Daniele Cucurachi

Computational Physicist · VC collaborator

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Summary

Computational physicist with experience in research, passionate about entrepreneurship and startups. Currently, I am working as a **Junior Quantum Machine Learning Researcher** at *Pasqal*. On the side, I collaborate as an **AdVenture Partner** with *Scientifica VC*, a venture capital firm specializing in deep tech startups.

Education

University of Cambridge — *Cambridge, UK*

Master of Philosophy (MPhil) in Advanced Computer Science (ML track) — *Oct 2024 - Jun 2025*

- Incoming graduate student starting in October 2024

University of Cambridge — *Cambridge, UK*

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

- Awarded the **Scientifica VC "Thesis" Award** for outstanding master's thesis
- Hosted by the **Quantum Information Group** (Cavendish Laboratory)

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

Master of Science (MSc) in Applied Physics — *Sep 2020 - May 2023*

- Final GPA: **top 10%** in the Applied Physics class of 2023
- EPFL is ranked **10th worldwide** in the 2024 QS World University Rankings for "Engineering & Technology"

Politecnico di Torino — *Torino, Italy*

Bachelor of Science (BSc) in Physics Engineering — *Sep 2017 - Jul 2020*

- Final Grade: **110/110 with honours**

Professional Experience

Junior Quantum Machine Learning Researcher — *Amsterdam, The Netherlands*

Pasqal — *Apr 2024 - Present*

- Investigating Quantum Physics-Informed Neural Networks trainability and developing tailored quantum-specific optimization algorithms.

AdVenture Partner — *remote*

Scientifica Venture Capital — *Nov 2023 - Present*

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

Quantum Software Engineer (Internship) — *Helsinki, Finland*

IQM Quantum Computers — *Feb 2022 - Aug 2022*

- Developed Python libraries for the design and simulation of superconducting quantum processors:
  - Submitted 25 merge/pull requests within my first six months for software projects involving up to 15 contributors. A small part of my contributions (open-source projects only) can be found at *https://github.com/iqm-finland/KQCircuits/commits?author=danielecucurachiiqm*.
  - Hands-on experience with large codebases, collaborative programming tools such as GitHub and GitLab with Git, and software engineering best practices such as unit testing and conducting code reviews.
  - Developed a novel library feature to exponentially speed up the routing of quantum processors, currently utilized by the *IQM Design & Simulation Team*.
  - Collaborated closely with the *IQM Fabrication Team* to design photomasks' layouts and various superconducting circuit elements.
- Modeled electromagnetic coupling in quantum processing units (QPUs) through finite element methods (ANSYS HFSS).

Awards & Achievements

2023	**Scientifica VC "Thesis" Award:** every year Scientifica VC awards grants to the best thesis in STEM subjects. The selected candidates receive a grant of €3,000 and gain access to a mentorship programme on entrepreneurship and the world of startups. I was selected as a winner for my master's thesis.	*UK / Italy*
2023	**Winner of the IMC "Trading simulation":** ranked first among around 40 participants at the "Trading Simulation" organized by IMC Trading at the "EPFL Forum" event (2023 edition).	*Switzerland*
2020	**Graduated "with honours" (Politecnico di torino):** honours may be awarded at the discretion of the Graduation Committee upon reaching a final grade of 110.51/110.00.	*Italy*
2018-20	**"Riduzione per Merito":** awarded merit-based tuition fee reduction for two consecutive academic years (2018/19 & 2019/20), granted to the top students at Politecnico di Torino maintaining a GPA above 27/30.	*Italy*

Research Experience

Quantum-enhanced Monte Carlo Markov chain optimisation (Master's Thesis) *Cambridge, UK and remote*

University of Cambridge (Quantum Information Group) *Sep 2022 - Present*

Supervisors: Prof. C. Barnes, Prof. G. Carleo, Dr. H. V. Lepage

Developed a subroutine for optimising parametrised proposal strategies in quantum-enhanced Monte Carlo Markov chains (MCMC). A Python simulator of the first version of the algorithm is available at *https://github.com/DanieleCucurachi/QMCMC.git*. Submitted to a peer-reviewed journal for publication (currently under review).

Apodization of coupled cavity array for waveguide QED (Quantum Electrodynamics) *Lausanne, Switzerland*

EPFL (Hybrid Quantum Circuits Lab) *Sep 2021 – Jan 2022*

Supervisor: Prof. P. Scarlino

Designed coupled resonator waveguides tailored for slow light applications in superconducting circuits. The project involved finite element method simulations (ANSYS HFSS and Sonnet) and the development of a Python library (based on the Python module gdspy) to optimize and speed up the design workflow. For more details, please visit my website at *https://danielecucurachi.github.io/personal-website/project/slowlight/*.

Localized crystallization of Germanium nanowires for hole spin qubits fabrication *Lausanne, Switzerland*

EPFL (Laboratory of Semiconductor Materials) *Sep 2020 – Jan 2021*

Supervisor: Prof. A. Fontcuberta i Morral, recently appointed as the new president of EPFL

Conducted data analysis on Raman spectroscopy experiments (hands-on experience with optical setups) to characterize Ge nanowires, aiming to optimize the crystallization process and enhance the crystal quality. My work enabled the utilization of the nanowires to produce fully functioning hole spin qubits. For more details, please visit my website at *https://danielecucurachi.github.io/personal-website/project/ge_nanowires/*.

Associations

Student Researcher *Remote*

United Italian Societies (UIS) Research Centre *Mar 2024 - Present*

Supervisor: Dr. Enrico Fontana

- Currently working on a commentary-type article about the recent downturn in venture capital investments in quantum computing projects and the likelihood and potential ramifications of a "quantum winter" scenario.

Vice President *Lausanne, Switzerland*

EPFL Quantum Computing Association *Feb 2021 - Sep 2022*

- 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" (*https://memento.epfl.ch/event/epfl-quantum-hackathon-2/*): approximately 100 international participants, the event was focused on quantum computation and its ties to chemistry simulations.
- Secured event funding from the company *Quantum Machines*.

Technical Skills

Programming Languages Python, C/C++, MATLAB (basic)

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

Software & Tools GitLab and GitHub with Git (version control) for collaborative software development, ANSYS High Frequency Simulation Software (HFSS), KLayout, Sonnet Software, LTspice (analog circuit simulations), LaTeX (technical writing)

Experience with Numerical Simulations, Algorithms, Data Analysis and Visualization | **OS:** Windows, Linux (Ubuntu)

Volunteering

Pool Lifeguard *Novara, Italy*

Federazione Italiana Nuoto *2015*

- License "Piscina (P) Rif. PIE-432/2014-5"

Volunteer at a Children's Summer Camp *Novara, Italy*

Parrocchia Madonna Pellegrina *Jun 2014 - Jun 2017*

- Organized activities, trips and excursions for a group of around 60 children
- Assisted the summer camp organizers with handling the finances

Languages

Italian Native Proficiency

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

French Elementary Proficiency: **Level A2 - B1**

Hobbies

Chess Currently holding a rating of 2000 in rapid and blitz chess on Lichess.org (ranking in the 98th percentile of Lichess users), I am always up for a game.

Trail running Achieved a personal best with an average pace of 4 minutes and 07 seconds per kilometer in a 10 km run. Participated in **Porte di Pietra** 20° Edizione, an international trail running competition.