



北京大学量子材料科学中心

International Center for Quantum Materials, PKU

Seminar

**Engineering non-Abelian Berry curvatures
via dissipation—spontaneous Chern-Euler duality transitions**

Kang Yang

Free University of Berlin



Time: 3:00 pm, Dec.19, 2025 (Friday)

时间: 2025年12月19日 (周五) 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

Abstract

Many universal phenomena of physical states can be understood from symmetries and global topological structures. For energy bands, after fixing the symmetry, topological transitions are often marked by an abrupt jump in the quantized index. Here we present a different paradigm for parity-time symmetry breaking induced by dissipation in photonic systems, where the topology must remain conserved, but its manifestation switches from Euler number characterizing Dirac points to Chern number characterizing in-gap modes. The non-Abelian Berry curvature exhibits different forms of nontrivial quantization across the transition. Such a new transition originates from the contrasting gauge structures of the symmetry-preserving regime and spontaneous-symmetry-breaking regime in the system. Their coexistence in a single platform renders the system beyond Cartan's symmetric spaces and Bott clock. I will show that the systems are described by more generic homogeneous spaces interpolating different Altland-Zirnbauer symmetry classes and this might lead to new ideas of engineering topological phenomena via dissipation.

About the speaker

Kang Yang obtained his bachelor in Peking University, master in École Normale Supérieure and PhD in Sorbonne University. Then he worked as a postdoc in Stockholm University and Free University of Berlin. He works in the geometrical and topological structures of electronic and photonic states, with their applications in fractional quantum Hall effects, fractional Chern insulators and topological band theories.