

Micromegas- and GEM-TPC resolution studies with charge dispersion in a magnetic field in a test beam.

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The MPGD readout TPC for the ILC will have to measure ~ 200 track points with a resolution close to 100 microns for all drift distances. It may be difficult to meet the resolution target with conventional MPGD readout techniques if ~ 2 mm wide pads were used as is presently envisioned. Reducing the pad width to improve resolution could add significantly to the detector cost and complexity. The new MPGD readout concept of charge dispersion has been recently shown to achieve excellent resolution without resorting to narrower pads in cosmic ray TPC tests in absence of a magnetic field. We have recently studied the performance of two small prototype MPGD-TPCs with charge dispersion readout in a 1 T superconducting magnet in a 4 GeV/c test beam at KEK for several different gas mixtures. One of the TPCs was outfitted with a Micromegas endplate and the other with interchangeable Micromegas and triple-GEM endplates. Beam data were recorded both in and outside the magnet for the two TPCs. Preliminary results are quite encouraging. Transverse resolution close to 50 microns was achieved with 2 mm wide pads at 1 T for short drift distances for one of the TPCs. The dependence of resolution on drift distance was consistent with diffusion and electron statistics. With larger suppression of transverse diffusion at higher magnetic fields, the resolution goal of 100 microns appears within reach for the ILC TPC. The present status of charge dispersion MPGD-TPC beam test resolution studies will be presented.

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