Nithin Sivadas

Curriculum Vitae

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Research Interests complex systems, data analysis and modeling, existential risks, energetic precipitation, magnetospheric substorms, aurora, ionosphere

Education

2014–2020 **Ph.D., Electrical Engineering**, Boston University,
Focus in Space Physics, GPA: 4/4,
Thesis Title: Remote Sensing of Energetic Electron Precipitation.

2012-2013 **M.Tech., Aerospace Engineering**, Indian Institute of Technology Madras,
Research Report: Low Frequency Shear Alfven Wave Propagation and its Interaction with Charged Particles in the Magnetosphere.

2008-2012 **B.Tech., Aerospace Engineering**, Indian Institute of Technology Madras.

Honors and Awards

2017-2020 **NASA Earth and Space Science Fellowship**
The fellowship is renewable for 3 years, Award amount: 135k

2014 Boston University **Dean's fellowship**
Fellowship awarded on the first year of Ph.D., Award amount: 33k

Led teams on writing successful competitive proposals:

2013 ISRO-IITM Space Technology Cell Grant (∼ 20k USD), to develop the engineering model of the charged particle detector

2009 IITM ICSR Innovative Student Project Grant (∼2.5k USD), seed grant to demonstrate feasibility of the university satellite program

Experience

2020-Present **Postdoctoral Researcher**
NASA Goddard Space Flight Center & Catholic University of America

2014-2020 **Research Assistant**
Department of Electrical and Computer Engineering, Boston University
Technical Skills: Data analysis, data visualization, modeling - Monte-Carlo method, GEANT4, Finite-Difference-Time-Domain method, computational physics, solving inverse problems, regression analysis, error propagation, coding: MATLAB/ Python/ FORTRAN/ C++, Git, high performance computing, fundamental knowledge of electromagnetism, plasma dynamics, stochastic and dynamical systems.

2014 **Project Officer**
Department of Electrical Engineering, IIT Madras, Chennai, India
Set up IIT Madras Space Centre, a laboratory for Space Science and Technology related projects. Fabrication and testing of the Engineering Model of a high energy particle detector.

2009-2013 **Student Project Manager**
Department of Aerospace Engineering, IIT Madras, Chennai, India
Conceived and developed the IIT Madras Student Satellite Program - a student-driven interdisciplinary project at IIT Madras

Teaching

2016-2017 Graduate Teaching Fellow, Boston University
Senior design course for Electrical and Computer Engineering, Fall and Spring Semesters.

2013 Graduate Teaching Assistant, IIT Madras
Aerodynamics.

2012 Graduate Teaching Assistant, IIT Madras
Helicopter Aerodynamics.

Other Awards

2019 Boston University ECE **Student Travel Grant**

2019 **Student Travel Grant**, IUGG, Montreal, Canada

2019 **Student Poster Award**, CEDAR Workshop, Santa Fe, NM
For 'Optical Signature of Radiation Belt Boundary'

2018 **Student Poster Award**, NSF-GEM Workshop, Santa Fe, NM
1st place in Magnetotail and Plasma Sheet Section

2013 **Student Poster Award**, CEDAR Workshop, Boulder, CO
For 'Modeling of Low-frequency Shear-Alven-wave propagation and its Interaction with Trapped Charged Particles in the Magnetosphere'

2013 Boeing International **Travel Grant** ($\sim$ 2k USD)

Professional Service Activities

2017–2019 **Student Representative**, CEDAR Workshop 2018 & 2019, Santa Fe NM
Served on the CEDAR Science Steering Committee
Co-convened whole day workshop on 'Fundamentals of Space Physics', CEDAR 2018 and 'Core Aeronomy and Space Physics', CEDAR 2019

Conference Session Co-Convener

2019 CEDAR and Climate Change, CEDAR Workshop, Santa Fe, NM

2018 CEDAR Broader Impacts, CEDAR Workshop, Santa Fe, NM

2017 Geospace Science and Public Policy, CEDAR Woekshop, Keystone, CO

Leadership Roles

2009–2014 Student Lead of the Payload Subsystem
Development of a high energy particle detector

2011 Core member of the National Service Scheme (NSS), IIT Madras, India
Worked to coordinate social work related activities of 600 students.

2010 Coordinator of the Cancer Institute Program, NSS, IIT Madras
Coordinated a group of volunteers to work with Adayar Cancer Institute and engage with children undergoing cancer treatment.

2010 Coordinator of the Short-Film Making event at the annual cultural festival, IIT Madras
Co-convened a national competition for short film making.

