Riddhi Bandyopadhyay

Curriculum Vitae

Assistant Professor
Department of Physics and Astronomy, University of Delaware
Webpage: https://sites.google.com/view/riddhib/home

Email: riddhib@udel.edu
Office: 104 The Green,
Newark, DE, 19716, USA

Research Interest

Fundamental nature of turbulence in weakly-collisional plasmas (mostly found in space and astrophysical systems), as well as the impact of turbulence on macroscopic properties of these plasmas. My research uses a combination of in-situ spacecraft data, simulations, and theory to address related questions.

EDUCATION

2016- 2020 **Ph.D. in Physics**, University of Delaware, Newark DE, USA
Thesis supervisor: Prof. William H. Matthaeus

2014- 2016 **M.Sc. in Physics**, Indian Institute of Technology (IIT) Kanpur, India

2011- 2014 **B.Sc. with Physics Honours**, University of Calcutta, India

PROFESSIONAL EMPLOYMENT

2025- present Assistant Professor
Department of Physics and Astronomy, **University of Delaware**, Newark DE, USA

2021- 2025 Associate Research Scholar
Department of Astrophysical Sciences, **Princeton University**, Princeton NJ, USA

2020- 2021 Postdoctoral Research Associate
Department of Astrophysical Sciences, **Princeton University**, Princeton NJ, USA
Group of Prof. David J. McComas.

2020- 2020 Postdoctoral Researcher
Department of Physics and Astronomy, **University of Delaware**, Newark DE, USA
Group of Prof. William H. Matthaeus.

HONORS AND AWARDS

An article titled "Collisional-like dissipation in collisionless plasmas" was chosen as a Featured Article in Physics of Plasmas. Companion science highlight published in Scilight.

2021 AAPPS-DPP U30 (under 30 years old) Doctoral Scientist/Student Award instituted by the Division of Plasma Physics, Association of Asia-Pacific Physical Societies (AAPPS-DPP).

2020 Parvez Guzdar Young Scientist Award instituted by the Institute for Plasma Research, Bhat, Gandhinagar, India.

2020 Daicar-Bata Award, Department of Physics and Astronomy, University of Delaware, for authoring one of the department's three most impactful publications.

2020 Donald L. Turcotte Award from American Geophysical Union (AGU) for outstanding dissertation research that contributes directly to nonlinear geophysics.

2020 Qaisar and Monika Shafi Theoretical Physics Outstanding Dissertation Award, Department of Physics and Astronomy, University of Delaware.

2019 Daicar-Bata Highest GPA Award, Department of Physics and Astronomy, University of Delaware.

Innovation in Science Pursuit for Inspired Research (INSPIRE) scholarship by Ministry of Science and Technology, Government of India for a period of five years (2011 – 2016).

RESEARCH GRANT SELECTION

NASA ROSES-2020 Heliophysics Guest Investigator (H-GI) "Open" Program: "Investigation of the Nature of Turbulent Dissipation in near-Earth Space Plasma" (**PI**, 2021 – 2025).

NASA ROSES-2021 Parker Solar Probe Guest Investigator (PSP-GI) Program: "Geometry of Magnetic Fluctuations near the Sun" (**PI**, 2021 – 2025).

NASA MMS Early-Career Grant: "Ion & Electron Heating in Current Sheets in the Magnetosheath" (**PI**, 2021 – 2025).

INVITED TALKS

Pathways to Dissipation in Weakly-Collisional Plasmas, Geophysical Fluid Dynamics Session, AGU 2020.

Dissipation in Electron-only Reconnection Events: Insights from Pressure-Strain Interaction, Electron-only Reconnection Splinter Session, MMS Spring 2021 SWT Meeting.

Characterization of the sub-Alfvénic Solar Wind Observed by Parker Solar Probe, Asia Oceania Geosciences Society (AOGS) 2022 Virtual Meeting.

Energy transfer and proton-electron heating in turbulent plasmas, TESS 2022.

