Victor Liu

Web: https://victorliu1231.github.io/ • Brooklyn, NY • Email: victorliu1231@gmail.com

EDUCATION

Pennsylvania State University Aug 2025 - Current
Candidate Ph.D. in Astrophysics

Yale University Graduated May 2024
Bachelor of Science in Astrophysics with Distinction in Major Cum Laude, GPA: 3.92
Thesis: A Deep Study of the Nonstellar Variability in A0620-00

Relevant Coursework

Research Methods in Astrophysics	Machine Learning	Galactic and Extragalactic Astronomy
High Performance Computing	Survey Science	Introductory Radio Astronomy

Skills

Programming Languages: Python, C#, Julia
Packages: Matplotlib, Astropy, Scipy, Numpy, Pandas, PyXspec
Software & Services: Unity, ds9, Linux, LaTeX, AWS, GitHub, WordPress

RESEARCH EXPERIENCE

National Radio Astronomy Observatory | *Post-baccalaureate Research Fellow* Sept 2024 - July 2025
- Created novel distance-independent methods for studying radial metallicity gradients and azimuthal metallicity variations in the Milky Way using longitude-velocity diagrams
- Developed modular, readable, & powerful scripts to parse in, analyze, & visualize FIRE-2 galaxy simulation data
- Leveraged Bayesian inference models to estimate 12CN and 13CN isotopic abundances in the Milky Way

Yale University | *Astrophysics Research Assistant* May 2021 - Aug 2024
- Discovered differences in the timing and color characteristics between the active and passive quiescent substates of the X-ray binary system A0620-00
- Developed scripts to reduce, shift-stack, and perform aperture and differential photometry on dithered images, automating the image reduction process for over four datasets
- Created a comprehensive binary system analysis script that contains over a dozen time-series and spectral analysis functions used to model emission and characterize variability

NASA Goddard Space Flight Center | *Astrophysics Research Assistant* June 2023 - Aug 2023
- Discovered the second-ever evidence for asymmetry in the narrow iron Kα line in active galactic nuclei (AGNs) using Chandra data of MCG-5-26-13, providing a novel method to probe the circumnuclear environment in AGNs
- Created a re-usable script for modeling the iron Kα line and X-ray spectra in AGN using PyXspec
- Published a first-author paper in The Astrophysical Journal and gave a talk at the 243rd AAS Conference

SETI Institute REU | *Geophysics Research Assistant* June 2022 - Aug 2022
- Researched the relationship between stress-activated positive holes in mineral crystal structures and DNA damage in yeast by performing pressure experiments on a gabbro slab with yeast cells placed on top
- Developed a novel peroxy bond based theory for the cause of the Great Oxygenation Event with research advisor
- Conducted literature review of 20+ journal articles on current theories for the Great Oxygenation Event

New York University | *Bioinformatics Research Assistant* July 2019 - Aug 2019
- Investigated potential to treat malaria with light infections of soil-transmitted helminths using clinical data
- Contributing author to paper published in the leading microbiology journal mBio; generated 11 correlation graphs using QIIME2, R, Stray, Prism, and Excel
- Assisted supervisor with planning and running experiments, running machine learning programs, and literature search

WORK EXPERIENCE

Yale Science & Engineering Association | *Webmaster* May 2021 - Current
- Leveraged experience in web development to build out the website for the Yale Science & Engineering Association (YSEA) from start to finish, establishing a strong digital presence for the nonprofit
- Spearheaded the creation of new grant-writing resources on the website and clarified YSEA's grants program, increasing accessibility to YSEA's grants for future applicants

EXTRACURRICULARS

Amoriem Labs: Undergraduate Game Developers | *President* Sept 2021 - May 2024

- Led a project team of over 10 members to complete demo of the fantasy RPG game Planet 112 in under 4 months
- Coordinated with programming, art, and music teams to design over 20 project assets for Planet 112
- Composed and wrote detailed game design, music, art, and project asset documents for new games
- Recruited, onboarded, and introduced new members to the game development process
- Organized game nights and extracurricular bazaar booths that consistently received over 20 signups
- Headed programming and level design for Yale-themed platformer game Diploma Dash

