JAMES LILLY

james.lilly365@outlook.com | jlilly364.github.io | (443) 875-7192 | Baltimore, MD

SUMMARY

Motivated data analyst and software developer with 3 years of experience, specializing in Python and C. Proven ability to support large-scale data analysis projects and independently solve algorithmic challenges. Thrive in collaborative environments. Seeking to utilize my diverse skills to contribute to NASA's Heliophysics Digital Resource Library.

EDUCATION

University of Wyoming Laramie, WY
Master of Science in Physics (GPA: 4.00) May 2022

University of Arizona, Honors College Tucson, AZ
Bachelor of Science in Physics | Bachelor of Science in Astronomy with Honors (GPA: 3.78) May 2020
Honors Thesis: Characterizing Physical Properties of Hierarchical Structure in the Taurus Molecular Cloud

University of Maryland, Baltimore County Baltimore, MD
Graduate Certificate in Data Science *Expected: December 2026*
Courses Completed: Introduction to Data Analysis and Machine Learning & Data Management

RESEARCH EXPERIENCE

University of Wyoming Laramie, WY
Graduate Research Assistant March 2021 – July 2022

- Developed and maintained Python algorithm to analyze 100 GB of Hubble Space Telescope images for PHANGS-HST project ($1.2 million grant), contributing High Level Science Products to Mikulski Archive for Space Telescopes
- Designed Python scripts to identify and measure physical properties of stellar associations in 38 nearby galaxies, using scientific computing libraries like astropy and skimage, improving data-sorting efficiency by 50%
- Leveraged Jupyter and GitHub version control to deploy software to interdisciplinary research teams
- Generated value-added data products through advanced visualizations, like multi-wavelength image overlays and topographical maps, for multiple peer-reviewed research publications
- Composed clear & comprehensive user-facing code documentation and tutorials for internal and external stakeholders
- Delivered detailed weekly verbal and written reports to team members, both in-person and remotely

University of Arizona/NASA Space Grant Tucson, AZ
Undergraduate Research Assistant August 2018 – May 2020

- Automated detection of prestellar cores, with Python, in molecular tracer maps from new and and archival data
- Developed robust statistical criteria to delineate substructures found using different seeded watershed algorithms
- Presented written research posters and Honors thesis as well as several oral academic colloquia

PROFESSIONAL EXPERIENCE

Anne Arundel County Public Schools Baltimore, MD
High School Science Teacher August 2025 – Present

- Instruct AP Physics 1, Honors Principles of Engineering, Systems Science, and Environmental Science courses at North County High School for 140 students
- Collaboratively plan lessons and implement established science curricula with multidisciplinary teaching team
- Facilitate demonstrations, hands-on lab activities, and long-term robotics construction and programming projects

Seattle Public Schools Seattle, WA
Long-term Substitute Teacher September 2022 – September 2024

- Instructed "Precalculus" and "Math in Society" courses at Nova High School, developing original curricula
- Designed student accommodations database for 50+ students, as requested by the Nova Special Education team
- Built effective working relationships with students, faculty, and parents, enhancing my ability to multi-task

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University of Wyoming Laramie, WY
Graduate Teaching Assistant Aug 2020 – May 2021

- Guided weekly discussions and labs for 60 students in undergraduate physics courses
- Designed 12 demonstrations for experiments and recorded weekly instructional lab videos
- Led introductory Python workshop for 10 undergraduates in summer research program

Steward Observatory Tucson, AZ
Telescope Operator Aug 2018 – Mar 2020

- Orchestrated observations of nearby targets by manually operating telescope and observatory dome
- Presented weekly astronomy lessons to general education students and members of the public

Vatican Observatory Foundation Mt. Graham, AZ
Telescope Operator May 2019 – Aug 2019

- Planned and executed observations for NASA's Transiting Exoplanet Survey Satellite (TESS) at the Vatican Advanced Technology Telescope (VATT) using the PEPSI spectroscopic instrument
- Coordinated with remote observers to ensure timely and accurate observations of host stars
- Performed daily maintenance on telescope to protect telescope mirror and instruments

National Radio Astronomy Observatory Charlottesville, VA
Undergraduate Research Assistant May 2018 – August 2018

- Analyzed multi-dimensional radio-wavelength data from Green Bank Telescope using Python, delivering key insights
- Contributed to an Agile software development team, presenting findings through multimedia presentations effectively

PROFESSIONAL CERTIFICATIONS

Principles of Engineering – Project Lead The Way (PLTW) Core Training November 2025

PUBLICATIONS

- Larson et al. 2023: "Multi-Scale Stellar Associations across the Star Formation Hierarchy in PHANGS-HST Nearby Galaxies: Methodology and Properties", *MNRAS*, 523, 4
- Scibelli et al. 2023: "3D Radiative Transfer Modelling and Virial Analysis of Starless Cores in the B10 Region of the Taurus Molecular Cloud", *MNRAS*, 521, 3
- Whitmore et al. 2023: "Improving Star Cluster Age Estimates in PHANGS-HST Galaxies and the Impact on Cluster Demographics in NGC 628", *MNRAS*, 520, 1
- Turner et al. 2022: "PHANGS: constraining star formation time-scales using the spatial correlations of star clusters and giant molecular clouds", *MNRAS*, 516, 3
- Lee et al. 2022: "The PHANGS-HST Survey: Physics at High Angular Resolution in Nearby Galaxies with the Hubble Space Telescope", *ApJS*, 258**,** 10

PRESENTATIONS

- "*The Green Bank Ammonia Survey: Investigation of the Hierarchical Structures of Nearby Star-Forming Regions*", 233rd meeting of the American Astronomical Society, Washington State Convention Center, Seattle, WA, January 2019
- "*Characterizing Physical Properties of Hierarchical Structure in Star-Forming Regions*", 235th meeting of the American Astronomical Society, Hawaii Convention Center, Honolulu, Hawaii, January 2020
- "*Characterizing Physical Properties of Hierarchical Structure in Star-Forming Regions*", 35th Annual New Mexico Symposium, National Radio Astronomy Observatory, Socorro, NM, February 2020
- "*Identifying Prestellar Cores in Molecular Clouds*", San Diego Astronomy Association, February 2021

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AWARDS

- William F. Lucas Astronomy Scholarship, San Diego Astronomy Club, 2018 & 2019
- Galileo Circle Scholarship, University of Arizona College of Science, 2018 & 2019
- Angelos C. Langadas Scholarship in Astronomy, University of Arizona Astronomy Department, 2018
- Evelyn O. Bychinsky Promising Astronomer Award, University of Arizona Astronomy Department, 2018

TECHNICAL SKILLS

Programming Languages: Python, C, FORTRAN, SQL, IRAF, R, HTML, Visual Basic
Data Formats: FITS, HDF5, netCDF
Software/Libraries: Unix/Linux, GitHub, Jupyter, Anaconda (astropy, WCS, SciPy, Matplotlib), Microsoft Office

EXTRACURRICULAR ACTIVITIES

Volunteering Untapped Baltimore, MD
Volunteer October 2024 – Present

- Contribute to monthly community-focused service activities including building and grounds clean-up at Digital Harbor High School, food distribution with the Salvation Army, and landscaping for the Carry Murray Nature Center

University of Arizona Astronomy Club Tucson, AZ
Treasurer January 2018 – January 2020

- Managed club finances and coordinated with external organizations to secure funding for events
- Provided training to club members to operate small telescopes at outreach events