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Quantum optics with deterministically positioned quantum emitters in a two-dimensional semiconductor

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Abstract

The emergence of single quantum emitters in layered transition metal dichalcogenide semiconductors offers new opportunities to construct a scalable quantum architecture with a coherent light-matter interface. Here I will present results taking steps in this direction. First, using nanoscale strain engineering, we deterministically achieve a two-dimensional lattice of quantum emitters in an atomically thin semiconductor. We create point-like strain perturbations in mono-and bi- layer WSe_2 which locally modify the band-gap, leading to efficient funnelling of excitons towards isolated strain-tuned quantum emitters. These emitters exhibit high-purity single photon emission that is stable and bright, yielding detected count rates up to 3 MHz. Next, we perform time-resolved photoluminescence, resonance fluorescence, and high-resolution photoluminescence excitation spectroscopy of these isolated, localized 2D excitons to characterize their dephasing mechanisms and unravel their origin. Finally, I will provide an outlook on investigations of the spin and valley coherence and prospects for integrated photonic chips incorporating quantum emitters in atomically-thin TMD semiconductors.

ההרצאה תתקיים ביום חמישי, ה - 4.5.2017 בשעה 12:30
בבניין פיסיקה, חדר סמינרים 620
The lecture will take place on Thursday, 4.5.2017 at 12:30
at the Physics Building, Seminar Room 620

Host: Professor David Gershoni