

# Nicholas Saunders

PhD student • exoplanets & stars  
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## education

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- MSc Astronomy** 2019 – present  
INSTITUTE FOR ASTRONOMY, UNIVERSITY OF HAWAI‘I AT MĀNOA  
→ elected graduate outreach representative  
→ in progress, expected June 2021
- BS Astronomy & Physics** 2013 – 2018  
**BA Comparative Literature (emphasis: Cinema Studies)** 2013 – 2018  
UNIVERSITY OF WASHINGTON  
→ honors in Astronomy — Washington NASA Space Grant — Irving & Louise Donnergaard Endowment  
→ Astronomy GPA: 3.7/4.0 — Comparative Literature GPA: 3.9/4.0

## research

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- Graduate Research Assistant**  
INSTITUTE FOR ASTRONOMY, UNIVERSITY OF HAWAI‘I AT MĀNOA  
**Constraining Weakened Magnetic Braking with Asteroseismic Rotation Rates** 2020 – present  
→ creating stellar evolution models to constrain gyrochronology weakened magnetic braking models  
→ advised by Jen van Saders  
**Detecting Planets around Evolved Stars with TESS** 2019 – present  
→ searching for planets around post-main sequence stars using *TESS* Full Frame Image observations  
→ advised by Dan Huber & Sam Grunblatt
- Undergraduate Researcher**  
UNIVERSITY OF WASHINGTON  
**Producing High-precision K2 Light Curves** 2016 – 2018  
→ simulated a forward model of CCD detectors with Python to test K2 noise removal methods  
→ advised by Rodrigo Luger & Rory Barnes  
**Rubin Observatory Citizen Science with Zooniverse** 2017 – 2018  
→ created online interface to identify transients in Rubin Observatory data using Zooniverse citizen science portal  
→ advised by Andrew Connolly
- Planetary Science Intern**  
THE BEAR FIGHT INSTITUTE, WINTHROP, WA  
**Lunar Spectroscopic Mapping** 2011 – 2013  
→ generated mosaicked satellite-imagery maps for surface of the Moon for reflectance spectroscopy analysis  
→ advised by Tom McCord & Bernard Nordmann

## employment

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- Kepler & K2 Training Materials Developer** 2020 – 2020  
NUMFOCUS, STSCI, THE ASTROPY PROJECT  
→ wrote detailed tutorials about how to conduct time series astronomy with Python  
→ developed the lightcurve Python package to produce clear and well-tested astronomy tools
- Research Support Scientist, Kepler/K2 Guest Observer Office** 2018 – 2019  
NASA AMES RESEARCH CENTER  
→ developed and maintained the open source Python package lightcurve to assist with Kepler/K2 analysis
- Data Visualization Analyst, UW Astrobiology Mobile Planetarium** 2018 – 2018  
UNIVERSITY OF WASHINGTON  
→ created visualizations with Tableau demonstrating elementary & high school student learning  
→ analyzed student surveys to improve the reach and diversity of the UW Astrobiology Mobile Planetarium

## software

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Full details can be found on [my GitHub profile](#).

		GitHub stars	PyPI downloads
lead developer	→ <a href="#">scope</a> — simulated K2 CCD observations to test noise removal	6	11,135
core developer	→ <a href="#">lightkurve</a> — time series analysis tools for Kepler, K2 & TESS	211	93,611
core developer	→ <a href="#">eleanor</a> — photometry pipeline for TESS Full Frame Images	32	54,035
contributor	→ <a href="#">everest</a> — K2 noise removal pipeline	58	61,068

## teaching

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### Graduate Teaching Assistant

2019 – 2019

INSTITUTE FOR ASTRONOMY, UNIVERSITY OF HAWAII AT MĀNOA

→ led lectures for introductory astronomy, graded assignments, held office hours

### Planetarium Organizer

2018 – 2018

UNIVERSITY OF WASHINGTON

→ scheduled planetarium presentations, managed ticket sales and social media

### Teaching Assistant

2017 – 2018

UNIVERSITY OF WASHINGTON

→ led multiple weekly in-class sections, assisted students in labs, presented planetarium shows

## publications

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h-index: 6

Hedges, C., **Saunders, N.**, Barentsen, G., Coughlin, J., Vinícius de Miranda Cardoso, J., Kostov, V., Dotson, J., Cody, A.M. (2019) [Four Small Planets Buried in K2 Systems: What Can We Learn for TESS?](#) ApJL, 880, 1

**Saunders, N.**, Luger, R., Barnes, R. (2019) [The Pointing Limits of Transiting Exoplanet Light Curve Characterization with Pixel Level De-correlation](#). AJ, 157, 197

Feinstein, A.D., Montet, B.T., Bean, J.L., Bedell, M.E., Christiansen, J., Foreman-Mackey, D., Hedges, C., Luger, R., **Saunders, N.**, Scolnic, D., Vinícius de Miranda Cardoso, J. (2019) [eleanor: A tool for extracting light curves from the TESS Full-Frame Images](#). PASP, 131, 1003

David, T., Cody, A., Hedges, C., Mamajek, E., Hillenbrand, L., Ciardi, D., Beichman, C., Petigura, E., Fulton, B., Isaacson, H., Howard, A., Gagné, J., **Saunders, N.**, Rebull, L., Stauffer, J., Vasisht, G., Hinkley, S. (2019) [A warm Jupiter-sized planet transiting the pre-main sequence star V1298 Tau](#). AJ, 158, 2

