



量子物理学・ナノサイエンス第 63 回特別セミナー

## Catalogue of topological electronic materials

- 講師** : Dr. Tiantian Zhang  
Institute of Physics, Chinese Academy of Sciences
- 日程** : 5 月 29 日 (水) 15:00-16:00
- 場所** : 本館 2 階 284B 物理学系輪講室

### 概要

“Ten-fold way” table<sup>[1]</sup> tells us that different spatial dimensions and symmetries correspond to different topological classes. However, this table only contains time-reversal symmetry, particle-hole symmetry and chiral symmetries, but not a crystalline symmetry. Discoveries for topological insulators<sup>[2]</sup>, topological crystalline insulators<sup>[3]</sup>, and high-order topological insulators<sup>[4]</sup> make people realize that crystalline symmetries can bring new topological states and the diversity of symmetry-protected topological states in materials. Thus classification of topological states for the variety of crystalline symmetries becomes a vital issue.

In my talk, I will introduce a series of theoretical tools, such as compatibility relation<sup>[5]</sup>, symmetry-based indicator<sup>[6]</sup>, and indicator formulas<sup>[7-9]</sup>, which can help us to diagnose various topological states by considering time-reversal symmetry and crystalline symmetries. After that, I will show you how to use those theoretical tools to perform a high-throughput calculation<sup>[10]</sup>.

- [1] Chiu, *et al.* Reviews of Modern Physics, **88**, 035005 (2016).
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- [3] Hsieh, *et al.* Nature Communications **3**, 982 (2012).
- [4] Schindler, *et al.* Science Advances **4**, eaat0346 (2018).
- [5] Bradlyn *et al.*, Nature **547**, 298 (2017).
- [6] Po *et al.*, Nature Communications **8**, 50 (2017).
- [7] Zhida Song, Tiantian Zhang *et al.* Nature Communications **9**, 3530 (2018).
- [8] Zhida Song, Tiantian Zhang *et al.* Physical Review X **8**, 031069 (2018).
- [9] Khalaf, *et al.* Phys. Rev. X **8**, 031070 (2018).
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連絡教員 物理学系 村上 修一 (内線 2747)