DANIEL MARRIS

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SUMMARY

I am a final year PhD student at the University of Bristol. With a strong publication record in mathematical non-equilibrium statistical physics, I am accomplished working both analytically and computationally. In particular, I have worked extensively on quantifying the search dynamics of stochastic processes that are bounded in heterogeneous space. I have excellent communication skills, exemplified by presenting my research at many international meetings and conferences.

EDUCATION

The University of Bristol September 2021 - March 2025 (expected)

Engineering Mathematics (PhD), supervised by Prof. Luca Giuggioli.

Thesis Title: *Markovian and non-Markovian Transport on Lattices: From Data to Analytics via Random Walks with Internal Degrees of Freedom*

The University of Bristol September 2017 - June 2021

Engineering Mathematics (MEng), First class with Honours.

Units Include: Applied Data Science, Quantum Information Theory, Uncertainty Modelling for Intelligent Systems, Modern Mathematical Biology, Transport and Mobility Modelling

TECHNICAL STRENGTHS AND RESEARCH INTERESTS

I am interested in the intersection between statistical physics and movement ecology. My specific expertise lies in the analytics of lattice random walks in bounded and heterogeneous space; search and interaction dynamics; non-Markov processes and stochastic simulations.

Programming Languages & Tools: Julia, Python, MATLAB, HPC scheduling, Git, LaTeX, Inkscape.
Languages: English (Native), German (CEFR B1 standard).

PUBLICATIONS

- **D. Marris**, P. Fernández-López, F. Bartumeus, and L. Giuggioli, *Collective Foraging and Behavioural Heterogeneity in Ants: First-Passage Statistics with Heterogeneous Walkers in a Honeycomb Lattice*, Submitted (2024).
- **D. Marris**, and L. Giuggioli, *Persistent and anti-Persistent Motion in Bounded and Unbounded Space: Resolution of the First-Passage Problem*, New Journal of Physics, 26, 073020, (2024).
- L. Giuggioli, S. Sarvaharman, D. Das, **D. Marris**, and T. Kay, *Multi-target search in bounded and heterogeneous environments: a lattice random walk perspective.* The Target Problem, Springer Verlag, (2024).
- **D. Marris**, S. Sarvaharman, and L. Giuggioli, *Exact spatiotemporal dynamics of lattice random walks in hexagonal and honeycomb domains.* Physical Review E, 107(5), 054139, (2023).

ACADEMIC VISITS

- Mathematics of movement: an interdisciplinary approach to mutual challenges in animal ecology and cell biology (Isaac Newton Institute, University of Cambridge, UK, June-December 2023),
  - Six month visit to a world renowned research institute. I gave two conference talks, presented a poster and attended many other talks and seminars. A recently submitted publication (detailed above) stemmed from new collaborations created during this time.
- ICTP Meeting: Information, Noise and Physics of Life (Niš, Serbia, June 2024),
  - Attended two weeks of lectures on topics ranging from biological and statistical physics through to bio-informatics and machine learning. Presented a research poster.

- European Study Group with Industry (Ålesund, Norway, 2022),
  - Collaborated with Furuno Electric Co., Ltd. creating statistical models of the number of salmon in a North Sea fish farm.

CONFERENCES AND WORKSHOPS

- **Contributed Talk:** Modelling and Applications of Anomalous Diffusions (Cambridge, UK, 2024),
- **Invited Talk:** British Applied Mathematics Colloquium (Newcastle, UK, 2024),
- **Invited Talk:** Modelling non-Markov Movement Processes (Cambridge, UK, 2023),
- **Participant:** Collective Behaviour (Cambridge, UK, 2023),
- **Participant:** Measures and Representations of Interactions (Cambridge, UK, 2023),
- **Contributed Talk:** Summer School on Mathematics of Movement (Cambridge, UK, 2023),
- **Contributed Talk:** British Applied Mathematics Colloquium (Bristol, UK, 2023),
  - Winner of a competition for best graphic representation of research.

TEACHING EXPERIENCE

I have been a Graduate Teaching Assistant at the University of Bristol from September 2021 to present. In 2023 I was nominated for a Bristol Teaching Award for delivering supplementary lectures to students struggling with the Engineering Mathematics course.

Modules Taught:

- Mathematics and Data Modelling (Student level: 1^{st}, 2^{nd} and 3^{rd} years),
- Applied Linear Algebra (Student level: 2^{nd} year),
- Discrete Mathematics (Student level: 1^{st} and 2^{nd} years),
- Engineering Mathematics (Student level: 1^{st} and 2^{nd} years),
- Further Computer Programming (Student level: 1^{st} and 4^{th} years).

Responsibilities:
Supervising industry-provided undergraduate research projects,
Supervising group coding projects,
Providing supplementary lectures to aid students transitioning from non-standard backgrounds to university,
Marking (formative and summative),
Writing Python scripts to aid in the marking of coding projects,
Demonstrating and supporting in labs and workshops.

OTHER PROFESSIONAL ACTIVITIES

- Organiser and chair of the weekly Engineering Mathematics Post-Graduate Seminar Series (ca. 20 regular attendees each week).
- Outreach at the 2023 Somerscience Festival. I co-ran an all-ages workshop titled *Mathematical Modelling: Hands on Practical Problem Solving* with Prof. Alan Champneys.
- Created an easy to access repository of useful lattice random walk resources (Awesome-Random-Walks).

OTHER WORK EXPERIENCE

Labourer and Decorator (Bumble Bell Tents) — Summer 2019
Commis Chef (The Sussex Yeoman) — Summer 2018
Barista and Waiter (Scoop & Crumb) — July 2015 - December 2017