Spin, Charge, and Orbital Interactions in Transition Metal Oxides

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Abstract

Recent advances in the synthesis and epitaxial engineering of oxide materials has made it possible to fabricate novel materials with emergent physical properties including superconductivity, magnetism, and multiferoicity, which are manifested as a result of the competition among spin, orbital, and lattice degrees of freedom. Understanding the physical properties of such correlated materials often requires a detailed knowledge on the electronic, magnetic, and structural configurations with nano-scale ordering of spin and charge. In this talk, I will discuss the physics of transition metal oxides focusing on the role of on-site Coulomb interactions and the related physical properties arising from the interactions among spin, charge, and orbital degrees of freedom.