Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

The Graphenic Bicontinuum Provides a Unified Analytical Treatment of Lattice Dynamics in Carbon Nanostructures. CRISTIANO NISOLI, VINCENT CRESPI, Department of Physics, Penn State University, ERIC MOCKENSTURM, Department of Mechanics and Nuclear Engineering, Penn State University — A two-field bi-continuum model for the vibrational dynamics of graphene and carbon nanotubes describes a wealth of phenomena absent in a traditional continuum, including optical phonons, the high wave-vector nonlinearity of the acoustic branches, and even the hexagonal graphenic Brillouin zone. Since it includes all the degrees of freedom of the honeycomb lattice, the model provides a complete description of important electromechanical effects such as strain-induced gap opening or gap-induced phonon softening. The bi-continuum provides a unified framework for understanding and extending a previously disparate accumulation of analytical and computational results on deformations and vibrations in carbon nanostructures.

Vincent Crespi
Penn State University

Date submitted: 19 Nov 2006 Electronic form version 1.4