

DR. GEORGE WILLIAM STAGG

CURRICULUM VITAE

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EDUCATION

- JUNE 2016 **Doctor of Philosophy - Mathematics**, Newcastle University
Thesis Title: "A Numerical Study of Vortices and Turbulence in Quantum Fluids"
Supervisors: Prof. Carlo Barenghi and Prof. Nick Parker
- JULY 2012 **Master of Mathematics**, Newcastle University
First Class Honours
Project Title: "The Movement of a Fractal Through a Bose-Einstein Condensate"
Supervisor: Prof. Carlo Barenghi

WORK EXPERIENCE

- 2022–PRESENT **Open Source Software Engineer at Posit Software, PBC**
Software development with the Tidyverse team at Posit (formerly RStudio, PBC). Lead developer of the webR project. Responsible for developing and porting R software and packages for use on the web and in the cloud through by use of WebAssembly, Node.js, JavaScript and TypeScript. Also responsible for managing the webR CDN and documentation infrastructure at r-wasm.org.
- 2016–2022 **Teaching and Research Technical Officer at Newcastle University**
Responsible for supporting mathematical computing in the School of Mathematics, Statistics & Physics. Responsibilities include the authoring of academic material, research software engineering, system administration and configuration management, design and maintenance of School web services, academic and computational support for staff and postgraduate researchers, and the delivery of short tutorials and undergraduate courses.
Responsibilities also include developing pedagogical software, performing research related to digital assessment, and supporting computational content delivery in the mathematical sciences as a member of the School of Mathematics, Statistics and Physics E-Learning Unit.
- 2012–2016 **Postgraduate Researcher at Newcastle University**
PhD research based on modelling quantum turbulence in superfluids through numerical simulation of the Gross-Pitaevskii equation. Along with strong academic ability, the role required good interpersonal skills due to the need for academic collaboration and the communication of postgraduate level research to both experts and a more general scientific audience.
- 2012–2015 **Undergraduate Assignment Marker/Assisting at Newcastle University**
Responsible for marking undergraduate assignments for various modules in the School of Mathematics & Statistics at Newcastle University. Responsibilities also included the teaching of undergraduate level mathematics to students who required assistance in tutorials or computer practicals.

SKILLS SUMMARY

Approximately 10 years experience of collaboration and research in the mathematical sciences, including computational mathematics, fluid dynamics, numerical analysis, data science and data visualisation. Familiarity with writing publication quality documents and scientific presentations using \LaTeX and Markdown.

Familiar with several operating systems including Microsoft Windows, OS X, GNU/Linux, and Illumos/Solaris, with particular expertise in Linux systems. Extensive knowledge and experience of research programming with Fortran, R, Python, Matlab, C/C++ and other programming languages. Knowledge of highly parallel programming techniques using OpenMPI and OpenMP in a HPC context.

Experience of building web-based applications using HTML, Python, Javascript, PHP, and SQL technologies. Experience of porting projects to the web via WebAssembly using LLVM and Emscripten.

Knowledge of low-level and systems programming in the context of various Unix-based operating systems. Proficient with Git and other version management tools. Familiar with building software packages using GNU Autotools, Makefiles and shell scripting. Experience of hardware provisioning and configuration management using iPXE, Puppet and Heira.

Proven collaboration, public speaking and communication skills including attendance at several international mathematics and physics conferences. A fast learner with excellent problem solving skills. Curious, enthusiastic and hard working. Good time management skills and able to work efficiently and independently to deadlines.

PERSONAL INTERESTS AND CURRENT PROJECTS

A general interest in popular science and technology. Web and video games development. Low level systems programming and "retro" computing, including reverse engineering. Science fiction and fantasy literature. Electronic music and analog synthesisers. Amateur photography with DSLR.

