Abstract Submitted
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Velocity distributions in self-assembled phases of active magnetic colloids[1] ALEXEY SNEZHKO, Argonne National Laboratory — Colloids of strongly interacting particles driven out-of-equilibrium by an external periodic forcing often develop nontrivial collective dynamics and dynamically assembled structures. We use ferromagnetic colloidal micro-particles suspended over a water-air interface. The system is energized by a single-axis alternating magnetic field applied in-pane of the interface. Experiments revealed a rich variety of self-assembled phases (in particular, "wires," "rotators") emerging in such systems in a certain range of excitation parameters. Velocity distributions of particles in driven magnetic colloids in "rotators" phase were carefully examined. The studies revealed strongly non-Maxwellian nature of velocity statistics for both subsystems: single particles and self-assembled rotators. The high energy tails of velocity distributions are stretched exponential. Dissipations due to inelastic collisions and viscous damping contribute to the form of the high energy tails. When viscous damping dominates over collisional dissipation the distribution is nearly exponential (such behavior is observed for the gas of rotators) while in the opposite case (single particles driven by field) the core of the distribution is Gaussian and only high energy tails are close to exponential.

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