Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Quadratic band touching points and flat bands in two-dimensional topological Floquet systems[1] LIANG DU, XIAOTING ZHOU, GREGORY FIETE, The University of Texas at Austin, THE CENTER FOR COMPLEX QUANTUM SYSTEMS TEAM — In this work we theoretically study, using Floquet-Bloch theory, the influence of circularly and linearly polarized light on two-dimensional band structures with Dirac and quadratic band touching points, and flat bands, taking the nearest neighbor hopping model on the kagome lattice as an example. We find circularly polarized light can invert the ordering of this three band model, while leaving the flat-band dispersionless. We find a small gap is also opened at the quadratic band touching point by 2-photon and higher order processes. By contrast, linearly polarized light splits the quadratic band touching point (into two Dirac points) by an amount that depends only on the amplitude and polarization direction of the light, independent of the frequency, and generally renders dispersion to the flat band. The splitting is perpendicular to the direction of the polarization of the light. We derive an effective low-energy theory that captures these key results. Finally, we compute the frequency dependence of the optical conductivity for this 3-band model and analyze the various interband contributions of the Floquet modes. Our results suggest strategies for optically controlling band structure and interaction strength in real systems.

[1]We gratefully acknowledge funding from ARO grant W911NF-14-1-0579 and NSF DMR-1507621

Liang Du
The University of Texas at Austin

Date submitted: 10 Nov 2016 Electronic form version 1.4