

# Performance of Fast High-Resolution Muon Drift Tube Chambers for LHC Upgrades

## Abstract

Monitored drift tube chambers are used as precision tracking detectors in the muon spectrometer of the ATLAS experiment at the LHC at CERN. These chambers provide a spatial resolution of  $40\ \mu\text{m}$  and a tracking efficiency of close to 100% up to background rates of  $0.5\ \text{kHz}/\text{cm}^2$ , the former being limited at higher rates mainly due to space-charge effects and the latter due to the maximum drift time of 700 ns.

For LHC upgrades, a faster drift tube chamber have been developed, using drift tubes with a diameter of 15 mm instead of 30 mm. The increased channel density and shorter drift time of about 200 ns raise the rate capability to about  $10\ \text{kHz}/\text{cm}^2$ , while retaining the spatial resolution.

We present results of measurements with chamber prototypes at CERN at the Gamma Irradiation Facility (GIF) at high  $\gamma$  radiation rates, and at the H8 beam line with high momentum muons including the test of the first full-sized prototype chamber. Measurements of the response of the drift tubes to highly ionizing radiation such as neutrons and protons will also be discussed.