

ERIC W. ASPLING

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EDUCATION

Doctor of Philosophy in Theoretical Physics(upcoming), Binghamton University 2018-2023

Dissertation is a survey on the designing of an Unruh-DeWitt Quantum Computer with a focus on Relativistic Quantum Information channels and general entanglement properties of topologically protected edge states.

Bachelor of Sciences in Mathematical Physics, Binghamton University 2016 - 2018

Broome Community College 2006-2008, 2016 - 2017

Rowan University 2008-2010

RESEARCH INTEREST

Relativistic quantum information and quantum Shannon Theory including, Unruh-DeWitt detectors, TMDs, topologically protected edge states/Conformal Field Theories in condensed matter systems, coherent states/bosonic quantum channels, and the role entanglement plays in quantum materials. Furthermore, I am interested in connection between these topics, quantum computing, quantum thermodynamics, and quantum cosmology in laboratory settings.

RESEARCH EXPERIENCE

Undergraduate researcher Sept 2016 - April 2018

Dr. Bruce White *Binghamton University*

- Studied novel algorithms for diagonalizing dynamical matrices relating to phonon vibrations.
- Systems of interest included cubic lattices with Anderson localities and amorphous substrates.
- Presented project during a poster session at APS April 2018 in Columbus Ohio. [Abstract](#)

Graduate Researcher April 2018 - Oct 2020

Dr. Charles Nelson *Binghamton University*

- Assisted in the development of a model of parastatistical (a subfield of Axiomatic Field Theory) dark matter.
- Topics studied include: $\mathcal{N} = 1$ SUSY, cosmology, general relativity, particle physics, etc.

Graduate Researcher Oct 2020 - Current

Dr. Michael Lawler *Binghamton University*

- Developed theory for the first laboratory realizable Unruh-DeWitt Quantum Computer a subset of topological phase quantum computing. [arXiv.2210.12552](#)
- Presented project via. poster presentation at quantum information and probability 2022 in Växjö Sweden. [List of abstracts](#) as well as QIP2023 Ghent, Belgium [List of Posters \(802\)](#)
- Presentation of project at APS March Meeting 2023 Las Vegas [Details](#)
- Using quantum machine learning methods, evaluated quantum thermodynamics of transverse Ising model using the novel approach of time averaged classical shadows. [arXiv.2211.01259](#)
- Applied relativistic quantum information in the form of Unruh-DeWitt quantum computers to bosonic dephasing channels. Showed that bosonic depahsing channels can increase quantum capacity as well as model noise from unwanted interactions in UDW quantum channels. [arXiv.2309.07218](#)

TEACHING AND MENTORING EXPERIENCE

Graduate Teaching Assistant Aug 2018 - Current

Calculus Based Introductory Physics (PHYS 131-132) *Binghamton University*

- Twelve semesters of teaching these two course so far throughout my graduate program.
- Solved, taught, and presented problem sets for 60-80 first and second year students per semester.

Lead Lecturer

Calculus Based Introductory Physics (PHYS 132)

July-August 2021-2023

Binghamton University

- Prepared lecture notes and in-class demonstrations on the second semester of introductory physics which focuses on electricity and magnetism.
- Created and graded assessments to ensure the students adequately understood the necessary material.

Co-advisor/mentor

Student Research Thesis

Nov 2021 - Feb 2023

Binghamton University

- Mentored and advised an undergraduate researcher in the preparation and presentation of their senior thesis defense.
- Together, the student and I study quantum information channels of cosmological phenomena.

SCIENCE COMMUNICATION/COMMUNITY IMPACT

Science Advisor/Researcher

May 2021 - Current

Science Asylum (Nick Lucid)

Assisted in research, script-writing, proof-reading, and consultation for a few videos and topics of interest by the YouTuber Nick Lucid and his channel [The Science Asylum](#) which has over six hundred thousand subscribers.

Personal Science Communication Programs

March 2020 - Current

- Created and developed the science communication channel Physics Office Hours. The channel was originally designed to provide extra help to first and second year students taking introductory physics. It shortly turned into teaching the public topics ranging throughout all of physics resulting in hundreds of hours of lectures, demonstrations, and other physics oriented content. ([Twitch](#), [YouTube](#)).
- Occasional blog writing for my research group's website [Blog](#)

Invited Journal Referee

August 2022 - Current

SciPost Journal

Working with SciPost as an invited referee on the foundations of Quantum Mechanics. Also submitted a manuscript with SciPost that is currently going through the refereeing process. SciPost has been fantastic and I am a large supporter of open access science!