

Abstract Submitted
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Local electron heating in nanoscopic conductors¹ ROBERTO D'AGOSTA, NA SAI, MASSIMILIANO DI VENTRA, University of California - San Diego — The electron current density in nanoscale junctions is typically several orders of magnitude larger than the corresponding one in bulk electrodes. Consequently, the electron-electron scattering rate increases substantially in the junction. This leads to local electron heating of the underlying Fermi sea [1] in analogy to the local ionic heating that is due to the increased electron-phonon scattering rates [2]. By using a novel hydrodynamic formulation of transport [3], we predict the bias dependence of local electron heating in quasi-ballistic nanoscale conductors [1], its effect on ionic heating [1], and the consequent observable changes in the inelastic conductance [4]. [1] R. D'Agosta, N. Sai and M. Di Ventra, accepted in Nano Letters (2006). [2] Y.-C. Chen, M. Zwolak, and M. Di Ventra, Nano Lett. **3**, 1961 (2003); Nano Lett. **4**, 1709 (2004); Nano Lett. **5**, 621 (2005). M. J. Montgomery, T. N. Todorov, and A. P. Sutton, J. Phys. Cond. Matt. **14**, 5377 (2002). [3] R. D'Agosta and M. Di Ventra, J. Phys. Cond. Matt. in press. [4] R. D'Agosta and M. Di Ventra, in preparation.

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