

Andrea S.J. Lin

Department of Astronomy, California Institute of Technology
1200 E California Blvd, MC 249-17, Pasadena, CA 91125

asjlin@caltech.edu * andrealin628@gmail.com *  [0000-0002-9082-6337](https://orcid.org/0000-0002-9082-6337)

EDUCATION

Pennsylvania State University (University Park, PA)

Dissertation: Precision Radial Velocities and Photometry in Pursuit of Exoplanets around Low-Mass Stars

Ph.D. Astronomy and Astrophysics and Astrobiology

Aug 2024

M.S. Astronomy and Astrophysics

Dec 2020

University of Michigan (Ann Arbor, MI)

B.S. Astronomy and Astrophysics and Physics, with highest distinction

Apr 2018

RESEARCH EXPERIENCE

Troesh Postdoctoral Scholar Research Associate in Astronomy

2024 – present

Division of Physics, Mathematics, and Astronomy, California Institute of Technology

Advisor: Prof. Dimitri Mawet

Graduate Research Assistant

2018 – 2024

Cecelia Payne-Gaposchkin Science Achievement Graduate Fellowship in Astronomy

2018 – 2023

University Graduate Fellow

2018 – 2019

Department of Astronomy and Astrophysics, Pennsylvania State University

Advisor: Prof. Suvrath Mahadevan

Space Astronomy Summer Program (REU)

2017

Space Telescope Science Institute

Advisor: Dr. Massimo Robberto

Undergraduate Research (ASTRO 399)

2016 – 2018

Department of Astronomy, University of Michigan

Advisor: Prof. John Monnier

HONORS & AWARDS

NASA Group Achievement Award: *“For the development and delivery of the state-of-the-art*

2020

NEID radial velocity spectrograph and port adapter to the WIYN 3.5-meter telescope on Kitt Peak.”

Downsbrough Graduate Fellowship

2023

James B. Angell Scholar

2016, 2017

University Honors

2014, 2015, 2016

Dean’s List

2014, 2015

William J. Branstrom Freshman Prize

2015

RESEARCH PROJECTS

- **SNEAK: Searching for Nearby Exoplanets Around K-dwarfs with NEID [Project PI]**
3-year blind RV search for low-mass ($M < 10 M_{\oplus}$) planets around 10 nearby ($d < 20$ pc), RV-quiet, mid/late K-dwarfs using NEID. K-dwarfs suit NEID's red-optical wavelength coverage, and their planets are amenable to future direct imaging characterization. Managing observing queue, RV reduction, and data analysis. NEID time allocated (22B affected by Contreras Fire): *NOIRLab* – 24B-422321 (46.7h), 24A-211691 (46.7h), 23B-981173 (46.7h), 23A-621448 (46.7h), 22B-966899* (0.0h), 22A-923895 (40.0h), 21B-0225 (46.7h). *Penn State* – 24B543619 (18.7h), 24A-820750 (14.0h), 23B-936288 (23.3h), 23A-728052 (23.3h), 22B-837365* (10.0h), 22A-174847 (20.3h), 21B-0439 (29.3h).
- **NEID Solar Feed [Project Lead]**
A small solar telescope feeding disk-integrated sunlight into NEID, allowing daily monitoring of solar RVs to improve understanding of both instrumental systematics and the intrinsic “RV jitter” of Sun-like stars. Collection of rich data set enabling comparisons with, e.g., SDO/HMI (Ervin et al. 2022) and other EPRV solar feeds (Zhao et al. 2023). Led system design, construction, and testing.
- **TESS Planet Candidate Follow-Up with NEID & HPF [Team Member]**
Validation and confirmation of TESS Objects of Interest (TOIs), focusing on Giant Exoplanets around M-dwarf Stars (GEMS). Coordination of ground-based follow-up collaboration including transit photometry, high-contrast imaging (AO/speckle), and precision RVs with NEID, HPF, and other instruments. Involvement of undergraduates in data acquisition & analysis, with collaborative mentoring by senior team members. Led to GEMS-JWST (GO #3171, PI: S. Kanodia).
- **Precision Photometry with Engineered Diffusers [Team Member]**
Extreme-precision ground-based photometry ($\lesssim 1000$ ppm) through PSF stabilization with Engineered Diffusers and use of custom narrowband filters. Observing exoplanet transits and starspot-crossing events, primarily with ARCTIC on the ARC 3.5m Telescope.
- **NEID [Instrument Team & Science Team Member]**
NASA/NSF extreme-precision red-optical RV spectrograph targeting ~ 30 cm/s instrumental precision, on the WIYN 3.5m Telescope at Kitt Peak. Contributed to fiber optic feed construction and testing, as well as overall instrument integration, installation, and commissioning.
- **Habitable-zone Planet Finder (HPF) [Science Team Member]**
Precision NIR RV spectrograph on the 10m Hobby-Eberly Telescope, demonstrating ~ 1.5 m/s on-sky.

