# Kolloquium

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## A single atom in front of a mirror - Quantum feedback and bad-cavity QED

Single trapped and laser-excited ions allow for an exceptionally high degree of control over their quantum state. They have therefore served as model systems to demonstrate fundamental quantum optical phenomena, and they are paradigmatic systems for implementations of quantum information processing. I present a series of experiments, carried out in Innsbruck, with a single trapped ion which interacts with itself via a distant mirror. The system exhibits QED effects such as modified spontaneous emission rates, line shifts, and mechanical action created by the optical feedback. The non-Markovian dynamics of the system lead to a complex behaviour of the g(2)( ) photon-photon correlation function, which is connected to the complementarity of interference and which-way information. Furthermore, we realised quantum feedback on the phase and the energy of the trapped ion's oscillatory motion. Finally, I will describe how the same experimental methods are applied in our experiments in Barcelona to establish macroscopic entangled quantum states of two ions in distant traps.

**Wann?** Freitag, 14.07.2006, 15:30 Uhr

**Wo?** Universität Ulm, Raum N24/252