

125th Statistical Mechanics Conference
Rutgers University, Busch Campus, Hill Center, Room 114
Sunday, December 17, 2023 - Tuesday December 19, 2023
Guests of Honor
Larry Abbott, Chris Jarzynski and Bruno Nachtergaele

Sunday, December 17th 2023

Registration and Breakfast 8:00 - 9:00

- 9:00 - 9:25 **David G. Clark** – Columbia University
Mean fields for nice advisors
- 9:25 - 9:50 **Suriyanarayanan Vaikuntanathan** – University of Chicago
“Active” associative memory
- 9:50 - 10:15 **William Bialek** - Princeton University
Recent progress on statistical physics for networks of real neurons
- 10:15 - 10:40 **Sara A Solla** – Northwestern University
Low Dimensional Manifolds for Neural Dynamics
- 10:40 - 11:10 **Coffee Break**
- 11:10 - 11:35 **Anton Kapustin** – Cal Tech
Extracting topological invariants from ground-state wavefunctions
- 11:35 - 12:00 **Robert Sims** – University of Arizona
Stability of the Bulk Gap for Models with Frustration-Free Ground States
- 12:00 - 12:25 **Jordan Horowitz** – University of Michigan
Kinetic response in nonequilibrium steady states

Lunch 12:25 - 1:50

- 1:50 - 2:15 **Eleni Katifori** – University of Pennsylvania
A paradox in physical networks of optimal exploration
- 2:15 - 2:40 **Anna Vershynina** – University of Houston
Quantum resource theory of coherence
- 2:40 - 3:05 **Kanu Sinha** – Arizona State University
Quantum and classical Brownian motion of a polarizable particle in thermal fields
- 3:05 - 3:35 **Coffee Break**
- 3:35 - 4:00 **Dave Thirumalai** – University of Texas at Austin
Role of Condensin motors in Genome Folding
- 4:00 - 4:25 **Garegin Papoian** – University of Maryland
Towards Simulating Eukaryotic Cells from the Fundamental Physico-Chemical Principles
- 4:25 - 4:50 **Arup Chakraborty** – MIT
Statistical Mechanics of Antibody Production Upon Vaccination

5:00-7:00 Cocktails & Concert in the Fiber Optics Auditorium, sponsored by Springer

7:10 Banquet at the Hill Center - 7th Floor - Reservation required

Monday, December 18th 2023

Registration and Breakfast 7:45 - 8:20

- 8:20 - 9:30 Short Talks: Session A
- 9:35 - 10:00 **Sebastian Deffner** - UMBC (University of Maryland, Baltimore County)

Pointer states and quantum Darwinism with 2-body interactions

10:00 - 10:25 **Zhiyue Lu** – UNC Chapel Hill
Designing Chemical Reaction Networks for Free Energy Rectification: A Geometric Approach

Coffee Break 10:25 - 10:55

10:55 - 11:20 **Gavin Crooks** - Normal Computing
Thermodynamic Geometry of Matrix Determinants

11:20 - 11:45 **BingKan Xue** – University of Florida
Input vs interaction modulation: Controlling networks to retrieve dynamic sequences

11:45 - 12:10 **Nicole Yunger Halpern** – National Institute of Standards and Technology
Beyond the first law: Peculiarly quantum conservation laws in thermodynamics

12:10 - 12:35 **Human Rights Session, Ian Jauslin and Joel Lebowitz, Rutgers University**

Lunch 12:35 - 1:50

1:50 - 2:15 **Pablo Sartori** - Gulbenkian Institute of Science
Energetics of metabolism in unicellular organisms

2:15 - 2:40 **David Minh** - Illinois Institute of Technology
Targeted free energy perturbation for learned mappings of molecular structure

2:40 - 3:05 **Gabriel Kotliar** - Rutgers University
Understanding heavy fermions: emergent properties of the Anderson lattice model#

3:05 - 3:30 **David Vanderbilt** – Rutgers University
Theory of adiabatic phonon-magnon coupling in magnetic materials

Coffee Break 3:30 - 4:00

4:00 - 4:25 **Pratyush Tiwary** – University of Maryland
From chemical identity to Boltzmann ensembles for proteins, RNA and crystals with generative AI and statistical mechanics

4:25 - 4:50 **David Clark**, Laudatio for Larry Abbott

4:50 - 5:05 **Jordan Horowitz**, Laudatio for Chris Jarzynski

5:05 - 5:30 **Robert Sims**, Laudatio for Bruno Nachtergaele

5:30 Cocktails and Dinner at the Hill Center - 7th Floor

Tuesday, December 19th, 2023

Registration and Breakfast 7:45 - 8:15

8:15 - 9:20 Short Talks: Session B

9:20 - 9:45 **Jan Philip Solovej** – University of Copenhagen
A model for periodicity of atomic structure

9:45 - 10:10 **Amanda Young** – University of Illinois Urbana-Champaign
A bulk gap in the presence of edge states for a truncated Haldane pseudopotential

Coffee Break 10:10 - 10:40

10:40 - 11:05 **Predrag Cvitanovic** – Georgia Institute of Technology
A chaotic lattice field theory

11:05 - 11:30 **Martin Fraas** – UC Davis
Kitaev's determinant formula

11:30 - 11:55 **Edward Farhi** - MIT
The Quantum Approximate Optimization Algorithm and the Sherrington-Kirkpatrick model

11:55 - 12:20 **Sefano Olla** - Université Paris Dauphine
Speeding up the totally asymmetric exclusion process

Lunch 12:20 - 1:25

1:25 - 1:50 **Simone Warzel** – Technical University of Munich

The Parisi formula for quantum spin glasses

1:50- 2:15

Alex Kontorovich – Rutgers University

Why teach a computer how mathematicians prove theorems

2:15 - 2:40

Jacob Shapiro – Princeton University

Classification of disordered insulators in 1D

2:40 - 3:05

Ian Jauslin - Rutgers University

Non-perturbative behavior of interacting Bosons at intermediate densities