

Sam A. Scivier

British & Canadian Citizen

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Professional Summary

I am a PhD student in the Department of Earth Sciences at the University of Oxford, developing probabilistic methods for uncertainty quantification in geophysics. I hold a Master's in Physics from the University of Birmingham and have gained industry experience through internships in quantum computing at D-Wave Systems (Canada) and Riverlane (UK). My research focuses on Gaussian process-based approaches for probabilistic fusion of geospatial datasets, with applications to earthquake ground motion prediction and seismic hazard assessment. I am interested in applying physics-based computational, data science, and machine learning methods to tackle challenges across geoscience, aerospace, sustainability, and emerging technologies, with a particular focus on research opportunities that combine rigorous scientific methodology with practical applications having tangible societal impact.

Education

PhD in Earth Sciences October 2022 – present
University of Oxford, England Expected 2026

- Funding: Oxford-NERC DTP in Environmental Research (Full studentship ~£120k)
- Research: Developing probabilistic methods for uncertainty quantification in physics-based seismic hazard assessment
- Focus: Gaussian process-based approaches for probabilistic fusion of overlapping geospatial datasets

M.Sci. Physics (First Class Honours) October 2018 – July 2022
University of Birmingham, England

- Specialized coursework in theoretical and quantum physics, radar and imaging techniques
- Final year project: Machine learning algorithms for early identification of massive black hole binary mergers for LISA mission (ESA; launch 2035)
- Third year project: Bayesian inference for parameter estimation of binary black hole mergers

British Columbia High School Diploma September 2013 – June 2018
Prince of Wales Secondary School, Vancouver, Canada

- Graduated as highest GPA student with A grades in all Grade 12 subjects
- Top scholar for Grades 10, 11, and 12

Research Experience

PhD Researcher October 2022 – present
Department of Earth Sciences, University of Oxford

- Working on probabilistic methods for uncertainty quantification in physics-based seismic hazard assessment
- Developed Gaussian process-based approaches for probabilistic fusion of overlapping geospatial datasets
- Building collaborations to extend methods to other geophysical problems

- Developing open-source software to make methods broadly accessible across geosciences

Quantum Science Intern

June – August 2021

Riverlane, Cambridge, UK

- Focused on improving resource efficiency in quantum computation
- Developed software for quantum computers using Python
- Worked in multidisciplinary team of physicists, chemists, mathematicians, and software engineers
- Delivered algorithm implementation and research presentation

Quantum Research Intern

June – August 2019

D-Wave Systems Inc., Burnaby, Canada

- Conducted theoretical research in quantum technology and applications
- Used MATLAB for simulations of nonstoquastic quantum processing and analysis
- Designed optimization protocol for nonstoquastic quantum annealing
- Co-authored paper published in Physical Review A (2021)

Student Science Mentorship Programme Researcher

March – April 2016

DPoint Technologies Inc., Vancouver, Canada

- Worked part-time in commercial research laboratory during high school
- Prepared membrane samples and conducted testing using analytical equipment
- Assessed results for commercial energy recovery ventilation applications

Publications

1. **S.A. Scivier**, T. Nissen-Meyer, P. Koelemeijer, and A.G. Baydin, “Gaussian Processes for Probabilistic Estimates of Earthquake Ground Shaking: A 1-D Proof-of-Concept,” *arXiv:2412.03299 [physics.geo-ph]* (2024). DOI: [10.48550/arXiv.2412.03299](https://doi.org/10.48550/arXiv.2412.03299). Peer-reviewed and presented at ML4PS Workshop at NeurIPS 2024.
2. N.S. Blunt, J. Camps, O. Crawford, R. Izsák, S. Leontica, A. Mirani, A.E. Moylett, **S.A. Scivier**, C. Sunderhauf, P. Schopf, et al., “Perspective on the current state-of-the-art of quantum computing for drug discovery applications,” *Journal of Chemical Theory and Computation* **18**, 7001-7023 (2022). DOI: [10.1021/acs.jctc.2c00574](https://doi.org/10.1021/acs.jctc.2c00574)
3. E.M. Lykiardopoulou, A. Zucca, **S.A. Scivier**, and M.H. Amin, “Improving nonstoquastic quantum annealing with spin-reversal transformations,” *Physical Review A* **104**, 012619 (2021). DOI: [10.1103/PhysRevA.104.012619](https://doi.org/10.1103/PhysRevA.104.012619)

Teaching & Outreach

Gaussian Processes for Probabilistic Earthquake Ground Motion Prediction November 2024

Workshop Leader, Oxford Intelligent Earth CDT

- Led workshop for first-year PhD students on probabilistic fusion of seismic velocity models using Gaussian Processes
- Created open-source Jupyter notebook with interactive examples demonstrating data fusion and uncertainty quantification
- Designed progressive exercises covering engineering safety assessment and computational optimization
- Materials available at: github.com/sscivier/intelligent-earth-cdt-earthquakes-gp

