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Quantum anomalous Hall effect in ferromagnetic Ru iodide monolayer. JIAN ZHOU, Virginia Commonwealth University, CHENGXI HUANG, ERJUN KAN, Nanjing University of Science and Technology, PURU JENA, Virginia Commonwealth University — Based on the successful synthesis of transition metal halides, we use first-principles calculations to predict that RuI_3 monolayer is an intrinsic ferromagnetic QAH insulator with a topologically nontrivial global band gap of 11 meV. The band structure of RuI_3 monolayer shows a Dirac cone in the spin down channel, while the spin up channel is insulating. When the spin-orbit coupling is included, the Dirac cone opens a finite band gap. This topologically nontrivial band gap at the Fermi level is due to its crystal symmetry, thus the QAH effect is robust. Its Curie temperature, estimated to be ˜360 K using Monte-Carlo simulation, is above room temperature and higher than most of two-dimensional ferromagnetic thin films. We also discuss the manipulation of its exchange energy and nontrivial band gap by applying in-plane strain. This work adds a new experimentally feasible member to the QAH insulator family, which is expected to have broad applications in nanoelectronics and spintronics. Detailed information can be found in https://arxiv.org/pdf/1609.08115.

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