



Dr. ANIL BHARDWAJ

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J.C. Bose Fellow

Director

Physical Research Laboratory

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<https://www.researchgate.net/profile/Anil-Bhardwaj>

<https://www.infosys-science-foundation.com/prize/laureates/2016/anil-bhardwaj.asp>

 https://twitter.com/Bhardwaj_A_2016

 <https://www.linkedin.com/in/anil-bhardwaj-b672776/>

 <https://www.instagram.com/anil.bhardwaj.52643/>

Research Area:

Planetary & Space Sciences, and Space Exploration

Theoretical and observational studies of the surfaces, atmospheres, ionospheres, and magnetospheres of planets and planetary bodies, and their interaction with solar electromagnetic radiation and solar wind, solar system science.

Development of scientific experiments for planetary and space missions.

Current Research Interest includes – Aurora and airglow processes in planetary atmospheres, chemistry of planetary ionospheres, auroral plasma processes on comets and its implications on coma chemistry, Monte Carlo simulations of processes in atmosphere, solar wind-lunar interaction, ENA imaging of the lunar surface and Earth's magnetosphere-ionosphere system, ground-based and space-based multi-wavelength (X-ray, UV, radio) imaging and spectroscopy of emissions from planetary bodies, and comparative planetology.

Low-temperature Astrochemistry, Charged particle and UV radiation interaction with Ices, Shock processing of ices. Planetary Dust and lightning, Solar and planetary X-rays.

The planetary bodies investigated include: Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto, Galilean Satellites (Io, Europa, Ganymede), Titan, Triton, Io plasma torus, Rings of Saturn, Comets, and the Moon.

Academic Qualification :

B.Sc.	Physics	1985	Lucknow University	Ist Class
M.Sc.	Physics	1987	Lucknow University	Ist Class
UG Diploma	German language	1989	Banaras Hindu University	
Ph. D.	Applied Physics	1992	Indian Inst. of Tech., Banaras Hindu Univ.	

Ph. D. Thesis Title : "Aurora and Airglow Processes on the Outer Planets and Comets".

Scientific Administration Positions held:

Feb. 2017–present :	Director, Physical Research Laboratory, Ahmedabad
Feb. 2014 – Feb. 2017 :	Director, Space Physics Laboratory (SPL), Vikram Sarabhai Space Centre (VSSC), Indian Space Research Organization (ISRO), Trivandrum
Sept. 2007 – Feb. 2017 :	Head, Planetary Science Branch, SPL, VSSC, ISRO, Trivandrum
Feb. 2014 – Feb. 2017 :	Chairman, VSSC Central Level Monitoring Committee
2009 – 2014 :	Chairman, Academic Committee, SPL, VSSC

Professional Background :

Feb. 2017–present :	Director, Physical Research Laboratory, Ahmedabad
Feb. 2014–Feb. 2017 :	Director, Space Physics Laboratory (SPL), VSSC, ISRO, Trivandrum
July 2015–Feb. 2017 :	Scientist H, Space Physics Laboratory, VSSC, Trivandrum

July 2012–June 2015 : Scientist G, Space Physics Laboratory, VSSC, Trivandrum
 July 2007–June 2012 : Scientist SG, Space Physics Laboratory, VSSC, Trivandrum
 July 2002–June 2007 : Scientist-SF, Space Physics Laboratory, VSSC, Trivandrum
 Jan. 1998–June 2002 : Scientist-SE, Space Physics Laboratory, VSSC, Trivandrum
 Aug. 1993–Dec. 1997 : Scientist-SD, Space Physics Laboratory, VSSC, Trivandrum
 July 1990–July 1993 : CSIR Senior Research Fellow, IT, Banaras Hindu University
 April 1988–June 1990 : Research Fellow, Inst. of Tech., Banaras Hindu University

Abroad :

Jan. 2004–Oct. 2005 : National Academy of Science – NRC Senior Research Associate, NASA Marshall Space Flight Center, Huntsville, USA

Awards and Honours:

1. **Shanti Swarup Bhatnagar Prize** (Earth and Planetary Sciences), 2007.
2. **Nehru Centenary Lecture** of the *Kerala Academy of Sciences*, 2007.
3. **ISRO Team Excellence Award** for Chandrayaan-1 Science and Mission, 2008.
4. **Indian Space Research Organization (ISRO) Merit Award**, 2012.
5. **Dr. P. R. Pisharoty Memorial Lecture** of the *Kerala Science Congress*, 2015.
6. **Distinguished Alumnus Award**, *Indian Institute of Technology (Banaras Hindu University)*, Varanasi, 2015.
7. **Vainu Bappu Memorial (International) Award** of *Indian National Science Academy*, 2016.
8. **Infosys Prize in Physical Sciences**, of *Infosys science Foundation*, 2016.
9. **Outstanding Achievement Award** of *Indian Space Research Organization (ISRO)*, 2017.
10. **Decennial Award** of *Indian Geophysical Union*, 2017.
11. **Letter of Felicitation** by *Uttar Pradesh State Government* for Distinguished work in Science and Technology, 2018.
12. **Lunar and Planetary Society's Endowment Lecture** of *Gujarat Science Academy*, 2018.
13. **J. C. Bose National Fellowship** of the *Government of India (SERB-DST)*, 2019.
14. **6th A. P. Mitra Memorial Lecture**, of *National Physical Laboratory*, Sept., 2020.
15. **DAE - C V Raman Lecture** of the *Indian Physics Association*, March 2021.
16. **Prof. M. G. K. Menon Lecture Award** of *The National Academy of Sciences, India*, 2021.
17. **Elected Council Member**, *The National Academy of Sciences, India*, 2022.

International

18. **NRC Senior Research Associateship** by USA National Academy of Sciences, 2003.
19. **Indo-Swedish Award** for International Space Research and Cooperation, from **Swedish Research Council (SIDA)**, Sweden (3 years Project, 2010-2012).
20. **Indo-Swiss Joint Research Programme (ISJRP) Fellowship**, 2010.
21. **Fellowship Grant**, *United Nations Office of Outer Space Affairs*, Vienna, 1996.
22. **Invited Subject Expert**, *International Space Science Institute, Switzerland*, 2012–2014.
23. **Distinguished Planetary Science Lecture**, *Asia Oceania Geosciences Society, Japan*, 2014.

Fellowships of Academy/Union:

1. **Elected Fellow**, Indian Academy of Sciences, 2009.
2. **Elected Fellow**, Indian National Science Academy, 2010.
3. **Elected Fellow**, National Academy of Sciences, India, 2014.
4. **Elected Fellow**, Indian Geophysical Union, Hyderabad, 2008.
5. **Elected Fellow**, Kerala Academy of Sciences, Trivandrum 2013.
6. **Elected Fellow**, Gujarat Science Academy, 2019.
7. **Elected Fellow**, Aeronautical Society of India, 2021.

International

8. **Elected Corresponding Member**, International Academy of Astronautics, 2014.
9. **Elected Liaison Officer**, European Geophysical Union, Planetary Division, 2009.
10. **Elected Member**, International Astronomical Union, 2009.
11. **Elected Academician (Fellow)**, International Academy of Astronautics (IAA), 2018.

Selected Recognitions:

1. **Invited Chapter** in "*Encyclopedia of the Solar System*"(2007, and 2014).
2. **Invited Review** '*Auroral Emission of the Giant Planets*', in *Reviews of Geophysics*(2000).
3. **Invited Review** '*X-rays from Solar System Objects*', in *Planetary and Space Science*(2007).
4. **Contributor** to **Athena Mission** document – **Europe's** Next Generation X-ray Observatory, which is selected by **ESA Science Program** as Large Project.
5. **Book Chapter on Anil Bhardwaj** : "**A Rocket to Poke Martians**", *A chapter on Life and work of Anil Bhardwaj* in Children's Book "**They Made What?**" - Stories of Ingenious Inventions by Indian Scientists, Author- *Shweta Taneja*, Published by Hachette India (2021).

