

Light Dark Matter searches with a next generation Spherical Proportional Counter

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The NEWS-G collaboration is searching for light dark matter candidates using spherical proportional counters. Access to the mass range from 0.05 to 10 GeV is enabled by the combination of low energy detection threshold, light gaseous targets (H, He, Ne), and highly radio-pure detector construction.

Initial NEWS-G results obtained with SEDINE, a 60 cm in diameter spherical proportional counter operating at LSM (France), excluded for the first time WIMP-like dark matter candidates down to masses of 0.5 GeV. Currently, a 140 cm in diameter spherical proportional counter, S140, constructed at LSM using 4N copper with 500 μm electroplated inner layer, operates in SNOLAB (Canada) with the first physics campaign recently completed. The first physics results using commissioning data will be presented along with the developments in read-out sensor technologies using resistive materials and multi-anode read-out that enable its operation.

Moreover, recent developments on the detector instrumentation, namely individual read-out of the multi-anode sensor and electroformation techniques, will be discussed towards DarkSPHERE, a large-scale spherical proportional counter fully electroformed underground at the Boulby Underground Laboratory.

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