

Brief CV of Dr S.A. Haider

1. **Name in full:** Haider Syed Aftab
(Surname followed by forenames) (surname) (Forenames)
 2. **Date of Birth:** 22-06-1958
 3. **Nationality:** Indian
 4. **Field of Specialization:** 1. Planetary atmospheres, ionospheres and magnetospheres
2. Cometary coma and dust
 5. **Designation:** Professor
 6. **Address**
 - (a) **Official:** Prof. S. A. Haider, F.A.Sc.
Space & Atmospheric Sciences
Physical Research Laboratory
Navrangpura
Ahmedabad-380009.
 - (b) **Residential:** Bungalow 9, Unique Park Society
Opp. Bacha Motors
Near Vishala Hotel
Sarkhej Road
Ahmedabad-380055
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7. Academic career and professional attainments

(a) Degree	Institution	Year	Remarks
B.Sc. (Physics, Chemistry, Mathematics)	Gorakhpur University	1976	IInd Class
M.Sc. (Physics)	Kanpur University	1979	Ist Class
Ph.D. (Physics)	Banaras Hindu University	1984	

(b) Awards/ Special Attainments

1. *Elected*- Fellow of Indian Academy of Sciences (F.A.Sc.), 2010
2. *Awarded* – Foundation for Promotion of Science (FAPES) fellowship, 2008
3. *Awarded* – Institute of Space and Astronautical Science (ISAS) fellowship, 2000
4. *Awarded* –Japan Society for Promotion of Science (JSPS) fellowship, 1999
5. *Awarded* -Post doctoral fellowship from Russian Academy of Sciences, 1988
6. *Best paper Award* - Vikas Singh and **S.A. Haider** at PLANEX symposium held at PRL on November 8, 2004
7. *Best paper award* - Varun Sheel and **S.A. Haider** at National Space Science Symposium held at Saurashtra University, Rajkot during February 24-27, 2010

Special Recognition:

Invited review by the editor of Reviews of Geophysics on “Mars Ionosphere: A Review of Experimental Results and Modeling Studies” by **S.A. Haider**, K.K. Mahajan and Esa Kallio (under revision)

Membership:

1. *COSPAR*- Associate since 1992
2. *Member of International Programme*: Climate and Weather of Sun-Earth System (CAWSES) under Scientific Committee on Solar Terrestrial Physics (SCOSTEP) for the period 2004-2008
3. *Member of Asia Oceania Geosciences Society* (AOGS) since 2006
4. *Associated Faculty Member* of Planetary Sciences and Exploration Program (PLANEX) at PRL

5. *Member of Programme Advisory Committee (PAC) for PLANEX program at PRL*
6. *Member of Indian Mars mission team constituted by ISRO*

(c) Other relevant information

Fellowships held in India and abroad:

- | | | | |
|----|-----------|---|------------------------------|
| 1. | 1989-1990 | Space Research Institute,
Moscow, Russia | Post Doctoral Fellowship |
| 2. | 1990-1993 | Physical Research
Laboratory, Ahmedabad | CSIR Pool Scientist |
| 3. | 1999 | Institute of Space and
Astronautical Science,
Japan | JSPS Fellowship |
| 4. | 2000-2001 | Institute of Space and
Astronautical Science,
Japan | Visiting Professor |
| 5. | 2008-2009 | Instituto Nacional De
Pesquisas Espaciais (INPE), | Visiting Professor
Brazil |

Editor and Referee Responsibilities

1. Special issue on **Advances in Planetary Atmospheres and Exploration** to be published in *Planetary and Space Science*, Editors: **S.A. Haider**, Shyam Lal, Wing, Ip and S. Barabash
2. *Referee*, International Journals: *J. Geophys. Res.*, *Geophys. Res. Lett.*, *Ind. J. Radio & Space Phys.*

Research Supervision

1. Dr. S.P. Seth, Ph. D., Gujarat University, 2003 on “*Solar wind interaction with planets*”
2. Mr. Vikas Singh, M. Tech., Andhra University, 2004 on “*Chemistry of lower ionosphere of Mars*”
3. 14 students at PRL completed their project work/trainee under his supervision

Organization of conferences/summer schools etc

1. International workshop on Advances in Planetary Atmospheres and Exploration held at PRL during 12-13 July, 2010

Conveners: **S.A. Haider**, Varun Sheel and Shyam Lal.

