Martin-Luther-Universität Halle-Wittenberg
Naturwissenschaftliche Fakultät II
Chemie und Physik
SFB TR 102

SFB/TRR 102-KOLLOQUIUM
&
Physikalisches Kolloquium

am Donnerstag, dem 26.04.2012, 17.15 Uhr,

Gustav Mie Hörsaal, Theodor – Lieser - Str. 9, 06120 Halle

Es spricht:

Prof. Dr. Peter Schurtenberger
Physical Chemistry,
Lund University, 22100 Lund, Sweden

zum Thema:

"Concentrated protein solutions, or a physicists view of cataract formation"

A broad class of diseases, such as cataract, Alzheimer's disease and sickle-cell disease, involve protein association phenomena as an essential aspect. They all exhibit an attractive interaction between specific biological molecules, leading to dense phases that compromise cell and organ function. The study of protein condensation diseases has traditionally focused on a molecular viewpoint based on specific properties of the molecules involved. However, scientists have recognized that the subtle interplay between protein attractions, repulsions and entropy can lead to condensed phases, and that the difference between health and disease can hinge on changes in intermolecular interactions as small as thermal energy. Given the similar sensitivity of colloidal phase transitions, there is thus good reason to believe that colloid science tools can help to understand the molecular origins of protein condensation diseases. Among this class of diseases, cataract is particularly important as the world's leading cause of blindness. This disease is most often the consequence of an uncontrolled aggregation (or phase separation) of the proteins in the eye lens that results in a loss of its transparency.
In my presentation I will illustrate how modern colloid physics with its advanced methodological and theoretical framework can help us to understand the molecular origins of cataract formation. I will demonstrate that we can use a combination of small-angle neutron and X-ray scattering experiments combined with molecular dynamics computer simulations to identify, measure and model the molecular interactions and emergent optical and viscoelastic properties and the phase behavior of the relevant, complex cytoplasmic mixtures.