The states of the $\overline{\mathbf{3}}$ multiplet are antisymmetric under interchange of the two light quarks (the u, d, and s quarks), and the states of the $\mathbf{6}$ multiplet are symmetric under interchange of these quarks. Actually, there may be some mixing between the pure $\overline{\mathbf{3}}$ and $\mathbf{6}$ Ξ_c states (they have the same I, J, and P quantum numbers) to form the physical Ξ_c states.

It need hardly be said that the flavor symmetries Fig. 1 displays are very badly broken, but the figure is the simplest way to see what charmed baryons should exist.

For an entry into the literature on models of charmed baryons, see Ref. 1. For a review of recent experimental results, see Ref. 2. For a review of both theory and experiment, see Ref. 3.

References

1. K. Maltman and N. Isgur, Phys. Rev. **D22**, 1701 (1980);
S. Capstick and N. Isgur, Phys. Rev. **D34**, 2809 (1986);
W. Kwong, J.L. Rosner, and C. Quigg, Ann. Rev. Nucl. and Part. Sci. **37**, 325 (1987);
S. Fleck and J.M. Richard, Part. World **1**, 67 (1990).
2. S.R. Klein, Int. J. Mod. Phys. **A5**, 1457 (1990).
3. J.G. Körner and H.W. Siebert, Ann. Rev. Nucl. and Part. Sci. **41**, 511 (1991).

Λ_c^+

$I(J^P) = 0(\frac{1}{2}^+)$ Status: ∗∗∗∗

J has not actually been measured yet. Results of an analysis of $pK^-\pi^+$ decays (JEZABEK 92) are consistent with the expected $J = 1/2$. The quark content is udc.

We have omitted some results that have been superseded by later experiments. The omitted results may be found in our 1992 edition (Physical Review **D45**, 1 June, Part II) or in earlier editions.

Λ_c^+ MASS

Measurements with an error greater than 5 MeV or that are otherwise obsolete have been omitted.

The fit also uses $(m_{\Sigma_c} - m_{\Lambda_c^+})$ measurements.

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
2285.1±0.6 OUR FIT				
2284.9±0.6 OUR AVERAGE				
2284.7±0.6±0.7	1134	AVERY 91	CLEO	Six modes
2281.7±2.7±2.6	29	ALVAREZ 90B	NA14	$pK^-\pi^+$
2285.8±0.6±1.2	101	BARLAG 89	NA32	$pK^-\pi^+$
2284.7±2.3±0.5	5	AGUILAR-... 88B	LEBC	$pK^-\pi^+$
2283.1±1.7±2.0	628	ALBRECHT 88C	ARG	$pK^-\pi^+$, $p\overline{K}^0$, $\Lambda 3\pi$
2286.2±1.7±0.7	97	ANJOS 88B	E691	$pK^-\pi^+$
2281 ±3	2	JONES 87	HBC	$pK^-\pi^+$
2283 ±3	3	BOSETTI 82	HBC	$pK^-\pi^+$
2290 ±3	1	CALICCHIO 80	HYBR	$pK^-\pi^+$

Λ_c^+ MEAN LIFE

Measurements with an error $\geq 0.1 \times 10^{-12}$ s have been omitted.

VALUE (10^{-12} s)	EVTS	DOCUMENT ID	TECN	COMMENT
$0.200^{+0.011}_{-0.010}$ OUR AVERAGE				
0.215±0.016±0.008	1340	FRABETTI 93D	E687	γBe, $\Lambda_c^+ \to pK^-\pi^+$
0.18 ±0.03 ±0.03	29	ALVAREZ 90	NA14	γ, $\Lambda_c^+ \to pK^-\pi^+$
0.20 ±0.03 ±0.03	90	FRABETTI 90	E687	γBe, $\Lambda_c^+ \to pK^-\pi^+$
$0.196^{+0.023}_{-0.020}$	101	BARLAG 89	NA32	$pK^-\pi^+$ + c.c.
$0.12^{+0.05}_{-0.03}$	9	AGUILAR-... 88B	LEBC	
0.22 ±0.03 ±0.02	97	ANJOS 88B	E691	$pK^-\pi^+$ + c.c.
$0.23^{+0.09}_{-0.06}$ ±0.04	11	ADAMOVICH 87	EMUL	γA 20–70 GeV/c
$0.11^{+0.08}_{-0.04}$	9	AMENDOLIA 87	SPEC	γGe-Si, $pK^-\pi^+\pi^0$
$0.20^{+0.07}_{-0.05}$	13	USHIDA 86	EMUL	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.14^{+0.05}_{-0.03}$ ±0.03	14	BARLAG 87	NA32	See BARLAG 89

