

Akash Gupta

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RESEARCH INTERESTS	My research lies at the intersection of physics, chemistry and machine learning, specifically, astrophysics and planetary geosciences, and explores the origin of Earth- & Neptune-like planets across our galaxy and in our Solar system. In particular, I am interested in understanding the fundamental physical and chemical processes that dictate a planet's formation and subsequent evolution, and how this ultimately leads to an environment and ingredients suitable for life.	
APPOINTMENTS	51 Pegasi b Fellow,	2023-28
	Harry H. Hess Postdoctoral Fellow, and	
	Future Faculty in Physical Sciences Fellow	
	<i>Princeton University</i>	
	Department of Astrophysical Sciences & Department of Geosciences	
	NASA Future Investigator (FINESST grantee)	2020-23
	Graduate Student Researcher	2017-23
	<i>University of California, Los Angeles</i>	
	Department of Earth, Planetary, and Space Sciences (EPSS)	
	Research Associate	2016-17
	Undergraduate Researcher	2013-16
	<i>Indian Institute of Technology, Kanpur</i>	
	Mechanics & Applied Mathematics Group & Dept. of Aerospace Engineering	
PROFESSIONAL EDUCATION	Princeton University (PU)	2023-28
	Postdoctoral Fellow, Astrophysical Sciences & Geosciences	
	<i>Mentors:</i> Profs. Adam Burrows & Jie Deng	
	University of California, Los Angeles (UCLA)	2017-23
	Ph.D., M.S., Planetary Science	
	<i>Thesis:</i> Unraveling the evolution of super-Earths and sub-Neptunes	
	<i>Advisors:</i> Prof. Hilke E. Schlichting	
	Indian Institute of Technology, Kanpur (IIT-K)	2011-16
	B.Tech. - M.Tech. Dual degree, Aerospace Engineering	
	<i>Thesis:</i> Dynamics of rings around minor planets	
SELECT AWARDS & HONORS	<i>Advisors:</i> Prof. Ishan Sharma & Prof. Sharvari Nadkarni-Ghosh	
	<u>Summary:</u> Awarded several international, national and university-level awards and fellowships by organizations such as NASA, Heising-Simons Foundation and Princeton University	
	• 51 Pegasi b Fellowship , Heising-Simons Foundation	2023 -

- **Future Faculty in Physical Sciences Fellowship**, Princeton University 2023 -
- **Harry H. Hess Postdoctoral Fellowship**, Princeton University 2023 -
- *American Astronomical Society (AAS) International Travel Grant* (declined) 2024
- **Future Investigators in NASA Earth & Space Science & Technology (FINESST) grant** 2020-23
- *Exoplanet Summer Program Mini Grant* by Heising-Simons Foundation & UC Santa Cruz 2023
- *AAS Rodger Doxsey Travel Prize* awarded annually to 10 early-career researchers for presenting their PhD dissertation at the AAS meeting 2023
- *UCLA EPSS Outreach Award* in recognition of DEI initiatives 2022
- Travel grant awarded by the Munich Institute for Astro-, Particle and BioPhysics (MIAPbP) to attend and present at the *Planet Formation Workshop 2022* in Garching, DE 2022
- *Harold and Mayla Sullwold Scholarship* by EPSS, UCLA for excellence in research 2020
- *Constantine and Perina Panunzio Scholarship* by EPSS, UCLA for excellence in research 2019
- **UCLA's University Fellowship** 2017-19
- *EPSS Scholarship Award*, UCLA 2017
- Travel grant from IIT - Finnish Consortium of Higher Education program to conduct research with Prof. Heikki Salo, University of Oulu, Finland 2015
- Placed in the top ~ 1% in the Indian national exam GATE[†] (Aerospace Engineering) 2015
- **Secured 99.6+ percentile among ~ 0.5 million candidates** in the national exam IIT-JEE[‡] 2011

PEER-REVIEWED PUBLICATIONS Summary: **10 papers, incl. 8 published** and 7 conference proceedings.
780 total citations and 648 citations on first-author papers.
Source: Google Scholar, June 2024

JOURNAL PUBLICATIONS (*students directly mentored: **)

