



Evolution of specialization and social cooperation in dynamic fluids

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Wednesday

April 3

4:00 P.M.

Rm 118 NSH

Put a single microbe in a puddle, take a stroll for a few billion years, and when you are back, you might find something as astonishing as a coral reef or a rainforest. Somehow, over time, species radiate into novel ones, their inputs and outputs diversify, and their needs and provisions mingle by a process that appears entropic in nature. How do species start depending on one other, how do these interactions change over time, and what role does the laws of physics play in this process? In this talk I will present analytical and computational descriptions of how the transport properties of a fluid determine whether the evolution of species will be driven towards individualism, social cooperation, specialization, or extinction. I will end my talk by proposing ways to tailoring the interaction structure of a microbial community by manipulating flow patterns and domain geometry.