

Sam J. Griffiths

MSc MRes PhD(candidate)



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About me

I am a computer scientist and software engineer, currently studying for a PhD in quantum computing at UCL. Between my computing background and academic curiosity, I have developed a pattern of tackling advanced theoretical problems using a practical experience in a range of programming languages and modern software engineering tools.

Skills

Strong experience:

- **C++** (inc. Boost, CMake, C++/CLI, SWIG and pybind11)
- **C#** (inc. WPF)
- **Python** (inc. matplotlib, Tkinter)
- **Java**
- Visual Studio, VS Code, Git, GitHub/Bitbucket, CI/CD, \LaTeX , Office+VBA, Powershell, Linux/WSL

Moderate experience:

- **C**
- **Assembly**
- **F#**
- **Prolog**
- **R**
- **MATLAB**
- **SQL**
- **HTML/CSS/JavaScript**

Education

- 2020–2024 PhD in quantum error correction [University College London \(UCL\)](#)
Supervised by Prof. Dan Browne and co-funded by Riverlane, my PhD in quantum computing focuses on surface code techniques for quantum error correction (QEC). Specifically, I have studied algorithms and architectures for decoding QEC schemes efficiently at a scale feasible with near- to medium-term technology. This involves heavy use of C++ for simulation and profiling.
Thesis: *Topological error correction for quantum computing at scale*
- 2019–2020 MRes Delivering Quantum Technologies [UCL](#)
Distinction
EPSRC CDT course encompassing theory and experimentation in quantum information, quantum computation, quantum cryptography, quantum devices and systems engineering.
- 2018–2019 MSc Advanced Computing Science [University of East Anglia \(UEA\)](#)
Distinction
Including advanced programming techniques, graphics and game technology, artificial intelligence, computer vision and applied statistics.
Dissertation: *Non-Markovian dynamics of entangled states in open quantum systems*
Project: *Qlay*, quantum computing simulation library and visual circuit editor in C++ and C#/WPF
- 2015–2018 BSc (Hons) Computing Science [UEA](#)
First Class
Including programming, data structures and algorithms, software engineering, discrete mathematics, computer graphics, digital and analogue electronics, artificial intelligence, machine learning etc., with extra credits in quantum theory and molecular symmetry.
Dissertation: *Study of AI algorithms for the solution of the Rubik's Cube with minimum number of moves*
- 2008–2015 3 A-levels, 2 AS-levels (+10 GCSEs) [Bablake School, Coventry](#)
Physics, Mathematics, Drama and Theatre Studies, Chemistry and Further Mathematics, respectively.

Publications

Articles

- 2023 Sam J. Griffiths, Dan E. Browne. Union-find quantum decoding without union-find. Accepted in Physical Review Research, arXiv:2306.09767

Talks

- 2023 Union-find quantum decoding without union-find. APS March Meeting, Las Vegas, 07/03/2023

Employment

- 2022–2023 Quantum Software Intern [Phasecraft, Bristol](#)
4-month research placement in quantum algorithms, focusing on partitioning techniques for optimisation problems (particularly k -SAT) and simulating them programmatically. This involved setting up and working in a C++ and Python GitHub workflow.
- 2019–2022 Postgraduate Teaching Assistant [University College London \(UCL\)](#)
 - Seminar leading for *Quantum Computing* module.
 - Teaching, marking and designing Python coursework for *Algorithms, Logic and Structure* module.
 - Lab supervision for *Scientific Computing Using Object Oriented Languages* module.
- 2017 Course Tutor [Tech Camp, Coventry/Abingdon](#)
Teaching children aged 8–18 programming, physics game design, robotics and electronics at Bablake and St Helen & St Katherine.

Experience

- Software engineering and scientific simulation with a range of tools, including:
 - Creating low-level, high-performance libraries in C++;
 - Interop with high-level languages, creating libraries, scripts and GUIs in Python and C#;
 - CPU/memory profiling and optimisation;
 - Frequent use of engineering practices such as version control, CI/CD, unit testing etc.
- Understanding esoteric mathematical models in order to create programmatic simulations, such as topological quantum error-correcting codes (PhD) and open quantum system dynamics (MSc).
- Simulating computing architectures and devising algorithmic and structural improvements for time/space complexity (PhD).
- Researching practical use of constraint satisfaction and optimisation algorithms, novel techniques for their accuracy and efficiency, and their deployment on quantum hardware (Phasecraft).
- Developing new analytical models to explain observed behaviours and justify practical proposals, such as percolation theory to prove computational complexity (PhD) and metrics for successful partitioning of satisfaction problems (Phasecraft).
- Academic and scientific writing (including research reports, dissertations and posters) as well as presenting to audiences.

Awards

- Year 1 academic achievement award – UEA
- Half Colour for outstanding achievement in sport – UEA
- Denis Ward Prize for Physics – Bablake School
- Prize for Services to Dramatic Society – Bablake School
- Silver Award – British Physics Olympiad 2012/13
- UKA Gold Bar(s) I in Ballroom, Latin American and Classical Sequence dance
- NODA Award for 15 Years of Service to Amateur Theatre
- National Citizen Service (NCS) 2013

Interests

- Game design and development, including:
 - using engines such as Unreal, Unity and Godot;
 - developing custom engines using C++ and OpenGL;
 - Game Boy Advance (ARM architecture) programming using C and Assembly.
- Dance, particularly Ballroom and Latin dance since the age of three. I have served as Treasurer and Team Captain of UEA's Dancesport Society, received numerous 1st Place trophies at student nationals at Blackpool's Inter-Varsity Dance Competition, and also been active in rock 'n' roll and swing.
- Acting, with a longstanding involvement in amateur theatre, including appearing at the Edinburgh Festival Fringe three years consecutively (2014–16) and writing one of those plays myself.
- Writing, including prose, stageplay and game writing alongside academic.

References available upon request.