# Mafalda Ramôa

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## Research Experience

2023 – Current **Research Scholar**
Virginia Tech Center for Quantum Information Science and Engineering, USA
Project: Quantum Simulation Algorithms
Advisors: Sophia Economou, Edwin Barnes

## Education

2022 – Current **PhD in Computer Science**
Advisors: Sophia Economou (Virginia Tech), Luís Paulo Santos (University of Minho), Ernesto Galvão (INL)
Project: On the Quest for Shallow, Accurate, and Cost-Efficient Ansätze for Variational Quantum Algorithms

2016 – 2021 **Integrated Masters in Engineering Physics - Physics of Information**
University of Minho
Final Average: 18/20

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Master Thesis: Ansätze for Noisy Variational Quantum Eigensolvers
Grade: 19/20
Advisors: Ernesto Galvão (INL), Mikhail Vasilevskiy (University of Minho)
Informal supervision: Raffaele Santagati (Boehringer Ingelheim)

## Publications

2024 *Reducing Measurement Costs by Recycling the Hessian in Adaptive Variational Quantum Algorithms*
M. Ramôa, L. P. Santos, N. J. Mayhall, E. Barnes, S. E. Economou
Quantum Sci. Technol. 10 (2024) 015031

2024 *Reducing the Resources Required by ADAPT-VQE Using Coupled Exchange Operators and Improved Subroutines*
M. Ramôa, P. G. Anastasiou, L. P. Santos, N. J. Mayhall, E. Barnes, S. E. Economou
npj Quantum Inf 11, 86 (2025)

## Conferences

1-8 August 2024 Poster Presentation at the Quantum Simulation (QSim) 2025 Summer School and Conference, New York, USA
M. Ramôa, P. G. Anastasiou, L. P. Santos, N. J. Mayhall, E. Barnes, S. E. Economou, *Status and Prospects of Variational Quantum Algorithms*

16-21 March 2025 Talk at the APS Global Physics Summit, California, USA
M. Ramôa, P. G. Anastasiou, L. P. Santos, N. J. Mayhall, E. Barnes, S. E. Economou, *Reducing the Resources Required by ADAPT-VQE Using Coupled Exchange Operators and Improved Subroutines*

25-29 November 2024 Talk at the Quantum Techniques in Machine Learning (QTML) Conference, Melbourne, Australia
M. Ramôa, L. P. Santos, N. J. Mayhall, E. Barnes, S. E. Economou, *Reducing Measurement Costs by Recycling the Hessian in Adaptive Variational Quantum Algorithms*

09-16 August 2024 Poster Presentation at the Quantum Simulation (QSim) 2024 Summer School and Conference, Rhode Island, USA
M. Ramôa, P. G. Anastasiou, L. P. Santos, N. J. Mayhall, E. Barnes, S. E. Economou, *Improving Adaptive Variational Quantum Algorithms*

24-28 July 2023 Poster Presentation at the Theory of Quantum Computation, Communication and Cryptography (TQC) Conference, Aveiro, Portugal
M. Ramôa, R. Santagati and E. Galvão, *ADAPT-VQE: Impact of Noise, Importance of Symmetries, and Circuit Depth Reduction via Operator Removal*

## Peer Review

Reviewing activity for Nature Physics, Nature Communications, Nature Reviews, Quantum Science and Technology, IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems, Physica Scripta, Digital Discovery, PRResearch, Journal of Chemical Theory and Computation, AVS quantum science

IOP Trusted Reviewer Status

## Teaching

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| 28-21 July 2025 | Tutor at $C^2$QA QISE Summer School, Brookhaven National Laboratory and Virginia Tech<br>Online Summer School on Quantum Computing for High School Students |
| March 2025-Current | Supervisor of a student at the Lake Zurich High School (USA)<br>Project on reducing the impact of noise on ADAPT-VQE operator selection using quantum error mitigation techniques |
| November 2024-Current | Supervisor of two students for Diploma Thesis at at HTL Bregenz (Austria)<br>Project on the choice of operator ordering in adaptive ansätze for VQE |
| September 2024-September 2025 | Supervisor of an MSc student at the University of Minho (Portugal)<br>Project on the viability and costs of fault-tolerant VQAs |
| September 2024-Current | Supervisor of three students at the Thomas Jefferson High School (USA)<br>Project on the viability of a spin-preserving variant of ADAPT-VQE |
| 10 July 2024 | Tutor at C-Tech$^2$, Virginia Tech, USA<br>In-person Summer School on Quantum Computing for High School Students |
| 5-8 August 2024 | Tutor at $C^2$QA QIST Summer School, Brookhaven National Laboratory and Virginia Tech<br>Online Summer School on Quantum Computing for High School Students |
| June-September 2024 | Supervisor of a BSc student at the Longwood University (USA)<br>Project on VQE ansatz design for condensed matter Hamiltonians |

## Honors and scholarships

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| 2024 | ”R&D@USA” Scolarship (Luso-American Development Foundation) |
| 2020/21 | Excellence Scholarship Prize (University of Minho)<br>*Awarded to the best student of each degree* |
| 2020/21 | ”New Talents in Quantum Technologies” Scholarship (Gulbenkian Foundation) |
| 2019/20 | Excellence Scholarship Prize (University of Minho) |
| 2017/18 | Excellence Scholarship Prize (University of Minho) |

## Technical skills

**Programming languages**

Proficient: Python

Familiar: C, Assembly, R, Java, Haskell, Matlab

**Software**

Qiskit, CIRQ, OpenFermion, LaTeX

**Languages**

Native: Portuguese

Fluent: English

Basic knowledge: French, Spanish, Italian