Akash Gupta

CONTACT INFORMATION

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RESEARCH INTERESTS

Planet formation and evolution; atmospheric escape; radiative hydrodynamics; atmosphere-interior interactions; ab initio molecular dynamics; planetary dynamics and celestial mechanics.

EDUCATION

University of California, Los Angeles (UCLA)
Ph.D. in *Planetary Science*[†] (expected) 2017-23
Thesis: Unraveling the evolution of super-Earths and sub-Neptunes
Master of Science in *Planetary Science*[†] (2019)
Advisor: Prof. Hilke E. Schlichting

Indian Institute of Technology (IIT), Kanpur
Bachelor's and Master's (Dual degree) in *Aerospace Engineering* 2011-16
Thesis: Dynamics of rings around minor planets
Advisors: Prof. Ishan Sharma and Dr. Sharvari Nadkarni-Ghosh

RESEARCH EXPERIENCE

NASA Future Investigator 2020 - present
Graduate Student Researcher 2017 - present
Advisor: Prof. Hilke E. Schlichting (2017-) and Prof. Lars Stixrude (2021-)
Department of Earth, Planetary, and Space Sciences (EPSS), UCLA

Research Associate 2016-17
Advisor: Prof. Ishan Sharma
Mechanics & Applied Mathematics Group, IIT Kanpur

Summer Research Student Summer 2015
Advisor: Prof. Heikki Salo
Astronomy Research Unit, Department of Physics, University of Oulu

Undergraduate Researcher 2013-16
Advisors: Prof. Ishan Sharma & Dr. Sharvari Nadkarni-Ghosh
Mechanics & Applied Mathematics Group and *Dept. of Aerospace Engr., IIT Kanpur*

SELECT AWARDS & HONORS

Selected for the OWL Summer Exoplanet Program 2022 at UC Santa Cruz 2022
Travel grant from MIAPbP[‡] to attend *Planet Formation* Workshop 2022 in Germany 2022
Harold and Mayla Sullwold Scholarship by EPSS, UCLA for excellence in research 2020
Future Investigators in NASA Earth and Space Science and Technology (FINESST) grant 2020-23
Constantine and Perina Panunzio Scholarship by EPSS, UCLA for excellence in research 2019
UCLA's University Fellowship 2017-19
EPSS Department Scholarship Award, UCLA 2017
Travel grant for research from IIT to work with Prof. Heikki Salo, U. of Oulu, Finland 2015
Secured 99.6+ percentile among ~ 0.5 million candidates in the national exam IIT-JEE[§] 2011

[†] formally, *Geophysics & Space Physics*
[‡] Munich Institute for Astro-, Particle and BioPhysics (Garching, Germany)
[§] Indian Institute of Technology - Joint Entrance Examination (for admission to science & engineering colleges in India)

PUBLICATIONS

Total citations: 321 (Google Scholar; Aug 2022)
Number of papers – first-author: 5 (+1 in prep.), second-author: 1, n^{th}-author: 2
Students directly mentored: *

1. **Gupta, A.**, and Stixrude, L. 2022. In prep.
   Investigating the solubility of hydrogen in water using ab initio molecular dynamics: implications to exoplanets, Solar system icy giants and planet formation
2. **Gupta, A.**, *Nicholson, L. and Schlichting, H. E. 2022. In review. *MNRAS*. arXiv:2205.14020.
   Properties of the radius valley around low mass stars: Predictions from core-powered ...
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., 2021., In review. arXiv:2111.06094
   The fundamentals of Lyman-alpha exoplanet transits
4. Rogers, J. G., **Gupta, A.**, Owen, J. E. and Schlichting, H. E. 2021. *MNRAS*, 508, 5886.
   Photoevaporation Vs. core-powered mass-loss: Model comparison with the 3D radius gap
5. **Gupta, A.** and Schlichting, H. E. 2021. *MNRAS*, 504, 4634.
   Caught in the act: Core-powered mass-loss predictions for observing atmospheric escape
6. **Gupta, A.** and Schlichting, H. E. 2020. *MNRAS* 493, 792.
   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.
   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.
   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.
   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

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

SEMINARS (*: invited)

