Contribution ID: **236** Type: **oral**

The SuperCDMS experiment at SNOLAB

Tuesday, 24 September 2024 17:51 (17 minutes)

The Super Cryogenic Dark Matter Search (SuperCDMS) SNOLAB is a direct detection dark matter (DM) search experiment that is currently being constructed 2 kilometers underground at SNOLAB, Canada. The experiment will employ 24 cryogenic semiconductor detectors (18 germanium and 6 silicon) that are comprised of two different types. The first type is called a High Voltage (HV) detector operated at ∼100 V that measures only phonon signals. The second type is an interleaved Z-sensitive Ionization and Phonon (iZIP) detector operated at ∼6-8 V that measures both phonon and charge signals. The phonons generated by the drifting ionizing charges due to the Neganov-Trofimov-Luke effect add to the phonons produced from the initial particle interaction in the crystal. The phonons are subsequently measured by transition edge sensors and converted to electrical signals. The HV detectors will lower the energy threshold, whereas the iZIP detectors will facilitate a better understanding of the backgrounds. The silicon detectors, due to their lower atomic mass, are more sensitive to sub-GeV DM. On the other hand, the germanium detectors will be able to explore weaker DM-nucleon cross-sections due to lower intrinsic backgrounds. The experiment aims to achieve world-leading sensitivity for DM-nucleon interactions in the DM mass range of 0.5 GeV to 5 GeV. SuperCDMS recently tested a set of HV detectors at a low background low-temperature user facility at SNOLAB called the Cryogenic Underground TEst facility (CUTE). This talk will highlight the experiment design, the current status of its construction, and findings from the detector tests done at CUTE.

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Session Classification: Direct Dark Matter detection