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## Cryogenic optical beam steering for calibration of superconducting sensors

*Wednesday, 8 November 2023 17:00 (15 minutes)*

A major obstacle in the search for detection of meV-scale rare events is demonstrating sufficiently low energy detection thresholds in order to detect recoils from light dark matter particles. Many detector concepts have been proposed to achieve this goal, which often include novel detector target media or sensor technology. A universal challenge in understanding the signals from these new detectors is characterization of detector response near the detection threshold, as the calibration methods available at low energies are very limited. We have developed a method of cryogenic optical beam steering that can be used to generate  $O(\mu\text{s})$  pulses of small numbers of photons over the energy range of 0.1-5 eV and deliver them to any location on the surface of a superconducting device with time and energy features comparable to expected signals. This allows for robust calibration of any photon-sensitive detector, enabling exploration of a variety of science targets including position sensitivity of detector configurations, phonon transport in materials, and the effect of quasiparticle poisoning on detector operation. In this talk, I will review the operating principles of optical beam steering, present current results from both the pulse creation and pulse delivery systems, and discuss the implementation of this technology for various sensors such as KIDs and qubits.

### Early Career

Yes

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