## Abstract Submitted for the MAR17 Meeting of The American Physical Society

Wide gap Chern Mott insulating phases achieved by  $design^1$ HONGLI GUO, University of Science and Technology of China, SHRUBA GAN-GOPADHYAY, UC Davis, OKAN KOEKSAL, ROSSITZA PENTCHEVA, University of Duisburg-Essen, WARREN E. PICKETT, UC Davis — Chern insulators are exciting both as a novel electronic phase and for their novel and potentially useful boundary transport properties. Honeycomb lattices occupied by heavy transition metal ions, have been proposed by Okamoto and coworkers as Chern insulators, but finding a concrete example has been challenging due to an assortment of broken symmetry phases that thwart the topological character. Building on accumulated knowledge of the behavior of the 3d series, we tune spin-orbit and interaction strength together with strain to design two Chern insulator systems (one with Ru, one with Os) with bandgaps up to 130 meV and Chern numbers  $\mathcal{C} = -1$  and  $\mathcal{C} = 2$ . We find, in this class, that a trade-off between larger spin-orbit coupling and strong interactions leads to a larger gap, whereas the stronger SOC correlates with the larger magnitude of the Hall conductivity. Symmetry lowering in the course of structural relaxation hampers retaining QAH character, as pointed out previously. Fortunately there is only mild structural symmetry breaking of the bilayer in these robust Chern phases.Recent (111) growth of insulating, magnetic phases in closely related materials with this orientation supports the likelihood that synthesis and exploitation will follow.

<sup>1</sup>Supported partially by the NSF DMREF program.

Warren E. Pickett UC Davis

Date submitted: 10 Nov 2016

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