

Searching for Sub-GeV Dark Matter with SENSEI

Sho Uemura
Tel Aviv University
for the SENSEI Collaboration

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Abstract

SENSEI (Sub-Electron Noise Skipper Experimental Instrument) is pioneering the development of silicon CCDs with sub-electron charge resolution for low-threshold direct detection of dark matter. These “skipper CCDs” are the first detectors capable of resolving single electrons in each of millions of pixels, and the low thresholds possible with this technology give SENSEI world-leading sensitivity to sub-GeV dark matter.

Last year SENSEI conducted the first direct-detection search using a skipper CCD from a dedicated fabrication batch optimized for low-background dark matter searches. Using 24 days of data collected ~ 100 m underground at Fermilab with a 2-gram CCD, we measure the lowest rates in silicon detectors of events containing one, two, three, or four electrons, and achieve world-leading sensitivity for a large range of sub-GeV dark matter masses.

I will present these recent results, and preparations for the upcoming full-scale SENSEI run at the SNOLAB deep-underground facility.