

Quark Matter 2019 - the XXVIIIth International Conference on Ultra-relativistic Nucleus-Nucleus Collisions



Contribution ID: 274

Type: **Poster Presentation**

Measurements of prompt D-meson production in p–Pb collisions with ALICE at the LHC

Monday 4 November 2019 17:40 (20 minutes)

Heavy quarks (i.e charm and beauty quarks) are effective probes to investigate the properties of the hot, dense and strongly-interacting medium, known as the Quark-Gluon Plasma (QGP), formed in ultra-relativistic heavy-ion collisions. Due to their large masses, they are produced in the initial stages of the collision via hard partonic scatterings and hence, they experience the full evolution of the medium. The measurements of prompt D-meson production in small systems like p–Pb collisions allow us to decode the Cold Nuclear Matter (CNM) effects such as the modification of parton densities in nuclei and k_T -broadening or parton energy loss. Recent studies show that the high-multiplicity events of p–Pb collisions at the LHC exhibit unforeseen collective behaviour and the origin remains unclear. For a deeper understanding on the collective-like effects in high-multiplicity p–Pb events, the study of D-meson production as a function of charged-particle multiplicity can give further insight into the interplay between hard and soft mechanisms of particle production. Furthermore, to understand the role of initial-state geometry on the final-state observables in p–Pb collisions, a more differential study can be attempted based on the technique of Event-Shape Engineering (ESE) by selecting events of different initial geometry at similar multiplicity. The modification of production cross sections of D mesons in different shape-engineered events would strengthen our understanding of influence of initial geometry on the final state particle production mechanisms.

In this contribution, the production cross sections of D mesons (D^0 , D^+ , D^{*+} and D_s^+) measured at mid-rapidity in p–Pb collisions at $\sqrt{s_{NN}} = 5.02$ TeV with ALICE detector will be presented. The nuclear modification factor (R_{pPb}) for minimum bias p–Pb collisions will be shown. The results will be compared with model predictions including CNM effects. The prompt D-meson transverse momentum distributions in p–Pb collisions relative to pp collisions (Q_{pPb}), measured in several multiplicity/centrality classes, will also be discussed.

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Session Classification: Poster Session

Track Classification: Heavy flavor and quarkonium