

Assistant Professor  
Department of Space Science,  
University of Alabama in Huntsville,  
320 Sparkman Dr NW, Huntsville, AL 35805  
Email: lz0009@uah.edu

Dr. Ling-ling Zhao

## Education

- Sep. 2009 – Jul. 2013 **National Space Science Center (NSSC), Chinese Academy of Sciences**, Beijing, China, Ph.D. in Space Physics;  
**Thesis title:** Modulation of Galactic Cosmic Rays in the Inner Heliosphere
- Sep. 2005 – Jul. 2009 **Henan Normal University (HNU)**, Henan, China, B.S. in Information and Computing science.

## Work Experience

- Aug. 2021 – Present **Assistant Professor:** Department of Space Science, University of Alabama in Huntsville (UAH).
- Oct. 2018 – Aug. 2021 **Research Scientist I:** Center for Space Plasma and Aeronomic Research (CSPAR), University of Alabama in Huntsville (UAH).
- Mar. 2018 – Oct. 2018 **Postdoctoral Research Assistant III:** CSPAR, UAH.
- Mar. 2017 – Mar. 2018 **Visiting Scholar:** CSPAR, UAH.
- Aug. 2014 – Mar. 2018 **Lecturer:** University of Chinese Academy of Sciences.
- Jul. 2013 – Jul. 2014 **Assistant Researcher:** National Space Science Center, Chinese Academy of Sciences.

## Research Grants

- ♣ NASA Heliophysics Living with a Star (LWS) Science Program, “Diffusive Particle Acceleration and Extreme Solar Energetic Particle Gradual Events”, 80NSSC20K1783, \$866,261, 2020-2024. Role: **PI**
- ♣ NASA Heliophysics LWS Science Program, “Generation of Suprathermal Seed Particle Populations by Dynamic Small-scale Flux Ropes in the Vicinity of Traveling Shocks”, 80NSSC21K1319, \$946,102, 2021-2025. Role: **Co-I**

## Teaching Activities

- ♣ Graduate course: **Analysis of Spacecraft Data**, Department of Space Science, UAH, Spring 2022
- ♣ Graduate course: **Waves in Fluids**, Department of Space Science, UAH, Fall 2022

## Honors and Awards

- ♣ UAH Researcher of the Year Award, 2020
- ♣ CSPAR Science Achievement Award, 2019
- ♣ Scholarship Award from China Scholarship Council (CSC), 2017
- ♣ Outstanding Graduates Award of Chinese Academy of Sciences, 2013

---

## Research Experience

The goal of my academic career is to better understand the interplay of various heliospheric processes in both the inner and outer heliosphere. Broadly speaking, these include **magnetized turbulence, waves, shocks, and energetic particles**. My research combine theoretical development, numerical simulations, and observational analysis, with a focus on new observations obtained by the current *Parker Solar Probe* and *Solar Orbiter* missions. To be more specific, some of my recent research activities in space science are summarized below.

- ♣ Analyze turbulent properties of the sub-Alfvénic solar wind measured by Parker Solar Probe.
- ♣ Investigate the radial evolution of turbulence anisotropy.
- ♣ Identify small-scale magnetic structures in the solar wind.
- ♣ Investigate turbulence and wave transmission at interplanetary shocks.
- ♣ Study the MHD and ion kinetic waves in the magnetic field-aligned solar wind flows.
- ♣ Study particle acceleration due to magnetic reconnection in the solar wind.

---

## Professional Services

- ♣ 2021 AGU Fall meeting oral session SH44B: Small-scale coherent magnetic structures in the solar wind and particle energization, **Primary Convener & Session Chair**
- ♣ NASA Living with a Star (LWS) Proposal Reviewer, 2022
- ♣ Review Editor for **Frontiers** in Physics and **Frontiers** in Astronomy and Space Sciences, 2021-present
- ♣ Reviewer for *The Astrophysical Journal*, *Nature Astronomy*, *Frontiers*

---

## Memberships

- ♣ Member of AGU (American Geophysics Union), 2015-present
- ♣ Member of APS (American Physics Society), 2021

