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Entanglement dynamics within the micro-canonical approach to transport MASSIMILIANO DI VENTRA, UCSD, CHIH-CHUN CHIEN, MICHAEL ZWOLAK, Los Alamos National Lab — When a central barrier is located between two biased electrodes, the tunneling of electrons may build a quasi steady-state current and the entanglement entropy between the two sides increases. We study these quantities using the micro-canonical picture of transport [1]. The quasi steady-state current from our simulations agree with that obtained from single-particle scattering theory. In addition, we find that the entanglement entropy increases linearly in time and with bias, so long as the barrier is only partially transmitting, which agrees qualitatively with previous results derived under restrictive assumptions. The micro-canonical approach also allows us to investigate this system highly out-of-equilibrium and under a range of conditions. We present further results on barriers with different tunneling probabilities, biases, and time-dependent fields.

[1] M. Di Ventra and T. N. Todorov, J. Phys. Cond. Matt. 16, 8025 (2004).

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