Jamie McGowan

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I am a committed researcher with excellent communication skills. My research interests lie within the **interpretability** and understanding of **Generative AI** models across different modalities of data. I have hands-on experience in prototyping state-of-the-art techniques and proposing research that can **produce value** through products/services. I am fascinated by learning and I seek to exploit this in making **computers more intelligent**.

INTERESTS

Deep Learning | Mathematics | **Music** | Generative AI | **Coding** Reinforcement Learning | **Physics** | **Meta-Learning** | Bayesian Methods | Neuroscience | **Machine Learning**

EDUCATION

UNIVERSITY COLLEGE LONDON
PH.D. IN THEORETICAL PHYSICS
October 2022 | London

UNIVERSITY OF LEEDS
MPHYS (HONS) IN THEORETICAL PHYSICS
June 2018 | Leeds
Grade - 1:1

SHREWSBURY SIXTH FORM
A-LEVELS: MATHEMATICS (A*), PHYSICS (A*), BIOLOGY (A)
June 2014 | Shrewsbury

SKILLS

PROGRAMMING
Python • FORTRAN • C++ • Git • LaTeX • Bash • Swift • HTML

LIBRARIES
PyTorch • TensorFlow • Keras • Numpy • Scikit-Learn • Pandas • TensorBoard • And others...

REFEREES

Available upon request

For more information please scan the QR code!

RESEARCH EXPERIENCE

RESEARCH SCIENTIST | MEDIATEK RESEARCH
Oct 2022 - Present | London

- Led and contributed towards projects associated with the interpretability and application of **Generative AI**.
- Heavily involved in developing new and scalable **optimisation techniques** for pretraining and finetuning LLMs.
- Investigated techniques to enable the application of large AI models in **low resource** environments.

MACHINE LEARNING FELLOWSHIP | ASOS & UCL
January 2022 - October 2022 | London

- Funded short term **fellowship** to lead a collaborative project with the ML team at ASOS.
- Built a recommendation system to **predict customer returns** from user data using Graph Neural Networks (GNNs).
- As a fellow, I also **supervised three MSc students** who worked in our team as part of their final project.
- Outcome was a **submission** to the ACM Conference on Recommender Systems.

VISITING RESEARCHER | THE ALAN TURING INSTITUTE & ENTALE
April 2021 - May 2021 | London

- Two week intensive 'hackathon' working with GNN's and LDA models to produce a **podcast recommendation algorithm**.
- Cleaned a multimodal dataset and worked collaboratively with product owners at Entale, a podcast provider, to design a novel 'rabbit hole' style personalized recommendation system.

RESEARCH SCIENTIST INTERNSHIP | MEDIATEK RESEARCH
June 2020 – Sep 2020 | Cambourne, Cambridge

- Meta-Learning project based on an adaptation of the MAML algorithm for **hierarchical learning**. Working with Python and PyTorch.
- Achieved superior performance compared to similar meta-learning algorithms on **NLP tasks** by exploiting prior knowledge of the language tree.
- Co-authored and published the paper **Cross-Lingual Transfer with MAML on Trees**.

COMPUTER VISION PROJECT COLLABORATOR | UKAEA
Jan 2019 – May 2019 | Didcot, Oxford

- Proof of concept project to show that the **calibration of images** from 'shaky' cameras inside a **fusion reactor** could be automated.
- Extensive pre-processing of images using libraries such as OpenCV.
- Compared and contrasted custom and 'off-the-shelf' **ML techniques**.

PH.D. STUDENT | MSHT PARTON DISTRIBUTION FUNCTIONS
Oct 2018 - January 2022 | London

- Computational modelling of a variety of unknown **higher order functions** in perturbation theory, describing quantum interactions within particle collisions.
- Fitting approximate theory to datasets via second-order optimization to **quantify theoretical uncertainties** present in physical quantities calculated in quantum field theory.
- High impact and **award winning paper/thesis**.

FURTHER EXPERIENCE

LOCAL ICML ORGANISER | MediaTek Research & UCL

July 2024 | London

- Managed and organised a local meetup for ICML 2024 in London including multiple talks and more than 30 posters.
- Obtained funding from multiple institutions for the event.
- Gathered over 200 attendees from multiple academic and industry affiliations together.

MPHYS STUDENT | Unification of the Standard Model

Oct 2017 – May 2018 | Leeds

- Explored various **unification group** candidates including $SU(5)$, $SO(10)$ and E_6 with and without supersymmetry.
- Used the **running coupling** results to predict the mass scales in the symmetry breaking chain.
- Modelled the predictions using **minimisation techniques** in Python.

UNDERGRADUATE SUMMER RESEARCH | Theoretical & Condensed Matter Research Groups

June 2015 – May 2018 | Leeds

- Two **research projects** undertaken as an undergraduate working on thin film magnets and theoretical phases of matter.
- Made use of various pieces of **lab equipment** to design, build and test carbon based thin-film magnets.
- Computationally modelled **phases of matter** called 'Time Crystals' by manipulating Hamiltonian systems.

