

# Kristopher G. Klein: Curriculum Vitae

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EDUCATION	<b>University of Iowa</b> Doctor of Philosophy in Physics <i>The Kinetic Plasma Physics of Solar Wind Turbulence</i> <i>Chair: G.G. Howes Committee: F. Skiff, C. Kletzing, S. Spangler, A. Ratner</i> <b>Luther College</b> Bachelor of Arts in Physics and Mathematics; Magna Cum Laude <i>Advisor: Todd Pedlar; Departmental Honors</i>	<b>Iowa City, IA</b> Dec. 2013 10.5281/zenodo.50471
EMPLOYMENT	<b>University of Arizona</b> Assistant Professor, Dept. Planetary Sciences & LPL <b>University of Michigan</b> Postdoctoral Research Scholar, CLASP <b>University of New Hampshire</b> NSF AGS Postdoctoral Researcher, Space Science Center <b>University of Iowa</b> Postdoctoral Researcher, Dept. Physics & Astronomy	<b>Tucson, AZ</b> 2018-present <b>Ann Arbor, MI</b> 2016-2018 <b>Durham, NH</b> 2014-2016 <b>Iowa City, IA</b> 2014
HONORS AND AWARDS	NASA Early Career Investigator Program Award National Academy of Science New Leaders in Space Physics NASA LWS Jack Eddy Fellowship <sup>1</sup> NSF AGS Postdoctoral Research Fellow University of Iowa Goertz/Nicholson Memorial Scholarship Phi Beta Kappa - National Honor Society Pi Mu Epsilon - National Mathematics Honor Society Sigma Pi Sigma - National Physics Honor Society	2019 2016 2016 2014 2012 2008 2007 2006
SERVICE	<b>Government Service</b> NATIONAL AERONAUTICS AND SPACE ADMINISTRATION: Review Panelist - 2014, 2019; External Reviewer - 2015 NATIONAL SCIENCE FOUNDATION: Review Panelist - 2014, 2017, 2020; External Reviewer - 2016, 2019 DEPARTMENT OF ENERGY: External Reviewer - 2020 <b>Professional Service</b> Executive Committee Member-at-Large, Topical Group of Plasma Astrophysics, American Physical Society Division of Plasma Physics: 2018-present SHINE Workshop Session Organizer: 2015-2019 American Geophysical Union Fall Meeting Session Organizer: 2017, 2019 American Physical Society, Division of Plasma Physics Mini-conference Organizer: 2017	

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<sup>1</sup>My proposed project for this fellowship was selected, but I declined the fellowship as accepting it would conflict with a selected NASA HSR grant on which I was the PI.

### Professional Membership

American Astronomical Society, Division of Solar Physics (2018-present)

American Geophysical Union, (2013-present)

American Physical Society, Division of Plasma Physics (2010-present)

**Journal Referee**[24]: Nature Physics[1], Nature Communications[1],  
Journal of Plasma Physics[3], Physics of Plasmas[4], Physical Review Letters [1],  
Journal of Geophysical Research [1], The Astrophysical Journal Letters[3],  
The Astrophysical Journal[6], Annales Geophysicae[3]

### Departmental Service

*Lunar and Planetary Laboratory & Department of Planetary Sciences, U. Arizona:*

Theoretical Astrophysics Program Steering Committee: 2018-present

Theoretical Astrophysics Program Colloquium Committee: 2019-present

Graduate Advising and Admissions Committee: 2018-present

Journal Club Advisor: 2018-2019

### Public Seminars [5]

*Our First Encounters with the Sun: What we are learning from NASA's Parker Solar Probe*  
Old Pueblo Business Alliance, June 2020

*Our First Trip to the Sun: What we are learning from NASA's Parker Solar Probe*  
Saddlebrooke SkyGazers Club, Feb. 2019

*A Mission to Touch the Sun: What we are learning from NASA's Parker Solar Probe*  
49<sup>th</sup> Smithsonian Lecture Series in Astronomy, Jan. 2019

*Traveling to the Sun: What we are learning from NASA's Parker Solar Probe*  
Tuscon Graduate Club, Dec. 2018

*Visiting our Sun: Unraveling the Mysteries of the Solar Atmosphere using*  
*Parker Solar Probe* LPL Evening Seminar, Sept. 2018

## PUBLICATIONS **PEER REVIEWED JOURNAL ARTICLES** [59; H-INDEX 19, 963 CITATIONS]<sup>2,3</sup>

**Klein, K. G.**, Howes, G. G., TenBarge, J.M., & Valentini, F, *Diagnosing collisionless energy transfer using field-particle correlations: Alfvén-ion cyclotron turbulence*, J. Plasma Phys. **86**, 905860402, 2020 doi: 10.1017/S0022377820000689

Martinović, M. M., **Klein, K. G.**, et al(9 authors), *Solar Wind Electron Parameters Determination on Wind Spacecraft Using Quasi-Thermal Noise Spectroscopy* JGR, 2020 doi: 10.1029/2020JA028113

Lavraud, B, et al., (22<sup>nd</sup> of 39 authors), *The Heliospheric Current Sheet and Plasma Sheet during Parker Solar Probe's First Orbit* ApJL, **894** L19, 2020, doi: 10.3847/2041-8213/ab8d2d **Citations: 1**

