Einladung
zum
Physikalischen Kolloquium

Montag, 04.11.2013
16:15 Uhr in N24/H13

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Unraveling the molecular structure of chromatin, one at a time.

The compaction of eukaryotic DNA into chromatin has been implicated in the regulation of all processes involving DNA. However, the structure of chromatin remains poorly understood. This lack of structural information impedes a functional understanding of chromatin at the molecular level. Here I will discuss recent developments in single molecule force and torque spectroscopy techniques to study this higher order structure.

Using magnetic tweezers and reconstituted designer chromatin fibers, we show that such fibers stretch elastically up to three times their rest length. The stiffness is independent of the presence or absence of linker histones. At 3 pN an overstretching transition occurs that can be attributed to simultaneous rupture of nucleosome-nucleosome interactions and DNA unwrapping.

For quantitative analysis of the compliance of the fibers we use a two-state model in which nucleosomes are stacked, as found in a folded fiber, or unfolded in a beads-on-a-string fiber. All force induced transitions up to 10 pN can be captured in this simple two-state model. Kinetic analysis of the rupture events suggests that stretching of the histone tails precedes the rupture of nucleosome-nucleosome interactions. Changes in extension upon exertion of torsional stress clearly show that the chromatin fibers fold into a left-handed super-helix. Overall, by new single-molecule force spectroscopy techniques and quantitative analysis of the force-extension behavior of single chromatin fibers we resolved a structural and dynamic picture of chromatin folding.

Ab 15.45 Uhr Kaffee, Tee und Kekse vor dem Hörsaal H13

Organisation: Prof. Jelezko Tel.: 23750
Host: Prof. Michaelis Tel.: 23050, off: 23051