Topological Shiba chain in a spin-orbit coupled superconductor

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.


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