

Order Parameter Characterization of Oxide Superconductors

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It is becoming more and more evident that oxide high-temperature superconductors are characterized by properties other than its ability to superconduct. Some of these properties under experimental and theoretical scrutiny include spin/charge stripe order, staggered currents, and induced incommensurate magnetic order due to externally applied magnetic field. We discuss a general Ginzburg-Landau framework in which to understand the competition or the co-existence of these “orders” with superconductivity. Some mean-field, microscopic calculations are presented as well. A simple renormalization-group argument is introduced in order to complement the microscopic approach and to shed light on the physics of the order parameters characterizing an oxide superconductor. Finally experimental methods of detecting such an order are discussed.

keywords : oxide superconductor, order parameter, Ginzburg-Landau theory, mean-field theory, renormalization group