

Surabhi Jaiswal

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Education

Institute for Plasma Research

Granted by Homi Bhabha National Institute

PhD in Physics

Advisors: Dr. Pintu Bandyopadhyay and Prof. Abhijit Sen

Thesis Title: Nonlinear excitations in flowing complex plasmas

Gandhinagar, India

Mumbai, India

2017

University of Allahabad

Master of Science in Physics

Specialization: X-Rays and Ion Beam Instrumentation

Allahabad, India

2011

Employment

Eastern Michigan University

Assistant Professor

Aug 2021 – Present

Established plasma physics research group with a focus on atmospheric pressure plasmas. Taught a variety of courses to undergraduate and masters students. Contributed to university by serving on committees and establishing curriculum.

Princeton University

Postdoctoral Research Associate

Supervisor: Dr. Bruce E. Koel

July 2020 – July 2021

Designing new reactor for plasma enhanced catalysis and ammonia synthesis. Developing optical emission spectroscopy and Langmuir probe based diagnostics for plasma parameter measurements and gas phase studies at atmospheric pressure. Collaborating with various departments including PPPL for low temperature plasma experiments. Writing proposals and journal articles.

Auburn University

Postdoctoral Fellow

Supervisor: Dr. Edward Thomas Jr.

May 2018 - July 2020

Studied the effect of high magnetic field on the structural dynamics of nanoparticles growth in plasmas. Collaborating with various institutes for material characterization and its application to Industry. Independent research projects development and experimental setups for basic dusty plasma experiment for MPRL (Magnetized Plasma Research Facility at Auburn University).

Mentored undergraduate students projects. Involve in development of the laboratory setup for the investigation of crater formation at the moon surface due to the interaction of various impacters.

Designed and built atmospheric pressure plasma jet for technological and biomedical applications. Conducted experiment for studying Auroral physics and waster water treatment.

Data analysis of microgravity complex plasma experiment in collaboration with the German aerospace center.

Institut für Materialphysik im Weltraum, German Aerospace Center (DLR) May 2017–April 2018
 Postdoctoral Fellow
 Supervisor: Dr. Mikhail Pustynnik

Proposed and participated in the experimental campaign of PK-4 (A microgravity complex plasma facility on-board the International Space Station (ISS)) in the control center. Involved in development of ground base laboratory setup similar to PK-4 for investigating the dynamical phenomenon in dusty plasma. Data analysis from PK-4 facility on the ISS, writing reports and journal articles.

Scholarly
 Activities

Summary of Research Activities

First authored, peer-reviewed publications	12
Co-authored, peer-reviewed publications	2
Conference proceeding publications	2
Conference presentation (International conferences):	14
Conference posters (National conferences)	5
Presentation(Invited and Colloquia)	6
Establishment of new lab:	3
Significant outreach:	2
School attended:	2

Summary of Student Training

Summer student project co-supervised	3
Undergraduate students supervised	1
Undergraduate students co-supervised	2

Funding Awarded

NSF EPSCoR CPU2AL seed funding. Sept. 2019 – Aug. 2020
 Project Title: Influence of magnetic field on nanoparticle growth and structure dynamics.
 Awarded Amount: \$ 35000
 Position: Principal Investigator

Provost Research Award 2021
 Project Title: Dusty Plasma Experiments for the Understanding of Nonlinear Waves and Instabilities
 Awarded Amount: \$ 2400

Professional
 Service

Serving Michigan Institute for Plasma Science and Engineering (MIPSE).
 APS DPP Graduate School Day
 Undergraduate advisor (engineering physics, physics research) at EMU.
 Physics department instruction committee member at EMU.
 Reviewer Physics of plasma, review of modern physics.
 Reviewer IEEE Transactions on Plasma Science - IEEE Xplore.
 Reviewer Journal of Applied Physics

Session chair in 61 st Annual Meeting of the APS Division of Plasma Physics (APS-DPP).	2019
Session chair in 62 nd Annual Meeting of the APS Division of Plasma Physics (APS-DPP).	2020
Poster judge in CPU2AL Science and technology open house, Montgomery, Al.	2019

Professional Memberships

Lifetime membership of Plasma Science Society of India (2013)
 Member of American Physical Society.

