

Niyati Desai

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Education

- 2019 – 2024 **Ph.D. in Space Engineering**
California Institute of Technology, *GALCIT*
Advisor: Dimitri Mawet, Professor of Astronomy
- 2019 – 2020 **M.Sc. in Space Engineering**
California Institute of Technology, *GALCIT*
- 2015 – 2019 **B.Sc. in Physics**
Massachusetts Institute of Technology, *Physics Department*
- B.Sc. in Aerospace Engineering**
Massachusetts Institute of Technology, *Aero/Astro Department*

Research, Teaching and Engineering Positions

- Jul 2024 – Present **Jet Propulsion Laboratory, NASA Postdoctoral Fellow**
Astrophysics Division: High Contrast Direct Observations of Exoplanetary Systems
- May – Jul 2024 **Caltech Astronomy, Postdoctoral Researcher**
Exoplanet Technology Lab: high contrast testbed experiments, vortex coronagraph design
- Feb – May 2023 **Jet Propulsion Laboratory, Optics Intern**
High Contrast Imaging Testbed Facility: wavefront sensing and control experiments
- 2020 – 2024 **Caltech Astronomy, Graduate Research Assistant**
Exoplanet Technology Lab: high contrast testbed experiments, vortex coronagraph design
- Mar – Jun 2022 **Caltech Astronomy, Graduate Teaching Assistant**
AY 105: Optical Astronomy Instrumentation Lab Class
- Jun – Aug 2019 **Honeybee Robotics, Robotics Intern**
System Engineering: modular systems architecture for robotic motion control tasks
- Jun – Aug 2018 **Jet Propulsion Laboratory, Flight Instruments Intern**
Nancy Grace Roman Space Telescope: EMCCD cosmic ray detection/removal algorithms
- Jun – Aug 2017 **Northrop Grumman, Integration and Testing Intern**
James Webb Space Telescope: telemetry scripts for spacecraft command and data handling
- Jan – Jun 2016 **Computer Science and Artificial Intelligence Laboratory, Undergraduate Researcher**
Interactive Robotics Group: human and autonomous agent communication models

Scientific Publications

Peer-Reviewed Journal Articles (first author)

- 1 **N. Desai**, D. Mawet, E. Serabyn, G. Ruane, A. Bertrou-Cantou, J. Llop-Sayson, and A. J. E. Riggs, “Benefits of adding radial phase dimples on scalar coronagraph phase masks,” *Journal of Astronomical Telescopes, Instruments, and Systems*, vol. 10, no. 1, p. 015 001, 2024. [DOI: 10.1117/1.JATIS.10.1.015001](https://doi.org/10.1117/1.JATIS.10.1.015001).
- 2 **N. Desai**, A. Potier, S. Redmond, G. Ruane, A. E. Riggs, P. K. Poon, M. Noyes, and C. Mejia Prada, “A comparative laboratory study of electric field conjugation algorithms,” *Journal of Astronomical Telescopes, Instruments, and Systems*, 2024.
- 3 **N. Desai**, G. J. Ruane, J. D. Llop-Sayson, A. Bertrou-Cantou, A. Potier, A. E. Riggs, E. Serabyn, and D. Mawet, “Laboratory demonstration of the wrapped staircase scalar vortex coronagraph,” *Journal of Astronomical Telescopes, Instruments, and Systems*, vol. 9, no. 2, p. 025 001, 2023. [DOI: 10.1117/1.JATIS.9.2.025001](https://doi.org/10.1117/1.JATIS.9.2.025001).

Conference Proceedings (first author)

- 1 **N. Desai**, A. Bertrou-Cantou, G. Ruane, J. Llop-Sayson, A. E. Riggs, E. Serabyn, and D. Mawet, “Achromatizing scalar vortex coronagraphs with radial phase mask dimples,” in *Techniques and Instrumentation for Detection of Exoplanets XI*, vol. 12680, SPIE, 2023. [DOI: 10.1117/12.2677224](https://doi.org/10.1117/12.2677224).

- 2 **N. Desai**, L. König, E. Por, R. Juanola-Parramond, R. Belikov, *et al.*, “Integrated photonic-based coronagraphic systems for future space telescopes,” in *Techniques and Instrumentation for Detection of Exoplanets XI*, vol. 12680, SPIE, 2023. [DOI](#): 10.1117/12.2677210.
- 3 **N. Desai**, A. Potier, G. Ruane, A. E. Riggs, P. K. Poon, M. Noyes, and C. Mejia Prada, “Experimental comparison of model-free and model-based dark hole algorithms for future space telescopes,” in *Techniques and Instrumentation for Detection of Exoplanets XI*, vol. 12680, SPIE, 2023. [DOI](#): 10.1117/12.2677040.
- 4 **N. Desai**, J. Llop-Sayson, A. Bertrou-Cantou, G. Ruane, A. E. Riggs, E. Serabyn, and D. Mawet, “Topological designs for scalar vortex coronagraphs,” in *Space Telescopes and Instrumentation 2022: Optical, Infrared, and Millimeter Wave*, vol. 12180, SPIE, 2022, 121805H. [DOI](#): 10.1117/12.2630950.
- 5 **N. Desai**, J. Llop-Sayson, N. Jovanovic, G. Ruane, E. Serabyn, S. Martin, and D. Mawet, “High contrast demonstrations of novel scalar vortex coronagraph designs at the high contrast spectroscopy testbed,” in *Techniques and Instrumentation for Detection of Exoplanets X*, SPIE, 2021. [DOI](#): 10.1117/12.2603953.

