DECEMBER 2025

Prob_AI Winter Newsletter

Probabilistic AI for Environmental Science Event

In October 2025, the Hub ran its first joint event, organised by the Hub and the Natural Environment Research Council (NERC), at the Isaac Newton Institute for Mathematical Sciences. Our aim was to bring together relevant research communities, build new connections and stimulate collaboration.

Our speakers and attendees included academic researchers working in probabilistic AI; academic researchers working in NERC's remit with an interest in this area; and business and public sector partners with an interest in probabilistic AI in environmental science applications. We had over 90 in person attendees from more than 18 academic institutions as well as several public sector and business organisations, such as IBM, Space Intelligence, the Met Office, NPL and JBA Risk Management.

Due to demand, we were able to livestream the talks to a large online audience and recordings of those talks are now available online: https://www.youtube.com/@Prob_AIHub

"...The joint event organised by NERC and the EPSRC-funded ProbAI Hub on 'Probabilistic AI for Environmental Science' was hugely successful and generated a significant response from the community.

It is clear that this area is going to become increasing integral to the development of robust predictive models and informed policy responses to environmental hazards.

I look forward to the follow-on discussions which will generated and the prospect of greater research collaboration between the probabilistic AI and environmental science communities..." Dr Simon Gardner, Head of Digital Environment - Data, Technology and Space at NERC

Hub People News

We would like to welcome our newest Hub members:

Research Associates:

- Liam Llamazares – Lancaster University
- Ben Kent – University of Cambridge

Hub Recruitment - Vacancies

The Hub currently has 2 vacancies open:

Post Doctoral Research Associate - University of Manchester:
This numerical analysis-focused PDRA position, will be based at the University of Manchester, but co-supervised by lead researchers at both the University of Manchester (Professor Catherine Powell) and the University of Edinburgh (Dr. Aretha Teckentrup).
We are seeking a candidate with a strong background in some aspect of numerical analysis for PDEs and an interest in scientific machine learning and probabilistic methods, who enjoys working in collaborative inter-disciplinary settings, who will contribute to the Hub's research efforts under the following themes: Structure-constrained and Informed AI Probabilistic and Uncertainty-aware Methods for Trustworthy and Green AI.

For more information and to apply: https://tinyurl.com/suxrmp2e
Closing Date: 12th January 2026

Research Software Engineer - Lancaster University
The Research Software Engineer will contribute to the Hub's vision through (i) working with hub members to develop software packages implementing new methods; and (ii) through contributing to and supporting the methodological research of the hub.
We are looking for candidates with a postgraduate degree in Statistics, machine learning or a related discipline and a track record of methodological research relevant to Prob_AI, plus extensive knowledge of Python, including package development and experience of the academic research software development cycle, including deployment, maintenance and user support. Candidates should also have a demonstrable ability to publish, including the ability to produce high quality academic writing as this is essential for this post.

For more information and to apply: https://tinyurl.com/442uamsz
Closing date: 11th January 2026

Doctoral Prize Fellows Start

We are delighted that two Prob_AI Hub Doctoral Prize Fellows (Round 1) have now started their research projects funded by the Prob_AI Hub. In this article we introduce the fellows and their research.

Teresa Klatzer (University of Edinburgh)

Q: Tell us about your background? How did you get into this research and what motivates you?

My background is in computer science, but from my first mathematics courses at university, I was drawn to explore this subject more deeply. During my master's studies, I discovered signal processing, and became fascinated by imaging, how images are formed, reconstructed, and how mathematics can help to reveal information that would otherwise remain hidden. I enjoy understanding complex problems well enough to explain them simply. Eventually, I found a research community in mathematical imaging that perfectly combines my interests in mathematics and imaging, and I am very happy to now study the mathematical foundations of AI in this context.

Q: What research will you pursue with your Doctoral Prize Fellowship?

This Doctoral Prize Fellowship represents an important step toward establishing myself as an independent researcher, enabling me to deepen my expertise in probabilistic AI and expand collaborations at the interface of AI and scientific imaging. My research advances imaging sciences through Bayesian computation, machine learning, and uncertainty quantification (UQ), with a focus on inverse problems for low-photon or limited data regimes. During my PhD, I developed efficient sampling algorithms with convergence guarantees and integrated data-driven priors using plug-and-play frameworks with denoisers, achieving state-of-the-art reconstructions with UQ for photon-limited data.

Building on this foundation, my fellowship research will extend these methods beyond natural images to scientific imaging, focusing on fluorescence microscopy (FM), where phototoxicity and photobleaching restrict data acquisition, leading to severely photon-limited data. The core objective is to develop Bayesian imaging methodologies that leverage diffusion models as expressive data-driven priors to solve inverse problems in FM. I will design posterior sampling frameworks that integrate diffusion score models with physical likelihoods to enable uncertainty-aware image reconstruction under realistic noise conditions. Additionally, I will explore transfer learning strategies to adapt foundation models to microscopy data and develop scalable algorithms for efficient inference in high-dimensional, spatiotemporal imaging settings.

Q: Could you summarise your research for a general public audience?

I study how to create images when only very little light or signal is available, for example in biology, where too much light can harm delicate cells, or in medicine, where radiation must be kept low for patient safety. I use artificial intelligence together with a robust statistical framework to estimate the most likely true image from limited observed data and to understand how confident we can be in different parts of the result. My main goal is to develop new computational methods that make imaging both more accurate and reliable in these challenging situations.

