

MAR12-2011-005189

Abstract for an Invited Paper  
for the MAR12 Meeting of  
the American Physical Society

**Evidence for competing orders in underdoped  $\text{YBa}_2\text{Cu}_3\text{O}_y$**

CYRIL PROUST, Laboratoire National des Champs Magnétiques Intenses (CNRS)

25 years after the discovery of high temperature cuprate superconductors, the observation of quantum oscillations has deeply changed the theoretical landscape relevant to these materials. The measurements of quantum oscillations on both sides of the phase diagram of cuprates confirm the existence of a Fermi surface with sharply defined excitations on the overdoped side and also show that the Fermi surface has suffered a drastic modification on the other side. The small Fermi pockets inferred from quantum oscillations in the underdoped regime combined with the negative Hall and Seebeck coefficients pointing to electrons as dominant charge carriers, greatly strengthen the case that the Fermi surface of underdoped  $\text{YBa}_2\text{Cu}_3\text{O}_y$  undergoes a reconstruction because the translational symmetry of its lattice is broken at low temperature. Many studies, such those of the Hall and Seebeck effects, point to a reconstruction of the Fermi surface due to stripe order. More recently, NMR measurements discover a static, unidirectional, modulation of the charge density in the  $\text{CuO}_2$  planes that has the 4a-periodic stripe modulation. In this talk, I will show the impact of this charge order on some transport properties, in particular  $c$ -axis transport. A crossover to a coherent regime of metallic behavior of the  $c$ -axis resistivity at low temperature coincides with the emergence of the charge order. I will also address the topical question of competition between the charge order and superconductivity in high fields.