---

## Journal Papers

- [1] **L.-L. Zhao**, G. P. Zank, L. Adhikari, M. Nakanotani, Inertial-range magnetic fluctuation anisotropy observed from PSP's first seven orbits, *Astrophys. J. Lett.*, 924, L5, doi:10.3847/2041-8213/ac4415, **2022**.
- [2] **L.-L. Zhao**, G. P. Zank, D. Telloni, M. Stevens, J. C. Kasper, and S. D. Bale, The turbulent properties of the sub-Alfvénic solar wind measured by the Parker Solar Probe, *Astrophys. J. Lett.*, 928, L15, doi:10.3847/2041-8213/ac5fb0, **2022**.
- [3] G. P. Zank, **L.-L. Zhao**, L. Adhikari, D. Telloni, J. C. Kasper, M. Stevens, A. Rahmati, and S. D. Bale, Turbulence in the Sub-Alfvénic Solar Wind, *Astrophys. J. Lett.*, 926, L16, doi:10.3847/2041-8213/ac51da, **2022**.
- [4] K. T. Van Eck, J. A. le Roux, Y. Chen, **L.-L. Zhao**, and N. Thompson, Investigating Particle Acceleration by Dynamic Small-Scale Flux-Ropes Behind Interplanetary Shocks in the Inner Heliosphere, *Astrophys. J.*, In press, **2022**.
- [5] B.-B. Wang, G. P. Zank, **L.-L. Zhao**, and L. Adhikari, Turbulent Cosmic Ray Mediated Shocks in the Hot Ionized Interstellar Medium, *Astrophys. J.*, In press, **2022**.

- [6] L. Adhikari, G. P. Zank, **L.-L. Zhao**, and D. Telloni, MHD turbulent power anisotropy in the inner heliosphere, *Astrophys. J.*, In press, **2022**.
- [7] D. Telloni, L. Adhikari, G. P. Zank, **L.-L. Zhao**, L. Sorriso-Valvo, E. Antonucci, S. Giordano, and S. Mancuso, Possible Evidence for Shear-Driven Kelvin-Helmholtz Instability along the Boundary of Fast and Slow Solar Wind in the Corona, *Astrophys. J.*, 929, 98, doi:10.3847/1538-4357/ac5cc3, **2022**.
- [8] B.-B. Wang, G. P. Zank, L. Adhikari, and **L.-L. Zhao**, On the conservation of turbulence energy in turbulence transport models, *Astrophys. J.*, 928, 176, doi:10.3847/1538-4357/ac596e, **2022**.
- [9] M. Nakanotani, G. P. Zank, and **L.-L. Zhao**, Turbulence Dominated Shock Waves: 2D Hybrid Kinetic Simulations, *Astrophys. J.*, 926, 109, doi:10.3847/1538-4357/ac4781, **2022**.
- [10] T. Getachew, D. J. McComas, C. J. Joyce, E. Palmerio, E. R. Christian, C. M. S. Cohen, M. I. Desai, J. Giacalone, M. E. Hill, W. H. Matthaeus, R. L. McNutt, D. G. Mitchell, J. G. Mitchell, J. S. Rankin, E. C. Roelof, N. A. Schwadron, J. R. Szalay, G. P. Zank, **L.-L. Zhao**, B. J. Lynch, T. D. Phan, S. D. Bale, P. L. Whittlesey, and J. C. Kasper, PSP/IS $\odot$ IS Observations of a Lower-energy Solar Energetic Particle Event Associated with a Streamer Blowout Coronal Mass Ejection During Encounter 6, *Astrophys. J.*, 925, 212, doi:10.3847/1538-4357/ac408f, **2022**.
