

# BENJAMIN L. ALTERMAN

## Research Astrophysicist

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📍 8800 Greenbelt Rd, Greenbelt, MD, 20771 📧 [@BLAlterman](https://github.com/blalterman) 🌐 [blalterman.github.io](https://blalterman.github.io)



## BIO SKETCH

Dr. Alterman studies the Sun and solar wind on time scales ranging from seconds to decades to disentangle the effects of the solar cycle, inter-particle Coulomb collisions, and kinetic processes. He also studies suprathermal particles over the solar cycle to characterize their sources and acceleration mechanisms as well as during transient events to further constrain the latter. He works with instruments from multiple spacecraft including Wind, ACE, and Solar Orbiter. His publications show that the abundance of helium in the solar wind has a delayed response to changes in solar activity, the helium abundance can predict solar cycle onset, that helium and a secondary population of solar wind hydrogen have distinct speeds along the magnetic field when compared with the speed of Alfvén waves, and that the sources of suprathermal ions vary with solar activity while the means by which these ions achieve their observed energies does not.

Dr. Alterman's instrumentation experience covers data reduction, in-flight calibration, design, development, simulation, laboratory testing, and operations. The instruments he has experience with are the *Wind* spacecraft and *Parker Solar Probe* (PSP) Faraday cups (FCs); *Advanced Composition Explorer's* (ACE) Ultra Low Energy Isotope Spectrometer (ULEIS); *Interstellar Mapping and Acceleration Probe* (IMAP) Compact Dual Ion Composition Experiment (CoDICE); and *Solar Orbiter* (SolO) Heavy Ion Sensor (HIS). These instruments cover solar wind kinetics and bulk plasma properties; solar wind, suprathermal, and energetic particle ion spectrometers; and dual-component instruments that combine two distinct instruments into a single housing.

## KEY PUBLICATIONS

- Alterman, B. L., "Characterizing the impact of Alfvén wave forcing in interplanetary space on the distribution of near-earth solar wind speeds," *ApJ Letters*, May 2025.
- Alterman, B. L. and R. D'Amicis, "Cross helicity and the helium abundance as an in situ metric of solar wind acceleration," *ApJ Letters*, Apr. 2025. **1 Citation.**
- Alterman, B. L., (1st of 4), et al., "The transition from slow to fast wind as observed in composition observations," *A&A*, Feb. 2025. **2 Citations.**
- Alterman, B. L., (1st of 5), et al. (2024). "Quiet-time Spectra of Suprathermal Heavy Ions near 1 au in Solar Cycles 23 and 24". In: *ApJ Letters*.
- Livi, S., Alterman, B. L. (9th of 33), et al. (2023). "First results from the Solar Orbiter Heavy Ion Sensor". In: *A&A*. **18 Citations.**
- Alterman, B. L. and J. C. Kasper (2019). "Helium Variation across Two Solar Cycles Reveals a Speed-dependent Phase Lag". In: *ApJ Letters*. **41 Citations**
- Alterman, B. L., (1st of 4), et al. (2018). "A Comparison of Alpha Particle and Proton Beam Differential Flows in Collisionally Young Solar Wind". In: *ApJ*. **73 Citations.**

## EDUCATION

### PhD, Applied Physics

#### *The Significance of Proton Beams in the Multi-scale Solar Wind*

📅 2012 - 2019 📍 University of Michigan  
• Advisors: Justin C. Kasper & Stefano Livi  
• [hdl.handle.net/2027.42/153427](https://hdl.handle.net/2027.42/153427)

### BA, Physics & Philosophy

📅 2008 - 2012 📍 Macalester College

## POSITIONS HELD

### Research Astrophysicist

#### **NASA Goddard Space Flight Center (GSFC)**

📅 2024 - Research Astrophysicist 📍 Greenbelt, MD

### Senior Research Scientist

#### **Southwest Research Institute (SwRI)**

📅 2023 - 2024 Senior Research Scientist 📍 San Antonio, TX  
📅 2022 - 2023 Research Scientist  
📅 2020 - 2021 Postdoctoral Researcher

### Postdoctoral Researcher

#### **University of Texas at San Antonio (UTSA)**

📅 2021-2022 📍 San Antonio, TX

### Research Fellow

#### **University of Michigan (UMich)**

📅 2019-2020 📍 Ann Arbor, MI

## PUBLICATION SUMMARY

- 17 H-index (📊)
  - 39 Refereed Publications
  - 986 Citations
  - 131 Presentations
    - 104 Conference (4 Invited)
    - 23 Invited Other
  - 14 White Papers
  - 1 Dataset
- Most indexed by 🆔0000-0001-6673-3432 and 🌐NASA ADS.

## SERVICE SUMMARY

- Multiple AGU/SPA Committees
- Organizer of AGU and SHINE sessions
- Journal Referee: *Astrophysical Journal*, *JGR: Space Weather*, *A&A*, *Astrophysical Bulletin*, *Solar Physics*, *Astrophysical Journal*
- Multiple NASA/ROSES Panels

# INSTRUMENTATION

Dr. Alterman's instrumentation experience covers data reduction, data analysis, in-flight calibration, design, development, simulation, laboratory testing, and operations.

