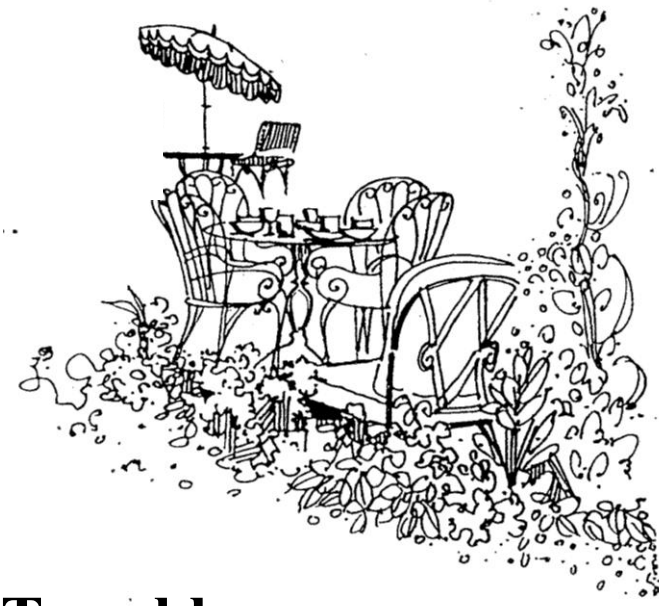
Chez Pierre

Presents ...

Monday, October 3, 2011
12:00pm
MIT Room 4-331



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"Mott Physics in strongly correlated superconductivity"

Strong repulsion between electrons in a half-filled band leads to an insulating state, the so-called Mott insulator. A doped Mott insulator is different from a doped band insulator. Signatures of doped Mott insulating behavior are present in high-temperature superconductors. To elucidate the influence of Mott Physics away from half-filling, we study the normal-state phase diagram as a function of temperature, interaction strength and filling. We use cellular dynamical mean-field theory on a plaquette and continuous-time quantum Monte Carlo methods. This methodology leads to a new point of view that replaces Landau Fermi liquid theory when interactions are strong. It is found that upon increasing filling towards the insulator, there is a surface of first-order transition between two metals at nonzero doping, a Fermi liquid and a pseudogapped metal. Finite temperature signatures of this transition seem to be what controls the strange metal appearing above optimal doping in high-temperature superconductors. [1-2] The superconducting state can also be studied with the same methodology. [3-4]

References:
[1] G. Sordi, K. Haule, and A.-M. S. Tremblay, Phys. Rev. Lett. 104, 226402 (2010)
[2] S. Okamoto, D. Sénéchal, M. Civelli, and A.-M. S. Tremblay, Phys. Rev. B 82, 180511(R) (2010)
[3] B. Kyung, D. Sénéchal and A.-M.S., Tremblay, Phys. Rev. B 80, 205109 (2009)
[4] S. S. Kancharla, M. Civelli, M. Capone, B. Kyung, D. Sénéchal, G. Kotliar, A.-M.S. Tremblay Phys. Rev. B 77, 184516 (2008)