

# Arvind Freedman Gupta

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## Education

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**Ph.D., Astronomy & Astrophysics (dual title Astrobiology)**, Pennsylvania State University August 2023  
Thesis: *Harnessing the Potential of Radial Velocity Exoplanet Surveys* [Advisor: Jason Wright]  
**M.S., Astronomy & Astrophysics**, Pennsylvania State University December 2020  
**B.Sc., Astronomy-Physics**, University of Virginia May 2018

## Awards & Honors

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NOIRLab Prize Postdoctoral Fellowship 2023 – Present  
Zaccheus Daniel Fellowship 2022  
Flatiron CCA Remote Pre-Doctoral Fellowship 2021  
NSF Graduate Research Fellowship Honorable Mention (×2) 2018 & 2020  
Verne A. Willaman Distinguished Graduate Fellowship 2018–2019  
Virginia Space Grant Scholarship 2017 – 2018  
Barry M. Goldwater Scholarship Honorable Mention 2017  
Phi Beta Kappa 2018  
Raven Society 2017

## Talks & Seminars

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**Contributed Seminar**, University of Arizona, Origins Seminar series Nov 2024  
Searching for Snapshots of Giant Exoplanet Migration: case studies of eccentric warm Jupiters  
**Invited Colloquium**, New Mexico State University May 2024  
Searching for Snapshots of Giant Exoplanet Migration: case studies of eccentric warm Jupiters  
**Dissertation Talk**, AAS 243 (New Orleans, LA) Jan 2024  
Harnessing the Potential of Radial Velocity Exoplanet Surveys  
**Contributed Talk**, EPRV Research Coordination Network Survey Design Meeting Dec 2023  
Using Fisher Information to Assess EPRV Survey Performance in the Presence of Correlated Noise  
**Invited Talk**, NOIRLab Flash Talks Sep 2023  
Searching for Snapshots of Giant Exoplanet Migration: case studies of eccentric warm Jupiters  
**Contributed Talk**, Emerging Researchers in Exoplanet Science VII (New Haven, CT) Jun 2023  
Status of the NEID Earth Twin Survey and Early Science Results  
**Contributed Talk**, EPRV 5 (Santa Barbara, CA) Mar 2023  
Status of the NEID Earth Twin Survey and Early Science Results  
**Invited Seminar**, Princeton University Exoplanets Seminar Oct 2022  
Harnessing the Potential of Radial Velocity Exoplanet Surveys  
**Invited Seminar**, Caltech Oct 2022  
Harnessing the Potential of Radial Velocity Exoplanet Surveys  
**Contributed Talk**, Flatiron CCA Predoctoral Symposium Jun 2022  
Fishing for Planets: Analyzing the Fisher Information Content of EPRV Exoplanet Surveys  
**Contributed Talk**, Emerging Researchers in Exoplanet Science VI (State College, PA) Jun 2022  
Fishing for Planets: Analyzing the Fisher Information Content of EPRV Exoplanet Surveys  
**Contributed Talk**, Exoplanets IV (Las Vegas, NV) May 2022  
Characterization of Single-transit TESS Warm Jupiters with NEID  
**Invited Seminar**, Yale Stars & Exoplanets Seminar Feb 2022  
Subgiant Asteroseismology with NEID and TESS  
**Contributed Talk**, Penn State Astronomy Lunch Talks Feb 2020

The NEID Earth Twin Survey: Target Selection and Survey Strategy

**Contributed Talk**, Emerging Researchers in Exoplanet Science V (Ithaca, NY)

Jun 2019

The NEID Earth Twin Survey: Target Selection and Survey Strategy

## Conference Posters

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☞ Cool Stars 22 (San Diego, CA)

Jun 2024

A hot Jupiter progenitor on a super-eccentric retrograde orbit

☞ Extreme Solar Systems V (Christchurch, New Zealand)

Mar 2024

A hot Jupiter progenitor on a super-eccentric retrograde orbit

☞ SPIE Astronomical Telescopes & Instrumentation (Montreal, Canada)

Jul 2022

Real-time Exposure Control and Instrument Operation with the NEID Spectrograph GUI

☞ Cool Stars 21 (Toulouse, France)