Other

2019–2020 **Journal reviewer**: Geophysical Research Letters

2014–Now Member of the American Geophysical Union

Training and Collaborative Work

2020 Summer Research Fellow at **the Future of Humanity Institute**, University of Oxford

2018 Invited as a **Young scientist on the ISSI Workshop**, Auroral Physics, Bern, CH. Part of an international team of scientists conducting a decedal review of progress within Auroral Physics. Contributed to two co-author papers in space science reviews.

2018 **SRI International**, Menlo Park
Worked with Roger Varney on Incoherent Scatter Radar data processing, and developing a Monte-Carlo simulation

2017-2019 **Invited as a Young scientist on an ISSI Team**, Soft Protons in the Magnetosphere focused by X-ray Telescope, Bern, Switzerland. Part of an international team trying to remove contamination of X-ray telescopes in space caused by ambient soft protons.

2017 ACF-345 Polar Magnetospheric Substorms, UNIS, Longyearbyen, Svalbard.
A 5 week course in Svalbard, studying the physics of the Earth's magnetosphere, and using radars, cameras, magnetometers to make observations.

2016 3rd Joint NSF-EISCAT Incoherent Scatter Radar School, Finland
Proposed and performed experiment to study energetic precipitation, group work using ESR 32m Radar data.

2015 CISM Space Weather Summer School,NCAR, Boulder, Colorado
Hands-on use of space weather tools and models

2013 ISRO Satellite Integration and Test Establishment, Bangalore
Development of a Space-based Particle Detector Prototype

2011 Indian Institute of Space Science and Technology, Trivandrum
Calibration of Inorganic CsI(TI) Detector, IIST, Trivandrum

2010 ISRO Satellite Center, Bangalore
Conceptual Design of Space-based Particle Detector

2009 Tata Institute of Fundamental Research, Mumbai
Study of Silicon Drift Detector Pre-amplifiers

Publications

12. **Sivadas, N.** (2020) Remote sensing of energetic electron precipitation. Boston University, Boston. **Ph.D. Thesis**, https://open.bu.edu/handle/2144/41486.

11. **Sivadas N.**, Semeter, J., Nishimura, Y., Sebastijan, M., (2019) Optical signatures of the outer radiation belt boundary. *Geophysical Research Letters*, 46. https://doi.org/10.1029/2019GL083908. **(Featured in the cover of GRL Issue 15, selected as a NASA Highlight, AGU Highlight)**

10. **Sivadas, N.**, Semeter, J., Nishimura, Y., Kero, A., (2017) Simultaneous Measurements of substorm-related electron energization in the ionosphere and the plasma sheet. *Journal of Geophysical Research: Space Physics*, 122. https://doi.org/10.1002/2017JA023995.

9. **Sivadas, N.**, Gulati, A., Kannapan, D., Yalamarthy, A. S., Dhiman, A., Bhagoji, A., Shankar, A., Prasad, N., Ramachandran, H., Koilpillai, D., (2013) A Nano-satellite mission to study charged particle precipitation from the Van Allen Radiation Belts caused due to Seismo-electromagnetic emissions. *The 5th Nano-satellite Symposium*, Tokyo, Japan. https://arxiv.org/abs/1411.6034.

8. **Sivadas, N.** (2013) Low Frequency Shear Alfven Wave Propagation and its Interaction with Charged Particles in the Magnetosphere, **M.Tech. Research Report**.

7. Kronberg, E., Gastaldello, F., Haaland, S., Smirnov, A., Berrendorf, M., Ghizzardi, S., Kuntz, K., **Sivadas, N.**, Allen, R., Tiengo, A., Ilie, Raluca., Huang, Y., and Kistler, K. (2020) Prediction and Understanding of Soft-proton Contamination in XMM-Newton: A Machine Learning Approach. *The Astrophysical Journal*, 903. https://iopscience.iop.org/article/10.3847/1538-4357/abbb8f/meta.

6. Wang, B., Nishumura, Y., Hartinger, M., **Sivadas, N.**, Lyons, L., Varney, R., Angelopoulos, A. (2020) Ionospheric Modulation by Storm Time Pc5 ULF Pulsations and the Structure Detected by PFISR-THEMIS Conjunction. *Geophysical Research Letters*, 47, e2020GL089060. https://doi.org/10.1029/2020GL089060.

