Physics AT QUEENS COLLEGE

Colloquium Notice

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Half-light half-matter quasiparticles: from condensation to quantum nonlinearity

Strong light-matter interaction results in the formation of half-light half-matter quasiparticles called polaritons that take on the properties of both its constituents. In this talk I will first introduce the concept of strong light-matter coupling in low-dimensional semiconductors in optical cavities. Following this, I will discuss the formation of Bose Einstein like condensates at room temperature using polaritons formed in organic molecules[1]. Approaches to create condensate lattices in such systems will also be presented. Next, I will present our recent work on polaritons in 2D materials and their potential to reach quantum nonlinearity[2]. I will conclude with a discussion on the potential of strong light-matter coupling to engineer magneto-optic response of 2D materials[3,4].

1. Deshmukh, P. et al. A plug-and-play molecular approach for room temperature polariton condensation. ArXiv 2304.11608 (2023).
2. Datta, B. et al. Highly nonlinear dipolar exciton-polaritons in bilayer MoS2. Nature Communications 2022 13:1 13, 1–7 (2022).
3. Dirnberger, F. et al. Spin-correlated exciton–polaritons in a van der Waals magnet. Nature Nanotechnology 2022 17:10 17, 1060–1064 (2022).
4. Dirnberger, F. et al. Magneto-optics in a van der Waals magnet tuned by self-hybridized polaritons. Nature 620, 533–537 (2023).

Tuesday
October 10, 2023
Starts at 12:15 PM
Coffee at 12:00 PM
Physics Conference Room, SB B326