Samuel Richards

Postgraduate Mathematician and Physicist

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sam-richards-mathphys.streamlit.app

Achievements

Graduated first class in Mathematics and Theoretical physics from Durham University.

Graduated Cambridge Part III Master of Advanced Study in Mathematics and Theoretical Physics.

Tutored IGCSE maths, physics and chemistry, with all students obtaining grades of 8 (A*) or 9 (A) in exams.**

Dissertation on geometry and supersymmetry ranked top 5 in final year at Durham University.

Skills and Proficiencies

Science Communication | Academic Writing & LaTeX | Semantic HTML5 & CSS | Python 3 & SQL | VS Code PyCharm & Git | Mathematical Models

Relevant Experience

Udemy Python Mega-Course

05/2025 - 07/2025 Remote

- Worked in Python 3, progressing from procedural programming, to functional programming and OOP.
- Learnt to write SQL and utilise a variety of data structures from dictionaries, csv files and json files, to sqlite3 and MySQL databases.
- Learnt to use and build APIs, and automate the processing of data by manipulating dataframes in Pandas.
- Designed and built data-analysis code in JupyterLab and Deepnote notebooks.
- Developed APIs and basic web-apps in the Flask web-framework, and learnt how to build data-driven web-apps with Django using the bottom-up Model-Template-View structure.
- Created automation apps using Selenium, smtplib and Email, and GUIs in tkinter and PyQt6.
- Built my own basic portfolio website as a data-driven streamlit web-app: sam-richards-mathphys.streamlit.app, and learnt to create and manage Git repositories with essential components like README.md files and requirements.
- Integrate AI tools into python apps using LangChain to develop helpful AI agents.

Outlier AI

01/2025 - current Remote

- Designed custom high-level physics problems using **LaTeX** for training AI models.
- Closely followed rubrics to **evaluate** AI responses and submit corrections before re-running models.

Bright Network Couch2Coder 2024

08/2024 - 09/2024 Remote

- Wrote a basic **website** in semantic **HTML5**. Used VS Code ad-ons and shortcuts to increase **time-efficiency**.
- Used **CSS** selectors to structure and design page. Appropriately used both **grid** and **flex** to create layouts.

Hurdler's Education & Ideas Globally

09/2021 - 07/2022 Remote

- **Taught** mathematics, physics, chemistry and English literature to students aged 8 to 18 in one-on-one sessions. My students were primarily GCSE to A-level, and all **achieved A and A*-equivalent** grades in subjects I tutored.
- **Adapted** my teaching style and **designed** interactive lessons to cater individually to each student's needs.
- Had a hands-on role in the digitisation of lessons onto the Ideas Globally interactive platform.
- **Organised** myself effectively and **flexibly** to work the design process around teaching appointments and to meet the multitude of deadlines for lesson designs during the week.

Masters Project & Dissertation

10/2020 - 06/2021 Remote

- Became **proficient** in **LaTeX** using Overleaf, and produced:
  - a **written report** of around 80 pages and 38,000 words,
  - an A2 poster summarising the content of the report
  - an 8-minute **presentation** given to other members of the department on the topic.
- **Achieved** a mark of 85 on the written report (95th percentile) and was praised for my **clear communication** of highly advanced theoretical ideas and my '**unique**' approach to introducing the topic of supersymmetry.

Formal Education

Master of Advanced Study in Mathematics

University of Cambridge 10/2022 - 07/2024 Cambridge, UK

- **Passed** with 2:1 equivalent**.**
- **Modules Examined:** Quantum Field Theory, General Relativity, Black Hole Theory, String Theory, The Standard Model, Advanced Differential Geometry.
- **Additional Modules:** Advanced Quantum Field Theory (Path Integral Methods), Information Theory, Statistical Field Theory, Stochastic Analysis.

MSc Natural Sciences with Mathematics and Physics (Integrated)

Durham University 10/2017 - 07/2021 Durham, UK

- **Graduated first class** with honours, **achieved** an average of 80 across maths modules in third and fourth year.
- **Dissertation:** produced a 60 page introduction to supersymmetry from a geometry-focused perspective. Was **awarded** 85 on the written report placing me in the **95th percentile** within my cohort.
- **Topics studied include:** Linear Algebra, Calculus, Analysis, Probability Theory, Complex Analysis, Measure Theory, Ring Theory, Group Theory, Differential Geometry, Riemannian Geometry, Analytical Mechanics, Quantum Mechanics, Statistical Mechanics, Special and General Relativity, Electromagnetism.

GCSEs and A Levels

The Lakes School 09/2009 - 07/2016 Windermere, UK

- **A2:** 2 A*s (Maths, Chemistry), 2 As (Physics, Biology)
- **AS:** 6 As (Maths, Physics, Chemistry, Biology, Drama, Art), 1C (English Literature)
- **GCSEs:** 1 A*, 7 As, 2 Bs

Interests

Personal Academic Research

My interest in theoretical physics persists through my interest in recent modified gravity theories that treat spacetime as undergoing stochastic fluctuations (Oppenheim et. al., UCL,) and their potential link to stochastic theories exhibiting emergent quantum phenomena (Cetto, De la Peña) and hidden symmetries (Parisi).

Other Interests

- **Music**: I play the violin and piano to grade 7. Currently I have singing lessons with the classical singer Lynette Alcantara and am an alumni member of the **Wolfson College choir** in Cambridge which she heads.
- **Drama**: I considered pursuing acting/musical theatre before choosing to study maths and physics. While in Durham I had roles as Jaques in William Shakespeare's *As You Like It*, and as Lord Berowne in *Loves Labours Lost*.
- **Ecology**: Having grown up in the Lake District, I have a keen interest in ecology. I worked as a **volunteer** for the John Muir Trust, helping to clear non-native regeneration and restore parts of the hills to their natural ecosystem. I've also trapped and documented moth species with them, including the critically endangered Netted Carpet.

Languages

English (Fluent) **Spanish (Intermediate)**

References

Director of Studies (Cambridge), Supervisor (Durham) available on request.