# 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 data sets 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.

#### EDUCATION

- Ph.D. in Physics (GPA: 3.92) July 2024, *University of Oklahoma* Dissertation on SHAREOK
- IBM Professional Certificate
  - o Machine Learning, Ongoing
  - o Data Science, Aug. 2024 (View)
- B.S. in Astrophysics (GPA: 3.91) May 2017, University of Oklahoma

# TECHNICAL SKILLS

Programming: Platforms: Technologies:

Python, SQL, C/C++, C#, Bash Linux/UNIX, Windows Git, JupyterLab, RStudio, LATEX, 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

Norman, OK

- University of Oklahoma, Advised by Dr. Eddie Baron

  - Perform thorough preprocessing, standardization, and feature engineering of spectroscopic data.
  - o Conduct detailed statistical analyses, resulting in two publications in a peer-reviewed journal (ApJ).

• Develop Python software to implement machine-learning techniques to model the behavior of supernovae.

- Collaborate with leading researchers from several other universities and facilities around the world (CSP, POISE).
- $\circ\,$  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 probablistically 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.
- 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.

# OTHER DATA SCIENCE PROJECTS

• White Dwarf Classifier: Testing several classification algorithms (Random forest, Gradient boosting, etc.) to develop and evaluate a model to classify white dwarfs using a complex data set.