

Dr. Krishnaprasad Chirakkil

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SUMMARY

I am a planetary space scientist specializing in spacecraft data analysis and numerical modeling, currently working as an Assistant Professor at Physical Research Laboratory (PRL), Ahmedabad. My research leverages datasets from multiple space missions, including MAVEN, Emirates Mars Mission, Mars Express, Mars Orbiter Mission, ACE, GOES, STEREO, and SDO, integrating both remote sensing and *in-situ* particles & fields observations. I have worked on planetary atmospheres, aeronomy, space weather, and heliophysics. In previous work, I updated a 3-D Monte Carlo particle transport model to simulate atmospheric escape from planets. Currently, I am developing a vertically and horizontally coupled 2-D photochemical model to study the atmospheres of Venus and Mars.

EDUCATION

Cochin University of Science and Technology	Cochin, India
<i>Ph.D. Physics</i>	<i>Jul 2021</i>
<i>Thesis: "Solar Energetic Particles Associated with Coronal Mass Ejections and Corotating Interaction Regions and their Influence on Martian Plasma Environment"</i>	
<i>Advisor: Dr. Smitha V. Thampi</i>	
National Institute of Technology Calicut	
<i>M.Sc. Physics</i>	<i>May 2015</i>
University of Calicut	
<i>B.Sc. Physics</i>	<i>May 2013</i>

RESEARCH AND TEACHING EXPERIENCE

Physical Research Laboratory	Ahmedabad, India
<i>Assistant Professor</i>	<i>Aug 2025 – present</i>
Planetary Sciences Division	
Laboratory for Atmospheric and Space Physics, CU Boulder	Colorado, USA
<i>Research Scientist-II</i>	<i>Dec 2023 – Aug 2025</i>
<i>Research Scientist-I</i>	<i>Jul 2021 – Dec 2023</i>
<i>Professional Research Assistant</i>	<i>May 2021 – Jul 2021</i>
Supervisors: Dr. David A. Brain, Dr. Michael S. Chaffin	
Space and Planetary Science Center, Khalifa University	Abu Dhabi, UAE
<i>Visiting Researcher</i>	<i>May 2021 – Dec 2024</i>
Supervisor: Dr. M. Ramy El-Maarry	
Space Sciences Laboratory, UC Berkeley	California, USA
<i>Visiting Scholar</i>	<i>May 2021 – Dec 2023</i>
Supervisor: Dr. Robert J. Lillis	
Space Physics Laboratory, VSSC, ISRO	Trivandrum, India
<i>Senior Research Fellow</i>	<i>Jun 2018 – Apr 2021</i>
<i>Junior Research Fellow</i>	<i>Jun 2016 – Jun 2018</i>
Supervisor: Dr. Smitha V. Thampi	
Indian Institute of Technology Palakkad	Palakkad, India
<i>Teaching Assistant (Physics)</i>	<i>Jul 2015 – Jun 2016</i>
Supervisor: Prof. S. Kasiviswanathan	
Raman Research Institute	Bangalore, India
<i>Visiting Student (Astronomy and Astrophysics)</i>	<i>Jan 2015 – Jun 2015</i>
Supervisor: Dr. Lakshmi Saripalli	
Indian Institute of Technology Madras	Chennai, India
<i>Summer Student (Gravitation and Cosmology)</i>	<i>May 2014 – Jul 2014</i>
Supervisor: Prof. Suresh Govindarajan	

