ICTS Seminar

Title : An open-quantum system description of Josephson effect in topological superconductors

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Time : 12:30 PM

Venue : Emmy Noether Seminar Room, ICTS Campus, Bangalore

Abstract : Using an open-quantum system description, we revisit the Josephson effect in hybrid junctions made of the topological superconductor (TS) and normal metal (N) wires. We consider an X-Y-Z configuration for the junctions where X, Y, Z = TS, N. We assume the wires X and Z being semi-infinite and in thermal equilibrium. We connect the wires X and Z through the short Y wire at some time, and numerically study time-evolution of the full device. For TS-N-TS device, we find a persistent, oscillating electrical current at both junctions even when there is no phase or thermal or voltage bias. The amplitude and period of the oscillating current depend on the initial conditions of the middle N wire indicating the absence of thermalization. This zero-bias current vanishes at a long time for any of X and Z being an N wire or a TS wire near a topological phase transition. Employing properties of different bound states within the superconducting gap, we develop a clear understanding of the oscillating currents.