Matthew C. Pharr

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OBJECTIVE Acceptance to PhD Programs in Plasma Physics and Applied Mathematics.

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

Physics Subjects	**Math Subjects**
Grad Electrodynamics	Grad Comp Vars and Integral Transforms
Introduction to Quantum Mechanics (III)	Advanced ODEs and Dynamical Systems
Statistical Mechanics	Complex Variables
Electrodynamics	Advanced Calculus
Theoretical Mechanics	Differential Geometry ($\mathbb{R}^3$)
Experimental Physics	Number Theory
Computational Physics	Linear Algebra
Computing for Physicists	Foundations of Analysis
Quantum Physics II	
Quantum Physics I	

RESEARCH

U.S. Department of Energy Research Intern Fall 2020, Summer 2021
Princeton Plasma Physics Lab, Princeton, NJ

- Full time undergraduate intern at PPPL in plasma and fusion sciences.
- Fall 2020: 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 (MRI) using computational tools such as NIMROD, under the supervision of Dr. Fatima Ebrahimi.
- Summer 2021: Work as a part of the liquid gallium MRI group towards the laboratory detection of the MRI. Conduct analytic linear stability analysis as well as numerical analysis using Daedalus and SFEMaNS.

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 theores 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.

EXPERIENCE

Undergraduate Facilitator Fall 2019 - Summer 2020, Spring 2021
Rensselaer Polytechnic Institute, Physics Department, Troy, NY

- Facilitate Honors Physics I/II Labs, Electromagnetic Theory, Introduction to Quantum Mechanics (third course in QM sequence)
- Hold weekly office hours
- Attend some courses to help answer questions

I-PERSIST Mentor Fall 2019
Rensselaer Polytechnic Institute, Physics Department, Troy, NY

- Run two small weekly group meetings to strengthen important problem solving skills in Physics I
- Guide 20 new freshmen to success in their first semester.

ALAC Tutor Fall 2019 - Spring 2020
Rensselaer Polytechnic Institute, Physics Department, Troy, NY

- Tutor Physics I,II Honors I, and Honors II students in private and group settings for Rensselaer's Learning Assistance Center

Private Tutor Spring 2018 - Spring 2020
Self-employed.

- Synthesize lessons, example problems, and meet with math, computer science, and physics students regularly to assist with coursework and test preparation.

HONORS

ΣΠΣ, Physics Honor Society
Rensselaer Archimedian Society (4.0 award)
Honorable Mention for Research Paper, Mathematical Competition in Modeling
Rensselaer Leadership Award

SKILLS

Python/Conda, Java, NumPy, SciPy, Matplotlib, Linux Terminal, Matlab
Society of Physics Students Build Team – Demos and Outreach
Competent in handling lab equipment using basic shop machinery
RPI Putnam Team - Competition in mathematical problem solving
Conversational in French
Excellent English Reading/Writing Skills

HOBBIES

Taekwondo, Media Studies, Green and LGBTQ+ Activism