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Charm production: constraint to transport models and charm diffusion coefficient with ALICE

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In this contribution the nuclear modification factor (R_{AA}) of prompt charm hadrons and leptons from heavy-flavour hadrons decays measured in Pb-Pb collisions at $\sqrt{s_{NN}} = 5.02$ TeV by the ALICE Collaboration are presented. The measurement of heavy-flavour leptons in Xe-Xe collisions is also discussed. Heavy quarks are a very suitable probe to investigate the quark-gluon plasma (QGP) produced in heavy-ion collisions, since they are mainly produced in hard-scattering processes and hence in shorter timescales compared to the QGP. Measurements of charm-hadron production in nucleus-nucleus collisions are therefore useful to study the properties of the in-medium charm quark energy loss via the comparison with theoretical models. Moreover, the comparison of different colliding systems provide insights in the dependency on the collision geometry. Models describing the heavy-flavour transport and energy loss in an hydrodynamically expanding QGP require also a precise modelling of the in-medium hadronisation of heavy quarks, which is investigated via the measurement of prompt D_s^+ mesons and Λ_c^+ baryons. In addition, the measurement of the azimuthal anisotropy of strange and nonstrange D mesons is discussed. The second harmonic coefficient provides information about the degree of thermalisation of charm quarks in the medium, while the third one relates to its sensitivity to event-by-event fluctuations in the initial stage of the collision. A thorough systematic comparison of experimental measurements with phenomenological model calculations will be performed in order to disentangle different model contributions and provide important constraints to the charmquark diffusion coefficient D_s in the QGP.

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