Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Theory of coherent phonons in carbon nanoribbons[1] GARY SANDERS, CHRIS STANTON, University of Florida — We have developed a microscopic theory for the generation and detection of coherent phonons in armchair and zigzag carbon nanoribbons using an extended tight-binding model for electrons and a valence force field model for the phonons. Coherent phonons are generated through the electron-phonon deformation potential interaction and we use Heisenberg's equation to obtain a driven oscillator equation for the coherent phonon amplitudes. We find that the driving function depends explicitly on the time-dependent photoexcited carrier distribution functions. We simulate the generation and detection of coherent phonons in coherent phonon spectroscopy experiments. We consider coherent phonon oscillations of the lowest lying radial breathing like mode (RBLM) in zigzag and armchair nanoribbons as a function of ribbon width and pump/probe polarization angle.

[1]Supported by NSF through grants OISE-0968405 and DMR-1105437.

Gary Sanders
University of Florida

Date submitted: 09 Nov 2011 Electronic form version 1.4