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Bayes-DREENA for QGP parameter inference from unified high and low-pt data

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Abstract: High-pt theory and data are conventionally utilized to examine interactions of high-pt partons with the Quark-Gluon Plasma (QGP). In contrast, bulk QGP properties are typically inferred from low-pt data and models. Our approach unifies these two domains through a finite-temperature dynamical energy loss DREENA framework, enabling a comprehensive assessment of QGP properties using both high-pt and low-pt data. We will demonstrate how the method can constrain the early evolution of the QGP and analyze the temperature dependence of the shear viscosity to entropy density ratio. By incorporating Bayesian inference within the DREENA framework, we show that using high-pt data jointly with low-pt data leads to parameter distributions within the bounds of those inferred only from low-pt data but are much better constrained. Thus, integrating DREENA within a formal statistical framework (Bayes-DREENA) allows more accurate inferences of QGP properties and utilizes a wide range of available data.

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