Verniero, J. et al., (7<sup>th</sup> of 22 authors), *Parker Solar Probe Observations of Proton Beams Simultaneous with Ion-scale Waves* ApJS, **248** 5, 2020, doi: 10.3847/1538-4365/ab86af

Verscharen, D., Parashar, T. N., Gary, S. P., & **Klein, K. G.**, *Dependence of kinetic plasma waves on proton-to-electron mass ratio and light-to-Alfvén speed ratio*, MNRAS, **494**, 2905-2911, 2020 doi: 10.1093/mnras/staa977

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<sup>2</sup>As of July 24, 2020 from SAO/NASA ADS: [http://adsabs.harvard.edu/abstract\\_service.html](http://adsabs.harvard.edu/abstract_service.html)

<sup>3</sup>ORCID ID: 0000-0001-6038-1923

- Whittlesey, P. L. et al., (12<sup>th</sup> of 22 authors), *The Solar Probe ANalysers - Electrons on Parker Solar Probe* ApJS, **246** 74, 2020, doi: 10.3847/1538-4365/ab7370 **Citations: 4**
- Huang, J., Kasper, J., Vech, D., **Klein, K. G.** et al., (30 authors) *Proton Temperature Anisotropy Variations in Inner Heliosphere Estimated with First Parker Solar Probe Observations* ApJS, **246** 70, 2020, doi: 10.3847/1538-4365/ab74e0 **Citations: 5**
- Bowen, T. S., Mallet, A, Huang, J., **Klein, K. G.** et al., (25 authors), *Inner Heliosphere Observations of Ion Scale Electromagnetic Waves* ApJS, **246** 66, 2020, doi: 10.3847/1538-4365/ab6c65 **Citations: 6**
- Chen, C. H. K. et al., (13<sup>th</sup> of 24 authors), *The Evolution and Role of Solar Wind Turbulence in the Inner Heliosphere* ApJS, **246** 53, 2020, doi: 10.3847/1538-4365/ab60a3 **Citations: 10**
- Vech, D., Kasper, J. C., **Klein, K. G.** et al. (20 authors), *Kinetic Scale Spectral Features of Cross Helicity and Residual Energy in the Inner Heliosphere*, ApJS, **246** 52, 2020, doi: 10.3847/1538-4365/ab60a2 **Citations: 3**
- Bandyopadhyay, R. et al., (26<sup>th</sup> of 28 authors), *Enhanced Energy Transfer Rate Observed near the Sun from Parker Solar Probe* ApJS, **246** 48, 2020, doi: 10.3847/1538-4365/ab5dae **Citations: 1**
- Horbury, T. S. et al., (14<sup>th</sup> of 24 authors), *Sharp Alfvénic Impulses in the near-Sun solar wind* ApJS, **246** 45, 2020, doi: 10.3847/1538-4365/ab5b15 **Citations: 7**
- Case, A. W. et al., (17<sup>th</sup> of 18 authors), *The Solar Probe Cup on Parker Solar Probe* ApJS, **246** 43, 2020, doi: 10.3847/1538-4365/ab5a7b **Citations: 13**
- Kim, T. K. et al., (22<sup>nd</sup> of 23 authors), *Predicting the Solar Wind at Parker Solar Probe using an Empirically Driven MHD Model* ApJS, **246** 40, 2020, doi: 10.3847/1538-4365/ab58c9 **Citations: 1**
- Adhikari, L. et al., (11<sup>th</sup> of 11 authors), *Turbulent Transport Modeling and First Orbit Parker Solar Probe (PSP) Observations* ApJS, **246** 38, 2020, doi: 10.3847/1538-4365/ab5852 **Citations: 1**
- Tenerani, A. et al., (13<sup>th</sup> of 21 authors), *Magnetic Field Kinks and Folds in the Solar Wind* ApJS, **246** 32, 2020, doi: 10.3847/1538-4365/ab53e1 **Citations: 5**
- Martinović, M., **Klein, K. G.**, et al., (21 authors), *The Enhancement of Proton Stochastic Heating in the near-Sun Solar Wind* ApJS, **246** 30, 2020, doi: 10.3847/1538-4365/ab527f **Citations: 2**
- Giacalone, J. et al., (20<sup>th</sup> of 35 authors), *Solar Energetic Particles Produced by a Slow Coronal Mass Ejection at  $\sim 0.25$  AU* ApJS, **246** 29, 2020, doi: 10.3847/1538-4365/ab5221 **Citations: 2**
- Zhao, L. et al., (20<sup>th</sup> of 20 authors), *Identification of Magnetic Flux Ropes from PSP Observations during the First Encounter* ApJS, **246** 26, 2020, doi: 10.3847/1538-4365/ab4ff1 **Citations: 3**

Halekas, J. S. et al., (11<sup>th</sup> of 17 authors), *Electrons in the Young Solar Wind: First Results from Parker Solar Probe* ApJS, **246** 22, 2020, doi: 10.3847/1538-4365/ab4cec

**Citations: 5**

Kasper, J. C. et al., (16<sup>th</sup> of 41 authors), *Alfvénic Velocity Spikes and Large Rotational Flows in the Near-Sun Solar Wind*, Nature, 2019, doi: 10.1038/s41586-019-1813-z

