北京大学量子材料科学中心

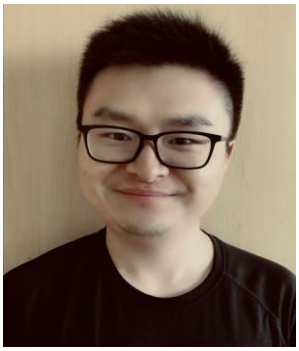
International Center for Quantum Materials, PKU

Seminar

Thermal optimization of Josephson diode effect

Noah F. Q. Yuan

Tsung-Dao Lee Institute, Shanghai Jiao Tong University



Time: 11:00 am, Sept.19, 2025 (Friday)

时间：2025年9月19日（周五）上午11:00

Venue: Room w563, Physics building, Peking University

地点：北京大学物理楼，西563会议室

Abstract

We present a comprehensive theoretical study of the temperature dependence of the Josephson diode effect. Our analysis reveals a material-independent non-monotonic behavior in appropriate temperature regimes: the diode efficiency is enhanced at lower temperatures but suppressed at higher temperatures, with an optimal efficiency occurring at an intermediate temperature. We analyze the underlying mechanisms, perform model calculations, and propose experimental candidates such as asymmetric superconducting quantum interference devices (SQUIDs), high temperature superconductors, rhombohedral graphene and twisted transition metal dichalcogenides.

About the speaker

Noah F. Q. Yuan got his PhD at the Hong Kong University of Science and Technology in 2017. After that he went to Massachusetts Institute of Technology as a Postdoc from 2017 to 2020. He was an Associate Professor at the Harbin Institute of Technology (Shenzhen) from 2021 to 2024. Since 2024 he joined Tsung-Dao Lee Institute, Shanghai Jiao Tong University as Tenure-track Associate Professor. His interests include mainly the theory of unconventional superconductivity, two-dimensional materials and topological materials. Recently, his research focus on unconventional superconductivity lies in finite-momentum superconductivity and supercurrent diode effect.