Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Majorana zero modes in spintronics devices CHIEN-TE WU, Department of Electrophysics, National Chiao Tung University, BRANDON ANDERSON, WEI-HAN HSIAO, K. LEVIN, James Franck Institute, University of Chicago
— We show that topological phases should be realizable in readily available and well studied heterostructures. In particular we identify a new class of topological materials which are well known in spintronics: helical ferromagnet-superconducting junctions. We note that almost all previous work on topological heterostructures has focused on creating Majorana modes at the proximity interface in effectively two-dimensional or one-dimensional systems. The heterostructures we address exhibit finite range proximity effects leading to nodal superconductors with Majorana modes localized away from this interface. To show this, we implement a Bogoliubov-de Gennes (BdG) proximity numerical scheme, which importantly, involves two finite dimensions in a three dimensional junction. Incorporating this level of numerical complexity serves to distinguish ours from alternative numerical BdG approaches which are limited by assuming translational invariance along multiple directions. With this access to the edges, we are then able to illustrate in a concrete fashion the wavefunctions of Majorana zero modes, and, moreover, address finite size effects. In the process we establish consistency with a simple analytical model [1].

[1]C.-T. Wu, B. M. Anderson, W.-H. Hsiao, K. Levin, ArXiv:1609.0453

Chien-Te Wu
Department of Electrophysics, National Chiao Tung University

Date submitted: 10 Nov 2016 Electronic form version 1.4