LORENTZ CENTER WORKSHOP

STABILITY AND FLUCTUATIONS IN COMPLEX ECOLOGICAL SYSTEMS

There will be eight survey talks (presented over the first four days of the workshop) in which the speakers will provide an overview of the field as it relates to the major themes and questions. The survey talks will also present additional important open problems that should be investigated over the next five years. Each hour-long survey talk will consist of a 45 minute presentation followed by 15 minutes of discussion.

In addition, there will be a selection of shorter, approximately 15 minute, presentations in which 16 other participants will present their recent research or specific open problems of interest. A poster session will allow for all participants to present their current research. These posters will be distributed electronically in advance of the workshop among all participants. In addition, the posters will be hung on the wall at the start of the workshop and will remain on the wall for the duration of the workshop. A formal poster session will be held on Monday during the wine and cheese event.

A large part of the workshop will be discussion sessions. Using the workshop themes and major workshop questions as a guide, survey talks and short talks will serve as a starting point for plenary discussion. At the end of each day, the organisers will add that day’s plenary discussion and group discussion notes to the white paper. This document will be shared with all participants. On the last day of the workshop, significant time is dedicated for the group to finalise the general framework of the white paper and to ensure that the document broadly encompasses what was discussed during the workshop. There is also a wrap-up/summary/inspirational talk on the last day.

A schedule for the week is outlined below.

Monday:

Theme: Stability versus complexity in ecological systems. Survey speakers: John Moore and Els Weinans.

09:30 – 10:30 Registration
10:30 – 10:45 Welcome from Lorentz Center
10:45 - 11:00 Welcome from organisers
11:00 – 12:00 4 Short Talks (15 minutes each including questions)
  * Ingrid van de Leemput (Wageningen University) - Models are a lie that may help us realize the truth
  * Juan Bonachela (Rutgers University) - Dimensional reduction and ecological transitions
  * Eric Siero (Wageningen University) - Busse balloon shape: a generic tool to discern patterned ecosystem resilience
* Ohad Vilk (The Hebrew University of Jerusalem) - *Ergodicity breaking in area-restricted search of avian predators*

12:00 - 13:30 Lunch and discussion

13:30 - 14:00 Participant introductions

14:00 - 15:00 Survey Talk and Discussion - John Moore (Colorado State University) - *Frameworks for assessing stability, complexity, and state changes in real and model ecosystems*

15:00 - 15:15 Break

15:15 - 16:15 Survey Talk and Discussion - Els Weinans (Eindhoven University of Technology) - *Directions of resilience in multivariate systems*

16:15 - 16:35 Plenary discussion

16:40 - 17:25 Group discussion

17:30 - 17:50 Plenary reconvening

17:50 - 19:10 Poster Session and wine and cheese event

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**Tuesday:**

**Theme:** Deterministic and stochastic fluctuations in ecological systems. Survey speakers: Sebastian Schreiber and Ellen van Velzen.

10:00 - 11:00 4 Short Talks (15 minutes each including questions)

* David Kessler (Bar-Ilan University) - *Optimal cheating*

* Nadav Shnerb (Bar-Ilan University) - *Quantifying invasibility*

* Baruch Meerson (The Hebrew University of Jerusalem) - *Fluctuations of a swarm of Brownian bees*

* Michael Assaf (The Hebrew University of Jerusalem) - *Phase transition in a non-Markovian animal exploration model with preferential returns*

11:00 - 12:00 Survey Talk and Discussion - Ellen van Velzen (University of Potsdam) -  *What can intermittent predator-prey cycles tell us?*

12:00 - 13:30 Lunch and discussion

14:00 - 14:55 Plenary discussion

15:00 - 16:00 Group discussion

16:00 - 16:15 Break

16:15 - 17:15 Survey Talk and Discussion - Sebastian Schreiber (University of California, Davis) - *Persistence and extinction in an autocorrelated world.*

17:15 - 18:15 Plenary reconvening
Wednesday:

Theme: Stability versus complexity in ecological systems. Survey speakers: Elly Morriën and Sonia Kéfi.

10:00 – 11:00 4 Short Talks (15 minutes each including questions)
* Arjen Doelman (Leiden University) - Evasion of tipping in complex systems through spatial pattern formation
* Anje-Margriet Neutel (British Antarctic Survey) - The paradox of the bryozoans - A stability analysis of hierarchy and complexity in observed competition networks
* Xiaoxiao Li (Guangdong University of Technology) - Energetic constraints imposed on trophic interaction strengths enhance food web stability
* Michael Bonsall (University of Oxford) - Title to be decided

11:00 – 12:00 Survey Talk and Discussion - Elly Morriën (University of Amsterdam) - Restoration of soil food webs in grasslands leads to increased co-occurrence interactions - Does this also increase stability of the system?

12:00 – 13:30 Lunch and discussion

13:30 - 14:30 Survey Talk and Discussion - Sonia Kéfi (Université de Montpellier) - Alternative stable states, tipping points and early warnings in multi-species ecological communities.

14:30 – 15:30 Plenary discussion

15:30 – 15:45 Break

15:45 - 16:45 Group discussion

16:50 - 17:50 Plenary reconvening

19:00 Boat tour and conference dinner

Thursday:

Theme: Deterministic and stochastic fluctuations in ecological systems. Survey speakers: Sarah Day and Christian Kuehn.

10:00 – 10:45 3 Short Talks (15 minutes each including questions)
* Edouard Strickler (Université de Lorraine) - Untangling the role of temporal and spatial variations in persistence of populations
* Lia Hemerik (Wageningen University) - A viability analysis of Neanderthals from a deterministic and stochastic viewpoint
* Jelena Pantel (University of Duisburg-Essen) - Detecting the signatures of historical eco-evolutionary processes in biological data
10:45 – 11:45 Survey Talk and Discussion - Sarah Day (William & Mary) - *Topological data analysis in population pattern quantification.*

11:45 - 12:00 1 Short Talk (15 minutes including questions)

* Laura Storch (Bates College) - *Topological data analysis and early warning signs of population extinction*

12:00 – 14:00 Lunch and discussion

14:00 - 15:00 Survey Talk and Discussion - Christian Kuehn (Technical University of Munich) - *Mathematical Foundations of Early-Warning Signs and Resilience.*

15:00 – 16:00 Plenary discussion

16:00 – 16:15 Break

16:15 - 17:15 Group discussion

17:20 - 18:20 Plenary reconvening

Friday:

10:00 - 10:55 Plenary discussion of white paper

11:00 - 12:00 Group discussion of white paper

12:00 – 13:30 Lunch and discussion

13:30 - 14:30 Summary Talk - Alan Hastings (University of California Davis) - *Title to be decided*

14:30 - 15:30 Final plenary discussion of white paper