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LArPix-v2: a commercially scalable large-format 3D charge-readout scheme for LArTPCs

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3D ionization information facilitates unambiguous mm-scale fine-tracking in high occupancy liquid argon time-projection chamber (LArTPC) environments. LArPix-v2 incorporates low-power, low-noise 64-channel custom ASICs that can operate at cryogenic temperatures with a mixed-signal large-format printed circuit board for an unambiguous 3D charge-readout anode. With robust I/O and control architecture, a 10-by-10 array of ASICs instrument a 4,900-pixel PCB-based anode. The system is compatible with standard large-scale commercial electronics production techniques, enabling low-cost quick-turn production. Here I present a system design overview alongside performance evaluation from cosmic ray muons imaged in the SingleCube prototype (a 40-kg LArTPC with 30-cm drift). This system will be deployed in the upcoming ProtoDUNE-ND LArTPC physics operation.

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