Pavani Jairam

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Education

Ph.D. in Physics **Expected 2029**
Northwestern University

B.S. in Physics with Distinction **May 2023**
Concentration in Astrophysics, Minor in Computer Science
Duke University
Senior Thesis: *Using SNEWPY to Analyze Neutrinos from the Black Hole Formation Stage*

Research Experience

Graduate Researcher, CIERA/Northwestern University **October 2023–Present**
Advisor: Prof. Alexander Tchekhovskoy *Evanston, IL*

- Investigating magnetic field configurations of tidal disruption events using `H-AMR`, a GPU-accelerated general relativistic magnetohydrodynamics code.

Undergraduate Researcher, Duke Neutrino Group **August 2020–May 2023**
Advisor: Prof. Kate Scholberg *Durham, NC*

- Studied the observability of neutrinos from the black hole formation stage using equations of state from the SNEWPY software, which is part of the Supernova Early Warning System (SNEWS)
- Examined the predicted energy spectra, event rates, and fluxes for the 40-kiloton liquid argon detector and compared observable parameters and time bin sizes for the black hole cutoff
- Contributed to the assembly of NaIvETe detector by soldering and crimping reams

Summer Undergraduate Research Fellow, Caltech LIGO Lab **June 2022–August 2022**
Advisor: Dr. Ryan Magee *Pasadena, CA*

- Generated supernova phenomenological model gravitational waveforms based off Astone et. al (2018) paper to test the feasibility of using matched filter searches for supernova waveforms
- Wrote Python package called SuperNova Waveforms for Calculating the Parameter Space (SNoW CaPS) for making a template bank for supernova waveforms

Research Intern, SLAC National Accelerator Laboratory **June 2021–August 2021**
Advisors: Dr. Michael Kagan and Dr. Rachel Hyneman *Menlo Park, CA*

- Compared the ability of the Gaussian process (GP) and the log Gaussian Cox process (LGCP) to model the smooth background in high energy physics collider data with gpytorch and scikit-learn

Undergraduate Researcher, Duke Cosmology Group **May 2020–September 2021**
Advisor: Prof. Michael Troxel *Durham, NC*

- Developed two distinct models, patch-based classification and direct localized detection, by studying CNN and RCNN models with Pytorch and TensorFlow to automate the identification of transient artifacts in Dark Energy Survey images
- Relabeled transient artifact masks with SAOImageDS9 to introduce the human-in-the-loop method and improve the performance of the models

Selected Honors and Awards

Sigma Pi Sigma Inductee   **2023**
Duke University

Graduate Research Fellowship Honorable Mention   **2023**
National Science Foundation

FUTURE of Physics   **2022**
California Institute of Technology

David M. Rubenstein Merit Scholarship   **2019-2023**
Duke University

Computer Skills

Programming: Python, C/C++, Java, MATLAB, Bash, SQL

Software and Tools: Mathematica, LaTeX, ROOT, DS9, H-AMR, AstroPy, gpytorch, PyTorch, TensorFlow, scikit-learn, Jupyter, Git

Talks and Posters

Office of University Scholars and Fellows Poster Session   **September 2022**
Determining the Feasibility of Matched Filtering for Core-Collapse Supernovae

LIGO SURF Final Presentations   **August 2022**
Determining the Feasibility of Matched Filtering for Core-Collapse Supernovae

APS Conference for Undergraduate Women in Physics   **January 2022**
Gaussian Process vs. Log Gaussian Cox Process: Comparing Methods for HEP Data

Office of University Scholars and Fellows Virtual Poster Session   **October 2021**
Gaussian Process vs. Log Gaussian Cox Process: Comparing Methods for HEP Data

SLAC Summer Intern Oral Presentations   **August 2021**
Gaussian Process vs. Log Gaussian Cox Process: Comparing Methods for HEP Data

APS Conference for Undergraduate Women in Physics   **January 2021**
Finding Transient Artifacts with Deep Learning in the Dark Energy Survey

Data+ Poster Session   **July 2020**
Finding Transient Artifacts with Deep Learning in the Dark Energy Survey

Outreach, Leadership, and Service

Physicist   **2023**
Adopt-A-Physicist   *Virtual*
Discussed journey in astrophysics via online discussion forum with high school students around the world.

Mentor   **2020-2023**
FEMMES+ Connect   *Durham, NC*

- Met biweekly with local middle and high school students to guide them through research and activism involvement in their community with semester-long projects

President ('22-'23), Vice President ('21-'22), Secretary ('20-'21)   **2020-2023**
Society of Physics Students (SPS)   *Durham, NC*

- Organized events including professional development workshops, Duke Teaching Observatory visits, game nights, and movie nights with executive team to build community among physics students
- Hosted local SPS chapters at 2023 Zone 5 Meeting
- Collaborated with the Graduate Student Organization to organize panels and talks on research and graduate school
- Started Women+ mentorship program between Duke undergraduate and graduate students in physics jointly with a graduate student

Fellow   **2019-2023**
STEM Pathways for Inclusion, Readiness, and Excellence (SPIRE)   *Durham, NC*

- Attended panels and talks to meet faculty and graduate students at Duke
- Engaged with Living Learning Community to establish a support network among fellows
- Mentored underclassmen fellows by providing advice and supporting their journey at Duke

Teaching Experience

Lead Physics 142 Peer Facilitator   **Spring 2022**
Academic Resource Center, Duke University   *Durham, NC*

- Led weekly review sessions for 15 students taking introductory electricity and magnetism to foster community and reinforce content
- Created physics problems, prepared review material for sessions for peer facilitators, and communicated with course professor

Lead Physics 141 Peer Facilitator   **Fall 2021**
Academic Resource Center, Duke University   *Durham, NC*

- Led weekly review sessions for 10 students taking introductory mechanics to foster community and reinforce content
- Created physics problems, prepared review material for sessions for peer facilitators, and communicated with course professor