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Quantifying jet modification as a function of energy lost and jet mass depletion

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Jet modification measurements to date are carried out by comparing a surviving jet, exiting a dense medium, with a vacuum (unmodified) jet at the same energy. We propose an extension to classify jet modification in heavy-ion collisions by also including the jet mass. The mass of a jet, as measured by jet reconstruction algorithms, is intimately connected to the jet's virtuality (or scale), which in turn has a considerable effect on such observables as the fragmentation function and jet shape observables. The leading hard parton, propagating through a dense medium tends to experience substantial virtuality (or mass) depletion along with energy loss, and thus accurate comparisons between surviving jets and jets produced in p-p collisions should take these effects into account. Using the event generator PYTHIA, we show the close relationship between the actual jet mass and that after applying a jet reconstruction algorithm. Using the in-medium event generator MATTER++, we demonstrate the clear difference between the mass of a surviving parton exiting a dense medium and a parton with a similar energy formed in a hard p-p event. Effects of this difference in jet mass on the ratio of fragmentation functions and jet shapes are also calculated.

On behalf of collaboration:

None

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