Awards and achievements

Travel Grant from [APS 2016](#), San Jose, CA for attending the “58th Annual Meeting of the APS Division of Plasma Physics” held there. **2016**

Travel Grant from [ICPP 2016](#), Kaohsiung, Taiwan for attending the “18th International congress on Plasma Physics” held there. **2016**

PSSI Best Poster Awards of Plasma Science Society of India (PSSI), SINP, Kolkata, India with **prize money and certificate.** **2015**

Awarded fellowship from DAAD for pursuing Post doctoral research at [DLR Oberpfaffenhofen](#), Germany. **2017**

Awarded fellowship from Department of Atomic Energy ([DAE](#)), Government of India, for pursuing PhD. work. **2012**

The paper “Excitation of low-frequency dust density waves in flowing complex plasmas” is selected as “**editor pick**”. **2019**

The paper “Dust density waves in a dc flowing complex plasma with discharge polarity reversal”, by **S. Jaiswal et al.**, Physics of Plasmas was selected as “**editor pick**” and an article entitled “Making waves in complex plasma” was published in **Physics Today** [doi:10.1063/PT.6.1.20180813a](#). **2018**

The paper “Effect of magnetic field on the phase transition in a dusty plasma,” by **S. Jaiswal**, T. Hall, S. LeBlanc, R. Mukherjee, and E. Thomas, Physics of Plasmas was highlighted by journal as **featured article** and published a report entitled “Magnetic fields melt dusty plasma crystals” in [AIP Scilight](#). **2017**

The paper “Flowing dusty plasma experiments: generation of flow and measurement techniques” by **S. Jaiswal**, P. Bandyopadhyay, and A. Sen, *PSST*, **25**(6), 065021 was highlighted by journal as **featured article.** **2016**

The paper entitled “Experimental observation of precursor solitons in a flowing complex plasma”, **Surabhi Jaiswal**, P. Bandyopadhyay, and A. Sen, *Phys. Rev. E.*, **93**, 041201(R) (2016), selected in [Physics Buzz](#). **2016**

References

Dr. Edward Thomas Jr

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 Phone: 334-844-4126

Dr. Sanjay K. Mishra

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Dr. Ahmed Diallo

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Prof. Abhijit Sen

S. Chandrasekhar Chair
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Fax: +9179 2396 9017

List of
Publications

Published journal articles

14. **S. Jaiswal** and E. M. Aguirre, "Comparison of atmospheric pressure argon producing $O(^1S)$ and helium plasma jet on methylene blue degradation," *AIP Advances* **11**, 045311 (2021).
<https://doi.org/10.1063/5.0046948>
13. **S. Jaiswal**, E. M. Aguirre, and G. V. Prakash, "A KHz frequency cold atmospheric pressure argon plasma jet for the emission of $O(^1S)$ auroral lines in ambient air," *Sci. Rep.* **11**, 1893 (2021).
<https://doi.org/10.1038/s41598-021-81488-x>.
12. **S. Jaiswal**, M. Menati, L. Couëdel, V. H. Holloman, V. Rangari and E. Thomas, "Effect of growing nanoparticle on the magnetic field induced filaments in a radio-frequency Ar/C₂H₂ discharge plasma", *Japanese Journal of Applied Physics*, 59, SHHC07 (2020) 10.35848/1347-4065/ab78eb.
11. Rupak Mukherjee, **S. Jaiswal**, Manish K. Shukla, Ammar Hakim and Edward Thomas, "Measurement of temperature of a dusty plasma from its configuration" *Contribution to Plasma Physics*, 2020;e201900161 (2020) 10.1002/ctpp.201900161.
10. **S. Jaiswal** and E. Thomas, Melting transition of two-dimensional complex plasma crystal in the DC glow discharge, *Plasma Research Express*, 1, 025014 (2019) 10.1088/2516-1067/ab1f30.
9. V. V. Yaroshenko, S. A. Khrapak, M. Y. Pustynnik, H. M. Thomas and **S. Jaiswal**, A. M. Lipaev, A. D. Usachev, O. F. Petrov, and V. E. Fortov, "Excitation of low-frequency dust density waves in flowing complex plasmas" *Phys. Plasmas*, 26, 053702 (2019) 10.1063/1.5097128.(editor's pick)
8. **S. Jaiswal**, M. Schwabe, P. Bandyopadhyay and A. Sen., "Experimental investigation of dynamical structures formed due to a complex plasma flowing past an obstacle" *Phys. Plasmas*, 25, 093703 (2018) 10.1063/1.5042497.

