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Measurement of missing transverse momentum with the ATLAS detector at the LHC Run-I and beyond

During the LHC Run-I data taking period, ATLAS has developed and refined several approaches for measuring missing transverse momentum \MET{} in proton-proton collisions. Standard calorimeter-based \MET{} reconstruction techniques have been improved to obtain high precision measurement, while new track-based \MET{} methods provide an independent, and complementary measurement from charged particle momenta reconstructed with the inner detectors. While both procedures are individually useful, preliminary studies have shown that combining information from both techniques leads to an improved understanding of \MET{}. This combined calorimeter and tracking \MET{} measurement has also proven to be very effective in the high-pileup conditions in Run-I as it reduces the dependence of the \MET{} on pileup activity.

The LHC Run-II could be even more challenging as higher luminosity will be delivered. The worsening of pileup conditions require a better precision in order to measure the \MET{} which originates from the hard interaction. Monte Carlo simulations using Run-II conditions have shown that the ATLAS \MET{} measurement maintain good performance in such extreme environment, with continuous development for further improvement.

Summary

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