

JACOB K. LUHN

CURRICULUM VITAE

2117 Frederick Reines Hall
University of California, Irvine
Irvine, CA

jluhn@uci.edu

EDUCATION

THE PENNSYLVANIA STATE UNIVERSITY

PhD	Astronomy & Astrophysics	Aug. 2021
MS	Astronomy & Astrophysics	2018

THE OHIO STATE UNIVERSITY

BS	Physics and Astronomy & Astrophysics double major, <i>magna cum laude</i> Honors Research Distinction in Astronomy Thesis: “ <i>Circumbinary Planets via Microlensing</i> ” (Advisor: B. Scott Gaudi)	May 2015
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RESEARCH INTERESTS

- Discovery of exoplanets through high-precision radial velocity (RV) observations
- Characterization of stellar variability and its impact on RV planet detections
- Stellar evolution and its effects on planetary systems

RESEARCH POSITIONS

<i>POSTDOCTORAL SCHOLAR</i> , University of California, Irvine Dr. Paul Robertson	2021–present
<i>NATIONAL SCIENCE FOUNDATION GRADUATE RESEARCH FELLOW</i> , Penn State University Dr. Jason Wright, Dr. Fabienne Bastien	2016–2021
<i>UNDERGRADUATE RESEARCHER</i> , Ohio State Department of Astronomy Summer Undergraduate Research Program (SURP) 2014 Dr. B. Scott Gaudi, Dr. Matthew Penny	2014–2015

FELLOWSHIPS/SCHOLARSHIPS

Pennsylvania Space Grant Consortium Graduate Research Fellow	2020–2021
Center for Exoplanets and Habitable Worlds small grant travel assistance	2019
Zaccheus Daniel Fellowship	2017, 2019
Stephen B. Brumbach Graduate Fellowship in Astrophysics	2017
Sagan Summer Workshop Travel Assistance	2016
National Science Foundation Graduate Research Fellow	2016–present
Homer F. Braddock/Nellie H. and Oscar L. Roberts Fellow	2015–2016
Ohio State Undergraduate Research Scholarship	2014
Leo Yassenoff Scholarship	2013
Ohio State University Maximus Scholarship	2011–2015

AWARDS/HONORS

Poster Competition Winner – Extremely Precise Radial Velocities (EPRV) Conference V	
Poster Competition Winner – EPRV Conference IV	Mar. 2019
Poster Competition Winner – Cools Stars 20 Workshop	Aug. 2018
Poster Honorable Mention – EPRV Conference III	Aug. 2017
Honors Undergraduate Research Thesis	2015
Outstanding Poster in the Field – NMS prize	Mar. 2015
Ohio State Dean’s List – 8 terms	2011–2015
Helen Cowan Book Award (Ohio State Freshman Physics Award)	2012

TEACHING POSITIONS

<i>INSTRUCTOR</i> Astronomy 297 – “Astronomy Communication”	Fall 2020
<i>ROOFTOP OBSERVING/PLANETARIUM TEACHING ASSISTANT</i>	Spring 2016

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Led nightly rooftop observing and planetarium shows for various intro Astro courses

LAB INSTRUCTOR

Astronomy 11 – “Elementary Astronomy Laboratory” [instructor of record]

Fall 2015

INSTRUCTIONAL AIDE

Astronomy 1141 – “Life in the Universe” [Dr. Donald Terndrup, Dr. Wayne Schlingman]

