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Latest results from the NEWS-G dark matter experiment

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In the Fall of 2019, the NEWS-G experiment used its latest detector, a 140 cm diameter Spherical Proportional Counter (SPC) to search for low-mass dark matter at the Laboratoire souterrain de Modane (LSM), in France. The detector has then been moved to SNOLAB in Canada, where it has been taking data since Fall 2022. SPCs are metallic spheres filled with gas, with a high voltage anode at the centre that attracts and amplifies ionization charges coming from atomic recoils. Having the sphere filled with pure methane, hydrogen was used as the target to produce new limits on the proton spin-dependent cross-section around masses of 1 GeV.

This talk will first introduce the NEWS-G experiment and describe the commissioning at the LSM with the shielding used, the SPC detection principle and the new multi-anode sensor. It will then focus on the calibrations using a UV laser and argon-37, as well as the background discrimination methods to remove alpha-induced events and spurious pulses coming from the electronics. Then, it will explain the profile likelihood ratio method that was used in order to derive constraints on WIMP mass and cross-section. Finally, it will describe the status of the recent data taken at SNOLAB and mention future projects.

Submitted on behalf of a Collaboration?

Yes

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