Stuart Flannigan

Quantum Applications Lead and Computational Physicist

stuart.flannigan@outlook.com | linkedin.com/in/stuart-flannigan-03ab7722a | github.com/SFlann | Google Scholar
Glasgow, United Kingdom | UK work authorization | Fully remote roles | Updated 24 August 2026

PROFILE

Quantum applications lead with a PhD in theoretical quantum physics and more than four years of industry experience translating research and mathematical ideas into deployed software.

Works across quantum algorithms, optimization platforms, provider integrations, asynchronous execution, scientific computing, tensor networks, QEC, benchmarking, and technical direction. Strongest at the boundary between physical assumptions, software architecture, and evidence-led product decisions.

3 quantum products created from concept to production	**15** peer-reviewed papers, including Nature, PRL and QST	**26-78** variables in a hardware-backed QAOA benchmark	**1** independent QEC package designed and built end to end

EXPERIENCE

Quantum Applications Lead
Aug 2026 - Present
Commutator Studios

- Leads quantum applications work at the boundary between customer needs, product direction and technical delivery.

Senior Quantum Software Engineer
Jun 2023 - Aug 2026
Strangeworks

- Principal technical owner of the shared Optimization platform across SDKs, canonical problem models, routing, heterogeneous provider services, durable job lifecycles, billing, results, tests and deployment.
- Continued to own and improve the QAOA, VQE and Hybrid Optimize products after creating their original algorithms, SDKs and services.
- Drove the prototype, architecture and adoption of Modal-backed asynchronous execution, turning blocking solver calls into durable submit, status and result workflows with queue controls and failure recovery.
- Revamped the Qiskit Runtime and Amazon Braket integrations for primitives, sessions, modern provider lifecycles and Hybrid Jobs.
- Led a 26-78-variable aircraft cargo-loading benchmark on Rigetti hardware through Amazon Braket Hybrid Jobs, using repeated runs, uncertainty, scaling and a strong classical baseline.
- Drove quantum and optimization direction for AI-assisted workflows that translated natural-language problems into executable MIP or QUBO models, selected solvers and analysed results.

Quantum Algorithm Scientist
Jun 2022 - Jun 2023
Strangeworks

- Created QAOA, VQE and Hybrid Optimize from concept and research prototype through production architecture, implementation, benchmarking, testing, documentation, CI/CD and deployment.
- Designed Hybrid Optimize as a provider-independent parent/child workflow that decomposed large QUBO or Ising problems, coordinated heterogeneous solvers and reconstructed one product-level result.
- Worked directly on a long-running pharmaceutical engagement spanning formulation, execution, large-data analysis, visualization, interpretation and co-authoring the final scientific report.

EXPERIENCE CONTINUED

Research Associate
University of Strathclyde

Oct 2020 - Jun 2022

- Developed realistic models of neutral-atom quantum hardware incorporating AMO physics, calibration effects and experimentally observed noise.
- Designed and executed tensor-network simulation campaigns on HPC clusters, managing and analysing tens of thousands of compute-intensive many-body jobs.
- Collaborated with experimental groups on quantitative error propagation and many-body spin dynamics, including weekly theory-experiment discussions with Wolfgang Ketterle's MIT group.
- Mentored three PhD students and helped guide their research direction.

SELECTED INDEPENDENT PROJECTS

qec-canvas
An explainable, production-shaped Python workbench for small QEC experiments with typed APIs, reproducible noise, batch and sliding-window decoding, CI and comprehensive automated validation.

Quantum Playground
Executable studies spanning surface codes, lattice surgery, noisy circuits, photonic architectures, Clifford+T compilation, resource estimation and application workloads.

SELECTED RESEARCH

A. J. Daley, I. Bloch, C. Kokail, S. Flannigan et al., Practical quantum advantage in quantum simulation, Nature 607, 667-676 (2022).

S. Flannigan et al., Propagation of errors and quantitative quantum simulation with quantum advantage, Quantum Science and Technology 7, 045025 (2022).

S. Flannigan et al., Many-body quantum state diffusion for non-Markovian dynamics in strongly interacting systems, Physical Review Letters 128, 063601 (2022).

I. Dimitrova, S. Flannigan et al., Many-body spin rotation by adiabatic passage in spin-1/2 XXZ chains of ultracold atoms, Quantum Science and Technology 8, 035018 (2023).

TECHNICAL RANGE

Quantum and scientific
QEC, FTQC, quantum algorithms, tensor networks, many-body physics, noise modelling, resource estimation, QUBO and Ising formulation, hardware-aware benchmarking

Languages and frameworks
Python, Julia, MATLAB, Wolfram Language, Qiskit, Amazon Braket, Stim, ITensors, Cirq, CUDA-Q, FastAPI

Systems and delivery
API and SDK design, service architecture, asynchronous jobs, scientific data pipelines, HPC, Docker, AWS, GCP, Modal, CI/CD, automated testing, code review

EDUCATION

PhD in Physics
University of Strathclyde
2017 - 2020

BSc (Hons) Physics, First Class
University of Strathclyde
2015 - 2017

BEng Electronic and Electrical Engineering
University of Strathclyde
2012 - 2015

AWARDS

- Fred Stern Memorial Prize (2020)
- Carnegie PhD Scholarship (2017-2020)
- Astronomical Society of Glasgow Prize (2017)
- Richard Thornley Memorial Prize (2017)