5. Nishimura, Y., Marc, R. L., Katoh, Y., Miyoshi, Y., Grono, E., Partamies, N., **Sivadas, N.**, Hosokawa, K., Fukizawa, M., Samara, M., Michell, R. G., Kataoka, R., Sakanoi, T., Whiter, D., Oyama, S., Ogawa, Y., Kurita, S. (2020) Diffuse and Pulsating Aurora. *Space Science Reviews*, 216, 4. https://doi.org/10.1007/s11214-019-0629-3. **(Book Chapter: Auroral Physics)**

4. Karlsson, T., Andersson, L., Gillies, M., Lynch, K., Marghitu, O., Partamies, N., **Sivadas, N.**, Wu, J. (2020) Quiet, discrete auroral arcs - observations. *Space Science Reviews*, 216, 16. https://doi.org/10.1007/s11214-020-0641-7. **(Book Chapter: Auroral Physics)**

3. Nishimura, Y., Lyons, L., Gabrielse, C., **Sivadas, N.**, Donovan, E., Varney, R., Angelopoulos, V., Weygand, J., Conde, M., Zhang, S. (2020) Extreme magnetosphere-ionosphere-thermosphere responses to the 5 April 2010 supersubstorm. *Journal of Geophysical Research: Space Physics*, 125, e2019JA027654. https://doi.org/10.1029/2019JA027654.

2. Mrak, S., Semeter, J., Nishimura, Y., Hirsch, M., **Sivadas, N.**, (2018) Coincidental TID production by tropospheric weather during the August 2017 total solar eclipse. *Geophysical Research Letters*, 45. https://doi.org/10.1029/2018GL080239.

1. Gulati, A., **Sivadas, N.**, Kannapan, D., Koilpillai, D., Ramachandran, H., Gaurav, A., Mohanbai, J., Karat, A., (2013) IITMSAT, An efficient nanosatellite bus design for a large payload. *The 5th Nano-satellite Symposium*, Tokyo, Japan.

Presentations

Invited Talks

5. Sivadas, N., Semeter, J., Nishimura, Y., Sebastijan, M. (Nov, 2019) Energetic sources of visible aurora. *Seminar*, University of Colorado, Denver.

4. Sivadas, N., Semeter, J., Nishimura, Y., Sebastijan, M. (Oct, 2019) Optical Signatures of the Outer Radiation Belt Boundary. *Seminar*, British Antarctic Survey, Cambridge, UK.

3. Sivadas, N. (Oct, 2019) Energetic sources of visible aurora. *Seminar*, University of Southampton, Southampton, UK.

2. Sivadas, N., Semeter, J., Nishimura, Y., (Aug 2018) Optical auroral structures and energy characteristics of their source populations. *Auroral Physics Workshop*, International Space Science Institute, Bern, Switzerland.

1. Sivadas, N., Semeter, J. (Jun 2016) Magnetically Conjugate observations of an Energetic Electron Precipitation event. *Joint NSF-GEM/CEDAR Workshop, Session: Particle Precipitation and the Effect on Earth's Atmosphere*, Santa Fe, NM.

Contributed Talks

9. Sivadas, N., Semeter, J., Nishimura, Y., Sebastijan, M. (Dec, 2019) Optical Signatures of the Outer Radiation Belt Boundary. *AGU Fall 2019*, San Francisco.

8. Sivadas, N., Semeter, J., Nishimura, Y., Sebastijan, M. (Oct, 2019) Optical Signatures of the Outer Radiation Belt Boundary. *CHAMOS Workshop 2019*, Finnish Meteorological Institute, Helsinki, Finland.

7. Sivadas, N., Semeter, J., Nishimura, Y., Sebastijan, M. (Oct, 2019) Optical Signatures of the Outer Radiation Belt Boundary. *International Conference on Substorms*, Tromsø, Norway.

6. Sivadas, N., Semeter, J., Nishimura, Y., (Jun 2019) Pre-onset energetic electron precipitation. *NSF-GEM Workshop, Session: MAPS*, Santa Fe, NM.

5. Sivadas, N., (Jun 2019) Radiation belt electron loss from current sheet scattering. *NSF-GEM Workshop, Session: System Understanding of Radiation Belt Particle Dynamics through Multi-spacecraft and Ground-based Observations and Modeling*, Santa Fe, NM.

4. Sivadas, N., Semeter, J., Nishimura, Y., Yiqun, Yu (Dec 2018) D-region conductivity enhancements and their dependence on substorm phases. *AGU Fall 2018*, Washington D.C.

3. Mrak, S., Semeter, J., Nishimura, Y., **Sivadas, N.**, Hirsch, M., Drob, D. P., Huba, J. D., Hairston, M., Coley, R. (Dec 2018) Transient perturbations of the Earth's Ionosphere during the August 2017 Total Solar Eclipse, *AGU Fall 2018*, Washington, D.C.

