Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Topological Floquet Spectrum in Three Dimensions via a Two-Photon Resonance NETANEL LINDNER, DORON BERGMAN, GIL REFAEL, California Institute of Technology, VICTOR GALITSKI, University of Maryland — A recent theoretical work [Nature Phys., 7, 490 (2011)] has demonstrated that external non-equilibrium perturbations may be used to convert a two-dimensional semiconductor, initially in a topologically trivial state, into a Floquet topological insulator. Here, we develop a non-trivial extension of these ideas to three-dimensional systems. In this case, we show that a two-photon resonance may provide the necessary twist needed to transform an initially unremarkable band structure into a topological Floquet spectrum. We provide both an intuitive, geometrical, picture of this phenomenon and also support it by an exact solution of a realistic lattice model that upon irradiation features single topological Dirac modes at the two-dimensional boundary of the system. It is shown that the surface spectrum can be controlled by choosing the polarization and frequency of the driving electromagnetic field. Specific experimental realizations of a three-dimensional Floquet topological insulator are proposed.

Netanel Lindner
California Institute of Technology

Date submitted: 11 Nov 2011

Electronic form version 1.4