PT-symmertic wave dynamics in photonic molecular systems

Sunkyu Yu, Daniel R. Mason, Xianji Piao, and Namkyoo Park*

Photonic Systems Laboratory, School of EECS, Seoul National University, Seoul 151-744, Korea
email: *nkpark@snu.ac.kr

Abstract:

The property of non-Hermitian Hamiltonians satisfying parity-time (PT) symmetry has been widely investigated, for the alleviation of restricted Hermitian condition and for the application of their unusual phenomena related to complex potentials. Among those phenomena, non-reciprocal wave dynamics around the onset of PT symmetry breaking has been a hot topic in optics, for the realization of non-reciprocal devices without magneto-optical effects.

In this talk, we explore the non-reciprocity in photonic molecular systems, focusing on the phase of eigen-spectra. We show the unconventional phase dependency of non-reciprocal dynamics, contrary to the intuitive expectation. Exploiting this phase-dependent dynamics, we also demonstrate the novel phenomenon of 'reversible non-reciprocity', based on the local inversion of PT symmetry. The separation of exceptional points, related to spatio-spectral dispersion of photonic molecular systems, also will be presented.