Spring 2015

SELECTED OBSERVING PROGRAMS

1. UC Observatory/Keck Observatory Keck Planet Finder — *1.75 nights* 2023
CHARACTERIZING THE SPECTRAL EFFECTS OF SOLAR-LIKE P-MODE OSCILLATIONS
2. UC Observatory/Keck Observatory Keck Planet Finder — *2.1 nights* 2023
A PANCHROMATIC VIEW OF STELLAR ACTIVITY IN TWO BENCHMARK STARS USING THE KPF
3. UC Observatory/Lick Observatory Automated Planet Finder Telescope — *43.1 nights* 2022–present
EXTENDING THE RETIRED A-STAR LEGACY WITH TAILORED APF OBSERVATIONS TO MITIGATE STELLAR VARIABILITY
4. NASA Exoplanet NOIRLAB NEID proposal — *0.7 nights* 2021
2 FINGERS ON THE PULSE: SIMULTANEOUSLY RESOLVING P-MODE OSCILLATIONS WITH NEID AND TESS
5. NASA K2 Guest Observer Cycle 6, (\$30K Research Grant) 2018
DEVELOPING PREDICTORS OF RADIAL VELOCITY JITTER FROM K2 LIGHT CURVES [Administrative PI: F. Bastien]
6. NASA K2 Guest Observer Cycle 5, (\$30K Research Grant) 2017
DEVELOPING PREDICTORS OF RADIAL VELOCITY JITTER FROM K2 LIGHT CURVES [Administrative PI: F. Bastien]

TELESCOPE OBSERVING EXPERIENCE

10 m Keck I/KPF — California Planet Search observer — *3 nights* 2023–present

REFEREED PUBLICATIONS [6 first-author, 7 co-author]

1. *IMPACT OF CORRELATED NOISE ON THE MASS PRECISION OF EARTH-ANALOG PLANETS IN RADIAL VELOCITY SURVEYS*
Luhn, J. K.; Ford, E. B.; Guo, Z.; Gilbertson, C.; [+9 coauthors], 2023, AJ, 165, 98
2. *NEID REVEALS THAT THE YOUNG WARM NEPTUNE TOI-2076 B HAS A LOW OBLIQUITY*
Frazier, R. C.; Stefánsson, G.; Mahadevan, S.; Yee, S. W.; Cañas, C. I.; Winn, J. N.; **Luhn, J. K.** [+23 coauthors] 2023, AJ, 944, 41
3. *DETECTION OF P-MODE OSCILLATIONS IN HD 35833 WITH NEID AND TESS*
Gupta, A. F.; **Luhn, J. K.**; Wright, J. T.; Mahadevan, S.; Ford, E. B. [+13 coauthors] 2022, AJ, 164, 264
4. *HD 166620: PORTRAIT OF A STAR ENTERING A GRAND MAGNETIC MINIMUM*
Luhn, J. K.; Wright, J. T.; Henry, G. W.; Saar, S. H.; Baum, A. C., 2022, ApJL, 936L, 23
5. *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.; [+31 coauthors, including **Luhn, J. K.**], 2022, ApJ, 936, 55
6. *OBSERVING THE SUN AS A STAR: DESIGN AND EARLY RESULTS FROM THE NEID SOLAR FEED*
Lin, A. S. J.; Monson, A.; Mahadevan, S.; Ninan, J. P.; Halverson, S.; Nitroy, C.; Bender, C. F.; Logsdon, S.; Kanodia, S.; Terrien, R. C.; Roy, A.; **Luhn, J. K.**; Gupta, A. [+17 coauthors], 2022, AJ, 163, 184
7. *FIVE DECADES OF CHROMOSPHERIC ACTIVITY IN 55 SUNLIKE STARS*
Baum, A. C.; Wright, J. T.; **Luhn, J. K.**; Isaacson, H., 2022 AJ, 163, 183
8. *TARGET PRIORITIZATION AND OBSERVING STRATEGIES FOR THE NEID EARTH TWIN SURVEY*
Gupta, A. F.; Wright, J. T.; Mahadevan, S.; Robertson, P.; Halverson, S.; **Luhn, J. K.** [+14 coauthors], 2021, AJ, 161, 130
9. *PROPERTIES OF F STARS WITH STABLE RADIAL VELOCITY TIMESERIES: A USEFUL METRIC FOR SELECTING LOW JITTER F STARS*
Luhn, J. K.; Wright, J. T.; Isaacson, H., 2020, AJ, 159, 236
10. *ASTROPHYSICAL INSIGHTS INTO RADIAL VELOCITY JITTER FROM AN ANALYSIS OF 600 PLANET-SEARCH STARS*
Luhn, J. K.; Wright, J. T.; Howard, A. W.; Isaacson, H., 2020, AJ, 159, 235

