



ABOUT

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 Wessel Bruinsma 

wesselb.github.io 
 Wessel Bruinsma 
 wesselb 

LANGUAGES

dutch, native
 english

INTERESTS

machine learning for environmental science and forecasting, probabilistic modelling with a focus on time series, Bayesian nonparametrics with a focus on Gaussian processes, approximate inference, probabilistic programming, probability theory, and real analysis

EDUCATION

- Jan '18 – Jul '22 **PhD in Machine Learning** Machine Learning Group, U. of Cambridge
 • Supervised by Richard E. Turner
- Oct '15 – Sep '16 **MPhil in Machine Learning** Dept. of Engineering, U. of Cambridge
 • Distinction, class rank 1 / ~20
- Sep '12 – Jul '15 **BSc in Electrical Engineering (Hons)** EEMCS, Delft U. of Technology
 • Distinction, class rank 1 / ~100
 • Specialisation in mathematics

PROFESSIONAL HISTORY

- Oct '22 – now **Senior Researcher** Microsoft Research, Amsterdam
 • Research into foundation models for atmospheric modelling
- Jul '19 – Sep '19 **Internship (Quantitative Research)** G-Research, London
- Sep '16 – Oct '22 **Machine Learning Researcher** Invenia Labs Limited, Cambridge
 • Research into modelling multi-output time series, with a focus on electricity markets
- Sep '14 – Jul '15 **Technical Specialist** EEMCS Recruitment Days, Delft
 • Design and implementation of solutions to scheduling problems
- Sep '13 – Jul '14 **Electrical Engineer** TU Delft Solar Boat Team, Delft
 • Competed in DONG Solar Energy Challenge 2014 and Solar1 Monte Carlo Cup 2014

SELECTED PUBLICATIONS

- [link] Bodnar, C., Bruinsma, W. P., Lucic, A., Stanley, M., Brandstetter, J., Garvan, J., Riechert, M., Weyn, J., Dong, H., Vaughan, A., Gupta, J. K., Tambiratnam, K., Archibald, A., Heider, E., Welling, M., Turner, R. E., and Perdikaris, P. (2024). “Aurora: A Foundation Model of the Atmosphere,” in *arXiv preprint: 2405.13063*.
- [link] Bruinsma W. P., Tegnér M., and Turner R. E. (2022). “Modelling Non-Smooth Signals with Complex Spectral Structure,” in *Artificial Intelligence and Statistics (AISTATS), 25th International Conference on*.
- [link] Gordon, J., Bruinsma W. P., Foong, A. Y. K., Requeima, J., Dubois Y., Turner, R. E. (2020). “Convolutional Conditional Neural Processes,” *International Conference on Learning Representations (ICLR), 8th*. (Awarded oral presentation.)

SELECTED SOFTWARE

- [link] *Stheno*: Probabilistic programming with Gaussian processes in Python
- [link] *Aurora*: Implementation of the Aurora model for atmospheric forecasting in Python
- [link] *Plum*: Implementation of multiple dispatch in Python

