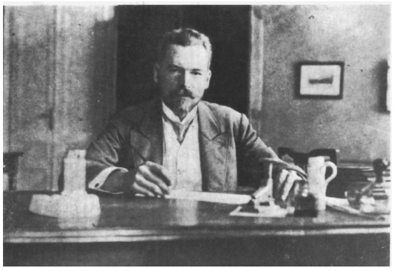

Contribution ID: **72** Type: **Invited Talk**

Nematic ordering in active systems

Wednesday, 27 September 2023 15:40 (40 minutes)

Active systems refer to collections of entities that consume energy and thereby move forward showing emergent collective dynamics. In the macroscopic world this could be fish schools or flocks of birds. In the microscopic world, which we address here, the entities often have the shape of rods like bacteria or are flexible filaments such as microtubules, which are biopolymers found within cells. For sufficiently large densities the active entities exhibit local orientational order and may even show active turbulence.

The talk addresses such systems from two perspectives. First, we use full hydrodynamic simulations of a collection of active rods moving in their fluid environment. We show the dynamic ordering, which arises as a function of density and the aspect ratio of the rods using different types of microswimmers, namely pusher, puller, or neutral active rods. In particular, pusher swimmers can exhibit turbulent motion.

In the second part, we rely on a continuum description of active paranematics, the Doi-Edwards theory supplemented by active stresses. Above an absolute pusher strength, activity induced nematic ordering arises, where disclinations continuously form or annihilate each other. We show how this active turbulence can be controlled by a lattice of inactivity spots leading to multi-lane flow and confined vortex states.

Primary author: STARK, Holger

Presenter: STARK, Holger

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