

# ANDREW Y. K. FOONG

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

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

## EXPERIENCE

---

### Mayo Clinic

January 2025 - Present

*AI Scientist, Senior Associate Consultant*

- Co-director of the AI and Data Analytics team in the Department of Radiation Oncology at Mayo Clinic in Rochester, Minnesota. Overseeing the research and development of machine learning solutions that directly impact cancer care.

### Microsoft Research Cambridge

November 2022 - November 2024

*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

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 Langle on the theoretical foundations of statistical mechanics. Wrote hard-sphere molecular dynamics simulation programs in MATLAB.

## EDUCATION

---

### Ph.D. in Engineering, University of Cambridge

October 2018 - November 2022

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

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

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

---

- Sarah Lewis\*, Tim Hempel\*, Jos Jiménez-Luna\*, Michael Gastegger\*, Yu Xie\*, **Andrew Y. K. Foong\***, Victor Garca Satorras\*, Osama Abidin\*, Bastiaan S. Veeling\*, Iryna Zaporozhets, Yaoyi Chen, Soojung Yang, Arne Schneuing, Jigyasa Nigam, Federico Barbero, Vincent Stimper, Andrew Campbell, Jason Yim, Marten Lienen, Yu Shi, Shuxin Zheng, Hannes Schulz, Usman Munir, Cecilia Clementi, Frank Noé. Scalable emulation of protein equilibrium ensembles with generative deep learning. *bioArXiv preprint 2024.12.05.626885*.
- Richard E. Turner, Cristiana-Diana Diaconu, Stratis Markou, Aliaksandra Shysheya, **Andrew Y. K. Foong**, Bruno Mlodozienec. Denoising Diffusion Probabilistic Models in Six Simple Steps. *arXiv preprint 2402.04384*.
- Jason Yim, Andrew Campbell, Emile Mathieu, **Andrew Y. K. Foong**, Michael Gastegger, Jos Jimnez-Luna, Sarah Lewis, Victor Garcia Satorras, Bastiaan S. Veeling, Frank Noé, Regina Barzilay, Tommi Jaakkola. Improved motif-scaffolding with SE(3) flow matching. *arXiv preprint 2401.04082*. Under review.
- Jason Yim, Andrew Campbell, **Andrew Y. K. Foong**, Michael Gastegger, Jos Jimnez-Luna, Sarah Lewis, Victor Garcia Satorras, Bastiaan S. Veeling, Regina Barzilay, Tommi Jaakkola, Frank Noé. Fast protein backbone generation with SE(3) flow matching. In *Machine Learning for Structural Biology Workshop, NeurIPS, 2023*.
- Leon Klein\*, **Andrew Y. K. Foong\***, Tor Erlend Fjelde\*, Bruno Mlodozienec\*, Marc Brockschmidt, Sebastian Nowozin, Frank Noé, Ryota Tomioka. Timewarp: Transferable Acceleration of Molecular Dynamics by Learning Time-Coarsened Dynamics. In *Neural Information Processing Systems, 2023*. (Spotlight)
- Wessel P. Bruinsma\*, Stratis Markou\*, James Requiema\*, **Andrew Y. K. Foong\***, Tom R. Andersson, Anna Vaughan, Anthony Buonomo, J. Scott Hosking, Richard E. Turner. Autoregressive Conditional Neural Processes. 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

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

---

## AWARDS AND SCHOLARSHIPS

<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

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

---

## REFERENCES

Available upon request.