

Topology of exceptional points

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Exceptional points are band-touching points that are unique to non-Hermitian systems[1]. At the exceptional points, two eigenstates coalesce, resulting in square-root dispersion. The emergence of exceptional points is ubiquitous as they are observed for a wide range of systems from quantum systems[2] through meta-materials[3] to geophysical fluid dynamics[4].

In this talk, we discuss topology of exceptional points with/without symmetry[5]. Specifically, we show that symmetry may enrich exceptional points leading to symmetry-protected exceptional rings (surfaces) in two (three) dimensions. We also demonstrate that strongly correlated electrons may host such exceptional points, rings, and surfaces. Furthermore, we extend the analysis to multi-fold exceptional points (i.e., non-Hermitian band touching of three or more bands) which is beyond the periodic table of Bernard-LeClair symmetry classes[6]. Based on resultant of the characteristic polynomial, we clarify the topological aspect of multi-fold exceptional points[7]. Our framework also elucidates the robustness of non-Hermitian band touching reported for acoustic meta-materials.

References:

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