PRESENTATIONS

CONFERENCE TALKS

- American Astronomical Society Meeting 243 Jan 2024
Dissertation Talk: Precision RVs and Photometry in Pursuit of Small Planets around Low-Mass Stars
- Extreme Precision Radial Velocity 5 Mar 2023
The NEID Solar Feed
- Flatiron Sun-as-a-Star Workshop Mar 2023
The NEID Solar Telescope
- Emerging Researchers in Exoplanet Science VI May 2021
The NEID Solar Feed: Observing the Sun as an Exoplanet Host Star

SEMINARS

- JPL Virtual Exoplanet Lecture Series Nov 2023
The Search for Exo-Earths, and Why K-dwarfs May Be Our Best Bet
- Carnegie Earth & Planets Laboratory, Astro Seminar Oct 2023
The Search for Exo-Earths, and Why K-dwarfs May Be Our Best Bet

- Ohio State University, Exoplanet Group Seminar Oct 2023
The Search for Exo-Earths, and Why K-dwarfs May Be Our Best Bet
- Pennsylvania State University, Center for Exoplanets & Habitable Worlds Seminar Oct 2023
The Search for Exo-Earths, and Why K-dwarfs May Be Our Best Bet
- Space Telescope Science Institute, Space Astronomy Summer Program Aug 2017
ONCdb: Creating a Database of the Orion Nebula Cluster

CONFERENCE POSTERS

- SPIE Astronomical Telescopes & Instrumentation 2022 Jul 2022
The NEID solar feed: the first year of data and operations
- Exoplanets IV May 2022
SNEAK: Searching for Nearby Exoplanets Around K-dwarfs with NEID
- SPIE Astronomical Telescopes & Instrumentation 2020 Dec 2020
A solar feed for NEID
- American Astronomical Society Meeting 231 Jan 2018
Determining Disk Parameters for the Classical Be Star 59 Cyg

TEACHING & ACADEMIC SERVICE

Teaching Assistant, ASTRO 320 (*Observational Astronomy Laboratory*) 2021, 2022
 Grading Assistant, PHYSICS 360/401/405/453 (*intermediate/advanced undergrad courses*) 2016 – 2018
 Telescope Operator, ASTRO 100-200 (*introductory astronomy courses*) 2015 – 2016

Organizing Committee, Emerging Researchers in Exoplanet Science VII 2022

Memberships: American Astronomical Society, SPIE

OUTREACH

- Science Olympiad 2015 – present
 - National Astronomy Committee 2017 – present
- Universe Today Podcast, Interview 2021
Ep. 777: Discovering Earth-Sized Planets
- Astronomy on Tap, Invited Talk 2020
How Can Looking at the Sun Help Us Find Exoplanets?
- University of Michigan Student Astronomical Society 2014 – 2018
 - Webmaster 2017 – 2018
 - Outreach/Publicity Coordinator 2016 – 2017

OTHER SKILLS

Citizenship: United States

CERTIFICATES

Certified SolidWorks Associate – Mechanical Design (CSWA-Academic)

SOFTWARE & PROGRAMMING LANGUAGES

Proficient: Python, Microsoft Windows, Linux/Unix, Microsoft Office, LaTeX, AstroImageJ, SolidWorks

Novice: Julia, MATLAB, C++, SQL, IDL, Git, CCDSoft, IRAF, SAO DS9, AutoCAD, Zemax OpticStudio

LANGUAGES

English (*native*), French (*intermediate*), Taiwanese Mandarin (*intermediate, spoken*), Taiwanese Hokkien (Min Nan Chinese) (*elementary, spoken*)

PUBLICATIONS

FIRST AUTHOR

1. *The closest transiting Earth-sized exoplanet: Ground-based precision photometry confirms a non-grazing geometry for LTT 1445Ac.* **Lin, A.S.J.**, Libby-Roberts, J.E., Mahadevan, S., et al. (submitted to ApJ).
2. *The unusual M-dwarf Warm Jupiter TOI-1899 b: Refinement of orbital and planetary parameters.* **Lin, A.S.J.**, Libby-Roberts, J.E., Alvarado-Montes, J.A., et al. 2023, AJ, 166, 90.
3. *Observing the Sun as a star: Design and early results from the NEID solar feed.* **Lin, A.S.J.**, Monson, A., Mahadevan, S., et al. 2022, AJ, 163, 184.

