复旦大学物理系 Colloquium

Time: 14:00, Tuesday, 2024.5.14

Location: C108, Jiangwan Physics Building

Manipulate Exciton and Polariton Quantum Fluids in TMD Materials

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Abstract: Monolayer transition metal dichalcogenides (TMDs) are emerging two-dimensional (2D) semiconductors with a sizable direct bandgap and exceptional physical properties. The tightly bound excitons with giant oscillator strength render monolayer TMDs as an ideal platform to investigate the fundamental properties of excitons and their strong light-matter interactions when they are integrated with optical cavities. In this talk, we will present our recent progress of TMD microcavity exciton polariton and the ultrafast dynamics in in TMD microcavity devices, using WS_2 as a model system, followed by a focused discussion on the nonlinear interactions and how the artificial potential landscape can be utilized to enhance such interactions. Finally, we will share a recent discovery of ultrafast exciton fluids in TMD monolayers, when the trions are suppressed by a backgate. The neutral exciton emission was observed to rapidly extend the entire sample region below 150 Kelvin. This observation suggests that the exciton propagate through the entire region with tens of micrometers within their finite lifetime, beyond any possible diffusion-controlled motion. The exciton fluids propagate with a velocity ~ 6% of the speed of light.

报告人简介： 熊启华，美国物理学会、材料研究学会和光学会会士,重点研发计划首席科学家。1997年本科毕业于武汉大学，2006年于宾夕法尼亚州立大学获得博士学位。2006-2009在哈佛大学从事博士后研究，2009年加入南洋理工大学，2016年获聘正教授。2017年获得国家特聘专家称号，2019年初兼聘清华大学建设实验室，2021年初全职加入清华大学物理系。主要研究方向是光学和光谱学，发表330多篇论文，包括自然-科学5篇及其子刊36篇，总引用超过30000次，多年入选全球高被引科学家名单。目前担任《Nano Letters》等期刊副主编和多家杂志国际编委。