Curriculum Vitae, Paul A. Cassak

Contact Information

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Positions Held

Provost's Distinguished Professor, Department of Physics and Astronomy
Clemson University, August 2025 — Present

Professor, Department of Physics and Astronomy
West Virginia University, August 2018 – August 2025

Associate Professor, Department of Physics and Astronomy
West Virginia University, August 2013 – August 2018

Assistant Professor, Department of Physics
West Virginia University, July 2008 – August 2013

Postdoctoral Researcher, Department of Physics and Astronomy
University of Delaware, Newark, Delaware, January 2007 – July 2008

Other Positions Held

Associate Director, Center for KINETIC Plasma Physics
West Virginia University, January 2020 – August 2025

Adjunct Faculty, Department of Physics and Astronomy
Clemson University, October 2024 – August 2025

Researcher, Department of Physics and Astronomy
University of Delaware, March 2023 – April 2023

Invited Senior Researcher, Laboratoire de Physique des Plasmas
École Polytechnique, October 2022 – November 2022

Education

Ph.D., Physics, December 2006
University of Maryland, College Park, Maryland
Thesis: "Catastrophe Model for the Onset of Fast Magnetic Reconnection"
Adviser: James F. Drake

M.S., Physics, August 2001
University of Wisconsin, Madison, Wisconsin
Thesis: "Character Expansions for the Orthogonal and Symplectic Groups"
Adviser: A. Baha Balantekin

B.S., Mathematics and Physics, June 1998
University of Arizona, Tucson, Arizona
Magna cum laude (with honors)

Honors and Awards

Institute of Physics Rutherford Plasma Physics Communication Prize, for excellence in the communication of plasma physics to non-experts, March 2024

Woodburn Fellow of the West Virginia University Eberly College of Arts and Sciences, August 2020 - August 2022

Fellow of the American Physical Society, September 2018

West Virginia University Benedum Distinguished Scholar in Physical Sciences and Technology, March 2018

West Virginia University Eberly College of Arts and Sciences Outstanding Public Service Award, November 2017

West Virginia University Honors College Nath Outstanding Teacher Award, April 2016

James B. Macelwane Medal, given annually by the American Geophysical Union to three or up to five honorees in recognition for "significant contributions to the geophysical sciences by an outstanding early career scientist," December 2015

Fellow of the American Geophysical Union, December 2015

West Virginia University Eberly College of Arts and Sciences Outstanding Teacher Award, April 2014

West Virginia University Eberly College of Arts and Sciences Outstanding Researcher Award, April 2012

National Science Foundation Faculty Early Career Award, September 2010

Fred L. Scarf Award, awarded annually by the Space Physics and Aeronomy Section of the American Geophysical Union for outstanding dissertation research that contributes directly to solar-planetary science, December 2008

Outstanding Student Paper Award for "Spontaneous Catastrophic Onset of Fast Magnetic Reconnection and Solar Flares", awarded by the American Geophysical Union, May 2006

Emanuel R. Piore Award for Distinguished Achievement in the Study of Physics, a biannual University of Wisconsin Department of Physics award for outstanding performance, May 1999

Vesto Melvin Slipher Scholarship of the Sciences presented annually to an undergraduate Physics senior at University of Arizona to further scientific studies, September 1997

Professional Memberships

American Association for the Advancement of Science, since 2018
Union of Concerned Scientists, since 2017
American Astronomical Society, since 2007
American Geophysical Union, since 2005
American Physical Society, since 2003
Phi Beta Kappa, since 1997
American Association of Physics Teachers, 2018-2023

Teaching Experience

Department of Physics and Astronomy, Clemson University

- Electromagnetics 1, Phys 4410/6410 (Fall 2025)

Department of Physics and Astronomy, West Virginia University

- Electromagnetism 1, Phys 633 (Spring 2025, co-teaching)
- Solar and Space Physics, Phys 685 (Spring 2025, co-teaching)

- Electromagnetism 2, Phys 634 (Fall 2024)
- Plasma Kinetic Theory, Phys 783 (Spring 2024)
- Electromagnetism 2, Phys 634 (Fall 2023)
- Electromagnetism 1, Phys 633 (Spring 2022)
- Introduction to Mathematical Physics, Phys 611 (Fall 2021)
- Plasma Kinetic Theory, Phys 783 (Spring 2021)
- Electromagnetism 2, Phys 634 (Fall 2020)
- Electricity and Magnetism II, Phys 334 (Spring 2020)
- Electricity and Magnetism I, Phys 333 (Fall 2019)
- Plasma Kinetic Theory, Phys 783 (Spring 2019)
- Solar and Space Physics, Phys 793A (Fall 2018)
- Science and Public Policy, Phys 493A (Spring 2018)
- Nonlinear Dynamics, Phys 710 (Fall 2017)
- Plasma Kinetic Theory, Phys 783 (Spring 2017)
- Electromagnetism 2, Phys 634 (Fall 2016)
- Plasma Kinetic Theory, Phys 783 (Spring 2015)
- Computer Simulation of Plasma, Phys 782 (Fall 2014)
- Advanced Magnetohydrodynamic Theory, Phys 784 (Spring 2014)
- Special Topics: Advanced Physics Problem Solving (GRE Prep), Phys 493X (long term substitute, Spring 2014)
- General Physics II, Phys 112 (Fall 2013)
- Plasma Kinetic Theory, Phys 783 (Spring 2013)
- General Physics II, Phys 112 (Fall 2012)
- Advanced Magnetohydrodynamic Theory, Phys 784 (Spring 2012)
- General Physics II, Phys 112 (Fall 2011)
- Plasma Kinetic Theory, Phys 783 (Fall 2010)
- Advanced Magnetohydrodynamic Theory, Phys 784 (Spring 2010)
- Electricity and Magnetism I, Phys 333 (Fall 2009)
- Plasma Kinetic Theory, Phys 783 (Spring 2009)
- Electricity and Magnetism I, Phys 333 (Fall 2008)

Professional Service

Professional Committee Service:

- American Physical Society Physics Policy Committee, Member, January 2024 - December 2026 (3-year term)
- NASA Heliophysics Advisory Committee
  - Chair, September 2023 - December 2024
  - Member, August 2017 - September 2023
- American Geophysical Union Space Physics and Aeronomy Scarf Award Committee
  - Member, Spring 2021 - Spring 2023
  - Chair, Spring 2013 - December 2014
  - Member, Spring 2011 and Spring 2012
- Geospace Environment Modeling (GEM) Steering Committee
  - Chair, July 2019 - April 2020
  - Vice Chair, April 2017 - June 2019
  - Member At-Large, July 2015 - April 2017

- American Geophysical Union Space Physics and Aeronomy Advocacy and Policy Committee
  - Chair, January 2019 - March 2020
  - Member, August 2014 - December 2018
- American Geophysical Union Position Statement Committee, Member, October 2017 - December 2019
- American Physical Society-Division of Plasma Physics Public Information Committee
  - Past-Chair, January 2019 - December 2019
  - Chair, November 2017 - December 2018
  - Vice-Chair, November 2016 - November 2017
  - Member, January - November 2016
- American Physical Society Topical Group in Plasma Astrophysics Steering Committee, Officer (Member-At-Large), October 2016 - October 2019
- American Geophysical Union College of Fellows Task Force Committee, Member, February 2016 - May 2017
- American Geophysical Union Space Physics and Aeronomy Executive Committee, Member, Spring 2013 - December 2014

OTHER PROFESSIONAL SERVICE:

- American Geophysical Union Space Physics and Aeronomy (SPA) Nomination Task Force, Member, September 2020 - September 2021, September 2022 - September 2023
- Program Review Committee for a domestic Department of Physics, External Reviewer, January - May, 2023
- APS-DPP Program Committee, Member, October 2012 - October 2013, November 2021 - November 2022
- Auburn Endowed Chair Committee, Member, January 2022 - February 2022
- Summer School Lecturer, Introduction to Fusion Energy and Plasma Physics Course June 17, 2020
- Geospace Environment Modeling (GEM) Focus Group on “Magnetic Reconnection in the Magnetosphere”, Chair, December 2012 - December 2017
- Journal of Geophysical Research - Space Physics, Associate Editor, March 2010 - February 2014
- Co-chair for sessions at domestic and international conferences:
  - Fall American Geophysical Union meetings, 2012, 2013, 2014, 2016, and 2023
  - Solar, Heliospheric, and Interplanetary Environment (SHINE), 2023
  - Japan Geophysical Union, 2016
  - Triennial Earth-Sun Summit, Indianapolis, Indiana, 2015
- Mentor to graduate students in programs associated with conferences
  - GEM Encourage & Elevate (GEMEE) Mentoring program, June 2022
  - American Geophysical Union Mentoring 365 program, December 2019

