TECHNISCHE UNIVERSITÄT WIEN
Vienna University of Technology

INSTITUT FÜR ANGEWANDTE PHYSIK
Institute of Applied Physics
vormals/formerly
Institut für Allgemeine Physik

Wiedner Hauptstraße 8-10/E134, 1040 Wien/Vienna, Austria – Tel: +43 1 58801 13401 / Fax: +43 1 58801 13499 – E-mail: office@iap.tuwien.ac.at / http://www.iap.tuwien.ac.at

IAP-SEMINAR

EINLADUNG

Termin: **Mittwoch, 9.6.2010 um 12:00 Uhr**

Ort: **Technische Universität Wien,**
Institut für Angewandte Physik,
Seminarraum 134, Turm B (gelbe Leitfarbe), 5. OG
1040 Wien, Wiedner Hauptstraße 8-10

Vortragender: **Dr. Gerhard J. Schütz**
Biophysics Institute, Johannes-Kepler-Universität Linz

Thema: **Chips, Cells and Single Molecules - towards a functional understanding of the nanoscopic organization of the cellular plasma membrane**

Kurzfassung

Current scientific research throughout the natural sciences aims at the exploration of the *Nanocosm*, the collectivity of structures with dimensions between 1 and 100nm. In the life sciences, the diversity of this Nanocosm attracts more and more researchers to the emerging field of Nanobiotechnology. In my lecture, I will show examples how to obtain insights into the organization of the cellular Nanocosm by single molecule experiments.
Our primary goal is an understanding of the role of such structures for immune recognition. For this, we apply single molecule tracking to resolve the plasma membrane structure at sub-diffraction-limited length-scales by employing the high precision for localizing biomolecules of ~15nm. Brightness and single molecule colocalization analysis allows us to study stable or transient molecular associations *in vivo*. In particular, I will present results on the interaction between antigen-loaded MHC and the T cell receptor directly in the interface region of a T cell with a mimicry of an antigen-presenting cell.
Moreover, the high sensitivity *per se* is of primary interest for bioanalytics. To utilize single molecule sensitivity in screening assays, we developed a scanner that enables ultra-sensitive diffraction limited recordings of biochips. We used the device for mRNA expression profiling: sample equivalents of only 10.000 cells were sufficient for robust analysis, which is two orders of magnitude below the detection limit of conventional assays.
Finally, we developed a method for *in vivo* micropatterning of plasma membrane proteins to measure molecular interactions. This technology brings together our interest in immune signaling, and the capability for ultra-sensitive readout of large biochip surfaces. Cells transfected with a fluorescent fusion protein (“prey”) are grown on micropatterned surfaces functionalized with specific antibodies to the extracellular domain of a membrane protein (“bait”); the fluorescence copatterning is used as readout for the bait-prey interaction. We applied this technology for the study of the interaction between CD4 – the major coreceptor for T cell activation – and Lck, an important tyrosine kinase in early T cell signaling. In addition to the well-known zinc-clasp structure, we found strong contributions of Lck membrane anchorage to the binding of the two proteins.

Alle interessierten Kolleginnen und Kollegen sind zu diesem Seminar
im Rahmen des Berufungsverfahrens Biophysik
herzlich eingeladen.

H. Störi e.h.
(LVA-Leiter)