Matthew Asker

School of Mathematics, University of Leeds

Email: mmmwa@leeds.ac.uk
Personal site
Google Scholar

Publications

First author:

- Coexistence of Competing Microbial Strains under Twofold Environmental Variability and Demographic Fluctuations - *New Journal of Physics*

Second author:

- Coupled environmental and demographic fluctuations shape the evolution of cooperative antimicrobial resistance - *Journal of the Royal Society Interface*
- Eco-evolutionary dynamics of cooperative antimicrobial resistance in a population of fluctuating volume and size - *Journal of Physics A: Mathematical and Theoretical*

Education

- **University of Leeds** — Leeds, England
  PhD Applied Mathematics; Evolution of Populations in Fluctuating Environments — *Oct. 2021 – present*
  Supervised by Prof. M. Mobilia and Prof. A. M. Rucklidge
  - **Research**: Part of an international group using statistical physics techniques and computational methods (Python) to understand the eco-evolutionary dynamics of populations under varying environments. Relevant to the problems of antimicrobial resistance and species diversity.
  - **Project website**: Set-up and now manage the website eedfp.com as a hub for the overarching research project I work within, in collaboration with researchers from Virginia Tech and Imperial College London. Additionally used the site as the homepage for the workshop I co-organised (see below).
  - **Dissemination**: Gave a talk at the University of Leeds SoM PGR conference. Presented posters at 3 external conferences and attended 2 schools.
  - **Seminar organisation**: Organised the biweekly Joint Mathematics PGR seminar series (2 semesters) and the weekly Applied Mathematics PGR seminar series (2 semesters).
  - **Mathematics tutor**: Tutored multiple groups of students in MATH1005 Core Mathematics via in-person tutorials and online marking feedback. (4 semesters) Also marked exams for the course (3 semesters). Additionally marked for MATH1331 Linear Algebra with Applications (1 semester).
  - **Extended learning**: Taken the modules Advanced Mathematical Methods (90%), Advanced Nonlinear Dynamics (91%), and Advanced Evolutionary Modelling (93%) as well as 2 HPC courses. Regularly attended the Leeds Applied Nonlinear Dynamics seminar series, the Mathematical Biology seminar series, and many PGR seminars.
- **University of Manchester** — Manchester, England
  MPhys Physics with Theoretical Physics; Grade: First-Class — *Sep. 2017 – Jun. 2021*
  - **Research Project**: Modelled COVID-19 using a modified percolation model. Calculated the fractal dimension of the spread of the disease through Germany and the USA and used this as a proxy for disease spread. Fit a percolation model with a travel term to the data. Found that imposing lockdowns in the data corresponds to a decrease in the travel term in the model and vice versa. All code written in Python.
  - **Peer Assisted Study Support (PASS) mentor**: Mentored 10 first year physics students (4 semesters). Prepared engaging activities for weekly meetings, and facilitated discussion surrounding problems in the course. Won the PASS Legacy Award in 2019, and nominated for the Innovation Award in 2020 as a mentor group.
  - **Other relevant modules**: Mathematical Biology (94%), Statistical Mechanics (91%), Statistical Methods (86%), Advanced Statistical Physics (94%).

Workshops

- **L24EEDs Workshop**: I co-organised the Leeds 2024 Eco-Evolutionary Dynamics workshop on "Mathematical modelling of microbial communities: cooperation, dynamics, and resistance", with ∼80 attendees (9 invited speakers, 20 contributed speakers) from 9th-12th July 2024.

Grants & Awards

- **ECR Travel Grant** - *London Mathematical Society*: an award of £500 to provide partial support for UK-based ECRs to attend conferences or undertake research visits.
- **Physics Entrance Scholarship** - *University of Manchester*: an award of £1000 for outstanding results (A*A*A*) in pre-university exams.
- **Best talk in Applied Mathematics** - *University of Leeds*: a prize given to the best talk in the applied department at the annual PGR conference in the School of Mathematics.

Other Experience

- **Partnership for Advanced Computing in Europe (PRACE)** Brussels, Belgium
  Summer Research Intern *Jul. 2020 - Sep. 2020*
  - **High Performance Computing**: Attended a one-week training course on MPI, OpenMP, and CUDA. Completed efficient computational fluid dynamics simulations of the DARPA Suboff submarine on the IRIS cluster at the University of Luxembourg.
  - **Presentation**: Produced a concise report detailing the findings made, alongside a video presentation. Wrote a series of well-received blog posts describing the experience.

Extra-Curricular Activities

- **Football** Anywhere
  Casual *2004 – present*
  - I have found that the best cure for frustration is 60 minutes of 5-a-side football, after which I can barely breathe, let alone think.
- **Outdoors Explorer** Earth
  Enthusiast *My birth – present*
  - Regularly take any opportunity possible to get out and run, hike, or climb around wherever I currently am!