

Abstract Submitted  
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**Possible Chern insulators based on novel ferromagnetic substrates**<sup>1</sup> JIANPENG LIU, DAVID VANDERBILT, Department of Physics and Astronomy, Rutgers University — Previous work<sup>2</sup> has opened the possibility that one can obtain non-zero Chern numbers from the surface bands of atomic layers with strong spin-orbit coupling deposited on insulating ferromagnetic thin films. Following this idea, we carry out a theoretical search for Chern (i.e., quantum anomalous Hall) insulators formed by depositing heavy adatoms on top of stable insulating ferromagnetic substrates such as CrSiTe<sub>3</sub> and CrGeTe<sub>3</sub>. These materials have a layered structure with weak van der Waals interlayer coupling, so it seems likely that thin films with clean surfaces will be experimentally stable. Moreover, the insulating character of these materials, with magnetization normal to the surface, are promising for realizing Chern-insulator states when adatoms are added. By searching over a series of heavy elements, we found non-zero Chern numbers in Bi and Tl-deposited CrSiTe<sub>3</sub> thin films, although with slightly negative indirect energy gaps. We expect that a global energy gap could be opened up by some further engineering, such as by applying epitaxial strain or additional atomic substitution.

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<sup>2</sup>K. F. Garrity and D. Vanderbilt, Phys. Rev. Lett. **110**, 116802 (2013).

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