SECOND & THIRD AUTHOR

4. *Stable fiber-illumination for extremely precise radial velocities with NEID.* Kanodia, S., **Lin, A.S.J.**, Lubar, E., et al. 2023, AJ, 166, 105.
5. *TOI-3785 b: A Low-Density Neptune Orbiting an M2-Dwarf Star.* Powers, L.C., Libby-Roberts, J.E., **Lin, A.S.J.**, et al. 2023, AJ, 166, 44.
6. *A Mini-Neptune and a Radius Valley Planet Orbiting the Nearby M2 Dwarf TOI-1266 in Its Venus Zone: Validation with the Habitable-zone Planet Finder.* Stefánsson, G., Kopparapu, R., **Lin, A.**, et al. 2020, AJ, 160, 259.

ALL CO-AUTHOR

7. *Utilizing Photometry from Multiple Sources to Mitigate Stellar Variability in Precise Radial Velocities: A Case Study of Kepler-21.* Beard, C., Robertson, P., Giovannazzi, M.R., et al. (including **Lin, A.S.J.**) (submitted to AAS journals, [arXiv:2408.02873](https://arxiv.org/abs/2408.02873)).
8. *Astrometry and Precise Radial Velocities Yield a Complete Orbital Solution for the Nearby Eccentric Brown Dwarf LHS 1610 b.* Fitzmaurice, E., Stefánsson, G., Kavanagh, R.D., et al. (including **Lin, A.S.J.**) (submitted to AAS journals, [arXiv:2310.07827](https://arxiv.org/abs/2310.07827)).
9. *A hot-Jupiter progenitor on a super-eccentric retrograde orbit.* Gupta, A.F., Millholland, S.C., Im, H., et al. (including **Lin, A.S.J.**) 2024, Nature, 632, 50.
10. *TOI-2015 b: A Warm Neptune with Transit Timing Variations Orbiting an Active Mid-type M Dwarf.* Jones, S.E., Stefánsson, G., Masuda, K., et al. (including **Lin, A.S.J.**) 2024, AJ, 168, 93.
11. *Searching for Giant Exoplanets around M-dwarf Stars (GEMS) I: Survey Motivation.* Kanodia, S., Cañas, C.I., Mahadevan, S., et al. (including **Lin, A.S.J.**) 2024, AJ, 167, 161.
12. *TOI-4201: An Early M-dwarf Hosting a Massive Transiting Jupiter Stretching Theories of Core-Accretion.* Delamer, M., Kanodia, S., Cañas, C.I., et al. (including **Lin, A.S.J.**) 2024, ApJ, 962, 22.
13. *TOI-5344 b: A warm Saturn orbiting a super-Solar metallicity M0 dwarf.* Han, T., Robertson, P., Kanodia, S., et al. (including **Lin, A.S.J.**) 2024, AJ, 167, 4.
14. *A Neptune-mass exoplanet in close orbit around a very low-mass star challenges formation models.* Stefánsson, G., Mahadevan, S., Miguel, Y., et al. (including **Lin, A.S.J.**) 2023, Science, 382, 1031.
15. *TOI-1670 c, a 40-day Orbital Period Warm Jupiter in a Compact System, is Well-aligned.* Lubin, J., Wang, X.-Y., Rice, M., et al. (including **Lin, A.S.J.**) 2023, ApJ, 959, 5.

