

# 12<sup>th</sup> Experimental Chaos and Complexity Conference

May 16-19, 2012

On the campus of the University of Michigan

## TUESDAY MAY 15

Michigan League, Hussey Room, 2<sup>nd</sup> floor

6:00-7:30pm      **Opening Reception**

## WEDNESDAY MAY 16

Rackham School of Graduate Studies, Fourth Floor

7:15-8:00am      **Registration and Continental Breakfast**

8:00-8:30am      **Welcome and Opening Remarks**

Michal Zochowski, Departments of Physics and Biophysics Program, University of Michigan

Janet Weiss, Dean, Rackham Graduate School, Vice Provost for Academic Affairs, University of Michigan

Victoria Booth, Departments of Mathematics and Anesthesiology, University of Michigan

8:30-10:00am      **Systems Biology**

8:30-9:05      *Data-driven reconstruction of directed networks: from genes to chaotic oscillators*  
Aneta Koseska, University of Potsdam

9:05-9:25      *Information dynamics in the Kinouchi-Copelli model*  
Leonardo Maia, USP

9:25-10:00      *Dynamics of DNA replication*  
Alessandro Moura, University of Aberdeen

10:00-10:20      *The Immunomics of Lymphocyte repertoires*  
Ramit Mehr, Bar-Ilan University, Israel

10:25-10:45am      **Break**

10:45am-12:35pm

**Energy Systems Dynamics**

- 10:45-11:20 *Laboratory Experiments on Porous Media Mass Transport: Implications for Carbon Sequestration*  
Robert Ecke, Los Alamos National Laboratory
- 11:20-11:40 *Percolation and misfire in spark-ignited engines*  
Charles Finney, Oak Ridge National Laboratory
- 11:40-12:15 *Turbulence driving wind energy*  
Joachim Peinke, ForWind, University of Oldenburg
- 12:15-12:35 *Experimental Bouncer Ball Model*  
Mario Silva, Sao Paulo State University

12:35-1:50pm

**Lunch and Poster Session**

1:55-3:45pm

**Social Dynamics & Economics**

- 1:55-2:30 *TITLE TBD*  
Mogens Jensen, University of Copenhagen
- 2:30-2:50 *Minimal agent model for economic critical behavior: application to financial stability*  
Pedro Lind, University of Lisbon
- 2:50-3:25 *Incentives, Dynamics and Collective Wisdom*  
Scott Page, University of Michigan
- 3:25-3:45 *Co-adaptation and the Emergence of Structured Environments*  
Robert Savit, University of Michigan

3:50-4:10pm

Break

4:10-5:25pm

**Nonlinear Optics**

- 4:10-4:45 *Synchronization in Nonlinear Optical Networks: Chaos, Communication and Chimeras in the Laboratory*  
Rajarshi Roy, University of Maryland
- 4:45-5:05 *Afterbounce instability and period doubled emission in single-bubble sonoluminescence*  
Mogens Levinsen, Niels Bohr Institute, UCHP
- 5:05-5:25 *Chimera States in a Spatial Light Modulator Feedback System*  
Aaron Hagerstrom, University of Maryland

5:45-6:45pm

**Transportation to banquet**

7:00-10:00pm

**Banquet Dinner, Henry Ford Museum**

## THURSDAY MAY 17

Rackham School of Graduate Studies, Fourth Floor

7:15-8:00am            **Registration and Continental Breakfast**

8:00-9:50am           **Nonlinear Optics**

8:00-8:35            *Light on nonlinearity: new insight from optics into the science of extreme waves*  
John Dudley, University of Franche-Comte

8:35-8:55            *Crenelated slow-fast oscillations in a dual delay nonlinear photonic dynamics*  
Maxime Jacquot, University of Franche-Comte

8:55-9:30            *Deterministic Optical Rogue Waves and Chaotic Dynamics*  
Jose Roberto Rios Leite, Universidade Federal de Pernambuco

9:30-9:50            *State of Play for Analysing the Nonlinear Dynamics of Laser Systems from Output Power Time Series*  
Joshua Toomey, Macquarie University