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11. *RETIRED A STARS AND THEIR COMPANIONS VIII: 15 NEW PLANETARY SIGNALS AROUND SUBGIANTS AND TRANSIT PARAMETERS FOR CALIFORNIA PLANET SEARCH PLANETS WITH SUBGIANT HOSTS*
Luhn, J. K.; Bastien, F. A.; Wright, J. T.; Johnson, J. A.; Howard, A. W.; Isaacson, H, 2019, AJ, 157, 149
12. *THE FIRST CIRCUMBINARY PLANET FOUND BY MICROLENSING: OGLE-2007-BLG-349L(AB)C*
Bennett, D. P.; Rhie, S. H.; Udalski, A.; Gould, A.; Tsapras, Y.; Kubas, D.; Bond, I. A.; Greenhill, J.; Cassan, A.; Rattenbury, N. J.; Boyajian, T. S.; **Luhn, J. K.**; Penny, M. T.; Anderson, J. [+73 coauthors], 2016, AJ, 152, 125
13. *CAUSTIC STRUCTURES AND DETECTABILITY OF CIRCUMBINARY PLANETS IN MICROLENSING*
Luhn, J. K.; Penny, M. T.; Gaudi, B. S., 2016, ApJ, 827, 61

NON-REFEREED/PUBLICATIONS IN PROGRESS [2 co-author]

14. *THE DEATH OF VULCAN: NEID REVEALS THE PLANET CANDIDATE ORBITING HD 26965 IS STELLAR ACTIVITY*
Burrows, A.; Halverson, S.; Siegel, J. C.; Gilbertson, C.; **Luhn, J. K.**; [+15 coauthors], [under review]
15. *A FOURIER-BASED METHOD FOR SIMULATING RADIAL VELOCITY TIME SERIES: STELLAR GRANULATION AND OSCILLATIONS*
Guo, Z.; Ford, E. B.; Stello, D.; Grundah, F.; **Luhn, J. K.**; Mahadevan, S.; Gupta, A. F.; Yu, J., 2022

INVITED COLLOQUIA/SEMINARS

NASA EPRV Research Coordination Network Colloquium [virtual]	Oct. 26, 2023
University of Cambridge Exoplanet Centre Seminar [virtual]	Nov. 17 th , 2020
Carnegie Institute of Washington Earth & Planets Laboratory Astronomy Seminar [virtual]	Nov. 6 th , 2020
Yale University Exoplanet/Stellar Seminar [virtual]	Oct. 27 th , 2020
University of Exeter Astrophysics Seminar [virtual]	Oct. 21 st , 2020
Center for Astrophysics, Harvard & Smithsonian Stars and Planets Seminar [virtual]	Sep. 21 st , 2020
University of Chicago Exoplanet Seminar [virtual]	July 20 th , 2020
Penn State Astronomy Board of Visitors talk	Apr. 27 th , 2019

INVITED TALKS

1. **PLENARY: PUSHING THE CONVECTIVE ENVELOPE: LEVERAGING P-MODE OSCILLATIONS IN SUBGIANTS TO IMPROVE RV PRECISION**
Jacob K. Luhn, Paul Robertson, Howard Isaacson, Brad Holden
- Extremely Precise Radial Velocities (EPRV) V, Santa Barbara, CA [poster prize talk] Mar. 30th, 2023
2. **PLENARY: NEW ASTROPHYSICAL INSIGHTS INTO RADIAL VELOCITY JITTER**
Jacob K. Luhn, Fabienne A. Bastien, Jason T. Wright
- Extremely Precise Radial Velocities (EPRV) IV, Grindelwald, Switzerland [poster prize talk] Mar. 21st, 2019
- Cool Stars 20 Workshop, Boston, MA [poster prize talk] Aug. 3rd, 2018

