

Snowmass2021 - Letter of Interest

Optical and Infrared Microwave Kinetic Inductance Detectors

Thematic Areas: (check all that apply /)

- (CF1) Dark Matter: Particle Like
- (CF2) Dark Matter: Wavelike
- (CF3) Dark Matter: Cosmic Probes
- (CF4) Dark Energy and Cosmic Acceleration: The Modern Universe
- (CF5) Dark Energy and Cosmic Acceleration: Cosmic Dawn and Before
- (CF6) Dark Energy and Cosmic Acceleration: Complementarity of Probes and New Facilities
- (CF7) Cosmic Probes of Fundamental Physics
- (Other) [*Please specify frontier/topical group*]
- (IF1) Quantum Sensors
- (IF2) Photon Detectors
- (TF10) Quantum Information Science

Contact Information:

Ben Mazin (UCSB): bmazin@ucsb.edu

Abstract:

Optical and IR (OIR) Microwave Kinetic Inductance Detectors, or MKIDs, are superconducting photon counting detectors capable of measuring the energy and arrival time of individual OIR photons without read noise or dark current. They are widely considered to be one of the most promising emerging OIR detectors. In this whitepaper we will discuss the current status of MKIDs and MKID-based instruments, and lay out the exciting future they will enable with sufficient support from the community.

This LOI is submitted to make the community aware of the significant progress that has been made in MKIDs for many applications across the optical and infrared, as detailed in the Astro2020 whitepaper by Mazin *et al.* (<https://arxiv.org/abs/1908.02775>).

In the submitted whitepaper we will update the Astro2020 whitepaper with the latest MKID advances, as well as go into detail on applications relevant to The Particle Physics Community Planning Exercise such as the proposed DEEPDISH Dark Mater MKID Haloscope.