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**“Collective Phenomena in Membranes:
Lateral structure, fusion and spreading“**

**Thursday, May 08th, 2014, 4:15 p.m.
Building C6 4, Lecture Hall II**

Collective phenomena in lipid membranes – like lateral phase transitions, fusion or sprading – involve many lipid molecules. Due to the long time and length scales associated with these phenomena, a systematic investigation via atomistic modeling is difficult. Simple Helfrich-like Hamiltonians that represent the free energy of the membrane via its bending free energy, in turn, have difficulties in describing highly bent structures or changes of the membrane topology. Accounting for the relevant interactions that are necessary to bring about lipid self-assembly, minimal coarse-grained models offer the opportunity to provide direct insights into the mechanisms of these collective phenomena and their free-energy landscape.

I will discuss computer simulations of collective phenomena: (i) The coupling between local composition fluctuations and curvatures and its consequences for pronounced, finite-sized composition fluctuations in binary lipid membranes [1], (ii) the free-energy landscape of bilayer membrane fusion [2,3], and (iii) different mechanisms of spreading of lipid vesicles on solid supports dictating the orientation of supported bilayer membranes (see figure) [4].

- [1] *Raft formation in lipid bilayers coupled to curvature*, S. Sadeghi, M. Müller, and R.L.C. Vink (submitted)
- [2] *Transition path from two apposed membranes to a stalk obtained by a combination of particle simulations and string method*, M. Müller, Y.G. Smirnova, G. Marelli, M. Fuhrmans, and A.C. Shi, *Phys. Rev. Lett.* **108**, 228103 (2012)
- [3] *Line tension controlled mechanism for influenza fusion*, H.J. Risselada, G. Marelli, M. Fuhrmans, Y. Smirnova, H. Grubmüller, S.J. Marrink, and M. Müller, *PLoS ONE* **7**, e38302 (2012)
- [4] *Mechanisms of vesicle spreading on surfaces: Coarse-grained simulations*, M. Fuhrmans and M. Müller, *Langmuir* **29**, 4335 (2013)

Ralf Seemann (71799) takes care of the guest.

Interested people are cordially invited

Coffee at 4:00 p.m. in front of the Lecture Hall