Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

The Effect of Nonlinearity on Topological States in Quasiperiodic Lattices[1] PHONG VO, YOAV LAHINI, Massachusetts Institute of Technology — The discovery of topological insulators has sparked considerable interest in the study of topological phases of matter. Recently, it has been shown that certain quasiperiodic systems are also topologically nontrivial. As topological states arise from a linear, non-interacting theory of solids, it is of interest to understand the effect of interactions on topological properties. In an extensive numerical study, we introduce nonlinearity into a 1-D quasiperiodic model to observe its effect on energy localization at the boundary due to topological edge states. We compare two different quasiperiodic modulations: one where the on-site potential is modulated at an incommensurate frequency (the diagonal Aubry-Andre model), and a second in which the hopping terms are modulated (off-diagonal model). We find that in the diagonal model, increasing the magnitude of nonlinearity delocalizes energy from the boundary. The strength of nonlinearity needed for delocalization depends on the eigenvalue of the linear edge state, the width of the gap in which it resides, and the sign of nonlinearity. In contrast, in the off-diagonal model, the effects of positive and negative nonlinearity are identical when only the edge lattice site is excited due to symmetry in the eigenvalue spectrum.

[1]We acknowledge financial support from the MIT's Undergraduate Research Opportunities Program (UROP)

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Date submitted: 15 Nov 2013 Electronic form version 1.4