

# **Complex Spreading Phenomena: From Bacteria to Innovations**

**826. WE-Heraeus-Seminar**

**12 – 17 January 2025**

**at the Physikzentrum Bad Honnef, Germany**

**WILHELM UND ELSE  
HERAEUS-STIFTUNG**



# Program

## Sunday, 12 January 2025

17:00 – 21:00     Registration

from 18:00        *BUFFET SUPPER and informal get-together*

## Monday, 13 January 2025

08:00              *BREAKFAST*

09:00              Scientific organizers     **Opening**

09:15 – 10:00     Shlomi Reuveni            **Sokoban: a model for percolation with obstacle-pushing**

10:00 – 10:45     Jona Kayser                **Evolution of therapy resistance in spreading cellular populations**

10:45 – 11:15     *COFFEE BREAK*

11:15 – 12:00     Anupam Kundu            **Hydrodynamics and super-diffusive spreading of heat in one-dimension**

12:00 – 12:45     Stas Burov                  **Disorder-induced anomalous mobility enhancement in confined geometries**

12:45              *LUNCH*

# Program

**Monday, 13 January 2025**

14:30 – 15:15	Alessandro Vezzani	<b>Big jump principle in physical modelling</b>
15:15 – 16:00	Vittorio Loreto	<b>Exploring the adjacent possible: Play, anticipation, surprise</b>
16:00 – 16:30	<i>COFFEE BREAK</i>	
16:30 – 18:00	Olivier Bénichou	Colloquium: <b>Universal exploration dynamics of random walks</b>
18:30	<i>DINNER</i>	

# Program

**Tuesday, 14 January 2025**

08:00	<i>BREAKFAST</i>	
09:00 – 09:45	Vittoria Sposini	<b>Subordination processes for non-Gaussian diffusion</b>
09:45 – 10:30	Carsten Beta	<b>Movement strategies of a polarly flagellated swimmer in complex environments</b>
10:30 – 11:00	<i>COFFEE BREAK</i>	
11:00 – 11:45	Franziska Lautenschläger	<b>Search phenomena in immune cells</b>
11:45 – 12:30	Oskar Hallatschek	<b>The sensitivity of epidemic spreading to noise and long-range dispersal</b>
12:30	<i>LUNCH</i>	
14:30 – 15:00	Maryam Lotfigolian	<b>Routing of ticket control teams in an urban transportation network as an optimization problem: A quantum annealing approach</b>
15:00 – 15:30	Marco Mancastroppa	<b>The role of higher-order hierarchical structures in complex spreading processes</b>
15:30 – 16:00	Javier Cristín Redondo	<b>Understanding information propagation in insect swarms</b>
16:00 – 16:30	<i>COFFEE BREAK</i>	

# Program

**Tuesday, 14 January 2025**

16:30 – 17:15	Ralf Metzler	<b>Non-Gaussianity and varying scaling exponents in long-range dependent motion</b>
17:15 – 17:45	Robert Großmann	<b>Active colloidal transport by motile cells</b>
18:00	<i>DINNER</i>	
19:00 – 21:00	<b>Poster session I</b>	

# Program

**Wednesday, 15 January 2025**

08:00            *BREAKFAST*

09:00 – 09:45    Peter Hänggi            **Thermodynamics and its ensembles: Do we really understand the old stuff?**

09:45 – 10:30    Antonio Politi            **Heat transport in classical systems: a review of open problems**

10:30 – 11:00    *COFFEE BREAK*

11:00 – 11:45    Christina Kurzthaler    **Intermittent transport phenomena in active matter systems**

11:45 – 12:30    Samir Suweis            **The emergence of cooperation from shared goals in the governance of common-pool resources**

12:30            *LUNCH*

14:30            **Excursion**

18:30            *HERAEUS DINNER*  
*(social event with cold & warm buffet with complimentary drinks)*

# Program

Thursday, 16 January 2025

08:00            *BREAKFAST*

09:00 – 09:45    Erwin Frey            **Sonic swarms: Acoustic control in active matter**

09:45 – 10:30    Pedro Lind            **From physics to health and AI with eye-tracking data analysis**

10:30 – 11:00    *COFFEE BREAK*

11:00 – 11:45    Eli Barkai            **Packets of diffusing particles exhibit universal exponential tails**

11:45 – 12:30    Natasa Conrad        **The mathematics of complex spreading: From past to present social systems**

12:30            *LUNCH*

14:30 – 15:00    Bara Levit            **Proteins: An equation of state**

15:00 – 15:30    Pedro Lencastre E Silva        **Distinguishing between Lévy and intermittent strategies in foraging dynamics**

15:30 – 16:00    Talia Baravi            **Solutions of first passage times problems: A bi-scaling approach**

16:00 – 16:30    *COFFEE BREAK*

# Program

**Thursday, 16 January 2025**

16:30 – 17:15	Marc Timme	<b>Dynamic perturbation spreading in networks</b>
17:15 – 17:45	Kristian Olsen	<b>Intermittent active motion for enhanced spatial exploration</b>
18:00	<i>DINNER</i>	
19:00 – 21:00	<b>Poster session II</b>	

# Program

**Friday, 16 January 2025**

08:00            *BREAKFAST*

09:00 – 09:45    Igor Sokolov            **Homogenization problems for  
generalized Langevin equation: The  
bath always wins**

09:45 – 10:30    Katja Taute            **Bacterial spreading in complex  
environments, from individuals to  
populations**

10:30 – 11:00    *COFFEE BREAK*

11:00 – 11:30    Davide Bernardi            **Landscape and environmental  
heterogeneity support coexistence in  
competitive metacommunities**

11:30 – 12:00    Scientific organizers    **Seminar closing**

12:00            *LUNCH*

**End of the seminar**

**Departure**

*NO DINNER for participants leaving on Saturday; however, a self-service breakfast  
will be provided on Saturday morning*