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The gradient tomography of dijet in heavy-ion collisions

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Jet energy loss and transverse momentum broadening are twin consequences of a jet interacting with a hot and dense QCD matter in heavy-ion collisions. The underlying interaction can be represented by jet transport coefficient $\hat{q}$ distributed in the whole phase space of the bulk medium. The gradient of $\hat{q}$ perpendicular to the momentum direction of an energetic parton leads to an asymmetry of the transverse momentum distribution, which can be used for the initial jet production localization. We investigate such an asymmetry caused by the subleading jet by triggering the leading jet propagating in-plane in Pb+Pb 0-10% collisions at $\sqrt{s} = 5.02$ TeV. Simulations are performed in the linear Boltzmann transport model with fluctuating event-by-event 3+1D viscous hydrodynamic backgrounds. We find that the initial jet production vertex can be localized by combining the dijet transverse imbalance $x_J = p_T^{\rm subleading}/p_T^{\rm leading}$ and subleading jet transverse gradient asymmetry for different leading jet p_T regions. The correlation between both quantities is also investigated to illustrate the properties of $\hat{q}$.

Experiment/Theory

Theory/Phenomenology

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