- Panelist for junior community members at conferences
  - Geospace Environment Modeling meeting, science ethics, June 19, 2017
  - American Geophysical Union meeting, “Wearing The White Hat: Careers in Science Policy” about careers in policy, December 14, 2016
  - APS-DPP Town Hall Meeting on Concerns of Junior Scientists, careers in academia, October 30, 2012
- Meeting organization
  - Magnetic Reconnection 2025, Princeton, NJ, Scientific Organizing Committee Member, October 2024 - present
  - International Space Science Institute (ISSI) team co-leader, "Unveiling energy conversion and dissipation in non-equilibrium space plasmas,” 2024-2025
  - US-Japan Workshop on Magnetic Reconnection, Monterey, California, Lead-organizer, January 2021 - May 2022
  - Parker Workshop on Magnetic Reconnection, São José de Campos, Brazil, Scientific Organizing Committee Member, January 2013 - March 2014
- Judge for student poster awards:
  - Outstanding Student Presentation Awards for the Space Physics and Aeronomy section of the American Geophysical Union, December of 2008, 2010, 2011, 2012, 2013, 2014, 2016, 2018, 2019, and 2024
  - Outstanding Student Presentation Awards for Solar, Heliospheric, and Interplanetary (SHINE), July 2018, July 2022
  - Outstanding Student Presentation Awards for Geospace Environment Modeling (GEM), June 2014, 2015, 2016, and 2022
  - Outstanding Student Presentation Awards for Triennial Earth-Sun Summit (TESS), May 2018
- Reviewed proposals and served on panels for NSF, NASA, DOE, and Austrian Science Fund, 2008-2017, 2019-2020, 2024-2025
- Panelist for NASA Postdoctoral Program proposals, 2009-2011, 2016
- External reviewer for 19 promotion cases, October 2015, April 2016, March 2017, March 2017, September 2017, September 2019, August 2020, October 2020, May 2021, July 2021, August 2021, August 2022, November 2022, December 2023, July 2024, September 2024, September 2024, September 2024, November 2024
- Refereed publications for 26 journals, 2007-present, Journal of Geophysical Research - Space Physics, Journal of Plasma Physics, Physics of Plasmas, Astrophysical Journal, Space Science Reviews, Nonlinear Processes in Geophysics, Journal of Atmospheric and Solar-Terrestrial Physics, Plasma Physics and Controlled Fusion, Science, Physical Review Letters, Geophysical Research Letters, Applied Mathematics Letters, Nature, Space Weather, Eos, Scientific Reports, Proceedings of the Royal Society A, Nature Communications, Indian Journal of Physics, Nature Communications Physics, Perspectives of Earth and Space Scientists, Communications Physics, Monthly Notices of the Royal Astronomical Society, Journal of Physics A, and Physical Review E
- Refereed publications in two books - Springer and AGU Books, 2007-2021

OUTREACH

- Creating and delivering science kits about space weather and plasma physics to elementary schools in rural counties across West Virginia, May 2022 - present

- Contributor to a planetarium movie "Magnetism - Defending the Earth … Shaping the Cosmos," 2009-2016
- Exhibit development at Spark! Imagination and Science Center (formerly the Children's Discovery Museum of West Virginia):
  - Delivered science kits to elementary schools in Webster County, West Virginia and did presentation in three classrooms (other kits were delivered to Braxton County, West Virginia), May 24-25, 2018
  - Acquired a terrella to add to the "Space Weather" exhibit, 2016
  - Added Magnetospheric Multiscale Mission component of "Space Weather" exhibit, 2015-2016
  - Created and delivered science kits about space weather to elementary schools in McDowell County, West Virginia and did presentation in a 4th grade class, October 20, 2015
  - Designed and built "Space Weather" exhibit and volunteered at its opening 2013 - 2014
  - Helped design signage for science exhibits on gravity, magnetism, and sound Spring 2011
- Volunteer at outreach events at Spark! Imagination and Science Center (formerly the Children's Discovery Museum of West Virginia):
  - Bruceton Mills Elementary School STEM Night April 10, 2025
  - Superhero Science September 24, 2022
  - World Oceans Day June 8, 2019
  - STEM Fair and Emily Calandrelli book signing July 1, 2018
  - Celebrating Frankenstein January 27, 2018
  - Space Day February of 2011-2018
  - Science Day November of 2011-2015, 2019, 2023
  - Brookhaven Elementary School STEM Night April 13, 2018
  - Aurora Elementary School Science Night July 26, 2016
  - Mountain View Elementary School's Math and Science Night March 5, 2014
- Volunteer at science outreach events at West Virginia University:
  - Filmed by WVU for statewide outreach about the Great American Eclipse June 14, 2017
  - STEM Camp for middle school students July 27, 2016
  - Outreach event for the transit of Venus, Department of Physics June 5, 2012
- Science outreach:
  - Did presentation in 4th grade class in McDowell County, West Virginia March 31, 2017

- Online and press:
  - Numerous online articles about Physical Review Letters paper, February 2023
  - Participated in pre-launch press activities for Magnetospheric Multiscale (MMS) mission at NASA Headquarters and Kennedy Space Center
    February and March, 2015
  - Interviewed by several television stations and newspapers after a solar flare
    March 8, 2012
  - Filmed for outreach videos on magnetic reconnection, online on You Tube and the Magnetospheric MultiScale (MMS) Mission website
    March 29, 2010
- Public and outreach lectures:
  - "Making Holes in Earth's Magnetic Shield"
    NASA Headquarters Heliophysics Carnival
    Washington, DC
    October 27, 2017
  - "All About NASA's MMS Mission"
    WVU Astronomy Club
    Morgantown, West Virginia
    March 14, 2017
  - "The Closest Star: The Sun and Its Effect on Earth"
    WVU Astronomy Club
    Morgantown, West Virginia
    April 27, 2015
  - "The Sun and Space Weather"
    Pulsar Search Collaboratory Capstone Seminar (for high school student participants)
    Morgantown, West Virginia
    May 30, 2013
  - "Space Weather: What We Know and How We Know It"
    Astronomy Weekend of the Kanawha Valley Astronomical Society
    Blackwater Falls State Park, West Virginia
    September 11, 2010
  - "The Sun and Space Weather"
    Pulsar Search Collaboratory Capstone Seminar (for high school student participants)
    Morgantown, West Virginia
    May 24, 2010
  - "Catastrophic Explosions on the Sun"
    Astronomy Weekend of the Kanawha Valley Astronomical Society
    Blackwater Falls State Park, West Virginia
    October 25, 2008
  - "Einstein's Theory of Relativity – What Is It?"
    Hood College World Year of Physics Lecture Series
    Frederick, Maryland
    October 6, 2005
- Volunteer Tutor in Physics, Frederick Community College, Frederick, Maryland, Fall 2003 – Fall 2005
- Volunteer at public physics presentation, Physics is Phun, University of Maryland, College Park, Maryland, April 2003 and March 2004

SELECTED REFEREED PUBLICATIONS (OF 136 IN PLASMA PHYSICS + 3 SUBMITTED)

1. M. B. Khan, M. A. Shay, S. Oughton, W. H. Matthaeus, C. C. Haggerty, S. Adhikari, P. A. Cassak, S. Fordin, D. O′Donnell, Y. Yang, R. Bandyopadhyay, S. Roy, "Does turbulence at the correlation scale regulate the statistics of magnetic reconnection?", Submitted to *Phys. Rev. Lett.,* May 2025
2. Colby Haggerty, Damiano Caprioli, Paul A. Cassak, M. Hasan Barbhuiya, Lynn Wilson III and Drew Turner, "The Importance of Heat Flux in Low Mach Number, Quasi-Parallel Collisionless Shocks," Submitted to *Astrophysical Journal*, October 2024
3. Michael Shay, Subash Adhikari, Naoki Beesho, Joachim Birn, Jorg Buechner, Paul Cassak, Li-Jen Chen, Yuxi Chen, Giulia Cozzani, Jim Drake, Fan Guo, Michael Hesse, Neeraj Jain, Yann Pfau-Kempf, Yu Lin, Yi-Hsin Liu, Mitsuo Oka, Yuri A. Omelchenko, Minna Palmroth, Oreste Pezzi, Patricia H. Reiff, Marc Swisdak, Frank Toffoletto, Gabor Toth, Richard A. Wolf, "Simulation Models for Exploring Magnetic Reconnection," Submitted to *Space Science Reviews*, June 2024
4. M. Hasan Barbhuiya, Paul A. Cassak, Alex Chasapis, Michael A. Shay, Giulia Cozzani, Alessandro Retinò, "Identifying the Growth Phase of Magnetic Reconnection using Pressure-Strain Interaction," *J. Geophys. Res.*, **130**, e2024JA033446 (2025)
5. Yi-Hsin Liu, Michael Hesse, Kevin J. Genestreti, Rumi Nakamura, Jim Burch, P. A. Cassak, N. Bessho, J. P. Eastwood, T. Phan, M. Swisdak, S. Toledo-Redondo, M. Hoshino, C. Norgren, H. Ji, T. K. M. Nakamura, "Ohm's Law, Reconnection Rate, and Energy Conversion in Collisionless Magnetic Reconnection," *Space Sci. Rev.*, **221**, 16 (2025)
6. S. A. Conley, J. Juno, J. M. TenBarge, M. H. Barbhuiya, P. A. Cassak, G. G. Howes, and E. Lichko, "The Kinetic Analogue of the Pressure-Strain Interaction," *Physics of Plasmas*, **31**, 122117 (2024)
7. Carlos Giai, Colby Haggerty, Michael A Shay, and Paul Cassak, "Suppression of Collisionless Magnetic Reconnection in the High Ion beta, Strong Guide Field Limit," *Astrophysical Journal*, **977**, 218 (2024)
8. M. Hasan Barbhuiya and Paul Cassak, "A Magnetic Analog of Pressure-Strain Interaction," *Physics of Plasmas*, **31**, 124501 (2024)
9. Subash Adhikari, Yan Yang, William H. Matthaeus, Paul A. Cassak, Tulasi N. Parashar, and Michael A. Shay, "Scale Filtering Analysis of Kinetic Reconnection and its Associated Turbulence," *Physics of Plasmas*, **31**, 020701 (2024)
10. M. Hasan Barbhuiya, Paul A. Cassak, Subash Adhikari, Tulasi N. Parashar, Haoming Liang, and Matthew R. Argall, "HORNET - A Power Density Quantifying Out of Local Thermodynamic Equilibrium Energy Conversion," *Physical Review E*, **109**, 015205 (2024)
11. S. Adhikari, W. H. Matthaeus, T. N. Parashar, M.A. Shay, and P. A. Cassak, "Statistics of Pressure Fluctuations in Turbulent Kinetic Plasmas," *Monthly Notices of the Royal Academy of Sciences*, **526**, 4067 (2023)
12. Peiyun Shi, Earl E. Scime, M. Hasan Barbhuiya, Paul A. Cassak, Subash Adhikari, M. Swisdak, and Julia E. Stawarz, "Using direct laboratory measurements of electron temperature anisotropy to identify the heating mechanism in electron-only guide field magnetic reconnection," *Phys. Rev. Lett.*, **131**, 155101 (2023)
13. L. J. Fryer, R. C. Fear, I. L. Gingell, J. C. Coxon, M. Palmroth, S. Hoilijoki, P. Janhunen, A. Kullen, P. Cassak, "3D GUMICS simulations of northward IMF magnetotail structure,"*J. Geophys. Res.*, **128**, e2023JA031317 (2023)

