Kolloquium

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Exploring classical coherence with nanomechanical systems

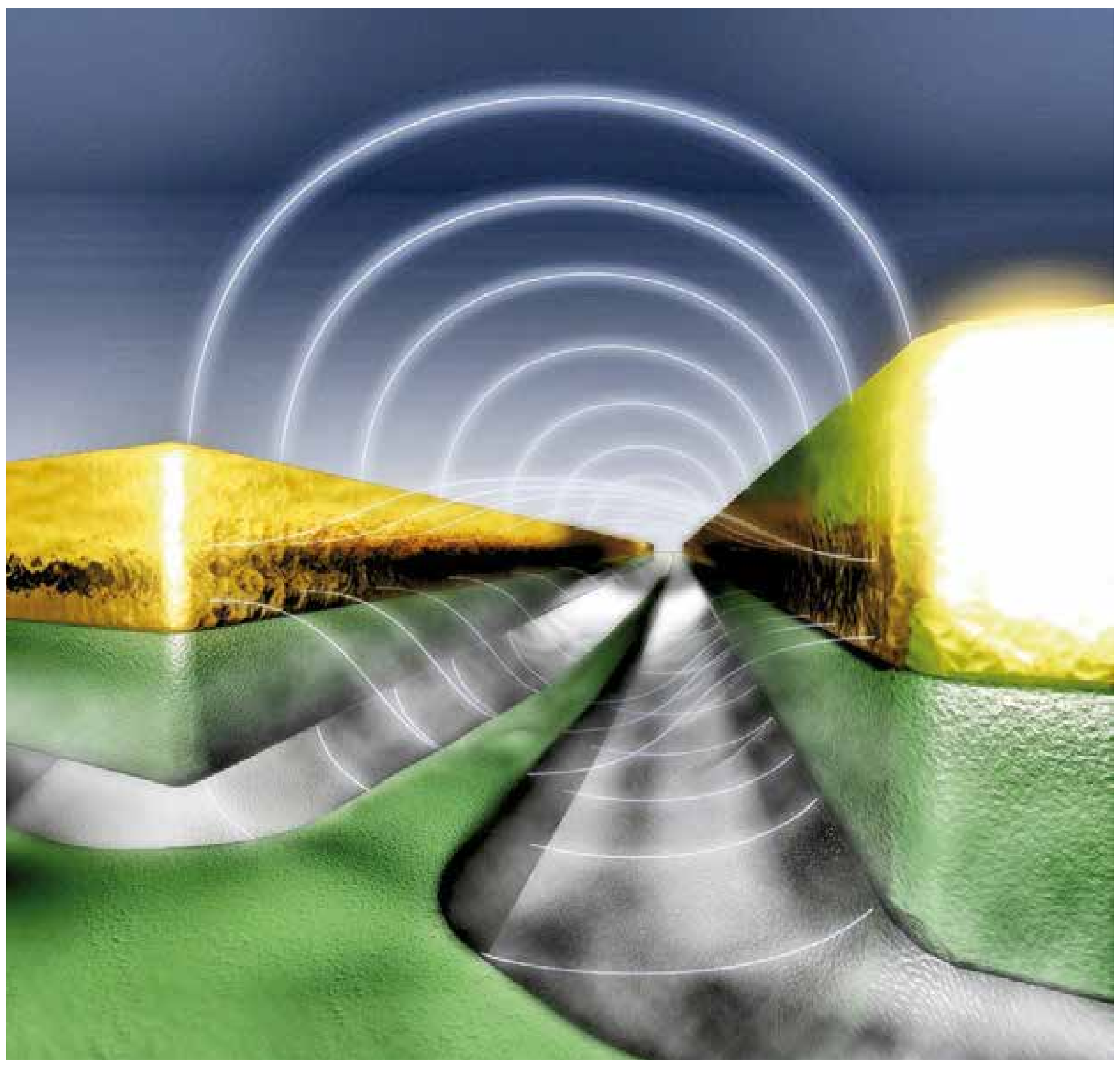
physikalisches

Mo. 31.10.16
16:00 Uhr
Ort: H34

Nanomechanical resonators are freely suspended, vibrating bridges with nanoscale diameters. These nanostructures are receiving an increasing amount of attention, both in fundamental experiments addressing the foundations of quantum mechanics and for sensing applications, and show great promise as linking elements in hybrid nanosystems. In particular, doubly-clamped pre-stressed silicon nitride string resonators are explored as high Q nanomechanical systems enabling room temperature coherence times of several milliseconds.

Here I will review how two strongly coupled flexural modes of the resonator constitute a classical two-mode system, which is employed as a model system to explore phenomena related to classical coherence. This yields fascinating insights into classical Landau-Zener dynamics, Rabi-, Ramsey- and Hahn-echo-type experiments, as well as Stückelberg interferometry – all well-known from their quantum counterparts.

The presented measurements allow deep insights into the decoherence of classical nanomechanical resonators. After a series of ground-breaking experiments on ground state cooling and non-classical signatures of nanomechanical systems in recent years, improving our understanding of decoherence might help pave the way for quantum nanomechanical systems.



Above: A nanoelectromechanical system (NEMS). Silicon nitride beam flanked by two gold electrodes.

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