7. **S. Jaiswal et al.**, “Dust density waves in a dc flowing complex plasma with discharge polarity reversal” *Phys. Plasmas*, 25, 083705 (2018) 10.1063/1.5040417.(editor’s pick) (An article entitled “Making waves in complex plasma” was published in **Physics Today** highlighting this work.)

6. **S. Jaiswal**, T. Hall, S. LeBlanc, R. Mukherjee and E. Thomas, Effect of magnetic field on the phase transition in a dusty plasma *Phys. Plasmas*, 24, 113703 (2017) 10.1063/1.5003972. (featured article) (Published a report entitled “Magnetic fields melt dusty plasma crystals” in **AIP Scilight**.)

5. **S. Jaiswal**, P. Bandyopadhyay, and A. Sen, “Flowing dusty plasma experiments: Generation of flow and measurement techniques” *Plasma sources sci. technol.*, 25, 065021 (2016) 10.1088/0963-0252/25/6/065021. (featured article)

4. **S. Jaiswal**, P. Bandyopadhyay, and A. Sen, “Experimental investigation of flow induced dust acoustic shock waves in a complex plasma” *Phys. Plasmas*, 23, 083701 (2016) 10.1063/1.4960032.

3. **S. Jaiswal**, P. Bandyopadhyay, and A. Sen, “Experimental observation of precursor solitons in a flowing complex plasma” *Phys. Rev. E.*, 93, 041201(R) (2016) 10.1103/PhysRevE.93.041201. (selected by Physics Buzz)

2. **S. Jaiswal**, P. Bandyopadhyay, and A. Sen, “Dusty Plasma Experimental (DPEx) device for complex plasma experiments with flow” *Rev. Sci. Instrum.*, 86, 113503 (2015) 10.1063/1.4935608.

1. **S. Jaiswal**, P. Bandyopadhyay, and A. Sen, “Theoretical study of head-on collision of dust acoustic solitary waves in a strongly coupled complex plasma” *Phys. Plasmas*, 21, 053701 (2014) 10.1063/1.4876752.

Conference Papers

2. **S. Jaiswal**, P. Bandyopadhyay, and A. Sen, “Excitation of Nonlinear Wave Patterns in Flowing Complex Plasmas” *AIP Conference Proceedings*, 1925, 020015 (2018) 10.1063/1.5020403.

1. MY Pustynnik, VY Nosenko, **S Jaiswal**, M Schwabe, T Antonova, S Khrapak, H Thomas, AM Lipaev, AV Zobnin, AD Usachev, VI Molotkov, OF Perov, VE Fortov, MH Thoma, C Du, “Complex plasma experiments investigations in the PK-4 facility on board the International Space Station”, IAC 18, A2,6,2,x46424 (2018).

In Preparation

1. **S. Jaiswal**, L. Couëdel, V. H. Holloman, E. Thomas Jr and V. Rangari, “Influence of magnetic field on the growth and morphology of carbon nanoparticle in a radio-frequency Ar/C₂H₂ discharge plasma”.

2. **S. Jaiswal**, I. Arnold, L. Couëdel, and E. Thomas Jr, “Spectroscopic analysis of nanoparticle growth in plasma” .

3. **S. Jaiswal**, Z. Chen, S. Sundaresan, B. E. Koel, and A. Diallo, “Effect of surface prosoity of catalytic supports on plasma-assisted catlysis for ammonia synthesis”, submitted to *Plasma Processes and Polymers* Sept. 2021.

