Lorenzo Laneve

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Research interests: design of randomized and quantum algorithms, complexity theory, quantum information

Education

Università della Svizzera Italiana
Sep 2022 – Ongoing

PhD in Computer Science

Advisor: Stefan Wolf — Quantum Algorithms and Computation

ETH Zurich
Sep 2019 – Jul 2022

M.Sc. in Computer Science

Major in Theoretical Computer Science — GPA: 5.66/6.00 (Top 10%)

Politecnico di Milano
Sep 2016 – Jul 2019

B.Sc. in Computer Science and Engineering

Final grade: 110 *with honors*, GPA: 28.89/30

Research

An adversary bound for quantum signal processing
Preprint (2025), submitted to Quantum

Generalized Quantum Signal Processing and Non-Linear Fourier Transform are equivalent
Preprint (2025)

On multivariate polynomials achievable with quantum signal processing
with Stefan Wolf. *Quantum 9, 1641, presented at QIP'25 (poster)*

Quantum signal processing over SU(N)
Preprint (2023), presented at QIP'24 (poster)

On hitting times for general quantum Markov processes
with Francesco Tacchino, Ivano Tavernelli. *Quantum 7, 1056*

Robust black-box quantum-state preparation via quantum signal processing
Preprint (2021)

Quantum Random Walks
Master Thesis at ETH Zurich, joint with IBM Research Zurich (2022)

Impossibility of composable Oblivious Transfer in relativistic quantum cryptography
with Lídia del Rio. *Presented at QCrypt'21 (poster)*

Experience & Teaching

Università della Svizzera Italiana

Seminar on Quantum Algorithms — Spring '24, '25

• Founded the seminar to promote advanced quantum algorithms at USI, prepared a selection of topics from the literature, graded the final presentations (25 students)

Quantum Computing — Spring '23, '24

Lecturer: Stefan Wolf

• Led exercise sessions, gave feedback on assignments, graded final exam (80+ students)

Calculus — Fall '22, '23, '24

Lecturer: Kai Hormann

• Led exercise sessions, graded assignments and final exam (90+ students)

IBM Research Zurich

Theory and Applications group — Oct 2021 - Jul 2022

Supervisors: Ivano Tavernelli, Francesco Tacchino Python Qiskit

• Developed a theoretical framework to numerically analyze the behaviour of hybrid quantum-classical walks, which resulted in a publication. Used *Qiskit* to simulate small-scale examples.

ETH Zurich

Algorithmic Game Theory Fall 2021

Lecturer: Paolo Penna

- Led exercise sessions, gave feedback for assignments, graded exams (90+ students)

Applied Cryptography Spring '21, Spring '22

Lecturer: Kenny Paterson Python

- Led exercise sessions (20-30 students) and assisted students in laboratory assignments

Quantum Physics for Non-Physicists Fall 2021

Lecturer: Lídia del Rio

- Written detailed, official lecture notes for the course (200+ pages)

Conferences & Workshops

2025 International Conference on Quantum Information Processing
Raleigh, USA (2025) [poster presented]

2025 International Conference on Quantum Technologies for High-Energy Physics
CERN, Switzerland (2025) [talk given]

2024 Theory of Quantum Computation, Communication and Cryptography
Okinawa, Japan (2024)

2024 Swiss Quantum Days
Villars-sur-Ollon, Switzerland (2024) [poster presented]

2024 International Conference on Quantum Information Processing
Taipei, Taiwan (2024) [poster presented]

2021 International Conference on Quantum Cryptography
Online (2021) [poster presented]

Served as external reviewer for: ISIT'24, QIP'26

Programming Projects

The `nlft-qsp` package — computing QSP phase factors Python

Open source project Winter 2025

- Written QSP/QSVT solver, decomposing million-degree polynomials with 10^{-14} accuracy in less than two minutes following state-of-the-art techniques.

Satellite Road Segmentation Python Keras Tensorflow

Project of Computational Intelligence Lab Spring 2020

- Obtained 92% accuracy on road classification in satellite imagery by using *fully convolutional* networks and *image augmentation* techniques.

Adrenaline Java

Project of Software Engineering Spring 2019

- Written a client-server implementation of the board game *Adrenaline*, applying software engineering techniques to organize the code and coordinate group work.

The Human Plus Programming Language C C++

Hobby Project 2015–2018

- Designed a front-end compiler for a mini general-purpose programming language, based on the LLVM infrastructure. (100+ files and classes)

Honors

Politecnico di Milano Best Freshmen Award A.Y. 2016/2017
Ranked top 100 out of 10000+ students, for the results achieved during the first year.