



"Soft-Matter Seminar"

Thorsten Auth

Weizmann Institute of Science, Israel

Erythrocyte membrane fluctuations – a new approach

A fundamental understanding of the shape and the fluctuation behaviour of human erythrocytes is important for applications in medicine. Furthermore, erythrocytes – which are easily isolated in large quantities – can serve as relatively simple model systems for more complex cells. Their simplicity arises from the fact that the mechanical properties of the whole cell are completely governed by the cell membrane. The two-dimensional composite membrane consists of a phospholipid bilayer and an adjacent spectrin network that forms the cytoskeleton. A model will be presented that couples the fluctuations of the fluid, lipid bilayer with those of the adjacent solid-like, polymerized membrane by excluded volume interactions. The theory will be compared with reflection interference contrast microscopy (RICM) measurements of the erythrocyte fluctuation spectrum [Zilker/Engelhardt/Sackmann, J. Phys. France 48, 2139 (1987)]. For long wavelengths (> 1200 nm), the model describes the data well. For intermediate wavelengths (between 400 and 1200 nm), the experiments show an apparently much more floppy membrane than expected by the theory. For small wavelengths (below 400 nm), no experimental fluctuation data is available yet. Several other models for the fluctuations of the complex cell membrane have been proposed in the literature and will be discussed shortly. Finally, a qualitatively new approach to evaluate the experimental fluctuation data for intermediate wavelengths will be suggested.

Montag, den 25.09.2006

16:00 Uhr

Raum PH 3344

Sonderforschungsbereich 563, Bioorganic functional systems on solids
Prof. Dr. Roland Netz
Physik-Department T 37, Technische Universität München, Theoretische Physik
85747 Garching