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Picosecond imaging using a capacitive charge division readout

Wednesday 14 September 2011 09:00 (1 hour)

The requirements of high energy, high luminosity particle accelerators, particularly the Large Hadron Collider at CERN, has driven the development of a range of Application Specific Integrated Circuits (ASICs) able to cope with extremely high event rates and data throughput, while maintaining picosecond timing resolution in the region of 10-100 ps incorporated in a high channel density design. The University of Leicester and Photek Ltd. have been collaborating on using two of these CERN developed ASICs, the NINO amplifier/discriminator and High Performance Time to Digital Convertor (HPTDC), for readout of multi-channel and imaging MCP detectors.

We present results from a photon-counting microchannel plate (MCP) imaging detector using the Capacitive Division Image Readout (C-DIR), designed to provide moderate position resolution (of the order of 100x100 pixel^2), with timing resolution of the order 25 ps and a maximum event rate of 10 MHz, limited by microchannel plate count rate saturation. The NINO and HPTDC combination simultaneously provide picosecond event timing and time-over-threshold determination of charge amplitude required for position determination by the centroiding C-DIR readout. Measurements of the detector's performance will be presented, with a discussion of our experience with utilising ASICs designed for high energy physics for alternative applications.

Preferred medium (Oral/poster)

Oral

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