CONTRIBUTED TALKS

1. *THE EVOLUTION OF STELLAR RADIAL VELOCITY JITTER: TOWARD AN ASTROPHYSICALLY MOTIVATED PREDICTOR OF STELLAR RV JITTER*
Jacob K. Luhn, Jason T. Wright
- 237th American Astronomical Society (AAS) Meeting [virtual] Jan. 13th, 2021
2. *AN ASTROPHYSICALLY-MOTIVATED PREDICTOR OF STELLAR RADIAL VELOCITY JITTER*
Jacob K. Luhn, Angie Wolfgang, Jason T. Wright
- Exoplanet Program Analysis Group (ExoPAG) 22 [virtual] June 19th, 2020
3. *"RETIRED" A STARS AND THEIR COMPANIONS: PROSPECTS FOR CATCHING LONG-PERIOD RV PLANETS IN TRANSIT WITH TESS*
Jacob K. Luhn, Fabienne A. Bastien, Jason T. Wright, John A. Johnson, Andrew W. Howard, Howard Isaacson
- Chesapeake Bay Area Exoplanet (CHEXO) Meeting, University of Maryland Feb. 15th, 2019
- 233rd American Astronomical Society (AAS) Meeting, Seattle, WA Jan. 10th, 2019
4. *NEW ASTROPHYSICAL INSIGHTS INTO RV JITTER*
Jacob K. Luhn, Fabienne A. Bastien, Jason T. Wright
- Lunch Talk, Penn State University Dec. 3rd, 2019

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- Emerging Researchers in Exoplanet Science (ERES) IV, Penn State University June 21st, 2018
- 5. *RADIAL VELOCITIES OF SUBGIANT STARS AND NEW ASTROPHYSICAL INSIGHTS INTO RV JITTER*
Jacob K. Luhn, Fabienne A. Bastien, Jason T. Wright
- 231st American Astronomical Society (AAS) Meeting, National Harbor, MD Jan. 12th, 2018
- 6. *THE FLICKER-JITTER RELATION AND PLANETS AROUND SUBGIANTS*
Jacob K. Luhn, Fabienne A. Bastien, Jason T. Wright
- Emerging Researchers in Exoplanet Science (ERES) III, Yale University June 12th, 2017
- 7. *FLICKER, JITTER, AND “RETIRED” A-STARS*
Jacob K. Luhn, Fabienne A. Bastien, Jason T. Wright
- Lunch Talk, Penn State University Apr. 14th, 2017
- 8. *CIRCUMBINARY PLANETS IN MICROLENSING*
Jacob K. Luhn, Matthew T. Penny, B. Scott Gaudi
- Lunch Talk, Penn State University Feb. 18th, 2016
- Ohio State Astronomical Society, The Ohio State University Oct. 14th, 2014
- SURP Symposium, The Ohio State University Aug. 29th, 2014

POSTERS

- 1. *PUSHING THE CONVECTIVE ENVELOPE: LEVERAGING P-MODE OSCILLATIONS IN SUBGIANTS TO IMPROVE RV PRECISION*
Jacob K. Luhn, Eric B. Ford
- EPRV V, Santa Barbara, CA [Competition Winner] Mar. 26–30, 2023
- 2. *STELLAR VARIABILITY IN ISOLATION: TWO CASE STUDIES OF TIME-RESOLVED STELLAR SIGNALS WITH EPRV INSTRUMENTS*
Jacob K. Luhn, Eric B. Ford
- EPRV V, Santa Barbara, CA Mar. 26–30, 2023
- 3. *THE IMPACT OF CORRELATED NOISE ON THE MASS PRECISION OF EARTH-ANALOG PLANETS IN RADIAL VELOCITY SURVEYS*
Jacob K. Luhn, Eric B. Ford
- Exoplanets IV, Las Vegas, NV May 1–6, 2022
- Emerging Researchers in Exoplanet Science VII, Penn State University Aug. 1–3, 2022
- 4. *NEW ASTROPHYSICAL INSIGHTS INTO RADIAL VELOCITY JITTER*
Jacob K. Luhn, Fabienne A. Bastien, Jason T. Wright
- 335th American Astronomical Society (AAS) Meeting, Honolulu, HI Jan. 7th, 2020
- Extreme Solar Systems IV, Reykjavik, Iceland Aug. 19–23, 2019
- Extremely Precise Radial Velocities IV, Grindelwald, Switzerland [Competition Winner] Mar. 18–21, 2019
- Cool Stars 20, Boston, MA [Competition Winner] July 30–Aug. 3, 2018
- 5. *RVs WITH K2: JITTER, NEW PLANETS, AND TRANSIT PROBABILITIES FOR SUBGIANTS*
Jacob K. Luhn, Fabienne A. Bastien, Jason T. Wright
- Extremely Precise Radial Velocities (EPRV) III, Penn State University [Honorable Mention] Aug. 14–17, 2017
- Kepler-K2 Science Conference IV, NASA Ames Research Center, Mountainview, CA June 19–23, 2017
- 6. *EXAMINING THE FLICKER-JITTER RELATION OF K2 STARS: THE DEPENDENCE ON CHROMOSPHERIC ACTIVITY*
Jacob K. Luhn, Fabienne A. Bastien, Jason T. Wright
- 229th American Astronomical Society (AAS) Meeting, Grapevine, TX Jan. 4th, 2017
- 7. *FINDING CIRCUMBINARY PLANETS VIA MICROLENSING*
Jacob K. Luhn, Matthew T. Penny, B. Scott Gaudi
- 2016 Sagan Exoplanet Summer Workshop, NExSci, Caltech July 18th, 2016
- Emerging Researchers in Exoplanet Science (ERES) II, Cornell University June 13th, 2016
- Denman Undergraduate Research Forum, The Ohio State University Mar. 25th, 2015
- Natural and Mathematical Sciences (NMS) forum, The Ohio State University [Competition Winner] Mar. 6th, 2015
- 225th American Astronomical Society (AAS) Meeting, Seattle, WA Jan. 8th, 2015

