Measurements of $\Lambda_c^+$ production via $\Lambda_c^+ \rightarrow pK^-\pi^+$ channel in pp and p–Pb collisions at 5.02 TeV with ALICE

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Why study Heavy Flavour?
- Charm and Beauty quarks are produced in hard partonic scattering processes in the early stages of the collisions and experience the entire evolution of the medium.
- $M >> T$, thermal production in the plasma is negligible.
- The study of charm and beauty production provides information on the in-medium partonic energy loss and on the medium transport properties.

Why study $\Lambda_c^+$ production?
- Baryon/meson ratio ($\Lambda_c^+/D^0$) is sensitive to the hadronisation processes.
- RUN 1 measurements have shown enhanced production of the $\Lambda_c^+$ baryon [udc] with respect to $e^+e^-$ and ep collisions. [2]

Why study smaller systems?
- Reference to Pb–Pb collisions and tests universality of fragmentation functions in different systems.
- Disentangles cold nuclear matter effects such as $k_T$ broadening or nuclear modification of the Parton Distribution Functions.

The ALICE detector
Inner Tracking System (ITS)
- Track reconstruction
- Vertex reconstruction

Time Projection Chamber (TPC)
- Track reconstruction
- Particle Identification (PID) with $dE/dx$ measurements.

Time Of Flight (TOF)
- Particle Identification (PID) with time-of-flight measurements.
- A Bayesian approach is used to identify the tracks as protons, kaons or pions. The species with the highest probability is assigned to the track.

Particle Identification
- Models based on results from $e^+e^-$ experiments fail to describe the enhancement.
- Similarities in charm and strange baryon-to-meson ratios hint at a common hadronisation mechanism.

Baryon-to-meson ratio
Measurements in pp and p–Pb are better described by models that either include an augmented list of charm states(green) [8] or colour reconnection (orange) [9].

Models based on results from $e^+e^-$ experiments fail to describe the enhancement.

The $p_T$-differential cross section of prompt $\Lambda_c^+$ measured from the $pK^-\pi^+$ decay channel is consistent with those obtained from the $\Lambda_c^+ \rightarrow pK^-\pi^+$ channel, which was studied with standard rectangular cuts as well as with a multivariate technique exploiting Boosted Decision Trees [7].

Nuclear Modification Factor
The nuclear modification factor compares the differential cross section in p–Pb collisions with the differential cross section in pp collisions scaled by the lead mass number.

$$R_{pPb} = \frac{1}{A} \frac{\Delta^DD^0}{\Delta^Dp}\frac{d\sigma_{pp}}{dt}$$

The $R_{pPb}$ of the $\Lambda_c^+$ is consistent with the D mesons within uncertainties. Current uncertainties allow both models to qualitatively describe the data. No significant cold nuclear matter effects are observed.

References