Leach Science Center 2130
380 Duncan Dr.
Auburn, AL 36849

Chen Shi
Curriculum Vitae

chenshi@auburn.edu
ORCID: 0000-0002-2582-7085
Google Scholar

Dr. Chen Shi is an assistant professor working at Department of Physics of Auburn University. His research interests include *onset and evolution of fast magnetic reconnection*, *theory of solar wind turbulence*, and *heating and acceleration of solar corona and solar wind*. His work includes developing magnetohydrodynamic (MHD) theories, building and running parallelized MHD simulation programs, and analysis of satellite (Parker Solar Probe, WIND, etc.) data.

Employment

Assistant Professor, *Department of Physics, Auburn University, Auburn, AL* — August 2025 —
Assistant Researcher, *Department of Earth, Planetary, and Space Sciences, UCLA, Los Angeles, CA* — April 2023 — July 2025
Postdoctoral Researcher, *Department of Earth, Planetary, and Space Sciences, UCLA, Los Angeles, CA* — July 2020 — March 2023

Education

Ph.D. in Geophysics and Space Physics, *University of California, Los Angeles, Los Angeles, CA* — June 2020
Thesis title: *Magnetic Reconnection and Turbulence in the Inner Heliosphere*
B.S. in Space Science & Technology with honors, *Peking University, Beijing, China* — July 2015

Skills

Programming — Expert at **C/C++, Fortran, Python, IDL, Parallel computing (MPI, OpenMP, Pthreads)**; familiar with **MATLAB, MATHEMATICA**
Communication — Mandarin, English & Japanese

Awards and Fellowships

Vincenzo Ferraro Award for Best PhD thesis — 2021
***Physics of Plasmas* Early Career Collection 2022** — 2022
NASA Group Achievement Award to Parker Solar Probe Team — 2023
EPSS department fellowship, *University of California, Los Angeles* — 2015
Outstanding College Student of Beijing, *Bureau of Education of Beijing* — 2014
First place of Henan Province, *Chinese Physics Olympiad* — 2010

Funds

NASA Early Career Investigator Program #80NSSC23K1064, PI, *Properties and origins of magnetic switchbacks and switchback patches in the solar wind* — 2023-2027
NSF SHINE #2229566, PI, *Structures in the solar corona and solar wind and their interaction with the turbulence* — 2022-2025
NSF GEM #2247758, Co-I, *How Upstream Solar Wind Conditions Determine the Properties of the Foreshock Backstreaming Ions* — 2023-2026
NSF ACCESS Allocation, PI, *3D MHD Simulations of Magnetic Reconnection and Turbulence in the Heliosphere* — 2020-2023

Media Reports

San Diego Supercomputer Center News Releases, *UCLA researchers use UC San Diego-based resource to simulate solar wind behavior, Kimberly Mann Bruch* — 2021

Activities & Outreaches

- Organizer of GEM Focus Group *Magnetic Reconnection: The Key to Understanding Earth's Space Environment* — 2025-2029
- Guest editor for *Frontiers in Astronomy and Space Sciences*, Topic: *Solar Wind Turbulence: Its Origins, Evolution, and Impacts*
- Served as a panelist for proposal review panels of NSF and NASA
- Convener of AGU fall meeting Session: *Fundamental Physics of the Solar Corona and Inner Heliosphere* — 2022-2024
- Served as reviewer for multiple journals including *ApJ, ApJL, JPP, PoP, JGR, A&A, etc.*
- Host space physics seminar at UCLA — 2023
- Served as judge for *Outstanding Student Presentation Awards* program in AGU Fall meetings
- ***Booth: Our Magnetic Sun***, EXPLORE YOUR UNIVERSE outreach event, UCLA — 2020, 2022-2024
- ***Booth: Our Exciting Sun***, EXPLORE YOUR UNIVERSE outreach event, UCLA — 2018

