Searching for Majorana zero modes using persistent currents.

Dunkan Martínez Camacho
F. Gonzalo-Medina, A. Díaz-Fernández, F. Domínguez-Adame, L. Rosales, P. A. Orellana
Universidad Complutense de Madrid, Plaza de las Ciencias 1, E28040-Madrid, Spain
dunmar01@ucm.es

Abstract

The quest for Majorana zero modes (MZM) in the laboratory is an active field of research in condensed matter physics. In this regard, there have been many theoretical proposals but their experimental detection remains elusive. In this contribution, we present a realistic setting by considering a quantum ring with Rashba spin-orbit coupling and threaded by a magnetic flux, in contact with a topological superconducting nanowire. We focus on spin-polarized persistent currents to assess the existence of Majorana zero modes. We find that the Rashba spin-orbit coupling allows for tuning the position of the zero energy crossings in the flux parameter space and has sizable effects on spin-polarized persistent currents. We believe that our results will contribute towards probing the existence of Majorana zero modes.

References

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Figures

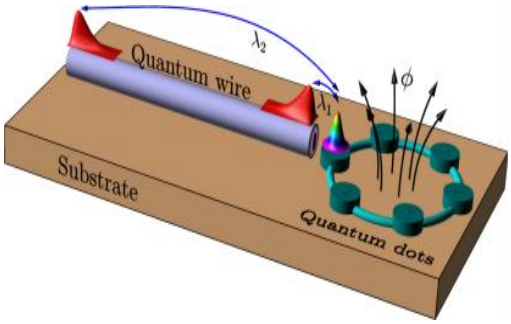

Figure 1: Schematic representation of the system under study. A nanowire driven into a superconducting regime supports a MZM at each edge and influences the persistent currents of a quantum ring, threaded by a magnetic flux.