Nathaniel T. Stemen

nate@stemen.email • natestemen.xyz • Staten Island, NY

Education

University of Waterloo 2020–

Ph.D. in Applied Mathematics (Quantum Information)

New York University 2013–2017

B.Sc. in Mathematics and Physics

- Thesis in Mathematics: *An Investigation of Q-Balls*
  – Advisor: Prof. Luciano Medina
- Dean's List (*cum laude*)
- University Honors Scholar

Employment & Research

Software Developer: Overleaf, London & New York City *July* 2017–*current*

- Provided data for and built new LaTeX autocomplete feature using machine learning techniques such as cosine similarity, decision trees, and neural networks.
- Maintained large **Rails** and **Node** web applications by providing bug fixes and feature improvements.
- Collected and presented company data to use as a starting point for data driven decisions on the companies business model and new feature development.
- Attended conferences as a company representative to interact with and gather customer feedback from Overleaf users.
- Extracted and analyzed data for The Connected Culture of Collaboration Report. An analysis of collaborative scholarly writing to be published in 2020.

Undergraduate Researcher: New York University *May* 2016–*May* 2017

- Studied nonlinear Schrödinger equations modeling transmission of short electromagnetic pulses in nonlinear media under Prof. Luciano Medina and Dr. Joseph Esposito.
- Numerically computed solutions to nonlinear partial differential equations using **python** and analytically proved existence of solutions.

Summer Researcher: Yale University (PROSPECT Experiment) *Summer* 2014 *&* 2015

- Completed R&D for detector that is performing eV-scale sterile neutrino search and measuring the antineutrino spectrum from the nuclear reactor at Oak Ridge National Laboratory under Prof. Karsten Heeger and Dr. Ke Han.
- Built optical simulation using **C++** of a prototype detector to study light collection, detector uniformity, and optimize light guide shape.
- Surveyed and implemented pulse-shape discrimination methods in **python** to determine optimal method for neutrino event selection.

Orientation Leader: New York University *Summer* 2014 *&* 2015

- Worked with a partner orientation leader guiding groups of 25 new students through NYU's orientation week.

- Organized, coordinated, and facilitated events encouraging new students to socialize and discover NYU and NYC.

Publications

Refereed Research Papers

1. Ashenfelter, J. et al. (2016). Background Radiation Measurements at High Power Research Reactors. *Nucl. Instrum. Meth.* A806, 401–419. arXiv: 1506.03547 [physics.ins-det].
2. Ashenfelter, J. et al. (2015). Light Collection an Pulse-Shape Discrimination in Elongated Scintillator Cells for the PROSPECT Reactor Antineutrino Experiment. *JINST* 10.(11), P11004. arXiv: 1508.06575 [physics.ins-det].

Books

1. Stemen, N. and K. Yeh (In Progress). *Rudin: Translated. A new take on a classic text*. URL: https://github.com/natestemen/rudin.

Professional Writing

1. Stemen, N., J. Lees-Miller, and D. W. Hook (2020). The Connected Culture of Collaboration. *Digital Science*.
2. Stemen, N. (2017). A Data-Driven Approach to LaTeX Autocomplete. *Overleaf Blog*. URL: https://www.overleaf.com/blog/523-a-data-driven-approach-to-latex-autocomplete.

Talks

Contributed Conference Presentations

1. A Few Words About Overleaf (2019). *TEX Users Group*.
2. Optical Vortex Solitons: Existence and Computation (2016). *Gulf Coast Undergraduate Research Symposium, Rice University*.
3. Optical Simulations and Studies with the PROSPECT-20 Detector (2015). *Poster presentation, APS Division of Nuclear Physics Conference Experience for Undergraduates*. URL: http://meetings.aps.org/link/BAPS.2015.DNP.EA.159.

Workshops

1. An Introduction to LaTeX (2019). *FYSEM-UA 731: The Mathematics of Ramsey Theory, Courant Institute of Mathematics Sciences NYU*.

Teaching

Mathematics Teacher: NYU Metro Center College Prep Academy *June–August* 2016

- Independently planned and taught Pre-Calculus course for high school students.
- Created and graded in class worksheets, quizzes, and homework.
- Used the Moore Method to guide students through advanced topics and introduce the idea of rigor in mathematics.

Mathematics Tutor: NYU Metro Center College Prep Academy *October* 2015–*May* 2017

- Facilitated numerous extra-curricular math courses of 30 students as a class assistant by providing additional guidance to students.

Conferences Attended

Joint Mathematics Meeting: Denver, CO *January* 2020

TEX Users Group: Palo Alto, CA *August* 2019

Joint Mathematics Meeting: Baltimore, MD *January* 2019

MathFest: Denver, CO *August* 2018

#FuturePub: North Carolina State University *April* 2018

String Data: Northeastern University *November* 2017

Gulf Coast Undergraduate Research Symposium: Rice University *October* 2016

Fall Meeting of the APS Division of Nuclear Physics: Santa Fe, NM *October* 2015

Affiliations

Mathematical Association of America 2018–*current*

Sigma Pi Sigma: Physics Honors Society 2015–*current*

American Physical Society 2014–*current*

Society of Undergraduate Physicists: President, Vice-President, Secretary. 2014–2017

- Planned weekly events with talks from students, alumni, professors, and professionals.
- Planned and organized fundraising events such as Fermi Estimation with over 40 attendees.

Academic Activities

Readings in Spectral Graph Theory: Courant Institute *Spring* 2017

- Met with group of 5 students and Professor weekly to discuss current research topics in graph theory.

Foundations and Philosophy of Quantum Mechanics: NYU 2016–2017

- Co-organized group of 15 students that met weekly to discuss the mathematical and philosophical foundations of quantum mechanics at NYU.

Continued Education

Docker Mastery: with Kubernetes & Swarm from a Docker Captain

- Learned how to use Docker to build development environments with code running in containers for interoperability.
- Verification: `https://ude.my/UC-HGBK3LSJ`

Presenting Data and Information *November* 2019

- Covered fundamental design strategies for information displays such as tables, diagrams, charts, images, and other data visualizations.
- Taught by Edward Tufte.

Cryptography I: Coursera *Ongoing*

- Online course about the inner workings of cryptographic primitives and how to reason about security.
- Taught by Dan Boneh, Stanford University.

Languages

- Python, JavaScript, SQL, Ruby, Mathematica, C++, HTML
- English (native), Mandarin Chinese (beginner)