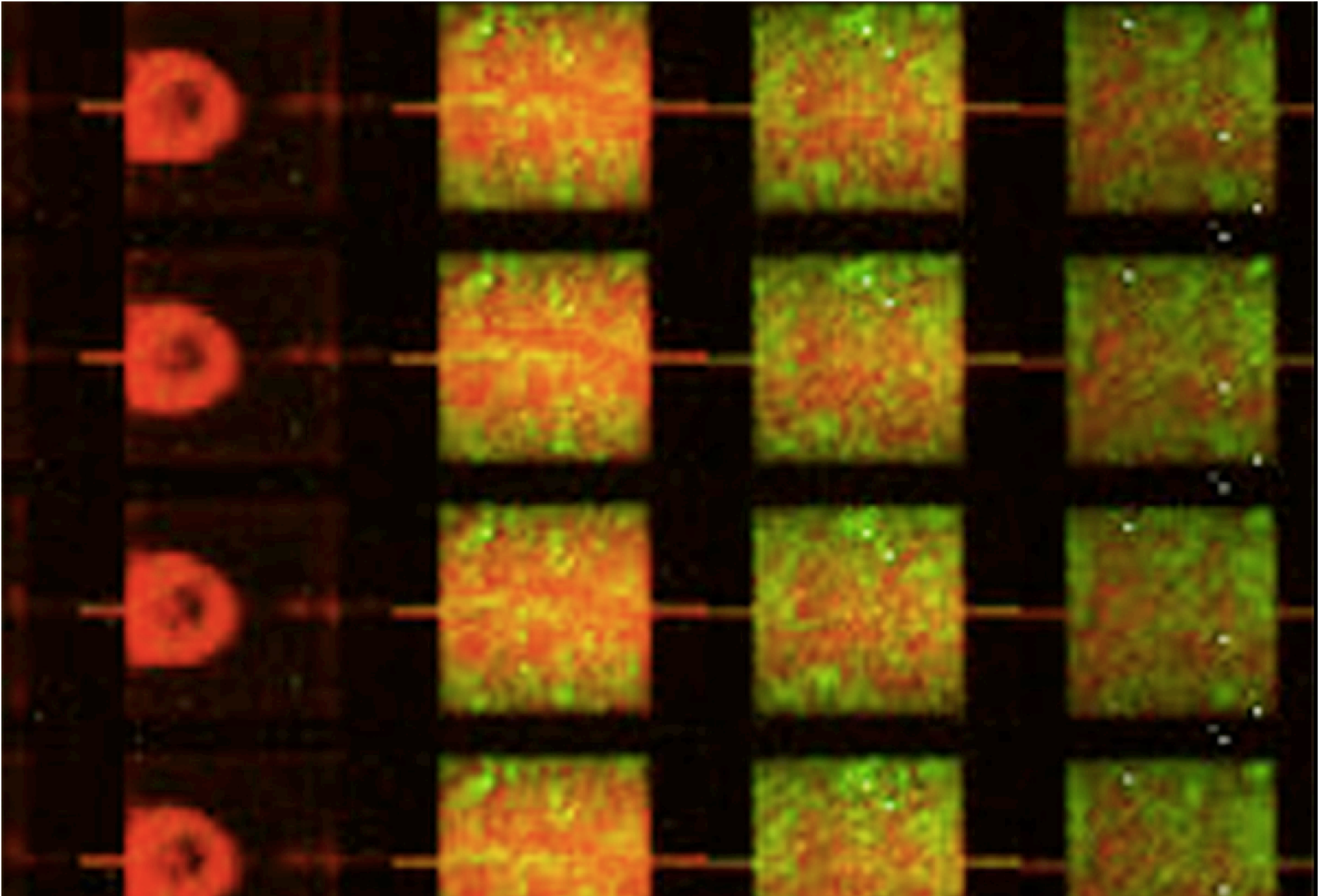


Boston University Physics Colloquium



Of Bugs and Men:

Game Playing, Evolution and Adaptation for Physicists

We have developed a way to examine the population dynamics of bacteria in a complex ecological environment using nanolithography. We have observed, as would be expected, that there is a complex “game” (but more than a game) played by populations of populations (metapopulations) of organisms that is a mixture of selfishness and altruism at many different length scales. Although it is believed that game theory as developed by von Neumann and Nash can predict the stable equilibrium of our metapopulations, we believe that this in fact not true, that the population dynamics are not computable from a conventional approach using stored programs and rational analysis. Bacterial communities do probably try to maximize fitness, but how fitness is defined, over what range of individual genotypes is the community defined, and over what time scale into the future is fitness extrapolated is probably a task that cannot be expressed in terms of numerical algorithms. Yet, it is a game that all organisms, from bacteria to man, are constantly playing. The computational game that they play we do not believe is one that can be coded using conventional logic, yet the solutions to this game we believe represent the future of complex communities on our planet.

Robert H. Austin

Princeton University

April 8, 2008 (Tuesday) at 3:30pm (Refreshments at 3:15pm)

SCI 107, Metcalf Science Center, Boston University

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