中国科学院
固体物理研究所

学术报告(7月6日,周三)

题目： **Theory of Dirac and Topological States on Conventional Semiconductor Surfaces**

报告人： **Prof. Feng Liu, University of Utah**

时　间： **3:00p.m., July 6**

地　点： **Room 520, New building**

Abstract

Since the discovery of graphene, two-dimensional (2D) materials have drawn much recent interest. Two outstanding properties unique to 2D materials are Dirac and topological states, which span a wide range of novel electronic and quantum transport phenomena. When a freestanding 2D atomic layer is transferred to a substrate, however, its intrinsic properties will be altered, let alone the difficulty of the transfer process. This poses also a formidable technical challenge for potential applications of 2D materials. In this talk, I will present our recent efforts in computational design of Dirac and topological states on conventional semiconductor surfaces [1-4]. By constructing overlayer structures that are atomically bonded but electronically isolated from the underlying substrates, various "virtual" 2D materials can be made on top of semiconductor substrates, where the electronic bands of the virtual 2D materials lie completely inside the band gap of substrates. A substrate orbital filtering effect is shown to play a key role in the design process. We envision that our findings will not only greatly broaden the scientific scope of 2D materials but also significantly impact on their applications in real devices.

[1] M. Zhou, W. Ming, Z. Liu, Z. Wang, P. Li, F. Liu, "Epitaxial growth of large-gap quantum spin Hall insulator on semiconductor surface", Proc. Natl. Acad. Sci., 111, 14378 (2014).

[2] M. Zhou, Z. Liu, W. Ming, Z. Wang, F. Liu, "sd2 Graphene: Kagome Band in Hexagonal lattice", Phys. Rev. Lett. 113, 236802 (2014).

[3] M. Zhou, W. Ming, Z. Liu, Z. Wang, Y. Yao, F. Liu, "Formation of quantum spin Hall state on Si surface and energy gap scaling with strength of spin orbit coupling", Sci. Rep. 4, 7102 (2014).

[4] Z. F. Wang, F. Liu, "Self-Assembled Si Surface Dirac States and THz Plasmonics", Phys. Rev. Lett. (in press, 2015).

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