PHYSICAL MATHEMATICS SEMINAR

Capillary attraction underlies bacterial collective dynamics

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ABSTRACT:

Collective motion of active matter occurs in many living systems, such as bacterial communities, epithelial cell populations, bird flocks, and fish schools. A remarkable example can be found in the soil-dwelling bacterium *Myxococcus xanthus*. Key to the life cycle of *M. xanthus* cells is the formation of collective groups: they feed on prey in swarms and aggregate upon starvation. However, the physical mechanisms that keep *M. xanthus* cells together remains unclear. In this talk, I will present a computational model to explore the role that capillary forces play in bacterial collective dynamics. The modeling results, combined with experiments, show that water menisci forming around bacteria mediate strong capillary attraction between cells. The model accounts for a variety of previously observed phases of collective dynamics as the result of a competition between cell-cell capillary attraction and cell motility. Finally, I will discuss the large-scale self-organization of bacterial populations and highlight the importance of capillary force in this process. Together, these results suggest that cell-cell capillary attraction provides a generic mechanism underpinning bacterial collective dynamics.

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2:30 PM – 3:30 PM
Building 2, Room 449

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