

Low Tc Hafnium Kinetic Inductance Device for Dark Matter Search

Closely related but contrary to Qubits, dark matter detectors are built to be ultra-sensitive to phonons created from impacts in the substrate. TESs have been successfully implemented as phonon sensors on gram-scale detectors. Kinetic inductance devices (KIDs) are naturally suitable for multiplexing readout, which can scale detectors to kilogram scale.

At LBL we focus on low Tc Hafnium KIDs R&D for phonon sensing. 250mK Tc resonators with internal quality factors exceeding 10^5 have been demonstrated. Low Tc not only yields more quasiparticles per unit energy, but also enables quasiparticle trapping from aluminum phonon absorbers. This technique will lead to sub-eV energy threshold kilogram scale dark matter detectors.

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