Geometric constraints can profoundly affect pattern selection and topological defect formation in equilibrium and non-equilibrium systems. In this talk, I will summarize recent experimental and theoretical work that aims to understand how confinement geometry affects the spontaneous flows of active suspensions. First, we demonstrate how collective microbial swimming can be controlled by microstructure to realize bacterial spin lattices exhibiting ferro- and antiferro-magnetic ordering. Building on these insights, we can propose designs of active flow networks to implement logical operations in autonomous microfluidic transport devices.

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