# Louis Robinson



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Research Engineer with 5 years experience in large-scale ML systems, specialising in generative models, protein modelling, and efficient training.

## WORK EXPERIENCE

**2021 Oct-Present | Research Engineer, InstaDeep**
InstaDeep, 5 Merchant Sq, London W2 1AY.
Contributed to product development and internal research projects in cryo-EM, cryo-ET, mRNA optimisation, TCR binding and protein modelling. Work spans Bayesian flow networks for protein structure, sequence and function; Feynman–Kac steering and twisted SMC; stochastic interpolants; and kernel development and performance optimisation.

**2019 Jul-Sep | Research Assistant, Oxford University**
University of Oxford, Nuffield Department of Primary Health Care Sciences, Oxford OX2 6GG.
Contributed to a systematic review of obesity research.

## RESEARCH

†= Under Submission

†*CryoPose: Supervised Single Particle Cryo Electron Microscopy Prediction*
Louis Robinson, Jonas Miehling, Sebastien Maignan and Liviu Copoiu
A neural network for direct pose prediction in single-particle cryo-EM.

†*A multimodal generative model for antibody design*
Miles McGibbon, Adam Leach, Jack Simons, Dylan Dissanayake, Jack Sawdon, Shaun Kandathil, Louis Robinson, Miguel Pinto Leite De Braganca, Maxime Seince, Krisztina Sinkovics, Silvia Acosta Gutiérrez, Jules Tilly, Bora Guloglu
MAbGen jointly models antibody sequences, structures and properties; enabling arbitrary combinations of conditioning variables at inference via FK-steering and twisted SMC sampling.

**2026 Oct** *Causal Edit Serialization*
NeurIPS main track -- accepted | Louis Robinson
A framework that enables autoregressive language models to generate explicit edit programs with pointers to source text, unifying text generation and localised revision.

**2026 Sept** *Stix: Stochastic Interpolants in JAX*
Valentin Heyraud, Jack Simons, Maxime Seince, Miguel Pinto Leite De Braganca, Christoph Brunken, Louis Robinson, Adam Leach, Jules Tilly
JAX library for training and sampling generative models with stochastic interpolants.

**2025 Apr** *Protein Sequence Modelling with Bayesian Flow Networks*
Nature Communications | Timothy Atkinson, Thomas D Barrett, Scott Cameron, Bora Guloglu, Matthew Greenig, Charlie B. Tan, Louis Robinson, Alex Graves, Liviu Copoiu, Alexandre Laterre
Introduced ProtBFN, a 650M parameter model trained on UniProtKB.

**2023 Dec** *Contrasting sequence with structure: Pre-training graph representations with PLMs*
MLSB, NeurIPS workshop | Louis Robinson, Timothy Atkinson, Liviu Copoiu, Patrick Bordes, Thomas Pierrot, Thomas D Barrett
GNN pretrained contrastively with ESM2; fine-tuned for protein function and binding-site prediction.

**2022 Oct** *So manyfolds, so little time: efficient protein structure prediction with pLMs and MSAs*
MLSB, NeurIPS workshop | Thomas D Barrett, Amelia Villegas-Morcillo, Louis Robinson, Benoit Gaujac, David Admete, Elia Saquand, Karim Beguir, Arthur Flajolet
Protein structure prediction model combining ESM2 representations with multiple sequence alignments.

## EDUCATION

**MSc Machine Learning | UCL**
**2020-21** *First Class*
**Dissertation:** Adapting AlphaFold for RNA Structure Prediction

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|---|---|
| Supervised Learning | Robotic Systems Engineering |
| Prob & Unsupervised Learning | Bioinformatics |
| Statistical Learning Theory & Kernels | Multi-Agent AI |
| Machine Vision | Machine Learning Seminar |

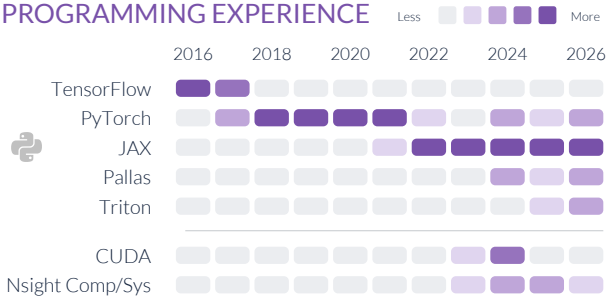
**MSci Natural Sciences | Durham University**
**2016-20** *First Class* - **Mathematics & Computer Science**
**Dissertation:** Determinantal Point Processes and Reinforcement Learning

