Floquet Hamiltonians and topological insulators

Abstract:

Floquet topological insulators (FTIs) are an emerging category of materials whose properties are transformed by time-periodic forcing, with a wide range of applications to electronics, laser science, and more. Traditionally, the theory of FTIs is based on discrete, approximated models. Can FTIs be understood from their first-principles continuum models, i.e., from a driven Schrodinger equation? First, we rigorously show that the propagation of physically relevant wave-packets are governed by a Dirac equation. This dynamical-systems approach allows us to study both the bulk and edge insulation of FTIs. In particular, we show that in the continuous Dirac model, localized edge-modes decay due to a resonance phenomenon.