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Results on 5 GeV electron tracks observed with a triple GEM and MediPix2/TimePix-readout

The combination of Micro-Pattern-Gas-Detectors and highly pixelated readout provided by the MediPix2 chip and by the recently developed TimePix chip demonstrates a new approach of the TPC-readout for the ILC. For the DESY test beam of 5 GeV electrons the results of a triple GEM/MediPix2 and a triple GEM/TimePix detector with 55 μ m readout pitch are presented. Different gases (Ar/CO₂, 70/30, He/CO₂ 70/30, Ar/CH₄/CO₂, 93/5/2) are used. On average ≥ 8 clusters are recorded on a plane of 14 \times 14mm². Two configurations of the GEM stack have been used with transfer gaps of 1 and 2mm. The induction gap is 1mm, the drift gap 6mm. The point resolution of a cluster is determined by various methods being between 30 - 60 μ m depending on the drift length. The new TimePix allows the determination of the time of arrival above a given threshold and also a charge measurement in each individual pixel (via time over threshold information). In the mixed mode operation, where these quantities are measured in a checker board configuration, the point resolution is improved, moreover the 3-dimensional track reconstruction can be performed by using the drift time information. The point resolution in the readout plane and the features of the reconstruction of the drift coordinate are given for the triple GEM/TimePix setup. The excellent double track resolution is addressed.

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