

Tilmann Gneiting: 2026 Wald Memorial Award and Lecture



Tilmann Gneiting, head of the Computational Statistics (CST) group at the Heidelberg Institute for Theoretical Studies (HITS) and Professor at the Karlsruhe Institute of Technology (KIT), has been awarded the Wald Memorial Award and Lecture by the Institute of Mathematical Statistics (IMS). The IMS describes the award as follows: "The Wald Memorial Award and Lecture is an annual award that honors Abraham Wald. It is presented to a person whose contributions have been fundamental to the development of statistics or probability."

Foundations for the Science of Forecasting
Tilmann Gneiting is Head of the Computational Statistics Group at HITS and Professor of Computational Statistics at KIT, Germany. He was affiliated with the KIT Institute of Stochastics until 2024, where he continues to teach, and joined the newly established KIT Institute of Statistics at the beginning of 2025. At HITS, he also served as Scientific Director in 2023 and 2024.

Prior to these roles, he held academic positions at the University of Washington in Seattle, USA, and at Heidelberg University, Germany. He served as Editor-In-Chief for the Annals of Applied Statistics from 2016 to 2018. His research has been recognized with several major distinctions, including an ERC Advanced Grant in 2011 supporting his work on probabilistic forecasting, and the Ulf Grenander Prize in Stochastic Theory and Modeling awarded by the American Mathematical Society in 2024.

His research focuses on two main areas: spatial and spatio-temporal statistics, and the theory and methodology of forecasting, with applications ranging from methodological developments to weather prediction.

The Talks: Dependence Measures and Calibration

The Wald Memorial Lectures consist of two talks to be delivered at the IMS Annual Meeting in Salzburg, Austria, from 6–9 July 2026. The first talk, "Assessing Monotone Dependence: Area Under the Curve Meets Rank Correlation," addresses the classical problem of quantifying monotone association between random variables. The second, "Hierarchies of Calibration: Classification and Regression," focuses on calibration – the statistical consistency between probabilistic forecasts and their corresponding outcomes. Both talks present joint work with members of the Computational Statistics group at HITS.



HITS Open House – 11 July 2026, 11.00 a.m.–5.00 p.m.

Climate, Molecules, Galaxies: One Institute. Many Dimensions.
Schloss-Wolfsbrunnenweg 35 and Studio Villa Bosch, Heidelberg
www.h-its.org/2026/05/19/hits-open-house-2026



HITS

Terminal Pulsations of Dying Stars

A team led by PhD student **Vincent Bronner** (Stellar Evolution Theory, HITS) and former HITS postdoctoral researcher **Eva Laplace**, now at the Institute of Astronomy at KU Leuven, found that massive stars may be far less stable in their final moments than previously thought.

Their work focuses on red supergiant stars, the massive progenitors of many supernovae. While observations have long indicated that these stars can pulsate, most theories treated this stage as relatively steady due to limited observations and numerical models of these stars.



Bronner, Laplace, and their collaborators argue instead that these late-life

pulsations are not minor details but a natural and growing part of a star's death process. As the team highlights, this shifting behavior could influence how a supernova appears when it finally occurs. They point to recent observations, including the well-studied SN 2023jxf, as evidence that real explosions match the patterns their group expect-



ed, reinforcing their conclusion that pulsations cannot be ignored.

The researchers say their findings also mean astronomers may need to rethink how they interpret massive stars before they explode, since a star's brightness and appearance can change dramatically depending on the amplitude and the phase of the pulsations. The team is expanding their work and looking ahead to new data from upcoming large sky surveys. This work also highlights the close collaboration between HITS and international partner institutions such as KU Leuven.

Publication: Eva Laplace et al. Pulsations Change the Structures of Massive Stars before Explosion: Interpreting SN 2023jxf and SN 2024ggi. 2026 ApJL 998 L40. DOI 10.3847/2041-8213/ae3d2e

New employees and visiting scientists

Master student: Artem Stetoi (MCM)
PhD student: Dariusz Szablowski (MCM)
Research associates: Alper Daggez (SDBV), Pascal Memmesheimer (SDBV)
Visiting scientist: Anna Su (MLI, Yale University), Wun-Yi Chen (PSO, National Taiwan University, Taipei, Taiwan – DAAD/NSTC Scholarship)

