Nolan J. Coble

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Education

University of Maryland, College Park — College Park, MD
Applied Mathematics PhD Student, GPA: 3.89 — 2020–Current

- Application Area: Quantum Information

SUNY Brockport — Brockport, NY
B.S. in Mathematics and Physics, GPA: 4.00 — 2016–2020

- Thesis: "Spectral properties of quaternionic unit gain cycles."

Experience

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

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
- Developed a parallel reservoir computing method to predict the dynamics of Kuramoto oscillator systems, which are novel network-coupled systems that exhibit complex dynamics even at relatively low dimensions.
- Wrote the object-oriented code in MATLAB which ran the prediction method
- Analyzed the performance of the predictions and made improvements to our proposed method to further increase prediction accuracy.

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

- Project title: Finite-Element Modeling of Waveguide Structures Using COMSOL® Multiphysics
- Used the RF Module within COMSOL to model electric field strength of different waveguide structures/materials in order to optimize the electric field strength at the surface of the waveguide. This was part of a larger project for utilizing photonic ring resonators in single-molecule/virus biological sensing applications.

Publications

[1] N. J. Coble* and M. Coudron, "Quasi-polynomial time approximation of output probabilities of geometrically-local shallow quantum circuits.", 2021. arXiv: 2012.05460.

[2] F. Belardo, M. Brunetti, N. J. Coble, N. Reff, and H. Skogman, "Spectra of quaternion unit gain graphs.", In Preparation, 2020.

[3] 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.

*-main contributor

Graduate Coursework

- **Computer Science:** Intro to Quantum Information Processing, Quantum Algorithms, Quantum Error Correction and Fault-Tolerance*, The Foundation of End-to-End Quantum Applications*
- **Mathematics:** Algebra I and II, Analysis I, Complex Analysis, Scientific Computing I

*-to be completed through Fall 2021

Languages

- **Intermediate:** MATLAB, Python, Java
- **Beginner:** Bash, LabView, COMSOL RF Module

Teaching

- **Graduate Teaching Assistant** for *Precalculus* at University of Maryland
- **Math Tutor** at SUNY Brockport

Independent Projects

- Title: Developing a novel classifier using reservoir computing methods — Fall 2019

  Using the method for recurrent neural networks known as reservoir computing (RC), I developed a simple multi-class classification technique which was comparable in performance to other novel approaches such as decision tree, naïve Bayesian, and a 3 layer neural network. Before this work, literature only existed for binary classification using RC. This project developed an altered method which increased performance while also expanding to multi-class problems. I developed the object-oriented method in Python. See [3] on first page for conference publication.

Scholarships and Awards

- 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