

Abstract Submitted
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Quantum Anomalous Hall Effect in Magnetically Doped InAs/GaSb Quantum Wells QINGZE WANG, XIN LIU, The Pennsylvania State University, HAI-JUN ZHANG, Stanford University, NITIN SAMARTH, The Pennsylvania State University, SHOU-CHENG ZHANG, Stanford University, CHAO-XING LIU, The Pennsylvania State University — The quantum anomalous Hall effect has recently been observed experimentally in thin films of Cr doped $(\text{Bi,Sb})_2\text{Te}_3$ at low temperature ($\sim 30\text{mK}$). In this work, we propose realizing the quantum anomalous Hall effect in more conventional diluted magnetic semiconductors with magnetically doped InAs/GaSb type II quantum wells. Based on a four band model, we find a large increase of the Curie temperature for ferromagnetism due to the band edge singularity in the inverted regime of InAs/GaSb quantum wells. Below the Curie temperature, the quantum anomalous Hall effect is confirmed by the direct calculation of Hall conductance. Remarkably, our calculation based on eight-band Kane model reveals a band gap induced by exchange coupling reaching 10meV . The high sample quality and strong exchange coupling make the magnetically doped InAs/GaSb quantum well a good candidate for the quantum anomalous Hall insulator at high temperature.

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