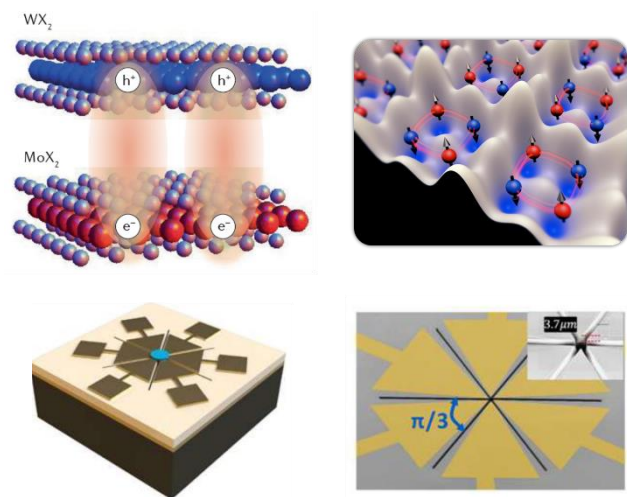


PhD Thesis (WS2020 – Finley Lab)

Tunable moiré potentials in 2D heterostructures

The field of van der Waals heterostructures, which are stacks on individual atomically thin crystal sheets, has exploded in the last decade. Specifically, heterostructures between different 2D materials have shown the emergence of interlayer excitons, due to the separation of charges at the interface. Furthermore, a lateral potential landscape, the so called moiré potential, emerges, trapping the excitons in an egg-box shaped potential. This results in a situation where a few interlayer excitons can interact with each other, resulting in novel quantum phases.

The thrust of this PhD thesis is to study the optical properties of actively strain-tunable van der Waals heterostructures to examine topics such as exciton localization, manybody physics, exciton-exciton interactions in relation to the in-plane moiré potential. You will use a piezo substrate, which enable anisotropic strain to the 2D heterostructure, therefore changing the moiré landscape, and therefore the inter-exciton interactions.



During the project you will work in close collaboration with a small team of Ph.D. students and postdocs, therefore individual effort is key to drive this PhD project.

Some experience in the areas of van der Waals stacking, optics, electronics, data analysis or cleanroom fabrication will be beneficial, but secondary to your personal motivation.

You should:

(1) Be highly motivated and self-driven, (2) be practically minded with a get-things-done attitude, (3) enjoy working across a wide range of tasks (processing, optics, electronics) and (4) be willing to work in a very small team on challenging things very long hours ...

You will get:

(1) the chance to work on current hot-topic issues in the area of van der Waals heterostructures (2) gain highly sought after abilities in the field of 2D materials (3) a sound understanding of the physics in atomically thin materials and hopefully (4) a few nice papers.

Interested? Please email finley@wsi.tum.de and Andreas.Stier@wsi.tum.de