Aggregation and Segregation of Confined Active Particles – Supplementary Material

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MOVIE CAPTIONS

Supplementary Movies 1-3

These three movies display the aggregated, jammed and homogeneous gas states of a monodisperse system for $v_0 = 0.02$. Large immobile particles are glued to the wall to confine the system. The blue lines describe the direction of the interaction forces between active particles. The thickness of the lines is proportional to the strength of force.

Supplementary Movie 1. Aggregated state at $\phi = 0.672$ and $D_r = 5\times10^{-5}$. Active particles travel ballistically across the box and aggregate at the walls, leaving a void at the center. The inhomogeneous density leads to force gradients, with the interaction force decaying away from the wall.

Supplementary Movie 2. Jammed state at $\phi = 0.896$ and $D_r = 5 \times 10^{-5}$. Motion of the active particles is suppressed by local caging, leading to crystalline domains separated by grain boundaries. Rattling of the particles in their cages promote local self-organization and the density and interaction forces remain globally homogeneous.

Supplementary Movie 3. Homogeneous gas state at $\phi = 0.672$ and $D_r = 5 \times 10^{-3}$. For this large value of the rotational diffusion rate the system behave like a thermal gas with a homogeneous density and force distribution.

Supplementary Movies 4-5

These two movies display spontaneous segregation in a mixture of non-adhesive active particles with different sizes or activities. The total packing fraction is $\phi = 0.90$, with both species occupying half of the space. The rotational diffusion rate $D_r = 5 \times 10^{-5}$ and the radii ratio is $1 : 1.4$.

Supplementary Movie 4. Spontaneous segregation at $v_S = v_L = 0.3$, where the small particles are closer to the wall.

Supplementary Movie 5. Spontaneous segregation at $v_S = 0.1$ and $v_L = 0.4$, where the large particles are closer to the wall.

[1] Y. Fily and M. C. Marchetti, Phys. Rev. Lett. **108**, 235702 [5pages] (2012).