- Faraday cups (FCs): data reduction and analysis from the *Wind* spacecraft and *Parker Solar Probe* (PSP) FCs
- Ion composition spectrometers: in-flight calibration, operation, data reduction and analysis for *Solar Orbiter* (SOLO) Heavy Ion Sensor (HIS)
- Energetic particle telescopes: data reduction and analysis from *Advanced Composition Explorer's* (ACE) Ultra Low Energy Isotope Spectrometer (ULEIS)
- Dual-component instruments that combine two distinct instruments into a single housing
  - Testing of the *Interstellar Mapping and Acceleration Probe* (IMAP) Compact Dual Ion Composition Experiment (CoDICE) composition and suprathermal ion spectrometer
  - Design and simulation for the *Advanced Mass and Ionic Charge Composition Experiment* (AMICCE) suprathermal and energetic particle instrument

- Organize mission team and department science seminars

# AFFILIATIONS

- American Geophysical Union
- American Physical Society
- European Geophysical Union
- The Explorers Club (Fellow)
- [International Astronomical Union](#)
- The Planetary Society

# TECHNICAL SKILLS

- Python
- Bash
- Git/GitHub
- LaTeX
- Mathematica
- LabView
- Linux
- Mac OS
- Windows
- Simple Test Fixture Fabrication
- Vacuum Chambers
- High Voltage Equipment
- Particle Accelerators
- Core Lab Equipment
- SIMION (basic functionality)

# RESEARCH (SELECTED)

## The Sun as a Star: Characterizing How the Sun Drives the Heliosphere Over Multiple Solar Cycles

📅 2014 -

📍 UMich, SwRI, NASA/GSFC

- Statistically identifying the source of the Alfvénic slow wind as solar wind from source regions that are continuously open to the heliosphere has a minimum speed that is less than the maximum speed of solar wind from source regions that are continuously open to the heliosphere
- Alfvén wave acceleration of the solar wind during transit through interplanetary space accounts for the distribution of fast wind speeds observed near Earth
- Solar wind from source regions that are continuously open to the heliosphere (e.g. coronal holes) that does not carry a significant amount of Alfvén waves is accelerated to speeds faster than slow wind but not to speeds characteristic of the fast wind
- The heavy element composition of the solar wind evolves with solar activity in a manner that suggests heavy element abundances are driven by gravitational settling
- The dependence of solar wind heavy element and helium abundances on solar wind speed in slow wind indicate the abundances are likely set by gravitational settling
- Demonstration that the solar wind helium abundance predicts solar cycle onset
- Development of the *Trans-Heliospheric Survey* data set
- Report a speed-dependent phase lag in solar wind helium's response to changes in sunspot number.

## Connecting Solar Wind Kinetic Signatures, Solar Energetic Particle Events, and Instrumentation

📅 2020 -

📍 SwRI, NASA/GSFC

- Inter-calibration of Solar Orbiter's Heavy Ion Sensor and Suprathermal Ion Spectrograph
- Characterization of charge-state dependent iron heating at collisionless heliospheric shocks using Solar Orbiter's Heavy Ion Sensor
- Solar cycle variation of suprathermal abundances and spectra during quiet times using ACE/ULEIS
- Analysis of heavy ion surfing on Alfvén waves
- Inter-calibration of Solar Orbiter's Heavy Ion Sensor and Suprathermal Ion Spectrograph
- Characterization of charge particle spectra from solar wind through suprathermal energies
- Characterization of solar wind kinetic instabilities at 1 AU
- In-flight calibration and operations for Solar Orbiter's Heavy Ion Sensor
- Development, building, and testing of the *Interstellar Mapping and Acceleration Probe* (IMAP) Compact Dual Ion Composition Experiment (CoDICE) composition and suprathermal ion spectrometer

## Multi-scale Analysis of Solar Wind Ions

**Mentors: Dr. Justin C. Kasper & Dr. Stefano Livi**

📅 2014 - 2020

📍 UMich

- Demonstrate a statistically significant difference between Coulomb collisional coupling to alpha particles and proton beams
- Predict asymptotic alpha particle and proton beam differential flow in the absence of Coulomb collisions.
- Analyze *Wind*/FC data with Nyquist's instability criterion to differentiate between instabilities and collisions.
- Validate a *Wind*/FC proton beam dataset covering 23+ years.
- Characterize novel measurements of interpenetrating solar wind streams containing multiple populations in two distinct ion species and demonstrate that this solar wind configuration is the result of two colliding coronal mass ejections.
- Develop [SolarWindPy](#), an open source python package for solar wind data analysis.

## Laboratory Characterization of Mass Spectrometer

**Mentors: Dr. Stefano Livi & Dr. Jim Raines**

📅 1/2018 – 2/2018

📍 UMich, SwRI

- University of Michigan & Southwest Research Institute
- Collect MESSENGER/FIPS recalibration data.
- Operate high voltage particle accelerator.
- Calibrate time-of-flight experiment.

## Characterize Phenomenological Signatures of an Extended Standard Model of High Energy Physics

**Mentor: Dr. Tonnis ter Veldhuis**

📅 6/2011 – 8/2011

📍 Macalester College

- Predict phenomenological signatures of the Singlet Scalar Standard Model extension using *Mad Graph* simulations.

## TEACHING

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### Guest Lecturer

***Engineering for the Space Environment***

📅 9/2018

📍 University of Michigan

- Masters of Engineering class

### Alterman Tutoring

📅 2011 – 2019

📍 Multiple Locations

- Tutor and mentor high school and college students in physics and math with a focus on individualized learning strategies, self-teaching, and self-advocacy.

### Introductory Physics Labs, Summer Session

**Instructor**

📅 Multiple Dates

📍 University of Michigan

- (5/2014–6/2014) Introductory Physics Lab for Life Sciences
- (5/2013–6/2013) Introductory Physics Lab for Engineers

### Electromagnetic Theory and Intro Physics

**Teaching Assistant and Grader**

📅 8/2011 – 4/2012

📍 Macalester College

- Grade and tutor undergraduate introductory physics and upper level electromagnetism.

