



Nonequilibrium to Induce and Maintain Spatio-Temporal Patterns

July 17 - 22, 2022

Chair

Satoshi Nakata

Vice Chair

Marcus Hauser

Stonehill College

320 Washington Street
Easton, MA, United States

Venue

Office Manager:

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Conference Description

The GRC on Oscillations and Dynamic Instabilities in Chemical Systems will provide a forum for discussion of frontier research in recent breakthroughs in nonlinear dynamics of chemical and biological systems. Chemical reactions under far-from-equilibrium conditions can generate multi-stability, oscillations, and spatial patterns induced by diffusion and other means of mass transport. The Conference will focus on the development of theoretical and experimental approaches to the identification and the control of novel self-organized structures. The topics include emerging applications in surface science, electrochemistry, encapsulated media, chemical engineering, transport phenomena, synthetic biology, and brain science. The Conference will feature a diverse group of leading researchers who emphasize interdisciplinary approaches to the description of emergent collective behavior in dissipative systems; contributed talks on late-breaking topics will be selected from the poster abstracts. The collegial atmosphere of the Conference will offer ample opportunities for informal gatherings in the afternoons and evenings, provide avenues for scientists from different disciplines to brainstorm and promote collaborations. The GRC will be immediately preceded by a Gordon Research Seminar which will provide early career researchers with an excellent opportunity to discuss their work and network with peers.

This GRC will be held in conjunction with the "Oscillations and Dynamic Instabilities in Chemical Systems Gordon Research Seminar (GRS)". Those interested in attending both meetings must submit an application for the GRS in addition to an application for the GRC. Refer to the associated GRS program page for more information.

Related Meeting



This GRC will be held in conjunction with the "Oscillations and Dynamic Instabilities in Chemical Systems" Gordon Research Seminar (GRS). Those interested in attending both meetings must submit an application for the GRS in addition to an application for the GRC. Refer to the [associated GRS program page](#) for more information.

Conference Program

Sunday	
2:00 pm - 9:00 pm	Arrival and Check-in
6:00 pm - 7:00 pm	Dinner
7:30 pm - 7:40 pm	Introductory Comments by GRC Site Staff / Welcome from the GRC Chair
7:40 pm - 9:30 pm	Spatio-Temporal Pattern Based on Reaction-Diffusion Systems Discussion Leaders: Tomohiko Yamaguchi (Meiji University, Japan)
7:40 pm - 8:20 pm	Annette Taylor (University of Sheffield , United Kingdom) "Bacteria-Inspired Networks and Dynamic Materials"
8:20 pm - 8:35 pm	Discussion
8:35 pm - 9:15 pm	Sumana Dutta (Indian Institute of Technology Guwahati, India) "Interaction and Control of Excitation Waves in Reaction-Diffusion Systems"

9:15 pm - 9:30 pm	Discussion
Monday	
7:30 am - 8:30 am	Breakfast
8:30 am - 9:00 am	Group Photo
9:00 am - 12:30 pm	Self-Organized Active Matter Discussion Leader: Kouichi Asakura (Keio University, Japan)
9:00 am - 9:05 am	Introduction by Discussion Leader
9:05 am - 9:45 am	Raymond Kapral (University of Toronto, Canada) "Chemically-Powered Nanomotors as Active Agents in Active Matter"
9:45 am - 10:05 am	Discussion
10:05 am - 10:30 am	Coffee Break
10:30 am - 11:10 am	Lee Cronin (University of Glasgow, United Kingdom) "Quantifying and Exploring Dissipative Self-Organization of Molecular Systems with Assembly Theory"
11:10 am - 11:30 am	Discussion
11:30 am - 11:40 am	Muneyuki Matsuo (Hiroshima University, Japan) "Synchronization of Self-Oscillating Droplets"
11:40 am - 11:45 am	Discussion
11:45 am - 11:55 am	Masaki Itatani (Budapest University of Technology and Economics, Hungary) "Formation of Periodic Precipitation Pattern in pH-induced Metal Nanoparticles Aggregation System"
11:55 am - 12:00 pm	Discussion
12:00 pm - 12:30 pm	Poster Previews
12:30 pm - 1:30 pm	Lunch

