

Dr. Parish, Meera (University of Cambridge): Polarons, molecules and trimers in polarized atomic Fermi gases

Wednesday, August 11, 2010 11:00 AM (1 hour)

In this talk, I will consider an atomic Fermi gas in the limit of extreme spin imbalance, where one has a single spin-down impurity atom interacting attractively with a spin-up atomic Fermi gas. By constructing variational wave functions for polarons, molecules and trimers, I will explore the quantum phase transitions between each of these bound states as a function of mass ratio and interaction strength. I will show that Fulde-Ferrell-Larkin-Ovchinnikov (FFLO) pairing is mostly superceded by the formation of a p-wave trimer, which can be viewed as a FFLO molecule that has bound an additional majority atom. When the mass of impurity atom is sufficiently light, I find that these transitions lie outside the region of superfluid-normal phase separation in spin-imbalanced Fermi gases and should thus be observable in experiment, unlike the well-studied equal-mass case.

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