## HONORS, AWARDS, & FELLOWSHIPS

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### Parker Solar Probe Group Achievement Award

**National Aeronautics and Space Administration (NASA)**

📅 2023

📍

### Outstanding Student Presentation Award

**AGU Fall Meeting & SHINE Conference**

📅 2018, 2019

📍 Multiple Locations

- (2019) SHINE Conference, Boulder, C.O.
- (2018) [AGU Fall Meeting](#), Washington, D.C.

### [Leadership Fellow](#)

**Ross School of Business**

📅 9/2018 – 4/2019

📍 University of Michigan

### [Leadership Crisis Challenge Finalist](#)

**Ross School of Business**

📅 1/2018

📍 University of Michigan

### [Munger Case Competition](#)

**Munger Graduate Residences**

📅 2018

📍 University of Michigan

### [Science Communication Fellow](#)

**Museum of Natural History**

📅 2017

📍 University of Michigan

### [Bezos Scholar](#)

**Bezos Family Foundation**

📅 2007

📍 Aspen Institute

## SERVICE

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### Policy Advocacy

#### [Congressional Visit Day](#)

**American Geophysical Union**

📅 12/2018

📍 Washington, D.C.

- Hold 5 meetings with the Massachusetts Congressional delegation.
- Brief Congressional staffers on the importance of funding Space Science, Geophysics research, and graduate education.
- Communicate the significance of stable budgets for research, graduate student recruitment, and graduate student retention.
- Share the excitement surrounding Parker Solar Probe and

#### Michigan Congressional Delegation & Senate Commerce Committee

**University of Michigan**

📅 7/2018

📍 Washington, D.C.

- Hold 9 meetings with the Michigan Congressional delegation.
- Meet with Senate Commerce Committee.
- Organized with Coalition for Aerospace and Science & Aerospace Industries Association annual Showcase of NASA Partnerships & Collaboration.

#### [Local Science Partners](#)

the *Solar Wind Electrons, Alphas, and Protons* (SWEAP) instrument suite.

## American Geophysical Union

📅 2021-

📍 Washington, D.C.

### Conference Session Organizer

- **AGU Fall Meeting** ([2021](#), [2021](#), [2020](#), [2019](#))
- **SHINE Conference** ([2019 #22](#), [2017 #1](#))

### Committees

- [AGU/SPA Nomination Task Force](#) (2020-2023)
- [AGU/SPA DEI Committee](#) (2023-2025)
- [AGU/SPA Early Career Leadership Advisory Committee](#) (2023-)

### Journal Referee

- Astrophysical Journal
- Astrophysical Journal Letters
- JGR: Space Weather
- Astronomy & Astrophysics
- Astrophysical Bulletin
- Solar Physics

### Proposal Review Panels

- NASA/ROSES (2020, 2021)

## Institutional

### Organizer of Heliosphere Group Meeting

📅 2020 – 2022

📍 Southwest Research Institute

- Run weekly science meeting.
- Coordinate weekly science presentations.
- Integrate graduate students through senior researchers into a cohesive team.
- Organize group response to NASA funding solicitations.

### Co-Organizer of Space Science Seminar Series

📅 2020 – 2024

📍 Southwest Research Institute

### Graduate Student Representative

#### Central Student Government

📅 2012 – 2015

📍 University of Michigan

- (4/2013–4/2014) Vice-Chair, Rules Committee
- (8/2014–1/2015) Vice-Chair, Inclusive Campus Commission

## Diversity, Equity, and Inclusion (DEI)

### Committee for an Inclusive University

#### Faculty Senate Advisory Committee on University Affairs (SACUA)

📅 2018 – 2019

📍 University of Michigan

- Collect and summarize unit DEI expectations.
- Explore and summarize how these expectations relate to faculty evaluation and reviews.
- Recommend best practices to SACUA.

### DEI Student Committee Chair

#### Climate & Space Sciences & Engineering Department

📅 2018 – 2019

📍 University of Michigan

- Coordinate student events targeting DEI.
- Advise faculty committees on DEI activities, especially as related to student involvement and experience within the department.

### Student Advisory Board

#### Services for Students with Disabilities

📅 2017 – 2018

📍 University of Michigan

- Provide guidance and feedback to the Office of Services for Students with Disabilities.
- Interview candidates for University of Michigan Associate Vice-President for Student Life and Executive Director of University Health Services.

## PUBLICATIONS

Indexed by  0000-0001-6673-3432 and  NASA ADS.

### Peer Reviewed Articles

1. **Alterman, B. L.** and R. D'Amicis, "On the regulation of the solar wind helium abundance by the hydrogen compressibility," *The Astrophysical Journal Letters*, Jan. 2026. DOI: 10.3847/2041-8213/ae002f **2 Citations.**
2. C. M. S. Cohen, **Alterman, B. L.** (2<sup>nd</sup> of 31), et al., "Imap's role in understanding particle injection and energization throughout the heliosphere," *Space Science Reviews*, Jan. 2026. DOI: 10.1007/s11214-025-01257-4 **1 Citations.**
3. B. J. Vasquez, **Alterman, B. L.** (15<sup>th</sup> of 18), et al., "Solar orbiter's passage through comet Leonard's tail while in the he<sup>+</sup> focusing cone," *The Astrophysical Journal*, Feb. 2026. DOI: 10.3847/1538-4357/ae2756
4. Yogesh, **Alterman, B. L.** (14<sup>th</sup> of 22), et al., "Solar wind heating near the sun: A radial evolution approach," *The Astrophysical Journal*, Mar. 2026. DOI: 10.3847/1538-4357/ae4582 **1 Citations.**
5. **Alterman, B. L.**, "Characterizing the impact of alfvén wave forcing in interplanetary space on the distribution of near-earth solar wind speeds," *The Astrophysical Journal Letters*, May 2025. DOI: 10.3847/2041-8213/add0a6 **6 Citations.**

