

Matteo A. C. Rossi

Curriculum Vitae

Personal Information

website <https://www.matteoacrossi.com>

Current position

Aug. 2020 - present CTO and co-founder, **Algorithmiq**. A startup developing quantum algorithms for the life sciences. After successfully closing a Series A funding round, we reached more than \$ 18m in equity investment. <https://algorithmiq.fi>

Jan. 2024 - present Docent, University of Helsinki.

Previous positions

August 2021 - December 2023 Postdoctoral Researcher, **Aalto University**, Espoo, Finland

In the PICO group led by Prof. Jukka Pekola.

August 2018 - July 2021 Postdoctoral researcher of the Turku Collegium for Science and Medicine, University of Turku, Finland.

November 2017 - July 2018 Postdoctoral researcher at the Turku Centre for Quantum Physics, University of Turku, Finland

Education

October 2023 **Docent in Theoretical Physics**, University of Helsinki, Finland

November 2017 **PhD in Physics** - *Università degli Studi di Milano*.

Thesis: Dynamics and characterization of quantum systems interacting with classical noise

Supervisor: Prof. Matteo G.A. Paris, Cosupervisor: Prof. Bassano Vacchini

July 2014 **Laurea Magistrale (MSc) in Physics** - *Università degli Studi di Parma*. 110/110 cum laude

Thesis: Dynamics of a two-qubit system interacting with a noisy classical environment

Advisors: Prof. Matteo G.A. Paris (Università degli Studi di Milano), Prof. Raffaella Burioni (Università degli studi di Parma)

July 2012 **Laurea Triennale (BSc) in Physics** - *Università degli Studi di Parma*. 110/110 cum laude

Publications

I published **35 articles** on international peer-reviewed journals (1 as last and 11 as first author).

I have **7** preprints and 2 conference proceedings.

ORCID <https://orcid.org/0000-0003-4665-9284>

Google Scholar <https://scholar.google.com/citations?user=97NUjusAAAAJ>

Web of Science <https://www.webofscience.com/wos/author/record/572451>

Organized conferences

2021 IBM Qiskit Research Unconference, Member of the organizing and program committees. <https://qiskit.org/events/finland-unconference/>.

Dissemination

I participated in more than 22 international conferences and workshops, where I gave 5 invited talks, 10 contributed talks, and 7 poster presentations.

Invited Talks *Informationally Complete Measurements and Tensor-Network Methods for Near-Term Quantum Computing*, ReAQT conference, 19-20 June 2024, Budapest, HU
Quantum walks for network medicine, QWEST Kickoff meeting, 6-7 June 2024, Modena, IT
Quantum Chemistry on Quantum Computers: Challenges and New Directions, Numerical methods in quantum chemistry 23, 5-8 June 2023, Tromsø, NO
Overcoming challenges in quantum chemistry simulations on near-term quantum computers Near-term quantum computers workshop, 21-24 March 2023, Warsaw, PL
Continuous-time quantum walks on graphs with classical noise Quantum2Classical Workshop at University of Strathclyde, 18-19 June 2018, UK
Simulating Open Quantum Systems with IBM Q Experience. 4th AQM Meeting, 20 December 2019, Milano, Italy
Effective description of the short-time dynamics in open quantum systems. Workshop on *Continuous variable quantum information theory and applications*, 5 June 2017, University of Nottingham, UK

Contributed talks *Self-consistent tomography based on semidefinite programming for quantum device characterization*, CEWQO 2023, 3-7 July 2023, Milano, Italy
Noisy quantum metrology enhanced by continuous nondemolition measurement, YIQIS 2020, 28 Sep - 2 Oct 2020, Italy (Online event)
Continuous measurements for advanced quantum metrology, Quantum 2019, 31 May, Torino, Italy
Restoring Heisenberg scaling in noisy metrology by continuous monitoring OSA QIM V, 4-6 April 2019, Roma, Italy
Quantum walks & spatial search on graphs affected by classical noise IQIS 2018, 17-20 September, Catania, Italy
Continuous-time quantum walks on graphs with classical noise Quantum Roundabout, 11-13 July 2018, University of Nottingham, UK
Continuous-time quantum walks on spatially correlated noisy lattices QuProCS III meeting, 21-23 March 2018, Oxford, UK
All-optical quantum simulator of qubit noisy channels Young IQIS 2017, 11-15 September, Florence, Italy
Probing the diamagnetic term in light-matter interaction. Quantum Roundabout, 6-8 July 2016, Nottingham, UK
Entangled quantum probes for classical environmental noise. Non-Markovian Quantum Dynamics conference, 24-28 August 2015, Cortona, Italy

