Nicholas Saunders

NSF Graduate Research Fellow

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

RESEARCH INTERESTS

Detection and characterization of exoplanets; space telescopes; asteroseismology; stellar evolution modeling; gyrochronology; computational astrophysics; software development.

EDUCATION

INSTITUTE FOR ASTRONOMY, UNIVERSITY OF HAWAIʻI AT MĀNOA

PhD Astronomy — expected 2025

MSc Astronomy — June 2021

UNIVERSITY OF WASHINGTON

BS Physics & Astronomy (with Honors) — 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
Advisors: Dan Huber, Sam Grunblatt, Jen van Saders
INSTITUTE FOR ASTRONOMY, UNIVERSITY OF HAWAIʻI AT MĀNOA, HONOLULU, HI

Undergraduate Research Assistant — Jan 2016 – Aug 2018
Advisors: Rodrigo Luger, Rory Barnes
UNIVERSITY OF WASHINGTON, SEATTLE, WA

Planetary Science Research Assistant — Apr 2011 – June 2013
Advisors: Bernard Nordmann, Tom McCord
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

HONORS

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 | h-index: **11**

first author →

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 →

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., 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
3. 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
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

GRANTS, AWARDS, & TELESCOPE TIME

The Fate of Planets Transiting Evolved Stars	Keck/KPF	**PI, 1n**	2023 – present
The Fate of Planets Transiting Evolved Stars	Keck/HIRES	**PI, 5n**	2022 – present
Planetary Archaeology (NASA Keck)	Keck/HIRES	**Co-I, 5n, $55,662**	2021 – present
Planetary Archaeology (TESS GI)	TESS	**Co-I, $70,000**	May 2021

SOFTWARE

			GitHub ★'s
Lead Developer	→	scope – simulated K2 CCD observations to test noise removal	6
Core Developer	→	lightkurve – time series analysis tools for Kepler, K2 & TESS	334
Core Developer	→	eleanor – photometry pipeline for TESS Full Frame Images	77
Contributor	→	everest – K2 noise removal pipeline	37

SERVICE

LOC Member, TESS/Kepler Asteroseismic Science Consortium	2023
Graduate Student Representative, University of Hawai'i at Mānoa	Aug 2022 – present
Graduate Outreach Representative, University of Hawai'i at Mānoa	Aug 2022 – Aug 2023

TEACHING & OUTREACH

Science Pen Pal — Sept 2020 – June 2021
LETTERS TO A PRE-SCIENTIST

Project Mentor, "HI STAR" High School Summer Research — July 2020
INSTITUTE FOR ASTRONOMY, UNIVERSITY OF HAWAI'I AT MĀNOA

Graduate Teaching Assistant — Aug 2019 – Jan 2020
INSTITUTE FOR ASTRONOMY, UNIVERSITY OF HAWAI'I AT MĀNOA

Planetarium Organizer — Jan 2018 – Aug 2018
UNIVERSITY OF WASHINGTON

Teaching Assistant — Jan 2017 – June 2018
UNIVERSITY OF WASHINGTON

Astrobiology Mobile Planetarium Presenter — Mar 2018
UNIVERSITY OF WASHINGTON

Undergraduate Liaison, Astronomy Department Faculty Board — Sept 2017 – Aug 2018
UNIVERSITY OF WASHINGTON

NASA Total Solar Eclipse Outreach Event Volunteer — Aug 2017
WASHINGTON NASA SPACE GRANT CONSORTIUM

UW Planetarium Volunteer Presenter — Nov 2015 – Aug 2018
UNIVERSITY OF WASHINGTON

TALKS

science talks →

Saunders, N., Grunblatt, S., Huber, D., van Saders, J. "Orbital Evolution of Giant Planets After the Main Sequence," AAS 241, Seattle, WA, Jan 2023

Saunders, N., Grunblatt, S., Huber D. et al. "TESS Giants Transiting Giants IV: The Hottest Evolved Neptune," AAS 241, Seattle, WA, Jan 2023

Saunders, N., van Saders, J. "Refining Weakened Magnetic Braking with a Hierarchical Model for Stellar Rotation," Institute for Astronomy, University of Hawai'i at Mānoa, Honolulu, HI, June 2021

Saunders, N. "TOI-2184b: A Non-inflated Hot Jupiter Orbiting a Massive Subgiant," TESS Science Team Meeting #25, Mar 2021

Saunders, N., Huber, D., Grunblatt, S. "Revealing the Mysteries of Exoplanets Around Evolved Stars with TESS," Institute for Astronomy, University of Hawai'i at Mānoa, Honolulu, HI, Sept 2020

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 20182

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 talks →

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

POSTERS

Saunders, N., Grunblatt, S., Huber, D., Hon, M., van Saders, J. "Spin-Orbit (Re?) Alignment of Giant Planets Transiting Evolved Stars," Exoplanet Systems and Stellar Life Cycles: Late-Stage and Post-MS Systems, Aspen, CO, March 2023

Saunders, N., Grunblatt, S., Huber, D., Hon, M., van Saders, J. "Giants Transiting Giants: Unraveling the Evolution of Planetary Systems," Exoplanet Systems and Stellar Life Cycles: Late-Stage and Post-MS Systems, Aspen, CO, March 2023

Saunders, N., van Saders, J. "Evidence for Weakened Magnetic Braking in Old Stars," TASC6 / KASC13, Leuven, Belgium, July 2022

Saunders, N., van Saders, J. "Evidence for Weakened Magnetic Braking in Old Stars," Cool Stars 21, Toulouse, France, July 2022

Saunders, N., Grunblatt, S., Huber, D. "No Planet Left Behind: A Search for Giant Planets Orbiting Giant Stars with TESS," Exoplanets IV, Las Vegas, NV, May 2022

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