Seminar of SFB 910

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Spontaneous trail formation in populations of auto-chemotactic walkers

We study the formation of trails in populations of self-propelled agents that make oriented deposits of pheromones and also sense such deposits to which they then respond with gradual changes of their direction of motion. Based on extensive off-lattice computer simulations aiming at the scale of insects, e.g. ants, we identify a number of emerging stationary patterns and obtain qualitatively the non-equilibrium state diagram of the model, spanned by the strength of the agentpheromone interaction and the number density of the population. In particular, we demonstrate the spontaneous formation of persistent, macroscopic trails, and highlight some behaviour that is consistent with a dynamic phase transition. This includes a characterisation of the mass of system-spanning trails as a potential order parameter. We also propose a dynamic model for a few macroscopic observables, including the sub-population size of trail-following agents, which captures the early phase of trail formation.

The event is part of the group seminar AG Klapp at TU Berlin and will take place in hybrid format. For information on how to access the event, please contact: henning.reinken@itp.tu-berlin.de

Wednesday, 27.04.2022 · 16:15h · EW 733/via Zoom