

Katelyn Horstman

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EDUCATION

California Institute of Technology (Caltech) Doctor of Philosophy in Astrophysics Advisor: Dr. Dimitri Mawet	Expected August 2026
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California Institute of Technology (Caltech) Master of Science in Astrophysics	June 2023
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University of California, Los Angeles (UCLA) Bachelor of Science in Astrophysics Departmental Honors	June 2021
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TEACHING AND MENTORSHIP

Teaching Development

Certificate of Practice in University Teaching (CTLO) <i>Pedagogy development and refinement</i>	Ongoing
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California Observatories Professional Development Program <i>Pedagogy development and refinement</i>	Planned April 2026
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AstroTech Summer School <i>Teaching lead on detectors for astronomical instrumentation</i>	Planned July 2026
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I am completing a Certificate of Practice in University Teaching through Caltech's Center for Teaching, Learning, and Outreach (CTLO), where I have implemented evidence-based teaching strategies such as active learning, formative assessment, inclusive course design, and structured opportunities for student feedback. I am also participating in the University of California Observatories Professional Development Program (PDP), a program that prepares graduate students and early career researchers to be effective educators through workshops and team-based design and facilitation of STEM learning experiences, including inquiry-based and inclusive activities for a range of learners. As a continuation of the PDP, I will teach at the AstroTech Summer School, a week-long program for upper-level undergraduate and early graduate students focused on astronomical instrumentation, where participants work in teams on hands-on design and build projects and engage with career development and inclusive teamwork practices.

Teaching Assistant Experience

Ay 126: Physical processes in the interstellar medium <i>Including microphysical processes, gas dynamics, magnetic fields, and large-scale structures</i>	2023
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Ay 124: Structure and Evolution of Galaxies 2023
Including galaxy structure, dynamics, and evolution, stellar populations, and star formation with feedback

Ay 20: Basic Astronomy and the Galaxy 2022
Including radiative processes, stellar and exoplanet physics, and the structure and dynamics of the galaxies

My teaching assistant experience includes supporting both undergraduate and graduate courses in astrophysics. For undergraduate courses, I led discussion sections that reviewed lecture concepts and provided homework assistance, guided an astrophysical lab involving observations at Palomar Observatory, development of observing strategies, and a project addressing scientific questions, and graded homework and final examinations. For graduate courses, I led discussion sections to review material, assist with homework, and prepare students for oral examinations by providing practice questions and developing grading rubrics. I also implemented feedback-driven improvements, including beginning and mid-quarter surveys to assess student backgrounds and adjust teaching accordingly. For example, in Ay20, I increased the time in recitations devoted to general concepts and lecture review based on student feedback.

Student feedback includes positive remarks noting clarity, approachability, and responsiveness. Students appreciated well-structured recitations and office hours, where concepts were explained clearly and guidance was provided without giving away answers. One student noted that I "effectively highlighted the key concepts needed to complete problem sets and reinforce understanding of the course material." Other comments included "excellent... very helpful in all aspects of the class" and "flexible and supportive of students."

Guest Lectures

Celestial Mechanics 2025
Pasadena City College Physics and Astronomy Club

Celestial Mechanics 2025
Ay 20, Basic Astronomy and the Galaxy

I delivered guest lectures on celestial mechanics for undergraduate and community college audiences, designing lessons to make advanced physical concepts accessible and engaging. I used active learning techniques such as think-pair-share and 2-minute summary exercises, changing the concepts emphasized based on real time feedback giving insights into students' backgrounds.

Mentorship

Summer Undergraduate Research Fellow (SURF) mentor 2025
Caltech undergraduate Anica Ancheta

WAVE fellow mentor 2025
Non-academic mentorship to summer student cohort

CAPP program mentor

2022

Mentorship to undergraduates applying to graduate school

I have mentored students across multiple programs, providing guidance on research projects, professional development, and graduate school preparation. As a SURF mentor, I guided a Caltech undergraduate in reducing astrophysical data for exoplanet science and instrumentation, resulting in a successful final report, presentation, and an upcoming lead-author contribution on a paper in development. As a WAVE mentor, I focused on providing non-academic mentorship, supporting summer students in skill development, networking, and career guidance. Through the CAPP program, I advised undergraduates applying to graduate school, offering feedback on applications, research experiences, and professional development strategies.

