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Jet substructure and event shapes at high Q^2 in ATLAS

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We present results on the measurement of hadronic jet event shapes and jet substructure in proton-proton collisions at $\sqrt{s} = 7$ TeV with the ATLAS detector. These measurements constitute the first dedicated study of hadronic event shapes at high Q^2 in ATLAS. New results are also presented on the measurement of the substructure of these jets and in commissioning the tools for distinguishing the signatures of new boosted massive particles in the hadronic final state. Two “fat” jet algorithms are used, along with the filtering jet grooming technique that was pioneered in ATLAS. New jet substructure observables are compared for the first time to data at the LHC. Finally, a sample of candidate boosted top quark events collected in the 2010 data is analyzed in detail for the jet substructure properties of hadronic top-jets” in the final state. Together, these measurements demonstrate not only our excellent understanding of QCD in a new energy regime but open the path to using complex event-level and jet substructure observables in the search for new physics.

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