

Justin Yirka

703-229-7956 | yirka@utexas.edu | JustinYirka.com | linkedin.com/in/justinyirka

SUMMARY

Ph.D. candidate in quantum computing advised by Scott Aaronson, graduating in 2025, seeking an industry position. Strong mathematical background, creative problem solver, and practiced analyzing and assessing technical literature. Proven communicator and collaborator in research, teaching, and leadership roles.

- Math: Quantum physics, proofs, TCS, linear algebra, probability, game theory, algorithms.
- Coding: College Java Instructor, quantum simulations in Python, undergraduate coursework.
- 8+ semesters teaching, including as Instructor.
- 20+ professional and public presentations.

EDUCATION

Ph.D. in Computer Science | The University of Texas at Austin Expected May 2025

Advised by Scott Aaronson. Quantum computation, Complexity theory, Algorithms

M.S. in Computer Science | The University of Texas at Austin 2022

Selected courses: Machine learning, Randomized algorithms, Combinatorics, Programming Languages

B.S. in Mathematical Sciences | Virginia Commonwealth University 2018

B.S. in Computer Science concurrent degrees

Specialization in Data Science | Capstone Design Award for senior project Android app 2017 |

VCU Presidential Scholarship (\$110,000) 2014.

RESEARCH EXPERIENCE

R&D Intern | Sandia National Laboratories June 2023 – present

- Initiated, led, and completed a project in 6 months which was accepted to QIP (top venue).
- Studied complexity of quantum optimization problems, derived 3D geometric approximations, and designed new quantum algorithms out-performing classical algorithms.

Summer School Fellow | Los Alamos National Laboratories Summer 2019

- Designed new algorithms for entanglement spectroscopy requiring fewer qubits while maintaining noise-resilience, enabling useful quantum computation on smaller, noisier devices.
- Programmed noisy quantum circuit simulations in Qiskit Python up to 24 qubits.
- Contracted with Honeywell to test our circuit designs on their experimental quantum computer.
- Maintained code and data using git, GitHub, Jupyter, and Unix tools. ([link](#))

Research Assistant | Computational Graph Theory Lab, Virginia Commonwealth University Summer 2018

- Wrote algorithms for computing graph properties in Sage/Python.
- Maintained database and improved project documentation and management using git, GitHub. ([link](#))

NSF REU Researcher | QuICS, The University of Maryland Summer 2017

Research Assistant | Quantum Computing Lab, Virginia Commonwealth University 2015 – 2016

- Started as a freshman and self-taught necessary linear algebra, TCS, and QC over the summer.
- Contributed key ideas for multiple proofs. Published 2 papers at top venues as an undergraduate.

ADDITIONAL EXPERIENCE

Head Teaching Assistant | Quantum Information Science for M.S. students Spring '22, '23, '24

- Responsible for all assignments, student questions, and more. Supervised 4 graduate TAs, 200+ students.

Instructor | Software Engineering (Java), UT International Academy Summer 2021

- Developed entire course including lectures and Java programming assignments.

Chair | UT Computer Science Graduate Student Association Sep 2020 – Dec 2021

- Rep. to UTCS DEI Council 2020. | Co-Organized Program for under-represented Ph.D. applicants 2020.

Founder and President | RamDev: Software Development at VCU 2016 – 2018

- Coordinated 46 weekly seminars including 9 corporate speakers and several hackathon trips.
- Increased weekly attendance to 20+ students, becoming largest C.S. organization at VCU.

Teaching Assistant | Undergraduate Rhetoric (English), Virginia Commonwealth University 2015

- J. Yirka. Even quantum advice is unlikely to solve PP. Preprint, March 2024. [\(link\)](#)
- S. Grewal and J. Yirka. The entangled quantum polynomial hierarchy collapses. CCC 2024. [\(link\)](#)
- J. Kallaugher, O. Parekh, K. Thompson, Y. Wang, J. Yirka. Complexity classification of product state problems for local Hamiltonians. QIP 2024 and ITCS 2025. [\(link\)](#)
- S. Gharibian, M. Santha, J. Sikora, A. Sundaram, J. Yirka. Quantum generalizations of the polynomial hierarchy with applications to QMA(2). *computational complexity*, 2022. [\(link\)](#)
- J. Yirka and Y. Subasi. Qubit-efficient entanglement spectroscopy using qubit resets. *Quantum*, 2021. [\(link\)](#)
- S. Gharibian, S. Piddock, J. Yirka. Oracle complexity classes and local measurements on physical Hamiltonians. QIP 2020 and STACS 2020. [\(link\)](#)
- S. Gharibian and J. Yirka. The complexity of simulating local measurements on quantum systems. TQC 2017 and *Quantum*, 2019. [\(link\)](#)