# Nicholas Saunders

NSF Graduate Research Fellow

saunders.nk@gmail.com | github.com/nksaunders | nksaunders.space

## EDUCATION

**University of Hawai'i at Mānoa**

**PhD** Astronomy — advisors: Daniel Huber, Jennifer van Saders — expected 2025

**MSc** Astronomy — June 2021

**University of Washington**

**BS** Physics & Astronomy (with Honors) — advisors: Rodrigo Luger, Rory Barnes — June 2018

**BA** Comparative Literature (emphasis: Cinema Studies) — June 2018

## APPOINTMENTS

**Visiting Scientist** — Aug 2021 – present
Department of Astrophysics, American Museum of Natural History, New York, NY

**NSF Graduate Research Fellow** — Sept 2019 – present
Institute for Astronomy, University of Hawai'i at Mānoa, Honolulu, HI

**Undergraduate Research Assistant** — Jan 2016 – Aug 2018
University of Washington, Seattle, WA

**Planetary Science Intern** — Apr 2011 – June 2013
The Bear Fight Institute, Winthrop, WA

## RELEVANT EMPLOYMENT

**Kepler & K2 Training Materials Developer** — Apr 2020 – Sept 2020
NumFocus, STScI, The Astropy Project, Remote from Honolulu, HI

**Research Support Scientist**, Kepler/K2 Guest Observer Office — Aug 2018 – Aug 2019
NASA Ames Research Center, Mountain View, CA

**Data Visualization Analyst**, UW Mobile Planetarium — June 2018 – Aug 2018
University of Washington, Seattle, WA

## GRANTS, AWARDS, & TELESCOPE TIME

| | | |
|---|---|---|
| "The Fate of Planets Transiting Evolved Stars," Keck/KPF (UH) | **PI, 3n** | 2023 – present |
| "The Fate of Planets Transiting Evolved Stars," Keck/HIRES (UH) | **PI, 9n** | 2022 – present |
| "Planetary Archaeology…" Keck/HIRES (NASA) | **Co-I, 5n, $55,662** | 2021 – present |
| Travel Award, Aspen Center for Physics Winter Workshop | **$1,903.30** | 2023 |
| "Planetary Archaeology…" TESS Space Telescope (TESS GI) | **Co-I, $70,000** | 2021 |
| National Science Foundation Graduate Research Fellowship | | 2021 |
| Honorable Mention, National Science Foundation Graduate Research Fellowship | | 2019 |
| Departmental Honors in Astronomy, University of Washington | | 2018 |
| 1st Place: Best Online Photo Essay, Washington Newspaper Publishers Association | | 2016 |
| Washington NASA Space Grant, University of Washington | | 2013 |
| Irving and Louise Donnergaard Endowment, University of Washington | | 2013 |

## PUBLICATIONS

NASA ADS | **22** total publications (3 first author, 7 second author) | **1,900+** total citations | h-index = **11**

First Author

3. **Saunders, N.**, van Saders, J., Lyttle, A. et al. (2023, submitted) Stellar Cruise Control: Weakened Magnetic Braking Leads to Sustained Rapid Rotation of Old Stars. arXiv:2309.05666
2. **Saunders, N.**, Grunblatt, S., Huber, D., et al. (2022) TESS Giants Transiting Giants I. A Non-inflated Hot Jupiter Orbiting a Massive Subgiant. AJ, 163, 2

