Progress on a KID-Based Phonon-Mediated Dark Matter Detector

• KIDs as phonon sensors in a phonon-mediated dark matter detector

• Two design strategies:
  1. ~100 KIDs for position reconstruction and background removal in a large (kg-scale) detector
     • Current design under test
     • High yield ~93%
     • Designed to minimize inter-KID coupling
  2. Single KID for low-threshold (< 1 eV) sub-GeV DM detector

• Two layer fab:
  • 300 nm Nb feedline for reliability and minimal dead metal
  • 30 nm Al KIDs

• Used in-array KIDs as phonon source for calibration events
  • Can control timing, amplitude, and location of events
    • Every KID is a phonon source for every other KID
  • Can create (and average) as many identical events as desired
    • See poster #407

• Used phonon signal template and noise PSD to calculate optimum filter resolution on energy absorbed by quasiparticle system
  • 12.6 eV

• Plan to implement kinetic inductance paramp

• Post-doc ad coming out soon (Contact: Sunil Golwala)