

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

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5           Proton-ion collisions at the LHC and RHIC have yielded unexpected trends,  
6 notably in measurements of jet nuclear modification factors as a function of  
7 event activity (EA). Recent preliminary measurements from STAR in p+Au  
8 collisions at  $\sqrt{s_{\text{NN}}} = 200 \text{ GeV}$  demonstrate inherent correlations between high-  
9  $Q^2$  parton scatterings and EA measured at backward (Au-going) rapidities or  
10 underlying event (UE) at mid-rapidity. The measurements at STAR disfavor jet  
11 quenching as an explanation for the suppression of jet yield observed in high-EA  
12 collisions. This leads to an opportunity to probe the early stages of the proton-  
13 ion collisions. In this talk, we show correlations of backward-rapidity EA with  
14 mid-rapidity UE, as well as measurements of EA-dependent modifications to  
15 charged hadron spectra and jets. In particular, we present measurements of  
16 the UE for various EA selections and discuss its kinematic dependence on jet  
17 pseudorapidity ( $\eta$ ) and transverse momentum ( $p_{\text{T}}$ ) as a means of examining  
18 the correlation between initial hard scatterings and soft processes. We also  
19 investigate the EA dependence of high- $p_{\text{T}}$  hadron and jet properties—including  
20 fully corrected ungroomed and SoftDrop groomed jet substructure observables—  
21 to study the impact of initial and final state effects.