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Teaching Experience

- Instruct PhD students (Nikos Sioulas, Zesen Huang, Yuliang Ding, Lizet Casillas) and undergraduate students (Yuliang Ding, William Vong) to conduct research
- Organize and co-host UCLA *Space Physics Journal Club* Fall 2023
- Co-lecturer of UCLA graduate course *EPSS 298: MHD Turbulence and Magnetic reconnection* Winter 2025
- Co-lecturer of UCLA graduate course *EPSS M263A: Solar System Magnetohydrodynamics* Spring 2024
- Co-lecturer of UCLA graduate course *EPSS 298: Particle-in-Cell and MHD simulations* Spring 2023
- Co-lecturer of UCLA graduate course *EPSS 298: MHD Turbulence and Magnetic reconnection* Spring 2022
- Invited guest lecture on *Resistive tearing mode instability and magnetic reconnection*, 2021-2024, University of Science and Technology of China
- Student day tutorial talk: *MHD waves and turbulence in the expanding solar wind*, SHINE Conference, 2019, Boulder, Colorado
- Teaching assistant & lab instructor, *Oceanography*, 2016 spring quarter, UCLA

Selected Oral Presentations

- Unveiling the key physical processes shaping the solar wind, *Colloquium of Dartmouth College*, 2024
- Evolution of MHD turbulence in the expanding solar wind: residual energy and intermittency, *AGU Annual Meeting*, 2023
- Understanding the solar corona and wind in the epoch of Parker Solar Probe, *Colloquium of University of Delaware*, 2023
- Turbulence and large-scale structures in the expanding solar wind, *SHINE workshop*, ***invited scene-setting talk***, 2022
- Alfvén wave as a power source of the solar wind: energy and momentum deposition and evolution of switchbacks, *SHINE workshop*, ***invited scene-setting talk***, 2022
- Patches of the magnetic switchbacks: hints of their origins, *AGU Fall Meeting*, ***invited***, 2021
- Ion and electron temperatures in the solar wind and their correlations with the solar wind speed, *AGU Fall Meeting*, 2021
- MHD Turbulence in the Solar Wind: Observations from First Five Encounters of Parker Solar Probe, *AGU Fall Meeting*, 2020

Publications

1. **Shi, C.**, Sioulas, N., Huang, Z. et al. Evolution of Magnetohydrodynamic turbulence in the expanding solar wind: residual energy and intermittency (2025). *The Astrophysical Journal*, 979, 152.
2. **Shi, C.**, Tenerani, A., Rappazzo, A. F. et al. LAPS: An MPI-parallelized 3D pseudo-spectral Hall-MHD simulation code incorporating the expanding box model (2024). *Frontiers in Astronomy and Space Sciences*, 11, 1412905.
3. **Shi, C.**, Velli, M., Toth, G. et al. Analytic model and MHD simulations of three-dimensional magnetic switchbacks (2024). *The Astrophysical Journal Letters*, 964 L28.
4. **Shi, C.**, Velli, M., Lionello, R. et al. Proton and electron temperatures in the solar wind and their correlations with the solar wind speed (2023). *The Astrophysical Journal*, 944, 82.
5. **Shi, C.**, Velli, M., Bale, S. D. et al. Acceleration of polytropic solar wind: Parker Solar Probe observation and one-dimensional model (2022). *Physics of Plasmas*, 29, 122901.
6. **Shi, C.**, Panasenco, O., Velli, M. et al. Patches of magnetic switchbacks and their origins (2022). *The Astrophysical Journal*, 934, 152.
7. **Shi, C.** Instabilities in a current sheet with plasma jet (2022). *Journal of Plasma Physics*, 88, 4.
8. **Shi, C.**, Velli, M., Tenerani, A. et al. Influence of the heliospheric current sheet on the evolution of solar wind turbulence (2022). *The Astrophysical Journal*, 928, 93.
9. **Shi, C.**, Artemyev, A., Velli, M. et al. Stability of the magnetotail current sheet with normal magnetic field and field-aligned plasma flows (2021). *Journal of Geophysical Research: Space Physics*, 126, 11, e2021JA029711.
10. **Shi, C.**, Velli, M., Panasenco, O., et al. Alfvénic versus non-Alfvénic turbulence in the inner heliosphere as observed by Parker Solar Probe (2021). *Astronomy & Astrophysics*, 650, A21.
11. **Shi, C.**, Velli, M., Pucci, F., et al. Oblique Tearing Mode Instability: Guide Field and Hall Effect (2020). *The Astrophysical Journal*, 902, 2.
12. **Shi, C.**, Velli, M., Tenerani, A., et al. Propagation of Alfvén waves in the expanding solar wind with the fast-slow stream interaction (2020). *The Astrophysical Journal*, 888, 2.
13. **Shi, C.**, Tenerani, A., Velli, M., et al. Fast recursive reconnection and the Hall effect: Hall-MHD simulations (2019). *The Astrophysical Journal*, 883, 2.
14. **Shi, C.**, Velli, M., & Tenerani, A. Marginal stability of Sweet–Parker type current sheets at low Lundquist numbers (2018). *The Astrophysical Journal*, 859, 2.