14. J. R. Shuster, D. J. Gershman, B. L. Giles, N. Bessho, S. Wang, S. Sharma, L.-J. Chen, H. Gurram, J. C. Dorelli, J. Ng, V. Uritsky, P. A. Cassak, S. J. Schwartz, R. E. Denton, J. Burch, J. Webster, R. Torbert, W. R. Paterson, C. Schiff, A. F. Viñas, L. A. Avanov, J. Stawarz, T. C. Li, Y.-H. Liu, M. R. Argall, A. Afshari, D. S. Payne, C. J. Farrugia, J. Verniero, F. Wilder, K. Genestreti, D. E. da Silva, "Observational Verification of the Vlasov Equation with MMS: Temporal, Spatial, and Velocity-Space Variations of Electron Phase Space Density Measurements at the Magnetopause," *J. Geophys, Res.*, **128**, e2023JA031317 (2023)

15. Milton Arencibia, P. A. Cassak, M. A. Shay, Jiong Qiu, Steven M. Petrinec, Haoming Liang, "Three-Dimensional Magnetic Reconnection Spreading in Current Sheets of Non-Uniform Thickness," *J. Geophys. Res.*, **128**, e2022JA03099 (2023)

16. P. A. Cassak, M. Hasan Barbhuiya, Haoming Liang, and Matthew R. Argall, "Quantifying energy conversion in higher order phase-space density moments in plasmas," *Physical Review Letters*, **130**, 085201 (2023)

17. P. A. Cassak and M. Hasan Barbhuiya, "Pressure-Strain Interaction: I. On Compression, Deformation, and Implications For Pi-D," *Phys. Plasmas*, **29**, 122306 (2022) (Featured Article)

18. P. A. Cassak, M. Hasan Barbhuiya and H. Arthur Weldon, "Pressure-Strain Interaction: II. Decomposition in Magnetic Field-Aligned Coordinates," *Phys. Plasmas*, **29**, 122307 (2022) (Featured Article)

19. M. Hasan Barbhuiya and P. A. Cassak, "Pressure-Strain Interaction: III. Particle-in-Cell Simulations of Magnetic Reconnection," *Phys. Plasmas*, **29**, 122308 (2022) (Featured Article)

20. Souhail Dahani, Rungployphan Kieokaew, Vincent Génot, Benoit Lavraud, Yuxi Chen, Bayane Michotte de Welle, Nicolas Aunai, Gábor Tóth, Paul Cassak, Naïs Fargette, Robert Fear, Aurelie Marchaudon, Daniel Gershman, Barbara Giles, Roy Torbert, Jim Burch, "The Helicity Sign of Flux Transfer Event Flux Ropes and its Relationship to the Guide Field and Hall Physics in Magnetic Reconnection at the Magnetopause," *J. Geophys. Res.*, **127** e2022JA030686 (2022)

21. M. Hasan Barbhuiya, P. A. Cassak, M. A. Shay, Vadim Roytershteyn, M. Swisdak, Amir Caspi, Andrei Runov, Haoming Liang, "Scaling of electron heating by magnetization during reconnection and applications to dipolarization fronts and super-hot solar flares," *J. Geophys. Research*, **127**, e2022JA030610 (2022)

22. Yi-Hsin Liu, Paul Cassak, Xiaocan Li, Michael Hesse, Shan-Chang Lin, and Kevin Genestreti, "First-principles theory of the rate of magnetic reconnection in magnetospheric and solar plasmas," *Communications Physics (Nature)*, **5**, 97 (2022)

23. Peiyun Shi, Prabhakar Srivastav, Mahmud Barbhuiya, Paul Cassak, Earl Scime, Marc Swisdak, Cuyler Beatty, Tyler Gilbert, Regis John, Matthew Lazo, Ripudaman Singh Nirwan, Mitchell Paul, Ethan Scime, Katey Stevenson, and Thomas Steinberger, "Electron-Only Reconnection and Associated Electron Heating and Acceleration in PHASMA," *Physics of Plasmas*, **29**, 032101 (2022)

24. M. R. Argall, M. H. Barbhuiya, P. A. Cassak, S. Wang, J. Shuster, H. Liang, D. J. Gershman, R. B. Torbert, and J. L. Burch, "Theory, Observations and Simulations of Kinetic Entropy in a Magnetotail Electron Diffusion Region," *Phys. Plasmas*, **29**, 022902 (2022)

25. Peiyun Shi, Prabhakar Srivastav, M. Hasan Barbhuiya, Paul A. Cassak, Earl E. Scime, and Marc Swisdak, "Laboratory Observations of Electron Heating and non-Maxwellian Distributions at the Kinetic Scale During Electron-Only Magnetic Reconnection," *Phys. Rev. Lett.*, **128**, 025002 (2022) (Editor's Suggestion)

26. P. S. Pyakurel, M.A. Shay, J.F. Drake, T.D. Phan, P.A. Cassak, and J. L. Verniero, "A faster form of electron magnetic reconnection with a finite length X-line," *Phys. Rev. Lett.*, **127**, 155101 (2021)

27. M. Arencibia, P. A. Cassak, M. A. Shay, and E. R. Priest, "Scaling Theory of Three-Dimensional Magnetic Reconnection Spreading," *Phys. Plasmas*, **28**, 082104 (2021)

28. J. R. Shuster, D. J. Gershman, B. L. Giles, S. Wang, N. Bessho, L.-J. Chen, J. C. Dorelli, V. Uritsky, W. R. Paterson, P. A. Cassak, S. J. Schwartz, R. E. Denton, C. Schiff, A. F. Viñas, J. Ng, L. A. Avanov, D. E. da Silva, and R. B. Torbert, "Structures in the terms of the Vlasov equation observed at Earth's magnetopause," *Nature Phys.*, **17**, 1056 (2021)

29. O. Pezzi, H. Liang, J. L. Juno, P. A. Cassak, C. L. Vásconez, L. Sorriso-Valvo, D. Perrone, S. Servidio, V. Roytershteyn, J. M. TenBarge, and W. H. Matthaeus, "Dissipation measures in weakly-collisional plasmas," *Monthly Notices of the Royal Astronomical Society*, **505**, 4857 (2021)

30. J. P. Eastwood, M. V. Goldman, T. D. Phan, J. E. Stawarz, D. Newman, B. Lavraud, M. A. Shay, P. A. Cassak, J. F. Drake, R. E. Ergun, J. L. Burch, D. J. Gershman, B. L. Giles, P. A. Lindqvist, R. B. Torbert, R. J. Strangeway and C. T. Russell, "3D energy transport and partition in asymmetric magnetopause reconnection," *Phys. Rev. Lett.*, **125**, 265102 (2020)

31. Haoming Liang, M. Hasan Barbhuiya, P. A. Cassak, O. Pezzi, S. Servidio, F. Valentini, G. P. Zank, "Kinetic Entropy-Based Measures of Distribution Function Non-Maxwellianity: Theory and Simulations," *J. Plasma Phys.*, **86**, 825860502 (2020)

32. S. Eriksson, V. M. Souza, P. A. Cassak, and S. Hoilijoki, "Nascent Flux Rope Observations at Earth's Dayside Magnetopause," *J. Geophys. Res.*, **125**, e2020JA027919 (2020)

33. J. L. Burch, J. M. Webster, M. Hesse, K. J. Genestreti, R. E. Denton, T. D. Phan, H. Hasegawa, P. A. Cassak, R. B. Torbert, B. L. Giles, D. J. Gershman, R. E. Ergun, C. T. Russell, R. J. Strangeway, O. Le Contel, K. R. Pritchard, A. T. Marshall, K.-J. Hwang, K. Dokgo, S. A. Fuselier, L.-J. Chen, S. Wang, M. Swisdak, J. F. Drake, M. R. Argall, K. J. Trattner, M. Yamada, and G. Paschmann, "Electron Inflows and Outflows Around Reconnection Sites at Day Side of Earth," *Geophys. Res. Lett.*, **47**, e2020GL089082 (2020)

34. R. E. Ergun, N. Ahmadi, L. Kromyda, S. J. Schwartz, A. Chasapis, S. Hoilijoki, F. D. Wilder, P. A. Cassak, J. E. Stawarz, K. A. Goodrich, D. L. Turner, F. Pucci, A. Pouquet, W. H. Matthaeus, J. F. Drake, M. Hesse, M. A. Shay, R. B. Torbert, and J. L. Burch, "Particle Acceleration in Strong Turbulence in the Earth's Magnetotail, *Ap.J.*, **898**, 153 (2020)

35. M. Hesse and P. A. Cassak, "Magnetic Reconnection in the Space Sciences: Past, Present, and Future," *J. Geophys. Res.*, **125**, e2018JA025935 (2020)

36. R. E. Ergun, S. Hoilijoki, N. Ahmadi, S. J. Schwartz, F. D. Wilder, J. F. Drake, M. Hesse, M. A. Shay, H. Ji, M. Yamada, D. B. Graham, P. A. Cassak, J. L. Burch, R. B. Torbert, J. C. Holmes, J. E. Stawarz, K. A. Goodrich, S. Eriksson, R. J. Strangeway, O. Le Contel, "Magnetic Reconnection in Three Dimensions: Modeling and Analysis of Electromagnetic Drift Waves in the Adjacent Current Sheet," *J. Geophys. Res.*, **124**, 10085 (2019)

37. S. A. Fuselier, K. J. Trattner, S. M. Petrinec, K. R. Pritchard, J. L. Burch, P. A. Cassak, B. L. Giles, B. Lavraud, and R. J. Strangeway, "Stationarity of the Reconnection X-Line at Earth's Magnetopause for Southward IMF," *J. Geophys. Res.*, **124**, 8524 (2019)

38. M. Akhavan-Tafti, J. A. Slavin, J. P. Eastwood, P. A. Cassak, and D. J. Gershman, "MMS Multi-Point Analysis of FTE Evolution: Physical Characteristics and Dynamics," *J. Geophys. Res.*, **124**, 5376 (2019)

