

Shubham Kanodia

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[ADS]

EDUCATION

Pennsylvania State University

Doctor of Philosophy (Ph.D.) Astrophysics

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

Pennsylvania, USA

May 2019 - May 2022

Pennsylvania State University

Master of Science (M.Sc.) Astrophysics

Combining the Next Generation of Exoplanet Instrumentation & Astrostatistics

Pennsylvania, USA

Sept 2017 - May 2019

Brown University

Master of Science (Sc.M.) Physics

Optical Design of the Exoplanet Climate Infrared Telescope Spectrometer

Rhode Island, USA

Sept 2015 - Dec 2016

St. Xavier's College

Bachelor of Science (B.Sc.) Physics

Mumbai, India

June 2012 - Apr 2015

AWARDS

- Downsbrough 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

- HET 10 m HPF: > 30 nights
- WIYN 3.5 m NEID: > 10 nights
- ARC 3.5 m: > 25 half nights
- Davey 0.4 m: > 5 nights

SOFTWARE

- **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

- Carnegie EPL Astronomy Seminar, October 2021

- PSU Center for Exoplanets and Habitable Worlds Seminar, September 2021
- [NASA Goddard Extrasolar Planets Seminar, September 2021](#)
- [Order of the Octopus, July 2021](#)
- [PSETI Seminar, October 2020](#)
- NASA Technosignatures Workshop, USRA, September 2018
- Emerging Researchers in Exoplanet Science Symposium, June 2018

POSTER PRESENTATIONS

- [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
- **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

Referee

International Journal of Astrobiology

Science Organizing Committee

Emerging Researchers in Exoplanet Sciences IV

June 2018

RESEARCH PROJECTS

Optical design for exoplanet telescope (EXCITE) in Zemax
Brown University

Rhode Island, USA
April 2016 - Dec 2016

Master's Thesis - Optical Design and Simulation for EXoplanet Climate Infrared Telescope (EX-CITE). Zemax designing includes non-sequential ray tracing to optimize positions, specifications and design of the various optical components of the setup. (Prof. Gregory Tucker)

Muon detection and rate measurement **Mumbai, India**

St. Xavier's College Jan 2015
(Undergraduate Semester Project) Performed using a plastic scintillator coupled to photomultiplier tubes, discriminator and then counted using coincidence logic. (Prof. Kajari Mazumdar and Mrs. Mandakini Patil, TIFR, India)

Diffuse UV background radiation **Bangalore, India**

Indian Institute of Astrophysics (IIA) Apr 2014 - May 2014
Worked on Galex spacecraft data to analyze diffuse background UV radiation scattering due to interstellar dust, particularly at high northern galactic latitudes. (Prof. Jayant Murthy)

FPGA programming **Mumbai, India**

Tata Institute of Fundamental Research (TIFR) Oct 2013 - Nov 2013
Worked on FPGA programming in a Altera FPGA board using VHDL for basic digital logic functions for use in detectors in High Energy Particle Physics. (Prof. Kajari Mazumdar and Mandakini Patil)

Alpha tagged Calibration for CZT-I in ASTROSAT **Mumbai, India**

Tata Institute of Fundamental Research (TIFR) May 2013 - June 2013
Analyzing timing parameters for efficient calibration of CZT-I hard X-ray detector using Alpha particle source for the space telescope ASTROSAT. (Prof. A.R.Rao)

Starting the Physics Circle **Mumbai, India**

St. Xavier's College Nov 2012 - Dec 2014
The Physics Circle was started as a forum for students to discuss concepts and new ideas. Students gave presentations, apart from which there were public lectures by distinguished speakers.

TEACHING

Teaching probabilistic programming **State College, USA**

Pennsylvania State University July 2021 - Aug 2021
Spread across 5 weeks, I developed and taught an informal course on probabilistic programming, and statistical inference using the Hamiltonian Monte Carlo Python code - PyMC3 and package exoplanet.

Teaching Assistant for Astronomy lab **Providence, USA**

Brown University Jan 2016 - Apr 2016
Lab assistant for basic astronomy labs, eg. measuring blue shift of Andromeda, CCD imaging etc. (Prof. Ian Dell'Antonio)

MENTORING

- 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 –) - Undergraduate/Master's student in Engineering Science at Pennsylvania State University

FIRST AUTHOR PUBLICATIONS

Total: 46; First Author (Refereed): 8 (5); Significant Contributions: 9

Total Citations: 338 ; 31st October, 2021. [\[ADS\]](#)

REFEREED

- **Shubham Kanodia**, L. Ramsey, M. Maney, and others, *High resolution near-infrared spectroscopy of a flare around the ultracool dwarf - vB 10*, ApJ, under review, (2021).
- **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). [\[ADS\]](#).
- **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). [\[ADS\]](#).
- **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). [\[ADS\]](#).
- **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

- **Shubham Kanodia**, J. Ninan, A. Monson, Suvrath Mahadevan, and others, *Ghosts of NEID's Past*, SPIE, 11447, 1144740 (2020). [\[ADS\]](#).
- **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). [\[ADS\]](#).
- **Shubham Kanodia**, and J. Wright, *Python Leap Second Management and Implementation of Precise Barycentric Correction (barycorrpy)*, RNAAS, 2, 1 (2018). [\[ADS\]](#).

CO-AUTHOR PUBLICATIONS

Significant Contributions

- J. Wright, and **Shubham Kanodia**, *Barycentric Corrections for Precise Radial Velocity Measurements of Sunlight*, The Planetary Science Journal, 1, 2, 38, (2020). [\[ADS\]](#).
- 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). [\[ADS\]](#).
- C. Schwab, A. Monson, **Shubham Kanodia**, *The NEID spectrometer: fibre injection system design*, SPIE, 11447, 114474L (2020). [\[ADS\]](#).
- 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). [\[ADS\]](#).

- A. Roy, et al., *Solar Contamination in Extreme-precision Radial-velocity Measurements: Deleterious Effects and Prospects for Mitigation*, AJ, 159, 4, 161, (2020). [\[ADS\]](#).
- 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). [\[ADS\]](#).
- A. Metcalf, et al., *Stellar Spectroscopy in the Near-infrared with a Laser Frequency Comb*, Optica, 6, 2, 233, (2019). [\[ADS\]](#).
- 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). [\[ADS\]](#).
- G. Stefansson, et al., *Toward Space-like Photometric Precision from the Ground with Beam-shaping Diffusers*, ApJ, 848, 1, (2017). [\[ADS\]](#).

Other Publications

- V. Krishnamurthy, et al., *Nondetection of Helium in the Upper Atmospheres of TRAPPIST-1b, e, and f*, ApJ, 162, 82 (2021). [\[ADS\]](#).
- S. Vissapragada, et al., *A Search for Planetary Metastable Helium Absorption in the V1298 Tau System*, ApJ - Accepted (2021). [\[ADS\]](#).
- A. Gupta, et al., *Target Prioritization and Observing Strategies for the NEID Earth Twin Survey*, AJ, 161, 30, (2021). [\[ADS\]](#).
- J. Lubin, et al., *Stellar Activity Manifesting at a One Year Alias Explains Barnard b as a False Positive*, ApJ, 162, 61 (2021). [\[ADS\]](#).
- 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). [\[ADS\]](#).
- 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). [\[ADS\]](#).
- 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). [\[ADS\]](#).
- 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). [\[ADS\]](#).
- 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). [\[ADS\]](#).
- 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). [\[ADS\]](#).
- 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) [\[ADS\]](#).