- [11] **L.-L. Zhao**, G. P. Zank, J. S. He, D. Telloni, L. Adhikari, M. Nakanotani, J. C. Kasper, and S. D. Bale, MHD and ion kinetic waves in field-aligned flows observed by Parker Solar Probe, *Astrophys. J.*, 922, 188, doi:10.3847/1538-4357/ac28fb, **2021**.
- [12] M. Nakanotani, G. P. Zank, and **L.-L. Zhao**, Interaction between multiple current sheets and a shock wave: 2D Hybrid kinetic simulations, *Astrophys. J.*, 922, 219, doi:10.3847/1538-4357/ac2e06, **2021**.
- [13] L. Adhikari, G. P. Zank, and **L.-L. Zhao**, The transport and evolution of MHD turbulence throughout the heliosphere: Models and observations, *Fluids*, 6, 368, doi:10.3390/fluids6100368, **2021**.
- [14] S. Fu, **L.-L. Zhao\***, X. P. Zhang, and Y. Li, Comparison of Anomalous and Galactic Cosmic Ray Oxygen at 1 au during 1997-2020, *Astrophys. J. Lett.*, 920, L12, doi:10.3847/2041-8213/ac29b9, **2021**.
- [15] E. K. J. Kilpua, S. W. Good, M. Ala-Lahti, A. Osmane, S. Pal, J. E. Soljento, **L.-L. Zhao**, and S. Bale, Structure and fluctuations of a slow ICME sheath observed at 0.5 au by Parker Solar Probe, *Astronomy & Astrophysics*, doi: 10.1051/0004-6361/202142191, **2022**.
- [16] **L.-L. Zhao**, G. P. Zank, J. S. He, D. Telloni, Q. Hu, G. Li, M. Nakanotani, L. Adhikari, E. K. J. Kilpua, T. S. Horbury, H. O'Brien, V. Evans, and V. Angelini, Turbulence/wave transmission at an ICME-driven shock observed by Solar Orbiter and Wind, *Astronomy & Astrophysics Solar Orbiter special issue*, 656, A3, doi:10.1051/0004-6361/202140450, **2021**.
- [17] G. P. Zank, M. Nakanotani, **L.-L. Zhao**, S. Du, L. Adhikari, H. Che, and J. A. Le Roux, Flux ropes, turbulence, and collisionless perpendicular shock waves: high plasma beta case, *Astrophys. J.*, 913, 127, doi:10.3847/1538-4357/abf7c8, **2021**.
- [18] L. Adhikari, G. P. Zank, **L.-L. Zhao**, D. Telloni, T. S. Horbury, H. O'Brien, V. Evans, V. Angelini, C. J. Owen, P. Louarn, and A. Fedorov, Evolution of anisotropic turbulence in the fast and slow solar wind: theory and solar orbiter measurements, *Astronomy & Astrophysics*, 656, A6, doi:10.1051/0004-6361/202140672, **2021**.
- [19] S. Fu, X. P. Zhang, **L.-L. Zhao\***, and Y. Li, Variations of the Galactic cosmic rays in the Recent Solar Cycles, *Astrophys. J. Supplement*, 254, 37, doi:10.3847/1538-4365/abf936, **2021**.
- [20] Y. Chen, Q. Hu, **L.-L. Zhao**, J. C. Kasper, and J. Huang, Small-scale magnetic flux ropes with field-aligned flows via the PSP in-situ observations, *Astrophys. J.*, 914, 108, doi:10.3847/1538-4357/abfd30, **2021**.
- [21] D. Telloni, L. Sorriso-Valvo, L. D. Woodham, O. Panasenco, M. Velli, F. Carbone, G. P. Zank, R. Bruno, D. Perrone, M. Nakanotani, C. Shi, R. D'Amicis, R. D. Marco, V. K. Jagarlamudi, K. Steinvall, R. Marino,

