

Zifan Lin

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Education, Research, and Work Experience

Washington University in St. Louis

St. Louis, MO

McDonnell Center Postdoctoral Fellow, McDonnell Center for the Space Sciences

July 2025 –

- **Advisor:** Prof. Tansu Daylan

Massachusetts Institute of Technology

Cambridge, MA

PhD in Planetary Sciences

August 2020 – May 2025

Department of Earth, Atmospheric and Planetary Sciences

- **PhD thesis:** Reducing the Compositional and Structural Degeneracy of Planetary Interiors
- **Advisor:** Prof. Sara Seager

Cornell University

Ithaca, NY

B.A., Astronomy Major, with Concentration in Astrophysics

August 2016 – May 2020

- Worked as undergraduate research assistant for 2.5 years
- **Research topic:** Climate, photochemistry, and spectra models for exoplanets
- **Research advisor:** Prof. Lisa Kaltenegger

Publications

- **Lin, Z., & Daylan, T.** 2026. The Persistent Thermal Anomalies in Rocky Worlds, *Astrophysical Journal*, 1001, 241.
- Cherubim, C., Vissapragada, S., Cunningham, T., et al. (including **Lin, Z.**) 2026. Helium escaping from the atmosphere of a nearby rocky exoplanet orbiting in a habitable zone, *Science*, eaea9708.
- Glidden, A., Shapiro, A. I., Seager, S., et al. (including **Lin, Z.**) accepted. Leveraging Impact Parameter to Mitigate the Transit Light Source Effect: Early Insights from TRAPPIST-1, arXiv: 2608.20450.
- Huff, M. F., Marshall, M. C., Hansen, L. E., et al. (including **Lin, Z.**) 2026. Temperature and conductivity in shock compressed bridgmanite MgSiO₃ up to 2 TPa, *Physical Review B*, 113, 134104.
- Allen, N. H. et al. (including **Lin, Z.**) 2026. JWST TRAPPIST-1 e/b Program: Motivation and First Observations, *Astronomical Journal*, 171, 105.
- **Lin, Z., & Seager, S.** 2025. Carbon-rich Sub-Neptune Interiors Are Compatible with JWST Observations, *Astrophysical Journal Letters*, 990, L35.
- **Lin, Z., Cambioni, S., Seager, S.** 2025. Most High-density Exoplanets Are Unlikely to Be Remnant Giant Planet's Cores, *Astrophysical Journal Letters*, 978, L41.
- **Lin, Z., Seager, S., Weiss, B. P.** 2025. Interior and Gravity Field Models for Uranus Suggest a Mixed-composition Interior: Implications for the Uranus Orbiter and Probe, *Planetary Science Journal*, 6, 27.
- Espinoza, N. et al. (including **Lin, Z.**) 2025. JWST-TST DREAMS: NIRSpec/PRISM Transmission Spectroscopy of the Habitable Zone Planet TRAPPIST-1 e, *Astrophysical Journal Letters*, 990, L52.

