

102ND STATISTICAL MECHANICS CONFERENCE
[RUTGERS UNIVERSITY](#), BUSCH CAMPUS, [HILL CENTER](#), ROOM 114
SUNDAY, MONDAY, TUESDAY, DECEMBER 13-15, 2009

**Thermodynamics, Statistical Mechanics, and Fundamental Issues in
Biology: Where do we stand?"**

PROGRAM OF THE 102ND STATISTICAL MECHANICS CONFERENCE

Sunday, December 13, 2009

8:00 – 9:00 Registration and breakfast

9:00 – 9:30 H. Swinney, University of Texas
Lethal protein produced in response to competition between bacterial colonies

9:30 – 10:00 M. Vergassola, Institut Pasteur
Bacterial chemotaxis as a game against nature

10:00 – 10:30 S. Klumpp, Max Planck
Transcription of ribosomal RNA - a central task for rapid bacterial growth

10:30 – 11:00 Coffee

11:00 – 11:30 E. Siggia, Rockefeller University
Geometry and Genetics

11:30 – 12:00 C. Tang, University of California, San Francisco
Linking network function and topology

12:00 – 12:30 Y. Tu, IBM – Watson Research Center
The dissipative nature of adaptation and its thermodynamic cost

12:30 – 2:00 Lunch

2:00 – 2:30 G. Menon, Institute of Mathematical Sciences, India
Stretching Fluctuations and Loop Formation in Short Double-Stranded DNA molecules

2:30 – 3:00 A. Morozov, Rutgers University
Statistical Mechanics of Chromatin Structure

3:00 – 3:30 M.E. Fisher, University of Maryland
Biology, medicine, and engineering: Roles for theory?

3:30 – 4:00 Coffee

4:00 – 4:30 G. Bhanot, Rutgers University
Scales of selection events-local or genome wide?

4:30 – 5:00 U. Alon, Weizmann Institute
On the Evolution of Modularity

5:00 – 5:30 D. Fisher, Stanford University
Quantitative Issues in Evolutionary Dynamics

5:30 – 6:00 B. Shraiman, Kavli Institute for Theoretical Physics
Evolution, Sex and Statistical Mechanics

6:00 - 8:00 **COCKTAILS AND CONCERT WILL BE HELD AT THE FIBER OPTICS AUDITORIUM.
SPONSORED BY SPRINGER, PUBLISHER OF THE JOURNAL OF STATISTICAL PHYSICS AND
COMMUNICATIONS IN MATHEMATICAL PHYSICS. ALL ARE INVITED.**

**8:00 - BANQUET WILL BE HELD AT THE BUSCH FACULTY DINING ROOM. ADVANCED RESERVATIONS
ARE REQUIRED**

SEE MAP FOR DIRECTIONS: [http://maps.rutgers.edu/maps/default.aspx?preadj=true&campus=4?
1326,322](http://maps.rutgers.edu/maps/default.aspx?preadj=true&campus=4?1326,322).

Monday, December 14, 2009

7:20 – 8:00 Registration and breakfast

8:00 – 9:40 Short talk, Session A

9:40 – 10:10 Coffee

10:10 – 10:40 L. Abbott, Columbia University
Controlling Chaotic Activity in Neural Networks

10:40 – 11:10 R. Monasson, ENS
Learning in the temporal domain with an integrate-and-fire neuron

11:10 – 11:40 J. Hopfield, Princeton University
What is thinking? The dynamics of mental exploration

11:40 – 12:30 Human Rights session with U. Alon, H. Swinney and others

12:30 – 2:00 Lunch

2:00 – 2:30 M. Kardar, MIT
Thymic Selection of T-Cell Receptors as an Extreme Value Problem

2:30 – 3:00 E. Vanden Eijnden, Courant Institute
Navigating through the maze of rare events

3:00 – 3:30 G. West, Sante Fe Institute
Damage and Repair; Sleep, Aging and Nucleotide Substitution Rates

3:30 – 4:00 **Coffee**

4:00 – 4:30 B. Shklovskii, University of Minnesota
Self-assembly of viruses

4:30 – 5:00 B. Gelbart, UCLA
What does evolution have to say about our being able to make a virus from scratch?

5:00 – 5:30 S. Leibler, Rockefeller University
Selection and survival in microbial populations

5:30 – 6:00 F. Dyson, IAS
Why Negative Specific Heat is Good for Life

6:00 – 8:00 **Cocktails and dinner**

8:00 – 9:30 R. Austin, Princeton University
Physics and cancer (This talk will be followed by an open discussion on this and related subjects)

Tuesday, December 15, 2009

7:30 – 8:00 **Registration and breakfast**

8:00 – 9:30 Short talks, Session B

9:30 – 10:00 **Coffee**

10:00 – 10:30 D. Botstein, Princeton University
A few examples of quantitative issues biology

10:30 – 11:00 D. Bensimon, ENS
Single Cell Physiology

11:00 – 11:30 P. Fratzl, Max Planck Institute
Tissue growth and remodelling

11:30 – 12:00 M. Schick, University of Washington
“Rafts” as mixtures of lipids and cholesterol; are we still at sea?

12:00 – 12:30 H. Qian, University of Washington
Nonequilibrium Phase Transition in a Biochemical System: Emerging landscape, time scales, and a possible basis for epigenetic-inheritance

12:30 – 1:00 R. Levine, The Hebrew University of Jerusalem
Maximal Entropy Thermodynamic-Like Analysis of Cell Signaling With Application to Early Processes in Carcinogenesis

1:00 – 2:00 **Lunch**

2:00 – 2:30 K. Mischaikow, Rutgers University
A Database Schema for Multiparameter Dynamical Systems

2:30 – 3:00 W. Bialek, Princeton University
How much can we calculate?: Predicting the structure of genetic networks from an optimization principle

3:00 – 3:30 L-S. Young, Courant Institute
Spike-time reliability of neural oscillator networks

3:30 – 4:00 M. Feigenbaum, Rockefeller University
Comments on optics and vision

4:00 – 4:30 E. Sontag, Rutgers University
Interconnections in biochemical networks: signaling, impedance, and insulators.

4:30 Short talks, Session C

DECEMBER 7, 2009

Towards Quantitative Biology

9:30am – 5:00pm
Bloomberg Lecture Hall
Institute for Advanced Study
Einstein Drive, Princeton, NJ

To register email Diane DePiano (depiano@ias.edu)