Energy transfer and proton-electron heating in turbulent plasmas, AAPPS-DPP 2022.

Energy Dissipation in Electron-only Reconnection, MR2023 Workshop on Magnetic Reconnection.

Turbulent Cascade and Proton–Electron Heating in Collisionless Plasmas, AGU 2023.

LEAD AUTHOR OR STUDENT-LED PUBLICATIONS

(from 78 total, 26 first author, Underlined authors indicate student mentees, Google-Scholar citations=1973, h-index=26)

[1] **R. Bandyopadhyay**, J. Ward, D. J. McComas, N. A. Schwadron, *et al.*, *Asymmetric Tangential Velocity inside Switchbacks: Implication for Switchback Origin*. The Astrophysical Journal, **vol. 991**(1), (2025), p. 41. URL http://dx.doi.org/10.3847/1538-4357/adfc45.

[2] **Riddhi Bandyopadhyay**, James R. Beattie, and Amitava Bhattacharjee, *Density Fluctuation–Mach Number Scaling in Compressible, High Plasma Beta Turbulence: In Situ Space Observations and High-Reynolds Number Simulations*. The Astrophysical Journal Letters, **vol. 982**(2), (2025), p. L45. URL http://dx.doi.org/10.3847/2041-8213/adbe3b.

[3] Zachary Bailey, **Riddhi Bandyopadhyay**, Shadia Habbal, and Miloslav Druckmüller, *Measurement of Turbulence Injection Scale Down to the Chromosphere*. The Astrophysical Journal Letters, **vol. 980**(2), (2025), p. L20. URL http://dx.doi.org/10.3847/2041-8213/ada363.

[4] **R. Bandyopadhyay**, N. V. Sarlis, J. M. Weygand, R. J. Strangeway, *et al.*, *Observation of chaotic fluctuations in turbulent plasma*. Physics of Plasmas, **vol. 31**(10), (2024), p. 100702. ISSN 1070-664X. URL http://dx.doi.org/10.1063/5.0220376.

[5] S. Roy, **R. Bandyopadhyay**, W. H. Matthaeus, and P. S. Pyakurel, *Energy Dissipation in Electron-only Reconnection*. The Astrophysical Journal, **vol. 964**(1), (2024), p. 44. URL http://dx.doi.org/10.3847/1538-4357/ad2769.

[6] **R. Bandyopadhyay**, C. M. Meyer, W. H. Matthaeus, D. J. McComas, *et al.*, *Estimates of Proton and Electron Heating Rates Extended to the Near-Sun Environment*. The Astrophysical Journal Letters, **vol. 955**(2), (2023), p. L28. URL http://dx.doi.org/10.3847/2041-8213/acf85e.

[7] **Riddhi Bandyopadhyay**, Yan Yang, William H. Matthaeus, Tulasi N. Parashar, *et al.*, *Collisional-like dissipation in collisionless plasmas*. Physics of Plasmas, **vol. 30**(8), (2023), p. 080702. ISSN 1070-664X. URL http://dx.doi.org/10.1063/5.0146986.

[8] S. Roy, **R. Bandyopadhyay**, Y. Yang, T. N. Parashar, *et al.*, *Turbulent Energy Transfer and Proton–Electron Heating in Collisionless Plasmas*. The Astrophysical Journal, **vol. 941**(2), (2022), p. 137. URL http://dx.doi.org/10.3847/1538-4357/aca479.

[9] C. Phillips, **R. Bandyopadhyay**, D. J. McComas, and S. D. Bale, *Association of intermittency with electron heating in the near-Sun solar wind*. Monthly Notices of the Royal Astronomical Society: Letters. ISSN 1745-3925. Slac143, URL http://dx.doi.org/10.1093/mnrasl/slac143.

[10] **Riddhi Bandyopadhyay**, Ramiz A. Qudsi, S. Peter Gary, William H. Matthaeus, *et al.*, *Interplay of turbulence and proton-microinstability growth in space plasmas*. Physics of Plasmas, **vol. 29**(10), (2022), p. 102107. URL http://dx.doi.org/10.1063/5.0098625.

