

QUANTUM OPTICS SEMINAR



Title: Interaction phenomena in ultracold Rydberg gases

Speaker: Thomas Amthor
Universität Freiburg, Germany

Time: Tuesday, May 13 at 10:15

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Abstract:

Ultracold Rydberg gases provide insight into a variety of atomic interaction phenomena. Due to their large polarizability, Rydberg atoms show strong dipole-dipole and van der Waals interactions over large distances and their properties can easily be influenced by external fields. Using laser cooling techniques, the thermal energies can be minimized so that the interaction energies become relevant. This is why cold Rydberg gases represent an ideal system to study the physics of interacting many-body systems experimentally.

The talk focuses on three aspects of ultracold Rydberg gases: First the excitation to Rydberg states is discussed, which involves experimental results on coherent Rabi oscillations and interaction-induced suppression of excitation. The second focus will be on interaction-induced motion and the dynamics of collisional ionization, a process which can lead to the formation of ultracold plasmas. Finally, the topic of resonant energy transfer among Rydberg atoms is introduced. This process is based on long-range dipole interaction and is related to energy transfer in biological systems. So far this phenomenon has been investigated in unordered many-body systems, but an outlook to future experiments in regularly structured systems is also given.

Peter Fröhlich Staantum