



Contribution ID: 39

Type: Dark Matter Searches

Detector Response Simulation for NEWS-G Dark Matter Experiment

Wednesday, February 16, 2022 11:00 AM (12 minutes)

The Spherical Proportional Counter (SPC) is used in NEWS-G to search for low-mass Weakly Interacting Massive Particles (WIMPs). UV laser and Ar37 calibration data were previously taken at Laboratoire Souterrain de Modane (LSM) with a 1.35m diameter SPC filled with pure CH₄ gas. To verify our understanding of the detector behavior and the physics model we use, a simulation of the SPC response to these two sets of calibration data is needed. The primary electrons originating from the same event will drift toward the high voltage sensor and a current is induced by the motion of secondary ions drifting away from the sensor. How much diffusion a swarm of electrons undergoes is parametrized by the “rise time” of the integrated charge pulse. Both rise times and drift times of electrons can be affected by the “space charges”, which are secondary ions created near the sensor distorting the overall electric field within the detector. The simulation results will be compared with the calibration data and the effect due to space charges will be discussed. Finally, I will talk about the implication of the simulation results in cut efficiencies and WIMP signal acceptance to further extract the dark matter cross-section exclusion limits.

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Please select: Experiment or Theory

Experiment

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