

Generic long-range interactions between bodies in an active fluid

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Abstract

It is well known that a non-spherical body immersed in an active fluid generates currents by ratchet effects. We show that, in the presence of two or more passive bodies, these currents induce long-range interactions between the bodies. Using a canonical model of dry active matter in the dilute regime, we characterize the far-field features of the interactions by multipole expansion. These include the algebraic decay with the distance between the bodies, anisotropy, and the violation of the actionreaction principle. They lead to rich dynamical phenomena, illustrated by the spontaneous synchronized rotation of pinned non-chiral bodies and the formation of traveling bound pairs. The occurrence of these phenomena depends on tunable properties of the bodies, thus opening new possibilities for self-assembly mediated by active fluids.

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