ZIXUAN PENG

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RESEARCH INTERESTS

• Supernova-driven galactic winds • Superbubble breakthroughs and blowouts • Galaxy mergers and Lyman continuum photon escape • Chemical evolution of star-forming galaxies • Shock interaction of massive stars with the dense circumstellar medium • Integrating observational data with analytical models and numerical simulations

EDUCATION

Doctor of Philosophy, Physics, UC Santa Barbara — Sept. 2021 - Present
Emphasis: Astrophysics
Committee: Dr. Crystal L. Martin, Dr. Joseph F. Hennawi, Dr. S. Peng Oh

Bachelor of Science, Physics, UC Santa Barbara — Sept. 2017 - June 2021
Minor: Astronomy And Planetary Science
Bachelor Honors Thesis: Extreme Emission-Line Galaxies: Electron Temperature, Electron Density, and Metallicity (Advisor: Dr. Crystal L. Martin)

PUBLICATIONS

■ **First or Second Author (∗ indicates corresponding author, † indicates co-first authors):**

1. Chen, Z.*†, **Peng, Z.***†, Rubin, K., et al. (2025, submitted to *MNRAS*), *"Modeling Emission-Line Surface Brightness in a Multiphase Galactic Wind: An O VI Case Study"* https://arxiv.org/abs/2510.02443
2. **Peng, Z.***, Martin, C., Huang, J., et al. (2025, submitted to *ApJ*), *"When Stars Mimic Monsters: Luminous Blue Variables in SBS 0335-052 E"* https://arxiv.org/abs/2508.03912
3. **Peng, Z.***, Martin, C., Chen, Z., et al. (2025, *ApJ*), *"Physical Origins of Outflowing Cold Clouds in Local Star-forming Galaxies"* https://arxiv.org/abs/2412.05371
4. Martin, C.*, **Peng, Z.**, & Li, Y. (2024, *ApJ*), *"Resolving the Mechanical and Radiative Feedback in J1044+0353 with KCWI Spectral Mapping"* https://arxiv.org/abs/2403.11390
5. **Peng, Z.***, Martin, C., Thibodeaux, P., et al. (2023, *ApJ*), *"Using KCWI to Explore the Chemical Inhomogeneities and Evolution of J1044+0353"* https://arxiv.org/abs/2308.00351

■ **Co-Author:**

1. Moya-Sierralta, C., Martin, C., Barrientos, L., et al. (**Peng, Z.** included) (submitted to *Astronomy & Astrophysics*), *"Galaxy Protoclusters as Drivers of Cosmic Reionization: II. T_e-Based Metallicities of Lyman-α Emitters"*
2. Hu, W., Papovich, C., Shen, L., et al. (**Peng, Z.** included) (*Nature Astronomy*), *"Extended Enriched Gas in a Multi-galaxy Merger at Redshift 6.7"* https://arxiv.org/abs/2503.04032

SELECTED FELLOWSHIPS AND AWARDS

• Future Investigators in NASA Earth and Space Science and Technology Award ($148,389) — Oct. 2023 - Oct. 2026
• UCSB Doctoral Student Travel Grant ($1,500) — May 2025
• Worster Summer Research Fellowship (Role: Mentor; $1,000) — June 2024 - Sept. 2024
• Worster Summer Research Fellowship (Role: Mentor; $1,000) — June 2022 - Sept. 2022
• UCSB Physics Academic High Honors Award — June 2021
• UCSB Physics Research Honors Award — June 2021

OBSERVING EXPERIENCE

■ **Keck-II Telescopes (Co-I; PI: C. L. Martin)**

• Keck/KCRM (2.5 nights): Building Physical Diagnostics of Galaxy Outflows II — Sept. 2023 – May 2024
• Keck/ESI (3.5 nights): Building Physical Diagnostics of Galaxy Outflows I — Nov. 2022 – Apr. 2023
• Keck/KCWI (1 night): Ionization Structure of Low-Mass, High-Ionization Galaxies — Dec. 2021

■ **Magellan Telescope (Co-I; PI: C. Moya)**

- Magellan/LLAMAS (2 nights): Escape of Ionizing Radiation in Local Galaxies — Dec. 2025