Mahabal, A., Rebbapragada, U., Walters, R. et al. (including **Saunders, N.**) (2019) [Machine Learning for the Zwicky Transient Facility](#). PASP, 131, 997

Hedges, C., **Saunders, N.**, Barentsen, G., Gully-Santiago, M., Cody, A.M., Vinícius de Miranda Cardoso, J. (2019) [A Hot Jupiter Exoplanet Candidate towards the Galactic Center Identified in Kepler/K2 Campaign 9 Microlensing Survey](#). RNAAS, 3, 1

Barentsen, G., Hedges, C., **Saunders, N.**, Cody, A.M., Gully-Santiago, M., Bryson, S., Dotson, J. (2018) [Kepler's Discoveries Will Continue: 21 Important Scientific Opportunities with Kepler & K2 Archive Data](#). arXiv:1810.12554

Cody, A.M., Barentsen, G., Hedges, G., Gully-Santiago, M., Dotson, J., Barclay, T., Bryson, S., **Saunders, N.** (2018) [A catalog of 29 open clusters and associations observed by the Kepler and K2 Missions](#). RNAAS, 2, 4

Luger, R., Kruse, E., Foreman-Mackey, D., Agol, E., **Saunders, N.** (2018) [An Update to the EVEREST K2 Pipeline: Short Cadence, Saturated Stars, and Kepler-like Photometry down to Kp = 15](#). AJ, 156, 99

## posters

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**Saunders, N.**, Luger, R., "Quantifying Biases with Simulated Kepler/K2 Exoplanet Light Curves," Kepler SciCon V, Glendale, CA, Mar 2019

**Saunders, N.**, M. Gully-Santiago, C. Hedges, G. Barentsen, J. Dotson, "Exoplanet Science with the Lightkurve Python Package," AAS 233, Seattle, WA, Jan 2019

## talks

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### science →

- Saunders, N.**, "Revealing the Mysteries of Planets Around Evolved Stars with TESS," AAS 235, Honolulu, HI, Jan 2020
- Saunders, N.**, "A Catalog of Uniform Exoplanet Parameters," CIPS Seminar, University of California, Berkeley, CA, Apr 2019
- Saunders, N.**, "Analysis of Simulated Kepler/K2 Exoplanet Transit Parameters," AAS 233, Seattle, WA, Jan 2019
- Saunders, N.**, "Simulated CCD Photometry: An Application for K2 Sputtering," Kepler/K2 Science Office, NASA Ames, Moffett Field, CA, May 2018
- Saunders, N.**, "Searching for Exoplanets with Sputtering Space Telescopes," UW Undergraduate Research Symposium, Seattle, WA, May 2018
- Saunders, N.**, Luger, R., Barnes, R., "De-trending K2 Exoplanet Targets for High Spacecraft Motion," AAS 231, Washington DC, Jan 2018
- Saunders, N.**, Luger, R., "Sputtering Effects on K2 Systematics Removal," Kepler/K2 Guest Observer Office, NASA Ames, Moffett Field, CA, Oct 2017
- Saunders, N.**, "Effects of Pixel Sensitivity Variation on K2 Systematics Removal," UW Undergraduate Research Symposium, Seattle, WA, May 2017

### outreach →

- Saunders, N.**, "Putting the Science in Science Fiction," Astronomy on Tap, San Jose, CA May 2019
- Saunders, N.**, "Putting the Science in Science Fiction," Astronomy on Tap, Seattle, WA, Apr 2018
- Saunders, N.**, "The Search for Habitable Worlds," Astrobiology Mini Talks, Museum of Flight, Seattle, WA, Apr 2018

## outreach

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**"HI STAR" Mentor** 2020

INSTITUTE FOR ASTRONOMY, UNIVERSITY OF HAWAI'I AT MĀNOA

→ led team of high school students as they conducted a one-week astronomy research project

**Astrobiology Mobile Planetarium Presenter** 2018

UNIVERSITY OF WASHINGTON

→ presented planetarium shows with UW's inflatable dome to rural schools to introduce the study of astrobiology

**Undergraduate Liaison to the Astronomy Department Faculty Board** 2017 – 2018

UNIVERSITY OF WASHINGTON

→ attended faculty meetings; reported undergraduate concerns; communicated with both faculty and students

**NASA Total Solar Eclipse Outreach Event Volunteer** 2017

WASHINGTON NASA SPACE GRANT CONSORTIUM

→ organized educational outreach activities at a middle school on the Warm Springs Indian Reservation

→ assembled and managed telescopes for solar and planetary observation

**UW Planetarium Volunteer Presenter** 2015 – 2018

UNIVERSITY OF WASHINGTON

→ performed multiple shows each month for public and private audiences

## honors

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| 2019 | <b>Honorable Mention</b> , National Science Foundation Graduate Research Fellowship Program        |
| 2018 | <b>Departmental Honors in Astronomy</b> , University of Washington                                 |
| 2018 | <b>"Kudos of the Quarter,"</b> University of Washington Astronomy Department                       |
| 2016 | <b>1<sup>st</sup> Place: Best Online Photo Essay</b> , Washington Newspaper Publishers Association |
| 2016 | <b>2<sup>nd</sup> Place: Best Video</b> , Washington Newspaper Publishers Association              |
| 2013 | <b>Washington NASA Space Grant</b> , University of Washington                                      |
| 2013 | <b>Irving and Louise Donnergaard Endowment</b> , University of Washington                          |