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Bottom-up approach to describe groomed jet data in heavy-ion collisions

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Quantum Chromodynamics (QCD) dictates that in extreme conditions, as those reproduced in heavy-ion collisions, hadronic matter turns into a new form of elementary matter: the quark-gluon plasma (QGP). The theoretical interpretation of QCD jet observables in heavy-ion collisions is nonetheless to this day a complex task and there are still competing explanations for the physical origin of the measured medium-induced modifications.
I will present a new approach to compute groomed jet sub-structure observables. The core idea is to treat medium effects a posteriori by an effective energy shift of the hard, vacuum-like jet substructure. Moreover, these medium-induced effects include a gradual onset of colour coherence originated from the in-medium propagation of a set of two subjets.
This simplified approach was first applied to a NLO-exact dijet vacuum configuration, which was able to qualitatively capture the narrowing trend of groomed observables. Afterwards this was extended to full events obtained by matching the NLO matrix-element to a leading-logarithm accurate parton shower, resulting in a very good theory-to-data agreement (within 10%) for a broad range of observables.
Given the current standard of a LO baseline for in-medium jet analysis, this study also contributes for the necessary theoretical development anticipating the upcoming heavy-ion programme at the LHC, which will carry a broad range of precision measurements to faithfully characterise the QGP.

Abstract

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