SFB 608

Einladung zum Sonderkolloquium

Ort: Universität zu Köln
Seminarraum 111 in der ***Kernphysik*** !!

Zeit: ***Montag*** !! den 22. September 2003, 15 Uhr c.t.

Sprecher: Dr. Christian Batista
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Thema: Electronic Ferroelectricity: A Novel Broken Symmetry State.

Ferroelectrics are of considerable interest because their highly unusual properties open the door to their use as sensors, switches, and data storage devices. The transition to a ferroelectric (FE) state has traditionally been considered as a subgroup of the structural phase transitions driven by phonons. As in the case of superconductivity, the existence of ferroelectricity based on a purely electronic mechanism would provide a new set of physical properties and technological applications; for instance, it would create the possibility of controlling their optical properties with magnetic fields. In this talk, I will demonstrate that a ferroelectric state can be induced in a two-band system of interacting electrons without phonons. To this end I will solve an extended Falicov-Kimball model by mapping its strong coupling limit into a xxz spin 1/2 model with a magnetic field. In this way, I can easily determine the phase diagram of the extended Falicov-Kimball model and show the existence a transition to a mixed valence regime containing two phases: an orbitally ordered state and a Bose-Einstein condensation of excitons with a built-in electric polarization.

Gez. Prof. D. Khomskii