Λ_c^+ DECAY MODES

	Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level
	Hadronic modes with a p and one K		
Γ_1	$p\overline{K}^0$	(2.1± 0.4) %	
Γ_2	$pK^-\pi^+$	(4.4± 0.6) %	
Γ_3	$p\overline{K}^*(892)^0$	[a] (1.6± 0.4) %	
Γ_4	$\Delta(1232)^{++}K^-$	(7 ± 4) × 10^{-3}	
Γ_5	$\Lambda(1520)\pi^+$	[a] ($3.9^{+2.0}_{-1.7}$) × 10^{-3}	
Γ_6	$pK^-\pi^+$ nonresonant	($2.4^{+0.5}_{-0.6}$) %	
Γ_7	$p\overline{K}^0\pi^+\pi^-$	(2.4± 0.8) %	S=1.3
Γ_8	$pK^-\pi^+\pi^0$	seen	
Γ_9	$pK^*(892)^-\pi^+$	seen	
Γ_{10}	$p(K^-\pi^+)_{\text{nonresonant}}\pi^0$	(3.2± 0.7) %	
Γ_{11}	$\Delta(1232)\overline{K}^*(892)$	seen	
Γ_{12}	$pK^-\pi^+\pi^+\pi^-$	(10 ± 7) × 10^{-4}	
Γ_{13}	$pK^-\pi^+\pi^0\pi^0$	(7.0± 3.5) × 10^{-3}	
Γ_{14}	$pK^-\pi^+\pi^0\pi^0\pi^0$	(4.4± 2.8) × 10^{-3}	
	Hadronic modes with a p and zero or two K's		
Γ_{15}	$p\pi^+\pi^-$	(3.0± 1.6) × 10^{-3}	
Γ_{16}	$pf_0(980)$	[a] (2.4± 1.6) × 10^{-3}	
Γ_{17}	$p\pi^+\pi^+\pi^-\pi^-$	(1.6± 1.0) × 10^{-3}	
Γ_{18}	pK^+K^-	(3.0± 1.1) × 10^{-3}	
Γ_{19}	$p\phi$	[a] < 1.7 × 10^{-3}	CL=90%
	Hadronic modes with a hyperon		
Γ_{20}	$\Lambda\pi^+$	(7.9± 1.8) × 10^{-3}	
Γ_{21}	$\Lambda\pi^+\pi^0$	(3.2± 0.9) %	
Γ_{22}	$\Lambda\rho^0$	< 4 %	CL=95%
Γ_{23}	$\Lambda\pi^+\pi^+\pi^-$	(2.7± 0.6) %	
Γ_{24}	$\Sigma^0\pi^+$	(8.7± 2.0) × 10^{-3}	
Γ_{25}	$\Sigma^0\pi^+\pi^0$	(1.6± 0.6) %	
Γ_{26}	$\Sigma^0\pi^+\pi^+\pi^-$	(9.2± 3.3) × 10^{-3}	
Γ_{27}	$\Sigma^+\pi^0$	(8.7± 2.2) × 10^{-3}	
Γ_{28}	$\Sigma^+\pi^+\pi^-$	(3.0± 0.6) %	
Γ_{29}	$\Sigma^+\rho^0$	< 1.2 %	CL=95%
Γ_{30}	$\Sigma^-\pi^+\pi^+$	(1.6± 0.6) %	
Γ_{31}	$\Sigma^+\pi^+\pi^-\pi^0$		
Γ_{32}	$\Sigma^+\omega$	[a] (2.4± 0.7) %	
Γ_{33}	$\Sigma^+\pi^+\pi^+\pi^-\pi^-$	($2.6^{+3.5}_{-1.8}$) × 10^{-3}	
Γ_{34}	$\Sigma^+K^+K^-$	(3.1± 0.8) × 10^{-3}	
Γ_{35}	$\Sigma^+\phi$	[a] (3.0± 1.3) × 10^{-3}	
Γ_{36}	$\Sigma^+K^+\pi^-$	($5.7^{+5.3}_{-3.1}$) × 10^{-3}	
Γ_{37}	Ξ^0K^+	(3.4± 0.9) × 10^{-3}	
Γ_{38}	$\Xi^-K^+\pi^+$	(3.8± 1.2) × 10^{-3}	
Γ_{39}	$\Xi(1530)^0K^+$	[a] (2.3± 0.9) × 10^{-3}	
	Semileptonic modes		
Γ_{40}	$\Lambda\ell^+\nu_\ell$		
Γ_{41}	Λ anything $\ell^+\nu_\ell$		
	Inclusive modes		
Γ_{42}	p anything	(50 ±16) %	
Γ_{43}	p anything (no Λ)	(12 ±19) %	
Γ_{44}	p hadrons		
Γ_{45}	n anything	(50 ±16) %	
Γ_{46}	n anything (no Λ)	(29 ±17) %	
Γ_{47}	Λ anything	(35 ±11) %	S=1.4
Γ_{48}	$\Sigma^\pm$ anything	[b] (10 ± 5) %	
Γ_{49}	e^+ anything	(4.5± 1.7) %	
Γ_{50}	pe^+ anything	(1.8± 0.9) %	
Γ_{51}	Λe^+ anything	(1.4± 0.5) %	
Γ_{52}	$\Lambda\mu^+$ anything	(1.5± 0.9) %	
Γ_{53}	dummy mode used by the fit	(89.1± 1.7) %	

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

[b] The value is for the sum of the charge states indicated.