**Citations: 49**

Verscharen, D., **Klein, K. G.**, & Maruca, B.M. *The Multiscale Nature of the Solar Wind*, LRSP, 2019, 16:5 doi: 10.1007/s41116-019-0021-0 **Citations: 31**

**Klein, K. G.**, Martinović, M., Stansby, D., & Horbury, T., *Linear Stability in the Fast Solar Wind: Helios Reevaluated*, ApJ, **887** 234, 2019, doi: 10.3847/1538-4357/ab5802

**Citations: 3**

Yoon, P.H., Seough, J., Salem, C., & **Klein, K. G.**, *Solar wind temperature isotropy*, PRL **123**, 145101, 2019, doi:10.1103/PhysRevLett.123.145101 **Citations: 2**

Sharma Pyakurel P.S. et al (8<sup>th</sup> of 12 authors) *Transition from ion-coupled to electron-only reconnection: Basic physics and implications for plasma turbulence* P. Plasma **26**, 082307, 2019, doi:10.1063/1.5090403 **Citations: 7**

Li, T. C., Howes, G. G., **Klein, K. G.**, Liu, Y.H., & TenBarge, J.M. *Collisionless Energy Transfer in Kinetic Turbulence: Field-Particle Correlations in Fourier Space*, J. Plasma Phys., **85**, 905850406, 2019, doi:10.1017/S0022377819000515 **Citations: 1**

Martinović, M. M., **Klein, K. G.**, & Bourouaine, S *Radial Evolution of Stochastic Heating in low- $\beta$  Solar Wind* ApJ, **879** 43, 2019, doi:10.3847/1538-4357/ab23f4 **Citations: 5**

Mallet, A., **Klein, K. G.** et al (8 authors) *Interplay between intermittency and dissipation in collisionless plasma turbulence* J. Plasma Phys. **85**, 175850302, 2019, doi:10.1017/S0022377819000357 **Citations: 6**

Kasper, J. C. & **Klein, K. G.** *Strong Preferential Ion Heating is Limited to within the Solar Alfvén Surface*, ApJL, **877** L35, 2019, doi:10.3847/2041-8213/ab1de5 **Citations: 4**

Chen, C. H. K, **Klein, K. G.**, & Howes, G. G., *Evidence for Electron Landau Damping in Space Plasma Turbulence* Nature Communications **10** 740 2019, doi:10.1038/s41467-019-08435-3 **Citations: 25**

van der Holst, B., Manchester, W. B., **Klein, K. G.**, & Kasper, J. C. *Predictions of the First Parker Solar Probe Encounter*, ApJL **872** L18, 2019, doi:10.3847/2041-8213/ab04a5 **Citations: 9**

Hoppock, I.W., Chandran, B.D.G., **Klein, K. G.**, Mallet, A., & Verscharen, D. *Stochastic proton heating by kinetic-Alfvén-wave turbulence in moderately high- $\beta$  plasmas* J. Plasma Phys. **84**, 905840615 2018, doi:10.1017/S0022377818001277 **Citations: 6**

Verscharen, D, **Klein, K. G.** et al (6 authors), *ALPS: The Arbitrary Linear Plasma Solver*, J. Plasma Phys. **84**, 905840403 2018, doi:10.1017/S0022377818000739 **Citations: 10**

Vech, D., **Klein, K. G.** & Kasper, J. C. *Large-scale Control of Kinetic Dissipation in the Solar Wind* ApJL **863** L4 2018, doi:10.3847/2041-8213/aad329 **Citations: 2**