PUBLICATIONS

- [link] Ashman, M., Diaconu, C., Weller, A., Bruinsma, W. P., and Turner, R. E. (2024). “Approximately Equivariant Neural Processes,” in *arXiv preprint: 2406.13488*.
- [link] Räisä, O., Markou, S., Ashman, M., Bruinsma, W. P., Tobaben, M., Honkela, A., and Turner, R. E. (2024). “Noise-Aware Differentially Private Regression via Meta-Learning,” in *arXiv preprint: 2406.08569*.
- [link] Chien, I., Bruinsma, W. P., Gonzalez, J., and Turner, R. E. (2024). “Safe Exploration in Dose Finding Clinical Trials with Heterogeneous Participants,” in *International Conference on Machine Learning (ICML)*, 41th.
- [link] Ashman, M., Diaconu, C., Kim, J., Sivaraya, J., Markou, S., Requeima, J., Bruinsma, W. P., and Turner, R. E. (2024). “Translation-Equivariant Transformer Neural Processes,” in *International Conference on Machine Learning (ICML)*, 41th.
- [link] Bodnar, C., Bruinsma, W. P., Lucic, A., Stanley, M., Brandstetter, J., Garvan, J., Riechert, M., Weyn, J., Dong, H., Vaughan, A., Gupta, J. K., Tambiratnam, K., Archibald, A., Heider, E., Welling, M., Turner, R. E., and Perdikaris, P. (2024). “Aurora: A Foundation Model of the Atmosphere,” in *arXiv preprint: 2405.13063*.
- [link] Vaughan, A., Markou, S., Tebbutt, W., Requeima, J., Bruinsma, W. P., Andersson, T. R., Herzog, M., Lane, N. D., Chantry, M., Hosking, J. S., and Turner, R. E. (2024). “Aardvark Weather: End-to-End Data-Driven Weather Forecasting,” in *arXiv preprint: 2404.00411*.
- [link] Bruinsma, W. P., Markou, S., Requeima, J., Foong, A. Y. K., Andersson, T. R., Vaughan, A., Anthony, B., Hosking, J. S., and Turner, R. E. (2023). “Autoregressive Conditional Neural Processes,” in *International Conference on Representation Learning (ICLR)*, 11th.
- [link] Andersson, T. R., Bruinsma, W. P., Markou, S., Requeima, J., Coca-Castro, A., Vaughan, A., Ellis, A.-L., Lazzara, M., Jones, D. C., Hosking, J. S., and Turner, R. E. (2023). “Environmental Sensor Placement with Convolutional Gaussian Neural Processes” in *Environmental Data Science 2*.
- [link] Lalchand, V., Bruinsma, W. P., Burt, D. R., and Rasmussen, C. E. (2022). “Sparse Gaussian Process Hyperparameters: Optimize or Integrate?” in *Advances in Neural Information Processing Systems (NeurIPS)*, 36th.
- [link] Rawat, A., Requeima, J. R., Bruinsma, W. P., and Turner, R. E. (2022). “Challenges and Pitfalls of Bayesian Unlearning,” in *Updatable Machine Learning (UpML), ICML 2022 Workshop on*.
- [link] Foong, Y. K., Bruinsma, W. P., and Burt, D. (2022). “A Note on the Chernoff Bound for Random Variables in the Unit Interval,” *arXiv:2205.07880*.
- [link] Bruinsma, W. P., Tegnér, M., and Turner, R. E. (2022). “Modelling Non-Smooth Signals with Complex Spectral Structure,” in *Artificial Intelligence and Statistics (AISTATS), 25th International Conference on*.
- [link] Coker, B., Burt, D., Bruinsma, W. P., Pan, W., Doshi-Velez, F. (2022). “Wide Mean-Field Bayesian Neural Networks Ignore the Data,” in *Artificial Intelligence and Statistics (AISTATS), 25th International Conference on*.
- [link] Markou, S., Requeima, J. R., Bruinsma, W. P., and Turner, R. E. (2022). “Practical Conditional Neural Processes Via Tractable Dependent Predictions,” in *International Conference on Learning Representations (ICLR)*, 10th.
- [link] Markou, S., Requeima, J. R., Bruinsma, W. P., and Turner, R. E. (2021). “Efficient Gaussian Neural Processes for Regression,” in *Uncertainty & Robustness in Deep Learning (UDL), ICML 2021 Workshop on*.
- [link] Foong, A. Y. K., Bruinsma, W. P., Burt, D. R., and Turner, R. E. (2021). “How Small can PAC-Bayes be in the Small Data Regime?” in *Advances in Neural Information Processing Systems (NeurIPS)*, 35th.

- [link] Bruinsma, W. P., Requeima, J., Foong, A. Y. K., Gordon, J., and Turner, R. E. (2021). “The Gaussian Neural Process,” in *Advances in Approximate Bayesian Inference (AABI), 3rd Symposium on*. (Awarded contributed talk.)
- [link] Xia, R., Bruinsma W. P., Tebbutt W., and Turner R. E. (2021). “The Gaussian Process Latent Autoregressive Model,” in *Advances in Approximate Bayesian Inference (AABI), 3rd Symposium on*.
- [link] Foong, A. Y. K., Bruinsma W. P., Gordon, J., Dubois, Y., Requeima J., and Turner R. E. (2020). “Meta-Learning Stationary Stochastic Process Prediction with Convolutional Neural Processes,” in *Advances in Neural Information Processing Systems (NeurIPS), 33th*.
- [link] Bruinsma, W. P., Perim E., Tebbutt W., Hosking J. S., Solin A., Turner R. E. (2020). “Scalable Exact Inference in Multi-Output Gaussian Processes,” in *International Conference on Machine Learning (ICML), 37th*.
- [link] Gordon, J., Bruinsma, W. P., Foong, A. Y. K., Requeima, J., Dubois, Y., and Turner, R. E. (2020). “Convolutional Conditional Neural Processes,” in *International Conference on Learning Representations (ICLR), 8th*. (Awarded oral presentation.)
- [link] Berkovich, P., Perim, E., and Bruinsma, W. P. (2019) “GP-ALPS: Automatic Latent Process Selection for Multi-Output Gaussian Process Models,” in *Advanced in Approximate Bayesian Inference (AABI), 2nd Symposium on*.
- [link] Requeima, J. R., Tebbutt, W. C., Bruinsma, W. P., and Turner, R. E. (2019). “The Gaussian Process Autoregressive Regression Model (GPAR),” in *Artificial Intelligence and Statistics (AISTATS), 22nd International Conference on*.
- [link] Bruinsma, W. P. and Turner, R. E. (2018). “Learning Causally-Generated Time Series,” in *arXiv preprint:1802.08167*.
- [link] Bosma, S., Bruinsma, W. P., Hes, R. P., Bentum, M. J., and Lager, I. E. (2017). “Grating Lobe Prediction in 3D Array Antennas,” in *Antennas and Propagation (EuCAP), 11th European Conference on*.
- [link] Bruinsma, W. P., Hes, R. P., Bosma, S., Lager, I. E., and Bentum, M. J. (2016). “Radiation Properties of Moving Constellations of (Nano) Satellites: A Complexity Study,” in *Antennas and Propagation (EuCAP), 10th European Conference on*.
- [link] Bentum, M. J., Lager, I. E., Bosma, S., Bruinsma, W. P., and Hes, R. P. (2015). “Beamforming in Sparse, Random, 3D Array Antennas with Fluctuating Element Locations,” in *Antennas and Propagation (EuCAP), 9th European Conference on*.

