Panagiotis (Panos) Promponas

Ph.D. Candidate in Electrical & Computer Engineering, Yale University

Google Scholar · ppromponas.com · LinkedIn · ResearchGate

ppromponas · panagiotis.promponas@yale.edu

Research Interests

Mathematical modeling and optimization of quantum networks and distributed quantum computers. Quantum networks: how entanglement is scheduled, routed and stored; the rate–fidelity tradeoffs of different hardware designs for quantum switches; and how networks should be built around those limits. Distributed quantum computing: compilers that partition, map and schedule quantum programs across networked processors, and estimates of the resources that useful algorithms need on a given platform. Background in classical network optimization and resource-sharing games.

Education

Ph.D. in Electrical & Computer Engineering **Aug 2020 – Dec 2026 (expected)**

Yale University, New Haven, CT. Advisor: Leandros Tassiulas

M.S. and M.Phil. in Electrical & Computer Engineering en route

Diploma in Electrical & Computer Engineering **2013 – 2019**

National Technical University of Athens, Greece

Five-year diploma (integrated master's level); specialization in Computer Science, Mathematics and Networks

Experience

Graduate Research Assistant **Aug 2020 – Present**

Yale Institute for Network Science & NSF Center for Quantum Networks (2020–2025), Yale University

- Characterized the capacity region of quantum entanglement switches with limited memory and decoherence, and designed throughput-optimal scheduling and memory-allocation policies (IEEE JSAC 2024, IEEE Commun. Lett. 2023, IFIP Networking 2023, SIGMETRICS 2023 workshop).
- Compared all-photonic and memory-equipped switch architectures through their rate–fidelity tradeoffs (QCNC 2026), and developed a capacity-driven framework for the design and operation of quantum networks built from such devices.
- Modeled and analyzed large-scale classical networks, including sectorized wireless and sliced networks, designing frameworks that enlarge the throughput region, improve routing efficiency, and support incentive-compatible resource allocation (IEEE ToN 2025, MobiHoc 2023, INFOCOM 2023, CDC 2024).

Applied Scientist Intern **Aug 2024 – Feb 2025**

Amazon, Transportation Services

- Designed a queueing-theoretic framework and digital-twin simulator for trailer operations, modeling facilities as a network of queues to optimize control policies and reduce trailer leasing and operating costs.

Ph.D. Research Intern **Jul 2024 – Aug 2024**

Cisco Systems

- Designed a measurement-based distributed quantum computing framework that compiles quantum algorithms into two-qubit gates and measurements while minimizing network communication cost and required quantum memories.

Ph.D. Research Intern **May 2023 – Aug 2023**

Cisco Systems

- Developed a gate-based distributed quantum computing compiler that translates a quantum circuit into physical operations native to multiple QPUs, jointly optimizing entanglement generation, routing, and teleportation to minimize expected execution time (IEEE ICC 2025, J. Quantum Computing 2025).

Research Assistant **Apr 2019 – Aug 2020**

Network Management and Optimal Design Laboratory,
National Technical University of Athens

- Modeled multi-user systems that share a common pool of resources using satisfaction games, introduced the *minimum efficient satisfaction equilibrium*, and designed distributed dynamics that provably converge to it and outperform Nash equilibria in common-pool and wireless resource-allocation use cases (IEEE TAC 2025, IEEE/ACM ToN 2021, IEEE TCNS 2021, WMNC 2019 Best Paper).

Teaching and Mentoring

Graduate Teaching Fellow **Jan 2022 – May 2022**

EENG 310: Signals and Systems, Yale University

Arda Kara **Summer 2025 – Present**

Research intern, Yale University
B.S. in Electrical and Electronics Engineering, Bilkent University (now M.S. student)
Ongoing work on a modular compiler for distributed quantum computing: separate components for network operation and routing, qubit mapping, and per-QPU compilation, coordinated by a discrete-event orchestrator so that compilation scales with the network.

Siddharth R. Chander **Summer 2026 – Present**

Research intern, Yale University
B.S. student in Computer Science and Physics, Caltech
Ongoing study of the resources that practically relevant quantum algorithms require and of how far current hardware is from providing them.

Raphael Bastos **Summer 2026 – Present**

Research intern, Yale University
B.S. student in Computer Science, Penn State University
Ongoing study of mathematical programming on quantum annealers, in a project carried out jointly with D-Wave: formulating smart-grid scheduling problems and solving them on D-Wave's annealers.

