"Dynamics of Active Matter"

by
Dr. Björn Stuhrmann

FOM Institute for Atomic and Molecular Physics (AMOLF)
Amsterdam

Abstract:

Active matter is comprised of particles which can self-propel by energy dissipation, and includes systems ranging from motor-driven polymers over bacterial colonies to groups of living organisms such as birds or humans. Surprisingly similar patterns of extended spatiotemporal coherence are observed in all these systems. Intense cross-disciplinary research aims at the investigation of general principles of collective motion. Despite impressive theoretical advances, experimental systems suitable to test theories are scarce. Biological swimmers (e.g., bacteria) provide a promising experimental toolbox due to easy preparation, modification, and the ability to record and analyze high particle numbers. Understanding collective dynamics of microscopic swimmers bears particular medical and technological relevance, e.g., in the formation of biofilms during bacterial infection or the handling and processing of “living fluids” on macroscopic (biofuel production) and microscopic (lab-on-a-chip applications) scales. I will discuss experimental approaches that focus on the manipulation of self-propelled particle systems using optical tweezers, magnetic fields, and spatial confinement. By investigating system dynamics, mechanics, and interaction with patterned geometries, these experiments will advance our control of this new material class and contribute to the physicists’ grand goal of incorporating spontaneously moving matter into the condensed matter fold.

Friday, November 9th, 2012, 13:00

Room PH 127

Contact: Prof. Andreas Bausch, (abausch@ph.tum.de), phone: 089 289-12480