

# **Extreme Events: Identification, Analysis and Prediction**

**808. WE-Heraeus-Seminar**

**22 – 26 April 2024 at the  
Physikzentrum, Bad Honnef, Germany**

**WILHELM UND ELSE  
HERAEUS-STIFTUNG**



# Program

## Sunday, 21 April 2024

17:00 – 21:00 Registration

From 18:00 *BUFFET SUPPER*

## Monday, 22 April 2024

08:00 – 08:45 *BREAKFAST*

08:50 – 09:00 *Ulrike Feudel; Syamal  
Dana, Klaus Lehnertz*

**Welcome and Introduction**

09:00 – 09:40 Jürgen Kurths

**Forecasting extreme events related  
to tipping elements in the climate  
system**

09:40 – 10:20 Melinda Galfi

**The typicality of weather and climate  
extreme events**

10:20 – 11:00 *COFFEE BREAK*

11:00 – 11:40 Freddy Bouchet

**New ways for dynamical prediction  
of extreme heat waves, extreme of  
renewable electricity production,  
and abrupt climate change: rare  
event simulations and machine  
learning**

11:40 – 12:05 Dániel Jánosi

**An ensemble based approach for the  
effect of climate change on the  
dynamics of extremes**

12:05 – 12:30 Sebastian Buschow

**How extreme was the Christmas  
2023 flood event?**

12:30 – 14:15 *LUNCH*

# Program

**Monday, 22 April 2024**

14:30 – 15:10	Joachim Peinke	<b>Non-equilibrium thermodynamics of extreme events in wind turbulence and water waves</b>
15:10 – 15:35	Hildegard Meyer-Ortmanns	<b>Methods of dimensional reduction to assess rare events of blackouts in power grids</b>
15:35 – 15:50	Stefan Jorda	<b>About the Wilhelm and Else Heraeus Foundation</b>
15:50 – 16:30	<i>COFFEE BREAK</i>	
16:30 – 17:10	Themistoklis Sapsis (online)	<b>Extreme event catalogues from coarse climate models and the value of data</b>
17:10 – 17:35	Ohad Shpielberg	<b>Thermal activation of interacting particles: a different kind of universality, and dynamical phase transitions</b>
17:35 – 18:00	Michael Möckel	<b>Hybrid physics-based and data-driven approaches for predictive maintenance in the case of rare events</b>
18:00	<i>DINNER</i>	

# Program

**Tuesday, 23 April 2024**

08:00 – 09:00	<i>BREAKFAST</i>	
09:00 – 09:40	Holger Kantz	<b>Analysis and modeling of precipitation extremes</b>
09:40 – 10:20	Thordis Thorarinsdottir	<b>Evaluating forecasts of extreme events</b>
10:20 – 11:00	<i>COFFEE BREAK</i>	
11:00 – 11:40	Davide Faranda	<b>Understanding and attributing extreme weather events in a changing climate</b>
11:40 – 12:05	Vidar Frette	<b>Spontaneous transition from smoldering to flaming combustion</b>
12:05 – 12:30	Milan Palus	<b>Non-Shannonian information theory connects inference of causality and understanding of extreme events</b>
12:30 – 12:40	<i>Conference Photo</i>	
12:40 – 14:15	<i>LUNCH</i>	
14:30 – 15:10	Christian Meisel	<b>Towards predicting extreme events in neurology with theory-based and machine learning approaches</b>
15:10 – 15:35	Svenja Szemkus	<b>How ClimXtreme builds a knowledge base for decision support</b>
15:35 – 16:00	Alexander Hartmann	<b>First-passage area distribution and optimal fluctuations of fractional Brownian motion</b>
16:00 – 16:40	<i>COFFEE BREAK</i>	
16:40 – 17:30	<b>POSTER FLASH 1</b>	
18:00 – 19:00	<i>DINNER</i>	
19:00 – 22:00	<b>POSTER SESSION 1</b>	

