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Dark Matter Direct Detection with SuperCDMS

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The Super Cryogenic Dark Matter Search (SuperCDMS) SNOLAB is a world-leading direct detection experiment currently under construction, expected to begin full science runs next year. The successor to the SuperCDMS detectors previously operated at the Soudan Underground Laboratory in Minnesota, it will continue the progression of ever-improving dark matter sensitivities using cryogenic Ge and Si crystals. It employs two detector designs, with photolithographically patterned quantum sensors for ionization and phonon signals from particle interactions. The detectors are being deployed in a new radiopure cryostat and shield, which drastically reduce background sources such as radioactive decay products. With the lower energy thresholds enabled by these developments, the focus of the search is widening: from traditional WIMPs at the mass scale of several GeV, to sub-GeV dark matter particle candidates. Detector characterizations, background measurements, and calibrations are already underway at test facilities, including the Cryogenic Underground TEst (CUTE) facility at SNOLAB, aided by gram-scale “HVeV” prototype detectors featuring single electron-hole pair sensitivity. In this talk, I will present the status and plans of the SuperCDMS SNOLAB experiment and associated activities at test facilities, as well as projections for their science results over the next several years.

Keyword-1

direct detection

Keyword-2

low-mass dark matter

Keyword-3

cryogenic semiconductors

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