

**Abstract for IAS Focused Program on Mathematical Foundations of Topological Materials
(January 6-9, 2026)**

Recent Progress on the Bulk-edge Correspondence Principle in Finite Systems

Jiayu QIU

Department of Mathematics, ETH Zürich, Switzerland

Email: jiayu.qiu@math.ethz.ch

The bulk-edge correspondence (BEC) principle, as a fundamental idea in solid-state physics, photonics, and many other fields, serves as the bridge linking the topological property of bulk materials to the quantum transport along the edge or interface. Typically, the BEC is studied exclusively for systems of infinite size and characterized by topological invariants such as the Chern integer or \mathbb{Z}_2 index. In this talk, we present some new results demonstrating that the BEC extends to systems of *finite size* with or without disorder. These results reveal that the BEC is a universal phenomenon governed by conservation laws. The talk is based on joint work with Hai Zhang (HKUST) and Habib Ammari (ETH Zurich),