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Studies of ageing effects of Small-Strip Thin Gap Chambers for the Muon Spectrometer Upgrade of the ATLAS Experiment

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The instantaneous luminosity of the Large Hadron Collider at CERN will be increased up to a factor of five with respect to the design value by undergoing an extensive upgrade program over the coming decade. The largest upgrade project for the ATLAS Muon System is the replacement of the present first station in the forward regions with the so-called New Small Wheels (NSWs), to be installed during the LHC long shutdown in 2019/20. Small-Strip Thin Gap Chambers (sTGC) detectors are one chosen technology to provide fast trigger and high precision muon tracking under the high luminosity LHC conditions. The basic sTGC structure consists of a grid of gold-plated tungsten wires sandwiched between two resistive cathode planes at a small distance from the wire plane. We study ageing effects of sTGC detectors with a gas mixture of 55% of CO_2 and 45% of n-pentane. A sTGC detector was irradiated with beta-rays from a Sr-90 source. Three different gas flow rates were tested. We observed no deterioration on pulse height of the sTGC up to an accumulated charge of 10 C/cm. The results of an image and chemical element analysis of the wire will also be presented.

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