Service to Scientific Community:

International

1. **President, Planetary Science** Section of the **Asia Oceania Geosciences Society (AOGS)**, 2006–2010.
2. **President, International Union of Radio Sciences (URSI)** Indian Committee, 2020–2023.
3. **Liaison Officer, European Geophysical Union (EGU)**, Planetary Division, 2009.
4. **Vice-Chair, COSPAR Commission B**, 2012–2020.
5. **Member, International Academy of Astronautics Commission 1** (Space Physical Sciences), 2015–2017.
6. **Member, International Union of Geodesy and Geophysics - Union Commission on Planetary Sciences (UCPS)**, 2015–2019 .
7. **Leader of Indian Delegation**, to *Portugal Science Summit*, 2017.
8. **Leader of Indian Delegation, Indo-Israel Astrophysics and Planetary Science**, 2019.
9. **Member, ISRO-NASA Planetary and Space Sciences Working Group**, 2014–

10. **Chairman, International Science Council (INSA-ICSU) Joint Indian National Committee for COSPAR, URSI and SCOSTEP**, for 2020-2023.

National

11. **Member, Executive Council** of *Indian Geophysical Union*, 2011 – 2014.
12. **Member, NISER-Earth & Planetary Sciences *National Steering Committee***, 2016.
13. **Member, Apex Science Board** of *ISRO* (earlier ADCOS), 2014 – .
14. **Member, INSA-ICSU Committee** for COSPAR, SCOSTEP and URSI, 2012–2020.
15. **Member, INSA Section Committee** for Earth and Planetary Sciences, 2017–2019.
16. **Member, ISRO Council**, 2017–.
17. **Member, State Audit Advisory Board (SAAB)** for Gujarat, 2020–.
18. **Member, Program Management Committee, National Information System for Climate & Environment Studies (NICES)**, 2017–
19. **Member, Projects Advisory Committee**, DST International Cooperation Program, 2020–.
20. **Chairman, Search-cum-Selection Committee** for Scientist H/OS-HRDG, CSIR.

Governing Council / Research Council / Management Board of Institutes

21. **Member, Governing Council, Indian Institute of Geomagnetism (IIG-DST)**, Mumbai, 2017 –
22. **Member, Governing Council, North East-Space Application Centre (ISRO-DOS)**, Shillong, 2017–.
23. **Member, Governing Council, National Centre for Earth Science Studies (NCESS-MoES)**, Trivandrum, 2017–.
24. **Member, Governing Council, Indian Institute Astrophysics (IIA-DST)**, Bangalore, 2019–
25. **Member, Governing Council, Aryabhata Research Institute of Observational Sciences (ARIES-DST)**, Nainital, July 2019 – .
26. **Member, Research Council, CSIR-National Institute of Oceanography (NIO)**, Goa, 2017–2020.
27. **Member, Research Council, CSIR-National Geophysical Research Laboratory (NGRI)**, Hyderabad, 2017–2020.
28. **Member, Scientific Advisory Committee, National Atmospheric Research Laboratory (NARL-DOS)**, Gadanki, Tirupati, 2014– .
29. **Member, National Committee, Centre for Co-operation in Science and Technology among Developing Societies**, Chennai, 2018-2020.
30. **Member, TIFR Balloon Facility Management Board (TIFR-DAE)**, Hyderabad, 2018– .
31. **Member, Board of Management, Indian Institute of Space Science and Technology (IIST-DOS)**, Trivandrum, 2017 -.
32. **Member, Governing Council, Electronics and Quality Development Centre**, Govt. of Gujarat, Gandhinagar, 2017– .
33. **Member, Executive Committee, Gujarat Council of Science and Technology**, 2017– .
34. **Member, Advisory Committee of Centre for Space Science and Technology Education in Asia and the Pacific (CSSTEAP- affiliated to United Nation)**, Dehradun, 2018– .

35. **Senate Member**, *National Institute of Design* (NID-Ministry of Commerce and Industry), Ahmedabad, 2021– .
36. **Member Advisory Committee**, *Cosmic Ray Laboratory of TIFR*, Ooty, 2022– .

Award Committees

37. **Member**, *AOGS Award Committee*, 2014–2016.
38. **Member**, *Sunanda & Satimay Basu International Early Career Award Committee of American Geophysical Union*, 2019–.
39. **Chairman**, *SwarnaJayanti Fellowship Award Committee* for Earth & Atmospheric Sciences, 2018-2019.
40. **Chairman**, *CSIR Young Scientist Award Committee*, in Earth, Atmosphere, Ocean, and Planetary Sciences.
41. **Member**, *S S Bhatnagar Award Committee* for Earth Sciences.
42. **Member**, *SwarnaJayanti Award Committee* Earth & Atmospheric Sciences, 2015-2017.
43. **Member**, *B M Birla Science Prize Committee*, for 2016, 2018.

Service to Scientific Publications:

1. **Editor-in-Chief**, *Advances in Geosciences* (World Scientific), 2006–2013.
2. **Associate Editor**, *Advances in Space Research* (Elsevier), 2014–2020.
3. **Chair**, Publication Committee of *Asia Oceania Geosciences Society*, 2006 – 2008.
4. **Member**, **Board of Advisory Editors**, *Planetary & Space Science* (Elsevier), 2007–2009.
5. **Member**, **Editorial Board**, *Space Science Reviews* (Springer), 2010– .
6. **Member Editorial Board**, *Bulletin of Astronomical Society of India*, 2012–2015 .
7. **Member**, **Editorial Board**, *Molecular Astrophysics* (Elsevier), 2015–2020.
8. **Advisory Board Member**, Book Series: *Advances in Planetary Science*, World Scientific, 2015–.
9. **Member**, *AOGS Publication Committee*, 2017– .
10. **Referee**, Several peer-reviewed journals - e.g., *Nature*, *ApJ*, *A&A*, *MNRAS*, *JGR-Space*, *JGR-Planets*, *Icarus*, *Planetary Space Sci.*, *GRL*, *Current Science*, *JESS*, others.

Press Releases:

Press Releases by NASA, ESA, and ISRO on Discoveries and Landmark Research Findings, which formed the Breaking News at several Science Websites and attracted Media Coverage.

1. **NASA Press Release**, Feb. 27, 2002, "**Jupiter Hot Spot Makes Trouble For Theory**", on the **Nature** paper coauthored by Anil Bhardwaj "A Pulsating Auroral X-Ray Hot Spot on Jupiter". It also made "**ASTRONOMY PICTURE OF THE DAY**" on March 1, 2002.
2. **ESA Press Release**, March 7, 2005, "**Jupiter: A Cloudy Mirror for the Sun**" on *Geophysical Research Letters* paper by Bhardwaj et al. "Solar Control on Jupiter's Equatorial X-ray Emissions".
3. **NASA Press Release**, May 25, 2005, "**NASA's Chandra Finds Saturn Reflects X-rays from Sun**" on *Astrophysical Journal Letters* paper by Bhardwaj et al. "Chandra Observation of an X-ray Flare at Saturn".