Jun 2022

Fishing for Planets: Analyzing the Fisher Information Content of EPRV Exoplanet Surveys

☞ TESS Science Conference II (virtual)

Jul 2021

Optimizing Radial Velocity Follow-up Strategies for Single-Transit Exoplanet Candidates

## Observing Programs

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**Transiting Warm Jupiter Follow-up** [Total 159 hours; \$47,000 awarded through NN-Explore]

– Measuring the Spin-Orbit Misalignment of the most Eccentric Transiting Exoplanet

2024A

PI: A. F. Gupta; WIYN/NEID: 10 hours

– Cornering an Eccentric Giant

2023B

PI: A. F. Gupta; WIYN/NEID: 3 hours & PI: J. Libby-Roberts; APO-3.5 m/ARCTIC: 5 hours

– Radial Velocity Observations of Long-period TESS Exoplanet Candidates with NEID

2021A – 2023B

PI: A. F. Gupta; WIYN/NEID: 130 hours; WIYN/NESSI: 11 hours

**EPRV Stellar Variability Characterization** [Total 54 hours]

– Coordinated Multi-Facility Observations of Supergranulation in EPRV Time Series

2024B

PI: A. F. Gupta; WIYN/NEID: 13.6 hours; Gemini-N/MAROON-X: 15.5 hours & PI: J. Luhn; Keck/KPF: 10 hours

– 2 Fingers on the Pulse: Simultaneously Resolving P-mode Oscillations with NEID and TESS

2022A

PI: J. Luhn; WIYN/NEID: 7 hours

– Simultaneous NEID and TESS Observations of p-mode Oscillations in HD 35833

2020B

PI: A. F. Gupta; WIYN/NEID: 8 hours

**The NEID Earth Twin Survey** [Total ~ 180 nights]

– Guaranteed Time Observations Program

2021A – 2025B

PI: S. Mahadevan, J. Wright; WIYN/NEID: 30 nights / year for 5 years, plus 2-4 institutional nights / semester

## Observing Experience

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**NEID, WIYN-3.5 m**, Kitt Peak National Observatory

November 2019 – May 2021

30 nights NEID instrument commissioning

**FourStar, Baade Magellan 6.5 m**, Las Campanas Observatory

2017 – 2018

7 nights

## Teaching and Mentoring

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**Instructor of Record**, Pennsylvania State University

Spring 2022

Astro 5: The Sky & Planets

**Guest Lecturer**, Pennsylvania State University

Fall 2019

Astro 140: Life in the Universe, Astro 401: Fundamentals of Planetary Science and Astronomy

**Instructor**, Upward Bound Math & Science (State College, PA)

Summer 2019 & 2020

Astronomy: The Search for Exoplanets and Life Beyond Earth

**Academic Tutor**, University of Virginia Department of Athletics

2016 – 2017

Calculus, Differential Equations, Introductory calculus-based Physics, Introductory Astronomy

**Mentor**, Carnegie Astronomy Summer Student Internship (CASSI) Program

2020 – Present

## Research Advising

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<b>Evan Fitzmaurice</b> , Graduate Student at Pennsylvania State University EPRV data analysis for the NEID Earth Twin Survey	2023 – Present
<b>James Ball</b> , Undergraduate Student at Arizona State University TESS + NEID warm Jupiter characterization	2024 – Present
<b>Armand Zeibari</b> , Undergraduate Student at Pennsylvania State University Prospects for atmospheric characterization of RV exoplanets	2022 – 2023

## Scientific and Professional Service

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Task Group Lead, Habitable Worlds Observatory START: Target Stars & Systems	2024 – Present
NASA ROSES Review Panelist	2024
NOIRLab Time Allocation Committee	2024 – Present
Referee, AAS Journals	2023 – Present
Member, EPRV Research Coordination Network	2022 – Present
Science & Local Organizing Committee, Emerging Researchers in Exoplanet Science VII	Aug 2022
American Astronomical Society Congressional Visits Day	Mar 2021

## Press

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Discovery of TIC 241249530 b: [CNN](#), [NOIRLab](#), [Penn State](#), [Simons Foundation](#), [MIT](#), [IAC](#), [Space.com](#), [Cosmos](#), [Popular Science](#), [365 Days of Astronomy Podcast](#)

