

# Dr. Kevin K. Hardegree-Ullman

🪐 Exoplanets

★ Stars

🌌 Brown Dwarfs

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## Education

Ph.D. Physics, University of Toledo 2018  
Dissertation: [Kepler Planet Occurrence Rates for Mid-Type M Dwarfs as a Function of Spectral Type](#)  
Advisor: [Prof. Michael C. Cushing](#)

B.S. Astronomy, University of Arizona 2011

## Professional History

Assistant Research Scientist, Caltech/IPAC-NASA Exoplanet Science Institute 2024–Present

Postdoctoral Research Associate, University of Arizona/Steward Observatory 2021–2024  
Advisor: [Prof. Dániel Apai](#)

Postdoctoral Scholar, Caltech/IPAC-NExSci 2018–2021  
Advisor: [Dr. Jessie L. Christiansen](#)

Visiting Graduate Fellow, IPAC 2017  
Advisor: [Dr. Jessie L. Christiansen](#)

Ritter Observatory Research Assistant, University of Toledo 2013–2017  
Observatory Director: [Prof. Jon Bjorkman](#)

## Awards and Grants

US Contributions to Ariel Preparatory Science Grant - Science Lead 2025–2027  
Research grant to characterize high-priority targets for the upcoming Ariel mission with high-resolution spectroscopy. **\$121,598**

NASA WIYN PI Data Awards – 7 total awards 2015–2018  
NASA/NSF Exoplanet Observational Research Program awards to characterize M dwarfs for exoplanet demographics studies using the WIYN telescope. **\$109,400**

## Telescope Time as PI

SOAR - NOIRLab Survey Program 2019–2022  
Atmospheric survey of hot Jupiters observed by TESS (Goodman).  
3 Publications: [#16](#), [17](#), [25](#) 30 nights

IRTF 2016–2025  
M dwarfs and metallicity characterization projects (SpeX).  
3 Publications: [#39](#), [42](#), [46](#) 31 nights

WIYN 2015–2018  
Kepler M dwarfs and TESS cool star characterization projects (Hydra).  
1 Publication: [#39](#) 46 nights

Lowell Discovery Telescope 2013–2017  
Kepler M dwarfs and transiting exoplanet projects (DeVeney, LMI).  
2 Publications: [#4](#), [39](#) 20 nights

## Service

IPAC Student Coordinator	2025–Present
SOAR Classification Spectrograph Working Group	2023–Present
NOIRLab Mid-Scale Observatories Users' Committee	2022–Present
SOAR Telescope Science Advisory Committee ( <i>Chair</i> , 2025–Present)	2020–Present
Subject-matter expert in NASA peer reviews	2020–Present
ExoPAG SAG 22 - Existing Stellar Catalogs Task Force Co-Lead	2020–2021
Referee for AAS Journals, MNRAS, PASP, and A & A	2018–Present

## Advising/Mentoring History

### *Undergraduate Advising*

Vivian Welch, University of Arizona	2024
Bryan Wang, University of Arizona	2024
Justin Klingele, University of Arizona	2021–2023
Malhar Dave, University of Arizona	2022
Kate Wienke, Kansas University	2022
Jillian Henkel, University of Toronto	2022

### *Graduate Mentoring*

Galen Bergsten, Ph.D., University of Arizona, LPL	2022–2025
Kiersten Boley, Ph.D., The University of Ohio	2021–2024
Rachel Fernandes, Ph.D., University of Arizona, LPL	2020–2023
Jon Zink, Ph.D., University of California, Los Angeles	2019–2021

## Teaching

<a href="#">Summer Science Program</a> - Guest Instructor (Exoplanets)	2023–2024
ASTR 399 Astronomy Independent Study - Research Instructor	2022–2023
PHYS 1910 Frontiers Of Physics And Astronomy - Guest Instructor (Exoplanets)	2013–2016
ASTR 5880 Astrophysical Measurements - Guest Instructor (3-color images)	2013
ASTR 2050 Elementary Astronomy Laboratory - Instructor	2013
ASTR 1010 Survey of Astronomy - Teaching Assistant	2012–2013
PHYS 2070 General Physics Laboratory - Instructor	2012