4. **NASA Press Release**, March 2, 2005, "**Chandra Probes High-Voltage Auroras on Jupiter**", on *Journal of Geophysical Research* paper coauthored by A. Bhardwaj "Simultaneous Chandra X-ray, HST UV, and Ulysses Radio Observations of Jupiter's Aurora".
5. **CXC-NASA Photo Press Release**, June 27, 2005, "**Saturn's Rings Sparkle with X-rays**" on *Astrophysical Journal Letters* paper by Bhardwaj et al. "Discovery of Oxygen K α X-ray Emission from Rings of Saturn".
6. **NASA Press Release**, Dec. 28, 2005, "**Chandra Looks Back at the Earth**" on *Journal of Atmospheric and Solar-Terrestrial Physics* paper by Bhardwaj et al. "First Terrestrial Soft X-ray Auroral Observation".
7. **CXC-NASA Photo Press Release**, March 1, 2007, "**Jupiter: Chandra Examines Jupiter During New Horizons Approach**", on Chandra X-ray observations of Jupiter during New Horizon flyby in Feb., 2007.
8. **ESA Press Release**, October 16, 2009, "**Hydrogen offers a New Way to study the Moon**" on *Planetary and Space Science* paper coauthored by A. Bhardwaj "Extremely High Reflection of Solar Wind Protons as Neutral Hydrogen Atoms from Regolith in Space".
9. **ISRO Story of the Week**: May 2, 2016, "**MENCA observed the evening exosphere of Mars**", on *Geophysical Research Letters* paper by Bhardwaj et al. "On the evening time exosphere of Mars: Result from MENCA aboard Mars Orbiter Mission".
10. **CXC-NASA Press Release**: Sept. 14, 2016, "**X-ray Detection Sheds New Light on Pluto**", on *Icarus* paper co-authored by A. Bhardwaj "The puzzling detection of x-rays from Pluto by Chandra".
11. **ISRO Story of the Week**: March 27, 2017, "**Observation of Suprathermal Argon in the exosphere of Mars**", on *Geophysical Research Letters* paper by Bhardwaj et al. "Observation of Suprathermal Argon in the exosphere of Mars".
12. **ISRO Story of the Week**: 27 June 2017, "**Discovery of new suprathermal proton population around the Moon by SARA onboard Chandrayaan-1**", on *Geophysical Research Letters* paper by Dhanya, Bhardwaj, et al. "New suprathermal proton population around Moon: Observation by SARA on Chandrayaan-1".
13. **ISRO Story of the Week**: June 14, 2021, "**Natural selection in few milliseconds: Shock-induced formation of complex macroscale structures**", on the two papers co-authored by A. Bhardwaj "Shock processing of amino acids leading to complex structures—implications to the origin of life" published in *Molecules*(2020), and the "Complex structures synthesized in shock processing of nucleobases – Implications to the origins of life", published in *International Journal of Astrobiology* (2021).
14. **ISRO Story of the Week**: June 22, 2021, "**Unraveling the mysteries of the Solar Corona: New results from Chandrayaan-2 Solar X-ray Monitor**", on the two papers published in *Astrophysical Journal Letters* co-authored by A. Bhardwaj. "Observations of the quiet Sun during solar minimum with Chandrayaan-2 XSM. I. Elemental abundances in quiescent corona", and "Observations of the quiet Sun during the Deepest solar minimum of the past century with Chandrayaan-2 XSM. II. Sub-A Class microflares outside active regions".

Cover Page of Journals & Highlights of Articles:

1. **Cover Page of *Reviews of Geophysics***: Figure 1 of Bhardwaj and Gladstone (2000) article made the Cover Page of August 2000 issue of the journal "*Reviews of Geophysics*".
2. **Cover Page of *Astronomy and Astrophysics***: Figure 5 from Branduardi-Raymont, Bhardwaj, et al. (2007) paper made the Cover Page of the journal *Astronomy and Astrophysics*, vol. 463, No.2 (2007).

3. **Cover Page of *Geophysical Research Letters*:** The paper "First Observation of a Mini-Magnetosphere above a Lunar Magnetic Anomaly using Energetic Neutral Atoms" on discovery of Mini-Magnetosphere on the Moon using the **SARA** experiment aboard **Chandrayaan-1** mission made the cover page of the March 16, 2010 issue of the *Geophysical Research Letters*.
4. **American Geophysical Union (AGU) Journal Highlights:** *Geophysical Research Letters* (2005) paper by *Bhardwaj et al.* "Solar Control on Jupiter's Equatorial X-ray Emissions: 26-29 November 2003 XMM-Newton Observation", was selected for *AGU Journal Highlights*.
5. **Most Popular Journal Article at AGU:** As per the *American Geophysical Union* (AGU) website on 30 March 2010, the JGR (2009) paper by *Bhardwaj and Jain* "Monte Carlo Model of Electron Degradation in a CO₂ Atmosphere" was the *Most Popular Article* (Top 5 Weekly Downloads = 364) across all journals of AGU.
6. **One of the top-50 most cited papers:** As per the communication from Elsevier – the paper "**X-rays from Solar System Objects**", by *Bhardwaj et al.*, is one of the top-50 most cited papers published in the *Planetary Space Science* (Elsevier) during January 2006 – February 2011.
7. ***Astronomische Nachrichten* Editor's Choice,** the paper "Solar system X-rays from charge exchange processes", coauthored by A. Bhardwaj, selected as Editor's Choice of journal *Astronomische Nachrichten* (Astronomical Notes) in 2012.
8. ***Nature India* Research Highlight:** The paper "**Proton entry into the near-lunar plasma wake for magnetic field aligned flow**", by Dhanya, Bhardwaj, et al. published in *Geophysical Research Letters* (2013) made *Research Highlight of Nature India* with title "**Tracing Sun's Protons Near Moon**", Published online on 23 July 2013.
9. ***ISRO Story of the Week*, June 19, 2017, "Mars Orbiter Mission Completes 1000 Days in Orbit",** Scientific Results from MENCA aboard MOM are summarised in this Press Release.
10. **United News of India (UNI) news, June 28, 2017, Chandrayaan mission discovers new group of suprathermal protons.**
11. **Hindu Newspaper Report, 12 Jan. 2019, Study shows solar wind fills the night side of the Moon, on *Geophysical Research Letters* paper "First Observation of Transport of Solar Wind Protons Scattered From Magnetic Anomalies Into the Near Lunar Wake: Observations by SARA/Chandrayaan-1".**

Selected Colloquium/Invited Lecture at Institutes (in last ~20 yrs):

1. "Multi-spectral Aurora on Jupiter", *National Center for Radio Astronomy*, Pune, Dec. 2001.
2. "Auroral Radiation of Jupiter", *Swedish Institute of Space Physics*, Kiruna, Sweden, May 30, 2002.
3. "Multi-wavelength Observations of Jupiter", *Raman Research Institute*, Bangalore, May 2002.
4. "The Indian Space Research Program", *Institut d'Astrophysique et de Géophysique*, Université de Liège, Liège, Belgium, June 10, 2002.
5. "X-Rays from Solar System Bodies", *Rutherford Appleton Laboratory*, Chilton, Oxford, UK, October 7, 2002.
6. "Solar System X-rays", *University of Virginia*, Charlottesville, VA, USA, October 10, 2002.
7. "Indian Space Research Program", *Southwest Research Institute*, San Antonio, TX, USA, October 23, 2002.
8. "Remote Sensing of Solar System Bodies in Soft X-Rays", NSSTC Space Science Colloquium, *NASA Marshall Space Flight Center*, Huntsville, AL, USA, September 24, 2004.
9. "X-rays from the Jupiter and Saturn Systems", *Jet Propulsion Laboratory*, Pasadena, CA, USA, December 9, 2004.
10. "Low Energy Neutral Atom (LENA) Imaging of the Moon Environment", *California Institute of Technology*, Pasadena, CA, USA, December 10, 2004.
11. "X-Rays from the Solar System Bodies", *Joint CSP-IAR Colloquium*, *Boston University*, Boston, MA, USA, February 15, 2005.

