



Title of PhD Project	Emergent Phases in Two-Dimensional Quantum Materials
Type	Experimental
Supervisor(s)	Prof. Kin Fai Mak, Prof. Jie Shan
Affiliation(s):	Max Planck Institute for the Structure and Dynamics of Matter
Number of positions:	Multiple
Abstract:	Two-dimensional (2D) materials and their heterostructures have provided a highly tunable platform to study the electronic correlations and topology. Multiple projects are available, focusing on the study of quantum many-body phases and quantum phase transitions in two dimensions. They typically involve the design, fabrication, and electrical/optical characterizations of 2D devices built from transition metal dichalcogenides and the graphene system. Topics include, but are not limited to, · Exciton condensation in electron-hole double layers · THz spectroscopy and on-chip THz waveguide devices · Ultrafast spectroscopy and nonlinear optics of 2D materials · Compressibility and entropy measurements of 2D materials · Strongly correlated states & superconductivity in semiconductor moiré materials · Mesoscopic devices, such as quantum point contacts (QPCs), quantum Hall interferometers · Quantum twisting microscope · Rhombohedral graphene transport and mesoscopic devices · Radio-frequency and acoustoelectric measurements.
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Research Group Website:	https://www.mpsd.mpg.de/research/nanoscale-quantum-materials