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Spontaneous ordering and vortex states of active fluids in circular confinement MAXIME THEILLARD, BARATH EZHILAN, DAVID SAINTILLAN, UCSD — Recent experimental, theoretical and simulation studies have shown that confinement can profoundly affect self-organization in active suspensions leading to striking features such as directed fluid pumping in planar confinement, formation of steady and spontaneous vortices in radial confinement. Motivated by this, we study the dynamics in a suspension of biologically active particles confined in spherical geometries using a mean-field kinetic theory for which we developed a novel numerical solver. In the case of circular confinement, we conduct a systematic exploration of the entire parameter space and distinguish 3 broad states: no-flow, stable vortex and chaotic and several interesting sub-states. Our efficient numerical framework is also employed to study 3D effects and dynamics in more complex geometries.

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