

## **Reaching the neutrino floor for sub-GeV dark matter with spherical proportional counters fully electroformed underground**

*Wednesday, 1 September 2021 17:45 (15)*

The NEWS-G collaboration has demonstrated the ability to competitively search for light Dark Matter (DM) using spherical proportional counters. SNOGLOBE, the current 1.4 m in diameter detector, was constructed with 99.99% pure copper (C10100). A 500 $\mu$ m ultra-pure copper layer was electroplated to the detector's inner surface to further suppress backgrounds. Building on this experience, the collaboration is now undertaking the underground construction of entire detectors for unparalleled radiopurity. ECUME, a 1.4 m in diameter detector, will be fully electroformed (EF) in SNOLAB, suppressing both Pb-210 contamination and cosmogenic activation. The construction of a 30 cm in diameter scale model at PNNL will begin imminently, while the construction of ECUME is expected to begin later in 2021. The prototype construction, design and physics potential of ECUME will be discussed. Furthermore, the physics potential of DarkSPHERE, a 3 m in diameter spherical proportional counter currently at the conceptual design stage, will be presented. An improved shielding is foreseen for this detector to reduce external backgrounds to a level matching that of EF copper. New developments in the read-out technology will facilitate operation at higher pressure and potentially provide track reconstruction capabilities. These improvements, along with the increased detector volume, operating pressure, and use of light (H, He, C) gas targets, will enable sensitivity down to the neutrino floor in the sub-GeV DM mass range.

**Reference to paper (DOI or arXiv)**

**Your gender (free text)**

**Primary author(s)** : NIKOLOPOULOS, Kostas (University of Birmingham)

**Presenter(s)** : NIKOLOPOULOS, Kostas (University of Birmingham)

**Session Classification** : Discussion Panel Dark Matter 6

**Track Classification** : Dark Matter and its detection