

APPROACHES TO EVOLUTION OF COMPLEX SYSTEMS

NOVEMBER 10-11, 2016

COMPLEXITY SCIENCE HUB VIENNA
JOSEFSTÄDTER STRASSE 39
1080 VIENNA

KLI KLOSTERNEUBURG
MARTINSTRASSE 12
3400 KLOSTERNEUBURG

ABOUT THE WORKSHOP

Evolutionary processes pose fundamental challenges to a quantitative predictive understanding. One of the main reasons for this lack of predictability is the fact that the configuration space of evolving complex systems cannot be pre-stated. Dimensionality and boundary conditions change with every innovation. These systems incessantly explore what Kauffman has termed the adjacent possible. The need to rigorously understand evolutionary systems is bigger than ever before. Humanity as a whole is facing numerous complex challenges. Increased understanding of complex evolutionary dynamics will have wide implications for analysis and management of health, eco-systems, financial markets, societal change, and innovation in the economy.

The aim of this interdisciplinary workshop organized by the Complexity Science Hub Vienna, KLI Klosterneuburg, IIASA, and Arizona State University is to discuss progress in how to conceptualize, quantify, model, and manage the dynamics of evolving complex systems.

Organizing Committee:

- Stefan Thurner, Medical University of Vienna, IIASA, Santa Fe Institute, Complexity Science Hub Vienna
- Johannes Jäger, KLI Klosterneuburg
- Ulf Diekmann, IIASA
- Manfred Laubichler, Arizona State University, Santa Fe Institute

To register: <https://www.eventbrite.com/e/approaches-to-evolution-of-complex-systems-tickets-28907568315>

AGENDA

THURSDAY, NOVEMBER 10 @ COMPLEXITY SCIENCE HUB VIENNA

- 09:00-09:30 Welcome and Introduction
- 09:30-10:15 **Eörs Szathmary**, Eötvös University Budapest
Language, biology, and Luc Steels
- 10:15-11:00 **Erik van Nimwegen**, University of Basel
Noise and the evolution of regulatory systems
- 11:00-11:15 Break
- 11:15-12:00 **Imre Kondor**, Parmenides Foundation, London Mathematical Laboratory
On top and beyond networks
- 12:00-12:45 **Ulf Dieckmann**, IIASA
- 12:45-14:00 Lunchbreak
- 14:00-14:45 **Manfred Laubichler**, Arizona State University & Santa Fe Institute
Extended Evolution Theory: Context and History in Evolutionary Dynamics
- 14:45-15:30 **Stefanie Widder**, CeMM
The human microbiome - a complex ecosystem in health and disease
- 15:30-15:45 Break
- 15:45-16:30 **Stefan Thurner**, Medical University of Vienna, SFI, IIASA, CSH
Combinatorial Evolution and its Statistics
- 16:30-16:45 Discussion and Summary of Day 1
- 16:45 End of Day 1

Guest: Karl Sigmund, University of Vienna, IIASA

FRIDAY, NOVEMBER 11 @ KLI KLOSTERNEUBURG

- 09:00-09:45 **Jonathan Bard**, University of Edinburgh, Oxford University
Mutation, variation, and the schizophrenic gene
- 09:45-10:30 **Hans Metz**, IIASA
How observations can be misinterpreted due to the complexity of the generating system
- 10:30-10:45 Break
- 10:45-11:30 **Berta Verd**, KLI
Evolving developmental processes with dynamical systems
- 11:30-12:15 **Paulien Hogeweg**, University of Utrecht
Multilevel evolution: evolution of mutational neighborhood and new selection pressures
- 12:15-13:00 Lunchbreak
- 13:00-13:45 **Peter Stadler**, University of Leipzig
Limits of Dynamic Programming
- 13:45-14:30 **Peter Klimek**, Medical University of Vienna
Evolutionary Dynamics from a Variational Principle
- 14:30-15:15 **Wim Hordijk**, KLI
Evolvability of Autocatalytic Sets
- 15:15 -15:30 Discussion and Conclusion: **Johannes Jäger**, KLI