Nathaniel T. Stemen

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Work & Research Experience

Software Development/Data Science Intern: Overleaf *Jul–Nov* 2017
- Built framework using pandas, sklearn, and scipy to parse, mung, and analyze TEX files to obtain data for new Overleaf autocomplete feature.
- Using common patterns found in TEX files, extended Overleaf's editor to support context-aware autocompletion by using a recommendation system.

Undergraduate Researcher: New York University *May* 2016–*May* 2017
- Studied nonlinear Schrödinger equations modeling transmission of short electromagnetic pulses in nonlinear media under Professor Luciano Medina.
- Numerically computed solutions using numpy to nonlinear PDE's and analytically proved existence of solutions.
- Built package to numerically solve functional minimization problems.

Summer Researcher: Yale University (PROSPECT Experiment) *Summer* 2014 2015
- Completed R&D for detector that will perform eV-scale sterile neutrino search and measure the antineutrino spectrum from the nuclear reactor at Oak Ridge National Laboratory under Professor Karsten Heeger.
- Built optical simulation using SLitrani, and C++ to model 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 PROSPECT Experiment.

Education

New York University 2013–2017
B.S. in Physics and Mathematics
- Thesis in Mathematics: *An Investigation of Q-Balls*
- Dean's List
- University Honors Scholar

Skills

Languages *most→least*
Python, [Coffee | Java]Script, SQL, Ruby, Mathematica, MATLAB

Tools
git/Github, Bash, LaTeX, Chebfun, HTML, CSS

Affiliations

Sigma Pi Sigma 2015–
Physics Honors Society

American Physical Society 2014–

NYU Society of Undergraduate Physicists 2014–17
President, Vice-President, and Secretary.

Publications

Current Papers

1. Stemen, N. and L. Medina (2017). Existence of Spinning $\mathcal{Q}$-vortex Solitons. *to appear*.

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].

Talks & Presentations

Contributed Conference Presentations

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

Teaching Experience

Mathematics Teacher: NYU Metro Center College Prep Academy *Jun–Aug* 2016
- Independently planned and taught Pre-Calculus class 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 *Oct* 2015–*May* 2017
- Facilitated numerous extra-curricular math courses of 30 students as a class assistant by providing additional guidance to students.
- Specialized in tutoring Algebra II and Pre-Calculus, focusing on strong fundamentals.