Contribution ID: 264 Type: not specified

## Phonon-mediated kinetic inductance detectors for sub-GeV dark matter searches

Friday 31 March 2023 17:30 (15 minutes)

Kinetic inductance detectors (KIDs) as low mass dark matter detectors are interesting for two reasons: 1) their massive multiplexability and concomitant position resolution enable NR/ER discrimination down to 500eV recoil energy, allowing for neutrino-limited NRDM searches from 0.5GeV-5GeV, and 2) a variety of RF-based and KID-specific improvements chart an attainable path forward to sub-eV recoil energy resolutions. To date, a prototype 1 gram 20-KID device has demonstrated <1mm position resolution and 0.55keV resolution at 30keV. We report on the progress of two different KID architectures that highlight our two main thrusts of demonstrating multiplexability and sub-eV resolutions: 1) a 9 gram 80-KID device has shown scalability issues that we believe can be solved with improved RF engineering, and 2) a 1 gram single KID device has shown an inferred baseline energy resolution of 20eV, with 5eV resolution immediately possible with minor modifications.

Author: WEN, Osmond

**Co-authors:** ARALIS, Taylor (California Institute of Technology); BASU THAKUR, Ritoban (California Institute of Technology); BUMBLE, Bruce (JPL); CHANG, Yen-Yung (California Institute of Technology); KURINSKY, Noah (SLAC/Stanford); RAMANATHAN, Karthik (California Institute of Technology); SANDOVAL, Brandon (California Institute of Technology); TEMPLES, Dylan (Fermilab); GOLWALA, Sunil (California Institute of Technology)

Presenter: WEN, Osmond

**Session Classification:** SESSION 14: Direct detection: Technical Development-2 (CHAIR: Rafael Lang - Purdue University)