6. **Alterman, B. L.**, (1<sup>st</sup> of 4), et al., "The transition from slow to fast wind as observed in composition observations," *Astronomy and Astrophysics*, Feb. 2025. DOI: 10.1051/0004-6361/202451550 **10 Citations**.
7. **Alterman, B. L.**, (1<sup>st</sup> of 5), et al., "Heavy ion abundances evolve with solar activity," *Astronomy and Astrophysics*, Aug. 2025. DOI: 10.1051/0004-6361/202554299 **5 Citations**.
8. **Alterman, B. L.** and R. D'Amicis, "Cross helicity and the helium abundance as an in situ metric of solar wind acceleration," *The Astrophysical Journal Letters*, Apr. 2025. DOI: 10.3847/2041-8213/adb48e **13 Citations**.
9. C. P. Brown, **Alterman, B. L.** (6<sup>th</sup> of 7), et al., "Evaluating the parker model with the trans-heliospheric survey," *Geophysical Research Letters*, Jun. 2025. DOI: 10.1029/2025GL115186 **2 Citations**.
10. R. D'Amicis, **Alterman, B. L.** (16<sup>th</sup> of 34), et al., "On alfvénic turbulence of solar wind streams observed by solar orbiter during march 2022 perihelion and their source regions," *Astronomy and Astrophysics*, Jan. 2025. DOI: 10.1051/0004-6361/202451686 **9 Citations**.
11. J. Huang, **Alterman, B. L.** (10<sup>th</sup> of 23), et al., "The temperature anisotropy and helium abundance features of alfvénic slow solar wind observed by parker solar probe, helios, and wind missions," *The Astrophysical Journal Letters*, Jun. 2025. DOI: 10.3847/2041-8213/ade0ac **19 Citations**.
12. S. A. Livi, **Alterman, B. L.** (11<sup>th</sup> of 49), et al., "The compact dual ion composition experiment (codice) for the imap mission," *Space Science Reviews*, Dec. 2025. DOI: 10.1007/s11214-025-01251-w **4 Citations**.
13. Y. J. Rivera, **Alterman, B. L.** (11<sup>th</sup> of 18), et al., "Observational constraints on the radial evolution of  $\text{o}^{6+}$  temperature and differential flow in the inner heliosphere," *The Astrophysical Journal Letters*, Sep. 2025. DOI: 10.3847/2041-8213/adfa97 **2 Citations**.
14. Y. J. Rivera, **Alterman, B. L.** (21<sup>st</sup> of 21), et al., "Differentiating the acceleration mechanisms in the slow and alfvénic slow solar wind," *The Astrophysical Journal*, Feb. 2025. DOI: 10.3847/1538-4357/ada699 **16 Citations**.
15. **Alterman, B. L.**, (1<sup>st</sup> of 5), et al., "Quiet-time spectra of suprathermal heavy ions near 1 au in solar cycles 23 and 24," *The Astrophysical Journal Letters*, Apr. 2024. DOI: 10.3847/2041-8213/ad2deb **1 Citations**.
16. P. Louarn, **Alterman, B. L.** (21<sup>st</sup> of 30), et al., "Skewness and kurtosis of solar wind proton distribution functions: The normal inverse-gaussian model and its implications," *Astronomy and Astrophysics*, Feb. 2024. DOI: 10.1051/0004-6361/202347874 **3 Citations**.
17. Y. J. Rivera, **Alterman, B. L.** (16<sup>th</sup> of 16), et al., "Mixed source region signatures inside magnetic switchback patches inferred by heavy ion diagnostics," *The Astrophysical Journal*, Oct. 2024. DOI: 10.3847/1538-4357/ad7815 **10 Citations**.
18. **Alterman, B. L.**, (1<sup>st</sup> of 5), et al., "Solar cycle variation of 0.3-1.29 mev nucleon<sup>-1</sup> heavy ion composition during quiet times near 1 au in solar cycles 23 and 24," *The Astrophysical Journal*, Jul. 2023. DOI: 10.3847/1538-4357/acd24a **6 Citations**.
19. E. Johnson, **Alterman, B. L.** (13<sup>th</sup> of 17), et al., "Anterograde collisional analysis of solar wind ions," *The Astrophysical Journal*, Jun. 2023. DOI: 10.3847/1538-4357/acc32 **5 Citations**.
20. S. Livi, **Alterman, B. L.** (9<sup>th</sup> of 33), et al., "First results from the solar orbiter heavy ion sensor," *Astronomy and Astrophysics*, Aug. 2023. DOI: 10.1051/0004-6361/202346304 **25 Citations**.
21. B. A. Maruca, **Alterman, B. L.** (3<sup>rd</sup> of 12), et al., "The trans-heliospheric survey. radial trends in plasma parameters across the heliosphere," *Astronomy and Astrophysics*, Jul. 2023. DOI: 10.1051/0004-6361/202345951 **23 Citations**.
22. M. J. West, **Alterman, B. L.** (15<sup>th</sup> of 42), et al., "Defining the middle corona," *Solar Physics*, Jun. 2023. DOI: 10.1007/s11207-023-02170-1 **57 Citations**.
23. **Alterman, B. L.**, "Plasma data sources in the omni database," *Research Notes of the American Astronomical Society*, Jun. 2022. DOI: 10.3847/2515-5172/ac7a2f **1 Citations**.
24. G. G. Howes, **Alterman, B. L.** (13<sup>th</sup> of 14), et al., "Revolutionizing our understanding of particle energization in space plasmas using on-board wave-particle correlator instrumentation," *Frontiers in Astronomy and Space Sciences*, Jun. 2022. DOI: 10.3389/fspas.2022.912868 **2 Citations**.
25. Y. J. Rivera, **Alterman, B. L.** (7<sup>th</sup> of 7), et al., "Manifestation of gravitational settling in coronal mass ejections measured in the heliosphere," *The Astrophysical Journal*, Sep. 2022. DOI: 10.3847/1538-4357/ac8873 **14 Citations**.
26. Y. J. Rivera, **Alterman, B. L.** (5<sup>th</sup> of 17), et al., "Deciphering the birth region, formation, and evolution of ambient and transient solar wind using heavy ion observations," *Frontiers in Astronomy and Space Sciences*, Dec. 2022. DOI: 10.3389/fspas.2022.1056347 **18 Citations**.
27. J. L. Verniero, **Alterman, B. L.** (5<sup>th</sup> of 19), et al., "Strong perpendicular velocity-space diffusion in proton beams observed by parker solar probe," *The Astrophysical Journal*, Jan. 2022. DOI: 10.3847/1538-4357/ac36d5 **56 Citations**.
28. **Alterman, B. L.**, (1<sup>st</sup> of 4), et al., "Solar wind helium abundance heralds solar cycle onset," *Solar Physics*, Apr. 2021. DOI: 10.1007/s11207-021-01801-9 **21 Citations**.

