

$$\Lambda_c(2625)^+$$

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

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 $\Lambda(1520)$.

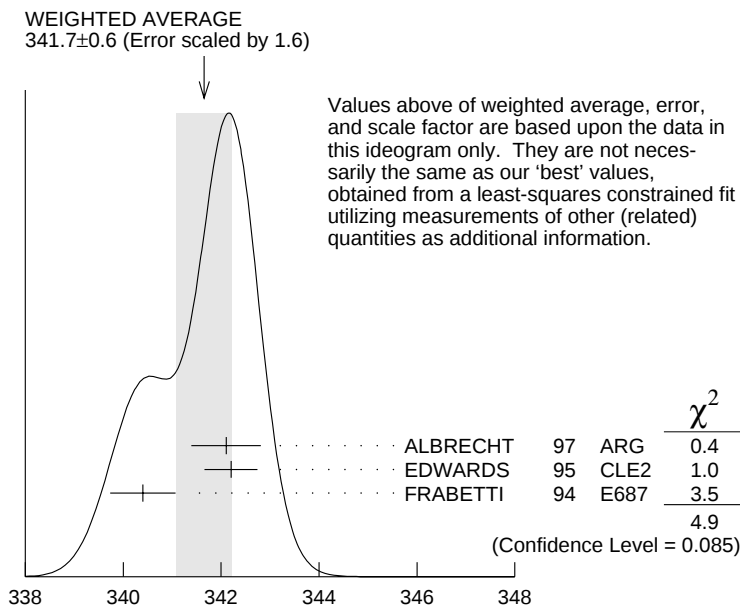
$\Lambda_c(2625)^+$ MASS

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

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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	$e^+e^- \approx 10.5 \text{ GeV}$
• • • 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
$\Gamma_1 \quad \Lambda_c^+ \pi^+ \pi^-$	[a] $\approx 67\%$	
$\Gamma_2 \quad \Sigma_c(2455)^{++} \pi^-$	<5	90%
$\Gamma_3 \quad \Sigma_c(2455)^0 \pi^+$	<5	90%
$\Gamma_4 \quad \Lambda_c^+ \pi^+ \pi^- \text{ 3-body}$	large	
$\Gamma_5 \quad \Lambda_c^+ \pi^0$	[b] not seen	
$\Gamma_6 \quad \Lambda_c^+ \gamma$	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
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• • • 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
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.54 ± 0.14	16	ALBRECHT	93F ARG	$e^+e^- \approx \Upsilon(4S)$
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$\Gamma(\Lambda_c^+\pi^0)/\Gamma(\Lambda_c^+\pi^+\pi^-)$ 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 <i>et al.</i>	(ARGUS Collab.)
EDWARDS	95	PRL 74 3331	K.W. Edwards <i>et al.</i>	(CLEO Collab.)
FRABETTI	94	PRL 72 961	P.L. Frabetti <i>et al.</i>	(FNAL E687 Collab.)
ALBRECHT	93F	PL B317 227	H. Albrecht <i>et al.</i>	(ARGUS Collab.)