- Wilson III, L. B. et al (4<sup>th</sup> of 8 authors) *The Statistical Properties of Solar Wind Temperature Parameters Near 1 AU* ApJ Supp. **236** 41 2018, doi:10.3847/1538-4365/aab71c  
**Citations: 30**
- Klein, K. G.**, Alterman, B. L., Stevens, M. L., Vech, D., & Kasper, J. C. *Majority of Solar Wind Intervals Support Ion-Driven Instabilities* PRL **120**, 205102, 2018, doi:10.1103/PhysRevLett.120.205102 **Citations: 24**
- Kunz, M. W., Abel, I. G., **Klein, K. G.** & Schekochihin, A. A., *Astrophysical gyrokinetics: Turbulence in pressure-anisotropic plasmas at ion scales and beyond*, J. Plasma Phys. **84**, 715840201 2018, doi:10.1017/S0022377818000296 **Citations: 10**
- Vech, D, Mallet, A, **Klein, K. G.** & Kasper, J. C. *Magnetic Reconnection May Control the Ion-scale Spectral Break of Solar Wind Turbulence*, ApJL **855** L27 2018, doi:10.3847/2041-8213/aab351 **Citations: 22**
- Howes, G. G., McCubbin, A. J. & **Klein, K. G.**, *Spatial Localization of Particle Energization in Current Sheets Produced by Alfvén Wave Collisions*, J. Plasma Phys. **84** 905840105, 2018, doi:10.1017/S0022377818000053 **Citations: 13**
- Verniero, J. L., Howes, G. G., & **Klein, K. G.**, *Nonlinear energy transfer and current sheet development in localized Alfvén wavepacket collisions in the strong turbulence limit*, J. Plasma Phys. **84**, 905840103, 2018 doi:10.1017/S0022377817001003 **Citations: 5**
- Vech, D., **Klein, K. G.**, & Kasper, J. C. *Nature of Stochastic Ion Heating in the Solar Wind: Testing the Dependence on Plasma Beta and Turbulence Amplitude*, ApJL **850** L11 2017, doi:10.3847/2041-8213/aa9887 **Citations: 19**
- Kasper, J., **Klein, K. G.** et al (9 authors), *A Zone of Preferential Ion Heating Extends Tens of Solar Radii from the Sun* ApJ **849** 126, 2017 doi:10.3847/1538-4357/aa84b1  
**Citations: 21**
- Klein, K. G.**, Kasper, J.C., Korreck, K.E., & Stevens, M.L. *Applying Nyquist's Method for Stability Determination to Solar Wind Observations*, J. Geophys. Res. Space Physics, **122**, 2017 doi:10.1002/2017JA024486 **Citations: 10**
- Klein, K. G.**, Howes, G. G., & TenBarge, J.M., *Diagnosing collisionless energy transfer using field-particle correlations: gyrokinetic turbulence*, J. Plasma Phys. **83**, 535830401, 2017 doi:10.1017/S0022377817000563 **Citations: 19**
- Klein, K. G.**, *Characterizing Fluid and Kinetic Instabilities using Field-Particle Correlations on Single-Point Time Series*, Phys. Plasmas **24**, 055901, 2017 doi:10.1063/1.4977465  
**Citations: 10**
- Howes, G. G., **Klein, K. G.**, & Li, T. C. *Diagnosing Collisionless Energy Transfer Using Field-Particle Correlations: Vlasov-Poisson Plasmas*, J. Plasma Phys. **83**, 705830102, 2017 doi:10.1017/S0022377816001197 **Citations: 19**
- Li, T. C., Howes, G. G., **Klein, K. G.**, & TenBarge, J. M. *Energy Dissipation and Landau Damping in Two- and Three-Dimensional Plasma Turbulence*, ApJL **832** L24, 2016, doi:10.3847/2041-8205/832/2/L24 **Citations: 23**



Verscharen, D., Chandran, B. D. G., **Klein, K. G.** & Quataert, E. *Collisionless Isotropization of the Solar Wind by Compressive Fluctuations and Plasma Instabilities*, ApJ **831** 128, 2016, doi:10.3847/0004-637X/831/2/128 **Citations: 33**

**Klein, K. G.** & Howes, G. G. *Measuring Collisionless Damping in Heliospheric Plasmas using Field-Particle Correlations*, ApJ Lett **826** L30, 2016, doi:10.3847/2041-8205/826/2/L30 **Citations: 25**

**Klein, K. G.** & Chandran, B. D. G. *Evolution of the Proton Velocity Distribution due to Stochastic Heating in the Near-Sun Solar Wind*, ApJ **820** 47, 2016, doi:10.3847/0004-637X/820/1/47 **Citations: 12**

Chandran, B. D. G., Perez, J. C., Verscharen, D., **Klein, K. G.**, & Mallet, A. *On the Conservation of Cross Helicity and Wave Action in Solar-Wind Models with non-WKB Alfvén Wave Reflection*, ApJ **811** 50, 2015, doi:10.1088/0004-637X/811/1/50 **Citations: 5**

**Klein, K. G.** & Howes, G. G. *Predicted Impacts of Proton Temperature Anisotropy on Solar Wind Turbulence*, Phys. Plasmas, **22**, 032903, 2015, doi:10.1063/1.4914933 **Citations: 33**

**Klein, K. G.**, Perez, J. C., Verscharen, D., Mallet, A., & Chandran, B. D. G. *A Modified Version of Taylor's Hypothesis for Solar Probe Plus Observations* ApJ Lett, **801** L18, 2015, doi:10.1088/2041-8205/801/1/L18 **Citations: 12**

**Klein, K. G.**, Howes, G. G., & TenBarge, J. M. *The Violation of the Taylor Hypothesis in Measurements of Solar Wind Turbulence*, ApJ Lett, **790** L20, 2014, doi:10.1088/2041-8205/790/2/L20 **Citations: 28**

Howes, G. G., **Klein, K. G.**, & TenBarge, J. M. *Validity of the Taylor Hypothesis for Linear Kinetic Waves in the Weakly Collisional Solar Wind*, ApJ, **789** 106, 2014, doi:10.1088/0004-637X/789/2/106 **Citations: 43**

**Klein, K. G.**, Howes, G. G., TenBarge, J. M., & Podesta, J. J. *Physical Interpretation of the Angle Dependent Magnetic Helicity Spectrum in the Solar Wind: The Nature of Turbulent Fluctuations near the Proton Gyroradius Scale* ApJ, **785** 138, 2014, doi:10.1088/0004-637X/785/2/138 **Citations: 35**

**Klein, K. G.** et al (6 authors) *Using Synthetic Spacecraft Data to Interpret Compressible Fluctuations in Solar Wind Turbulence*, ApJ, **755** 159, 2012, doi:10.1088/0004-637X/755/2/159 **Citations: 69**

