

Chiral adiabatic transmission protected by Fermi surface topology

Isidora Araya Day

Kostas Vilkelis, Antonio L. R. Manesco, A. Mert Bozkurt, Valla Fatemi, Anton R. Akhmerov

TU Delft, Lorentzweg 1, Delft, The Netherlands

iarayaday@gmail.com

Multiple mechanisms can protect two modes from scattering into one another: topology and symmetry in a quantum spin Hall effect, adiabaticity in a point contact, and spatial separation in quantum Hall effect.

Up to now, however, only spatial separation was known to protect chiral transport of modes in a three terminal device.

I will share our discovery of higher-dimensional adiabaticity that allows three modes to pass through each other without scattering in a multiterminal superconducting device [1].

This protection relies on the recently discovered link between the Fermi surface topology and the structure of propagating quasiparticle modes in Josephson junctions [2-3].

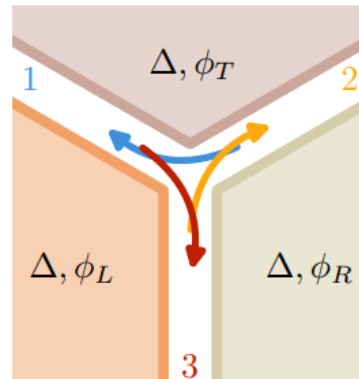


Figure 1: Three terminal Josephson junction.

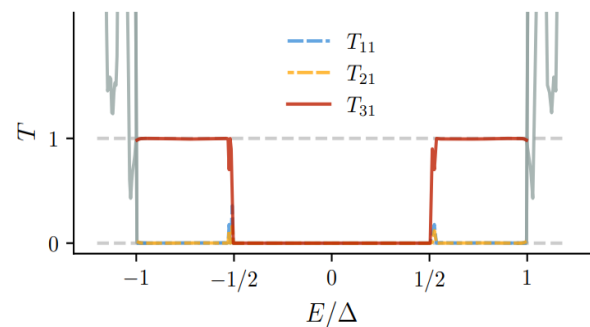


Figure 2: Quantized transmission of Andreev modes through the superconducting trijunction.

References

- [1] I. Araya Day et al. ArXiv preprint 2311.17160, 2023.
- [2] P. M. Tam et al. Physical Review Letters, 2023.
- [3] P. M. Tam et al. Physical Review B, 2023.

Figures