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Multi-Observable Analysis of Jet Quenching Using Bayesian Inference

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The JETSCAPE Collaboration presents a new, multi-observable study of jet transport in the QGP using Bayesian Inference, for the first time incorporating all available inclusive hadron and jet suppression data, and jet substructure data. The theoretical description of jet quenching is multi-stage, based on the MATTER and LBT models, with virtuality-dependent jet-medium interaction. Detailed hydrodynamic modeling of the QGP utilizes a previous Bayesian calibration. This study extends the previous JETSCAPE Bayesian Inference jet quenching analysis, which was based solely on inclusive hadron data. The multi-observable nature of the analysis enables exploration of correlations and differences between different probes and different kinematic ranges. Notably, tension is observed between calibrations based on hadron RAA for pT<30 GeV/c, and higher pT hadron and jet RAA data. This approach goes beyond the constraint of model parameters, testing the consistency with which the theoretical formulation describes a wide range of jet quenching data, and identifying those aspects of the formulation that are in tension with data. We also explore the constraints imposed by jet substructure data, beyond those of inclusive jet and hadron suppression measurements. These studies provide new insight into the mechanisms of jet interactions in matter and their theoretical description, and point to next steps in the field for comprehensive understanding of jet quenching as a probe of the QGP.

Category

Theory

Collaboration

JETSCAPE

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