NODE=B102

$\Lambda_c(2625)^+$

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

NODE=B102

The spin-parity has not been measured but is expected to be $3/2^-$: this is presumably the charm counterpart of the strange $\Lambda(1520)$.

NODE=B102

$\Lambda_c(2625)^+$ MASS

NODE=B102M

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

NODE=B102M

NODE=B102M

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

NODE=B102D

NODE=B102D

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	$p\overline{p}$ 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	γBe, $\overline{E}_\gamma$ = 220 GeV

$\Lambda_c(2625)^+$ WIDTH

NODE=B102W

NODE=B102W

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	$p\overline{p}$ 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

NODE=B102215;NODE=B102

$\Lambda_c^+ \pi\pi$ and its submode $\Sigma(2455)\pi$ are the only strong decays allowed for an excited Λ_c^+ having this mass.

NODE=B102

	Mode		Fraction (Γ_i/Γ)	Confidence level	
Γ_1	$\Lambda_c^+ \pi^+ \pi^-$	[a]	(50 ±7) %		DESIG=1
Γ_2	$\Sigma_c(2455)^{++} \pi^-$		(2.6±0.4) %		DESIG=2
Γ_3	$\Sigma_c(2455)^0 \pi^+$		(2.6±0.4) %		DESIG=4
Γ_4	$\Lambda_c^+ \pi^+ \pi^-$ 3-body		seen		DESIG=3;OUR EST;→ UNCHECKED ←
Γ_5	$\Lambda_c^+ \pi^0 \pi^0$	[a]	(41 ±6) %		DESIG=7
Γ_6	$\Lambda_c^+ \pi^0$	[b]	< 50 %	90%	DESIG=5
Γ_7	$\Lambda_c^+ \gamma$		< 26 %	90%	DESIG=6

[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.

LINKAGE=ISP

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

LINKAGE=B19

$\Lambda_c(2625)^+$ BRANCHING RATIOS

NODE=B102220

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

NODE=B102R00
NODE=B102R00

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

NODE=B102R3
NODE=B102R3

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 $\Lambda_c(2625)^+ \to \Sigma_c(2455)^0 \pi^+$.

NODE=B102R3;LINKAGE=A

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

NODE=B102R4
NODE=B102R4

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 $\Lambda_c(2625)^+ \to \Sigma_c(2455)^{++} \pi^-$.

NODE=B102R4;LINKAGE=A

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

NODE=B102R1
NODE=B102R1

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, $\overline{E}_\gamma = 220$ 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

NODE=B102R2
NODE=B102R2

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

NODE=B102R01
NODE=B102R01

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

NODE=B102R5

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

NODE=B102R5
NODE=B102R5

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_7/Γ_1

NODE=B102R6
NODE=B102R6

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

$\Lambda_c(2625)^+$ REFERENCES

NODE=B102

ABLIKIM	25BJ	JHEP 2508 065	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	24BC	PR D109 112007	M. Ablikim *et al.*	(BESIII Collab.)
WANG	23	PR D107 032008	D. Wang *et al.*	(BELLE Collab.)
AALTONEN	11H	PR D84 012003	T. Aaltonen *et al.*	(CDF Collab.)
ALBRECHT	97	PL B402 207	H. Albrecht *et al.*	(ARGUS Collab.)
EDWARDS	95	PRL 74 3331	K.W. Edwards *et al.*	(CLEO Collab.)
FRABETTI	94	PRL 72 961	P.L. Frabetti *et al.*	(FNAL E687 Collab.)
ALBRECHT	93F	PL B317 227	H. Albrecht *et al.*	(ARGUS Collab.)

REFID=63494
REFID=62808
REFID=62082
REFID=16435
REFID=45403
REFID=44199
REFID=43682
REFID=43552