

Investigation of charm-quark hadronisation into baryons in hadronic collisions with ALICE

mardi 4 juin 2024 09:30 (20 minutes)

Charm-baryon production measurements in proton-proton (pp) collisions at the LHC are fundamental to investigate the charm-quark hadronisation, and to test perturbative QCD-based calculations. Measurements in pp collisions showed baryon-to-meson ratios significantly higher than those in e^+e^- collisions, suggesting that the hadronisation of charm quarks is not universal across collision systems. They challenge the validity of theoretical calculations based on the factorisation approach, which assume universal fragmentation functions across collision systems. Similar measurements in hadronic collisions as a function of the event multiplicity provide sensitive tools to explore how the formation of charm baryons is influenced by different processes from small to large colliding systems. Lastly, measurements of charm baryon-to-meson yield ratios in p-nucleus and nucleus-nucleus collisions provide crucial information about possible modifications of hadronisation mechanisms in presence of, respectively, cold nuclear-matter effects and final-state effects induced by the formation of a quark-gluon plasma (QGP).

In this contribution, the final results of the ALICE Collaboration obtained by measuring the production of strange ($\Xi_c^{0,+}$, Ω_c^0) and non-strange (Λ_c^+ , $\Sigma_c^{0,+}$) charm baryons in pp, p-Pb collisions and that of Λ_c^+ baryons in Pb-Pb collisions collected during the LHC Run 2 with the ALICE experiment are shown. A comparison between baryon-to-meson ratios with novel theoretical models implementing hadronisation mechanisms different from the fragmentation in the vacuum will be also discussed. The first studies of charm-baryon reconstruction using the large data sample of pp collisions at $\sqrt{s} = 13.6$ TeV harvested from the start of LHC Run 3 are presented.

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Classification de Session: Track2-HF&Q

Classification de thématique: Heavy-Flavours & Quarkonia