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

Co-author

19. Pereira, F., Grunblatt, S., Psaridi, A. et al. including **Saunders, N.** (2023, submitted) TESS Giants Transiting Giants V. Two hot Jupiters orbiting red-giant hosts. arXiv: 2311.06678
18. Hey, D., Huber, D., Shappee, J. et al. including **Saunders, N.** (2023, submitted) The Far Side of the Galactic Bar/Bulge Revealed Through Semi-Regular Variables. aXiv:2305.19319
17. Grunblatt, S., **Saunders, N.**, Huber D. et al. (2023, submitted) An Unlikely Survivor: A Low-density Hot Neptune Orbiting a Red Giant Star. arXiv:2303.06728
16. Grunblatt, S., **Saunders, N.**, Chontos, A. et al. (2023) TESS Giants Transiting Giants III. An Eccentric Warm Jupiter Supports a Period-Eccentricity Relation for Giant Planets Transiting Evolved Stars. AJ, 165, 2
15. Vissapragada, S., Chontos, A., Greklek-McKeon, M. et al. including **Saunders, N.** (2022) The Possible Tidal Demise of Kepler's First Planetary System. ApJL, 941, 2
14. The Astropy Collaboration, Price-Whelan, A. M., Lian Lim, P. et al. including **Saunders, N.** (2022) The Astropy Project: Sustaining and Growing a Community-oriented Open-source Project and the Latest Major Release (v5.0) of the Core Package. ApJ, 935, 2
13. Grunblatt, S., **Saunders, N.**, Sun, M. et al. (2022) TESS Giants Transiting Giants II. The Hottest Jupiters Orbiting Evolved Stars. AJ, 163, 3
12. Stello, D., **Saunders, N.**, Grunblatt, S., et al. (2022) TESS asteroseismology of the Kepler red giants. MNRAAS, 512, 2
11. Hedges, C., **Saunders, N.**, Martínez-Palomera, J. (2021) Contaminante: A Tool for Automatically Finding a Close-to-optimal Aperture for Transiting Signals in Kepler, K2, and TESS Data. RNAAS, 5, 260
10. Grunblatt, S., Zinn, J., Price-Whelan, A., Angus, R., **Saunders, N.** et al. (2021) Age-Dating Red Giant Stars Associated with Galactic Disk and Halo Substructures. ApJ, 916, 88
9. Hedges, C., Angus, R., Barentsen, G., **Saunders, N.**, Montet, B.T., Gully-Santiago, M. (2020) Systematics-insensitive Periodogram for Finding Periods in TESS Observations of Long-period Rotators. RNAAS, 4, 220
8. 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
7. Feinstein, A.D., Montet, B.T., Bean, J.L. et al. including **Saunders, N.** (2019) eleanor: A tool for extracting light curves from the TESS Full-Frame Images. PASP, 131, 1003
6. David, T., Cody, A.M., Hedges C. et al. including **Saunders, N.** (2019) A warm Jupiter-sized planet transiting the pre-main sequence star V1298 Tau. AJ, 158, 2
5. Mahabal, A., Rebbapragada, U., Walters, R. et al. including **Saunders, N.** (2019) Machine Learning for the Zwicky Transient Facility. PASP, 131, 997
4. Hedges, C., **Saunders, N.**, Barensen, G. et al. (2019) A Hot Jupiter Exoplanet Candidate towards the Galactic Center Identified in Kepler/K2 Campaign 9 Microlensing Survey. RNAAS, 3, 1
3. Barentsen, G., Hedges, C., **Saunders, N.** et al. (2018) Kepler's Discoveries Will Continue: 21 Important Scientific Opportunities with Kepler & K2 Archive Data. arXiv:1810.12554
2. 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
1. 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

## ADVISING

Undergraduate

**Advisor**, Alicia Chun, Research Experience for Undergraduates, University of Chicago — May 2023 – July 2023
**Co-advisor**, Erica Sawczynec, Undergraduate Honors Thesis, UH Mānoa — June 2019 – June 2021

High School Students & Teachers

**Advisor**, Anica Ancheta, Dominic Rice, Holden Suzuki, HI STAR Research, HI High Schools — May 2023 – June 2023
**Co-advisor**, Alison English, Research Experience for Teachers, Honoka'a High School — June 2022
**Advisor**, Wilson Chau, Pono Fortune, Gabe Mckillip, HI STAR Research, HI High Schools — July 2020

## TEACHING & OUTREACH

| | |
|---|---|
| "Dying stars swallowing nearby planets," Interview, Hawai'i Public Radio | Jan 2022 |
| Science Pen Pal, Letters to a Pre-Scientist | Sept 2020 – June 2021 |
| Graduate Teaching Assistant, University of Hawai'i | Aug 2019 – Jan 2020 |
| Planetarium Organizer, University of Washington | Jan 2018 – Aug 2018 |
| Teaching Assistant, University of Washington | Jan 2017 – June 2018 |
| Astrobiology Mobile Planetarium Presenter, University of Washington | Mar 2018 |
| Volunteer, NASA Total Solar Eclipse Outreach Event | Aug 2017 |
| Planetarium Presenter, University of Washington | Nov 2015 – Aug 2018 |

## OPEN-SOURCE SOFTWARE

Lead developer → **giants**: TESS full-frame image photometry & planet search pipeline
Core developer → **lightkurve**: time-series analysis tools for Kepler/K2 & TESS
Core developer → **eleanor**: TESS full-frame image photometry pipeline
Contributor → **everest**: K2 noise removal pipeline

