Session 26V

The Pseudogap State in Underdoped Cuprates: Orbital Currents and Cheap Vortices **26V1**

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In the past several years, we have developed a theory for the underdoped cuprates in collaboration with X.-G. Wen, based on an SU(2) formulation of the t-J model. In this formulation, the staggered flux state plays a central role as the progenitor of the Neél state at half-filling and a close competitor to the d-wave superconductor with small doping where it is characterized by staggered orbital currents. We found support for this point of view when we discovered fluctuating orbital currents in the Gutzwiller projected BCS wavefunction. We shall argue that low-energy vortices, where the staggered flux state is stabilized in the core, are needed to explain many of the unusual properties of underdoped cuprates. Proposed experiments to look for these orbital currents will be discussed.

Magnetic Dynamics in Correlated Electron Systems **26V2**

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We will give an overview over recent neutron scattering experiments on high temperature superconductors and related transition metal oxides. Recent experiments have shown that an unusual "resonant" spin excitation mode is a generic spectral feature of all copper oxides. Manifestations of a strong interaction of this mode with charged quasiparticles are observed by several spectroscopic techniques. After giving some perspective on a current debate about the role of the mode for the mechanism of high temperature superconductivity, we will move on to a discussion of related experiments in titanium and vanadium oxides, where the interplay between spin and orbital degrees of freedom gives rise to interesting new physics. The magnetic dynamics measured in these materials defies conventional theories, and the development of a quantum many body description of these effects is an exciting new frontier of research.