

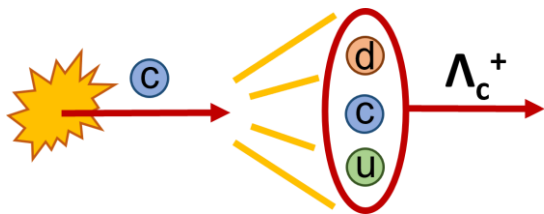


# New measurement of $\Lambda_c^+$ production in pp and p-Pb collisions with the ALICE experiment at the LHC

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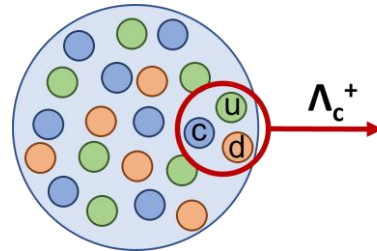
# Motivation

- Heavy flavour production measurements in pp crucial to test pQCD calculation and hadronization mechanisms
- Baryon to meson ratio: sensitive to quark hadronization
- Can test assumption that fragmentation is universal across collision systems
- p-Pb measurements useful to investigate role of cold nuclear matter effects



## Fragmentation

Assumed universal across collision systems

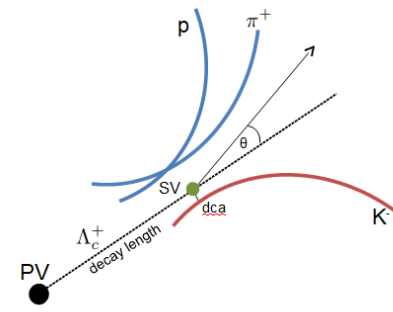


## Coalescence

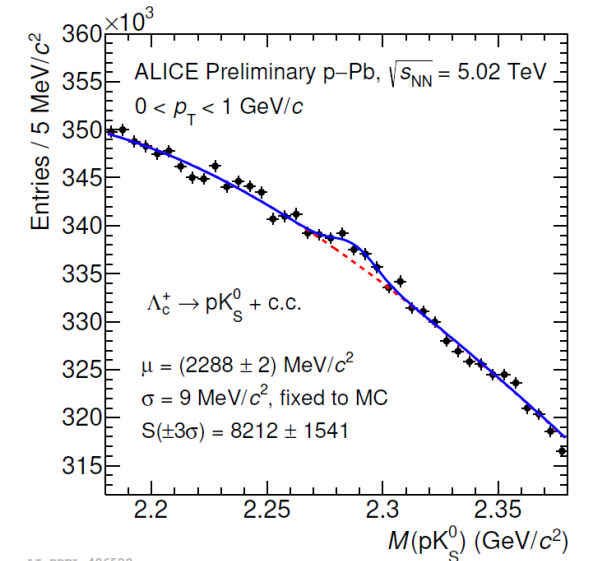
Predicted in a colour-deconfined matter (QGP)

# Analysis

- Measure production of  $\Lambda_c^+$  baryon (ucd)
- Short lifetime ( $c\tau = 60\mu\text{m}$ ): reconstruction via decay products
- $\Lambda_c^+ \rightarrow pK_s^0$  and  $\Lambda_c^+ \rightarrow pK\pi^+$  decay channels used
- Boosted Decision Tree (BDT) model trained on MC (signal) and data (Background)
- **First  $\Lambda_c^+$  baryon measurement down to  $p_T = 0$  GeV/c achieved**

