

Christopher Bülte

DEEP LEARNING · UNCERTAINTY QUANTIFICATION · PROBABILISTIC MODELING

LMU Munich, Germany

✉ buelte@math.lmu.de | [cbuelte.github.io](https://github.com/cbuelte) | [cbuelte](https://www.linkedin.com/in/cbuelte) | [Google Scholar](https://scholar.google.com/citations?user=...) | [ORCID](https://orcid.org/...)

Research Interests

My research centres on uncertainty quantification and probabilistic modelling in deep learning, as well as applications in the natural sciences. I am interested both in theoretical foundations and in practical use, and in particular in developing novel probabilistic and uncertainty-related methods for neural networks. Applications of the developed methodologies span meteorology, dynamical systems and energy systems.

Education

Ludwig-Maximilians-Universität München (LMU)

Munich, Germany

PHD IN MATHEMATICS — FOUNDATIONS OF DEEP LEARNING

03/2024 - present

- Advisor: Prof. Gitta Kutyniok
- Probabilistic deep learning, uncertainty quantification and physics-informed machine learning.
- Associated PhD student, Konrad Zuse School of Excellence in Reliable AI (relAI) and Munich Center for Machine Learning (MCML)

Karlsruhe Institute of Technology (KIT)

Karlsruhe, Germany

M.SC. IN ECONOMATHEMATICS

04/2021 - 02/2024

- Grade: 1.1/5 (1 best, 5 worst), top 2% of cohort
- Thesis: *Estimation of Extremes for Spatio-Temporal Processes with Neural Networks*, advisor: Prof. Melanie Schienle
- Supplementary studies in Sustainable Development

Karlsruhe Institute of Technology (KIT)

Karlsruhe, Germany

B.SC. IN INDUSTRIAL ENGINEERING

10/2017 - 03/2021

- Grade: 1.5/5 (1 best, 5 worst), top 10% of cohort
- Thesis: *Nonlinear Kernel Regression: Theoretical Aspects and Robust Extensions*

Research Experience

Chair of Statistical Methods and Econometrics, KIT

Karlsruhe, Germany

RESEARCH ASSISTANT

06/2022 - 02/2024

- Benchmarked large-scale data-driven weather models, in particular with respect to probabilistic calibration and uncertainty quantification (AIES 2026)
- Built part of the automated data pipeline behind the [RESPINOW](#) nowcasting project, including an OCR engine for scanned public-health reports

anacision GmbH

Karlsruhe, Germany

DATA SCIENCE INTERN

09/2019 - 02/2020

- Forecasting and extreme-value detection for large-scale industrial time series
- Designed, tested and deployed distributed algorithms for data integration in Apache Spark

Research Visits

11/2026 - 02/2027 **New York University:** Research visit hosted by Asst. Prof. Zongyi Li (*upcoming*).

New York, US

2026 **Isaac Newton Institute for Mathematical Sciences:** Invited participant, programme workshop *Operator methods for dynamical systems*.

Cambridge, UK

Publications

JOURNAL & CONFERENCE PUBLICATIONS

Bülte, C., Sale, Y., Kutyniok, G., and Hüllermeier, E. Uncertainty Quantification for Regression: A Unified Framework Based on Kernel Scores. **Conference on Uncertainty in Artificial Intelligence (UAI)**, 2026.

Bülte, C., Sale, Y., Löhr, T., Hofman, P., Kutyniok, G., and Hüllermeier, E. An Axiomatic Assessment of Entropy- and Variance-Based Uncertainty Quantification in Regression. **Conference on Uncertainty in Artificial Intelligence (UAI)**, 2026.

Bülte, C., Horat, N., Quinting, J., and Lerch, S. Uncertainty Quantification for Data-Driven Weather Models. **Artificial Intelligence for the Earth Systems (AIES) 5**, 2026. doi:10.1175/AIES-D-24-0049.1

Bülte, C., Scholl, P., and Kutyniok, G. Probabilistic Neural Operators for Functional Uncertainty Quantification. **Transactions on Machine Learning Research (TMLR)**, 2025.

Bülte, C., Kleinebrahm, M., Yilmaz, Ü., and Gómez-Romero, J. Multivariate Time Series Imputation for Energy Data Using Neural Networks. **Energy and AI** **13**, 2023. doi:10.1016/j.egyai.2023.100239

EDITED VOLUMES

Bülte, C., Burger, M., Hein, M., Kutyniok, G., Pokutta, S., and Steinwart, I. (eds.), Theoretical Foundations of Deep Learning. **Springer Cham**, 2026. (forthcoming)

PEER-REVIEWED WORKSHOP PAPERS

Sale, Y., **Bülte, C.**, Czaja, F., Stiller, J., and Hüllermeier, E. What Uncertainties Do We Need for Dynamical Systems? **ICML 2026 Workshop on Epistemic Intelligence in Machine Learning**.