**Astronomy Seminar*, Carnegie Earth & Planets Laboratory	2021
**Disks and Exoplanets Group Seminar*, University of Arizona	2020
**Astronomy Seminar*, McMaster University	2020
**Planetary Lunch Seminar*, Massachusetts Institute of Technology	2020
Planetary Science Seminar, UCLA	2019, '18, '21

CONFERENCES (*: invited)

**Planet Formation Workshop* by MIAPbP‡, Munich, Germany. Talk.	2022
240th AAS Meeting, Pasadena, CA, US. Talk.	2022
Exoplanets IV, Las Vegas, NV, US. Talk.	2022

Stars and Planets in the Ultraviolet. Talk. 2021
Exoplanet Demographics. Talk. 2020
Exoplanets III. Talk. 2020
Bay Area Exoplanet Meeting. Talk. 2020
Extreme Solar Systems IV. Reykjavik, Iceland. Poster. 2019
NASA Sagan Summer Workshop. Pasadena, CA, US. Poster. 2019
New Horizons in Planetary Systems. Victoria, BC, Canada. Talk. 2019
Kepler & K2 Science Conference V. Pasadena, CA, US. Poster. 2019
11^{th} *Annual EPSS Student Research Symposium, UCLA*. Los Angeles, CA, US. Poster. 2018
48^{th} *DPS Meeting and* 11^{th} *EPSC*. Pasadena, CA, US. Poster. 2016

OTHER MAJOR PROJECTS

Geochemical evolution of planets 2021 - present
Asymmetry in Lunar 'cold-spot' craters; now led by Sophie Taylor (UCLA) 2017 - present
Rings around irregularly shaped minor-planets; now led by Shri B. Bharath (IIT) 2016 - present
Understanding the dynamics of Saturn's F-ring 2015
Adaptively optimized trajectories for rendezvous with an asteroid 2013-14

TECHNICAL SKILLS

Programming languages: FORTRAN, C, MATLAB, Python, IDL, Shell Script.
Select open-source codes used: VASP, REBOUND, MESA, emcee, dynesty.

TECHNICAL WORKSHOPS

OWL Exoplanet Summer workshop by UC Santa Cruz and Heising-Simons 2022
Planet Formation workshop by MIAPbP in Garching, Germany 2022
Sagan Exoplanet Workshop: Astrobiology for Astronomers by NExSci at Caltech 2019
Communicating Science Effectively in Today's World by UCLA and EPSS 2019
XSEDE HPC Workshop: Summer Boot Camp by XSEDE & PSC at UCLA 2018
High Performance Computing Workshop by Intel at IIT Kanpur 2015

MENTORING, TEACHING, SERVICES & OUTREACH

Mentoring (research):

- Lorraine Nicholson (awarded UC LEADS fellowship; currently NSF GRFP fellow at U. Florida) 2020-22
  Project: *Planet evolution under core-powered mass-loss around ultra-cool M-dwarfs*
- Sohanjit Ghosh (IITK undergraduate; currently Ph.D. student at U. Maryland) 2017-18
  Project: *Understanding the dynamics of rings around non-spherical minor planets*

Mentoring (other):

- Mentor, *EPSS Family Mentorship Program (EFMP)*, UCLA 2021 - present
- 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

Other Diversity, Equity & Inclusion activities

- Founder & Organizing Committee Member, *EPSS Family Mentorship Program* 2021 - present

Beginning 2022-23 AY, has an annual budget allocated by the Department Chair and has been awarded ~$2500 to-date

- Department Representative, *Mathematics & Physical Sciences Council*, UCLA 2017-19
- Departmental Undergraduate Committee, Aerospace Engr., IIT Kanpur 2012-13

Other Professional Services and Activities

- Referee: *Nature Astronomy*, *MNRAS*, *AAS* journals 2020 - present
- Member, *American Astronomical Society* and *Division for Planetary Sciences* 2022 - present
- Founder & Organizer, *Planets & Exoplanets Journal Club*, UCLA 2020 - 2022
- Global Organizing Committee Member, *Exoplanets III* conference 2020
- Founded and managed the *UCLA Planets & Exoplanets mailing list* for promoting inter-departmental communication at UCLA 2019 - 2022

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, MAJOR ACHIEVEMENTS

Member of the first-ever IIT Kanpur team (*IITK Motorsports*) to conceive, design and fabricate a small, Formula-style racing car to compete at the *Formula SAE*, Italy'13 organized by the 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.

[‖]Society of Automative Engineers