Nonlinearity and Excpetional Points in Non-Hermitian Nanophotonic Systems

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Many interesting phenomena, such as intriguing chirality and unidirectional responses, emerge around so-called exceptional point (EP) in non-Hermitian optical systems. Although there have been extensive studies of linear properties of EPs, studies in nonlinear regime are very limited. In fact, this plays an important role for utilizing EPs for lasers, which is inherently nonlinear. Previously, we showed that it is nontrivial to observe exact EP in the lasing condition [1]. Recently, we have investigated nonlinear double-coupled cavity systems with dissipative coupling, and found that most of properties of EP in the linear regime can be maintained even at lasing condition in heavily nonlinear regime [2].

In this talk, we will present further extended studies of nonlinear non-Hermitian nanophotonic systems relating to singular EP properties.

References

[1] K Takata, K Nozaki, E Kuramochi, *et al.*, Optica **8**, 184 (2021)

[2] T Uemura, K Takata and M Notomi, Phys. Rev. Res. **7**, 043266 (2025)