12. "Chandrayaan-1 Mission and the SARA Experiment", *Mullard Space Science Laboratory*, University College London, UK, August 5, 2005.
13. "X-rays from Saturnian System", *Mullard Space Science Laboratory*, University College London, UK, August 5, 2005.
14. "X-ray Emission from the Solar System Bodies", *PRL Colloquium*, Ahmedabad, Nov. 19, 2008.
15. "Indian Space Program and Space Research", *Physikalisches Institut, University of Bern*, Bern, Switzerland, June 26, 2009.
16. "X-rays from the Solar System", *Laboratory for Electro-Optics Systems*, Bangalore, July 31, 2009.
17. "X-ray Emission from the Solar System Bodies", *Colloquium at Raman Research Institute*, Bangalore, Nov. 11, 2009.
18. "Solar System and the Chandrayaan-1 Mission", *Sardar Patel University*, Vallabh Vidyanagar, Gujarat, Jan. 6, 2011.
19. "Indian Mars Orbiter Mission", *Andhra University*, Visakhapatnam, March 26, 2014.
20. "MOM and SARA: Mars and Moon, Colloquium at *Tata Institute of Fundamental Research*, Mumbai, 7 Jan., 2015.
21. "Planetary New Science", *Earth & Planetary Sciences-NISER*, Bhubaneswar, May 5, 2016.
22. "Indian MOM", IIST-Day Lecture, *Indian Institute of Space Science and Technology*, Trivandrum, 10 August 2016.
23. "India to Mars: The Mars Orbiter Mission", *Science Week Lecture, University of Mauritius*, Mauritius, Sept. 28, 2016.
24. "MOM and SARA: Mars and Moon, Institute Lecture at *Indian Institute of Technology*, Kanpur, 7 Nov., 2016.
25. "Solar System & Planetary Exploration", Lecture at *Bangalore Science Forum*, 18 Jan. 2017.
26. "Indian Planetary Exploration Program", *National Vijyoshi Camp, IISER*, Kolkata, Dec. 10, 2017.
27. "Indian Planetary Missions: Challenges and Science", *Special Talk at Teachers Meet at Infosys Campus, Mysore*, June 28, 2018.
28. "Indian Mars Mission", *Indian Institute of Toxicology Research*, Lucknow, October 17, 2017.
29. "Indian Planetary Mission and Exploration", *National Science Day Lecture, Institute of Physics*, Bhubaneswar, Feb. 28, 2018.
30. "Indian Planetary Mission", *Frontiers in Science, India International Science Festival*, Lucknow, 7 Oct, 2018.
31. "Indian Space Missions", *3rd PuneSciFi Fest, National Film Archive of India*, Pune, 28 Jan. 2019.
32. "Indian Planetary Mission", *Birbal Sahni Institute of Paleosciences*, Lucknow, Jan. 23, 2019.
33. "Indian Planetary and Space Missions and Sciences", *Israel Academy of Sciences and Humanities*, Jerusalem, Israel, Dec. 2–3, 2019.
34. "Indian Mars Orbiter Mission", *SAIHPA Lecture, National Institute of Technology*, Calicut, 8 March, 2021
35. "Indian Lunar Program", *ESA's Lunar Communications and Navigation Services (LCNS) User Engagement Workshop*, 1 June 2021.
36. "Indian Mars Orbiter Mission", *Center for Space Science at NYU Abu Dhabi and the UAE Space Agency*, July 21, 2020.
37. *IETE Varodara Webinar* on "Let's Know Our Institutions", Sept., 18, 2021.
38. *Talk at New Zealand India Research Institute*, New Zealand, Oct. 26, 2021.

Membership in Professional Bodies:

1. *Member*, American Geophysical Union (since 1988).
2. *Member*, American Association for Advancement of Sciences.
3. *Life Member*, Astronomical Society of India.
4. *Life Member*, Kerala Academy of Sciences.
5. *Life Member*, Indian Society of Atomic and Molecular Physics.

6. *Life Member*, Plasma Science Society of India.
7. *Life Member*, Indian Physics Association.
8. *Life Member*, Indian Science Congress Association.
9. *Life Member*, Astronautical Society of India.

International and National Conferences/Sessions Organised:

1. **Convener** and **Co-Convener**, of several (>25) National conferences organised in India, including - *National Space Science Symposium, Meeting of Astronomical Society of India, PLANEX Workshop, Plasma Science Society of India Meeting, Indian Planetary Science Conference, etc.*
2. **Convener or Co-convener of sessions**, and **Member** of Science Organizing Committee (**SOC**), for more than **60 International conferences**.

Details of Research and Professional Accomplishments:

Experiments on Indian Planetary and Space Missions:

- 1) **Principal Investigator**, Sub-keV Atom Reflecting Analyzer (**SARA**) experiment, an Indo-Swedish collaboration, on the **First Indian Lunar Mission Chandrayaan-1**.
- 2) **Principal Investigator**, Mars Exospheric Neutral Composition Analyzer (**MENCA**) experiment on the **First Indian Mars Orbiter Mission**.
- 3) **Principal Investigator**, Chandra's Atmospheric Composition Explorer (**CHACE-2**) experiment on the **Chandrayaan-2 Orbiter** mission.

Overall guidance and Supervision in the development of :

6. **XSM** on **Chandrayaan-2 Orbiter**.
7. **APXS** on Rover, and **ChaSTE** for **Lander** of the **Chandrayaan-3** mission.
8. **SWIS** and **STEP** of the **ASPEX** experiment for **ADITYA-L1 solar mission**.
9. **Instruments for future Indian missions to: (i) Venus, (ii) Mars, (iii) Moon, and (iv) Aeronomy mission DISHA.**

Planetary Multi-wavelength Astronomy using Telescopes:

1. Radio Observation of Jupiter and Venus with Giant Metrewave Radio Telescope (GMRT)

- 1) **Principal Investigator** on **first** GMRT radio observation of Jupiter, Feb–March 2003.
- 2) **Co-Principal Investigator** on the GMRT observation of Jupiter, May–June 2007.
- 3) **Co-Investigator** on the GMRT observation of Jupiter, May–June 2008.
- 4) **Co-Investigator** on radio observation of Venus, Jan. 2014.
- 5) **Co-Investigator** on radio observation of Venus, July–Sept. 2015.

2. X-ray Observations with Chandra and XMM-Newton Space Observatories

- 1) **Co-Investigator** on Chandra HRC-I **Jupiter** observation during **Cassini** flyby, Dec. 2000.
- 2) **Co-Investigator** on Chandra HRC-I observation program for **Jupiter** – 2001.

- 3) **Co-Investigator** on Chandra ACIS **Jupiter** observation program – Feb. 2003.
- 4) **Co-Investigator** on Chandra ACIS **Saturn** observation – Jan. 2004.
- 5) **Co-Investigator** on Chandra **Earth** aurora observations – Dec. 2003-April 2004.
- 6) **Co-Investigator** on XMM-Newton **Saturn** observation program – April & Oct. 2005.
- 7) **Co-Investigator** on joint Chandra–XMM-Newton observation of **Jupiter** during *New Horizon* flyby of Jupiter – Feb.-March 2007.
- 8) **Co-Investigator** on XMM-Newton **Mars** Observation – Nov. 2009.
- 9) **Co-Investigator** on XMM-Newton **Mars DDT** Observation – Aug. 2016.
- 10) **Co-Investigator** on XMM-Newton observation of **Pluto** in April-May 2017.

3. Multi-Instrument, Multi-wavelength (radio, IR, UV) Observation of Jupiter

- 1) **Co-Investigator** on HST-STIS, Chandra, and GMRT observation program – Feb. 2003.
- 2) **Co-Investigator** on near-simultaneous GMRT radio and NASA Infrared Telescope Facility (IRTF) infrared observations during Nov. 2011.
- 3) **Co-Investigator** on radio, UV, IR and GMRT, NASA-IRTF-CHSELL, HST, IPRT, SPRINT-A, Nict 34m observations, Jan. 2014.
- 4) **Co-Investigator** on GMRT, Juno, and Hisaki observations, May-June, 2016 during **Juno** approach to Jupiter.
- 5) **Co-Investigator** on GMRT, Dec. 2017 when **Juno** is near radiation belts of Jupiter.

