

Shubham Kanodia

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[ADS]

Appointments

Carnegie Institution for Science

Washington, DC, USA

Carnegie Postdoctoral Fellow, Earth and Planets Laboratory

July 2022 - Present

From Pixels to Population: Understanding Gas Giants around M dwarfs

Pennsylvania State University

Pennsylvania, USA

Research Technologist

February 2017 - July 2017

HPF and NEID spectrograph design and instrument assembly

Education

Pennsylvania State University

Pennsylvania, USA

Doctor of Philosophy (Ph.D.) Astrophysics

May 2019 - May 2022

Developing new tools and techniques to probe the M dwarf planet population

Pennsylvania State University

Pennsylvania, USA

Master of Science (M.Sc.) Astrophysics

Sept 2017 - May 2019

Combining the Next Generation of Exoplanet Instrumentation & Astrostatistics

Brown University

Rhode Island, USA

Master of Science (Sc.M.) Physics

Sept 2015 - Dec 2016

Optical Design of the Exoplanet Climate Infrared Telescope Spectrometer

St. Xavier's College

Mumbai, India

Bachelor of Science (B.Sc.) Physics

June 2012 - Apr 2015




Awards

- Carnegie Postdoctoral Fellow, Carnegie Earth & Planets Lab, 2022 onwards
- Downsborough Graduate Fellowship in Astrophysics, Penn State, 2021
- Zaccheus Daniel Fellowship, Penn State, 2018, 2020, 2021
- Homer F. Braddock / Nellie H. and Oscar L. Roberts Fellowship, Penn State, 2017
- J.N. Tata Endowment Fund for Higher Education, Mumbai, 2015
- INSPIRE Scholarship - Government of India, Mumbai, 2013

Telescope Time Allocation

- JWST Cycle 2 (GO 3171): 133 hours
- HET 10 m HPF: > 50 nights
- Gemini-N 8 m MAROON-X: 1.5 nights
- PFS 6.5 Magellan: 4 nights
- ARC 3.5 m: > 50 half nights
- WIYN 3.5 m NEID: > 15 nights

Software

- [pyastrotools](#) - Repository with set of astronomy helper functions 
- [barycorrpy](#) - Python package for barycentric corrections at the cm/s level for precise radial velocity measurements. Used for HPF, NEID, SPIROU, EXPRES, CARMENES (Kanodia and Wright, 2018; Wright and Kanodia, 2020). 
- [MRExo](#) - Nonparametric tool used to fit mass-radius relationships using beta density functions. It is currently being expanded to simultaneously fit 5 dimensions to model additional planetary parameters (Kanodia et al. 2019). 

Professional Talks

- Strange New Worlds, Pune, August 2023
- Origins of Solar Systems, Gordon Research Seminar, June 2023
- EPL General Seminar, Carnegie EPL, February 2023
- School of Earth and Planetary Sciences (SEPS), NISER Bhubaneswar, March 2023
- [SPIE Astronomical Telescopes + Instrumentation, Montreal, August 2022](#)
- DAA Seminar, Tata Institute for Fundamental Research, Mumbai, March 2022
- EPL Astronomy Seminar, Carnegie EPL, October 2021
- PSU Center for Exoplanets and Habitable Worlds Seminar, PSU, September 2021
- [NASA Goddard Extrasolar Planets Seminar, NASA Goddard, September 2021](#)
- [Order of the Octopus, PSU, July 2021](#)
- [PSETI Seminar, PSU, October 2020](#)
- NASA Technosignatures Workshop, USRA, September 2018
- Emerging Researchers in Exoplanet Science Symposium, PSU, June 2018

Poster Presentations

- [Extreme Precision Radial Velocity V, March 2023](#)
- [Planet ESLAB 2023](#)
- [Exoplanets IV, May 2022](#)
- [Emerging Researchers in Exoplanet Science, May 2021](#)
- [STScI Symposium, April 2021](#)
- [Cool Stars 20.5, March 2021](#)
- [SPIE Astronomical Telescopes and Instrumentation 2020, December 2020](#)
- [Extreme Precision Radial Velocity IV, March 2019](#)
- [SPIE Astronomical Telescopes and Instrumentation 2018, June 2018](#)