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104. P. A. Cassak and J. F. Drake, "On Phase Diagrams of Magnetic Reconnection," *Phys. Plasmas*, **20**, 061207 (2013)

105. L. S. Shepherd and P. A. Cassak, "Guide Field Dependence of 3D X-line Spreading During Collisionless Magnetic Reconnection," *J. Geophys. Res.*, **117**, A10101 (2012)

106. S. Donato, S. Servidio, P. Dmitruk, V. Carbone, M. A. Shay, P. A. Cassak and W. H. Matthaeus, "Reconnection events in two-dimensional Hall magnetohydrodynamic turbulence," *Phys. Plasmas*, **19**, 092307 (2012)

107. P. A. Cassak and M. A. Shay, "Magnetic Reconnection for Coronal Conditions: Reconnection Rates, Secondary Islands and Onset," *Space Sci. Rev.*, **172**, 283 (2012)

108. M. T. Beidler and P. A. Cassak, "Model for Incomplete Reconnection in Sawtooth Crashes," *Phys. Rev. Lett.*, **107**, 255002 (2011)

109. S. Servidio, P. Dmitruk, A. Greco, M. Wan, S. Donato, P. A. Cassak, M. A. Shay, V. Carbone, and W. H. Matthaeus, "Magnetic reconnection as an element of turbulence," *Nonlin, Processes Geophys.*, **18**, 675 (2011)

110. P. A. Cassak, "Theory and Simulations of the Scaling of Magnetic Reconnection with Symmetric Shear Flow," *Phys. Plasmas*, **18**, 072106 (2011)

111. P. A. Cassak and A. Otto, "Scaling of the Magnetic Reconnection Rate with Symmetric Shear Flow," *Phys. Plasmas*, **18**, 074501 (2011)

112. R. N. Baylor, P. A. Cassak, S. Christe, I. G. Hannah, Sam Krucker, D. J. Mullan, M. A. Shay, H. S. Hudson, and R. P. Lin, "Estimates of Densities and Filling Factors from a Cooling Time Analysis of Solar Microflares Observed with RHESSI," *Ap. J.*, **736**, 75 (2011)

113. R. Schreier, M. Swisdak, J. F. Drake, and P. A. Cassak, "Three-dimensional simulations of the orientation and structure of reconnection X-lines," *Phys. Plasmas*, **17**, 110704 (2010)

114. K. Malakit, M. A. Shay, P. A. Cassak, and C. Bard, "Scaling of asymmetric magnetic reconnection: Kinetic particle-in-cell simulations," *J. Geophys. Res.*, **115**, A10223 (2010)

115. N. A. Murphy, C. R. Sovinec, and P. A. Cassak, "Magnetic Reconnection with Asymmetry in the Outflow Direction," *J. Geophys. Res.*, **115**, A09206 (2010)

116. L. S. Shepherd and P. A. Cassak, "Comparison of secondary islands in collisional reconnection to Hall reconnection," *Phys. Rev. Lett.*, **105**, 015004 (2010)

117. P. A. Cassak, M. A. Shay, and J. F. Drake, "A saddle-node bifurcation model of magnetic reconnection onset," *Phys. Plasmas*, **17**, 062105 (2010)

118. S. Servidio, W. H. Matthaeus, M. A. Shay, P. Dmitruk, P. A. Cassak, and M. Wan, "Statistics of Magnetic Reconnection in Two-Dimensional Magnetohydrodynamic Turbulence," *Phys. Plasmas*, **17**, 032315 (2010)

119. P. A. Cassak, M. A. Shay, and J. F. Drake, "Scaling of Sweet-Parker Reconnection with Secondary Islands," *Phys. Plasmas*, **16**, 120702 (2009)

120. P. A. Cassak and J. F. Drake, "The Impact of Microscopic Magnetic Reconnection on Pre-Flare Energy Storage," *Ap. J. Lett.*, **707**, L158, (2009)

121. J. F. Drake, P. A. Cassak, M. A. Shay, M. Swisdak, and E. Quataert, "A magnetic reconnection mechanism for ion acceleration and abundance enhancements in impulsive flares," *Ap. J. Lett.*, **700**, L16 (2009)

122. J. F. Drake, M. Swisdak, T. D. Phan, P. A. Cassak, M. A. Shay, S. Lepri, R. P. Lin, E. Quataert, and T. H. Zurbuchen, "Ion Heating Resulting from Pickup in Magnetic Reconnection Exhausts," *J. Geophys. Res.*, **114**, A05111 (2009)

123. K. Malakit, P. A. Cassak, M. A. Shay and J. F. Drake, "The Hall effect in magnetic reconnection: Hybrid vs. Hall-less hybrid simulations," *Geophys. Res. Lett.*, **36**, L07107 (2009)

124. T. N. Parashar, M. A. Shay, P. A. Cassak, and W. H. Matthaeus, "Kinetic dissipation and anisotropic heating in a turbulent collisionless plasma," *Phys. Plasmas*, **16**, 032310 (2009)

125. P. A. Cassak and M. A. Shay, "Structure of the dissipation region in fluid simulations of asymmetric magnetic reconnection," *Phys. Plasmas*, **16**, 055704 (2009)

126. S. Servidio, W. H. Matthaeus, M. A. Shay, P. A. Cassak and P. Dmitruk, "Magnetic reconnection in two dimensional magnetohydrodynamic turbulence," *Phys. Rev. Lett.*, **102**, 115003 (2009)

127. P. A. Cassak and M. A. Shay, "The Scaling of Asymmetric Hall Reconnection," *Geophys. Res. Lett.*, **35**, L19102 (2008)

128. P. A. Cassak, D. J. Mullan and M. A. Shay, "From Solar and Stellar Flares to Coronal Heating: Theory and Observations of How Magnetic Reconnection Regulates Coronal Conditions", *Ap. J. Lett.*, **676**, L69 (2008)

129. P. A. Cassak and M. A. Shay, "Scaling of Asymmetric Magnetic Reconnection: General Theory and Collisional Simulations", *Phys. Plasmas*, **14**, 102114 (2007)

130. P. A. Cassak, J. F. Drake, M. A. Shay, and B. Eckhardt, "Onset of Fast Magnetic Reconnection", *Phys. Rev. Lett.*, **98**, 215001 (2007)

131. P. A. Cassak, J. F. Drake, and M. A. Shay, "Catastrophic Onset of Fast Magnetic Reconnection with a Guide Field", *Phys. Plasmas*, **14**, 054502 (2007)

132. P. A. Cassak, J. F. Drake, and M. A. Shay, "A Model for Spontaneous Onset of Fast Magnetic Reconnection," *Ap. J. Lett.*, **644**, L145 (2006)

133. P. A. Cassak, M. A. Shay, and J. F. Drake, "Catastrophe Model for Fast Magnetic Reconnection Onset," *Phys. Rev. Lett.*, **95**, 235002 (2005)

REFEREED BOOK CHAPTERS

1. P. A. Cassak and S. A. Fuselier, "Reconnection at Earth's Dayside Magnetopause" (Chapter 6), in Magnetic Reconnection: Concepts and Applications, eds. W. D. Gonzalez and E. N. Parker, Astrophysics and Space Science Library 427, Springer, 2016

2. W. D. Gonzalez, E. N. Parker, F. S. Mozer, V. M. Vasyliunas, P. L. Pritchett, H. Karimabadi, P. A. Cassak, J. D. Scudder, M. Yamada, R. M. Kulsrud, and D. Koga, "Fundamental Concepts Associated with Magnetic Reconnection" (Chapter 1), in Magnetic Reconnection: Concepts and Applications, eds. W. Gonzalez and E. Parker, Astrophysics and Space Science Library 427, Springer, 2016

PEER REVIEWED CONFERENCE PROCEEDINGS

1. Haoming Liang, P. A. Cassak, M. Swisdak, Sergio Servidio, "Estimating Effective Collision Frequency and Kinetic Entropy Uncertainty in Particle-in-Cell Simulations," *Journal of Physics: Conference Series*, **1620**, 012009 (2020) - Proceedings for the 19th Annual International Astrophysics Conference
2. S. Donato, S. Servidio, P. Dmitruk, F. Valentini, A. Greco, P. Veltri, M. Wan, M. A. Shay, P. A. Cassak, and W. H. Matthaeus, "Overview on numerical studies of reconnection and dissipation in the solar wind," *AIP Conf. Proc.*, **1539**, 99 (2013) - Proceedings of the Solar Wind 13 Conference
3. S. Servidio, M. A. Shay, W. H. Matthaeus, P. Dmitruk, P. A. Cassak, and M. Wan, Properties of magnetic reconnection in MHD turbulence," *AIP Conf. Proc.*, **1216**, 198 (2010) - Proceedings of the Solar Wind 12 Conference
4. T. N. Parashar, S. Servidio, M. A. Shay, W. H. Matthaeus, and P. A. Cassak, "Orszag Tang vortex - Kinetic study of a turbulent plasma," *AIP Conf. Proc.*, **1216**, 304 (2010) - Proceedings of the Solar Wind 12 Conference

SELECTED INVITED TALKS (OF 83)

1. "Quantifying and Interpreting Energy Evolution in Plasmas in the MMS Era"
   Magnetospheric MultiScale (MMS) Community Workshop, Invited Keynote Talk
   Los Angeles, California, September 17, 2024
2. "Space Plasma Science Kits for Rural Elementary Schools in West Virginia"
   50th IOP Annual Plasma Physics Conference, Invited Talk (Rutherford Plasma Physics Communication Prize)
   York, England (attended remotely), April 11, 2024
3. "Quantifying Dynamics of Plasmas Out of Local Thermodynamic Equilibrium"
   Michigan Institute for Plasma Science and Engineering Seminar, Invited Talk
   Ann Arbor, Michigan, March 20, 2024
4. "A Kinetic Entropy Approach to Quantifying Dynamics of Plasmas out of Local Thermodynamic Equilibrium"
   Vlasovia 2024, Invited Talk
   Florence, Italy, January 30, 2024
5. "A Review of Recent Progress on Energy Conversion in Plasmas Beyond Fluid Models"
   APS DPP, (Plenary) Review talk
   Denver, Colorado, November 1, 2023
6. "Beyond Thermodynamics: Describing Plasmas Out of Local Thermodynamic Equilibrium"
   Thai Space Physics 2023, Highlight Talk
   Pathum Thani, Thailand (Presented remotely), August 24, 2023

