEZ-JA...08	SELX	Σ^- nucleus, 600 GeV	

$\Gamma(\Sigma^+ K^+ K^-)/\Gamma(\Sigma^+ K^- \pi^+)$					Γ_{21}/Γ_7
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
0.16±0.06±0.01	17	LINK	03E	FOCS	γ nucleus, $\bar{E}_\gamma \approx 180$ GeV

$\Gamma(\Sigma^+ \phi) / \Gamma(\Sigma^+ K^- \pi^+)$ Γ_{22} / Γ_7

Unseen decay modes of the ϕ are included.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<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_{23} / Γ_7

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.05	90	LINK	03E FOCS	γ nucleus, $\bar{E}_\gamma \approx 180$ GeV

Ξ_c^+ REFERENCES

AALTONEN	14B	PR D89 072014	T. Aaltonen <i>et al.</i>	(CDF Collab.)
VAZQUEZ-JA...	08	PL B666 299	E. Vazquez-Jauregui <i>et al.</i>	(SELEX Collab.)
LESIK	05	PL B605 237	T. Lesiak <i>et al.</i>	(BELLE Collab.)
Also		PL B617 198 (erratum)	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		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.)