Niall Francis Byrnes

Physics Researcher
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Education

Imperial College London — London, UK
MRes/PhD Physics — 2018 - 2022 (expected)
"Random matrix modelling of polarised light scattering in disordered media"
Supervisor: Dr. Matthew Foreman

University of Warwick — Coventry, UK
MMathPhys Mathematics and Physics (First-Class Honours) — 2011 - 2015
"Simulation of diffractive pion production on neutrinos in the T2K experiment"
Supervisor: Dr. Steve Boyd

Employment

Shanghai Guanghua College — Shanghai, China
Mathematics Teacher — 2015 - 2018

- Taught **CIE A-Level Mathematics** and **Further Mathematics** at an **international high school** in China.
- Covered a **wide range of modules** including pure mathematics, statistics, mechanics and **extra classes** for mathematics competitions and university entrance examinations.
- Extra responsibilities included setting school exams, organising **extra-curricular research projects**, interviewing college applicants, writing recommendation letters, and giving mock university interviews.

University of Tokyo — Tokyo, Japan
University of Tokyo Summer Internship Program (UTSIP) — 2014

- Research intern at the university of Tokyo. Worked with a local student developing a device for measuring the electric field inside a nuclear fusion reactor using **polarimetry**.

Professional Activities

Conference Assistant

- Assistant at Focus on Microscopy 2019 in London. Welcomed and directed attendees, assisted presenters with technical problems and time management, and helped guests with miscellaneous queries and issues.

MSc Student Project Co-Supervisor

- Co-supervisor of two physics **MSc student research projects**. Attended weekly meetings to give student guidance and gave **critical feedback** on final project reports.

Journal Publication Reviewer

- Critically reviewed submissions for potential publication in Optics Express.

Private Tutor

- Tutored undergraduate level mathematics and physics for private students.

Skills

Mathematics and Physics

- Expertise in **theory** and **numerical simulation** of **electromagnetic scattering** in **random media**.
- Strong understanding of **statistics and data analysis**. Experience managing **large datasets**.
- Professional working knowledge of **polarisation theory**, **polarimetry** and **optical imaging**.
- Experience working with **random matrix theory** and **information theory** with application to **mesoscopic physics**.

Programming

- Proficiency in **scientific programming** in Python, C, Java, Matlab and Mathematica.
- Comfortable using **Windows** and **Linux**, including **command line interfaces**.
- **Web development** experience using HTML, CSS and JavaScript, including the React and Vue frameworks.
- Experience with other software including **LaTeX**, Git, **Github**, Inkscape and Microsoft Office.

Languages

- English: Native speaker
- Mandarin Chinese: Conversationally fluent and literate
- Italian: Elementary proficiency

Miscellaneous

- Good **teamwork** and **interpersonal skills**. Extensive experience working with **diverse** groups of people from different **cultural** and **linguistic backgrounds**.
- Strong **teaching** and **communication** skills. Experience teaching both native and non-native speakers of English, both in a classroom environment and online.
- Finished within the top ten in the 2011 **International Space Olympics** in Korolev, Russia.

Publications

- **N. Byrnes** and M. R. Foreman, "Random matrix theory of polarized light scattering in disordered media", arXiv, 2205.09423 (2022) (submitted, under review)
- **N. Byrnes** and M. R. Foreman, "Polarisation statistics of vector scattering matrices from the circular orthogonal ensemble", Opt. Commun. 503, 127462 (2022)
- **N. Byrnes** and M. R. Foreman, "Symmetry constraints for vector scattering and transfer matrices containing evanescent components: energy conservation, reciprocity and time reversal", Phys. Rev. Research 3, 013129 (2021)
- **N. Byrnes** and M. R. Foreman, "Universal bounds for imaging in scattering media", New J. Phys. 22, 083023 (2020)

Conference Presentations

- **N. Byrnes** and M. R. Foreman, "Polarized Light Scattering in Random Media: A Random Matrix Model" (poster), Complex Nanophotonics Science Camp 2022, Windsor Great Park, UK
- **N. Byrnes** and M. R. Foreman, "Random Matrix Modelling of Polarised Light Scattering in Disordered Media" (talk), Imperial College Postgraduate Symposium 2022, Imperial College London
- **N. Byrnes** and M. R. Foreman, "Polarized Light Scattering in Random Media: A Random Matrix Model" (talk), PIERS 2021, online