

CURRICULUM VITAE

First Name : Dhanya
Last Name : Mahalingam Balaram
Office Address : Planetary Science Branch (PSB)
Space Physics Laboratory (SPL)
Vikram Sarabhai Space Centre (VSSC)
Indian Space Research Organisation (ISRO)
Thiruvananthapuram - 695022, India
Fax : +91-471-270 6535
Date of Birth : 29 May 1981
Gender : Female
Nationality : Indian
Office Phone : +91-471-256 2553
Cell Phone : +91-8111814442
Email : dhanya.m_b@yahoo.co.in;
mb.dhanya@vssc.gov.in

RESEARCH INTERESTS

Solar wind and its interaction with different solar system objects; planetary atmospheres, and solar flares.

CURRENT RESEARCH

Solar wind interaction with Earth's moon, and Mars; Martian neutral exosphere.

EDUCATION

- 1996–1998 Pre-Degree in Science (Physics, Chemistry and Mathematics), University of Calicut, Kerala, India.
Percentage Marks: 81.2% (First Class with Distinction)
- 1998–2001 Bachelor of Science (B.Sc.) in Physics, University of Calicut, Kerala, India.
Percentage Marks: 91% (First Class)
- 2001–2003 Master of Science (M.Sc.) in Physics, University of Calicut, Kerala, India
Percentage Marks: 81.45% (First Class with Distinction)
- 2010–2017 Ph.D. Awarded on 20 Decemeber 2017. University of Kerala, Thiruvananthapuram, Kerala, India.
Thesis Title: Study of Lunar-Solar Wind Interaction with the SARA Experiment aboard the Chandrayaan-I Mission

PROFESSIONAL EXPERIENCE

- | | |
|---|---|
| Guest Lecturer
February 2004–March 2004 | Department of Physics, Vimala College
Thrissur, Kerala |
| Guest Lecturer
June 2004–March 2005 | Department of Physics, Vimala College
Thrissur, Kerala |
| Guest Lecturer
June 2005–February 2006 | Department of Physics, Vimala College
Thrissur, Kerala |
| Scientist 'SC'
February 2006–December 2010 | Space Physics Laboratory, VSSC
Trivandrum |
| Scientist 'SD'
January 2011–July 2015 | Space Physics Laboratory, VSSC
Trivandrum |
| Scientist 'SE'
July 2015–Present | Space Physics Laboratory, VSSC
Trivandrum |

AWARDS, HONOURS AND RECOGNITIONS

- **Lead Talk**, National Space Science Symposium - 2019, on 'New insights on near wake plasma environment of Moon from SWIM/SARA of Chandrayaan-1 Mission'.
- **Young Research Award** by the Association of Asia Pacific Physical Societies, Division of Plasma Physics (AAPPS-DPP) for "Significant Contribution to the field of Plasma Physics", under certificate of Laureate of Subrahmanyan Chandrasekhar Prize of Plasma Physics, 7 December 2016.

- **Special Mention Prize** for the MENCA experiment onboard Mars Orbiter Mission, in the contest for the innovative products/ideas in connection with the Innovation Day 2016 at Vikram Sarabhai Space Centre, Thiruvananthapuram.
- **ISRO Young Scientist Merit Award** for the year 2014.
- **Best Paper award for young scientists** at 19th National Space Science Symposium (NSSS-2016), Space Physics Laboratory, Vikram Sarabhai Space Centre, Thiruvananthapuram, 9–12 February 2016, for the paper titled *Source Mechanism of protons in near-lunar wake: SARA/Chandrayaan-1 observations* by **M. B. Dhanya**, Anil Bhardwaj, Yoshifumi Futaana, Stas Barabash, Abhinaw Alok, Martin Wieser, Mats Holmström, and Peter Wurz.
- **Best Paper award** at 27th Kerala Science Congress, organized by Kerala State Council for Science, Technology and Environment (KSCSTE) jointly with NATPAC, Alappuzha, 27–29 January 2015, for the paper *New population of protons in lunar wake: discovery by Chandrayaan-1/ SARA* by **M B Dhanya**.
- **Best Paper award** at National Space Science Symposium (NSSS-2014), Dibrugarh University, Assam, 29 January–1 February 2014, for the paper titled *First Observation of Protons in the Near-Lunar Plasma Wake for magnetic field aligned flow from SWIM/SARA on Chandrayaan-1* by **M. B. Dhanya**, Anil Bhardwaj, Y. Futaana, S. Fatemi, M. Holmstrom, S. Barabash, M. Wieser, P. Wurz, Abhinaw Alok and R. Satheesh Thampi.
- **Session chair**, scientific event B0.1: Lunar Science and Exploration, 40th COSPAR Scientific Assembly, Moscow State University, Moscow, Russia, 2-10 August 2014
- **Travel Support from Committee on Space Research (COSPAR)** to participate in 40th COSPAR scientific Assembly in Moscow, 2014.
- **Research Travel Grant from SIDA, Sweden**, for joint scientific analysis of SARA data at Swedish Institute of Space Physics (IRF), Kiruna during June - July 2013.
- **Travel support from NASA Living With a Star summer school sponsors** to participate in the Heliophysics Summer School, organised by UCAR, Boulder, Colorado, May 31- June 7, 2012.
- **Research Travel Grant from SIDA, Sweden**, for joint scientific analysis of SARA data at Swedish Institute of Space Physics (IRF), Kiruna during April - May 2010.
- **Best Paper award** at National Space Science Symposium (NSSS-2010), Saurashtra University, Rajkot, February 2010, for the paper *First Results from SARA Experiment on the Chandrayaan-1 Mission*.
- **ISRO Team Excellence Award** for Chandrayaan-1, 2008.
- **CSIR (Council of Scientific and Industrial Research) research fellowship** in 2006.

