Emily M. Foley

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EDUCATION

University of Arizona   Tucson, AZ
Doctor of Philosophy, Applied Mathematics   *Aug 2024 – Present*

Wake Forest University   Winston-Salem, NC
Bachelor of Science, Physics and Mathematics   *Aug 2020 – June 2024*
With Honors in Physics and Mathematics
GPA: 3.928/4.00

RESEARCH EXPERIENCE

Mentored Graduate Research Study   Tucson, AZ
Project: Simulating Magnetic Field States of Black Holes   *Sept 2024-Present*
Advisor: Chi-Kwan Chan

- Currently beginning a project using ATHENAK, an advnaced numerical general relativistic magnetohydrodynamics code in C++, to simulate accretion disks of magnetically arrested black holes on GPU architectures.

Undergraduate Thesis, Physics   Winston-Salem, NC
Project: Investigating the Unruh State in 4D Schwarzschild-de Sitter Spacetime   *Oct 2022 - Apr 2024*
Advisor: Paul Anderson

- Studied quantum effects of black holes related to the Hawking Effect.
- Used analytic and computational tools to study radiation emitted by static and eternal black holes.
- Compared prevalence of radiation emitted to other methods of particle production predicted in cosmology.

Undergraduate Thesis, Mathematics   Winston-Salem, NC
Project: Spatiotemporal Chaos in the Damped-Driven Sine Gordon Equation   *Sept 2023- Apr 2024*
Advisor: John Gemmer

- Characterized solutions to the damped and forced sine-Gordon equation.
- Developed MATLAB scripts to determining regions in parameter space in which solutions are chaotic.

U.S. DOE Summer Undergraduate Laboratory Internship (SULI)   Los Alamos, NM
Project: Space Charge Calibration the ProtoDUNE Cryostat using a UV Laser System   *May 2023 - Jul 2023*
Advisor: Sowjanya Gollapinni

- Developed an analysis framework in python to correct electric field distortions in the detector for a prototype for the Deep Underground Neutrino Experiment (DUNE) caused by interference from cosmic rays.

Research Experience for Undergraduates (NSF-REU)   Minneapolis, MN
Project: Updated Multimessenger Implications for Forthcoming LIGO Observing Runs   *Jun 2022 - Aug 2022*
Advisor: Michael Coughlin

- Conducted monte carlo simulations of gravitational wave signal data to forecast detection rates and sensitivity constraints for the next observation run of the LIGO detector network.
- Results were used to inform data-driven proposals by the scientific community to detect electromagnetic counterparts to gravitational wave signals known as kilonovae.

HONORS AND AWARDS

University Fellows Award   University of Arizona
Awarded to highest ranked incoming graduate students at UA to partially fund graduate studies.   *Aug 2024*

Joint Math Meetings Travel Funding   American Mathematical Society
Awarded travel funding to attend the 2024 Joint Math Meetings in San Francisco.   *Jan 2024*

Outstanding Undergraduate Oral Presentation   American Physical Society April Meetings
One of nine undergraduates recognized for an outstanding presentation.   *Apr 2023*

Starr Travel Grant	Wake Forest University
Awarded travel funding to attend the 2023 APS April Meeting in Minneapolis, MN.	*Apr 2023*
2023 Barry Goldwater Scholarship Nominee	Wake Forest University
One of four students nominated by WFU to be considered for the 2023 Goldwater Scholarship.	*Dec 2022*
Stamps Scholarship	Stamps Foundation
Awarded merit scholarship covering the full cost of undergraduate studies at WFU.	*Aug 2020 - May 2024*

PUBLICATIONS

Kiendrebeogo, R. W.; Farah, A. M.; **Foley, E. M.**; et. al. (2023). Updated Observing Scenarios and Multimessenger Implications for the International Gravitational-wave Networks O4 and O5. https://iopscience.iop.org/article/10.3847/1538-4357/acfcb1

PRESENTATIONS

Investigating the Unruh State in 4D Schwarzschild-de Sitter Spacetime	Winston-Salem, NC
Seminar presentation of honors thesis to physics department faculty and students at WFU.	*Apr 2024*
Noise Induced Tipping in the Forced Sine Gordon Equation	San Francisco, CA
Oral Presentation at Joint Math Meetings.	*Jan 2024*
Solutions to Mode Equations in 4D Schwarzschild-de Sitter Spacetime	Minneapolis, MN
Oral Presentation at American Physical Society April Meeting.	*Apr 2023*
Updated Observing Scenarios Based on LIGO Public Alerts Data	Winston-Salem, NC
Seminar presentation to physics department faculty and students at WFU.	*Aug 2022*
Updated Observing Scenarios Based on LIGO Public Alerts Data	Minneapolis, MN
Poster and oral presentation at REU Research symposium.	*Aug 2022*
Updated Observing Scenarios Based on LIGO Public Alerts Data	Minneapolis, MN
Oral presentation given at the Zwicky Transient facility summer school workshop.	*Jul 2022*

TECHNICAL SKILLS AND SOFTWARE

Python, MATLAB, C++, Mathematica, Linux/Unix systems, LaTeX

SERVICE AND EMPLOYMENT

Association of Women in Mathematics (AWM)	Wake Forest University
Secretary: Apr 2022- Apr 2023	*Apr 2022 - May 2024*
Vice President: Apr 2023 - May 2024	

- Published weekly newsletter to the mathematics and statistics faculty, staff, and students
- Planned weekly events to foster an inclusive and welcoming community among mathematics and statistics students at WFU.

Integrating Research in Science (IRIS) Conference Organizer	Wake Forest University
Assistant Organizer: Jan 2021 - Apr 2023	*Jan 2021 - Apr 2024*
Lead Organizer: Jan 2024 - Apr 2024	

- Planned an interdisciplinary STEM research conference with 60+ attendees, organized by undergraduate students at Wake Forest University and Elon University.
- Provided a platform for students to present research projects and receive faculty feedback, as well as attend career panels on academia and industry.
- Responsibilities included searching for and inviting a keynote speaker from a nearby university, securing funding and managing cost of materials for the event, advertisement on campus and to local universities, reviewing student submissions and organizing oral and poster presentations.

Mathematics Tutor	Wake Forest University
Math and Stats Center	*Mar 2022 - Jan 2024*

- Tutored undergraduate students for 2-4 hours weekly in the calculus sequence, linear algebra, ordinary differential equations, and complex analysis.