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Ian Weaver, Ph.D.

Data Scientist / Junior Developer

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Experience

Harvard Science Center **Jan 2017 — Present**
The Center for Astrophysics | Harvard & Smithsonian (CfA) *Cambridge, MA*
- Operated and maintained the 0.4 meter Clay Telescope atop the Harvard University Science Center.
- Hosted star parties and other outreach events for the undergraduate and local community.

Graduate student researcher **Sep 2016 — May 2022**
The Center for Astrophysics | Harvard & Smithsonian (CfA) *Cambridge, MA*
- Provided spectroscopic time-series observations and follow-up atmospheric analysis for an underrepresented class of exoplanet.
- Accomplished this using Gaussian process (GP) and principal component analysis (PCA) detrending techniques, combined with Bayesian inference frameworks including Markov chain Monte Carlo (MCMC) and nested sampling.
- Utilized high performance computing facilities and schedulers (Torque/PBS, SGE, slurm) via ssh and the command line on different Linux operating systems.
- Taught/mentored several undergraduate courses in Astronomy and received multiple teaching awards.

Co-Instructor **Jun 2017 — Sep 2019**
Banneker Institute *Cambridge, MA*
- Collaborated in the design and execution of a novel summer astronomy workshop through the ISEE Professional Development Program geared towards underrepresented students in STEM.
- Taught 20+ class size emphasizing hands-on and inquiry based learning.

Technical skills

Programming and computation: Python, Julia, Plotly, Bokeh, JavaScript, HTML/CSS, Linux, Bash, LaTeX, Markdown
Tooling: CI/CD workflows, Git, GitHub, make, rclone, Google Cloud Platform, ssh, SQL (ADQL), Table Access Protocol (TAP)
Statistics: Bayesian inference, Nested sampling, MCMC, Variational inference, Stochastic gradient descent, Simulated annealing

Projects

JuliaAstro [link] **2020 – Present**
Contributor and member of the Julia astronomy organization
- Designed the Keplerian orbit capabilities for the transit modeling package, Transits.jl [link], which uses automatic unit and integration testing via GitHub Actions, supports Python interoperability, and produces competitive benchmark performance.
- Implemented several dust extinction models for the interstellar medium observations package DustExtinction.jl [link], which provides first-class support for measurements containing units and estimated uncertainties.

Team member, Graduate course final project [link] **Fall 2019**
Python implementation for new algorithm estimating MCMC uncertainty
- Addressed limitations in current definition of the $\hat{R}$ statistic by implementing a new algorithm proposed by Veharti et al. (2019).
- Packaged this deliverable as a set of Jupyter notebooks, including comprehensive documentation, example usage, and sample figures with associated npy and pickle data sets.

Team member, Graduate course final project [link] **Fall 2018**
Python package for differential equation solving, powered by automatic differentiation
- Designed and developed a numerical integration Python package, and demonstrated its usage in fields ranging from Astronomy to Ecology.
- Deployed extensive documentation via ReadTheDocs.io, unit testing with pytest, and bounded registration on PyPI for the duration of the course.

Education

Doctor of Philosophy (Ph.D.) in Astronomy, Graduate School of Arts and Sciences, *Harvard University* **May 2022**
Master of Arts (AM) in Astronomy, Graduate School of Arts and Sciences, *Harvard University* **May 2020**
Bachelor of Arts in Astronomy and Astrophysics, Division of Physical and Biological Sciences, *UC Santa Cruz* **May 2016**

Relevant graduate coursework: Advanced Scientific Computing: Stochastic Methods for Data Analysis, Inference and Optimization, Systems Development for Computational Science, Noise and Data Analysis in Astrophysics

Activities and Outreach

Graduate School of Arts and Sciences Crew Team **2016 — 2022**
Co-Director of science outreach program Open Labs at Harvard (OLAH) [link] **2018 — 2020**
Graduate Student Council Representative **2016 — 2018**
Eagle Scout, Troop 255 **2012**