PUBLICATIONS

1. A. Kumar, S. L. England, J. Deighan, S. K. Jain, M. S. Chaffin, M. O. Fillingim, R. J. Lillis, G. Holsclaw, J. S. Evans, R. Susarla, **K. Chirakkil**, et al. (2025), A Statistical Analysis of Enhancements in the Martian Far UV Dayglow observed by EMM-EMUS (*in-preparation*)
2. **K. Chirakkil**, J. Deighan, R. Lillis, R. Elliott, M. Chaffin, et al. (2025), Increase in Estimated Oxygen Photochemical Escape Rates at Mars from MAVEN in-situ Data and Updated Modeling (*in-preparation*)
3. **E. Smith, K. Chirakkil**, R. Lillis, S. Xu, J. Deighan, M. Chaffin, et al. (2025), Sinuous Discrete Aurora Analysis During MAVEN and EMM Conjunctions (*in-preparation*) *lead author is student
4. R. Jolitz, et al. including **K. Chirakkil** (2025), Mars on the Farside: Multipoint observations of an unusual space weather event in December 2023 (*in-preparation*)
5. R. Lillis, Y. Ma, S. Xu, J. Deighan, **K. Chirakkil**, et al. (2025), IMF control of electron aurora across Mars' crustal magnetic fields: Insights into electron sources, *Journal of Geophysical Research: Space Physics, Journal of Geophysical Research: Space Physics*, 130, <https://doi.org/10.1029/2025JA033913>
6. R. Susarla, J. Deighan, M. S. Chaffin, E. Quemerais, S. Jain, R. J. Lillis, G. Holsclaw, **K. Chirakkil**, et al. (2025), Interplanetary Hydrogen Observations of the Emirates Ultraviolet Spectrometer Onboard the Emirates Mars Mission, *Journal of Geophysical Research: Space Physics*, 130, <https://doi.org/10.1029/2025JA033903>
7. **K. Chirakkil**, R. J. Lillis, J. Deighan, M. S. Chaffin, S. K. Jain, D. A. Brain, et al. (2024), EMM EMUS observations of FUV aurora on Mars: Dependence on magnetic topology, local time, and season, *Journal of Geophysical Research: Planets*, 129, <https://doi.org/10.1029/2024JE008336>
8. R. J. Lillis, J. Deighan, **K. Chirakkil**, S. Jain, M. Fillingim, M. Chaffin, et al. (2024), Sinuous aurora at Mars: A link to the tail current sheet?, *Journal of Geophysical Research: Space Physics*, 129, <https://doi.org/10.1029/2024JA032477>
9. R. Susarla, J. Deighan, M. S. Chaffin, S. Jain, R. J. Lillis, **K. Chirakkil**, et al. (2024). Variability of atomic hydrogen brightness in the Martian exosphere: Insights from the emirates ultraviolet spectrometer on board emirates Mars mission, *Journal of Geophysical Research: Space Physics*, 129, <https://doi.org/10.1029/2024JA032525>
10. **K. Chirakkil**, J. Deighan, M. S. Chaffin, S. K. Jain, R. J. Lillis, et al. (2024), EMM EMUS Observations of Hot Oxygen Corona at Mars: Radial Distribution and Temporal Variability, *Journal of Geophysical Research: Space Physics*, 129, <https://doi.org/10.1029/2023JA032342>
11. L. Soret, B. Hubert, J. Gérard, S. Jain, **K. Chirakkil**, R. Lillis, J. Deighan (2024), Quantifying the electron energy of Mars aurorae through the oxygen emission intensity ratio at 130.4 and 135.6 nm, *Journal of Geophysical Research: Planets*, 129, <https://doi.org/10.1029/2023JE008214>
12. K. Garcia-Sage et al. including **K. Chirakkil** (2023), Expanding Heliophysics to Engage in Interdisciplinary Star-Planet Interactions Studies, *Bulletin of the AAS*, 55(3), 121, <https://doi.org/10.3847/25c2cfb.70c18b9c>
13. M. S. Chaffin, J. Deighan, S. Jain, G. Holsclaw, H. AlMazmi, **K. Chirakkil**, et al. (2022), Combined analysis of hydrogen and oxygen 102.6 nm emission at Mars, *Geophysical Research Letters*, 49, <https://doi.org/10.1029/2022GL099851>
14. R. J. Lillis, J. Deighan, D. Brain, M. Fillingim, S. Jain, M. Chaffin, S. England, G. Holsclaw, **K. Chirakkil**, et al. (2022), First synoptic images of FUV discrete aurora and discovery of sinuous aurora at Mars by EMM EMUS, *Geophysical Research Letters*, 49, <https://doi.org/10.1029/2022GL099820>