29. K. G. Klein, **Alterman, B. L.** (3<sup>rd</sup> of 15), et al., "Inferred linear stability of parker solar probe observations using one- and two-component proton distributions," *The Astrophysical Journal*, Mar. 2021. DOI: 10.3847/1538-4357/abd7a0 **59 Citations.**
30. M. M. Martinović, **Alterman, B. L.** (4<sup>th</sup> of 4), et al., "Ion-driven instabilities in the inner heliosphere. i. statistical trends," *The Astrophysical Journal*, Dec. 2021. DOI: 10.3847/1538-4357/ac3081 **20 Citations.**
31. Z. Němeček, **Alterman, B. L.** (6<sup>th</sup> of 9), et al., "Spectra of temperature fluctuations in the solar wind," *Atmosphere*, Sep. 2021. DOI: 10.3390/atmos12101277 **5 Citations.**
32. J. Huang, **Alterman, B. L.** (7<sup>th</sup> of 30), et al., "Proton temperature anisotropy variations in inner heliosphere estimated with the first parker solar probe observations," *The Astrophysical Journal Supplement Series*, Feb. 2020. DOI: 10.3847/1538-4365/ab74e0 **94 Citations.**
33. M. M. Martinović, **Alterman, B. L.** (11<sup>th</sup> of 21), et al., "The enhancement of proton stochastic heating in the near-sun solar wind," *The Astrophysical Journal Supplement Series*, Feb. 2020. DOI: 10.3847/1538-4365/ab527f **45 Citations.**
34. J. L. Verniero, **Alterman, B. L.** (10<sup>th</sup> of 22), et al., "Parker solar probe observations of proton beams simultaneous with ion-scale waves," *The Astrophysical Journal Supplement Series*, May 2020. DOI: 10.3847/1538-4365/ab86af **117 Citations.**
35. T. Woolley, **Alterman, B. L.** (7<sup>th</sup> of 13), et al., "Proton core behaviour inside magnetic field switchbacks," *Monthly Notices of the Royal Astronomical Society*, Nov. 2020. DOI: 10.1093/mnras/staa2770 **39 Citations.**
36. **Alterman, B. L.** and J. C. Kasper, "Helium variation across two solar cycles reveals a speed-dependent phase lag," *The Astrophysical Journal Letters*, Jul. 2019. DOI: 10.3847/2041-8213/ab2391 **49 Citations.**
37. L. D. Woodham, **Alterman, B. L.** (6<sup>th</sup> of 6), et al., "Parallel-propagating fluctuations at proton-kinetic scales in the solar wind are dominated by kinetic instabilities," *The Astrophysical Journal Letters*, Oct. 2019. DOI: 10.3847/2041-8213/ab4adc **46 Citations.**
38. **Alterman, B. L.**, (1<sup>st</sup> of 4), et al., "A comparison of alpha particle and proton beam differential flows in collisionally young solar wind," *The Astrophysical Journal*, Sep. 2018. DOI: 10.3847/1538-4357/aad23f **94 Citations.**
39. K. G. Klein, **Alterman, B. L.** (2<sup>nd</sup> of 5), et al., "Majority of solar wind intervals support ion-driven instabilities," *Physical Review Letters*, May 2018. DOI: 10.1103/PhysRevLett.120.205102 **70 Citations.**