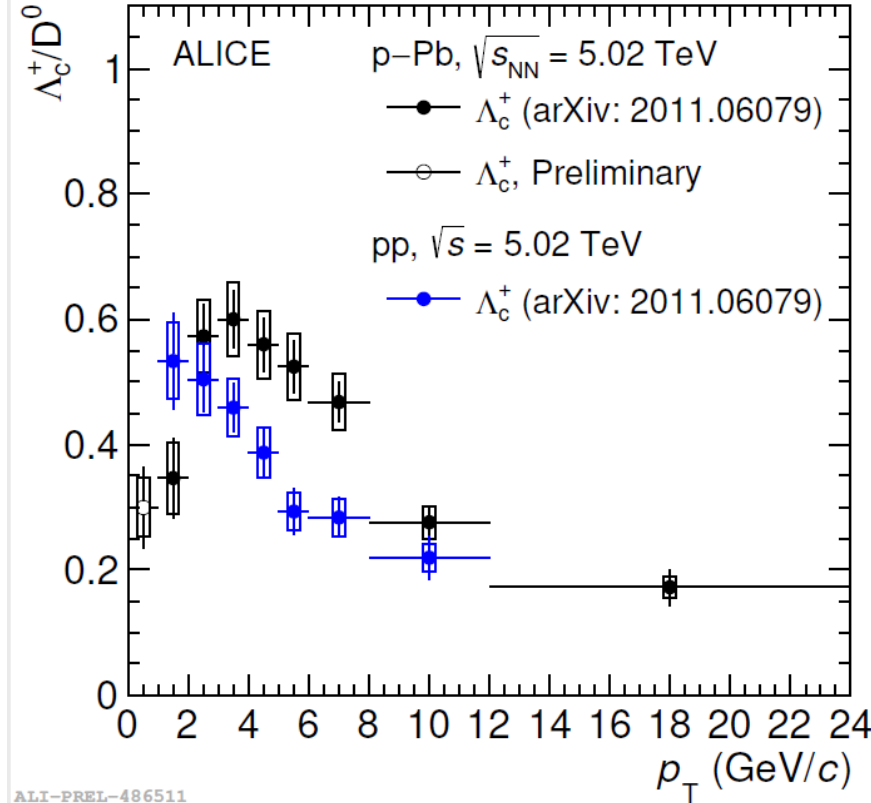
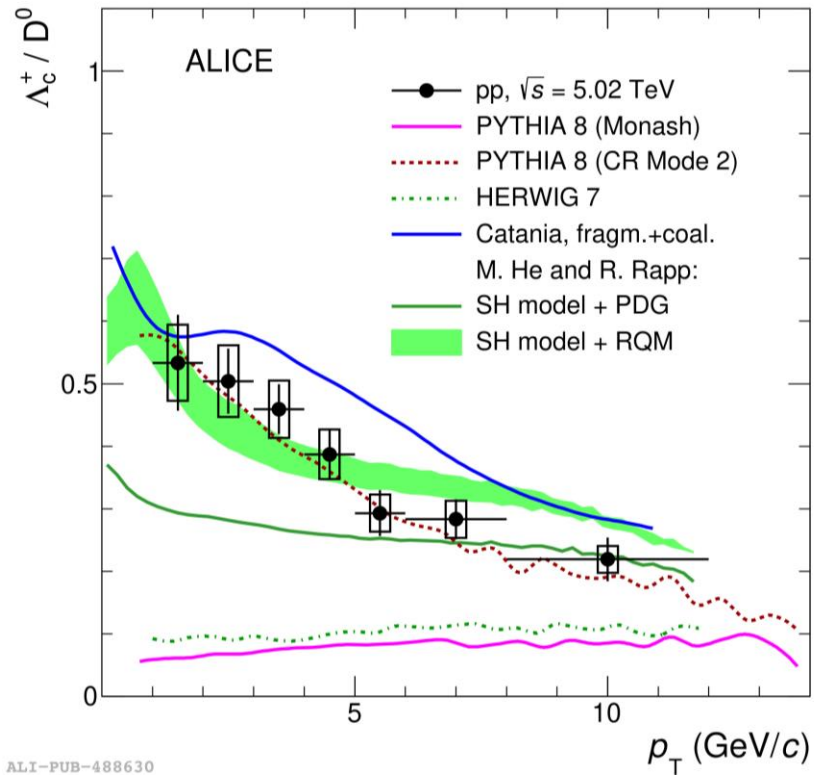


Reconstruction of  $\Lambda_c^+$  decay



Invariant mass spectrum of  $\Lambda_c^+$

# Results



- Enhanced  $\Lambda_c^+ / D^0$  ratio compared to  $e^+e^-$  in both pp and p-Pb collisions [1]
  - Decrease towards higher  $p_T$  also not found in  $e^+e^-$
  - Not described by models using fragmentation functions parametrised from  $e^+e^-$  and ep measurements:
- Fragmentation not universal across collision systems

Better described by models assuming:

- colour reconnection beyond the leading-colour approximation: PYTHIA8 (CR Mode2) [2]
- underlying charmed-baryon spectrum/additional excited charmed baryons: SH model [3]
- a colour-deconfined state of matter also in pp collisions: Catania [4]

[1] The ALICE collaboration, arXiv:2011.06078

[2] R. Christiansen and P. Z. Skands, "String Formation Beyond Leading Colour", JHEP 08 (2015) 003, arXiv:1505.01681 [hep-ph]

[3] M. He and R. Rapp, "Charm-Baryon Production in Proton-Proton Collisions", Phys. Lett. B795 (2019) 117–121, arXiv:1902.08889 [nucl-th]

[4] Minissale, S. Plumari, and V. Greco, "Charm Hadrons in pp collisions at LHC energy within a Coalescence plus Fragmentation approach", arXiv:2012.12001 [hep-ph]