SFB/TRR 21 - Kolloquium
15. Juni 2007, Ulm

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Cavity-QED and precision measurements with trapped ions

In the first part of my talk, I will present results of an experiment in which a single trapped ion is coupled to a high-finesse cavity. Photons are emitted by the atom into a mode of the cavity in a continuous excitation scheme. The output of the cavity is analyzed using a Hanbury-Brown & Twiss setup. We were able to observe a transition from photon bunching to anti-bunching in the arrival times of the photons by changing simple experimental parameters. Using a pulsed excitation scheme, we are able to generate single photons on demand with high efficiency. These are precursor experiments towards the realization of an interface between atomic and photonic qubits with applications in distributed quantum information processing.
In the second part of my talk, I will describe a project proposal for direct frequency spectroscopy using quantum logic techniques. The goal of the planned experiment is to investigate a possible variation in fundamental constants using precision spectroscopy of atomic and molecular ions.

15. Juni 2007, 15:30 Uhr

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