TEACHING ASSISTANT | University College London

Jan 2019 – Present | London

- Physics mentor for lower years during my undergraduate studies, providing **weekly workshops** to discuss topics in a small group.
- Postgraduate teaching assistant leading and assisting in **workshops for undergraduate modules** in Maths, Physics and Computing; marking coursework and exams; and answering student forum questions online.
- 3+ years experience in teaching **undergraduate Python** and 2+ years experience teaching **Software Carpentry** (mixture of Bash, Git and Python) at a postgraduate level.

STUDENT AMBASSADOR | University of Leeds

Jan 2015 – June 2018 | Leeds

- Student **ambassador for Physics**, representing the course at university events whilst giving **talks and tours**.
- Consulted on changes that would **affect undergraduates** (such as the construction of the new Physics building).
- Meeting and discussing with alumni and donors of the university at **networking events**.

PHYSICS COMMITTEE MEMBER | University of Leeds

Mar 2016 – May 2017 | Leeds

- Responsible for **organising trips** to Amsterdam and CERN in Geneva.
- **Applied for funding** to make the trips accessible to all students from **all backgrounds**.
- Able to bring the cost down to £5 per person through several grants championing inclusivity in the Physics society.

AWARDS

HIGH ENERGY PHYSICS PRIZE | 2023

- Highly competitive prize awarded to the **best overall and most impactful** thesis submission of the year.

RESEARCH & LEADERSHIP SCHOLARSHIP | 2015 - 2018

- One of two students selected to receive this scholarship across the faculty of Mathematics and Physical Sciences.
- Included funding for **summer research placements** within two different research groups as an undergraduate.
- Extensive development of **leadership and teamwork skills** through funded training provided by the scholarship.
- Regular opportunities through networking events with alumni and donors of the university to give **talks on my experiences and research**.

DEANS EXCELLENCE SCHOLARSHIP | 2014 - 2018

- Awarded to the **top performing students** in Physics & Astronomy.
- Continued to hold this award **throughout undergraduate** studies.

LIST OF PUBLICATIONS

EXACT, TRACTABLE GAUSS NEWTON OPTIMIZATION IN REVERSIBLE NEURAL NETWORKS | In Review, 2024
J. McGowan, D. Buffeli, W. Xu, A. Cioba, D. Shiu, G. Hennequin and A. Bernacchia

A UNIFIED APPROACH TO MODEL COMPRESSION USING FISHLEG | In Review, 2024
J. McGowan, J. Garcia, G. Hennequin and A. Bernacchia

CROSS-LINGUAL TRANSFER WITH MAML ON TREES | EACL Adapt-NLP, 2021
J. Garcia, F. Freddi, F. Liao, J. McGowan, T. Nieradzik, D. Shiu, Y. Tian and A. Bernacchia

MSHT20 N^{3}LO PARTON DISTRIBUTION FUNCTIONS WITH THEORETICAL UNCERTAINTIES | European Physical Journal C, January 2023
J. McGowan, T. Cridge, L.A. Harland-Lang and R. Thorne

A DATASET FOR LEARNING GRAPH REPRESENTATIONS TO PREDICT CUSTOMER RETURNS IN FASHION RETAIL | FashionXRecSys, 2022
J. McGowan, Fabon Dzogang, et. al.

RECOMMENDATION SYSTEMS FOR PODCAST DISCOVERY | The Alan Turing Institute, 2021
R. Chan, J. McGowan, I. Price, et. al.

POPULAR SCIENCE ARTICLES

TOPIC MODEL BASED RECOMMENDATION SYSTEMS | Towards Data Science, 2021
J. McGowan

WHAT ACTUALLY HAPPENS IN A PARTICLE COLLISION? | Particle Physics 101, 2021
J. McGowan

CAN MACHINES DREAM? | Towards Data Science, 2021
J. McGowan

GRADIENT DESCENT: OPTIMISATION AND INITIALISATION EXPLAINED | Towards Data Science, 2023
J. McGowan

A DEEP DIVE INTO IMAGEN | Towards Data Science, 2023
J. McGowan

AGI, AI, DL, ML...WHAT'S THE DIFFERENCE? | The Startup, 2021
J. McGowan

RECENT PUBLIC PRESENTATIONS

EXACT, TRACTABLE GAUSS-NEWTON OPTIMIZATION IN REVERSIBLE NEURAL NETWORKS | ICML Local Meetup, 2024, London

BEYOND NNLO IN GLOBAL PDF FITS | International Symposium of Multiparticle Dynamics, 2022, Scotland

MSHT20 APPROXIMATE N^{3}LO PARTON DISTRIBUTION FUNCTIONS WITH THEORETICAL UNCERTAINTIES | International Workshop on Deep-Inelastic Scattering and Related Subjects, 2022, Santiago de Compostela | IOP HEPP & APP 2022, RAL Oxford

PREDICTING CUSTOMER RETURNS WITH GRAPH NEURAL NETWORKS | UCL Data Intensive Science & Industry Annual Event, 2022, London

PODCAST RECOMMENDATIONS WITH MACHINE LEARNING | The Alan Turing Institute Data Study Group, 2021, London