RESEARCH WORK IN SPOTLIGHT

1. **ISRO Story of the Week:** The paper ‘Discovery of new suprathermal proton population around the Moon by SARA onboard Chandrayaan-1’, published in Geophysical Research Letters, 2017 (doi: 10.1002/ 2017GL072605) has been highlighted as ‘The Story of the Week’ at ISRO website on 27 June 2017.
2. **ISRO Story of the Week:** The paper ‘Observation of Suprathermal Argon in the exosphere of Mars’, published in Geophysical Research Letters, 2017 (doi: 10.1002/ 2016GL072001) has been highlighted as ‘The Story of the Week’ at ISRO website on 27 June 2017.
3. **ISRO Story of the Week:** The paper ‘On the evening time exosphere of Mars: Result from MENCA aboard Mars Orbiter Mission’, published in Geophysical research Letters, 2016 (doi: 10.1002/2016GL067707) made “The Story of the Week” at ISRO website on 02 May 2016.
4. **Nature India Highlight** for the paper *First Observation of Protons in the Near-Lunar Plasma Wake for magnetic field aligned flow from SWIM/SARA on Chandrayaan-1* by **M. B. Dhanya**, A. Bhardwaj, Y. Futaana, S. Fatemi, M. Holmström, S. Barabash, M. Wieser, P. Wurz, A. Alok, R. S. Thampi published in Geophysical Research Letters, 2013.

