



Seminar/Talk

Valley exciton in 2D semiconductor: from experimental observation to coherent manipulation

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Host:

Following the success of graphene, the transition metal dichalcogenide (TMDC) family of the form MX_2 ($\text{M} = \text{Mo}, \text{W}$; $\text{X} = \text{S}, \text{Se}, \text{Te}$) has attracted significant attention as a two-dimensional semiconductor. While maintaining the advantageous flexibility and tunability found in graphene, TMDCs possess a band gap that transitions from the indirect to direct type at the monolayer limit, giving rise to an extraordinarily strong light-matter interaction. In this talk, I will discuss our effort to understand and control the electronic structure of TMDCs using ultrafast light. We will present our discovery of a strong and anomalous excitonic effect in the TMDC monolayer, where the room-temperature stable exciton emerges from an unscreened Coulomb interaction in the two-dimensional space [1]. In addition, we will report our recent successful coherent manipulation of the valley polarization, a degree of freedom analogous to spin but exists only in the momentum space of the electron [2]. The ability to control the valley degree of freedom can potentially enable a new platform for quantum information applications.

[1] Z. Ye et al. Nature 513, 214 (2014)

[2] Z. Ye et al. Nature Physics (2016) doi:10.1038/nphys3891

Thursday, February 2, 2017 09:45am - 10:45am

Mondi Seminar Room 2, Central Building



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