Development of Precision Drift Tube Chambers for the ATLAS detector at the Super-LHC.

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May 6, 2008

Detectors at the Large Hadron Collider (LHC) at CERN are designed to withstand unprecedentedly high background rates. At the LHC design luminosity of 10^{34} cm^{2}s^{-1}, the Muon Drift Tube chambers of the ATLAS muon spectrometer have to cope with neutron and gamma ray background rates of up to 100 Hz/cm^2 in the inner and middle chamber layers in the forward regions of the detector. At the Super-LHC, the high luminosity upgrade of the LHC, the background rates are expected to increase by an order of magnitude. The resulting high occupancies lead to a significant deterioration of the muon detection efficiency compromising the physics goals. The possibility to improve the muon detection efficiency at the Super-LHC by reducing the diameter of the pressurized aluminum drift tubes from 30 mm to 15 mm has been investigated. We report on the performances of a prototype drift-tube detector with thin-walled aluminum tubes of 15 mm diameter at photon irradiation rates as expected during Super-LHC operations. The impact of high counting rates on the prototype drift tubes is investigated, and the results are compared with simulations.