Doctoral Prize Fellows Start...(cont)

Rocco Caprio (University of Warwick)

Q: Tell us about your background? How did you get into this research and what motivates you?

I am originally from Eboli, in Italy. I just finished my PhD at the University of Warwick in mathematical statistics. My research is at the intersection of statistics, probability, and machine learning. I enjoy this area because it blends mathematics with computational methods that can be applied to solve real-world problems. What motivates me is the challenge of taking mathematical ideas and turning them into tools that improve the way we analyse and learn from data.

Q: What research will you pursue with your Doctoral Prize Fellowship?

I will pursue my research in the mathematical and computational foundations of algorithms used in latent data models. These models are central in statistics, machine learning, and AI, as they are designed to make sense of situations where we only observe incomplete or indirect information about an underlying process. They appear both in classical statistical applications and in modern generative AI. My research will focus on questions such as: How fast do these algorithms converge? How stable are they under perturbations? And how can we design new methods that are both efficient and reliable?

Q: Could you summarise your research for a general public audience?

In simple terms, my research uses mathematics to better understand and improve the algorithms behind modern data analysis and artificial intelligence. By studying their behaviour, I plan to help guide how these algorithms are chosen, tuned, and designed—so that they can be made more accurate, efficient, and trustworthy in real-world applications.

Prob_AI Hub Problem Solving Week

The Hub's first problem-solving week took place in November. This brought together postdoctoral level researchers to work in groups on real world problems, including from external partners. The aim for these events is for researchers to gain valuable skills and experience, as well as helping business and public sector partners tackle challenges. The plan is to run further problem-solving weeks, and we are starting to look for problems to work on.

If you work for a business or public sector organisation, and have a problem where additional postdoctoral level expertise and perspectives might be valuable, then please get in touch with the Hub Manger (craig.walker@lancaster.ac.uk).

Hub Funding Update

The Prob_AI Networking and Development Fund invests in projects that bring together researchers from the various mathematical, statistical and computer science fields that underpin probabilistic AI, and stimulate new activity. The aspiration is that this will help build research collaboration, better engage research users, grow external investment in probabilistic AI, and raise the profile of this work.

Round 1 of the Networking and Development Fund has now closed and eight projects have been funded. Please see below for the titles and project leads of the funded projects.

If you are interested in the funding opportunities then please contact the Hub Manager, Dr Craig Walker (craig.walker@lancaster.ac.uk), who is happy to help and explore any ideas you have.

Round 1 Funded Projects

- The first workshop on Advances in post-Bayesian methods
  Jeremias Knoblauch, University College London
- Bayesian Kolmogorov–Arnold Neural Models
  Miguel de Carvalho, University of Edinburgh
- ProbAI-ETH Zurich Workshop on "Machine Learning in Infinite Dimensions"
  Yury Korolov, University of Bath
- Summer School on Numerical Analysis of PDEs, Optimisation and Uncertainty Quantification
  John Pearson, University of Edinburgh
- Non-reversible processes for sampling: Robustness-Methodology
  Georgios Vasdekis, Newcastle University
- London Geometry and Machine Learning Summer School 2025
  Zhengang Zhong, University of Warwick
- Advances and Best Practices in Static and Dynamic Data Integration within Bayesian Networks
  Onaopepo Adeniyi, Northumbria University
- Neural inference for Bayesian phylodynamics and genetic epidemiology
  Alexander Zarebski, University of Cambridge

Round 2 of this funding opportunity is live: https://www.probai.ac.uk/funding

Prob_AI Hub Winter School - Mathematical Foundations of Probabilistic AI

The Hub's first winter school is taking place from 5th to 8th January 2026, at the University of Warwick. This includes internationally leading speakers from world-class universities and industry (Google DeepMind, Microsoft Research, NVIDIA Research).

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Prob_AI Hub Seminar Series

The Hub's successful biweekly seminar series has started up for the 2025/26 academic year. These seminars are organised by Hub postdoctoral researchers and feature a variety of speakers on topics related to mathematical and computational foundations of AI.

Further details and forthcoming speakers can be found here: https://tinyurl.com/3k3zbf37

Save the Date - Upcoming Events

More information on these events will be sent out in 2026:

- Theory of Scaling Laws Workshop – 22nd to 24th June 2026, University of Warwick
- Prob_AI Second Biennial Workshop – 15th to 17th September 2026, Whitworth Art Gallery, Manchester
- Prob_AI Winter School 2027 – 5th to 8th January 2027, University of Bristol

Collaboration with Erlangen and Informed AI Hubs – Postdoctoral Community Building

Three EPSRC AI Hubs (INFORMED, Erlangen, Prob_AI) were funded under the 'Mathematical and Computational Foundations of Artificial Intelligence' theme. An event focused on postdoctoral level researchers from these AI Hubs will take place on the 10th and 11th March 2026 at the Isaac Newton Institute. This should help build the postdoctoral research community working in this area.

Engage with Us

If you are interested in the funding opportunities, or the Prob_AI Hub more generally, then please contact the Hub Manager, Dr Craig Walker (craig.walker@lancaster.ac.uk), who is happy to help and explore any ideas you have.

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