### Under Review, & In Prep

1. R. C. Allen, **Alterman, B. L.** (6<sup>th</sup> of 12), et al., *State of the early career profession in space physics and aeronomy: Climatological survey results*, Feb. 2026. DOI: 10.22541/essoar.177039878.82691134/v1
2. R. D'Amicis, **Alterman, B. L.** (12<sup>th</sup> of 35), et al., *Alfvénic solar wind intervals observed by solar orbiter: Exploiting the capability of the swa plasma suite and source region investigation*, Dec. 2025. DOI: 10.48550/arXiv.2512.20098
3. M. M. Martinovic, **Alterman, B. L.** (9<sup>th</sup> of 9), et al., *How the oblique drift instability alters solar wind heating and constrains the distribution of solar wind observations*, Dec. 2025. DOI: 10.48550/arXiv.2512.18485 **1 Citations.**
4. J. Ng, **Alterman, B. L.** (12<sup>th</sup> of 13), et al., *The may 2024 storm: Dayside magnetopause and cusps in simulated soft x-rays*, Dec. 2025. DOI: 10.48550/arXiv.2512.03890
5. **Alterman, B. L.**, (1<sup>st</sup> of 5), et al., *Solar cycle variation of suprathermal heavy ion composition and spectra during quiet times near 1 au*, Dec. 2021. DOI: 10.1002/essoar.10509340.1
6. V. Martinez Pillet, **Alterman, B. L.** (7<sup>th</sup> of 23), et al., *Solar physics in the 2020s: Dkist, parker solar probe, and solar orbiter as a multi-messenger constellation*, Apr. 2020. DOI: 10.48550/arXiv.2004.08632 **3 Citations.**



### White Papers

1. **Alterman, B. L.**, (1<sup>st</sup> of 118), et al., "Pushing the frontier of solar & space physics: Exploration of the heliosphere and the very local interstellar medium by an interstellar probe," Jul. 2022. [Online]. Available: [scixplorer.org/abs/2022dsss.rept..158A/abstract](https://scixplorer.org/abs/2022dsss.rept..158A/abstract)
2. Y. ( Collado-Vega, **Alterman, B. L.** (13<sup>th</sup> of 31), et al., "Space weather operations and the need for multiple solar observational vantage points," Jul. 2022. [Online]. Available: [scixplorer.org/abs/2022dsss.rept..220C/abstract](https://scixplorer.org/abs/2022dsss.rept..220C/abstract)
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10. S. J. Schonfeld and **Alterman, B. L.**, "Helioweb: A resource for 21st century science," Sep. 2020. DOI: 10.5281/zenodo.4060331
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12. N. A. Murphy and **Alterman, B. L.**, "Building an open source software ecosystem for cross-disciplinary plasma research and education," Feb. 2019. DOI: 10.5281/zenodo.2578277
13. N. A. Murphy and **Alterman, B. L.**, "Enabling scientific reproducibility in plasma research," Jul. 2019. DOI: 10.5281/zenodo.3265454
14. N. A. Murphy, **Alterman, B. L.**, and D. Stansby, "Making plasma research reproducible," Feb. 2019. DOI: 10.5281/zenodo.2578291

## PRESENTATIONS

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Many listed on  0000-0001-6673-3432 and  NASA ADS.

### Invited Conference Presentations

1. **Alterman, B. L.**, "Later years and early careers (panel discussion)," in *SHINE Conference*, Aug. 2021.
2. **Alterman, B. L.** and J. C. Kasper, "Helium variation across two solar cycles reveals a speed-dependent phase lag," in *AGU Fall Meeting*, Dec. 2019. [Online]. Available: [scixplorer.org/abs/2019AGUFM.U21B..14A/abstract](https://scixplorer.org/abs/2019AGUFM.U21B..14A/abstract)
3. **Alterman, B. L.**, "An experimentalists introduction to the solar wind," in *SHINE Conference Student Day*, Jul. 2017.
4. **Alterman, B. L.**, "Collisions in an expanding solar wind (scene setting talk)," in *SHINE Conference*, Jul. 2017. [Online]. Available: [scixplorer.org/abs/2017shin.confE...7A/abstract](https://scixplorer.org/abs/2017shin.confE...7A/abstract)

### Other Invited Presentations

1. **Alterman, B. L.**, "Using in situ helium to understand the solar wind's acceleration and how this shows up in solar wind composition observations," in *Lunar and Planetary Laboartory (University of Arizona)*, Tucson, AZ, Jan. 2026.
2. **Alterman, B. L.**, "Why is it so hard to map intermediate speed solar wind to its solar source region and how does this answer give us an amplitude independent solar cycle clock?" In *Lunar and Planetary Laboartory (University of Arizona)*, Tucson, AZ, Jan. 2026.
3. **Alterman, B. L.**, "The significance of helium in the solar wind: Insights from 1 au," in *University of New Hampshire*, Durham, NH, Jan. 2025.
4. **Alterman, B. L.**, "The significance of helium in the solar wind: Insights from 1 au," in *Science with Sibeck*, Greenbelt, MD, Apr. 2025.
5. **Alterman, B. L.**, "The significance of helium in the solar wind: Insights from 1 au," in *NASA/GSFC Heliophysics Science Directorate Seminar*, Greenbelt, MD, May 2025.
6. **Alterman, B. L.**, "From kinetics to the solar cycle: Probing the sun and heliospheric processes using in situ observations," in *Centrum Badań Kosmicznych PAN*, Warsaw, Poland, Jul. 2024.
7. **Alterman, B. L.**, "Using in situ observations to understand solar wind sources and predict solar cycle onset," in *NASA Johnson Space Center*, Houston, TX, Jan. 2024.
8. **Alterman, B. L.**, "From kinetics to the solar cycle: Probing the sun and heliospheric processes using in situ observations," in *Center for Astrophysics | Harvard & Smithsonian*, Cambridge, MA, Apr. 2023.
9. **Alterman, B. L.**, "From kinetics to the solar cycle: Probing the sun and heliospheric processes using in situ observations," in *Mullard Space Science Laboratory, University College London*, Surrey, UK, Jun. 2023.
10. **Alterman, B. L.**, "From kinetics to the solar cycle: Probing the sun and heliospheric processes using in situ observations," in *NASA Goddard Space Flight Center*, Greenbelt, MD, Jul. 2023.
11. **Alterman, B. L.**, "From kinetics to the solar cycle: Probing the sun and heliospheric processes using in situ observations," in *IAPS – INAF Istituto di Astrofisica e Planetologia Spaziali*, Rome, Italy, Nov. 2023.
12. **Alterman, B. L.**, "From kinetics to the solar cycle: Probing the sun and heliospheric processes using in situ observations," in *Observatoire de Paris*, Meudon, France, Nov. 2023.

