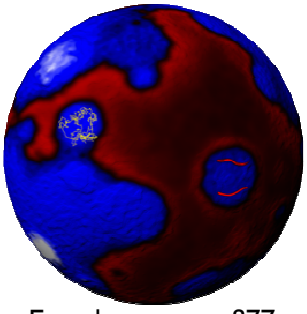

Forschergruppe 877

Universität Leipzig
Fakultät für Physik und
Geowissenschaften
Institut für Theoretische Physik

Gemeinsames

TKM- / FOR877- Seminar

Am Freitag, dem 29.04.2011 um 14:00 Uhr spricht

Prof. Sean Sun

(Johns Hopkins University)

über

Mechanosensation of adherent cells

Tissue cells sense and respond to the stiffness of the surface on which they adhere. Precisely how cells sense surface stiffness remains an open question, though various biochemical pathways are critical for a proper stiffness response. Here, based on a simple mechanochemical model of biological friction, we propose a model for cell mechanosensation as opposed to previous more biochemically based models. Our model of adhesion complexes predicts that these cell-surface interactions provide a viscous drag that increases with the elastic modulus of the surface. The force-velocity relation of myosin II implies that myosin generates greater force when the adhesion complexes slide slowly. Then, using a simple cytoskeleton model, we show that an external force applied to the cytoskeleton causes actin filaments to aggregate and orient parallel to the direction of force application. The greater the external force, the faster this aggregation occurs. As the steady-state probability of forming these bundles reflects a balance between the time scale of bundle formation and destruction (because of actin turnover), more bundles are formed when the cytoskeleton time-scale is small (i.e., on stiff surfaces), in agreement with experiment. As these large bundles of actin, called stress fibers, appear preferentially on stiff surfaces, our mechanical model provides a mechanism for stress fiber formation and stiffness sensing in cells adhered to a compliant surface. The model is also able to explain some aspects of durotaxis: directed migration of cells on substrates with graded stiffness.

Ort: ITP, Großer Seminarraum

Interessenten sind herzlich eingeladen!

gez. Prof. Kroy