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Quantum anomalous Hall effect with field-tunable Chern number near Z_2 topological critical point[1] LE QUY DUONG, HSIN LIN, WEI-FENG TSAI, YUAN PING FENG, National University of Singapore — We study the practicability of achieving quantum anomalous Hall (QAH) effect with field-tunable Chern number in a magnetically doped, topologically trivial insulating thin film. Specifically in a candidate material, $TlBi(S_{1-\delta}Se_{\delta})_2$, we demonstrate that the QAH phases with different Chern numbers can be achieved by means of tuning the exchange field strength or the sample thickness near the Z_2 topological critical point. Our physics scenario successfully reduces the necessary exchange coupling strength for a targeted Chern number. This QAH mechanism differs from the traditional QAH picture with a magnetic topological insulating thin film, where the "surface" states must involve and sometimes complicate the realization issue. Furthermore, we find that a given Chern number can also be tuned by a perpendicular electric field, which naturally occurs when a substrate is present.[1] High-Chern number QAH phase obtained from magnetically doped topological crystalline insulator thin films will also be discussed.

REF: [1] Le Quy Duong, Hsin Lin, Wei-Feng Tsai, and Y. P. Feng, Phys. Rev. B 92, 115205 (2015).

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