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Measurements of jet and soft activity in $\sqrt{s_{NN}} = 200$ GeV p+Au collisions at STAR

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Proton-ion collisions at the LHC and RHIC have yielded unexpected trends, notably in measurements of jet nuclear modification factors at different collision centralities. Recent preliminary measurements from STAR in p+Au collisions at $\sqrt{s_{NN}} = 200$ GeV demonstrate inherent correlations between high- Q^2 parton scatterings and event activity (EA), measured using either detectors at backward (Au-going) rapidities or underlying event (UE) at mid-rapidity. The measurements at STAR disfavor jet quenching as an explanation for the suppression of jet yield observed in high-EA collisions. This leads to an opportunity to probe the early stages of the collisions and cold nuclear matter (CNM) effects. In this talk, we show correlations of backward-rapidity EA with mid-rapidity UE, as well as measurements of EA-dependent modifications to charged hadron spectra and jets. In particular, we present measurements of the UE for various EA selections and discuss its kinematic dependence on jet pseudorapidity and transverse momentum, p_T , as a means of examining the initial hard scatterings. We also investigate the EA dependence of high- p_T hadron and jet properties – including fully corrected ungroomed and SoftDrop groomed jet substructure observables as a function of EA – to study the impact of initial and final state effects.

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