Abstract Submitted
for the 4CF17 Meeting of
The American Physical Society

Solving the Bogoliubov-de Gennes Hamiltonian for a p-wave superconductor on a triangular lattice AIDAN WINBLAD, HUA CHEN, Colorado State University — The Bogoliubov-de Gennes (BdG) Hamiltonian is commonly used for describing quasiparticle excitations in superconductors. We want to solve the BdG equation for a $p_x + ip_y$ superconductor on an equilateral triangle of finite lattice sites. An equilateral is chosen because it is topologically equivalent to a 1-D T-junction, and we want to determine how the physics maps from an equilateral triangle to the T-junction geometry. We diagonalized the lattice version of the BdG Hamiltonian, using a simple python script, to find the energy eigenvalues and the corresponding eigenstates of the system, first for a 1D p-wave superconducting wire and then for an equilateral triangle. Alternatively, we also solved the continuum BdG equation analytically in both momentum space and real space with proper boundary conditions for a given geometry. Understanding the mapping from an equilateral triangle to a T-junction would have significance in building practical logic units for topological quantum computation.

Aidan Winblad
Colorado State University

Date submitted: 21 Sep 2017 Electronic form version 1.4