Topological Phases in the Single-Layer FeSe

By: Hao, NN (Hao, Ningning)[1,2,3] ; Hu, JP (Hu, Jiangping)[1,2,3,4,5]

View ResearcherID and ORCID

PHYSICAL REVIEW X
Volume: 4 **Issue:** 3
Article Number: 031053
DOI: 10.1103/PhysRevX.4.031053
Published: SEP 24 2014
View Journal Impact

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

Author Information

Reprint Address: Hao, NN (reprint author)

+ Chinese Acad Sci, Beijing Natl Lab Condensed Matter Phys, POB 603, Beijing 100190, Peoples R China.

Addresses:

+ [1] Chinese Acad Sci, Beijing Natl Lab Condensed Matter Phys, Beijing 100190, Peoples R China
+ [2] Chinese Acad Sci, Inst Phys, Beijing 100190, Peoples R China
+ [3] Purdue Univ, Dept Phys, W Lafayette, IN 47907 USA
+ [4] King Abdulaziz Univ, Dept Phys, Fac Sci, Jeddah 21589, Saudi Arabia

[5] Collaborat Innovat Ctr Quantum Matter, Beijing, Peoples R China

Funding

Funding Agency	Grant Number
Ministry of Science and Technology of China 973 program	2012CB821400
National Science Foundation of China	11334012 91221303 11190020
Chinese Academy of Sciences	XDB07020200

View funding text

Publisher

AMER PHYSICAL SOC, ONE PHYSICS ELLIPSE, COLLEGE PK, MD 20740-3844 USA

Categories / Classification

Research Areas: Physics

Web of Science Categories: Physics, Multidisciplinary

Document Information

Document Type: Article

Language: English

Accession Number: WOS:000342150300001

ISSN: 2160-3308

Journal Information

Table of Contents: Current Contents Connect

Impact Factor: Journal Citation Reports

Other Information

IDS Number: AP5WV

Cited References in Web of Science Core Collection: 46

Times Cited in Web of Science Core Collection: 29