



# Seminar

## Relaxation to an Ideal Chern Band through Coupling to a Markovian Bath

### Bruno Mera

*Universidade de Lisboa*



**Time: 3:00 pm, Dec.29, 2025 (Monday)**

**时间: 2025年12月29日（周一）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

We propose a microscopic, weak-coupling mechanism by which generic Chern bands relax toward ideal bands. We consider coupling interacting electrons to a Caldeira-Leggett like Ohmic bosonic bath. Using the Born-Markov approximation, Slater determinant states of a Chern band under Hartree-Fock approximation evolve toward Slater determinant states corresponding to an ideal Chern band. We validate our proposal by performing numerical simulation of a massive Dirac model, showing that the Berry curvature and quantum metric indeed co-evolve to saturate the trace condition. Our proposal provides a concrete dissipative route to realize ideal Chern bands, a fundamental building block for the stabilization of fractional Chern insulators.

### About the speaker

Bruno Mera is a theoretical condensed matter physicist working on the geometry of quantum states, with a focus on its role in quantum materials and correlated systems. His research explores how geometric quantities—such as Berry curvature and the quantum metric, including their mixed-state extensions—govern the emergence of exotic quantum phases and determine measurable properties in solid-state and cold-atom platforms, including Hall conductivity, Hall viscosity, and optical absorption.

He received his PhD from the University of Lisbon in 2018, held postdoctoral positions at the University of Lisbon and Instituto de Telecomunicações, and previously worked at the Advanced Institute for Materials Research (AIMR) at Tohoku University. He is currently an FCT Junior Researcher in Lisbon.