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Flavor dependence of jet suppression, substructures and axis decorrelation

We investigate the flavor dependence of parton splitting inside a color-deconfined medium by examining the suppression factor, substructures, and jet axis decorrelation of inclusive jets, c-jets and b-jets. Utilizing the linear Boltzmann transport model that treats light and heavy flavor parton scatterings with the quark-gluon plasma (QGP) on an equal basis, we provide a simultaneous description of the suppression factors of inclusive jets and heavy-flavor tagged jets observed at the LHC. We find that while the suppression factor of jets does not explicitly reveal flavor dependence due to significant gluon contributions in both inclusive and heavy-flavor jets, jet flavor does influence their substructures, such as the longitudinal and transverse distributions of energetic particles within jets. Additionally, we explore the jet axis decorrelation, defined as the angle between the standard jet axis and the winner-take-all (WTA) axis, which is expected to be sensitive to interactions between the hardest particle inside a jet and the QGP. The observed differences in the jet axis decorrelation between light and heavy flavor jets highlight not only the mass dependent diffusion of hard partons in a thermal medium, but also provide a valuable opportunity to investigate the distinct broadening effects experienced by quarks and gluons inside the QGP.

Category

Theory

Collaboration (if applicable)

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