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LightPix: Scalable digital readout for cryogenic SiPM applications

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LightPix is an Application Specific Integrated Circuit (ASIC) geared towards highly scalable cryogenic SiPM readout. LightPix is manufactured in 180-nm Bulk CMOS, and provides 64 individual channels each with amplification, a self-triggering TDC with O(ns) precision, and digital readout. Each ASIC dissipates $<200 \mu\text{W}$ per channel, and is scalable to >1000 channels per signal cable, allowing for large area coverage and high channel density in cryogenic environments. LightPix also features multi-channel hit-coincidence logic to deal with high dark count rates, enabling applications beyond cryogenic detectors. We present several directions of current and future R&D, including results of operation of LightPix-based cosmic ray telescope in liquid Argon, as well as progress towards deployment of LightPix for joint charge-light readout in a pixelated LArTPC. Prospects of LightPix for use in future large scale experiments are discussed.

Early Career

Yes

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