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Topological Phases in the Single-Layer FeSe

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Abstract

A distinct electronic structure was observed in the single-layer FeSe which shows surprisingly high-temperature superconductivity over 65 K. Here, we demonstrate that the electronic structure can be explained by the effective strain effect due to substrates. More importantly, we find that this electronic structure can be tuned into robust topological phases from a topologically trivial metallic phase by the spin-orbital interaction and couplings to substrates. The topological phase is robust against any perturbations that preserve the time-reversal symmetry. Our study suggests that nontrivial topology and high-T-c superconductivity can be intertwined in the single FeSe layer to search novel physics.

Keywords

KeyWords Plus: HIGH-TEMPERATURE SUPERCONDUCTIVITY; HGTE QUANTUM-WELLS; IRON SELENIDE; INSULATORS; COLLOQUIUM; FILMS

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