- Glidden, A. et al. (including **Lin, Z.**) 2025. JWST-TST DREAMS: Secondary Atmosphere Constraints for the Habitable Zone Planet TRAPPIST-1 e, *Astrophysical Journal Letters*, 990, L53.
- Louie, D. R., et al. (including **Lin, Z.**) 2025. JWST-TST DREAMS: A Precise Water Abundance for Hot Jupiter WASP-17b from the NIRISS SOSS Transmission Spectrum, *Astronomical Journal*, 169, 86.
- Cambioni, S. et al. (including **Lin, Z.**) 2025. Can Metal-Rich Worlds Form by Giant Impacts?, *Astronomy & Astrophysics*, 696, 21.
- Gressier, A. et al. (including **Lin, Z.**) 2025. JWST-TST DREAMS: A Supersolar Metallicity in WASP-17 b's Dayside Atmosphere from NIRISS SOSS Eclipse Spectroscopy, *Astronomical Journal*, 169, 57.
- Kunitomo, M., **Lin, Z.**, Millholland, S., et al. 2024. Two Earth-size Planets and an Earth-size Candidate Transiting the nearby Star HD 101581, *Astronomical Journal*, 169, 47.
- Valentine, D. et al. (including **Lin, Z.**) 2024. JWST-TST DREAMS: Nonuniform Dayside Emission for WASP-17b from MIRI/LRS, *Astronomical Journal*, 168, 123.
- Tey, E., Shporer, A., **Lin, Z.**, et al. 2024. GJ 238 b: A 0.57 Earth Radius Planet Orbiting an M2.5 Dwarf Star at 15.2 pc, *Astronomical Journal*, 167, 283.
- Vaughan, S. et al. (including **Lin, Z.**) 2024. Behind the mask: can HARMONI@ELT detect biosignatures in the reflected light of Proxima b?, *Monthly Notices of The Royal Astronomical Society*, 528, 2.
- Essack, Z. et al. (including **Lin, Z.**) 2023. TOI-1075 b: A dense, massive, ultra-short-period hot super-earth straddling the radius gap, *Astronomical Journal*, 165, 47.
- Grant, D., et al. (including **Lin, Z.**) 2023. JWST-TST DREAMS: quartz clouds in the atmosphere of WASP-17b, *Astrophysical Journal Letters*, 956, L32.
- Libralato, M., et al. (including **Lin, Z.**) 2023. JWST-TST Proper Motions. I. High-precision NIRISS Calibration and Large Magellanic Cloud Kinematics, *Astrophysical Journal*, 950, 101.
- Kaltenegger, L., Payne, R. C., **Lin, Z.**, Kasting, J., Delrez, L. 2023. Hot Earth or Young Venus? A nearby transiting rocky planet mystery, *Monthly Notices of The Royal Astronomical Society Letters*, 524, 1.
- **Lin, Z.**, Seager, S., Ranjan, S., Kozakis, T., Kaltenegger, L. 2022. H₂-dominated Atmosphere as an Indicator of Second-generation Rocky White Dwarf Exoplanets, *Astrophysical Journal Letters*, 925(1), p. L10.
- Ranjan, S. et al. (including **Lin, Z.**) 2022, Photochemical Runaway in Exoplanet Atmospheres: Implications for Biosignatures, *Astrophysical Journal*, 930, 2.
- **Lin, Z.** & Kaltenegger, L. 2022. High-resolution spectral models of TRAPPIST-1e seen as a Pale Blue Dot for ELT and JWST observations, *Monthly Notices of The Royal Astronomical Society*, 516, 3167.
- Kaltenegger, L., **Lin, Z.** 2021. Finding Signs of Life in Transits: High-resolution Transmission Spectra of Earth-like Planets around FGKM Host Stars. *Astrophysical Journal Letters*, 909, L2.
- **Lin, Z.**, MacDonald, R. J., Kaltenegger, L., Wilson, D. J. 2021. Differentiating modern and pre-biotic Earth scenarios for TRAPPIST-1e: high-resolution transmission spectra and predictions for JWST, *Monthly Notices of The Royal Astronomical Society*, 505(3), pp. 3562–3578.
- Kaltenegger, L., **Lin, Z.**, Madden, J. 2020. High-resolution Transmission Spectra of Earth Through Geological Time. *Astrophysical Journal*, 892, L17.
- Kaltenegger, L., **Lin, Z.**, Rugheimer, S. 2020. Finding Signs of Life on Transiting Earth-like Planets: High-resolution Transmission Spectra of Earth through Time around FGKM Host Stars. *Astrophysical Journal*, 904, 10.

- Kozakis, T., **Lin, Z.**, Kaltenegger, L. 2020. High-resolution Spectra and Biosignatures of Earth-like Planets Transiting White Dwarfs. *Astrophysical Journal*, 894, L6.
- **Lin, Z.** & Kaltenegger, L. 2019. High-resolution reflection spectra for Proxima b and Trappist-1e models for ELT observations. *Monthly Notices of The Royal Astronomical Society*, 491, 2.
- Kaltenegger, L., Madden, J., **Lin, Z.**, et al. 2019. The Habitability of GJ 357 d: Possible Climate and Observability. *Astrophysical Journal*, 883, L40.

Awards & Approved Proposals

PI: Roman Space Telescope Cycle 1 General Investigator Program (\$150k)	2026
Transiting White Dwarf Exoplanets with the Galactic Bulge Time Domain Survey	
PI: NEID – WIYN 3.5m (12.7 hours)	2026B
Refining the Core Mass Fraction of Exoplanet HD 93963 A b	
CoI: JWST Cycle 5 AR 11007	2026
Characterizing Infrared Stellar Flares on TRAPPIST-1 Using Archival JWST Data	
PI: WINERED – Magellan Clay 6.5m (1 night)	2025B
Follow-up Observations on the Origin of High-density Exoplanet TOI-431 b	
CoI: JWST Cycle 4 GO 9256 (82.4 hours)	2025
Using stellar contamination proxy TRAPPIST-1 b to search for an atmosphere on TRAPPIST-1 e	
McDonnell Center for the Space Sciences Postdoctoral Fellowship	2025–
PI: WINERED – Magellan Clay 6.5m (1 night)	2024B
Unveiling the Origin of High-density Exoplanet TOI-431 b with WINERED	
CoI: JWST Cycle 3 GO 6456 (52.2 hours)	2024
Using stellar contamination proxy TRAPPIST-1 b to search for an atmosphere on TRAPPIST-1 e	
MIT Presidential Fellowship	2020–2021
Cranson W. and Edna B. Shelley Award, Cornell University	2019–2020
For Excellence in Research in Astronomy	