Talks and Presentations

- Invited talk: "Rate-Fidelity Tradeoffs in All-Photonic and Memory-Equipped Quantum Switches." Research seminar of the group of Patrick Eugster, Università della Svizzera italiana (USI), Lugano, Switzerland (online), May 2026.
- "Compiler for Distributed Quantum Computing: A Reinforcement Learning Approach" and "Throughput Region of a Quantum Switch: Comparative Analysis under Different Regimes." Quantum Networking Workshop: Modeling, Applications, Design (UMass Amherst, Yale, Argonne National Laboratory, and the Center for Quantum Networks), University of Massachusetts Amherst, June 2025.
- Presented the first-authored conference papers listed under Publications at INFOCOM 2023, IFIP Networking 2023, MobiHoc 2023, the SIGMETRICS 2023 workshop, ICC 2025, and QCNC 2026.

- Research presentations at site visits of the NSF Center for Quantum Networks and of the Army Research Office MURI "Theory and Engineering of Large-Scale Distributed Entanglement."

Honors & Awards

Onassis Foundation Scholarship for graduate studies in Electrical Engineering (2023–2026).

A.G. Leventis Foundation Scholarship for graduate studies in Electrical Engineering (2021–2024).

Bodossaki Foundation Scholarship for graduate studies in Electrical Engineering (2021–2025).

Gerondelis Foundation Award for Academic Excellence (2020–2021).

NTUA Special Account for Research Funding Scholarship for Academic Excellence (2019–2020).

Space Hellas "Dimitris Manolopoulos" Scholarship for Academic Excellence (Dec. 2019).

Best Paper Award at the 12th IFIP Wireless and Mobile Networking Conference (WMNC 2019) for the paper "Redesigning Resource Management in Wireless Networks based on Games in Satisfaction Form" (Sept. 2019).

Three NTUA Thomaidion Awards for three publications on satisfaction equilibria and wireless resource management (2019–2022).

Academic Service

Reviewer for IEEE JSAC, IEEE/ACM Transactions on Networking, IEEE Transactions on Communications, IEEE Transactions on Quantum Engineering, IEEE Communications Magazine, IEEE Access, WiOpt, MILCOM, and SPAWC.

Technical Skills

Methods: Mathematical modeling, stochastic and queueing optimization, scheduling and resource allocation, reinforcement learning, game theory and mechanism design, approximation and heuristic algorithms.

Programming: Python, Java, C/C++, Julia, Matlab, R.

Tools: Qiskit, D-Wave Ocean SDK, Gym environments, Stable-Baselines3, PyTorch, TensorFlow, scikit-learn, SciPy, CVXPY, NetworkX, SimPy.

Software: CompilerDQC: open-source reinforcement-learning compiler and simulation environment for distributed quantum computing (Python, MIT license).

Languages

- **Greek** – Native
- **English** – Fluent (C2; Certificate of Proficiency, Univ. of Michigan)

Publications

*Equal contribution.

Quantum Networks and Distributed Quantum Computing

1. **Promponas, P.**, Bacciottini, L., Polakos, P., Vardoyan, G., Towsley, D., & Tassiulas, L. Rate-Fidelity Tradeoffs in All-Photonic and Memory-Equipped Quantum Switches. IEEE International Conference on Quantum Communications, Networking, and Computing (QCNC 2026).
2. **Promponas, P.**, Mudvari, A., Della Chiesa, L., Polakos, P., Samuel, L., & Tassiulas, L. Compiler for Distributed Quantum Computing: A Reinforcement Learning Approach. IEEE International Conference on Communications (ICC 2025).
3. Crampton, O., **Promponas, P.**, Chen, R., Polakos, P., Tassiulas, L., & Samuel, L. A Genetic Approach to Minimising Gate and Qubit Teleportations for Multi-Processor Quantum Circuit Distribution. Journal of Quantum Computing, 2025.
4. **Promponas, P.**, Valls, V., Guha, S., & Tassiulas, L. Maximizing Entanglement Rates via Efficient Memory Management in Flexible Quantum Switches. IEEE Journal on Selected Areas in Communications, Special Issue on the Quantum Internet, 2024.
5. Valls, V., **Promponas, P.**, & Tassiulas, L. A Brief Introduction to Quantum Network Control. IEEE Communications Magazine, 2024.
6. Valls, V., **Promponas, P.**, & Tassiulas, L. On the Capacity of the Quantum Switch With and Without Entanglement Decoherence. IEEE Communications Letters, 2023.
7. **Promponas, P.**, Valls, V., & Tassiulas, L. Quantum Switch Scheduling for Information Qubits. Workshop on Quantum Systems and Computation, ACM SIGMETRICS 2023.
8. **Promponas, P.**, Valls, V., & Tassiulas, L. Full Exploitation of Limited Memory in Quantum Entanglement Switching. IFIP Networking Conference, 2023.

