Contribution ID: **38** Type: **not specified**

Konrad Kobuszewski - Dynamics of quantized vortices in sipn-imbalanced Fermi superfluids.

Friday, 14 June 2019 10:00 (20 minutes)

Behaviour of interacting fermions at low temperutres is not fully understood despite over the six decades of theoretical and experimental studies in the systems like liquid He-3, heavy nuclei, neutron stars and more recently in cold atoms. In this regime all these systems undergo a superfluid phase transition which can be indicated by appearance of quantized vortices.
In my talk I would like to briefly describe crucial differences between bosonic and fermionic superfluidity to justify that the second case is far more demanding at the fundamental level, because a satisfactory description requires inclusion of many mechanisms for superfluid relaxation like various phonon processes or Cooper pair breaking. Moreover the spin-imbalnce introduces new complication, because implies coexistance of both superfluid and normal components even at zero temperature limit. I will show that time-dependent superfluid density functional theory (TDSLDA) in a natural manner incorporates all these necessary ingredients. I will also present some numerical simulations of quantized vortices within TDSLDA in the so-called unitary Fermi gas. In comparison to the spin-balanced case, a suprising feature of a vortex in the spin-polarized system will be revealed.
Finally I will discuss how my research can influence understanding of quantum turbulence and modeling of the neutron star crust.

Primary authors: Mr KOBUSZEWSKI, Konrad (Warsaw University of Technology); Dr WLAZŁOWSKI, Gabriel; Dr SEKIZAWA, Kazuyuki; Prof. MAGIERSKI, Piotr