# IAP-SEMINAR

# EINLADUNG

Termin: **Dienstag, 17.6.2014 um 16:00 Uhr**
Ort: **Technische Universität Wien,**
**Institut für Angewandte Physik,**
Seminarraum 134A, Turm B (gelbe Leitfarbe), 5. OG
1040 Wien, Wiedner Hauptstraße 8-10

Vortragende: **Dipl.-Ing. Maria Bernard-Schwarz**

IAP & National Instruments Germany GmbH, Munich/Germany

Thema: **Quantum Optics control system for single atoms experiments**

## Kurzfassung

The two main components for quantum optics experiments are a resonator, in our case to interact with single atoms, and computational power in order to simulate experiments, control the setup and analyze results. Our system of interest is a strongly coupled atom-cavity experiment. The goal is to develop tools for controlling the external degrees of freedom, the motion of the atom [1], as well as the internal degrees of freedom, the quantum state of the system [2]. The experimental control requires the generation of precisely timed computer-controlled measurement sequences. In order to fulfill these requirements on the hardware programming level, we use a Real-Time Operating System. This guarantees the response of control tasks within certain time periods. By implementation of a Real-Time based system, we centralize the controller, data acquisition cards, FPGAs and quantum optics analysis tools [3] within one platform. The presentation will show the concepts using FPGAs for simulating quantum optics problems and discuss the implementation of this new experimental control system.

[1] M. Koch et.al., "Feedback Cooling of a Single Neutral Atom", Phys. Rev. Lett. 105, 173003 (2010)
[2] S. Brakhane et.al.,"Bayesian Feedback Control of a Two-Atom Spin-State in an Atom-Cavity System", Phys. Rev. Lett. 109, 173601 (2012)
[3] LabVIEW Quantum Optics Toolkit https://decibel.ni.com/content/docs/DOC-30311

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*Alle interessierten Kolleginnen und Kollegen sind zu diesem Seminar*
*(45 min mit anschließender gemeinsamer Diskussion) herzlich eingeladen.*

*M. Gröschl  e.h.*
*(Seminar-Chairperson)*

*H. Störi  e.h.*
*(LVA-Leiter)*