1. Fernandes et al. (including **Gupta, A.**). In review. *AAS journals*.
Signatures of atmospheric mass loss and planet migration in the time evolution of short-period transiting exoplanets
2. **Gupta, A.**, Stixrude, L. and Schlichting, H.E. 2024. In review. arXiv:2407.04685
The miscibility of hydrogen and water in planetary atmospheres and interiors
3. Owen, J. E., Murray-Clay, R. A., Schreyer, E., Schlichting, H. E., David, A., **Gupta, A.**, Loyd, R. O. P., Shkolnik, E. L., Sing, D. K., Swain, M. R., 2023. *MNRAS*. 518, 4357-4371.
The fundamentals of Lyman-alpha exoplanet transits
4. **Gupta, A.**, *Nicholson, L. and Schlichting, H. E. 2022. *MNRAS*, 516, 4585-4593.
Properties of the radius valley around low mass stars: Predictions from the core-powered ...
5. Rogers, J. G., **Gupta, A.**, Owen, J. E. and Schlichting, H. E. 2021. *MNRAS*, 508, 5886-5902.
Photoevaporation vs. core-powered mass-loss: Model comparison with the 3D radius gap
6. **Gupta, A.** and Schlichting, H. E. 2021. *MNRAS*, 504, 4634-4648.
Caught in the act: Core-powered mass-loss predictions for observing atmospheric escape

[†]Graduate Aptitude Test in Engineering

[‡]Indian Institute of Technology - Joint Entrance Examination (for admission to science & engineering colleges in India)

7. **Gupta, A.** and Schlichting, H. E. 2020. *MNRAS* 493, 792-806.
Signatures of the core-powered mass-loss mechanism in the exoplanet population: Dependence on stellar properties and observational predictions
8. Estrada, R. Swain, M., **Gupta, A.**, Sotin, C. and Valio, A.. 2020. *ApJ*. 898, 104-109.
Evolutionary tracks of H/He envelopes of the observed pop. of sub-Neptunes and super-Earths
9. **Gupta, A.** and Schlichting, H.E. 2019. *MNRAS* 487, 24-33.
Sculpting the valley in the radius distribution of small exoplanets as a by-product of planet formation: The core-powered mass-loss mechanism
10. **Gupta, A.**, Nadkarni-Ghosh, S. and Sharma, I. 2018. *Icarus* 299, 97-116.
Rings of non-spherical, axisymmetric bodies

SELECT CONFERENCE PROCEEDINGS

1. Tang, H., **Gupta, A.**, Schlichting, H.E. and Young E.D., 2020., 51st Annual Lunar and Planetary Science Conference, 1481
Escape from a Transient Rock Vapor Atmosphere as the Mechanism for Fractionation of the Moon's Moderately Volatile Elements

OBSERVING PROGRAMS AWARDED

Summary: **6 observing proposals awarded, including the largest Exoplanet Science proposal ever awarded by NASA's Hubble Space Telescope (HST) to-date**

1. XMM-Newton (European Space Agency) 2024
9 hrs
Co-I[§] (PI[¶]: Christian Schneider, Hamburger Sternwarte, Germany)
X-STEL α
2. Hubble Space Telescope Cycle 32/33/34 Treasury Program 2024
Awarded **600+ primary orbits** in total, & **USD 0.47 million** to-date for HST Cycle 32
Co-I[¶] (PI^{**}: R. O. Loyd, Eureka Scientific Inc. & Shreyas Vissapragada, Harvard U.)
STEL α : Survey of Transiting Exoplanets in Lyman-alpha
3. W.M. Keck Observatory 2024
3 nights
Co-I (PI: Erik Petigura, UCLA)
The KPF Disordered Multis Survey II
4. James Webb Space Telescope, Cycle 3 2024
Archival proposal
Co-I (PI: Shreyas Vissapragada, Harvard U.)
TUNES: The Unintentional NIRISS Escape Survey
5. W.M. Keck Observatory 2023
3 nights

[§]Co-Investigator

[¶]Principal Investigator

^{||}Co-Investigator

^{**}Principal Investigator

Co-I (PI: Erik Petigura, UCLA)
The KPF Disordered Multis Survey I

6. Gemini MAROON-X 2022
25.7 hrs
 Co-I (PI: Erik Petigura, UCLA)
Probing the Role of Mass Loss in the Formation of Super-Earths and Sub-Neptunes with MAROON-X
7. Hubble Space Telescope Cycle 28 2020
15 primary orbits
 Co-I (PI: Paul Cauley, UC Boulder)
Measuring mass loss via metal lines from the very young planet AU Mic b

SEMINARS

Summary: 19 talks at universities and research institutes (*: upcoming)

