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Investigation of Laser Driven Charge Clusters in Liquid Xenon[1]
OUMAROU NJOYA, Stony Brook University, THOMAS TSANG, Brookhaven National Lab, MICHAL TARKA, Stony Brook University, WILLIAM FAIRBANK, Colorado State University, KRISHNA KUMAR, Stony Brook University, TRIVENI RAO, Brookhaven National Lab, NEXO COLLABORATION — We report on progress made in testing the concept of a laser driven in-situ electron lifetime monitoring system for a large Liquid Xenon Time Projection Chamber (LXe TPC). In our setup we use a 150-ns, 262-nm UV pulse (4th harmonic of YLF laser) to generate electrons from a gold photocathode; the laser couples to the photocathode via a 600-μm optical fiber. The electrons drift 20-mm in a uniform electric field inside the LXe-filled cell. The drift velocity and effects of diffusion are measured. Our setup is able to distinguish photo-emission due to gold from the multi-photon ionization of LXe by different drift times; this allows us to infer the cross section of the two-photon ionization process in LXe. Finally, we discuss preliminary studies of the stability, quantum efficiency, and work function of gold in a Xe environment.

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