13. **Alterman, B. L.**, "Status of heavy ion sensor data," in *Mullard Space Science Laboratory, University College London, Surrey, UK*, Jun. 2023.
14. **Alterman, B. L.**, "From kinetics to the solar cycle: Probing the sun and heliospheric processes using in situ observations," in *Imperial College, London, UK*, Sep. 2022.
15. **Alterman, B. L.**, "From kinetics to the solar cycle: Probing the sun and heliospheric processes using in situ observations," in *Queen Mary University, London, UK*, Sep. 2022.
16. **Alterman, B. L.**, "M/q-dependent heating observed with high time-resolution fe vdfs at a shock with solar orbiter's heavy ion sensor," in *Solar Orbiter Working Groups, Virtual*, Sep. 2022.
17. **Alterman, B. L.**, "Solar wind helium abundance predicts solar cycle onset," in *University of Arizona, Virtual*, Feb. 2021.
18. **Alterman, B. L.**, "Tracing the solar cycle with in situ helium measurements – phase lag and cycle herald," in *NASA Goddard Space Flight Center, Greenbelt, MD*, Jun. 2020.
19. **Alterman, B. L.**, "Tracing the solar cycle with solar wind helium – phase lag and heralding cycle onset," in *NASA Goddard Space Flight Center, Greenbelt, MD*, May 2020.
20. **Alterman, B. L.**, "The multi-scale solar wind," in *Southwest Research Institute, San Antonio, TX*, Mar. 2019.
21. **Alterman, B. L.**, "The multi-scale solar wind," in *Goddard Space Flight Center, Greenbelt, MD*, Mar. 2019.
22. **Alterman, B. L.**, "A comparison of alpha particle and proton beam differential flows in collisionally young solar wind," in *NASA Goddard Space Flight Center, Greenbelt, MD*, Sep. 2018.
23. **Alterman, B. L.**, "Parker solar probe – launching august," in *Capitol Visitor Center, Washington, D. C.*, Jul. 2018.

