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Quantum creep and variable range hopping of one-dimensional interacting electrons THOMAS NATTERMANN, University of Cologne — The variable range hopping results for non-interacting electrons of Mott and Shklovskii are generalized to 1D disordered charge density waves and Luttinger liquids using an instanton approach. In the present paper we calculate the quantum creep of charges at zero temperature and the linear conductivity at finite temperatures for these systems. The hopping conductivity for the interacting electrons acquires the same form as for non-interacting particles if the one-particle density of states is replaced by the compressibility. It turns out that dissipation is crucial for tunneling to happen. Contrary to pure systems the new meta-stable state does not propagate through the system but is restricted to a region of the size of the tunneling region. This corresponds to the hopping of an integer number of charges over a finite distance. A global current results only if tunneling events fill the whole sample. We argue that rare events of extra low tunneling probability are not relevant for realistic systems of finite length. Finally we show that an additional Coulomb interaction only leads to small logarithmic corrections.

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