

Charm-baryon hadronization mechanism and its multiplicity dependence with Alice

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Quantum Chromodynamics (QCD) is characterized by a phenomenon known as color confinement. When quarks are produced at high-energy colliders like the Large Hadron Collider (LHC), they evolve into observable hadrons through a process called hadronization. In the context of QCD, heavy-flavour production is calculated as a convolution of three independent: the PDFs of the incoming protons, the cross sections of the partonic scatterings producing the heavy quarks, and the FFs. heavy-flavour hadrons performed in different collision systems provide an excellent experimental benchmark to test this assumption. this determined based on data from e^+e^- collisions factorization theorems assume that hadronization is a universal process, independent of the types of colliding. the initial quarks in the colliding particles do not contain any b-quark content, and the production of b-quarks is primarily governed by the high-energy interactions between partons in the early phases of the collision

Run2 measurements of Λ_c^+/D^0 , $\Sigma_c^{0,++}/D^0$, $\Xi_c^{0,+}/D^0$ and Ω_c^0/D^0 all the mentioned baryon-to-meson ratios are significantly underestimated p_T -differential yield ratios in pp collisions are inconsistent with measurements in e^+e^- collision which increased at low p_T . In contrast, a comparable measurement in the beauty sector conducted by LHCb reveals an increasing trend in the Λ_b^0/B^0 ratio with multiplicity. Interestingly, in the lowest multiplicity interval, this ratio nears the baryon fraction observed in $e+e-$ collisions. These discrepancies highlight the need for additional measurements in the charm sector with enhanced precision and broader coverage towards lower multiplicities. Measurements indicating increased Ω^- and Ξ^- production in correlation with event multiplicity suggest that this augmentation develops gradually as particle multiplicity rises, commencing from low-multiplicity pp collisions. Therefore the measurement of the multiplicity dependence of Ξ_c^0 and Λ_c yield ratio at differe multiplicity Run3 can provide further constraints on the study of charm hadronization.

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