Discovery of TOI-4127 b: [Space.com](#)

Kitt Peak celebrates 60 years of telescope tourism, [Tucson.com](#)

## Outreach

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<b>Kitt Peak National Observatory Tours</b> Summit and telescope tours for members of the Tohono O'odham Nation and Pascua Yaqui Tribe	2024 – Present
<b>Tucson Dark Sky Advocacy</b> Classroom presentations at local schools, analysis of sky brightness monitoring data	2024 – Present
<b>Organizing Committee</b> , Penn State Astronomy Grad-Undergrad Research Mentoring Program	2021 – 2023
<b>Co-Organizer &amp; Host</b> , Astronomy on Tap – State College	2019–2023
<b>Public Science Talks &amp; Presentations</b> , various topics, events, locations	2019 – Present

## Refereed Publications [6 First Author, 46 Total [↗](#)]

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First Author:

1. Gupta, A. F., Luhn, J. K., Wright, J. T., et al., *The NEID Earth Twin Survey. I. Confirmation of a 31 Day Planet Orbiting HD 86728* 2025, *The Astronomical Journal*, 169, 1
2. Gupta, A. F., Millholland, S., Im, H., et al., *A hot Jupiter progenitor on a super-eccentric retrograde orbit*, 2024, *Nature*, 632, 50
3. Gupta, A. F., & Bedell, M., *Fishing for Planets: A Comparative Analysis of EPRV Survey Performance in the Presence of Correlated Noise*, 2024, *The Astronomical Journal*, 168, 29
4. Gupta, A. F., Jackson, J. M., Hébrard, G., et al., *A High-Eccentricity Warm Jupiter Orbiting TOI-4127*, 2023, *The Astronomical Journal*, 165, 234
5. Gupta, A. F., Luhn, J., Wright, J. T., et al., *Detection of p-mode Oscillations in HD 35833 with NEID and TESS*, 2022, *The Astronomical Journal*, 164, 254
6. Gupta, A. F., Wright, J. T., Robertson, P., et al., *Target Prioritization and Observing Strategies for the NEID Earth Twin*

Survey, 2021, *The Astronomical Journal*, 161, 130

Co-author:

