

$\Lambda_c(2625)^+$

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

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 $\Lambda(1520)$.

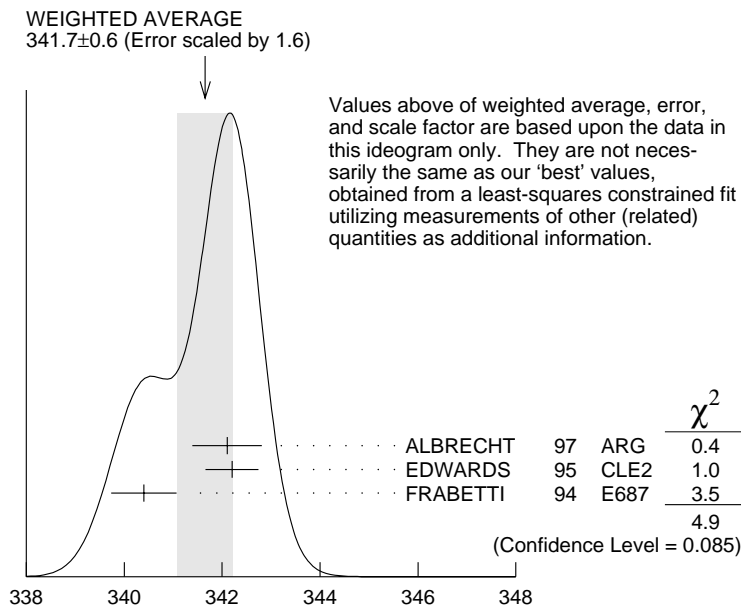
$\Lambda_c(2625)^+$ MASS

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

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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, $\bar{E}_\gamma = 220$ 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	$e^+e^- \approx 10.5$ 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

$$\Gamma(\Sigma_c(2455)^{++} \pi^-) / \Gamma(\Lambda_c^+ \pi^+ \pi^-) \quad \Gamma_2 / \Gamma_1$$

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

$$\Gamma(\Sigma_c(2455)^0 \pi^+) / \Gamma(\Lambda_c^+ \pi^+ \pi^-) \quad \Gamma_3 / \Gamma_1$$

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

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

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

$$\Gamma(\Lambda_c^+ \pi^+ \pi^- \text{ 3-body}) / \Gamma(\Lambda_c^+ \pi^+ \pi^-) \quad \Gamma_4 / \Gamma_1$$

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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$$\Gamma(\Lambda_c^+ \pi^0) / \Gamma(\Lambda_c^+ \pi^+ \pi^-) \quad \Gamma_5 / \Gamma_1$$

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

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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<0.91	90	EDWARDS 95	CLE2	$e^+ e^- \approx 10.5$ GeV
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$$\Gamma(\Lambda_c^+ \gamma) / \Gamma(\Lambda_c^+ \pi^+ \pi^-) \quad \Gamma_6 / \Gamma_1$$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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<0.52	90	EDWARDS 95	CLE2	$e^+ e^- \approx 10.5$ GeV
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$\Lambda_c(2625)^+$ 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.)