- L. Adhikari, **L.-L. Zhao**, H. Liang, R. Laker, T. S. Horbury, S. D. Bale, M. Pulupa, D. M. Malaspina, R. J. MacDowall, K. Goetz, et al., Evolution of solar wind turbulence from 0.1 to 1 AU during the First Parker Solar Probe – Solar Orbiter radial alignment, *Astrophys. J. Lett.*, 912, L21, doi:10.3847/2041-8213/abf7d1, **2021**.
- [22] H. Liang, G. P. Zank, M. Nakanotani, and **L.-L. Zhao**, Assessing the role of interchange reconnection in forming switchbacks, *Astrophys. J.*, 917, 110, doi:10.3847/1538-4357/ac0a73, **2021**.
- [23] D. Telloni, C. Scolini, C. Möstl, G. P. Zank, **L.-L. Zhao**, et al., Study of two interacting interplanetary coronal mass ejections encountered by solar orbiter during its first perihelion passage, *Astronomy & Astrophysics*, 656, A5, doi:10.1051/0004-6361/202140648, **2021**.
- [24] G. P. Zank, **L.-L. Zhao**, L. Adhikari, D. Telloni, J. C. Kasper, and S. D. Bale, Turbulence Transport in the Solar Corona: Theory, Modeling, and Parker Solar Probe, *Physics of Plasma*, 28, 080501, doi:10.1063/5.0055692, **2021**.
- [25] Q. Hu, W. He, **L.-L. Zhao**, and E. Lu, Configuration of a Magnetic Cloud from Solar Orbiter and Wind In-situ Spacecraft Measurements, *Frontiers in Physics*, 9, 706056, doi: 10.3389/fphy.2021.706056, **2021**.
- [26] J. P. Eastwood, J. E. Stawarz, T. D. Phan, R. Laker, S. Robertson, **L.-L. Zhao**, G. P. Zank, B. Lavraud, M. A. Shay, V. Evans, V. Angelini, H. O'Brien, & T. S. Horbury, Solar orbiter observations of an ion-scale flux rope confined to a bifurcated solar wind current sheet, *Astronomy & Astrophysics*, 656, A27, doi:10.1051/0004-6361/202140949, **2021**.
- [27] **L.-L. Zhao**, G. P. Zank, Q. Hu, D. Telloni, Y. Chen, L. Adhikari, M. Nakanotani, J. C. Kasper, J. Huang, S. D. Bale, K. E. Korreck, A. W. Case, M. Stevens, J. W. Bonnell, T. Dudok de Wit, K. Goetz, P. R. Harvey, R. J. MacDowall, D. M. Malaspina, M. Pulupa, D. E. Larson, R. Livi, P. Whittlesey, K. G. Klein, and N. E. Raouafi, Detection of Small Magnetic Flux Ropes from the Third and Fourth Parker Solar Probe Encounters, *Astronomy & Astrophysics PSP special issue*, 650, A12, doi:10.1051/0004-6361/202039298, **2021**.
- [28] L. Adhikari, G. P. Zank, **L.-L. Zhao**, M. Nakanotani, and S. Tasnim, Modeling proton and electron heating in the fast solar wind, *Astronomy & Astrophysics*, 650, A16, doi:10.1051/0004-6361/202039297, **2021**.
- [29] **L.-L. Zhao**, G. P. Zank, L. Adhikari, M. Nakanotani, D. Telloni, and F. Carbone, Spectral features in field-aligned solar wind turbulence from Parker Solar Probe observations, *Astrophys. J.*, 898, 113, doi:10.3847/1538-4357/ab9b7e, **2020**.
- [30] **L.-L. Zhao**, G. P. Zank, and L. F. Burlaga, Turbulence in the Very Local Interstellar Medium (VLISM), *Astrophys. J.*, 900, 166, doi:10.3847/1538-4357/ababa2, **2020**.
- [31] **L.-L. Zhao**, G. P. Zank, L. Adhikari, Q. Hu, J. C. Kasper, S. D. Bale, K. E. Korreck, A. W. Case, M. Stevens, J. W. Bonnell, T. Dudok de Wit, K. Goetz, P. R. Harvey, R. J. MacDowall, D. M. Malaspina, M. Pulupa, D. E. Larson, R. Livi, P. Whittlesey, and K. G. Klein, Identification of Magnetic Flux Ropes from Parker Solar Probe Observations during the First Encounter, *Astrophys. J. Supplement*, 246, 26, doi:10.3847/1538-4365/ab4ff1, **2020**.
- [32] G. P. Zank, M. Nakanotani, **L.-L. Zhao**, L. Adhikari, and D. Telloni, Spectral anisotropy in 2D plus slab magnetohydrodynamic turbulence in the solar wind and upper corona, *Astrophys. J.*, 900, 115, doi:10.3847/1538-4357/abad30, **2020**.
- [33] G. P. Zank, M. Nakanotani, **L.-L. Zhao**, L. Adhikari, and J. Kasper, The origin of switchbacks in the solar corona: linear theory, *Astrophys. J.*, 903, 1, doi:10.3847/1538-4357/abb828, **2020**.
- [34] M. Nakanotani, G. P. Zank, L. Adhikari, **L.-L. Zhao**, J. Giacalone, M. Opher, and J. D. Richardson, The Downwind Solar Wind: Model Comparison with Pioneer 10 Observations, *Astrophys. J. Lett.*, 901, L23, **2020**.
- [35] L. Adhikari, G. P. Zank, and **L.-L. Zhao**, A solar coronal hole and fast solar wind turbulence model and first orbit Parker Solar Probe (PSP) observations, *Astrophys. J.*, 901, 102, doi:10.3847/1538-4357/abb132, **2020**.

