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Data driven analysis of jet energy loss distribution in relativistic heavy ion collision

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We present a numerical investigation of partonic energy loss in the Quark-Gluon Plasma (QGP) using a data-driven Bayesian inference framework. This study explores the energy, transverse momentum, and angular characteristics of the energy loss distribution associated with medium-induced multiple gluon emissions by hard partons traversing the QGP. The inference process employs the Markov Chain Monte Carlo method, implemented via the Metropolis-Hastings algorithm. Independent radiation mechanisms are modeled under the effects of boost-invariant longitudinal expansion, incorporating gamma and log-normal energy distribution functions to examine transverse momentum broadening and angular profiles of partonic cascades, providing insights into the interplay between medium properties and partonic evolution. Our results demonstrate consistent nuclear modification factor RAA values with the LHC data across both energy distributions.

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