

Abstract Submitted
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Weak Topological Insulators in PbTe/SnTe superlattice¹ GANG YANG, The Penn State University, JUNWEI LIU, Tsinghua University, LIANG FU, MIT, WENHUI DUAN, Tsinghua University, CHAOXING LIU, The Penn State University — It is desirable to realize topological phases in artificial structures by engineering electronic band structures. In this paper, we investigate $(\text{PbTe})_m(\text{SnTe})_{2n-m}$ superlattices along the [001] direction and find a robust weak topological insulator phase for a large variety of layer numbers m and $2n - m$. We confirm this topologically non-trivial phase by calculating Z_2 topological invariants and topological surface states based on the first-principles calculations. We show that the folding of Brillouin zone due to the superlattice structure plays an essential role in inducing topologically non-trivial phases in this system. This mechanism can be generalized to other systems in which band inversion occurs at multiple momenta, and gives us a brand-new way to engineer topological materials in artificial structures.

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