



### Seminar

## Shift insulators: rotation-protected two-dimensional topological crystalline insulators

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**Time: 10:00am, Dec. 19, 2018 (Wednesday)**

**时间: 2018年12月19日 (周三) 上午10:00**

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

**地点: 北京大学物理楼, 西563会议室**

### Abstract

We study a two-dimensional tight-binding model of a topological crystalline insulator protected by rotation symmetry. The model is built by stacking two Chern insulators with opposite Chern numbers which transform under conjugate representations of the rotation group, e.g.  $p_{\pm}$  orbitals. Despite its apparent similarity to the Kane-Mele model, it does not host stable gapless surface states. Nevertheless, the model exhibits topological responses including the appearance of quantized fractional charge bound to rotational defects (disclinations) and the pumping of angular momentum in response to threading an elementary magnetic flux, which are described by a mutual Chern-Simons coupling between the electromagnetic field and an effective probe field corresponding to the rotation symmetry. We show that although the filled bands of the model do not admit a symmetric Wannier representation, this obstruction is removed on addition of appropriate atomic orbitals, which implies “fragile” topology. As a result, the responses of the model can be derived by representing it as a superposition of atomic orbitals with positive and negative integer coefficients.

Shang Liu, Ashvin Vishwanath, Eslam Khalaf, arXiv: 1809.01636.

### About the speaker

I am currently a PhD student at the Physics Department of Harvard University. Under the advising of Prof. Ashvin Vishwanath, my research focuses on the theory of topological phases of matter.

Education:

2016–present: Department of Physics, Harvard University.

2012–2016: School of Physics, Peking University. B.S.