北京大学量子材料科学中心

International Center for Quantum Materials, PKU

Weekly Seminar

Non-Hermitian skin effect and non-Bloch band theory

Prof. Zhong Wang

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Time: 4: 00 pm, Oct. 30, 2019 (Wednesday)

时间：2019年10月30日 （周三）下午4:00

Venue: Room W563, Physics building, Peking University

地点：北京大学物理楼，西563会议室

Abstract

Non-Hermitian operators provide a unifying language for many open systems. One of the counterintuitive features of non-Hermitian Hamiltonians is the non-Hermitian skin effect, namely, that all the eigenstates are exponentially localized at the boundary of the system. It implies a dramatic departure from the standard Bloch band theory of Hermitian systems, and causes failures of conventional topological invariants in predicting the topological edge modes. In this talk, I will introduce the basic idea of the recently proposed non-Bloch band theory of non-Hermitian systems. In the first part, it will be shown that the non-Bloch topological invariants defined in the generalized Brillouin zone faithfully predict the topological edge modes, embodying a generalized (non-Bloch) bulk-boundary correspondence. In the second part, I will show that the non-Hermitian skin effect has interesting consequences in the dynamics of open quantum systems governed by the master equation. Specifically, the non-Hermitian skin effect induces a "chiral damping" with novel long-time behaviors.

References:

[1] S. Yao, Z. Wang, Phys. Rev. Lett. 121, 086803 (2018)

[2] S. Yao, F. Song, Z. Wang, Phys. Rev. Lett. 121, 136802 (2018)

[3] F. Song, S. Yao, Z. Wang, Phys. Rev. Lett. 123, 170401 (2019)

[4] L. Xiao, et al, arXiv:1907.12566

About the speaker

Zhong Wang finished his undergraduate education (2001-2005) and then got the doctorate from University of Science and Technology of China (2011). During 2009-2010 he was a visiting student in Stanford University. He joined Institute for Advanced Study of Tsinghua Univeristy in 2011 as an associate member; he is now a member there. His current research interests include topological phases and topological phenomena in condensed matters, classical and quantum open systems, and strongly correlated electronic systems.