2. Symposium on Science and Exploration of Mars and Venus (PS05) in Asia Oceania Geosciences Society (AOGS) meeting held in Hyderabad, India during 5-9 July, 2010
Conveners: **S.A. Haider**, A. Chicarro, T. Satoh, M.A. Abdu and J. Helbert
3. Symposium on Science and Exploration of Mars (PS08) in Asia Oceania Geosciences Society (AOGS) meeting held in Singapore, during 11-15 August, 2009
Conveners: **S.A. Haider**, A. Chicarro, T. Satoh, M.I. Verigin and M.A. Abdu
4. Symposium on Science and Exploration of Mars and Venus (PS12) in Asia Oceania Geosciences Society (AOGS) meeting held in Busan, Korea during June 16-20, 2008
Conveners: **S.A. Haider**, H. Hoffmann, J. Helbert, T. Imamura, V. Sheel and S.N. Tripathi
5. Symposium on Science and Exploration of Mars and Venus (PS05) in Asia Oceania Geosciences Society (AOGS) meeting held in Bangkok during 30 July-4 August, 2007
Conveners: **S.A. Haider**, J.S. wang, H. Hoffmann and J. Helbert
6. Winter School on Modeling of Planetary Atmospheres at PRL during 18th December 2006 to 6th January 2007,
Conveners: **S.A. Haider**, Varun Sheel and Shyam Lal

Invited Talks

Dr Haider has participated in 20 national and 12 international conferences. His invited talks are given below:

1. Atmospheres of terrestrial planets, *11th PLANEX workshop* at Physical Research Laboratory, Ahmedabad, 3 -7 January (2011)
2. Atmosphere and Aurora on planets, *National science workshop: Organized by Indian National Science Academy (Gujarat-Rajsthan Chapter)* at Gujarat Vidya Mandir, Ahmedabad, 23-24 December (2010)
3. Solar wind electron and galactic cosmic rays precipitating at Mars terminator ionosphere, *8th Asia Oceanic Geosciences Society (AOGS) meeting*, Busan, Korea, June 16-20, (2008)
4. Longitudinal distribution of the dayside ionosphere of Mars at high latitude, *7th Asia Oceanic Geosciences Society (AOGS) meeting*, Bangkok, 31 July-4 August (2007)
5. Exploration of atmospheres of Mars and comets, *8th PLANEX workshop* in University of Pondichery, Pondichery, 24-28 December (2007)
6. Cassini and Huygen's probe to Titan, *8th PLANEX workshop* in University of Pondichery, Pondichery, 24-28 December (2007)
7. Ionospheres of Mars at low and high latitudes, *3rd Asia Oceanic Geosciences Society (AOGS) meeting*, Singapore, 10-14 July (2006)

8. Chemistry and compositions of cometary coma,
3rd Asia Oceanic Geosciences Society(AOGS) meeting, Singapore, 10-14 July (2006)
9. Ionosphere of Mars: Role of solar EUV and solar wind interaction,
2nd Asia Oceanic Geosciences Society (AOGS) meeting, Singapore, June 20-24 (2005)
10. Solar wind absorption into Martian atmosphere,
12thNational Space Science Symposium, Bhopal, India, Feb. 25-28 (2002)
11. Solar wind interaction with Mars,
11th National Space Science Symposium at Puri, India, March 1-4 (2000)

(d) Publications in Journals

1. **Haider, S.A.**, V. Sheel, M.D. Smith, W.C. Maguire and G.J. Molina-Cuberos (2010), Effect of dust storms on the D region of the Martian ionosphere, *J. Geophys. Res.*, 115, A12336, doi:10.1029/2010JA016125
2. **Haider, S.A.**, S.P. Seth, D.A. Brain, D.L. Mitchell, T. Majeed and S.W. Bougher (2010), Modeling photoelectron transport in the Martian ionosphere at Olympus Mons and Syrtis Major: MGS observations, *J. Geophys. Res.*, 115, A08310, doi:10.1029/2009JA014968
3. **Haider, S.A.**, M.A. Abdu, I.S. Batista, J.H. Sobral, Esa Kallio, W.C. Maguire and M.I. Verigin (2009), On the responses to solar X-ray flare and coronal mass ejection in the ionosphere of Mars and Earth, *Geophys. Res. Lett.*, 36, L13104, doi:10.1029/2009GL038694
4. **Haider, S.A.**, M.A. Abdu, I.S. Batista, J.H. Sobral, Varun Sheel, G.J. Molina-Cuberos, W.C. Maguire and M.I. Verigin (2009), Zonal wave structures in the nighttime density, Temperature and in the D region ionosphere over Mars: Modeling and observations, *J. Geophys. Res.*, 114, A12315, doi:10.1029/2009JA014231
5. **Haider, S.A.**, M.A. Abdu, I.S. Batista, J.H. Sobral, Xiaoli Luan, Esa Kallio, W.C. Maguire, M.I. Verigin, and V. Singh (2009), D, E, and F layers in the daytime at high latitude terminator ionosphere of Mars: Comparison with Earth's ionosphere using COSMIC data, *J. Geophys. Res.*, 114, A03311, doi:10.1029/2008JA013709
6. **Haider, S.A.**, Varun Sheel, V. Singh, W.C. Maguire and G. J. Molina-Cuberos (2008), Model calculation of production rates, ion and electron densities in the evening troposphere of Mars at latitudes 67°N and 62°S: Season variability, *J. Geophys. Res.* 113, A08320, doi:10.1029/2007JA012980
7. **Haider, S.A.**, V. Singh, V.R. Choksi, W.C. Maguire and M.I. Verigin (2007), Calculated densities of $\text{H}_3\text{O}^+(\text{H}_2\text{O})_n$, $\text{NO}_2^-(\text{H}_2\text{O})_n$, $\text{CO}_3^-(\text{H}_2\text{O})_n$ and electron in the nighttime ionosphere of Mars: Impact of solar wind electron and galactic cosmic rays, *J. Geophys. Res.*, 112, A12309, doi:10.1029/2007JA012530
8. **Haider, S.A.**, S.P. Seth, V.R. Choksi and K.I. Oyama (2006), Model of photoelectron

