BP 47: Posters - Active Matter

Time: Wednesday 17:00–19:00 Location: Poster C

BP 47.1 Wed 17:00 Poster C

Emergent Vortex Patterns in Systems of Self-Propelled, Chiral Particles — •Lorenz Huber, Jonas Denk, Emanuel Reithmann, and Erwin Frey — Arnold Sommerfeld Center for Theoretical Physics (ASC) and Center for NanoScience (CeNS), Department of Physics, Ludwig-Maximilians-Universität München, Theresienstrasse 37, D-80333 München, Germany

Self-organization of FtsZ polymers is vital for Z-ring assembly during bacterial cell division, and has been studied using reconstituted in vitro model systems. Employing Brownian dynamics simulations and a Boltzmann approach, we model FtsZ polymers as active particles moving along chiral circular paths. With both methods we find self-organization into vortex structures and characterize different states in parameter states. Our work demonstrates that these patterns are robust and are generic for active chiral matter. Moreover, we show that the dynamics at the onset of pattern formation is described by a generalized complex Ginzburg-Landau equation.

BP 47.2 Wed 17:00 Poster C

Dynamical density functional theory for hard, active disks — •Josua Grawitter and Holger Stark — Institut für Theoretische Physik, Technische Universität Berlin, 10623 Berlin, Germany

We study a collection of self-propelled, active particles using a modified dynamical density functional theory (DDFT) in two dimensions. DDFT provides an ensemble description of hard-sphere interactions in colloidal systems. It therefore gives insight into statistical properties which would otherwise require extensive Brownian dynamics simulation.

When active particles are placed in a harmonic trapping potential, we observe nonequilibrium steady states, which were previously noted by Pototsky and Stark using different methods [1]. Switching to the co-moving and -rotating reference frame of a single particle produces the radial-orientational distribution function of the liquid. Using this model, we can statistically predict the relative orientations and positions of active particles close to each other.

[1] A. Pototsky and H. Stark, Europhys. Lett. **98**, 50004 (2012).