

Berlin Center for Studies of Complex Chemical Systems

Fritz-Haber-Institut der Max-Planck-Gesellschaft, Humboldt-Universität, Max-Delbrück-Centrum für Molekulare Medizin, Otto-von-Guericke-Universität Magdeburg, Physikalisch-Technische Bundesanstalt, Technische Universität Berlin, Universität Potsdam.

Seminar

Complex Nonlinear Processes in Chemistry and Biology

Honorary Chairman: G. Ertl.

Organizers: M. Bär, C. Beta, H. Engel, M. Falcke, M. J. B. Hauser, J. Kurths, A. S. Mikhailov, P. Plath, L. Schimansky-Geier, and H. Stark.

Friday, 6th December, 2013, 16:00 s.t.

Address: Richard-Willstätter-Haus, Faradayweg 10, 14195 Berlin, U-Bahnhof Thielplatz (U3).

Dr. Stefan Klumpp

Max Planck Institute of Colloids and Interfaces, Potsdam

Tug-of-war: Mechanical coordination of biomolecular motors

Molecular motors often perform their functions in small teams rather than as individual molecules. An important issue for understanding the function of motor teams is how the motors are coordinated. It has become clear in recent years that mechanical interactions between motors play an important role in such processes, as motors exert forces on each other. I will discuss two cases, where strong experimental evidence has recently been obtained for the presence of such mechanical interactions: bidirectional cargo transport by cytoskeletal motors of opposite polarity (e.g. kinesins and dyneins) and the twitching motility of bacteria on surfaces powered by pilus motors. Stochastic tug-of-war models explain how fast bidirectional motion (or persistent motion in random direction) is obtained despite the presence of opposing forces via an instability caused by the forced unbinding of motors. Mechanical interactions alone are sufficient to account for the experimentally observed dynamics.