

# Shubham Kanodia

5241 Broad Branch Road, NW, Washington, DC 20015-1305

🌐 <https://shbhuk.github.io/>

✉ skanodia@carnegiescience.edu

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## APPOINTMENTS

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**Carnegie Institution for Science** **Washington, DC, USA**  
Carnegie Postdoctoral Fellow, Earth and Planets Laboratory July 2022 - July 2025  
*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

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**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

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- 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

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- HET 10 m HPF: > 30 nights
- WIYN 3.5 m NEID: > 10 nights
- ARC 3.5 m: > 30 half nights
- Davey 0.4 m: > 5 nights

## SOFTWARE

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- **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

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- [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

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- [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

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- **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
- **Volunteering** -
  - 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

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### Executive Secretary

NASA The Exoplanets Research Program (XRP)

### Referee

International Journal of Astrobiology, Astronomical Journal

### Organizing Committee

Emerging Researchers in Exoplanet Sciences IV

June 2018

### Organizing Committee

Emerging Researchers in Exoplanet Sciences VII

July 2022

## TEACHING

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### Teaching probabilistic programming

Pennsylvania State University

State College

2021 and 2022

I 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 labs, eg. measuring blue shift of Andromeda, CCD imaging etc. (Prof. Ian Dell'Antonio)

## MENTORING

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- Helen Baran (2019 – 2020) - Now a graduate student at Paris Observatory
- Marissa Maney (2019 – 2021) - Now a graduate student at Harvard University
- Brody McElwain (2020 – 2022) - Undergraduate and Master's thesis. Now a graduate student at University of Arizona

## FIRST AUTHOR PUBLICATIONS

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First Author (Refereed): 10 (7); Significant Contributions: 12

Total Citations: 546 ; 22nd Sept, 2022. [\[ADS\]](#)

### REFEREED

7. **Shubham Kanodia**, S. Mahadevan, J. Libby-Roberts, and others, *TOI-5205b: A Jupiter transiting an M dwarf near the Convective Boundary*, Submitted to AAS journals [\[ADS\]](#).
6. **Shubham Kanodia**, J. Libby-Roberts, C. Canas, and others, *TOI-3757 b: A low density gas giant orbiting a solar-metallicity M dwarf*, *AJ*, 164, 3, 81 (2022) [\[ADS\]](#).
5. **Shubham Kanodia**, L. Ramsey, M. Maney, and others, *High resolution near-infrared spectroscopy of a flare around the ultracool dwarf -  $vB$  10*, *ApJ*, 925, 2 (2022) [\[ADS\]](#).
4. **Shubham Kanodia**, G. Stefansson, C. Canas, and others, *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, 135, (2021). [\[ADS\]](#).

3. **Shubham Kanodia**, S. Halverson, J. Ninan, and others, *A Harsh Test of Far-field Scrambling with the Habitable-zone Planet Finder and the Hobby-Eberly Telescope*, ApJ, 912, 1, 11, (2021). [\[ADS\]](#).
2. **Shubham Kanodia**, C. Canas, G. Stefansson, and others, *TOI-1728b: The Habitable-zone Planet Finder Confirms a Warm Super Neptune Orbiting an M dwarf host*, ApJ, 899, 1, 29, (2020). [\[ADS\]](#).
1. **Shubham Kanodia**, A. Wolfgang, G. Stefansson, Bo Ning, S. Mahadevan, *Mass-Radius relationship for M dwarf exoplanets: Comparing Nonparametric and Parametric Methods*, ApJ, 882, 1, 38, (2019). [\[ADS\]](#).

#### UN-REFEREED

3. **Shubham Kanodia**, J. Ninan, A. Monson, Suvrath Mahadevan, and others, *Ghosts of NEID's Past*, SPIE, 11447, 1144740 (2020). [\[ADS\]](#).
2. **Shubham Kanodia**, S. Mahadevan, L. W. Ramsey, and others, *Overview of the spectrometer optical fiber feed for the Habitable-zone Planet Finder*, SPIE, 10702, 107026Q (2018). [\[ADS\]](#).
1. **Shubham Kanodia**, and J. Wright, *Python Leap Second Management and Implementation of Precise Barycentric Correction (barycorrpy)*, RNAAS, 2, 1 (2018). [\[ADS\]](#).

## CO-AUTHOR PUBLICATIONS

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#### Significant Contributions

12. C. Beard, P. Robertson, **Shubham 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, 55 (2022) [\[ADS\]](#).
11. C. Cañas, **Shubham Kanodia**, et al., *TOI-3714 b and TOI-3629 b: Two gas giants transiting M dwarfs confirmed with HPF and NEID*, AJ, 164, 2, 50 (2022) [\[ADS\]](#).
10. A.S.J. Lin et al., *Observing the Sun as a star: Design and early results from the NEID solar feed*, AJ, 163, 4, 184, (2022) [\[ADS\]](#).
9. J. Wright, and **Shubham Kanodia**, *Barycentric Corrections for Precise Radial Velocity Measurements of Sunlight*, The Planetary Science Journal, 1, 2, 38, (2020). [\[ADS\]](#).
8. C. Cañas, G. Stefansson, **Shubham Kanodia**, *A warm Jupiter transiting an M dwarf: A TESS single transit event confirmed with the Habitable-zone Planet Finder*, AJ, 160, 3, 147, (2020). [\[ADS\]](#).
7. C. Schwab, A. Monson, **Shubham Kanodia**, *The NEID spectrometer: fibre injection system design*, SPIE, 11447, 114474L (2020). [\[ADS\]](#).
6. J.P. Ninan, 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, 97, (2020). [\[ADS\]](#).
5. A. Roy, et al., *Solar Contamination in Extreme-precision Radial-velocity Measurements: Deleterious Effects and Prospects for Mitigation*, AJ, 159, 4, 161, (2020). [\[ADS\]](#).

