第93回トポロジカル物質科学セミナー
Topological Materials Science Seminar (93)

State-based characterization of topological phases in periodically driven systems

Dr. Masaya Nakagawa
University of Tokyo

Place: **Room K202, YITP**
Date: **May 8 (Wednesday), 2019**
Time: **14:00-15:00**

Abstract:
The past decade has witnessed remarkable progress in extending the concept of topological phases toward periodically driven systems, which are out of equilibrium [1]. The non-equilibrium topological phases are described by the Floquet theory, where particles synchronize with the driving in a steady state and thereby form Floquet states. Notably, periodically driven systems have richer topological structures than static systems, enabling new anomalous topological phases unique to driven systems [2]. To date, it is known that there exist three distinct types of topological phases in periodically driven free-fermion systems, which are based on (i) topology of effective static Hamiltonians, (ii) topology of unitary time-evolution operators, and (iii) topology of Floquet operators. However, the three types of Floquet topological phases are defined through topology of three distinct operators, and have been discussed somewhat independently. In this talk, we show that the three types of topology in periodically driven systems can be expressed directly with Floquet states themselves and all the topological information can be extracted from a single data of time-dependent bulk wave functions [3]. This result is achieved by generalizing the characterization of topological insulators in terms of hybrid Wannier functions.

References:
[1] T. Oka and H. Aoki, Phys. Rev. B 79, 081406 (2009).
[2] M. S. Rudner, N. H. Lindner, E. Berg, and M. Levin, Phys. Rev. X 3, 031005 (2013).
[3] M. Nakagawa, R.-J. Slager, S. Higashikawa, and T. Oka, arXiv:1903.12197.

Host: Ken Shiozaki [Adjunct member]
(ken.shiozaki@yukawa.kyoto-u.ac.jp)