# Kaila Nathaniel

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## RESEARCH EXPERIENCE

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|---|---|
| 2022- | **GRADUATE RESEARCH ASSISTANT**<br>RIT \| Rochester, NY |
| 2023- | **DATA SCIENCE FELLOW**<br>LSST Discovery Alliance \| Various, US |
| 2023 | **KAVLI STUDENT FELLOW**<br>Max Planck Inst. for Astrophysics \| Garching, DE |
| 2019-2022 | **GRADUATE RESEARCH ASSISTANT**<br>University of Bonn \| Bonn, DE |
| 2018 | **LIGO SUMMER UNDERGRAD. RESEARCH FELLOW**<br>Caltech \| Pasadena, CA |
| 2017 | **NSF SUMMER UNDERGRAD. RESEARCH FELLOW**<br>University of Birmingham \| Birmingham, UK |
| 2016 | **NANCY GRACE ROMAN SPACE TELESCOPE INTERN**<br>NASA Goddard Flight Center \| Greenbelt, MD |

## SELECT RESEARCH PROJECTS

### MONTE CARLO SIMULATIONS OF STARS & BLACK HOLES

(software repo | papers)

- **Situation**: The behavior of stars and black holes in active galactic nuclei disks is extremely complex and difficult to model.
- **Task**: Develop public, open-source Python software (McFACTS) to compute simulated populations of these objects.
- **Action**: Refactored codebase using OOP, vectorization, and unit tests. Built new modules to add stars to the disk model.
- **Result**: Reduced simulation runtime by 80%, incorporated reliability and maintainability measures, enabled the computation of stellar behavior and stars' effects on the black hole population.

### MERGERS OF STARS AND NEUTRON STARS (paper)

- **Situation**: Mergers of stars and neutron stars are extremely rare and poorly understood.
- **Task**: Develop framework to describe observable properties and final states of star-neutron star binaries.
- **Action**: Analyzed simulated population of 10 million stellar binaries with detailed statistics.
- **Result**: Predicted merger rates under four different formation models, determined spatial velocities of binaries before merging.

## RESEARCH SUMMARY

- Author of 8 scientific articles (first author of 2), peer reviewer of 1 journal article.
- Part of NASA proposal review panel.
- Presented 9 talks/posters (invited and contributed).
- Organized and participated in hackathons for rapid prototyping and development of open-source code.
- Prepared materials to communicate complex scientific results to general audiences and presented them through outreach programs.

## INTERESTS

Software-focused computational astrophysicist with expertise in development, data analysis, and some experience in machine learning. Looking to combine scientific methodology with technical proficiency to deliver robust, scalable solutions for challenging problems.

## EDUCATION

### PHD, ASTROPHYSICAL SCIENCES & TECHNOLOGY

Rochester Institute of Technology (RIT)
Expect. Sept 2025 | Rochester, NY

### MSC, ASTROPHYSICS

University of Bonn
2022 | Bonn, DE

### BS, PHYSICS

Virginia Tech
2019 | Blacksburg, VA

## SKILLS

### LANGUAGES

Python • C++ • Fortran • Matlab • Java • Bash • Ruby • HTML • CSS • *German :)*

### LIBRARIES

SciPy • NumPy • scikit-learn • PyTorch • TensorFlow • Pandas • Matplotlib • Seaborn • Shapely

### TOOLS

Git • Unix • VSCode • Jupyter • Docker • LaTeX • Firefly • Jekyll • Obsidian

### APPLIED

Software development • Data visualization • Statistics/Bayesian inference • Machine learning

### INTERPERSONAL

Communication • Technical writing and presentation • Project management • Mentorship

## EXTRACURRICULARS

Duolingo (2100+ day streak) • NYT Games • Scrabble • Knitting • Watercolors • Hiking