

$\Lambda_c(2625)^+$ $I(J^P) = 0(\frac{3}{2}^-)$ 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, $\bar{E}_\gamma = 220$ GeV

 $\Lambda_c(2625)^+$ WIDTH

VALUE (MeV)	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<0.52	90	30.3k	WANG	23 BELL	e^+e^- at/near $\Upsilon(4S)$
● ● ● 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 for an excited Λ_c^+ having this mass.

Mode	Fraction (Γ_i/Γ)	Confidence level
Γ_1 $\Lambda_c^+ \pi^+ \pi^-$	[a] (50 ± 7) %	
Γ_2 $\Sigma_c(2455)^{++} \pi^-$	(2.6 ± 0.4) %	
Γ_3 $\Sigma_c(2455)^0 \pi^+$	(2.6 ± 0.4) %	
Γ_4 $\Lambda_c^+ \pi^+ \pi^-$ 3-body	seen	

Γ_5	$\Lambda_c^+ \pi^0 \pi^0$	[a]	(41 ± 6)	%	
Γ_6	$\Lambda_c^+ \pi^0$	[b]	< 50	%	90%
Γ_7	$\Lambda_c^+ \gamma$		< 26	%	90%

[a] In the isospin limit, with no other decays, the $\Lambda_c^+ \pi^+ \pi^-$ branching fraction would be 2/3 and the $\Lambda_c^+ \pi^0 \pi^0$ branching fraction would be 1/3.

[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
• • • 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	$e^+ e^- \approx \Upsilon(4S)$

$\Gamma(\Lambda_c^+ \pi^+ \pi^- \text{ 3-body})/\Gamma(\Lambda_c^+ \pi^+ \pi^-)$					Γ_4/Γ_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	$e^+ e^- \approx \Upsilon(4S)$	

$\Gamma(\Lambda_c^+ \pi^0 \pi^0)/\Gamma_{\text{total}}$					Γ_5/Γ
VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT	
41.0±5.2±3.3	203	ABLIKIM	25BJ BES3	$e^+ e^-$ at 4.918, 4.951 GeV	

$\Gamma(\Lambda_c^+ \pi^0)/\Gamma(\Lambda_c^+ \pi^+ \pi^-)$ Γ_6/Γ_1 $\Lambda_c^+ \pi^0$ decay is forbidden by isospin conservation if this state is in fact a Λ_c .

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.91	90	EDWARDS	95 CLE2	$e^+ e^- \approx 10.5$ GeV

 $\Gamma(\Lambda_c^+ \gamma)/\Gamma(\Lambda_c^+ \pi^+ \pi^-)$ Γ_7/Γ_1

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.52	90	EDWARDS	95 CLE2	$e^+ e^- \approx 10.5$ GeV

 $\Lambda_c(2625)^+$ REFERENCES

ABLIKIM	25BJ	JHEP 2508 065	M. Ablikim <i>et al.</i>	(BESIII Collab.)
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.)