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GridPix detector with Timepix3 ASIC

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GridPix detectors combine the advantages of a high granularity readout based on a pixel ASIC with a Micromegas gas amplification stage. By producing the Micromegas with photolithographic postprocessing techniques directly on the ASIC a very good alignment of grid holes with readout pixels can be reached. Thus, the charge avalanche started by a single primary electron can be collected and digitized by a single pixel giving excellent spatial resolution. Also, the energy resolution improves because of the primary electron counting instead of charge summation.

After demonstrating the potential of the GridPix detector in several environments a new ASIC, Timepix3, has been designed and produced. It overcomes its predecessors limitations. Most notably it allows for multihit readout and for simultaneous charge and time measurement of each pixel. While preparing for the new generation of GridPix detectors, also the design and the production techniques of the grid were revised and improved.

A first detector was built with the new Timepix3-based GridPix. It was tested with different kinds of ionization sources among which are radioactive sources and a laser setup. These first measurements underline the improvements of the system and will be presented in the conference. As a possible application a design for a TPC endplate covered with GridPixes for an ILC experiment will be discussed.

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