Abstract Submitted
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Laser Assisted Electric Field Monitoring in a Cryogenic Environment[1] MARK BROERING[2], University of Kentucky, JOSH ABNEY[3], Argonne National Lab, MURCHHANA ROY, MARK MCCREA, University of Kentucky, CHRISTOPHER SWANK, BRAD FILIPPONE, California Institute of Technology, WEIJUN YAO, Oak Ridge National Lab, WOLFGANG KORSCH, University of Kentucky, SNS NEDM COLLABORATION COLLABORATION — The neutron EDM collaboration at the Spallation Neutron Source (ORNL) plans to use ultra-cold neutrons in liquid helium to improve the nEDM limit by two orders of magnitude. In this apparatus, neutrons are stored in target cells located in a strong, stable electric field. Local radiation generates charged particles which build up on the target cell walls reducing the field's strength and stability. The field fluctuations need to be kept below 1%, making it necessary to study this cell charging behavior, determine its effect on the experiment, and find ways to mitigate this. A compact test setup was designed to study this effect using small electrodes and a cell. Charged particles are generated by ionizing the helium with a ^{137}Cs source and the electric field is monitored via the electro-optic Kerr effect. Linearly polarized light is passed through the helium. The Kerr effect then introduces an ellipticity to the polarization that is proportional to the electric field squared. First measurements of cell charging in superfluid helium will be reported. This research is supported by DOE grants: DE-FG02-99ER41101, DE-AC05-00OR22725, DE-SC0014622

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