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Measurement of open charm production in heavy ion collisions with ALICE

Content

In this contribution, the nuclear modification factor (RAA) and the elliptic flow (v2) of open heavy-flavour hadrons via their hadronic and semileptonic decays to electrons at mid-rapidity and to muons at forward rapidity in heavy-ion collisions will be presented. The measurements of the production of leptons from heavy-flavour hadron decays and the modification of their spectra in different collision systems, like Xe–Xe and Pb–Pb will also be discussed. This measurement , together with the centrality-dependent measurements of the prompt D mesons, set new constraints to the modeling of the nature of parton energy loss and its dependence on the size of the QGP medium in transport-model calculations, highlighting that the collision geometry plays an important role in heavy-quark energy loss. The v2 measurements of open heavy-flavour hadrons provide information about the thermal degrees of freedom of heavy quarks in the QGP (Quark-gluon plasma), path-length dependence of heavy-quark in-medium energy loss and recombination effects during the hadronization. In addition to the elliptic flow, other flow harmonics provide information about the properties of the QGP. The directed flow (v1) of heavy-flavour particles is sensitive to the unprecedentedly strong magnetic fields present in the early stages of the collision, and so measurements of its charge dependence are key to constraining the electrical conductivity of the QGP. Finally, the triangular flow (v3) is driven by fluctuations in the initial state of the system, and is sensitive to the ratio of the shear viscosity to the entropy density, η/s. The coupling of the charm quark to the light quarks in the underlying medium is further investigated with the application of the event-shape engineering technique to the D-meson elliptic flow and pT-differential yields. A strong correlation with the average bulk elliptic flow in both central and semi-central collisions is measured.

Summary

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