Abstract Submitted
for the FWS16 Meeting of
The American Physical Society

Polarization induced Z2 and Chern topological phases in a periodically driving field SHU-TING PI, SERGEY SAVRASOV, UC Davis — Z2 and Chern topological phases such as newly discovered quantum spin Hall and original quantum Hall states hardly both coexist in a single material due to their contradictory requirement on the timereversal symmetry (TRS). We show that although the TRS is broken in systems with a periodically driving field, an effective TRS can still be defined provided the acfield is linearly polarized or certain other conditions are satisfied. The controllable TRS provides us a route to manipulate contradictory phases by tuning the polarization. To demonstrate the idea, we consider a tight-binding model that is relevant to several monolayered materials as a benchmark system. Our calculation shows not only topological Z2 to Chern phase transition occurs but rich Chern phases are also observed. In addition, we also discussed the realization of our proposal in real materials, such as spin-orbit coupled graphene and crystal Bismuth. This opens the possibility of manipulating various topological phases in a single material and can be a promising approach to engineer new electronic states of matter.

Shu-Ting Pi
UC Davis

Date submitted: 05 Oct 2016 Electronic form version 1.4