Anderson Delocalization of Boundary States via Index Theory

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Abstract

In the first part of my talk I will introduce the Fredholm Index and related Index Theorems and describe how we use them to demonstrate the existence of Anderson localization-delocalization transition every time a strong bulk topological invariant changes its quantized value. This will be exemplified with numerical experiments and calculations of phase diagrams for various strongly disordered tight-binding models. In the second part, I will introduce topological invariants for the boundary states and explain how are they related to the bulk topological invariants. Then I will show that a non-trivial value of such boundary invariant prevents the boundary spectrum from undergoing an Anderson localization.

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