



Northeast Regional Conference on Complex Systems (NERCCS 2022)

Date: March 30 - April 1, 2022
Location: **Buffalo, NY and satellite locations**
Webpage: <https://nerccs2022.github.io/>

Virtual participation

Registered participants can choose to join virtually via Zoom or in person at UB or a satellite location. Zoom links will be included in a finalized schedule that will be emailed to registered participants. Please keep your microphone on mute unless asking a question.

In-person participation

Registered participants can join in person at the following locations.

Location	Room	Local Contact
University at Buffalo, SUNY	Student Union, room 330 and others	Dane Taylor danet@buffalo.edu
SUNY Binghamton	Engineering Building, room R-15	Yingjun Dong ydong25@binghamton.edu
Rochester Institute of Technology	Louise Slaughter Hall, room SLA-A634	Nishant Malik nxmsma@rit.edu
University of Vermont	Votey 107, Dean's Conference Room	Jean-Gabriel Young jean.gabriel.young@gmail.com

Thursday, March 31

Time [EDT]	Event	Zoom Link
<u>Morning Session</u> (room: UB Student Union (SU) 330)		
9:00 – 9:15	Welcome remarks	
9:15 – 9:45	Invited talk 1– Daniel Abrams <i>Bactrian states: the emergence of bimodality in oscillator systems and elsewhere</i>	
9:45 – 10:45	Keynote 1 – Peter J. Mucha <i>Community Detection in Networks: Pruning and Picking Parameters</i>	
10:45 – 11:00	Break	
11:00 – 12:20	Parallel contributed talks 1 (each 4x20 min talks) 1A. Network Dynamics - room: UB SU 330 1B. Data Science - room: UB SU 228	
12:20 – 1:30	Lunch break	

Afternoon Session (room: UB SU 330)

1:30 – 2:00	Invited talk 2 – Yingjie Hu <i>GeoAI: Integrating Geospatial Data and AI Models for Social Good</i>
2:00 – 2:30	Invited talk 3 – Francesca Bernardi <i>The complex systems of Wikipedia</i>
2:30 – 3:00	Invited talk 4 – Abigail Jacobs <i>Complex & responsible social/technical infrastructures</i>
3:00 – 3:15	Break
3:15 – 4:35	Parallel contributed talks 2 (each 4x20 min talks) 2A. Network Theory - room: UB SU 330 2B. Complex Models - room: UB SU 228
5:00 – 6:30	Poster Session

Friday, April 1

Time [EDT]	Event	Zoom Link
<u>Morning Session</u> (room: UB SU 330)		
9:00 – 9:15	Announcements	
9:15 – 9:45	Career Advice Panel Bernard Ricca, Dane Taylor, Sara Muldoon and Naoki Masuda	
9:45 – 10:45	Keynote 2 – Dora Biro <i>Scaling up from individual to collective cognition in bird flocks</i>	
10:45 – 11:00	Break	
11:00 – 12:20	Parallel contributed talks 3 (each 4x20 min talks) 3A. Higher-order Networks - room: UB SU 330 3B. Models of Life - room: UB SU 222	
12:20 – 1:30	Lunch break	
<u>Afternoon Session</u> (room: UB SU 330)		
1:30 – 2:00	Invited talk 6 – Jean-Gabriel Young <i>Uncertain network science: estimation techniques and applications</i>	
2:00 – 2:30	Invited talk 7 – Caitlin Hult <i>Neutrophil dynamics affect Mycobacterium tuberculosis granuloma outcomes and dissemination</i>	
2:30 – 3:00	Invited talk 8 – Scott Rich <i>Multistability and bifurcations in epileptogenic neural circuits</i>	
3:00 – 3:15	Break	
3:15 – 4:35	Parallel contributed talks 4 (each 4x20 min talks) 4A. Network Analysis - room: UB SU 145C+D	

4B. Neuronal Systems - room: UB SU 222

4:35 – 4:45

Break

4:45 – 5:00

Closing remarks and awards

Contributed Talks on Thursday March 31

(1A) Network Dynamics – 11:00am–12:20am (room: UB SU 330, chair: Erdem Sariyuce)

- 1A-1. **Guillaume St-Onge, Laurent Hébert-Dufresne and Antoine Allard.** Nonlinear infection rate to compress mechanistic epidemic models
- 1A-2. **Ruodan Liu, Masaki Ogura, Elohim Fonseca Dos Reis and Naoki Masuda.** Impacts of concurrency on epidemic spreading in Markovian temporal networks
- 1A-3. **Nicholas Landry and Juan G. Restrepo.** Community structure in hypergraphs and the emergence of polarization
- 1A-4. **Maisha Islam Sejunti, Naoki Masuda and Dane Taylor.** Floquet Theory for Spreading Dynamics over Periodically Switching Networks

(1B) Data Science – 11:00am–12:20pm (room: UB SU 222, chair: Barney Ricca)

- 1B-1. **Ulya Bayram, William Lee, Daniel Santel, Ali Minai, Peggy Clark, Tracy Glauser and John Pestian.** Toward Suicidal Ideation Detection with Lexical Network Features and Machine Learning
- 1B-2. **Mei Fukuda, Kazuyuki Shudo and Hiroki Sayama.** Detecting and Forecasting Local Collective Sentiment Using Emojis
- 1B-3. **Tuan Pham, Jan Korbel, Rudolf Hanel and Stefan Thurner.** Empirical social triad statistics can be explained with dyadic homophylic interactions
- 1B-4. **Neil Maclaren, Siobhán Mattison and Naoki Masuda.** A Maximum Entropy Approach to the Multivariate "Space" of Social Networks

