

## **Internal Webinar**

### **Device Applications of Specialty Optical Systems Hosting Exceptional Points**

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The field of non-Hermitian formalism in photonics has gained substantial attention for its ability to reveal unconventional phenomena. Exceptional Points (EPs) within non-Hermitian systems are particularly intriguing, representing critical junctures where system behaviour deviates significantly from the norm. EPs occur when coupled eigenvalues and corresponding eigenstates coalesce, leading to the collapse of the eigenspace-dimensionality of the underlying Hamiltonian. This collapse endows EPs with the characteristic of topological defects, and they have found applications in generating unique optical phenomena such as unidirectional lasing, enhanced sensing, asymmetric mode conversions, optical isolation etc. Various gain loss-assisted optical waveguides/fibres have been investigated to host different order EPs. Non-Hermiticity has been introduced in terms of a gain-loss profile based on only two control parameters. The unconventional propagation characteristics of the coupled modes following dynamical parametric encirclement processes, enclosing the identified EPs, have been proposed. This comprehensive exploration advances the understanding of the physics of different orders of EPs in photonics and their application in optical devices, paving the way for transformative developments in integrated all photonic components and devices for next-generation communication and emerging quantum technological applications.

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***10:30 Hrs***