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|--|----------------|
| Harvard University, <i>Insitute for Theory and Computation Luncheon</i> | *2025 |
| Harvard University, <i>Center for Astrophysics, Exoplanet Pizza Lunch Talk</i> | *2025 |
| Princeton University, <i>Chemistry in Solution and at Interfaces (CSI) Seminar</i> | 2024 |
| Penn State, <i>Center for Exoplanets and Habitable Worlds (CEHW) Seminar</i> | 2024 |
| NSF Center for Matter at Atomic Pressures (CMAP) <i>Seminar</i> | 2024 |
| MIT Kavli Institute, <i>Brown Bag Lunch Seminar</i> | 2022 |
| NASA Jet Propulsion Laboratory, <i>Exoplanet Journal Club Seminar</i> | 2022 |
| University of Arizona, <i>Origins Seminar</i> | 2022 |
| University of Texas, <i>Austin Stars and Planets Seminar</i> | 2022 |
| Caltech, <i>Dix Planetary Science Seminar</i> | 2022 |
| Yale, <i>Exoplanets and Stars Seminar</i> | 2022 |
| Cornell, <i>Planetary Lunch Seminar</i> | 2022 |
| UC Berkeley, <i>Center for Integrative Planetary Science Seminar</i> | 2022 |
| Princeton, <i>Exoplanet Discussion Group Seminar</i> | 2022 |
| Carnegie Earth & Planets Laboratory, <i>Astronomy Seminar</i> | 2021 |
| University of Arizona, <i>Disks and Exoplanets Group Seminar</i> | 2020 |
| McMaster University, <i>Astronomy Seminar</i> | 2020 |
| MIT, <i>Planetary Lunch Seminar</i> | 2020 |
| UCLA, <i>Planetary Science Seminar</i> | 2018, '19, '21 |

CONFERENCES

Summary: 20 conference presentations (12 talks and 8 posters)

TALKS

- | | |
|---|------|
| 245 th AAS Meeting, Washington D.C. | 2025 |
| 2024 AGU ^{††} Meeting, Washington D.C. | 2024 |

^{††}American Geophysical Union

	<i>Future Faculty in Physical Sciences Symposium</i> , Princeton University, NJ	2024
	241 st AAS Meeting, Seattle, WA	2023
	<i>Planet Formation Workshop</i> by MIAPbP [‡] , Munich, Germany	2022
	240 th AAS Meeting, Pasadena, CA, US	2022
	<i>Exoplanets IV</i> , Las Vegas, NV, US	2022
	<i>Stars and Planets in the Ultraviolet</i> , online conference	2021
	<i>Exoplanet Demographics</i> , online conference	2020
	<i>Exoplanets III</i> , online conference	2020
	<i>Bay Area Exoplanet Meeting</i> , online conference	2020
	<i>New Horizons in Planetary Systems</i> , Victoria, BC, Canada	2019
	POSTERS	
	<i>Extreme Solar Systems V</i> , Christchurch, New Zealand	2024
	<i>TESS Science Conference II (NASA/MIT)</i> , online conference	2021
	<i>ExSoCal 2020</i> , virtual conference	2020
	<i>Extreme Solar Systems IV</i> . Reykjavik, Iceland	2019
	<i>NASA Sagan Summer Workshop</i> , Pasadena, CA, US	2019
	<i>Kepler & K2 Science Conference V</i> , Pasadena, CA, US	2019
	11 th Annual EPSS Student Research Symposium, UCLA, Los Angeles, CA, US	2018
	48 th DPS Meeting and 11 th EPSC, Pasadena, CA, US	2016
TECHNICAL SKILLS	<i>Programming languages:</i> Python, C, MATLAB, FORTRAN, IDL, Bash. <i>Select softwares/codes:</i> VASP, DeePMD, REBOUND, MESA, emcee, dynesty.	
TECHNICAL WORKSHOPS	OWL Exoplanet Summer workshop by UC Santa Cruz and Heising-Simons	2022
	<i>Planet Formation</i> workshop by MIAPbP in Garching, Germany	2022
	<i>Sagan Exoplanet Workshop: Astrobiology for Astronomers</i> by NExSci at Caltech	2019
	<i>Communicating Science Effectively in Today's World</i> by UCLA and EPSS	2019
	<i>XSEDE HPC Workshop: Summer Boot Camp</i> by XSEDE & PSC at UCLA	2018
	<i>High Performance Computing Workshop</i> by Intel at IIT Kanpur	2015
MENTORING & TEACHING	<u>Summary:</u> (1) Research advisor to 4 undergraduate and 1 PhD student to-date, and mentor to 10+ students , and (2) teaching assistant for 4 courses and 1 guest lecture.	
	MENTORING (RESEARCH):	
	- Roberto Tejada Arevalo (Princeton University, PhD student)	2024 - Present
	Project: <i>Evolution of water-worlds with hydrogen-rich atmospheres</i>	
	- Mariana Ordonez (Princeton U., Undergrad; co-mentor: Dr. Yubo Su)	2024 - Present

