Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Series of Abelian and Non-Abelian States in C>1 Fractional Chern Insulators ANTOINE STERDYNIAK, CÉCILE REPELLIN, Laboratoire Pierre Aigrain, ENS and CNRS, BOGDAN BERNEVIG, Department of Physics, Princeton university, NICOLAS REGNAULT, Department of Physics, Princeton university; Laboratoire Pierre Aigrain, ENS and CNRS — We report the observation of a new series of abelian and non-abelian topological states in fractional Chern insulators (FCI). The states appear at bosonic filling nu= k/(C+1) (k, C integers) in a wide variety of lattice models, in fractionally filled bands of Chern numbers $C \geq 1$ subject to on-site Hubbard interactions. We show strong evidence that the $k = 1$ series is abelian while the $k > 1$ series is non-abelian. The energy spectrum at both ground-state filling and upon the addition of quasiholes shows a low-lying manifold of states whose total degeneracy and counting matches, at the appropriate size, that of the Fractional Quantum Hall (FQH) SU(C) (color) singlet k-clustered states (including Halperin, non-abelian spin singlet(NASS) states and their generalizations). The ground-state momenta are correctly predicted by the FQH to FCI lattice folding. However, the counting of FCI states also matches that of a spinless FQH series, preventing a clear identification just from the energy spectrum. The entanglement spectrum lends support to the identification of our states as SU(C) color-singlets but offers new anomalies in the counting for $C > 1$, possibly related to dislocations that call for the development of new counting rules of these topological states.

Antoine Sterdyniak
Laboratoire Pierre Aigrain, ENS and CNRS

Date submitted: 10 Dec 2012 Electronic form version 1.4