SFB/TRR 21 - Colloquium

2. Juli 2010, Stuttgart

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Schroedinger's Mirrors – extending quantum experiments using massive mechanical resonators

Nano- and micromechanical resonators are about to become a new paradigm system for quantum science. They combine features that allow unique approaches in both quantum foundations and quantum applications. For example, their flexibility to couple to a variety of physical systems (photons, electrons, atoms etc.) together with their on-chip integrability promise novel transducer schemes for quantum information processing. At the same time, their mass and size allows access to a hitherto untested parameter regime of macroscopic quantum physics such as quantum superposition states involving objects that are visible to the bare eye.
Quantum optics provides a well-developed toolbox to enter and control the quantum regime of mechanical systems. I will briefly highlight the recent developments of the field and report the current status in our Vienna experiments on laser cooling micromechanical resonators towards their quantum ground state and on strong optomechanical coupling to achieve coherent control. I will also discuss our recent progress towards generating optomechanical quantum entanglement, which is at the heart of Schroedinger's cat paradox.

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