4. G Stefansson, et al., *A Mini-Neptune and a Venus-Zone Planet in the Radius Valley Orbiting the Nearby M2-dwarf TOI-1266: Validation with the Habitable-zone Planet Finder*, AJ, 160, 6, 259, (2020). [\[ADS\]](#).
3. A. Metcalf, et al., *Stellar Spectroscopy in the Near-infrared with a Laser Frequency Comb*, Optica, 6, 2, 233, (2019). [\[ADS\]](#).
2. J. Wright, **Shubham Kanodia** and E. Lubar, *How Much SETI Has Been Done? Finding Needles in the n-dimensional Cosmic Haystack*, AJ, 156, 6, 260, (2018). [\[ADS\]](#).
1. G. Stefansson, et al., *Toward Space-like Photometric Precision from the Ground with Beam-shaping Diffusers*, ApJ, 848, 1, (2017). [\[ADS\]](#).

### Other Publications

18. M. Reefer et al., *A Close-in Puffy Neptune with Hidden Friends: The Enigma of TOI 620*, AJ, 163, 269, (2022) [\[ADS\]](#).
17. J. Dong et al., *NEID Rossiter-McLaughlin Measurement of TOI-1268b: A Young Warm Saturn Aligned with Its Cool Host Star*, ApJL, 926, 2, (2022) [\[ADS\]](#).
16. R. Terrien et al., *Rotational modulation of spectroscopic Zeeman signatures in low-mass stars*, ApJL, 927, 1, (2022) [\[ADS\]](#).
15. G. Stefansson et al., *The Warm Neptune GJ 3470b has a Polar Orbit*, ApJL, 931, 2, 16, (2022). [\[ADS\]](#).
14. A. Ghosh, et al., *Gaia 20eae: A newly discovered episodically accreting young star*, ApJ, 926, 1, 68 (2022) [\[ADS\]](#).
13. C. Canas, et al., *A Hot Mars-sized Exoplanet Transiting an M Dwarf*, AJ, 163, 15, (2022). [\[ADS\]](#).
12. C. Canas, et al., *An eccentric Brown Dwarf Eclipsing an M dwarf*, AJ, 163, 2, 89, (2022). [\[ADS\]](#).
11. V. Krishnamurthy, et al., *Nondetection of Helium in the Upper Atmospheres of TRAPPIST-1b, e, and f*, ApJ, 162, 82 (2021). [\[ADS\]](#).
10. S. Vissapragada, et al., *A Search for Planetary Metastable Helium Absorption in the V1298 Tau System*, ApJ, 162, 5 (2021). [\[ADS\]](#).
9. A. Gupta, et al., *Target Prioritization and Observing Strategies for the NEID Earth Twin Survey*, AJ, 161, 30, (2021). [\[ADS\]](#).
8. J. Lubin, et al., *Stellar Activity Manifesting at a One Year Alias Explains Barnard b as a False Positive*, ApJ, 162, 61 (2021). [\[ADS\]](#).
7. S. Mahadevan, 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 Letters, 919, L9, (2021). [\[ADS\]](#).
6. G. Stefansson, et al., *The Habitable-zone Planet Finder Reveals A High Mass and a Low Obliquity for the Young Neptune K2-25b*, AJ, 160, 4, 192, (2020). [\[ADS\]](#).

5. P. Robertson, et al., *Persistent starspot signals on M dwarfs: multi-wavelength Doppler observations with the Habitable-zone Planet Finder and Keck/HIRES*, ApJ, 897, 2, 125, (2020). [\[ADS\]](#).
4. G. Stefansson, 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, 100, (2020). [\[ADS\]](#).
3. P. Robertson, et al., *Ultra-Stable Environment Control for the NEID Spectrometer: Design and Performance Demonstration*, Journal of Astronomical Telescopes, Instruments, and Systems, 5, 015003, (2019). [\[ADS\]](#).
2. J.P. Ninan, et al., *The Habitable-Zone Planet Finder: improved flux image generation algorithms for H2RG up-the-ramp data*, SPIE, 10709, 107092U (2018). [\[ADS\]](#).
1. Edited by Dawn Gelino and Jason Wright; Chapter Leads incl. **Shubham Kanodia** *NASA and the Search for Technosignatures: A Report from the NASA Technosignatures Workshop*, NASA Technosignatures Workshop Participants (2018) [\[ADS\]](#).