Supercurrents in full-shell nanowire Josephson junctions

Giorgos Giavaras
Ramon Aguado

Instituto de Ciencia de Materiales de Madrid, CSIC, Madrid, Spain

g.giavaras@gmail.com

Full-shell nanowires (NWs) are under investigation for qubit applications [1]. Josephson junctions based on full-shell NWs can provide an additional tool for quantum operations. Here, we theoretically study the properties of supercurrents in Josephson junctions based on full-shell NWs. We find that in the hollow-core limit the critical supercurrent, *Ic*, can be tuned by an external magnetic flux, and specifically, *Ic* exhibits a characteristic flux dependence which involves the orbital transverse channels. This flux dependence is not related to the usual Little-Parks modulation of the superconducting pairing and can be observed in realistic NWs.

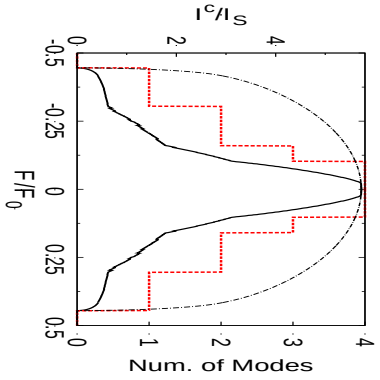

Figure 1: Critical current and number of subgap modes versus magnetic flux in the zero lobe.

References

[1] D. Sabonis, O. Erlandsson, A. Kringhoj, B. van Heck, T. W. Larsen, I. Petkovic, P. Krogstrup, K. D. Petersson, and C. M. Marcus, Phys. Rev. Lett. 125, (2020) 156804