Yale CubeSat Project | *Cosmic Ray Detector Team Member* Sept 2021 - May 2023

- Modeled the distribution of cosmic rays within the South Atlantic Anomaly using the physics simulation software GEANT4 and tested the detection efficiency of cosmic ray detectors
- Combed through the literature to find a model that can map the distribution of proton and electron energies in the South Atlantic Anomaly, used to determine how much protective shielding is necessary for electronic components

PUBLICATIONS

- **Liu, V.**, Balser, D. S., & Wenger, T. V. (2025). *Metallicity Structure in Galactic Longitude-Velocity Diagrams of the Milky Way Disk and FIRE-2 Simulations.* In prep.
- **Liu, V.**, Bailyn, C. D., & Dincer, T. (2025). *Timing and Color Characteristics of Accretion in the Active and Passive Quiescent States of A0620-00.* In prep.
- **Liu, V.**, Zoghbi, A., & Miller, J. M. (2024). *Detection of Asymmetry in the Narrow Fe Kα Emission Line in MCG-5-23-16 with Chandra.* The Astrophysical Journal, 963(1), 38. `https://doi.org/10.3847/1538-4357/ad18c8`
- Easton, A. V., Raciny-Aleman, M., **Liu, V.**, Ruan, E., Marier, C., Heguy, A., Yasnot, M. F., Rodriguez, A., & Loke, P. (2020). *Immune Response and Microbiota Profiles during Coinfection with Plasmodium vivax and Soil-Transmitted Helminths.* MBio. `https://doi.org/10.1128/mBio.01705-20`

PRESENTATIONS

- **Liu, V.**, Bailyn, C. D. (2024). *A Deep Study of the Nonstellar Variability in A0620-00.* 245th American Astronomical Society Meeting.
- **Liu, V.**, Bailyn, C. D. (2023). *WASP Observations of the Short-Term Variability in the Black Hole Binary A0620-00.* Palomar Science Meeting 2023.
- **Liu, V.**, Zoghbi, A., Miller J. M. (2024). *Detection of Asymmetry in the Narrow Fe Kα Emission Line in MCG-5-26-13 with Chandra.* 243rd American Astronomical Society Meeting.
- **Liu, V.**, Freund, F., Stolc, V. (2022). *An Alternative Explanation for the Great Oxygenation Event (GOE): Weathering of Rocks Containing Minerals with Peroxy Bonds.* 22nd American Geophysical Union Conference.
- **Liu, V.** (2022). *Linking Stress-Activated Charge Carriers in Rocks to Genomic Damage in Yeast.* SETI Institute REU Final Day Symposium.

VIDEO GAMES DEVELOPED

Portfolio: [https://vliu09.itch.io/]

[**Coup d'Koala**] (demo, released on Steam Aug 2025) | Bullet hell roguelite with large amount of content
[convoy.io] (complete, released Sept 2025) | Short top-down multiplayer PvP shooter
[Superposition] (complete, released Apr 2025) | Short thriller horror puzzle game
[Conquer Chiron] (complete, released Jan 2025) | Short psychological horror puzzle game
[Boss Blast] (complete, released Oct 2024) | Fast-paced blast-em-all arcade shooter
[Echoes of Eternity] (complete, released June 2024) | Time-travel endless mode arcade shooter
[Diploma Dash] (demo, released Apr 2024) | Fast-paced platformer
[Planet 112] (demo, released Sept 2023) | Farming sim + fantasy RPG

AWARDS

Penn State University Graduate Fellowship & Homer F. Braddock/Nellie H. and Oscar L. Roberts Fellowship (2025)
National Science Foundation Graduate Research Fellowship Program (NSF GRFP) Honorable Mention (2025)
Yale Science & Engineering Association (YSEA) Award for Outstanding Undergraduate Achievement (2024)
Yale University First-Year Summer Research Fellowship in the Sciences & Engineering (2021)