Lead developer of several free and open source projects in a variety of areas:

- 2D-GP, and 3D-GP-MPIMP — Parallel, HPC-aware Fortran projects used to mathematically simulate Bose-Einstein condensates. Actively used in research at Newcastle University.
- webR — A WebAssembly version of the statistical language R, compiled using Emscripten for the web browser.
- χ run — A tool to produce flexible and accessible course notes, in a variety of formats, from LaTeX or Markdown source. Currently used at several UK universities to deliver mathematical course content.
- WebGL GPE — A web-based demonstration of two-dimensional superfluid vortex dynamics and turbulence. Currently used for teaching and science outreach.
- Graph Curvature Calculator — A mathematical tool for calculating discrete graph curvature. Discrete curvature is an exciting new research area with possible applications to Bayesian networks, natural language processing and quantum gravity.
- Several hobbyist mathematical demos and games playable on the web. Links to these small projects and their source code are available at my personal website and GitHub.

FURTHER ACADEMIC INFORMATION

TEACHING EXPERIENCE

- 2020–2022 Introduction to Python (Laboratory Physics)
- 2018–2020 Introduction to Computing and Problem Solving
- 2018–2020 Introduction to GNU/Linux
- 2017–2022 R and Matlab Refresher Sessions
- 2016–2022 Introduction to Mathematical Typesetting with L^AT_EX

SCHOLARSHIPS AND AWARDS

- 2020 Collaborative Award for Teaching Excellence, NEWCASTLE UNIVERSITY
- 2019 Vice Chancellor's Education Excellence Award, NEWCASTLE UNIVERSITY
- 2012–2016 Doctoral Training Grant, EPSRC
- 2012 Best Applied Mathematics MMath Project, NEWCASTLE UNIVERSITY

RESEARCH PUBLICATIONS

- 2023 Automatic assessment of mathematical programming exercises with Numbas
C. Graham, G. Stagg, C. Lawson-Perfect, A. Khan, MSOR Connections **21**, 1
- 2022 A Prolog assisted search for new simple Lie algebras
D. Cushing, G. W. Stagg, D. I. Stewart, arXiv:2207.01094 [**math.RA**]
- 2022 The Graph Curvature Calculator and the curvatures of cubic graphs
D. Cushing, R. Kangaslampi, V. Lipiäinen, S. Liu, G. W. Stagg, Exp. Math. **31**, 2
- 2019 Quasiperiodic boundary conditions for three-dimensional superfluids
T. S. Wood, M. Mesgarnezhad, G. W. Stagg, C. F. Barenghi, Phys. Rev. B **100**, 024505
- 2018 Quantum ferrofluid turbulence
T. Bland, G. W. Stagg, L. Galantucci, A. W. Baggaley, N. G. Parker, Phys. Rev. Lett. **121**, 174501
- 2017 Vortex scattering by impurities in a Bose-Einstein condensate
A. Griffin, G. W. Stagg, N. P. Proukakis and C. F. Barenghi,
J. Phys. B: At. Mol. Opt. Phys. **50**, 115003
- 2017 Superfluid boundary layer
G. W. Stagg, N. G. Parker, C. F. Barenghi, Phys. Rev. Lett. **118**, 0135301
- 2016 Ultraquantum turbulence in a quenched homogeneous Bose gas
G. W. Stagg, N. G. Parker, and C. F. Barenghi, Phys. Rev. A **94**, 053632
- 2016 Critical velocity for vortex nucleation in a finite-temperature Bose gas
G. W. Stagg, R. W. Pattinson, C. F. Barenghi, N. G. Parker, Phys. Rev. A **93**, 023640
- 2015 Generation and Decay of Two-Dimensional Quantum Turbulence
in a Trapped Bose-Einstein Condensate
G. W. Stagg, A. J. Allen, N. G. Parker, and C. F. Barenghi, Phys. Rev. A **91**, 013612
- 2014 Quantum analogues of classical wakes in Bose-Einstein condensates
G. W. Stagg, N. G. Parker and C. F. Barenghi, J. Phys. B: At. Mol. Opt. Phys. **47**, 095304