Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Many-body localization and symmetry protected topology with ultracold Rydberg atoms IONUT-DRAGOS POTIRNICHE, Univ of California - Berkeley, MONIKA SCHLEIER-SMITH, Stanford University, ASHVIN VISHWANATH, NORMAN YAO, Univ of California - Berkeley — The interplay between quantum entanglement and symmetry-protected topological order has led to the classification of gapped, interacting, one dimensional quantum phases. A consequence of this classification is the existence of a diverse set of exactly solvable models, which serve as paradigmatic examples of various SPT orders. The experimental realization of such models has been hampered by the challenge of implementing tunable multi-body interactions. Recently, an alternate strategy has arisen: periodic driving. Indeed, it has been shown that the dynamics of a simple Floquet transverse-field Ising model can mirror that of the celebrated Haldane chain. However, as SPT order is expected only in the ground state while a driven system is expected to heat to infinite temperature, the ability to observe such Floquet SPT phases remains an open question. Here, we demonstrate that strong disorder, leading to many-body localization, stabilizes SPT order at finite energy densities while also preventing arbitrary heating of the system. Moreover, we propose a natural experimental implementation in a 1D optical lattice of ultracold Rydberg atoms.

Ionut-Dragos Potirniche
Univ of California - Berkeley

Date submitted: 06 Nov 2015 Electronic form version 1.4