impact ionization within the high latitude ionosphere at Mars: Comparison of calculated and measured electron density, *Icarus*, 185,102-112

9. Seth, S.P., U.B. Jayanthi and **S.A. Haider** (2006), Estimation of peak electron density in upper ionosphere of Mars at high latitude (50°-70°N) using MGS ACC data, *Geophys.Res.Lett.*, 33, L19204, doi:10.1029/2006GL027064
10. Mahajan, K.K., S. Singh, A. Kumar, S. Raghuvanshi and **S.A. Haider** (2007), Mars Global Surveyor radio science electron density profiles: Some anomalous features in the Martian ionosphere, *J.Geophys.Res.*, 112, E10006, doi:10.1029/ 2006JE002876
11. Seth, S.P., V.B. Rao, C.M. Esposito, **S. A. Haider** and V.R. Choksi (2006), Zonal variations of peak ionization rates in upper atmosphere of Mars at high latitude using Mars Global Surveyor accelerometer data, *J.Geophys.Res.*, 111, A09308, doi:10. 1029/2006JA011753
12. **Haider, S. A.** and Anil Bhardwaj (2005), Radial distribution of production rates, loss rates and densities corresponding to ion masses ≤ 40 amu in the inner coma of comet Halley: Composition and chemistry, *Icarus*, 177,196-216
13. **Haider, S.A.**, S.P. Seth, Esa Kallio and K.I. Oyama (2002), Solar EUV and electron-proton-hydrogen atom produced ionosphere at Mars: Comparative studies of particle fluxes and ion production rates due to different processes, *Icarus*,159, 18-30
14. **Haider, S. A.** and K. I. Oyama (2002), Calculated electron flux and densities at 10-1000 eV in the dayside Martian ionosphere: Comparison with MGS and Viking results, *Indian J. Radio and Space Phys.* 31, 173-182
15. Seth, S. P., **S.A. Haider** and K.I. Oyama (2002), The photoelectron flux and night glow emissions of 5577 Å and 6300 Å due to solar wind electron precipitation in Martian atmosphere , *J.Geophys. Res.* 107, 1324, doi: 10.1029/2001 JA 000261
16. Bhardwaj, A. and **S.A. Haider** (2002), Chemistry of O (¹D) atoms in coma: implications for cometary mission, *Advance in Space Research* 29(5), 745-749
17. **Haider, S.A.**, S.P. Seth and K.S. Raina (1999), Field aligned current and parallel electric field between magnetosphere and ionosphere of Mars, *Indian J. of Radio and Space Phys.*, 28, 36-48
18. Bhardwaj, A. and **S.A. Haider** (1999), Modeling of metastable carbon atoms in comets: implications for ROSETTA, *Advance in Space Research*, 23(7), 1325-1341
19. Raina, K.S. and **S.A. Haider** (1998), Chemistry of the dayside ionosphere of Mars, *Indian J. of Radio and Space Phys.*, 27, 185-197
20. **Haider, S.A.** (1997), Chemistry of the nightside ionosphere of Mars, *J. Geophys. Res.*, 102, 407-416
21. **Haider, S.A.** and A. Bhardwaj (1997), Chemistry of the ions ≤ 40 amu in the inner coma of comet Halley, *Advance in Space Research.*, 20, 291-297
22. **Haider, S.A.** (1997), Effect of ion heating on the plasma transport at polar latitudes of Mars

