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, 19th October, 2012, 16:00 s.t.
Address: Richard-Willstätter-Haus, Faradayweg 10,14195 Berlin, U-Bahnhof Thielplatz (U3).

Dr. Jörn Dunkel

University of Cambridge

Meso-scale turbulence and symmetry-breaking in microbial fluids

Self-sustained turbulent motion in microbial suspensions presents an intriguing example of collective dynamical behavior amongst the simplest forms of life, and is thought to be important for fluid mixing and molecular transport on the microscale. The mathematical characterization of turbulence phenomena in active non-equilibrium fluids proves even more difficult than for conventional liquids or gases. It is not known which features of turbulent phases in living matter are universal or system-specific, or which generalizations of the Navier-Stokes equations are able to describe them adequately. In this talk, I will summarize recent experimental and theoretical work that aims to answer two questions: How do individual bacteria and microalgae affect their fluid environment? Which minimal mathematical models are capable of providing a quantitative description of collective bacterial motion in highly concentrated suspensions? I will conclude by discussing how microscopic symmetry-breaking mechanisms can enter macroscopic continuum theories of microbial swimming near surfaces.

Information: Dr. Sergio Alonso, Tel. (030) 3481-7948, email: sergio.alonso@ptb.de