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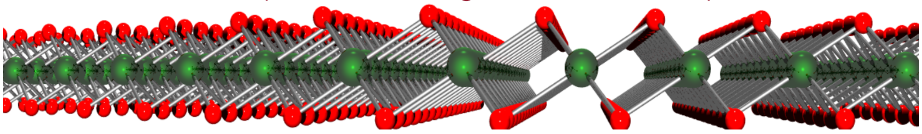

January 11, 2018
Temple University, SERC Room 703, 12:30 PM

Topological Phases in Transition Metal Chalcogenides

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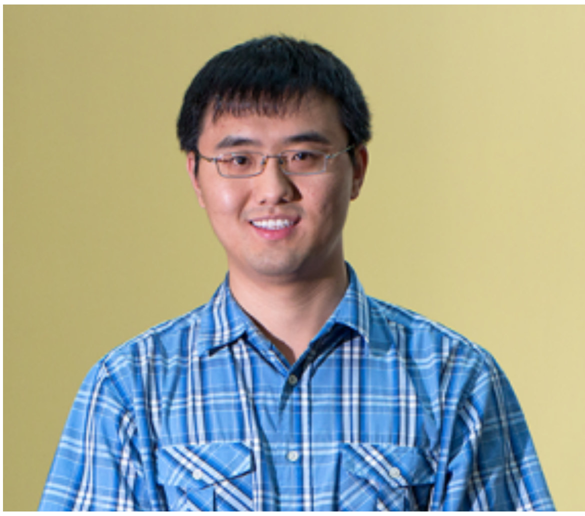
http://physics.ust.hk/eng/people_detail.php?pplcat=1&id=349

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 MX_2 (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 $MM'Te_4$ (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 WTe_2, where many of the observations are consistent with monolayer WTe_2 being a 2D TI.

[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)

Junwei Liu, Hong Kong University of Science and Technology



Junwei Liu has a broad interest in condensed matter physics, from the traditional phenomena like ferroelectricity to the exotic topological phases like quantum spin Hall insulators. Currently, his research mainly focuses on two parts: 1) the novel topological phases of matter, especially the symmetry-related topological phases, and their material realizations and experimental signatures; 2) applications of advanced machine learning techniques in physics, especially the combination of machine learning techniques and quantum Monte Carlo simulations.