

Anthony Burrow, Ph.D.

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SUMMARY

Research scientist with a Ph.D. in Physics and a robust background in applying machine-learning concepts to complex datasets in astrophysics. Extensive work utilizing Python, C/C++, and more to develop software tools which have shown to be significant contributions to the scientific community. Experienced with the entire data science life cycle: identifying problems, data wrangling, and model deployment, evaluation, and maintenance.

TECHNICAL SKILLS

Programming:

Python, SQL, C/C++, C#, Bash

Platforms:

Linux/UNIX, Windows

Technologies:

Git, JupyterLab, RStudio, L^AT_EX, Slurm

Experience with Python Libraries:

NumPy pandas scikit-learn matplotlib SciPy Astropy Tensorflow GPy

Data Science Skills:

Machine Learning Data Wrangling Statistics Data Analysis Data Visualization Model Evaluation
Regression Classification Parameter Optimization Cluster Analysis Dimensionality Reduction

RESEARCH EXPERIENCE

- **Graduate Research Assistant** July 2019 – Present
University of Oklahoma, Advised by Dr. Eddie Baron *Norman, OK*
 - Develop Python software to implement machine-learning techniques to model the behavior of supernovae.
 - Perform thorough preprocessing, standardization, and feature engineering of spectroscopic data.
 - Conduct detailed statistical analyses, resulting in two publications in a peer-reviewed journal (ApJ).
 - Collaborate with leading researchers from several other universities and facilities around the world (CSP, POISE).
 - Present results to peers and collaborators at meetings and conferences.
 - Synthesize models in a supercomputing environment with Slurm scripts using PHOENIX radiative transfer code.

Products:

- [Burrow, Anthony, et al. \(2024\)](#). *Extrapolation of Type Ia Supernova Spectra into the NIR Using PCA*. ApJ
- [Burrow, Anthony, et al. \(2020\)](#). *Carnegie Supernova Project: Classification of Type Ia Supernovae*. ApJ
- [SNEx](#) (Python): Spectrum extrapolation into near-infrared wavelengths using principal component analysis.
- [Spextractor](#) (Python): Fast spectrum-smoothing using Gaussian process regression.
- [SNIaDCA](#) (Python): Wrapper for probabilistically classifying supernovae with Gaussian mixture models.
- **Undergraduate Research Assistant** June 2015 – May 2017
University of Oklahoma, Advised by Dr. John Wisniewski *Norman, OK*
 - Calibrated observed data by removing multiple sources of noise from raw FITS images of stars using IRAF.
 - Modeled the observed light profile of stars on images using IRAF to calculate their brightness values.
 - Created Python and IDL scripts needed to analyze data and propagate errors derived from observations.
 - Conducted multiple remote observations at the Apache Point Observatory to obtain more raw data for analysis.
 - Presented results at the American Astronomical Society conference.