Outreach

- **Public Talks -**
 - Astronomy on Tap: State College, USA, *Digging through the Cosmic Haystack*, 2019
 - Nerd Nite: Webster's Cafe, State College, USA, *Searching for other worlds, other life*, 2019
 - Nehru Planetarium, Mumbai, India, *Finding Earth 2.0*, 2018

○ Education -

- Volunteered for Carnegie Academy of Science (CASE) - First Light science program for middle-school kids (2022-23)
- Volunteered for Astrofest - Penn State Department of Astronomy Annual outreach event (2017, 2018, 2019)
- Volunteered with Brown Cubesat Educational Outreach Saturday STEM program at West Broadway Middle School to communicate Science and Physics to students. (2015 - 2016)
- Volunteered at Umang Foundation, Mumbai - teaching underprivileged children basic Mathematics and English. (2012 - 2014)

Academic Service

NSF's NOIRLab Telescope Time Allocation Committee

Panel Member

NASA Exoplanets Research Program (XRP)

Panel Member, Executive Secretary

ApJ, AJ, MNRAS, International Journal of Astrobiology

Referee

Emerging Researchers in Exoplanet Sciences IV, VII

Organizing Committee

2018, 2022

Teaching

Teaching probabilistic programming

Pennsylvania State University

State College

2021 and 2022

Developed and taught a course on probabilistic programming, and statistical inference using the Hamiltonian Monte Carlo Python code - PyMC3 and package `exoplanet`.

Teaching Assistant for Astronomy lab

Brown University

Providence, USA

Jan 2016 - Apr 2016

Lab assistant for basic astronomy lab course. (Prof. Ian Dell'Antonio)

Mentoring & Advising

- Helen Baran (2019 – 2020) - Undergraduate at Pennsylvania State University
- Marissa Maney (2019 – 2021) - Undergraduate at Pennsylvania State University
- Brody McElwain (2020 – 2022) - Master's student at Pennsylvania State University
- Megan Delamer (2022 –) - PhD student at Pennsylvania State University
- Narisara (Mick) Mayer (2023) - Undergraduate at Haverford College

Publications

First Author (Refereed): 12 (9); Significant Contributions: 14

Total Citations: 889 on 24 August, 2023. [\[ADS\]](#)

First Author.....

12. **S. Kanodia**, M. He, E. Ford, et al., *Beyond 2-D Mass-Radius Relationships: A Non-parametric and Probabilistic Framework for Characterizing Planetary Samples in Higher Dimensions*, arXiv e-prints, 2023 [\[ADS\]](#)
11. **S. Kanodia**, A. Lin, E. Lubar, et al., *Stable Fiber-illumination for Extremely Precise Radial Velocities with NEID*, AJ, 166, 3, 2023 [\[ADS\]](#)
10. **S. Kanodia**, S. Mahadevan, J. Libby-Roberts, et al., *TOI-5205b: A Short-period Jovian Planet Transiting a Mid-M Dwarf*, AJ, 165, 3, 2023 [\[ADS\]](#)
9. **S. Kanodia**, L. Ramsey, M. Maney, et al., *High-resolution Near-infrared Spectroscopy of a Flare around the Ultracool Dwarf *vB 10**, ApJ, 925, 2, 2022 [\[ADS\]](#)
8. **S. Kanodia**, J. Libby-Roberts, C. Cañas, et al., *TOI-3757 b: A Low-density Gas Giant Orbiting a Solar-metallicity M Dwarf*, AJ, 164, 3, 2022 [\[ADS\]](#)
7. **S. Kanodia**, G. Stefansson, C. Cañas, et al., *TOI-532b: The Habitable-zone Planet Finder confirms a Large Super Neptune in the Neptune Desert orbiting a metal-rich M-dwarf host*, AJ, 162, 4, 2021 [\[ADS\]](#)
6. **S. Kanodia**, S. Halverson, J. Ninan, et al., *A Harsh Test of Far-field Scrambling with the Habitable-zone Planet Finder and the Hobby-Eberly Telescope*, ApJ, 912, 1, 2021 [\[ADS\]](#)
5. **S. Kanodia**, C. Cañas, G. Stefansson, et al., *TOI-1728b: The Habitable-zone Planet Finder Confirms a Warm Super-Neptune Orbiting an M-dwarf Host*, ApJ, 899, 1, 2020 [\[ADS\]](#)
4. **S. Kanodia**, J. Ninan, A. Monson, et al., *Ghosts of NEID's past*, Ground-based and Airborne Instrumentation for Astronomy VIII, SPIE, 11447, 2020 [\[ADS\]](#)
3. **S. Kanodia**, A. Wolfgang, G. Stefansson, et al., *Mass-Radius Relationship for M Dwarf Exoplanets: Comparing Nonparametric and Parametric Methods*, ApJ, 882, 1, 2019 [\[ADS\]](#)
2. **S. Kanodia**, and J. Wright, *Python Leap Second Management and Implementation of Precise Barycentric Correction (*barycorrpy*)*, RNAAS, 2, 1, 2018 [\[ADS\]](#)
1. **S. Kanodia**, S. Mahadevan, L. Ramsey, et al., *Overview of the spectrometer optical fiber feed for the habitable-zone planet finder*, SPIE, 10702, 2018 [\[ADS\]](#)

