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Improving light yield in a LAr veto for neutrinoless double beta decay searches[1] RYAN GIBBONS, DOUGLAS FIELDS, MICHAEL GOLD, DINESH LOOMBA, NEIL MCFADDEN, The University of New Mexico — The Large Enriched Germanium Experiment for Neutrinoless double beta Decay (LEGEND) is an upcoming experiment searching for neutrinoless double beta decay. This process has a predicted half-life of at least 10^{27} yrs in 76Ge, therefore reducing radioactive backgrounds that could mimic the expected signals is the largest challenge facing the experiment. A method that has been shown to work is to veto external backgrounds by surrounding the Ge detectors with a volume of liquid argon (LAr) scintillator. Our work is focused on improving the efficiency of the LAr veto by studying methods to maximize the scintillation light yield. With a LAr test stand we detect the scintillation using PMTs and measure the light yield by counting photons and characterizing the pulse shape. By measuring the lifetime of the triplet state in LAr we have demonstrated that the removal of impurities in argon greatly improves light yield. We plan to dope the LAr with ppm-levels of xenon, which has also been shown to improve light yield in small-scale detectors. Additionally, we are performing optical simulations with Geant4 to optimize the geometry of the Ge detectors and the light collection system, which will be used to inform the best design for the LEGEND experiment.

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