

Roohi Dalal

GRADUATE STUDENT AT PRINCETON UNIVERSITY, DEPARTMENT OF ASTROPHYSICAL SCIENCES

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Education

Princeton University

PH.D., ASTROPHYSICAL SCIENCES

2024 (expected)

CERTIFICATE IN SCIENCE, TECHNOLOGY AND ENVIRONMENTAL POLICY

2024 (expected)

M.A., ASTROPHYSICAL SCIENCES

2021

Leiden University

FULBRIGHT RESEARCH SCHOLAR

2018-19

California Institute of Technology

B.S., ASTROPHYSICS AND HISTORY (GPA 4.0/4.0)

2018

Research Interests

I study cosmology using data from large surveys of galaxies, particularly the Hyper Suprime-Cam (HSC) Subaru Strategic Program. I recently led the weak lensing cosmic shear analysis for the HSC Year 3 data release, and am now focused on improving our modeling of baryonic feedback, so that we can utilize our measurements at small scales. I am also interested in science policy, particularly space policy and the sustainable use of outer space. I am working with the [IAU CPS](#) to understand policy pathways for protecting the night sky from light pollution, and with the Princeton Science and Global Security program to develop technical standards for a destructive anti-satellite weapon testing ban.

Keywords: Cosmology, Weak Lensing, Large Scale Structure, Space Policy, Orbital Debris, Space Security

Publications

Lead Author:

- **Dalal, R.**, Li, X., Nicola, A., Zuntz, J. et al., [Hyper Suprime-Cam Year 3 Results: Cosmology from Cosmic Shear Power Spectra](#), (2023) arXiv:2304.00701 (submitted to PRD)
- Li, X., Zhang, T., Sugiyama, S., **Dalal, R.** et al., [Hyper Suprime-Cam Year 3 Results: Cosmology from Cosmic Shear Two-point Correlation Functions](#), (2023) arXiv:2304.00702 (submitted to PRD)
- Pobre, S., **Dalal, R.**, Strauss, M., Lin, Y.-T., [Are Brightest Cluster Galaxies Special?](#), RNAAS 19 (2023) 7 (primary advisor)
- Zhang, T., Li, X., **Dalal, R.**, Mandelbaum, R. et al., [A General Framework for Removing Point Spread Function Systematics in Cosmological Weak Lensing Analysis](#), (2023, accepted by MNRAS)
- Rau, M. M., **Dalal, R.**, Zhang, T., Li, X. et al., [Weak Lensing Tomographic Redshift Distribution Inference for the Hyper Suprime-Cam Subaru Strategic Program three-year shape catalogue](#) (2023, accepted by MNRAS)
- Martinelli, M., **Dalal, R.**, Majidi, F., Akrami, Y. et al., [Ultralarge-scale approximations and galaxy clustering: Debiasing constraints on cosmological parameters](#), MNRAS 510 (2022) 1964
- **Dalal, R.**, Strauss, M. A., Sunayama, T., Oguri, M. et al., [Brightest cluster galaxies are statistically special from \$z = 0.3\$ to \$z = 1\$](#) , MNRAS 507 (2021) 4016

Significant Contributions:

- Dark Energy Survey, Kilo-Degree Survey Collaboration, ..., **Dalal, R.** et al., [DES Y3 + KiDS-1000: Consistent cosmology combining cosmic shear surveys](#), (2023) arXiv:2305.17173 (submitted to the Open Journal of Astrophysics)
- Madhavacheril, M., ..., **Dalal, R.** et al., [The Atacama Cosmology Telescope: DR6 Gravitational Lensing Map and Cosmological Parameters](#), (2023) arXiv:2304.05203 (submitted to ApJ)
- Qu, F., ..., **Dalal, R.** et al., [The Atacama Cosmology Telescope: A Measurement of the DR6 CMB Lensing Power Spectrum and its Implications for Structure Growth](#), (2023) arXiv:2304.05202 (submitted to ApJ)
- More, S., ..., **Dalal, R.** et al., [Hyper Suprime-Cam Year 3 Results: Measurements of Clustering of SDSS-BOSS Galaxies, Galaxy-Galaxy Lensing and Cosmic Shear](#), (2023) arXiv:2304.00703 (submitted to PRD)

- Miyatake, H., ..., **Dalal, R.** et al., *Hyper Suprime-Cam Year 3 Results: Cosmology from Galaxy Clustering and Weak Lensing with HSC and SDSS using the Emulator Based Halo Model*, (2023) arXiv:2304.00704 (submitted to PRD)
- Sugiyama, S., ..., **Dalal, R.** et al., *Hyper Suprime-Cam Year 3 Results: Cosmology from Galaxy Clustering and Weak Lensing with HSC and SDSS using the Minimal Bias Model*, (2023) arXiv:2304.00705 (submitted to PRD)

