



e-conversion



Special Seminar

**Tuesday, August 30, 2022
5 pm**

WSI, Seminar room S 101

also ONLINE via ZOOM

<https://tum-conf.zoom.us/j/68128328666>

Meeting ID: 681 2832 8666

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“Optical sensing of electronic correlations in two-dimensional materials”

When the strength of Coulomb interaction between itinerant electrons in a two-dimensional system becomes significantly larger than the kinetic energy, the electrons start to develop strong correlations. A paradigm phase that is expected to emerge in this regime is an electronic Wigner crystal, in which the electrons spontaneously form a periodic lattice mimicking that of the real crystals. In this talk, I will review our recent experimental explorations of strongly correlated electronic phases in charge-controlled van der Waals heterostructures based on transition metal dichalcogenide (TMD) monolayers. In particular, I will present our novel spectroscopic technique allowing us to detect the Wigner crystal in a TMD monolayer through the periodic potential it generates for the excitons. In the presence of this potential, the excitons Bragg scatter off the Wigner crystal, which gives rise to the emergence of a Bragg-umklapp resonance in the reflectance spectrum that heralds the formation of an electronic lattice. In the second part of the talk, I will also show how the TMD monolayer can be exploited as a quantum proximity sensor to optically probe the formation of fractional quantum Hall states in a nearby graphene layer.

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