16. *The Extreme Stellar-Signals Project III. Combining Solar Data from HARPS, HARPS-N, EXPRES, and NEID.* Zhao, L.L., Dumusque, X., Ford, E.B., et al. (including **Lin, A.S.J.**) 2023, AJ, 166, 173.
17. *Measuring the Temperature of Starspots from Multi-filter Photometry.* Schutte, M.C., Hebb, L., Wisniewski, J.P., et al. (including **Lin, A.S.J.**) 2023, AJ, 166, 92.
18. *TOI-3984 A b and TOI-5293 A b: Two temperate gas giants transiting mid-M dwarfs in wide binary systems.* Cañas, C.I., Kanodia, S., Libby-Roberts, J., et al. (including **Lin, A.S.J.**) 2023, AJ, 166, 30.
19. *An In-Depth Look at TOI-3884b: a Super-Neptune Transiting a M4 Dwarf with Persistent Star Spot Crossings.* Libby-Roberts, J.E., Schutte, M., Hebb, L., et al. (including **Lin, A.S.J.**) 2023, AJ, 165, 249.
20. *A High-Eccentricity Warm Jupiter Orbiting TOI-4127.* Gupta, A.F., Jackson, J.M., Hébrard, G., et al. (including **Lin, A.S.J.**) 2023, AJ, 165, 234.
21. *TOI-5375 B: A Very Low Mass Star at the Hydrogen Burning Limit Orbiting an Early M-type Star.* Lambert, M., Bender, C.F., Kanodia, S., et al. (including **Lin, A.S.J.**) 2023, AJ, 165, 218.
22. *TOI-5205b: A Short-period Jovian Planet Transiting a Mid-M Dwarf.* Kanodia, S., Mahadevan, S., Libby-Roberts, J., et al. (including **Lin, A.S.J.**) 2023, AJ, 165, 120.
23. *NEID Reveals that The Young Warm Neptune TOI-2076 b Has a Low Obliquity.* Frazier, R.C., Stefánsson, G., Mahadevan, S., et al. (including **Lin, A.S.J.**) 2023, ApJL, 944, 41.
24. *GJ 3929: High-precision Photometric and Doppler Characterization of an Exo-Venus and Its Hot, Mini-Neptune-mass Companion.* Beard, C., Robertson, P., Kanodia, S., et al. (including **Lin, A.S.J.**) 2022, ApJ, 936, 55.
25. *TOI-3757 b: A Low-density Gas Giant Orbiting a Solar-metallicity M Dwarf.* Kanodia, S., Libby-Roberts, J., Cañas, C.I., et al. (including **Lin, A.S.J.**) 2022, AJ, 164, 81.
26. *TOI-3714 b and TOI-3629 b: Two Gas Giants Transiting M Dwarfs Confirmed with the Habitable-zone Planet Finder and NEID.* Cañas, C.I., Kanodia, S., Bender, C.F., et al. (including **Lin, A.S.J.**) 2022, AJ, 164, 50.
27. *The Warm Neptune GJ 3470b Has a Polar Orbit.* Stefánsson, G., Mahadevan, S., Petrovich, C., et al. (including **Lin, A.S.J.**) 2022, ApJL, 931, 15.
28. *TOI-1696 and TOI-2136: Constraining the Masses of Two Mini-Neptunes with the Habitable-Zone Planet Finder.* Beard, C., Robertson, P., Kanodia, S., et al. (including **Lin, A.S.J.**) 2022, AJ, 163, 286.
29. *Leveraging Space-based Data from the Nearest Solar-type Star to Better Understand Stellar Activity Signatures in Radial Velocity Data.* Ervin, T., Halverson, S., Burrows, A., et al. (including **Lin, A.S.J.**) 2022, AJ, 163, 272.
30. *A Close-in Puffy Neptune with Hidden Friends: The Enigma of TOI 620.* Reefer, M., Luque, R., Gaidos, E., et al. (including **Lin, A.**) 2022, AJ, 163, 269.
31. *A Snowball in Hell: The Potential Steam Atmosphere of TOI-1266c.* Harman, C.E., Kopparapu, R.K., Stefánsson, G., et al. (including **Lin, A.S.J.**) 2022, PSJ, 3, 45.
32. *Gaia 20eae: A Newly Discovered Episodically Accreting Young Star.* Ghosh, A., Sharma, S., Ninan, J.P., et al. (including **Lin, A.S.J.**) 2022, ApJ, 926, 68.
33. *An Eccentric Brown Dwarf Eclipsing an M dwarf.* Cañas, C.I., Mahadevan, S., Bender, C.F., et al. (including **Lin, A.S.J.**) 2022, AJ, 163, 89.
34. *A hot Mars-sized Exoplanet Transiting an M Dwarf.* Cañas, C.I., Mahadevan, S., Cochran, W.D., et al. (including **Lin, A.S.J.**) 2022, AJ, 163, 3.
35. *TOI-532b: The Habitable-zone Planet Finder confirms a Large Super Neptune in the Neptune Desert orbiting a metal-rich M-dwarf host.* Kanodia, S., Stefansson, G., Cañas, C.I., et al. (including **Lin, A.S.J.**) 2021, AJ, 162, 135.
36. *Nondetection of Helium in the Upper Atmospheres of TRAPPIST-1b, e, and f.* Krishnamurthy, V., Hirano, T., Stefánsson, G., et al. (including **Lin, A.**) 2021, AJ, 162, 82.
37. *The NEID spectrometer: fibre injection system design.* Schwab, C., Monson, A.J., Kanodia, S., et al. (including **Lin, A.S.J.**) 2020, Proc. SPIE, 11447, 114474L.
38. *A Warm Jupiter Transiting an M Dwarf: A TESS Single-transit Event Confirmed with the Habitable-zone Planet Finder.* Cañas, C.I., Stefansson, G., Kanodia, S., et al. (including **Lin, A.S.J.**) 2020, AJ, 160, 147.
39. *TOI-1728b: The Habitable-zone Planet Finder Confirms a Warm Super-Neptune Orbiting an M-dwarf Host.* Kanodia, S., Cañas, C.I., Stefansson, G., et al. (including **Lin, A.S.J.**) 2020, ApJ, 899, 29.