



HELLENIC REPUBLIC  
MINISTRY OF DEVELOPMENT AND INVESTMENTS  
GENERAL SECRETARIAT FOR RESEARCH AND INNOVATION



**FORTH**  
Research • Technology • Innovation

FOUNDATION FOR RESEARCH AND TECHNOLOGY – HELLAS  
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<sub>2</sub>**

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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<sub>2</sub> monolayers using optical spectroscopy. WSe<sub>2</sub> 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<sub>2</sub>/MoSe<sub>2</sub> structure.



This project receives funding in the European Commission's Horizon 2020 Research Programme under Grant Agreement Number 818087.



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