

# $\Lambda_c(2625)^+$

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

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

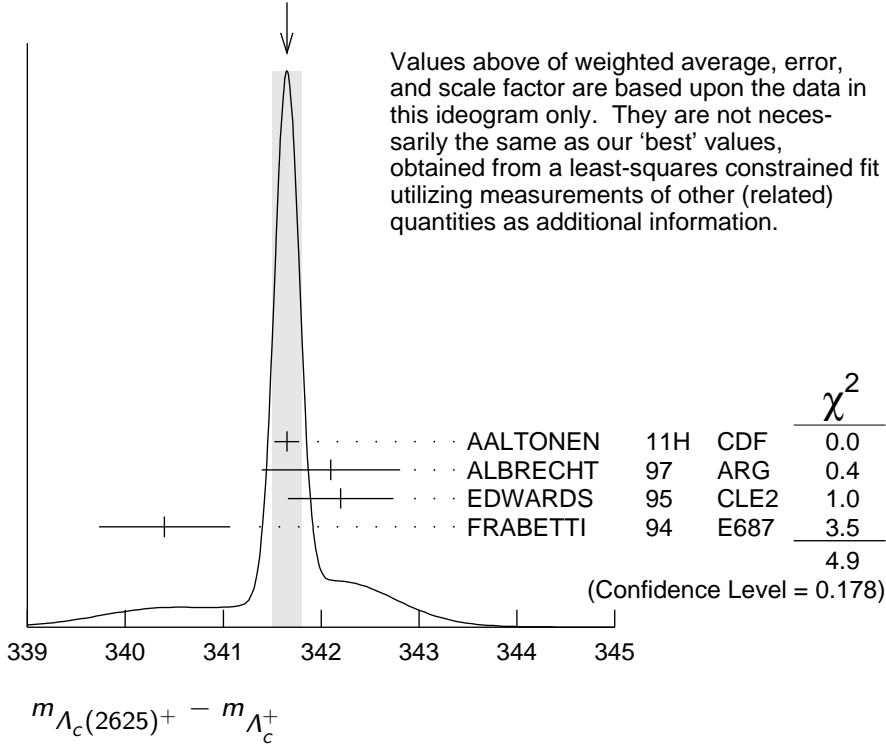
The mass is obtained from the  $\Lambda_c(2625)^+ - \Lambda_c^+$  mass-difference measurements below.

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
<b>2628.11 ± 0.19 OUR FIT</b>				Error includes scale factor of 1.1.
● ● ● 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

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
<b>341.65 ± 0.13 OUR FIT</b>				Error includes scale factor of 1.1.
<b>341.65 ± 0.15 OUR AVERAGE</b>				Error includes scale factor of 1.3. See the ideogram below.
341.65 ± 0.04 ± 0.12	6.2k	AALTONEN	11H CDF	$p\bar{p}$ at 1.96 TeV
342.1 ± 0.5 ± 0.5	51	ALBRECHT	97 ARG	$e^+e^- \approx 10$ GeV
342.2 ± 0.2 ± 0.5	245 ± 19	EDWARDS	95 CLE2	$e^+e^- \approx 10.5$ GeV
340.4 ± 0.6 ± 0.3	40 ± 9	FRABETTI	94 E687	$\gamma\text{Be}, \bar{E}_\gamma = 220$ GeV

WEIGHTED AVERAGE  
341.65 ± 0.15 (Error scaled by 1.3)



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

VALUE (MeV)	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<b>&lt;0.97</b>	90	6.2k	AALTONEN	11H CDF	$p\bar{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.9	90	245 ± 19	EDWARDS	95 CLE2	$e^+e^- \approx 10.5$ GeV
<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] See AALTONEN 11H, Fig. 8, for the calculated ratio of  $\Lambda_c^+ \pi^0 \pi^0$  and  $\Lambda_c^+ \pi^+ \pi^-$  partial widths as a function of the  $\Lambda_c(2595)^+ - \Lambda_c^+$  mass difference. At our value of the mass difference, the ratio is about 4.

[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	
<b>&lt;0.08</b>	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	
<b>&lt;0.07</b>	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	$\gamma$ Be, $\bar{E}_\gamma = 220$ GeV
0.46 ± 0.14		21	ALBRECHT	93F ARG	$e^+e^- \approx \Upsilon(4S)$

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

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     $e^+ e^- \approx \Upsilon(4S)$

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

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

VALUE                      CL%                      DOCUMENT ID                      TECN                      COMMENT

**<0.91**                      90                      EDWARDS    95    CLE2     $e^+ e^- \approx 10.5 \text{ GeV}$

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

VALUE                      CL%                      DOCUMENT ID                      TECN                      COMMENT

**<0.52**                      90                      EDWARDS    95    CLE2     $e^+ e^- \approx 10.5 \text{ GeV}$

**$\Lambda_c(2625)^+$  REFERENCES**

AALTONEN	11H	PR D84 012003	T. Aaltonen <i>et al.</i>	(CDF Collab.)
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.)