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Topological Shiba chain in a spin-orbit coupled superconductor[1]
PHILIP BRYDON, HOI-YIN HUI, JAY SAU, Condensed Matter Theory Center, University of Maryland, College Park — The impurity band formed from a chain of classical spins embedded in a superconductor can be topological, depending on the magnetic texture of the spins. Previous proposals require a helical texture [1] which is, however, unstable towards a ferromagnetic or antiferromagnetic configuration [2]. We show that including surface spin-orbit coupling permits a topological state for a ferromagnetic alignment of the spins [3]. By deriving an effective tight-binding model for the impurity band and hence evaluating the Z_2 topological invariant, we show that a topologically non-trivial state is generically present in this model.

[1] T.-P. Choy, J. M. Edge, A. R. Akhmerov, and C. W. J. Beenakker, Phys. Rev. B **84**, 195442 (2011).
[2] Y. Kim, M. Cheng, B. Bauer, R. M. Lutchyn, and S. Das Sarma, Phys. Rev. B **90**, 060401(R) (2014).
[3] P. M. R. Brydon, H.-Y. Hui, and J. D. Sau, arXiv:1407.6345.

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