Bülte, C., Sale, Y., Kutyniok, G., and Hüllermeier, E. A Formal Assessment of Uncertainty Measures in Regression. **EurIPS 2025 Workshop on Epistemic Intelligence in Machine Learning**. (oral)

Kneissl, C., **Bülte, C.**, Scholl, P., and Kutyniok, G. Uncertainty-Aware Diffusion Models for Probabilistic Regression. **EurIPS 2025 Workshop on Epistemic Intelligence in Machine Learning**. (oral)

Bülte, C., Maskey, S., Scholl, P., von Berg, J., and Kutyniok, G. Graph Neural Networks for Enhancing Ensemble Forecasts of Extreme Rainfall. **ICLR 2025 Workshop on Tackling Climate Change with Machine Learning**.

Bülte, C., Scholl, P., and Kutyniok, G. Probabilistic Predictions with Fourier Neural Operators. **NeurIPS 2024 Workshop on Bayesian Decision-Making and Uncertainty**.

Yilmaz, Ü., Kleinebrahm, M., **Bülte, C.**, and Gómez-Romero, J. Applying Transformer to Imputation of Multivariate Energy Time Series Data. **ICML 2021 Workshop on Tackling Climate Change with Machine Learning**.

PREPRINTS

Franzoni, S., **Bülte, C.**, Scheck, L., Keil, C., and Craig, G. Using Distributional Regression Networks to Retrieve Cloud Properties from Solar Satellite Channels for Data Assimilation. Preprint. [arXiv:2606.21294](#)

Kneissl, C., **Bülte, C.**, Scholl, P., and Kutyniok, G. Improved Probabilistic Regression Using Diffusion Models. Preprint. [arXiv:2510.04583](#)

Bülte, C., Leimenstoll, L., and Schienle, M. Modeling Spatial Extremal Dependence of Precipitation Using Distributional Neural Networks. Preprint. [arXiv:2407.08668](#)

Talks

INVITED & CONTRIBUTED TALKS

2026	WCCM ECCOMAS 2026: Invited talk: <i>Probabilistic neural operators for functional uncertainty quantification</i> .	Munich, DE
2025	MIAPbP Workshop: Build Big or Build Smart: Examining Scale and Domain Knowledge in Machine Learning for Fundamental Physics: Contributed talk: <i>Probabilistic neural operators</i> .	Munich, DE
2025	EurIPS 2025 Workshop on Epistemic Intelligence in Machine Learning: Oral presentation: <i>A Formal Assessment of Uncertainty Measures in Regression</i> .	Copenhagen, DK
2024	COMPSTAT 2024: Contributed talk: <i>Estimation of spatio-temporal extremes via generative neural networks</i> .	Gießen, DE

Academic Service

2024 - present	Coordinator, DFG Priority Programme <i>Theoretical Foundations of Deep Learning</i> (SPP 2298).
2025 - 2026	Organizer, DFG Minisymposium at the Annual Meeting of GAMM.
2025 - 2026	Program Committee, Workshop on Epistemic Intelligence in Machine Learning (EIML).
2025 - 2026	Reviewer, Artificial Intelligence for the Earth Systems (AIES).
2025	Reviewer, International Conference on Learning Representations (ICLR).

Teaching & Supervision

2026 **Nicholas Michael Graf**, M.Sc. thesis supervision, *Variational Autoencoders for Generation and Interpolation of Implied Volatility Surfaces*, LMU Munich.

2018 - 2020 Teaching assistant, *Mathematics I & II* and *Statistics*, KIT.

Honors & Awards

2023 **Best Poster Award**, MathSEE Symposium, Karlsruhe.

2019 - 2020 **Deutschlandstipendium**, national merit scholarship.

Technical Skills

Programming	Python, R, Bash, LaTeX, Git, Linux
ML & scientific stack	PyTorch, JAX, TensorFlow, NumPy/SciPy, Xarray, Weights & Biases
Compute	SLURM-managed HPC clusters, multi-node and multi-GPU training
Languages	German (native), English (fluent)
Volunteering	EduRef e.V. — Education for Refugees