Canadian Association of Physicists
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Contribution ID: **270** Type: **Oral Competition (Graduate Student) / Compétition orale (Étudiant(e) du 2e ou 3e cycle)**

(G*) Detector response simulation for NEWS-G Dark Matter experiment

Thursday 10 June 2021 12:55 (10 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 was previously taken at Laboratoire Souterrain de Modane (LSM) with a 1.35m diameter SPC filled with pure CH4 gas. In order to verify our understanding of the detector behaviour and the physics model we use, a simulation of the SPC response to these two responses 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. The signal amplitude characterized by the rise time of the amplitude of the integrated charge pulse, will increase with the diffusion time and consequently with the radial location of the event. After describing the method used to model the electron drift and how we obtain the rise time from the simulated events, I will present the different approaches used to match the model with the calibration data performed at LSM. Finally, I will discuss 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: R2-8 Backgrounds and modelling for rare event searches (PPD) / Bruit et modélisation pour la recherche d'événements rares (PPD)

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