Howes, G. G., Bale, S. D., **Klein, K. G.** et al (6 authors) *The slow-mode nature of compressible wave power in solar wind turbulence*, ApJ Lett, **753** L19, 2012, doi:10.1088/2041-8205/753/1/L19 **Citations: 106**

TenBarge, J. M., Podesta, J. J., **Klein, K. G.**, & Howes, G. G. *Interpreting Magnetic Variance Anisotropy Measurements in the Solar Wind*, ApJ **753** 107, 2012, doi:10.1088/0004-637X/753/2/107 **Citations: 46**

#### CONFERENCE PROCEEDINGS & WHITE PAPERS [8]

Chen, L. J. et al. (10<sup>th</sup> of 21 authors) *Challenges and the next transformative steps in understanding plasma turbulence from the perspective of multi-spacecraft measurements* arxiv:1908.04192 **Citations: 1**

Verscharen, D. et al (15<sup>th</sup> of 27 authors) *A Case for Electron-Astrophysics* arxiv:1908.02206  
**Citations 2**

**Klein, K. G.** & Vech, D. *Solar Wind Plasma Parameter Distributions at 1 au*, RNAAS, 2019, doi: 10.3847/2515-5172/ab3465 **Citations: 3**

**Klein, K. G.** et al. (24 authors) *Multipoint Measurements of the Solar Wind: A Proposed Advance for Studying Magnetized Turbulence* arXiv:1903.05740 **Citations: 4**

TenBarge, J. M. et al. (11<sup>th</sup> of 29 authors) *Disentangling the Spatiotemporal Structure of Turbulence Using Multi-Spacecraft Data*, arXiv:1903.05710 **Citations: 5**

Matthaeus, W. H. (21<sup>st</sup> of 49 authors) *The essential role of multi-point measurements in turbulence investigations: the solar wind beyond single scale and beyond the Taylor Hypothesis*, arXiv:1903.06890 **Citations: 4**

Howes, G. G., **Klein, K. G.**, & TenBarge, J. M. *The Quasilinear Premise for the Modeling of Plasma Turbulence*, arXiv:1404.2913 **Citations: 13**

Chen, C. H. K. et al (5<sup>th</sup> of 6 authors) *Kinetic Scale Density Fluctuations in the Solar Wind* Solar Wind 13 Proceedings **1539** 143, 2013, doi:10.1063/1.4811008 **Citations: 26**

#### SUBMITTED [5]

Verniero, J.L., Howes, G.G, Stewart, D.E., & **Klein, K.G.** *Determining threshold instrumental resolutions for resolving the velocity-space signature of ion Landau damping*, JGR

Kawazura, Y. et al. (7<sup>th</sup> of 8 authors) *Ion versus electron heating in compressible driven gyrokinetic turbulence* PRX

Livi, R. et al., (6<sup>th</sup> of 21 authors), *The Solar Probe ANalysers - Ions on Parker Solar Probe*

Martinović, M. M. , (6<sup>th</sup> of 10 authors), *Quasi-thermal Noise in Anisotropic Plasmas* JGR

Huang, J. et al (6<sup>th</sup> of 27 authors) *Alfvénic Slow Solar Wind Observed in Inner Heliosphere by Parker Solar Probe* ApJS

#### MANUSCRIPTS IN PREPARATION [6]

**Klein, K.G.** et al (4 authors) *A Scale-Filtered Correlation for Determining Properties of Velocity Fluctuations*, ApJ

**Klein, K.G.** et al (10 authors) *Assessing Properties of Turbulence using Multi-point, Multi-Scale Measurements*, Frontiers in Space Physics

Vech, D., Martinović, M. M., **Klein, K. G.**, et al (20 authors) *Wave-particle energy exchange directly observed in an ion cyclotron wave*, PRL

Esman, T. M., Espley, J., Gruesbeck, J, **Klein, K. G.**, & Giacalone, J., *Plasma Waves Far Upstream of the Martian Bow Shock* JGR

Vech, D. et al (6<sup>th</sup> of 9 authors) *Experimental determination of ion acoustic wave dispersion relation with interferometric analysis* JGR

Yoon, P. et al (6<sup>th</sup> of 7 authors) *Anisotropic temperature relaxation by collisions* J. Plasma Physics