## Publication Statistics

**54 Papers** | **3 Research Notes** | **1 Report to NASA** | **1411 Citations** | [Link to ADS](#)

## Major Contributions

58. *Scaling K2 VIII: Short-Period Sub-Neptune Occurrence Rates Peak Around Early-Type M Dwarfs*  
**Hardegree-Ullman, K. K.**; Bergsten, G. J.; Christiansen, J. L. et al. 2025. AJ, in press
57. *Bioverse: Giant Magellan Telescope and Extremely Large Telescope Direct Imaging and High-resolution Spectroscopy Assessment—Surveying Exo-Earth O<sub>2</sub> and Testing the Habitable Zone Oxygen Hypothesis*  
**Hardegree-Ullman, K. K.**; Apai, D.; Haffert, S. Y. et al. 2025. AJ, 169, 171
56. *The First Evidence of a Host Star Metallicity Cutoff in the Formation of Super-Earth Planets*  
Boley, K. M.; Christiansen, J. L.; Zink, J. K.; **Hardegree-Ullman, K. K.** et al. 2024. AJ, 168, 128
55. *Scaling K2. VII. Evidence For a High Occurrence Rate of Hot Sub-Neptunes at Intermediate Ages*  
Christiansen, J. L.; Zink, J. K.; **Hardegree-Ullman, K. K.** et al. 2023. AJ, 166, 248
54. *No Evidence for More Earth-sized Planets in the Habitable Zone of Kepler's M versus FGK Stars*  
Bergsten, G. J.; Pascucci, I.; **Hardegree-Ullman, K. K.** et al. 2023. AJ, 166, 234
53. *Using Photometrically-Derived Properties of Young Stars to Refine TESS's Transiting Young Planet Survey Completeness*  
(Fernandes, R. B. & **Hardegree-Ullman, K. K.** co-first authors); Pascucci, I. et al. 2023. AJ, 166, 175
52. *Bioverse: A Comprehensive Assessment of the Capabilities of Extremely Large Telescopes to Probe Earth-like O<sub>2</sub> Levels in Nearby Transiting Habitable Zone Exoplanets*  
**Hardegree-Ullman, K. K.**; Apai, D.; Bergsten, G. J. et al. 2023. AJ, 165, 267
51. *Scaling K2. VI. Reduced Small-planet Occurrence in High-galactic-amplitude Stars*  
Zink, J. K.; **Hardegree-Ullman, K. K.**; Christiansen, J. L. et al. 2023. AJ, 165, 262
50. *EDEN Survey: Small Transiting Planet Detection Limits and Constraints on the Occurrence Rates for Late M Dwarfs within 15 pc*  
Dietrich, J.; Apai, D.; Schlecker, M.; **Hardegree-Ullman, K. K.** et al. 2023. AJ, 165, 149
49. *Scaling K2. V. Statistical Validation of 60 New Exoplanets From K2 Campaigns 2-18*  
Christiansen, J. L.; Bhure, S.; Zink, J. K.; **Hardegree-Ullman, K. K.** et al. 2022. AJ, 163, 244
48. *Final Report for SAG 22: A Target Star Archive for Exoplanet Science*  
Hinkel, N. R.; Pepper, J.; Stark, C. C. et al. 2021. Final report to guide NASA exoplanet science.
47. *Scaling K2. IV. A Uniform Planet Sample for Campaigns 1-8 and 10-18*  
Zink, J. K.; **Hardegree-Ullman, K. K.**; Christiansen, J. L. et al. 2021. AJ, 162, 259
46. *K2-138 g: Spitzer Spots a Sixth Planet for the Citizen Science System*  
**Hardegree-Ullman, K. K.**; Christiansen, J. L.; Ciardi, D. R. et al. 2021, AJ, 161, 219
45. *Scaling K2. III. Comparable Planet Occurrence in the FGK Samples of Campaign 5 and Kepler*  
Zink, J. K.; **Hardegree-Ullman, K. K.**; Christiansen, J. L. et al. 2020, AJ, 160, 94
44. *Scaling K2. II. Assembly of a Fully Automated C5 Planet Candidate Catalog Using EDI-Vetter*  
Zink, J. K.; **Hardegree-Ullman, K. K.**; Christiansen, J. L. et al. 2020, AJ, 159, 154

