清华大学高等研究院

Institute for Advanced Study, Tsinghua University

学术报告

Title: **Exploring toplogical phases of matter by periodic driving**

Speaker: **Prof. Jiangbin Gong**
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Time: **10:30am, Thursday, Dec 18, 2014**

Venue: **Conference Hall 322, Science Building, Tsinghua University**

Abstract

The creation of new topological phases of matter in periodically driven systems is now a topic of wide interest. In this talk, I shall first discuss a few examples to explain how and why periodic driving can generate intriguing topological phases that are otherwise absent without driving. In particular, I show that the symmetry class of a system can be altered, long-range effective Hamiltonians can be synthesized, and topologically nontrivial flat bands may be induced, all by periodic driving. I shall then focus on adiabatic pumping as a means to detect topological phase transitions in periodically driven systems. It is shown that for initial states prepared as a Wannier state of a Floquet quasi-energy band, the adiabatic pumping can be simply connected with the Chern number of the occupied band. By contrast and much more remarkable, for general and easy-to-prepare initial states possessing coherence between different Floquet quasienergy bands, adiabatic pumping is found to be comprised by two components independent of the pumping time scale: a weighted integral of the Berry curvature summed over all Floquet quasienergy bands, plus an inter-band-coherence induced correction. It is stressed that the found correction is always there no matter how slowly a pumping cycle is executed. In addition to probing topological phase transitions, adiabatic pumping is now also anticipated to be useful in manifesting coherence and decoherence effects in periodically driven systems.

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