

# David Liu

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## Education

- 2020-current **PhD Computational Neuroscience**  
University of Cambridge, Wolfson College  
Supervised by Prof Máté Lengyel at the Computational and Biological Learning Lab  
Topics: Neural variability, statistical neuroscience, probabilistic machine learning
- 2015-2019 **MSci and BA (Hons) Natural Sciences**  
University of Cambridge, Queens' College  
Result: Quadruple First Class, ranked 2/92 in Part III Physics (4<sup>th</sup> year) and 7/140 in Part II (specialization computational and theoretical physics, 3<sup>rd</sup> year)  
Dissertation: Signal propagation in systems of hydrodynamically coupled active oscillators (supervised by Prof Pietro Cicuta, in progress for publication)

## Publications

### Conference papers

- Liu D**, Lengyel M. Bayesian nonparametric (non-)renewal processes for analyzing neural spike train variability. *Advances in Neural Information Processing Systems* (2023).
- Liu D**, Lengyel M. A universal probabilistic spike count model reveals ongoing modulation of neural variability. *Advances in Neural Information Processing Systems* (2021).

### Conference abstracts

- Liu D**, Amvrosiadis T, Rochefort N, Lengyel M. Diverse covariates modulate neural variability: a widespread (sub)cortical phenomenon. *Cosyne Abstracts* (2022).
- Jensen KT, **Liu D**, Kao TC, Tripodi M, Lengyel M, Hennequin G. Beyond the Euclidean brain: inferring non-Euclidean latent trajectories from spike trains. *Cosyne Abstracts* (2021).

## Journal papers

- Stimper V, **Liu D**, Campbell A, Berenz V, Ryll L, Schölkopf B, Hernández-Lobato JM. normflows: A PyTorch Package for Normalizing Flows. *Journal of Open Source Software* (2023).

## Research experience

- 2023 **Quantitative Research intern, G-research London**  
Summer internship as Quantitative Researcher working on Time Series Forecasting
- 2022 **Research Scientist intern (neuromotor interfaces), Reality Labs NYC**  
Interned at the Science team of the neuromotor interface group at Meta Reality Labs (previously CTRL labs), working on modelling, signal processing and deep learning of wrist EMG signals
- 2018 **Ludwig-Prandtl internship, MPIDS Göttingen**  
Worked with Dr Marco G. Mazza on formulating a Langevin-type equation for self-diffusion in charged granular gases based on theory and MD simulations

- 2017      **Undergraduate internship, Maxwell Centre Cambridge**  
 Joined the Sebastian Quantum group working on low temperature experimental physics.  
 Measured heat capacities and studied quantum oscillations in crystals
- 2013-2014      **Junior Med School, Erasmus Medical Centre, Rotterdam**  
 Pre-university Medical School research programme, joined the Frens neuroscience lab studying cerebellum motor control by conducting and analysing experiments with human subjects

## Work experience

- 2016      **Summer software internship at Siemens Traffic Solutions Poole**  
 Developed a tool in Java for converting and editing navigation map files

## Thesis supervision

- 2023      Njaradi V. *Neural variability in head direction cells*. MEng thesis. University of Cambridge. Co-supervised with Máté Lengyel.
- 2021      De Paepe M. *Statistical models of theta phase precession in place cell firing*. MEng thesis. University of Cambridge. Co-supervised with Máté Lengyel.

## Teaching

- 2020-2023      **Supervisor, University of Cambridge**  
 Supervising undergraduate engineering courses on statistical signal processing (3F3) and mathematical physiology (3G2)
- 2018-2019      **Online tutoring, MyTutor**  
 IB, A level and GCSE tutoring with topics in mathematics, physics, chemistry, and biology.  
 Provided mentorship with university applications

## Service

- Refereeing**
- 2022      International Conference on Artificial Intelligence and Statistics
- 2022      NeurIPS Workshop on Gaussian Processes, Spatiotemporal Modeling, and Decision-making Systems
- Organization**
- 2020-2023      Executive Chairman, Cambridge University Artificial Intelligence society
- 2021      Setting up foundational NLP framework using BioBERT for parsing medical literature, CardiaTec
- 2020-2021      Introductory workshops on machine learning for undergraduates, University of Cambridge

## Summer Schools

- 2020      **Poster presentation, Eastern European Machine Learning Summer School**  
 Work applying recent normalizing flow models to approximate complicated probability densities

## Awards

- 2020-current      **Cambridge Trust Scholar**
- Undergraduate prizes**
- 2017-2019      Foundation Scholar of Queens' College, Cambridge
- 2019      President's Prize NatSci - awarded to a 4th year undergraduate for distinction
- 2018      The Chalmers Prize - for best first of the current academic year in Physics

2018 Treglowan Fund - travel grant for research projects  
2017 Alison Roper Prize - all round award for excellence in Natural Sciences

#### **Other awards**

2015 Honourable mention (top 67%), 46<sup>th</sup> International Physics Olympiad  
2015 3<sup>rd</sup> place, Dutch National Physics Olympiad  
2014 9<sup>th</sup> place, Dutch National Biology Olympiad

#### **Technical Skills**

Python, C++, MATLAB – experienced for scientific modelling and data analysis  
PyTorch – experienced for building machine learning models  
JAX – familiar for differentiable computational modelling  
CUDA C, OpenGL, Java, React, React Native – basic knowledge and use  
Tools: LaTeX, git, Linux command line, Microsoft Office

#### **Other interests and skills**

Fluent in English, Mandarin and Dutch  
2018-2019 Principal violist in the Cambridge University Sinfonia, and violist in symphonic projects with the Cambridge University Orchestra  
2015 DELF B2 level diploma for French language  
2015 Pre-conservatory level piano examination, practice and theory  
2013 Performed in piano trio at the Storioni Festival, Eindhoven

Signature:

