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Noah R. Franz

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Summary

National Science Foundation Graduate Research Fellow at the University of Arizona Steward Observatory. Interested in applying complex data science techniques to discover and analyze tidal disruption events in large astronomical surveys.

Education

Ph.D. in Astronomy and Astrophysics — Anticipated 2028
University of Arizona (Steward Observatory) — Tucson, AZ

B.S. in Physics & Applied Data Science — May 2023
Siena College — Loudonville, NY

Skills

Programming	Python, Java, Bash, Git, LaTeX, SQL, MATLAB, Basic HTML
Related Programming Packages	NumPy, Pandas, Matplotlib, Keras, Tensorflow, Astropy, Flask
Other	GitHub, Overleaf, Jupyter, Oracle, ArangoDB, Statistical Analysis

Projects

University of Arizona, Department of Astronomy & Steward Observatory

Tool for Rapid Object Vetting and Examination (TROVE) — Oct 2024 - Present

- Actively developing a tool for connecting and vetting potential electromagnetic counterparts to non-localized multimessenger events, such as gravitational waves and neutrino observations.

Searches After Gravitational waves Using ARizona Observatories (SAGUARO) — May 2024 - Present

- Maintain the SAGUARO Target and Observation Management (TOM) software infrastructure.
- Contribute features to the SAGUARO TOM including improved target vetting and user experience.

The Open mulTiwavelength Transient Event Repository (OTTER) — Aug 2023 - Present

- Accumulate and clean $> 100,000$ photometric observations of tidal disruption events from the literature into a customized JSON data schema stored as an ArangoDB document database.
- Develop the software API to access the cleaned dataset of photometry.
- Build a front-end web application for viewing, downloading, and contributing other datasets to the catalog.

Radio Observations of Extreme Coronal Line Emitters — Aug 2023 - Present

- Reduce radio observations of Extreme Coronal Line Emitters using the standard CASA software.
- Analyze the results of the radio observations to better understand the connection between extreme coronal line emitters and tidal disruption events.

University of Hawaii at Manoa, Institute for Astronomy
Research Intern - Tip of the Red Giant Branch Bounds on the NMDM Revisited — Jun 2022 - Aug 2022

- Modified an open source stellar evolution simulation using Fortran.
- Optimized a simulation by using python to train a deep neural network and use it as a simulation emulator.
- Conducted a Bayesian statistical analysis, Markov Chain Monte Carlo, to constrain a particle physics property.
- Code is available on GitHub and results will be presented in Franz et al. (2023), in progress (see second page).

University of California, Berkeley Search for Extraterrestrial Intelligence (SETI)
Research Intern - Technosignature Search of Transiting TESS Targets of Interest — Jun 2021 - May 2022

- Searched through and analyzed over 30 terabytes of Green Bank Telescope radio data for evidence of extraterrestrial intelligence using Python and Bash.

- Optimized the existing search software by developing a a parallel processing algorithm using multiple compute nodes on a cluster.
- Created visualizations of multi-dimensional radio signals using matplotlib.
- Code is available on GitHub and results are published in Franz et al. (2022), Astronomical Journal.

Siena College

`hepfile` Development — May 2023 - July 2023

- Developed the Python `hepfile` software to store so-called "hetergeneous" datasets.
- Added tools for integration with existing Python software.

Senior Thesis — Sep 2022 - May 2023

- Developed a pipeline to search Dark Energy Spectroscopic Instrument data for spectroscopic lenses.
- Analyzed spectroscopic lenses to extract source object properties.

Astrophysics Research Intern — Jan 2021 - Feb 2022

- Developed a Python program to simulate and analyze spectroscopic lenses to place limits on Dark Energy Spectroscopic Instrument observation parameters.
- Code is available on GitHub and results were presented at the 237th meeting of the American Astronomical Society.

Electronics Research Intern — Dec 2021 - Feb 2022

- Designed a circuit for an automatic hand sanitizer dispenser with MATLAB, Simulink, and Eagle CAD.

