Curriculum Vitae for **Dr. David M. Malaspina**

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Statement of Research Interest:

Dr. Malaspina conducts experimental space physics research, focusing on plasma phenomena in the terrestrial magnetosphere and the solar wind. Primary topics of study include plasma waves, kinetic-scale electric field structures and spacecraft charging. He also studies the impact ionization of hypervelocity dust on spacecraft.

Dr. Malaspina designs, builds and operates spaceflight instruments. He was instrumental in the successful design and implementation of the Digital Signal Processor board for the *Magnetospheric MultiScale* mission (MMS) FIELDS instrument and the Digital Fields Board for the *Van Allen Probes* mission, Electric Fields and Waves instrument. He is a Co-I on the *Parker Solar Probe* FIELDS instrument, where he and his team are responsible for the design, fabrication, testing, calibration, and operation of the Digital Fields Board (DFB) signal processing board.

Dr. Malaspina actively pursues innovation in spaceflight instrumentation, through proposals to external funding agencies and through Internal Research and Development (IRD) projects.

Institution: Laboratory for Atmospheric and Space Physics (LASP)
University of Colorado (CU), Boulder, Colorado, USA

Positions Held:

2013 – Present	Research Scientist (CU/LASP)
2010 – 2013	Post-Doctoral Researcher (CU/LASP)
2005 – 2010	Graduate Research Assistant (CU)

Education:
2010 Ph.D. (Physics) University of Colorado, Boulder, Colorado, USA
Advisor: Prof. Robert Ergun
2005 B.S. (Physics) Purdue University, Lafayette, Indiana, USA

Publications: 85 peer-reviewed publications (24 first-author, 61 co-author)

Awards:
MMS SMART Team Exceptional Achievement for Engineering
Van Allen Probes Project Team Group Achievement Award
MAVEN Team Exceptional Achievement for Engineering Team

Major Spaceflight Mission Experience:

2010 - Present	Parker Solar Probe, Co-I on FIELDS instrument, Digital Fields Board lead
2010 - Present	Magnetospheric Multiscale Mission (MMS), FIELDS instrument, Digital Signal Processing board
2008 - Present	Van Allen Probes, Electric Fields and Waves Instrument, Digital Fields Board

Hardware Development Projects:

2016 - Present	LASP IRD: RAPS (Rapid Active Plasma Sounder), a Cubesat instrument
2016 – 2017	LASP IRD: Developing a burst algorithm for Solar Imagers
2014 – 2015	C-SALT: Cubesat-based magnetic field measurements of Europa's ocean
2014 - 2015	LASP IRD: Radiation screening for low power analog to digital converters
2012 - 2014	Witness Plate: A miniaturized dust detector optimized for Solar Probe Plus
2012 - 2013	An attitude control magnetometer for the GeoOptics CICERO spacecraft
2011 - 2013	LASP IRD: Development of a novel fluxgate magnetometer
2011 - 2012	LASP IRD: Efficient wavelet transform algorithms for FPGAs
2006 - 2007	LASP IRD: A de-spun Auroral Imager

Externally Funded Research Proposals:

2018

- (**PI**) NASA Heliophysics Supporting Research (HSR): Quantifying the Importance of Missing Aspects of Hiss Waves in the Modeling of Electron Dynamics of the Inner Magnetosphere (3 yr.)

2017

- (**PI**) NASA Heliophysics Guest Investigator (HGI): Kinetic-Scale Electric Field Structures and Particle Distributions Associated with Plasma Boundaries in the Inner Terrestrial Magnetosphere (3 yr.)
- (Co-I) [PI: S. Savage, MSFC] NASA HGI: SADs and the Magnetosphere: Informing the study of Supra Arcade Downflows with In Situ observations of retracting loops from the Earth's magnetotail (3 yr.)
- (Co-I) [PI: A. Jaynes, U. Iowa] NASA HSR: The importance of event-specific spatial and temporal variations in chorus wave activity on radiation belt evolution (3 yr.)
- (Co-I) [PI: E. Tejero, NRL] NASA HSR: Wave Generation and Energization in Dipolarization Fronts: A Coordinated Study between in Situ Data, Laboratory Experiments, and Modeling (3 yr.)
- (Co-I) [PI: R. Marshall, CU] CU Grand Challenge: Magnetic Cubesat Constellation for Advanced Navigational Models (3 yr.)

