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Testing of the CRYO ASIC for in-liquid-xenon ionization readout

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Liquid xenon (LXe) time projection chambers (TPCs) are powerful tools in the search for neutrinoless double beta decay (NDBD), offering a scalable, ultra-low-background technology with excellent energy resolution in the MeV energy range. An important aspect of these detectors is their 3D imaging capability, which enables powerful signal/background discrimination based on the position and topology of each event. Here we describe the CRYO ASIC –a LXe-compatible ionization readout solution developed for the nEXO experiment. nEXO is a proposed next-generation TPC that is designed to achieve sensitivity to NDBD at half-lives beyond 10^{28} years. CRYO is a system-on-chip designed in 130 nm CMOS technology that provides configurable front-end amplification and shaping as well as 2 MSPS digitization and serialization for up to 64 channels directly in the liquid xenon, reducing both noise and cabling requirements for high-resolution and low-background applications. I will discuss results from the nEXO collaboration's testing of the CRYO ASIC both at room temperature and at cryogenic temperature, including preliminary tests of performance in liquid xenon. The talk will also touch on R&D towards high-speed digital signal transmission for in-LXe electronics.

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