

Prospects for a measurement of the W boson mass in the all-jets final state at hadron colliders

Thursday 19 July 2018 09:00 (25 minutes)

Precise measurements of the mass of the W boson are important to test the overall consistency of the Standard Model of particle physics. The current best measurements of the W boson mass come from single production measurements at hadron colliders in its decay mode to a lepton (electron or muon) and a neutrino and pair production of W bosons at lepton colliders, where also the decay mode of the W boson to a quark anti-quark pair has been considered. In this study, prospects for a measurement of the W boson mass in the all-jets final state at hadron colliders are presented. Compared to the lepton plus neutrino final state, a measurement in the all-jets final state could avoid experimental systematic uncertainties related to the measurement of the missing transverse momentum and the theoretical uncertainties related to the transverse mass. Compared to other methods for measuring the W mass, a measurement in the all-jets final state would be complementary in methodology and have systematic uncertainties orthogonal to previous measurements. We have estimated the main experimental and theoretical uncertainties affecting a measurement in the all-jets final state making use of jet substructure techniques.

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Session Classification: New Tools