- [36] F. Carbone, D. Telloni, L. Sorriso-Valvo, G. P. Zank, **L.-L. Zhao**, L. Adhikari, and R. Bruno, Statistical analysis of field-aligned Alfvénic turbulence and intermittency in fast solar wind, *Universe*, 6, 116, doi:10.3390/universe6080116, **2020**.
- [37] Y. Chen, Q. Hu, **L.-L. Zhao**, J. C. Kasper, S. D. Bale, K. E. Korreck, A. W. Case, M. L. Stevens, J. W. Bonnell, K. Goetz, P. R. Harvey, K. G. Klein, D. E. Larson, R. Livi, R. J. MacDowall, D. M. Malaspina, M. Pulupa, and P. L. Whittlesey, Small-scale Magnetic Flux Ropes in the First two Parker Solar Probe Encounters, *Astrophys. J.*, 903, 76, doi:10.3847/1538-4357/abb820, **2020**.
- [38] S. W. Good, E. K. J. Kilpua, M. Ala-Lahti, A. Osmane, S. D. Bale, and **L.-L. Zhao**, Cross Helicity of the 2018 November Magnetic Cloud Observed by the Parker Solar Probe, *Astrophys. J. Lett.*, 900, L32, doi:10.3847/2041-8213/abb021, **2020**.
- [39] D. Telloni, R. D'Amicis, R. Bruno, F. Carbone, D. Perrone, G. P. Zank, **L.-L. Zhao**, M. Nakanotani, and L. Adhikari, Detection capability of flux ropes during the solar orbiter mission, *Astrophys. J. Lett.*, 899, L25, doi:10.3847/2041-8213/abacc4, **2020**.
- [40] D. Telloni, **L.-L. Zhao**, G. P. Zank, H. Liang, M. Nakanotani, L. Adhikari, F. Carbone, R. D'Amicis, D. Perrone, R. Bruno, and S. Dasso, Magnetohydrodynamic Turbulent Evolution of a Magnetic Cloud in the Outer Heliosphere, *Astrophys. J. Lett.*, 905, L12, doi:10.3847/2041-8213/abcb03, **2020**.
- [41] L. Adhikari, G. P. Zank, **L.-L. Zhao**, and G. M. Webb, Evolution of Entropy and Mediation of the Solar Wind by Turbulence, *Astrophys. J.*, 891, 34, doi:10.3847/1538-4357/ab7010, **2020**.
- [42] L. Adhikari, G. P. Zank, **L.-L. Zhao**, J. C. Kasper, K. E. Korreck, M. Stevens, A. W. Case, P. Whittlesey, and K. G. Klein, Turbulence Transport Modeling and First Orbit Parker Solar Probe (PSP) Observations, *Astrophys. J. Supplement*, 246, 38, doi:10.3847/1538-4365/ab5852, **2020**.
- [43] **L.-L. Zhao**, G. P. Zank, Q. Hu, Y. Chen, L. Adhikari, J. A. leRoux, A. Cummings, E. Stone, and L. F. Burlaga, ACR proton acceleration associated with reconnection processes beyond the heliospheric termination shock, *Astrophys. J.*, 886, 144, doi:10.3847/1538-4357/ab4db4, **2019**.
- [44] **L.-L. Zhao**, G. P. Zank, and L. Adhikari, Generation Mechanisms for Low-energy Interstellar Pickup Ions, *Astrophys. J.*, 879, 32, doi:10.3847/1538-4357/ab2381, **2019**.
- [45] **L.-L. Zhao**, G. P. Zank, Y. Chen, Q. Hu, J. A. le Roux, S. Du, and L. Adhikari, Particle acceleration at 5 AU associated with turbulence and small-scale magnetic flux ropes, *Astrophys. J.*, 872, 4, doi:10.3847/1538-4357/aafcb2, **2019**.
- [46] S. Fu, **L.-L. Zhao\***, G. P. Zank, M. Wang, and Y. Jiang, An ACE/CRIS-observation-based Galactic Cosmic Rays heavy nuclei spectra model II, *Science China*, 63, 1, doi:10.1007/s11433-019-9423-3, **2019**.
- [47] L. Adhikari, G. P. Zank, **L.-L. Zhao**, Does Turbulence Turn off at the Alfvén Critical Surface?, *Astrophys. J.*, 876, 26, doi:10.3847/1538-4357/ab141c, **2019**.
- [48] L. Adhikari, O. Khabarova, G. P. Zank, **L.-L. Zhao**, The Role of Magnetic Reconnection-associated Processes in Local Particle Acceleration in the Solar Wind, *Astrophys. J.*, 873, 72, doi:10.3847/1538-4357/ab05c6, **2019**.
- [49] J. A. Le Roux, G. M. Webb, O. V. Khabarova, **L.-L. Zhao**, and L. Adhikari, Modeling Energetic Particle Acceleration and Transport in a Solar Wind Region with Contracting and Reconnecting Small-scale Flux Ropes at Earth Orbit, *Astrophys. J.*, 887, 77, doi:10.3847/1538-4357/ab521f, **2019**.
- [50] L. Yan, J. Gao, L. Chai, **L.-L. Zhao**, Z. Rong, and Y. Wei, Revisiting the Strongest Martian X-ray Halo Observed by XMM-Newton on 2003 November 19-21, *Astrophys. J. Lett.*, 883, L38, doi:10.3847/2041-8213/ab40c8, **2019**.
- [51] **L.-L. Zhao**, G. P. Zank, O. Khabarova, S. Du, Y. Chen, L. Adhikari, and Q. Hu, An Unusual Energetic Particle Flux Enhancement Associated with Solar Wind Magnetic Island Dynamics, *Astrophys. J. Lett.*, 864, L34, doi:10.3847/2041-8213/aaddf6, **2018**.

