Canadian Association of Physicists
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Contribution ID: **3168** Type: **Oral Competition (Graduate Student) / Compétition orale (Étudiant(e) du 2e ou 3e cycle)**

(G*) detector response simulation for NEWS-G experiment

Monday 6 June 2022 17:00 (15 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 data calibrations were previously taken at the Laboratoire Souterrain de Modane (LSM) with a 1.35m diameter SPC filled with pure CH4 gas. To verify our understanding of the detector behaviour and the physics model we are using, 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 will be 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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Session Classification: M3-8 Dark Matter Experiment II (PPD) | Experiences de matière sombre II (PPD)

Track Classification: Technical Sessions / Sessions techniques: Particle Physics / Physique des particules (PPD)