

Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Heat flow in metallic carbon nanostructures: hot phonons or hot electrons? MARCELO KURODA, Beckman Institute and Dept. of Physics, University of Illinois at Urbana-Champaign, JEAN-PIERRE LEBURTON, Beckman Institute and Dept. of Electrical and Computer Engineering, University of Illinois at Urbana-Champaign — A model for electronic and thermal transport in metallic carbon nanotubes and graphene ribbons under electrical stress is presented. The influence of acoustic and optical phonon scattering is taken into account within a self-consistent electro-thermal scheme. Owing to the linear electronic dispersion relation, two thermalized carrier populations arise as a consequence of inter-carrier scattering. We show that depending on the experimental setup and nanotube parameters, different transport regimes emerge for which non-equilibrium electrons and phonons compete to carry the energy in these carbon nanostructures.

Marcelo Kuroda
Beckman Institute and Dept. of Physics,
University of Illinois at Urbana-Champaign

Date submitted: 20 Dec 2007

Electronic form version 1.4