María Gragera Garcés

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Introduction

I'm a PhD student at the University of Edinburgh specializing in quantum distributed systems and information theory. With a strong foundation in physics, my research has encompassed quantum networking and photonic hardware simulations. Committed to advancing open science, I actively contribute to the open-source community and engage in science communication to foster broader understanding and collaboration.

Work History

Quantum Software Lab *Edinburgh, In person*
PhD Researcher *Sep 2024 – Aug 2028*

- Researching secure and verifiable distributed quantum compiling platforms for cloud access, as part of my PhD work.

IBM Quantum *Zurich, Remote*
Community Advocate Intern *May 2023 – Aug 2024*

- Built and maintained IBM's UK Quantum Community, collaborating with partners and Quantum Hubs.
- Promoted IBMQ infrastructure adoption through tailored programs and community engagement.
- Contributed to IBM Quantum Partner collaborations, including the 2023 and 2024 NQCC Hackathon, assisting projects in Quantum Machine Learning and Quantum Optimization.
- Presented a proposal for a UK-wide national curriculum for quantum computing in schools.
- Co-mentored an industrial dissertation project at the University of Portsmouth.

Cisco *London, Hybrid*
Placement Research Intern *Jul 2021 – Aug 2022*

- Led internal quantum network simulation efforts using discrete event simulator tools.
- Developed and tested quantum network and protocol design on remote clusters.
- Collaborated with academic research groups from the Centre for Quantum Networks (CQN).
- Contributed to Quantum technology-based patent designs and submissions.

Education

PhD in Quantum Informatics *Sept 2024 – August 2028*
University of Edinburgh

- Researching Distributed Quantum Computing.
- **Courses:** Design and Analysis of Parallel Algorithms, Distributed Systems, Quantum informatics Group project, Category Theory reading group, Operating Systems

BSc Physics *Sept 2019 – July 2024*
University of Bath

- Dissertation on quantum photonics hardware simulations.
- **Courses:** Analysis, Algebra, Methods & applications, Properties of matter, Vibrations, waves, & optics, Intro to quantum physics, Electricity & magnetism, Experimental laboratory sessions, Quantum & Atomic Physics, Thermal Physics, Electromagnetism, Condensed Matter Physics, ODEs, Programming skills, Planets & Exoplanets, Experimental Physics & Computing, Planets Nuclei & stars, Intro to Web Development, Quantum mechanics, Science Education in practice, Contemporary Physics, Simulation techniques, Issues in Science Ed, Laser Physics, Computational Physics, Advanced Quantum Physics

Public Research Projects

Modeling of a novel Lithium Niobate single photon source *GitHub Repository* ↗

- As my graduating dissertation work I modeled a novel Lithium Niobate single-photon source, investigating the feasibility and performance of dual rail waveguide setups as a heralded single-photon source for quantum

technologies.

- Demonstrated that dual rail setups hold promise as a scalable alternative to current single rail heralded single-photon sources.

Comparing Multiple Networks: A Statistical Viewpoint *GitHub Repository* ↗

- Contributed to a study within my University's Mathematics department, comparing the effects of topology on end-to-end connections through entangled and non-entangled channels in the context of communication.

Implementation of a quantum error correction code library for Julia's *GSoC project summary* ↗
Clifford gate simulator

- As part of the Google Summer of Code 2022, I created a comprehensive library of frequently used quantum error correcting codes for Julia's simulator of Quantum Clifford Circuits, including Steane, Shor, Toric, Surface, and CSS quantum error correction codes.

Discrete event simulation of Quantum Network hardware setup *GitHub Repository* ↗

- Simulated an experimental setup for Bell state analysis showing confirmation of state simulation, completed in collaboration with Dr. Inès Montaño's graduate student team as part of Cisco-CQN collaborations.

Technologies

Languages: Python, C++, C, Julia, MATLAB

Technologies: Git/Github, Linux UNIX,Windows, Jupiter Notebooks, VScode

Quantum outreach Projects

bqb Quantum Youth: a global quantum student outreach initiative *Youtube channel* ↗

- Co-founded and direct an international student team sharing quantum tech knowledge.
- Run a series introducing the quantum industry to students (16-18) to inspire STEM careers.

Qubits for the Kids: Realizing a sustainable quantum internet for future *QIH Paper* ↗
researchers

- Developed during Quantum Internet Hackathon 2022, winning the Little Green Qubits challenge on quantum internet sustainability.
- Explored questions on environmental sustainability and climate justice, emphasizing early integration of climate principles to address energy demands and environmental concerns.

Hackathons and Conferences

LOQCATHON.2 *Sorbonne University, 15/11/23 – 18/11/23*
Team won 3rd place by implementing a Variational Quantum Eigensolver (VQE) using classical shadows on linear photonics software.

QuantumQuake, Qiskit Fall Fest'23 *IIT Patna, 09/11/23*
Virtually ran a 1.5-hour workshop introducing over 350 students to Qiskit's quantum software.

Youth Quantum Summit, Qsium *University of Oxford, 04/11/23*
Introduced over 150 students to Qiskit at the Martin Wood Lecture Theatre.

Qiskit Fall Fest Spanish *bqb Quantum Youth, 23/10/23 – 10/11/23*
Organized and mentored over 300 students in their first steps in Quantum technology.

National Quantum Hackathon 2023, NQCC *University of Birmingham, 25/07/23 – 26/07/23*
Mentored postgraduate students as part of the IBM team.

Quantum Internet Hackathon 2022 *RIPE, 25/11/22 – 02/12/22*
Participated in the hackathon focused on quantum internet applications.

Girls in Quantum October 2022 Conference *Girls in Quantum, October 2022*
Presented on the topics of quantum networks.

UnitaryHack 22 *UnitaryFund, 03/06/22 – 17/06/22*
Contributed to Qiskit Terra and Quantum Universal Education; won bounties and was a featured participant.

Global Quantum Computing & Entrepreneurship Conference *Womanium, 10/07/22 – 26/08/22*
Attended with a full grant.

Woman at the Forefront of Technology Conference *IBM Research Lab Zurich, 22/07/22*
Visited the IBM Zurich research labs as an early in career STEM researcher. Attended with a full grant.