



### Weekly Seminar

#### Prediction of Topological Materials: from physical intuition to routinely search

### Prof. Hongming Weng

*the Institute of Physics, Chinese Academy of Sciences*



**Time: 4:00Pm, April. 10, 2019 (Wednesday)**

**时间: 2019年4月10日 (周三) 下午16:00**

**Venue: Room W563, Physics building, Peking University**

**地点: 北京大学物理楼, 西563会议室**

#### Abstract

Topological materials are solids with nontrivial topology in their electronic band structures. The periodical lattice of atoms in solids limits the electrons in a compact reciprocal lattice space and leads to nontrivial band topology in both insulators and metals, namely topological insulators and topological semimetals. Band inversion is an intuitive picture for understanding the underlying physics since it is related with Berry phase and Berry curvature of bands. How to find a material with nontrivial band topology had been a quite elusive and difficult task. However, some exotic and abnormal physical phenomena related with nontrivial band topology have been noticed and successfully applied for locating the exact topological materials, which includes a large band gap two-dimensional TIs in ZrTe<sub>5</sub>, the first Dirac semimetal Na<sub>3</sub>Bi and the first Weyl semimetal TaAs. These discoveries have greatly advanced the whole field of topological quantum states. Recently, the band inversion have been found to be efficiently identified with symmetry indicators formed by irreducible representation of bands at high symmetrical momenta, which can be calculated through first-principles. High throughput calculation of known non-magnetic materials is thus performed and thousands compounds have been identified to have nontrivial band topology for routinely search.

#### About the speaker

Hongming Weng is a professor in the Institute of Physics, Chinese Academy of Sciences (IOP-CAS). He graduated and received Ph. D. from Nanjing university in 2005. Before he joined IOP-CAS in 2010, he worked as postdoc and assistant professor in Japan. His research interests include first-principle calculation methods, topological materials and magneto-optical properties. He has published more than 120 SCI papers and they have been cited more than 10000 times. He has received several awards, including "JSPS postdoc fellowship", "Excellent Young Scientist Programme" from NSFC, "Nishina Asia Award" from Nishina Memorial Foundation and "Young Scientists Award" from CAS.