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Probing the Short-Distance Structure of the Quark-Gluon Plasma with Energy Correlators

Tuesday 24 September 2024 10:00 (20 minutes)

Energy-energy-correlators (EEC's) are a promising observable to study the dynamics of jet evolution in the quark-gluon plasma (QGP) through its imprint on angular scales in the energy flux of final-state particles. We carry out the first complete calculation of EEC's using realistic simulations of high-energy heavy-ion collisions, and dissect the different dynamics underlying the final distribution through analyses of jet propagation in a uniform medium. The EEC's of γ-jets in heavy-ion collisions are found to be enhanced by the medium response from elastic scatterings instead of induced gluon radiation at large angles. In the meantime, EEC's are suppressed at small angles due to energy loss and transverse momentum broadening of jet shower partons. These modifications are further shown to be sensitive to the angular scale of the in-medium interaction, as characterized by the Debye screening mass. Experimental verification and measurement of such modifications will shed light on this scale, and the short-distance structure of the QGP in heavy-ion collisions.

Category

Theory

Collaboration

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