HITS groups (06/2026): Astroinformatics (AIN), Computational Molecular Evolution (CME), Computational Statistics (CST), Data Mining and Uncertainty Quantification (DMQ), Machine Learning and Artificial Intelligence (MLI), Molecular and Cellular Modeling (MCM), Natural Language Processing (NLP), Physics of Stellar Objects (PSO), Scientific Databases and Visualization (SDBV), Stellar Evolution Theory (SET), Theory and Observations of Stars (TOS)

HITSters

Molecular Research: When Speed meets Precision

Inside biological cells, molecules are constantly in motion. However, studying these movements remains challenging because they occur at extremely small spatial and temporal scales. To address this, researchers from the Heidelberg Institute for Theoretical Studies (HITS) and the Max Planck Institute for Polymer Research (MPIP) have developed a fast simulation method that can accurately predict chemical processes inside cells. Their findings have been published in Nature Communications.



Researchers at HITS and the MPIP have developed a method to overcome this limitation. The new software, KIMMDY (Kinetic Monte Carlo Molecular Dynamics), combines multiple computational approaches with machine learning techniques to predict when and where chemical reactions are likely to occur.

"This allows us not only to track how molecules move, but also to observe how they react with one another," says **Frauke Gräter**, director of the Biomolecular Mechanics department at MPIP and former group leader at HITS. "This, in turn, opens up entirely new possibilities for investigating complex biological processes on a computer."

The newly developed method makes it possible to simulate very large molecular systems – such as proteins or DNA in their natural environment – while simultaneously tracking reaction chains in which one chemical step triggers the next. Such processes play a role

in many biological contexts, including collagen, a protein essential for the stability of our skin, bones, and connective tissue. Using the new approach, the research team was able to track how reactive molecular fragments migrate through the protein and accumulate at specific sites. Damage to DNA, such as that caused by UV radiation, can now also be investigated.

A key advantage of this new approach is that it enables simulations of systems containing millions of atoms to be performed more efficiently than with competing methods. As a result, KIMMDY could help deepen our understanding of biological and chemical processes in the future. At the same time, it opens up new possibilities for interpreting experimental results and designing new experiments. The project was supported by the Klaus Tschira Foundation.

Publication: Hartmann, E.; Bühr, J.; Riedmiller, K.; Ulanov, E.; Schüpp, B.; Kiesewetter, D.; Sucerquia, D.; Aponte-Santamaría, C.; Gräter, F. KIMMDY: a biomolecular reaction emulator. Nat Commun 17, 3500 (2026). <https://doi.org/10.1038/s41467-026-71955-2>

Research

Beyond the limits – Monika Mondal, HITS Journalist in Residence 2026



Indian science journalist Monika Mondal joined HITS in February 2026 as the 14th Journalist in Residence. At the midpoint of her stay, she gave a video interview for

the institute's social media channels, in which she shared her greatest inspiration during her time at HITS so far and described a question she wishes journalists would ask scientists more often.

What drew you to apply for the Journalist in Residence program at HITS?

When I applied for the HITS residency, I was already working on broad ideas for my book project. I applied to find a place where I could have some peace of mind and connect with like-minded people with whom I could discuss the project and develop it into something substantial.

You have now reached the midpoint of your stay. What has inspired you the most so far?

Speaking with the young researchers here and discussing ideas with them has been inspiring. But my greatest inspiration comes from the HITS garden, and especially the Sequoia trees in it. In life, we are often led to believe that things which are massive and strong must also be hard. Yet the strength of these towering Sequoias lies in their softness, which challenges our understanding of vision, perception, and reality. These are exactly the topics I'm exploring in my book.

What's one question you wish more journalists would ask scientists?

Scientists are generally asked about their discoveries, but rarely about the moments when they were still in the process – when things were uncertain, challenging, or even mysterious. That space of not knowing is where curiosity lives. What did the world feel like before understanding took hold? Science explains how nature works, but in doing so, it can also turn wonder into something measurable and utilitarian. If we focus only on

answers, we risk seeing nature merely as something to extract from.

How important is being "in residence" for truly understanding scientific work, compared to remote reporting?

Apart from my time at HITS, I am also speaking with many other researchers across Heidelberg. Being a science journalist in this city of science is, in itself, an extraordinary opportunity.

So far, how has your stay at HITS influenced the work you want to pursue moving forward?

Right now, I'm at the midpoint of my residency, and I can feel my questions becoming clearer and more focused. My time at HITS has made me look at both myself and my book project in a new light and from a different perspective.

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Beyond the limits



The Charts