

Probing Topological Properties of Quasicrystals with Waves

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Quasicrystals and tiling spaces have long been recognized as being a natural playground for topological features including a description through topological invariants. For quasiperiodic chains such as the Fibonacci chain, Chern numbers emerging from purely structural building rules are known to label the dense set of spectral gaps. We present a study of topological properties of a finite Fibonacci Chain using the scattering and also the diffraction of waves. We show that the Chern numbers may be measured as the winding of a chiral phase as a function of a translational degree of freedom which corresponds to an underlying palindromic symmetry cycle. Furthermore, we present a method to obtain all available Chern numbers as a function of the chain length, using purely structural properties of the finite chain. Existing experimental realizations will be addressed, as well as the possible generalizations.

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