Contribution ID: **25** Type: **not specified**

Performance of missing transverse momentum reconstruction in ATLAS studied in proton-proton collisions in 2012 at 8 TeV

Thursday 12 February 2015 14:20 (20 minutes)

The missing transverse energy plays a really important role in reconstructing events produced at hadron colliders. Undetectable particles, such as neutrinos, pass through the matter with a negligible probability of interaction. Hence, no direct evidence of them can be measured in a general purpose detector, as ATLAS. However, the total momenta in the transverse plane to the beam axis has to be conserved and computed. In particular, it is used in searches for the Standard Model Higgs boson channels, such as: H->WW, H->ZZ and H->tautau. The benefit of using this conservation law is that an energy imbalance may signal the presence of such undetectable particles. Therefore, it becomes also a powerful tool for new physics searches at the Large Hadron Collider, such as Supper Symmetry and Extra Dimensions. The performance of the missing transverse momentum reconstruction in the ATLAS detector is evaluated using data collected in 2012 in proton-proton collisions at a centre-of-mass energy of 8 TeV. An optimised reconstruction and calibration of missing transverse momentum is used and the effects arising from additional proton-proton interactions superimposed on the hard physics process are suppressed with various methods. Results are shown for a data sample corresponding to an integrated luminosity of about 20 fb-1 and for events with different topologies with or without a genuine missing transverse momentum due to undetected particles. Estimates of the systematic uncertainty on the missing transverse momentum measurement are also presented.

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