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Performance of a Large GEM-TPC at FOPI

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A large TPC (75 cm length, 15 cm radius, ~10000 readout channels) with GEM amplification operating in an ungated mode has been built and installed at the FOPI experiment at GSI, Darmstadt, where it was successfully tested in a physics campaign (pion-beam on different targets). From the recorded data, charged particle tracks entering the GEM-TPC are reconstructed using a fully 3-dimensional clustering algorithm and then matched with the surrounding FOPI tracking detectors. In this talk the performance of the detector both with cosmics and in physics beams is presented: Spatial resolution from the measurements of cosmics; Distortions due to field cage inhomogeneities in comparison with Finite Element simulations; Vertex reconstruction capabilities; Specific energy loss (dE/dx) performance for Pions, Kaons, Protons and Deuterons as a function of the particle momentum. The above performance results will be complemented with first results from physics analysis. This successful operation of such a challenging detector is an important milestone towards an upgrade of the ALICE TPC with GEM technology. This work has been supported by the BMBF and the DFG Cluster of Excellence "Universe" (Exc153)

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