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Photo-induced Charge Calibration R&D for nEXO

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The nEXO experiment, a pioneering initiative aimed at searching for the elusive neutrinoless double beta decay of ^{136}Xe, sets an ambitious half-life sensitivity target exceeding 10^{28} years. The project utilizes a 5-tonne liquid xenon (LXe) Time Projection Chamber (TPC), right-cylindrical with a diameter of 1.3 m. Achieving precise calibration of the detector's ionization and scintillation responses is paramount, necessitating innovative strategies to overcome the LXe's inherent self-shielding capability, which complicates the use of external radioactive sources. Strategic injection of ^{220}Rn and ^{127}Xe isotopes into the xenon is planned to reach the innermost volume of the detector. Yet, to enhance calibration precision and to mitigate potential risks, University of Massachusetts Amherst leads the development of a method for in-situ generation and monitoring of drift electrons, and the light response of silicon photomultipliers within LXe. This novel approach is demonstrated using a small-scale, LXe dual grid ionization chamber, looking forward to enabling continuous monitoring of ionization electron lifetimes. Our poster presents the status, including preliminary results of this effort, highlighting the possible integration of gold photocathodes into the nEXO framework.

Poster prize

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