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Current & Heat Transport in Graphene Nanoribbons: Role of Non-Equilibrium Phonons GARY PENNINGTON, UMD, DANIEL FINKENSTADT, U.S. Naval Academy — The conducting channel of a graphitic nanoscale device is expected to experience a larger degree of thermal isolation when compared to traditional inversion channels of electronic devices. This leads to enhanced non-equilibrium phonon populations which are likely to adversely affect the mobility of graphene-based nanoribbons due to enhanced phonon scattering. Recent reports indicating the importance of carrier scattering with substrate surface polar optical phonons in carbon nanotubes[1] and graphene[2,3] show that this mechanism may allow enhanced heat removal from the nanoribbon channel. To investigate the effects of hot phonon populations on current and heat conduction, we solve the graphene nanoribbon multiband Boltzmann transport equation. Monte Carlo transport techniques are used since phonon populations may be tracked and updated temporally.[4] The electronic structure is solved using the NRL Tight-Binding method,[5] where carriers are scattered by confined acoustic, optical, edge and substrate polar optical phonons. [1] S. V. Rotkin et al., *Nano Lett.* **9**, 1850 (2009). [2] J. H. Chen, C. Jang, S. Xiao, M. Ishigami and M. S. Fuhrer, *Nature Nanotech.* **3**, 206 (2008). [3] V. Perebeinos and P. Avouris, arXiv:0910.4665v1 [cond-mat.mes-hall] (2009). [4] P. Lugli et al., *Appl. Phys. Lett.* **50**, 1251 (1987). [5] D. Finkenstadt, G. Pennington & M.J. Mehl, *Phys. Rev. B* **76**, 121405(R) (2007).

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