Research Supervision:

Ph.D.'s – 8

- 1) **Marykutty Michael, 2001.** Ph.D. thesis topic *“Model for electron degradation and production of emission in the atmosphere of Io”*, MG University, Kottayam.
- 2) **Sonal Kumar Jain, 2013.** Ph.D. thesis topic *“Dayglow Emissions on Mars and Venus”*, CUSAT, Kochi.
- 3) **Susarla Raghuram, 2014.** Ph.D. thesis topic *“Modelling of Ultraviolet and Visible Emissions in Comets”*, CUSAT, Kochi.
- 4) **K. M. Ambali, 2014.** Ph.D. thesis topic *“A study equatorial and low latitude plasma processes using physics based ionospheric models in association with ground based/space borne optical and radio experiments”*, Kerala Univ., Trivandrum.
- 5) **Tirtha Pratim Das, 2017.** Ph.D. topic *“Study of Noble Gases in Lunar Exosphere using the CHACE-MIP Observation of Chandrayaan-1”*, CUSAT, Kochi.
- 6) **M. B. Dhanya, 2017.** Ph.D. thesis topic *“Study of Lunar-Solar Wind Interaction with the SARA Experiment aboard the Chandrayaan-1 Mission”*, Kerala Univ., Trivandrum.
- 7) **P. R. Shreedevi, 2018,** Ph.D. thesis topic *“A study on the impact of space weather events on the ionosphere over the Antarctic station Bharati and the Indian subcontinent”*, CUSAT, Kochi.
- 8) **Vrinda Mukundan, 2018,** Ph.D. thesis *“Modelling the Dayside Ionosphere of Titan: Application of Electron Degradation Model for Methane”*, CUSAT, Kochi.

M. Tech. Thesis Supervision: **2**

M. Phil. Thesis Supervision: **2**

M. Sc. Thesis Supervision:	17 (1 from MIT, USA)
DST-INSPIRE Fellowship Supervision:	2
Indian Academies of Sciences – Summer Research Fellows:	30
DST INSPIRE Faculty Supervised:	2
ISRO Research Associate Supervised:	4

Recognized Ph.D. Research guide:

1. Mahatma Gandhi University, Kottayam.
2. University of Kerala, Trivandrum.
3. Cochin University of Science and Technology (CUSAT), Kochi.
4. Andhra University, Vishakhapatnam.

Publications: (for details see separate list)

- 1) Refereed Journal Publications: 169 [First/Second authored : 82]
- 2) Chapter in Books: 6
- 3) Book Reviewed : 1
- 4) Books edited (Editor-in-Chief): 6
- 5) arXiv Publications: 3
- 6) Popular/General Articles: 6
- 7) Guest Editor, Special issue of Journal:3

Conferences, Lectures and Invited Talks:

- 1) Invited Talks at Conferences: >120
- 2) Conference Presentations: >300
- 3) Session Chair at Conferences: >40
- 4) Sessions Convener/Co-convener at International Conferences: >45
- 5) Member of Scientific Organising Committee – International Conferences: >15
- 6) Conferences/Workshops/Sessions Organized in India: >15

Public Outreach Activities and Teaching:

With the aim to enthuse students, in recent years, delivered more than 100 public outreach lectures and popular lectures in the area of the Solar System, Space, Planetary, Lunar and Martian Sciences and Exploration to students of schools and colleges in cities in the States of Kerala, Tamilnadu, West Bengal, Orissa, Rajasthan, Andhra Pradesh, Karnataka, Gujarat, Uttarakand, Maharashtra, Goa, Himachal Pradesh, Punjab, Delhi, and Uttar Pradesh, and Union Territory of Chandigarh and Pondicherry, as well as in Mauritius.

Participated in many *Interactive Sessions* with school and college students on the occasion of *World Space Week Celebrations, INSPIRE*, and many other programs. Has interacted with more than 50,000 students and teachers during the last two decades.

1. *Talk at All India Radio Trivandrum: Moon eliciting man's curiosity since time immemorial, 9.30 pm, 22 July 2016, in context of First Human Landing on Moon.*

2. Video Lecture on "Module 7 - Solar System Astronomy" - Chapter 7.5 - "Planetary Science", for SWAYAM program of Ministry of Human Resource Development, 2019.
3. Resource Person at Leadership Development Program of the Ministry of Human Resource Development (MHRD), Government of India, at the Indian Institute of Technology (Banaras Hindu University), Varanasi, March 2019.
4. Moderator and Panel Member, Discussion on "Journey of Indian Space Program - Past, Present, and Future", jointly organized by Regional Science Centre of National Council of Science Museum and Master Control Facility, ISRO, Bhopal, as part of World Space Week (Theme: Women in Space), October 8, 2021.
5. Talk at Live TV Webinar Series: Listening to Learn of National Centre of Educational Research and Training (NCERT), New Delhi, Nov. 16, 2021.
6. CSIR-JIGYASA webinar series "Demystifying Science", under the CSIR-JIGYASA-ATL (Atal Tinkering Labs of NITI AAYOG), Nov. 18, 2021.

Teaching Lectures:

Delivered series of invited lectures (>150) in the area of Space and Planetary Sciences and Space Exploration at several workshops/courses/training programs, including :

- 1) United Nations Post Graduate Course in Space Physics and Atmospheric Sciences.
- 2) Planetary Sciences and Exploration (PLANEX) Workshops.
- 3) Winter School on Modeling of Planetary Atmospheres.
- 4) DST-SERC Schools.
- 5) ISRO Induction Training Programs.
- 6) B. Sc. and M. Sc. students of several colleges and universities.
- 7) CSIR Program for Youth Leadership in Science.
- 8) Swadeshi Science Movement.
- 9) International Science Olympiad.
- 10) National Science Day Celebrations.
- 11) UGC Refresher course in Physics for College Teachers.
- 12) ISRO Structured Training Program.

Selected Distinguished Lectures at (during last ~10 yrs):

1. Inaugural Lecture at DAE-BNRS Symposium on Atomic, Molecular and Optical Physics, Inter-University Accelerator Centre, Delhi, Feb. 10, 2009.
2. National Conference of Shanti Swarup Bhatnagar Award Winners, Devi Ahilya University, Indore, July 17, 2009.
3. National Academy of Sciences, India, Regional Science City, Lucknow, Oct. 30, 2009.
4. National Conference on Recent Trends in Materials and Devices, Amity School of Engineering and Technology, Amity University, Noida, May 22, 2010.
5. National Technology Day Lecture, Centre for Earth Sciences System, Trivandrum, June 8, 2010.
6. 16th National Seminar on Physics and Technology of Sensors, Lucknow University, Lucknow, Feb. 11, 2011.
7. 34th Institute of Indian Geographers' Meet, Centre for Earth Sciences System, Trivandrum, Dec. 14, 2012.
8. The National Academy of Sciences Annual Meeting, Goa, Dec. 5, 2013.
9. 17th National Space Science Symposium, Dibrugarh University, Assam, Jan. 29, 2014.

