

Md. Mosarraf Hossain

Scientist/Engineer – SF

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Research Area

(1) Terrestrial aeronomy / thermospheric / ionospheric investigations; (2) Optical Instrumentation involving photometry / spectrometry, interference spectroscopy and all-sky airglow imaging; Optical measurements of airglow emissions spectra, thermospheric winds and temperature; Development of ground segment part of science data pipeline for the Langmuir probe payload on-board the Lander of Chandrayan 3 mission.

Academic Qualification

Degree	Year	Details
• Ph.D.	2008	Physics, Thesis Title: “Applications of digital holography in optical metrology and information reduction”, Indian Institute of Technology Delhi, New Delhi, India. Thesis advisor: Prof. Chandra Shakher.
• M. Tech.	2001	Applied Optics (Laser Applications, Holography etc.), Indian Institute of Technology Delhi, New Delhi, India.
• M. Sc.	1999	Physics, Visva Bharati University, Santiniketan, West Bengal. India.

Professional Background

Designation	Duration	Institution
• Scientist/Engineer	Mar 2006 – Present	Space Physics Laboratory, VSSC, ISRO, India
• Project Associate	Feb 2001-May 2001	Indian Institute of Technology Delhi, New Delhi, India.

Awards/Honors/Recognitions/Aclamations

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- Peer reviewer and invitee for the Intellectual Property Rights Monitoring & Coordination Committee 2020, VSSC, ISRO.
 - Evaluator for child scientist’s projects in the National Children Science Congress (NCSC) 2019 held at Trivandrum, Kerala, India.
 - Reviewer, DST project proposal under Science and Engineering Research Council (SERC) programme.
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Major additional responsibilities

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- Visiting Faculty at Indian Institute of Space Science and Technology (IIST), Trivandrum for conducting M.Tech. (Optical Engineering) courses.
 - Member, Doctoral committees for students Indian Institute of Space Science Technology, Trivandrum.
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Specific Scientific/Technical contributions

- ❖ Contributions mentioned below are as part of the terrestrial aeronomy/ionospheric/thermospheric research:
 - Developed a ground based Spatial Heterodyne Spectrometer (SHS) for measurement of nocturnal airglow emissions. SHS, a compact and robust system, provides large throughput performance at high resolution, and hence it is an important contemporary tool for space based planetary explorations.
 - Demonstrated and regularized systematic first-of-its-kind measurements of the daytime sodium airglow emissions.
 - Realized development of a Doppler imaging Fabry-Perot interferometer and started measurements of the nocturnal thermospheric winds and temperature for the first-time from an equatorial Indian station.
 - As project manager, ground segment for the Langmuir probe payload onboard the Lander of Chandrayan-3 mission, I have established ground segment part of the science data pipeline.

