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Energy-energy correlators at the LHC and EIC

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Jets produced in high energy collisions offer an excellent QCD laboratory. Jet substructure encodes QCD dynamics ranging from the initial partonic shower in the weakly coupled limit to hadronization in the strongly coupled, non-perturbative, regime. Energy correlators, which measure statistical correlations of the energy flux within a jet, are a means to separate the different scales. Defined as the energy-weighted cross-section of particle pairs inside jets, energy-energy correlators provide a calibrated probe of the scale dependence of QCD dynamics in vacuum, where the scale is controlled by the angular distance of the pairs.
As a function of pair distance, energy correlators reflect the perturbative regime at large angular distance and non-perturbative physics at small angular distance. The separation allows us to probe the dynamics of jet formation and to separate the confinement process. I will present energy-energy correlators in inclusive jets in pp collisions at the LHC, and discuss the perturbative and hadronic regions, as well as the transition between them, which corresponds to the confinement process. I will also show how this observable can be used in eA collisions at the future EIC to study the jet-medium interaction as a function of nuclear size.

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