Freezing and phase separation of non-aligning self-propelled disks Electronic Supplementary Information

Supplementary movies

Movies 1(a) to 1(e) show the dynamics associated with the snapshots of figures 1(a) to 1(e) in the main text. Each system has N = 2000 particles and $\tilde{v}_r = 5.10^{-4}$. Velocities are shown as red arrows, whose scale is indicated at the bottom of each movie.

Movie 1(a) Dynamics in the homogeneous fluid phase below close packing at low self-propulsion speed ($\tilde{v} = 0.001, \phi = 0.5$).

Movie 1(b) Dynamics in the phase separated state below close packing ($\tilde{v} = 0.1$, $\phi = 0.5$), showing a dense cluster surrounded by a more dilute gas phase.

Movie 1(c) Dynamics in the phase separated state above close packing ($\tilde{v} = 0.1$, $\phi = 0.9$), showing a dense liquid with a hole filled by a dilute gas of active particles.

Movie 1(d) Dynamics in the homogeneous liquid phase above close packing ($\tilde{v} = 0.025$, $\phi = 0.9$). These values are located in the sliver of homogeneous liquid between the glass phase and the phase separated phase on figure 2 in the main text. Note the absence of low density hole, as well as the constant reorganizations of the packing leading to the diffusive MSD shown on figure S1.

Movie 1(e) Dynamics in the glassy phase ($\tilde{v} = 0.005$, $\phi = 0.9$). Despite a flow field similar in structure to that of movie 1d (albeit much slower), the packing does not reorganize here, leading to the bounded MSD shown on figure S1. Note however the uniform drifting motion associated with the lack of momentum conservation.



Figure S1 MSD as a function of time for movies 1(d) ($\phi = 0.9$, $\tilde{v} = 0.025$, in blue) and 1(e) ($\phi = 0.9$, $\tilde{v} = 0.005$, in red). The long time behavior is diffusive for movie 1(d) (the dashed line shows a slope 1) and bounded for movie 1(e).