Significant Contributions.....

14. C. Cañas, **S. Kanodia**, J. Libby-Roberts, et al., *TOI-3984 A b and TOI-5293 A b: Two Temperate Gas Giants Transiting Mid-M Dwarfs in Wide Binary Systems*, AJ, 166, 1, 2023 [\[ADS\]](#)
13. M. Lambert, C. Bender, **S. Kanodia**, et al., *TOI-5375 B: A Very Low Mass Star at the Hydrogen-burning Limit Orbiting an Early M-type Star*, AJ, 165, 5, 2023 [\[ADS\]](#)
12. S. Sheikh, **S. Kanodia**, E. Lubar, et al., *A Green Bank Telescope Search for Narrowband Technosignatures between 1.1 and 1.9 GHz During 12 Kepler Planetary Transits*, AJ, 165, 2, 2023 [\[ADS\]](#)
11. M. Delamer, **S. Kanodia**, C. Cañas, et al., *TOI-4201: An Early M-dwarf Hosting a Massive Transiting Jupiter Stretching Theories of Core-Accretion*, arXiv e-prints, None, 2023 [\[ADS\]](#)

10. A. Lin, A. Monson, S. Mahadevan, et al., *Observing the Sun as a Star: Design and Early Results from the NEID Solar Feed*, AJ, 163, 4, 2022 [\[ADS\]](#)
9. C. Beard, P. Robertson, **S. Kanodia**, et al., *GJ 3929: High-precision Photometric and Doppler Characterization of an Exo-Venus and Its Hot, Mini-Neptune-mass Companion*, ApJ, 936, 1, 2022 [\[ADS\]](#)
8. C. Cañas, **S. Kanodia**, C. Bender, et al., *TOI-3714 b and TOI-3629 b: Two Gas Giants Transiting M Dwarfs Confirmed with the Habitable-zone Planet Finder and NEID*, AJ, 164, 2, 2022 [\[ADS\]](#)
7. C. Beard, P. Robertson, **S. Kanodia**, et al., *TOI-1696 and TOI-2136: Constraining the Masses of Two Mini-Neptunes with the Habitable-Zone Planet Finder*, AJ, 163, 6, 2022 [\[ADS\]](#)
6. J. Wright, and **S. Kanodia**, *Barycentric Corrections for Precise Radial Velocity Measurements of Sunlight*, PSJ, 1, 2, 2020 [\[ADS\]](#)
5. G. Stefánsson, R. Kopparapu, A. Lin, et al., *A Mini-Neptune and a Radius Valley Planet Orbiting the Nearby M2 Dwarf TOI-1266 in Its Venus Zone: Validation with the Habitable-zone Planet Finder*, AJ, 160, 6, 2020 [\[ADS\]](#)
4. C. Cañas, G. Stefánsson, **S. Kanodia**, et al., *A Warm Jupiter Transiting an M Dwarf: A TESS Single-transit Event Confirmed with the Habitable-zone Planet Finder*, AJ, 160, 3, 2020 [\[ADS\]](#)
3. C. Schwab, A. Monson, **S. Kanodia**, et al., *The NEID spectrometer: fibre injection system design*, SPIE, 11447, 2020 [\[ADS\]](#)
2. A. Metcalf, T. Anderson, C. Bender, et al., *Stellar spectroscopy in the near-infrared with a laser frequency comb*, Optica, 6, 2, 2019 [\[ADS\]](#)
1. J. Wright, **S. Kanodia**, and E. Lubar, *How Much SETI Has Been Done? Finding Needles in the n-dimensional Cosmic Haystack*, AJ, 156, 6, 2018 [\[ADS\]](#)

Co-Author.....

