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Exploring QGP Properties through Unified High-pt and Low-pt approach with Bayesian Inference

Sunday 29 September 2024 12:00 (30 minutes)

High-pt theory and data traditionally study the interactions of high-pt partons with the Quark-Gluon Plasma (QGP), while bulk QGP properties are inferred from low-pt data. Our approach unifies these domains using the DREENA framework, enabling a comprehensive assessment of QGP properties. We will overview the ebe-DREENA framework, a state-of-the-art dynamical energy loss model optimized to incorporate various medium-averaged and event-by-event evolutions, and applicable to both large and small collision systems. The framework provides a unique tomography tool for mapping QGP properties, which we will demonstrate by constraining the temperature dependence of the shear viscosity to entropy density ratio. This example will suggest the intriguing hypothesis that the quasiparticle picture remains valid across the entire temperature range in QGP.

As our most recent advancement, we will present our Bayesian inference results with low-pt and high-pt data. We demonstrate that using both low-pt and high-pt data results in parameter distributions that are consistent with those inferred solely from low-pt data yet are much more constrained. This highlights the necessity of high-pt data for precise QGP parameter determination. Thus, integrating DREENA within a formal statistical framework (Bayes-DREENA) enables more accurate inferences of QGP properties and may provide optimal usage of a wide range of available and upcoming experimental data from RHIC and LHC.

Category

Theory

Collaboration

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