Other Co-authored Publications

- 1 J. Liberman, J. Llop-Sayson, A. Bertrou-Cantou, D. Mawet, A. J. E. Riggs, and **N. Desai**, “Implicit electric field conjugation through a single-mode fiber,” submitted.
- 2 J. Fowler, S. Y. Haffert, M. A. M. van Kooten, *et al.*, “Visible extreme adaptive optics on extremely large telescopes: towards detecting oxygen in Proxima Centauri b and analogs,” in *Techniques and Instrumentation for Detection of Exoplanets XI*, International Society for Optics and Photonics, vol. 12680, SPIE, 2023. [DOI](#): 10.1117/12.2677503.
- 3 L. König, S. Palatnick, **N. Desai**, O. Absil, M. Millar-Blanchaer, and D. Mawet, “Metasurface-based scalar vortex phase mask design in pursuit of 1e-10 contrast,” in *Techniques and Instrumentation for Detection of Exoplanets XI*, vol. 12680, SPIE, 2023. [DOI](#): 10.1117/12.2676174.
- 4 J. Liberman, J. Llop-Sayson, A. Bertrou-Cantou, D. Mawet, A. J. E. Riggs, and **N. Desai**, “Implicit electric field conjugation for improved starlight rejection through a single-mode fiber,” in *Techniques and Instrumentation for Detection of Exoplanets XI*, vol. 12680, SPIE, 2023. [DOI](#): 10.1117/12.2677532.
- 5 P. Morrissey, L. Harding, N. Bush, *et al.*, “Flight photon counting electron multiplying charge coupled device development for the Roman Space Telescope coronagraph instrument,” *Journal of Astronomical Telescopes, Instruments, and Systems*, vol. 9, no. 1, p. 016 003, Jan. 2023. [DOI](#): 10.1117/1.JATIS.9.1.016003.
- 6 S. Palatnick, L. König, M. Millar-Blanchaer, J. K. Wallace, O. Absil, D. Mawet, **N. Desai**, D. Echeverri, D. John, and J. Schuller, “Prospects for metasurfaces in exoplanet direct imaging systems: From principles to design,” in *Techniques and Instrumentation for Detection of Exoplanets XI*, vol. 12680, SPIE, 2023. [DOI](#): 10.1117/12.2677834.
- 7 S. R. Vaughan, T. D. Gebhard, K. Bott, *et al.*, “Chasing rainbows and ocean glints: Inner working angle constraints for the Habitable Worlds Observatory,” *Monthly Notices of the Royal Astronomical Society*, vol. 524, no. 4, pp. 5477–5485, Aug. 2023, ISSN: 0035-8711. [DOI](#): 10.1093/mnras/stad2127.

Awards and Fellowships

Amelia Earhart Fellow, Zonta International (2023)

Three Minute Thesis: 1st Place Winner, Caltech Libraries (2023)

Hummel-Gray Award, Caltech Y (2023)

KISS Affiliate, Keck Institute for Space Studies (2021)

Admiral Luis de Florez Award for Original Thinking or Ingenuity, MIT Aero Astro (2019)

Outreach

Caltech Astronomy Outreach Volunteer (2019-present)

Women in GALCIT Organizer (2019-present)

Women in Engineering and Applied Science Volunteer (2021-present)

Caltech Space Challenge 2022 Organizer (2021-2022)

Pasadena Unified School District Innovation Expo Judge (2022-present)

Caltech Science Olympiad Judge (April 2022)

Yucca Valley Hi-Desert Museum Outreach Talk (October 2022)

STEM Summer Camp Mentor (Summer 2023)

Research Talks and Invited Workshops

- Jan 2024  Pasadena Astronomy on Tap Public Outreach Lecture
- Oct 2023  2nd International Vortex Workshop: Scientific Organizing Committee
-  2nd International Vortex Workshop: Two Contributed Talks
- Aug 2023  SPIE Optics and Photonics: Session Chair: Coronagraph Testbeds and Results I
-  SPIE Optics and Photonics: Contributed Talk
-  SPIE Optics and Photonics: Two Poster Presentations
- Jun 2023  Adaptive Optics for Extremely Large Telescopes: Contributed Poster
-  Group Seminar at Institut de Planéologie et d'Astrophysique de Grenoble
- Feb 2023  Lorentz Center Workshop: Optimal Exoplanet Imagers
- Nov 2022  Network of Young Researchers in Instrumentation for Astronomy (NYRIA) Workshop
-  Planetary & Stellar systems Imaging Lab Group Seminar at Université de Liège
- Sept 2022  Caltech Associates Keynote Speaker
-  Exoplanet Group Seminar at University of California Santa Barbara
- Jul 2022  SPIE Astronomical Telescopes + Instrumentation: Poster Presentation
- Jun 2022  Spirit of Lyot: Poster Presentation
-  High Angular Resolution for Astrophysics Seminar at the Paris Observatory
- Aug 2021  SPIE Optics and Photonics: Contributed Talk