



HARVARD Quantum Optics Center

Special Seminar

Friday | Nov. 30 | 3:00 pm
Lyman 425

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"Many-body Dynamics in Open Systems: Optically Driven Rydberg Gases"

Quantum optical realizations of many-body systems must often be described as open systems and thus offer a way to study quantum correlations in the non-equilibrium steady-state rather than the ground state of a Hamiltonian. Being an attractor of the dynamics, stationary states have the advantage of being robust and providing a natural way of preparation. Little is known, however, about many-body phenomena such as phase transitions in open systems. These questions will be addressed for free lattice models and the experimentally relevant example of optically driven Rydberg gases. The strong and long-range van-der Waals repulsion drives the system into a state of Rydberg excitations with crystalline order which however competes with fluctuations inherent to the open system. Quantum correlations in the steady state are calculated by open-system DMRG simulations and discussed in terms of an analytically solvable effective model. Finally the build-up dynamics of the stationary state is discussed.