REFEREED JOURNAL PUBLICATIONS

1. **M. B. Dhanya**, A. Bhardwaj, A. Alok, Y. Futaana, S. Barabash, M. Wieser, et al. (2018), First observation of transport of solar wind protons scattered from magnetic anomalies into the near lunar wake: Observations by SARA/Chandrayaan-1. *Geophysical Research Letters*, 45, doi: 10.1029/2018GL079330.
2. **M. B. Dhanya**, A. Bhardwaj, Y. Futaana, S. Barabash, M. Wieser, M. Holmström, and P. Wurz (2017), New suprathermal proton population around the Moon: Observation by SARA on Chandrayaan-1, *Geophysical Reserach Letters*, 44, 4540-4548, doi: 10.1002/2017GL072605
3. T. P. Das, S. V. Thampi, **M. B. Dhanya**, A. Bhardwaj, S. M. Ahmed, R. Sridharan (2017), Upper limit of helium-4 in the sunlit lunar exosphere during magnetotail passage under low solar wind condition: Result from CHACE aboard MIP in Chandrayaan-1, *Icarus*, 297, 189-194, doi:10.1016/j.icarus.2017.07.001.
4. P. Janardhan, S. Vadawale, B. Bapat, K. P. Subramanian, D. Chakrabarty, P. Kumar, A. Sarkar, N. Srivastava, R. S. Thampi, V. K. Yadav, **M. B. Dhanya**, G. G. Nampoothiri, J. K. Abhishek, A. Bhardwaj, and K. Subhalakshmi (2017), Probing the heliosphere using in situ payloads onboard AdityaL1, *Current Science*, 113 (4), 62062.
5. **M. B. Dhanya**, A. Bhardwaj, Y. Futaana, S. Barabash, M. Wieser, M. Holmström, and P. Wurz (2017), New suprathermal proton population around the Moon: Observation by SARA on Chandrayaan-1, *Geophysical Research Letters*, 44, 4540-4548, doi: 10.1002/2017GL072605
6. A. Bhardwaj S. V. Thampi, T. P. Das, **M. B. Dhanya**, N. Naik, D. P. Vajja, P. Pradeepkumar, P. Sreelatha, G. Supriya, J. K. Abhishek, R. S. Thampi, V. K. Yadav, B. Sundar, A. Nandi, G. P. Padmanabhan and A.V. Aliyas (2017), Observation of Suprathermal Argon in the exosphere of Mars, *Geophysical Research Letters*, doi:10.1002/2016GL072001.
7. Vorburger, A., P. Wurz, S. Barabash, Y. Futaana, M. Wieser, A. Bhardwaj, **M. B. Dhanya**, and K. Asamura (2016), Transport of solar wind plasma onto the lunar nightside surface, *Geophysical Research Letters*, 43, 10586-10594, doi:10.1002/2016GL071094.
8. Choudhary, R. K., K. M. Ambili, S. Choudhury, **M. B. Dhanya**, A. Bhardwaj (2016), On the origin of the ionosphere at the Moon using results from Chandrayaan-1 S band radio occultation experiment and a photochemical model, *Geophysical Research Letters*, 43, 10025-10033, doi:10.1002/2016GL070612.
9. **M. B. Dhanya**, A. Bhardwaj, Y. Futaana, S. Barabash, A. Alok, M. Wieser, M. Holmström, and P. Wurz (2016), Characteristics of proton velocity distribution functions in the near-lunar wake from Chandrayaan-1/SWIM observations, *Icarus*, 271, 120-130, doi: 10.1016/j.icarus.2016.01.032.
10. Bhardwaj, A., S. V. Thampi, T. P. Das, **M. B. Dhanya**, N. Naik, D. P. Vajja, P. Pradeepkumar, P. Sreelatha, G. Supriya, J. K. Abhishek, S. V. Mohankumar, R. S. Thampi, V. K. Yadav, B. Sundar, A. Nandi, G. P. Padmanabhan and A. V. Aliyas (2016), On the evening time exosphere of Mars: Result from MENCA aboard Mars Orbiter Mission, *Geophysical Research Letters*, 43(5),1862–1867, doi: 10.1002/2016GL067707.
11. Bhardwaj, A., **M. B. Dhanya**, A. Alok, S. Barabash, M. Wieser, Y. Futaana, P. Wurz, A. Vorburger, M. Holmström, C. Lue, Y. Harada, and K. Asamura (2015), A New View on Solar wind interaction with Moon, *Geosciences Letters*, 2 (10), 1-15, doi: 10.1186/s40562-015-0027.
12. Bhardwaj, A., S. V. Mohankumar, T. P. Das, P. Pradeepkumar, P. Sreelatha, B. Sundar, A. Nandi, D. P. Vajja, **M. B. Dhanya**, N. Naik, G. Supriya, R. S. Thampi, G. P. Padmanabhan, V. K. Yadav, A. V. Aliyas (2015), MENCA Experiment aboard India’s Mars Orbiter Mission, *Current Science*, 109 (6), 1-8.
13. **M. B. Dhanya**, A. Bhardwaj, Y. Futaana, S. Fatemi, M. Holmström, S. Barabash, M. Wieser, P. Wurz, A. Alok, R. S. Thampi (2013), Proton entry into the near-lunar plasma wake for magnetic field aligned flow, *Geophysical Research Letters*, 40, 2913–2917, doi:10.1002/grl.50617.
14. A. Vorburger, P. Wurz, S. Barabash, M. Wieser, Y. Futaana, C. Lue, M. Holmström, A. Bhardwaj, **M. B. Dhanya**, K. Asamura (2013), Energetic neutral atom imaging of the lunar surface, *Journal of Geophysical Research*, 118 (7), 3937–3945, doi: 10.1002/jgra.50337.
15. Y. Futaana, S. Barabash, M. Wieser, M. Holmström, C. Lue, P. Wurz, A. Shaufelberger, A. Bhardwaj, **M. B. Dhanya**, K. Asamura (2012), Empirical Energy Spectra of Neutralized Solar Wind Proton from the Lunar Regolith, *Journal of Geophysical Research*, 117, E05005, doi:10.1029/2011JE004019, 2012.