Student feedback highlights providing guidance and resources, connecting mentees with broader research networks, and supporting skill development and professional growth. Students noted that I “provided the resources I need to complete tasks related to my projects, and helped me work through problems,” “introduced me to people within the research group and field, providing opportunities to build interpersonal skills,” and “gave valuable feedback that elevated my writing to a more professional level.”

SERVICE AND LEADERSHIP

Gender Minorities and Women in Physics, Math, and
Astronomy (GiWPMA)

2023-Ongoing

President, organizing committee member

Developed mentorship programming, professional development workshops, and peer-support networks serving undergraduate and graduate students, postdoctoral scholars, and faculty members.

PMA Diversity, Equity, Inclusion, and Outreach committee

2023-Ongoing

Graduate student task force member

Contributed to departmental conversations with undergraduates, graduates, post-docs, and faculty about initiatives aimed at improving recruitment, retention, and climate for underrepresented minorities in physical sciences.

Caltech Astrophysics graduate student mentorship chair

2022-2024, 2025-Ongoing

Facilitator for academic and social connections

Developed social programming to encourage interaction between junior and senior graduate students multiple times a year, including meeting for dinner, going hiking, and visiting museums.

PATHWAYS Symposium

2025

Organizer and participant

Organized and participated in a one day symposium aiming to bring together women and gender minorities in physics and applied sciences to celebrate their research achievements and explore the diverse career paths available after earning a degree in these fields.

GWiPMA mentorship chair <i>Facilitator for academic and social connections</i> Developed social programming to encourage interaction between undergraduates, graduates, and postdoctoral scholars multiple times a year, including visiting botanical gardens and community markets.	2024
Respect is Part of Research <i>Organizer and facilitator</i> Organized and trained individuals for a sexual harassment prevention workshop. Lead their peers in small group discussions to eliminate the taboo surrounding discussion of sexual harassment.	2024
Group Meeting Lead <i>Weekly group meetings</i> Facilitated weekly research discussions, lead paper reviews, and organized visitor and guest presentations.	2023-2024
Zeitschrift für Naturforschung A. <i>Invited journal reviewer</i>	2019

FELLOWSHIPS AND AWARDS

NSF Graduate Research Fellowship Recipient	2023
Keck Institute for Space Studies (KISS) Affiliate	2022
NSF Graduate Research Fellowship Honorable Mention	2021
Summer Undergraduate Research Fellow (SURF)	2020
UCLA Clay Trust Physical Science Scholarship	2020

SELECTED PRESENTATIONS

Research Presentations

Spirit of Lyot 6 <i>Contributed talk, click for recording</i>	February 2026
Carnegie Observatories <i>Invited talk</i>	January 2026
Detection and Dynamics of Exoplanets (DDE) <i>Contributed talk</i>	June 2025
Extremely Precise Radial Velocities (EPRV6) <i>Poster</i>	June 2025
PKI Keck Lunch Talk <i>Invited talk</i>	December 2024
Wang group meeting, CIERA/Northwestern <i>Talk</i>	October 2024

SPIE Astronomical Telescopes + Instrumentation <i>Poster</i>	June 2024
American Physical Society (APS) April Meeting <i>Invited talk</i>	April 2024
Extreme Solar Systems (ExSS V) <i>Poster</i>	March 2024
ExSoCal <i>Contributed talk</i>	December 2023
Network of Young Researchers in Instrumentation for Astronomy (NYRIA) <i>Contributed talk</i>	November 2023
Extremely Precise Radial Velocities (EPRV5) <i>Poster</i>	March 2023
ESO Disks and Planets <i>Contributed talk</i>	November 2022
Keck Science Meeting (KSM) <i>Poster</i>	September 2022
Spirit of Lyot 5 <i>Poster</i>	June 2022
240th American Astronomical Society (AAS) Meeting, Pasadena <i>Contributed talk</i>	June 2022
UCLA Undergraduate Research Week <i>Contributed talk</i>	February 2020