- CONFERENCES/  
SCHOLARLY  
PRESENT.
- INVITED CONFERENCE PRESENTATIONS [12<sup>4</sup>]**
- The Distribution of Ion-Driven Instabilities in the Inner Heliosphere*  
19<sup>th</sup> International Astrophysics Conference, March 2020
- Kinetic Instabilities in Magnetized, Collisionless Plasmas*  
12<sup>th</sup> Plasma Kinetics Working Meeting, Aug. 2019
- A Preferential Ion Heating Zone Near The Sun: What is it, Where is it,  
and What Drives it?* 18<sup>th</sup> International Astrophysics Conference, Feb. 2019
- Tracking Energization and Dissipation in the Near-Sun Environment with  
Parker Solar Probe* AGU TESS, May. 2018
- How Unstable is the Solar Wind? Evaluating in situ Observations using  
Nyquist's Criterion* 17<sup>th</sup> International Astrophysics Conference, Mar. 2018
- Using Velocity-Space Structure of Field-Particle Correlations to Characterize Energy  
Transfer in Space and Laboratory Plasmas* IPELS, June 2017
- Applying Field-Particle Correlations to Assess Turbulent Heating in the Solar Wind*  
EGU, Apr. 2017
- A General Method for Instability Identification in Solar Wind Observations  
Illustrated by Particular Application to WIND Measurements*  
16<sup>th</sup> International Astrophysics Conference, Mar. 2017
- Identifying and Characterizing Kinetic Instabilities using Solar Wind Observations  
of Non-Maxwellian Plasmas* AGU, Dec. 2016
- A Field-Particle Correlation Technique to Explore the Collisionless Damping of Plasma  
Turbulence* APS-DPP, Nov. 2016
- Diagnostics for Comparing Turbulence in Solar Wind Observations and Numerical  
Simulations* AGU, Dec. 2014
- Quantitative Comparisons between Turbulence Simulations and Solar Wind Observations*  
SHINE Workshop, June 2014
- INVITED COLLOQUIUM PRESENTATIONS [21]**
- Plasma Heating and Instabilities in the Young Solar Wind: Thermodynamics far from  
Equilibrium* Imperial College, Space Physics Seminar, July 2020
- Instabilities and Plasma Heating in the Inner Heliosphere: Thermodynamics far from  
Equilibrium* Princeton Plasma Physics Laboratory, Heliospheric Seminar, March 2019
- Thermodynamics far from Equilibrium: Studying Instabilities and Plasma Heating in  
the Solar Wind* University College, London, Space Physics Seminar, Jan 2019
- A Majority of Solar Wind Intervals Support Ion-Driven Instabilities*  
Wind Science Telecon, April 2018
- Testing The Frequency of Ion-Driven Instabilities in the Solar Wind*  
Parker Solar Probe Science Working Group, Jan. 2018
- A Rosetta Stone for Solar Probe Plus Heating Science*  
SWEAP Science Team Meeting, Dec. 2016
- Can Field-Particle Correlations be used to Discern the Nature of Solar Wind Heating?*  
Solar Probe Plus Theory Working Group, Nov. 2016
- Assessing Solar Wind Heating Through Measurement of Velocity Distribution Functions*

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<sup>4</sup>An additional three invited presentations at international conferences in 2020 have been postponed due to COVID-19 travel restrictions.



Solar Probe Plus Science Working Group, Sept. 2016  
*Velocity Space Signatures of Turbulent Dissipation*  
Space Science Seminar - University of New Hampshire, April 2016  
*Reevaluating Taylor's Hypothesis in the Era of Solar Probe Plus*  
Solar Probe Plus Science Working Group, Feb. 2016  
*Characterizing Solar Wind Turbulence with Kinetic Plasma Physics*  
Space & Planetary Physics Seminar - University of Michigan, Jan. 2016  
*Observable Signatures of Stochastic Heating in the Near-Sun Solar Wind*  
SWEAP Science Team Meeting - UC Berkeley, Dec. 2015  
*Signatures of Kinetic Damping in Collisionless Plasmas*  
FIELDS Science Team Meeting - UC Berkeley, Dec. 2015  
*Applying Taylor's Hypothesis to Solar Probe Plus Perihelion Measurements*  
FIELDS and STEREO/WAVES Science Team Meeting - UC Berkeley, Dec. 2014  
*Understanding Solar Wind Turbulent Fluctuations using Linear Kinetic Physics*  
Plasma Physics Seminar - University of Maryland, Oct. 2014  
*Mapping the Kinetic Physics of Proton Temperature Anisotropies in Phase Space*  
Space Plasma Physics Seminar - Goddard Space Flight Center, Oct. 2014  
*Linear Kinetic Physics of Turbulent Fluctuations in the Solar Wind*  
Space Science Seminar - University of New Hampshire, March 2014  
*How Will the Violation of Taylor's Hypothesis Alter Turbulent Power Spectra Measured by Solar Probe Plus?*  
SWEAP Science Team Meeting - UC Berkeley, Dec. 2013  
*Identification of Compressive Fluctuations in the Solar Wind Inertial Range*  
Plasma Physics Seminar- University of Iowa, Oct. 2012  
*Using Synthetic Time Series to Understand Compressive Solar Wind Turbulence*  
Plasma Physics Seminar- University of Iowa, March 2011  
*Using MHD Theory to Understand Satellite Measurements in the Heliosphere*  
Plasma Physics Seminar- University of Iowa, May 2010

**CONTRIBUTED CONFERENCE PRESENTATIONS [42]**

*The Prevalence of ion-scale instabilities in the near-Sun Environment* AGU, Dec 2019  
*The Ubiquity of Ion-Driven Instabilities in the Inner Heliosphere* APS-DPP, Oct 2019  
*HelioSwarm: Revealing the Transfer of Energy Across Scales and Boundaries in Plasmas Throughout the Universe* 18<sup>th</sup> International Astrophysics Conference, Feb. 2019  
*Testing the Utility of a Swarm of Spacecraft to Study Magnetized Turbulence*  
233<sup>rd</sup> AAS Meeting, Jan. 2019  
*On the Frequency and Drivers of Ion Scale Instabilities in the Solar Wind* AGU, Dec 2018  
*The Occurrence Rate of Ion Driven Instabilities in the Solar Wind* APS-DPP, Nov 2018  
*Comparing Energy Transfer in High and Low Frequency Alfvénic Turbulence*  
APS-DPP, Nov 2018  
*Ion Free-Energy Sources Drive Instabilities in Half the Solar Wind* SHINE, July 2018  
*Numerical Preparations Toward Identifying Heating Mechanisms using Distribution Function Measurements from SWEAP and Parker Solar Probe* AGU, Dec. 2017  
*Reassessing Solar Wind Stability using Nyquist's Method* APS-DPP, Oct. 2017  
*Numerical Support for Applying Field-Particle Correlations to Space and Laboratory Plasmas* APS-DPP, Oct. 2017

