

# $\Lambda_c(2625)^+$

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

Seen in  $\Lambda_c^+ \pi^+ \pi^-$  but not in  $\Lambda_c^+ \pi^0$  so this is indeed an excited  $\Lambda_c^+$  rather than a  $\Sigma_c^+$ . 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

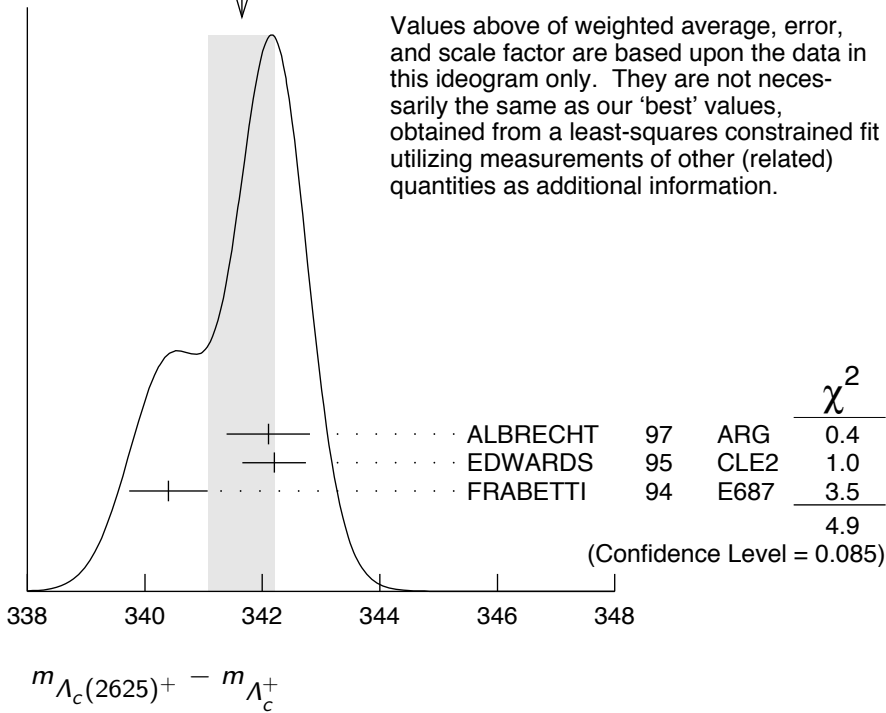
The mass is obtained from the  $\Lambda_c(2625)^+ - \Lambda_c^+$  mass-difference measurements below.

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>2628.1 ± 0.6 OUR FIT</b>		Error includes scale factor of 1.5.		
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
2626.6 ± 0.5 ± 1.5	42 ± 9	ALBRECHT	93F ARG	See ALBRECHT 97

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

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>341.7 ± 0.6 OUR FIT</b>		Error includes scale factor of 1.6.		
<b>341.7 ± 0.6 OUR AVERAGE</b>		Error includes scale factor of 1.6. See the ideogram below.		
342.1 ± 0.5 ± 0.5	51	ALBRECHT	97 ARG	$e^+ e^- \approx 10 \text{ GeV}$
342.2 ± 0.2 ± 0.5	245 ± 19	EDWARDS	95 CLE2	$e^+ e^- \approx 10.5 \text{ GeV}$
340.4 ± 0.6 ± 0.3	40 ± 9	FRABETTI	94 E687	$\gamma \text{Be}, \bar{E}_\gamma = 220 \text{ GeV}$

WEIGHTED AVERAGE  
 $341.7 \pm 0.6$  (Error scaled by 1.6)



### $\Lambda_c(2625)^+$ WIDTH

VALUE (MeV)	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<b>&lt;1.9</b>	90	$245 \pm 19$	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  $\Lambda_c^+$  having this mass.

Mode	Fraction ( $\Gamma_i/\Gamma$ )	Confidence level
$\Gamma_1$ $\Lambda_c^+ \pi^+ \pi^-$	[a] $\approx 67\%$	
$\Gamma_2$ $\Sigma_c(2455)^{++} \pi^-$	<5	90%
$\Gamma_3$ $\Sigma_c(2455)^0 \pi^+$	<5	90%
$\Gamma_4$ $\Lambda_c^+ \pi^+ \pi^-$ 3-body	large	
$\Gamma_5$ $\Lambda_c^+ \pi^0$	[b] not seen	
$\Gamma_6$ $\Lambda_c^+ \gamma$	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  $\Lambda_c^+$ .

### $\Lambda_c(2625)^+$ BRANCHING RATIOS

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

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

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

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

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

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

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

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.54 \pm 0.14$	16	ALBRECHT 93F	ARG	$e^+ e^- \approx \Upsilon(4S)$
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$\Gamma(\Lambda_c^+ \pi^0) / \Gamma(\Lambda_c^+ \pi^+ \pi^-)$   $\Gamma_5 / \Gamma_1$

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

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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$\Gamma(\Lambda_c^+ \gamma) / \Gamma(\Lambda_c^+ \pi^+ \pi^-)$   $\Gamma_6 / \Gamma_1$

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.)