



Condensed Matter Seminar

Professor Peter Schauss

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“Quantum gas microscopy of many-body dynamics in Fermi-Hubbard and Ising systems”

Monday, April 22, 2019

4:00pm—5:00pm

304 Robeson Hall

The ability to probe and manipulate cold atoms in optical lattices at the atomic level using quantum gas microscopes enables quantitative studies of quantum many-body dynamics. While there are many well-developed theoretical tools to study many-body quantum systems in equilibrium, gaining insight into dynamics is challenging with available techniques. Approximate methods need to be benchmarked, creating an urgent need for measurements in experimental model systems. In this talk, I will discuss two such measurements. First, I will present a study that probes the relaxation of density modulations in the doped Fermi-Hubbard model. This leads to a hydrodynamic description that allows us to determine the conductivity. We observe bad metallic behavior that we compare to predictions from finite-temperature Lanczos calculations and dynamical mean field theory. Second, I introduce a new platform to study the 2D quantum Ising model. Via optical coupling of atoms in an optical lattice to a low-lying Rydberg state, we observe quench dynamics in the resulting Ising model and prepare states with antiferromagnetic correlations

