

# Kieran Dalton

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## EDUCATION

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### ETH Zurich

2022-

*PhD, Physics*

- Investigating the improvement of superconducting quantum devices with the Quantum Device Lab.

### University of Cambridge

2021-2022

*MSci, Physics*

- Grade: First.
- Awarded Foundress Prize.
- Major Courses: Advanced Quantum Condensed Matter, Theories of Quantum Matter, Atomic and Optical.
- Minor Courses: Quantum Information, Superconductivity and Quantum Coherence, Quantum Simulation.
- Project: Quantum algorithms for molecular simulations - Supervised by Dr David Arvidsson Shukur.

### University of Cambridge

2018-2021

*BA, Physical Natural Sciences*

- Grade: Double First.
- Third year results: First class, 20th in cohort. Awarded Foundation Scholarship and Foundress Prize.
  - \* Research Review: Superconducting Qubits for Quantum Computers.
  - \* Further Work: Measurement of  $e/h$  using the Josephson Effect.
- Second year results: Exam percentages in high first range (No official rankings given in 2020).
- First year results: First class, 4th in cohort of 604 students. Awarded Satish Kumar Aggarwal Prize for outstanding first-year performance in Mathematics or Natural Sciences and a College Scholarship.

## RESEARCH EXPERIENCE

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### Masters Project: Quantum algorithms for molecular simulations

2021

*Dr. David Arvidsson Shukur, Quantum Information Group*

*University of Cambridge*

- Simulating ADAPT-VQE and QEB-ADAPT-VQE with noise.
- Comparing noise dependence for qubit and fermionic excitations.
- Presented my research at the Quantum Information and Probability: from Foundations to Engineering (QIP22) conference in Växjö, Sweden.
- Technologies: CUDA, OpenFermion, Qiskit.

### Summer Research Intern: Superconducting qubit package simulation

2021

*Prof. Martin Weides, Quantum Circuits Group*

*University of Glasgow*

- Simulating qubit package to identify spurious modes.
- Worked on thermalisation/noise improvements to the package design.
- Technologies: Qiskit Metal, Ansys HFSS.

### Summer Research Intern: 5G Reflective Surfaces

2020

*Dr Anas Mohsin Al-Rawi, Cavendish Laboratory*

*Royal Society, BT*

- Simulating 5G reflectors using a 2.5D raytracing model tested at Adastral Park.
- Investigated metamaterial reflectors.
- Technologies: MATLAB Communications Toolbox, RadioMobile.

## SUMMER SCHOOLS

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### Qiskit Global Summer School

2021

*IBM Quantum*

*Online*

- Lectures: Classical/quantum machine learning, quantum circuits, noise in quantum computers.
- Highlights: Variational quantum algorithms, advanced QML algorithms, qiskit labs.
- Qiskit lab exercises: Cumulative Score of 100/100.

### Quantum Cryptography School for Young Students

2018

*Institute for Quantum Computing*

*Waterloo, Ontario*

- Lectures: Quantum mechanics, classical/quantum cryptography, quantum algorithms.
- Involved in experiments and small group discussions with resident researchers.

### International Summer School for Young Physicists

2017

*Perimeter Institute*

*Waterloo, Ontario*

- Lectures: General relativity, quantum mechanics, cosmology, black holes.
- Focus Topic: Quantum algorithms, including Grover Search and Shor Code, with a final group presentation.
- Highlight: SNOLAB visit, Institute for Quantum Computing visit, Neil Turok keynote.

## PUBLICATIONS

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### Variational quantum chemistry requires gate-error probabilities below the fault-tolerance threshold.

2022

*Kieran Dalton, Christopher K. Long, Yordan S. Yordanov, Charles G. Smith, Crispin H. W. Barnes, Normann Mertig and David R. M. Arvidsson-Shukur*

<https://arxiv.org/abs/2211.04505>

## PROJECTS

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### PAWB Summer School

2016-2018

*Photonics Academy of Wales*

*Bangor University*

- Designed and constructed a solar tracking device for photovoltaic cells, using the Rayleigh sky model.
- Circuitry: Operational amplifiers, voltage comparators, monostables, multivibrators, and custom logic control (with D-flip flops).
- Returned to mentor students in optoelectronics and circuit production techniques.

### Engineering Education Scheme Wales

2017-2018

*STEM Cymru*

*Bangor University*

- Designed and constructed a self-levelling platform capable of returning to any angular orientation relative to the horizontal.
- Circuitry: Laser diode, rotational optical encoder, and logic circuitry.
- Position: Team leader.
- Team Awards: AIRBUS 'Best Application of Engineering and Technology' award, CREST Gold award, and attended the 2018 National Big Bang Final.
- Individual Awards: Runner-Up EESW Young Engineer of the Year 2018, for this and my previous project.

## TECHNICAL SKILLS

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**Proficient:** Python, Matlab, L<sup>A</sup>T<sub>E</sub>X.

**Familiar:** Qiskit, Git, C++, Mathematica, Java.

**Software/OS:** Ansys HFSS, Linux.

## OTHER

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**Societies:** Cambridge University Physics Society (Year Rep and Sponsorship Officer).

**Sports:** Football, Pembroke River Swimming (Co-Founder).