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Factorization and Resummation for Jet Processes

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Jets not only display the behaviour of QCD over a wide range of energy scales, from hard colliding energy to the hadronization energy, but also contain important signatures of exotic physics, such as top quarks or particles beyond the SM. In particular, recently jet substructure observables are playing a central role in a large number of analyses at the LHC. Most of the theoretical discussion of these aspects has taken place in the context of MC simulation studies. However, MC analysis is not always good enough, and it is difficult to extract the key characteristics of individual substructure methods and reveal the relations between them. With this motivation, it is imperative to understand jet observables from the first principles QCD.

In our recent series papers we have constructed a new effective field theory which fully factorizes non-global jet observables for the first time. Our formalism provides the basis for higher-order logarithmic resummations of jet and other non-global observables. As a nontrivial consistency check, we used it to obtain explicit next-to-next-to-leading order results for all logarithmically enhanced terms in several different non global jet observables and verified those against numerical fixed order computations.

Summary

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