7. "A Kinetic Theory Generalization of the First Law of Thermodynamics Capturing Non-Equilibrium Effects"
JPP Frontiers of Plasma Physics Colloquium
Online, May 18, 2023

8. "Quantifying energy conversion in higher order phase space density moments in non-equilibrium statistical mechanics"
Working Across Scales in Complex Systems Workshop
Atlanta, Georgia, April 13, 2023

9. "The First Law of Thermodynamics Gets A Makeover"
Science Society Clubhouse
Online, April 6, 2023

10. "The First Law of Thermodynamics Gets A Makeover"
Quantum Photonics Clubhouse Fireside Chat
Online, April 5, 2023

11. "New Theoretical and Numerical Developments on Energy Conversion via the Pressure-Strain Interaction and Applications to Magnetic Reconnection"
WVU Center for KINETIC Plasma Physics Seminar
Morgantown, West Virginia, February 24, 2023

12. "The First Law of Thermodynamics Gets A Makeover"
WVU Physics and Astronomy Colloquium
Morgantown, West Virginia, February 22, 2023

13. "Energy Conversion Beyond the First Law of Thermodynamics in Non-Equilibrium Plasmas"
École Polytechnique Laboratoire de Physique des Plasmas, Invited Seminar
Palaiseau, France, October 20, 2022

14. "New Theoretical and Numerical Developments on Energy Conversion via the Pressure-Strain Interaction and Applications to Magnetic Reconnection"
École Polytechnique Laboratoire de Physique des Plasmas Café Spatial, Invited Seminar
Palaiseau, France, October 14, 2022

15. "Challenges and Future Directions in the Theoretical and Computational Study of Magnetic Reconnection"
Triennial Earth Sun Summit (TESS), Invited Talk
Bellevue, Washington, August 9, 2022

16. "A New Generalization of Thermodynamics in Heliospheric and Astrophysical Systems – What it is and Why it is Needed"
University of Hawai'i Institute for Astrophysics Colloquium, Invited Talk
Manoa, Hawai'i, June 15, 2022

17. "Using kinetic entropy to study energy conversion and dissipation in space plasmas"
Princeton Plasma Physics Laboratory Heliophysics Seminar
Online, August 2, 2021

18. "Using Kinetic Entropy to Study Energy Conversion in Plasmas"
University of Colorado, Boulder, LASP Meeting Turbulence Discussion
Online, June 30, 2021

19. "Kinetic-Scale Physics of Magnetic Reconnection in the MMS Era: Accomplishments and Future Challenges for Theoretical Research"
2020 APS Division of Plasma Physics Meeting
Online, November 10, 2020

20. "Kinetic Entropy as a Diagnostic in Particle-In-Cell Simulations of the Vlasov Equation"
Vlasovia 2019 (International Workshop on the Theory and Applications of the Vlasov Equation)
Strasbourg, France, July 22, 2019

21. "Magnetic Field Lines Breaking in Space Causes Huge Eruptions"
Gettysburg College Physics Department Colloquium
Gettysburg, PA, January 25, 2019

22. "Magnetic Reconnection and NASA's Magnetospheric Multiscale (MMS) Mission"
2018 Fall American Geophysical Union Meeting, Tutorial talk
Washington, DC, December 11, 2018

23. "The Explosive Sun: A Cosmic Jekyll and Hyde and its Impacts on Earth"
2018 Benedum Distinguished Scholar Lecture, Invited talk
Morgantown, West Virginia, October 18, 2018

24. ""The Sun is a Miasma of Incandescent Plasma""
AAPT Appalachian Section Meeting, Invited talk
Morgantown, West Virginia, October 12, 2018

25. "Are Fluid Simulations of Magnetic Reconnection In-A-Box Still Useful?
(or Localized vs. Spreading of Three-dimensional Magnetic Reconnection with Solar, Solar Wind, and Magnetospheric Applications)"
13th International Symposium for Space Simulations, Invited talk
Los Angeles, California, September 12, 2018

26. "Terminating the Turbulent Cascade: What's Dissipation Got To Do With It?"
SHINE Workshop, Invited Scene Setting talk
Cocoa Beach, Florida, August 2, 2018

27. "Solar and Helio Research Enabled by DKIST at the WVU Department of Physics and Astronomy"
DKIST Critical Science Plan Workshop 8, Invited talk
Bozeman, Montana, July 19, 2018

28. "Reconnecting with Magnetic Reconnection"
Triennial Earth-Sun Summit, Invited plenary talk
Leesburg, VA, May 22, 2018

29. "Recent Progress in Magnetic Reconnection from Theory and Simulations"
Triennial Earth-Sun Summit, Invited panelist
Leesburg, VA, May 21, 2018

30. "Magnetic Reconnection with Asymmetries and Guide Fields"
Max Planck/Princeton Center for Plasma Physics Workshop 2018, Invited tutorial talk
Princeton, NJ, April 23, 2018

31. "To Heliophysics and Beyond! NASA's Magnetospheric Multiscale (MMS) Mission"
NASA Science Mission Directorate Monthly Status Review, Invited talk
Washington, DC, March 29, 2018

32. "Opportunities for Kinetic Global Magnetospheric Simulations"
First International Vlasiator Science Hackathon, Invited talk
Helsinki, Finland, August 7, 2017

33. "A Review of the 0.1 Reconnection Rate Problem"
1st Journal of Plasma Physics Frontiers in Plasma Physics Conference, Invited talk
Spineto, Italy, May 24, 2017

34. "Local and Global Aspects of Dayside Reconnection"
Advancing Plasma Physics from the Sun to the Earth, Invited talk
Breckenridge, Colorado, May 22, 2017

35. "Local Dayside Reconnection From A Global Perspective"
Magnetic Reconnection Workshop, Invited talk
Toulouse, France, May 9, 2017

36. "A Summary of Results from Year 1 of the Magnetospheric (MMS) Mission"
CEDAR/GEM Science Highlight Plenary Talk
Santa Fe, New Mexico, June 23, 2016

37. "... the tale of magnetic reconnection …"
CEDAR/GEM Student Day Tutorial
Santa Fe, New Mexico, June 19, 2016

38. "Magnetic Reconnection at the Dayside Magnetopause"
University of Michigan, Climate and Space Sciences and Engineering Seminar
Ann Arbor, Michigan, June 16, 2016

39. "When Magnetic Field Lines Break"
University of Wisconsin-Madison, Physics Department Colloquium
Madison, Wisconsin, April 29, 2016

40. "Magnetic Reconnection During the Sawtooth Crash in Tokamaks"
Los Alamos National Laboratory, Seminar
Los Alamos, New Mexico, April 11, 2016

41. "Magnetic Reconnection at the Dayside Magnetopause"
SHIELDS Workshop: Shielding Society from Space Weather, Invited Talk
Santa Fe, New Mexico, April 5, 2016

42. "Asymmetric Reconnection, Guide Field Reconnection, and Reconnection with Flow Shear: Recent Work and Future Horizons"
MR 2016 US-Japan Meeting on Magnetic Reconnection, Invited Tutorial Talk
Napa, California, March 11, 2016

43. "Magnetic Reconnection at the Dayside Magnetopause"
NASA Goddard Space Flight Center Heliophysics Seminar
Greenbelt, Maryland, February 12, 2016

44. "Magnetic Reconnection at the Dayside Magnetopause and Tokamaks"
University of Maryland Plasma Physics Seminar
College Park, Maryland, February 10, 2016

45. "Predictions of space physics are difficult, especially when they are about the future"
2015 Fall American Geophysical Union Meeting (Macelwane Medal talk)
San Francisco, California, December 16, 2015

46. "Quantifying the tailward motion of reconnecting flux ropes at magnetopauses of Earth and other planets"
2015 Fall American Geophysical Union Meeting
San Francisco, California, December 14, 2015

47. "How Magnetospheres Interact with the Solar Wind through Magnetic Reconnection"
Georgia Institute of Technology Planetary Seminar Series
Atlanta, Georgia, November 17, 2015

48. "Many Facets of Magnetic Reconnection at the Dayside Magnetopause"
Chapman Conference on Magnetospheric Dynamics
Fairbanks, Alaska, September 29, 2015

49. "What Can the Sun Tell Us about Dipolarization Fronts? A Look at Supra-Arcade Downflows"
Workshop on Magnetotail Reconnection and Dipolarization Fronts
Laurel, Maryland, September 17, 2015

50. "Theory and Simulations of Magnetic Reconnection at the Dayside Magnetopause"
Institut de recherche en astrophysique et planetologie (IRAP) seminar
Toulouse, France, August 18, 2015

51. "Theory and Simulations of Magnetic Reconnection at the Dayside Magnetopause"
Magnetic Reconnection in Plasmas workshop
Stockholm, Sweden, August 12, 2015

52. "Asymmetric Reconnection with a Flow Shear"
ISSI Meeting on Ion and Electron Bulk Heating by Magnetic Reconnection
Bern, Switzerland, June 2, 2015

53. "Studies of Magnetic Reconnection From Solar Flares to the Dayside Magnetopause"
High Altitude Observatory (HAO) Colloquium
Boulder, Colorado, April 8, 2015

54. "Theoretical Studies of Energy Conversion in Magnetic Reconnection"
2014 Fall American Geophysical Union Meeting
San Francisco, California, December 18, 2014

55. "Multi-Scale Aspects of Magnetic Reconnection for Solar Applications"
Solar Heliospheric and Interplanetary Environment (SHINE) Conference
Telluride, Colorado, June 26, 2014

56. "Quantitative Predictions of Magnetic Reconnection at the Dayside Magnetopause"
Parker Reconnection Workshop
Sao Jose dos Campos, Brazil, March 20, 2014

57. "Ideas on How and When Reconnection Occurs in the Corona and Inner Heliosphere"
Solar Probe Plus Science Working Group Workshop
San Antonio, Texas, February 26, 2014

