Contribution ID: **323** Type: **not specified**

Transverse momentum dependence of charm baryon production and hadronization with ALICE

Thursday, 30 October 2025 17:40 (20 minutes)

Heavy quarks (i.e. charm quarks and beauty quarks) are one of the important probes to study the properties of strongly interacting partonic matter. Heavy quarks produced in the early stage of collisions will experience the whole evolution of the collision process. Therefore, Heavy-flavour observables carry important information of quark-medium interactions in an early phase of the QGP. The measurement of the production of heavy flavour hadrons and their interaction with the hot and dense medium are of great importance to investigate the energy loss mechanism of hard partons in the medium and to test the mass dependence of radiative energy loss. The measurement of the anisotropic flow of heavy-flavour hadrons can reveal the degree and mechanism of thermalization of quark matter, and the measurement of heavy-flavour baryon-to-meson yield ratios can shed light on the hadronization mechanism of quark matter.
In addition, measurements of the production of heavy-flavour hadrons in high-energy hadronic collisions provide important tests of QCD because perturbative techniques are applicable down to low transverse momentum thanks to the large masses of charm and beauty quarks. The production cross sections of heavy-flavour hadrons can be calculated using the factorization approach as a convolution of three factors: the parton distribution functions (PDFs) of the incoming protons, the hard-scattering cross section at partonic level, which can be calculated perturbatively in powers of the strong coupling constant, and the fragmentation function, which parametrizes the non-perturbative transition of a heavy quark into a given heavy-flavour hadron species. It was generally assumed that the fragmentation functions are universal regardless of the collision system and energy. The measurement of the relative production of different heavy-flavour hadron species is sensitive to the fragmentation function used in pQCD-based calculations. Measurements of the production cross sections of different charm-hadron species, comparing in particular baryon and meson production in various collision systems and centre-of-mass energies, provide new insights into the properties of the fragmentation process.
The recent heavy-flavour baryon measurements in hadronic collisions at LHC energies indicated a significant difference in the fragmentation fractions of charm and beauty quarks into charm and beauty baryons compared to those measured in electron-positron and electron-proton collisions. These observations required a new approach for evaluating the charm-quark production cross section at midrapidity and the charm-quark fragmentation fraction based on the measurements of both charm mesons and baryons.

Primary author: TU, RAN

Presenter: TU, RAN

Session Classification: Parallel 3

Track Classification: ALICE