

SFB – Colloquium

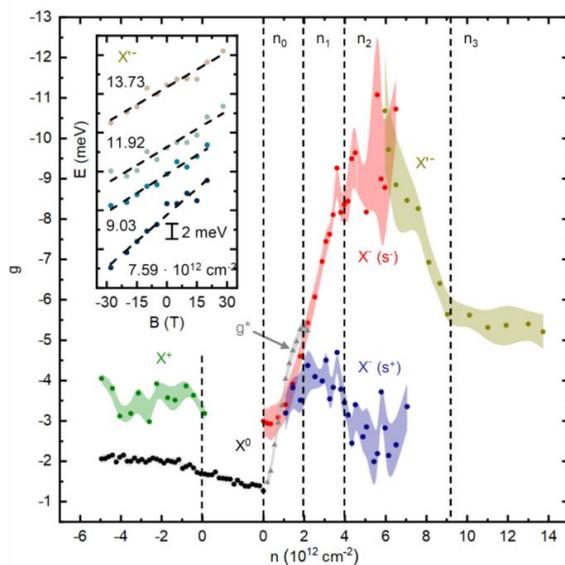
Speaker: **Dr. Andreas V. Stier**
Walter Schottky Institut, TU Munich



Date: Tuesday, 24 May 2022, 14:15, H34

Topic: Optical spectroscopy of 2D semiconductors
in high magnetic fields

Abstract:



In monolayer semiconductors such as MoS₂, WSe₂ or 2D perovskites, masses are heavy and exciton binding energies (E_B) are hundreds of meV, requiring magnetic fields of order 100 T to approach a regime where the cyclotron energy exceeds E_B [1,2,3].

I will review our progress on magneto-optical spectroscopy of atomically thin semiconductors in large magnetic fields up to 91 Tesla with a special emphasis on the spin and Coulomb physics of neutral and charged excitons.

While studies on neutral excitons are (by now) fairly well understood, in gated structures, at excess electron- or hole doping, we examine the interaction of the exciton with the surrounding Fermi sea [4]. In recent results on electron-doped MoS₂, we find that the spin of the resident electron bath defines the ground state of the dressed exciton [5,6].

These results cannot be understood within a single-particle picture, highlighting the importance of exchange interactions and intervalley correlations in monolayer semiconductors.

Host: Dr. Paulo E. Faria Junior

Density-dependent valley Zeeman g-factor for the positively charged trion (X^+), the neutral exciton (X^0), negatively charged trion in positive ($X^-(s^+)$) and negative ($X^-(s^-)$) magnetic fields as well as a many-body state (X'^-) at high electron doping in monolayer MoS₂.

- [1] A.V. Stier et al., Nature Comm. **7**, 10643 (2016)
- [2] A.V. Stier et al., Phys. Rev. Lett. **120**, 057405 (2018)
- [3] M Goryca et al., Nature Comm. **10**, 1 (2019)
- [4] J. Li et al., Phys. Rev. Lett. **125**, 147602 (2020)
- [5] J. Klein et al., Phys. Rev. R. **3**, L022009 (2021)
- [6] J. Klein et al., Phys. Rev. B, **105**, L041302 (2022)