SFB/TRR 21 - Seminar

9. Mai 2012, Stuttgart

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Nanodomain formation and electronic transport near the 1st-order Mott-Hubbard transition

Mott-Hubbard systems near half filling exhibit unusual electronic transport properties, often summarized by the term "bad metal". For a number of Mott-Hubbard systems the metal-insulator transition is of 1st order even at finite temperature, well described by the dynamical mean-field theory (DMFT) for the Hubbard model. Hence, there exists a region around the transition where metallic and insulating phases coexist. In this coexistence region, the thermodynamically stable state is characterized by randomly distributed insulating nanodomains within the metallic phase and vice versa. That is, a complex, static disorder problem emerges from the strong dynamical correlations of the a priori homogeneous system. Using a spatially dependent dynamical mean field theory (rDMFT), we calculate the size distribution of insulating and metallic domains, depending on temperature and Hubbard repulsion U. Using this distribution, the system can be mapped onto a random resistor network, whose transport properties are governed by the percolation of nanodomains. Within the coexistence region up to the 2nd-order critical point of the Mott-Hubbard transition we obtain a linear temperature dependence of the resistivity, reminiscent of several Mott-Hubbard compounds.

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