

Floquet exceptional topological insulator

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We propose a novel way of modulating exceptional topology by implementing Floquet engineering in non-Hermitian (NH) systems. We introduce Floquet exceptional topological insulator which results from shining circularly polarized light on a three-dimensional NH topological insulator i.e. NH generalization of Floquet topological insulator. The light-matter interaction facilitates the quantum phases of matter to exhibit a novel phenomenon, where the point gap in the bulk hosts surface states. These doubly degenerate surface states, which are localized at opposite surfaces, fill the point gap in the complex eigenspectrum isotropically, thus showcasing a single-sheet structure. In the presence of an external magnetic field, the system exhibits exceptional points at the surface and the order of them can be modulated using light. We also introduce Floquet driving of an unconventional three-dimensional NH topological insulator that has two Fermi points and transition between single-sheet to double-sheet can be achieved by tuning system parameters. The existence of the Floquet biorthogonal Chern number which is connected to the three-dimensional winding number and spectral winding number shows that the momentum slices exhibit skin effect, even though the system as a whole does not. We employ wave dynamics evolution to illustrate the consequence of NH surface skin effect.