Professional Development Presentations

PATHWAYS Symposium <i>Contributed talk</i>	May 2025
FUTURE of Physics at Caltech <i>Invited speaker</i>	October 2023
FUTURE Ignited at Caltech <i>Invited speaker</i>	October 2022

Public Presentations

Caltech Astronomy On Tap <i>Invited talk, click for recording</i>	October 2025
Caltech Astronomy Star Gazing Lecture <i>Panel member</i>	August 2023
Caltech Associates at Jet Propulsion Laboratory (JPL) <i>Invited talk</i>	May 2023

SELECTED PUBLICATIONS

First or major contributing author

- [1] **Katelyn Horstman**, Jean-Baptiste Ruffio, Jason J. Wang, et al. “Fringing analysis and forward modeling of Keck Planet Imager and Characterizer (KPIC) spectra”. In: *Journal of Astronomical Telescopes, Instruments, and Systems* 11, 035004 (July 2025), p. 035004. DOI: [10.1117/1.JATIS.11.3.035004](https://doi.org/10.1117/1.JATIS.11.3.035004).
- [2] **Katelyn Horstman**, Jean-Baptiste Ruffio, Konstantin Batygin, et al. “RV Measurements of Directly Imaged Brown Dwarf GQ Lup B to Search for Exosatellites”. In: *AJ* 168.4, 175 (Oct. 2024), p. 175. DOI: [10.3847/1538-3881/ad73d8](https://doi.org/10.3847/1538-3881/ad73d8). arXiv: [2408.10299](https://arxiv.org/abs/2408.10299) [[astro-ph.EP](#)].
- [3] Jean-Baptiste Ruffio, **Katelyn Horstman**, Dimitri Mawet, et al. “Detecting Exomoons from Radial Velocity Measurements of Self-luminous Planets: Application to Observations of HR 7672 B and Future Prospects”. In: *AJ* 165.3, 113 (Mar. 2023), p. 113. DOI: [10.3847/1538-3881/acb34a](https://doi.org/10.3847/1538-3881/acb34a). arXiv: [2301.04206](https://arxiv.org/abs/2301.04206) [[astro-ph.EP](#)].
- [4] **Katelyn Horstman**, Michael P. Fitzgerald, James E. Lyke, et al. “Using Non-negative Matrix Factorization to Improve Calibration of the Keck OSIRIS Integral Field Spectrograph”. In: *PASP* 134.1036, 064504 (June 2022), p. 064504. DOI: [10.1088/1538-3873/ac7905](https://doi.org/10.1088/1538-3873/ac7905). arXiv: [2206.04070](https://arxiv.org/abs/2206.04070) [[astro-ph.IM](#)].
- [5] **Katelyn Horstman**, Alice E. Shapley, Ryan L. Sanders, et al. “The MOSDEF survey: differences in SFR and metallicity for morphologically selected mergers at $z \sim 2$ ”. In: *MNRAS* 501.1 (Feb. 2021), pp. 137–145. DOI: [10.1093/mnras/staa3502](https://doi.org/10.1093/mnras/staa3502). arXiv: [2008.04327](https://arxiv.org/abs/2008.04327) [[astro-ph.GA](#)].
- [6] **Katelyn Horstman** and Virginia Trimble. “Correlation of Time from Submission to Acceptance of Astronomical Papers with Gender of Lead Author”. In: *Bulletin of the American Astronomical Society*. Vol. 52. Apr. 2020, 0204, p. 0204. DOI: [10.3847/25c2cfeb.907653b3](https://doi.org/10.3847/25c2cfeb.907653b3).
- [7] **Katelyn Horstman** and Virginia Trimble. “A citation history of measurements of Newtons constant of Gravity”. In: *arXiv e-prints*, arXiv:1811.10556 (Nov. 2018), arXiv:1811.10556. DOI: [10.48550/arXiv.1811.10556](https://doi.org/10.48550/arXiv.1811.10556). arXiv: [1811.10556](https://arxiv.org/abs/1811.10556) [[physics.hist-ph](#)].