16. Bhardwaj, A., **M. B. Dhanya**, R. Sridharan, S. Barabash, Y. Futaana, M. Wieser, M. Holmström, C. Lue, P. Wurz, A. Schaufelberger, and K. Asamura (2012), Interaction of solar wind with Moon: An Overview on the results from the SARA experiment aboard Chandrayaan-1, *Advances in Geosciences*, 25, 35–56.
17. A. Schaufelberger, P. Wurz, S. Barabash, M. Wieser, Y. Futaana, M. Holmström, A. Bhardwaj, **M. B. Dhanya**, R. Sridharan, and K. Asamura (2011), Scattering function for energetic neutral hydrogen atoms off the lunar surface, *Geophysical Research Letters*, 38, L22202, doi:10.1029/2011GL049362.
18. Lue, C., Y. Futaana, S. Barabash, M. Wieser, M. Holmström, A. Bhardwaj, **M. B. Dhanya**, P. Wurz (2011), Strong influence of lunar crustal fields on the solar wind flow, *Geophysical Research Letters*, 38, L03202, doi:10.1029/2010GL046215.
19. Bhardwaj, A., S. Barabash, **M. B. Dhanya**, M. Wieser, Y. Futaana, M. Holmström, R. Sridharan, P. Wurz, A. Schaufelberger, and K. Asamura (2010), Studying the Lunar–Solar Wind Interaction with the SARA Experiment aboard the Indian Lunar Mission Chandrayaan-1, in *SOLAR WIND TWELVE: American Institute of Physics Conference Proceedings*, 1216, 518–521.
20. Futaana, Y., S. Barabash, M. Wieser, M. Holmström, A. Bhardwaj, **M. B. Dhanya**, R. Sridharan, P. Wurz, A. Schaufelberger, K. Asamura (2010), Protons in the Lunar Wake Observed by the SARA Instrument on Board Chandrayaan-1, *Journal of Geophysical Research*, 115, A10248, doi:10.1029/2010JA015264
21. Wieser, M., S. Barabash, Y. Futaana, M. Holmström, A. Bhardwaj, R. Sridharan, **M. B. Dhanya**, P. Wurz, A. Schaufelberger, K. Asamura (2010), First observation of a mini-magnetosphere above a lunar magnetic anomaly using energetic neutral atoms, *Geophysical Research Letters*, 37, L05103, doi:10.1029/2009GL041721.
22. Bhardwaj, A., M. Wieser, **M. B. Dhanya**, S. Barabash, Y. Futaana, M. Holmström, R. Sridharan, P. Wurz, A. Schaufelberger, and K. Asamura (2010), The Sub-keV Atom Reflecting Analyzer (SARA) Experiment Aboard Chandrayaan-1 Mission: Instrument and Observations, *Advances in Geosciences*, 19, 151–162.
23. **M. B. Dhanya** and A. Bhardwaj (2010), Relationship between Soft X-rays and EUV Emissions during Solar Flares: A Case Study for October–November 2003, *Astrophysics and Space Science Proceedings*, XII , (Eds)S. Hasan, R. J. Rutten, 475–477.
24. Wieser, M., S. Barabash, Y. Futaana, M. Holmström, A. Bhardwaj, R. Sridharan, **M. B. Dhanya**, P. Wurz, A. Schaufelberger, K. Asamura (2009), Extremely high reflection of solar wind protons as neutral hydrogen atoms from regolith in space, *Planetary and Space Science*, 57, 2131–2134, doi:10.1016/j.pss.2009.09.012.
25. S. Barabash, A. Bhardwaj, M. Wieser, R. Sridharan, T. Kurian, S. Varier, E. Vijayakumar, V. Abhirami, K. V. Raghavendra, S. V. Mohankumar, **M. B. Dhanya**, S. Thampi, K. Asamura, H. Andersson, Y. Futaana, M. Holmström, R. Lundin, J. Svensson, S. Karlsson, R. D. Piazza and P. Wurz (2009), Investigation of the solar wind - Moon interaction onboard Chandrayaan-1 mission with the SARA Experiment, *Current Science*, 96, 526–34.

COVER PAGE OF JOURNALS & HIGHLIGHTS

1. **Cover Page of Geophysical Research Letters:** The paper titled “First Observation of a Mini-Magnetosphere above a Lunar Magnetic Anomaly using Energetic Neutral Atoms” on the 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 journal Geophysical Research Letters published by American Geophysical Union (AGU).
2. **Nature India Research Highlight:** The paper “Proton entry into the near-lunar plasma wake for magnetic field aligned flow”, published in Geophysical Research Letters (2013) made Research Highlight of Nature India with the title “Tracing Sun’s Protons Near Moon”, Published online on 23 July 2013; doi:10.1038/nindia.2013.99.

PRESS RELEASES

1. **ESA Press Release** on October 16, 2009: “Hydrogen offers a New Way to study the Moon” in the context of the paper “Extremely High Reflection of Solar Wind Protons as Neutral Hydrogen Atoms from Regolith in Space” published in the journal *Planetary and Space Science* in 2009.

