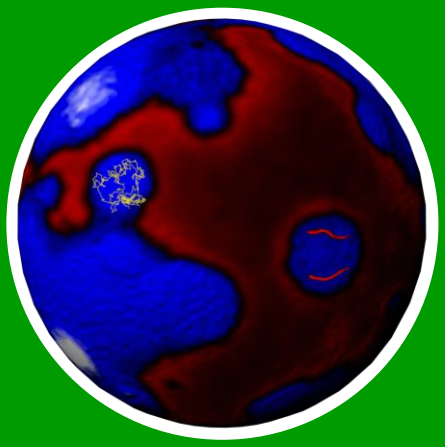

Sächsische Forschergruppe
"From Local Constraints to Macroscopic Transport"

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Effect of nanoconfinement on polymer dynamics

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Investigation of structure and dynamics of polymers in nanoconfinement plays an important role in technology, from adhesion and coatings to nanocomposites with an extension in the aria of biotechnology aiming to control the functional properties of proteins by their immobilization on the surface. Confinement effects in polymer melts may lead to unusual properties. This concerns both the chain conformation, which may be distorted in particular if the chain dimensions are significantly larger than the confinement size, as well as chain dynamics, which may be altered due to surface interactions and changes of topology and chain self-density. Particular attention is given to the so-called polymer *interphase*, i.e. the region of the polymer phase where its properties have not quite reached their bulk values. Controlling the formation of the polymer interphase opens the new ways for the development of more energy efficient, highly functional nanostructured materials.

In this talk I will focus on the influence of the solid surfaces and their interaction with polymers on the dynamics of polymer melt by neutron scattering. The confining systems are presented by well-ordered cylindrical Alumina nanopores (2D confinement). The segmental dynamics on the local time scale is studied by quasielastic neutron scattering (QENS) up to a few nanoseconds and on the large scale dynamics measured by high resolved neutron spin-echo (NSE) spectroscopy extending the time scale to a few hundred of nanoseconds [1]. The main goal is investigation of the influence of the confining surfaces and geometrical confinement on the structure and dynamics of polymer chains at the interface and their extent into a possible *interphase* for different types of interaction between solid walls and the melt. In particular, the influence of the surface on the local segmental dynamics, unentangled Rouse dynamics and the polymer entanglement network will be considered [2,3,4].

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