Thomas Bourke

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I am a highly motivated fourth year Master's student at the University of Bath who is seeking a PhD in nanoscience - specifically researching future quantum devices. I would like to pursue a career in scientific research, with the goal of becoming a future leader in nanoscience.

Education

University of Bath Oct. 2021 – present (graduating 2025)

Master of Science in Physics, expected first class honours *Bath, United Kingdom*

- Thesis: 2D magneto-electric materials and devices for spintronics applications.
- Advisors: Dr. Adelina Ilie and Dr. Kei Takashina.
- During my 11 week Master's research project I investigated the properties of thin film 2D materials, with a focus on exploring systems featuring unconventional magnetism. I used molecular beam epitaxy to grow low dimensional crystals, and scanning probe microscopy (STM, STS) to characterize and manipulate them.
- Final year modules: Advanced quantum theory, mathematical physics, nanoscience, photonics, advanced problem solving.

City of Norwich School Sept. 2018 – June 2020

A-levels *Norwich, United Kingdom*

- Achieved A*'s in Maths, Physics, Chemistry.
- Awarded silver Crest certificate for building an electric generator.

Research Projects

Network Flow Search | *Python, Qiskit, Fire Opal* July 2024

- Tackled Cisco-assigned network flow search problem at National Quantum Computing Centre 3-day hackathon.
- Implemented Grover's search algorithm to identify a malicious packet from a network log, which successfully ran on a simulated quantum computer provided by IBM Quantum using a limited dataset.
- Delivered results as an oral presentation to cohort of hackathon participants and industry partners, for which I received praise for engaging public speaking.

Quantum communications review | *Quantum information, networks, cybersecurity* April 2024

- Conducted a literature review on Quantum Key Distribution (BB84 QKD), using databases including Web of Science and Google Scholar.
- Synthesized findings in a comprehensive review paper, where I developed my scientific writing and critical analysis skills.

Work Experience

Systems Engineer - Summer placement June 2024 – Sept. 2024

Leonardo - Electronics Division - Radar Systems *Edinburgh, United Kingdom*

- Spending a week learning about modelling radar beams using MATLAB and Simulink.
- Developed and automated a data extraction tool for radar systems using Python, improving data collection efficiency by up to 40%.
- Designed and created a relational SQL database to streamline storage and retrieval of radar surveillance data.
- Prepared and delivered poster presentations to diverse audiences from within the company, developing my ability to explain complex ideas clearly and confidently.

Volunteering

Student-Staff Liaison Committee | *University of Bath* Oct. 2024 - present

- Represented student interests in academic matters such as curriculum development, assessment policies and academic regulations.
- Key skills: communication and teamwork, advocacy and negotiation, problem solving and decision making.

Physics Society Welfare and Inclusivity Officer | *University of Bath* Oct. 2023 - May 2024

- Coordinated PhySoc Movember fundraising campaign, contributing to £30,000 raised university-wide.
- Organised PhySoc x Optica astrophysics-themed hackathon, liased with Optica student chapter to arrange funding and event space access.

Hackathons and Conferences

National Quantum Computing Centre (NQCC) hackathon | *University of Warwick* July 2024

- Tackled Network Flow problem at 3 day hackathon, which concluded in a presentation delivering our findings to the rest of the cohort.

PhySoc hackathon | *University of Bath* March 2024

- Awarded 2nd place in astrophysics themed hackathon in which I created a black hole 3D model using Blender.

Careers in Quantum | *University of Bristol* March 2024

- Networked with academics and industry professionals at University of Bristol Quantum Engineering CDT.

Oxford Physics Summit | *University of Oxford* Feb. 2024

- Attended lectures from faculty including Sir Roger Penrose and Prof Alexander Lvovsky.
- Participated in quantum computing workshop where I learned how to create superposition and entangled states using Qiskit.

Technical Skills

Languages: Python, C/C++, MATLAB, SQL
Libraries: pandas, NumPy, SciPy, Matplotlib
Software: git, MS Office, COMSOL, LaTeX / Overleaf, Linux