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Inverting the mass hierarchy of jet quenching with b-jet substructure

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The two-prong substructure of the leading subjets inside a reconstructed jet opens new windows on precision constraints on the in-medium modification of parton showers. We present the first resumed calculation of the groomed soft-dropped subjet momentum sharing distribution in heavy ion collisions, and demonstrate that both the STAR data at RHIC and the CMS results at LHC can be understood in the unified framework of soft-collinear effective theory with Glauber gluon interactions. Recent advances in understanding mass effects on the QCD splitting functions enable us to apply this method for the first time to heavy flavor tagged jets, the main topic of this presentation. Theoretical predictions for the momentum sharing distribution modification of jets tagged by single and two in-jet heavy mesons will be presented. We find that in the kinematic region that will be accessed by sPHENIX in the future, or by studying jets of lower transverse momenta than currently explored at the LHC, there is a unique reversal of the mass hierarchy of jet quenching effects. Namely, the momentum sharing distribution of b-tagged jets is more strongly modified in comparison to the one for light jets. This unique feature provides a handle on mass corrections that are at present difficult to constraint using inclusive heavy meson production.

Content type

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