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15. Jia, Y., Chen, Y., Chen, Y., et al. Evolutionary Dynamics of Counterhelical Magnetic Flux Ropes (2024). *The Astrophysical Journal*, 977 267.
16. Huang, Z., Velli, M., Shi, C., et al. Dominance of 2 Minute Oscillations near the Alfvén Surface (2024). *The Astrophysical Journal Letters*, 977, L12.
17. Liu, T. Z., Shi, X., Hartinger, M. D., et al. Global observations of geomagnetically induced currents caused by an extremely intense density pulse during a coronal mass ejection (2024). *Space Weather*, 22, 10, e2024SW003993.
18. Telloni, D., Sorriso-Valvo, L., Zank, G. P., et al. Metis Observation of the Onset of Fully Developed Turbulence in the Solar Corona (2024). *The Astrophysical Journal Letters*, 973, L48
19. Huang, Z., Shi, C., Velli, M., et al. Solar Wind Structures from the Gaussianity of Magnetic Magnitude (2024). *The Astrophysical Journal Letters*, 973, L26
20. Rivera, Y. J., Badman, S. T., Stevens, M. L., et al. In situ observations of large-amplitude Alfvén waves heating and accelerating the solar wind (2024). *Science*, 385, 6712, 962-966
21. Jia, Y., Lai, H., Miles, N., et al. Magnetic Field Enhancements in the Solar Wind: Diverse Processes Manifesting a Uniform Observation Type? (2024). *Journal of Geophysical Research: Space Physics*, 129, 3
22. Khoo, L. Y., McComas, D. J., Rankin, J. S., et al. Compensating for gyroradius effects in beamlines with small Helmholtz coils (2023). *Rev. Sci. Instrum.*, 94, 035102
23. Telloni, D., Romoli, M., Velli, M., et al. Coronal Heating Rate in the Slow Solar Wind (2023). *The Astrophysical Journal Letters*, 955, L4
24. Telloni, D., Romoli, M., Velli, M., et al. Energy Budget in the Solar Corona (2023). *The Astrophysical Journal*, 954, 108
25. Sioulas, N., Velli, M., Huang, Z., et al. On the Evolution of the Anisotropic Scaling of Magnetohydrodynamic Turbulence in the Inner Heliosphere (2023). *The Astrophysical Journal*, 951, 141
26. Huang, Z., Sioulas, N., Shi, C., et al. New Observations of Solar Wind 1/f Turbulence Spectrum from Parker Solar Probe (2023). *The Astrophysical Journal Letters*, 950, L8
27. Tenerani, A., González, C., Sioulas, N., et al. Dispersive and kinetic effects on kinked Alfvén wave packets: A comparative study with fluid and hybrid models (2023). *Physics of Plasmas*, 30, 3
28. Raouafi, N., Matteini, L., Squire, J., et al. Parker Solar Probe: Four Years of Discoveries at Solar Cycle Minimum (2023). *Space Science Reviews*, 219, 8.
29. Sioulas, N., Huang, Z., Shi, C., et al. Magnetic field spectral evolution in the inner heliosphere (2023). *The Astrophysical Journal Letters*, 943, L8.
30. Artemyev, A., Shi, C., Lin, Y., et al. Ion Kinetics of Plasma Flows: Earth's Magnetosheath versus Solar Wind (2022). *The Astrophysical Journal*, 939, 85.
31. Sioulas, N., Shi, C., Huang, Z., et al. Preferential Heating of Protons over Electrons from Coherent Structures during the First Perihelion of the Parker Solar Probe (2022). *The Astrophysical Journal Letters*, 935, L29.
