European XFEL Theory Seminar

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Campus Schenefeld, main building (XHQ) room E1.173

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Correlated systems in non equilibrium conditions: few case studies

In the talk I shall present few selected results of my activity in out-of-equilibrium correlated systems. First, I will focus on phenomena that arise within the metal-insulator coexistence region across a first order Mott transition. I will start by briefly discussing the evolution in V_2O_3 of the corundum metal-monoclinic insulator coexistence region upon increasing temperature, as revealed by linear dichroism in photoemission microscopy. This tool allows recognising the crucial role in seeding metallic nuclei of the polydomain phase of the monoclinic insulator, unavoidable in a martensitic transformation. Next, I will show in a simple model for a d-d Mott insulator, V_2O_3 being just the prototype, how the electric breakdown in a FET geometry differs inside from outside the insulator-metal coexistence region. Outside coexistence, the electric breakdown is alike the standard Landau-Zener one. On the contrary, inside coexistence we find a genuine resistive transition, where the electric field simply stabilises the formerly metastable metal. Next, I will move to a different topic, and discuss a general mechanism to cool down low-energy excitations in correlated metals by laser pulses. This mechanism is quite general, as it just requires the existence of a high-energy mode, e.g. an exciton, which acts as an efficient entropy sink when the laser is on, but releases back that entropy very slowly when the laser is off. I will then provide arguments that such mechanism could explain the light-induced enhancement of Tc observed in K_3C_{60}.

Host: Evgeny Gorelov