$\Lambda_c(2625)^+$

$I(J^P) = 0(\frac{3}{2}^-)$ Status: $\ast\ast\ast$

Seen in $\Lambda_c^+ \pi^+ \pi^-$ but not in $\Lambda_c^+ \pi^0$ so this is indeed an excited Λ_c^+ rather than a Σ_c^+. The spin-parity has not been measured but is expected to be $3/2^-$: this is presumably the charm counterpart of the strange $\Lambda(1520)$.
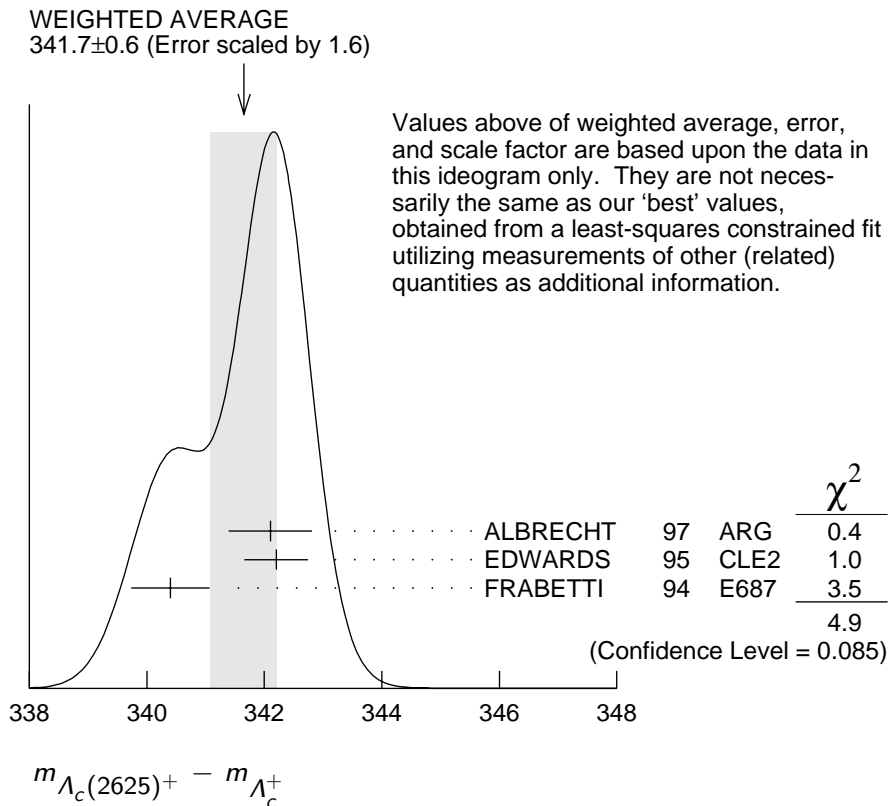
$\Lambda_c(2625)^+$ MASS

The mass is obtained from the $\Lambda_c(2625)^+ - \Lambda_c^+$ mass-difference measurements below.

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
2626.6±0.8 OUR FIT		Error includes scale factor of 1.2.		
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2626.6±0.5±1.5	42	[1] ALBRECHT	93F ARG	See ALBRECHT 97

[1] ALBRECHT 93F claims a signal of 42.4 ± 8.8 events.

$\Lambda_c(2625)^+ - \Lambda_c^+$ MASS DIFFERENCE

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
341.7±0.6 OUR FIT		Error includes scale factor of 1.6.		
341.7±0.6 OUR AVERAGE		Error includes scale factor of 1.6. See the ideogram below.		
342.1±0.5±0.5	51	ALBRECHT	97 ARG	$e^+ e^- \approx 10$ GeV
342.2±0.2±0.5	245	[2] EDWARDS	95 CLE2	$e^+ e^- \approx 10.5$ GeV
340.4±0.6±0.3	40	[3] FRABETTI	94 E687	γ Be, $\overline{E}_\gamma = 220$ GeV

[2] EDWARDS 95 claims a signal of 244.6 ± 19.0 events in $\Lambda_c^+ \pi^+ \pi^-$.

[3] FRABETTI 94 claims a signal of 39.7 ± 8.7 events.

WEIGHTED AVERAGE
341.7±0.6 (Error scaled by 1.6)

Values above of weighted average, error, and scale factor are based upon the data in this ideogram only. They are not necessarily the same as our 'best' values, obtained from a least-squares constrained fit utilizing measurements of other (related) quantities as additional information.