15. M. S. Chaffin, C. M. Fowler, J. Deighan, S. Jain, G. Holsclaw, A. Hughes, R. Ramstad, Y. Dong, D. Brain, H. AlMazmi, **K. Chirakkil**, et al. (2022), Patchy proton aurora at Mars: A global view of solar wind precipitation across the Martian dayside from EMM/EMUS, *Geophysical Research Letters*, 49, <https://doi.org/10.1029/2022GL099881>
16. **Krishnaprasad, C.**, S. V. Thampi, C. O. Lee, S. P. Tadepalli, K. Sankarasubramanian, and T. K. Pant (2021), Solar Energetic Particle Events of July 2017: Multi-spacecraft Observations near 1 and 1.5 AU, *Earth and Space Science Open Archive*, <https://doi.org/10.1002/essoar.10503517.2>.
17. **Krishnaprasad, C.**, S. V. Thampi, A. Bhardwaj, T. K. Pant, and R. S. Thampi (2021), Ionospheric plasma energization at Mars during the September 2017 ICME event, *Planetary and Space Science*, 205, 105291, <https://doi.org/10.1016/j.pss.2021.105291>.
18. Thampi, S. V., **C. Krishnaprasad**, G. G. Nampoothiri, and T. K. Pant (2021), The Impact of a Stealth CME on the Martian Topside Ionosphere, *Monthly Notices of the Royal Astronomical Society*, 503, 1, 625–632, <https://doi.org/10.1093/mnras/stab494>.
19. **Krishnaprasad, C.**, S. V. Thampi, A. Bhardwaj, C. O. Lee, K. K. Kumar, and T. K. Pant (2020), Recurrent Solar Energetic Particle Flux Enhancements Observed near Earth and Mars, *The Astrophysical Journal*, 902(1), 13, <https://doi.org/10.3847/1538-4357/abb137>.
20. Mukundan, V., S. V. Thampi, A. Bhardwaj, and **C. Krishnaprasad** (2020), Model calculation of ionization efficiency in the Martian dayside ionosphere using MAVEN observations, *Monthly Notices of the Royal Astronomical Society*, 497, 2, 2239–2249, <https://doi.org/10.1093/mnras/staa2123>.
21. Mukundan, V., S. V. Thampi, A. Bhardwaj, and **C. Krishnaprasad** (2020), The dayside ionosphere of Mars: Comparing a one-dimensional photochemical model with MAVEN Deep Dip campaign observations, *Icarus*, 337, 113502, <https://doi.org/10.1016/j.icarus.2019.113502>.
22. **Krishnaprasad, C.**, S. V. Thampi, and A. Bhardwaj (2019), On the response of Martian ionosphere to the passage of a corotating interaction region: MAVEN observations, *Journal of Geophysical Research: Space Physics*, 124, 8, 6998–7012, <https://doi.org/10.1029/2019JA026750>.
23. Thampi, S. V., **C. Krishnaprasad**, P. R. Shreedevi, T. K. Pant, and A. Bhardwaj (2019), Acceleration of energetic ions in corotating interaction region near 1.5 AU: Evidence from MAVEN, *The Astrophysical Journal Letters*, 880(1), L3, <https://doi.org/10.3847/2041-8213/ab2b43>.
24. Thampi, S. V., **C. Krishnaprasad**, A. Bhardwaj, Y. Lee, R. K. Choudhary, and T. K. Pant (2018), MAVEN observations of the response of Martian ionosphere to the interplanetary coronal mass ejections of March 2015, *Journal of Geophysical Research: Space Physics*, 123, 8, 6917–6929, <https://doi.org/10.1029/2018JA025444>.

JOURNAL REVIEWER

- AGU Advances
- The Astrophysical Journal (ApJ)
- Monthly Notices of the Royal Astronomical Society (MNRAS)
- Planetary and Space Science (PSS)

PARTICIPATION AND MENTORSHIP

- CU/LASP Annual Research Scientist Evaluation Committee (2025)
- Mentor for NSF Partners Across the Sky Program by CU Boulder and Fort Lewis College (2025)
Student: Elijah Smith (May - August 2025)
- NASA Postdoctoral Program (NPP) application review panel (2024 Jul, 2024 Nov, 2025 Mar)

- CU Boulder Undergraduate Research Opportunities Program application review board (2025)
- NASA ROSES grant proposal review panel (2024)
- Boulder Solar REU Program application review panel (2024, 2025)
- NASA Heliophysics Summer School (2020)
- STFC Solar–Stellar Connection Summer School (2020)
- STFC Introductory Solar System Plasmas Summer School (2020)
- NASA SPICE Training Class (2019)
- ICARB Ocean Research Expedition (2018)
- Winter School on Astroparticle Physics (2014)

COMPUTER SKILLS

- Operating systems
macOS, Linux, Windows
- Programming languages
Python, MATLAB, Julia, IDL, C++, Fortran
- Other softwares
 \LaTeX , HTML, MS–Office, Git, Shell, AWS

MEMBERSHIP

- Science Team Member of the Emirates *Hope* Mars Mission (EMM)
- Science Team Member of the NASA MAVEN mission
- Extended Science Team Member of the NASA ESCAPADE mission
- American Geophysical Union (AGU)
- European Geosciences Union (EGU)

