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Jet Correlation Tomography of the QGP in Heavy-Ion Collisions

A hot and dense, strongly interacting nuclear matter is created in high energy nucleus-nucleus collision experiments at RHIC and the LHC, known as the Quark-Gluon Plasma (QGP). Energetic partonic jets tend to lose energy when traversing through this coloured medium. In comparison with elementary proton-proton collisions, the suppression of high p_T jet yields and enhancement of dijet asymmetries is a key signature of QGP formation as a result of the so-called Jet Quenching phenomena.

In these studies [1-4], we utilise jet correlations to probe the transport properties of the QGP and numerically extract its transport coefficient $\hat{q}$. Using the newly developed resummation improved pQCD approach (RiPQCD) to set the pp baseline, together with the BDMPS energy loss mechanism and 2+1D OSU hydro to simulate the medium effect in AA collisions, the transport coefficient $\hat{q}$ is extracted for dijet, dihadron, hadron-jet, photon-jet, Z-jet and H-jet processes at RHIC and the LHC.

This method shed light on a new direction for jet tomography research and supplements current jet quenching studies of the QGP, which can provide a more precise and quantitative extraction of the jet transport coefficient in relativistic heavy-ion collisions.

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Topics

Jet Physics

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