Honors & Awards

National Science Foundation Graduate Research Intern — Sep 2023 - Aug 2028
Siena College Excellence in Physics Award — May 2023
Siena College Excellence in Applied Data Science Award — May 2023
Siena College Physics Department Sophomore Excellency Award — May 2021
Sigma Pi Sigma Honor Society Member — May 2021 - May 2023
Siena College President's List — Dec 2019 - May 2023

Teaching & Outreach Experience

University of Arizona
Astronomy Education for Undergraduate Majors — Nov 2024 - Present

- Designed a lesson plan utilizing Jupyter Notebooks to teach basic programming concepts along with improving students astronomy knowledge
- This is a work in progress and all educational materials will be made publicly available

Space Drafts Organizer — Nov 2024 - Present

- Facilitate monthly public science talks in Tucson, AZ as part of the international organization Astronomy on TAP

Black Hole Summer Camp Science Expert — June 2024

- Teach elementary school students about Black Holes as part of the Flandrau Science Center Black Hole Summer Camp.
- Collaborate with an elementary school instructor to create interactive teaching activities on Black Holes.

Siena College
Teaching Assistant — Aug 2020 - May 2023

- Facilitated a lab or office hours to help students learn physics, programming, and data science concepts.
- Classes include Introduction to Exploratory Data Analysis and Visualization, Computational Physics, General Physics I, & General Physics II.

Peer Tutor — Aug 2020 - May 2022

- Explained difficult academic concepts to peers taking General Physics.

Physics Club Outreach — Feb 2020, Oct 2022, Apr 2023

- Taught middle school aged students basic physics and engineering concepts.

Siena College Public Observing Night — Sep 2022 - May 2023

- Telescope operator for Siena College public observing nights.
- Taught other students about the astronomical objects being observed.

Leadership & Volunteer Experience

Member of Siena College Astronomy Club	April 2022 - May 2023
President of Siena College Ultimate Frisbee Team	Sep 2020 - May 2023
Resident Assistant	Aug 2020 - May 2021
Member of Siena College Physics Club	September 2019 - present
GROC Mountain Bike Patrol (National Ski Patrol)	Oct 2018 - Dec 2022

Publications, Presentations, & Software

Publications

Noah Franz, Mitchell Dennis, and Jeremy Sakstein. Tip of the Red Giant Branch Bounds on the Neutrino Magnetic Dipole Moment Revisited. arXiv e-prints, page arXiv:2307.13050, July 2023. In Prep.

Noah Franz, Steve Croft, Andrew P. V. Siemion, et al. The breakthrough listen search for intelligent life: Technosignature search of transiting tess targets of interest. The Astronomical Journal, 163(3):104, feb 2022.

Presentations

Noah Franz, Mitchell Dennis, and Jeremy Sakstein. Tip of the red giant branch constraints on the neutrino magnetic dipole moment revisited. 241st American Astronomical Society, 2023.

Noah Franz. Neutrinos, machine learning, and stellar evolution. aug 2022.

Noah Franz, Steve Croft, Andrew P. V. Siemion, et al. The breakthrough listen search for intelligent life: Technosignature search of transiting tess targets of interest. 73rd International Astronautical Congress, 2022.

Noah Franz, Steve Croft, Andrew P. V. Siemion, et al. The breakthrough listen search for intelligent life: Technosignature search of transiting tess targets of interest. 239th American Astronomical Society, 2022. Conference cancelled due to the COVID-19 pandemic.

Noah Franz, Brian Bauer, and John Moustakas. Identifying Strong Gravitational Lenses in DESI Spectroscopy. 237th American Astronomical Society, 53(1), jan 11 2021. https://baas.aas.org/pub/2021n1i125p05.

Software

Matt Bellis, Noah Franz, and Matt Dreyer. mattbellis/hepfile: v0.1.7, July 2023. https://doi.org/10.5281/zenodo.8171930.