CONFERENCE ORGANIZER AND OUTREACH ACTIVITY

- Volunteer for LASP booth at AGU Fall Meeting, San Francisco, USA (2023)
- Co-convened the EGU General Assembly 2023 session on “Scientific results from the Emirates Mars Mission primary mission” held in Vienna, Austria (2023)
- Session chair at EGU General Assembly, Vienna, Austria (2023)
- Volunteer for LASP table at Fiske Planetarium’s Astronomy Day, Boulder, CO (2023)
- Session chair at Mars Atmosphere Modelling and Observations (MAMO), Paris, France (2022)
- Emirates Mars Mission science outreach at the International School of Creative Science, Sharjah, UAE (2021)
- Science outreach at Chalavara Higher Secondary School, Palakkad, India (2020)
- Science outreach at Government Victoria College, Palakkad, India (2020)
- Science outreach at NSS Higher Secondary School, Wayanad, India (2019)
- Solar eclipse campaign on the occasion of annular solar eclipse, Wayanad, India (2019)
- Volunteer for ISRO Space Exhibition (2016, 2017, 2018)

AWARDS AND ACHIEVEMENTS

- KU-CU/LASP Mars postdoctoral fellowship (2021)
- Best paper award at the high-end workshop on Solar Activities and their Influences in the Heliosphere and Planetary Atmospheres, Calicut, India (2021)
- International travel support from Science and Engineering Research Board (SERB), India to attend NASA SPICE training class at USA (2019)
- Foreign travel grant by Council of Scientific and Industrial Research (CSIR), India to attend AGU Fall Meeting (2018)
- General student travel grant by American Geophysical Union (AGU), USA to attend AGU Fall Meeting (2018)
- Research fellowship by Indian Space Research Organisation (ISRO) (2016)
- Selected as Summer Research Fellow of Indian Academy of Sciences (2014)
- Proficiency prize for outstanding academic performance in B.Sc. (2012)
- Kerala state merit scholarship (2010)

FIRST-AUTHOR CONFERENCE PRESENTATIONS

1. **K. Chirakkil**, M. Chaffin, B. Gregory, E. Cangi, V. Sheel, A. Bhardwaj (2025), 2-D Photochemical Modeling of the Venus Thermosphere and Ionosphere: Effects of Day-to-Night Transport, *Venus Science Conference (online)*.
2. **K. Chirakkil**, R. Lillis, J. Deighan, et al. (2025), Auroral Electron Observations During EMM-MAVEN Conjunction, *M-MATISSE Community Workshop*, London, UK.
3. **K. Chirakkil**, R. Lillis, J. Deighan, et al. (2024), Dependencies and Drivers of FUV Disk and Limb Aurora at Mars, *AGU Fall Meeting*, Washington, DC, USA.
4. **K. Chirakkil**, J. Deighan, R. Lillis, et al. (2024), Hot Oxygen Corona and Photochemical Escape at Mars: New Data and Modeling, *AGU Fall Meeting*, Washington, DC, USA.
5. **K. Chirakkil**, R. Lillis, J. Deighan, et al. (2024), FUV Aurora on Mars: Dependence on Space Weather Conditions, *The Tenth International Conference on Mars*, Pasadena, CA, USA.
6. **K. Chirakkil**, J. Deighan, R. Lillis, et al. (2024), Martian Hot Oxygen Corona and Photochemical Escape: EMM & MAVEN Observations and Monte Carlo Modeling, *Astrobiology Science Conference*, Providence, RI, USA.
7. **K. Chirakkil**, R. Lillis, J. Deighan, et al. (2023), Mars' Discrete Aurora: Insights from EMM/EMUS and Correlations with Magnetic Topology and Solar Wind Conditions, *AGU Fall Meeting*, San Francisco, USA.
8. **K. Chirakkil**, R. Lillis, J. Deighan, et al. (2023), Dependencies and Drivers of Discrete Aurora on Mars: EMM and MAVEN Observations, *NSSTC Mars and Planetary Science Conference*, United Arab Emirates University, Al Ain, UAE.
9. **K. Chirakkil**, R. Lillis, J. Deighan, et al. (2023), Exploring the Dependencies and Drivers of Discrete Aurora on Mars: Insights from EMM EMUS Observations, *Mars Upper Atmosphere Network*, New York, USA.
10. **K. Chirakkil**, J. Deighan, M. Chaffin, et al. (2023), Martian Outer Oxygen Corona Observations from Emirates Mars Ultraviolet Spectrometer, *LASP Mars Symposium*, Boulder, CO, USA.

