Zoe Ko

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EDUCATION:

Johns Hopkins University
2024 – Present
Physics and Astronomy Ph.D. Student

University of California, Berkeley
2019 – 2023
B.A. Astrophysics
B.A. Data Science
High Distinction in General Scholarship (magna cum laude equivalent)

RESEARCH EXPERIENCE:

Johns Hopkins University
Research Assistant | Advisor: Néstor Espinoza | August 2024 – Present

- Developed a Gaussian Process aided atmospheric retrieval framework to mitigate stellar contamination in transmission spectroscopy.
- Applied retrieval framework to constrain the atmospheric properties of a gas giant orbiting an M dwarf to better understand giant planet formation around low mass stars.
- Leading a first-author publication and a JWST Cycle 5 follow-up proposal based on current work.

California Institute of Technology LIGO Lab
Research Intern | Advisor: Katerina Chatziioannou | June 2022 – January 2024

- Developed and implemented a hierarchical Bayesian inference framework to analyze binary black hole spin distributions using LIGO gravitational wave data.
- Generated mock binary black hole populations with different component spin parameters to quantify how much spin information is extractable from observed effective spins.
- Presented findings at the American Physical Society Conference in April of 2023 and co-authored a publication in Physical Review D.

University of California, Berkeley SETI Research Center
Research Intern | Advisor: Howard Isaacson | June 2021 – January 2023

- Developed and implemented a laser detection algorithm to search for potential technosignatures in optical stellar spectra.
- Analyzed over 1000 spectra of nearby stars to set detection limits.
- Presented work at the 2021 Assembly of the Order of the Octopus and AbSciCon 2022 and co-authored a publication in the Astronomical Journal.

Pennsylvania State University
Research Assistant | Advisor: Ian Czekala | September 2019 – February 2023

- Designed a data analysis pipeline to detect radial velocity variations by cross-correlating stellar spectra to calculate Doppler shifts.
- Applied pipeline to search for radial velocity variations in 28 protoplanetary disk-hosting stars, identifying candidate spectroscopic binaries for follow-up study.
- Authored a successful observing proposal for the Automated Planet Finder telescope in 2020 and led follow-up observations of a binary star candidate.

AWARDS AND FELLOWSHIPS:

William H. Miller III Graduate Fellowship
August 2024 – August 2025

- Awarded a 12-month fellowship from Johns Hopkins to support independent graduate research.

Fulbright Scholar
September 2023 – July 2024
- Awarded a Fulbright English Teaching Assistant Scholarship.
- Designed and taught an English language curriculum for seventh and tenth grade students in a rural village in Northeast Thailand.
- Expanded mentorship and communication skills beyond STEM-focused environments.

PUBLICATIONS:

- Miller, S. J., **Ko, Z.**, Callister, T., & Chatziioannou, K. 2024, "Gravitational waves carry information beyond effective spin parameters but it is hard to extract," Phys. Rev. D, 109, 104036
- Zuckerman, A., **Ko, Z.**, Isaacson, H., Croft, S., Price, D., Lebofsky, M., & Siemion, A. 2023, "The Breakthrough Listen Search for Intelligent Life: A Laser Search Pipeline for the Automated Planet Finder," AJ, 165, 114

CONFERENCE TALKS AND POSTERS:

- **Z. Ko**, N. Espinoza, A. Jordan. Mitigating Stellar Contamination in JWST Transit Data with Gaussian Processes, Exojamboree, Baltimore, MD, November 2025. (Oral Presentation)
- **Z. Ko**, N. Espinoza, A. Jordan. A Gaussian Process Framework for Exoplanet Atmospheric Retrievals, Exoclimes V, Montreal, QC, Canada, July 2025. (Poster)
- **Z. Ko**, N. Espinoza, A. Jordan. Physically-Guided Gaussian Process Retrievals for TOI-3235b, Emerging Researchers in Exoplanet Science Symposium X, Princeton University, Princeton, NJ, June 2025. (Oral Presentation)
- **Z. Ko**, S. J. Miller, K. Chatziioannou. Analyzing the Effective and Component Spin Distributions of Binary Black Hole Mergers, American Physical Society April Meeting, Minneapolis, MN, April 2023. (Oral Presentation)
- **Z. Ko,** H. Isaacson, A. Zuckerman, S. Croft. Search for Laser Emission Lines with the Automated Planet Finder Telescope, American Astronomical Society Meeting, Seattle, WA, January 2023. (Poster)
- **Z. Ko**, H. Isaacson, A. Zuckerman. Search for Laser Emission Lines with the Automated Planet Finder Telescope, AbSciCon, Atlanta, GA, May 2022. (Poster)
- **Z. Ko**, H. Isaacson, A. Zuckerman, S. Croft. Search for Laser Emission Lines with the APF, Order of the Octopus, Virtual, August 2021. (Poster)

SKILLS:

- Programming: Advanced proficiency in Python (NumPy, SciPy, pandas, matplotlib, Astropy, etc.); also experienced with Java and R.
- Statistical Modeling: Extensive experience with Bayesian inference frameworks (PyMC, emcee, dynesty) and Gaussian process modeling (tinygp, george, celerite).
- Languages: Native fluency in English and Mandarin; strong proficiency in Spanish and Thai.

TEACHING AND OUTREACH:

Physics and Astronomy Peer Mentor at Johns Hopkins
August 2025 – Present
- Advise undergraduate students on research opportunities, graduate school applications, and career pathways in physics and astronomy through weekly mentoring sessions.

Peer Tutor at the Berkeley Student Learning Center
August 2022 – May 2023
- Provided tutoring services for introductory astrophysics courses, supporting students with homework, lecture material, and exam preparation.

Research Mentor at the Berkeley Undergraduate Lab
August 2021 – May 2022
- Mentored a team of five undergraduates through a year-long independent research project on binary star systems.

Student Mentor and Outreach Director of Berkeley Engineers and Mentors
January 2020 – May 2023
- Led weekly science labs at public elementary and middle schools in Oakland and coordinated outreach events.