

Akash Gupta

CONTACT Princeton University  
INFORMATION Princeton, NJ 08544

*Email:* akashgpt@princeton.edu;  
*Website:* www.akashgpt.com

RESEARCH Planet formation & evolution; planet demographics; atmospheric escape; atmosphere-interior in-  
INTERESTS teractions; celestial mechanics; ab-initio molecular dynamics; N-body simulations; and habitability.

APPOINTMENTS **51 Pegasi b Fellow,** Aug 2023 -  
**Harry H. Hess Postdoctoral Fellow, and**  
**Future Faculty in Physical Sciences Fellow**  
*Princeton University*  
 Department of Astrophysical Sciences & Department of Geosciences

NASA Future Investigator (FINESST grantee) 2020 - 23

**Graduate Student Researcher** 2017 - 23

University of California, Los Angeles (UCLA)

Department of Earth, Planetary, and Space Sciences (EPSS)

Research Associate 2016-17

Undergraduate Researcher 2013-16

Indian Institute of Technology (IIT), Kanpur

Mechanics &amp; Applied Mathematics Group and Dept. of Aerospace Engineering

EDUCATION *University of California, Los Angeles (UCLA)*

Ph.D., M.S., Planetary Science 2017-23

*Thesis:* Unraveling the evolution of super-Earths and sub-Neptunes

*Advisor:* Prof. Hilke E. Schlichting

Indian Institute of Technology (IIT), Kanpur

<b>B.Tech. - M.Tech. Dual degree, Aerospace Engineering</b>	2011-16
---	---------

Thesis: Dynamics of rings around minor planets

*Advisors:* Prof. Ishan Sharma and Dr. Sharvari Nadkarni-Ghosh

SELECT AWARDS • 51 *Pegasi b Fellowship*, Heising-Simons Foundation 2023 -

& HONORS • *Future Faculty in Physical Sciences Fellowship*, Princeton University 2023 -

- *Harry H. Hess Postdoctoral Fellowship*, Princeton University

- *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

- *American Astronomical Society (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* for DEI initiatives

2022

- Travel grant from MIAPbP<sup>†</sup> to attend *Planet Formation Workshop 2022* in Germany 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
- *EPSS Scholarship Award*, UCLA 2017

#### PEER-REVIEWED JOURNAL PUBLICATIONS

##### PUBLICATIONS

*Total citations:* 479 (first-author: 427 — Google Scholar, June 2023)

*Number of papers:* 5 first-author (+1 in prep.), 1 second-author and 2 *n*<sup>th</sup>-author

*Students directly mentored:* \*

1. **Gupta, A.**, and Stixrude, L. 2023. In prep.  
*Investigating the solubility of hydrogen in water using ab initio molecular dynamics: implications to water-rich planets and exoplanets*
2. 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., 2022. *MNRAS*. 518, 4357-4371.  
*The fundamentals of Lyman-alpha exoplanet transits*
3. **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 ...*
4. 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*
5. **Gupta, A.** and Schlichting, H. E. 2021. *MNRAS*, 504, 4634-4648.  
*Caught in the act: Core-powered mass-loss predictions for observing atmospheric escape*
6. **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*
7. 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*
8. **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*
9. **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*

---

<sup>†</sup>Munich Institute for Astro-, Particle and BioPhysics (Garching, Germany)

OBSERVING PROGRAMS AWARDED	1. Gemini MAROON-X, 25.7 hrs, Co-I (PI: Erik Petigura) <i>Probing the Role of Mass Loss in the Formation of Super-Earths and Sub-Neptunes with MAROON-X</i>	2022
	2. HST Cycle 28, 15 primary spacecraft orbits, Co-I (PI: Paul Cauley) <i>Measuring mass loss via metal lines from the very young planet AU Mic b.</i>	2020
SEMINARS	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
CONFERENCES	MIT, <i>Planetary Lunch Seminar</i>	2020
	UCLA, <i>Planetary Science Seminar</i>	2018, '19, '21
	TALKS	
	241 <sup>st</sup> AAS Meeting, Seattle, WA	2023
	Planet Formation Workshop by MIAPbP <sup>‡</sup> , Munich, Germany (invited)	2022
	240 <sup>th</sup> AAS Meeting, Pasadena, CA, US	2022
	Exoplanets IV, Las Vegas, NV, US	2022
	Stars and Planets in the Ultraviolet, virtual conference	2021
	Exoplanet Demographics, virtual conference	2020
	Exoplanets III, virtual conference	2020
	Bay Area Exoplanet Meeting, virtual conference	2020
	New Horizons in Planetary Systems, Victoria, BC, Canada	2019
	POSTERS	
	ExSoCal 2020, virtual conference	2020
	Extreme Solar Systems IV. Reykjavik, Iceland	2019
	NASA Sagan Summer Workshop, Pasadena, CA, US	2019
	Kepler & K2 Science Conference V, Pasadena, CA, US	2019
	11 <sup>th</sup> Annual EPSS Student Research Symposium, UCLA, Los Angeles, CA, US	2018

