

The Pressure of Active Matter

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One of the distinguishing features of many living systems is their ability to move, to self-propel, to be active. Through their motion, either voluntarily or involuntarily, living systems are able self-assemble: birds flock, fish school, bacteria swarm, etc. But such behavior is not limited to living systems. Recent advances in colloid chemistry have led to the development of synthetic, nonliving particles that are able to undergo autonomous motion by converting chemical energy into mechanical motion and work – chemical swimming. This chemical or biological swimming or intrinsic activity imparts new behaviors to active matter that distinguish it from equilibrium condensed matter systems. Active matter generates its own internal stress, which can drive it far from equilibrium and free it from conventional thermodynamic constraints, and by so doing active matter can control and direct its own behavior and that of its surroundings. This talk will discuss our recent work on the origin of a new source for stress that is responsible for self-assembly and pattern formation in active matter.