AWARDS AND GRANTS

Jan 2022	Christ’s College Excellence in Teaching Prize
2018–2021	International Doctoral Scholarship (IDS) Grant Covering PhD Fees and Stipend
Mar 2016	UfD – Damen Bachelor Award

INVITED TALKS

Oct 2024	Advancing Ecosystem Carbon Flux Research • Foundation Models for Earth Systems	Leiden, NL
Jan 2024	Center for Basic Machine Learning in Life Sciences (MLLS) • Autoregressive Conditional Neural Processes	Copenhagen, DK
Feb 2022	Sheffield Machine Learning Group Seminar Series • Meta-Learning as Prediction Map Approximation	Sheffield, UK
Jan 2019	Online Winter School on Spectral Methods for Complex Systems • Spectral Methods in Gaussian Modelling	Online

MACHINE LEARNING SOFTWARE

- [\[link\]](#) *Stheno*: Probabilistic programming with Gaussian processes in Python
- [\[link\]](#) *Aurora*: Implementation of the Aurora model for atmospheric forecasting in Python
- [\[link\]](#) *GPAR*: Implementation of GPAR in Python
- [\[link\]](#) *NeuralProcesses.jl*: A framework for composing Neural Processes in Julia
- [\[link\]](#) *NeuralProcesses*: A framework for composing Neural Processes in Python
- [\[link\]](#) *ConvCNP*: Implementation of the ConvCNP in Python
- [\[link\]](#) *GPCM*: Implementation of several variants of the Gaussian Process Convolution Model in Python
- [\[link\]](#) *OILMM*: Implementation of the OILMM in Python
- [\[link\]](#) *MLKernels*: Flexible implementation of kernels in Python

OTHER SOFTWARE

- [\[link\]](#) *Plum*: Implementation of multiple dispatch in Python
- [\[link\]](#) *LAB*: A generic interface for linear algebra backends in Python
- [\[link\]](#) *FDM*: Estimate derivatives with finite differences in Python
- [\[link\]](#) *FiniteDifferences.jl*: Estimate derivatives with finite differences in Julia
- [\[link\]](#) *Varz*: Painless optimisation of constrained variables in AutoGrad, TensorFlow, PyTorch, and JAX
- [\[link\]](#) *Matrix*: Structured matrices in Python
- [\[link\]](#) *Algebra*: Algebraic structures in Python

THESES

- [\[link\]](#) Bruinsma, W. P. (2022). “Convolutional Conditional Neural Processes.” Department of Engineering, University of Cambridge. Thesis for the degree Doctor of Philosophy.
- [\[link\]](#) Bruinsma, W. P. (2016). “The Generalised Gaussian Process Convolution Model.” Department of Engineering, University of Cambridge. Thesis for the degree Master of Philosophy.
- [\[link\]](#) Bruinsma, W. P., Hes, R. P., Kroep, H. J. C., Leliveld, T. C., Melching, W. M., and aan de Wiel, T. A. (2015). “An Extensible Toolkit for Real-Time High-Performance Wideband Spectrum Sensing.” Faculty of Electrical Engineering, Mathematics and Computer Science, Delft University of Technology. Thesis for the degree Bachelor of Science.

REVIEWING

AABI 2024	Reviewer
NeurIPS 2023	Reviewer
ICML 2023	Reviewer
GPSMDMS 2022	Reviewer
ICML 2022	Reviewer (top 10%)
AISTATS 2022	Reviewer
ICML 2021	Reviewer
NeurIPS 2020	Reviewer

TEACHING

All below teaching was done at the University of Cambridge.

Easter 2022	Cosupervisor for two MPhil Projects	MPhil in Machine Learning and Machine Intelligence
Easter 2021	Cosupervisor for two MPhil Projects	MPhil in Machine Learning and Machine Intelligence
Lent 2021	Supervisor for Inference	Part IIA, Engineering Tripos
Michaelmas '21	Supervisor for Introduction to ML	MPhil in Machine Learning and Machine Intelligence
Easter 2020	Cosupervisor for MPhil Project	MPhil in Machine Learning and Machine Intelligence
Lent 2020	Supervisor for Inference	Part IIA, Engineering Tripos
Michaelmas '20	Demonstrator	AI for the study of Environmental Risks (CDT)
Michaelmas '20	Demonstrator	MPhil in Machine Learning and Machine Intelligence
Lent 2019	Supervisor for Inference	Part IIA, Engineering Tripos

FULL PORTFOLIO

See wesselb.github.io/publications and wesselb.github.io/software for a full overview of my software, publications, posters, theses, talks, and write-ups.