Riccardo Romanello

riccardo.romanello@gmail.com —
(+39 3484299473) — riccardoromanello.github.io

About me

I am currently pursuing a PhD at the University of Udine, with a focus on the intersection of graph theory and quantum computation. My research focuses on both the development of quantum algorithms on graphs and the application of graph-theoretical methods to address challenges in quantum computing. My academic interests lie primarily in the field of theoretical computer science, with a specific emphasis on the study of bisimilarity techniques as applied to graphs and classical automata. Additionally, I am member of the Quantum Computing Lab at the University of Udine.

Contact Information

Email (1): riccardo.romanello@gmail.com
Email (2): riccardo.romanello@uniud.it
Website: riccardoromanello.github.io
Scholar: Riccardo Romanello
Phone: (+39) 3484299473
Address: Viale Tricesimo, 164, 33100 Udine, Italy

Education

University of Udine, Udine, Italy
Ph.D. Student, 11/2021-11/2024
Topic: Investigating the role of graphs in quantum computation. How they can be used in such paradigm and how graph-theoretical techniques can help quantum.

MSc in Computer Science, 2018-2021
Score: 110/110 with honors. *Thesis:* Quantum Automata. How are automata defined in the quantum settings. Introduction of a novel model of quantum automata *a la Heisenberg*.

BSc in Computer Science, 2015-2018
Score: 110/110 with honors *Thesis:* Models for Quantum Computing. A very first approach to theoretical Quantum models: from Quantum Turing Machines to Grover's algorithm.

I.T.I.S Max Planck, Treviso, Italy
Technical Diploma (High school), 2010-2015
Score: 100/100 with honors

Experience

Academic

Technical University of Munich, Munich, Germany
Visiting Scientist, 03/2023-06/2023
Three-month internship at the Technical Univeristy of Munich, working in Professor Wille's Quantum laboratory. We investigated techniques for the compilation of Quantum Circuits.

Industrial

Blue Reply, Silea, Italy
Consultant, 10/2018-10/2021
Software for financial services

Skills

Languages: Italian (native), English (competent)
Software: Python, C/C++, Java

Academic Service

Teaching Assistant for: *Elements of Mathematics and Linear Algebra*: Introduction to the basic notions of mathematics, probability and linear algebra, 24 hours. October 2022-February 2023, BSc Computer Science at the University of Udine.

Teaching Assistant for: *Foundations of Computer Science*: automata theory, language theory, complexity theory, 20 hours. March 2024-June 2024, BSc Computer Science at the University of Udine.

Conferences Reviewer for: IEEE QSW 2023, AIQxQIA 2023, CILC 2023, GandALF 23, ICTCS 2023, ICTCS 2024, CILC 2024.

Journals Reviewer for: Quantum, International Journal of Foundations of Computer Science, IEEE Transactions on Neural Networks and Learning Systems, Intelligenza Artificiale,

Program Committee member for: International Workshop on AI for Quantum and Quantum for AI (2023).

Local Committee member for: EQAI (2022, 2023, 2024), CILC (2023,2024), AIxIA 2023.

Supervisor for:
[3] Alex Della Schiava, MSc Artificial Intelligence and Cybersecurity at the University of Udine. *Graph encoding in Quantum Computing*

[2] Davide Della Giustina, MSc Artificial Intelligence and Cybersecurity at the University of Udine. *Classical Computations On Quantum Architectures - Compiling Answer Set Programns*

[1] Francesco De Cataldo, BSc Computer Science at University of Udine. *An algorithm for the T-Count of Clifford+T circuits*

Selected Publications

[6] *Classical computation over quantum architectures: From graph encoding to declarative languages compilation*. Della Schiava A et al. Journal of Logic and Computation (2024).

[5] *Incremental NFA Minimization*. Bianchini C et al. Theoretical Computer Science (2024).

[4] *Quantum Encoding of Dynamic Directed Graphs*. Della Giustina D et al. Journal of Logical and Algebraic Methods in Programming (2024).