7. Dong, J., Chontos, A., Zhou, G., et al., *Origins of Super Jupiters: TOI-2145b has a Moderately Eccentric and Nearly Aligned Orbit* 2025, *The Astronomical Journal*, 169, 4
8. Bernabò, L. M., Kanodia, S., Cañas, C. I., et al., *Searching for GEMS: TOI-6383Ab, a Giant Planet Transiting an M3-dwarf Star in a Binary System* 2024, *The Astronomical Journal*, 168, 273
9. Kanodia, S., Gupta, A. F., Cañas, C. I., et al., *Searching for GEMS: Characterizing Six Giant Planets Around Cool Dwarfs* 2024, *The Astronomical Journal*, 168, 235
10. Hotnisky, A., Kanodia, S., Libby-Roberts, J., et al., *Searching for GEMS: Two Super-Jupiters around M-dwarfs – Signatures of Instability or Accretion?* 2024, *arXiv e-prints*, [arXiv:2411.08159](#)
11. Lam, C., Bedell, M., Zhao, L. L., et al., *Gasperry: Optimized Scheduling of Radial Velocity Follow-up Observations for Active Host Stars* 2024, *The Astronomical Journal*, 168, 200
12. Placco, V. M., Gupta, A. F., Almeida-Fernandes, F., et al., *BD+44 493: Chemo-Dynamical Analysis and Constraints on Companion Planetary Masses from WIYN/NEID Spectroscopy* 2024, *arXiv e-prints*, [arXiv:2410.08943](#)
13. Reji, V., Kanodia, S., Ninan, J., et al., *Searching for GEMS: TOI-5688 A b, a low-density giant orbiting a high-metallicity early M-dwarf* 2024, *arXiv e-prints*, [arXiv:2409.01371](#)
14. Jones, S. E., Stefánsson, G., Masuda, K., et al., *TOI-2015 b: A Warm Neptune with Transit Timing Variations Orbiting an Active Mid-type M Dwarf* 2024, *The Astronomical Journal*, 168, 93
15. Ford, E. B., Bender, C. F., Blake, C. H., et al., *Earths within Reach: Evaluation of Strategies for Mitigating Solar Variability using 3.5 years of NEID Sun-as-a-Star Observations* 2024, *arXiv e-prints*, [arXiv:2408.13318](#)
16. Peluso, D. O., Dalba, P. A., Wright, D., et al., *Confirming the Warm and Dense Sub-Saturn TIC 139270665 b with the Automated Planet Finder and Unistellar Citizen Science Network* 2024, *The Astronomical Journal*, 167, 170
17. Orell-Miquel, J., Carleo, I., Murgas, F., et al., *Revisiting the warm sub-Saturn TOI-1710b. The impact of stellar activity on the mass measurement* 2024, *Astronomy and Astrophysics*, 684, A96
18. Jones, M. I., Reinartz, Y., Brahm, R., et al., *A long-period transiting substellar companion in the super-Jupiters to brown dwarfs mass regime and a prototypical warm-Jupiter detected by TESS* 2024, *Astronomy and Astrophysics*, 683, A192
19. Delamer, M., Kanodia, S., Cañas, C. I., et al., *TOI-4201: An Early M Dwarf Hosting a Massive Transiting Jupiter Stretching Theories of Core Accretion* 2024, *The Astrophysical Journal*, 962, L22
20. Carleo, I., Malavolta, L., Desidera, S., et al., *The GAPS programme at TNG. L. TOI-4515 b: An eccentric warm Jupiter orbiting a 1.2 Gyr-old G-star* 2024, *Astronomy and Astrophysics*, 682, A135
21. Han, T., Robertson, P., Kanodia, S., et al., *TOI-5344 b: A Saturn-like Planet Orbiting a Super-solar Metallicity M0 Dwarf* 2024, *The Astronomical Journal*, 167, 4
22. Lubin, J., Wang, X.-Y., Rice, M., et al., *TOI-1670 c, a 40 day Orbital Period Warm Jupiter in a Compact System, Is Well Aligned* 2023, *The Astrophysical Journal*, 959, L5
23. Mann, C. R., Dalba, P. A., Lafrenière, D., et al., *Giant Outer Transiting Exoplanet Mass (GOT 'EM) Survey. III. Recovery and Confirmation of a Temperate, Mildly Eccentric, Single-transit Jupiter Orbiting TOI-2010* 2023, *The Astronomical Journal*, 166, 239
24. Kanodia, S., Lin, A. S. J., Lubar, E., et al., *Stable Fiber-illumination for Extremely Precise Radial Velocities with NEID* 2023, *The Astronomical Journal*, 166, 105
25. Powers, L. C., Libby-Roberts, J., Lin, A. S. J., et al., *TOI-3785 b: A Low-density Neptune Orbiting an M2-dwarf Star* 2023, *The Astronomical Journal*, 166, 44
26. Cañas, C. I., Kanodia, S., Libby-Roberts, J., et al., *TOI-3984 A b and TOI-5293 A b: Two Temperate Gas Giants Transiting Mid-M Dwarfs in Wide Binary Systems* 2023, *The Astronomical Journal*, 166, 30
27. Libby-Roberts, J. E., Schutte, M., Hebb, L., et al., *An In-depth Look at TOI-3884b: A Super-Neptune Transiting an*

*M4Dwarf with Persistent Starspot Crossings* 2023, **The Astronomical Journal**, 165, 249

