

Abstract Submitted  
for the MAR11 Meeting of  
The American Physical Society

**Theory of coherent phonons in graphene**<sup>1</sup> G.D. SANDERS, University of Florida, C.J. STANTON, University of Florida, J.-H. KIM, K.-J. YEE, Chungnam National University, M.H. JUNG, B.H. HONG, Sungkyunkwan University, E.H. HAROZ, J. KONO, Rice University — We develop a theory for the generation and detection of coherent phonons in graphene. Coherent phonons are generated via the deformation potential electron-phonon interaction with photogenerated carriers. In our theory the electronic states are treated in a third nearest neighbor extended tight binding formalism which gives a good description of the states over the entire graphene Brillouin zone while the phonon states are treated in a valence force field model. The equations of motion for the coherent phonon amplitudes are obtained in a density matrix formalism and we find that the coherent phonon amplitudes satisfy driven oscillator equations for each value of the phonon wavevector. Comparison is made with recent experimental measurements.

<sup>1</sup>Supported by NSF through grants OISE-0530220 and DMR-0706313 and the ONR through grant ONR-00075094, and the Robert A. Welch Foundation through grant No. C-1509.

Gary Sanders

Date submitted: 17 Dec 2010

Electronic form version 1.4