Invited seminars *Informationally complete generalised quantum measurements for near-term quantum algorithms*. Invited seminar at University of Wien, Austria, 30 November 2022.
Informationally complete generalised quantum measurements for near-term quantum algorithms. Invited seminar at University of Milan, Italy, 10 November 2022.
Learning to measure: Adaptive IC-POVMs for quantum algorithms. Invited seminar at Gemini-Center on Quantum Computing, Norway, 2 Feb 2022.
IBM Quantum devices for research in quantum information. Invited seminar at University of Milan, Italy, 16 March 2021.
Continuous measurements for advanced quantum metrology. Invited seminar at INRIM, Torino, 3 July 2020.

Schools

2021 Machine Learning in Quantum Physics and Chemistry, Aug 24 - Sep 3, Warsaw, Poland

- 2018 *Quantum Complex Systems out of Equilibrium*, Lake Como School of Advanced Studies, Italy, July 29 - August 3, 2018
- 2017 *Quantum Machine Learning Summer School 2017*, Alpine Heath Resort, South Africa, 23rd January - 1st February 2017
- 2016 International Summer School Enrico Fermi 198 on *Quantum Simulators*, Varenna, Italy, 22-27 July 2016
- 2015 SUSSP71 on *Frontiers in Quantum Dynamics & Quantum Optics*, University of Strathclyde, Glasgow, 21st July to 2nd August 2015

Grants and awards

- 2018 **Turku Collegium for Science and Medicine postdoctoral research position** Three-year postdoctoral position for carrying research at University of Turku.
- 2020 **HPC-Europa3 grant** covering a 3-week visit to the University of Milan for developing HPC code.
- IBM Q Awards Teach me Quantum. 8k \$ prize** for the best university level course on quantum physics using Qiskit. Together with Daria Anttila, Boris Sokolov, Guillermo García-Pérez.

Academic merits

- 2023 Member of the steering group of the TORQS Project (Business Finland, budget 1.2 M€)
- 2021 Italian National Scientific Qualification as Associate Professor in theoretical physics of matter and theoretical physics of fundamental interactions
- Referee for *Nature Communications*, *Physical Review Letters*, *PRX Quantum*, *npj Quantum Information*, *Scientific Reports*, *PNAS Nexus*, *Quantum Science and Technology*, *Physical Review Research*, *New Journal of Physics*, *Advanced quantum technologies*, *Physical Review A*, *Physical Review E*, *Europhysics Letters*, *AVS Quantum Science*, *Quantum Information Processing*, *Physics Letters A*, *Annals of Physics*
- Referee for NQSTI Cascade calls, National Quantum Science and Technology Institute, Italy
- Referee for the National Science Centre in Poland
- Referee for funding applications to PRIN 2017 (Progetti di ricerca di Rilevante Interesse Nazionale), Ministry of Education and Research, Italy
- Referee for Rita Levi Montalcini fellowships, Ministry of Education and Research, Italy

Teaching

Pedagogical training

- 2022 University Pedagogy training 1 (5 ECTS), University of Helsinki
- Course Design (5 ECTS), Aalto University