23. **Haider, S.A.** (1996), High latitude plasma transport through the Martian tail: Polar wind, *J. Geophys. Res.*, 101, 24955-24963
24. Bhardwaj, A., **S.A. Haider** and R.P. Singhal (1996), Production and emissions of atomic carbon and oxygen in the inner coma of comet Halley: Role of electron impact, *Icarus*, 120, 412-430
25. **Haider, S.A.** (1995), O^+ escape through the plasmashet of Mars and its causative mechanism, *J. Geophys. Res.*, 100, 12235- 12242
26. **Haider, S.A.** (1995), O^+ escape in the polar ion exosphere of Mars, *Advance in Space Research*, 16, 6, 49-54
27. Bhardwaj, A., **S.A. Haider** and R.P. Singhal (1995), Consequences of cometary aurora on the carbon chemistry at comet Halley, *Advance in Space Research*, 16, 2, 31-36
28. **Haider, S.A.** (1994), Comparative study of electron fluxes, ionization rates, ion and electron densities due to photoelectron and magnetospheric electron interaction with the atmosphere of Mars, *Current Science*, 66, 577-583
29. **Haider, S.A.**, A. Bhardwaj and R.P. Singhal (1993), Role of auroral and photoelectrons on the abundance of methane and ammonia in the coma of comet Halley, *Icarus*, 101, 234-243
30. Sridharan, R., **S.A. Haider**, S. Gurubaran, R. Sekar and R. Narayanan (1992), OI 630.0 nm Dayglow in the region of equatorial ionization anomaly: Temporal variability and its causative Mechanism, *J. Geophys. Res.*, 97, 13715-13721
31. **Haider, S.A.**, J. Kim, A.F. Nagy, C.N. Keller, M.I. Verigin, K.I. Gringauz, N.M. Shutte, K. Szego and P. Kiraly (1992), Calculated ionization rates, ion densities and airglow emission rates due to precipitating electrons in the nightside ionosphere of Mars, *J. Geophys. Res.*, 97, 10637-10641
32. Verigin, M.I., K.I. Gringauz, N.M. Shutte, **S.A. Haider**, K. Szego, P. Kiraly, A.F. Nagy and T.I. Gombosi (1991), On the possible source of the ionization in the nighttime Martian ionosphere, 1, Phobos- 2/HARP electron spectrometer measurements, *J. Geophys. Res.*, 96, 19307- 19313
33. Bhardwaj, A., **S.A. Haider** and R.P. Singhal (1990), Auroral and photoelectron fluxes in cometary ionospheres, *Icarus*, 85, 216-228
34. **Haider, S.A.** (1988), Emission intensities of N_2 Lyman-Birge-Hopfield and Birge-Hopfield bands in the dayside disc spectrum of Titan, *Indian J. Radio and Space Physics*, 26, 705-715
35. **Haider, S.A.** (1988), Emission intensities of fourth positive bands of CO in the atmosphere of Mars due to solar EUV interaction, *Indian J. Radio and Space Physics*, 17, 27-38
36. **Haider, S.A.** (1988), Model calculation of nightside ionosphere of Venus: Ionic composition, *Indian J. Radio and Space Physics*, 17, 183-195

37. **Haider, S.A.** (1986), Some molecular nitrogen emission from Titan-Solar EUV interaction, *J. Geophys. Res.*, 91, 8998-9000
38. **Haider, S.A.** and R.P. Singhal (1986), Analytical approach to backscattering of low energy electrons, *J. Geophys. Res.*, 91, 13761-13763
39. **Haider, S.A.**, R. Shanker and O.N. Singh (1986), Photoelectron excitation of H₂ due to solar EUV interaction in the Jovian atmosphere, *Indian J. Radio and Space Physics*, 15, 6-17
40. Singhal, R.P. and **S.A. Haider** (1986), Some molecular nitrogen emission from Titan solar EUV and magnetospheric interaction, *Indian J. Radio and Space Physics*, 15, 46-56
41. Singhal, R.P. and **S.A. Haider** (1984), Analytical yield spectrum approach to photoelectron fluxes in Earth's atmosphere, *J. Geophys. Res.*, 89, 6847-6852
42. **Haider, S.A.** and R.P. Singhal (1983), Analytical yield spectrum approach to electron energy degradation in Earth's atmosphere, *J. Geophys. Res.*, 88, 7185-7189
43. **Haider, S.A.** and R.P. Singhal (1983), Electron loss cross sections for He⁺ and He incident on N₂ and O, *Physica C*, 121C, 437-440
44. Singhal, R.P. and **S.A. Haider** (1982), Optical emission on the nightside ionosphere of Venus *Indian J. Radio and Space Physics*, 11, 15-19