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|---|---|---|
| **Mathematics:** | Operations Research | Decision Theory |
| Bayesian Statistics | Differential Geometry | Complex Analysis |
| Partial Differential Eqns | Quantum Information | Mathematical Physics |
| **Computer Science:** | Network Analysis | Recommender Systems |
| Bioinformatics | GPGPU programming | AI Search |
| Quantum Computing | Functional & Logic Prog. | Computer Graphics |

**A-Levels | Sir William Borlase's Grammar School**
**2014-16** Maths: A*, Further Maths: A*, Physics: A*, Chemistry: A, AS-Level Biology: B

**GCSEs | Gillotts Comprehensive Secondary School**
**2008-13** Mathematics: A, English: A, Physics: A, Chemistry: A, Biology: A

## PROGRAMMING EXPERIENCE




**Other Languages:** Haskell, C, C# (Unity), HTML, JS, SQL, Rust
**Dev Stack:** Git, Docker, GCP, AWS

## INDEPENDENT PROJECTS

2026 JAX distributed training layout-compiler.
2026 MoE in Pallas with roofline analysis (expert parallelism).
2026 Flash attention fwd+bwd (CUDA), paged attention.
2026 QAT methods, BitNet, GPTQ, TurboQuant.
2025 LLM-based simulation of common-pool resource dilemmas for AI safety research.
2025 MeanFlow, Geng et al.; Rectified Flows Liu et al., Consistency Training, Song et al. & Meta Flow Maps, Potaptchik et al.
2024 EDM, Karras et al. with the PF-ODE in TrigFlow, Lu et al. for noise/data/velocity prediction with SDE sampling.
2024 Atom diffusion. SO3 diffusion and flow matching.
2024 Image flow matching. Vision transformers, stable diffusion U-net, Fourier net, VAE for SP-CryoEM.
2023 Auto-regressive atom generative model for PDB assemblies.
2023 Custom JaxMD forcefields with artificially designed simple 'chemistry' of particles to explore model generalisation to novel combinations of these particles.
2022 Experiments with AlphaFold2 Jumper et al. re-trained on RNA structures; efficient MSA search with FAISS; fine-tuned binder prediction involving template alignment and gap tricks.
2022 Up-side MD, Jumper et al.
2021 Value-Decomposition Networks, Sunehag et al.
2020 Created a robot dog in Unity ML agents, trained with PPO.
2020 Every sequence algorithm in "Deep Learning" Goodfellow, Bengio & Courville. Neural Turing Machines, Graves et al.
2019 Every algorithm in "An Introduction to RL" Sutton & Barto.
2018 Search: A*, ant & bee colony, simulated annealing, genetic.

## COURSES & SELF-STUDY

- *How to Scale Your Model*, Google DeepMind.
- École Polytechnique, Density Functional Theory.
- Gromacs tutorials.
- UCL: RL course, David Silver.
- Stanford ML, Andrew Ng.
- MIT: AI, Patrick Winston.
- Udemy: ML A-Z (Python & R).
- Coursera: Princeton, Algorithms Part 1.

## AWARDS & ACHIEVEMENTS

**2021 Multi-Agent RL Coursework**
Best-performing model for counterfactual multi-agent policy gradients coursework.
**2020 Natural Sciences MSci Prizes:**
- Peter Rowe Undergraduate Memorial Prize from the Department of Mathematical Sciences, Durham.
- Natural Sciences Award Outstanding Achievement.

**2018 Travelling Salesman Problem Coursework**
Best-performing method: a simulated annealing algorithm.
**2015 STEM Crest project**
Studied vanadium redox batteries for renewable energy storage.
**2014 Engineering Headstart Course**
First prize for plane design, University of Bristol.
**2013 Music**
Grade 5 theory. Grade 6 level piano.
**2008 MindLab, UK**
Olympic Finals, Oxford.

## REFERENCES

References available on request.