Seamus Fallows

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Education

- **PhD Theoretical Physics | Durham University** *Oct 2018 – Dec 2022*
  - Thesis title: 'Investigating Holography: Traversable Wormholes and Closed Universes'.
- **MPhys Physics with Theoretical Physics | University of Manchester** *Sep 2013 – Jun 2017*
  - First Class Honours, with a degree average of 82%.
- **A Levels | Kirkbie Kendal School** *Sep 2011 – Jun 2013*
  - Mathematics (A*), Further Mathematics (A*), Physics (A).

Research Experience

- **AI Safety Hubs Labs Summer Research Project** *Jul 2023 – Oct 2023*
  - Worked in a team of four investigating Contrast-Consistent Search (CCS), a recently-developed unsupervised technique for extracting knowledge from the hidden activations of pretrained LLMs.
  - This involved re-implementing CCS for a range of models and datasets using Hugging Face's Transformers library.
  - Resulted in a paper *Comparing Optimization Targets for Contrast-Consistent Search*, accepted to the 'Socially Responsible Language Modelling Research' (SoLaR) conference.
- **PhD** *Oct 2018 – Dec 2022*
  - Conducted original research in the areas of holography, quantum gravity, and black holes, resulting in three published papers.
  - Attended several high energy physics conferences and summer schools and have given two talks on my research.
- **Masters Project** *Sep 2016 – Jun 2017*
  - Completed a Masters research project on the topic of field redefinitions in quantum field theory, presenting my work in two written reports and two vivas.
  - Achieved 91% and 86% for the first and second semesters' research respectively.
- **Third Year Undergraduate Summer Research Project** *Jul 2016 – Aug 2016*
  - Completed a six-week research project using the open-source software Quantum ESPRESSO to perform electronic structure calculations for H_2S confined between graphene sheets.
  - Taught myself the theoretical basis for density functional theory, learnt to use the university's high performance computing cluster to run calculations, and presented my findings in a written report.

Positions of Responsibility

- **Brandon Learning Centre Tutor** *Mar 2023 – Present*
  - Privately tutored secondary school students in maths and science.
- **Co-president of Effective Altruism Durham** *Jun 2020 – Jun 2021*
  - Took on the role of Effective Altruism Durham Co-president for one year. This involved organising and chairing discussion groups, finding guest speakers, and coordinating with the rest of the exec committee.

- **Centre for Particle Theory Student Seminar Series Organiser** *Jun 2018 – Jun 2019*
  - Sourced speakers for and chaired my department's biweekly postgraduate student seminar series.
- **Undergraduate Teaching** *Oct 2019 – Jun 2020*
  - Led problem classes for first and second year students in *Mathematics For Physicists* and *Special Relativity and Electromagnetism*.

Technical Skills

- **Programming**
  - Python, Mathematica, MATLAB, LaTeX.

Academic Awards

- **University of Manchester Physics and Astronomy**
  - Entry Scholarship of £1,000. *May 2014*
- **Kirkbie Kendal School**
  - The Lomax Cup for Mathematics. *Jun 2013*
  - The Brian Ellis Shield for Outstanding Achievement. *Jun 2013*

Publications

- S. Fallows, S. F. Ross, *Making near-extremal wormholes traversable*, *JHEP* **12** (2020) 044 [arXiv:2008.07946].
- S. Fallows, S. F. Ross, *Islands and mixed states in closed universes*, *JHEP* **07** (2021) 022 [arXiv:2103.14364].
- S. Fallows, S. F. Ross, *Constraints on cosmologies inside black holes*, *JHEP* **05** (2022) 094 [arXiv:2203.02523].