Publications – 20

1. Md. Mosarraf Hossain, Tarun Kumar Pant, C. Vineeth, “Nocturnal thermospheric neutralwind and temperature measurement using a Fabry-Perot Interferometer: First results froman equatorial Indian station”, *Advances in Space Research*, 72, 598–613 (2023), doi:<https://doi.org/10.1016/j.asr.2023.03.040>.
2. Manju, G., Tarun K. Pant,P. Sreelatha, Santhosh J. Nalluveetil, P. Pradeep Kumar, Nirbhay Kumar Upadhyay, **Md. Mosarraf Hossain**, Neha Naik, Vipin Kumar Yadav, Rosmy John, R. Sajeev, Jothi Ramalingam, Philip George, Amarnath Nandi, N. Mridula, Aswathy R., P. Janmejey, Jaiswal Rana, Snehil Srivastava and Satheesh Thampi, “New outlook on lunar near surface plasma environment from Chandrayaan-2 lunar lander platform: RAMBHA-LP payload perspective”, *Current Science*, 118(3), 383 (2020).
3. Sumod. S. G, Tarun Kumar Pant, C. Vineeth and **Md. Mosarraf Hossain**, “Unusual depletion of OI 630.0 nm dayglow and simultaneous mesopause heating during the penetration of interplanetary electric field over dip equator”, *J. Geophys. Res. Space Physics*, 120, doi:10.1002/2014JA020584 (2015).
4. Sumod. S. G, Tarun Kumar Pant, C. Vineeth and **Md. Mosarraf Hossain**, “On the ionospheric and thermospheric response of Solar flare events of January 19, 2005: An investigation using radio and optical techniques”, *Journal of Geophysical Research*, 119 (6), 50405059 (2014).
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6. Debadatta Swain, N. V. P. Kiran Kumar, K. Kishore Kumar, **Md. Mosarraf Hossain**, M. Rajasekhar, and Geetha Ramkumar, “Application of Wavelet Denoising for Wind Speed Retrieval from a 2.5 MHz Partial Reflection Radar”, *Current Trends in Signal Processing*, Vol. 3, Issue 2, 18, STM Journals (2013).
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9. C. Vineeth, T. K. Pant and **Md. Mosarraf Hossain**, "Enhanced Gravity wave activity over the equatorial MLT Region during Counter Electrojet Events", *Ind. J. Radio & Space Phys.*, 41, 258263 (2012).
10. S. G. Sumod, T. K. Pant, C. Vineeth, and **Md. Mosarraf Hossain**, "Response of Tropical Mesopause to the longest Annular Solar Eclipse of this millennium", *J. Geophys. Res.*, 116, A06317 (2011).
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12. T. K. Pant, C. Vineeth and **Md. Mosarraf Hossain**, "A brief review of Neutral Atmosphere-Ionosphere Coupling over the dip Equator", *Review Article, Asian J. Phys.*, 4, 435442, (2011).
13. **Md. Mosarraf Hossain**, T. K. Pant, C. Vineeth, S. G. Sumod and R. Sridharan, "Daytime sodium airglow emission measurements over Trivandrum using a scanning monochromator : first results", *Annales Geophysicae*, 28, 20712077 (2010).
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15. **Md. Mosarraf Hossain** and C.Shakher, "Temperature measurement in laminar free convective flow using digital holography", *Applied Optics* 48(10), 18691877 (2009).
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17. **Md. Mosarraf Hossain**, D. S. Mehta and C. Shakher," Information Reduction using lensless Fourier transform digital composite holography", *Optics & Laser Technology* 40, 120128 (2008).
18. **Md. Mosarraf Hossain**, G. Sheoran, D. S. Mehta and C. Shakher, "Contouring of diffused objects by using digital holography ", *Optics and Lasers in Engineering* , 45, 684689 (2007).
19. **Md. Mosarraf Hossain**, D. S. Mehta and C. Shakher," Refractive index determination: An application of lensless Fourier digital holography", *Optical Engineering* 45(10), 1062037 (2006).
20. D. S. Mehta, S. K. Dubey, **Md. Mosarraf Hossain** and C. Shakher, "Simple multifrequency and phase shifting fringe projection system based on two wavelength lateral shearing interferometry for threedimensional profilometry", *Applied Optics*, 44(35), 75157521 (2005).

मोह. मोसाराफ होसैन

वैज्ञानिक/इंजीनियर- एसएफ

फ़ोन :+९१-४७१-२५६२७८६

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अनुसंधान क्षेत्र

(१) टेर्रेस्ट्रियल एरोनॉमी/ थर्मोस्फेरिक/आयनोस्फेरिक इन्वैस्टिगेशन; (२) ऑप्टिकल इंस्ट्रुमेंटेशन जिसमें फोटोमेट्री/स्पेक्ट्रोमेट्री, इंटरफेरेंस स्पेक्ट्रोस्कोपी और ऑल-स्काई एयरग्लो इमेजिंग शामिल है।; ऑप्टिकल मेसुरेमेंट ऑफ एयरग्लो एमिस्सिओन स्पेक्ट्र, थर्मोस्फेरिक विंड्स और टेंपरेचर; चंद्रयान-३ मिशन के लैंडर पर लैंगमयर प्रोब पेलोड के लिए साइंस डेटा पाइपलाइन का ग्राउंड सेगमेंट पार्ट की स्थापन।

शैक्षणिक योग्यता

डिग्री	वर्ष	विवरण
पी एचडी	२००८	भौतिक विज्ञान; शोधग्रंथ का शीर्षक: "ऑप्टिकल मेट्रोलाजी और इन्फॉर्मेशन रिडकसन में डिजिटल होलोग्राफी के अनुप्रयोग"; भारतीय प्रौद्योगिकी संस्थान दिल्ली (आईआईटी दिल्ली), नई दिल्ली, भारत। थीसिस सलाहकार : प्रो .चंद्र शेखर।
एमटेक	२००१	अप्लाइड ओपटिक्स (लेजर अनुप्रयोग, होलोग्राफी आदि), भारतीय प्रौद्योगिकी संस्थान दिल्ली (आईआईटी दिल्ली), नई दिल्ली, भारत।
एम एससी	१९९९	भौतिक विज्ञान, विश्व भारती विश्वविद्यालय, शांतिनिकेतन, पश्चिम बंगाल। इंडिया।

प्रोफेशनल बैकग्राउंड

पद	समयांतराल	संस्थान
वैज्ञानिक / इंजीनियर	मार्च २००६- वर्तमान	अंतरिक्ष भौतिकी प्रयोगशाला, वीएसएससी, इसरो, भारत
परियोजना सहयोगी	फरवरी २००१- मई २००१	भारतीय प्रौद्योगिकी संस्थान दिल्ली (आईआईटी दिल्ली), नई दिल्ली, भारत।

