Interplay between Kondo and Majorana Interactions in Quantum Dots

Roman Lutchyn

Microsoft Station Q, United States

***Email of Presenting Author: rolutchy@microsoft.com**

We study the properties of a quantum dot coupled to a topological superconductor and normal leads and discuss the interplay between Kondo- and Majorana-induced couplings in quantum dots. The latter appears due to the presence of Majorana zero-energy modes localized, for example, at the ends of the one-dimensional topological superconductor. We investigate the phase diagram of the system as a function of Kondo and Majorana interactions using a renormalization-group analysis, a slave-boson mean-field theory, and numerical simulations using the density-matrix renormalization-group method. We show that, in addition to the well-known Kondo fixed point, the system may flow to a new fixed point controlled by the Majorana-induced coupling, which is characterized by nontrivial correlations between a localized spin on the dot and the fermion parity of the topological superconductor and the normal lead. We compute full counting statistics of charge fluctuations, which highlights some peculiar features characteristic to this Majorana fixed point.