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Effects of initial state conditions on the azimuthal angular correlation of $D^0 - D^0$ in heavy ion collision

The study of thermalization of heavy flavors (HF) in the Quark Gluon Plasma (QGP) is one of the major physics goals of the upcoming heavy-ion experiments. Heavy flavors are primarily produced by hard scatterings during the early stages of ultra-relativistic hadronic collisions. Their azimuthal angular correlation ($\Delta\varphi$) can be modified at different stages of collisions. Probing the initial state of these collisions is important to quantify the degree of HF thermalization.

This study investigates the impact of different pre-equilibrium models on the azimuthal angular correlations of $D^0 - D^0$ mesons in Pb—Pb collisions at $\sqrt{s_{NN}} = 5.5$ TeV. Recent studies indicate that, despite the stage's duration being less than 1 fm/c, the pre-equilibrium glasma phase significantly influences heavy quark azimuthal angular correlation. The treatment of the initial stage of heavy ion collisions can influence the interactions of heavy flavors at this stage, thereby affecting the correlation between D mesons. The effects of different initial states are quantified by measuring the yield and width of the $\Delta\phi$ distribution. This study is crucial for drawing robust conclusions regarding heavy quark thermalization in the quark-gluon plasma (QGP).

Field of contribution

Phenomenology

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