Riccardo Romanello

PhD Student · Computer Science & Artificial Intelligente

University Of Udine, Via delle Scienze 206, Udine, Italy

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Education

University of Udine *Udine*

PhD in Computer Science and Artifical Intelligence *2021 - present*

- Advisor: Prof. Carla Piazza
- Research Topics: Quantum Computation, Quantum Circuit Minimization, Quantum Automata, Graphs, Optimization
- Visiting Student for 3 months at Technical University of Munich with Prof. Robert Wille
- Founding member of the Quantum Computing Lab at University of Udine
- Organizer of the European Summer School on Quantum AI - EQAI

University of Udine *Udine*

Master Degree Computer Science *2018 - 2021*

- Advisor: Prof. Carla Piazza
- Thesis: Quantum Automata. An introduction to Quantum Automata Theory, followed by some original material on a new quantum automata model.
- 110/110 cum laude

University of Udine *Udine*

Bachelor Degree Computer Science *2015 - 2018*

- Advisor: Prof. Carla Piazza
- Thesis: Models of Quantum Computation. An introduction to Quantum Turing Machine and Quantum Complexity Theory.
- 110/110 cum laude

Research Interests

- Encoding of graphs for the quantum setting [RC22, JLAMP]
- Graphs Theory as a tool for Quantum Computation [CILC23BSP, JLS]
- Quantum Automata models, Quantum Automata Expressiveness [QEST22]
- Minimization of Quantum Circuits [CIL23, AIQxQIA]
- Classical Automata Minimization [ICTCS22]
- Neural Network Reduction [AIxIA22, NN]
- Blockchain and AI [JNCA]

Professional Experience

2018-2021 **Junior Software Developer**, Blue Reply

Publications

Published - Journals

[JLAMP] Della Giustina Davide, Piazza Carla, Riccardi Brian, **Romanello Riccardo**. 2023. Quantum encoding of dynamic directed graphs. Journal of Logical and Algebraic Methods in Programming.

Published - Conferences

[ICTCS22] Bianchini Christian, Policriti Alberto, Riccardi Brian, **Romanello Riccardo**. 2022. Incremental NFA Minimization. CEUR WORKSHOP PROCEEDINGS, 3284, 161–173.

[RC22] Della Giustina Davide, Piazza Carla, Riccardi Brian, **Romanello Riccardo**. 2022. Directed Graph Encoding in Quantum Computing Supporting Edge-Failures. International Conference on Reversible Computation, 75–92.

[QEST22] Piazza Carla, **Romanello Riccardo**. 2022. Mirrors and Memory in Quantum Automata. International Conference on Quantitative Evaluation of Systems, 359–380.

[AIxIA22] Ressi Dalila, **Romanello Riccardo**, Rossi Sabina, Piazza Carla. 2022. Neural Networks Reduction via Lumping. International Conference of the Italian Association for Artificial Intelligence, 75–90.

[CILC23] Piazza Carla, **Romanello Riccardo**, Wille Robert. 2023. An ASP Approach for the Synthesis of CNOT Minimal Quantum Circuits. CEUR WORKSHOP PROCEEDINGS, 3428.

[CILC23BSP] Della Schiava Alex, Piazza Carla, **Romanello Riccardo**. 2023. Graph-Theoretical Arguments in Support of a Quantum Declarative Manifesto. CEUR WORKSHOP PROCEEDINGS, 3428. **BEST STUDENT PAPER AWARD**

[AIQxQIA] Piazza Carla, **Romanello Riccardo**. 2023. Synthesis of CNOT minimal quantum circuits with topological constraints through ASP. CEUR WORKSHOP PROCEEDINGS, 3586.

Under Review

[JNCA] Ressi Dalila, **Romanello Riccardo**, Piazza Carla, Rossi Sabina. AI-Enhanced Blockchain Technology: a Review of Advancements and Opportunities. Journal of Network and Computer Applications.

[JCTS] Bianchini Christian, Policriti Alberto, **Romanello Riccardo**, Riccardi Brian. Incremental NFA Minimization. Journal of Theoretical Computer Science.

[JLC] Della Schiava Alex, Piazza Carla, **Romanello Riccardo**. 2023. Classical Computation over Quantum Architectures. Journal of Logic and Computation.

[NN] Ressi Dalila, **Romanello Riccardo**, Rossi Sabina, Piazza Carla. Compressing Neural Networks via Formal Methods. Neural Networks.

