

SACHIN ALEXANDER REDDY

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I am currently a visiting research student at the NASA-Caltech Jet Propulsion Laboratory and PhD student at the UCL Mullard Space Science Laboratory. I like making scientific discoveries about our solar system with big data and AI. Over the next decade, I plan to continue to contribute to our understanding of icy moons, seeking signs of habitability and potentially life.

EDUCATION

- 2020 – Present **PhD in Space Physics**, University College London
Ions, Irregularities, and Plasma Dynamics in Planetary Ionospheres
Advisors: Dr. Colin Forsyth, Prof. Anasuya Aruliah & Dr. Gethyn Lewis
- 2022 – Present **Research Student**, California Institute of Technology
- 2018 – 2019 **MSc in Systems Engineering & Space Systems**, University College London
GPA: 3.9/4.0
Awards: *Top of Class* and *Best Research Project*
- 2010 – 2015 **BSc in Computer Science with Business**, Oxford Brookes University
Grade: *Second Class Honours*

FELLOWSHIPS, HONORS AND AWARDS

- 2023 *Johnstone Award for Outstanding Scientific Achievement*, University College London
Postdoctoral Fellowship, Japan Society for the Promotion of Science (JSPS)
Research Student Fund, Institute of Physics
[Start Me Up](#) Challenge Coin 1 of 100, US Government Award
- 2022 *EA Milne Travel Grant*, Royal Astronomical Society
Student Travel Grant, University College London
Student Travel Grant, University College London
- 2021 *Team achievement award for SOAR mission*, Mullard Space Science Laboratory
Team achievement award CIRCE mission, Mullard Space Science Laboratory
- 2020 *UCL doctoral fellowship*, Science and Technology Facilities Council
- 2019 *Top of class award 2019*, University College London
Best research project, University College London
Conference travel grant, Europlanet Society

RESEARCH EXPERIENCE

- March 2024 – April 2024 **Postdoctoral Fellowship**, National Institute of Polar Research (Japan)
Development of next generation AI for MHD modeling in the auroral ionosphere
Advisor: Prof. Ryuho Kataoka, Space Sciences Group
- February 2023 – March 2024 **Visiting Research Student (JVSRP)**, NASA-Caltech Jet Propulsion Laboratory
Building state-of-the-art AI models to predict ionospheric plasma dynamics
Advisor: Dr. Xiaoqing Pi, Ionospheric & Remote Sensing Group
- October 2022 – December 2022 **Visiting Research Student (JVSRP)**, NASA-Caltech Jet Propulsion Laboratory
Modeling moon-plasma interactions at Jupiter's moon Europa
Advisors: Dr. Tom Nordheim & Dr. Kevin Hand, Ocean Worlds Lab
- July 2020 – January 2023 **Co-I on Ion & Neutral Mass Spectrometer**, Mullard Space Science Laboratory
Analysis and troubleshooting of in-flight data on [SOAR](#). Testing pre-flight scripts for spectrometer on [CIRCE](#). Creation of fitting routines and modeling techniques

TEACHING EXPERIENCE

- November 2021 – June 2022 **Mentor**, Orbyts Education Programme
Teach 14-15yr old pupils space physics, Python programming, and research skills.
Focus on students from under-represented and non-privileged backgrounds
- October 2020 – January 2022 **Teaching Assistant**, University College London
Taught: Space Systems, Systems Thinking and Engineering Management
Audited: Machine Learning with Big Data and Space Plasma Physics
- Spring 2020 **Teaching Assistant**, University of Bath
Tutored on *Introduction to Python* module. Co-supervised 3 undergraduate students for their final year projects. Invigilated exams and cross-checked assessment marks

INDUSTRY EXPERIENCE

- April 2018 – July 2018 **Design Engineer**, Synergy Circuits - Bengaluru, India
Designed next gen. circuit boards for use in commercial and semiconductor systems.
Created diagrams of systems architectures to visualise product relationships and highlight potential pitfalls
- March 2016 – April 2017 **Process Engineer**, Gorilla Circuits – San Jose, USA
Led 20+ experiments to improve the manufacture of advanced circuit boards. Employed inferential statistics on manufacturing data which improved yield by 4% and productivity by 9%. Trained 30+ colleagues on operating procedures

FIRST AUTHOR PUBLICATIONS

- [-] **Reddy, S. A.**, Pi, X., Forsyth, C., Aruliah, A., Neural network model of vertical plasma drifts with uncertainty quantification. *Journal of Geophysical Research: Space Physics* (Draft Stage)

