Contribution ID: **49** Type: **Oral Presentation**

Topological Edge States in 2D Su–Schrieffer–Heeger Models

Wednesday, 5 July 2023 11:00 (20 minutes)

Topological behaviour in optical systems and low dimensional materials has been studied widely over the last several years. In materials topological states are of special interest as they promise to exhibit protected conducting surface states in otherwise insulating systems. The protection here refers to any symmetry-preserving perturbation to the system.
For rectangular lattices the 2D Su–Schrieffer–Heeger (SSH) model is a common choice for materials with particle-hole and chiral symmetries. In two-dimensional materials specifically topologically protected corner and edge states can occur. Edge states are usually identified with some weak notion of topology, but they are more interesting for applications needing to drive some surface current.
We present here the standard SSH model as well as a new extended SSH model including second-nearest-neighbour (SNN) interaction. For these models the characteristic topological phases are presented. The standard SSH model presents phases with corner as well as edge states. The zero energy corner state is suppressed in semi-periodic configurations allowing for the edge state to be the lowest energy state. We further show the influence of symmetry-breaking SNN interactions. These leave the edge states virtually unchanged, but shift and deform the bulk bands, allowing us the engineer a desired band structure and topological state.

Apply to be considered for a student ; award (Yes / No)?

Yes

Level for award;(Hons, MSc, PhD, N/A)?

PhD

Consent on use of personal information: Abstract Submission

Primary authors: VAN NIEKERK, Chani (University of Johannesburg); Dr WARMBIER, Robert (University of the Witwatersrand)

Presenter: VAN NIEKERK, Chani (University of Johannesburg)

Session Classification: Theoretical and Computational Physics

Track Classification: Track G - Theoretical and Computational Physics