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Bayes-DREENA: Integrated QGP Parameter Inference from High-pt and Low-pt Data

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High-pt theory and data are traditionally used to study the interactions of high-pt partons with the Quark-Gluon Plasma (QGP). Conversely, bulk QGP properties are typically inferred from low-pt data and models. Our approach unifies these domains through a finite-temperature dynamical energy loss (DREENA) framework, enabling a comprehensive QGP properties assessment using high-pt and low-pt data. Through this method, we constrain the early evolution of the QGP, examine the temperature dependence of the shear viscosity to entropy density ratio, and demonstrate the importance of including heavy flavor data in containing bulk QGP properties. By incorporating Bayesian inference within the DREENA framework, we show that utilizing light and heavy-flavor high-pt data together with low-pt data yields parameter distributions that are within the bounds of those inferred solely from low-pt data but are much better constrained. Therefore, integrating DREENA within a formal statistical framework (Bayes-DREENA) allows for more accurate inferences of QGP properties and leverages a broader range of available data.

Category

Theory

Collaboration

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