

ASTROPHYSICAL PLASMA AND NONLINEAR DYNAMICS RESEARCH LABORATORY

PRINCIPAL INVESTIGATOR AND EXPLORER:

PROF. PRALAY KUMAR KARMAKAR

*Professor, Department of Physics, Tezpur University
Napaam-782028, Tezpur, Assam, India*

RESEARCH AND TEACHING INTEREST:

Plasma Physics, Theoretical Physics, Electromagnetic Theory, Astrophysics, Nonlinear Dynamics, Astrophysical Fluid Dynamics, Structure Formation, Plasma Sheath, Stability Analysis, Complex System, Waves and Instabilities, Nonlinear Coherent Structure, etc.

DEPARTMENTAL PROFILE LINK:

<http://www.tezu.ernet.in/dphy/profile/?id=21>

GOOGLE SCHOLAR PROFILE LINK:

<https://scholar.google.com/citations?hl=en&user=4XB5BgIAAAAJ>

RESEARCHGATE PROFILE LINK:

<https://www.researchgate.net/profile/P-K-Karmakar>

LINKEDIN PROFILE:

<https://www.linkedin.com/in/pralay-kumar-karmakar-53491b17a/>

PUBLON ID: 1467420

PUBLON LINK:

<https://publons.com/researcher/1467420/pralay-kumar-karmakar>

TWITTER ACCOUNT:

<https://twitter.com/pkk14733432>

ORCID: 0000-0002-3078-9247

WEB OF SCIENCE RESEARCHER ID: AAY-1754-2021

RESEARCH ID: 18551



MEMBERSHIP OF ACADEMIC AND PROFESSIONAL BODY:

- [1] Plasma Science Society of India (PSSI LM ID: 424)
- [2] Assam Science Society (ASS LM ID: 107)
- [3] Departmental Advisory Committee (DAC)
- [4] CIBTech Editorial Board Membership, Centre for Info Bio Technology (CIBTech), A
163 Dr. Rajendra Prasad Nagar, 200 Feet Road, Post Office Mansarowar, Jaipur-
302020, Rajasthan, India
- [5] Fellow of International Science Congress Association (FISCA), LM ID: ISCA-FM-
195, 427, Palhar Nagar, RAPTC, VIP-Road, Indore-452005 (MP) INDIA
- [6] Life Member (LM ID: Gen/LM/12931) of Indian Physics Association (IPA), PRIP
SHED, Room No. 4, BARC, Mumbai – 400 085. Maharashtra, INDIA
- [7] Physics Academy of the North-East (PANE), LM ID: 277255

WORKING REVIEWER OF VARIOUS PRESTIGIOUS JOURNALS:

- (01) Astrophysical Journal (by IoP)
- (02) Physics of Plasmas (by AIP)
- (03) Astronomical and Astrophysical Research (JAAR)
- (04) Proceedings of the Royal Society (Royal Society)
- (05) Institute of Electrical and Electronics Engineers (IEEE)
- (06) Physica Scripta (by IoP)
- (07) Journal of Applied Physics (by AIP)
- (08) British Journal of Mathematics & Computer Science (Elsevier)
- (09) Journal of Ocean Engineering and Science (Elsevier)
- (10) Heat Transfer Asian Research (by Wiley)
- (11) Zeitschrift für Naturforschung A (ZNA)
- (12) Journal of Technological and Space Plasmas (JTSP)
- (13) Journal of Theoretical and Applied Physics (JTAP, Springer)
- (14) Nanoscience & Nanotechnology-Asia
- (15) IEEE Transactions in Plasma Science and Technology
- (16) Journal of Ocean Engineering and Science (Elsevier)
- (17) Journal of Taibah University of Science (Elsevier)
- (18) Indian Journal of Physics (by Springer Nature)
- (19) European Physical Journal Plus (EPJP, Springer)
- (20) Annalen der Physik (AdP, Wiley)
- (21) Journal of Taibah University for Science (JTUS, Springer)
- (22) Nonlinear Dynamics (NODY, Springer)
- (23) Journal of Vibration Engineering & Technologies (JVET, Springer)
- (24) Conference Proceedings (Springer, IoP, etc.), etc.

EXAMINER AND GUIDE:

- (1) UG Project guidance: 25+
- (2) PG Dissertation: 65+
- (3) PhD Thesis Evaluation (as Examiner): 10+
- (4) PhD Produced: 6+

MAIN ACHIEVEMENTS

OF OUR RESEARCH LABORATORY

(A) PHD DEGREE PRODUCED AND AWARDED:

[1] Dr. Bhupen Borah

[Roll No: *PHP11103* bearing Reg. No: *TZ121523* of 2012, awarded in 2015],
Department of Physics, School of Science, Tezpur University

PhD thesis title: *Equilibrium and Fluctuation Dynamics in Self-gravitating Plasmas*

He is Teacher of Physics in Biswanath Chariali College

[2] Dr. Hari Prasad Goutam

[Roll No: *PHP13103* bearing Reg. No: *TZ120883* of 2012, awarded in 2017],
Department of Physics, School of Science, Tezpur University

