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Using Jet Substructure to probe Heavy-Flavor Energy-Loss

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The dynamics of shower development for a jet traveling through the quark-gluon plasma (QGP) involves a variety of scales, including the mass for heavy flavors in jets. During the high virtuality portion of the jet evolution, the mass of the heavy quark affects longitudinal drag and diffusion, stimulating additional radiation. These emissions partially compensate the reduction in radiation from the dead cone effect. In the lower virtuality part of the shower evolution, when the mass is comparable to the transverse momentum of the parton, scattering and radiation processes off heavy quarks are different than off light quarks. All these factors result in a different shower development for heavy-flavor tagged jets vs. light-flavor jets.

In this work, we present a multi-stage calculation using a weak coupling recoil approach to calculate jet and jet substructure observables to explore differences between various heavy quark energy-loss mechanisms. Our work extends and compares to previous studies that have used leading hadron and open heavy flavor observables.

1

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