Dr Matthew Doyle

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Accomplished PhD researcher in quantum fluid physics with expertise in quantum turbulence and superfluid dynamics. Experienced in developing computational simulations, designing experiments, and robust data analysis techniques. Strong background in teaching and mentoring, with proven ability to communicate complex scientific concepts effectively. Known for strong interpersonal skills, collaborative spirit and a supportive approach to teamwork and supervision. Skilled in multiple programming languages and scientific software, with a track record of published research and conference presentations.

Education

PhD	**University of Manchester**, Quantum Fluid Physics	2020 – 2024
MSci	**University of Bristol**, First-class honours in Physics	2016 – 2020
A-Level	**South Nottinghamshire Academy Sixth Form**, A*AA in Maths, Further Maths, and Physics	2014 – 2016

Experience

Private Maths and Physics Tutor, Independent Contractor — Manchester, UK — Jan 2025 – Now

- Tutored UK and international students in Mathematics and Physics at various levels, for various curricula around the world, including GCSE, A-Level, SAT, IB, AP and more.
- Created and delivered bespoke lesson plans and learning materials to meet individual student needs.
- Collaborated with other tutors (Luminary Education) to provide comprehensive and high-quality services.
- Developed a website ⧉ (React, Tailwind & TypeScript) to advertise my services, provide original learning resources and custom AI tools (via Gemini API) to assist with independent learning.

Expert AI Trainer, Independent Contractor — Manchester, UK — Jan 2025 – Now

- Trained AI models in the use of productivity software (G-Suite, Microsoft Office) by providing expert instruction and correction, with focus on MacOS-specific workflows and features.
- Created training datasets and evaluation rubrics to improve AI performance in complex physics, mathematics, programming, and critical reasoning tasks.
- Contributed to training of major language models including ChatGPT, Claude, and Gemini.

University of Manchester, Graduate Teaching Assistant — Manchester, UK — 2021 – 2024

- Delivered large-group tutorials in Foundations of Physics for 4 semesters
- Demonstrated in 2nd Year Physics Computing (Python, C++) Workshop classes for 2 semesters
- Lead demonstrator in 2nd Year Physics Laboratory for 3 semesters
  - Supervised and assessed students' experimental projects via interview and written reports
- GTA mentor role: provided training and support for new graduate teaching assistants

Aalto University, Visiting Researcher — Helsinki, Finland — 2023

- Collaborated with researchers to perform quantum turbulence experiments using superfluid vortex probes.
- Performed statistical analysis of extensive existing datasets using MATLAB.
- Used these results to direct further experimental activity during the month-long visit.

University of Bristol, Research Intern — Bristol, UK — 2019

2-month summer internship writing FORTRAN code and documentation in the Theoretical Physics Group

Research Projects

PhD Research: Simulating Quantum Turbulence — 2020 – 2024

- Developed and analysed novel simulations (FORTRAN, Python) of quantum vortex dynamics.
- Optimised solver algorithms, reducing simulation runtime from months to days for large mesh sizes.
- Presented research as (award winning ⧉) posters at numerous UK and international conferences.
- Utilised HPC clusters and remote connection to several unused laboratory computers (revived with Linux), connected to a single data storage system.

PhD Research: Visualising Quantum Turbulence   2022 – 2024
- Conducted risk assessments, operated rotating cryostat (< 1 K) and collected data from experiments.
- Developed video processing pipelines (Python, OpenCV) to detect and track tracer particles.
- Performed batch data analysis (Python, pandas) to extract vortex dynamics from observed particle motions.
- Collaborated in creation of a machine learning-based (TensorFlow) particle tracking system.

PhD Research: Designing Superfluid ^{4}He Flow Experiments   2020 – 2022
- Designed (CAD) and collaborated with technicians to construct a novel experimental apparatus.
- Built real-time data visualisation and remote experimental control software (Python, LabVIEW).
- Performed calibration measurements using classical (normal) fluids.

MSci Thesis: Particle Tracking in a Compact Linear Lepton Collider   2019 – 2020
- Evaluated track reconstruction algorithm efficiencies for CERN detector geometry.
- Simulated particle collisions using Geant4 on HPC clusters and generated analytics in Python.
- Thesis awarded commendation for outstanding research quality.

Marching Cubes for Fermi-Surface Calculations   2019
- Implemented a marching cubes algorithm to improve precision for electronic structure calculations by 1,000.
- Developed for a FORTRAN codebase, optimised using an OpenMP parallel computing approach.
- Visualised the Fermi surfaces of various materials using ggplot and matplotlib scripts.

Other Projects

Banner Generator Web App ⧉ ↻   2025
Developed an image editing app (Vue, Tailwind & TypeScript) for users to generate banners for social profiles.
- Created a user-friendly interface for creating banners with custom text, icons, images and backgrounds.
- Provides templates, layout sizes, image downloads, and a randomiser.

QFS2023 Conference ⧉   2023
Member of organising committee ⧉ for the 23rd International Conference on Quantum Fluids and Solids
- Prepared conference information booklets, conducted photography and organised banquet music.
- Coordinated speaker invitations and delegate reception.

Publications

2025* **The Motion of Tracer Particles in Turbulent Superfluid ^{4}He Down to the Zero-Temperature Limit**
C. O. Goodwin, *M. J. Doyle*, J. A. Hay, I. Skachko, W. Guo, P. M. Walmsley & A. I. Golov
Journal of Low Temperature Physics

2024 **Modelling Turbulent Flow of Superfluid ^{4}He Past a Rough Solid Wall in the $T = 0$ Limit**
M. J. Doyle, A. I. Golov, P. M. Walmsley & A. W. Baggaley
Journal of Low Temperature Physics   DOI: 10.1007/s10909-024-03073-6 ⧉

Technologies

Simulation:	FORTRAN, Python, C++, OpenFOAM, OpenMP, CUDA, MPI.
Data Analysis:	Python, matplotlib, seaborn, pandas, numpy, scipy, TensorFlow, OpenCV, ggplot, C++, ROOT, OriginLab.
Data Structures:	CSV, XML, JSON, YAML, SQL.
Automation:	Git, Linux, Bash & PowerShell scripts, Python, Selenium, LabVIEW.
Web Development:	HTML, CSS, JavaScript, React, Vue, Tailwind, TypeScript, MySQL.
Other Software:	GitHub, Teams, Slack, LaTeX, Notion, Powerpoint, Excel, G-Suite, Inkscape.
Laboratory Equipment:	Lasers, cryogenic apparatus, vacuum technology, intensified cameras, optical fibres.

References

Available upon request.

*Manuscript awaiting publication