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

Berlin Center for Studies of Complex Chemical Systems

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

Wednesday, September 28, 2016, at 16:00
Address: Technische Universität Berlin, Hardenbergstraße 36, 10623 Berlin, Eugene-Paul-Wigner-Gebäude EW 731

Dr. Gil Ariel

Bar-Ilan University (Israel)

Coarse graining collective motion

Collective movement is a common yet spectacular manifestation of synchronized behavior. Despite considerable progress, many of the theoretical principles underlying the emergence of large scale order among moving individuals are still poorly understood. For example, a key question in the study of animal motion is how the details of locomotion, interaction between individuals and the environment contribute to the macroscopic dynamics of the hoard, flock or swarm.

The talk will present some of the prevailing models for swarming and collective motion with emphasis on stochastic descriptions. The goal is to identify some generic macroscopic characteristics regarding the build-up and maintenance of collective order in swarms. In particular, whether order and disorder correspond to different phases, requiring external environmental changes to induce a transition, or rather meta-stable states of the dynamics, suggesting that the emergence of order is kinetic. Different aspects of the phenomenon will be presented, from experiments with locusts to our own attempts towards a statistical physics of collective motion within simplified network models.

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