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Electric-field-driven resistive switching in dissipative Hubbard model JIAJUN LI, State Univ of NY - Buffalo, CAMILLE ARON, Princeton University, GABRIEL KOTLIAR, Rutgers University, JONG HAN, State Univ of NY - Buffalo — Understanding of solids driven out of equilibrium by external fields has been one of the central goals in condensed matter physics for the past century and is relevant to nanotechnology applications such as resistive transitions. We study how strongly correlated electrons on a dissipative lattice evolve from equilibrium when driven by a constant electric field, focusing on the extent of the linear regime and hysteretic non-linear effects at higher fields. We access the non-equilibrium steady states, non-perturbatively in both the field and the electronic interactions, by means of a non-equilibrium dynamical mean-field theory in the Coulomb gauge. The linear response regime is limited by Joule heating effects and breaks down at fields orders of magnitude smaller than the quasi-particle energy scale. For large electronic interactions, strong but experimentally accessible electric fields can induce a resistive switching by driving the strongly correlated metal into a Mott insulator. Hysteretic I-V curves suggest that the non-equilibrium current is carried through a spatially inhomogeneous metal-insulator mixed state.[1]

[1]J. Li, C. Aron, G. Kotliar, J. E. Han, Phys. Rev. Lett. **114**, 226403 (2015)

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