

Chez Pierre

Presents ...

Monday, April 30, 2018

12:00pm Noon

MIT Room 4-331

Chez Pierre Seminar

Oskar Vafek – Florida State University

“Superconductivity on the Brink of Spin-Charge Order in a Doped Honeycomb Bilayer”

At neutrality, bilayer graphene features quadratic band touching points. Such (multicritical) points are unstable at low enough temperature when electron-electron interactions are taken into account, and appear in AB stacked graphene bilayer (with fine-tuned hopping) or twisted bilayer (with twist angle fine-tuned to 'magic' values). Using a controlled weak-coupling renormalization group formalism, I will describe the fate of such points for repulsive interactions at, and away, from the neutrality point. As electrons are added to the system, spin or charge ordered phases are suppressed, and unconventional superconductivity appears generically in their place. The analysis is sufficiently tractable that the mechanism of superconductivity can be identified. Sufficiently far away from the neutrality point, the ordering is suppressed, and the system is a Fermi liquid. I will also describe recent DMRG results for another (simpler) model system of spinless Fermions with quadratic band touching on checkerboard lattice, and compare the results with the weak-coupling renormalization group analysis.

[1] O. Vafek, J. M. Murray, and V. Cvetkovic, Phys. Rev. Lett. 112, 147002 (2014)

[2] J. M. Murray and O. Vafek PRB 89, 205119 (2014)

[3] Shouvik Sur, Shou-Shu Gong, Kun Yang, and O. Vafek (in preparation)

