

Rodrigo Luger, PhD

LinkedIn: [linkedin.com/in/rodluger](https://www.linkedin.com/in/rodluger) | Email: rodluger@gmail.com | Phone: (610) 675-6056

SUMMARY

Astrophysicist, data scientist, statistician, and open source software developer looking to transition from academia to industry. 5 years postdoctoral experience developing algorithms & open source software to tackle problems involving large datasets, high-dimensional parameter spaces, and strong correlated noise in astrophysics. Focused on improving algorithmic efficiency and developing new inference techniques to solve previously intractable problems, particularly in astrophysical imaging and time series analysis/forecasting. On the side, setting the standard for writing reproducible research articles in astronomy, harnessing version control, CI/CD, and graphs to tackle the reproducibility crisis in the field. Looking for positions in tech, fintech & finance that combine my interests in data science & software engineering. Always looking to learn new technologies to solve challenging algorithmic/data problems.

SELECTED SKILLS

Statistics/Machine Learning: probability theory, Bayesian modeling & inference, hierarchical modeling, linear regression, MCMC/HMC/NUTS, Gaussian processes, information theory, time series analysis, noise modeling, de-trending, signal filtering, imaging algorithms, exploratory data analysis, data viz.

Software Engineering: Python (*numpy, scipy, scikit-learn, pandas, pymc3, aesara, pytorch, numpyro, jax, Snakemake, etc.*), C/C++, Javascript, HTML/CSS, Linux, Docker, version control, unit testing, docs, and CI/CD (*GitHub Actions, Azure Pipelines, Travis CI*). Maintainer of/contributor to several popular astronomy open source packages [e.g., [exoplanet](#) | [starry](#) | [vplanet](#) | [showyourwork](#)].

EXPERIENCE

Research Fellow, Center for Computational Astrophysics, New York

August 2018 - present

- Developed **showyourwork!**, an end-to-end pipeline for open source scientific articles to address the reproducibility crisis in the sciences [[github](#) | [docs](#) | [examples](#) | [pypi](#)]. Researchers provide the scripts and instructions to build their articles and **showyourwork!** takes care of the rest, generating a dependency graph of the workflow and re-assembling the article upon every commit with intelligent caching of datasets & results. Development involved collaboration with over a dozen researchers in different scientific fields to understand varying use cases and requirements. **showyourwork!** is used in dozens of papers to date, 300+ stars on GitHub.
- Developed the leading algorithm for reconstructing images of astrophysical sources based on time series flux measurements, outperforming existing methods by several orders of magnitude in both speed and precision. Released it as **starry** [[github](#) | [docs](#) | [pypi](#)], an open source suite of tools for mapping the surfaces of stars & planets. Used in hundreds of papers to date; 117+ stars on GitHub.
- Developed the leading algorithm (in speed, accuracy, & precision) for modeling signals used in the detection and characterization of extrasolar planets. This algorithm is now at the core of the **exoplanet** code [[github](#) | [docs](#) | [pypi](#)]. Used in hundreds of papers to date; 170+ stars on GitHub.
- Developed approximate inference techniques to jointly model time series data from tens of thousands of stars to infer statistical information about the physics driving their variability. Constructed a hierarchical Bayesian model and developed a custom Gaussian process kernel to reduce the dimensionality of the space by four orders of magnitude & make the problem tractable. Released the algorithm as the **starry-process** package [[github](#) | [docs](#) | [pypi](#) | [web app](#)].

- Published **15 first-author articles (51 total)** in refereed journals to date, with 2395+ citations [[full list](#)]. Led a research group of 8 students. Gave 20+ invited colloquium talks at astronomy departments across the globe. Lectured at 4 summer schools on statistics, machine learning, and Gaussian processes.

Postdoctoral Researcher, University of Washington, Seattle

August 2017 - August 2018

Graduate Student Researcher, University of Washington, Seattle

June 2012 - August 2017

- Developed **everest**, the leading signal processing tool for NASA's *Kepler/K2* telescope, used in hundreds of publications to date to separate instrument systematics from astrophysical signals. Applied the code to the entire mission catalog to produce time series data for 100,000+ stars, leading to the discovery of hundreds of new extrasolar planets and major results across many areas of astrophysics [[github](#) | [catalog](#)]. Used **everest** to lead a team of 30+ researchers in the discovery of the extrasolar planet with the smallest signal-to-noise ratio in *Kepler/K2* data [[paper](#)].
- Co-developed **vplanet**, a suite of open-source tools to simulate the evolution of planetary systems, with a focus on determining a planet's ability to support life. **vplanet** models planetary evolution as a complex system of coupled differential equations describing physics spanning scales from sub-planetary to galactic. Focused on ease-of-use and reproducibility, used in dozens of publications to date. 88+ stars on GitHub [[github](#) | [docs](#) | [examples](#)].
- Developed several other algorithms and open-source software to detect and characterize extrasolar planets, and in particular probe their habitability from noisy and extremely limited data using Bayesian techniques. Led interdisciplinary teams to understand planet habitability at the nexus of various scientific fields (astronomy, biology, chemistry, geology, atmospheric science).

Physics Teacher, St. Luke's School, New Canaan CT

July 2010 - June 2012

- Taught several sections of junior level physics, with a focus on critical thinking and creative problem solving. Created and taught a college-level elective course in astrophysics for seniors. Coached JV soccer, fencing, and middle school tennis.

EDUCATION

PhD, Astronomy and Astrobiology

August 2017

University of Washington, Seattle. GPA 3.9

MSc, Astronomy and Astrobiology

August 2013

University of Washington, Seattle. GPA 3.9

BA, Astrophysics | English Literature (minor)

May 2010

Swarthmore College, PA. GPA 3.9

SELECTED HONORS AND AWARDS

Flatiron Research Fellowship, Center for Computational Astrophysics

August 2018

One of the most competitive institutional fellowships in astrophysics in the country, offering complete research freedom at the leading center for computational research in astrophysics.

ARCS Foundation Scholar

August 2012

Research support award from the ARCS Foundation, providing monetary support to distinguished graduate students engaged in research.

Phi Beta Kappa Society

May 2010

Awarded to distinguished students in the top tenth of their graduating class.