



CRC 1227
Designed Quantum States of Matter



GASTVORTRAG

am 20. April 2017, 15:30 Uhr
Leibniz Universität Hannover
Welfengarten 1, 30167 Hannover
Hauptgebäude (1101),
Seminarraum am Institut für Quantenoptik
Raum D326

Vortragender: Prof. Dr. Tracy Northup,
Universität Innsbruck
(Guest of Prof. Dr. Klemens Hammerer)

Thema: Building quantum networks with ions, photons, and cavities

Trapped ions are among the most promising candidates for quantum computing platforms, while optical cavities offer a coherent interface between matter and light. By coupling ions to a high-finesse optical cavity, we can explore light-matter interactions at the level of single quanta. These interactions provide a building block for future quantum networks, as they enable the transfer of quantum information between ions for quantum computing and photons for long-distance quantum communication.

I will discuss probabilistic and deterministic approaches to ion-photon quantum networks, based on ion-photon entanglement and ion-photon state transfer. In experiments to date, we have coupled one and two ions to a cavity operating in an intermediate coupling regime, in which the coherent coupling rate between the ion and the cavity field is similar to the rates of dissipative processes, namely, cavity decay and spontaneous emission. I will also present work in progress to couple an ion to a fiber-based cavity, with which it should be possible to access the strong coupling regime, in which coherent processes dominate. Finally, we will turn to the question of how to link together ion-cavity systems in a quantum repeater architecture.

**Zu dieser Veranstaltung sind alle DQ-mat-Mitglieder und
alle Interessierten herzlich eingeladen.**