Carl von Ossietzky
Universität
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Institut für Physik

Physical Colloquium

„Active matter and how to find glass physics in the physics of life“

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Monday, 06.05.2024, 2.15 p.m.
Room No. W02 1-148

Over the last three decades or so, physicists have become progressively more interested in understanding the collective behaviour of biological organisms, ranging from the formation of bacterial films at the microscale to the flocking of birds at the macroscale. Following the statistical physics philosophy of studying simple yet paradigmatic systems, much of this work has explored „active matter“ models that strip away most biological detail and represent e.g. bacterial swimmers as particles with an „active“ swim velocity that changes randomly on some timescale.

In this talk I will demonstrate that dense assemblies of such self-propelled active particles have many nontrivial properties. In particular, they can show behaviour similar to that of conventional „glassy“ amorphous materials under external shear. Focussing on the limit of strong activity, i.e. highly persistent swimming velocities, results from a dedicated numerical simulation approach show that the system relaxes intermittently, via a succession of scale-free elastic events and broadly distributed plastic events. Correlations between these plastic events lead to emergent dynamic facilitation and strongly heterogeneous relaxation dynamics.

Host: Prof. Dr. Alexander Hartmann