

Anthony Burrow, Ph.D.

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OBJECTIVE

Data scientist with a Ph.D. in Physics and experience leveraging machine learning to model complex data sets in astrophysics. Seeking to apply my advanced skill set in model production, data visualization, and software development in Python and C++ to deliver insightful data-driven solutions to business goals.

EDUCATION

- **Ph.D. in Physics** (GPA: 3.92; [Verification](#))
July 2024, *University of Oklahoma*
[View Dissertation](#)
- **B.S. in Astrophysics** (GPA: 3.91)
May 2017, *University of Oklahoma*

CERTIFICATIONS

- **IBM Professional Certificate**
 - Data Science, Aug. 2024 ([View](#))Enhancing skills in the data science lifecycle — ETL, data analysis, data visualization, SQL, machine learning, etc. — to derive insights from data.

RELEVANT EXPERIENCE

- **Lecturer/Instructor** Aug. 2025 – Present
University of Oklahoma
 - Act as instructor of record for courses in both Physics and Mathematics, adapting instruction to diverse student backgrounds and academic goals.
 - Independently design and manage a full course, developing instructional materials and assessments while integrating advanced content in Python programming and data analysis.
 - Collaborate within a multi-instructor team to coordinate curriculum, align objectives, and ensure consistency across course sections.
- **Generative AI Trainer** Dec. 2024 – Aug. 2025
Independent Contractor
 - Serve as an expert in physics, mathematics, and programming to train and evaluate responses from large language models (LLMs) to STEM-based prompts.
 - Assess the validity of evaluations from other AI trainers to maintain quality assurance in model training data.
- **Research Assistant (Data Science)** July 2019 – July 2024
University of Oklahoma *Norman, OK*
 - Employed machine learning algorithms to establish a new, optimized standard of classifying astronomical objects.
 - Designed an innovative method of extrapolating and predicting astronomical data by leveraging dimensionality reduction techniques, with extrapolated results matching observed data within 2–5%.
 - Led collaborative statistical analyses with leading researchers from around the world, resulting in two published reports to a peer-reviewed journal that interpret findings using data visualizations and highly technical writing.
 - Developed and maintained open-source software to enhance accessibility of models for the scientific community.
 - Utilize hybrid cloud computing infrastructure to synthesize physics models for comparative data analysis.
- **Undergraduate Research Assistant (Data Analysis)** June 2015 – May 2017
University of Oklahoma *Norman, OK*
 - Created Python scripts needed for data analysis, discovering several stars with time-variable properties.
 - Calibrated and processed raw image data by removing multiple sources of noise and bias.
 - Conducted multiple remote observations at the Apache Point Observatory to obtain more raw data for analysis.

TECHNICAL SKILLS

Programming & Scripting: Python, C/C++, SQL, Make/CMake, Bash, Fortran, Slurm, L^AT_EX
Python Libraries: NumPy, pandas, scikit-learn, PyTorch, matplotlib, SciPy
Version Control: Git, CI/CD with GitHub Actions workflows
Platforms: Linux/UNIX, Windows

SOFTWARE PRODUCTS

- **SNIApectrumNN** (Python): Neural network models made with PyTorch for predicting observational properties of astronomical objects based on their spectra.
- **SNEx** (Python): Spectrum extrapolation into near-infrared wavelengths using principal component analysis.
- **Spectractor** (Python): Fast spectrum-smoothing by implementing interpolation using models such as Gaussian processes and splines.
- **SpecFit** (C++, Python): Efficient spectrum-fitting of various integrated models using non-linear optimization, utilizing `pybind11` to enhance performance.
- **Rad1D** (C++, Python): Radiative transfer code that utilizes iterative matrix operations to solve complex equations that explain light passing through a medium.
- **Hydro1D** (C++, Python): Hydrocode that simulates the time-dependent shock dynamics of stellar material.

PUBLICATIONS

- **Burrow, Anthony**, Baron, E., Burns, Christopher R., et al. (2024). *Extrapolation of Type Ia Supernova Spectra into the Near-Infrared Using PCA*. *ApJ*, doi: [10.3847/1538-4357/ad3c45](https://doi.org/10.3847/1538-4357/ad3c45)
- **Burrow, Anthony**, Baron, E., Ashall, C., et al. (2020). *Carnegie Supernova Project: Classification of Type Ia Supernovae*. *ApJ*, doi: [10.3847/1538-4357/abafa2](https://doi.org/10.3847/1538-4357/abafa2)
- Eight co-authored publications of scientific analyses with collaborators.

PRESENTATIONS

- **POISE Collaboration Meeting, August 2023**: *Extrapolation of Type Ia Spectra into the Near-Infrared Using PCA*; a final discussion leading to [Burrow et al. \(2024\)](#).
- **POISE Collaboration Meeting, July 2022**: *Extrapolation of Type Ia Spectra into the Near-Infrared Using PCA*; the beginning of the project leading to [Burrow et al. \(2024\)](#).
- **CSP Collaboration Workshop, September 2020**: *Carnegie Supernova Project: Classification of Type Ia Supernovae*; a presentation of the publication by [Burrow et al. \(2020\)](#).
- **American Astronomical Society Winter Conference, January 2017**: Poster presentation highlighting my undergraduate research.

AWARDS

- **Avenir Foundation Graduate Student Fellowship**:
Spring 2022, Summer 2022; *University of Oklahoma*
- **Provost's Certificate of Distinction in Teaching**:
Fall 2019; *University of Oklahoma*
- **Award for Outstanding Scholarship by a Graduating Senior**:
May 2017; *University of Oklahoma Homer L. Dodge Department of Physics and Astronomy*
- **William Schriever Award for Outstanding Scholarship in Physics & Astronomy**:
2014-2015; *University of Oklahoma*

ADDITIONAL WORK EXPERIENCE

- **Graduate Teaching Assistant** Aug. 2019 – Dec. 2021
University of Oklahoma Norman, OK
 - Delivered lectures and facilitated in-class group discussions in undergraduate astronomy and physics courses, focusing on foundational concepts and problem-solving strategies.
 - Led hands-on astronomy lab sessions, instructing students in the operation of telescopes.
 - Heavily supported an undergraduate Introduction to Research course, emphasizing hands-on research practices including data analysis, coding in Python, and literature review.