[11] **R. Bandyopadhyay**, L. J. Begley, B. A. Maruca, D. J. McComas, *et al.*, *Beta-Dependent Constraints on Ion Temperature Anisotropy in Jupiter's Magnetosheath*. Geophysical Research Letters, **vol. 49**(15), (2022), p. e2022GL098053. URL http://dx.doi.org/https://doi.org/10.1029/2022GL098053.

[12] C. Phillips, **R. Bandyopadhyay**, and D. J. McComas, *Taylor microscale and effective Reynolds number near the Sun from PSP*. The Astrophysical Journal, **vol. 933**(1), (2022), p. 33. URL http://dx.doi.org/10.3847/1538-4357/ac713f.

[13] **R. Bandyopadhyay**, W. H. Matthaeus, D. J. McComas, R. Chhiber, *et al.*, *Sub-Alfvénic Solar Wind Observed by the Parker Solar Probe: Characterization of Turbulence, Anisotropy, Intermittency, and Switchback*. The Astrophysical Journal Letters, **vol. 926**(1), (2022), p. L1. URL http://dx.doi.org/10.3847/2041-8213/ac4a5c.

[14] **R. Bandyopadhyay** and D. J. McComas, *Geometry of Magnetic Fluctuations near the Sun from the Parker Solar Probe*. The Astrophysical Journal, **vol. 923**(2), (2021), p. 193. URL http://dx.doi.org/10.3847/1538-4357/ac3486.

[15] **R. Bandyopadhyay**, A. Chasapis, W. H. Matthaeus, T. N. Parashar, *et al.*, *Energy dissipation in turbulent reconnection*. Physics of Plasmas, **vol. 28**(11), (2021), p. 112305. URL http://dx.doi.org/10.1063/5.0071015.

[16] **R. Bandyopadhyay**, D. J. McComas, J. R. Szalay, F. Allegrini, *et al.*, *Observation of Kolmogorov Turbulence in the Jovian Magnetosheath From JADE Data*. Geophysical Research Letters, **vol. 48**(15), (2021), p. e2021GL095006. URL http://dx.doi.org/10.1029/2021GL095006.

[17] Yanwen Wang, **Riddhi Bandyopadhyay**, Rohit Chhiber, William H. Matthaeus, *et al.*, *Statistical Survey of Collisionless Dissipation in the Terrestrial Magnetosheath*. Journal of Geophysical Research: Space Physics, **vol. 126**(6), (2021), p. e2020JA029000. URL http://dx.doi.org/https://doi.org/10.1029/2020JA029000.

[18] **R. Bandyopadhyay**, W. H. Matthaeus, D. J. McComas, C. J. Joyce, *et al.*, *Energetic Particle Behavior in near-Sun Magnetic Field Switchbacks from PSP*. Astroomy & Astrophysics, **vol. 650**, (2021), p. L4. URL http://dx.doi.org/10.1051/0004-6361/202039800.

[19] **R. Bandyopadhyay**, Alexandros Chasapis, D. J. Gershman, B. L. Giles, *et al.*, *Observation of an inertial-range energy cascade within a reconnection jet in the Earth's magnetotail*. Monthly Notices of the Royal Astronomical Society: Letters, **vol. 500**(1), (2020), pp. L6. ISSN 1745-3925. URL http://dx.doi.org/10.1093/mnrasl/slaa171.

[20] S. Peter Gary, **R. Bandyopadhyay**, Ramiz A. Qudsi, William H. Matthaeus, *et al.*, *Particle-in-cell Simulations of Decaying Plasma Turbulence: Linear Instabilities versus Nonlinear Processes in 3D and 2.5D Approximations*. The Astrophysical Journal, **vol. 901**(2), (2020), p. 160. URL http://dx.doi.org/10.3847/1538-4357/abb2ac.

