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Factorization of in-medium parton branching beyond the eikonal approximation

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The description of the in-medium modifications of parton showers is at the forefront of current theoretical and experimental efforts. The theory of jet quenching, a commonly used alias for the modifications of QCD parton branching resulting from the interactions with the QGP, has been significantly developed over the last years. Within a weak coupling approach, several elementary processes that build up the parton shower evolution such as single gluon emissions, interference effects between successive emissions and corrections to radiative energy loss off massive quarks, have been addressed both at eikonal accuracy and beyond by taking into account the Brownian motion that high-energy particles experience when traversing a hot and dense medium. In this work, using the setup of single gluon emission from a color correlated quark-antiquark pair in a singlet state (a q-qbar antenna), we calculate the in-medium gluon radiation spectrum beyond the eikonal approximation. This allows us to fully explore the physical interplay between broadening and coherence/decoherence effects. The results show factorization of broadening effects from the modifications of the radiation process itself in the limit of soft emissions. As such, we show that a probabilistic picture of in-medium parton shower evolution holds beyond eikonal accuracy, a feature that is of the utmost importance for a successful future generation of jet quenching Monte Carlos.

Summary

Presentation type

Oral

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