chemisch physikalische gesellschaft

Gegründet im Jahre 1869 von H. Hlasiwetz, J. Loschmidt, J. Petzval und J. Stefan

EINLADUNG

zum Vortrag von

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Exploiting radiation pressure interaction between light and matter for quantum experiments

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Dienstag, 28. Mai 2013, um 17:30 Uhr

Ort: Lise-Meitner-Hörsaal, Fakultät für Physik, Universität Wien,
1090 Wien, Strudlhofgasse 4 / Boltzmanngasse 5, 1. Stock

Barrierefreier Zugang: Boltzmanngasse 5, Lift, 1. Stock rechts über den Gang zum Hintereingang des Hörsaals

Abstract:
Mechanical resonators have recently drawn significant attention for their potential in becoming a new species of quantum systems. Such devices are a textbook example for a classical harmonic oscillator, while at the same time being at the forefront of a number of classical applications including high-resolution sensing. However, bringing such mechanical resonators into the quantum domain will allow for fundamentally new applications – with potential applications ranging from experiments on the foundations of quantum physics (e.g. creating macroscopic superpositions of massive objects), to their potential as a quantum bus between different quantum systems in quantum information processing.

A particularly successful approach for realizing quantum states in macroscopic mechanical systems is cavity (quantum) opto-mechanics, where mechanical oscillators are coupled via radiation pressure forces inside an optical cavity to a laser field. These experiments offer a fundamentally new way of achieving light-matter interaction on the micro- and nanoscale and so far the underlying physical mechanisms have been demonstrated in a variety of proof-of-principle demonstrations.

We would like to discuss some of the most recent experiments that lead to the demonstration of ground-state cooling of optomechanical devices, as well as an experiment using the radiation pressure back action to generate squeezed light. We will show how these first results could lead to more complex quantum experiments with truly macroscopic mechanical systems.

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