Conferences & Talks

Other Worlds Laboratory Exoplanet Summer Program	Santa Cruz, CA
Oral presentation	August 2026
Emerging Researchers in Exoplanet Science Symposium XI	Ann Arbor, MI
Oral presentation	July 2026
Layers of Understanding: Model Intercomparisons of Exoplanet Interiors	Online
Oral presentation	April 2026
247th meeting of the American Astronomical Society	Phoenix, AZ
Oral presentation	January 2026
Mid-American Regional Astrophysics Conference (MARAC)	Columbia, MO
Oral presentation	December 2025
Astronomik Nesnelerin Yapısı ve Evrimi (ANYE) workshop	Online
Invited talk	December 2025
Great Lakes Exoplanet Area Meeting (GLEAM) 2025	Madison, WI
Poster presentation	November 2025
The Solar System in Context	Tucson, AZ
Oral presentation	September-October 2025
Washington University Cosmology and AstroPhysics seminar	St. Louis, MO
Oral presentation	September 2025
MIT EAPS Planetary Lunch Seminar	Cambridge, MA

Oral presentation	<i>February 2025</i>
Gordon Research Conferences: Research at High Pressure	Holderness, NH
Poster presentation	<i>July 2024</i>
Gordon Research Seminar: Research at High Pressure	Holderness, NH
Oral presentation	<i>July 2024</i>
Emerging Researchers in Exoplanet Science Symposium IX	Ithaca, NY
Oral presentation	<i>July 2024</i>
Uranus Flagship Workshop 2024	Online
Poster presentation	<i>May 2024</i>
Harvard CfA Exoplanet Pizza Lunch	Cambridge, MA
Oral presentation	<i>December 2023</i>
Uranus Flagship Workshop 2023	Online
Oral presentation	<i>July 2023</i>
Emerging Researchers in Exoplanet Science Symposium VIII	New Haven, CT
Poster presentation	<i>June 2023</i>
Gordon Research Conferences: Origins of Solar Systems	South Hadley, MA
Poster presentation	<i>June 2023</i>
Center for Matter at Atomic Pressures Annual Conference	Rochester, NY
Invited talk	<i>May 2023</i>
Gordon Research Conferences: Research at High Pressure	Holderness, NH
Attendee	<i>July 2022</i>
Planetary Lunch Seminar, Cornell University	Online
Invited talk	<i>March 2022</i>
Workshop: Spatially Resolved Spectroscopy with ELTs	Online
Poster presentation	<i>September 2021</i>
235th meeting of the American Astronomical Society	Honolulu, HI
Poster presentation	<i>January 2020</i>
Emerging Researchers in Exoplanet Science Symposium V	Ithaca, NY
Poster presentation	<i>June 2019</i>

Teaching Experience

Guest lecturer for Physics 3330/5330	St. Louis, MO
Department of Physics, Washington University in St. Louis	<i>Fall 2025</i>
• Course title: Planets and Life in the Universe • Give a lecture on planetary interiors	
TA for 12.425	Cambridge, MA
Department of Earth, Atmospheric and Planetary Sciences, MIT	<i>Fall 2023 & Fall 2024</i>
• Course title: Extrasolar Planets Physics and Detection Techniques • Sole TA for a course with roughly 15-20 students • Responsible for helping to organize in-class activities, holding weekly office hours, assisting with grading, and helping to organize course page on Canvas • Give a lecture on planetary interiors each semester	
TA for 12.003	Cambridge, MA
Department of Earth, Atmospheric and Planetary Sciences, MIT	<i>Fall 2022</i>
• Course title: Introduction to Atmosphere, Ocean, and Climate Dynamics • Sole TA for a course with roughly 20 students	

- Responsible for holding weekly office hours, grading problem sets, and helping to organize course page on Canvas

Physics Undergraduate TA Program

Department of Physics, Cornell University

Ithaca, NY

Spring 2018

- Responded to questions during lectures in the PHYS 2213 Physics II: Electromagnetism course (for ~300 students, in collaboration with 5 other TAs)
- Participated in a workshop on effectively communicating science