



Contribution ID: 170

Type: Oral

Sapphire substrate qubit-based detector for light dark matter search

Thursday, 9 November 2023 13:30 (15 minutes)

Harnessing sub-eV energy excitations from light dark matter interaction with a target material is one of the challenges in exploring promising novel materials for dark matter searches. In polar materials like sapphire, dark matter interaction can excite sub-eV optical phonon modes. Furthermore, the anisotropy of sapphire crystal could provide a signature of daily modulation of the dark matter scattering rate, making it a promising target material. We plan to utilize superconducting qubits on a sapphire substrate to take advantage of the excitation of phonons, which scatter and further down-convert to lower-energy phonons. A good fraction of these phonons are expected to reach the qubit superconductor on the substrate and break Cooper pairs. Such a process can cause qubit decoherence, which can be measured using standard qubit readout protocol. In this talk, we describe our ongoing attempt to build such a prototype detector.

Early Career

No

Primary author: ANYANG, Kester (Illinois Institute of Technology)

Co-authors: KHATIWADA, Rakshya; LINEHAN, Ryan

Presenter: ANYANG, Kester (Illinois Institute of Technology)

Session Classification: RDC8

Track Classification: RDC Parallel Sessions: RDC8: Quantum and Superconducting Sensors