Abstract for an Invited Paper
for the MAR09 Meeting of
The American Physical Society

Quantum Optical Control of Micromechanics

MARKUS ASPELMEYER, Institute for Quantum Optics and Quantum Information (IQOQI), Austrian Academy of Sciences, Vienna, Austria

Massive mechanical resonators are now approaching the quantum regime. This opens up not only a spectrum of new applications but also a previously inaccessible parameter range for macroscopic quantum experiments on systems consisting of up to 10^{20} atoms. Quantum optics provides a rich toolbox to prepare and detect quantum states of mechanical systems, in particular by combining nano- and micromechanical resonators with high-finesse cavities. I will report on our recent experiments in Vienna on laser cooling micromechanical systems towards the quantum ground state by using radiation pressure. I will also discuss the prospects and experimental challenges of generating and detecting optomechanical entanglement, which is at the heart of Schrödinger's cat paradox.