

Chez Pierre

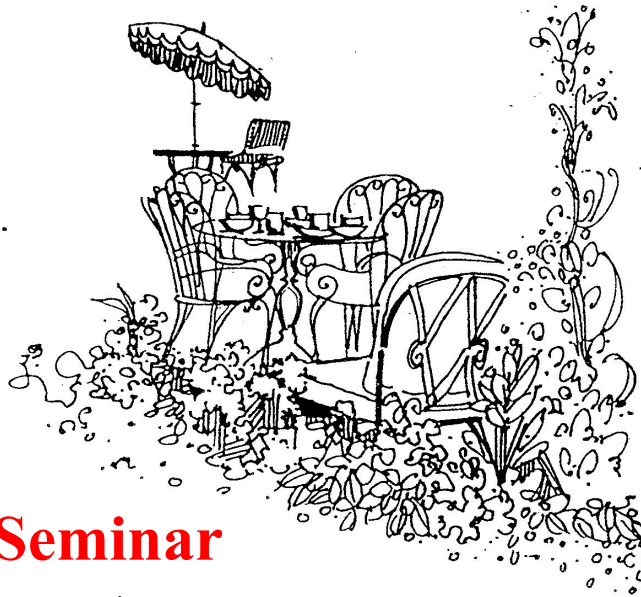
Presents ...

Monday, September 12, 2016

12:00pm Noon

MIT Room 4-331

Chez Pierre Seminar



Boris Fine - Skolkovo Institute of Science and Technology ” Fermi-surface in cuprates in the presence of spin-vortex checkerboard“

Spontaneous modulations of electronic spin and charge densities may play an important role in the mechanism of superconductivity in cuprates. 1/8-doped lanthanum cuprates are often mentioned as a prototypical example of a one-dimensional stripe-like spin and charge modulations. Yet, it is also possible that these materials exhibit two-dimensional checkerboard-like modulations. We present a broader discussion of this issue, and then turn to a specific puzzle associated with 1/8-doped lanthanum cuprates, namely, the observation of the nodes of the pseudogap at angle 45 degrees with respect to the principal lattice directions[1,2]. In the framework of the stripe scenario, the above directions are also at 45 degrees with respect to the supposed stripe orientation - the fact that is difficult to explain. We consider an alternative to stripes known as spin-vortex checkerboard[3,4] and perform the calculation of the Fermi-surface in the framework of a simplified model imitating the magnetic modulation. We find that, for a certain range of parameters, the Fermi surface has a character of a small Fermi-ark with the same orientation as the experimentally observed pseudogap nodes. Finally, we discuss the implications of this result for electronic transport.

[1] T. Valla et al., Science 314, 1914 (2006)

[2] R. He et al., Nat. Phys. 5, 119 (2009)

[3] B. V. Fine, Phys. Rev. B 75, 060504R (2007)

[4] B. V. Fine, J. Supercond. Nov. Magn. 24, 1207 (2011).