Gregory Rosenthal

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Appointments

- Postdoc, University of Cambridge and University of Warwick[1], May 2023 – Apr. 2025.
  - Supervised by Tom Gur and Animesh Datta.
  - Postdoctoral research associate at Trinity Hall, Cambridge, Sep. 2023 – present.

Education

- PhD in Computer Science, University of Toronto, Jan. 2019 – Aug. 2023.
  - Thesis: *Quantum State and Unitary Complexity.* https://www.cs.toronto.edu/~rosenthal/thesis.pdf
  - Supervised by Benjamin Rossman and Henry Yuen.
- MSc in Computer Science, University of Toronto, Sep. 2017 – Jan. 2019.
  - Thesis: *Beating Treewidth for Average-Case Subgraph Isomorphism.*
  - Supervised by Benjamin Rossman.
- BA in Mathematics *cum laude* & minor in Computer Science, Cornell University, Aug. 2013 – May 2017.

Research Papers

Preprints

Rosenthal, Gregory. "Efficient Quantum State Synthesis with One Query". 2023. arXiv: 2306.01723.

Rosenthal, Gregory. "Query and Depth Upper Bounds for Quantum Unitaries via Grover Search". 2021. arXiv: 2111.07992.

Conference Papers

Rosenthal, Gregory and Henry Yuen. "Interactive Proofs for Synthesizing Quantum States and Unitaries". In: *13th Innovations in Theoretical Computer Science Conference (ITCS 2022)*. Vol. 215. 2022, 112:1–112:4. DOI: 10.4230/LIPIcs.ITCS.2022.112. arXiv: 2108.07192.

Rosenthal, Gregory. "Bounds on the QAC^0 Complexity of Approximating Parity". In: *12th Innovations in Theoretical Computer Science Conference (ITCS 2021)*. Vol. 185. 2021, 32:1–32:20. DOI: 10.4230/LIPIcs.ITCS.2021.32. arXiv: 2008.07470. **Best Student Paper Award**.

Rosenthal, Gregory. "Beating Treewidth for Average-Case Subgraph Isomorphism". In: *14th International Symposium on Parameterized and Exact Computation (IPEC 2019)*. Vol. 148. 2019, 24:1–24:14. DOI: 10.4230/LIPIcs.IPEC.2019.24. arXiv: 1902.06380. **Best Student Paper Award**.

Journal Papers

Rosenthal, Gregory. "Beating Treewidth for Average-Case Subgraph Isomorphism". In: *Algorithmica* (2021). DOI: 10.1007/s00453-021-00813-y. arXiv: 1902.06380. **Special Issue** for IPEC 2019.

[1] Affiliated with the computer science and physics departments at Warwick, but with long-term visitor status in the computer science department at Cambridge (and living in Cambridge) from Sep. 2023 – Apr. 2025.

Reference Letter Writers

- Henry Yuen
- Benjamin Rossman
- Tom Gur

Talks

- Connections between quantum circuit complexity of states, unitaries, and functions
  - Simons Institute for the Theory of Computing, Aug. 2, 2023
- Query and Depth Upper Bounds for Quantum Unitaries via Grover Search
  - Theory of Quantum Computation, Communication and Cryptography (TQC) 2021.
  - Poster at Quantum Information Processing (QIP) 2022.
  - Scott Aaronson's research group meeting, Nov. 22, 2021.
- Interactive Proofs for Synthesizing Quantum States and Unitaries
  - Quantum cryptography seminar at University of Ottawa (`https://quasarlab.org`), Sep. 30, 2022.
  - IQC-QuICS Math and Computer Science Seminar (`https://iqc-quics-seminar.umiacs.io/`), Apr. 28, 2022.
  - QIP 2022.
  - ITCS 2022.
- Bounds on the QAC^0 Complexity of Approximating Parity
  - TQC 2021.
  - Poster at QIP 2021.
  - ITCS 2021.
- Beating Treewidth for Average-Case Subgraph Isomorphism
  - IPEC 2019.

Service

- Conference reviews: CCC, ICALP, ITCS (x2), QIP (x4), FOCS, FSTTCS.
- Journal reviews: *ACM Trans. Quantum Comput.*, *IEEE Trans. Comput. Aided Des. Integr. Circuits Syst.*, *Quantum*, *Quantum Inf. Comput.*, *SIAM J. Comput.*, *Theory Comput.*
- Triager for graduate admissions in University of Toronto Dept. of Computer Science, Dec. 2021.
- Coordinated food for the Theory Student Seminar (`https://www.cs.toronto.edu/tss/`) in the University of Toronto Dept. of Computer Science, Feb. 2022 – Apr. 2022.
- Social Coordinator for the University of Toronto Computer Science Graduate Student Benevolent Society (CSGSBS), Jan. 2018 – July 2019.
  - Each week a student would volunteer to bring in food to share; I coordinated logistics and reimbursement.

Awards and Scholarships

- Best Student Paper Awards for "Bounds on the QAC^0 Complexity of Approximating Parity" (ITCS 2021) and "Beating Treewidth for Average-Case Subgraph Isomorphism" (IPEC 2019).
- Natural Sciences and Engineering Research Council of Canada (NSERC) Postgraduate Scholarships – Doctoral program (PGS D), Sep. 2019 – Aug. 2022.
- C.C. Gotlieb (Kelly) Graduate Fellowship in the Department of Computer Science, University of Toronto, Nov. 2018.

– Awarded on the basis of academic merit (research and coursework).

Teaching Assistantships

University of Toronto

- Fall 2022: Introduction to Quantum Algorithms (CSC 2332), half TAship.
- Fall 2021: Topics in the Theory of Computation: Algebraic Gems in Theoretical Computer Science and Discrete Mathematics (CSC 2429).
- Fall 2020: Topics in the Theory of Computation: Advanced Topics in Quantum Information Theory (CSC 2429), half TAship.
- Fall 2020: Fundamentals of Cryptography (CSC 2426), half TAship.
- Summer 2020: Numerical Methods (CSC 336).
- Winter 2020: Computational Complexity and Computability (CSC 463).
- Fall 2019: Algorithm Design, Analysis and Complexity (CSC 373).
- Summer 2019: Data Structures and Analysis (CSC 263).
- Winter 2019: Algorithms for Collective Decision Making (CSC 2556).
- Fall 2018: Quantum Computing: Foundations to Frontier (CSC 2451).
- Summer 2018: Mathematical Expression and Reasoning for Computer Science (CSC 165).
- Winter 2018: Advanced Algorithm Design (CSC 473).
- Fall 2017: Algorithm Design, Analysis and Complexity (CSC 373).

Cornell University

- Spring 2016: Introduction to Analysis of Algorithms (CS 4820).