TECHNICAL SKILLS	<p><i>Programming languages:</i> FORTRAN, C, MATLAB, Python, IDL, Bash.</p> <p><i>Select open-source codes used:</i> VASP, REBOUND, MESA, emcee, dynesty.</p>	
TECHNICAL WORKSHOPS	<p>OWL Exoplanet Summer workshop by UC Santa Cruz and Heising-Simons</p> <p>Planet Formation workshop by MIAPbP in Garching, Germany</p> <p>Sagan Exoplanet Workshop: Astrobiology for Astronomers by NExSci at Caltech</p> <p>Communicating Science Effectively in Today's World by UCLA and EPSS</p> <p>XSEDE HPC Workshop: Summer Boot Camp by XSEDE &amp; PSC at UCLA</p> <p>High Performance Computing Workshop by Intel at IIT Kanpur</p>	<p>2022</p> <p>2022</p> <p>2019</p> <p>2019</p> <p>2018</p> <p>2015</p>
MENTORING, TEACHING, OUTREACH & PROFESSIONAL SERVICES	<p>MENTORING (RESEARCH):</p> <ul style="list-style-type: none"> <li>- Lorraine Nicholson (UCLA undergrad/UC LEADS fellow → NSF GRFP fellow and Ph.D. student at U. of Florida) Project: <i>Planet evolution under core-powered mass-loss around ultra-cool M-dwarfs</i></li> <li>- Sohanjit Ghosh (IIT Kanpur/IIEST undergrad → Ph.D. student at Johns Hopkins U.) Project: <i>Understanding the dynamics of rings around non-spherical minor planets</i></li> </ul> <p>MENTORING (OTHER):</p> <ul style="list-style-type: none"> <li>- Mentor, EPSS Family Mentorship Program (EFMP), UCLA</li> <li>- Mentor, Counseling Service, IIT Kanpur</li> </ul> <p>TEACHING:</p> <ul style="list-style-type: none"> <li>- Guest Lecturer, Planetary &amp; Orbital Dynamics (EPS SCI 219), UCLA</li> <li>- Teaching Assistant, Solar System and Planets (EPS SCI 9), UCLA</li> <li>- Teaching Assistant, Solar System and Planets (EPS SCI 9), UCLA</li> <li>- Teaching Assistant, Experiments in Aerospace Engineering III (AE451A), IIT</li> <li>- Teaching Assistant, Experiments in Aerospace Engineering II (AE351A), IIT</li> </ul> <p>REVIEWS:</p> <ul style="list-style-type: none"> <li>- Reviewer, NASA, European Research Council (ERC)</li> <li>- Referee: <i>Nature Astronomy</i>, <i>Monthly Notices of the Royal Astronomical Society</i>, <i>American Astronomical Society</i> journals</li> <li>- Judge, AAS Chambliss Astronomy Achievement Student Awards</li> </ul> <p>OTHER DIVERSITY, EQUITY &amp; INCLUSION ACTIVITIES</p> <ul style="list-style-type: none"> <li>- Founder &amp; Organizing Committee Member, EPSS Family Mentorship Program Beginning 2022-23 AY, has an annual budget allocated by the Department Chair and has been awarded ~\$2500 to-date (Sep, 2022)</li> <li>- Department Representative, Mathematics &amp; Physical Sciences Council, UCLA</li> </ul>	<p>2020-22</p> <p>2017-18</p> <p>2021 - present</p> <p>2012-13</p> <p>Spring 2019</p> <p>Winter 2019</p> <p>Winter 2018</p> <p>Spring 2016</p> <p>Fall 2015</p> <p>2023</p> <p>2021 - present</p> <p>2017-19</p>

- Departmental Undergraduate Committee, Aerospace Engr., IIT Kanpur 2012-13

#### OTHER PROFESSIONAL SERVICES AND ACTIVITIES

- Member, *American Astronomical Society* 2022 - present
- Member, *Division for Planetary Sciences* of the AAS 2022 - present
- Founder & Organizer, *Planets & Exoplanets Journal Club*, UCLA 2020 - 2022  
In effort to promote interdisciplinary dialogue; now also financially supported by Prof. David Jewitt/iPLEX institute
- Global Organizing Committee member, *Exoplanets III* conference 2020
- Co-founder and Manager of the *UCLA Planets & Exoplanets mailing list* 2019 - present  
In effort to promote interdisciplinary dialogue; currently has 130+ members from across three UCLA departments

#### OTHER SELECT OUTREACH ACTIVITIES

- 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 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 org. by the SAE<sup>‡</sup> 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.

---

<sup>‡</sup>Society of Automotive Engineers