EXPLOITING JET TOPOLOGICAL DIFFERENCES IN pp AND AU+AU COLLISIONS AT $\sqrt{s_{\rm NN}} = 200$ GEV AT RHIC ABSTRACT FOR QM 22 TALK

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Jets are algorithmic proxies of hard scattered quarks/gluons created in collisions of high energy particles. In the last few years, there has seen an explosion of jet substructure results from all experiments derived from exploiting clustering algorithms. Jet quenching via parton energy loss in heavy ion collisions is an established probe for exploring the properties of the quark-gluon plasma. Since jets are multi-scale objects, there is a need to characterize different likely mechanisms of medium interaction leading to energy loss for jets of varying shower topologies. In this talk, we present novel differential measurements of the jet shower in pp collisions at $\sqrt{s_{\rm NN}} = 200$ GeV and discuss their connection to parton evolution. We then proceed to tag specific jet populations in Au+Au collisions based on jet substructure observables, such as opening angle and the splitting formation time calculated using the leading and subleading subjets or charged particles within the jet. These observables are shown to be experimentally robust to the heavy ion underlying event. With multiple jet classes based on their shower topology in central Au+Au collisions, we compare and contrast their energy loss via jet quenching observables such as dijet momentum asymmetry and recoil jet yield. Such measurements, for the first time, point towards a space-time study of energy loss phenomenon via selections on jet formation time and opening angle.

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