- An Automated Calculation of Plasma Instability for in situ Parker Solar Probe Measurements* Parker Solar Probe Science Working Group Meeting, Oct 2017
- Using the Arbitrary Linear Plasma Solver (ALPS) to characterize non-Maxwellian features in the solar wind* SHINE Workshop, July 2017
- Novel Plasma Instability Studies using the Nyquist Stability Criteria on Solar Wind Observations*, National Academy of Science & Chinese Academy of Sciences Forum for New Leaders in Space Science, Woods Hole, Mass. May 2017
- Applying an Efficient Method for Identifying Instabilities to Solar Wind Observations* EGU, Apr. 2017
- Application of Field-Particle Correlations to Space and Laboratory Plasmas* Bringing Space Down to Earth, UCLA, Apr. 2017
- Field-Particle Correlations as a Measure of Turbulent Damping in Collisionless Plasmas* AGU, Dec. 2016
- Observing the Kinetic Signature of Turbulent Damping in Numerical Simulations and Solar Wind Observations* National Academy of Science & Chinese Academy of Sciences Forum for New Leaders in Space Science, Beijing, China, Dec. 2016
- A Method of Measuring Turbulent Heating using Field-Particle Correlations from Single Spacecraft Observations*, Arcetri Workshop on Plasma Astrophysics, Oct. 2016
- Identifying Resonant Damping in Turbulence using Field-Particle Correlations* SHINE Workshop, July 2016
- Secular Field-Particle Energy Transfer in a Turbulent, Gyrokinetic System* Fifth International Vlasovia Workshop, Calabria, Italy, May 2016
- A Role for Stochastic Heating in the Near-Sun Environment* AGU, Dec. 2015
- Signatures of Heating via Landau Damping in Nearly Collisionless Plasmas* APS-DPP, Nov. 2015
- Stochastic Heating and Diffusion in the Near-Sun Solar Wind* APS-DPP, Nov. 2015
- Stochastic Ion Heating in the Near-Sun Environment* Turbulence and Dissipation in Collisionless Astrophysical Plasmas, Cargese, France Sept. 2015
- Predictions for Solar Probe Plus: The Applicability of the Taylor Hypothesis and Signatures of Stochastic Ion Heating* Joint Solar Probe Plus-Solar Orbiter Workshop, Florence, Italy, Sept. 2015
- Effects of Proton Temperature Anisotropy on Unstable Eigenmodes and Solar Wind Turbulence* SHINE Workshop, July 2015
- Impact of Proton Temperature Anisotropy and Instability on Solar Wind Turbulence* Turbulence, Magnetic Fields, and Self-Organization in Laboratory and Astrophysical Plasmas - Winter School, Les Houches, France, March 2015
- Predictions for Near Sun Turbulent Spectra from Synthetic Time Series* AGU, Dec. 2014
- Predictions for in situ Observations of Turbulent Power Spectra within the Alfvén Critical Point* APS-DPP, Oct. 2014
- Simulation of Alfvén Wave Distribution Function Structure* SHINE Workshop, June 2014
- How Will the Violation of Taylor's Hypothesis Alter the Turbulent Power Spectra Measured by Solar Probe Plus?* AGU, Dec. 2013
- Effects of the Violation of Taylor's Hypothesis on Observed Turbulent Power Spectra in the Solar Wind* APS-DPP, Nov. 2013
- Uses and Limitations of Synthetic Spacecraft Data for Studying Solar Wind Turbulence Models*, SHINE Workshop, June 2013

*Identification of Linear Modes in the Solar Wind Dissipation Range Using Magnetic Helicity* The Future of Plasma Astrophysics, Feb. 2013

*Using Plasma Metrics as a Diagnosis of Solar Wind Mode Composition*  
APS-DPP, Nov. 2012

*Analyzing Compressive Fluctuations at Inertial and Dissipative Scales in Solar Wind Turbulence using Linear Synthetic Data and Non-linear Simulations*  
SHINE Workshop, June 2012

*Identification of Compressive Fluctuations in the Solar Wind Inertial Range*  
APS-DPP, Nov. 2011

*Interpreting Compressive Solar Wind Fluctuations using Synthetic Spacecraft Data*  
SHINE Workshop, July 2011

*Understanding Compressive Fluctuations in Solar Wind Turbulence using Synthetically Generated Data* APS-DPP, Nov. 2010

*Numeric Solution of Plasma Impulse Response with Model Fokker-Planck Operator*  
American Physical Society-Prairie Section, Nov. 2009

*Branching Fraction Measurements for Dipion Transitions*  
American Physical Society- April Meeting, April 2008

AWARDED

GRANTS AND  
CONTRACTS

*Improved Characterization of Solar Wind Dissipation, Energization, and Stability*  
NASA Early Career Investigator Program, 2019-2024

**Principal Investigator** for \$607, 946 total funding.

Sole Investigator, responsible for 100% of effort on grant.