[21] **R. Bandyopadhyay**, William H. Matthaeus, Alexandros Chasapis, Christopher T. Russell, *et al.*, *Direct Measurement of the Solar-wind Taylor Microscale Using MMS Turbulence Campaign Data*. The Astrophysical Journal, **vol. 899**(1), (2020), p. 63. URL http://dx.doi.org/10.3847/1538-4357/ab9ebe.

[22] **Riddhi Bandyopadhyay**, William H. Matthaeus, Tulasi N. Parashar, Yan Yang, *et al.*, *Statistics of Kinetic Dissipation in the Earth's Magnetosheath: MMS Observations*. Physical Review Letters, **vol. 124**, (2020), p. 255101. URL http://dx.doi.org/10.1103/PhysRevLett.124.255101.

[23] **Riddhi Bandyopadhyay**, Luca Sorriso-Valvo, Alexandros Chasapis, Petr Hellinger, *et al.*, *In Situ Observation of Hall Magnetohydrodynamic Cascade in Space Plasma*. Physical Review Letters, **vol. 124**, (2020), p. 225101. URL http://dx.doi.org/10.1103/PhysRevLett.124.225101.

[24] **Riddhi Bandyopadhyay**, Yan Yang, William H. Matthaeus, Alexandros Chasapis, *et al.*, *In Situ Measurement of Curvature of Magnetic Field in Turbulent Space Plasmas: A Statistical Study*. The Astrophysical Journal Letters, **vol. 893**(1), (2020), p. L25. URL http://dx.doi.org/10.3847/2041-8213/ab846e.

[25] **Riddhi Bandyopadhyay**, W. H. Matthaeus, T. N. Parashar, R. Chhiber, *et al.*, *Observations of Energetic-particle Population Enhancements along Intermittent Structures near the Sun from the Parker Solar Probe*. The Astrophysical Journal Supplement Series, **vol. 246**(2), (2020), p. 61. URL http://dx.doi.org/10.3847/1538-4365/ab6220.

[26] **Riddhi Bandyopadhyay**, M. L. Goldstein, B. A. Maruca, W. H. Matthaeus, *et al.*, *Enhanced Energy Transfer Rate in Solar Wind Turbulence Observed near the Sun from Parker Solar Probe*. The Astrophysical Journal Supplement Series, **vol. 246**(2), (2020), p. 48. URL http://dx.doi.org/10.3847/1538-4365/ab5dae.

[27] **Riddhi Bandyopadhyay**, William H. Matthaeus, Sean Oughton, and Minping Wan, *Evolution of Similarity Lengths in Anisotropic Magnetohydrodynamic Turbulence*. Journal of Fluid Mechanics, **vol. 876**, (2019), pp. 5. URL http://dx.doi.org/10.1017/jfm.2019.513.

[28] **Riddhi Bandyopadhyay**, S. Oughton, M. Wan, W. H. Matthaeus, *et al.*, *Finite Dissipation in Anisotropic Magnetohydrodynamic Turbulence*. Physical Review X, **vol. 8**, (2018), p. 041052. URL http://dx.doi.org/10.1103/PhysRevX.8.041052.

[29] **Riddhi Bandyopadhyay**, A. Chasapis, R. Chhiber, T. N. Parashar, *et al.*, *Solar Wind Turbulence Studies Using MMS Fast Plasma Investigation Data*. The Astrophysical Journal, **vol. 866**(2), (2018), p. 81. URL http://dx.doi.org/doi.org/10.3847/1538-4357/aade93.

[30] **Riddhi Bandyopadhyay**, A. Chasapis, R. Chhiber, T. N. Parashar, *et al.*, *Incompressive Energy Transfer in the Earth's Magnetosheath: Magnetospheric Multiscale Observations*. The Astrophysical Journal, **vol. 866**(2), (2018), p. 106. URL http://dx.doi.org/10.3847/1538-4357/aade04.