1:30 pm - 4:00 pm	Free Time
3:00 pm - 4:00 pm	<p>The GRC Power Hour™</p> <p><i>The GRC Power Hour™ is designed to address diversity and inclusion in the scientific workplace by providing a safe environment for informal and meaningful conversations amongst colleagues of all career stages. The program supports the professional growth of all members of our communities, including ethnicity, race and/or gender identity by providing an open forum for discussion and mentoring.</i></p> <p>Organizers: Sumana Dutta (Indian Institute of Technology Guwahati, India) and Veronique Pimienta (University of Toulouse, France)</p>
4:00 pm - 6:00 pm	Poster Session
6:00 pm - 7:00 pm	Dinner
7:30 pm - 9:30 pm	<p>Electrochemical Control on Oscillations and Patterns</p> <p>Discussion Leader: Jichang Wang (University of Windsor, Canada)</p>
7:30 pm - 8:10 pm	<p>Istvan Kiss (Saint Louis University, United States)</p> <p>"Order by Disorder: Heterogeneity Induced Synchronization in Electrochemical Oscillator Networks"</p>
8:10 pm - 8:30 pm	Discussion
8:30 pm - 9:10 pm	<p>Ronald Imbihl (Leibniz University Hannover, Germany)</p> <p>"Dynamics of Supported V-Oxide Catalysts from UHV to 0.1 mbar"</p>
9:10 pm - 9:30 pm	Discussion
Tuesday	
7:30 am - 8:30 am	Breakfast
9:00 am - 12:30 pm	<p>Spatio-Temporal Collective Behaviors</p> <p>Discussion Leader: Yutaka Sumino (Tokyo University of Science, Japan)</p>
9:00 am - 9:05 am	Introduction by Discussion Leader

9:05 am - 9:45 am	Jeremie Palacci (IST Austria, Austria) "Synchronization of Self-Organized Machines"
9:45 am - 10:05 am	Discussion
10:05 am - 10:30 am	Coffee Break
10:30 am - 11:10 am	Veronique Pimienta (University of Toulouse, France) "Marangoni Driven Patterns of Single and Multiple Drops"
11:10 am - 11:30 am	Discussion
11:30 am - 12:10 pm	Toshiyuki Nakagaki (Hokkaido University, Japan) "Ethological Dynamics in a Diorama Situation"
12:10 pm - 12:30 pm	Discussion
12:30 pm - 1:30 pm	Lunch
1:30 pm - 4:00 pm	Free Time
4:00 pm - 6:00 pm	Poster Session
6:00 pm - 7:00 pm	Dinner
7:30 pm - 9:30 pm	Design of Self-Organized Dynamic Structures Discussion Leader: John Pojman (Louisiana State University, United States)
7:30 pm - 7:35 pm	Introduction by Discussion Leader
7:35 pm - 8:15 pm	Nobuhiko Suematsu (Meiji University, Japan) "Self-Propelled Droplet Motion Coupled with Nonlinear Chemical Reaction"
8:15 pm - 8:30 pm	Discussion
8:30 pm - 8:50 pm	Istvan Szalai (Eötvös Lorand University, Hungary) "Pattern Formation in Multi-Channel Gel Reactors"
8:50 pm - 9:00 pm	Discussion

9:00 pm - 9:10 pm	Gabor Schuszter (University of Szeged, Hungary) "Polymorph Selection of Zinc Zeolitic Imidazolate Frameworks via Kinetic and Thermodynamic Control"
9:10 pm - 9:15 pm	Discussion
9:15 pm - 9:25 pm	Pearson Miller (Flatiron Institute, United States) "Mass-Conserved Pattern Formation on Curved Domains"
9:25 pm - 9:30 pm	Discussion
Wednesday	
7:30 am - 8:30 am	Breakfast
9:00 am - 12:30 pm	Biological Oscillations and Patterns Discussion Leaders: Igor Schreiber (University of Chemistry and Technology, Prague, Czech Republic)
9:00 am - 9:05 am	Introduction by Discussion Leader
9:05 am - 9:45 am	Geneviève Dupont (Université Libre de Bruxelles, CP231, Belgium) "Intracellular Calcium Dynamics: From Random Channels to Auto-Organized Signaling"
9:45 am - 10:05 am	Discussion
10:05 am - 10:30 am	Coffee Break
10:30 am - 11:10 am	Takashi Amemiya (Yokohama National University, Japan) "Metabolic Oscillations and Symbiosis in Cancer and Brain Cells"
11:10 am - 11:30 am	Discussion
11:30 am - 11:50 am	Enrique Peacock-Lopez (Williams College, United States) "Dynamic Properties of a Self-Replicating Peptide Network with Inhibition"
11:50 am - 12:00 pm	Discussion
12:00 pm - 12:30 pm	Poster Previews

