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HRPPD photosensors for RICH detectors with a high resolution timing capability

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High Rate Picosecond Photodetectors (HRPPDs) are Micro-Channel Plate (MCP) based DC-coupled photosensors recently introduced by Incom, Inc. that have an active area of 104 mm by 104 mm, pixel pitch 3.25 mm, peak quantum efficiency in excess of 30%, exceptionally low dark count rates and timing resolution on the order of 30-40 ps for a single photon detection. As such, these photosensors are very well suited for Ring Imaging CHerenkov (RICH) detectors that can also provide high resolution timing capability, especially in a configuration where a detected charged particle passes through the sensor window which produces a localized flash containing a few dozens of Cherenkov photons in it.

Recently, a new version of HRPPDs has been developed that were substantially re-designed for use at the Electron-Ion Collider (EIC) , which will be sited at Brookhaven National Laboratory in the US. A first batch of seven "EIC HRPPDs"was manufactured in early 2024. Results of a systematic evaluation of these first EIC HRPPD tiles, including gain and quantum efficiency (QE) uniformity, timing resolution, and dark count rates (DCR) will be the main focus of this talk.

Primary experiment

EIC, but see the Comments

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