पुरस्कार/सम्मान/स्वीकरण/अभिनंदन

- बौद्धिक संपदा अधिकार निगरानी और समन्वय समिति २०२०, वीएसएससी, इसरो के लिए समीक्षक और आमंत्रित।
- मूल्यांकनकर्ता। त्रिवेंद्रम, केरल, भारत में आयोजित राष्ट्रीय बाल विज्ञान कांग्रेस (एनसीएससी) २०१९ में बाल वैज्ञानिकों की परियोजनाओं के लिए।
- समीक्षक, डीएसटी परियोजना प्रस्ताव, विज्ञान और इंजीनियरिंग अनुसंधान परिषद (एसईआरसी) कार्यक्रम के तहत

प्रमुख अतिरिक्त जिम्मेदारियां

- एम.टेक (ऑप्टिकल इंजीनियरिंग) पाठ्यक्रम आयोजित करने के लिए भारतीय अंतरिक्ष विज्ञान और प्रौद्योगिकी संस्थान (आईआईएसटी), त्रिवेंद्रम में अतिथि फ़ैकल्टि।
- सदस्य, डॉक्टरेट समितियाँ, भारतीय अंतरिक्ष विज्ञान प्रौद्योगिकी संस्थान (आईआईएसटी), त्रिवेंद्रम के छात्रों के लिए ।

विशिष्ट वैज्ञानिक/तकनीकी योगदान

- ❖ नीचे उल्लिखित योगदान टेर्रेस्ट्रियल एरोनोमी/आयनोस्फेरिक/थर्मोस्फेरिक अनुसंधान के भाग के रूप में हैं:
 - रात्रिकालीन एयरग्लो उत्सर्जन के मापन के लिए एक ग्राउंड पर आधारित स्पसियल हेटेरोडाइन स्पेक्ट्रोमीटर (एसएचएस) विकसित किया। एसएचएस, एक कॉम्पैक्ट और रोबस्ट सिस्टम, लार्ज थ्रौघ्पुट देते हैं हाइ रेसोल्यूशन में। इसीलिए अंतरिक्ष पर आधारित प्लानेटरी एक्सप्लोरसन के लिए यह एक गुरुत्वपूर्ण कोण्टेपोरारी टूल है।
 - दिन के समय सोडियम एयरग्लो उत्सर्जन के अपनी तरह के पहले माप को प्रदर्शित और नियमित किया।
 - डॉपलर इमेजिंग फ़ैब्री-पेरो इंटरफेरोमीटर के विकास किया और एक भूमध्यरेखीय भारतीय स्टेशन से पहली बार रात्रिकालीन थर्मोस्फेरिक हवाओं और तापमान का मापन शुरू किया।
 - चंद्रयान-3 मिशन के लैंडर पर लैंगमयर प्रोब पेलोड के लिए प्रोजेक्ट मैनेजर, ग्राउंड सेगमेंट के रूप में, मैने साइंस डेटा पाइपलाइन का ग्राउंड सेगमेंट पार्ट स्थापित किया।

प्रकाशनों

1. Md. Mosarraf Hossain, Tarun Kumar Pant, C. Vineeth, "Nocturnal thermospheric neutralwind and temperature measurement using a Fabry-Perot Interferometer: First results from an equatorial Indian station", *Advances in Space Research*, 72, 598–613 (2023), doi:<https://doi.org/10.1016/j.asr.2023.03.040>.
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10. S. G. Sumod, T. K. Pant, C. Vineeth, and **Md. Mosarraf Hossain**, "Response of Tropical Mesopause to the longest Annular Solar Eclipse of this millennium", *J. Geophys. Res.*, 116, A06317 (2011).
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17. **Md. Mosarraf Hossain**, D. S. Mehta and C. Shakher," Information Reduction using lensless Fourier transform digital composite holography", *Optics & Laser Technology* 40, 120128 (2008).
18. **Md. Mosarraf Hossain**, G. Sheoran, D. S. Mehta and C. Shakher, "Contouring of diffused objects by using digital holography", *Optics and Lasers in Engineering*, 45, 684689 (2007).
19. **Md. Mosarraf Hossain**, D. S. Mehta and C. Shakher," Refractive index determination: An application of lensless Fourier digital holography", *Optical Engineering* 45(10), 1062037 (2006).
20. D. S. Mehta, S. K. Dubey, **Md. Mosarraf Hossain** and C. Shakher, "Simple multifrequency and phase shifting fringe projection system based on two wavelength lateral shearing interferometry for threedimensional profilometry", *Applied Optics*, 44(35), 75157521 (2005).