

Solvay Workshop on
“Nonlinear phenomena and complex systems”
in memory of Grégoire Nicolis
June 14 - 16, 2021

MONDAY 14 JUNE

09:00 - 09:15	Online log-in
09:15 - 09:30	Welcome and Introduction
09:30 - 10:00	In memoriam
10:00 - 10:15	Welcome by Marc Henneaux (Director of the Solvay Institutes, Brussels)

Session 1: Hydrodynamics, chaos and atmospheric science - Chair: Pierre Gaspard

10:15 - 10:45	Yves Pomeau <i>Turbulence in fluids: from deterministic equations to statistical picture</i>
10:45 - 11:00	Yves Elskens <i>Critical exponent for the Lyapunov exponent and phase transition</i>
11:00 - 11:30	COFFEE BREAK
11:30 - 11:45	Benoit Scheid <i>Dripping or not dripping in suspended falling films</i>
11:45 - 12:00	Priya Verma <i>Chemical Reaction Induced Viscous Fingering in a Radial Displacement Flow</i>
12:00 - 12:15	Stéphane Vannitsem <i>Extratropical low-frequency variability with El-Niño-Southern Oscillation forcing: A reduced-order coupled model study</i>
12:15 - 13:30	LUNCH BREAK

Session 2: Reaction-diffusion patterns and nonlinear oscillations - Chair: Anne De Wit

13:30-13:45	István Szalai <i>Reaction-diffusion patterns in a simple hydrogel device with flow-through channels</i>
13:45-14:00	Judit Horváth <i>A New Aldehyde - Sulfite - Lactone Type pH-Oscillator</i>
14:00-14:15	Ljiljana Kolar-Anić <i>Investigation of the Bray-Liebhafsky oscillatory reaction</i>
14:15-14:30	Dezső Horváth <i>Oscillatory dynamics in the model of reactive oxygen species in the rhizosphere</i>
14:30-15:00	COFFEE BREAK

- 15:00-15:30 **Irving Epstein**
Turing patterns on growing domains
- 15:30-16:00 **Kenneth Showalter**
Chimera and Chimera-Like States in Populations of Coupled Chemical Oscillators
- 16:00-16:30 **Raymond Kapral**
Active matter meets nonlinear dynamics
- 16:30-16:45 **Marcello Budroni**
Between dissipative structures and applied processes: chemohydrodynamic (and not only) oscillatory systems
- 16:45-17:00 **Seth Fraden**
The Symmetry Basis of Pattern Formation in Reaction-Diffusion Networks with Heterogeneity
- 17:00-17:15 BREAK - GROUP PHOTO
- 17:15 - 18:30 Personal testimonies (Chair: Claude Baesens)**

TUESDAY 15 JUNE

Session 3: Regulatory networks and biocomplexity - Chair: Geneviève Dupont

- 09:00-09:30 **Kunihiko Kaneko**
Macroscopic Theory for Adaptation and Evolution: Multilevel Consistency, Dimensional Reduction, and Fluctuation-Response Relationship
- 09:30-10:00 **Annie Lemarchand**
A thermostatted kinetic theory model of tumor growth
- 10:00-10:30 **Edda Klipp**
Entropic regulation of dynamical metabolic processes
- 10:30-11:00 COFFEE BREAK

Session 4: Complex systems - Chair: Thomas Gilbert

- 11:00-11:30 **Annick Lesne**
Concepts from nonlinear dynamics for the analysis of symbolic sequences
- 11:30-12:00 **Robert MacKay**
Thermoeconomics
- 12:00-12:15 **Igor Franovic**
Emergent Dynamics in Populations of Active Rotators, with Diversity
- 12:15-13:30 LUNCH BREAK

Session 5: Synchronization and chimera states - Chair: Jean-Louis Deneubourg

- 13:30-14:00 **Astero Provata**
Complex synchronization patterns in spatially correlated networks of coupled oscillators
- 14:00-14:30 **Katharina Krischer**
Between Synchrony and Turbulence: Intricate Hierarchies of Coexistence Patterns
- 14:30-14:45 **Maximilian Patzauer**
Self-Organized Multifrequency Clusters in an Oscillating Electrochemical System with Strong Nonlinear Coupling
- 14:45-15:00 **Maria Masoliver**
Embedded Chimera States in Recurrent Neural Networks
- 15.00-15.30 COFFEE BREAK

Session 6: Self-organization, from chemistry to biology - Chair: Dominique Maes

- 15:30-16:00 **Oliver Steinbock**
From Chemobionics to Self-propelled Tubes
- 16:00-16:30 **Peter Vekilov**
Harnessing the complexity of crystal nucleation: nucleation control by manipulating the amorphous precursors
- 16:30-17:00 **John Tyson**
A Dynamical Paradigm for Molecular Cell Biology
- 17:00-17:15 BREAK - GROUP PHOTO
- 17:15 - 18:30** **Personal testimonies (Chair: Claude Baesens)**

WEDNESDAY 16 JUNE

Session 7: Thermodynamics and non-equilibrium systems - Chair: Yannick De Decker

- 09:00-09:30 **Massimiliano Esposito**
Stochastic Thermodynamics from the mid 80s to now
- 09:30-10:00 **Valérie Voorsluijs**
Energetic cost of the cross-talk between calcium dynamics and mitochondrial metabolism
- 10:00-10:15 **Sandip Saha**
Suppressing birhythmicity by parametrically modulating nonlinearity in limit cycle oscillators

10:15-10:30 **Enrique Abad**
Peculiarities of nanoparticle diffusion in polymer melts

10:30-11:00 COFFEE BREAK

Session 8: Spatially extended systems and networks - Chair: Yannick De Decker

11:00-11:30 **Manuel G. Velarde**
Variations on the quasiparticle (dressed particle) concept: from entropy to polaron and to soliton (with a bonus: a novel field effect transistor)

11:30-11:45 **Hans Dierckx**
A novel view on the topology of wave patterns in the heart

11:45-12:00 **Jerzy Gorecki**
Information processing with networks of coupled chemical oscillators

12:00-12:15 **Jean-François Kemmter**
Symmetry breaking induced by self-recruitment random walks on regular networks

12:15-13:30 LUNCH BREAK

Session 9: Nonlinear dynamics and beyond - Chair: Claude Baesens

13:30-14:00 **Pierre Coulet**
Ibn Sahl and Kepler: the search for « Anaclastic » and the refraction law

14:00-14:15 **Jean-Marc Ginoux**
A physical memristor based Muthuswamy-Chua-Ginoux system

14:15-14:30 **Juan Perez-Mercader**
From Equations to Artificial Life in a Test Tube

14:30-14:45 **Yannis Kevrekidis**
Disentangling (the parametrization of) relations

14:45-15:30 COFFEE BREAK

Session 10: Neural networks - Chair: Claude Baesens

15:30-16:00 **Xiao-Jing Wang**
Slope bifurcation: how cognitive functions arise from canonical cortical microcircuits

16:00-16:30 **Alain Destexhe**
Complexity of spontaneous and evoked brain dynamics

16:30-17:00 **Andrey Shilnikov**
Cooperative Rhythm Generation in Neural Networks

17.00 **Conclusions and farewell**