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Active Freedericksz transition in 3D active nematics

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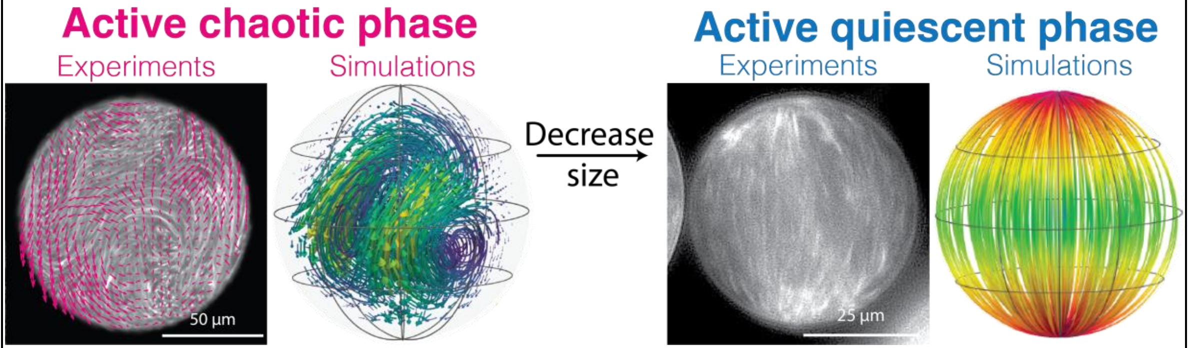
Spontaneous flows are defining features of active nematics. They've been reported in various 2D experimental systems that share the same conserved and broken symmetries, from biofilms to active layers of biopolymers. Quiescent active nematics are more uncommon, despite their biological relevance for cell cytoskeleton and tissue dynamics. The active Fréedericksz transition predicts that confinement can stabilize active nematics in a quiescent out-of-equilibrium phase. **Duclos, Yevick,** and **Baskaran** combined microscopy, biochemical assays, microfluidics, and simulations to test this fundamental prediction of active hydrodynamic theory using a simple and tunable model system composed of microtubules and molecular motors dispersed in a 3D colloidal liquid crystal.



How to tame active chaos? *A side-by-side comparison of experimental and simulated results shows how spherical confinement in cell-like compartments can suppress the collective motion of 3D active biopolymers and motor proteins.*

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