SPECIAL SEMINAR/SONDERSEMINAR
LMU/MPQ

am:	**Freitag, 24. Januar 2014**
Uhrzeit:	**2:00 p.m. s.t.**
spricht:	**Dr. Tolga Bagci** **Niels Bohr Institute** **University of Copenhagen**
Thema:	**An Opto-Electromechanical Device for Low-Noise Detection of Radio Waves**
Ort:	**LMU, Faculty of Physics, Chair Prof. T. W. Hänsch** **Discussion Room H 311**

gez. Prof. T.W. Hänsch

Abstract

An opto-electromechanical device for low-noise detection of radio waves

Optomechanical and electromechanical systems have been utilized extensively for sensing applications and manipulation of nanomechanical resonators with excellent quality factors. Recent achievements include demonstration of strong coupling and cooling of mechanical resonators down to the quantum ground state. One of the current promising directions is the realization of a hybrid opto-electromechanical system where the desirable properties of electrical and optical systems are combined via versatile mechanical transducers. Such a system would enable conversion of rf electrical signals to optical signals, which is desirable as the latter have access to routinely achieved quantum-limited detection together with the possibility of transmission via fiber-optic links.

In this talk, I will describe our experiments where we have realized strong coupling between an electrical LC circuit and a metal-coated nanomechanical membrane and achieved sensitive optical detection of 0.7 MHz radio waves through the mechanical transducer. For the recent performance of our room-temperature device at the optimized cooperativity, we find noise temperatures in the range of a few Kelvin, on a par with the current state of the art op amps. Further optimization and improvement of our device is expected to push the noise level down to a point where it can replace the expensive cryogenic amplifiers for ultrasensitive applications in fields such as NMR imaging and astrophysics.

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