PHYSICAL MATHEMATICS SEMINAR

Hot particles attract in a cold bath

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ABSTRACT:

Controlling interactions out of thermodynamic equilibrium is crucial for designing functional self-organizing structures. These active interactions also underpin collective behavior in biological systems. I will discuss the general setting of active particles in a bath of passive particles. A long ranged attraction between active particles emerges when translational persistence length of the active particle motion is smaller than the particle diameter. In this limit, the system reduces to particles of higher diffusivity ("hot" particles) in a bath of particles with lower diffusivity ("cold" particles). This attractive interaction arises as a hot particle pushes cold particles away to create a large hole around itself, and the holes interact via a depletion-like attraction even though all particles have the same size. I will also discuss the converse of this effect: for passive objects in an active bath, I will show that the force between the passive objects is determined by the fluctuation spectrum of the active bath. Importantly, this force is long ranged and can oscillate between repulsion and attraction as a function of the separation between the objects.

TUESDAY, DECEMBER 6, 2016
2:30 PM
Building 4, Room 257

Reception following in Building 2, Room 290
(Math Dept. Common Room)

http://math.mit.edu/seminars/pms/

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