SPP 1929 – Seminar

30. Januar 2018, 14:30 Uhr

Max-Planck-Institut für Quantenoptik
New Lecture Hall, Room B 0.32
Hans-Kopfermann-Str. 1, 85748 Garching

Thomas Pohl
(Aarhus University)

Atomic giants in a new light: Emerging photon interactions from highly excited Rydberg atoms

The combination of electromagnetically induced transparency (EIT) and strongly interacting Rydberg states in cold atomic gases has opened up new routes towards achieving few-photon optical nonlinearities. While EIT provides strong light-matter coupling under low-loss conditions, the strong interactions between Rydberg states can be used to generate nonlinearities that are strong enough to operate on the level of single photons.

Such synthetic interactions enable few-photon applications and exotic many-body physics, emerging from the interplay of coherent driving, quantum light propagation, strong atomic interactions and dissipative photon scattering. In this talk, I will discuss the basic concepts behind such settings, based on specific examples that afford a simple and intuitive understanding. The combination of theory and experiments enables in-depth studies of many-body decoherence processes that are found to present challenges but also new opportunities for generating and manipulating nonclassical states of light. Finally, I will introduce new concepts beyond traditional Rydberg-EIT approaches and discuss corresponding prospects for technological applications and the observation of highly correlated multi-photon dynamics with current experimental capabilities.

A live stream of the talk will be available on the following website:
https://post.rzg.mpg.de/mailman/listinfo/mpq-colloquium-stream
Prior registration on the website is required.