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Develop the new generation DELTA photodetector

Wednesday 8 October 2025 16:30 (20 minutes)

In this talk, I present a proposal for the next generation of fully packaged digital photodetectors based on a light-trapping mechanism called DELTA, Digital End-to-end Light Trap Assembly. The end-to-end development covers incident photons up to the digital signals saved to disk. Main topics of R&D for the DELTA detector include large-area photo-collectors that trap light inside, small-area photosensors optically coupled to photocollectors, on-board fast signal processing and digitization, and finally, laser photonics for power & signal transmission. The goal is to prototype this next-generation DELTA photodetector using the resources available under CPAD RDC2 working packages (WP1 and WP2).
The DELTA photodetector has final target applications in future noble liquid dark matter and neutrino experiments, as well as VUV light detection in astro-particle physics, astronomy, nuclear particle physics, medical physics, and national security where compact light detectors, large scale deployment, or harsh environment such as cryogenics, high voltage, and radio purity are called for. This proposal is motivated by emerging technologies in many fields, including microelectronics, laser photonics, and material science.
Preliminary light detection simulation performance, ongoing detector R&D, and future development interests will be presented.

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