

14w5170 : Biological and Bio-Inspired Information Theory
October 26-31, 2014
Final Program

Meals

- Breakfast (Buffet): 7:00-9:30 am, Sally Borden Building, Monday—Friday
- Lunch (Buffet): 11:30 am-1:30 pm, Sally Borden Building, Monday—Friday
- Dinner (Buffet): 5:30-7:30 pm, Sally Borden Building, Sunday—Thursday
- Coffee Breaks: As per daily schedule, in the foyer of the TransCanada Pipeline Pavilion (TCPL)
- **Please remember to scan your meal card at the host/hostess station in the dining room for each meal.**

Meeting Rooms

All lectures will be held in the lecture theater in the TransCanada Pipelines Pavilion (TCPL). An LCD projector, a laptop, a document camera, and blackboards are available for presentations.

Schedule of Events

Sunday, October 26, 2014

Check-in is available from 1600

1730-1930 Dinner, Sally Borden building
Evening Social event, depending on interest

Monday, October 27, 2014

0700-0845 Breakfast, Sally Borden building
0845-0930 **Session 1:** Introduction and Welcome

Introduction and welcome by the BIRS station manager (15 min)

Linda Jarigina-Sahoo, BIRS station manager

The Landscape (30 min)

Andrew W. Eckford, York University

0930-1030 **Session 2:** Molecular and cell-cell communication (I)

Signal Transduction and Information Theory (60 min)

Peter J. Thomas, Case Western Reserve University

1030-1100 Coffee break

1100-1200 **Session 3:** Molecular and cell-cell communication (II)

Information Bottlenecks in Signaling and the Virtues of Multi-Cellularity (60 min)

Andre Levchenko, Yale University

1200-1300 Lunch, Sally Borden building
1300-1400 Guided tour of the Banff Centre (meet in the 2nd floor lounge, Corbett Hall)
1400 Group photo (meet in the foyer of TCPL)
1400-1500 **Session 4:** Biological Models and Platforms

Biological Platforms in Self-Assembly and Dynamic Restructuring (30 min)
Janet Paluh, SUNY College of Nanoscale Science and Engineering
A Stochastic Model for Electron Transfer in Bacterial Cables (30 min)
Nicolo Michelusi, University of Southern California

1500-1530: Coffee break
1530-1700: **Session 5:** Molecular and cell-cell communication (III)

Molecular Communication Channels: timing vs. payload (30 min)
Chris Rose, Rutgers University
Capacity Bounds of the Memoryless AIGN Channel – a Toy-Model for Molecular Communication in a Fluid (30 min)
Stefan Moser, ETH Zurich
Communication Envelopes for Molecular Diffusion and Electromagnetic Wave Propagation (30 min)
Weisi Guo, University of Warwick

1730-1930: Dinner, Sally Borden building

Tuesday, October 28, 2014

0700-0900 Breakfast, Sally Borden building
0900-1000 **Session 6:** Neurology, Physiology, and Information Theory (I)

Neuroscience Applications of GIG Distributions (60 min)
Toby Berger, University of Virginia

1000-1030 Coffee break
1030-1130 **Session 7:** Neurology, Physiology, and Information Theory (II)

Sensing and acting under information constraints - a principled approach to biology and intelligence (60 min)
Naftali Tishby, The Hebrew University of Jerusalem

1130-1330 Lunch, Sally Borden building
1330-1500 **Session 8:** Neurology, Physiology, and Information Theory (III)

Real-Time Network Modulation for Intractable Epilepsy (30 min)
Benhaam Aazhang, Rice University
Invariant signal processing in auditory biological systems (30 min)
Alexander Dimitrov, Washington State University, Vancouver
Communicating with noisy signals: lessons learned from the mammalian visual system (30 min)
Joel Zylberberg, University of Washington

1500-1530 Coffee break
1530-1730 **Session 9:** Molecular and cell-cell communication (IV)

Intersymbol interference mitigation in diffusive molecular communication (30 min)
Robert Schober, Erlangen-Nürnberg University

Modelling Molecular Communication Channels by Modal Expansions (30 min)

Rudolf Rabenstein, Erlangen-Nürnberg University

Results on molecular communication among bacteria (30 min)

Faramarz Fekri, Georgia Institute of Technology

Molecular MIMO: From Theory to Practice (30 min)

Chan-Byoung Chae, Yonsei University

1730-1930 Dinner, Sally Borden building

Wednesday, October 29, 2014

0700-0900: Breakfast, Sally Borden building

0900-1000: **Session 10:** Ecology, Evolution, and Information Theory (I)

Three Principles of Biological States: Ecology and Cancer (60 min)

Tom Schneider, National Cancer Institute, National Institutes of Health

1000-1030: Coffee break

1030-1130: **Session 11:** Ecology, Evolution, and Information Theory (II)

Biodiversity, entropy and thermodynamics (30 min)

John Baez, University of California, Riverside

Some Information-Theoretic Musings Concerning the Origin and Evolution of Life (30 min)

Christoph Adami, Michigan State University

1130-1330 Lunch, Sally Borden building

1330-1730 **Free afternoon – informal interactions or sightseeing**

1730-1930 Dinner, Sally Borden building

Thursday, October 30, 2014

0700-0900 Breakfast, Sally Borden building

0900-1000 **Session 12:** Neurology, Physiology, and Information Theory (IV)

Predictive information (60 min)

Ilya Nemenman, Emory University

1000-1030 Coffee break

1030-1130 **Session 13:** Neurology, Physiology, and Information Theory (V)

Informational Principles in Perception-Action Loops (60 min)

Daniel Polani, University of Hertfordshire

1130-1330 Lunch, Sally Borden building

1330-1500 **Session 14:** Molecular and cell-cell communication (V)

Applications of Discrete Mathematics in Bioinformatics (30 min)

Amin Emad, University of Illinois at Urbana-Champaign

Multiscale Analysis Reveals Complex Behavior in Bacteria Population Dynamics (30 min)

Paul Bogdan, University of Southern California

Information and Causality in a Reaction-Diffusion System

Robert Shaw, Protolife

1500-1530 Coffee break
1530-1630 **Session 15:** Neurology, Physiology, and Information Theory (VI)

Efficient information transmission and stimulus coding in neuronal models (30 min)

Lubomir Kostal, Academy of Sciences of the Czech Republic

Thermodynamics of information processing (30 min)

Susanne Still, University of Hawaii

Applications of Directed Information to Neuroscience (30 min)

Nima Soltani, Stanford University

1730-1930 Dinner, Sally Borden building
Evening Social event, depending on interest

Friday, October 31, 2014

0700-0900 Breakfast, Sally Borden building
0900-1200 ***Free morning for informal interactions***
Check out by 12 noon