

# DIESE WOCHE

## PHYSIKALISCHES KOLLOQUIUM

des Fachbereichs Physik  
der Johann Wolfgang Goethe-Universität Frankfurt

Mittwoch, den 04.02.2015, 16 Uhr c.t.  
Großer Hörsaal, Raum \_0.111,  
Max-von-Laue-Str. 1

**Prof. Dr. Johan Stiens**  
ETRO, Vrije Universiteit Brussel

*" Generic,  
label-free and immobilization-free bio-sensing  
of solvated biomolecules with (sub) THz waves "*

In a solution comprising a solvent (predominantly water), buffers, and solvated biomolecules complex biophysical and biochemical interactions can take place due to the existence of permanent and induced charges, permanent and (induced) dipoles, hydrogen bonds, hydrophilic and hydrophobic species, phonon vibrations which depend on the conformations and rigidity of the components, ... The dielectric response of this solution to EM waves in the (sub)-THz waves will dependent on the relative concentration of the individual components, but also on their interaction strengths. Any (tiny) change in the concentrations or interaction strength due to an external perturbation can be monitored with sub-THz waves, when one disposes over an ultra-sensitive biosensor which can cope with the high absorption properties of water in this frequency range.

In this presentation we will discuss the operation principle and the technological implementation of a novel generic, label-free, immobilization-free biosensor with world-record sensitivities in the sub-THz range for the characterization of micro and nano-liter liquids. A multitude of biological and pharmaceutical applications will be discussed ranging from monitoring antibody-antigen interactions, PCR reactions, protein crystallization, HPLC of pharmaceutical compounds. We will compare this novel measurement technology with commercial analytical instruments such a SPR, UV-spectroscopy, etc.

In the final part of the presentation we would like to raise the question if we potentially disturb the functionality of biomolecules when exposed to these THz waves. If one can do this in a controllable way, one can imagine applications where we exploit the usage of these EM waves for cellular function control.

Die Dozenten der Physik

# Kolloquium