ZINING (LEONARDO) ZHU

1210 1/2 Fedora St, Los Angeles, CA, 90006
+1(509) 580-1625 ⋄ zznleo1997@gmail.com

EDUCATION

M.S. in Computer Science Aug 2023 - Dec 2025
University of Southern California - Los Angeles, CA
Overall GPA: 3.93

M.A. in Physics (Emphasis: Astrophysics) Oct 2020 - June 2023
University of California, Santa Barbara - Santa Barbara, CA
Overall GPA: 3.64

B.S. Honors in Comprehensive Physics & Honors in Astronomy Sep 2016 - Jun 2020
University of Washington - Seattle, WA
Overall GPA: 3.92/4.0 **GPA in Physics: 3.96/4.0** **GPA in Astronomy: 3.85/4.0**

RESEARCH EXPERIENCE

Role: Graduate Researcher Jul 2022 – Jun 2023
Method of Orbit Fitting for Gaia Observations
Department of Physics, UCSB *Santa Barbara, CA*
Advisor: Prof. Timothy Brandt
Goal: To improve the accuracy of astrometric orbit fitting of companion systems particularly for the data collected by the Gaia mission.

- Generated hundreds of synthetic orbits of stellar binaries based on authentic observations of the Gaia satellite.
- Compared the posterior probability distributions of orbital parameters fitted with and without marginalizing over linear parameters based on Bayesian statistics for the fake orbits above.
- Checked the sensitivity of the marginalization technique to each nonlinear parameter.

Role: Graduate Researcher Sep 2021 – Feb 2022
Circumgalactic Emission from High-Redshift Galaxies
Department of Physics, UCSB *Santa Barbara, CA*
Advisor: Prof. Crystal Martin
Goal: To investigate the formation and evolution of large-scale gas emission from galaxies at $z \sim 1$.

- Observed pre-identified galaxies around $z \sim 1$ with the Low Resolution Imaging Spectrometer (LRIS) at Keck II observatory.
- Constructed a user-oriented data reduction pipeline for astronomical datasets obtained from long-slit or integral field spectroscopy.
- Identified galaxies with spectrocopically extended [O II] regions ([OII] blobs) in 2-D spectra and extracted the corresponding 1-D spectra.
- Fit the Gaussian model to [O II] $\lambda\lambda 3726, 3729$ emission line doublets to measure the systematic redshifts and to determine the stellar mass densities of [OII] blobs.
- Fit the Voigt profile to [C IV] $\lambda\lambda 1548, 1550$ absorption doublets in spectra of [OII] blobs to characterize the emission pattern of high-velocity gas outflows from individual sources.

Role: Undergraduate Research Assistant Jun 2019 - Jun 2020
Research with Student Quasar Absorption Diagnosticians (Werk SQuAD)
Department of Astronomy, UW *Seattle, WA*
Advisor: Prof. Jessica Werk
Goal: To characterize the circumgalactic medium (CGM), the galactic ecosystems where baryons cycle.

- Analyzed thousands of optical galaxy spectra taken with the Gemini telescopes as part of the CGM^2 survey.
- Measured emission-line ratios and determined the redshifts for galaxies in the CGM^2 spectroscopic survey above.
- Determined the metallicity of the galaxies in the survey based on fluxes of metallicity indicators.

Role: Undergraduate Research Assistant Sep 2018 - Jun 2019
Axion Dark Matter Experiment (ADMX)
Center for Experimental Nuclear Physics and Astrophysics, UW *Seattle, WA*
Advisor: Prof. Gray Rybka
Goal: To detect dark matter as axions or to rule out this plausible form of dark matter.

- Defined a noise temperature function of the amplifier used in the experiment.
- Researched the effect of a strong external magnetic field (8T) on the amplifier under a cryogenic condition.
- Increased the space utilization and electronic efficiency by rearranging the instruments.

COURSE PROJECTS

Stock Trading System Simulator using TCP/UDP Sockets April 2025
Language used: C++

- Designed and developed a program to locally simulate network-based stock trading system with socket programming, featuring multiple client interfaces and four dedicated servers for user authentication, stock quotes, trading operations, and portfolio management. Enabled users to buy/sell shares and query real-time positions via command-line interactions.