10. *Kerala Academy of Sciences and Kerala State Council for Science Technology and Environment, Thiruvananthapuram, Feb. 28, 2014.*
11. *Chief Guest Lecture, Physics Association 2013-2014, Andhra University, March 26, 2014.*
12. *Amelthea 2014 Conclave Lecture, Indian Institute of Technology, Gandhinagar, Oct. 12, 2014.*
13. *National Institute of Interdisciplinary Science and Technology Foundation Day Lecture, Oct. 15, 2014.*
14. *Convocation Week Lecture, Lucknow University, Jan.17, 2015.*
15. *National Technology Day Oration, organized by KSCSTE and CWRDM, Kozhikode, May 11, 2015.*
16. *Infosys Award Function Lecture, Homi Bhabha Centre for Science Education, Mumbai, Dec. 22, 2015.*
17. *Science Day Lecture, Satish Dhawan Space Centre, SHAR, Sriharikota, March 1, 2016.*
18. *Science Week Lecture, University of Mauritius, Mauritius, Sept. 28, 2016.*
19. *INSA Vainu Bappu Memorial Medal Lecture, NISER, Bhubaneswar, Dec. 29, 2016.*
20. *Represented India, in CIENCIA 2017-National Science Summit of Portugal, Lisbon, July 3-5, 2017.*
21. *Foundation Day Lecture, CSIR-Central Scientific Instruments Organisation, Chandigarh, 30 October, 2017.*
22. *Key Note address, 32nd National Symposium on Plasma Science & Technology, Institute for Plasma Research, Gandhinagar, Gujarat, 7 November 2017.*
23. *Chief Guest Lecture in 25th National Children Science Congress, Science City, Ahmedabad, 31 December 2017.*
24. *Chief Guest Lecture, Vishwakarma Government Engineering College, Ahmedabad, 2 Jan. 2018.*
25. *Key-Note Speaker at International Symposium on Lunar and Planetary Science, Macau University of Science and Technology, Macau, 12-15 June 2018.*
26. *Special Invited Talk, Mars Upper Atmosphere Network, Nicosia, Cyprus, Oct. 15-18, 2018.*
27. *Celebrating 125th Birth Anniversary of Professor Meghnad Saha, Allahabad, October 6-7, 2018.*
28. *'Exploring Moon: 50 Years of Apollo Landing' Lecture of Indian Society of Geomatics, Indian Society of Remote Sensing, IEEE Geoscience and Remote Sensing Society at M.G. Science Institute, Ahmedabad, July 20, 2019.*
29. *Key Note Lecture, National Conference on Polar Sciences, NCAOR, Goa, Aug. 21, 2019.*
30. *Vikram Sarabhai Public Lecture, Student Conference on Optics and Photonics, Ahmedabad, September 24, 2019.*
31. *Plenary Talk at Federation of Indian Geosciences Associations, 2nd Triennial Congress, NGRI, Hyderabad, Oct. 14, 2019.*
32. *Guest of Honour Lecture, Indian Institute of Tropical Meteorology, Pune, 17 Nov., 2019.*
33. *Lead Lecture at Indo-Israel cooperation in Astrophysics and Planetary Sciences, Academy of Sciences and Humanities, Jerusalem, Israel, Dec. 2-3, 2019.*
34. *Chief Guest Lecture-International Day of Light Celebration, Lucknow University, May 16, 2020.*
35. *Engineer's Day Talk at Ganpat University, Sept. 14, 2020.*
36. *Chief Guest Lecture at 14th Chandigarh Science Congress, Punjab University, Dec. 17, 2020.*
37. *National Science Day Celebration, Ramaiah University of Applied Sciences, Bangalore, 27 Feb, 2021.*
38. *IPA DAE - C. V. Raman Lecture, Ahmedabad University, 10 March, 2021.*
39. *Chief Guest Lecture, National Level Techno-Management fest, SRM-IST, Chennai, 16 Sept., 2021.*
40. *Chief Guest Lecture at Space-Tech Fest "National Students' Space Challenge", Indian Institute of Technology, Kharagpur, Dec. 10, 2021.*
41. *Chief Guest, PhD Orientation Program, Indus University, Ahmedabad, 22 Jan., 2022.*

Invited Talks at Conferences/Symposium/Workshops (during last ~15 years):

1. "X-ray Studies of the Jovian System", *National Space Science Symposium*, Bhopal, February 25-28, 2002.
2. "Soft X-Ray Emissions from Planets and Moons", *ESLAB 36 Symposium on "Earth-Like Planets and Moons"*, ESTEC, Noordwijk, Amsterdam, Netherlands, June 3-8, 2002.
3. "Auroral Observations of the Giant Planets", *34th COSPAR Scientific Assembly*, Houston, Texas, USA, Oct 12-19, 2002.
4. "New results on X-ray emissions from the Jovian system", *22nd Meeting of Astronomical Society of India*, Trivandrum, February 13, 2003.
5. "Planetary Sciences in India – Recent Developments", *IAA Asia-Pacific Regional conference on "Advances in Planetary Exploration"*, Bangalore, India, June 26-29, 2005.
6. "X-Ray Emission from the Saturnian System", *Magnetospheres of the Outer Planets 2005 Meeting*, University of Leicester, Leicester, UK, 7-12 August, 2005.
7. LENA Imaging on the Moon with SARA instrument aboard Chandrayaan-1, *National Space Science Symposium*, Andhra University, Visakhapatnam, India, February 9-12, 2006.
8. "Planetary X-rays: Relationship with Solar X-rays and Solar Wind", *International Living With Star Workshop on "The Solar Influence on the Heliosphere and Earth's Environment: Recent Progress and Prospects"*, Goa, India, February 19-24, 2006.
9. "Indian Lunar Mission Chandrayaan-1", *Third AOGS Annual Meeting*, Singapore, July 10-14, 2006.
10. "Chandrayaan-1: First Indian Lunar Mission", *Fourth AOGS Annual Meeting*, Bangkok, Thailand, July 30-August 4, 2007
11. "Solar wind flows and interaction with planets, comets and other solar system bodies", *International Heliophysical Year School for the Asia-Pacific Region*, Kodaikanal Observatory (IIA), Kodaikanal, Dec. 10-22, 2007.
12. "Recent Advances in Planetary X-ray Astronomy and Science", *National Space Science Symposium*, Radio Astronomy Center-TIFR, Ooty, India, February 26-29, 2008.
13. "India's First Lunar Mission Chandrayaan-1", *Fifth AOGS Annual Meeting*, Busan, Korea, June 16-20, 2008.
14. "Monitoring Solar Wind in the Near-Earth Environment with SWIM of the SARA Experiment aboard the Indian lunar Mission Chandrayaan-1, "Centenary Commemoration of the discovery of the Evershed Effect", Indian Institute of Astrophysics, Bangalore, Dec. 2-5, 2008.
15. "X-Ray Emission from the Solar System Bodies: Connection with Solar X-Rays and Solar Wind", *International Solar Wind 12 Conference*, Saint Malo, France, June 21-26, 2009.
16. "Exploration of Planetary Atmospheric Processes", *DST National Discussion Meeting on Atmospheric Sciences*, Indian Institute of Science, Bangalore, 22-24 Oct, 2009.
17. "New findings on Moon from the SARA experiment on board Chandrayaan-1 Mission, *Platinum Jubilee Meeting 2 of the Indian Academy of Sciences*, Bangalore, Nov. 13, 2009.
18. "New Findings from the SARA/Chandrayaan-1", *International Conference on Astronomy IICFA 2009*, Field Marshal K.M. Cariappa College, Madikeri, Karnataka, Dec. 28-30, 2009.
19. "Planetary Exploration: Future Perspective", *16th National Space Science Symposium (NSSS-2010)*, Saurashtra University, Rajkot, Feb. 24-27, 2010.
20. "Solar System X-ray Emission", *DST-SERC School on Space Weather*, Indian Institute of Geomagnetism, Mumbai, April 23, 2010.
21. "Indian Lunar Mission Chandrayaan-1", *DST-SERC School on Space Weather*, Indian Institute of Geomagnetism, Mumbai, April 23, 2010.
22. "The Solar System and Planetary Exploration", *Fourth Summer Workshop on Foundations of Space Science and Technology*, Ramakrishna Mission Vivekananda University and Kalpana Chawla Centre for Space and Nano Sciences, Kolkata, May 17, 2010.
23. "Solar System X-ray Emissions", *International Workshop on Planetary Atmospheres*, PRL, Ahmedabad, July 12-13, 2010.