[31] **Riddhi Bandyopadhyay**, William H. Matthaeus, and Tulasi N. Parashar, *Single-Mode Nonlinear Langevin Emulation of Magnetohydrodynamic turbulence*. Phys. Rev. E, **vol. 97**, (2018), p. 053211. URL http://dx.doi.org/10.1103/PhysRevE.97.053211.

[32] **Riddhi Bandyopadhyay** and Mahendra K. Verma, *Discrete Symmetries in Dynamo Reversals*. Physics of Plasmas, **vol. 24**(6), (2017), p. 062307. 1705.09630, URL http://dx.doi.org/10.1063/1.4985307.

TEACHING EXPERIENCE

Guest Lecturer (University of Delaware)

PHYS835 Plasma Physics I (Graduate level course on fluids and magnetohydrodynamics)	Fall 2019
PHYS638 Turbulent Flows (Graduate level course on fundamental characteristics of turbulence)	Spring 2025
PHYS809 Electrodynamics I (Graduate level course on Electrodynamics)	Fall 2025

Teaching Assistant (University of Delaware)

Introductory Physics I (Introduction to classical physics and fluid mechanics for students in the life and environmental sciences)	2017 Winter, 2017 Fall, 2018 Winter
Introductory Physics II (Introduction to electromagnetism and optics for students in the life and environmental sciences)	2017 Spring
Fundamentals of Physics II (Introduction to electromagnetism for students in the physical sciences and engineering)	2017 Summer, 2017 Fall

SYNERGISTIC ACTIVITIES

Reviewer for The Astrophysical Journal (ApJ), The Astrophysical Journal Letters (ApJL), Geophysical Research Letters (GRL), Monthly Notices of the Royal Astronomical Society (MNRAS), Physics of Plasmas (PoP), Physical Review Letters (PRL), Earth and Space Science (ESS), Physical Review E (PRE), Scientific Reports, Astronomy & Astrophysics (A & A), Nature Communications, Journal of Plasma Physics (JPP), Space Science Reviews (SSR) (~ 10 per year).

NASA Review Panels

Review Panelist	2021, 2022, 2023
External Reviewer	2020, 2024
Executive Secretary	2020

Conference Panel Organization

Magnetospheric Multiscale (MMS) Mission Science Working Team meeting	Spring 2020, Fall 2020, Fall 2024
Interstellar Boundary Explorer (IBEX) Mission Science Team meeting	2021, 2022
Solar Heliospheric and INterplanetary Environment (SHINE) workshop	2022, 2023, 2024

Graduate Student & Dissertation Advising	**Next Position**
William Taranto (Ph.D. expected 2030, University of Delaware)	N/A (ongoing)
Sohom Roy (Ph.D. December 2024, University of Delaware)	postdoc at Space Research Institute (Institut für Weltraumforschung, IWF), Graz, Austria
Camryn Phillips (Fall 2021 and Spring 2022 semester projects, Princeton University)	changed field

Undergraduate Student Advising	**Next Position**
Yanwen Wang, ’22 (2019 Sophomore Project), University of Delaware	Ph.D. student at the University of Maryland, College Park
Luke Begley, ’22 (2020 Junior Project), Princeton University	joined industry
Siegfried Gawenda, ’23 (2022 Spring Junior Project), Princeton University	Ph.D. student at the University of Texas Rio Grande Valley
Ryan LoRusso, ’24 (2022 Fall Junior Project), Princeton University	Ph.D. student at Indiana University at Bloomington
Cole Meyer, ’24 (2022 Fall Junior Project), Princeton University	Ph.D. student at Lunar and Planetary Laboratory at the University of Arizona
Juston Ward, ’24 (Princeton University Undergraduate Summer Research Program via National Radio Astronomy Observatory/National Astronomy Consortium; 2023&2024 Summer), Sam Houston State University	Ph.D. student at Baylor University

Public Outreach

Lecture and Interaction at the “Science Under the Stars" series organized by the New Jersey State Museum.