PhD thesis title: *Astrophysical plasmas: Equilibrium and Stability*

He is Assistant Professor (Permanent) of Physics in Dr. Dindyal Upadhyay Adarsh Mahavidyalaya, Amjonga, Goalpara, Assam, India

[3] Dr. Munmi Gohain

[Roll No: *PHP13104* bearing Reg. No: *TZ144307* of 2014, awarded in 2018],
Department of Physics, School of Science, Tezpur University

PhD thesis title: *A Theoretic Study of Equilibrium and Perturbation Plasma Dynamics*

She is Assistant Professor (Permanent) of Physics in Jorhat Institute of Science and Technology, Jorhat, Assam, India

[4] Dr. Archana Haloi

[Roll No: *PHP14003* bearing Reg. No: *TZ154766* of 2015, awarded in 2019],
Department of Physics, School of Science, Tezpur University

PhD thesis title: *Stability Analysis of Complex Astroplasmas*

She is Assistant Professor (Permanent) of Physics in Darang College, Tezpur, Assam, India

[5] Dr. Papari Das

[Roll No: *PHP15101* bearing Reg. No: *TZ167002* of 2016, awarded in 2020],
Department of Physics, School of Science, Tezpur University

PhD thesis title: *Analytical Dynamics of Complex Astrofluids*

[6] Dr. Pranamika Dutta

[Roll No: *PHP15104* bearing Reg. No: *TZ143896* of 2014, awarded in 2021],
Department of Physics, School of Science, Tezpur University

PhD thesis title: *Astrobasic Dynamics in Molecular Clouds*

(B) SELECTED PUBLICATIONS

- [01] C. B. Dwivedi, P. K. Karmakar, and S. C. Tripathy, “*A gravito-electrostatic sheath model for surface origin of subsonic solar wind plasma*”, *Astrophysical Journal*, vol. 663 (2), pp. 1340-1353, July 2007.
DOI: <https://iopscience.iop.org/article/10.1086/511409/pdf>.
(Publisher: IoP, Impact Factor: 5.874)
- [02] P. K. Karmakar, “*A new technique for electromagnetic characterization of spherical charged dust molecular cloud*”, *Results in Physics*, vol. 2, pp. 77–89, 2012. DOI: <http://dx.doi.org/10.1016/j.rinp.2012.07.001>.
(Publisher: Elsevier, Impact Factor: 4.476)
- [03] P. K. Karmakar, H. P. Goutam, M. Lal, and C. B. Dwivedi, “*Stability analysis of the gravito-electrostatic sheath-based solar plasma equilibrium*”, *Monthly Notices of the Royal Astronomical Society*, vol. 460, no. 2, pp. 2919-1932, 2016. URL: <https://academic.oup.com/mnras/article/460/3/2919/2609441>.
DOI: 10.1093/mnras/stw1174.
(Publisher: Oxford University Press, Impact Factor: 4.957)
- [04] P. K. Karmakar and H. P. Goutam, “*Electrostatic streaming instability modes in complex viscoelastic quantum plasmas*”, *Physics of Plasmas*, Pub: AIP Press, vol. 23, pp. 112121 (1-14), 2016. DOI: <http://dx.doi.org/10.1063/1.4967855>.
(Publisher: AIP, Impact Factor: 2.023)
- [05] H. P. Goutam and P. K. Karmakar, “*Turbulent gravito-electrostatic sheath (GES) structure with kappa-distributed electron for solar plasma characterization*”, *Solar Physics*, Pub: Springer, vol. 292, pp. 182 (1-12), 2017. URL: <https://link.springer.com/article/10.1007/s11207-017-1192-2>.
DOI: 10.1007/s11207-017-1192-2.
(Publisher: Springer, Impact Factor: 2.671)
- [06] M. Gohain and P. K. Karmakar, “*Nonextensive GES instability with nonlinear pressure effects*”, *Results in Physics*, Pub: Elsevier, vol. 8, pp. 592-597, 2018. DOI: <https://doi.org/10.1016/j.rinp.2017.12.063>.
(Publisher: Elsevier, Impact Factor: 4.476)
- [07] P. K. Karmakar and P. Dutta, “*Nonlinear eigen-structures in star-forming gyratory nonthermal complex molecular clouds*”, *Physics of Plasmas*, Pub: AIP, vol. 25, pp. 012306(1-10), 2018. DOI: <https://doi.org/10.1063/1.5002562>.
(Publisher: AIP, Impact Factor: 2.023)
- [08] P. K. Karmakar and P. Das, “*Nucleus-acoustic waves: Excitation, propagation, and stability*”, *Physics of Plasmas*, Pub: AIP, vol. 8, pp. 085209 (1-15), 2018. DOI: <https://doi.org/10.1063/1.5044610>.
(Publisher: AIP, Impact Factor: 2.023)
- [09] Karabi Devi, Apratim Nag, Jaydeep Paul and Pralay Kumar Karmakar, “*Dynamics of sheath evolution in magnetized charge-fluctuating dusty plasmas*”, *Chinese Journal*

