

Precision Drift-Tube Chambers for the ATLAS Muon Spectrometer at Super-LHC

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The muon detectors of the ATLAS experiment at the Large Hadron Collider (LHC) at CERN are designed to operate under unprecedentedly high background rates. At the LHC design luminosity of 10^{34} cm²s⁻¹, the Monitored Drift Tube (MDT) chambers of the ATLAS muon spectrometer have to cope with neutron and gamma ray background rates of up to 500 Hz/cm² in the inner chamber layers of the forward regions of the detector. At the Super-LHC, the high-luminosity upgrade of the LHC, 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 presently 30 mm to 15 mm has been investigated. We report on the tests of a prototype drift-tube detector with thin-walled aluminum tubes of 15 mm diameter at the Gamma Irradiation Facility at CERN with counting rates as expected at Super-LHC.