Advanced theories for functional oxides: new routes to handle the devices of the future

Von 2009-06-01 bis 2012-05-31, Abgeschlossenes Projekt | ATHENA Website

Ziel

Transition metal oxides are the building blocks of future microelectronics, due to outstanding properties such as, e.g. colossal magnetoresistivity and electroresistivity. Envisioned applications are countless, from spintronic devices to multiferroics, to non-volatile magnetic memories. Despite the huge amount of work already accomplished, a deep and complete understanding of these systems is still lacking. This is due on the one hand to the complexity inherent to the physics of strong-correlated electrons, which includes a plethora of fascinating but overtly complex phenomena (e.g. charge and orbital ordering, polaronic formation, spin-charge separation, non-Fermi liquid behavior, to name just few). On the other hand, there is an unquestionable lack of coordinated effort devoted to share, integrate, and develop the most advanced and powerful computational techniques nowadays available. With the present project we aim to close this gap by gathering in a synergic collaboration some of the most experienced groups in the subject, equipped with the most advanced methodologies for the theoretical study of strong-correlated phenomena in transition metal oxides. Specifically, the European units assemble a vast competence on methodologies that are at the developmental forefront of First-Principles methodologies, whereas the Indian partners are worldwide recognized experts on both First-Principles and model many-body (e.g. Hubbard Hamiltonian (HH)) techniques. In the project we plan to develop an unprecedented fusion of these two different but complementary viewpoints, applied to the study of the most fascinating and technologically promising class of systems candidates to be employed in the devices of the future.

Verwandte Informationen

Berichtzusammenfassungen  
Final Report Summary - ATHENA (Advanced theories for functional oxides: new routes to handle the devices of the future)
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