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Test of a large drift-gap MicroMegas detector for TPC application

The MM-TPC collaboration has tested a MicroMegas detector for TPC purposes both in a single particle and high particle regime.
This has been possible thanks to the INFN Frascati Beam Test Facility (BTF) facility that provided electrons and positrons at $450\,\mathrm{MeV}$ energy with multiplicity ranging from 1 to 10^4.
The detector under test was a $40 \times 50\,\mathrm{cm}^2$ MicroMegas gaseous detector with extended drift gap of $5\,\mathrm{cm}$, which is ten times the standard one, to allow the ionization of more gas atoms and thus a larger number of reconstructed hits for improved tracking performances.
A small $10 \times 10\,\mathrm{cm}^2$ MicroMegas chamber, also with extended drift gap, was used to provide a reference position, perpendicular to the BTF electron beam, while the large MicroMegas chamber was tilted by $22°$.
Both chambers were filled with $\mathrm{Ar} : \mathrm{CF4} : \mathrm{iC_4H_{10}}$ gas mixture with 88:10:2 vol%, and equipped with APV front-end electronics.
Drift voltages scans were performed to measure investigate the maximum drift velocity reachable, and to test the inclined track position reconstruction with the micro-TPC method.
Tests at higher multiplicity were also carried out in order to measure the rate sustainability at such a high flux for a possible use of the detector as a beam monitor device.
This contribution will describe the results obtained from the above studies, showing the good response of the detector for a precise inclined track reconstruction.

Work-package

WP3 - RIs for Accelerator R&D

Facility identifier

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Author: D'AMICO, Valerio (Ludwig Maximilians Universitat (DE))

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