Honors and Awards

2023	Equity Award (Princeton Astrophysics) , for many positive contributions to the department climate, working towards a more inclusive environment.
2023	Next-Generation Fellowship , Physicists Coalition for Nuclear Threat Reduction
2022	Best of Access, Diversity, and Inclusion Award: Outstanding Programming (Princeton) , for work done as President of the Princeton Women in STEM Leadership Council.
2018-23	NSF Graduate Research Fellowship
2018-19	Fulbright Research Award , Leiden University
2018	Mabel Beckman Prize (Caltech) , for academic and personal excellence, outstanding character and leadership.
2018	Eleanor Searle Prize in Law, Politics and Institutions (Caltech) , for senior thesis in History.
2017	Deans' Cup (Caltech) , for persistent efforts to improve the quality of undergraduate life.
2016-18	Mellon Mays Undergraduate Fellowship (Caltech)
2014-15	Milton and Jane Mohr Scholarship (Caltech)

Selected Talks

“Cosmology from Cosmic Shear Power Spectra with Hyper Suprime-Cam Year 3 Data”

June 2023	Midwest Cosmology Network Seminar*
May 2023	Institute for Nuclear and Particle Astrophysics Seminar, Lawrence Berkeley National Laboratory*
May 2023	Informal Seminar, UC Santa Cruz*
May 2023	KIPAC Tea Talk, Stanford University*
May 2023	Cosmology Seminar, Duke University*
April 2023	Dark Cosmos Seminar, Princeton University*
April 2023	Future Science with CMBxLSS Workshop, Kyoto University
April 2023	Astrophysics Seminar, Carnegie Mellon University*
Nov 2022	Tucson Astrophysics and Cosmology Seminar, University of Arizona*

“Space Debris and Nuclear Strategic Stability”

April 2023	Lichtenstein Institute on Self-Determination, Princeton University*
Oct 2022	Princeton School on Science and Global Security

“Brightest Cluster Galaxies are Statistically Special from $z = 0.3$ to $z = 1$ ”

Feb 2022	Galread, Princeton University*
Nov 2021	OPINAS Seminar, Max Planck Institute for Extraterrestrial Physics and Universitäts-Sternwarte München*

“Debiasing Ultra-Large Scale Cosmology”

May 2019	de Sitter Seminar, Leiden University
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* = invited

Granted Observing Time

- Baade Telescope, Las Campanas Observatory: 2 nights (PI)
- Clay Telescope, Las Campanas Observatory: 1 night (PI)
- Gemini North and Gemini South: 97 hours (PI)

Teaching Experience

Spring 2023 **SPI353 - Science and Global Security**, Guest Lecturer
Fall 2021 **AST255 - Life in the Universe**, Assistant in Instruction
Spring 2021 **AST204 - Topics in Modern Astronomy**, Assistant in Instruction
Spring 2017, 2018 **Ay1 - The Evolving Universe**, Teaching Assistant
Winter 2018 **Ph2b -Quantum Mechanics**, Teaching Assistant

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Advising Experience

Jupiter Ding Undergraduate Summer Research Program and Junior Paper (2022)
Savannah Pobre Undergraduate Summer Research Program and Junior Paper (2021)

Leadership, Outreach and Service

I am passionate about improving equity and inclusion in STEM, facilitating better communication between scientists and policy makers, and scientific outreach. A selected list of my involvements in such activities follows.

2013- **USA Astronomy and Astrophysics Olympiad**, President (2013-18, 2019-20), Founding member, Board of Directors (2013-), Team leader (2014, 2016)
2023- **AAS Committee for the Protection of Astronomy and the Space Environment**, Member
2023- **IAU Centre for the Protection of the Dark and Quiet Sky**, Policy Hub member
2022- **HSC+PFS+Rubin Discussions**, Organizer
2019- **Women in STEM Leadership Council**, President (2021-22), Council member (2019-)
2023 **Princeton School on Science and Global Security**, Organizer
2020-22 **Graduate Scholars Program**, Peer Mentor
2019-22 **Women in Physics**, Executive board member
2019-22 **Astrophysics Climate Committee**, Graduate student representative
2019-22 **Astrophysics Graduate Student Committee**, Cohort Representative
2020-21 **Committee on Equity in Astrophysics Graduate Admissions**, Graduate student representative
2018-20 **Astronomy on Tap**, Organizer, Speaker
2020 **WFIRST Congressional Advocacy Day**, Participant
2019 **Fulbright EU-NATO Seminar**, Representative from the Netherlands Fulbright Commission
2015-18 **Title IX**, Undergraduate advisory board chair, Co-founder of Title IX Advocate Program
2017-18 **Women in Physics, Math and Astronomy**, Co-founder, Organizing committee member
2018 **American Astronomical Society Congressional Visit Day**, Participant
2017 **Astrophysics Option Committee**, Co-chair (evaluated and revised the astrophysics major)
2017-18 **Conduct Review Committee**, Elected representative
2015-18 **Hixon Writing Center**, Peer tutor
2014-18 **Caltech Y RISE Program**, Tutor, Advisory board member

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References

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Professor Christopher Chyba

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