北京大学量子材料科学中心

International Center for Quantum Materials, PKU

Seminar

Topological Phases in Transition Metal Chalcogenides

Junwei Liu

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Time: 10:30am, June 5, 2017 (Monday)

时间：2017年6月5日 （周一）上午10:30

Venue: Room W563, Physics building, Peking University

地点：北京大学物理楼，西563会议室

Abstract

The discovery of quantum spin Hall effect engendered a new chapter of topological materials research in condensed matter physics and materials science. In this talk, I will introduce some of our recent theoretical works about the topological phases in 2D and 3D transition metal chalcogenides. We predict monolayer MX2 (M=Mo, W; X=S, Se, Te) of 1T' structure could realize quantum spin Hall insulator. Moreover, their topology can be easily tuned by external electric field, which motivated us to propose a new type of transistor, called topological field transistor. More recently, we found another new class of transition metal chalcogenides MM'Te4 (M=Nb, Ta; M'=Ir, Rh) could be quantum spin Hall insulators in 2D and Weyl semimetals in 3D. I will also discuss some recent transport, ARPES and STM experiments on monolayer WTe2, where many of the observations are consistent with monolayer WTe2 being a 2D TI.

Keywords: WTe2, quantum spin Hall insulator, transition metal chalcogenides

[1] X. Qian, J. Liu, L. Fu, J. Li， Science 346, 1344 (2014)
[2] J. Liu, H. Wang, C. Fang, L. Fu, X. Qian, Nano Lett. 17 467-475 (2017)

About the speaker

Dr. Jun-Wei Liu obtained his PhD in the department of physics, Tsinghua University, in 2014, and then he started his postdoctoral research in Massachusetts Institute of Technology. His research interest includes: 1) Topological materials including quantum anomalous Hall insulators, topological insulators topological crystalline insulators and topological semi-metals; 2) Quantum Monte Carlo simulations of strongly correlated systems; 3) Atomic-layer-thin ferroelectric materials and physics; 4) Two-dimensional quantum materials and phenomena.