24. "Chandrayaan-1: India's First Mission to the Moon, *38th COSPAR Scientific Assembly*, Bremen, Germany, 18-25 July, 2010.
25. "Electron Impact Processes in Cometary Coma: Implications for Cometary Missions", *38th COSPAR Scientific Assembly*, Bremen, Germany, 18-25 July, 2010.
26. "Chandrayaan-1: Indian First Mission to the Moon, *International Symposium of the Science and Utilization of the Moon (SUM2010)*, Waseda University, Tokyo, Japan, 7–9 September, 2010.
27. "Solar System and the Chandrayaan-1 Mission", *National Seminar on "Advances in Science, Emerging Technologies and Societal Development*, Bodhananda Research Foundation for Management & Leadership Studies, KSCSTE, Trivandrum, Jan. 15, 2011.
28. "Mars Atmosphere: Present Understanding, *Brainstorming Session on Mars Science and Exploration*, Physical Research Laboratory, Ahmedabad, March 24-25, 2011.
29. "An overview on the Results from the SARA Experiment aboard the Chandrayaan-1 mission", *Eighth AOGS Annual Meeting*, Taipei, Taiwan, August 8-12, 2011.
30. "Study of the Lunar Exosphere with the CHACE-2 Experiment aboard the Chandrayaan-2", *Conference on Planetary Sciences and Exploration*, PRL, Ahmedabad, Dec. 12-14, 2011.
31. "A New View of the Moon: Discoveries from the SARA and CHACE/MIP Experiments aboard the Chandrayaan-1", *National Conference on Space Transportation Systems: Opportunities and Challenges*, VSSC, Trivandrum, Dec. 16-18, 2011.
32. "A New View of the Solar Wind – Moon Interaction: Results from the SARA Experiment aboard Chandrayaan-1, *17th National Space Science Symposium*, Sri Venkateswara University, Tirupati, Feb 14-17, 2012.
33. "New View of the Moon: Discoveries from the SARA and CHACE/MIP Experiments aboard the Chandrayaan-1", Workshop on "*Recent Trends in Space Physics, Atmospheric Physics & Astrophysics*", Banaras Hindu University, Varanasi, March 14, 2012.
34. "Model for the Cameron band emission of CO molecule in comets, *39th COSPAR Scientific Assembly*, Mysore, India, 14-22 July, 2012.
35. "Interaction of the solar wind with the Moon: New results from the SARA/Chandrayaan-1", *International Symposium on Atmospheres of Terrestrial Planets: Observations & Modeling*, PRL, Ahmedabad, July 23-24, 2012.
36. "New Results from SARA/Chandrayaan-1", *Workshop on Space Science Education and Technology*, India Institute of Space Science and Technology (IIST), Trivandrum, July 26, 2012.
37. "Electron Impact Processes in Cometary Coma: Chemistry and Emissions", Meeting on *International Space Science Institute Project*, ISSI Bern, Switzerland, Nov. 19-23, 2012.
38. "Evolution of Planetary Atmospheric Research in India", *Workshop on 'Infrared spectroscopy of planetary atmospheres*, ISRO Satellite Centre, Bangalore, May 8-10, 2013.
39. "Current and future activities in Indian planetary exploration Research", *Low Cost Planetary Mission (LCPM-10)*, Caltech, Pasadena, CA, USA, June 18-21, 2013.
40. "MENCA: Instrument and Science", *Workshop on Mars Orbiter Mission*, PRL, Ahmedabad, July 26-27, 2013.
41. "Mars Orbiter Mission (MOM) & Scientific Studies", *ISRS-ISG National Symposium on Remote Sensing and GIS for Environment*, Dec. 2-3, 2013, Vishakhapatnam.
42. "Planetary Exploration and the case for Understanding Mars", Symposium on "Space for Human Welfare, *The National Academy of Sciences Annual Meeting*, Goa, Dec. 5-6, 2013.
43. "Interaction of Solar Wind with Moon: A New View from SARA/Chandrayaan-1", *17th National Space Science Symposium*, Dibrugarh University, Dibrugarh, Assam, Jan. 29-Feb 1, 2014.
44. "Venus: Airglow and X-ray emissions", *Venus Workshop*, SSIF/ISITE, ISAC, June 2-6, 2014.
45. "Indian Mars Orbiter Mission", *6th Alfvén Conference*, University College London, UK, 8 July, 2014.
46. "Indian Mars Orbiter Mission", *40th COSPAR Scientific Assembly*, Moscow, Russia, 8 August, 2014.
47. Indian Mars Orbiter Mission, *Comet Siding Spring Workshop*, Aug. 11, 2014.
48. Indian Mars Orbiter Mission, *JPL comet C/2013 A1 Siding Spring workshop*, Sept. 19, 2014.
49. Atmosphere of Mars, *PLANEX workshop*, PRL, Ahmedabad, 6 Jan., 2015.

50. "Indian Mars Orbiter Mission", *National Seminar on Space Sciences and Space Missions*, NSS Hindu College, Changanacherry, March 11-13, 2015.
51. "Influence of Space Weather on Planetary Environments", *International Meeting on Science of Space Weather*, Goa, 24-29 Jan. 2016.
52. "Planetary Atmospheres: Our Current Understanding", *19th National Space Science Symposium (NSSS-2016)*, VSSC, Trivandrum, Feb. 10 (Feb.9-12), 2016.
53. "Exploration of Venus", *PLANEX Workshop*, PRL, Ahmedabad, March 7, 2016.
54. "Solar-Planetary-Moon Connection", *IIA-ISAC National Symposium on Exoplanets*, Kodaikanal Observatory, Kodaikanal, 7-8 Oct. 2016.
55. India to Mars: The Indian Mars Orbiter Mission (MOM), *TWAS Young Scientists Conference*, Indian Institute Science, Bangalore, Dec. 6, 2016.
56. "A New View on Solar Wind - Moon Interaction from SARA/Chandrayaan-1", *Frontiers in Theoretical and Applied Physics*, American University of Sharjah, Sharjah, UAE, 22 Feb., 2017.
57. "Space Sciences and Planetary Exploration", *3rd Indian Society of Systems for Science and Engineering National Conference*, Indian School of Business, Mohali, October 12, 2017.
58. "Science of the Outer Planets and their Moons," *Brainstorming session on Vision & Exploration for Planetary Sciences in Decades 2020-2060*, PRL, Ahmedabad, 8 Nov., 2017.
59. "Highlights of the Indian planetary missions and future plan ", *International Symposium on Lunar and Planetary Science*, Macau University of Science and Technology, Macau, 12-15 June 2018.
60. "Indian Planetary Missions", *Young Astronomers' Meet*, PRL, Ahmedabad, 24 Sept., 2018.
61. "Indian Mars Program", *10th Mars Upper Atmosphere Network workshop*, Nicosia, Cyprus, 18, 2018.
62. "Comparative Planetary Aeronomy", *15th International Symposium on Equatorial Aeronomy*, PRL, Ahmedabad, 22 Oct. 2018.
63. "Deep Space Missions and Cutting Edge Technologies for Space Explorations", *A Decade of Excellence in Indian Deep Space Network services*, ISTRAC, Bangalore, 24 October 2018.
64. "Highlights of Indian Planetary Missions and Future Plan", *International Conference on Computational Mathematics in Nano-electronics and Astrophysics*, IIT Indore, Nov. 2, 2018.
65. "The Solar System and Beyond", *APRSAF ISRO-JAXA Seminar on Space Education for Educators*, IIRS, Dehradun, Nov. 15-16, 2018.
66. "Chandrayaan-2: Indian Second Lunar Mission", *20th National Space Science Symposium*, Savitribai Phule Pune University, Pune, 29-31 Jan., 2019.
67. "Radio Probing of Planetary Bodies using GMRT and Science", *2019 URSI Asia Pacific Radio Science Conference*, Delhi, 9-15 March 2019.
68. "A New Perspective on Moon - Solar Wind Interaction after Chandrayaan-1 Mission", *AOGS 16th Annual Meeting*, Singapore, July 30, 2019.
69. "Science from the Chandrayaan-2 Mission", *AOGS 16th Annual Meeting*, Singapore, 28 July - 2 August, 2019.
70. "Indian Planetary and Space Missions and Sciences", *Conference on Astrophysics and Planetary Sciences, Israel Academy of Sciences and Humanities*, Jerusalem, Israel, Dec. 2-3, 2019.
71. "Indian Mars Orbiter Mission", *Mini-Symposium on "Mars: 2020 and Beyond"*, Center for Space Science at NYU Abu Dhabi and the UAE Space Agency, July 21, 2020.
72. "Indian Planetary Missions and Science", *43rd COSPAR meeting*, Australia, Feb. 3, 2021.
73. "Indian Lunar Program", *ESA's Lunar Communications and Navigation Services (LCNS) User Engagement Workshop*, online, 1 June 2021.
74. "Interaction of Solar Wind with Moon: Results from Chandrayaan-1 and Implications", *Key Note Address at Lunar Science Workshop*, ISRO HQ, Bangalore, Sept. 6, 2021.
75. "Overview on Venus", *Inaugural Lecture at Venus Science Conference-2021*, PRL, Ahmedabad, 23 Sept., 2021.
76. "Venus and its Facets", *IIST-ISAC-SUPERO Joint International Project Meeting*, 11 Oct., 2021.
77. "Moon-Solar Wind Interaction", *Invited Talk at IEEE India Geoscience and Remote Sensing Symposium (InGRASS-2021)*, 7 December, 2021.

