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Study of charm quark and QGP medium interactions via Λ_c^+ and D^0 production and collective flow in the CMS

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Since charm quarks are massive, they are dominantly produced in the early stage of a collision. In heavy ion collisions, they propagate through the quark-gluon plasma (QGP) and provide important information about the initial stages of the collision, and the properties of the QGP medium. The interaction between heavy quarks and the QGP affects the hadronization of heavy quarks and their azimuthal distribution and transverse momentum (p_T) spectrum. By comparing the Λ_c^+ baryon and D^0 meson productions, and measuring the azimuthal anisotropy of the D^0 meson, we can study the charm quark hadronization and the interaction between charm quark and the QGP medium. In this talk, we present the measurements of Λ_c^+ baryon production, the Λ_c^+/D^0 yield ratio at $\sqrt{s_{NN}} = 5.02$ TeV in proton-proton collisions and different centrality regions of lead-lead (PbPb) collisions. The results indicate that the production of Λ_c^+ baryons is suppressed for more central events in PbPb, and the coalescence does not play a significant role in the hadronization of Λ_c^+ baryon at $p_T > 10$ -GeV. Furthermore, we present the measurements of the azimuthal anisotropy coefficients (v_2 and v_3), and R_{AA} of prompt D^0 in PbPb collisions as a function of p_T from central to mid-central collisions. Clear centrality dependencies of prompt D^0 meson v_2 and R_{AA} are observed. No evidence of the effect of the Coulomb field on the collective flow of charm hadron is found.

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