Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Filament Formation and Electric-field-driven Resistive Switching in ordered Mott insulator JIAJUN LI, State Univ of NY - Buffalo, CAMILLE ARON, Princeton University, GABRIEL KOTLIAR, Rutgers University, JONG HAN, State Univ of NY - Buffalo — Formation of conductive filaments is widely observed in resistive switching experiments of strongly correlated materials. Although several theoretical scenarios have been suggested, the underlying mechanism is still far from completely understood within microscopic models. In this work, we study the spatial inhomogeneity during electric-field-driven AFI-to-PM transition in a dissipative Hubbard model[1,2]. We focus on the non-equilibrium steady state, by means of space-dependent Hartree-Fock approximation. It is shown that external field induces a first order insulator-to-metal transition (IMT) even when equilibrium transition is continuous. Disorder turns out to be crucial for formation of filaments. When impurities are placed in lattice, Joule heating assists to create robust conductive paths. Insulator-to-metal transition is then stimulated by conductive paths, with critical field significantly reduced.

[1]J. E. Han and J. Li, Phys. Rev. B **88**, 075113 (2013)
[2]J. Li, C. Aron, G. Kotliar, J. E. Han, Phys. Rev. Lett. **114**, 226403 (2015)

Jiajun Li
State Univ of NY - Buffalo

Date submitted: 05 Nov 2015 Electronic form version 1.4