

EINLADUNG

zum Vortrag von

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über

Ultrafast spectroscopy of DNA: Following electronic energy across hydrogen bonds and along base stacks

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im Großen Hörsaal des Instituts für Experimentalphysik der Universität Wien
1090 Wien, Strudlhofgasse 4 / Boltzmannngasse 5, 1. Stock

Abstract:

Although, base stacking and base pairing interactions are the major forces governing the macromolecular structure of DNA, their influence on electronic energy relaxation has remained elusive. This information is fundamental for understanding how excited states evolve to form photolesions. Over the years, much attention has been focused on dynamical processes in excited base pairs and their role in the evolution of electronic energy in DNA. Recent experimental and theoretical reports have suggested that light-triggered motion of a proton or hydrogen atom within an isolated Watson-Crick base pair initiates nonradiative decay to the electronic ground state. In order to understand how the spatial organization of the bases affects DNA photoprocesses, we have been studying defined-sequence oligonucleotides by femtosecond pump-probe spectroscopy. Although singlet excited states in monomeric bases decay nonradiatively in hundreds of femtoseconds, excimers are observed in many single- and double-stranded DNAs with decay times that are several orders of magnitude longer. Transients recorded at UV probe wavelengths monitor ground state repopulation dynamics and reveal that excimers are formed in significant yields in excess of 50%. In many respects, the photophysical properties of DNA oligo- and polynucleotides differ significantly from those of smaller model systems. Implications for DNA photodamage will be discussed.