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Non-equilibrium ballistic phonon transport in microstructures JARED HERTZBERG, OBAFEMI OTELAJA, RICHARD ROBINSON[1], Cornell University — We demonstrate a method to locally excite and detect phonon modes in silicon microstructures. Decay of quasiparticles injected into an adjacent superconducting film excites phonons in a non-thermal spectral distribution [1]. Phonons of frequency of order 100 GHz are detected by the excitations they cause in a second superconducting film, after ballistically traversing microstructures of 10 to 50 micron dimension. Measurements are made at temperatures of 0.3 to 1.2 K. Such a device advances the goal of building a nanoscale phonon spectrometer to study acoustic confinement and surface scattering effects. This work is supported by KAUST (KUS-C1-018-02), NSF (DMR 0520404), and DOE (DE-SC0001086).

[1] W. Eisenmenger, A. H. Dayem, Phys. Rev. Lett. 18, 125 (1967).

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