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# Competing Orders in High Temperature Superconductors

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## Abstract

In the 25 years since the discovery of high temperature superconductivity (HTS) in the layered cuprates, it has become clear that an important characteristic of these materials is the existence of many competing and co-existing ground states. These competing phases break various forms of symmetry, for example, U(1) gauge symmetry in the superconducting phase, and time reversal symmetry in the magnetically order phases. Scanning probe microscopy (STM), quantum oscillatory measurements and NMR provided evidence for further symmetry breaking. We have recently observed charge order in the form of a charge density wave (CDW) x-ray diffraction in the archetypical HTS material YBa<sub>2</sub>Cu<sub>3</sub>O<sub>6+x</sub>. I will present experiments which probe the spin and charge correlations in cuprates. Specifically our x-ray measurements and a inelastic neutron scattering measurements of the spin excitations on YBa<sub>2</sub>Cu<sub>3</sub>O<sub>6+x</sub> and La<sub>2-x</sub>Sr<sub>x</sub>CuO<sub>4</sub> which we have made over a wide energy range.

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