Abstract Submitted
for the DAMOP14 Meeting of
The American Physical Society

Breaking time reversal symmetry in a circuit topological insulator CLAI OWENS, NINGYUAN JIA, ARIEL SOMMER, DAVID SCHUSTER, JONATHAN SIMON, Univ of Chicago — Materials exhibiting knotted bandstructures provide a unique window on interplay between topology and quantum mechanics under well-controlled conditions. The main difficulty is engineering a strong background gauge field for the electrically neutral "particles" that comprise such materials. In cold atom systems, the leading candidates include Raman couplings, lattice modulation, and optical flux lattices; however no scalable approach has yet been demonstrated. Meta-materials have seen substantial success, both in coupled optical waveguides, and circuit networks. Here we describe progress towards time reversal breaking in a circuit, to split up- and down- spin Chern bands. This work is essential for studies of fractional quantum hall physics, where spin-flip collisions effectively reverse the magnetic field and destroy the many-body state. We present the design of a 1D transmission line that breaks time reversal symmetry via periodic capacitance modulation. We extend this approach to a 2D geometry, realizing a Floquet topological insulator with an isolated ground Chern-band. These tools are compatible with circuit quantum electrodynamics techniques, and thus provide an exciting route to studies of topologically ordered phases of matter.

Ningyuan Jia
Univ of Chicago

Date submitted: 21 Feb 2014 Electronic form version 1.4