Exploiting Two- and Three-point Charge-Energy Correlators as Probes of Jet Evolution at STAR

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Hard-scattered partons that are ejected from high-energy collisions at both the Relativistic Heavy Ion Collider (RHIC) and the Large Hadron Collider (LHC) undergo fragmentation as described by quantum chromodynamics and hadronize into showers of final state particles that are measured by an experiment. The behavior of these showers can be studied using jets, clusters of final state particles used as a proxy for the initial parton and containing information about its evolution. The projected N-point energy correlator separates non-perturbative and perturbative effects of this evolution by examining the jet in terms of the largest angular distance between N particles. Additionally, the distance scales at which hadron groups with different charge compositions form are sensitive to the hadronization mechanism, an effect shown in Monte-Carlo simulations to be observable by charge-weighted ENCs.

We will present the first measurement of the projected three-point energy correlator (E3C) at RHIC, measured using pp collision data at $\sqrt{s} = 200$ GeV from the STAR experiment, and its ratio to the two-point correlator (EEC). These ENC measurements are shown for several jet transverse momentum ranges in the charge inclusive sample as well as samples selected on the charge configuration of involved particles.