28. Lambert, M., Bender, C. F., Kanodia, S., et al., *TOI-5375 B: A Very Low Mass Star at the Hydrogen-burning Limit Orbiting an Early M-type Star* 2023, **The Astronomical Journal**, 165, 218
29. Luhn, J. K., Ford, E. B., Guo, Z., et al., *Impact of Correlated Noise on the Mass Precision of Earth-analog Planets in Radial Velocity Surveys* 2023, **The Astronomical Journal**, 165, 98
30. Kanodia, S., Mahadevan, S., Libby-Roberts, J., et al., *TOI-5205b: A Short-period Jovian Planet Transiting a Mid-M Dwarf* 2023, **The Astronomical Journal**, 165, 120
31. Frazier, R. C., Stefánsson, G., Mahadevan, S., et al., *NEID Reveals That the Young Warm Neptune TOI-2076 b Has a Low Obliquity* 2023, **The Astrophysical Journal**, 944, L41
32. Ulmer-Moll, S., Lendl, M., Gill, S., et al., *Two long-period transiting exoplanets on eccentric orbits: NGTS-20 b (TOI-5152 b) and TOI-5153 b* 2022, **Astronomy and Astrophysics**, 666, A46
33. Kanodia, S., Libby-Roberts, J., Cañas, C. I., et al., *TOI-3757 b: A Low-density Gas Giant Orbiting a Solar-metallicity M Dwarf* 2022, **The Astronomical Journal**, 164, 81
34. Beard, C., Robertson, P., Kanodia, S., et al., *GJ 3929: High-precision Photometric and Doppler Characterization of an Exo-Venus and Its Hot, Mini-Neptune-mass Companion* 2022, **The Astrophysical Journal**, 936, 55
35. Cañas, C. I., Kanodia, S., Bender, C. F., et al., *TOI-3714 b and TOI-3629 b: Two Gas Giants Transiting M Dwarfs Confirmed with the Habitable-zone Planet Finder and NEID* 2022, **The Astronomical Journal**, 164, 50
36. Reefer, M. A., Luque, R., Gaidos, E., et al., *A Close-in Puffy Neptune with Hidden Friends: The Enigma of TOI 620* 2022, **The Astronomical Journal**, 163, 269
37. Beard, C., Robertson, P., Kanodia, S., et al., *TOI-1696 and TOI-2136: Constraining the Masses of Two Mini-Neptunes with the Habitable-Zone Planet Finder* 2022, **The Astronomical Journal**, 163, 286
38. Lin, A. S. J., Monson, A., Mahadevan, S., et al., *Observing the Sun as a Star: Design and Early Results from the NEID Solar Feed* 2022, **The Astronomical Journal**, 163, 184
39. Guo, Z., Ford, E. B., Stello, D., et al., *Modeling Stellar Oscillations and Granulation in Radial Velocity Time Series: A Fourier-based Method* 2022, **arXiv e-prints**, arXiv:2202.06094
40. Cañas, C. I., Mahadevan, S., Bender, C. F., et al., *An Eccentric Brown Dwarf Eclipsing an M dwarf* 2022, **The Astronomical Journal**, 163, 89
41. Kanodia, S., Stefánsson, G., Cañas, C. I., 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* 2021, **The Astronomical Journal**, 162, 135
42. Burt, J. A., Dragomir, D., Mollière, P., et al., *TOI-1231 b: A Temperate, Neptune-sized Planet Transiting the Nearby M3 Dwarf NLTT 24399* 2021, **The Astronomical Journal**, 162, 87
43. Stefánsson, G., Kopparapu, R., Lin, A., 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* 2020, **The Astronomical Journal**, 160, 259
44. Cañas, C. I., Stefánsson, G., Kanodia, S., et al., *A Warm Jupiter Transiting an M Dwarf: A TESS Single-transit Event Confirmed with the Habitable-zone Planet Finder* 2020, **The Astronomical Journal**, 160, 147
45. Dalba, P. A., Gupta, A. F., Rodriguez, J. E., et al., *The TESS-Keck Survey. I. A Warm Sub-Saturn-mass Planet and a Caution about Stray Light in TESS Cameras* 2020, **The Astronomical Journal**, 159, 241
46. Roy, A., Halverson, S., Mahadevan, S., et al., *Solar Contamination in Extreme-precision Radial-velocity Measurements: Deleterious Effects and Prospects for Mitigation* 2020, **The Astronomical Journal**, 159, 161

## **SPIE Conference Proceedings**

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1. Gupta, A. F., Bender, C. F., Ninan, J. P., et al., *Real-time exposure control and instrument operation with the NEID spectrograph GUI* 2022, **Software and Cyberinfrastructure for Astronomy VII**, 12189, 1218925
2. Logsdon, S. E., Wolf, M. J., Li, D., et al., *The NEID port adapter: on-sky performance* 2022, **Ground-based and Airborne Instrumentation for Astronomy IX**, 12184, 121844N