



Contribution ID: 496

Type: Poster

Resolution Effects in the Hybrid Strong/Weak Coupling Model

Tuesday, 15 May 2018 19:10 (30 minutes)

Within a hybrid strong/weak coupling model of jet quenching, plasma produced in a heavy ion collision cannot resolve the substructure of a collimated parton shower propagating through it with arbitrarily fine spatial resolution. We introduce a screening length parameter, L_{res} , proportional to the inverse of the local temperature in the plasma, estimating a range for the value of the proportionality constant via comparing weakly coupled QCD calculations and holographic calculations appropriate in strongly coupled plasma. When a parton in a jet splits, its two offspring are initially unresolved and suffer the energy loss of the original parton until they are separated by L_{res} . This delays the quenching of partons with intermediate energy, resulting in the survival of more hadrons in the final state with p_T in the several GeV range. Introducing a nonzero L_{res} results in modifications to the jet shapes and jet fragmentations functions, as it makes it more probable for particles carrying a small fraction of the jet energy at larger angles from the jet axis to survive their passage through the quark-gluon plasma. These effects are small in magnitude, which we confirm via checking for effects on missing- p_T observables.

Content type

Theory

Collaboration

Centralised submission by Collaboration

Presenter name already specified

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Session Classification: Poster Session

Track Classification: Jet modifications and high- p_T hadrons