

**gemeinsames Kolloquium
mit der
Fakultät für Chemie**

Kolloquium

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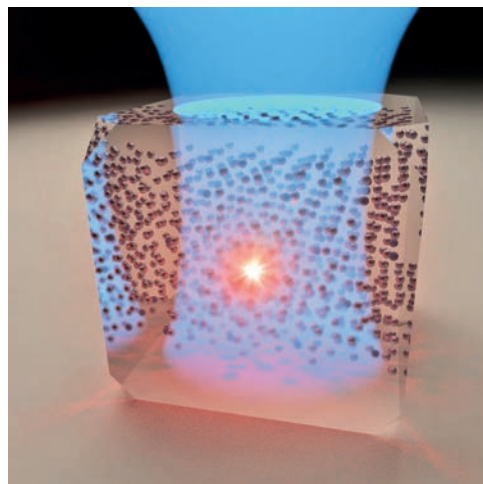
**On efficient interaction of photons
and atoms:
from quantum optics to biophotonics**

physikalisches

Mo. 8.12.14
16:00 Uhr
Ort: H34

Recently, we showed that in the linear excitation regime, an atom can theoretically block a propagating light beam by up to 100%. I will formulate this finding in a more general context of mode matching between the incident and scattered photons and present an overview of our experimental work on the efficient interaction of light and single organic molecules both in the near and far fields. We will see that at cryogenic temperatures, solid-state emitters can attenuate, transmit, amplify or phase-shift a focused laser beam. Furthermore, I will report on the direct long-distance communication of two optical emitters via single photons and the first high-resolution spectroscopy of single rare earth ions.

In the second part of this presentation, I will show that the same concepts in mode matching can lead to ultrasensitive detection, microscopy and tracking of biological nanoparticles such as single viruses and proteins or lipids in a biological membrane.



Optical detection and state preparation of a single quantum emitter in the solid state