58. "Signatures of Finite Length X-line Reconnection"
ISSI Meeting on Ion and Electron Bulk Heating by Magnetic Reconnection
Berne, Switzerland, October 10, 2013

59. "On The Cause of Supra-Arcade Downflows in Solar Flares"
Harvard-Smithsonian Center for Astrophysics Seminar
Cambridge, Massachusetts, July 31, 2013

60. "Properties of Asymmetric Reconnection at the Dayside Magnetopause"
THEMIS/ARTEMIS Science Working Group Meeting
Fairbanks, Alaska, March 28, 2013

61. "Magnetic Reconnection - What is NASA's MMS for Anyway?"
NASA Goddard Scientific Colloquium
Greenbelt, Maryland, March 1, 2013

62. "Ion-Scale Signatures of Magnetospheric Magnetic Reconnection"
MMS Fast Plasma Investigation (FPI) Team Meeting
Greenbelt, Maryland, September 10, 2012

63. "Theory of Magnetic Reconnection for Magnetospheric Applications" (Plenary Talk)
2012 Geospace Environment Modeling Workshop
Snowmass, Colorado, June 21, 2012

64. "X-line Spreading in Three-Dimensional Magnetic Reconnection"
Seminar at NASA-GSFC Reconnexion Forum
Greenbelt, Maryland, May 29, 2012

65. "Guide Field Dependence of X-line Spreading in Three-Dimensional Magnetic Reconnection"
2012 US-Japan Workshop on Magnetic Reconnection
Princeton, New Jersey, May 23, 2012

66. "The Scaling of Asymmetric Magnetic Reconnection and Magnetospheric Applications"
Rice Space Physics Seminar
Houston, Texas, March 29, 2010

67. "Extending Hall Reconnection to Large-scale Reconnection in the Corona"
Yosemite 2010 Workshop on Magnetic Reconnection
Yosemite, California, February 11, 2010

68. "The Onset of Fast Reconnection in the Corona"
Workshop of the International Space Science Institute
Berne, Switzerland, January 27, 2010

69. "Catastrophic Explosions in Space: The Physics of Magnetic Reconnection"
Physics Department Colloquium
Montana State University, December 12, 2009

70. "Secondary Islands in Sweet-Parker Reconnection: Scaling, Onset, and Coronal Energy Storage"
2009 Thin Current Sheets Workshop
Yellowstone, Wyoming, September 28, 2009

71. "Theory of Magnetic Reconnection for Solar Applications" (Plenary Talk)
2009 SHINE Workshop
Wolfville, Nova Scotia, August 6, 2009

72. "The Scaling of Asymmetric Magnetic Reconnection"
"The Structure of the Dissipation Region in Asymmetric Collisionless Magnetic Reconnection"
2009 Geospace Environment Modeling (GEM) Summer Workshop
Snowmass, Colorado, June 22-24, 2009

73. "The Nonlinear Dynamics of Magnetic Reconnection and Applications to Solar Eruptions" (Fred L. Scarf Award Lecture)
2008 Fall AGU Meeting
San Francisco, California, December 16, 2008

74. "The Role of Magnetic Reconnection in Self-Organization of the Corona: Theory and Observations"
2008 Fall AGU Meeting
San Francisco, California, December 16, 2008

75. "Scaling of Asymmetric Magnetic Reconnection"
50th Annual Meeting of the Division of Plasma Physics
Dallas, Texas, November 18, 2008

76. "Reconnection Onset and Self-Organization in Solar and Stellar Coronae"
2008 General Meeting for the Center for Magnetic Self-Organization (CMSO)
Princeton, New Jersey, July 10, 2008

77. "The Theory of Magnetic Reconnection: Past, Present, and Future," SPD Parker Lecture
AGU 2008 Joint Assembly
Fort Lauderdale, Florida, May 28, 2008

78. "On the Onset of Fast Magnetic Reconnection" (Invited Poster)
2007 US-Japan Reconnection Workshop
St. Michaels, Maryland, March 26-29, 2007

79. "Catastrophe Model for Fast Magnetic Reconnection"
University of Maryland Space and Cosmic Ray Physics Seminar
College Park, Maryland, March 27, 2006

80. "The Transition between Sweet-Parker and Hall Reconnection and its Impact on Onset"
Harry Petschek Symposium on Magnetic Reconnection
College Park, Maryland, March 21, 2006

81. "Catastrophe Model for Fast Magnetic Reconnection Onset"
NASA-Goddard Space Flight Center Laboratory for Solar and Space Physics Seminar
Greenbelt, Maryland, February 24, 2006

82. "The Onset of Fast Magnetic Reconnection: A Catastrophe Model"
P. A. Cassak, M. A. Shay, J. F. Drake, and B. Eckhardt
47th Annual Meeting of the Division of Plasma Physics
Denver, Colorado, October 25, 2005

CONTRIBUTED TALKS AND POSTERS AT CONFERENCES (OF 67)

1. "An Entropic Approach to Quantifying Dynamics Out of Local Thermodynamic Equilibrium"
2024 Fall American Geophysical Union Meeting, Contributed Poster,
Washington, DC, December 11, 2024

2. "Theoretical Developments on Energy Conversion via the Pressure-Strain Interaction and Applications to Magnetic Reconnection"
SHINE Workshop, Contributed Poster
Stowe, Vermont, August 7-11, 2023

3. “Science Kits for Rural West Virginia Elementary Schools: The Outreach Program for the WVU NSF ANSWERS Project"
WVU NSF ANSWERS Team Meeting, Contributed Talk
Morgantown, West Virginia, May 5, 2023

4. “Theoretical Developments on Energy Conversion via the Pressure-Strain Interaction"
European Geophysical Union Meeting, Contributed Talk
Vienna, Austria, April 24, 2023

5. “New Theoretical Developments on Energy Conversion via the Pressure-Strain Interaction”
Magnetospheric Multiscale (MMS) Science Working Team (SWT) Meeting, Contributed Talk
Online, October 6, 2022

6. “A Kinetic Generalization of the First Law of Thermodynamics”
WVU Center for KINETIC Plasma Physics workshop, Contributed Talk
Morgantown, West Virginia, July 18, 2022

7. “Two Aspects of Solar Flare Physics Beyond MHD - 3D Reconnection Spreading and Electron Heating”
Solar Heliospheric and Interplanetary Environment (SHINE) workshop, Contributed Poster
Honolulu, Hawaii, June 30, 2022

8. “A New Theory of Kinetic-Scale Energy Conversion and Dissipation”
Geospace Environment Modeling (GEM) workshop, Contributed Poster
Honolulu, Hawaii, June 21, 2022

9. “A New Theory of Kinetic-Scale Energy Conversion and Dissipation”
US-Japan Workshop on Magnetic Reconnection, Contributed Poster
Monterey, California, May 16-20, 2022

10. “A New Theory of Kinetic-Scale Energy Conversion and Dissipation”
Magnetospheric Multiscale (MMS) Community Workshop, Contributed Talk
Daytona Beach, Florida (attended remotely), May 13, 2022

11. Spreading Of 3d Collisionless Anti-parallel Magnetic Reconnection In Current Sheets Of Non-uniform Thickness And Application To Two-ribbon Flares"
238th Meeting of the American Astronomical Society, Contributed Talk
Online, June 7, 2021

12. “Dissipation measures in weakly-collisional plasmas"
2021 European Geophysical Union General Assembly Meeting, Contributed Talk (Solicited 10 minute talk)
Online, April 27, 2021

13. “Cross-Scale Properties of Dayside Magnetic Reconnection"
2020 Fall American Geophysical Union Meeting, Contributed Poster,
Online, December 1-17, 2020

14. "Kinetic Entropy-Based Measures of Distribution Function Non-Maxwellianity: Theory and Simulations"
2020 Magnetospheric Multiscale Science Working Team Meeting, Contributed Talk
Online, October 7, 2020

15. “Non-traditional Instructional Approaches and Assessment of Graduate Plasma Physics Courses at West Virginia University”
2019 Fall American Geophysical Union Meeting, Contributed Talk
San Francisco, CA, December 12, 2019

16. “Dependence of Solar Wind-Magnetospheric Coupling on Reconnection Physics”
2019 Fall American Geophysical Union Meeting, Contributed Poster, and 2019 Mini-GEM Workshop, Contributed Talk
San Francisco, CA, December 10, 2019

17. “Simulations of Nascent Flux Rope Observations at the Earth’s Dayside Magnetopause"
2019 Geospace Environment Modeling (GEM) Workshop, Contributed Poster
Santa Fe, NM, June 25, 2019

18. “Parametric study of the out-of-plane tripolar magnetic field component with Particle-In-Cell simulations”
2018 Fall American Geophysical Union Meeting, Contributed Talk
Washington, DC, December 12, 2018

19. “Kinetic Entropy as a Diagnostic in Particle-in-Cell Simulations”
APS Division of Plasma Physics Meeting, Contributed Poster
Portland, Oregon, November 6, 2018

20. “Kinetic Entropy as a Diagnostic in Particle-in-Cell Simulations”
SHINE Workshop, Contributed Poster
Cocoa Beach, Florida, July 30 - August 1, 2018

21. “Application of Kinetic Entropy as a Diagnostic in Particle-in-Cell Simulations of Magnetic Reconnection”
GEM Workshop, Contributed Poster
Santa Fe, New Mexico, June 19, 2018

22. “Kinetic Entropy as a Diagnostic in Particle-in-Cell Simulations of Magnetic Reconnection”
MMS Community Workshop, Contributed Talk
Bergen, Norway, June 13, 2018

23. Tripolar Hall Magnetic Field Signatures in Magnetic Reconnection in the Solar Wind and Magnetopause”
2017 Solar Heliospheric and Interplanetary Environment (SHINE) Conference, Contributed Poster
Saint Sauveur, Quebec, Canada, July 24, 2017

24. “The effect of a guide field on local energy conversion during asymmetric magnetic reconnection: Particle-in-cell simulations”
2017 Geospace Environment Modeling (GEM) Workshop, Contributed Poster
Portsmouth, Virginia, June 22, 2017