In Prep

Della Schiava Alex, **Romanello Riccardo**. Topological Quantum Computation for Computer Scientists.

Romanello Riccardo. State of the Art of the CNOT-Minimization Problem.

Awards, Fellowships, & Grants

2019 **Best Computer Science Student**, University of Udine, Dies Academicus *500€*
2020 **Advance badge**, IBM Quantum Challenge

Presentations

** presenting author; + mentored undergraduate*

Contributed Presentations

Della Giustina Davide, Piazza Carla, Brian Riccardi, **Romanello Riccardo***. 2022. Directed Graph Encoding in Quantum Computing Supporting Edge-Failures. Oral presentation: Reversible Computation 2022, Urbino, Italy.

Piazza Carla, **Romanello Riccardo***. 2022. Mirrors and Memory in Quantum Automata. Oral presentation: QEST 2022, Warsaw, Poland.

Romanello Riccardo*. 2022. On the Role of Graphs in Quantum Computation. Departmental seminar: Technical University of Munich, Group of Design Automation and Software Tools for Quantum Computing.

Romanello Riccardo*. 2023. On the Minimization of (CNOT, T) Gates in Quantum Circuits. Departmental seminar: Technical University of Munich, Group of Design Automation and Software Tools for Quantum Computing.

Romanello Riccardo*. 2023. Lumpabilities in PEPA. Presentation held during the PRIN2020 annual meeting. University of Venice, Italy.

Della Schiava Alex*+, Piazza Carla, **Romanello Riccardo**. 2023. Graph-Theoretical Arguments in Support of a Quantum Declarative Manifesto. CILC 23, Udine, Italy.

Piazza Carla, **Romanello Riccardo***, Wille Robert. 2023. An ASP Approach for the Synthesis of CNOT Minimal Quantum Circuits. CILC 23, Udine, Italy.

Piazza Carla, **Romanello Riccardo***. Synthesis of CNOT minimal quantum circuits with topological constraints through ASP. AIQxQIA 2023, Rome, Italy.

Teaching Experience

Winter 2022	**Elements of Mathematics and Linear Algebra**, Teaching Assistant	*University of Udine*

Mentoring

2023	**Alex Della Schiava**, Master Thesis co-supevisor, *Title: Graph encoding in Quantum Computing*	*University of Udine*
2023	**Francesco Decataldo**, Bachelor Thesis co-supervisor, *Title: An algorithm for the T-Count of Clifford+T circuits*	*University of Udine*
2024	**Diego Borsoi**, Master Thesis co-supervisor, *Title: On the Role of Graphs in Measurement-Based Quantum Computation*	*University of Udine*
2024	**Davide Della Giustina**, Master Thesis co-supervisor	*University of Udine*

Outreach

Service and Outreach

2015 - Today	**Private Tutoring**, I have been in charge of tutoring high schools students in Math, Physics and Computer Science	
2022	**QEST22**, Staff member	*Warsaw*
2022	**EQAI22 European Summer School on Quantum AI**, Organizer	*Udine*
2023	**EQAI23 2nd European Summer School on Quantum AI**, Organizer	*Udine*
2023	**AIQ x QIA**, Member of the Program Committee at AIQxQIA 23	*Rome*

Reviewer Activities

Reviewed papers for ICTCS23, Gandalf23, IEEE QSW, AIQxQIA.

Professional Memberships

Member of the PRIN 2020 project (Udine research unit), *Title: Noninterference and Reversibility Analysis in Private Blockchains.*

AIxIA annual membership.

Further informations

For any kind of additional information or curiosity you may have, any of the following professor/researcher will be happy to answer your questions:

- Professor Robert Wille, Technical University of Munich, ✉ robert.wille@tum.de,

- Riccardo Rascondi, National Research Council - The Institute for Cognitive Sciences and Technologies, ✉ riccardo.rasconi@istc.cnr.it,
- Angelo Oddi, National Research Council - The Institute for Cognitive Sciences and Technologies, ✉ angelo.oddi@istc.cnr.it,
- Marco Baioletti, University of Perugia, ✉ marco.baioletti@unipg.it,
- Carla Piazza, University of Udine, ✉ carla.piazza@uniud.it,
- Alberto Policriti, University of Udine, ✉ alberto.policriti@uniud.it