

Abstract Template

Searching for intrinsic magnetic topological insulator materials

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The discovery of the quantum anomalous Hall (QAH) effect set a remarkable example for understanding topological states of quantum matter in condensed matter physics and material science. Here we use both the symmetry design and machine learning methods to search for intrinsic magnetic topological insulator materials. We identify several new classes of intrinsic magnetic topological insulator materials, in which both the spin-orbit coupling and ferromagnetism synergize in d orbitals.

An example is V₂MX₄, they are quantum anomalous Hall insulators in their odd layer, axion insulators in their even layer, antiferromagnetic topological insulators in their 3D ground state, and 3D quantum anomalous Hall insulators in their ferromagnetic state of 3D.