

Colloquium Notice

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Non-Hermitian Photonics: New Opportunities for Controlling the Flow of Light

This talk will describe several opportunities for realizing novel nanophotonic devices by employing new degrees of freedom including optical gain and loss as well as mechanical motion. Although most previous efforts on designing photonic devices and structures have been focused on crafting their refractive index profile while avoiding active and dissipative mechanisms, recent investigations suggest the use of such non-conservative processes in order to achieve unusual properties and functionalities. These recent theoretical developments, which are originally inspired by quantum mechanics, have led to the emerging area of non-Hermitian photonics, proposing the conjunctive use of the optical refractive index, gain and loss as three ingredients for photonics design.

In the first part of this talk, I will provide an overview of the fundamental concepts of non-Hermitian photonics, discuss some of its unique and exotic phenomena and mention potential applications. In particular, I will discuss coupled active/passive resonators and introduce a versatile approach for enforcing single-mode operation in multi-mode laser cavities. The second part of this talk is devoted to micro-/nano-optomechanical cavities as rich platforms for establishing a dynamical coupling between the electromagnetic field and mechanical motion. I will discuss the dynamics of such devices and show that giant optomechanically-induced nonlinear effects, in connection with the optical and mechanical dissipation, offer a viable route for breaking the reciprocity of light in order to realize compact optical isolators and circulators.

Wednesday

April 18, 2018

Starts at 12:15 PM

Coffee at 12:00 PM

Physics Conference Room, SB B326