

Sheila A. Saguear

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EDUCATION

Ph.D. in Astronomy

University of Florida, Gainesville, FL

In Progress (Expected May 2026)

M.S. in Astronomy

University of Florida, Gainesville, FL

May 2022

B.A. in Astronomy and Physics, Cum Laude

Boston University, Boston, MA

May 2020

WORK EXPERIENCE

Graduate Research Assistant, University of Florida Dept. of Astronomy (Gainesville, FL)

Sept 2020 – Present

- Used inferential statistics (Bayesian hierarchical modeling techniques) to constrain the orbital eccentricities of exoplanets around small stars using large telescope datasets, including time-series data from NASA's Kepler space telescope. Developed a user-friendly, open-source Python package called **photoeccentric** to measure orbital eccentricities with these methods.
- Designing an experiment to identify empirical relationships between planet properties and galactic location using machine learning (non-parametric, nonlinear regression).

Predoctoral Research Fellow, Center for Computational Astrophysics (Flatiron Institute) (New York, NY)

Jan – Jun 2023

Constrained stellar ages and metallicities for low-mass stars using stellar kinematics data from the *Gaia* space telescope. Developed an open-source, user-friendly Python package called **zoomies** for constraining kinematic stellar ages. Work involved handling large datasets through relational databases.

Research Assistant, Boston University Dept. of Physics (Boston, MA)

Jan – Aug 2020

Measured the effectiveness of in-person, virtual, and hybrid teaching models by comparing student learning outcomes in introductory college physics labs using qualitative and quantitative research techniques in R.

Undergraduate Research Assistant, Boston University Dept. of Astronomy (Boston, MA)

Jan 2017 – May 2020

Processed time-series data from NASA's K2 space telescope and conducted a signal search for exoplanets orbiting small stars. Statistically constrained exoplanet occurrence rates based on a null detection result. Conducted a sample literature search for the PINES survey, a photometric search for transiting exoplanets around the smallest stars.

Directed Studies Student, CERN (CMS Experiment) (Geneva, CH)

Jan – Jul 2019

Improved the CMS Trigger System by training particle identification models with machine learning (Keras). Created firmware implementations and tested the performance of these machine learning algorithms for FPGAs with the Vivado high-level synthesis language, using the Python package `hls4ml`.

Intern, NASA Ames Research Center (Kepler/K2 Guest Observer Office) (Moffett Field, CA)

Jun – Aug 2018

Developed an exoplanet and supernova signal injection and recovery tool for Kepler GO's open-source Python package **lightkurve**, a Python tool for processing and analyzing time-series data from NASA's Kepler, K2, and TESS space telescopes.

SKILLS

Programming: Python (advanced); R, IDL, relational databases SQL and ADQL (variant of SQL for astronomical datasets)

Frameworks and Tools:

General: Unix command line, pandas, Jupyter Notebooks, Git and GitHub, Slurm (HPC Job Scheduler), LaTeX, Keras/Tensorflow, Docker, and HTML. Familiar with high-performance computing clusters, inferential statistics, Markov chain Monte Carlo (MCMC) analysis, and large scale data analysis.

Machine learning: JAX, scikit-learn, Keras, TensorFlow

Selected Python Tools: numpyro, pymc, emcee, celerite, lightkurve, hls4ml

PUBLICATIONS

Sagear, Sheila; Adrian M. Price-Whelan, Sarah Ballard, Yuxi (Lucy) Lu, Ruth Angus, David W. Hogg

"[zoomies: A tool to infer stellar age from vertical action in Gaia data](#)" (2024)

The Astrophysical Journal, Volume 977, Issue 1, id.49, 21 pp.

Sagear, Sheila; Ballard, Sarah

"[The Orbital Eccentricity Distribution of Planets Orbiting M dwarfs](#)" (2023)

Proceedings of the National Academy of Sciences, 120, 23

Tamburo, Patrick et al. (inc. **Sagear, Sheila**)

"[The Perkins INfrared Exosatellite Survey \(PINES\) I. Survey Overview, Reduction Pipeline, and Early Results](#)" (2022)

The Astronomical Journal, Volume 163, Issue 6, id.253, 18 pp.

Di Guglielmo, Giuseppe et al. (inc. **Sagear, Sheila**)

"[Compressing Deep Neural Networks on FPGAs to Binary and Ternary Precision with HLS4ML](#)" (2021)

Machine Learning: Science and Technology, 2, 015001

Sagear, Sheila; Allen, Emily; Duffy, Andrew; Jariwala, Manher

"[Student learning outcomes with hybrid computer simulations and hands-on labs](#)" (2020)

2020 Physics Education Research Conference Proceedings, 448-453

Sagear, Sheila; Skinner, Julie N.; Muirhead, Philip S.

"[Upper Limits on Planet Occurrence around Ultracool Dwarfs with K2](#)" (2020)

The Astronomical Journal, Volume 160, Issue 1, id.19, 7 pp.

SOFTWARE

Author of the Python package **zoomies** (github.com/ssagear/zoomies)

Author of the Python package **photoeccentric** (github.com/ssagear/photoeccentric)

Contributor to the Python package **lightkurve** (github.com/lightkurve/lightkurve)

SELECTED PRESENTATIONS

Poster: "[The Orbital Eccentricities of the Kepler M dwarf Planets: A Population-Level View of Planet Dynamics around Small Stars](#)"

Exoplanets IV, Las Vegas, NV

May 2022

Poster: "[Machine Learning Improvements to the CMS Trigger System](#)"

PhysCon 2019, Providence, RI

Oct 2019

Poster: "[Measuring Transit Detection Efficiency in Ultracool Dwarfs and an Open Source Injection and Recovery Tool](#)"

The 20th Cambridge Workshop on Cool Stars and the Sun, Boston, MA

Aug 2018