



TECHNISCHE  
UNIVERSITÄT  
WIEN



INSTITUT FÜR PHOTONIK  
Photonics Institute

Gußhausstraße 27-29, 1040 Wien/ Vienna Tel: +43 1 58801 38701 Fax: +43 1 58801 38799 <http://www.photonik.tuwien.ac.at/>

# PHOTONIK SEMINAR

**Sven Borghardt**

*Forschungszentrum Juelich GmbH*

## **Dielectric Effects and Multi-Particle Excitonic Complexes in Transition Metal Selenides**

Transition metal dichalcogenide monolayers (TMDC-MLs) are a promising material class for next generation optoelectronic devices. Their van-der-Waals nature enables the easy stacking with other two-dimensional materials, e.g. insulators, metals or ferromagnets. Due to their ultimate thinness, the intrinsic properties of TMDC-MLs are highly sensitive to their direct environment. In our work, we examine the effect of a dielectric environment on the band gaps and binding energies of transition metal diselenide monolayers. Furthermore, we study the rich excitonic physics of WSe<sub>2</sub> MLs in a gate-tunable device, which gives access to multi-particle excitonic complexes such as trions, biexcitons, charged biexcitons, spin-forbidden dark excitons and spin-forbidden dark trions. As an application, we demonstrate the generation of radially polarized light from spin-forbidden dark states in WSe<sub>2</sub> MLs.

**Friday, April 5<sup>th</sup>, 2019, 11:00**

Seminarraum 387 - Institut für Photonik

Gußhausstraße 27-29, 1040 Wien, Raum CBEG02

Host: Karl Unterrainer