Nolan J. Coble

Website: nolanjcoble.com
Email: nolanjcoble@gmail.com
Google Scholar: Nolan J. Coble

Education

University of Maryland, College Park — College Park, MD
Computer Science PhD Student — 2020–present

- Advised by Matthew Coudron and Alexander Barg
- Member of the Equity, Diversity, & Inclusion Committee, 2023—present

SUNY Brockport — Brockport, NY
B.S. in Mathematics and Physics — 2016–2020

- Thesis: "Spectral properties of quaternionic unit gain cycles."
- Advised by Nathan Reff
- Member of the Honors College

Programs/Workshops

Simons Institute for the Theory of Computing — Berkeley, CA
Visiting Graduate Student — Spring 2024

- Semester-long program on Quantum Algorithms, Complexity, and Fault Tolerance.

Institute for Pure & Applied Mathematics — Los Angeles, CA
Attendee — Fall 2023

- Week-long workshop on Topology, Quantum Error Correction, and Quantum Gravity.

Park City Mathematics Institute — Park City, UT
Attendee — Summer 2023

- Three week long graduate summer school which focused on both new developments and foundational results in quantum computing and information.

Publications

[1] N. J. Coble, M. Coudron, J. Nelson, and S. S. Nezhadi, "Hamiltonians whose low-energy states require $\Omega(n)$ T gates", Preprint, 2023. arXiv: 2310.01347 [quant-ph].

[2] N. J. Coble, M. Coudron, J. Nelson, and S. S. Nezhadi, "Local Hamiltonians With No Low-Energy Stabilizer States", in *18th Conference on the Theory of Quantum Computation, Communication and Cryptography (TQC 2023)*, 2023. arXiv: 2302.14755 [quant-ph].

[3] Z. Holmes, N. J. Coble, A. T. Sornborger, and Y. Subaşı, "Nonlinear transformations in quantum computation", *Phys. Rev. Res.*, vol. 5, p. 013 105, 1 Feb. 2023.

[4] F. Belardo, M. Brunetti, N. J. Coble, N. Reff, and H. Skogman, "Spectra of quaternion unit gain graphs", *Linear Algebra and its Applications*, vol. 632, pp. 15–49, Jan. 2022, ISSN: 00243795.

[5] K. Srinivasan, N. J. Coble, J. Hamlin, T. Antonsen, E. Ott, and M. Girvan, "Parallel machine learning for forecasting the dynamics of complex networks", *Phys. Rev. Lett.*, vol. 128, p. 164 101, 16 Apr. 2022.

[6] N. J. Coble and M. Coudron, "Quasi-polynomial time approximation of output probabilities of geometrically-local, shallow quantum circuits.", in *Conference on Quantum Information Processing (QIP),* and *Symposium on Foundations of Computer Science (FOCS)*, 2021. arXiv: 2012.05460.

[7] N. J. Coble and N. Yu, "A reservoir computing scheme for multi-class classification.", in *Proceedings of the 2020 ACM Southeast Conference*, ser. ACM SE '20, Tampa, FL, USA: Association for Computing Machinery, 2020, pp. 87–93, ISBN: 9781450371056.

Experience

Los Alamos National Laboratory — Los Alamos, NM
Quantum Computing Summer School Fellowship — Summer 2021
Advisor: Dr. Yigit Subasi

– Project title: Generating Polynomials of Density Matrices

University of Maryland — College Park, MD
Training and Research Experiences in Nonlinear Dynamics (TREND) REU — Summer 2019
Advisors: Dr. Michelle Girvan, Dr. Ed Ott, Dr. Thomas Antonsen

– Project title: Predicting Network Dynamics with a Parallel Machine Learning Approach

University of Rochester — Rochester, NY
Photonics REU — Summer 2018
Advisor: Dr. Benjamin Miller

– Project title: Finite-Element Modeling of Waveguide Structures Using COMSOL Multiphysics

Talks

[1] *Divide-and-conquer method for approximating output probabilities of geometrically-local, shallow quantum circuits*, Presented to The IQC-QuICS Math and Computer Science Seminar, 2021.

Graduate Coursework

Computer Science: Intro to Quantum Information Processing, Quantum Algorithms, Quantum Error Correction and Fault-Tolerance, End-to-End Quantum Applications, Scientific Computing, Advanced Numerical Optimization, Zero-knowledge Proofs, Quantum Complexity

Mathematics: Algebra I and II, Brauer Groups, Complex Analysis, Differential Geometry

Course Projects

Brauer Groups: Division algebras and space-time block coding. — Spring 2022

End-to-End Quantum Applications: Applications of block encodings in quantum computing. — Fall 2021

Quantum Error Correction and Fault-Tolerance: QKD and error-correcting codes. — Fall 2021

Quantum Algorithms: Hidden subgroup problem for semi-direct product groups. — Spring 2021

Languages

Intermediate: MATLAB, Python

Some: C++, Rust, Java, Bash

Teaching

TA: Quantum Information Processing, Fall 2023

TA: Precalculus, Fall 2020, Spring 2022

Scholarships and Awards

NSF GRFP Honorable Mention	2022
Aziz Osborn Gold Medal in Teaching Excellence	2021
University of Maryland Dean's Fellowship	2020
SUNY Chancellor's Award for Student Excellence	2020
School of Arts and Sciences Outstanding Undergraduate Award	2020
Brockport Honors College Scholar Award	2020
Robert E. Hall Memorial Scholarship for Mathematics	2020
Department of Computer Science Undergraduate Research Award	2020
Belva A. Waite Memorial Scholarship	2019, 2016
Interdisciplinary Award in Mathematics	2018
Harvard House Award	2018
Brockport Physics, Mathematics, and Computer Science Award	2018, 2017
Dean's Citation for Diversity, University of Rochester	2018