

DIS2023: XXX International Workshop on Deep-Inelastic Scattering and Related Subjects



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Beautiful and Charming Energy Correlators

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Understanding the detailed structure of energy flow within jets, a field known as jet substructure, plays a central role in searches for new physics, and precision studies of QCD. Many applications of jet substructure require an understanding of jets initiated by heavy quarks, whose description has lagged behind remarkable recent progress for massless jets.

In this work we initiate a study of correlation functions of energy flow operators on beauty and charm jets to illuminate the effects of the intrinsic mass of the elementary particles of QCD. We present a factorization theorem incorporating the mass of heavy quarks. Our results achieve a full next-to-leading-logarithmic calculation of a heavy quark jet substructure observable at the LHC.

We study the behavior of the correlators, and show that they exhibit a clear transition from a massless scaling regime, at precisely the scale of the heavy quark mass. This manifests the long-sought-after dead-cone effect and illustrates fundamental effects from the intrinsic mass of beauty and charm quarks in a perturbative regime, before they are confined inside hadrons.

Submitted on behalf of a Collaboration?

No

Participate in poster competition?

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