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Measurement of groomed event shape observables in electron-proton collisions

Event shape observables provide incisive probes of QCD, both its perturbative and nonperturbative aspects. Grooming techniques have been developed to separate perturbative from non-perturbative components of jets in a theoretically well-controlled way, and have been applied extensively to jet measurements in hadronic collisions.

In this contribution, the first application of grooming techniques to event shape measurements in electron-proton collisions is presented, utilizing data from the H1 experiment at HERA (DESY). The analysis is based on the novel Centauro jet clustering algorithm, which is designed specifically for the event topologies in deep inelastic scattering. Cross-section measurements of groomed event 1-jettiness and groomed invariant jet mass are shown, as well as a measurement of the ungroomed 1-jettiness event shape observable. The measurements are compared to Monte Carlo models, fixed order QCD predictions, and to a theoretical calculation based on Soft Collinear Effective Theory.

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