

# ANDREW Y. K. FOONG

Personal website: <https://andrewfoongyk.github.io/>

Google Scholar: <https://scholar.google.com/citations?user=2U0jgIUAAAAJ&hl=en>

## EXPERIENCE

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### Microsoft Research Cambridge

November 2023 - Present

*Senior Researcher*

- Research on deep learning applied to molecular modelling in the AI4Science team. Conceptualised, developed, trained and evaluated novel probabilistic deep generative models to predict the time-evolution of protein dynamics. Ran large-scale computational experiments on Azure.

### DeepMind London

February 2022 - May 2022

*Research Scientist Intern*

- Research on data-efficient and Bayesian learning under Dr. Michalis Titsias. Designed and implemented novel deep generative models.

### Microsoft Research Cambridge

July 2021 - October 2021

*Research Intern*

- Research on deep learning for molecular simulation under Dr. Sebastian Nowozin.

### Cambridge University Engineering Department

2018 - 2021

*Undergraduate Supervisor (analogous to US teaching assistant)*

- Supervised third-year undergraduates in small group teaching sessions for the modules 3F7 Information Theory and 3F8 Inference.

### Cambridge University Engineering Department

Summer 2016

*Undergraduate Research Opportunities Program*

- Research under Prof. Robin Langley on the theoretical foundations of statistical mechanics. Wrote hard-sphere molecular dynamics simulation programs in MATLAB.

## EDUCATION

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### Ph.D. in Machine Learning, University of Cambridge

October 2018 - November 2022

Thesis: *Approximate Inference in Bayesian Neural Networks and Translation Equivariant Neural Processes*.

Ph.D. under Professor Richard E. Turner at the Computational and Biological Learning Lab. Research areas: Bayesian deep learning, approximate inference, deep generative models, meta-learning, equivariances, PAC-Bayes, molecular simulation.

### MEng and BA in Engineering, University of Cambridge

October 2014 - June 2018

*First Class Honors with Distinction*

Specialised in information and computer engineering, with Master's project on approximate inference and information theory. Scored in the top first or second percentile in year group of ~300 students for first three years, awarded Institution of Engineering and Technology Prize in 4th year.

## RESEARCH PAPERS

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- Leon Klein\*, **Andrew Y. K. Foong\***, Tor Erlend Fjelde\*, Bruno Mlodozieniec\*, Marc Brockschmidt, Sebastian Nowozin, Frank Noé, Ryota Tomioka. Timewarp: Transferable Acceleration of Molecular Dynamics by Learning Time-Coarsened Dynamics. *arXiv preprint arXiv:2302.01170*. Under review.
- Wessel P. Bruinsma\*, Stratis Markou\*, James Requeima\*, **Andrew Y. K. Foong\***, Tom R. Andersson, Anna Vaughan, Anthony Buonomo, J. Scott Hosking, Richard E. Turner. Autoregressive Conditional Neural Processes. To appear in *International Conference on Learning Representations*, 2023.
- **Andrew Y. K. Foong\***, Wessel P. Bruinsma\*, David R. Burt, Richard E. Turner. How Tight Can PAC-Bayes be in the Small Data Regime? In *Neural Information Processing Systems*, 2021.
- Marcin B. Tomczak, Siddharth Swaroop, **Andrew Y. K. Foong**, Richard E. Turner. Collapsed Variational Bounds for Bayesian Neural Networks. In *Neural Information Processing Systems*, 2021.
- Wessel P. Bruinsma, James Requeima, **Andrew Y. K. Foong**, Jonathan Gordon, Richard E. Turner. The Gaussian Neural Process. In *Symposium on Advances in Approximate Bayesian Inference*, 2021.
- **Andrew Y. K. Foong\***, Wessel P. Bruinsma\*, Jonathan Gordon\*, Yann Dubois, James Requeima, Richard E. Turner. Meta-Learning Stationary Stochastic Process Prediction with Convolutional Neural Processes. In *Neural Information Processing Systems*, 2020. Accompanying blog: <https://yanndubs.github.io/Neural-Process-Family>
- **Andrew Y. K. Foong\***, David R. Burt\*, Yingzhen Li, Richard E. Turner. On the Expressiveness of Approximate Inference in Bayesian Neural Networks. In *Neural Information Processing Systems*, 2020.
- Tim Pearce, **Andrew Y. K. Foong**, Alexandra Brintrup. Structured Weight Priors for Convolutional Neural Networks. In *Uncertainty in Deep Learning Workshop, ICML*, 2020.
- **Andrew Y. K. Foong\***, David R. Burt\*, Yingzhen Li, Richard E. Turner. Pathologies of Factorised Gaussian and MC Dropout Posteriors in Bayesian Neural Networks. In *Bayesian Deep Learning Workshop, NeurIPS*, 2019.
- Jonathan Gordon\*, Wessel P. Bruinsma\*, **Andrew Y. K. Foong**, James Requeima, Yann Dubois, Richard E. Turner. Convolutional Conditional Neural Processes. In *International Conference on Learning Representations*, 2020. (Oral presentation)
- **Andrew Y. K. Foong**, Yingzhen Li, José Miguel Hernández-Lobato, Richard E. Turner. ‘In-Between’ Uncertainty in Bayesian Neural Networks. In *Uncertainty in Deep Learning Workshop, ICML*, 2019. (Oral presentation)

## ORGANISATION AND REVIEWING

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- Organiser for the NeurIPS 2021 Approximate Inference in Bayesian Deep Learning Competition.
- Reviewer for Journal of Machine Learning Research (JMLR), AISTATS 2021, ICML 2020 Uncertainty in Deep Learning Workshop, NeurIPS 2019 Bayesian Deep Learning Workshop.

## AWARDS AND SCHOLARSHIPS

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<b>Trinity Hall Research Studentship</b> Ph.D. Funding.	2018-2021
<b>George and Lilian Schiff Foundation Studentship</b> Ph.D. Funding.	2018-2021
<b>Institution of Engineering and Technology Prize</b> For outstanding students who have completed an IET accredited course.	2018
<b>Institution of Civil Engineers Baker Prize</b> Awarded to the two highest scoring students in the Cambridge third-year Engineering course.	2017
<b>BP First Year Prize</b> Awarded to the four highest scoring students in the Cambridge first-year Engineering course.	2015

## SOFTWARE PROFICIENCIES

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· Python, git, GitHub, PyTorch, JAX, NumPy, MATLAB, L<sup>A</sup>T<sub>E</sub>X