



Contribution ID: 172

Type: Poster

Ageing tests for the MEG II drift chamber

Wednesday, 27 May 2015 09:43 (0 minutes)

The MEG II experiment will search for the Lepton-Flavour-Violating decay of $\mu \rightarrow e\gamma$ with an expected sensitivity on the branching ratio of about 5×10^{-14} , ten times better than MEG.

In MEG II Michel positrons will be tracked by a single-volume cylindrical drift chamber, composed of 10 criss-crossing sense wire planes with alternating stereo angles of about 7° . The elementary drift cell is approximately squared with a width of about 7 mm. The chamber is filled with an ultra-low mass gas mixture of helium and isobutane 85:15. Since the detector will be subject to a very high flux of Michel positrons, it is necessary to probe the robustness of the chamber to huge amounts of accumulated charge (up to 0.5 C/cm in the expected data taking period). For this reason, laboratory tests were performed on small size drift chamber prototypes.

Accelerated charge collection was induced by X-ray tubes illuminating selected portions of the wires. As an indicator of the ageing of the chamber, gain loss was monitored. Special attention was paid in considering gain variations that can arise from changes of the environmental conditions (e.g. gas temperature) and from space charge effects. At the end of the test, aged wires were inspected with Scanning Electron Microscopy and Energy Dispersive X-ray analysis.

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Session Classification: Gas Detectors - Poster Session

Track Classification: S7 - Gas detectors