33. G. Stefánsson, S. Mahadevan, Y. Miguel, et al., *An extreme test case for planet formation: a close-in Neptune orbiting an ultracool star*, arXiv e-prints, None, 2023 [\[ADS\]](#)
32. J. Dong, S. Wang, M. Rice, et al., *TOI-1859b: A 64 Day Warm Jupiter on an Eccentric and Misaligned Orbit*, ApJ, 951, 2, 2023 [\[ADS\]](#)
31. A. Gupta, J. Jackson, G. Hébrard, et al., *A High-Eccentricity Warm Jupiter Orbiting TOI-4127*, AJ, 165, 6, 2023 [\[ADS\]](#)
30. L. Powers, J. Libby-Roberts, A. Lin, et al., *TOI-3785 b: A Low-density Neptune Orbiting an M2-dwarf Star*, AJ, 166, 2, 2023 [\[ADS\]](#)
29. J. Libby-Roberts, M. Schutte, L. Hebb, et al., *An In-depth Look at TOI-3884b: A Super-Neptune Transiting an M4Dwarf with Persistent Starspot Crossings*, AJ, 165, 6, 2023 [\[ADS\]](#)
28. R. Frazier, G. Stefánsson, S. Mahadevan, et al., *NEID Reveals That the Young Warm Neptune TOI-2076 b Has a Low Obliquity*, ApJ, 944, 2, 2023 [\[ADS\]](#)
27. A. Lin, J. Libby-Roberts, J. Alvarado-Montes, et al., *The Unusual M-dwarf Warm Jupiter TOI-1899 b: Refinement of Orbital and Planetary Parameters*, AJ, 166, 3, 2023 [\[ADS\]](#)

