

PHYSICS COLLOQUIUM

Speaker: **Dr. Fiona Spuler**
ScaDS.AI Leipzig/Dresden,
University of Leipzig



Topic: **Attributing and predicting near-term climate change using causal representation learning**

Time and Tuesday, July 14, 2026, **2:50 pm** – hybrid event

place: **The colloquium will be held in REC/C213.**

Online participation possible:

Zoom-Meeting: Meeting-ID: 674 4304 6840 / passcode: PC-SoSe26

<https://tu-dresden.zoom-x.de/j/67443046840?pwd=QAEHLWawl2P3iDmQToOSHhNYgu3Fzz.1>

Host: Alexander Hempel, Jona Moeller (FSR Physik)

Abstract: Climate attribution science can now link individual extreme events, such as the June 2026 European heatwave, to anthropogenic greenhouse-gas emissions. However, projecting how the climate of any particular region will change over the next few years to decades remains challenging. This is because in any given year, the severity of observed extremes reflects both the emerging forced response of the climate system to anthropogenic emissions, as well as the influence of internal modes of variability such as the El Niño Southern Oscillation or variability in the eddy-driven jets. Both influences are highly uncertain, and existing literature shows that internal variability can dominate observed trends in the coming decade. However, building robust knowledge of internal modes of variability and their relationship with the emerging climate change signal is challenged by their misrepresentation in many physics-based global climate models, while data-driven approaches struggle to robustly extrapolate observed relationships to a changing climate and rely on low-dimensional representations of modes of variability that can obscure relevant dynamical processes. This talk will present causal representation learning, an emerging field of AI research, as an approach to learn physically interpretable representations of modes of variability, and show examples of how this approach can be used to understand modes of internal variability as well as the influence of climate change on regional extremes.

Bio: Fiona completed her PhD in climate physics at the University of Reading, UK, and the Alan Turing Institute in London, UK, and holds an MSc in Mathematical Physics (University of Edinburgh) and an MSc in Environmental Change and Management (University of Oxford). Her PhD research focused on developing causal representation learning approaches to study climate dynamics, in

particular on disentangling drivers of regional extremes across timescales. Next to her PhD, Fiona co-developed and maintains the open-source software package *ibicus* for the comparison and evaluation of statistical bias adjustment of climate models. Prior to starting her PhD, she worked for two years at a not-for-profit organization on climate finance and was part of the international Mercator Fellowship program, working on finance for climate resilience and loss and damage.

Get-Together:

The colloquium will be followed directly by a Get-Together with Dr. Fiona Spuler in REC/D17 (around 4:00 p.m.). All students and staff are invited to talk to the speaker and discuss perspectives on the academic career, work-life balance and the professional life as a scientist.