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High-p_t suppression in small systems

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We present first results for light and heavy flavor high-p_T hadron suppression from a short path length corrected energy loss model in $p+p$, $p+A$, and $A+A$ collisions at RHIC and the LHC. We find that the short path length corrections to final state radiative energy loss for light flavor hadrons predict nontrivial enhancement such that high multiplicity $R_{pA} > 1$, consistent with data. We further systematically check the consistency of the assumptions—such as collinearity, softness, and large formation time—made in the derivation of radiative energy loss, with the final numerical model. We find that the large formation time approximation breaks down at modest to high momenta $p_T \geq 30$ GeV. Comparison to data at higher momenta thus requires a rederivation of GLV, DGLV, and short path length correction results; with the large formation time assumption relaxed. We also show that the usual elastic energy loss treatment vastly overpredicts the suppression in small systems; thus, small path length corrections to elastic energy loss are required for quantitative comparison to data in small systems.

Category

Theory

Collaboration (if applicable)

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