## SERVICE

| | |
|---|---|
| LOC Member, TESS/Kepler Asteroseismic Science Consortium | 2023 |
| Graduate Student Representative, University of Hawai'i at Mānoa | Aug 2022 – Aug 2023 |
| Graduate Outreach Representative, University of Hawai'i at Mānoa | Aug 2022 – Aug 2023 |
| Undergraduate Liaison, University of Washington Astronomy Department Faculty Board | Sept 2017 – Aug 2018 |

## TALKS

Invited Talks

| | |
|---|---|
| "Orbital Evolution of Giant Planets…" ESPF Seminar, STScI, Johns Hopkins University, Baltimore, MD | Jan 2023 |
| "A Catalog of Uniform Exoplanet Parameters," CIPS Seminar, University of California, Berkeley, CA | Apr 2019 |
| "Sputtering Effects on K2…" Kepler/K2 Guest Observer Office, NASA Ames, Moffett Field, CA | Oct 2017 |

Contributed Talks

| | |
|---|---|
| "Evidence for Efficient Tidal Realignment of Hot Jupiters…" TASC7 / KASC14, Honolulu HI | July 2023 |
| "Orbital Evolution of Giant Planets After the Main Sequence," AAS 241, Seattle, WA | Jan 2023 |
| "TESS Giants Transiting Giants IV: The Hottest Evolved Neptune," AAS 241, Seattle, WA | Jan 2023 |
| "Tracing Hot Jupiter Evolution," Dissertation Proposal, University of Hawai'i | Dec 2021 |
| "Refining Weakened Magnetic Braking with Hierarchical Modeling," University of Hawai'i | June 2021 |
| "TOI-2184b: A Non-inflated Hot Jupiter…" TESS Science Team Meeting #25, Virtual | Mar 2021 |
| "Revealing the Mysteries of Exoplanets Around Evolved Stars with TESS," University of Hawai'i | Sept 2020 |
| "Revealing the Mysteries of Exoplanets Around Evolved Stars with TESS," AAS 235, Honolulu, HI | Jan 2020 |
| "Analysis of Simulated Kepler/K2 Exoplanet Transit Parameters" AAS 233, Seattle, WA | Jan 2019 |
| "Simulated CCD Photometry," Kepler/K2 Science Office, NASA Ames, Moffett Field, CA | May 2018 |
| "Searching for Exoplanets…" UW Undergraduate Research Symposium, Seattle, WA | May 2018 |
| "De-trending K2 Exoplanet Targets for High Spacecraft Motion," AAS 231, Washington DC | Jan 2018 |
| "K2 Pixel Sensitivity Variations," UW Undergraduate Research Symposium, Seattle, WA | May 2017 |

Outreach Talks

| | |
|---|---|
| "Exploring Strange New Worlds," HI STAR, UH Maui College, Kahului, HI | June 2023 |
| "Putting the Science in Science Fiction," Astronomy on Tap, San Jose, CA | May 2019 |
| "Putting the Science in Science Fiction," Astronomy on Tap, Seattle, WA | Apr 2018 |
| "The Search for Habitable Worlds," Astrobiology Mini Talks, Museum of Flight, Seattle, WA | Apr 2018 |

## POSTERS

| | |
|---|---|
| "Stellar Cruise Control: Weakened Magnetic Braking…" TASC7 / KASC14, Honolulu, HI | July 2023 |
| "Spin-Orbit (Re?) Alignment of Giant Planets," Late-Stage and Post-MS Systems Workshop, Aspen, CO | Mar 2023 |
| "Giants Transiting Giants," Late-Stage and Post-MS Systems Workshop, Aspen, CO | Mar 2023 |
| "Evidence for Weakened Magnetic Braking in Old Stars," TASC6 / KASC13, Leuven, Belgium | July 2022 |
| "Evidence for Weakened Magnetic Braking in Old Stars," Cool Stars 21, Toulouse, France | July 2022 |

"No Planet Left Behind…" Exoplanets IV, Las Vegas, NV — May 2022
"Quantifying Biases with Simulated Kepler/K2 Light Curves," Kepler SciCon V, Glendale, CA — Mar 2019
"Exoplanet Science with the Lightkurve Python Package," AAS 233, Seattle, WA — Jan 2019