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Collective motion of squirmers in a quasi-2D geometry ANDREAS ZÖTTL, HOLGER STARK, Technical University Berlin — Microorganisms like bacteria, algae or spermatozoa typically move in an aqueous environment where they interact via hydrodynamic flow fields. Recent experiments studied the collective motion of dense suspensions of bacteria where swarming and large-scale turbulence emerged. Moreover, spherical artificial microswimmers, so-called squirmers, have been constructed and studied in a quasi-2D geometry. Here we present a numerical study of the collective dynamics of squirmers confined in quasi-2D between two parallel walls. Because of their spherical shape the reorientation of squirmers is solely due to noise and hydrodynamic interactions via induced flow fields. This is in contrast to elongated swimmers like bacteria which locally align due to steric interactions. We study the collective motion of pushers, pullers and potential swimmers at different densities. At small densities the squirmers are oriented parallel to the walls and pairwise collisions determine the reorientation rate. In dense suspensions rotational diffusion is greatly enhanced and pushers, in particular, tend to orient perpendicular to the walls. This effects the dynamics of the emerging clusters. In very dense suspensions we observe active jamming and long-lived crystalline structures.

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