2. Sivadas, N., Semeter, J., Nishimura, Y., (Jun 2018) Energetic electron precipitation during substorms: Simultaneous measurements in the ionosphere and magnetosphere. *NSF-GEM Workshop*, Santa Fe, NM.

1. Sivadas, N., Semeter, J., Nishimura, Y., (Jun 2017) Synergistic ground- and space-based studies of magnetotail dynamics: Inferring properties of particle energization processes. *CEDAR Workshop*, Santa Fe, NM.

Conference Posters

14. Sivadas, N., Semeter, J., Nishimura, Y., Mrak, S., (Jun 2019) Optical Signatures of the Outer Radiation Belt Boundary, *CEDAR Workshop*, Santa Fe, NM. **(Won 2nd place in poster competition, top 3 in 35 entries.)**

13. Sivadas, N., Semeter, J., Nishimura, Y., (Jun 2018) Energetic Electron Precipitation >100 keV during a Substorm Onset originating Tailward of 9R_E in the Plasma Sheet, *NSF-GEM Workshop*, Santa Fe, NM. **(Won the poster competition in the Magnetotail and Plasma Sheet Section)**

12. Sivadas, N., Ramachandran, H., Murugananda, T. M., (Jun 2013) FDTD Modelling of Low-frequency Shear-Alfven-wave Propagation and its Interaction with Trapped Charged Particles in the Magnetosphere. *CEDAR Workshop*, Boulder, CO. **('Honorable Mention' awarded in poster competition, top 4 out of 65 entries.)**

11. Kronberg, E. A., Ilie, R., Smirnov, A., Gastaldello, F., Haaland, S., Berrendorf, M., Huang, Y., Daly, P. W., Ghizzardi, S., Kistler, L., Kuntz, K., Molendi, S., Tiengo, A., Allen, R., **Sivadas, N.** (Sep 2019) Prediction of Soft Protons in the Near-Earth Space using Machine Learning, *Machine Learning in Heliophysics*, Amsterdam, Netherlands.

10. Sivadas, N., Semeter, J., Nishimura, Y., Mrak, S., (Jul 2019) Energetic Precipitation from the Outer Radiation Belt Boundary, *The 27th General Assembly of the International Union of Geophysics and Geodesy*, Montreal, Canada.

9. Sivadas, N., Semeter, J., Nishimura, Y., Mrak, S., (Jun 2019) Outer Radiation Belt Loss from the Transition Region, *GEM Workshop*, Santa Fe, NM.

8. Sivadas, N., Semeter, J., Nishimura, Y., (Jun 2018) Multi-event Analysis of Growth-Phase Energetic Electron Precipitation, *CEDAR Workshop*, Santa Fe, NM.

7. Sivadas, N., Semeter, J., Nishimura, Y., (Dec 2017) Effects of Magnetospheric Particle Energization Processes on Ionospheric Conductance, *AGU Fall 2017*, New Orleans, LA.

6. Sivadas, N., Semeter, J., Nishimura, Y., (Jun 2017) Energy Flux Maps of Precipitating Electrons using Poker Flat Incoherent Scatter Radar, *CEDAR Workshop*, Key Stone, CO.

5. Sivadas, N., Hirsch, M., Nishimura, Y., Semeter, J., (Jun 2016) On the Source of Energetic Electron Precipitation during Auroral Substorms, *CEDAR-GEM Workshop*, Santa Fe, NM.

4. Sivadas, N., Semeter, J., (Dec 2015) An Analysis of Conjugate Ground-based and Space-based Measurements of Energetic Electrons during Substorms, *AGU Fall 2015*, San Fransisco, CA.

3. Sivadas, N., Semeter, J., Swoboda, J., (Jun 2015) Conjugate Space-based and Ground-based Observations of Energetic Electrons during Substorms, *CEDAR Workshop*, Seattle, WA.

2. Yalamarthy, S., Dhiman, A., Shankar, A., Prasad, N., **Sivadas, N.**, Ramachandran, H., (Jun 2013) Space-based Proton Electron Energy Detector (SPEED) for Measurement of Fluctuations in the Energy Spectra of High Energy Protons and Electrons in the Upper Ionosphere. *CEDAR Workshop*, Boulder, CO.

1. Sivadas, N., Shankar, A., Yalamarthy, S., Bhagoji, A., Gulati, A., (Mar 2012) Particle detector for measurements of fluctuations in the Energy Spectra of High Energy Protons and Electrons in the Upper Ionosphere. *National Symposium on Particles, Detectors and Instrumentation*, Mumbai, India.