Network Control and Optimization

9. **Promponas, P.**, Chen, T., & Tassiulas, L. On the Optimization and Stability of Sectorized Wireless Networks. IEEE Transactions on Networking, 2025.
10. **Promponas, P.**, Pelekis, C., Tsiropoulou, E. E., & Papavassiliou, S. Risk-Aware Satisfaction Equilibria in Resource Sharing Games. IEEE Transactions on Automatic Control, 2025.
11. Manganaris, K. N., **Promponas, P.**, Tsolis, A., Lazarakis, F. I., & Peppas, K. P. Optimizing Bandwidth Allocation in mmWave/sub-THz Cellular Networks Using Maximum Flow Algorithms. Computer Communications, 2025.
12. **Promponas, P.**, Valls, V., Nikolakakis, K., Kalogerias, D., & Tassiulas, L. Throughput-Optimal Scheduling via Rate Learning. IEEE Conference on Decision and Control (CDC 2024).
13. **Promponas, P.**, Chen, T., & Tassiulas, L. Optimizing Sectorized Wireless Networks: Model, Analysis, and Algorithm. ACM International Symposium on Theory, Algorithmic Foundations, and Protocol Design for Mobile Networks and Mobile Computing (MobiHoc 2023).
14. **Promponas, P.** & Tassiulas, L. Network Slicing: Market Mechanism and Competitive Equilibria. IEEE International Conference on Computer Communications (INFOCOM 2023).

15. **Promponas, P.**, Pelekis, C., Tsiropoulou, E. E., & Papavassiliou, S. Games in Normal and Satisfaction Form for Efficient Transmission Power Allocation under Dual 5G Wireless Multiple Access Paradigm. IEEE/ACM Transactions on Networking, 2021.

16. **Promponas, P.**, Tsiropoulou, E. E., & Papavassiliou, S. Rethinking Power Control in Wireless Networks: The Perspective of Satisfaction Equilibrium. IEEE Transactions on Control of Network Systems, 2021.

17. Pelekis, C., **Promponas, P.**, Alvarado, J., Tsiropoulou, E. E., & Papavassiliou, S. A Fragile Multi-CPR Game. Mathematical Methods of Operations Research, 2021.

18. Papavassiliou, S., Tsiropoulou, E. E., **Promponas, P.**, & Vamvakas, P. A Paradigm Shift Toward Satisfaction, Realism and Efficiency in Wireless Networks Resource Sharing. IEEE Network, 2020.

19. **Promponas, P.**, Apostolopoulos, P. A., Tsiropoulou, E. E., & Papavassiliou, S. Redesigning Resource Management in Wireless Networks Based on Games in Satisfaction Form. IFIP Wireless and Mobile Networking Conference (WMNC 2019), **Best Paper Award**.

Graph Representation Learning

20. Nakis, N.*, **Promponas, P.***, Tsirkas, K., Mamali, K., Makri, E., Tassiulas, L., & Christakis, N. A. Rank Is Not Capacity: Spectral Occupancy for Latent Graph Models. Advances in Neural Information Processing Systems (NeurIPS 2026).

21. Nakis, N., Kosma, C., **Promponas, P.**, Chatzianastasis, M., & Nikolentzos, G. Aitchison Embeddings for Learning Compositional Graph Representations. International Conference on Machine Learning (ICML 2026).

22. Nakis, N., Kosma, C., **Promponas, P.**, Chatzianastasis, M., & Nikolentzos, G. Archetypal Graph Generative Models: Explainable and Identifiable Communities via Anchor-Dominant Convex Hulls. International Conference on Artificial Intelligence and Statistics (AISTATS 2026), **Spotlight**.