# Seminar announcement

**Thursday, December 8, 2022**

**5 pm**

**WSI, Seminar room S 101**

## "Luminescent centers and strong coupling physics in two-dimensional materials"

Since their first measurements seven years ago, luminescent centers (LC) in the layered material hexagonal Boron Nitride (hBN) have attracted a lot of attentions due to their excellent quantum optical properties at room temperature. Despite a plethora of experimental and theoretical works, the microscopic nature of these centers remains elusive. Here, I present how reactive ion etching methods can be repurposed to generate efficiently high-quality LC on a large scale. By using ab initio calculations and molecular dynamics simulations we infer both the microscopic origin as well as the generation mechanism by which these LC are formed. In collaboration with the Holleitner group, we use photoluminescence excitation spectroscopy to show that the generated LC have a phonon-assisted excitation mechanism. Comparing our experimental results with ab initio calculations of 26 defects allows us to identify the most likely defects. I conclude by discussing how one could methodically identify the real nature of these defects, a crucial step towards their on-demand and site-selective generation.

In the second part of my talk, I present strong light-matter interaction at room temperature by using plasmonic nanodisks coupled to excitons in tungsten disulfide (WS2). Additional to our experimental results, I show recent theoretical developments to accurately describe the coupling of localized electromagnetic modes to delocalized excitons in WS2. Finally, I present near-field measurements of surface plasmon polaritons propagating on monocrystalline gold platelets. We use a scattering-type near-field optical microscope (sSNOM) at visible wavelengths to extract the wavevector and propagation length which show excellent agreement with our theoretical model.

**Prof. Nicolas Leitherer-Stenger**

**DTU Copenhagen**

**Denmark**