

WEBINAIRE DMONS

Mardi 26 mars 2024 à 15h00

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From micro to macro : exploring the physics of strongly correlated systems using cluster DMFT and resistor networks approaches

In the first part of the seminar, we will discuss a microscopical point of view of strongly correlated theory. We will compare the solution of the Hubbard model by using continuous time quantum Monte Carlo with Dynamical Cluster Approximation (DCA), Cellular Dynamical Mean-Field Theory (CDMFT) and the Dimer Hubbard model on the Bethe lattice to address the unusual features of the normal-state phenomena.

In the second part, we will address the complexity of experiment on resistive switching that can be understood by the use of the resistor network model. We will see how in VO₂ the ability to induce volatile resistive switching create conductive filaments, a key feature for developing novel hardware for neuromorphic. Instead, in LSMO we found that the opposite type of resistive switching, from a metal into an insulator, occurs in a reciprocal characteristic spatial pattern: the formation of an insulating barrier perpendicular to the driving current.

References:

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3. Fratino, L., et al. "Doping-driven resistive collapse of the Mott insulator in a minimal model for VO₂." *Physical Review B* 105.12 (2022) <https://journals.aps.org/prb/abstract/10.1103/PhysRevB.105.125140>
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5. Salev, P., Fratino, L., Sasaki, D., Berkoun, R., Del Valle, J., Kalcheim, Y., ... & Schuller, I. K. (2021). Transverse barrier formation by electrical triggering of a metal-to-insulator transition. *Nature communications*, 12(1), 1-7. <https://www.nature.com/articles/s41467-021-25802-1>
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