Andrea S.J. Lin

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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 Roberto

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 NEID radial velocity spectrograph and port adapter to the WIYN 3.5-meter telescope on Kitt Peak."* — 2020

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., Giovinazzi, M.R., et al. (including **Lin, A.S.J.**) (submitted to AAS journals, arXiv: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).
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*. Reefe, 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.