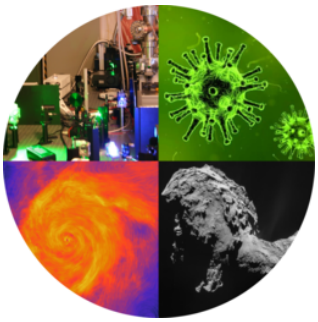

Münchner Physik-Kolloquium

Winter 2018/19

Magnetic tweezers to study gene machines at the single-molecule level

Dr. David Dullin, *Friedrich-Alexander-Universität Erlangen-Nürnberg*

Monday, 28 January 2019, 17:15 h
Hörsaal H 030, Fakultät für Physik der LMU, Schellingstraße 4, München

Every organism contains a piece of genetic information, in the form of either DNA or RNA. During the life cycle of an organism, nanoscopic molecular machines called enzymes express and maintain the genome. Enzymes activity is characterized by an underlying instability, where multiple free energy states separated by low activation energy, i. e. typically few $k_B T$ (k_B being the Boltzmann constant) interconvert rapidly through complex kinetic pathways. Therefore, in the wet and hot environment of the cell, enzymatic activity is noisy, asynchronous and heterogeneous. To characterize precisely a given enzyme without averaging all the different kinetic states, it is therefore important to observe each enzyme individually, i. e. at the single molecule level, and with a spatiotemporal resolution of a DNA base pair, i. e. 0.34 nm, at 10 to 100 ms. Several techniques have been developed in the last thirty years to manipulate and pull on single biomolecules, e. g. optical tweezers, magnetic tweezers and atomic force microscopy. Magnetic tweezers are a torque and force spectroscopy technique that have been developed to study the mechanical properties of nucleic acids, i. e. DNA and RNA, and protein-nucleic acids interactions at the single-molecule level. During the presentation, I will describe the technique and how magnetic tweezers are applied in my lab to study genome processing machines at the single molecule level.

Student event: Meet the speaker

*We invite you to a **student-only** discussion-round with Dr. David Dullin before his Munich Physics Colloquium talk.*

Be curious and feel free to ask any question.

Monday, 28 January 2019, 16:00 h
Room H 522 (5th floor), Fakultät für Physik der LMU, Schellingstraße 4, München