

Energy Correlators for massive parton fragmentation

Many searches for New Physics and precision measurements in QCD involve the study of jet substructure for final state hadrons. While traditionally the state of the art for studying jets at particle colliders have been event shape observables, recently it has been better understood that measuring correlation functions of energy flow operators inside a jet is in fact a very powerful tool for phenomenology which also naturally stems from first principles of quantum field theory. In many cases this makes it possible to take advantage of certain useful symmetries from the theory.

In this work we study the energy-energy correlators for charm and bottom quark fragmentation, extending studies on massless QCD jets. The presence of the mass introduces an additional scale, which is detected by the correlator, providing a clean manifestation of the dead cone effect. We compute the heavy-quark jet function and present a factorization formula for the process, which we use to perform a next-to-leading-log resummation of the large logarithms.

Our extension of energy correlators to heavy flavor opens many opportunities for precision studies of fragmentation with jet substructure.

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