SES16-2016-000250

Abstract for an Invited Paper
for the SES16 Meeting of
the American Physical Society

Conductance of a superconducting Coulomb blockade nanowire at finite temperature[1]

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By applying a magnetic field, a superconducting proximity nanowire in the presence of spin-orbital coupling can pass through topological phase transition and possess Majorana bound states on the ends. One of the promising platforms to detect the Majorana modes is a coulomb blockade island by measuring its two-terminal conductance (S. M. Albrecht et al., Nature (London) 531, 206 (2016)). Here, we study the transportation of a single electron across the superconducting Coulomb blockade nanowire at finite temperature to obtain the general conductance equation. By considering all possible scenarios that Majorana modes appear in the nanowire, we compute the nanowire conductance as the magnetic field and the gate voltage of the nanowire vary. The oscillation behavior of the conductance peak is temperature independent and the amplitude oscillation of the conductance peak decreases as the magnetic field increases.

[1]This work is supported by Microsoft Q and LPS-MPO-CMTC.