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The gradient tomography of dijet production in heavy-ion collisions

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Abstract: Jet energy loss and transverse momentum broadening can be implicitly represented by jet transport coefficient $\hat{q}$ distributed in the whole phase space of the QGP 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 study such an asymmetry caused by the subleading jet by triggering the leading jet propagating in-plane. Simulations are performed in the linear Boltzmann transport model with 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 $\hat{q}$.

Theory / experiment

Theory

Group or collaboration name

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