Lewis Napper

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Education

2021 – 2025 🔖 **Ph.D. Mathematics, University of Surrey.**
Key Topics: Geometry, Hamiltonian Mechanics, Quaternions, Fluid Dynamics.
Thesis: *Applications of Geometry to PDEs, Vortices, and Relativity*
Supervisors: Dr. M. Wolf and Prof. I. Roulstone.

2017 – 2021 🔖 **M.Math.** 1**st class (hons) Mathematics, University of Surrey.**
Key Topics: Linear Algebra, Matrix Analysis, Graph Theory, Vector Calculus.
Thesis: *Algebraic Bethe Ansatz for* $\mathfrak{su}(2)$ *Spin Chains and Beyond*.
Supervisors: Prof. A. Torrielli and Dr. A. Prinsloo.
Average grade: 98%

2010–2017 🔖 **Therfield Secondary School and Sixth Form**
A-level: 3 A*, 1 A (plus 1 A at AS level).
GCSE: 9 A* including English and German Language, 3 A, 1 B
Other: D^{*2} Cambridge Nationals ICT, A FSMQ Additional Mathematics

Portfolio Projects

🔖 **Archipelago Randomiser** (🔘 GitHub, ongoing)

– Contributing to the Archipelago cross-game randomiser open-source project, in particular for Another Crab's Treasure. Provided end-user support via Discord.
– Implemented (in Python) and tested logic for item randomisation, ensuring games were completable regardless of player strategy, and used UnityExplorer to interface with games.

🔖 **Cellular Automata on Aperiodic Mono-tiles** (🔘 GitHub, ongoing)

– Developing a C++ application for simulating Cellular Automata with an SFML based UI component, as part of a collaboration with Dr. M. J. Gabbay from Heriot–Watt University.

– Investigating how Cellular Automata, such as Conway's Game of Life, can be encoded as sparse matrix algorithms and how grid regularity affects their emergent behaviour.

🔖 3**DSage Raycaster** (🔘 GitHub, dormant)

– Raycaster game engine in C++ (OpenGL/Glut) based on 3DSage's tutorials. Code produces a top down map view as well as a 2.5D world which can be explored.

– On hiatus while I investigate alternatives such as SFML and Binary Space Partitioning.

Employment

2025 – · · · · 🔖 **Foundational Scientific Software Engineer, Met Office, UK**

– Provided geometric expertise to solve problems in numerical weather prediction and real-time computation, using C++ and Python.
– Developed familiarity with build systems, agile development, kanban, and a wide range of computing infrastructure including that which can utilise multi-threading and CUDA.

Employment (continued)

2019–2025   **Teaching Assistant, University of Surrey, UK**

– Supervised undergraduate MATLAB and R-Studio programming labs for Statistics and Numerical Methods modules. Regularly contacted by students from other (undergraduate/a-level) courses for help due to high quality teaching.

– Edited notes and exercises for 3 modules to a high standard, consequently becoming an invited expert for the Journal of Geometry and Physics.

– Supported the delivery of 13 undergraduate modules, providing students with clear and concise feedback within a week of work submission.

2024   **Visiting Research Fellow, University of La Rochelle, France**

– Recipient of a 3-month fully-funded research fellowship (Value: £4300) to work at a CNRS laboratory and support Franco–British collaboration, issued by the French Embassy in the UK.

– Researched the application of topological data analysis and geometric numerical integrators to physical dynamical systems, alongside Dr. V. Salnikov.

Skills

Software Skills

- **Scripting:** Experience with MATLAB, Mathematica, R-Studio, and Python through undergraduate study, teaching, and research.

- **Programming:** Experience with C++ , CMake, and Bash from contributing geometric tools to large scale, open source, industrial codebases, see Github.

- **Web Development:** Html, css, JavaScript, and JQuery frontend skills developed through making my Website and several small web apps. See GitHub for more.

- **Source Control:** Familiarity with GitHub Desktop and command line Git for commits of source code and unit tests to work and personal repositories.

- **Other:** Microsoft Office (Word, Excel, etc.), LaTeX typesetting, Affinity, Adobe Photoshop.

Professional Skills

- **Report Writing:** Refined writing skills during my Ph.D. and Professional Skills university module, resulting in successful grant applications worth over £7000 and 3 scientific publications.

- **Public Speaking:** Contributed 9 talks for conferences and seminars over the past 2 years, including invited talks at Imperial College London and the University of Sorbonne. See my Website for sample slides.

Activities and Achievements

- **Societies:** Academic secretary of the Surrey Maths Society (2018), for which I produced updated graphic design, ran revision sessions, and organised seminars with invited speakers. Active member of the Surrey Film Society (2017-2022).

- **Quant:** Member of the University of Surrey team and regional finalist in the WorldQuant Championships (2018), for which I learnt the software WebSim.

- **Art:** Produced digital and traditional art for art-shares and paid commissions. Exhibited art at the Surrey Youth Voice Awards and Therfield Art Festival, accompanying the latter by playing guitar as part of a live band.