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Kyoto University
Odd-frequency pairing state in superconducting junctions

Yukio Tanaka
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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 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 also expected in ferro-magnet / superconductor junctions [4].


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.