- of Physics, Pub: Elsevier, vol. 65, pp. 405-411, 2020. DOI: <https://doi.org/10.1016/j.cjph.2020.02.028>. (Publisher: Elsevier, Impact Factor: 3.110)
- [10] Dhrubajit Kalita and P. K. Karmakar, “*Analyzing the instability dynamics of spherical complex astroclouds in a magnetized meanfluidic fabric*”, Physics of Plasmas, Pub: AIP, vol. 27, pp. 022902 (1-9), 2020. DOI: <https://doi.org/10.1063/1.5143267>. (Publisher: AIP, Impact Factor: 2.023)
- [11] Dhrubajit Kalita and Pralay Kumar Karmakar, “*Adapted instabilities excited in spherical magnetized viscoelastic astroclouds with extreme dust-fugacity moderations*”, European Physical Journal Plus, Pub: Springer, vol. 136, pp. 479 (1-25), 2021. DOI: <https://doi.org/10.1140/epjp/s13360-021-01479-9>. (Publisher: Springer, Impact Factor: 3.991)
- [12] Apratim Nag, Karabi Devi, Jaydeep Paul, and Pralay Kumar Karmakar, “*Effect of levitated dust kinetics in the dynamic evolution of inhomogeneous plasma sheath*”, Chinese Journal of Physics, Pub: Elsevier, vol. 73, pp. 213–223, 2021. DOI: <https://doi.org/10.1016/j.cjph.2021.05.016>. (Publisher: Elsevier, Impact Factor: 3.110)
- [13] Pankaj Sarma and Pralay Kumar Karmakar, “*Nonlinear dynamics of structure formation in protoplanetary disks*”, Pub: Elsevier, vol. 74, pp. 9-19, 2021. (Publisher: Elsevier, Impact Factor: 3.110)
- [14] Sayanti Dasgupta and Pralay Kumar Karmakar, “*Propagatory dynamics of nucleus-acoustic waves excited in gyrogravitating degenerate quantum plasmas electrostatically confined in curved geometry*”, Scientific Reports (NATURE GROUP JOURNAL), 2021 (in Press). DOI: [10.21203/rs.3.rs-414233/v1](https://doi.org/10.21203/rs.3.rs-414233/v1). (Publisher: Springer Nature, Impact Factor: 5.179)
- [15] Sayanti Dasgupta and Pralay Kumar Karmakar, “*Relativistic ion-acoustic waves in electrospherically confined gyromagnetoactive quantum plasmas*”, Chinese Journal of Physics, Pub: Elsevier, vol. 76, pp. 299–309, 2022. DOI: <https://doi.org/10.1016/j.cjph.2021.12.005>.
- [16] Pankaj Sarma and Pralay Kumar Karmakar, “*Analyzing non-thermal steady solar plasmas in the κ -modified polytropic GES model framework*”, Journal of Astrophysics and Astronomy, Pub: Springer, vol. 00, pp. 00-00, 2022 (in Press).
- [17] Sayanti Dasgupta and Pralay Kumar Karmakar, “*Acoustic modal instability in relativistic gyromagnetoactive ultra-dense quantum fluids*”, Journal of Astrophysics and Astronomy, Pub: Springer, vol. 00, pp. 00-00, 2022 (in Press).
- [18] Souvik Das and Pralay Kumar Karmakar, “*Non-planar Magnetoactive GES-based Solar Plasma Stability*”, Journal of Astrophysics and Astronomy, Pub: Springer, vol. 00, pp. 00-00, 2022 (in Press).
- [19] Subham Dutta and Pralay Kumar Karmakar, “*Fireball sheath instability*”, Journal of Astrophysics and Astronomy, Pub: Springer, vol. 00, pp. 00-00, 2022 (in Press).

(C) SANCTIONED PROJECTS:

- [1] Minor Research Project of the University Grants Commission (UGC), Government of India, with F. No.- 34-503/2008(SR) entitled, “*Investigations of a few random problems in solar wind plasma*”, Amount: 0.84 lac only, for the duration 2009-2010. It successfully completed with a few discoveries reported in some reputed scientific research journals.
- [2] Start-up Project for seed money entitled, “*A theoretical investigation of electronic inertial effect on nonlinear plasma wave propagation*”, Amount: 1.10 lacs only, Tezpur University, for the duration 2011-2012.
- [3] DST SERB Fast Track Project of the Department of Science & Technology (DST), Government of India, D. O. No. SR/FTP/PS-021/2011 dated 08-07-2011 entitled, “*A plasma-based study of solar equilibrium structure and fluctuation dynamics*”, Amount: 12, 48, 000/- (Twelve lacs forty-eight thousand only), for the duration of 2012-15.
- [4] DST SERB Project of the Department of Science & Technology (DST), Government of India, EMR/2017/003222, dated 01-05-2018, entitled “*Stability analysis of astrophysical complex plasmas*”, Amount: 16, 93, 560/- (Sixteen lacs ninety-three thousand five hundred sixty only), for the duration of 2018-22.

And, etc. etc. etc.