Non-Technical Professional Experience

Assistant Programme Coordinator

June – August 2020

Squash British Columbia, Vancouver, Canada

- Collaborated with Executive Director to design Squash BC's COVID-19 pandemic response
- Managed communications to member facilities through website, newsletters, and online meetings
- Organized virtual panel discussion on university opportunities for competitive junior squash players

Part-Time Assistant Squash Professional

June 2016 – September 2018

Jericho Tennis Club, Vancouver, Canada

- Coached junior and adult squash players in private and group lessons
- Created positive sports environment and served as role model for junior squash players

Awards & Recognition

- IAGA/IASPEI 2025 Travel Grant – Free registration (€290 value) (2025)
- British Seismology Meeting 2024 – Best Student Poster Prize (2024)
- University of Birmingham School of Physics and Astronomy SWJ Smith Prize – M.Sci. Physics graduate with highest overall mark (2022)
- University of Birmingham Physics Sports Scholarship (2019-2022) – Combined academic and athletic excellence
- Canadian Governor General's Academic Medal – Highest GPA graduate (2018)
- British Columbia Academic Achievement Scholarship (2018)
- University of Birmingham School of Physics and Astronomy Academic Achievement Scholarship (2018/19)
- SFU Applied Sciences Math 11 Award, Simon Fraser University (2017)

Technical Skills

Programming: Python (7+ years), MATLAB, Bash, HTML

Machine Learning & Data Science: TensorFlow, PyTorch, Weights & Biases, Gaussian Processes, Bayesian inference

Geophysical Modeling: Finite difference methods, seismic wave propagation, geospatial data handling

Software & Tools: GitHub/GitLab, LaTeX, Overleaf, VSCode, Microsoft Office

Research Methods: Probabilistic methods, statistical analysis, machine learning, numerical methods, scientific computing, open-source development

Conferences & Presentations

Invited Talks

Towards physics-based probabilistic estimates of earthquake ground motion using Gaussian processes November 13, 2024

Department of Mathematics and Statistics, University of Exeter

- Presented methods for incorporating uncertainties from seismic velocity model inconsistencies in earthquake ground motion prediction using Gaussian process regression

Conference Presentations

Probabilistic fusion of seismic velocity models using Gaussian processes September 4, 2025
IAGA/IASPEI Joint Scientific Assembly, Lisbon, Portugal Oral presentation

- Session J04b: Data assimilation and Machine Learning
- Presented scalable Gaussian process methods for probabilistic fusion of overlapping seismic velocity models to improve uncertainty quantification in physics-based seismic hazard analysis

Gaussian Processes for Probabilistic Estimates of Earthquake Ground Shaking: A 1-D Proof-of-Concept

ML4PS Workshop at NeurIPS 2024, Vancouver, Canada

December 2024
Poster presentation

- Demonstrated proof-of-concept workflow for incorporating uncertainties from seismic velocity model inconsistencies into ground motion predictions using Gaussian processes

Physics-based probabilistic estimates of earthquake ground shaking: A synthetic 1D proof of concept

NERC DTP Student Conference, Oxford, UK

June 2024
Poster presentation

- Presented initial results on probabilistic approaches for earthquake ground motion prediction accounting for velocity model uncertainties

Probabilistic merging of seismic velocity datasets using deep learning: A case study on synthetic data

British Seismology Meeting, Reading, UK

March 2024
Poster presentation – *Best Student Poster Prize*

- Demonstrated neural process-based methods for merging overlapping seismic velocity datasets and their impact on earthquake ground motion simulations

Professional Development

Interrogating the Restless Earth

SPIN ITN (Seismology and Plate tectonics Imaging Network), Pitlochry, Scotland

March 19–24, 2023
5-day intensive workshop

- Earth imaging, monitoring and inverse problems in geophysics
- Topics: optimal experimental design, variational inference, uncertainties, transdimensional inference, and machine learning methods

Languages

English: Native proficiency **French:** Professional working proficiency **Romanian:** Basic proficiency

Extracurricular Activities

Competitive Squash

- Silver medal, 2019 Canada Winter Games; Gold medal, 2022 BUCS Squash Team Championships
- 1st team player, University of Birmingham (2018-2022)
- President, University of Birmingham Squash Club (2019-2020)
- Sport Colours Award for outstanding contribution (2020)

Other Interests

Skiing, hiking, road/mountain biking, bouldering/climbing, photography

Professional Memberships

- Fellow of the Royal Astronomical Society (elected February 14, 2025)
- Institute of Physics Member (Studying) (2018 – present)