SFB/TRR 21 - Kolloquium
30. November 2007, Ulm

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Nanotube ElectroMechanics

Carbon nanotubes are often recognized as the ultimate material for high-frequency mechanical resonators. For instance, nanotube resonator devices hold promise for ultralow mass detection or quantum electromechanical experiments. However, the detection of the mechanical vibrations remains very challenging. In this talk, I will present a novel detection method of nanotube vibrations, which is based on atomic force microscopy. This method enables the detection of the resonances up to 3.1 GHz with subnanometer resolution in vibration amplitude. Importantly, it allows the imaging of the mode-shape for the first eigenmodes. I will also discuss friction measurements in the motion between adjacent shells of multiwalled nanotubes (MWNT). The motion is actuated by passing a current through the MWNT. Depending on the device, this generates a motion that is rotational, translational, or the combination of the two. The results are compared with theories that take into account the interaction between atoms of adjacent shells.

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