

Abstract Submitted  
for the MAR10 Meeting of  
The American Physical Society

**Generation of coherent pulses of sub-terahertz longitudinal acoustic phonons in n-i-p-i silicon doping superlattices**<sup>1</sup> THOMAS WILSON, Marshall University — Intense pulses of coherent 246-GHz longitudinal acoustic phonons have been produced in n-i-p-i silicon doping superlattices by the resonant absorption of pulsed far-infrared (FIR) laser radiation. A niobium small-period grating-coupler has been used to convert the incident transverse electric field into an evanescent longitudinal field over the thickness of the superlattice. Si:B piezo-phonon spectroscopy is used, in conjunction with a fast granular aluminum/palladium microbolometer, to verify that the phonons exist in a narrow frequency band ( $\sim 10$ -GHz) around the FIR laser frequency at 246-GHz (1.22 mm). Time-of-flight across the thin (0.5-mm) substrate is used to verify that the phonons are longitudinal. The laser radiation is coupled onto the grating-coupler via a corrugated waveguide and a hyper-hemispherical silicon lens. Potential applications include the development of a novel terahertz cryogenic acoustic microscope for sub-surface imaging and sub-nanometer lateral resolution.

<sup>1</sup>We acknowledge the support under NSF ECCS 0622060

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Date submitted: 20 Nov 2009

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