Nth author

- [8] Luke Finnerty, Yinzi Xin, Jerry W. Xuan, et al. “True Mass and Atmospheric Composition of the Nontransiting Hot Jupiter HD 143105 b”. In: *AJ* 169.2, 94 (Feb. 2025), p. 94. DOI: [10.3847/1538-3881/ada1d9](https://doi.org/10.3847/1538-3881/ada1d9). arXiv: [2412.04552](https://arxiv.org/abs/2412.04552) [[astro-ph.EP](#)].
- [9] Luke Finnerty, Yinzi Xin, Jerry W. Xuan, et al. “Water Dissociation and Rotational Broadening in the Atmosphere of KELT-20 b from High-resolution Spectroscopy”.

In: *AJ* 169.6, 333 (June 2025), p. 333. DOI: [10.3847/1538-3881/adce02](https://doi.org/10.3847/1538-3881/adce02). arXiv: [2503.01946](https://arxiv.org/abs/2503.01946) [[astro-ph.EP](#)].

- [10] Nemanja Jovanovic, Daniel Echeverri, Jacques-Robert Delorme, et al. “Technical description and performance of the phase II version of the Keck Planet Imager and Characterizer”. In: *Journal of Astronomical Telescopes, Instruments, and Systems* 11, 015005 (Jan. 2025), p. 015005. DOI: [10.1117/1.JATIS.11.1.015005](https://doi.org/10.1117/1.JATIS.11.1.015005). arXiv: [2502.01863](https://arxiv.org/abs/2502.01863) [[astro-ph.IM](#)].
- [11] Daniel Echeverri, Nemanja Jovanovic, Jacques-Robert Delorme, et al. “Recent upgrades to the Keck Planet Imager and Characterizer”. In: *Ground-based and Airborne Instrumentation for Astronomy X*. Ed. by Julia J. Bryant, Kentaro Motohara, and Joël. R. D. Vernet. Vol. 13096. Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series. July 2024, 130962D, p. 130962D. DOI: [10.1117/12.3019085](https://doi.org/10.1117/12.3019085).
- [12] Daniel Echeverri, Jerry W. Xuan, John D. Monnier, et al. “Vortex Fiber Nulling for Exoplanet Observations: First Direct Detection of M Dwarf Companions around HIP 21543, HIP 94666, and HIP 50319”. In: *ApJL* 965.2, L15 (Apr. 2024), p. L15. DOI: [10.3847/2041-8213/ad3619](https://doi.org/10.3847/2041-8213/ad3619). arXiv: [2403.17295](https://arxiv.org/abs/2403.17295) [[astro-ph.EP](#)].
- [13] Chih-Chun Hsu, Jason J. Wang, Geoffrey A. Blake, et al. “PDS 70b Shows Stellar-like Carbon-to-oxygen Ratio”. In: *ApJL* 977.2, L47 (Dec. 2024), p. L47. DOI: [10.3847/2041-8213/ad95e8](https://doi.org/10.3847/2041-8213/ad95e8). arXiv: [2411.15117](https://arxiv.org/abs/2411.15117) [[astro-ph.EP](#)].
- [14] Chih-Chun Hsu, Jason J. Wang, Jerry W. Xuan, et al. “Rotation and Abundances of the Benchmark Brown Dwarf HD 33632 Ab from Keck/KPIC High-resolution Spectroscopy”. In: *ApJ* 971.1, 9 (Aug. 2024), p. 9. DOI: [10.3847/1538-4357/ad58d3](https://doi.org/10.3847/1538-4357/ad58d3). arXiv: [2405.08312](https://arxiv.org/abs/2405.08312) [[astro-ph.SR](#)].
- [15] Jason J. Wang, Dimitri Mawet, Jerry W. Xuan, et al. “The high-contrast performance of the Keck Planet Imager and Characterizer”. In: *Ground-based and Airborne Instrumentation for Astronomy X*. Ed. by Julia J. Bryant, Kentaro Motohara, and Joël. R. D. Vernet. Vol. 13096. Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series. July 2024, 130961X, p. 130961X. DOI: [10.1117/12.3019114](https://doi.org/10.1117/12.3019114).
- [16] Jerry W. Xuan, Chih-Chun Hsu, Luke Finnerty, et al. “Are These Planets or Brown Dwarfs? Broadly Solar Compositions from High-resolution Atmospheric Retrievals of $\sim 10\text{--}30\text{ M}_{Jup}$ Companions”. In: *ApJ* 970.1, 71 (July 2024), p. 71. DOI: [10.3847/1538-4357/ad4796](https://doi.org/10.3847/1538-4357/ad4796). arXiv: [2405.13128](https://arxiv.org/abs/2405.13128) [[astro-ph.EP](#)].
- [17] Jerry W. Xuan, Jason Wang, Luke Finnerty, et al. “Validation of Elemental and Isotopic Abundances in Late-M Spectral Types with the Benchmark HIP 55507 AB System”. In: *ApJ* 962.1, 10 (Feb. 2024), p. 10. DOI: [10.3847/1538-4357/ad1243](https://doi.org/10.3847/1538-4357/ad1243). arXiv: [2312.02297](https://arxiv.org/abs/2312.02297) [[astro-ph.SR](#)].
- [18] Yapeng Zhang, Jerry W. Xuan, Dimitri Mawet, et al. “Atmospheric Characterization of the Super-Jupiter HIP 99770 b with KPIC”. In: *AJ* 168.3,

