SFB 1432

Special Colloquium

Universität Konstanz

November 17, 2023
Talk at 10:00
in P 602

Dr. Letizia Catalini

ETH Zürich

Nanomechanical resonators: dynamics and application

Over the past four decades, nanomechanical resonators have gained a central role in widespread fields of science and technology. More recently, the introduction of novel nanomechanical engineering techniques, such as dissipation dilution and modeshape engineering, has led to the fabrication of string and membranes resonators with exceptionally high quality factors. The corresponding long coherence times, combined with the low effective mass featured by these devices put them at the forefront of sensing experiments, enabling force sensitivities on the order of 1 aN/sqrt(Hz) or lower at room temperature.
In this talk, I will review how such outstanding force sensitivities are being exploited in the development of a new generation of scanning force microscopes based on ultracoherent membrane and string devices. I will also report on the observation and theoretical modeling of nonlinear dissipation in such structures, when driven to the large amplitudes required for the force scanning protocols. Our model, which proved successful to describe nonlinearities in disparate membrane geometries, can be a valuable tool for engineering new nanomechanical resonators with controlled strengths of nonlinearity.

Contact:
Dr. M. Fu (AG Scheer), 4671