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1. R. C. Allen, **Alterman, B. L.** (4<sup>th</sup> of 15), et al., "The agu space physics and astronomy (spa) early career leadership advisory committee," Jun. 2025. [Online]. Available: [scixplorer.org/abs/2025shin.confE...4A/abstract](https://scixplorer.org/abs/2025shin.confE...4A/abstract)
2. **Alterman, B. L.** and R. D'Amicis, "Cross helicity and the helium abundance as an in situ metric of solar wind acceleration," Jun. 2025. [Online]. Available: [scixplorer.org/abs/2025shin.confE.129A/abstract](https://scixplorer.org/abs/2025shin.confE.129A/abstract)
3. R. D. Amicis, **Alterman, B. L.** (8<sup>th</sup> of 16), et al., "What determines the departure from equipartition of energy in alfvénic fluctuations in solar wind streams? insights from solar orbiter observations," Apr. 2025. DOI: 10.5194/egusphere-egu25-404
4. J. Buitrago-Casas, **Alterman, B. L.** (5<sup>th</sup> of 15), et al., "The agu space physics and astronomy (spa) early career leadership advisory committee," Jun. 2025. [Online]. Available: [scixplorer.org/abs/2025AAS...24640402B/abstract](https://scixplorer.org/abs/2025AAS...24640402B/abstract)
5. M. Martinovic, **Alterman, B. L.** (8<sup>th</sup> of 8), et al., "Low proton plasma-beta temperature anisotropy constraint driven by alpha-particle drift," Jun. 2025. [Online]. Available: [scixplorer.org/abs/2025shin.confE.195M/abstract](https://scixplorer.org/abs/2025shin.confE.195M/abstract)
6. **Alterman, B. L.**, "Charge-state dependent heating of fe at a cme-driven shock observed by solar orbiter," May 2024.
7. **Alterman, B. L.**, (1<sup>st</sup> of 20), et al., "Inter-calibration of solar orbiter's heavy ion sensor and suprathermal ion spectrograph," Apr. 2024. DOI: 10.5194/egusphere-egu24-13328
8. **Alterman, B. L.**, (1<sup>st</sup> of 37), et al., "Suprathermal ion observations from solar orbiter: Status of intercalibration between the heavy ion sensor and suprathermal ion spectrograph," Dec. 2024. [Online]. Available: [scixplorer.org/abs/2024AGUFMSH33E2787A/abstract](https://scixplorer.org/abs/2024AGUFMSH33E2787A/abstract)
9. C. Brown, **Alterman, B. L.** (4<sup>th</sup> of 6), et al., "Evaluating the parker model with the trans-heliospheric survey," Dec. 2024. [Online]. Available: [scixplorer.org/abs/2024AGUFMSH23F..01B/abstract](https://scixplorer.org/abs/2024AGUFMSH23F..01B/abstract)
10. K. Delano, **Alterman, B. L.** (18<sup>th</sup> of 19), et al., "Analysis of pickup ions observed by swa-his during the solar orbiter encounter with comet leonard," Dec. 2024. [Online]. Available: [scixplorer.org/abs/2024AGUFMP32B...02D/abstract](https://scixplorer.org/abs/2024AGUFMP32B...02D/abstract)
11. A. B. Galvin, **Alterman, B. L.** (15<sup>th</sup> of 16), et al., "Variations in the he+ pickup ion distributions inside 1 au," Dec. 2024. [Online]. Available: [scixplorer.org/abs/2024AGUFMSH33E2788G/abstract](https://scixplorer.org/abs/2024AGUFMSH33E2788G/abstract)
12. J. Huang, **Alterman, B. L.** (7<sup>th</sup> of 21), et al., "Temperature anisotropy and alpha abundance features of alfvénic slow solar wind observed by parker solar probe, helios, and wind missions," Dec. 2024. [Online]. Available: [scixplorer.org/abs/2024AGUFMSH31F2665H/abstract](https://scixplorer.org/abs/2024AGUFMSH31F2665H/abstract)
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17. Y. Rivera, **Alterman, B. L.** (26<sup>th</sup> of 26), et al., "Comparing the radial evolution of slow and alfvénic slow solar wind with parker solar probe and solar orbiter," Dec. 2024. [Online]. Available: [scixplorer.org/abs/2024AGUFMSH11B.03R/abstract](https://scixplorer.org/abs/2024AGUFMSH11B.03R/abstract)
18. F. Allegrini, **Alterman, B. L.** (4<sup>th</sup> of 8), et al., "The advanced mass and ionic charge composition experiment (amicce)," Dec. 2023. [Online]. Available: [scixplorer.org/abs/2023AGUFMSH23B.03A/abstract](https://scixplorer.org/abs/2023AGUFMSH23B.03A/abstract)
19. **Alterman, B. L.**, "Fe heating across a shock observed by solar orbiter's heavy ion sensor," Nov. 2023.
20. **Alterman, B. L.**, "Heavy ion surfing on alfvén waves observed by solar orbiter's heavy ion sensor," Nov. 2023.
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23. **Alterman, B. L.**, "Mass-per-charge depending heating of iron at a collisionless shock," Jun. 2023.
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25. **Alterman, B. L.**, (1<sup>st</sup> of 5), et al., "On the abundances and spectra of quiet-time suprathermal during solar cycle 23 and 24," Dec. 2023. [Online]. Available: [scixplorer.org/abs/2023AGUFMSH43A.04A/abstract](https://scixplorer.org/abs/2023AGUFMSH43A.04A/abstract)
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31. R. W. Ebert, **Alterman, B. L.** (3<sup>rd</sup> of 6), et al., "Plasma measurements for magnetospheric science at uranus," Jul. 2023. [Online]. Available: [scixplorer.org/abs/2023LPICo2808.8113E/abstract](https://scixplorer.org/abs/2023LPICo2808.8113E/abstract)
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34. S. T. Lepri and **Alterman, B. L.**, "Heavy ion composition in the inner heliosphere from solar orbiter," Jun. 2023.
35. P. Louarn, **Alterman, B. L.** (14<sup>th</sup> of 19), et al., "Interpretation of the skewness and kurtosis of the sw proton distributions observed by solar orbiter (pas/swa): Constraints on the heating and acceleration using the 'normal-inverse gaussian' model," Dec. 2023. [Online]. Available: [scixplorer.org/abs/2023AGUFMSH34B.01L/abstract](https://scixplorer.org/abs/2023AGUFMSH34B.01L/abstract)
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45. **Alterman, B. L.**, (1<sup>st</sup> of 27), et al., "Fe ion heating across a shock observed by solar orbiter's heavy ion sensor," Dec. 2022. [Online]. Available: [scixplorer.org/abs/2022AGUFMSH42D2320A/abstract](https://scixplorer.org/abs/2022AGUFMSH42D2320A/abstract)

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49. R. Dewey, **Alterman, B. L.** (10<sup>th</sup> of 10), et al., "A rare in-situ measurement of prominence plasma inside an icme as observed by the heavy ion sensor on solar orbiter," Jul. 2022. [Online]. Available: [scixplorer.org/abs/2022cosp...44.1524D/abstract](https://scixplorer.org/abs/2022cosp...44.1524D/abstract)
50. R. M. Dewey, **Alterman, B. L.** (12<sup>th</sup> of 12), et al., "In situ composition measurements of icme prominence material with solar orbiter," Dec. 2022. [Online]. Available: [scixplorer.org/abs/2022AGUFMSH22E2047D/abstract](https://scixplorer.org/abs/2022AGUFMSH22E2047D/abstract)
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52. A. B. Galvin, **Alterman, B. L.** (12<sup>th</sup> of 12), et al., "Initial observations of pickup ions by the his sensor on solar orbiter," Dec. 2022. [Online]. Available: [scixplorer.org/abs/2022AGUFMSH15E1521G/abstract](https://scixplorer.org/abs/2022AGUFMSH15E1521G/abstract)
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## DATASETS

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### Datasets

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