"From Ratchets, Catch Bonds and Cardiomyopathies - Single Molecule Biophysics with *Micro*fluidics, *Nano*pores and *Pico*newton Force Mechanics"

by
Prof. Dario Anselmetti

Bielefeld University, Physics Faculty
Experimental Biophysics & Applied Nanoscience
Bielefeld Institute for Biophysics and Nanoscience (BINAS)

Abstract:
The detection and quantitative analysis of single biomolecules, smallest analyte quantities and the hunt for low abundant proteins at the single cell level, require new sensitive and efficient techniques. Over the last 20 years, novel biophysical measurement concepts have been conceived with an offspring of ultrasensitive methods that allow to image, measure, analyze, steer, sort and manipulate individual biomolecules and cells by atomic force microscopy, single molecule force spectroscopy, optical tweezers, as well as micro- and nanofluidic devices.In my talk I will review our latest results where we control the migration of biopolymers like DNA and DNA-protein complexes in microstructured devices by (di)electrophoresis for separation purposes as well as our working concepts for microintegrated chiral separation. Similar theoretical concepts hold for nanopore fluidics and corresponding experimental bionanotechnological applications. Here, I will present our results on single-molecule translocation experiments where the mechanics and dynamics of a single dsDNA-protein complex threaded through a solid-state NP was investigated by quantitative 3D-optical tweezers (OT). Last but not least, I will give a brief overview about recent structural and functional experiments on biopolymers (intermediate filament desmin and heparan sulfate proteoglycans against their biological substrates) where we explore - beyond the fundamental molecular characteristics - their relevance in biomedical research.

Friday, June 15th, 2012, 13:00

Room PH 127

Prof. Matthias Rief, mrief@ph.tum.de , phone: 089 289-12471