

$\Lambda_c(2625)^+$

$I(J^P) = 0(\frac{3}{2}^-)$ 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
2628.00 ± 0.15 OUR FIT				
● ● ● 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
341.54 ± 0.05 OUR FIT				
341.54 ± 0.05 OUR AVERAGE				
341.518 ± 0.006 ± 0.049	30.3k	WANG	23 BELL	e^+e^- at/near $\Upsilon(4S)$
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	EDWARDS	95 CLE2	$e^+e^- \approx 10.5$ GeV
340.4 ± 0.6 ± 0.3	40	FRABETTI	94 E687	γ Be, $\overline{E}_\gamma = 220$ GeV

$\Lambda_c(2625)^+$ WIDTH

VALUE (MeV)	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<0.52					
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
<0.97	90	6.2k	AALTONEN	11H CDF	$p\bar{p}$ at 1.96 TeV
<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 Λ_c^+ having this mass.

Mode	Fraction (Γ_i/Γ)	Confidence level
$\Gamma_1 \quad \Lambda_c^+ \pi^+ \pi^-$	[a] (50 ± 7) %	
$\Gamma_2 \quad \Sigma_c(2455)^{++} \pi^-$	(2.6 ± 0.4) %	
$\Gamma_3 \quad \Sigma_c(2455)^0 \pi^+$	(2.6 ± 0.4) %	
$\Gamma_4 \quad \Lambda_c^+ \pi^+ \pi^-$ 3-body	large	

Γ_5	$\Lambda_c^+ \pi^0$	$[b] < 50$	%	90%
Γ_6	$\Lambda_c^+ \gamma$	< 26	%	90%

[a] In the isospin limit, this branching fraction would be 2/3, the other 1/3 being decays to $\Lambda_c^+ \pi^0 \pi^0$.

[b] A test that the isospin is indeed 0, so that the particle is indeed a Λ_c^+ .

$\Lambda_c(2625)^+$ BRANCHING RATIOS

$\Gamma(\Lambda_c^+ \pi^+ \pi^-)/\Gamma_{\text{total}}$ Γ_1/Γ

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
50.2 ± 5.7 ± 3.5	70	ABLIKIM	24BC BES3	$e^+ e^-$ at 4.918, 4.950 GeV

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

VALUE (units 10^{-2})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
5.13 ± 0.26 ± 0.32		467	¹ WANG	23 BELL	$e^+ e^-$ at/near $\Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<8 90 EDWARDS 95 CLE2 $e^+ e^- \approx 10.5$ GeV

¹ From a Dalitz plot fit, recovered simultaneously with $\Lambda_c(2625)^+ \rightarrow \Sigma_c(2455)^0 \pi^+$.

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

VALUE (units 10^{-2})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
5.19 ± 0.23 ± 0.40		391	² WANG	23 BELL	$e^+ e^-$ at/near $\Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<7 90 EDWARDS 95 CLE2 $e^+ e^- \approx 10.5$ GeV

² From a Dalitz plot fit, recovered simultaneously with $\Lambda_c(2625)^+ \rightarrow \Sigma_c(2455)^{++} \pi^-$.

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

VALUE	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<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	CL%	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 $e^+ e^- \approx \Upsilon(4S)$

$\Gamma(\Lambda_c^+ \pi^0)/\Gamma(\Lambda_c^+ \pi^+ \pi^-)$ 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	$e^+e^- \approx 10.5 \text{ GeV}$		

$\Lambda_c(2625)^+$ REFERENCES

ABLIKIM	24BC	PR D109 112007	M. Ablikim <i>et al.</i>	(BESIII Collab.)
WANG	23	PR D107 032008	D. Wang <i>et al.</i>	(BELLE Collab.)
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.)