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Investigation of charm and beauty quark hadronisation through charm hadron measurements with ALICE

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Measurements of the production of heavy-flavour hadrons performed at the LHC in recent years have provided crucial insights into the hadronisation mechanism of heavy quarks.
The enhancement of baryon-to-meson production yield ratio observed in pp collisions compared to that in e^+e^- collisions cannot be described by models developed under the traditional approach based on the assumption of universal quark fragmentation.
This observation has led to consider further hadronisation scenarios, such as colour reconnection mechanisms beyond the leading-colour approximation, coalescence mechanisms forming hadron and statistical hadronisation model including the feed-down from excited states of hadron which are not measured yet.
Precise measurements of heavy quarks are essential to understand how they hadronise into specific hadrons in hadronic collisions and to provide constraints for model development.

ALICE had studied the hadronisation mechanism of charm and beauty quarks by measuring prompt and non-prompt charm hadrons using data samples collected during Run 2.
With the upgraded ALICE detector during last LHC long shutdown 2 (LS2), ALICE is performing the precise measurements of prompt and non-prompt charm hadrons over an extended p_{T} interval.
Measurements performed with a larger data sample and improved spatial resolution are anticipated to provide further insights into the hadronisation mechanism of heavy quarks.

In this contribution, the final results of prompt charm hadrons (D^0, D^+, D_s^+, Λ_c^+ and $\Xi_\mathrm{c}^{0,+}$) in pp collisions as well as Λ_c^+ and Ξ_c^0 in p–Pb collisions obtained with data samples collected during Run 2 will be presented.
The final results of non-prompt charm hadrons (D^0, D^+, D_s^+ and Λ_c^+) in pp collisions will be discussed and compared with those of prompt charm hadrons.
The $\mathrm{c\overline{c}}$ and $\mathrm{b\overline{b}}$ production cross section per unit of rapidity at midrapidity ($\mathrm{d}\sigma/\mathrm{d}y|_{|y|<0.5}$) will also be presented.
Furthermore, new ALICE measurements of prompt and non-prompt charm hadrons in pp collisions using the data samples collected during Run 3 will be introduced.

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