25. “Comparisons of MMS data to 2D and 3D PIC Simulations”
2017 MMS Science Working Team Meeting, Contributed Talk
Key West, Florida, March 2, 2017

26. “PIC Simulation Study of Dissipation in Three MMS Reconnection Events with Different Guide Fields”
2014 Fall AGU Meeting, Contributed Poster
San Francisco, California, December 13, 2016

27. "Simulation Study of the Spreading/Elongation of Ribbons in Two-Ribbon Flares"
Solar Heliospheric and Interplanetary Environment (SHINE) Conference, Contributed Poster
Santa Fe, New Mexico, July 11-15, 2016

28. "Fast magnetic reconnection due to anisotropic electron pressure"
2015 APS Division of Plasma Physics Meeting, Contributed Poster
Savannah, Georgia, November 18, 2015

29. "Asymmetric Reconnection with a Flow Shear"
2015 Magnetospheric Multiscale (MMS) Science Working Team Meeting, Contributed Talk (HPCA Session)
San Antonio, Texas, November 6, 2015

30. "Asymmetric Reconnection with a Flow Shear: PIC simulations and magnetopause applications"
2015 American Physical Society Mid-Atlantic Section Meeting, Contributed Poster
Morgantown, West Virginia, October 24, 2015

31. "Asymmetric Reconnection with a Flow Shear"
2015 Geospace Environment Modeling (GEM) Workshop, Contributed Talk
Snowmass, Colorado, June 18, 2015

32. "Asymmetric Reconnection with a Flow Shear"
Magnetospheric MultiScale (MMS) Science Working Team meeting, Contributed Talk
Cocoa Beach, Florida, March 10, 2015

33. "The "Space Weather" Exhibit at the Children's Discovery Museum of West Virginia"
2014 Fall AGU Meeting, Contributed Poster
San Francisco, California, December 18, 2014

34. "Asymmetric Reconnection with a Shear Flow and Applications to X-line Motion at the Polar Cusps"
2014 Fall American Geophysical Union Meeting, Contributed Poster (for Chris Doss)
San Francisco, California, December 15, 2014

35. "Three-Dimensional Spreading of Magnetic Reconnection in Solar Flares and the Solar Wind"
Solar Heliospheric and Interplanetary Environment (SHINE) Conference, Contributed Poster
Telluride, Colorado, June 26, 2014

36. "Testing Models of the Location of Magnetic Reconnection at the Magnetopause"
2013 Fall AGU Meeting, Contributed Talk
San Francisco, California, December 10, 2013

37. "Properties of Asymmetric Reconnection at the Dayside Magnetopause"
Magnetospheric MultiScale Mission Science Working Team Meeting, Contributed Talk
Boulder, Colorado, March 21, 2013

38. "Reconnection with a Shear Flow and Applications to Solar Wind-Magnetospheric Coupling"
AGU Chapman Conference on Fundamental Properties of Processes of Magnetotails, Contributed Poster
Reykjavik, Iceland, March 11, 2013

39. "An Interpretation of Supra-Arcade Downflows as Reconnection Onset Bursts"
2012 Fall AGU Meeting, Contributed Poster
San Francisco, California, December 6, 2012

40. "Electron Kelvin-Helmholtz Instability and Generation of Demagnetized Electron Rings"
54th Annual Meeting of the Division of Plasma Physics, Contributed Poster
Providence, Rhode Island, October 31, 2012

41. "X-line Spreading in Three-Dimensional Magnetic Reconnection and Solar Applications"
2012 SHINE Workshop, Contributed Poster
Wailea, Maui, Hawaii, June 28, 2012

42. "Spreading of Magnetic Reconnection X-lines in Three Dimensions"
2012 APS April Meeting (with the Sherwood Fusion Theory Conference), Contributed Poster
Atlanta, Georgia, April 2, 2012

43. "On the Location of Reconnection on the Dayside Magnetopause"
2011 Fall AGU Meeting, Contributed Poster
San Francisco, California, December 8, 2011

44. "Incomplete Reconnection in Sawteeth due to Diamagnetic Effects"
53rd Annual Meeting of the Division of Plasma Physics, Contributed Poster
Salt Lake City, Utah, November 16, 2011

45. "The Scaling of Dayside Magnetic Reconnection with a Shear Flow"
CEDAR/GEM 2011 Summer Workshop, Contributed Poster
Santa Fe, New Mexico, June 28, 2011

46. "The Effect of Shear Flow on the Scaling of 2D Magnetic Reconnection"
2010 Fall AGU Meeting, Contributed Poster
San Francisco, California, December 17, 2010

47. "The Effect of Shear Flow on the Scaling of 2D Magnetic Reconnection"
52nd Annual Meeting of the Division of Plasma Physics, Contributed Poster
Chicago, Illinois, November 8, 2010

48. "Secondary Islands in Sweet-Parker Reconnection: Scaling, Onset, and Impact on Coronal Energy Storage"
2009 Fall AGU Meeting, Contributed Poster
San Francisco, California, December 16, 2009

49. "Secondary Islands in Sweet-Parker Reconnection: Scaling, Onset, and Impact on Coronal Energy Storage"
2009 SHINE Workshop, Contributed Talk
Wolfville, Nova Scotia, August 3, 2009

50. "The Catastrophic Onset of Magnetic Reconnection in Solar and Stellar Coronae due to Two-Fluid Effects: Theory and Observations"
2008 GEM/SHINE Workshop, Contributed Talk
Midway, Utah, June 23-25, 2008

51. "The Scaling of Asymmetric Magnetic Reconnection"
2008 GEM/SHINE Workshop, Contributed Talk
Midway, Utah, June 23-25, 2008

52. "The Scaling of Collisionless Asymmetric Magnetic Reconnection and Applications to the Magnetopause"
AGU 2008 Joint Assembly, Contributed Talk
Fort Lauderdale, Florida, May 30, 2008

53. "The Importance of the Hall Effect in Magnetic Reconnection: Comparisons of Hybrid and Hall-less Hybrid Simulations"
AGU 2008 Joint Assembly, Contributed Talk
Fort Lauderdale, Florida, May 27, 2008

54. "From Solar and Stellar Flares to Coronal Heating: Theory and Observations of How Collisionless Magnetic Reconnection Regulates Coronal Conditions"
US-Japan Workshop of Magnetic Reconnection 2008, Contributed Talk
Okinawa, Japan, March 5, 2008

55. "The Scaling of Asymmetric Magnetic Reconnection"
US-Japan Workshop of Magnetic Reconnection 2008, Contributed Poster
Okinawa, Japan, March 3, 2008

56. "Observational Evidence of the Role of Collisionless Magnetic Reconnection in Self-Organization of Solar and Stellar Coronae"
AGU 2007 Fall Meeting, Contributed Talk
San Francisco, California, December 13, 2007

57. "Asymmetric Magnetic Reconnection: General Theory and Collisional Simulations"
AGU 2007 Fall Meeting, Contributed Poster
San Francisco, California, December 13, 2007

58. "The Scaling of Asymmetric Magnetic Reconnection"
"The Catastrophic Onset of Fast Magnetic Reconnection"
"Nonlinear Dynamics of Magnetic Reconnection and the Localization of Onset"
2007 Cambridge Workshop on Magnetic Reconnection, Contributed Talks
St. Michaels, Maryland, September 11-13, 2007

59. "The Catastrophic Onset of Fast Magnetic Reconnection and its Implications for CMEs"
SHINE 2007 Workshop, Contributed Poster
Whistler, British Columbia, July 30 – Aug 3, 2007

60. "Catastrophe Model for the Onset of Fast Magnetic Reconnection"
210th Meeting of the American Astronomical Society, Contributed Dissertation Talk
Honolulu, Hawaii, May 29, 2007

61. "Bistability of Magnetic Reconnection With a Guide Field and its Impact on Onset"
AGU 2006 Fall Meeting, Contributed Talk
San Francisco, California, December 13, 2006

62. "Spontaneous Catastrophic Onset of Fast Magnetic Reconnection and Solar Flares"
AGU 2006 Joint Assembly, Contributed Talk
Baltimore, Maryland, May 26, 2006

63. "Bifurcation Model for the Onset of Fast Magnetic Reconnection"
2006 International Sherwood Fusion Theory Conference, Contributed Poster
Dallas, Texas, April 22, 2006

64. "Hysteresis and the Onset of Fast Magnetic Reconnection"
AGU 2005 Joint Assembly, Contributed Poster
New Orleans, Louisiana, May 24, 2005

65. "Hysteresis and the Onset of Fast Magnetic Reconnection"
2005 International Sherwood Fusion Theory Conference, Contributed Poster
Lake Tahoe, Nevada, April 11, 2005

66. "Turbulent Magnetic Reconnection"
45th Annual Meeting of the Division of Plasma Physics, Contributed Poster
Albuquerque, New Mexico, October 28, 2003

FEDERAL RESEARCH GRANTSMANSHIP

1. "The Theory of Magnetic Reconnection Onset: Three Dimensional and Diamagnetic Effects"
(PI: P. A. Cassak), NSF/DOE Partnership in Basic Plasma Science and Engineering
September 1, 2009 – August 31, 2012
Amount to WVU: $360,000, Amount Total: $360,000

2. "CAREER: The Effect of Shear Flow on the Scaling of Magnetic Reconnection and Solar Wind-Magnetospheric Coupling"
(PI: P. A. Cassak), National Science Foundation
September 1, 2010 – August 31, 2015,
Amount to WVU: $426,427, Amount Total: $426,427

3. "Remote Thermal Ion Measurements and Integrated Magnetospheric Modeling"
(Science PI: Amy Keesee, West Virginia University), West Virginia Experimental Program to Stimulate Competitive Research (EPSCoR) through NASA
July 12, 2010 – July 11, 2013
Amount to PAC group: $206,822, Amount Total: $750,000

4. "Investigation of the structure and dynamics of asymmetric reconnection at the dayside magnetopause"
(PI: Michael Shay, University of Delaware), NASA Geospace Sciences
January 1, 2011 – December 31, 2013
Amount to WVU: $0, Amount Total: $355,783