Review Papers

1. **Haider, S.A.**, K.K. Mahajan and Esa Kallio (2010), Mars Ionosphere: A Review of Experimental Results and Modeling Studies, *Reviews of Geophysics* (under revision).
2. Varun Sheel, **S.A. Haider**, V. Singh, W.C. Maguire and G.J. Molina-Cuberos (2010), Zonal variability of neutral density, temperature and ion production rates in the Martian troposphere, *Advances in Geosciences*, 19, *Planetary Science*, page 225-235
3. **Haider, S. A.**, Varun Sheel, V. Singh, W.C. Maguire and G.J. Molina-Cuberos (2008), Longitudinal distribution of the dayside ionosphere of Mars at high latitude, *Advances in Geosciences*, 15, *Planetary Science*, Chapter 3, page 1-27
4. **Haider, S.A.** (1995), Atmospheres of inner planets *Physics education*, 12, 125-136
5. **Haider, S.A.** and R.P. Singhal (1994), *Planetary Atmospheric Studies*, *Advances in Space Research in India*, edited by R.K. Varma, Diamond Jubilee publications, Indian National Science Academy, New Delhi, 69-98

Chapter in Books

1. Ready, R.V., A.C. Das and **S.A. Haider** (2010), Magnetic fields and solar wind interaction with planetary atmospheres, in *Modeling of Planetary Atmospheres*, edited by **S.A. Haider**, Varun Sheel and Shyam Lal, Macmillan, India Ltd., Chapter 3, page 145-202.

Books Edited/Published

1. **Haider, S.A.**, Varun Sheel and Shyam Lal (2010), Modeling of planetary atmospheres, Published by Macmillan, India Ltd., page 1-361
2. Kasaba, Y., G.M. Caro, T. Ito, P. Hartogh, C.Y. Robert and **S.A. Haider** (2010), Advances in Geosciences, Published by World Scientific Company, Singapore, 19, 1-680

Publications in Technical Reports

1. **Haider, S.A.**, S.P. Seth, S.W. Biugher and K.I. Oyama (2003), Longitudinal distributions of photoelectron spectra, production rates and densities at low latitude of Mars: comparison with accelerometer and radio measurements, Technical Research Note, Published by Institute of Space and Astronautical Science (Japan), page 1-33
2. **Haider, S.A.** (1999), Ionization and airglow in Martian atmosphere, Scientific Report, Published by Indian Space Research Organization (India), Technical Report No: ISRO-PRL-TR-100-99, page 1-67

Prof. Haider has made pioneering contributions in the modeling of Planetary and Cometary Atmospheres and provided new insights and predictions that are now being confirmed. He proposed that daytime ionosphere of Mars comprises D, E, and F layers as a consequence of the impact of galactic cosmic rays, X-rays, and solar EUV radiations. Using an extensive range of gas phase chemistry, he investigated and modeled the cometary compounds of masses ≤ 40 amu, which explained the observations successfully. His recent and most innovative work on the responses of solar X-ray flares has revolutionized the understanding of Martian auroral X-ray phenomena. This contribution has substantive implications for the coupling of solar wind with ionosphere of Mars. He has discovered Martian magnetic storm due to arrival of CME that reached Mars after ~ 30 hours of its eruption from the sun. This disturbed the E region of Martian ionosphere and enhanced the electron density significantly. He provided a new mechanism for the generation of magnetic storms on Mars. Based on his innovative contributions Prof. Haider was elected as Fellow of Indian Academy of Sciences, has been invited for topical overviews by international journals. He has authored and edited a book on the Modeling of Planetary Atmospheres.

Prof Haider has a very rigorous collaborative research programs with several scientists in USA, Europe and Asia. It is important to mention that most of the collaboration results have been published by scientists from abroad based on Dr Haider's models, analysis, innovative approach, broad understanding of planetary atmosphere-ionosphere-magnetosphere system (Please see the list of publications).

Prof Haider has organized several national and international conferences and summer schools. Since 2007 he has been organizing a planetary session in AOGS on 'Science and Exploration of Mars'. He is also an Editor of Planetary Science volume of Advances in Geosciences. He is a guest Editor of Planetary and Space Science. He is a member of Program Advisory Committee (PAC) for Planetary Exploration (PLANEX) at PRL. Indian Space Research Organization (ISRO) is planning to explore a mission to Mars. Prof Haider is a member of Mars Mission Team (MMST) constituted by ISRO.