26. A. Lin, A. Monson, S. Mahadevan, et al., *Observing the Sun as a Star: Design and Early Results from the NEID Solar Feed*, AJ, 163, 4, 2022 [\[ADS\]](#)
25. S. Logsdon, M. Wolf, D. Li, et al., *The NEID port adapter: on-sky performance*, Ground-based and Airborne Instrumentation for Astronomy IX, 12184, 2022 [\[ADS\]](#)
24. A. Gupta, C. Bender, J. Ninan, et al., *Real-time exposure control and instrument operation with the NEID spectrograph GUI*, SPIE, 12189, 2022 [\[ADS\]](#)
23. R. Terrien, A. Keen, K. Oda, et al., *Rotational Modulation of Spectroscopic Zeeman Signatures in Low-mass Stars*, ApJ, 927, 1, 2022 [\[ADS\]](#)
22. G. Stefánsson, S. Mahadevan, C. Petrovich, et al., *The Warm Neptune GJ 3470b Has a Polar Orbit*, ApJ, 931, 2, 2022 [\[ADS\]](#)
21. J. Dong, C. Huang, G. Zhou, et al., *NEID Rossiter-McLaughlin Measurement of TOI-1268b: A Young Warm Saturn Aligned with Its Cool Host Star*, ApJ, 926, 2, 2022 [\[ADS\]](#)
20. M. Reefer, R. Luque, E. Gaidos, et al., *A Close-in Puffy Neptune with Hidden Friends: The Enigma of TOI 620*, AJ, 163, 6, 2022 [\[ADS\]](#)
19. A. Gupta, J. Luhn, J. Wright, et al., *Detection of p-mode Oscillations in HD 35833 with NEID and TESS*, AJ, 164, 6, 2022 [\[ADS\]](#)
18. C. Cañas, S. Mahadevan, C. Bender, et al., *An Eccentric Brown Dwarf Eclipsing an M dwarf*, AJ, 163, 2, 2022 [\[ADS\]](#)
17. A. Ghosh, S. Sharma, J. Ninan, et al., *Gaia 20eae: A Newly Discovered Episodically Accreting Young Star*, ApJ, 926, 1, 2022 [\[ADS\]](#)
16. C. Cañas, S. Mahadevan, W. Cochran, et al., *A Hot Mars-sized Exoplanet Transiting an M Dwarf*, AJ, 163, 1, 2022 [\[ADS\]](#)
15. A. Gupta, J. Wright, P. Robertson, et al., *Target Prioritization and Observing Strategies for the NEID Earth Twin Survey*, AJ, 161, 3, 2021 [\[ADS\]](#)
14. S. Mahadevan, G. Stefánsson, P. Robertson, et al., *The Habitable-zone Planet Finder Detects a Terrestrial-mass Planet Candidate Closely Orbiting Gliese 1151: The Likely Source of Coherent Low-frequency Radio Emission from an Inactive Star*, ApJ, 919, 1, 2021 [\[ADS\]](#)
13. J. Lubin, P. Robertson, G. Stefánsson, et al., *Stellar Activity Manifesting at a One-year Alias Explains Barnard b as a False Positive*, AJ, 162, 2, 2021 [\[ADS\]](#)
12. V. Krishnamurthy, T. Hirano, G. Stefánsson, et al., *Nondetection of Helium in the Upper Atmospheres of TRAPPIST-1b, e, and f*, AJ, 162, 3, 2021 [\[ADS\]](#)
11. S. Vissapragada, G. Stefánsson, M. Greklek-McKeon, et al., *A Search for Planetary Metastable Helium Absorption in the V1298 Tau System*, AJ, 162, 5, 2021 [\[ADS\]](#)
10. A. Roy, S. Halverson, S. Mahadevan, et al., *Solar Contamination in Extreme-precision Radial-velocity Measurements: Deleterious Effects and Prospects for Mitigation*, AJ, 159, 4, 2020 [\[ADS\]](#)
9. P. Robertson, G. Stefánsson, S. Mahadevan, et al., *Persistent Starspot Signals on M Dwarfs: Multiwavelength Doppler Observations with the Habitable-zone Planet Finder and Keck/HIRES*, ApJ, 897, 2, 2020 [\[ADS\]](#)
8. G. Stefánsson, R. Kopparapu, A. Lin, et al., *A Mini-Neptune and a Radius Valley Planet Orbiting the Nearby M2 Dwarf TOI-1266 in Its Venus Zone: Validation with the Habitable-zone Planet Finder*, AJ, 160, 6, 2020 [\[ADS\]](#)

7. G. Stefansson, C. Cañas, J. Wisniewski, et al., *A Sub-Neptune-sized Planet Transiting the M2.5 Dwarf G 9-40: Validation with the Habitable-zone Planet Finder*, AJ, 159, 3, 2020 [\[ADS\]](#)
6. J. Ninan, G. Stefansson, S. Mahadevan, et al., *Evidence for He I 10830 Å Absorption during the Transit of a Warm Neptune around the M-dwarf GJ 3470 with the Habitable-zone Planet Finder*, ApJ, 894, 2, 2020 [\[ADS\]](#)
5. G. Stefansson, S. Mahadevan, M. Maney, et al., *The Habitable Zone Planet Finder Reveals a High Mass and Low Obliquity for the Young Neptune K2-25b*, AJ, 160, 4, 2020 [\[ADS\]](#)
4. P. Robertson, T. Anderson, G. Stefansson, et al., *Ultrastable environment control for the NEID spectrometer: design and performance demonstration*, JATIS, 5, 2019 [\[ADS\]](#)
3. A. Metcalf, T. Anderson, C. Bender, et al., *Stellar spectroscopy in the near-infrared with a laser frequency comb*, Optica, 6, 2, 2019 [\[ADS\]](#)
2. J. Ninan, C. Bender, S. Mahadevan, et al., *The Habitable-Zone Planet Finder: improved flux image generation algorithms for H2RG up-the-ramp data*, SPIE, 10709, 2018 [\[ADS\]](#)
1. G. Stefansson, S. Mahadevan, L. Hebb, et al., *Toward Space-like Photometric Precision from the Ground with Beam-shaping Diffusers*, ApJ, 848, 1, 2017 [\[ADS\]](#)