



# Seminarankündigung

**Dienstag, 17. November 2015**

**17:15 Uhr**

**ZNN, Seminarraum EG 0.001**

## **“Nanoscopy faster than a cycle of light”**

**Abstract:**

Scanning probe microscopies such as atomic force microscopy and scanning tunnelling provide access to the details of material surfaces with unsurpassed spatial resolution. By coupling light to these probes, one can even image optical properties in nanostructures far smaller than the free space wavelength. The low energy elementary excitations in such nanomaterials – such as plasmons, phonons, and interlevel transitions in excitons – are of particular importance for nanomaterial functionality, as are their ultrafast dynamics. These processes typically survive for only femtoseconds to picoseconds after photoexcitation and can evolve within a single oscillation period. Techniques capable of simultaneous sub-cycle time resolution and nanometer spatial resolution are therefore necessary to capture their full detail and record ultrafast nano-movies. In this talk, I will show how ultrafast field-resolved terahertz spectroscopy can be combined with scattering-type near-field scanning optical microscopy to access sub-cycle dynamics on the nanoscale. In particular, I will present ultrafast terahertz near-field measurements of indium arsenide nanowires and strained vanadium dioxide nanobeams. Finally, as an outlook, I will discuss potential future applications of our novel microscope and new experimental approaches for extending the scope of sub-cycle nanoscopy.

**Dr. Tyler Cocker**  
**Universität Regensburg**  
**Germany**