

# 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  $\text{\TeX}$  files to obtain data for new Overleaf autocomplete feature.
  - Using common patterns found in  $\text{\TeX}$  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.

## PUBLICATIONS

### Current Papers

1. Stemen, N. and L. Medina (2017). Existence of Spinning  $Q$ -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 and Pulse-Shape Discrimination in Elongated Scintillator Cells for the PROSPECT Reactor Antineutrino Experiment. *JINST* 10.(11), P11004. arXiv: 1508.06575 [physics.ins-det].

## 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.

## 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, CoffeeScript, JavaScript, Mathematica, MATLAB, C++
- Tools**
- Git/Github, Bash,  $\text{\LaTeX}$ , 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.

## 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>.