9:55-10:15am        **Break**

10:15-11:50am      **Neuroscience & Physiology**

10:15-10:50        *Multi-scale and multi-compartment approaches to understand host-pathogen dynamics: TB as a case study*  
Denise Kirschner, University of Michigan

10:50-11:10        *Cardiac tissue heterogeneity mediates electrical stimulation effects*  
Phillip Bittihn, Max Planck Institute for Dynamics and Self-Organization

11:10-11:30        *Minimal configuration models for experiment-based central pattern generator of melibe*  
Sajiya Jalil, Georgia State University

11:30-11:50        *Subject-driven birdsong synthesizer based on a model of the bird's vocal organ*  
Ezequiel M. Arneodo, Universidad de Buenos Aires

12:00-1:20pm       **Lunch, Michigan League, Ballroom**

1:30-3:05pm        **Data Analysis**

1:30-2:05            *Learning dynamical systems from an ensemble approach*  
Antonio Politi, University of Aberdeen

2:05-2:25            *The Observability of Biological Networks*  
Steven Schiff, Pennsylvania State University

2:25-2:45 *Time-resolved estimation of direct directed influences*  
Linda Sommerlade, Freiburg Institute for Advanced Studies

2:45-3:05 *On the frequency content of chaotic time series*  
Lawrie Virgin, Duke University

3:10-3:30pm **Break**

3:30-5:40pm **Electronics**

3:30-4:05 *Subwavelength Position Sensing Using Nonlinear Feedback and Wave Chaos*  
Seth Cohen, Duke University

4:05-4:25 *Acoustic Ranging Using Solvable Chaos*  
Ned Corron, U.S. Army RDECOM

4:25-4:45 *Explosive phase synchronization of chaotic oscillators*  
Inmaculada Leyva, Universidad Politecnica de Madrid

4:45-5:20 *Electronic circuits verify importance of dynamics in perception and predict failure of prominent algorithms used in bioinformatics*  
Ruedi Stoop, University of Zurich/ETH Zurich

5:20-5:40 *Master stability function approach to unveil the complex dynamics of an experimental ring of coupled optoelectronic oscillators*  
Francesco Sorrentino, University of New Mexico

5:45-7:20pm **Dinner Break**

7:30-9:30pm

**Public Talk**

**Michigan League, Second floor, Ballroom**

*How Bacteria in Colonies can Survive by Killing Siblings and Reversibly Changing Shape*

Harry L. Swinney, University of Texas at Austin / Jerry Gollub, Haverford College

## FRIDAY MAY 18

Rackham School of Graduate Studies, Fourth Floor

7:15-8:00am **Registration and Continental Breakfast**

8:00-9:50am

**Nano & Quantum Systems**

8:00-8:35 *Drops and elastic sheets*

Benoit Roman, ESPCI

8:35-8:55 *Nonlinear Time-Reversal in a Wave Chaotic System*

Matthew Frazier, University of Maryland

8:55-9:30 *Continuous Measurement of the Position of a Single Cold Atom: Towards the Quantum-Classical Transition*

Dan Steck, University of Oregon

9:30-9:50 *Ionization of kicked Rydberg atoms via a turnstile mechanism*

Kevin Mitchell, University of California, Merced

9:55-10:15am

**Break**

10:15-11:30am

**Hydrodynamics & Plasmas**

10:15-10:50 *The critical point for pipe flow*

Dwight Barkley, University of Warwick

10:50-11:10 *Experimental observations and numerical studies of the microbunching instability in storage rings*

Eléonore Roussel, Université de Lille

11:10-11:30 *Burning Invariant Manifolds in Advection Reaction Diffusion*

John Mahoney, University of California, Merced

11:30am-12:40pm

**Lunch and Poster Session**

12:45-2:00pm

**Neuroscience & Physiology**

12:45-1:20 *Human epileptic brain networks*

Klaus Lehnertz, University of Bonn

1:20-1:40 *Assessing atrial fibrillation as a chaotic dynamical state of coupled oscillators*

