NEW YORK CITY COLLEGE OF TECHNOLOGY
Physics Department
Center for Theoretical Physics

Pattern Formation and Strong Nonlinear Interactions in Exciton-Polariton Condensates

Presented by:

Dr. Li Ge

College of Staten Island of CUNY
Staten Island, NY

Thursday, October 22 at 12:00 PM
Namm, Room 823

Abstract

Exciton-polaritons generated by light-induced potentials can spontaneously condense into macroscopic quantum states that display nontrivial spatial and temporal density modulation. While these patterns and their dynamics can be reproduced through the solution of the generalized Gross-Pitaevskii equation (GPE), a predictive theory of their thresholds, oscillation frequencies, and multi-pattern interactions has so far been lacking. Here we represent such an approach based on current-carrying quasi-modes of the non-Hermitian potential induced by the pump. The presented theory allows us to capture the patterns formed in the steady-state directly and account for the nonlinearities exactly in GPE. We find a simple but powerful expression for thresholds of condensation and the associated frequencies of oscillations, quantifying the contribution of particle formation, leakage, and interactions. We also show that the evolution of the condensate with increasing pump strength is strongly geometry dependent and can display contrasting features such as enhancement or reduction of the spatial localization of the condensate. The comparison with two independent experiments will be discussed.

Light refreshments will be served.