Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Phase diagram for topological superconductivity in topological insulator nanowires FERNANDO DE JUAN, University of California Berkeley, JENS BARDARSON, Max Planck Institute for Complex Systems, Dresden, RONI ILAN, University of California Berkeley — A topological insulator nanowire can be used as a platform to produce one dimensional topological superconductivity in the presence of magnetic fields and the proximity effect from a nearby superconductor. In this work, we discuss the conditions under which this can happen by computing the topological invariant of the system from both a continuum Dirac fermion model and a lattice realization of a TI. We demonstrate that the presence of a vortex in the order parameter winding around the wire is essential to have a non-trivial invariant. In addition, we present a full phase diagram of the model as a function of chemical potential, flux and superconducting pairing, emphasizing that not all regions present a fully gapped superconducting state. Implications for transport in normal-superconductor junctions in this system will be discussed.

Fernando de Juan
UC Berkeley

Date submitted: 14 Nov 2014 Electronic form version 1.4