Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Zero-energy pinning from interactions in Majorana nanowires[1]
ELSA PRADA, FERNANDO DOMíNGUEZ, Universidad Autónoma de Madrid, JORGE CAYAO, PABLO SAN-JOSE, RAMÓN AGUADO, Instituto de Ciencia de Materiales de Madrid, ALFREDO LEVY YEYATI, Universidad Autónoma de Madrid — Majorana zero modes at the boundaries of topological superconductors are charge-neutral, an equal superposition of electrons and holes. This ideal situation is, however, hard to achieve in physical implementations, such as proximitised semiconducting nanowires of realistic length. In such systems Majorana overlaps are unavoidable and lead to their hybridisation into *charged* Bogoliubov quasiparticles of finite energy which, unlike true zero modes, are affected by electronic interactions. We here demonstrate that these interactions, particularly with bound charges in the dielectric surroundings, drastically change the non-interacting paradigm. Remarkably, interactions may completely suppress Majorana hybridisation around parity crossings, where the total charge in the nanowire changes. This effect, dubbed zero-energy pinning, stabilises Majoranas back to zero energy and charge, and leads to electronically incompressible regions with suppressed Majorana susceptibility to external noise, despite their overlap.

[1]Spanish Ministry of Economy and Competitiveness through RYC-2013-14645, RYC-2011-09345, FIS2012-33521, FIS2013-47328-C2-1-P, FIS2014-55486-P, FIS2015-65706-P, FIS2015-64654-P, and "María de Maeztu" Programme for Units of Excellence (MDM-2014-0377)

Elsa Prada
Universidad Autónoma de Madrid

Date submitted: 09 Nov 2016 Electronic form version 1.4