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Probing QCD dynamics with jet substructure in LHCb kinematics

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Jet production at the LHC provides an invaluable probe of QCD dynamics ranging from initial-state parton distributions to final-state jet fragmentation functions. High-precision perturbative calculations for jet substructure have recently become available, allowing direct comparison of experimental measurements to theory. Measurements of jet substructure therefore offer a direct test of first-principles theoretical prescriptions for jet formation and fragmentation in perturbative QCD. Selecting jets containing a heavy-flavor hadron extends tests of QCD fragmentation to a regime where parton mass and color factors play a crucial role, probing the limits of modern perturbative calculations. Comparing inclusive heavy-flavor jet production to jets associated with a Z boson probes initial state effects. At the same time, performing measurements using a novel jet flavor tagging algorithm allows tests of perturbative QCD at unprecedented theoretical precision. The LHCb Collaboration presents recent jet substructure results at forward rapidity in pp collisions at center-of-mass energy $\sqrt{s}$ = 13 TeV. These jet fragmentation studies are compared to theoretical predictions, providing new insight on QCD dynamics at forward rapidity and at low and moderate values of jet transverse momentum

Category

Experiment

Collaboration

LHCb

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