

Chez Pierre

Presents ...

Tuesday, April 16, 2019

12:00pm Noon

MIT Room 4-331

Special Chez Pierre Seminar

Andrey V Chubukov – University of Minnesota

“Interplay between superconductivity and non-Fermi liquid above a quantum critical point in a metal”

I discuss the interplay between non-Fermi liquid behaviour and superconductivity near a quantum-critical point (QCP) in a metal. It is widely thought that the tendency towards superconductivity and towards non-Fermi liquid behaviour compete, such that when the pairing interaction is reduced below a certain threshold, the system displays a naked non-Fermi liquid QC behaviour. I show that the situation is more complex as there are multiple solutions for T_c at a QCP. For all solutions, except one, T_c vanishes when the pairing interaction drops below the threshold. However, for one solution T_c remains finite even at arbitrary small pairing interaction, despite that there is no Cooper logarithm. I argue that superconductivity between this T_c and a lower T , when other solutions appear, is special, as it is entirely induced by fermions with the first Matsubara frequency. I discuss the implications for the density of states and the spectral function. I argue that there are two qualitatively different regimes of system behaviour below the onset of pairing – at low T the pairing gap closes with increasing T , while at higher T it gets filled in, but remains finite. I discuss pairing fluctuations and argue that in the “gap filling” regime long-range superconducting order is destroyed, and the system displays a pseudogap behaviour.

