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The Argon Response to Ionization and Scintillation (ARIS) experiment

Friday, 22 September 2017 09:30 (15 minutes)

The Argon Response to Ionization and Scintillation (ARIS) experiment was constructed to characterize the response of single-scatter nuclear and electronic recoils in liquid argon for support of direct dark matter detection experiments with a liquid argon target. A 0.5 kg active volume scintillation cell of liquid argon was exposed to the highly collimated and quasi-monoenergetic LICORNE neutron source at the Institut de Physique Nucléaire Orsay in Orsay, France. An array of liquid scintillator detectors was used to tag scattered neutrons and select nuclear recoil energies, with average energies between 6.99 and 119.4 keV measured. The relative scintillation efficiency of nuclear recoils was measured to high precision for both zero field and a range of applied electric fields in the liquid argon. The array of scintillator detectors was also used to tag Compton scattered gammas from the 478 keV de-excitation of excited Li produced in the beamline, resulting in a range of single-scatter electronic recoil events. These gamma-tagged events were analyzed to extract the recombination probability as a function of energy and measure the linearity of the light yield for electronic recoil events. Results from all studies described above will be presented.

Summary

On behalf of the ARIS collaboration.

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