



From molecular mechanisms to macroscopic dynamics in biological networks

The last decades have seen an explosion of tools for characterizing the microscopic mechanisms at work in biological systems. But many of the most interesting phenomena of life operate at more macroscopic levels—the fates of cells in a developing embryo, the organized motions of cytoplasm, the states of neural networks that represent thoughts or actions, and much more. There is a long history of trying to link microscopic and macroscopic through dynamical and statistical models, as in the physics of inanimate systems. These theoretical efforts highlight two key ideas. First, many of the microscopic parameters disappear from our macroscopic description, yet some molecular details are strikingly important. Second, we want to explain behavior without appeal to implausibly fine tuning, yet many real biological systems are described by very special points in the parameter space of possible models. In this symposium we will explore these issues as they appear in systems ranging from single cells to the brain. We hope that the schedule will allow for considerable discussion.

Tuesday, 9 April 2013
Science Center (Room 4102)

9:15 AM coffee and bagels

9:30 AM **Emergence of critical dynamics in the evolution of genetic networks**
Maximino Aldana-Gonzales, Universidad Nacional Autónoma de Mexico

11:00 AM coffee

11:30 AM **The stressful life of a cell: Contractile networks at the verge of instability**
Chase P. Broedersz, Princeton University

1:00 PM lunch

2:00 PM **Ears, brains, and bifurcations**
Marcelo Magnasco, Rockefeller University

3:30 PM coffee

4:00 PM **Chaos and information flow in neuronal circuits**
Fred Wolf, Max-Planck Institute for Dynamics and Self-Organization

The discussion will continue informally on Wednesday, in Room 3310B at 10:00 AM.

Events are free and open to the scientific community. The Graduate Center of the City University of New York is located at 365 Fifth Ave., between 34th and 35th Streets, in Manhattan.