Inverse problems and the statistical mechanics of biological networks

Physicists have long hoped that the collective behaviors of biological systems could be understood using ideas from statistical mechanics. New experiments that monitor many network elements simultaneously have stimulated an approach in which we construct a statistical mechanics description of the system directly from the data, and this construction has led to exciting results in a wide range of systems. At the heart of this approach is an inverse problem, which becomes more challenging as we analyze larger and larger networks. In this symposium we explore recent progress in addressing these challenges.

Tuesday, 22 February 2011
Science Center (Room 4102)

9:00 AM coffee and bagels/welcome

9:15 AM **Maximum entropy models of sequence variation in protein families**
Thierry Mora, CNRS & École Normale Supérieure, Paris

10:45 AM coffee

11:00 AM **Cluster expansions and the inverse Ising problem**
Simona Cocoo, Institute for Advanced Study

12:30 PM lunch

1:30 PM **Protein contact prediction and the inverse Potts problem**
Martin Weigt, Human Genetics Foundation, Torino

3:00 PM **Inference of interactions in assemblies of stochastic integrate-and-fire neurons**
Remi Monasson, Institute for Advanced Study

4:15 PM coffee

4:30 PM **Maximum entropy models for collective animal behavior**
Irene Giardina, CNR & Sapienza, Università di Roma

The symposium will continue, informally, starting at 10 AM on Wednesday 23 February. To start the discussion, Gašper Tkačik (IST Austria) will describe current work on inverse problems in large networks of neurons.

Events are free and open to the scientific community, but we ask that you register by sending an email to its@gc.cuny.edu. We particularly encourage participation by students and postdoctoral fellows, and some funds are available to help with travel and lodging. The Graduate Center of the City University of New York is located at 365 Fifth Ave., between 34th and 35th Streets, in Manhattan. For more information about ITS programs, see http://web.gc.cuny.edu/its/. Program supported in part by the Burroughs Wellcome Fund.