David Burt

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Professional Experience

Postdoctoral Associate
Massachusetts Institute of Technology **2022-**
Laboratory for Information and Decision Systems
Supervised by Prof. Tamara Broderick

Education

PhD in Engineering (Machine Learning Group)
University of Cambridge **2018-2022**
Supervised by Prof. Carl Edward Rasmussen. Thesis title: *Scalable Approximate Inference and Model Selection for Gaussian Process Regression.*

MPhil in Machine Learning, Speech and Language Technology
University of Cambridge **2017-2018**
Pass with distinction. Research Component Supervised by Dr. Mark van der Wilk and Prof. Carl Edward Rasmussen. Dissertation title: *Spectral Methods in Gaussian Process Approximations.*

Bachelor of Arts (Mathematics)
Williams College **2013-2017**
Summa cum laude (GPA in top 2% of graduating class).

Under Submission

Renato Berlinghieri*, **David R. Burt***, Paolo Giani, Arlene M. Fiore, and Tamara Broderick. Are hourly PM2.5 forecasts sufficiently accurate to plan your day? Individual decision making in the face of increasing wildfire smoke, 2025

Journal Papers

Jenny Y. Huang, **David R. Burt**, Yunyi Shen, Tin D. Nguyen, and Tamara Broderick. Approximations to worst-case data dropping: unmasking failure modes. In *Transactions on Machine Learning Research*, 2025

Alexander Terenin*, **David R. Burt***, Artem Artemev*, Mark van der Wilk Seth Flaxman, Carl Edward Rasmussen, and Hong Ge. Numerically stable sparse Gaussian processes via minimum separation using cover trees. *Journal of Machine Learning Research*, 2023

David R. Burt, Carl Edward Rasmussen, and Mark van der Wilk. Convergence of sparse variational inference in Gaussian processes regression. *Journal of Machine Learning Research*, 2020. Extended version of *Rates of convergence for sparse variational Gaussian process regression*

Conference Papers

David R. Burt*, Renato Berlinghieri*, Stephen Bates, and Tamara Broderick. Smooth sailing: Lipschitz-driven uncertainty quantification for spatial associations. In *Neural Information Processing Systems (NeurIPS)*, 2025. *To appear*

David R. Burt, Yunyi Shen, and Tamara Broderick. Consistent validation for predictive methods in spatial settings. In *Artificial Intelligence and Statistics (AISTATS)*, 2025

Renato Berlinghieri, Brian L. Trippe, **David R. Burt**, Ryan Giordano, Kaushik Srinivasan, Tamay Özgökmen, Junfei Xia, and Tamara Broderick. Gaussian processes at the Helm(holtz): A more fluid model for ocean currents. In *International Conference on Machine Learning (ICML)*, 2023

* denotes equal contribution

Vidhi Lalchand, Wessel P. Bruinsma, **David R. Burt**, and Carl Edward Rasmussen. Sparse Gaussian process hyperparameters: Optimize or integrate? In *Neural Information Processing Systems (NeurIPS)*, 2022

Beau Coker*, Wessel P. Bruinsma*, **David R. Burt***, Weiwei Pan, and Finale Doshi-Velez. Wide mean-field Bayesian neural networks ignore the data. In *Artificial Intelligence and Statistics (AISTATS)*, 2022

Andrew Y.K. Foong*, Wessel Bruinsma*, **David R. Burt**, and Richard E. Turner. How tight can PAC-Bayes be in the small data regime? In *Neural Information Processing Systems (NeurIPS)*, 2021

Artem Artemev*, **David R. Burt***, and Mark van der Wilk. Tighter bounds on the log marginal likelihood of Gaussian process regression using conjugate gradients. In *International Conference on Machine Learning (ICML)*, 2021

Andrew Y. K. Foong*, **David R. Burt***, Yingzhen Li, and Richard E. Turner. On the expressiveness of approximate inference in Bayesian neural networks. In *Neural Information Processing Systems (NeurIPS)*, 2020

David Janz, **David R. Burt**, and Javier González. Bandit optimisation of functions in the Matérn kernel RKHS. In *Artificial Intelligence and Statistics AISTATS*, 2020

David R. Burt, Carl Edward Rasmussen, and Mark van der Wilk. Rates of convergence for sparse variational Gaussian process regression. In *International Conference on Machine Learning (ICML)*, 2019. **Best Paper Award**

Workshop Papers

David R. Burt*, Artem Artemev*, and Mark van der Wilk. Barely biased learning for Gaussian process regression. In *I (Still) Can't Believe It's Not Better! NeurIPS Workshop*, 2021

David R. Burt, Sebastian W. Ober, Adrià Garriga-Alonso, and Mark van der Wilk. Understanding variational inference in function-space. In *Symposium on Advances in Approximate Bayesian Inference*, 2020

Andrew Y. K. Foong*, **David R. Burt***, Yingzhen Li, and Richard E. Turner. Pathologies of factorised Gaussian and MC dropout posteriors in Bayesian neural networks. In *Workshop on Bayesian Deep Learning, NeurIPS*, 2019

David R. Burt, Carl Edward Rasmussen, and Mark van der Wilk. Explicit rates of convergence for sparse variational inference in Gaussian process regression. In *Symposium on Advances in Approximate Bayesian Inference, NeurIPS*, 2018

Preprints

David R. Burt*, Renato Berlinghieri, and Tamara Broderick. Wrong model, right uncertainty: Spatial associations for discrete data with misspecification, 2025

Andrew Y.K. Foong, Wessel P. Bruinsma, and **David R. Burt**. A note on the Chernoff bound for random variables in the unit interval, 2022

David R. Burt, Carl Edward Rasmussen, and Mark van der Wilk. Variational orthogonal features, 2020

Reviewing

Advances in Approximate Bayesian Inference 2023; AISTATS 2021, 2025; I Can't Believe It's not Better NeurIPS Workshop, 2020; ICLR 2022 *(highlighted reviewer)*, 2023; ICML 2025; JMLR 2021-2023; NeurIPS 2021 *(outstanding reviewer)*, 2022, 2024, 2025; TMLR 2022-2023.

Teaching

Department of Engineering, University of Cambridge
Undergraduate Supervisor
3F3: Statistical Signal Processing — *Fall 2019*
3F8: Inference — *Winter 2020, Winter 2021*
Held small groups (2-3 students) review sessions.

Department of Mathematics and Statistics, Williams College
Teaching Assistant
Math 341: Probability — *Spring 2015, Spring 2017*
Held supplementary problem solving sessions and graded homework.

Scholarships and Awards

Qualcomm Innovation Fellowship (Europe): Fellowship in the amount of $40000 awarded on the basis of a research proposal. Selected in 2020.

Dr. Herchel Smith Fellowship: Fellowship awarded to graduating seniors at Williams college for graduate study at University of Cambridge. Selected in 2017.

Barry M. Goldwater Scholarship: Merit based, national (USA) scholarship in the amount of $7,500 awarded to undergraduates for promise in research in natural sciences, mathematics or engineering. Selected in 2016.

Rosenberg Prize for Excellence in Mathematics: Awarded to one or several seniors at Williams College for excellence in mathematics. Selected in 2017.

Computer Skills

Python, Tensorflow, LaTeX

Research Interests

Spatial machine learning and statistics, predictive validation, uncertainty quantification, Gaussian processes and kernel methods, Bayesian methods