

Massachusetts Institute of Technology
Department of Physics

Condensed Matter Theory Seminar

"Evolution of community structure in dynamic fluids."

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Abstract: Community ecology is built on the notion of interspecies interactions. The strengths of interactions are almost invariably taken as fixed parameters, which must either be measured or assumed. Few available models of "adaptive dynamics" that do consider the formation and evolution of interactions, are based on ad hoc definitions of fitness. In this talk I will present a theoretical first-principles, physics-based approach to understanding how interactions between and within species form and evolve. In this picture, the black box of "interspecies interactions" is replaced with advection, diffusion, dispersal, chemical secretions and the geometric properties of the habitat medium. I will show that the fundamental laws of fluid dynamics, diffusion and advection, and the physical parameters describing the habitat plays an important role in whether species are driven towards individualism, unspecialized or specialized social cooperation, or extinction. I will end my talk by proposing ways to tailoring the interaction structure of a microbial community for practical applications, by manipulating the physical properties of the habitat.

12:00pm noon
Tuesday, June 18, 2019
Duboc Room (4-331)

Host: Brian Skinner