5. "Heating and Dynamics in the Coupled Chromosphere-Corona System"
(PI: J. A. Klimchuk, NASA-Goddard Space Flight Center), NASA Heliophysics Supporting Research
April 1, 2015 - March 31, 2018
Amount to WVU: $0, Amount: $328,446

6. "SHINE Collaborative Research: Observational and Theoretical Investigation of Solar Flare Ribbon Elongation"
(PI: Jiong Qiu, Montana State University), NSF Solar Heliospheric and Interplanetary Environment (SHINE)
May 16, 2015 - May 15, 2018
Amount to WVU: $174,283, Amount Total: $347,818

7. "Signatures of Multiple Reconnection X-lines at the Magnetopause"
(PI: Stefan Eriksson, University of Colorado, Boulder), NASA Heliophysics Guest Investigator
February 15, 2016 - February 14, 2019
Amount to WVU: $84,995, Amount Total: $385,920

8. "Stabilization of Reconnection from Diamagnetic Drifts and Flow Shear at the Dayside Magnetopause"
(PI: P. A. Cassak, West Virginia University), NASA Heliophysics Supporting Research
March 16, 2016 - March 15, 2019
Amount to WVU: $235,033, Amount Total: $450,002

9. "PREEVENTS Track 2: Integrated Modeling of Extreme Space Weather Events from Electron to Global Scales"
(PI: G. Tóth, University of Michigan), NSF
August 1, 2017 - July 31, 2022
Amount to WVU: $0, Amount: $2,016,321

10. "GEM: Global vs. Local Control of Solar Wind-Magnetospheric Coupling"
(PI: P. A. Cassak, West Virginia University), NSF Geospace Environment Modeling
August 1, 2017 - July 31, 2020
Amount to WVU: $145,354, Amount total: $267,190

11. "Using Kinetic Entropy to Understand Dissipation in Reconnection and Turbulence"
(PI: P. A. Cassak, West Virginia University), NSF/DOE Partnership in Basic Plasma Science and Engineering
August 15, 2018 - August 14, 2021
Amount to WVU: $375,000, Amount total: $375,000

12. "MRI: Development of the PHAse Space MeAsurements (PHASMA) Experiment"
(PI: Earl Scime, West Virginia University), NSF (MRI)
July 1, 2018 - June 30, 2019
Amount to WVU: $375,000, Amount total: $375,000

13. "From Large to Small Scales and Back: Integrating Observations, Modeling, and Laboratory Experiments of Heliophysics"
(PI: Weichao Tu, West Virginia University), NASA (EPSCoR)
May 16, 2019 – May 15, 2022
Amount to WVU: $750,000, Amount total: $750,000

14. "Center for KINetic Experiment, Theory, and Integrated Computation (KINETIC) Physics"
(PI: Earl Scime, West Virginia University), DOE (EPSCoR)
August 15, 2019 – August 14, 2021
Amount to WVU: $2,000,000, Amount total: $2,000,000

15. "FDSS: Faculty Development in a Multifaceted Geospace Program at West Virginia University"
(PI: Paul Cassak, West Virginia University), NSF (FDSS)
August 1, 2020 – July 31, 2025
Amount to WVU: $1,500,000, Amount total: $1,500,000

16. "Center for KINetic Experiment, Theory, and Integrated Computation (KINETIC) Physics"
(PI: Earl Scime, West Virginia University), DOE (EPSCoR)
August 15, 2021 – August 14, 2023
Amount to WVU: $2,250,000, Amount total: $2,250,000

17. "Dynamics and statistical properties of Earth's magnetopause X-lines and flux transfer events"
(PI: Yuxi Chen, University of Michigan), NASA (HSR)
August 17, 2021 – August 16, 2024
Amount to WVU: $86,100

18. "ANSWERS: LARGE: Ion-Neutral Coupling in Geospace and its Impact on Space Weather"
(PI: Piyush Mehta, West Virginia University), NSF
August 17, 2021 – August 16, 2024
Amount to WVU: $2,400,000

19. "Understanding energy conversion in magnetotail reconnection using kinetic entropy"
(PI: Haoming Liang, University of Maryland), NASA (ECIP)
April 18, 2023 – April 17, 2027
Amount to WVU: $0, Amount total: $700,000

20. "Relative Entropy in Reconnection and Turbulence: Quantifying its Characteristics and the Influence of Electromagnetic Fields"
(PI: Matthew Argall, University of New Hampshire), NASA (HGI)
May 1, 2023 – April 30, 2026
Amount to WVU: $150,000

21. "Collaborative Research: Energy Conversion Beyond the First Law of Thermodynamics in Non-Equilibrium Plasmas"
(PI: Paul Cassak, West Virginia University), NSF (IIRP)
July 15, 2023 – July 14, 2026
Amount to WVU: $474,996, Amount total: $474,996

22. "Center for KINetic Experiment, Theory, and Integrated Computation (KINETIC) Physics"
(PI: Earl Scime, West Virginia University), DOE (EPSCoR)
August 15, 2023 – August 14, 2025
Amount to WVU: $4,500,000, Amount total: $4,500,000

23. "The effect of asymmetries on heating and its mechanisms in magnetic reconnection"
(PI: Paul Cassak, West Virginia University), NASA (FINESST)
August 15, 2023 – August 14, 2026
Amount to WVU: $144,000, Amount total: $144,000

24. "Fundamentals of Energy Conversion: The Role of Pressure-Strain Interaction in Magnetic Reconnection"
(PI: Paul Cassak, West Virginia University), NASA (HTMS)
September 1, 2023 – August 30, 2026
Amount to WVU: $759,233, Amount total: $1,350,000

25. "Understanding Energy Partitioning in Collisionless Shocks"
(PI: Damiano Caprioli, University of Chicago), NASA (HTMS)
September 1, 2023 – August 30, 2026
Amount to WVU: $165,000

FEDERAL AND INTERNAL OUTREACH FUNDING

1. ""What's the Weather in Space?": An Exhibit at the Children's Discovery Museum of West Virginia" (PI: Paul Cassak, West Virginia University), West Virginia University Public Service Grant
   July 1, 2013 – June 30, 2014, Total Amount: $8,696
2. "Bringing the Magnetospheric Multiscale Satellite (MMS) to the Public" (PI: J. L. Bryan, Children's Discovery Museum of West Virginia), NASA
   February 18, 2016 – February 17, 2017, Amount to WVU: $0, Total Amount: $13,125
3. "A Terrella for the "Space Weather" Exhibit at the Children's Discovery Museum of West Virginia" (PI: J. L. Bryan, Children's Discovery Museum of West Virginia), NASA
   June 6, 2016 – June 5, 2017, Amount to WVU: $0, Total Amount: $20,000
4. "Science Kits for Rural Elementary Schools in West Virginia" (PI: Paul Cassak, West Virginia University), West Virginia University Community Engagement Grant
   July 1, 2017 – June 30, 2018, Total Amount: $8,350

MENTORSHIP

Postdoctoral Researchers:

1. Mahmud Hasan Barbhuiya, 8/2023 - present
2. Subash Adhikari, 8/2022 - 6/2024
3. Vitor Souza (visiting Postdoctoral Researcher from INPE, Brazil), 3/2018 - 9/2018
4. Haoming Liang, 4/2017 - 1/2020
   Status - became Postdoctoral Researcher at University of Alabama - Huntsville
5. Raymond Fermo, 6/2013 - 6/2014
   Status - became Postdoctoral Researcher at University of Alabama - Huntsville

Graduate Students:

1. Hrithik, 7/2025 - present
2. Timothy Olszanski, 1/2025 - present (co-mentoring with Maura McLaughlin)
3. Hasith Perera, 8/2021 - present
4. Will Ryan, 8/2021 - present
5. Aleksandra Abova-Volkova, 8/2020 - present
6. Regis John, 4/2020 - present
7. Mahmud Hasan Barbhuiya, 5/2018 - 8/2022
   Status - Graduated with Ph.D., then postdoc at WVU
8. Milton Arencibia, 5/2015 - 12/2022
   Status - Graduated with Ph.D., employed at NOAA
9. Robert Baylor, 8/2010 - 12/2013
   Status - Graduated with M.S., Ph.D. student in Civil Engineering, WVU
10. Matthew Beidler, 6/2009 - 10/2015
    Status - Graduated with Ph.D., then Postdoctoral Researcher, University of Wisconsin-Madison, then Staff Scientist, Oak Ridge National Laboratory

11. Colin Komar, 6/2009 - 5/2015
Status - Graduated with Ph.D., Research Associate, NASA Goddard Space Flight Center, then employed by a government agency

12. Lucas Shepherd, 6/2009 - 8/2014
Status - Graduated with Ph.D., then Physics Teacher at Wheeling Park High School

Undergraduate Students:

1. Dylan Conner, 5/2019 - 8/2021
Status - Graduated with B.S., became graduate student in Physics at WVU

2. Christopher Doss, 6/2014 - 5/2016
Status - Graduated with B.S., became graduate student in Physics at University of Colorado

3. Evan Graber, 5/2012 - 5/2013
Status - Graduated with B.S., became graduate student in Physics at University of Virginia

4. Robert Baylor, 1/2009 - 8/2010
Status - Graduated with B.S., became graduate student in Physics at WVU

Graduate Student Dissertations:

1. "Energy Conversion in Plasmas out of Local Thermodynamic Equilibrium: A Kinetic Theory Perspective," M. H. Barbhuiya, West Virginia University, August 2023

2. "Scaling Theory of 3D Magnetic Reconnection X-Line Spreading," M. Arencibia, West Virginia University, November 2022

3. "Theory and Simulations of Incomplete Reconnection During Sawteeth Due to Diamagnetic Effects," M. T. Beidler, West Virginia University, October 2015

4. "The Nature of Magnetic Reconnection at the Dayside Magnetopause," C. M. Komar, Doctoral Dissertation, West Virginia University, May 2015

5. "A Study of Magnetic Reconnection: From 2D Energy Release to 3D Spreading and Localization," L. S. Shepherd, Doctoral Dissertation, West Virginia University, August 2014