



The Vienna Doctoral Programme on Complex Quantum Systems  
invites you to a

## Seminar Talk

by

**Stefan Kuhr**

*University of Strathclyde, Glasgow, UK*

### ***Quantum-Gas Microscopes - Quantum-Simulation with Single-Particle Access***

The possibility to trap atoms in well-controlled engineered environments in optical lattices has proved to be a powerful tool for quantum-simulation of strongly correlated quantum systems. The great challenge to obtain full single-site resolution and single-atom control in optical lattices was overcome by the development of quantum-gas microscopes [1] and I will present an overview of the recent developments in this field [2]. Fluorescence imaging of atoms has made it possible to directly observe bosonic and fermionic many-body quantum systems with single-atom resolution in an unprecedented way, giving access to, e.g., in-situ measurements of temperature and entropy distributions, direct observation of correlations and their spreading, or the build-up of entanglement. I will also present how we achieved single-atom-resolved fluorescence imaging of fermionic potassium-40 atoms using electromagnetically-induced-transparency (EIT) cooling [3], and a new way of Raman gray-molasses cooling on the D2-line [4], and report on our progress towards the study of strongly correlated fermionic quantum systems and their out-of-equilibrium dynamics.

**Monday, 12 June 2017,  
16:30h get-together with coffee and snacks!**

Atominstitut, Stadionallee 2, 1020 Vienna

The seminar talk will be preceded by a CoQuS Student talk at 17:00h  
by

**Christian Derntl**

*TU Wien*

***Enhanced nonlinear interactions in subwavelength plasmonic resonators coupled to semiconductor quantum wells***

Hosted by: Arno Rauschenbeutel

- [1] W. Bakr et al., Nature 462, 74 (2009); J. Sherson et al., Nature 467, 68 (2010).
- [2] S. Kuhr, Natl. Sci. Rev. 3, 170 (2016).
- [3] E. Haller et al., Nature Physics 11, 738 (2015).
- [4] G. Bruce et al., arXiv:1612.04583