M. Perry Nerem

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Dont misconstrue formulas to mean physics is formulaic.

Education

PhD	Physics	College of William and Mary	2020
MSc	Physics	College of William and Mary	2014
BS	Physics	Michigan Technological University	2012

Experience

Teaching

PHYS 103N Intro Astronomy of the Solar System — Old Dominion University
Semesters Taught: Fall 2018 – Fall 2021

PHYS 104N Intro Astronomy of the Stars — Old Dominion University
Semesters Taught: Spring 2018 – Spring 2021

PHYS 111N Intro General Physics I — Old Dominion University
Semesters Taught: Fall 2018

PHYS 112N Intro General Physics II — Old Dominion University
Semesters Taught: Spring 2018 – Spring 2020

PHYS 232N University Physics II — Old Dominion University
Semesters Taught: Spring 2021 – Fall 2021

PHYS451/551 Theoretical Mechanics — Old Dominion University (Co-Instructor)
Semesters Taught: Fall 2018

Graduate Teaching Assistant (Physics for Life Science) — William and Mary
Semesters Taught: 2012–2013, Summer 2016, Summer 2017

Graduate Teaching Assistant (Introduction to Nonlinear Dynamics) — William and Mary
Semesters Taught: Fall 2014

Demonstration Lab Technician — Michigan Technological University
Demonstration Crew: 2009–2012

Math Tutor — Michigan Technological University
Course Compass ExSEL: 2010–2012

SYP Instructor: Sports Science — Michigan Technological University
Summer Youth Programs: July 2012

Math Coach — Michigan Technological University
Math Learning Center: 2009–2012

SYP Co-Instructor: Astronomy — Michigan Technological University
Summer Youth Programs: 2009, 2010, 2011

Research

Constructed experimental apparatus and was the first group to observe *Dynamical Hamiltonian Monodromy in a classical system*. Hamiltonian Monodromy is the study of topological properties of systems with multivalued action-angle variables. Dynamical Monodromy exploits the multivalued canonical variables to observe topological changes in a system. The apparatus is a spherically symmetric physical pendulum with a permanent magnet on the end of the pendulum. Electronics circuits were created that generate bipolar currents in coils surrounding the pendulum, producing magnetic fields that control the energy and angular momentum of the pendulum. Image acquisition was used to record the pendulum's position and momentum.

Studied the mathematical formalism of *symplectic geometry* to derive canonical symmetries of Hamiltonian systems, such as the action-angle variables. Using semiclassical techniques like the *WKB* approximation, the canonical variables can be appropriately quantized to determine approximate wave functions and eigenvalues for quantum mechanical systems. Current research interest is studying quantum mechanical systems with Hamiltonian Monodromy, the multivalued action-angle variables result in multivalued wavefunctions. Using Hamilton's optico-mechanical analogy, are their optical systems with Hamiltonian Monodromy?

Previous Work: Control growth techniques of *Boron-Nitride nanotubes* (BNNTs). Using *chemical vapor deposition* BNNTs can crystallize onto silicone substrates by heating a Boron powder in an Ammonia rich environment. Focus was controlling BNNTs physical characteristics (i.e. diameter and length) by coating substrates in nanometer thick layers of different metals. The thin layers was accomplished through *pulsed laser deposition* of target material.

Technical Skills

Matlab	Expert	Wrote programs to do real time analysis of live image feed.
JupyterLab	Intermediate	Computational analysis and webpage creation.
Python	Intermediate	Perform computational task and processing databases.
Computer Software	Experience	Use debian base O.S., Raspberry pi, Audrino, Pasco Capstone
CAD/Engineering	Beginner	AutoCAD, Image analysis/object tracking, 3D printing

Professional Service

University Service

Faculty Senate: Physics Senator Fall 2020 – Present

SEES Faculty Advisory Committee Member Fall 2020 – Present

Physics Department Service

Chief Departmental Advisor Summer 2020 – Present

ODU Society of Physics Students Faculty Advisor Fall 2020 – Present

ODU Society of Black Physicist Faculty Advisor Fall 2021 – Present

Diversity Task Force (Chair) Fall 2020

Physics Undergraduate Committee (member) 2018 – 2020

Physics Open House (volunteer) March 2018, March 2019

Professional Development

Scientific Reasoning General Education Assessment Summit — Old Dominion University
Assessment Grader — January 2021

Unconscious Bias and Online Teaching — Old Dominion University
Workshop — May 2020

Assignment Re-Design — Old Dominion University
Workshop — February 2019

Community Service

31st Physics Olympics — Tidewater Community College
Volunteer Event Manager — March 2019

30st Physics Olympics — Tidewater Community College
Volunteer Event Manager — March 2018

Graduate and Undergraduate Service

W&M Physics Graduate Student Association: President — 2014 – 2017

W&M Physics Graduate Student Association: Treasurer — 2012 – 2014

MTU Society of Physics Students: Food Manager — 2011 – 2012

Presentations

Talk	CLT Faculty Summer Conference: Reviving the Chalkboard for Online Students	May 2021
Talk	CSAAPT Fall meeting: Classical Origin of Quantum Mechanics	Nov 2018
Poster	XXXV Dynamics Days	Jan 2016
Poster	APS March Meeting	Mar 2016
Talk	Graduate Research Symposium	Mar 2016

Awards

- Graduated Michigan Tech Cum Laude.
- Inducted into Sigma Pi Sigma Physics Honor Society, March 2011