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Measuring Sub-keV Ionization Yields in Liquid Argon for Dark Matter and Coherent Neutrino Scattering Searches BRIAN LENARDO, Univ of California - Davis, ADAM BERNSTEIN, KAREEM KAZKAZ, SERGEY PEREVERZEV, FINN REBASSOO, SAMUELE SANGIORGIO, Lawrence Livermore National Laboratory, MANI TRIPATHI, Univ of California - Davis, JINGKE XU, Lawrence Livermore National Laboratory — Liquid argon is widely used as a detector medium in particle physics, and is a promising technique for the future in the detection of neutrinos and possibly more exotic particles. Low energy recoils in argon are of special interest: coherent elastic neutrino-nucleus scattering (CENNS) and elastic scattering of dark matter in the form of low mass WIMPs are both expected to produce nuclear recoils at sub-keV energies. This regime that is largely unexplored in today's argon detectors. To properly model and analyze experimental data, an understanding of liquid argon response to nuclear recoils (signal) and electronic recoils (background) is needed at these energies. We present here a new measurement of the electronic recoil ionization yield of liquid argon at 0.27 keV using an Ar-37 calibration source dissolved in the liquid. The measurement spans a range of applied electric fields, and is the lowest energy multi-field calibration in liquid argon to date. We will describe the experiment, explain the analysis, and compare our results to existing models of ionization in liquid argon. These data provide information on the backgrounds in searches for low energy nuclear recoils and inform detector response models for existing and future experiments.

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