43. [\*Scaling K2. I. Revised Parameters for 222,088 K2 Stars and a K2 Planet Radius Valley at  \$1.9 R\_{\oplus}\$\*](#)   
**Hardegree-Ullman, K. K.**; Zink, J. K.; Christiansen, J. L. et al. 2020, ApJS, 247, 28
42. [\*Characterizing K2 Candidate Planetary Systems Orbiting Low-mass Stars. IV. Updated Properties for 86 Cool Dwarfs Observed during Campaigns 1–17\*](#)  
Dressing, C. D.; **Hardegree-Ullman, K. K.**; Schlieder, J. E. et al. 2019, AJ, 158, 87
41. [\*Bright Opportunities for Atmospheric Characterization of Small Planets: Masses and Radii of K2-3 b, c, and d and GJ3470 b from Radial Velocity Measurements and Spitzer Transits\*](#)  
Kosiarek, M. R.; Crossfield, I. J. M.; **Hardegree-Ullman, K. K.** et al. 2019, AJ, 157, 97
40. [\*Catalog of New K2 Exoplanet Candidates from Citizen Scientists\*](#)  
Zink, J. K.; **Hardegree-Ullman, K. K.**; Christiansen, J. L. et al. 2019, RNAAS, 3, 43
39. [\*Kepler Planet Occurrence Rates for Mid-type M Dwarfs as a Function of Spectral Type\*](#)  
**Hardegree-Ullman, K. K.**; Cushing, M. C.; Muirhead, P. S.; Christiansen, J. L. 2019, AJ, 158, 75
38. [\*Spitzer Light Curves of the Young, Planetary-Mass TW Hya Members 2MASS J11193254-1137466AB and WISEA J114724.10-204021.3\*](#)  
Schneider, A. C.; **Hardegree-Ullman, K. K.**; Cushing, M. C. et al. 2018, ApJ, 155, 238
37. [\*Investigating the physical properties of transiting hot Jupiters with the 1.5-m Kuiper Telescope\*](#)  
Turner, J. D.; Leiter, R. M.; Biddle, L. I. et al. 2017, MNRAS, 472, 3871
36. [\*Observed Variability at  \$1\mu\text{m}\$  and  \$4\mu\text{m}\$  in the Y0 Brown Dwarf WISEP J1738+2732\*](#)  
Leggett, S. K.; Cushing, M. C.; **Hardegree-Ullman, K. K.** et al. 2016, ApJ, 830, 141
35. [\*Ground-Based Near-UV Observations of 15 Transiting Exoplanets: Constraints on Their Atmospheres and No Evidence for Asymmetrical Transits\*](#)  
Turner, J. D.; Pearson, K. A.; Biddle, L. I. et al. 2016, MNRAS, 459, 789
34. [\*The First Detection of Photometric Variability in a Y Dwarf: WISE J1405+5534\*](#)  
Cushing, M. C.; **Hardegree-Ullman, K. K.**; Trucks, J. L. et al. 2016, ApJ, 823, 152
33. [\*Near-UV and Optical Observations of the Transiting Exoplanet TrES-3b\*](#)  
Turner, J. D.; Smart, B. M.; **Hardegree-Ullman, K. K.** et al. 2013, MNRAS, 428, 678
32. [\*A New Online Astronomy Resource for Education and Outreach\*](#)  
Impey C. D.; **Hardegree-Ullman, K. K.**; Patiklal, A. et al. 2013, Astro. Ed. Rev., 12, 010301

## Minor Contributions

31. [\*Bioverse: Potentially Observable Exoplanet Biosignature Patterns under the UV Threshold Hypothesis for the Origin of Life\*](#)  
Schlecker, M.; Apai, D., Affholder, A. et al. 2025. AJ, 987, 24
30. [\*The NASA Exoplanet Archive and Exoplanet Follow-up Observing Program: Data, Tools, and Usage\*](#)  
Christiansen, J. L.; McElroy, D. L.; Harbut, M. et al. 2025. PSJ, accepted
29. [\*Concerning the possible exomoons around Kepler-1625 b and Kepler-1708 b\*](#)  
Kipping, D.; Teachey, A.; Yahalomi, D. A. et al. 2025. Nature Astronomy, 9, 795
28. [\*GEMS JWST: Transmission spectroscopy of TOI-5205b reveals significant stellar contamination and a metal-poor atmosphere\*](#)  
Canas, C. I.; Lustig-Yaeger, J.; Tsai, S-M et al. 2025. AJ, submitted
27. [\*Planet Masses, Radii, and Orbits from NASA's K2 Mission\*](#)  
Howard, A. W.; Sinukoff, E.; Blunt, S. et al. 2025. ApJS, 278, 52

