NWS09-2009-000026

Abstract for an Invited Paper
for the NWS09 Meeting of
the American Physical Society

What we can expect from the first year of the LHC

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The ATLAS and CMS experiments at the CERN Large Hadron Collider have been built and commissioned over more than a decade. They are the most complex experiments ever assembled, but were completed in time for the first beams in the LHC in September 2008. The accident which interrupted the LHC startup did not interrupt the commissioning of the detectors with cosmic ray events, and the small amount of single-beam data collected in September was invaluable for timing in the detector. ATLAS and CMS will therefore be unusually well calibrated and understood by the time collision data become available in Fall 2009. The first part of the talk will discuss the expected performance of the detectors (with some bias towards ATLAS). The rest of the talk will discuss physics analyses which should be possible with the first year's running at the LHC. Roughly 100-200 pb^{-1} at a 10 TeV centre-of-mass energy are needed to match the Tevatron's Standard Model Higgs sensitivity around 160 GeV - if all goes according to plan, the LHC may collect this by Fall 2010. About 100 pb^{-1} at 10 TeV would match the full Tevatron sample of top quarks; roughly twice as much data would be needed if the run were mainly at 8 TeV. Sensitivity to W' or Z' resonances would match the Tevatron's with less than 100 pb^{-1} at 8 TeV. Prospects for discovering supersymmetry are even more promising: in some models as little as 10 pb^{-1} at 8 TeV could yield a 5 σ discovery. The next year is expected to be a critical period in defining the future of high energy physics, as the actual performance of the LHC and its detectors is tested with collision data. Discoveries of physics beyond the Standard Model could potentially be made by the end of the first year's running, especially if the start-up progresses smoothly.