

Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Emergence of a Chern-insulating state from a semi-Dirac dispersion HUAQING HUANG, Tsinghua University, ZHIRONG LIU, Peking University, HONGBIN ZHANG, Rutgers University, WENHUI DUAN, Tsinghua University, DAVID VANDERBILT, Rutgers University — By combining first-principles calculations with Wannier-based tight-binding modeling, we demonstrate that a TiO_2/VO_2 heterostructure that was previously proposed as a prototypical semi-Dirac system becomes a Chern insulator (quantum anomalous Hall insulator) in the presence of spin-orbit coupling. We show that this occurs only when the semi-Dirac structure is of a special type that can be formed by the merging of three conventional Dirac points. Our results reveal how the nontrivial topology with nonzero Chern number emerges naturally from this kind of semi-Dirac structure, establishing a general scenario that provides a new route to the formation of Chern-insulating states in practical materials systems.

Huaqing Huang
Tsinghua University

Date submitted: 05 Nov 2015

Electronic form version 1.4