Contribution ID: **115** Type: **Parallel session talk**

Enhanced Phonon Collection Efficiency in Aluminum MKIDs with Phonon Reflective Coating

Tuesday 7 October 2025 15:30 (15 minutes)

Phonon-sensitive Microwave Kinetic Inductance Detectors (MKIDs) are promising superconducting sensor candidates, offering scalability and lower energy resolution for fundamental physics experiments such as low-mass dark matter direct detection and neutrinoless double beta decay searches. Energy resolution of the sensor to phononic signal can be improved by improving phonon collection efficiency. We demonstrated a method to increase phonon reflectivity at the detector's boundaries by introducing a thin multilayer Si/Mo phonon reflection coating. We developed a microfabrication process to deposit 15 bi-layers of Si/Mo (350 nm thick) on the backside of the silicon substrates with Al MKID sensors. We tuned this reflective coating structure to be effective in the 100–225 GHz phonon frequency range. We did comparative measurements of phonon collection efficiencies between two MKID devices with identical front side MKID design, but one with the reflective coating and one without. We measured the coating's phonon reflectivity is approximately 60%. This presentation will cover the design and fabrication of the coated Al MKIDs and the details of the measurements.

Author: LI, Kungang (Lawrence Berkeley National Lab)

Co-authors: LI, Xinran (Lawrence Berkeley national laboratory); GARCIA-SCIVERES, Maurice (Lawrence Berkeley National Lab. (US)); Dr GULLIKSON, Eric (Lawrence Berkeley National Lab); Dr SALMASSI, Farhad (Lawrence Berkeley National Lab); Dr SIPAHIGIL, Alp (Lawrence Berkeley National Lab); SUZUKI, Aritoki (Lawrence Berkeley National Laboratory); Dr YOHANNES, Daniel (SEEQC); Dr ZHANG, Zihuai (UC Berkeley)

Presenter: LI, Kungang (Lawrence Berkeley National Lab)

Session Classification: RDC 8 Quantum & Superconducting Sensors

Track Classification: RDC 8 Quantum & Superconducting Sensors