[3] *Speeding up Answer Set Programming by Quantum Computing*. Della Giustina D et al. QUASAR '24: 2024 Workshop on Quantum Search and Information Retrieval (2024).

[2] *Synthesis of CNOT minimal quantum circuits with topological constraints through ASP*. Piazza C and Romanello Riccardo. AIxIA 23: International Conference of the Italian Association for Artificial Intelligence (2023).

[1] *Mirrors and Memory In Quantum Automata*. Piazza C and Romanello R. International Conference on Quantitative Evaluation of Systems (2022).

Awards

[2] *Graph-Theoretical Arguments in Support of a Quantum Declarative Manifesto* presented at CILC23 won the best student paper award

[1] I was awarded best BSc computer science student in 2021 by University of Udine.

Publications

Journal papers

[5] *Classical computation over quantum architectures: From graph encoding to declarative languages compilation*. Della Schiava A et al. Journal of Logic and Computation (2024).

[4] *Incremental NFA Minimization*. Bianchini C et al. Theoretical Computer Science (2024).

[3] *Quantum Encoding of Dynamic Directed Graphs*. Della Giustina D et al. Journal of Logical and Algebraic Methods in Programming (2024).

[2] *Compressing Neural Networks via Formal Methods*. Ressi D et al. Neural Networks (2024).

[1] *AI-enhanced blockchain technology: A review of advancements and opportunities*. Ressi D et al. Journal of Network and Computer Applications (2024).

Conference papers

[8] *Speeding up Answer Set Programming by Quantum Computing*. Romanello R et al. QUASAR '24: 2024 Workshop on Quantum Search and Information Retrieval (2024).

[7] *Synthesis of CNOT minimal quantum circuits with topological constraints through ASP*. Piazza C and Romanello Riccardo. AIxIA 23: International Conference of the Italian Association for Artificial Intelligence (2023).

[6] *Graph-Theoretical Arguments in Support of a Quantum Declarative Manifesto*. Della Schiava A et al. CILC23: 38th Italian Conference on Computational Logic (2023).

[5] *An ASP Approach for the Synthesis of CNOT Minimal Quantum Circuits*. Piazza C et al. CILC23: 38th Italian Conference on Computational Logic (2023).

[4] *Neural Networks Reduction Via Lumping*. Ressi D et al. International Conference of the Italian Association for Artificial Intelligence (2022).

[3] *Directed Graph Encoding in Quantum Computing Supporting Edge-Failures*. Della Giustina D et al. International Conference on Reversible Computation (2022).

[2] *Incremental NFA Minimization*. Bianchini C et al. 23rd Italian Conference on Theoretical Computer Science, ICTCS 2022 (2022).

[1] *Mirrors and Memory In Quantum Automata*. Piazza C and Romanello R. International Conference on Quantitative Evaluation of Systems (2022).

Talks

Conferences and Workshops

[8] QUASAR24, June 2024, Pisa.
peeding up Answer Set Programming by Quantum Computing.

[7] AIxIA23, November 2023, Udine.
Synthesis of CNOT minimal quantum circuits with topological constraints through ASP.

[6] CILC23, July 2023, Udine.
An ASP Approach for the Synthesis of CNOT Minimal Quantum Circuits.

[5] CILC23, July 2023, Udine.
Graph-Theoretical Arguments in Support of a Quantum Declarative Manifesto.

[4] QEST22, September 2022, Warsaw.
Mirrors and Memory in Quantum Automata.

[3] ICTCS22, September 2022, Rome.
Incremental NFA Minimization.

[2] RC22, July 2022, Urbino.
Directed Graph Encoding in Quantum Computing Supporting Edge-Failures.

[1] CILC22, June 2022, Bologna.
Heisenberg in Quantum Automata.

Seminars

[1] Technical University of Munich - Design Automation and Software Tools for Quantum Computing, November 2022, Munich.
On the Role of Graphs in Quantum Computation.

Poster Presentations

[1] MOVEP22, Juny 2022, Aalborg.
Heisenberg-Inspired Quantum Automata.