32. Huang, Z., Shi, C., Sioulas, N., et al. Conservation of Total Wave Action in the Expanding Solar Wind (2022). *The Astrophysical Journal*, 935, 60.
33. Telloni, D., Adhikari, L., Zank, G., et al. Observation and Modeling of the Solar Wind Turbulence Evolution in the Sub-Mercury Inner Heliosphere (2022). *The Astrophysical Journal Letters*, 938, L8.
34. Sioulas, N., Huang, Z., Velli, M., et al. Magnetic Field Intermittency in the Solar Wind: Parker Solar Probe and SolO Observations Ranging from the Alfvén Region up to 1 AU (2022). *The Astrophysical Journal*, 934, 143.
35. Sioulas, N., Velli, M., Chhiber, R., et al. Statistical analysis of intermittency and its association with proton heating in the near Sun environment (2022). *The Astrophysical Journal*, 927, 140.
36. Réville, V., Fargette, N., Rouillard, A. P., et al. Flux rope and dynamics of the heliospheric current sheet: Study of the Parker Solar Probe and Solar Orbiter conjunction of June 2020 (2022). *Astronomy & Astrophysics*, 659, A110.
37. Tenerani, A., Sioulas, N., Matteini, L., et al. Evolution of Switchbacks in the Inner Heliosphere (2021). *The Astrophysical Journal Letters*, 919, L31.
38. Telloni, D., Sorriso-Valvo, L., Woodham, L. D., et al. Evolution of Solar Wind Turbulence from 0.1 to 1 au during the First Parker Solar Probe–Solar Orbiter Radial Alignment (2021). *The Astrophysical Journal Letters*, 912, L21.
39. Réville, V., Velli, M., Rouillard, A. P., et al. Tearing Instability and Periodic Density Perturbations in the Slow Solar Wind (2020). *The Astrophysical Journal Letters*, 895, L20.
40. Pucci, F., Velli, M., Shi, C., et al. Onset of fast magnetic reconnection and particle energization in laboratory and space plasmas (2020). *Journal of Plasma Physics*, 86(6), 535860601.

41. Réville, V., Velli, M., Panasenco, O., et al. The role of Alfvén wave dynamics on the large scale properties of the solar wind: comparing a MHD simulation with PSP E1 data (2020). *The Astrophysical Journal Supplement Series*, 246, 2.
42. Tenerani, A., Velli, M., Matteini, L., et al. Magnetic field kinks and folds in the solar wind (2020). *The Astrophysical Journal Supplement Series*, 246, 2.
43. Panasenco, O., Velli, M., D'Amicis, R., et al. Exploring Solar Wind Origins and Connecting Plasma Flows from the Parker Solar Probe to 1 au: Nonspherical Source Surface and Alfvénic Fluctuations (2020). *The Astrophysical Journal Supplement Series*, 246, 2.
44. Liu, H., Zong, Q.-G., Zhang, H., et al. The geometry of an electron scale magnetic cavity in the plasma sheet (2019). *Geophysical Research Letters*, 46, 16.
45. Lu, S., Angelopoulos, V., Artemyev, A. V., et al. Turbulence and particle acceleration in collisionless magnetic reconnection: effects of temperature inhomogeneity across pre-reconnection current sheet (2019). *The Astrophysical Journal*, 878, 2,