

Critical phenomena and challenges emerging from dormancy

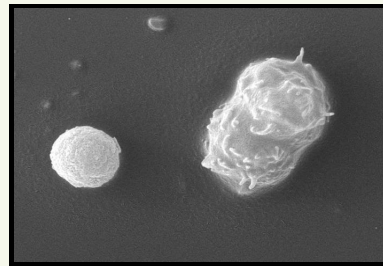
December 18th and 19th 2023



Topic description

Across the tree of life, species have evolved the capacity to contend with sub-optimal conditions by engaging in dormancy, whereby individuals enter a reversible state of reduced or vanishing metabolic activity, temporarily disconnecting themselves from their 'environment'. Dormancy traits have independently evolved numerous times and come in many different forms. The strategy is employed by many microorganisms, plants and animals, but for example also by human cancer cells.

On the population level, dormancy leads to pools of inactive individuals ('seed banks') with a profound impact on the dynamics of affected systems (typically introducing memory, resilience and diversity). In population genetics, for example, dormancy is a major driver behind the preservation of genetic diversity. In cancer biology, dormancy plays a key role in therapy resistance, where cancer cells switch into dormancy in response to chemo- or immunotherapy. In ecology, dormancy lies at the heart of long-term resilience of ecosystems, with potential implications in the face of climate change. In statistical physics, a type switching mechanism can lead to uphill diffusion and the failure of classical transport laws.



This SEM-image shows two *Acanthamoeba polyphaga* protozoa. The right one is active, the left one dormant. – CDC/ Catherine Armbruster; Margaret Williams. Photo credit: Janice Haney Carr

Monday, December 18

Opening lecture

9:05 am – 9:50 am **Jay Lennon**, IU Bloomington
"Principles of seed banks: complexity emerging from dormancy"

Dormancy in population genetics and evolution

10:00 am – 10:30 am **Maite Wilke Berenguer**, HU Berlin
"Coalescent models for dormancy and seed banks"

10:30 am – 11:00 am **Adrián González**, UC Berkeley
"Effects of latency in population genetics"

Coffee break

11:30 am – 12:00 pm **Apolline Louvet**, U Bath
"Dormancy in urban ecosystems: the example of urban tree bases"

12:00 pm – 12:30 pm **Franz Baumdicker**, U Tübingen
"Genome-wide linkage due to clonal reproduction and other challenges for the analysis of dormancy in bacterial populations"

Lunch break

Dormancy and cancer biology

2:00 pm – 2:30 pm **Ann Zeuner**, National Institute of Health, Rome
"Cancer dormancy: a great challenge for scientists, patients and doctors"

2:30 pm – 3:00 pm **Joel Brown**, Moffitt Cancer Center, Florida
"The evolutionary ecology of dormancy in nature and in cancer"

Coffee break

3:30 pm – 4:00 pm **Anna Kraut**, U Minnesota
"Mathematical models for dormancy and therapy evasion in cancer"

4:00 pm – 4:30 pm **Manuel Esser**, U Bonn
"Dormancy in fitness valleys and changing environments"

Dinner and discussion on location

Tuesday, December 19

Dormancy in ecology and biodiversity

9:00 am – 9:30 am **Nathan Wisnoski**, Mississippi State U
"The spatial ecology of dormancy in multispecies communities"

9:30 am – 10:00 am **András Tóbiás**, U Budapest
"Invasion and fixation of microbial dormancy traits in models of stochastic population dynamics"

10:00 am – 10:30 am **Tobias Paul**, U Berlin
"The impact of dormancy on speciation and the species abundance distribution"

Coffee break

11:00 am – 11:30 am **Andreas Greven**, FAU Erlangen
"Spatial systems of interacting Fisher-Wright diffusions with seedbanks: finite system scheme"

11:30 am – 12:00 pm **Ashley Shade**, U Lyon
"Exploring reactivation as a mechanism of microbiome resilience"

Lunch break

Dormancy and switching in statistical physics and random networks

2:00 pm – 2:30 pm **Cristian Giardina**, U Modena and Cambridge U
"Complexity emerging from dormancy in models of transport"

2:30 pm – 3:00 pm **Simone Floreani**, Oxford U
"Time non-locality from long dormancy"

3:00 pm – 3:30 pm **Michel Reitmeier**, GU Frankfurt
"The Contact Process with switching"

Coffee break

4:00 pm – 4:30 pm **Jan-Lukas Igelbrink**, JGU Mainz
"Hammond and Sheffield's power law Pólya's urn"

4:30 pm – 5:00 pm **Franziska Matthäus**, GU Frankfurt
"Is subdiffusion a useful concept to model dormancy?"

Wrap-up and closing

Location

The workshop will be held on Campus Westend Goethe University Frankfurt. Specifically it will take place in the Renate-von-Metzler-Saal on the **upper floor** of the Casino building.

Campus address

Theodor-W.-Adorno-Platz 1, 60323 Frankfurt am Main

Campus map



Public transport

The closest subway station is 'Holzhausenstraße' which is frequented by lines U1/2/3/8. It's a 10 minute walk from station to location.

The bus stops 'Bremer Straße' (lines 64,75) and 'Uni Campus Westend' (lines 36,75) are right next to the campus. The latter one is located in front of the IG Farben building.

Registration

To join the workshop visit the website:
https://www.uni-frankfurt.de/141137873/Mathematics_of_dormancy
or scan the QR code below.

Organizers

Jochen Blath, GU Frankfurt
Frank den Hollander, U Leiden
Noemi Kurt, GU Frankfurt
Jay T Lennon, IU Bloomington
Ulrich Meyer, GU Frankfurt

For more information visit



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