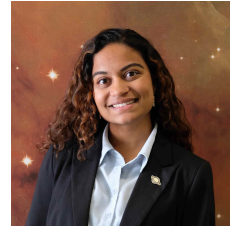


# Niyati Desai



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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

## Awards and Fellowships

- SPIE Overall Best Paper**, Astronomical Telescopes + Instrumentation: Optical, Infrared, and Millimeter Wave (2024)
- NASA Postdoctoral Program Fellow**, ORAU (2024)
- 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)
- 2nd Place in Physics**, Intel International Science Engineering Fair (2015)
- Regional Finalist**, Siemens Competition in Math, Science and Technology (2015)
- Simons Research Fellow**, Stony Brook University (2014)

## Outreach

Caltech Astronomy Outreach Volunteer (2019-present)  
Caltech Undergraduate Summer Research Seminar Day Session Chair (August 2024)  
Girl Scouts Spring into STEM Booth (May 2024)  
LA Astronomy on Tap Speaker (February 2024)  
JPL Explore Day Exoplanet Guide (April 2023)  
Caltech Women in GALCIT/Engineering and Applied Science Volunteer (2021-2024)  
Caltech Space Challenge 2022 Organizer (2021-2022)  
Pasadena Unified School District Innovation Expo Judge (2022-present)  
Yucca Valley Hi-Desert Museum Outreach Talk (October 2022)  
STEM Summer Camp Mentor (Summer 2023)

## 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](#).
- 2 **N. Desai**, A. Potier, S. F. Redmond, G. Ruane, P. K. Poon, A. J. E. Riggs, M. Noyes, and C. M. Prada, “Comparative laboratory study of electric field conjugation algorithms,” *Journal of Astronomical Telescopes, Instruments, and Systems*, vol. 10, no. 3, p. 035 001, 2024. [DOI: 10.1117/1.JATIS.10.3.035001](#).
- 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](#).

### Conference Proceedings (first author)

- 1 **N. Desai**, D. Mawet, A. Bertrou-Cantou, M. Kraus, A. Deparnay, E. Serabyn, G. Ruane, and S. Redmond, “Prototype development of broadband scalar vortex coronagraphs with phase dimples for exoplanet imaging,” in *Space Telescopes and Instrumentation 2024: Optical, Infrared, and Millimeter Wave*, vol. 13092, SPIE, 2024, p. 1 309 221. [DOI: 10.1117/12.3020702](#).
- 2 **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](#).
- 3 **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](#).
- 4 **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](#).
- 5 **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](#).
- 6 **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 A. Bertrou-Cantou, S. Redmond, D. Mawet, G. Sercel, D. Echeverri, **N. Desai**, J. Llop-Sayson, G. Ruane, E. Serabyn, and J. K. Wallace, “High-contrast spectroscopy testbed (HCST): tip/tilt sensing in reflection of the vector vortex coronagraph (VVC),” in *Space Telescopes and Instrumentation 2024: Optical, Infrared, and Millimeter Wave*, vol. 13092, SPIE, 2024, 130926B. [DOI: 10.1117/12.3019237](#).
- 2 L. König, S. Palatnick, **N. Desai**, O. Absil, D. Mawet, M. Millar-Blanchaer, T. Wenger, and E. Serabyn, “Design and prototyping of broadband metasurface scalar phase masks for high-contrast imaging,” in *Advances in Optical and Mechanical Technologies for Telescopes and Instrumentation VI*, vol. 13100, SPIE, 2024, p. 1 310 024. [DOI: 10.1117/12.3020488](#).
- 3 J. Liberman, J. Llop-Sayson, A. Bertrou-Cantou, D. Mawet, **N. Desai**, S. Y. Haffert, and A. J. E. Riggs, “Implicit electric field conjugation through a single-mode fiber,” 2, vol. 10, SPIE, 2024, p. 029 002. [DOI: 10.1117/1.JATIS.10.2.029002](#).

- 4 S. Palatnick, L. König, M. Millar-Blanchaer, J. K. Wallace, E. Serabyn, D. Mawet, **N. Desai**, D. John, and J. A. Schuller, “Optimizing metasurfaces to achieve deeper direct imaging contrasts: analyses of current performance and lessons learned from fabrication,” in *Advances in Optical and Mechanical Technologies for Telescopes and Instrumentation VI*, vol. 13100, SPIE, 2024, p. 1310 063. [DOI: 10.1117/12.3018594](#).
- 5 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](#).
- 6 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](#).
- 7 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](#).
- 8 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](#).
- 9 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](#).
- 10 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](#).

## Research Talks and Invited Workshops

Jun 2024	■ SPIE Astronomical Telescopes + Instrumentation: Contributed Talk
Jan 2024	■ Pasadena Astronomy on Tap Public Outreach Lecture
	■ Goddard Spaceflight Center Exoplanet Seminar Series
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 Planétologie 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