

Physikalisches Kolloquium Universität Kiel Wintersemester 2017/2018

Dienstag, 23.01.2018

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

Ultracold atoms in well-controlled engineered environments in optical lattices are a versatile tool for quantum-simulation of strongly correlated quantum systems. The most recent developments in this field include quantum-gas microscopes [1], enabling single-lattice-site resolution and single-atom control [2]. Imaging of with single-atoms resolution has made it possible to directly observe bosonic and fermionic many-body quantum systems 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 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 [4]. I will also report on our progress towards the creation of fermionic Mott insulators and the study of strongly correlated fermionic quantum systems and their out-of-equilibrium dynamics.

References

- [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.*, J. Phys. B: At. Mol. Opt. Phys. **50**, 095002 (2017).

Der Vortrag findet um **16:15 Uhr** im Hans-Geiger-Hörsaal (LS13-R.52) des Physikzentrums statt. Ab **16:00 Uhr** wird **Kaffee** angeboten.

Bitte Becher mitbringen!

J. Benedikt
für die Dozenten der Physik

Gastgeber: Prof. Bonitz