Abstract Submitted
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Robust spin-polarized midgap states at step edges of topological crystalline insulators.[1] DOMENICO DI SANTE, Institut fuer Theoretische Physik, Universitaet Wuerzburg, Germany, PAOLO SESSI, Experimentelle Physik II, Universitaet Wuerzburg, Germany, MARTIN GREITER, Institut fuer Theoretische Physik, Universitaet Wuerzburg, Germany, TITUS NEUPERT, Physik-Institut, Universitaet Zuerich, Switzerland, GIORGIO SANGIOVANNI, Institut fuer Theoretische Physik, Universitaet Wuerzburg, Germany, TOMASZ STORY, Institute of Physics, Polish Academy of Sciences, Warsaw, Poland, RONNY THOMALE, MATTHIAS BODE, Experimentelle Physik II, Universitaet Wuerzburg, Germany — Topological crystalline insulators are materials in which the crystalline symmetry leads to topologically protected surface states with a chiral spin texture, rendering them potential candidates for spintronics applications. In this talk, I report on the discovery of one-dimensional midgap states at odd-atomic surface step edges of the three- dimensional topological crystalline insulator (Pb,Sn)Se. A minimal toy model and realistic tight-binding calculations identify them as spin-polarized flat bands connecting two Dirac points. The midgap states inherit stability through the two-dimensional Dirac metal from the three-dimensional bulk insulator. This makes (Pb,Sn)Se the first example for a crystal symmetry-protected hierarchy of one- and two dimensional topological modes, which we experimentally prove to result in a striking robustness to defects, strong magnetic fields, and elevated temperature.

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