Abstract Submitted
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Interacting weak topological insulators and their transition to Dirac semimetal phases[1] GIORGIO SANGIOVANNI, WERNER HANKE, Universitat Wurzburg, GANG LI, Vienna University of Technology, BJOERN TRAUZETTEL, Universitat Wurzburg — Topological insulators in the presence of strong Coulomb interaction constitute novel phases of matter. Transitions between these phases can be driven by single-particle or many-body effects. On the basis of *ab-initio* calculations, we identify a concrete material, *i.e.* Ca_2PtO_4, that turns out to be a hole-doped weak topological insulator. Interestingly, the Pt-*d* orbitals in this material are relevant for the band inversion that gives rise to the topological phase. Therefore, Coulomb interaction should be of importance in Ca_2PtO_4. To study the influence of interactions on the weak topological insulating phase, we look at a toy model corresponding to a layer-stacked 3D version of the Bernevig-Hughes-Zhang model with local interactions. For small to intermediate interaction strength, we discover novel interaction-driven topological phase transitions between the weak topological insulator and two Dirac semimetal phases. The latter correspond to gapless topological phases. For strong interactions, the system eventually becomes a Mott insulator.

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