12:30 pm - 1:30 pm	Lunch
1:30 pm - 4:00 pm	Free Time
4:00 pm - 6:00 pm	Poster Session
6:00 pm - 7:00 pm	Dinner
7:00 pm - 7:30 pm	Business Meeting <i>Nominations for the Next Vice Chair(s); Complete the GRC Evaluation Forms; Discuss Future Dates and Venue; Election of the Next Vice Chair(s)</i>
7:30 pm - 9:30 pm	Emergence in Signal Transduction and Network Systems Discussion Leaders: Muneyuki Matsuo (Hiroshima University, Japan)
7:30 pm - 8:10 pm	Carsten Beta (University of Potsdam, Germany) "How Cortical Wave Patterns Shape Cellular Function"
8:10 pm - 8:30 pm	Discussion
8:30 pm - 9:10 pm	Agota Toth (University of Szeged, Hungary) "Gradient-Driven Precipitation and Beyond"
9:10 pm - 9:30 pm	Discussion

Thursday

7:30 am - 8:30 am	Breakfast
9:00 am - 12:30 pm	Nonlinear Dynamics in Reaction-Diffusion Systems Discussion Leader: Dezso Horvath (University of Szeged, Hungary)
9:00 am - 9:05 am	Introduction by Discussion Leader
9:05 am - 9:45 am	Irving Epstein (Brandeis University, United States) "Turing Patterns on Growing Domains"
9:45 am - 10:05 am	Discussion
10:05 am - 10:30 am	Coffee Break

10:30 am - 11:10 am	Anne De Wit (Université libre de Bruxelles, Belgium) "Reaction-Diffusion-Convection Pattern Formation"
11:10 am - 11:30 am	Discussion
11:30 am - 11:40 am	Igor Schreiber (University of Chemistry and Technology, Prague, Czech Republic) "Reaction Network Analysis of Metabolic and Circadian Models of Cyanobacteria in a Photobioreactor"
11:40 am - 11:45 am	Discussion
11:45 am - 11:55 am	Niklas Manz (The College of Wooster, United States) "Table-Top Analogues Using Chemical Waves"
11:55 am - 12:00 pm	Discussion
12:00 pm - 12:10 pm	Luca Barberi (University of Geneva, Switzerland) "Self-Organized Localized States of the Cell Cortex"
12:10 pm - 12:15 pm	Discussion
12:15 pm - 12:25 pm	Short Talk Selected from Poster Abstracts
12:25 pm - 12:30 pm	Discussion
12:30 pm - 1:30 pm	Lunch
1:30 pm - 4:00 pm	Free Time
4:00 pm - 6:00 pm	Poster Session
6:00 pm - 7:00 pm	Dinner
7:30 pm - 9:30 pm	Spatio Temporal Development under Nonequilibrium Discussion Leader: Kenneth Showalter (West Virginia University, United States)
7:30 pm - 8:10 pm	Hiraku Nishimori (Meiji University, Japan) "Intelligent Group Behavior by a Mass of Un-intelligent Individuals"

8:10 pm - 8:30 pm	Discussion
8:30 pm - 9:10 pm	Oliver Steinbock (Florida State University, United States) "Life-like Microstructures from Reaction-Diffusion Processes"
9:10 pm - 9:30 pm	Discussion
Friday	
7:30 am - 8:30 am	Breakfast
9:00 am	Departure

Contributors

