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INSTITUTE OF ELECTRONIC STRUCTURE AND LASER

IESL SEMINAR

Wednesday 03/05/2023, 12:00

FORTH Seminar Room 1

DYNASTY

DYNAmics and STructural analYsis of 2D materials

Spin/valley and excitonic transport in 2D-semiconductor WSe_2

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Abstract

Following the graphene craze, the scientific community is currently interested in the properties of new 2D materials that exhibit extraordinary optical and electrical properties: the family of Transition Metal Dichalcogenides (TMDs). These materials are semiconductors with a tunable bandgap that ranges from the visible to the near-infrared spectrum. It is crucial to measure the charge and spin transport properties of these materials and develop ultrathin optoelectronic and/or spintronic devices based on TMDs. In this talk, I will focus on the transport properties of WSe_2 monolayers using optical spectroscopy. WSe_2 is known to host a wide range of excitons, which are strongly bound electron-hole pairs. I will first analyze the transport properties of excitons when coupled to an electron reservoir (trionic species) and then demonstrate how it is possible to strongly spin/valley polarize the electron sea. The transport of this polarization can be carried out on a much larger scale than the classical exciton diffusion lengths, reaching up to tens of microns. Finally, I will show novel results of unidirectional excitonic transport on a coplanar $WSe_2/MoSe_2$ structure.

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