

Prof. Törmä, Päivi (Aalto University): Imbalanced Fermi gases: the FFLO state, polarons, and the Josephson effect

Tuesday, August 10, 2010 1:45 PM (1 hour)

In this talk, I will discuss three topics. First, the FFLO phase in one dimensional optical lattice and a direct way to observe it as narrowing of the hopping modulation spectrum. Second, I discuss our work on polaron-type physics in one dimension where we can explain the results of exact simulations by a polaron ansatz in one the weakly interacting and by a spinless Fermion solution given by the Bethe ansatz in the strongly interacting limit. This corresponds to the polaron-molecule crossover in three dimensions. Finally, I present a novel type of Josephson effect where the components of the Cooper pair feel a different potential (voltage), which is possible to realize in ultracold gases. We show that this leads to spin-asymmetric Josephson oscillations and provide an explanation of this intriguing phenomenon which also gives new information about the traditional Josephson effect.

Primary author: Prof. TÖRMÄ, Päivi (Aalto University)