

Measurement of Detector Properties in a Spherical Proportional Counter

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NEWS-G (New Experiments With Spheres-Gas) is an experiment searching for dark matter using Spherical Proportional Counters (SPCs). SPCs are low capacitance detectors which allow the detection of gas ionisation with very low (single electron) thresholds. It consists in a grounded metal sphere with a small sensing anode at the center, creating a radial electric field. Its low capacitance, and the possibility to use low mass target gases such as neon, helium and methane, make it an interesting candidates to detect low mass dark matter. It also has potential for the detection of low energy neutrinos through coherent nucleus electric scattering (CEvNS). Energy calibration is critical for these experiments, and multiple techniques are used to characterise the response of the detector. Using a UV laser, we extract electrons from the sphere surface, which allows a fine calibration of gain, diffusion and drift time of electrons in the SPC. When combining this with the signal X-ray sources such as gaseous ^{37}Ar , we can measure the mean ionisation for our gas mixtures. Additional measurements are done using nuclear recoils from neutron scattering. We will present characterisation methods and results, as well as early results of dark matter search underground at LSM and SNOLAB.

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