

Matthew C. Pharr

pharrm@rpi.edu
(410) 375-9882

OBJECTIVE Acceptance to PhD Programs in Applied Mathematics.

EDUCATION Rensselaer Polytechnic Institute, Troy, NY
B.S. Physics & Mathematics, expected May 2021
G.P.A. 4.0/4.0

Physics Subjects

Grad Electrodynamics
Introduction to Quantum Mechanics (III)
Statistical Mechanics
Electrodynamics
Theoretical Mechanics
iiiiiii HEAD Experimental Physics
Computational Physics
Computing for Physicists
Quantum Physics II
Quantum Physics I
===== Experimental Physics
Computing for Physicists
Quantum Physics II
Quantum Physics I

Math Subjects

Grad Comp Vars and Integral Transforms
Advanced ODEs and Dynamical Systems
Complex Variables
Advanced Calculus
Differential Geometry (\mathbb{R}^3)
Number Theory
Linear Algebra
Foundations of Analysis

Advanced Calculus
Linear Algebra
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Foundations of Analysis
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**RESEARCH** *SULI Undergraduate Research Intern* Fall 2020  
Princeton Plasma Physics Lab, Princeton, NJ

- Full time undergraduate intern at PPPL in plasma and fusion sciences.
- Investigate the relationship between Hall and MHD dynamo terms in the induction equation and the growth of large scale magnetic fields due to magnetorotational instability using computational tools such as NIMROD, under the supervision of Dr. Fatima Ebrahimi.

*Undergraduate Research in Molecular Biophysics* Summer 2020, Spring 2021  
Rensselaer Polytechnic Institute, Department of Mathematical Sciences, Troy, NY

- Explore the efficacy of two theoretical mathematical models for the interactions between microtubule filaments through connecting Kinesin-5 molecules using various Monte Carlo methods with Professor Peter Kramer.
- Implement Gillespie algorithm simulations for various models in python employing use of NumPy and other libraries.
- Expand and connect the two theories in unexplored parameter space.

*Personal Project in Applied Mathematics and Economics* Fall 2019 - Spring 2020

- Investigate the development of the Lorentz curve in a free market system for various Monte-Carlo models of an economy.
- Computationally implement and investigate various wealth and income distribution models.

*Mathematical Competition in Modeling* Spring 2020  
Awarded Honorable Mention for Research Paper

- Formulate a model for the changing of migration patterns of Northern Atlantic Mackerel and Herring due to climate change.
- Study how this will affect the Scottish fishing market for different climate change outcomes.

- Produce recommendations for businesses to minimize negative impact in the format of a mathematical research paper.

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|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| <b>EXPERIENCE</b> | <i>Undergraduate Facilitator</i>                                                                                                                                                                                                                                                                                                               | Fall 2019 - Summer 2020, Spring 2021 |
|                   | Rensselaer Polytechnic Institute, Physics Department, Troy, NY                                                                                                                                                                                                                                                                                 |                                      |
|                   | <ul style="list-style-type: none"> <li>• Facilitate Honors Physics I/II Labs, Electromagnetic Theory, Introduction to Quantum Mechanics (third course in QM sequence)</li> <li>• Hold weekly office hours</li> <li>• Attend some courses to help answer questions</li> </ul>                                                                   |                                      |
|                   | <i>I-PERSIST Mentor</i>                                                                                                                                                                                                                                                                                                                        | Fall 2019                            |
|                   | Rensselaer Polytechnic Institute, Physics Department, Troy, NY                                                                                                                                                                                                                                                                                 |                                      |
|                   | <ul style="list-style-type: none"> <li>• Run two small weekly group meetings to strengthen important problem solving skills in Physics I</li> <li>• Guide 20 new freshmen to success in their first semester.</li> </ul>                                                                                                                       |                                      |
|                   | <i>ALAC Tutor</i>                                                                                                                                                                                                                                                                                                                              | Fall 2019 - Spring 2020              |
|                   | Rensselaer Polytechnic Institute, Physics Department, Troy, NY                                                                                                                                                                                                                                                                                 |                                      |
|                   | <ul style="list-style-type: none"> <li>• Tutor Physics I,II Honors I, and Honors II students in private and group settings for Rensselaer's Learning Assistance Center</li> </ul>                                                                                                                                                              |                                      |
|                   | <i>Private Tutor</i>                                                                                                                                                                                                                                                                                                                           | Spring 2018 - Spring 2020            |
|                   | Self-employed.                                                                                                                                                                                                                                                                                                                                 |                                      |
|                   | <ul style="list-style-type: none"> <li>• Synthesize lessons, example problems, and meet with math, computer science, and physics students regularly to assist with coursework and test preparation.</li> </ul>                                                                                                                                 |                                      |
| <b>HONORS</b>     | Rensselaer Archimedian Society (4.0 award)<br>Honorable Mention for Research Paper, Mathematical Competition in Modeling<br>Rensselaer Leadership Award                                                                                                                                                                                        |                                      |
| <b>SKILLS</b>     | Python/Conda, Java, NumPy, SciPy, Matplotlib, Linux Terminal, Matlab<br>Society of Physics Students Build Team – Demos and Outreach<br>Competent in handling lab equipment using basic shop machinery<br>RPI Putnam Team - Competition in mathematical problem solving<br>Conversational in French<br>Excellent English Reading/Writing Skills |                                      |
| <b>HOBBIES</b>    | Taekwondo, Media Studies, Green and LGBTQ+ Activism                                                                                                                                                                                                                                                                                            |                                      |