Hadronisation of heavy quarks in small systems with ALICE at the LHC

Friday, 9 June 2023 09:00 (20 minutes)

The production cross section of charm hadrons in hadronic collisions can be calculated using the factorisation approach as a convolution of three factors: the parton distribution functions (PDFs), the hard-scattering cross section at the partonic level, and the fragmentation functions of the produced heavy quarks into given species of heavy-flavour hadrons, which is assumed to be universal for different collision systems. However, recent observations of enhanced baryon-to-meson production yield ratios in hadronic collisions, with respect to the same measurements performed in e^+e^- or e^-p collisions, suggest that the charm fragmentation fractions are not universal and depend on the collision system.

In this contribution, we present the measurements of D^0 , D^+ and D_s^+ meson production, together with those of Λ_c^+ , $\Sigma_c^{0,++}$, $\Xi_c^{0,+}$ baryons, as well as the first result for Ω_c^0 -baryon production at midrapidity in pp collisions at $\sqrt{s} = 13$ TeV with ALICE. These measurements confirm that the baryon-to-meson yield ratios in hadronic collisions are significantly larger than those measured in e^+e^- collisions, and are compared with different predictions assuming either in-vacuum fragmentation or modified hadronisation mechanisms for hadronic collisions.

Furthermore, the first measurement of the nuclear modification factor $R_{\rm pPb}$ for prompt Ξ_c^0 baryons and nonprompt D^0 mesons at $\sqrt{s_{\rm NN}} = 5.02$ TeV will be shown. In p–Pb collisions, they provide important information about the cold nuclear matter (CNM) effects and help us understand how the possible presence of collectivity could influence the production of heavy-flavour hadrons. Finally, the measured charm fragmentation fractions and $c\bar{c}$ production cross section at midrapidity in pp collisions at $\sqrt{s_{\rm NN}} = 5.02$ TeV will be reported.

Primary author: CHENG, Tiantian (GSI && CCNU)

Presenter: CHENG, Tiantian (GSI && CCNU)

Session Classification: Hadron decays, production and interaction

Track Classification: Hadron decays, production and interactions