26. *Signatures of Atmospheric Mass Loss and Planet Migration in the Time Evolution of Short-Period Transiting Exoplanets*  
Fernandes, R. B.; Bergsten, G. J.; Mulders, G. D. et al. 2025. AJ, 169, 208
25. *The Palomar twilight survey of 'Ayló'chaxnim, Atiras, and comets*  
Bolin, B. T.; Masci, F. J.; Coughlin, M. W. et al. 2025. Icarus 425, 116333
24. *New ephemerides and detection of transit-timing variations in the K2-138 system using high-precision CHEOPS photometry*  
Vivien, H. G.; Hoyer, S.; Deleuil, M. et al. 2024. A & A 668, 192
23. *Metallicities and Refined Stellar Parameters for 52 Cool Dwarfs with Transiting Planets and Planet Candidates*  
Gore, R.; Giacalone, S.; Dressing, C. D. et al. 2024. ApJS 271, 48
22. *A Reply to: Large Exomoons unlikely around Kepler-1625 b and Kepler-1708 b*  
Kipping, D.; Teachey, A.; Yahalomi, D. A. et al. 2024. Submitted to Nature Astronomy.
21. *Clouds and Clarity: Revisiting Atmospheric Feature Trends in Neptune-size Exoplanets*  
Brande, J.; Crossfield, I. J. M.; Kreidberg, L. et al. 2023. ApJL, 961, 23
20. *Bioverse: The Habitable Zone Inner Edge Discontinuity as an Imprint of Runaway Greenhouse Climates on Exoplanet Demographics*  
Schlecker, M.; Apai, D.; Lichtenberg, T. et al. 2023. PSJ, 5, 3
19. *Water Absorption in the Transmission Spectrum of the Water World Candidate GJ 9827 d*  
Roy, P.-A.; Benneke, B.; Piaulet, C. et al. 2023. ApJ, 954, 52
18. *The mass of TOI-519 b: A close-in giant planet transiting a metal-rich mid-M dwarf*  
Kagetani, T.; Narita, N.; Kimura, T. et al. 2023. PASJ, 75, 713
17. *Preliminary estimates of the Zwicky Transient Facility 'Ayló'chaxnim asteroid population completeness*  
Bolin, B. T.; Ahumada, T.; van Dokkum, P. et al. 2023. Icarus, 394, 115442
16. *The discovery and characterization of (594913) 'Ayló'chaxnim, a kilometre sized asteroid inside the orbit of Venus*  
Bolin, B. T.; Ahumada, T.; van Dokkum, P. et al. 2022. MNRAS, 517, 49
15. *The K2-3 System Revisited: Testing Photoevaporation and Core-powered Mass Loss with Three Small Planets Spanning the Radius Valley*  
Diamond-Lowe, H.; Kreidberg, L.; Harman, C. E. et al. 2022. AJ, 164, 172
14. *Tentative Evidence for Water Vapor in the Atmosphere of the Neptune-Size Exoplanet HD 106315 c*  
Kreidberg, L.; Mollière, P.; Crossfield, I. J. M. et al. 2022. AJ, 164, 124
13. *pterodactyls: A Tool to Uniformly Search and Vet for Young Transiting Planets In TESS Primary Mission Photometry*  
Fernandes, R. B.; Mulders, G. D.; Pascucci, I. et al. 2022. AJ, 164, 78
12. *An Updated Ephemeris for K2-138 d*  
Boyle, A.; Christiansen, J. L.; Vissapragada, S.; **Hardegree-Ullman, K. K.** 2022. RNAAS, 6, 71
11. *An exomoon survey of 70 cool giant exoplanets and the new candidate Kepler-1708 b-i*  
Kipping, D.; Bryson, S.; Burke, C. et al. 2022. Nature Astronomy, 6, 367
10. *WASP-107b's Density Is Even Lower: A Case Study for the Physics of Planetary Gas Envelope Accretion and Orbital Migration*

Piaulet, C.; Benneke, B.; Rubenzahl, R. A. et al. 2021, AJ, 161, 70

**9. *Transmission Spectroscopy for the Warm Sub-Neptune HD 3167c: Evidence for Molecular Absorption and a Possible High Metallicity Atmosphere***

Evans, T. M.; Crossfield, I. J. M.; Benneke, B. et al. 2021, AJ, 161, 18

**8. *Revisiting the HIP 41378 System with K2 and Spitzer***

Berardo, D.; Crossfield, I. J. M.; Werner, M. et al. 2019, AJ, 157, 185

**7. *An Updated Ephemeris for the Single-lined Orbit of the Supergiant  $\mu$  Sagittarii***

Johnson, R. A.; Richardson, N. D.; Moffat, A. F. J. et al. 2018, RNAAS, 2, 138

**6. *Characterizing K2 Candidate Planetary Systems Orbiting Low-mass Stars. III. A High Mass and Low Envelope Fraction for the Warm Neptune K2-55b***

Dressing, C. D.; Sinukoff, E.; Fulton, B. J. et al. 2018, AJ, 156, 70

**5. *Planetary Candidates from K2 Campaign 16***

Yu, L.; Crossfield, I. J. M.; Schlieder, J. E. et al. 2018, AJ, 156, 22

**4. *2MASS J11151597+1937266: A Young, Dusty, Isolated, Planetary-mass Object with a Potential Wide Stellar Companion***

Theissen, C. A.; Burgasser, A. J.; Bardalez Gagliuffi, D. C. et al. 2018, ApJ, 853, 75

**3. *The most massive heartbeat: an in-depth analysis of  $\iota$  Orionis***

Pablo, H.; Richardson, N. D.; Fuller, J. et al. 2017, MNRAS, 467, 2494

**2. *A Spectroscopic Orbit for the Late-type Be Star  $\beta$  CMi***

Dulaney, N. A.; Richardson, N. D.; Gerhartz, C. J. et al. 2017, ApJ, 836, 112

**1. *Photometric Monitoring of the Coldest Known Brown Dwarf with the Spitzer Space Telescope***

Esplin, T. L.; Luhman, K. L.; Cushing, M. C. et al. 2016, ApJ, 832, 58