Conferences

Talks

9. “Formation and control of nanoparticle growth in RF produced Argon plasma” **Contributed talk** delivered at 4th Asia Pacific Conference on Plasma Physics, e-conference **Oct. 26-31, 2020.**

8. "Influence of magnetic field on nanoparticle growth in argon- acetylene plasma", **Young achiever award presentation** delivered at 12th International Conference on Plasma Science and Applications (ICPSA 2019), Lucknow, India **Nov. 11-14, 2019.**
7. "Dynamical structure formation due to complex plasma flow past an obstacle" **Invited talk** delivered at 2nd Asia-Pacific Conference on Plasma Physics (AAPPS-DPP2018), Kanazawa, Japan **Nov. 12-17, 2018**
6. "Density waves in flowing dusty plasma" **Contributed talk** delivered at 15th Dusty plasma workshop, Baltimore, Maryland, USA. **May 29 – June 1, 2018**
5. "Dusty density waves in flowing plasma" **Talk** delivered at FST meeting, DLR oberpfaffenhofen, Germany. **21-23 December, 2017**
4. "Precursor solitons in a flowing complex plasma" **Invited talk** delivered at 1st Asia-Pacific Conference on Plasma Physics (AAPPS-DPP2017), Chengdu, China. **September 18-23, 2017**
3. "Nonlinear excitations in flowing complex plasmas", **Open Seminar** delivered at Institute for Plasma Research, Gandhinagar. **Feb 2, 2017**
2. Annual Scholar Research Colloquium", IPR Gandhinagar **May 20, 2015**
1. "Theoretical study of head-on collision of dust acoustic solitary waves in a strongly coupled complex plasma", **Talk** delivered at 3rd PSSI-Plasma Scholars Colloquium (PSC-2014), VIT Chennai, India **July 3-5, 2014**

Posters

- "Observation of O(¹S) Metastable Transition in Atmospheric Pressure Plasma", **S. Jaiswal** and E. M. Aguirre, PICI Annual Meeting, e-conference **Sept. 23-24, 2021.**
- "Formation of Reactive oxygen species in atmospheric pressure plasma jet" **S. Jaiswal**, E. M. Aguirre, and G. Veda Prakash 62nd Annual Meeting of the APS Division of Plasma Physics, Virtual Meeting (CST). **Nov 2020**
- "Modification of particle growth in a highly magnetized argon-acetylene plasma" **S. Jaiswal**, Vincent Holloman, Lenaic Coud el, Edward Thomas 61th Annual Meeting of the APS Division of Plasma Physics, Fort Lauderdale, Florida, USA. **Oct 2019**
- "Magnetic fields in dusty plasmas: pattern formation, particle growth, and other recent studies in the Magnetized Dusty Plasma Experiment " E. Thomas, T. Hall, S. LeBlanc, M. Menati, **Surabhi Jaiswal**, N. I. Arnold, U. Konopka, D. Artis, L. Cou edel, R. L. Merlino, M. Rosenberg, V. Rangari, M. Kushner 61st Annual meeting of the APS Division of Plasma Physics, Fort Lauderdale, Florida USA. **Oct 2019**
- "Self - excited waves in complex plasma under microgravity conditions" M. Y. Pustyl'nik, Victoria Yaroshenko, Sergey A. Khrapak, Sergey Zhdanov, Hubertus M. Thomas, **S. Jaiswal**, Valdimir Fortov and Markus H. Thoma XXXIV International Conference on Phenomenon in Ionized Gases (ICPIG) & ICRP - 10, Sapporo, Hokkaido, Japan. **July 2019**
- "Effect of discharge polarity reversal on the self-excited dust density waves", **S. Jaiswal**, M.Y. Pustyl'nik, S. Zhdanov, H. M. Thomas 60st Annual meeting of the APS Division of Plasma Physics, Portland, Oregon USA. **Nov 2018**

“Scientific basis for future experiments using the Magnetized Dusty Plasma Experiment (MDPX)”, E. Thomas, Jr., S. LeBlanc, T. Hall, **S. Jaiswal**, M. Menati, M. Mckinlay, L. Scott, S. Williams, B. Doyle, D. Funk, U. Konopka, R. L. Merlino, and M. Rosenberg *60st Annual meeting of the APS Division of Plasma Physics, Portland, Oregon USA.* **Nov 2018**

“Complex Plasma: A Unique Platform to Study Phase Transition and Collective Modes”, **S. Jaiswal**, T. Hall, S. Leblanc, Uwe Konopka, M. Pustylnik, S. Zhdanov, H.M. Thomas E. Thomas Jr., *2018 Science and Technology Open House: Showcasing STEM Activities Across Alabama Institutions, Montgomery, AL 36104.* **Sept 2018**

