DAY 3: 10:50 – 11:30

Odd-frequency pairing state in superconducting junctions

Yukio Tanaka
Nagoya University

We have theoretically studied the induced odd-frequency pairing states in ballistic normal metal/superconductor (N/S) junctions where a superconductor has even-frequency symmetry in the bulk. Using the quasiclassical Green's function formalism, we demonstrate that, quite generally, the pair amplitude in the junction has an admixture of an odd-frequency component due to the breakdown of translational invariance near the N/S interface [1]. We have also studied about the proximity effect in proximity effect in junctions between diffusive normal metals (DN) and superconductors. It is revealed when the superconductor has a spin-triplet state, the resulting symmetry in DN is always odd-frequency spin-triplet. The resulting quasiparticle density of state in DN has a zero energy peak. This unusual proximity effect due to the generation of odd- frequency state is also expected in ferro-magnet / superconductor junctions [4].

[1] Y. Tanaka, et al, Phys. Rev. Lett. 99, 037005 (2007), M. Eschirig, et al, J. Low Temp. Phys. 147 457 (2007).
[2] Y. Tanaka and A.A. Golubov, Phys. Rev. Lett. 98 037003 (2007).
[3] Y. Tanaka and S. Kashiwaya, Phys. Rev. B, 70, 012507 (2004).
[4] Y. Asano, Y. Tanaka and A. A. Golubov, Phys. Rev. Lett., 98, 107002 (2007).

DAY 3: 11:30 – 12:10

Quantum shock waves in fractional quantum Hall edge states: Nonlinear dynamics and topology

Paul Wiegmann
James Frank Institute, University of Chicago

Transport in interacting non-dissipative electronic systems is essentially nonlinear and unstable: a propagating semiclassical wave front develops a shock wave at a finite time. A wave collapses into oscillatory features which further evolve into regularly structured localized pulses carrying a fractionally quantized charge. I present a theory which describe fractional quantum Hall edge states where non-linear effects where taken into account and discuss perspectives of observation of quantum shock waves and a direct measurement of the fractional charge in fractional quantum Hall edge states. The talk is based on series of papers written with Bettelheim E, Abanov AG.