Seminar

Exploring the strong coupling regime in two-dimensional semiconductors

刘晓泽

武汉大学

Time: 10: 00 am, Nov. 7, 2019 (Thursday)

时间：**2019年11月7日 （周四）上午10:00**

Venue: Room W563, Physics building, Peking University

地点：北京大学物理楼，西563会议室

Abstract

The strong light-matter coupling is at the core of cavity quantum electrodynamics (CQED), which leads to discoveries of quantum optics in the solid state, such as Bose-Einstein condensation and photon blockade. Under the strong coupling regime in semiconductor cavities, the "marriage" of light (i.e., photon) and matter (i.e., exciton) leads to the formation of hybrid quasiparticles called exciton-polaritons with unprecedented physical properties. As emerging materials, two-dimensional (2D) semiconductors show unique excitonic properties, breaking the limitations of conventional quantum well systems for solid state CQED. In this talk, I will first briefly go over recent progresses about the formation and coherent control of exciton-polaritons with 2D semiconductors. Then I will focus on discussing our recent first observation of unexpected phonon scattering behaviors under the strong coupling regime of 2D semiconductors in a plasmonic cavity configuration. This observation clarifies the underlying valley physics, and more importantly indicates the critical role of phonon scattering for the quantum phenomena in solid state CQED. If time permits, I also would like to share some of our recent progress on the nonlinear optics and the quantum electrodynamics at the excited states of 2D exciton polaritons in a Fabry-Perot cavity configuration.

About the speaker

刘晓泽，2019年10月加入武汉大学物理科学与技术学院。2014年于纽约市立大学Vinod Menon教授课题组获得博士学位；2015-2019 于加州大学伯克利分校张翔教授课题组从事博士后研究。主要研究方向是微纳光腔中光和半导体的耦合过程及其新奇的光学现象。涉及的半导体材料包括有机无机半导体，二维材料和钙钛矿半导体，在固体光腔量子电动力学开展了较为系统深入的研究。作为主要贡献作者，在 Nature Photonics, Physical Review Letters, Proceedings of National Academic Sciences, Nano Letters等期刊上发表过研究成果。