

$\Lambda_c(2625)^+$

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

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 |
|---|--------|-------------|---------|-----------------|
| 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 | | | | | |
| ● ● ● 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 |
|---|--------------------------------|------------------|
| $\Gamma_1 \Lambda_c^+ \pi^+ \pi^-$ | [a] 66.67 % | |
| $\Gamma_2 \Sigma_c(2455)^{++} \pi^-$ | (3.42 ± 0.27) % | |
| $\Gamma_3 \Sigma_c(2455)^0 \pi^+$ | (3.46 ± 0.31) % | |
| $\Gamma_4 \Lambda_c^+ \pi^+ \pi^-$ 3-body | large | |
| $\Gamma_5 \Lambda_c^+ \pi^0$ | [b] < 60 % | 90% |
| $\Gamma_6 \Lambda_c^+ \gamma$ | < 35 % | 90% |

[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 Λ_c^+ .

$\Lambda_c(2625)^+$ BRANCHING RATIOS

$\Gamma(\Sigma_c(2455)^{++} \pi^-) / \Gamma(\Lambda_c^+ \pi^+ \pi^-)$ 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 $e^+ e^- \approx \Upsilon(4S)$ |

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

$\Lambda_c(2625)^+$ REFERENCES

| | | | | |
|----------|-----|----------------|-----------------------------|---------------------|
| 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.) |