

Detecting very low mass Dark Matter particles with NEWS-SNO

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The existence of Dark Matter in our Universe is nowadays well established, however, its exact nature still remains unknown. The goal of the NEWS-SNO (New Experiments with Spheres in SNOLAB) project is to search for particle candidates in mass regions not yet accessible by existing experiments. The planned NEWS-SNO detector consists of a spherical TPC (time-projection-chamber) out of ultrapure copper, filled with up to 10bar of CH₄ and He gas mixtures which is read out with one central sensor set at high voltage. Thanks to the very light nuclear mass of the employed targets as well as the very low energy threshold, the detection of spin-independent and spin-dependent interacting WIMPS down to masses of 0.1 GeV/c² is aimed at. This mass range for Dark Matter particles is motivated in a number of models based on dark sector forces and, e.g., millicharged models. Changing the nature and/or mix of gas, the pressure, the HV, the sensor are knobs that could be used to check a possible dark matter like signal. An overview and status of the planned experiment at SNOLAB and results of the prototype detector SEDINE operated with Neon gas in the Laboratoire Souterrain de Modane underground laboratory in France will be given.

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