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Exploring bulk QGP properties through high-pt theory and data

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High-pt theory and data are traditionally used to explore high-pt parton interactions with QGP, while bulk QGP properties are commonly explored through low-pt data. However, rare high-pt light and heavy flavor can also be a powerful tool for inferring bulk QGP properties, as they are sensitive to global QGP parameters. A prerequisite for such QGP tomography is a proper description of high-pt parton-medium interactions, which we here achieve through our finite-temperature dynamical energy loss formalism, recently implemented within the DREENA numerical framework.

We here advocate a novel QGP tomography approach, where bulk QGP properties are jointly constrained by low and high-pt data. The approach can include arbitrary temperature profiles from bulk QGP simulations, which are implemented in the dynamical energy loss framework, and subsequently compared with high-pt data. We will show how this method can be used to i) constrain the early evolution of QGP, ii) study the temperature dependence of eta/s, iii) explore if QGP in small systems is consistent with high-pt data. This research demonstrates inherent interconnections between low and high-pt QGP physics, strongly supporting the utility of such a synergistic approach to QGP tomography.

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