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Charm production and hadronisation in proton-proton, proton-Pb, and Pb-Pb collisions with ALICE at the LHC

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Produced only in hard-scattering processes occurring in the initial stage of the collisions, heavy quarks offer a unique perspective to study the transition from quarks to hadrons in all collision systems. Recently, the ALICE experiment at the LHC measured the Λ_c^+ , Ξ_c^0 , Ξ_c^+ , and $\Sigma_c^{0,++}$ charmed-baryon p_T -differential cross sections at midrapidity in pp collisions, as well as the cross-section times branching ratio of Ω_c^0 baryons, complementing the measurements of D^0 , D^+ , D^{*+} , and D_s^+ mesons. The baryon-to-meson cross-section ratios are largely enhanced with respect to expectations based on e^+e^- data. The Λ_c^+/D^0 ratio was also studied as a function of the event multiplicity and found to increase towards high multiplicities. These data indicate that the charm-hadronisation process strongly depends on the properties of the collision system and invalidate the assumption of "universality" of charm fragmentation fractions, on which several estimates of the total charm cross section rely on, already for pp collisions. They may also signal the possible onset of effects theoretically anticipated to be relevant in the quark-gluon plasma formed in heavy-ion collisions, like hadron formation via recombination of already formed quarks as a mechanism concurrent to string fragmentation.

In this talk, these results and the measurements of the Λ_c^+/D^0 ratio and Λ_c^+ nuclear-modification factor in p–Pb and Pb–Pb collisions will be presented. The comparison of data with expectations from models implementing different hadronisation processes will be discussed.

Primary author: ROSSI, Andrea (INFN Padua)

Presenter: ROSSI, Andrea (INFN Padua)

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