

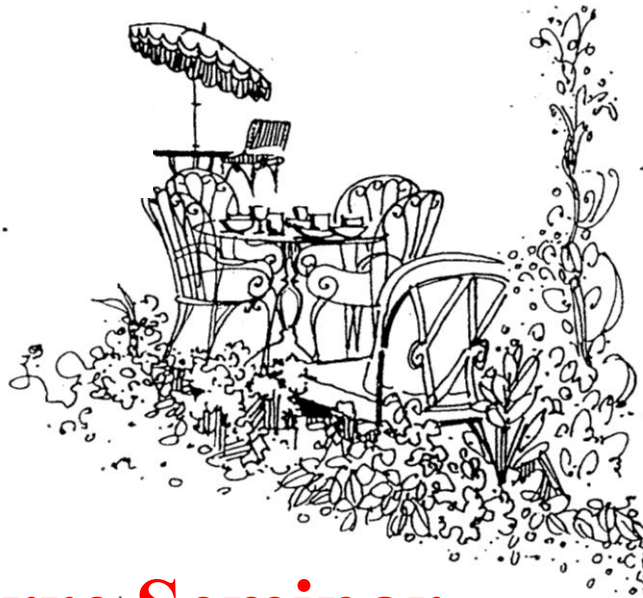
Chez Pierre

Presents ...

Thursday, April 10, 2014

1:00pm

MIT Room 4-331



Special Chez Pierre Seminar

Peter Fulde

Max Planck Institute for the Physics of Complex Systems,
Germany

“Superconductivity caused by intra-atomic excitations”

One of the most interesting questions in the theory of superconductivity is the nature of the bosonic excitations which cause Cooper pairing. Originally, these excitations were thought to be phonons. Yet, after the discovery of high- T_c superconductors other excitations based on magnetic interactions obtained high attention. Here I want to present two types of non-phononic excitations for which experimental evidence is particularly compelling, that they cause Cooper pairing. One case concerns the filled skutterudite PrOs_4Sb_2 which has a transition temperature T_c more than twice as high as LaOs_4Sb_2 . The only difference between the two materials are the two 4f electrons of Pr. Here, intra 4f shell transitions are pair forming. The other is UPd_2Al_3 where magnetic excitons act as a binding agent. These excitations are an example of the dual character of 5f electrons. The latter is a consequence of the strong correlations which the f electrons experience. Experimental evidence for the duality of 5f electrons is presented.