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(G*) Study of HV instabilities in Single-Phase LXe Detectors

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Liquid xenon (LXe) is frequently employed to build detectors for rare event searches due to many of its advantageous properties including high stopping power, high ionization and scintillation yields, and relatively high cryogenic operating temperature. Time projection chambers (TPC) with LXe allow for 3D event reconstruction and identification which is important for reducing backgrounds. Due to the high drift fields TPCs are operated at, it is crucial to model breakdown properties in LXe. Often, a high voltage (HV) discharge is able to damage the detector instrumentation, e.g., the photo-sensors array. The context for this research is the appearance of HV instabilities on the EXO-200 ($0\nu\beta\beta$ search experiment from the Enriched Xenon Observatory (EXO) collaboration) TPC HV line, accompanied by scintillation VUV light. In our investigation we use a cryogenic setup called EXO-100 capable of purifying and liquifying Xenon, with a TPC modelled after the EXO-200 TPC but specifically designed to study HV instabilities and breakdowns in LXe. In this follow-up presentation, results (based on data collected in EXO-100) are presented displaying the analysis of HV instability pulse waveforms, and some possible origins of these instabilities in LXe.

Keyword-1

Liquid Xenon

Keyword-2

High Voltage

Keyword-3

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