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Majorana Fermion Rides on a Magnetic Domain Wall[1] SE KWON KIM, Univ of California - Los Angeles, SUMANTA TEWARI, Clemson University, YAROSLAV TSERKOVNYAK, Univ of California - Los Angeles — Owing to the recent progress on endowing the electronic structure of magnetic nanowires with topological properties, the associated topological solitons in the magnetic texture—magnetic domain walls—appear as very natural hosts for exotic electronic excitations. Here, we propose to use the magnetic domain walls to engender Majorana fermions [1], which has several notable advantages compared to the existing approaches. First of all, the local tunneling density-of-states anomaly associated with the Majorana zero mode bound to a smooth magnetic soliton is immune to most of parasitic artifacts associated with the abrupt physical ends of a wire, which mar the existing experimental probes. Second, a viable route to move and braid Majorana fermions is offered by domain-wall motion. In particular, we envision the recently demonstrated heat-current induced motion of domain walls in insulating ferromagnets as a promising tool for nonintrusive displacement of Majorana modes. This leads us to propose a feasible scheme for braiding domain walls within a magnetic nanowire network, which manifests the nob-Abelian exchange statistics within the Majorana subspace.

[1] S. K. Kim, S. Tewari, and Y. Tserkovnyak, Phys. Rev. B **92**, 020412(R) (2015)

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