11. **K. Chirakkil**, R. Lillis, J. Deighan, et al. (2023), Seasonal and Local Time Dependence of Martian FUV Discrete Aurora Observed by EMM EMUS, *EGU General Assembly*, Vienna, Austria.
12. **K. Chirakkil**, J. Deighan, R. Lillis, et al. (2022), Seasonal and Solar EUV Flux Dependence of the Martian Hot Oxygen Corona: EMM/EMUS Observations, *AGU Fall Meeting*, USA.
13. **K. Chirakkil**, J. Deighan, R. Lillis, et al. (2022), More than Before: Increase in Estimated Oxygen Photochemical Escape Rates from EMM Data and Updated Modeling, *Mars Atmosphere Modelling and Observations*, Paris, France.
14. **K. Chirakkil**, J. Deighan, R. Lillis, et al. (2021), Martian Outer Hot Oxygen Corona as Observed by EMM/EMUS and Comparison with a 3-D Monte Carlo Particle Transport Model, *AGU Fall Meeting*, USA.
15. **Krishnaprasad, C.**, S. V. Thampi, A. Bhardwaj, C. O. Lee, K. K. Kumar, and T. K. Pant (2021), Recurrent Radiation Storms at Mars: Solar Energetic Particles and Radio Blackouts, *SAIHPA*, NIT Calicut, India (**Best Paper Award**).
16. **Krishnaprasad, C.**, S. V. Thampi, A. Bhardwaj, C. O. Lee, K. K. Kumar, and T. K. Pant (2021), Recurrent Space Weather Events at Mars, *Indian Planetary Science Conference*, PRL, Ahmedabad, India.
17. **Krishnaprasad, C.**, S. V. Thampi, and T. K. Pant (2020), Energization of Martian Heavy Ions during Solar Energetic Particle Events: MAVEN Observations, *Indian Planetary Science Conference*, PRL, Ahmedabad, India.
18. **Krishnaprasad, C.**, S. V. Thampi, and T. K. Pant (2020), September 2017 Space Weather Events: Effects on the Plasma Environments of Earth and Mars, *URSI RCRS*, IIT (BHU), Varanasi, India.
19. **Krishnaprasad, C.**, S. V. Thampi, P. R. Shreedevi, T. K. Pant, and A. Bhardwaj (2019), Evidence for Acceleration of Solar Energetic Protons in Corotating Interaction Region near 1.5 AU from MAVEN, *AGU Fall Meeting*, USA.
20. **Krishnaprasad, C.**, S. V. Thampi, and A. Bhardwaj (2019), Martian ionospheric response to the passage of a corotating interaction region: Observations from MAVEN, *Lunar and Planetary Science Conference*, USA.
21. **Krishnaprasad, C.** and S. V. Thampi (2019), MAVEN Observations of the Response of Mars to the Space Weather Events of September 2017, *Regional Astronomy Meeting*, CUSAT, Kochi, India.
22. **Krishnaprasad, C.**, S. V. Thampi, and A. Bhardwaj (2019), Ionospheric response of Mars to the passage of corotating interaction region of June 2015: Observations from MAVEN, *National Space Science Symposium*, Savitribai Phule Pune University, Pune, India.
23. **Krishnaprasad, C.**, S. V. Thampi, A. Bhardwaj, Y. Lee, R. K. Choudhary, and T. K. Pant (2018), MAVEN Observations of the Response of Martian Ionosphere to the Space Weather Events of March 2015, *AGU Fall Meeting*, USA.
24. **Krishnaprasad, C.**, P. R. Shreedevi, S. V. Thampi, and R. K. Choudhary (2018), Response of the Mid, Low, and Equatorial Ionosphere to the St. Patrick's Day Storms of 2013 and 2015, *International Symposium on Equatorial Aeronomy*, PRL, Ahmedabad, India.
25. **Krishnaprasad, C.**, S. V. Thampi, A. Bhardwaj, and T. K. Pant (2017), Mass spectrometric studies of the response of Mars to an interplanetary coronal mass ejection, *Young Astronomers' Meet*, IUCAA, Pune, India.

Over 50 co-authored presentations at major conferences; details on request.