7th International Workshop on 2D Materials

Title of the Presentation: Magnetic Moments Induced by Atomic Vacancies in Transition Metal Dichalcogenide Flakes

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Short Biography:

Jun Ge, a PhD candidate of International Center for Quantum Materials, School of Physics, Peking University, received her bachelor's degree in physics from Beijing Institute of Technology. She joined Prof. Jian Wang's group of the Low dimensional quantum transport Laboratory in 2017. Her research interests are focused on the quantum transport properties of low dimensional topological materials.

Abstract:

2D magnetism plays a key role in both fundamental physics and potential device applications. However, the instability of the discovered 2D magnetic materials has been one main obstacle in deep research and potential application of 2D magnetism. We discovered the localized magnetic moments induced by Pt vacancies in air-stable type-II Dirac semimetal $PtSe_2$ flakes[1]. The localized magnetic moments give rise to the Kondo effect, evidenced by logarithmic increment of resistance with decreasing temperature and isotropic negative magnetoresistance(NMR). Additionally, the induced magnetic moment and Kondo temperature appear to depend on thickness in the thinner samples (<10 nm). The small magnetocrystalline anisotropy revealed by first principles calculation indicates that the magnetic moments are randomly localized instead of long-range ordered. The findings demonstrate a new means to induce magnetism in 2D non-magnetic materials.

[1]J. Ge et al., *Adv. Mater.* 2005465(2020). https://doi.org/10.1002/adma.202005465.

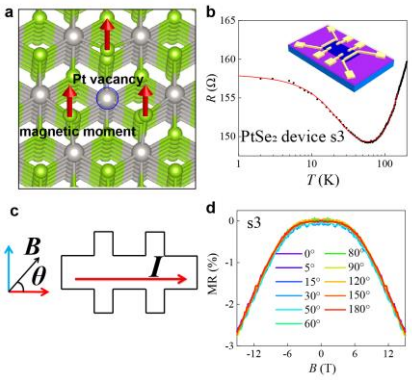

Fig. 1. Magnetic moments induced by Pt vacancies in $PtSe_2$ flakes. (a) An illustration of the local magnetic moments (red arrows) and a Pt-vacancy defect (the blue circle) placed in the topmost layer. (b) Longitudinal resistance of s3 as a function of temperature in log plot from 200 K to 2 K. (c) The schematic diagram of magnetotransport measurements. (d) Isotropic NMR when the magnetic field is applied in *ab* plane of s3.