

# Stuttgarter Physikalisches Kolloquium

Fachbereich Physik, Universität Stuttgart  
Max-Planck-Institut für Festkörperforschung  
Max-Planck-Institut für Intelligente Systeme

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Universität Stuttgart, Pfaffenwaldring 57, 70569 Stuttgart-Vaihingen

Gastgeber: Prof. Dr. Jörg Wrachtrup, Universität Stuttgart, Telefon: 0711 - 685-65278

## Interacting Opto-Moiré Quantum Matter

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### Abstract

Moiré superlattices of 2D materials are an emerging platform for studying strongly correlated phenomena. In this talk, I will present our progress in optical excitation of transition metal dichalcogenide heterostructures. I will firstly present the observation of exciton many-body states – formed by moiré exciton bound with generalized Wigner crystal states. Then I will present the observation of giant excitonic Hubbard U towards exploration of Bose-Hubbard model. Lastly, I will discuss the drastic tuning of spin-spin exchange interactions of moiré trapped holes by optical excitation, which results in ferromagnetic order over a small range of doping at elevated temperatures. These results show that semiconducting moiré quantum matter is a versatile laboratory for studying correlated light-matter interaction physics.