第 49 回トポロジカル物質科学セミナー
Topological Materials Science Seminar (49)

Anatomy of Topological Flat and Surface States: Exact Solutions from Destructive Interference on Frustrated Lattices

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Place: **Room 201a, Faculty of Science Bldg. #1, Hongo Campus, Univ. of Tokyo (東大本郷キャンパス理学部 1 号館 201a 号室)**
Date: **August 24 (Thursday), 2017**
Time: **13:00-13:45**

Abstract:

The main feature of topological phases is the presence of robust boundary states, which appear for example in the form of chiral edge states in Chern insulators and open Fermi arcs on the surfaces of Weyl semimetals. Even though, non-interacting, topological systems can be straightforwardly described in fully periodic systems, the detail of the corresponding boundary states has mainly relied on numerical studies. In our work, we present a general method on how to find exact, analytical solutions for topological as well as trivial boundary states using a generic tight-binding model on a large class of geometrically frustrated lattices without the necessity of having to fine-tune hopping amplitudes. Our method is inspired by a similar approach that has been used in the past to construct, topologically-trivial, flat band models from local constraints on 'line graphs', in which case fine-tuning is required in the sense that hopping is strictly local. We expand on this work by considering a larger class of lattices, finding solutions for both topologically trivial and non-trivial bands, and going beyond the need for fine-tuning. In this sense, it is likely that our work will contribute to both the research fields of flat-band physics and that of topological matter, as well as advance the cross-fertilization between them. In my talk, I will present a number of examples to illustrate our discoveries, some of which are experimentally relevant such as the derivation of exact solutions for Fermi arcs in the recently synthesized slabs of pyrochlore iridates

Host: Masahito Ueda [University of Tokyo/Core Research Group D01]
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