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Superconducting Nanowire Single Photon Detectors for sub-GeV Dark Matter Detection

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Elucidating the fundamental nature of dark matter (DM) is one of the open questions in particle physics today. The growing interest in new sub-GeV DM models has led to many proposals for experiments that can effectively probe this unexplored parameter space. Due to their low energy thresholds and low intrinsic dark count rates, superconducting nanowire single photon detectors (SNSPDs) can be effective in low-mass DM detection.

One novel detector architecture sensitive to MeV-scale DM via electron recoils uses n -type GaAs as a scintillating target and large-area SNSPDs as sensors to read out scintillation photons.

We highlight recent optical excitation experiments on nanogram-scale targets with 1 mm^2 SNSPD arrays, and the development of an energy-tagged x-ray excitation source for future characterization experiments. The plan to scale this experiment to larger target volumes is driving the development of SNSPDs with cm^2 -scale active areas using novel multiplexing techniques and nanofabrication processes.

In-person or Virtual?

In-person

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