

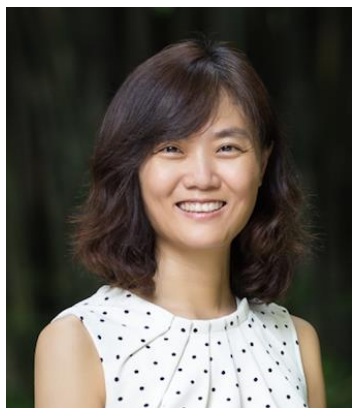


Weekly Seminar

Quantum Non-Hermitian Phenomena with Open Baths

胡颖 教授

山西大学



Time: 3:00 pm, April. 17, 2024 (Wednesday)

时间: 2024年4月17日 (周三) 下午3:00

Venue: Room w563, Physics building, Peking University

地点: 北京大学物理楼, 西563会议室

直播链接: <https://www.koushare.com/live/details/33633>

Abstract

While enchanting non-Hermitian properties unattainable in Hermitian systems are widely revealed, genuine quantum non-Hermitian phenomenology remains largely uncharted territory. Here, we show how engineered non-Hermiticity gives rise to novel phenomena with a genuine quantum nature [1]. We investigate a system of atoms (or artificial atoms) embedded in a particular type of bath, which in turn interacts with an outer bath and dissipates. By engineering the interaction with the bath and the bath itself, the atomic properties can be influenced in an unprecedented manner. In particular, we find the atomic emission can be suppressed by dissipation in an unusual way; the algebraic scaling with the relevant parameters acquires fractional power – the fractional Quantum Zeno effect. This interesting behavior cannot occur if the inner bath is isolated, and results in exotic long-range interactions of atoms. We further find FQZ-induced strong single-photon nonlinearity. Remarkably, we identify that the sub-Poissonian quantum statistics of photons, which has no classical analogues, stems here from the key role of non-Hermiticity. Our setup is experimentally feasible with the techniques used to design lattice models with dissipative couplings [2]. This work opens a path to exploring non-Hermitian quantum optics as well as quantum many-body non-Hermitian physics.

[1]. Phys. Rev. X 13, 031009 (2023)

[2]. Phys. Rev. Lett. 130, 153602 (2023)

About the speaker

胡颖, 山西大学激光光谱研究所教授, 2018年入选国家中组部高层次人才计划。从事基于光与原子的新奇物态与量子调控等交叉前沿领域的理论研究。博士毕业于美国范德堡大学, 先后在香港浸会大学非线性中心、北京大学量子材料科学中心、奥地利因斯布鲁克大学Peter Zoller教授团队从事博士后研究, 2017年加入山西大学。近年成果发表在Nat. Phys.、Phys. Rev. X 和 Phys. Rev. Lett. 等顶级期刊。



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