SCIENTIFIC PROJECTS

1. Co-investigator, SARA (Sub-keV Atom Reflecting Analyser) experiment on the Chandrayaan-1, the first Indian Lunar Mission.
2. Deputy Project Manager, MENCA (Mars Exospheric Composition Analyser) onboard MOM, the first Indian Mars Mission.
Responsible for scientific data analysis, quick look display (QLD) and archival of MENCA data. MENCA is a neutral mass spectrometer.
3. Project Manager, CHACE-2 (Chandra’s Altitudinal Composition Explorer-2) experiment onboard Chandrayaan-2, the second Indian Lunar Mission.
Responsible for data handling and scientific analysis of the data from the CHACE-2, a neutral mass spectrometer.
4. Project Manager, PAPA (Plasma Analyser package) experiment on the Indian Aditya L1 mission.
Responsible for science data analysis, and payload operations.
5. Deputy Project Manager, ChaSTe(Chandra’s Surface Thermo-physical Experiment) experiment on the Chandrayaan-2 lander.
Responsible for data handling, science data analysis, and payload operations.
6. Co-Principal Investigator, PREM (Plasma Analyser for the Environment of Mars) onboard MOM-2, the second Indian Mars Mission.

POPULAR ARTICLES

1. Bhardwaj, A., S.V. Mohankumar, T. P. Das, S. V. Thampi, P. Pradeepkumar, P. Sreelatha, Sundar B., A. Nandi, D. P. Vajja, **M. B. Dhanya**, N. Naik, G. Supriya, R. S. Thampi, G. P. Padmanabhan, V. K. Yadav, and A.V. Aliyas, MENCA onboard the Indian Mars Orbiter Mission, *Physics Education*, Vol. 31, no. 3, July-Sept, 2015.
2. Bhardwaj, A., **M. B. Dhanya**, R. Sridharan, S. Barabash, M. Wieser, Y. Futaana, C. Lue, M. Holmstrom, P. Wurz, and A. Schaufelberger, Novel aspects of Solar Wind interaction with Moon as revealed by the SARA experiment on the Chandrayaan-1 mission, *Signatures (Newsletter of the Indian Society of Remote Sensing-Ahmedabad Chapter)*, Vol. 23, No. 4, Page: 87-92, November–December 2011.

PRESENTATIONS AT INTERNATIONAL/NATIONAL CONFERENCES/SYMPOSIA: 50

INVITED TALKS

1. *MENCA Calibration, Data analysis tools and Data Archival, workshop on Mars Orbiter Mission-Data Analysis and Science Plans*, PRL, Ahmedabad, August 20-21, 2014.
2. *MENCA payload and calibration program, Workshop on Infrared Spectroscopy of Planetary Atmospheres (ISPA)*, Space Science Instrumentation Facility (SSIF), ISRO Satellite Centre, ISITE campus, Bangalore, India, May 8–10, 2013.
3. *Planetary Exploration, Two day workshop on Space Physics*, Victoria College, Kerala, India, 3 March 2013 .
4. *Planetary Science, 3 day Workshop in Advanced Data Analysis Techniques in Astrophysics*, University of Calicut, India, 12 October 2012.

PARTICIPATION IN SCHOOLS/WORKSHOPS: 12

COMPUTER SKILLS

Operating System : Linux, Windows

Programming Languages: C, FORTRAN, IDL, R

Documentation : L^AT_EX, MS Word

Other softwares : SPICE toolkit (SPICE is the NASA ancillary data toolkit).

ACADEMIC PROJECTS

1. Supervised Nina. S. Darsan, M Sc Physics student from Department of Physics, Sree Narayana College, Cherthala, for doing project titled “The Mercury: Magnetized and Atmosphereless Planet in our Solar System”, April–June 2017.
2. Supervised C. Suvarna, M.Sc Physics student from MES, Kalladi College, Palakkad, Kerala, for doing project titled “Solar wind properties: Variability over two Solar Cycles”, April-June 2016.
3. Supervised Mr. Vishaal Singh, M.Sc Physics student from IIT, Kharagpur on the summer project titled *Investigations on the low ENA albedo regions on the Moon and their association with Lunar Surface Properties*, 25 May-17 July, 2015.
4. Supervised two M.Sc Physics students from St. Albert’s College, Ernakulam for doing project during April-June 2014. The project details as follows.
 - (a) Parvathy S. Kumar, *X-ray and EUV emissions during X-class solar flares: Characteristics, time delays and flux enhancements.*
 - (b) Jinchu C S, *X-ray and EUV emissions during M-class solar flares: Characteristics, time delays and flux enhancements.*