

PHYSICAL MATHEMATICS SEMINAR

EMERGENT PATTERNS IN ACTIVE POLAR SUSPENSIONS

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ABSTRACT:

Aggregates of self-propelling entities such as flocks of birds, schools of fish, bands of bacteria and motors in motility assays exhibit a zoo of striking, large scale collective behavior. Advances in the imaging of small scale biological systems (bacteria, cells) and increased computational power enabling the tracking of large-scale coherent structures (birds, insects) have led to a resurgence of interest in the theoretical modeling of such active, polar suspensions. In my talk, I will first discuss how a classical model from soft condensed matter physics - the XY theory for spins - can be adapted for these systems by incorporating additional physical effects namely, convection due to self-propulsion, excluded volume interactions and alignment inducing non-linear couplings. I will then present results demonstrating the emergence of large scale patterns such as soliton-like waves, roving comets and stationary asters from the interplay between these effects.

TUESDAY, MAY 3, 2011

2:30 PM

Building 2, Room 105

Refreshments at 3:30 PM in Building 2, Room 290



Massachusetts Institute of Technology