78. "Science from the Chandrayaan-2 and Mars Orbiter Missions", *Invited Talk in IS-1* (Highlights from ISRO Space Science Missions), *NSSS 2022*, ISSER Kolkata, 01 Feb 2022.
79. "Saturn X-rays", in *Towards Solar System X-rays Astronomy - GEO-X workshop*, Tokyo Metropolitan University, Japan, Feb. 16, 2022.

Best Paper Awards:

1. "Source mechanism of protons in near-lunar wake: SARA/Chandrayaan-1 observations", M.B. Dhanya, Anil Bhardwaj, et al., 19th *National Space Science Symposium (NSSS-2016)*, SPL, VSSC, Trivandrum, Feb. 9–12, 2016.
2. "First Observation of Protons in the Near-Lunar Plasma Wake for magnetic field aligned flow from SWIM/SARA on Chandrayaan-1", M.B. Dhanya, Anil Bhardwaj, et al., 18th *National Space Science Symposium (NSSS-2014)*, Dibrugarh University, Dibrugarh, Assam, Jan. 29 – Feb.1, 2014.
3. "Study of N₂ Vegard-Kaplan band emission in the dayglow of Mars, Venus and Titan", Sonal K. Jain and Anil Bhardwaj, 17th *National Space Science Symposium (NSSS-2012)*, Sri Venkateswara University, Tirupati, February 2012.
4. "First Results from SARA Experiment on the Chandrayaan-1 Mission", Anil Bhardwaj, et al., 16th *National Space Science Symposium (NSSS-2010)*, Saurashtra University, Rajkot, February 2010.
5. "First GMRT Observation of Jupiter's Synchrotron Radio Emission", Anil Bhardwaj, *Golden Jubilee Symposium on Radio Science (INCURSI-2007)*, National Physical Laboratory, New Delhi, February 2007.
6. "Non-Stationary Plasma Processes on Comets and its Implications", Anil Bhardwaj, *PLASMA-95 Symposium*, Banaras Hindu University, October 1995.

Invited talks In Hindi:

1. **Invited Talk** on "Chandrayaan-1 Mission", at the *Inter-centre Technical Hindi Seminar*, LPSC, Trivandrum, Sept 22, 2010.
2. **Inaugural Key-Note address**, on "Mars Mission", IISU, Trivandrum, 7 Nov., 2012.
3. **Inaugural Key-Note address**, on "Indian Planetary Missions", ISTRAC, Bangalore, 8 Sept., 2014.
4. **Chief Guest**, Hindi Fortnight Program Valedictory Function, National Centre for Earth Science Studies (NCESS), Sept. 28, 2015.
5. **Chief Guest and Key Note address** on "Indian Planetary Missions", Hindi Talk, Feb. 18, 2016, IISU, Trivandrum.
6. **Chairman, Editorial Committee**, Centre Hindi Seminar, VSSC, July 19-20, 2016.
7. **Chief Guest**, and Key Note Lecture on "Planetary Missions of India" World Hindi Day Program, Master Control Facility (MCF), Hassan, Jan. 10, 2017.

Tit-Bits

Video Link on Talks to NDTV:

Talking to NDTV about SARA experiment aboard first Indian Lunar mission Chandrayaan-1
<http://www.ndtv.com/video/player/ndtv-specials/anil-bharadwaj-speaks-of-sara-an-instrument-on-chandrayaan/41961>

Talking to NDTV about MENCA experiment aboard first Indian Mars Orbiter Mission (MOM)

<http://www.ndtv.com/video/player/news/exciting-that-mangalyaan-may-fly-through-a-tail-of-comet/294282>

Infosys Prize (2016) related video links:

<http://www.infosys-science-foundation.com/prize/laureates/2016/anil-bhardwaj.asp>

Anil Bhardwaj – Infosys Prize 2016 Laureate, Physical Sciences

<https://www.youtube.com/watch?v=nKMyWT2S-10>

<https://www.youtube.com/watch?v=NkidsyOWOEo>

<https://www.youtube.com/watch?v=aT4tPd0y6H0>

[Dr. Bhardwaj receives the INFOSYS Prize in Physical Sciences \(2016\)](#)

<http://www.infosys-science-foundation.com/prize/laureates/2016/anil-bhardwaj.pdf>

News Clippings links:

- **Life may exist outside Earth but we may not recognize it - An Interview with Mint**
<http://www.livemint.com/Politics/A9NAbvUPa2WASStZcdrpTJI/Life-may-exist-outside-Earth-but-we-may-not-recognize-it-sa.html>
- **VSSC-SPL director Anil Bharadwaj wins Infosys Prize 2016 : Interview with Times of India**
<http://timesofindia.indiatimes.com/city/thiruvananthapuram/VSSC-SPL-director-Anil-Bharadwaj-wins-Infosys-Prize-2016/articleshow/55516595.cms>
- **He aims for stars, moon, mars and more : Interview with Indian Express**
<http://www.newindianexpress.com/cities/thiruvananthapuram/2016/dec/22/he-aims-for-stars-moon-mars-and-more-1552086--1.html>
- **ISRO is CHACEing big space dreams : Interview with Indian Express**
<http://www.newindianexpress.com/states/kerala/2016/dec/27/isro-is-chaceing-big-space-dreams-1553374.html>
- **INFOSYS Prize in Physical Sciences (2016) to Dr. Anil Bhardwaj: An Article by Prof. R. Sridhran in Current Science**

Book Excerpt: *In the flip-book for kids, They Made What? They Found What? Shweta Taneja tells the stories of inventions and discoveries by some of India's best-known scientists and also how they came to be who they are. Few excerpts at following site:*

- <https://news.careers360.com/anil-bhardwaj-astrophysics-ISRO-chandrayaan-India-moon-mission-NASA-mars-orbiter>

India's Space Stars:

On the web you can watch in English 48 minutes

<http://www.ndtv.com/video/player/ndtv-special-ndtv-24x7/the-team-behind-india-s-historic-mars-mission/344672>

Mangalyaan ke Maharathi

On the web you can watch in Hindi 47 minutes

<http://www.ndtv.com/video/player/prime-time/prime-time-meet-the-heroes-of-mangalyaan/344669>

SCIENTISTS GET A PEEK INTO MARTIAN EXOSPHERE

<http://www.bangaloremirror.com/bangalore/others/Scientists-get-a-peekinto-Martian-exosphere/articleshow/51271897.cms>