

# $2\pi$ domain walls for tunable Majorana devices

**Daniel Hauck**

Stefan Rex, Markus Garst

Karlsruhe Institute of Technology, Institute for Theoretical Solid State Physics, Wolfgang-Gaede-Str. 1,  
76131 Karlsruhe, Germany

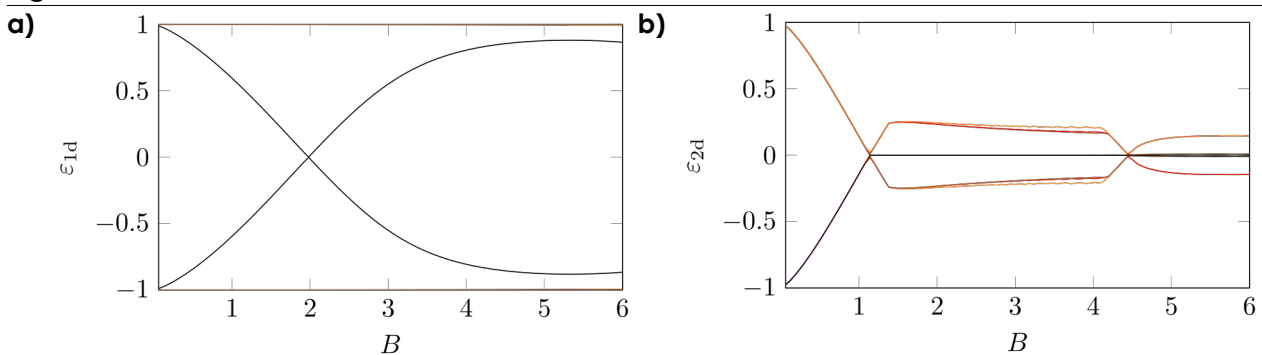
[daniel.hauck@kit.edu](mailto:daniel.hauck@kit.edu)

Superconductor-magnet hybrid structures provide a platform for investigating topological phases with localized Majorana states. Such states have previously been predicted for elongated Skyrmions in the magnetic layer[1,2]. Here we consider  $2\pi$  domain walls that can be easily controlled experimentally. Depending on the boundary conditions, we demonstrate that localized Majorana states can be found at both ends of such walls. This establishes  $2\pi$  domain walls as tunable elements for the realization of Majorana devices.

## References

- [1] U. Gungrd, S. Sandhoefner and A. A. Kovalev, Phys. Rev. B 97, 115136 (2018)
- [2] S. Rex, I. V. Gornyi and A. D. Mirlin, Phys. Rev. B 102, 224501 (2020)

## Figures



**Figure 1:** Dependence of the 8 lowest eigenvalues on field strength for the bulk model (a) and a finite 2d system (b).



**Figure 2:** Local density of states of a Majorana bound state for an example set of parameters.