Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Competing ferromagnetism in high temperature copper oxide superconductors[1] SUDIP CHAKRAVARTY, ANGELA KOPP, AMIT GHOSAL, UCLA — While much attention has been paid to the underdoped regime of the hole-doped cuprates because of its proximity to a complex Mott insulating phase, little attention has been paid to the overdoped regime. Experiments are beginning to reveal that the phenomenology of the overdoped regime is just as puzzling. For example, the electrons appear to form a Fermi liquid, but this interpretation is problematic; any trace of Mott phenomena, as signified by incommensurate antiferromagnetic fluctuations, is absent, and the uniform spin susceptibility shows a ferromagnetic upturn.Here we show and justify that many of these puzzles can be resolved if we assume that competing ferromagnetic fluctuations are simultaneously present with superconductivity, and the termination of the superconducting dome in the overdoped regime marks a quantum critical point beyond which there should be a genuine ferromagnetic phase at zero temperature. We propose new experiments, and make new predictions, to test our theory and suggest that effort must be mounted to elucidate the nature of the overdoped regime, if the problem of high temperature superconductivity is to be solved.

[1]Supported by NSF-DMR.

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Date submitted: 02 Dec 2006 Electronic form version 1.4