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Simulation-based Studies of the Fiducialization of SNOGLOBE for the NEWS-G Experiment

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The NEWS-G direct dark matter experiment uses spherical proportional counters (SPCs) to search for low mass WIMPs. The next phase of this experiment consists of a large 140 cm diameter SPC, called “SNOGLOBE”, which was recently installed at SNOLAB with improvements to overall detector performance and data quality. Prior to installation at SNOLAB, this detector was commissioned using pure methane gas at the LSM and a temporary water shield, providing a hydrogen-rich target and reduced backgrounds. For larger SPCs, a new sensor design with a more complex geometry was employed with the use of an 11-anode “ACHINOS” sensor. With an ACHINOS, the need for simulation-based studies of the detector’s fiducialization are crucial for characterizing SNOGLOBE’s low-energy signal acceptance. ACHINOS sensors group anodes using 2-3 electronic channels, allowing for the discrimination of event signals by detector volume. Alongside data analysis, electronic drift simulations of the sensor-wise distribution of primary electrons from observed events allow for further characterization of the fiducial volume for each channel. This talk will demonstrate the process for characterizing the total fiducialization of SNOGLOBE with a 2-channel ACHINOS sensor via simulation, as well as the feasibility for future simulation-based studies including SPC directionality with possibly more advanced sensory technology.

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Please select: Experiment or Theory

Experiment

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