

凝聚态物理-北京大学论坛

北京大学物理学院凝聚态物理与材料物理研究所
2023年第1期 (No. 553 since 2001)

The universal non-Hermitian skin effect

方辰 研究员

时间: 2月23日 (星期四) 15:00—16:30
地点: 北京大学物理大楼中212会议室

报告人简介 (About speaker): 方辰研究员于2004年取得北京大学物理学学士学位, 2011年于美国Purdue University获得物理学博士学位。2012-2015年, 方辰分别于普林斯顿大学、麻省理工学院等机构任博士后。2015年11月回国工作, 任中国科学院物理研究所副研究员, 2018年8月起任研究员。方辰在回国工作之后, 主持完成的工作包括: 提出高阶拓扑绝缘体理论 (PRL 2017), 建立了晶体能带中对称性质与拓扑性质的定量对应 (NatComm 2018, PRX 2018), 建立拓扑材料计算数据库 (Nature 2019), 揭示了非厄米趋肤效应的拓扑起源 (PRL 2019), 建立了高阶普适趋肤效应理论 (NatComm 2022)。总引用13000次, H=51。方辰曾任重点研发青年项目负责人 (2016-2021)。

摘要 (Abstract): The non-Hermitian skin effect has been theoretically predicted then experimentally observed in one dimension. This effect has twofold meanings: the eigenvalues of a non-Hermitian band differ drastically under periodic boundary and open boundary conditions; and the eigenstates of a non-Hermitian band under open boundary condition differ drastically from the Bloch states. In this talk, I will first review several key results on the skin effect in one dimension, including its qualitative relation to the spectral winding number, which is a topological invariant unique to non-Hermitian bands. I will then show some new results in 2D and higher dimensions that demonstrate the universal presence of the skin effect. Here “universal” means that (i) it does not need any symmetry for its protection, unlike topological edge modes; and (ii) it is compatible with all spatial symmetries, unlike its 1D counterpart. A natural consequence of this universality is the prediction that any non-Hermitian band having nontrivial exceptional points must also show skin effect, which has recently been observed in an experiment.

邀请人: 李新征 xzli@pku.edu.cn

http://www.phy.pku.edu.cn/icmp/xsjl/njtwl__bjdxlt.htm