Co-Is: None

*SWEAP Investigation: Wave Particle Correlation*<sup>5</sup>

NASA Parker Solar Probe Phase E Activities, 2020-2026

Subcontract from Smithsonian Astrophysical Observatory (PI Justin Kasper).

**Principal Investigator** for \$270, 946 subcontract.

Sole Investigator on subcontract, responsible for 5% of overall contract activities.

Co-Is: SWEAP Science Team

University of Michigan: Justin Kasper

Smithsonian Astrophysical Observatory: Tony Case, Leon Golub, Kelly Korreck,  
Michael Stevens

University of California, Berkeley: Stuart Bale, Davin Larson, Roberto Livi,  
Jim McFadden, Phyllis Whittlesey

JHU - Applied Physics Lab: George Ho

Laboratoire de Physique des Plasmas: Matthieu Berthomier

Los Alamos National Lab: Peter Gary, Ruth Skoug, John Steinberg

Massachusetts Institute of Technology: John Belcher, John Richardson

NASA - Goddard Space Flight Center: Adam Szabo

NASA - Marshall Space Flight Center: Dennis Gallagher

University of Alabama, Huntsville: Qiang Hu, Nikolai Pogorelov, Gary Zank

University of Colorado, Boulder: Steven Cranmer

University of Iowa: Jasper Halekas

University Space Research Association: Ken Wright

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<sup>5</sup>This proposal has been approved, and is currently under final negotiation with SAO

*Coupling of Electron and Ion Kinetic Physics via Collisions and Instabilities in the Expanding Solar Wind*

NASA Heliophysics Supporting Research Grant, 2019-2022

Subcontract from University of Maryland (PI Peter Yoon).

**Co-Investigator** for \$67,948 subcontract.

Sole UArizona Principal Investigator, responsible for 10% of overall grant activities.

Co-Is: Dr. Chadi Salem (SSL)

*Hybrid Kinetic-GRMHD simulations of Black Hole Accretion with Data-Calibrated Electron Physics*

NASA Astrophysics Theory Program, 2020-2023

Contract to UArizona Dept. Astronomy (PI Feryal Ozel).

**Co-Investigator**, Total UArizona Budget \$470,310.

Responsible for 15% of overall grant activities.

Co-Is: Prof. Dimitrios Psaltis (UArizona)

*Parametric Instability in the Inner Heliosphere*

NASA Heliophysics Supporting Research Grant, 2019-2022

Subcontract from University of New Hampshire (PI Benjamin Chandran).

**Co-Investigator**, \$76,689 sub-contract.

Sole UArizona Investigator, responsible for 10% of overall grant activities.

Co-Is: Prof. Stuart Bale, Dr. Trevor Bowen (SSL)

Prof. Kai Germanschewski, Mr. Kyle Morman (UNH)

*Investigation of Electron Parameter Statistical Distributions and Association with Structures using QTN Spectroscopy*

NASA Unsolicited Grant, 2019-2022

**Principal Investigator** \$150,792 total funding.

Sole UArizona Principal Investigator, responsible for 100% of grant activities.

Co-Is: Dr. Mihailo Martinović (UArizona)

*Assessing the Relative Importance of Stochastic and Resonant Ion Heating the Solar Wind*

NASA Heliophysics Supporting Research Grant, 2016-2019

**Principal Investigator** \$377,000 total funding.

Sole UArizona Principal Investigator, responsible for 100% of grant activities.

Co-Is: Prof. Benjamin Chandran (UNH) Dr. Sofiane Bourouaine (FIT)

*Vlasov-Maxwell Simulations to Resolve Electron Heating and Dissipation in Quasi-Perpendicular Shocks* NSF-DOE Basic Plasma Physics, 2019-2022,

Collaborative Proposal with Princeton University (PI Jason TenBerge)

and University of Maryland (PI Li-Jen Chen)

**Co-Principle Investigator**, \$73,749.

Sole UArizona Investigator, responsible for 15% of overall collaborative proposal.

Co-Is: Dr. Shan Wang (UMaryland)

*Non-Maxwellian Distribution Functions in the Solar Wind:*

*Dispersion Relations and Instabilities*

NASA Heliophysics Supporting Research Grant, 2016-2020,

Subcontract from University of New Hampshire (PI Benjamin Chandran).

**Co-Investigator**, \$150,000 sub-contract.

Sole UArizona Investigator, responsible for 35% of overall grant effort.

Co-Is: Dr. Daniel Verscharen (UCL) Prof. Stuart Bale, Dr. Chadi Salem (SSL)

Dr. Michael Stevens (SAO)

*Understanding the Nature of Turbulent Fluctuations in the Near-Sun Solar Wind*

NSF AGS Postdoctoral Research Fellowship, 2014-2016

**Principal Investigator**, \$172,000 total funding.

Sole Investigator, responsible for 100% of overall proposal.

Last updated: July 24, 2020