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PROFESSIONAL ACTIVITIES

Member:

- NASA ExoPAG Study Analysis Group 22 2020–present
- American Astronomical Society 2016–present
- Center for Exoplanets and Habitable Worlds, Penn State University 2015–present

Referee:

- Astronomy & Astrophysics 2020–present

Funding Review Panelist

- NASA funding panel July, 2023

Scientific Organizing Committee:

- Emerging Researchers in Exoplanet Science (ERES) IV, Penn State University June 21–22, 2018

Local Organizing Committee:

- The First Penn State SETI Symposium, Penn State University July 6–9, 2020
- Emerging Researchers in Exoplanet Science (ERES) IV, Penn State University June 21–22, 2018

MENTORING

- Antony Rozic** (UC Irvine undergrad) — performed transit searches and RV planet fitting for senior thesis 2021–2022
Anna Baum (Penn State undergrad) — characterized stellar activity in long-baseline, multi-instrument datasets 2018–2021

SERVICE

- Penn State Astronomy & Astrophysics Department Climate and Diversity Committee Aug. 2019–present
Penn State University Eberly College of Science Climate and Diversity Committee Aug. 2018–2020
Co-organizer & panelist for Grad School Information Panel for Undergraduates Sep. 9th, 2020

OUTREACH

Recurring Involvement:

- Astronomy on Tap State College Co-Founder & Co-Organizer [45 total events] Apr. 2017–2021
Penn State AstroFest Volunteer [yearly 4-night outreach event] July 2016, '18, '19
Penn State AstroNight Volunteer [yearly 1-night outreach event] Oct. 2015, '16, '17, '18, '19
Ohio State Society of Physics Students (SPS) Member 2011–2015
Ohio State Astronomical Society Member 2011–2015

Onetime Events/Talks:

- Astronomy on Tap on the Couch talk – “GRAVITATIONAL LENSES: THE UNIVERSE’S LARGEST TELESCOPES” Apr. 9th, 2020
Science U Life in Space Camp Ask a Scientist Volunteer July 25th, 2019
Apollo 11 50th Anniversary Celebration – Volunteer Exhibitor, Astronomy on Tap July 21st, 2019
Apollo 11 50th Anniversary Rocket Launch – Volunteer Exhibitor, Astronomy on Tap July 16th, 2019
Astronomy on Tap State College #17 talk – “STARS: HOW MUCH CAN WE LEARN FROM PINPRICKS OF LIGHT?” Sep. 24th, 2018
Astronomy on Tap State College #12 talk – “USING MICROLENSING TO FIND EXTRAGALACTIC PLANETS?” Mar. 19th, 2018
Astronomy on Tap State College #4 talk – “ECLIPSE ACROSS AMERICA” July 24th, 2017

PROGRAMMING LANGUAGES

Advanced: IDL, L^AT_EX **Proficient:** Python, Julia, C++