

Abstract Submitted  
for the MAR08 Meeting of  
The American Physical Society

**Graphene and Graphite Nanoribbons: phonon-scattering limit of conductivity from tight-binding**<sup>1</sup> DANIEL FINKENSTADT, U.S. Naval Research Laboratory, GARY PENNINGTON, U.S. Army Research Laboratory, MICHAEL MEHL, U.S. Naval Research Laboratory — To understand nanoribbons of graphene, and multilayers of such ribbons, we developed an ab initio parametrized fit to Carbon and Hydrogen chemical data, out to arbitrary neighbor interactions, including relaxations [*Phys. Rev. B* **76**, 121405R (2007)]. Our computed band structure shows a decrease in the armchair edge band gap when ribbons are multilayered. Further, the well-known three-family behavior of armchair bangaps is confirmed and shown here to apply also to the drift velocity of charge carriers, which can have  $\pm 20\%$  deviation from the ideal Fermi velocity. Boltzmann carrier transport simulations from calculated phonon spectra also show a familial dependence of conductance, peak field-effect mobility and “on” conductance that increase linearly with ribbon width. We will also discuss phonon-limited scattering of charge carriers in graphene multilayers and the temperature dependence of transport.

<sup>1</sup>Funded by the U.S. Naval Research Laboratory and the Office of Naval Research. Computational support from the DOD HPCMPO CHSSI program. DF is funded by the National Research Council.

Daniel Finkenstadt  
U.S. Naval Research Laboratory

Date submitted: 29 Nov 2007

Electronic form version 1.4