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Splitting functions and jet mass distributions in heavy ion collisions

We present the first calculations of the momentum sharing and angular separation distributions between the leading subjets inside a reconstructed jet, as well as the jet mass distribution modification in heavy ion collisions. These observables are sensitive to the early and late stages of the in-medium parton shower evolution and allow us to probe the quark-gluon plasma across a wide range of energy scales. We use the medium-induced splitting functions obtained in the framework of soft-collinear effective theory with Glauber gluon interactions to calculate the subjet distributions. Qualitative and in most cases quantitative agreement between theory and preliminary CMS measurements suggests that the parton shower in heavy ion collisions can be dramatically modified early in the branching history. Predictions for the subjet angular distribution is also presented which will illuminate the nature of the medium-induced radiations. On the other hand, using renormalization group techniques we can resum the jet mass at next-to-leading logarithmic accuracy, with the medium contributions consistently included. We find that the jet mass modification is sensitive to the medium scale and allows for a precise extraction of the medium properties.

Preferred Track

Jets and High pT Hadrons

Collaboration

Not applicable

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