Inverse Kinematics-Based Skinning Pipeline April 2025
Language used: C++

- Implemented linear blend and dual quaternion skinning for character animation, utilizing inverse kinematics with support for both pseudoinverse and Tikhonov regularization methods.

Motion Capture Interpolation Framework March 2025
Language used: C++

- Implemented Linear, Bézier, and Spherical Linear (SLERP) interpolation schemes to interpolate human motion data from an optical motion capture system, supporting both Euler angle and quaternion-based rotations.

Physically-Based Simulation of a Jelly Cube Feb 2025
Language used: C++

- Developed a 3D mass-spring simulation of a jello cube within a bounding box, incorporating user-defined external force fields and collision detection via the penalty method.

Kaggle Project: NFL 2024 Big Data Bowl Apr 2024 - May 2024
Language used: Python

- Predicted play outcomes in American football games by solving a regression problem with the application of LightGBM and Neural Networks.

Weenix OS Mar 2024 - May 2024
Language used: C

- Led a group of 4 members to develop a toy operating system with implementations of multithreading, virtual file system, and virtual memory system.

Scrabble Game Nov 2023
Language used: Java

- Implemented a console-based Scrabble game application enabling players to input dictionaries and determining the Scrabble scores for user-input English strings.

Minesweeper Game Oct 2023
Language used: Java

- Developed an interactive application imitating the classic Minesweeper video game, allowing players to choose difficulty levels and sizes of minefields.

Digital Bookshelf Keeper Sep 2023
Language used: Java

- Developed a program organizing digital books.

SKILLS

Programming Languages	C/C++, Python, Java, JavaScript, SQL, MATLAB, Wolfram Language
Tools and Technologies	CUDA, Unix/Linux Shell, Git, HTML5, CSS, Docker, AWS, GCP, Azure, ChatML, LaTeX, Blender, UE5, Jupyter, Wolfram Mathematica, SolidWorks, Angular, React, Flutter, Next.js, PyTorch, TensorFlow, SAOImageDS9, IRAF (Image Reduction and Analysis Facility) and PyRAF, MESA (Modules for Experiments in Stellar Astrophysics), Cloudy, GALFIT
Natural Languages	**English** (proficient), **Chinese** (native), **German** (beginner)

CONFERENCES AND PRESENTATIONS

- **2022 Sagan Summer Workshop**
  California Institute of Technology, Pasadena, CA Jul 2022
- **Chinese Space Station Telescope (CSST) Summer School of Galaxy Sciences**
  Remote meetings Jul 2022
- **Overviews of KATRIN (Karlsruhe Tritium Neutrino Experiment)**
  Senior Honors Seminar, UW, Seattle, WA Oct 2019 - Dec 2019 (Every Week)

HONORS AND AWARDS

Departmental Honors in Astronomy Mar 2020
Departmental Honors in Physics Feb 2019
The Quarterly Dean's List Autumn 2016 – Winter 2020

PROFESSIONAL AFFILIATIONS

Membership of Sigma Pi Sigma (the American Honor Society in Physics) May 2019

UNIVERSITY SERVICE

Graduate Teaching Assistant Oct 2020 - June 2023
UC, Santa Barbara

- College Physics and Labs

ACTIVITIES

Role: Vice President Jun 2019 – Aug 2020
Chinese Tutoring Association at UW

- Strengthened team building and networked with other UW student organizations.

Role: Manager of Finance and Fund Raising Mar 2017 – Jun 2020
University of Washington Chinese Students and Scholars Association

- Provided fundraising support for 12 activities each with more than 300 participants.
- Cultivated relationships with potential long-term sponsors.
- Initiated and directed the 2019 UW Chinese Spring Festival Gala with a capacity of 550 people after a three-month preparation.

REFERENCES

Prof. **Lars Bildsten** **Director, KITP;** **Frederick W. Gluck Chair in Theoretical Physics;** **Professor of Physics**	Prof. **Jessica Werk** **Chair of Department of Astronomy;** **Professor**	Prof. **Timothy Brandt** **Assistant Professor**
Address: Kohn Hall 1514, KITP Tel: 805-893-3979 Email: bildsten@kitp.ucsb.edu	Address: PAB C305, UW Tel: 206-221-0312 Email: jwerk@uw.edu	Address: 2015F Broida Hall, UCSB Tel: 805-893-5489 Email: tbrandt@physics.ucsb.edu