

Abstract

An unlimited large TPC pixel detector plane

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We have developed the gaseous pixel detector QUAD based on four Timepix-3 chips. To provide the required gas amplification a fine grid has been deposited on the chip surface by wafer postprocessing (GridPix technology). The precisely aligned grid holes and chip pixels having a pitch of 55 μm and the high time resolution of 1.56 ns of the Timepix3 chip enable the reconstruction of each individual primary electron. By using the full information imbedded in the ionization cloud, the ultimate resolution of a gaseous detector is achieved, mainly limited by diffusion. Long-thought limitations of TPCs, namely track separation and track density, are no longer a limit with TimePix-3.

The QUAD detector has all services located under the detection surface. In this way multiple QUADs can be simply put together to create a detection surface of arbitrary dimensions. A possible application is in the readout plane of a large TPC. At present we are producing a small series of QUADs for a 2 x 4 QUAD detection plane.

In the presentation we show details about the construction of the QUAD and the results from a recent test beam experiment performed at the ELSA electron beam in Bonn where a silicon telescope was used to provide accurate tracking.