

Open charm production in dense hadronic environment

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The production of open-heavy flavours in pp and p–nucleus collisions as a function of the charged-particle multiplicity ($dN_{ch}/d\eta$) can give insight into multiple parton interactions and into the interplay between hard and soft processes. Moreover, the comparison of the production of charmed mesons with and without strange-quark content and the baryon-to-meson ratio can help to study collective-like effects that in recent years have been observed in high multiplicity pp and p–nucleus collisions. These effects are typical of nucleus–nucleus collisions in which a Quark-Gluon Plasma with high-energy density is formed. This state produces a system with dense hadronic environment. It is interesting to investigate heavy-ion typical phenomena in the heavy-flavour sector across collisions systems as a function of the event activity, and, vice versa, to study in detail the coupling of heavy quarks to the "bulk" in heavy-ion collisions. Indeed, the measurement of the production of open heavy-flavour hadrons in nucleus–nucleus collisions can provide important information about the microscopic interactions of heavy quarks with the medium constituents. In particular, the measurement of the azimuthal anisotropies at low transverse momentum, quantified by the elliptic flow v_2 , gives insight into the participation of the heavy quarks in the collective expansion of the system and their possible thermalisation in the medium. Additional insight into the dynamics of the heavy quarks can be provided by the application of the event-shape engineering (ESE) technique to the D-meson v_2 . Measuring the D-meson v_2 in classes of events defined on the basis of the average flow in a given centrality class allows us to evaluate the correlation between the elliptic flow of soft hadrons and D mesons.

In this talk, the latest results on the production of open-heavy flavour production, including the ratio between the production of D+s and non-strange D mesons, as a function of $dN_{ch}/d\eta$ in pp, p–Pb and Pb–Pb collisions at $\sqrt{s_{NN}} = 5.02$ TeV with ALICE will be presented. The enhancement of the relative abundance of $\Lambda+c$ baryons compared to D mesons in pp and p–Pb collisions with respect to that measured in $+\sqrt{s_{NN}}$

ee collisions will be discussed. Finally, the first application of the ESE technique to the measurement of the D-meson v_2 in Pb–Pb collisions at $\sqrt{s_{NN}} = 5.02$ TeV with ALICE will be also presented.

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