

9th SYMPOSIUM ON LARGE TPCs FOR LOW-ENERGY RARE EVENT DETECTION



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Gas properties characterization for the NEWS-G detector

NEWS-G (New Experiments With Spheres-Gas) is a direct dark matter detection experiment using Spherical Proportional Counters (SPCs). Key advantages of SPCs for dark matter search and especially light mass DM particles are their low energy threshold -single ionisation electron- and the possibility to use various light target nuclei -Neon/Helium/CH₄ gases-. Dark

matter limits were obtained in 2017 using Neon in the 60 cm prototype SEDINE at Laboratoire Souterrain de Modane (LSM).

R&D is ongoing within the collaboration to define the best operating conditions in a larger 140 cm detector at SNOLAB. For this, we use two main

calibration tools: a gaseous ³⁷Ar source, providing two monoenergetic peaks at 280 eV and 2.8 keV, and a 213 nm UV laser, extracting photoelectrons from the inner surface of the sphere. The laser allows us to study the response of the detector to single electrons, to measure the drift time and diffusion of electrons from the surface. On the other hand, the ³⁷Ar source allows to measure the energy resolution for events in the whole detector volume. Finally, combining these two tools, we can extract the W-value of the gas mixture from the single electron response and the position of monoenergetic peaks.

Primary author: GROS, Philippe (Queen's University, Kingston, Canada)

Presenter: GROS, Philippe (Queen's University, Kingston, Canada)