Courses

- 2022 Coordinator of the course *Quantum Computing*, FYS2029 (5 ECTS), Bachelor's Programme in Physical Sciences, University of Helsinki
- 2021 Course *Open Quantum Systems with Qiskit* with Prof. Maniscalco at ICFO PhD programme (Barcelona, Spain), 8h
- Guest lecture *Practical quantum computing on IBM quantum devices* for Quantum Computing course FYS2029 at University of Helsinki, 2h
- Guest lecture *Practical quantum computing on IBM quantum devices* for Quantum Information course TFYS7039 at University of Turku, 1h
- 2018-2019 Coordinator of the course *Seminars in Theoretical Physics* TFYS7011 (4 ECTS). Topic: Simulating open quantum systems with IBM Quantum computers (University of Turku)
- 2017-2018 Teaching assistant for the General Physics course for Chemistry, e-learning project, 60h (University of Milan)
- 2017-2018 Teaching assistant for Programming Laboratory (C++) for Physics, 25h (University of Milan)

- 2016-2017 Teaching assistant for Programming Laboratory (C++) for Physics, 50h (University of Milan)
- 2015-2016 Teaching assistant and tutor for the Mathematics course for Chemistry, 20h (University of Milan)
- 2014-2015 Teaching assistant for the General Physics course for Chemistry, 20h (University of Milan)
- [Teaching material](#)
- 2019 D. Anttila, G. García-Pérez, M. A. C. Rossi and B. Sokolov, Open Quantum Systems with Qiskit, Online interactive book available at <https://matteoacrossi.github.io/oqs-jupyterbook/> (2019).

Thesis supervision

PhD theses

- 2019-2023 Co-supervisor of Marco Cattaneo, cotutelle PhD student at IFISC (Spain) and University of Helsinki (Finland). Thesis: *Characterization and simulation of multipartite open quantum systems*
- 2022-present Co-supervisor of Keijo Korhonen, PhD student at the University of Helsinki (Finland)
- 2022-present Co-supervisor of Daniele Morrone, PhD student at Università degli Studi di Milano (Italy), with an internship agreement with Algorithmiq
- 2022-present Co-supervisor of Joonas Malmi, PhD student at the University of Helsinki (Finland)

Bachelor/Master Theses

- 2022 *Exploring the use of Adaptive POVM Measurements in the VQE*, Keijo Korhonen, Master degree in Physics, University of Helsinki (Finland)
- 2021 *Reinforcement Learning for Feedback Control of Continuous-Variable Quantum Systems*, Alessio Fallani (Master degree in Physics, Università degli Studi di Milano, Italy). Resulted in publication
- 2021 *Quantum computation and experiments on IBM quantum systems*, Juho Nykänen (Master degree in Theoretical Physics, University of Turku, Finland)
- 2020 *Spatial search by continuous-time quantum walks on complex networks*, Joonas Malmi (Master degree in Theoretical Physics, University of Turku, Finland). Resulted in publication
- 2018 *Quantum walks and spatial search on graphs subject to dynamical noise*, Marco Cattaneo (Master degree in Physics, Università degli Studi di Milano, Italy). Resulted in publication
- 2016 *Quantum limits to precision in probing deformed commutators*, Tommaso Giani (Bachelor degree in Physics, Università degli Studi di Milano, Italy). Resulted in publication
- 2015 *Sonde quantistiche per sistemi complessi classici* Luca Vismara (Bachelor degree in Physics, Università degli Studi di Milano, Italy)

Outreach

- Quantum Jungle** *Quantum Jungle - The Dance of Quanta* is an interactive art installation visualising the fascinating world of quantum particles. (See eg. <https://www.aalto.fi/en/news/aalto-and-instituteq-are-partners-of-quantum-jungle-the-dance-of-quanta-exhibition>)
- Seminar** *The era of quantum technologies*. 2 Nov 2020. Public lecture at the Turku City Library <https://fb.me/e/4Ku7C4l0C>
- Quantum Garden** *Quantum Garden* is an art piece realised with artist Robin Baumgarten that showcases phenomena in quantum mechanics <http://quantum.garden>.
- QPlayLearn** Co-developer of QPlayLearn, an on-line platform containing multimedia resources for learning about quantum science and technologies in a playful way. <https://www.qplaylearn.com>
- QPlay** QPlay is a EU H2020 project on gamification of science and quantum physics. I collaborated in the project by realizing prototype games and by participating in quantum game jams like the Quantum Wheel Game Jam, Helsinki 2019 (<http://www.finnishgamejam.com/quantumwheel/>).