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Resistive Switching in Ordered Insulators: Thermal or Electronic Mechanism? JIAJUN LI, SUNY at Buffalo, CAMILLE ARON, Laboratoire de Physique Theorique, Ecole Normale Superieure, CNRS, PSL Research University, Sorbonne Universites, GABRIEL KOTLIAR, Rutgers University, JONG HAN, SUNY at Buffalo — We investigate the dramatic switch of resistance in ordered correlated insulators, when driven out of equilibrium by a strong voltage bias. Starting from a microscopic description, we present a driven-dissipative mechanism that explains and reproduces the characteristic features of resistive switching (RS), such as the S-shaped I-V curves with hysteresis and the formation of hot conductive filament during the switch. We discuss the tangled relationship between filament growth and negative differential resistance, and also how crystallographic structure and disorder contribute to this mechanism. The distribution function computed at the RS shows that the thermal and electronic mechanisms are compatible: nonequilibrium excitations created by the Landau-Zener tunneling over a self-consistent gap have the first moment fully consistent with the Joule heating scenario.

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