Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Phase Diagram of a Simple Model for Fractional Topological Insulator HUA CHEN, Zhejiang Institute of Modern Physics and Department of Physics, Zhejiang University, Hangzhou 310027, China, KUN YANG, National High Magnetic Field Laboratory and Department of Physics, Florida State University, Tallahassee, FL 32306, USA — We study a simple model of two species of (or spin-1/2) fermions with short-range intra-species repulsion in the presence of opposite (effetive) magnetic field, each at filling factor 1/3. In the absence of inter-species interaction, the ground state is simply two copies of the 1/3 Laughlin state, with opposite chirality. Due to the overall time-reversal symmetry, this is a fractional topological insulator. We show this phase is stable against moderate inter-species interactions. However strong enough inter-species repulsion leads to phase separation, while strong enough inter-species attraction drives the system into a superfluid phase. We obtain the phase diagram through exact diagonalization caluclations. Nature of the fractional topological insluator-superfluid phase transition is discussed using an appropriate Chern-Simons-Ginsburg-Landau effective field theory.

Kun Yang
National High Magnetic Field Laboratory and Department of Physics,
Florida State University, Tallahassee, FL 32306, USA

Date submitted: 09 Nov 2011 Electronic form version 1.4