$\Lambda_c(2625)^+$

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

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

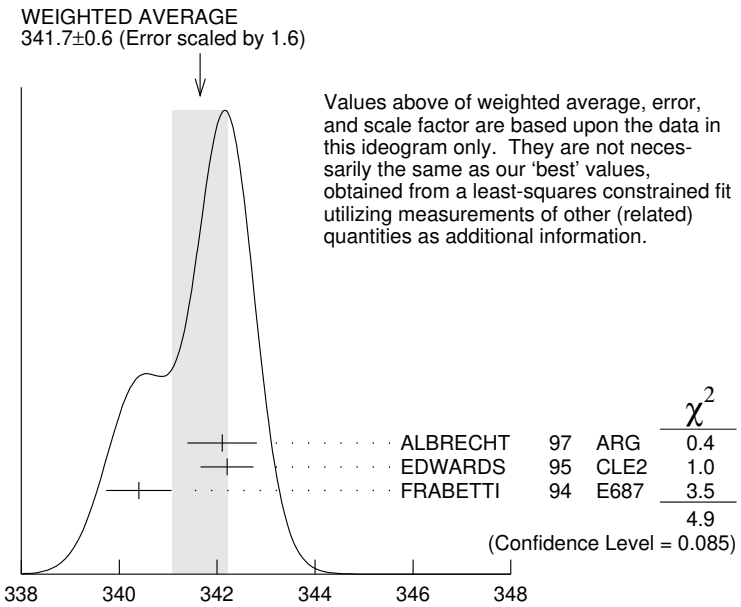
[1] ALBRECHT 93F claims a signal of 42.4 ± 8.8 events.

$\Lambda_c(2625)^+ - \Lambda_c^+$ 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.



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

$\Lambda_c(2625)^+$ WIDTH

VALUE (MeV)	*CL%*	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
<1.9	90	245	EDWARDS	95	CLE2	e^+e^- ≈ 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]	≈ 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

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

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

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

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

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

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	γ Be, $\overline{E}_\gamma$ = 220 GeV
0.46±0.14		21	ALBRECHT	93F	ARG	$e^+e^-\approx\Upsilon(4S)$

$\Gamma(\Lambda_c^+\pi^+\pi^-\text{ 3-body})/\Gamma(\Lambda_c^+\pi^+\pi^-)$ 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	$e^+e^-\approx\Upsilon(4S)$

$\Gamma(\Lambda_c^+\pi^0)/\Gamma(\Lambda_c^+\pi^+\pi^-)$ 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

$\Gamma(\Lambda_c^+\gamma)/\Gamma(\Lambda_c^+\pi^+\pi^-)$ 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.)