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Capacitive Division Image Readout - Modelling and simulation of new designs

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The Capacitive Division Image Readout (C-DIR) is a centroiding image readout for single photon counting detectors such as microchannel plate (MCP) photomultipliers and micro pattern gas detectors. Division of the event charge occurs through a capacitively coupled two-dimensional matrix of electrodes to a small number of readout nodes where charge measurement followed by a position decoding algorithm is used to determine the event coordinate.

The capacitive nature of the C-DIR concept provides very high signal bandwidth for very fast timing applications and places a low capacitive load on the measurement electronics. In combination these qualities provide an enhanced image resolution/event timing performance envelope compared with traditional centroiding readout devices.

The C-DIR concept can be physically realised in a variety of electrode configurations and manufacturing methods. We describe various alternative C-DIR designs optimised for different detector formats performance requirements, and present simulations of performance augmented by experimental results from some of the designs.

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