# Program

Wednesday, 24 April 2024

08:00 – 09:00	<i>BREAKFAST</i>	
09:00 – 09:40	Dibakar Ghosh	<b>Extreme events in dynamical networks</b>
09:40 – 10:20	Ying-Cheng Lai	<b>Machine-learning prediction of tipping and collapse of the Atlantic Meridional Overturning Circulation</b>
10:20 – 11:00	<i>COFFEE BREAK</i>	
11:00 – 11:40	Jörn Davidsen	<b>Earthquakes in the lab: From accelerated seismic release to magnitude clustering</b>
11:40 – 12:05	Jonas Wassmer	<b>Hidden Vulnerabilities in Emergency Response Post-Flood Disasters</b>
12:05 – 12:30	Gisela Charo	<b>Topological analysis of extreme events</b>
12:30 – 14:00	<i>LUNCH</i>	
14:00 – 18:30	Excursion	
18:30	<i>HERAEUS DINNER</i> <i>(social event with cold &amp; warm buffet and complimentary drinks)</i>	

# Program

Thursday, 25 April 2024

08:00 – 09:00	<i>BREAKFAST</i>	
09:00 – 09:40	Cristina Masoller	<b>New indicators for early detection of critical transitions</b>
09:40 – 10:20	Yujiang Wang	<b>Charting the pathway of extreme events in the brain</b>
10:20 – 11:00	<i>COFFEE BREAK</i>	
11:00 – 11:40	Thomas Guhr	<b>Multivariate distributions in highly correlated, nonstationary complex systems</b>
11:40 – 12:05	Leo Sahaya-Tharsis	<b>Routes to large-intensity pulses in laser models</b>
12:05 – 12:30	Sabin Roman	<b>Modelling the collapse of societies</b>
12:30 – 14:15	<i>LUNCH</i>	
14:30 – 14:55	Ryan Deeley	<b>The increased likelihood of plankton community changes following marine heatwaves</b>
14:55 – 15:20	Frank Kwasniok	<b>Data-driven quantification of weather and climate risk using large-deviation theory</b>
15:20 – 15:45	Timo Bröhl	<b>A subnetwork in the evolving functional epileptic brain carries predictive information about impending seizures</b>
15:45 – 16:15	<i>COFFEE BREAK</i>	

# Program

Thursday, 25 April 2024

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|---------------|--------------------------------|---------------------------------------------------------------------------------------------------------|
| 16:15 – 16:55 | Marcel Clerc ( <i>online</i> ) | <b>Spatiotemporal Chaos Induces Extreme Events in an Extended Microcavity Laser and Kerr Resonators</b> |
| 17:00 – 17:45 | <b>POSTER FLASH 2</b>          |                                                                                                         |
| 18:00         | <i>DINNER</i>                  |                                                                                                         |
| 19:00 – 22:00 | <b>POSTER SESSION 2</b>        |                                                                                                         |

# Program

**Friday, 26 April 2024**

08:00 – 09:00	<i>BREAKFAST</i>	
09:00 – 09:40	R. Sujith (online)	<b>Extreme Covid-19 Waves and Flame Blowout in Jet Engines: What is in common?</b>
09:40– 10:20	Tomasz Kapitaniak	<b>Transition to hyperchaos: Sudden expansion of attractor and intermittent large-amplitude events in dynamical systems</b>
10:20 – 11:00	<i>COFFEE BREAK</i>	
11:00 – 11:25	Reik Donner	<b>Quantifying statistical associations among persistent events: From event coincidence to interval coverage analysis</b>
11:25 – 11:50	Sara Vallejo-Bermal	<b>The role of atmospheric rivers in the spatio-temporal organization of heavy precipitation events in North America</b>
11:50 – 12:15	Samudrajit Thapa	<b>Leveraging large-deviation statistics to decipher the stochastic properties of measured trajectories</b>
12:15 – 13:00	<i>Ulrike Feudel; Syamal Dana, Klaus Lehnertz</i>	<b>Closing</b>
13:00 – 14:00	<i>LUNCH</i>	

***End of the seminar and departure***

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