

# 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

Developing novel neural data analysis methods to study neural variability

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

### Preprints

D. Liu, M. Lengyel. A universal probabilistic spike count model reveals ongoing modulation of neural variability. *bioRxiv*, 2021.

### Conference abstracts

K. T. Jensen, D. Liu, T.-C. Kao, M. Tripodi, M. Lengyel, G. Hennequin. Beyond the Euclidean brain: inferring non-Euclidean latent trajectories from spike trains. Cosyne Abstracts 2021.

## Research experience

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 programme consisting of lectures on medical topics followed by a research project. I joined the Frens neuroscience lab, studying motor control by conducting and analysing arm movement experiments with human subjects

## Work experience

2016 **Summer placement at Siemens Traffic Solutions Poole**

Developed a tool in Java for converting and editing navigation map files

## Teaching

2020-2021 **Supervisor, University of Cambridge**

Co-supervised master's student with Prof Máté Lengyel on applying Bayesian nonparametric methods to studying rat hippocampal theta precession in 1D and 2D navigation

- 2020            **Introductory workshops on machine learning, University of Cambridge**  
 Helped running and teaching ML workshops for all members of technical student societies.  
 Covered theory for backpropagation, PyTorch code sessions, CNNs for image data, RNNs for  
 language data, and writing DNNs from scratch
- 2018-2019      **Online tutoring, MyTutor**  
 IB, A level and GCSE tutoring with topics in mathematics, physics, chemistry, and biology.  
 Provided mentorship with university applications

## Organization

- 2020-current    **Executive Chairman, Cambridge University Artificial Intelligence society (CuAI)**  
 Part of the executive committee. Invited speakers and organized talks from big institutions as  
 Microsoft and Google Brain, discussed and planned other events, committee recruitment, and  
 setting up society sponsorships
- 2021            **Technical collaboration with student start-up CardiaTec**  
 Collaborated with founders of CardiaTec as part of a joint project with CuAI. Formed teams and  
 helped design a natural language processing pipeline using BioBERT to parse medical literature  
 and extract protein relations, used to construct a knowledge graph

## Summer Schools

- 2020            **Poster presentation, Eastern European Machine Learning Summer School**  
 Presented work on 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  
 OpenGL – familiar for basic game development  
 CUDA C, 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	DELFI 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