

THEORIEKOLLOQUIUM & Sonderkolloquium SFB/TRR80

Freitag, den 07.12.18 um 12:00 in MC 351

Prof. Dr. Daniel Khomskii

Universität Köln

“Molecules” in solids against magnetism

Close to Mott transition several novel states can appear. In particular, “molecular clusters” can be formed in the solid, such as dimers, trimers, etc. . Especially important for these phenomena is the role of different d-orbitals, which leads to different orbital-selective effects. In my talk I will formulate the main ideas and will illustrate such phenomena, especially dimer formation, on many examples, especially for systems with 4d and 5d electrons. The concept of orbital-selective Peierls transitions will be proposed and justified. In systems containing structural metal dimers there may exist in the presence of different orbitals a special state with partial formation of singlets by electrons on one orbital, while others are effectively decoupled and may give e.g. long-range magnetic order or stay paramagnetic. Similar situation can be realized in dimers spontaneously formed at structural phase transitions, which can be called orbital-selective Peierls transition. Yet another consequence of this picture is that for odd number of electrons per dimer there exist competition between double exchange mechanism of ferromagnetism and the formation of singlet dimer by electron on one orbital. Such molecular states can strongly reduce and effectively suppress double exchange ferromagnetism. I will discuss some implications of these phenomena, and consider examples of real systems, in which orbital-selective phase are realized.

Kontakt: Prof. Dr. Jürgen König, koenig@thp.uni-due.de