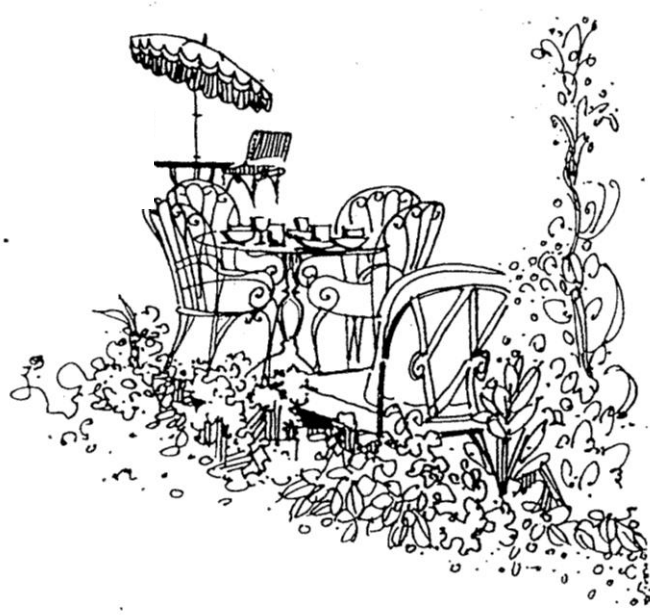
Chez Pierre

Presents ...

Monday, October 17, 2011
12:00pm
MIT Room 4-331



Martin Greven

University of Minnesota

"Novel Magnetism in the Cuprates"

Magnetic correlations might cause the superconductivity in the cuprates and are generally believed to be antiferromagnetic. Following our success in growing sizable crystals of the structurally simple compound HgBa2CuO4+□ [1], our elastic and inelastic polarized neutron scattering experiments allowed us to demonstrate the universal existence of an unusual kind of magnetic order [2] and to discover associated magnetic excitations [3]. Unlike antiferromagnetism, this order does not break the lattice translational symmetry. Nevertheless, the excitations mix with conventional antiferromagnetic fluctuations, which points toward a unifying picture of magnetism in the cuprates that requires a multi-band description. The experimental results are consistent with the notion that the phase diagram is controlled by an underlying quantum critical point [4], and I will compare them with the specific theoretical prediction that the novel magnetism results from circulating charge currents in the underlying copper-oxygen plaquettes [5].

[1] X. Zhao et al., Adv. Mat. 18, 3243 (2006).
[2] Y. Li et al., Nature 455, 372 (2008).
[3] Y. Li et al., Nature 468, 283 (2010), and unpublished results.
[4] S. Sachdev, Science 288, 475 (2000).
[5] C. Varma, Nature 468, 184 (2010).