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MPGD-TPC Resolution Studies with Charge Dispersion in a Test Beam

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The Micro Pattern Gas Detector (MPGD) readout TPC, proposed for the International Linear Collider (ILC), will have to measure 200 track points with a transverse resolution close to 100 microns. It will be difficult to meet the resolution goal with conventional MPGD readout techniques if 2 mm x 6 mm pads were used as was initially 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 shown to achieve excellent resolution without resorting to narrower pads in cosmic ray TPC tests without a magnetic field. We have recently tested two small prototype MPGD-TPCs with charge dispersion readout in a 1 T superconducting magnet in a test beam at KEK. Transverse resolution close to 50 microns was achieved with 2 mm wide pads at 1 T for short drift distances. The dependence of resolution on drift distance was as expected from diffusion. With larger suppression of transverse diffusion at higher magnetic fields, the resolution goal of 100 microns appears feasible for the ILC TPC. The present status of charge dispersion MPGD-TPC resolution studies will be presented.

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