SONDERSEMINAR
MPQ/LMU

am: **Dienstag, 20. Juli 2010**

Uhrzeit: **14;30 Uhr s.t.**

spricht: **Michael Hartmann**
TU München
Physik Department I/T34
James Franck Strasse
D-85748 Garching

Thema: **Strongly Correlated Photons Induced by Photon Losses**

Ort: **Lehrstuhl Prof. T.W. Hänsch, Diskussionsraum**
Schellingstr. 4/III. Stock, H 311, D-80799 München

gez. Prof. T.W. Hänsch

Abstract

In one-dimensional systems, the quantum statistics of particles is not independent of their interaction. A prominent example are bosons that interact via strong repulsive forces and can enter a Tonks-Girardeau gas regime, where they behave with respect to many observables as if they were fermions. Given that photons do not interact, one might conclude that they can not enter such regimes. The situation is however different if atom-photon interactions generate strong optical nonlinearities. In this talk, I will present a scheme for the generation of a Tonks-Girardeau gas of photons in optical nanofibers with purely dissipative interactions. In this approach the ubiquitous but usually undesired dissipative processes become the essential ingredient for creating of strong many-particle correlations. This paradigm shift allows us to achieve nonlinearities that are at least an order of magnitude larger than their conservative counterparts.

Devices that are suited for generating strongly correlated polaritons are typically operated in a driven dissipative regime where an input laser continuously loads photons into the device which are stored in it and eventually lost via dissipation. Here, the dynamical balance of the loading and loss mechanisms leads to stationary states, which can show dramatically different characteristics depending on the system parameters. Hence quantum phases and phases transitions of these stationary states can be explored in analogy to the well known phase transitions of ground states. Here, I will discuss a novel strongly correlated phase of polaritons that emerges in a driven array of nonlinear cavities.
