Daniele Cucurachi

Based in Milan, Italy *Nationality: Italian* *19/01/1998*

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Summary

Computational physicist with experience in research and scientific software development, determined to pursue a research career in deep learning.

Education

University of Cambridge *Cambridge, UK*

Visiting student in the Physics Department (Master's Thesis) *Sep 2022 - Mar 2023*

- Hosted by the *Quantum Information Group*

EPFL - École Polytechnique Fédérale de Lausanne *Lausanne, Switzerland*

Master of Science in Applied Physics *Sep 2020 - Jun 2023*

- Average Grade: **5.63/6** (top 10% in the Applied Physics class of 2023)

Politecnico di Torino *Torino, Italy*

Bachelor degree in Physics Engineering *Sep 2017 - Jul 2020*

- Final Grade: **110/110 cum laude**

Research Experience

Quantum-enhanced Monte Carlo Markov chain optimisation *Cambridge, UK and remote*

University of Cambridge, Quantum Information Group *Sep 2022 - Present*

Developed a hybrid algorithm for optimising parametrized proposal strategies in quantum-enhanced Monte Carlo Markov chains. A Python simulator of the algorithm is available at *https://github.com/DanieleCucurachi/QMCMC.git*. Currently in the process of finalizing and preparing this project for submission to a peer-reviewed journal.

Apodization of coupled cavity array for waveguide QED *Lausanne, Switzerland*

EPFL, Hybrid Quantum Circuits Lab *Sep 2021 - Jan 2022*

Designed coplanar waveguides tailored for slow light applications in superconducting circuits. The project involved finite element method (FEM) simulations and the development of a Python library to optimize and speed up the design process of the devices.

Localized crystallization of Germanium nanowires *Lausanne, Switzerland*

EPFL, Laboratory of Semiconductor Materials *Sep 2020 - Jan 2021*

Conducted data analysis on Raman spectroscopy experiments to characterize Ge nanowires, aiming to optimise the crystallization process and enhance the crystal quality. My work enabled the utilization of the nanowires to produce fully functioning hole spin qubits.

Professional Experience

AdVenture Partner *remote*

Scientifica Venture Capital *Nov 2023 - Present*

- Responsible for identifying innovative technological projects within universities and research departments, fostering potential investments by Scientifica Venture Capital.

Quantum Software Engineer *Helsinki, Finland*

IQM Quantum Computers *Feb 2022 - Aug 2022*

- Developed Python libraries for the design and simulation of superconducting quantum processors (QPUs):
  - Conducted code reviews and code design for projects involving up to 15 contributors, ensuring code quality.
  - Collaborated closely with the *IQM Fabrication Team* to design photomasks' layouts and various components of quantum processors, submitting approximately 25 merge/pull requests within my first six months. Part of my contributions can be found here (public projects only).
  - Developed a routing protocol to speed up the routing of complex QPUs, currently utilized by the *IQM Design & Simulations Team*.
- Simulated and analyzed the electromagnetic performance of superconducting quantum circuit elements using finite element analysis (FEA).

Technical Skills

Programming Languages Python, C++ (basic)

Python Packages PyTorch, Scikit-Learn, Numpy, Pandas, Scipy, Matplotlib, Qiskit, KQCircuits, Gdspy, QuTip

Software & Utilities GitLab and GitHub with Git for collaborative programming, ANSYS High Frequency Simulation Software (HFSS), KLayout, Sonnet Software, LTspice (analog circuit simulations), LaTeX

Experience with Software Development, Simulations, Data Analysis and Visualization | **OS:** Windows, Linux

Academic Outreach & Associations

Vice President *Lausanne, Switzerland*

EPFL Quantum Computing Association *Feb 2021 - Sep 2022*

- Secured sponsorship and event funding from the company *Quantum Machines*.
- As team leader for a group of five, organized three successful association events and managed advertising campaigns to promote them.
- Last organized event *"EPFL Quantum Hackathon"*: approximately 100 international participants, the event was dedicated to the promotion and education of quantum computation and its ties to chemistry simulations.

Awards and Scholarships

2023	**Scientifica "Thesis" award:** awarded a grant of €3000 and access to the Scientifica Venture Capital mentorship programme.	*Italy*
2020	**Graduated "cum laude" (Politecnico di Torino)**	*Italy*
2018/19	**"Riduzione per Merito" (Politecnico di Torino):** awarded merit-based tuition fee reduction for two consecutive years.	*Italy*

Languages

Italian Native Proficiency

English Full Professional Proficiency: **Level C1 - C2**

French Elementary Proficiency: **Level A2**

Hobbies

Chess Currently holding a rating of 1700 on Lichess.org in rapid chess, I am always up for a game.

Cross country running Achieved a personal best with an average pace of 4 minutes and 7 seconds per kilometer in a 10 km run.