



Polymers under Multiple Constraints

## Polymer and Soft Matter Seminar

Tuesday,

22<sup>nd</sup> October  
2013

at: 5.15 pm

VSP1 1.26,  
Von-  
Seckendorff-  
Platz 1,  
06120 Halle

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### Relaxation of Macromolecules Adsorbed on Surfaces Studied by Neutron Scattering Experiments

Polymer based nanostructured materials promise substantially improved features such as increased tensile strength, abrasion resistance, and gas barrier tightness. Even composites with very different material behavior such as an enhanced electrical conductivity or the opposite way around better insulating properties can be assembled. Though intense research in this field has led to substantial progress toward the physical understanding of the interrelation of polymer- filler affinity, filler structure, and macroscopic properties of filled polymer melts, the chain dynamics of the underlying polymer phase and the interaction mechanisms remain still an open question.

In order to understand the relationship between macroscopic and nanoscopic properties, the talk illuminates the polymer dynamics at the nanoscale in model nanocomposites exploiting the high spatial and time resolution of neutron scattering experiments. Using neutron spin echo and time-of-flight spectroscopy, a broad dynamic range – from the segmental relaxation up to the center of mass diffusion of the polymer chains – is explored. This allows for an accurate and detailed picture of the influence of the interaction strength on the chain dynamics and in particular on the molecular motion of the polymer adsorbed on surfaces. It directly evidences the influence of attractive forces and demonstrates the dependence on the particular chemical structure and architecture.