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The Capacitive Division Image Readout - Development and Experimental Results

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The Capacitive Division Image Readout (C-DIR) is a charge centroiding device for imaging microchannel plate detectors. It comprises a two-dimensional matrix of capacitively coupled electrodes which divide the event charge between four charge measurement nodes. C-DIR's capacitive nature maintains the bandwidth of the fast MCP signal for event timing applications and places a low capacitive load on the measurement electronics. The combination of these qualities provides an enhanced image resolution/time resolution performance envelope compared with traditional centroiding readout devices such as the resistive anode or wedge and strip anode.

We present experimental performance of the C-DIR in a microchannel plate detector and compare results with theory. We describe developments to the C-DIR design and electronics configuration to optimise spatial resolution, temporal resolution and linearity. We discuss the application of capacitive division centroiding to a 2D discrete pixel array with multichannel electronics to provide sub-pixel spatial resolution with parallel event processing for very high throughput.

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Session Classification: Position sensitive detectors for extreme and other environments