- [52] **L.-L. Zhao**, L. Adhikari, G. P. Zank, Q. Hu, and X. S. Feng, Influence of the Solar Cycle on Turbulence Properties and Cosmic-Ray Diffusion, *Astrophys. J.*, 856, 94, doi:10.3847/1538-4357/aab362, **2018**.
- [53] G. P. Zank, L. Adhikari, **L.-L. Zhao**, P. Mostafavi, E. J. Zirnstein, and D. J. McComas, The Pickup Ion Mediated Solar Wind, *Astrophys. J.*, 869, 23, doi:10.3847/1538-4357/aabefe, **2018**.
- [54] J. Cui, R. V. Yelle, **L.-L. Zhao**, S. Stone, F. Y. Jiang, Y. T. Cao, M. J. Yao, T. T. Koskinen, and Y. Wei, The Impact of Crustal Magnetic Fields on the Thermal Structure of the Martian Upper Atmosphere, *Astrophys. J. Lett.*, 853, L33, doi:10.3847/2041-8213/aaa89a, **2018**.
- [55] **L.-L. Zhao**, L. Adhikari, G. P. Zank, Q. Hu, and X. S. Feng, Cosmic Ray Diffusion Tensor throughout the Heliosphere Derived from a Nearly Incompressible Magnetohydrodynamic Turbulence Model, *Astrophys. J.*, 849, 88, doi:10.3847/1538-4357/aa932a, **2017**.
- [56] **L.-L. Zhao** and H. Zhang, Transient galactic cosmic ray modulation during solar cycle 24: A comparative study of two prominent Forbush decrease events, *Astrophys. J.*, 827, 13, doi:10.3847/0004-637X/827/1/13, **2016**.
- [57] **L.-L. Zhao** and H. Zhang, Galactic Cosmic Ray Heavy-ion Modulation During the Successive Peculiar Solar Cycle 23 and 24: Observations from ACE spacecraft, *Astrophys. J.*, 805, 6, doi:10.1088/0004-637X/805/1/6, **2015**.
- [58] **L.-L. Zhao**, G. Qin, M. Zhang, and B. Heber, Modulation of galactic cosmic rays during the unusual solar minimum of cycle 23 and 24, *J. Geophys. Res.*, 119, 1493, doi:10.1002/2013JA019550, **2014**.
- [59] **L.-L. Zhao** and G. Qin, An observation-based GCR model of heavy nuclei: Measurements from CRIS onboard ACE spacecraft, *J. Geophys. Res.*, 118, 1837, doi:10.1002/jgra.50235, **2013**.
- [60] G. Qin, **L.-L. Zhao**, and H.-C. Chen, Despiking of spacecraft energetic proton flux to study galactic cosmic-ray modulation, *Astrophys. J.*, 752, 138, doi:10.1088/0004-637X/752/2/138, **2012**.

