



## Weekly Seminar

# Emergence of Electron Coherence in MoS<sub>2</sub> Induced by Spatial Self-Phase Modulation

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**Time: 4:00pm, October 14, 2015 (Wednesday)**

**时间: 2015年10月14日 (周三) 下午4:00**

**Venue: Room w563, Physics building, Peking University**

**地点: 北京大学物理楼, 西563会议室**

### Abstract

Electron coherence has been established successfully in MoS<sub>2</sub> flakes by using spatial self-phase modulation (SSPM) and a *Wind-Chime Model* is proposed to describe this emergent collective phenomena. Gap-dependent  $\chi^{(3)}$  has been obtained directly in the SSPM experiment and the physics mechanisms have been analyzed, demonstrating a ubiquitous property for 2D layered quantum materials. Furthermore, two-color all-optical switching based on SSPM has been realized for the first time, whose superb performances endow promising prospects for layered quantum materials in photonics applications.

### References:

- [1] Y. L. Wu, Jimin Zhao\* et al., *Emergence of electron coherence and two-color all-optical switching in MoS<sub>2</sub> based on spatial self-phase modulation*, **PNAS** 112, 11800 (2015).
- [2] R. Wu, Jimin Zhao\* et al., *Purely coherent nonlinear optical response in solution dispersions of graphene sheets*, **Nano Letters** 11, 5159 (2011).
- [3] X. F. Han, Jimin Zhao\* et al., *Single-photon level ultrafast all-optical switching*, **APL** 92, 151109 (2008).

### About the speaker

Jimin Zhao, professor in the Institute of Physics, Chinese Academy of Sciences. From 2007 to 2015, he was an associate professor in the Institute of Physics (CAS). In 2004, he obtained his PhD degree from the department of physics, The University of Michigan (Ann Arbor). In 1998 and 1995, he received his MS and BS degrees from the department of physics, Tsinghua University, respectively. He serves as the EBM of Scientific Reports. His current research interest is ultrafast spectroscopy and dynamics of quantum materials, including high-temperature superconductors and other layered systems.