			χ^2
ALBRECHT	97	ARG	0.4
EDWARDS	95	CLE2	1.0
FRABETTI	94	E687	3.5
			4.9

(Confidence Level = 0.085)

338   340   342   344   346   348

$$m_{\Lambda_c(2625)^+} - m_{\Lambda_c^+}$$

$\Lambda_c(2625)^+$ WIDTH

VALUE (MeV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<1.9	90	245	EDWARDS	95	CLE2	$e^+ e^- \approx 10.5$ GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<3.2	90		ALBRECHT	93F	ARG	$e^+ e^- \approx \Upsilon(4S)$

$\Lambda_c(2625)^+$ DECAY MODES

$\Lambda_c^+ \pi \pi$ and its submode $\Sigma(2455)\pi$ are the only strong decays allowed to an excited Λ_c^+ having this mass.

	Mode	Fraction (Γ_i/Γ)		Confidence level
Γ_1	$\Lambda_c^+ \pi^+ \pi^-$	[a]	$\approx 67\%$	
Γ_2	$\Sigma_c(2455)^{++} \pi^-$		<5	90%
Γ_3	$\Sigma_c(2455)^0 \pi^+$		<5	90%
Γ_4	$\Lambda_c^+ \pi^+ \pi^-$ 3-body		large	
Γ_5	$\Lambda_c^+ \pi^0$	[b]	not seen	
Γ_6	$\Lambda_c^+ \gamma$		not seen	

[a] Assuming isospin conservation, so that the other third is $\Lambda_c^+ \pi^0 \pi^0$.

[b] A test that the isospin is indeed 0, so that the particle is indeed a Λ_c^+.

$\Lambda_c(2625)^+$ BRANCHING RATIOS

$\Gamma\left(\Sigma_c(2455)^{++}\pi^-\right)/\Gamma\left(\Lambda_c^+\pi^+\pi^-\right)$ $\qquad\qquad$ Γ_2/Γ_1

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.08	90	EDWARDS	95	CLE2	$e^+e^- \approx 10.5$ GeV

$\Gamma\left(\Sigma_c(2455)^0\pi^+\right)/\Gamma\left(\Lambda_c^+\pi^+\pi^-\right)$ $\qquad\qquad$ Γ_3/Γ_1

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.07	90	EDWARDS	95	CLE2	$e^+e^- \approx 10.5$ GeV

$\left[\Gamma\left(\Sigma_c(2455)^{++}\pi^-\right) + \Gamma\left(\Sigma_c(2455)^0\pi^+\right)\right]/\Gamma\left(\Lambda_c^+\pi^+\pi^-\right)$ $\quad$ $(\Gamma_2+\Gamma_3)/\Gamma_1$

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.36	90		FRABETTI	94	E687	γBe, $\overline{E}_\gamma = 220$ GeV
0.46±0.14		21	ALBRECHT	93F	ARG	$e^+e^- \approx \Upsilon(4S)$

$\Gamma\left(\Lambda_c^+\pi^+\pi^- \text{ 3-body}\right)/\Gamma\left(\Lambda_c^+\pi^+\pi^-\right)$ $\qquad\qquad$ Γ_4/Γ_1

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.54±0.14	16	ALBRECHT	93F	ARG	$e^+e^- \approx \Upsilon(4S)$

$\Gamma\left(\Lambda_c^+\pi^0\right)/\Gamma\left(\Lambda_c^+\pi^+\pi^-\right)$ $\qquad\qquad$ Γ_5/Γ_1

$\Lambda_c^+\pi^0$ decay is forbidden by isospin conservation if this state is in fact a Λ_c.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.91	90	EDWARDS	95	CLE2	$e^+e^- \approx 10.5$ GeV

$\Gamma\left(\Lambda_c^+\gamma\right)/\Gamma\left(\Lambda_c^+\pi^+\pi^-\right)$ $\qquad\qquad$ Γ_6/Γ_1

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.52	90	EDWARDS	95	CLE2	$e^+e^- \approx 10.5$ GeV

$\Lambda_c(2625)^+$ REFERENCES

ALBRECHT	97	PL B402 207	H. Albrecht *et al.*	(ARGUS Collab.)
EDWARDS	95	PRL 74 3331	K.W. Edwards *et al.*	(CLEO Collab.)
FRABETTI	94	PRL 72 961	P.L. Frabetti *et al.*	(FNAL E687 Collab.)
ALBRECHT	93F	PL B317 227	H. Albrecht *et al.*	(ARGUS Collab.)