- 131 (Sept. 2024), p. 131. DOI: [10.3847/1538-3881/ad6609](https://doi.org/10.3847/1538-3881/ad6609). arXiv: [2407.20952](https://arxiv.org/abs/2407.20952) [[astro-ph.EP](#)].
- [19] Daniel Echeverri, Jerry Xuan, Nemanja Jovanovic, et al. “Vortex fiber nulling for exoplanet observations: implementation and first light”. In: *Journal of Astronomical Telescopes, Instruments, and Systems* 9, 035002 (July 2023), p. 035002. DOI: [10.1117/1.JATIS.9.3.035002](https://doi.org/10.1117/1.JATIS.9.3.035002). arXiv: [2309.06514](https://arxiv.org/abs/2309.06514) [[astro-ph.IM](#)].
- [20] Luke Finnerty, **Katelyn Horstman**, Jean-Baptiste Ruffio, et al. “Characterization of hot Jupiter atmospheres with Keck/KPIC”. In: *Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series*. Vol. 12680. Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series. Oct. 2023, 1268006, p. 1268006. DOI: [10.1117/12.2677777](https://doi.org/10.1117/12.2677777).
- [21] Yinzi Xin, Jerry W. Xuan, Dimitri Mawet, et al. “On-sky speckle nulling through a single-mode fiber with the Keck Planet Imager and Characterizer”. In: *Journal of Astronomical Telescopes, Instruments, and Systems* 9, 035001 (July 2023), p. 035001. DOI: [10.1117/1.JATIS.9.3.035001](https://doi.org/10.1117/1.JATIS.9.3.035001). arXiv: [2307.11893](https://arxiv.org/abs/2307.11893) [[astro-ph.IM](#)].
- [22] Daniel Echeverri, Nemanja Jovanovic, Jacques-Robert Delorme, et al. “Phase II of the Keck Planet Imager and characterizer: system-level laboratory characterization and preliminary on-sky commissioning”. In: *Ground-based and Airborne Instrumentation for Astronomy IX*. Ed. by Christopher J. Evans, Julia J. Bryant, and Kentaro Motohara. Vol. 12184. Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series. Aug. 2022, 121841W, 121841W. DOI: [10.1117/12.2630518](https://doi.org/10.1117/12.2630518). arXiv: [2210.15915](https://arxiv.org/abs/2210.15915) [[astro-ph.EP](#)].
- [23] Jerry W. Xuan, Jason Wang, Jean-Baptiste Ruffio, et al. “A Clear View of a Cloudy Brown Dwarf Companion from High-resolution Spectroscopy”. In: *ApJ* 937.2, 54 (Oct. 2022), p. 54. DOI: [10.3847/1538-4357/ac8673](https://doi.org/10.3847/1538-4357/ac8673). arXiv: [2208.01657](https://arxiv.org/abs/2208.01657) [[astro-ph.EP](#)].