Project: *Exoplanet atmospheres X dynamics*

- Malik Booker (Delaware State U. UG, Princeton USRP Program; with PhD student Caleb Lammers) 2024 - Present

Project: *Applying ML techniques to AIMD derived data on material interactions*

- Lorraine Nicholson (UCLA Undergrad and UC LEADS fellow → NSF GRFP^{‡‡} fellow and Ph.D. student at U. of Florida) 2020-22

Project: *Planet evolution under core-powered mass-loss around ultra-cool M-dwarfs*

- Sohanjit Ghosh (IIT Kanpur/IIEST UG → Ph.D. student at Johns Hopkins U.) 2017-18

Project: *Understanding the dynamics of rings around non-spherical minor planets*

MENTORING (OTHER):

- Mentor, *EPSS Family Mentorship Program (EFMP)*, UCLA 2021-23
- Mentor, *Counseling Service*, IIT Kanpur 2012-13

TEACHING:

- Guest Lecturer, Planetary & Orbital Dynamics (EPS SCI 219), UCLA Spring 2019
- Teaching Assistant, Solar System and Planets (EPS SCI 9), UCLA Winter 2019
- Teaching Assistant, Solar System and Planets (EPS SCI 9), UCLA Winter 2018
- Teaching Assistant, Experiments in Aerospace Engineering III (AE451A), IIT Spring 2016
- Teaching Assistant, Experiments in Aerospace Engineering II (AE351A), IIT Fall 2015

PROFESSIONAL SERVICES & OUTREACH

Summary: (1) **Judged/reviewed 12 proposals for the US and European government organizations such as NASA and the European Research Council**, (2) **refereed 8 publications for journals from Nature, the American Astronomical Society and the Royal Astronomical Society**, and judge for 1 national student competition, (3) founder, member, and representative of various professional and student organizations, and (4) speaker and volunteer for several outreach events.

REVIEWS:

- Reviewer for the following organizations and programs: *NASA*, *European Research Council (ERC)*, *Hubble Space Telescope (HST)*, and *Future Investigators in NASA Space Science & Technology Program (FINESST)* 2022 -
- Referee for the following journals: *Nature* [×1], *Proceedings of the National Academy of Sciences* [×2], *Monthly Notices of the Royal Astronomical Society* [×2], *Astrophysical Journal* [×2]
- Judge, AAS Chambliss Astronomy Achievement Student Awards 2023

OTHER DIVERSITY, EQUITY & INCLUSION ACTIVITIES

- Founder & Organizing Committee Member, *EPSS Family Mentorship Program* 2021-23
- Department Representative, *Mathematics & Physical Sciences Council*, UCLA 2017-19
- Departmental Undergraduate Committee, Aerospace Engr., IIT Kanpur 2012-13

^{‡‡}National Science Foundation – Graduate Research Fellowship Program

OTHER PROFESSIONAL SERVICES AND ACTIVITIES

- Member, *NSF Physics Frontiers Center: Center for Matter at Atomic Pressures (CMAP)* 2023 -
- Member, *American Geophysical Union* 2024-
- Member, *American Astronomical Society (AAS)* 2022-
- Member, *Division for Planetary Sciences of the AAS* 2022-
- Founder & Organizer, *Planets & Exoplanets Journal Club, UCLA* 2020-22
- Global Organizing Committee member, *Exoplanets III* conference 2020

OTHER SELECT OUTREACH ACTIVITIES

- *Astronomy on Tap*, Trenton, NJ 2024
- Invited speaker, *Planning for Graduate School*, IIT Bombay, India 2021
- Invited speaker, Wildwood Institute for STEM Research and Development Poster Presentation and Lecture Series, Wildwood School, Los Angeles, CA 2019
- Volunteer, International Observe the Moon Night, UCLA 2019
- Participant, *Exploring Your Universe* - UCLA's Annual Science Outreach Festival 2017-20
- Panelist, Key to Success: Life and Physical Sciences. Grad Student Orientation, UCLA 2018

OTHER SELECT ACHIEVEMENTS Technical Member of the first IIT Kanpur team (*IITK Motorsports*) to ‘conceive, design and fabricate a small, Formula-style racing car to compete’ at the *Formula SAE*, Italy’13, a European-leg of the international competition organized by SAE International.

‘*Sangeet Bhushan*’ (equiv. to Diploma in Music) in playing Harmonium, an Indian classical instrument, from *Pracheen Kala Kendra*, India; 9-10 years of training in playing the instrument.

‘*Sangeet Bhushan/Visharad II*’ (equiv. to Diploma in Music) in playing Tabla, an Indian classical instrument, from *Pracheen Kala Kendra*, India; 6-7 years of training in playing the instrument.