SONDERSEMINAR/SPECIAL SEMINAR
LMU/MPQ

am: **Friday, June 1, 2012**

Uhrzeit: **2 p.m. s.t.**

spricht: **Dipl.-Phys. Thomas Hümmer**
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Thema: **Weak and Strong Coupling in Plasmon Resonators/**
Hybrid Systems for Qubit-coupled JC-Arrays

Ort: **Chair Professor Theodor W. Hänsch**
Discussion Room H 311

gez. Prof. T.W. Hänsch

Abstracts

Weak and strong coupling in plasmon resonators

Surface plasmon polaritons propagate along metal-dielectric interfaces and can be efficiently guided in nano-scale waveguides. The negative dielectric permittivity of metals allow the electromagnetic energy to be localized below the diffraction limit of light. This sounds promising for constructing nano-scale plasmonic resonators with very small mode volumes and increased light-matter coupling. However, compared to usual photons in cavities, plasmons exhibit considerable inherent losses associated with heating of the metal. This talk compares the performance of different possible plasmon resonators depending on waveguide geometry, temperature, wavelength and other parameters. The performance is addressed in the context of two different applications:
1) the Purcell enhancement of an emitter's spontaneous emission (weak coupling) and
2) the prospect of observing vacuum Rabi-oscillations between an emitter and the resonator (strong coupling).

Hybrid Systems for Qubit-coupled JC-Arrays

Hybrid quantum systems can be formed by combining artificial (e.g. superconducting circuits) with elemental quantum systems. This talk introduces a hybrid setup for simulating a localization-delocalization transition. It is based on an array of superconducting flux qubits coupled to a diamond crystal containing nitrogen-vacancy centers. The underlying model is a Jaynes-Cummings(JC)-lattice. However, in contrast to well-studied "coupled cavity arrays" the interaction between lattice sites is mediated by the qubit rather than by the oscillator degrees of freedom.