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A monitoring chamber for high precision measurements of the drift velocity in gas detectors

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The tracker detector of MEG II and the one under development of CREMLIN+, FCC and CEPC experiments consists of ultralight drift chambers, operated with a mixture of Helium and Isobutane. A stable performance of the tracker detector in terms of its electron transport parameters, avalanche multiplication, composition and purity of the gas mixture is of crucial importance, so in order to have a continuous monitoring of the quality of gas, we plan to install a small drift chamber, with a simple geometry that allows to measure very precisely the electron drift velocity in a prompt way. The monitoring chamber will be supplied with the gas mixture coming from the inlet and the outlet of the detector to determine if any gas contamination originate inside the main chamber or in the gas supply system. The chamber is a small box with cathode walls, that determine a highly uniform electric field inside two adjacent drift cells. Along the axis separating the two drift cells, four staggered sense wires alternated with five guard wires collect the drifting electrons. The trigger is provided by two ^{90}Sr weak calibration radioactive sources placed on top of a two thin scintillator tiles telescope. The whole system is designed to give a prompt response (within a minute) about drift velocity variations at the 10^{-3} level. We will present a detailed description of the chamber layout and its simulations and the preliminary measurements.

Collaboration

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