(2A) Network Theory – 3:15pm–4:35pm (room: UB SU 330, chair: Pitambar Khanra)

- 2A-1. **Jason Niu and A. Erdem Sariyüce.** Balanced and Dense Subgraphs in Signed Networks
- 2A-2. **Jeremy Kazimer, Dane Taylor, Peter Mucha and Manlio de Domenico.** Timescale determines the entropic importance of edges in complex networks
- 2A-3. **Golshan Madraki, Seyedamirabbas Mousavian and Yasamin Salmani.** A theoretical framework to accelerate scheduling improvement heuristics using a new longest path algorithm in perturbed DAGs
- 2A-4. **Minh Le and Dane Taylor.** Persistent Homology of Convection Cycles in Network Flows

(2B) Complex Models – 3:15pm–4:35pm (room: UB SU 222, chair: Yingjie Hu)

- 2B-1. **Christian Koertje and Hiroki Sayama.** Stability of opinion formation PDE model based on expanded non-local perceptual kernels
- 2B-2. **Daniel Cooney, Fernando Rossine, Dylan Morris and Simon Levin.** A PDE Model for the Origin of Chromosomes via Multilevel Selection
- 2B-3. **Hiroki Sayama.** Representing and Analyzing the Dynamics of an Agent-Based Adaptive Social Network Model with Partial Integro-Differential Equations
- 2B-4. **Alfredo Salinas Martínez, Jennifer Pérez Oregon, Alejandro Muñoz-Diosdado and Fernando Angulo-Brown.** Reproducing Utsu's Law for earthquakes in a spring-block cellular automaton

Contributed Talks on Friday April 1

(3A) Higher-order Networks – 11:00am–12:20pm (room: UB SU 330; chair: Dane Taylor)

- 3A-1. **Vincent Thibeault, Antoine Allard and Patrick Desrosiers.** The low-dimension hypothesis implies higher-order interactions in complex systems
- 3A-2. **Thomas Varley, Maria Pope, Joshua Faskowitz and Olaf Sporns.** Discovering Higher-Order Interactions via Multivariate Entropy Decomposition
- 3A-3. **Cameron Ziegler, Per Sebastian Skardal, Haimonti Dutta and Dane Taylor.** Balanced Hodge Laplacians Optimize Consensus Dynamics over Simplicial Complexes
- 3A-4. **Kazuki Nakajima, Kazuyuki Shudo and Naoki Masuda.** Higher-order rich-club phenomenon in research funding

(3B) Models of Life – 11:00am–12:20pm (room: UB SU 222, chair: Hiroki Sayama)

- 3B-1. **Daniel Strömbom, Stephanie Nickerson, Catherine Fatterman, Alyssa DiFazio, Cameron Costello and Kolbjørn Tunstrøm.** Bistability and switching behavior in moving animal groups
- 3B-2. **Chris Zosh, Andreas Pape, Brooke Foucault Welles, William Rand, Jeremy Blackburn, Pamela Mischen, Carl Lipo, Robert DiNapoli, Hiroki Sayama and Barret Brenton.** An Agent-Based Model of the Collective Action Dynamics of Goal-Driven Groups
- 3B-3. **Elohim Fonseca dos Reis and Naoki Masuda.** Emergent non-Poissonian statistics of interevent times from metapopulation models
- 3B-4. **Austin Marcus and Hiroki Sayama.** Spatial Complexity of Particle Dynamics by Potential Energy Function

(4A) Network Analysis – 3:15pm–4:35pm (room: UB SU 145C+D, chair: Prosenjit Kundu)

- 4A-1. **Pitambar Khanra, Subrata Ghosh, Karin Alfaro-Bittner, Prosenjit Kundu, Stefano Boccaletti, Chittaranjan Hens and Pinaki Pal.** Identifying clusters in complex networks using eigenvector centrality
- 4A-2. **Mateusz Wilinski and Andrey Lokhov .** Network Reconstruction from Noisy and Incomplete Spreading Dynamics
- 4A-3. **Huiyu Huang, Miaolin Fan and Chun-An Chou.** A Multi-Modal Physiological Network Analysis in Emotion Recognition
- 4A-4. **Lisa Shahin and Matthew Hamilton.** Applying Network Science Tools and Perspectives to Assess Systems Thinking about Climate Change

(4B) Neuronal Systems – 3:15pm–4:35pm (room: UB SU 222; chair: Naoki Masuda)

- 4B-1. **Ulgen Kilic and Dane Taylor.** Simplicial cascades are orchestrated by the multidimensional geometry of neuronal complexes
- 4B-2. **Abid Haque, Jason Graham, Subash Ray, Gregory Weber and Simon Garnier.** Problem solving behaviors in a brainless organism (*Physarum polycephalum*) can emerge from self-organized physical interactions within a single cell.
- 4B-3. **Tong Wu, David Poulsen and Sarah Muldoon.** Pass-through brain networks reveal lesion related disturbances in traumatic brain injury
- 4B-4. **Lu Bin Liu, Attila Losonczy and Zhenrui Liao.** Use the FORCE: A Python package for training chaotic RNNs