“Complex plasma investigations in the PK-4 facility” M. Y. Pustylnik, Volodymyr Nosenko, **S. Jaiswal**, Mierk Schwabe, Sergey Zhdanov, Tetyana Antonova, Sergey A. Khrapak, Hubertus M. Thomas, Valdimir Fortov, Andrey Zobnin, Markus Thoma, Oleg Novitskii, Chengran Du *45th EPS Conference on Plasma Physics, Prague, Czech Republic.* **July 2018**

“PK-4-Complex Plasma Research on the International Space Station” Hubertus M. Thomas, M. Y. Pustylnik, Volodymyr Nosenko, Mierk Schwabe, **S. Jaiswal**, Tetyana Antonova, Sergey A. Khrapak, Milenko Rubin- Zuzic, Vladimir Molotkov, Andrey Zobnin, Markus Thoma *COSPAR 2018 42nd Assembly, Pasadena, California, USA.* **July 2018**

“Experimental observation of Effect of interaction of metallic sphere with flowing complex plasma” **S. Jaiswal**, P. Bandyopadhyay, and A. Sen, *8th International Conference on the Physics of Dusty Plasmas (ICDPD 8), Prague, czech republic.* **May 2017**

“Excitation of Nonlinear Wave Patterns in Flowing Complex Plasmas” **S. Jaiswal**, P. Bandyopadhyay, and A. Sen, *8th International Conference on the Physics of Dusty Plasmas (ICDPD 8), Prague, czech republic.* **May 2017**

“Precursor solitons in a flowing complex (dusty) plasma”, **S. Jaiswal**, P. Bandyopadhyay, and A. Sen, *58th Annual Meeting of the APS Division of Plasma Physics (APS 2016), San Jose, CA.* **Nov 2016**

“Experimental observations of flow induced dust acoustic shock waves in a complex plasma”, **S. Jaiswal**, P. Bandyopadhyay, and A. Sen, *18th International Congress on Plasma Physics (ICPP 2016), Kaohsiung, Taiwan.* **June 2016**

“Neutral drag force measurement in a flowing complex plasma”, **S. Jaiswal**, P. Bandyopadhyay, and A. Sen, *30th National Symposium on Plasma Science & Technology (Plasma-2015), SINP, Kolkata, India.* **Dec 2015**

“Experimental Investigation Of Dust Acoustic Shocks In Flowing Complex Plasma”, P. Bandyopadhyay, **S. Jaiswal**, and A. Sen, *30th National Symposium on Plasma Science & Technology (Plasma-2015), SINP, Kolkata, India.* **Dec 2015**

“Flow induced excitation and propagation characteristics of shock waves in a dusty plasma”, **S. Jaiswal**, P. Bandyopadhyay, and A. Sen, *4th International Workshop on Diagnostic and Simulations of Dusty Plasmas, Kiel, Germany.* **Sept 2015**

“Experimental characterization of a Complex Plasma”, **S. Jaiswal**, P. Bandyopadhyay, and A. Sen, *29th National Symposium on Plasma Science & Technology (Plasma-2014), Kottayam, Kerala.* **Dec 2014**

“Experimental characterization of a Complex Plasma” **S. Jaiswal**, P. Bandyopadhyay, and A. Sen, 7th *International Conference on the Physics of Dusty Plasmas (ICPDP 7)*, Delhi, India. **March 2014**

“Theoretical study of head-on collision of dust acoustic solitary waves in a strongly coupled complex plasma”, **S. Jaiswal**, P. Bandyopadhyay, and A. Sen, 28th *National Symposium on Plasma Science & Technology (Plasma-2013)*, Bhubaneswar, Odisha, India. **Dec 2013**

“Observation of intermittency with varying toroidal magnetic field in a simple toroidal plasma”, Shekar Thatipamula, **Surabhi Jaiswal**, Umesh Kumar, Rajaraman Ganesh, Yogesh Saxena, Daniel, Raju *APS Division of Plasma Physics Meeting 2013*, Denver, Colorado. **Nov 2013**