Guillaume Attuel, IHU liryc / sigma Espci

1:40-2:00 *Patterns of Neuronal Synchronization*

Epaminondas Rosa, Illinois State University

2:00-3:30pm

**Extreme Events**

2:00-2:35 *Predicting and evaluating extreme weather events*

Barbara Brown, National Center for Atmospheric Research

2:35-2:55 *Analysis & Prediction of Computer Performance Dynamics*

Elizabeth Bradley, University of Colorado

2:55-3:30 *Extreme Events in Coupled Social Networks: Media Events as External Shocks*  
Pascal Jurgens, Johannes Gutenberg-University Mainz

3:35-3:55pm **Break**

3:55-5:30pm **Ecology, Evolution & Epidemiology**

3:55-4:30 *Strain competition dynamics in an evolutionary context: H3N2 influenza as a case study*  
Mercedes Pascual, University of Michigan

4:30-4:50 *Transport Analysis of Spatiotemporal Oceanographic Dynamical from Remote Sensing*  
Erik Bollt, Clarkson University

4:50-5:10 *Coherent fluid structures and biological invasions*  
Shane Ross, Virginia Tech University

5:10-5:30 *Water retention on random surfaces*  
Robert Ziff, University of Michigan

5:30-7:20pm **Dinner Break**

7:30-9:20pm **Complex Networks: The Direct and the Inverse Problem**

7:30-7:40 *Introductory Remarks*  
Klaus Lehnertz, University of Bonn

7:40-8:05 *From time series to complex networks: Potential pitfalls and remedies*  
Stephan Bialonski, University of Bonn

8:05-8:30 *Analyzing coherent brain networks with Granger causality*  
Mingzhou Ding, University of Florida

8:30-8:55 *Causal inference and its application to neural systems*  
Bjoern Schelter, University of Freiburg

8:55-9:20 *From cellular dynamics to network homeostasis*  
Chris Fink, University of Michigan

## SATURDAY MAY 19

Rackham School of Graduate Studies, Fourth Floor

7:15-8:00am **Registration and Continental Breakfast**

8:00-9:30am

**Earth Systems Science**

8:00-8:20 *Climate network analysis based on statistics of ordinal patterns and symbolic dynamics*  
Cristina Massoler, Universitat Politecnica de Catalunya,

8:20-8:55 *Fracturing Ranked Surfaces*  
Hans J. Hermann, ETH Zurich

8:55-9:30 *Complex network analysis of recurrences in phase space*  
Norbert Marwan, Potsdam Institute for Climate Impact Research

9:30-9:50 *GeoChaos: Engineered Chaotic Advection in Porous Media Enhances Reactive and Thermal Transport Rates*  
Guy Metcalfe, CSIRO Australia

9:55-10:15am

**Break**

10:15-11:50am

**Hydrodynamics & Plasmas**

10:15-10:50 *Modulational stability of ocean swell*  
Diane Henderson, Pennsylvania State University

10:50-11:10 *Reduction of Chaotic Particle Transport in Nontwist Plasmas*  
Ibere Caldas, University of Sao Paulo

11:10-11:30 *The Onset of Chaos in Vortex Sheet Flow*  
Robert Krasny, University of Michigan

11:30-11:50 *A Lagrangian interpretation of advective-diffusive scalar transport*  
Michel Speetjens, Eindhoven University of Technology

11:55am-1:15pm

**Lunch, Alumni Center**

1:15-2:50pm

**Earth Systems Science**

1:20-1:55 *Adaptive design of multi-functional network in a primitive organism*  
Toshiyuki Nakagaki, Future University Hakodate

1:55-2:15 *On the balance between segregation and integration in complex modular networks*  
Irene Sendia-Nadal, Universidad Rey Juan Carlos

2:15-2:50 *Communities, modules, and large-scale structure in networks*  
Mark Newman, University of Michigan

2:55-3:15pm

**Break**

3:15-4:50pm

**Data Analysis**

- 3:15-3:50 *Title TBD*  
Wen-Xu Wang, Arizona State University
- 3:50-4:10 *Phase synchronization of coupled chaotic noncoherent oscillators*  
Rosangela Follmann, University of Sao Paulo
- 4:10-4:30 *Detecting differences in noisy chaotic signals*  
Thomas Carroll, Naval Research Lab
- 4:30-4:50 Information Theory for Tralfamadorians: The Anatomy of a Bit  
Ryan James, University of California, Davis

4:50-5:00pm

**Closing Remarks**