## Conference Papers

- [1] **L.-L. Zhao**, G. P. Zank, L. Adhikari, Q. Hu, and J. A. le Roux, Evidence of magnetic flux ropes downstream of the heliospheric termination shock, *Journal of Physics: Conference Series*, 1620, 012027, doi:10.1088/1742-6596/1620/1/012027, **2020**.
- [2] L. Adhikari, G. P. Zank, **L.-L. Zhao**, and G. M. Webb, Evolution of entropy in the outer heliosphere, *Journal of Physics: Conference Series*, 1620, 012001, doi:10.1088/1742-6596/1620/1/012001, **2020**.
- [3] M. Nakanotani, G. P. Zank, and **L.-L. Zhao**, The Interaction of Current Sheets with a Shock Wave and Particle Acceleration, *Journal of Physics: Conference Series*, 1620, 012014, doi:10.1088/1742-6596/1620/1/012014, **2020**.
- [4] J. A. le Roux, G. M. Webb, O. V. Khabarova, K. T. Van Eck, **L.-L. Zhao**, and L. Adhikari, Investigating 1st and 2nd order Fermi acceleration of energetic particles by small-scale flux ropes at 1AU, *Journal of Physics: Conference Series*, 1620, 012008, doi:10.1088/1742-6596/1620/1/012008, **2020**.
- [5] **L.-L. Zhao**, G. P. Zank, and L. Adhikari, A possible explanation for the enhancement of energetic particles downstream of the heliospheric termination shock, *Journal of Physics: Conference Series*, 1332, 012020, doi:10.1088/1742-6596/1332/1/012020, **2019**.
- [6] L. Adhikari, G. P. Zank, and **L.-L. Zhao**, A Nearly Incompressible Turbulence-Driven Solar Wind Model, *Journal of Physics: Conference Series*, 1332, 012001, doi:10.1088/1742-6596/1332/1/012001, **2019**.
- [7] **L.-L. Zhao**, L. Adhikari, G. P. Zank, Q. Hu, and X. S. Feng, Analytical investigation of turbulence quantities and cosmic ray mean free paths from 1995-2017, *Journal of Physics: Conference Series*, 1100, 012029, doi:10.1088/1742-6596/1100/1/012029, **2018**.

[8] L. Adhikari, G. P. Zank, **L.-L. Zhao**, D. Telloni, P. Hunana, R. Bruno, and D. Shiota, Evolution of Power Anisotropy in Magnetic Field Fluctuations at Different Solar Activity Levels, *Journal of Physics: Conference Series*, 1100, 012001, doi:10.1088/1742-6596/1100/1/012001, **2018**.

---

### *Arxiv Papers*

[1] G. Qin and **L.-L. Zhao**, Study of Different Solar Cycle Variations of Solar Energetic Particles and Cosmic Rays by Despiking ACE/SIS Heavy-Ion Fluxes, arXiv:1312.2296, 2013.

---

### *Selected Presentations*

♣ MHD and Ion Kinetic Waves in Field-aligned Flows Observed by Parker Solar Probe, **Parker Solar Probe Scholars – Second Meeting**, Oral (Virtual), **2021**

♣ Properties of small magnetic flux ropes detected from PSP's first seven orbits, **AGU Fall Meeting 2021**, Poster (Virtual), **2021**

♣ Turbulence and wave transmission at an ICME-driven shock observed by the Solar Orbiter and Wind, **74th Annual Gaseous Electronics Conference**, Oral (Virtual), **2021**

♣ Spectral Features in Field-aligned Solar Wind Turbulence from Parker Solar Probe Observations, **AGU Fall Meeting 2020**, Poster (Virtual), **2020**

♣ Detection of small magnetic flux ropes from the third and fourth Parker Solar Probe encounters, **Parker Solar Probe Science Working Group Meeting**, Oral (Virtual), **2020**

♣ ACR Proton Acceleration Associated with Reconnection Processes beyond the Heliospheric Termination Shock, **18th Annual International Astrophysics Conference**, Oral (Invited), **2020**

♣ Generation Mechanisms for Low-energy Interstellar Pickup Ions, **Partially Ionised Plasmas in Astrophysics 2019**, Oral (Invited), **2019**

♣ Identification of Magnetic Flux Ropes from Parker Solar Probe Observations during the First Encounter, **AGU Fall Meeting 2019**, Poster, **2019**

♣ The pickup ion-mediated solar wind, **AGU Fall Meeting 2018**, Oral, **2018**

♣ An Unusual Energetic Particle Flux Enhancement Associated with Solar Wind Magnetic Island Dynamics, **Shine Conference 2018**, Poster, **2018**

♣ Cosmic Ray Diffusion Tensor throughout the Heliosphere Derived from a Nearly Incompressible Magneto-hydrodynamic Turbulence Model, **AGU Fall Meeting 2017**, Poster, **2017**