TEACHING EXPERIENCES

■ **Teaching Assistant (Physics Department at UC Santa Barbara)** — Oct. 2021 - June 2022

- PHYS 133 (Galaxies and Cosmology) — Mar. 2022 - June 2022
- PHYS 131 (Stellar Structure and Evolution) — Jan. 2022 - Mar. 2022
- PHYS 3L (Physics Laboratory) — Oct. 2021 - Jan. 2022

■ **Learning Assistant (Physics Department at UC Santa Barbara)** — Apr. 2019 - Dec. 2020

- PHYS 115A (Quantum Mechanics A) — Aug. 2020 - Dec. 2020
- PHYS 115B (Quantum Mechanics B) — Apr. 2020 - June 2020
- PHYS 104 (Advanced Mechanics) — Apr. 2019 - June 2019

TALKS AND POSTERS

■ *Topic: Physical Origins of Outflowing Cold Clouds in Local Star-forming Dwarf Galaxies*

- Talk: 2025 Santa Cruz Galaxy Workshop, UC Santa Cruz
- Talk: 2025 Star Formation, Stellar Feedback, and the Ecology of Galaxies, Visegrad, Hungary
- Talk: 2024 Cosmic Dawn Revealed by JWST: The Physics of the First Stars, Galaxies, and Black Holes, Kavli Institute for Theoretical Physics, UC Santa Barbara
- Talk: Spring 2024 Astro Lunch, Physics Department, UC Santa Barbara

■ *Topic: Using KCWI to Explore the Chemical Evolution and Feedback in a Reionization-era Spectral Analog J1044+0353*

- Talk: 2023 ELT Science in Light of JWST, UCLA Faculty Center, UC Los Angeles
- Talk: Fall 2022 Astro Lunch, Physics Department, UC Santa Barbara
- Poster: 2022 Keck Science Meeting, Cahill Center for Astronomy and Astrophysics, California Institute of Technology

TECHNICAL SKILLS

Programming Languages: `Python, Git, Matlab, Mathematica, C++, Linux/Unix,` LaTeX
Astrophysics Packages/Softwares: `Astropy`, `Bagpipes`, `BEAGLE`, `Cloudy`, `JWST`, `KCWIDRP`, `MESA`, `Photutils`, `PypeIt`, `SAOImageDS9`, `STARBURST99`

SOFTWARE

- `VerEmisFitting`: A `Python`-based tool for fitting and analyzing emission lines in astronomical spectra. It generates detailed outputs, including flux tables, equivalent width tables, parameter tables, and fitting plots, aiding in thorough data interpretation.
- `WInterPhase`: A `Python`-based framework designed to model the observable signatures of multiphase galactic winds. It combines the multiphase galactic wind model developed by Fielding & Bryan (2022) with the turbulent radiative mixing layer model of Chen et al. (2023) to compute emission-line surface brightness profiles as a function of radius up to ∼100 kpc out in the circum-galactic medium.

SERVICES AND OUTREACH

■ **Mentorship of Undergraduate Researchers**

- Ishan Deb (Haverford; prospective graduate student) — Jul. 2025 – Present
- Jiayang (Annabella) Yang (UCSB; now Ph.D. student, Texas A&M University) — Apr. 2024 – Jun. 2025
- Kaitlyn Casciotti (Embry–Riddle; now M.S. student, San Diego State University) — Jul. 2024 – Sept. 2024
- Yuan Li (UCSB; now Ph.D. student, Texas A&M University) — Jun. 2022 – Jun. 2024
- Katherine Kudla (Providence; now Ph.D. student, UCSB) — Jul. 2023 – Sept. 2023
- Jichen Zhang (UCSB; now Ph.D. student, Chinese University of Hong Kong) — Jun. 2022 – Jun. 2023
- Ilia Qato (UIUC; now Ph.D. student, Northwestern University) — Jul. 2022 – Sept. 2022

■ **Editorial Service**

- Referee, *Publications of the Astronomical Society of Japan (PASJ)* — Mar. 2025 – Present