- [1] **Reddy, S. A.**, Nordheim, T. A., Harris, C., (Under Review). Surface Charging of Jupiter's Moon Europa. *The Astrophysical Journal Letters*. (Submitted)
- [2] **Reddy, S. A.**, et al. (2023). Predicting Swarm Equatorial Plasma Bubbles via Machine Learning and Shapley Values. *Journal of Geophysical Research: Space Physics*, 128, e2022JA031183. <https://doi.org/10.1029/2022JA031183>
- [3] **Reddy, S. A.**, et al. (2022). CubeSat measurements of thermospheric plasma: spacecraft charging effects on a plasma analyzer. *CEAS Space Journal*, 14, 675–687. <https://doi.org/10.1007/s12567-022-00439-y>

PRESENTED WORKS

- [1] **Reddy, S. A.**, et al. (2023). Surface Charging at Jupiter's Icy Moon Europa. In AGU Fall Meeting Abstracts (Yet to be released)
- [2] **Reddy, S. A.**, et al. (2023). Interpretable predictions in ionosphere physics. European Space Weather Week 2023
- [3] **Reddy, S. A.**, et al. (2022). Predicting Swarm plasma bubbles via Machine Learning. In AGU Fall Meeting Abstracts (Vol. 2022, pp. NG46A-02).
- [4] **Reddy, S. A.**, et al. (2022). Predicting equatorial plasma bubbles with a random forest classifier. The Third Triennial Earth-Sun Summit (TESS, 54(7)).
- [5] **Reddy, S. A.**, et al. (2022). Equatorial Plasma Bubbles and Spread F with Machine Learning. Proceedings of the 2022 National Astronomy Meeting
- [6] **Reddy, S. A.**, et al. (2022). Predicting Equatorial Plasma Bubbles with Machine Learning and CubeSats. Proceedings of the 2nd Machine Learning in Heliophysics, 46.
- [7] **Reddy, S. A.**, et al. (2021). Measuring Ionospheric Plasmas. European Space Weather Week 2021
- [8] **Reddy, S. A.**, et al. (2021). Charging effects on a plasma analyser. Proceedings of the 2021 National Astronomy Meeting
- [9] **Reddy, S. A.**, et al. (2021). Impact of Spacecraft Charging on QB50 Ion and Neutral Mass Spectrometer. Spacecraft Plasma Interactions In Europe

INVITED TALKS & SEMINARS

- 2023 Surface-plasma interactions at Europa, *Applied Physics Lab, JHU* [seminar]
- Science CubeSats in the Ionosphere, *NASA Ames Research Centre* [seminar]
- AI in the Ionosphere, *UC Berkeley* [seminar]
- Surface-Plasma Interactions at Europa, *NASA Jet Propulsion Laboratory* [seminar]
- AI in the Ionosphere, *University of Northumbria* [seminar]
- Surface-Plasma Interactions at Europa, *University College London* [talk]

- 2022 Plasma bubbles and spacecraft charging, *University College London* [talk]
- 2021 Spacecraft charging and the impact on the INMS, *University College London* [talk]
- 2020 Charging in VLEO: A CubeSats Perspective, *DISCOVERER Careers event* [talk]

Press Releases:

[Scientists can now predict harmful plasma bubbles](#)

SKILLS

- Space Science: Planetary science, space plasma physics, ionospheric physics, magnetospheres
- Space Engineering: Plasma analyzer design, in-flight operations, moments calculations & fitting, data calibration
- Data Science: Inferential statistics, summary statistics, dispersion analysis, experiment design, data engineering
- Machine Learning: Neural networks, deep learning, explainable AI, uncertainty quantification, Monte Carlo analysis
- Programming: *Proficient in* : Python, \LaTeX , BASH (Linux)
- Community Leadership: Journal referee (JGR Space Weather), Chair of UCL Spacecraft Charging Committee

VOLUNTEERING

- 2023 - present **Journal Geophysical Research**
Reviewer for JGR Space Weather
- 2019 – 2021 **UKSEDS**
Events and competitions team at the UK's national student space society. Co-host of the 2020 Student Space Symposium. Committee member of the 2019-20 Satellite Design Competition
- 2020 – 2021 **UCL VESTIGO Satellite Team**
A competition to design a 3u CubeSat to explore the lunar surface. Head of mission analysis and systems engineering: orbit optimisation, concept-of-operations, ground segment, risk analysis and requirements definition