2016

- (Co-I) [PI: I. Hutchenson, MIT] NASA HGI: Electron Hole Instabilities in the Plasma Wake of Moons, Asteroids, and Comets (3 yr.)

2015

- (**PI**) NASA HGI: A Dust Impact Database for the Wind Spacecraft (2 yr.)

2014

- (Collaborator) Jet Propulsion Lab Concept Study: C-SALT, a Cubesat-Based Magnetic Field Measurement of Europa's Ocean (6 mo.)

2013

- (Co-I) [PI: S. Elkington, LASP] NASA HGI: Understanding Inner Magnetospheric Chorus Waves Using the Van Allen Probes (3 yr.)

2012

- (Co-I) [PI: Z. Sternovsky, CU] NASA Solar and Heliospheric Science: Laboratory Investigation of Dust Impacts on Antennas in Space (3 yr.)

2009

- (**PI**) NASA Earth and Space Science Fellowship: Eigenmode Theory of Solar Wind Langmuir Waves (1 yr.)

2008

- (**PI**) NASA Earth and Space Science Fellowship: Eigenmode Theory of Solar Wind Langmuir Waves (1 yr.)

Teaching / Mentoring Experience:

Advisor for CU Aerospace Graduate Studies projects

- 2018 - 2019 ASEN 5018 and 6028 "Rapid Active Plasma Sounder Development II"
- 2017 - 2018 ASEN 5018 and 6028 "Rapid Active Plasma Sounder Development I"

Advisor for CU Aerospace Engineering Sciences undergraduate senior project

- 2013 - 2014 ASEN 4018 and 4028 "Dust Impact Monitor Instrument Development"

Thesis committee member for CU Aerospace Engineering graduate students

- 2015 - 2017 Leela O'Brien "Formation, Dynamics, and Transport of Nanometer-Size Dust in the Inner Heliosphere"
- 2012 - 2016 Samuel Califf "DC Electric Field Measurements in the Inner Magnetosphere"

Advisor for CU undergraduate student

- 2014 - 2015 Fredrick Thayer "Re-interpretation of STEREO dust data based on laboratory dust accelerator testing"

Advisor to REU (Research Experience for Undergraduates) summer students

- 2017 Shaniya Jarrett "Currents and Waves in Earth's Magnetic Field"
- 2016 Veronica Dike "Cold Plasmas and Hot Plasmas: Understanding the Influence of Plasmapause Location on Radiation Belt Particle Populations"
- 2015 Cory Boulé "Variation of Whistler-mode Chorus Waves with Solar Wind Driving Conditions"
- 2013 Stephanie Wood "Hypervelocity dust impacts on the Wind spacecraft"

Guest lecturer

- 2017 ASTR 5300 (2 lectures) Graduate course: Intro. to Magnetospheres
- 2014 ASEN 6519 (2 lectures) Graduate course: Aerospace Special Topics
- 2011 PHYS 5150 (2 lectures) Graduate course: Intro. Plasma Physics

Teaching assistant for undergraduate courses

- 2006 CU Physics Department, Physics for Life Science Majors
- 2005 CU Physics Department, Physics of Music

References

[1] D. M. Malaspina, J-F. Ripoll, X. Chu, G. Hospodarsky, and J. Wygant. Variation in Plasmaspheric Hiss Wave Power with Plasma Density. *Geophysical Research Letters*, September 2018. doi: 10.1029/2018GL078564.

[2] D. M. Malaspina, A. Ukhorskiy, X. Chu, and J. Wygant. A Census of Plasma Waves and Structures Associated With an Injection Front in the Inner Magnetosphere. *Journal of Geophysical Research (Space Physics)*, 123:2566–2587, April 2018. doi: 10.1002/2017JA025005.

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[10] D. M. Malaspina, L. Andersson, R.E. Ergun, J.R. Wygant, J.W. Bonnell, C Kletzing, G.D. Reeves, R.M. Skoug, and B.A. Larsen. Nonlinear electric field structures in the inner magnetosphere. *Geophysical Research Letters*, 41:5693–5701, August 2014. doi: 10.1002/2014GL061109.

[11] D. M. Malaspina, M. Horányi, A. Zaslavsky, K. Goetz, L. B. Wilson, and K. Kersten. Interplanetary and interstellar dust observed by the Wind/WAVES electric field instrument. *Geophysical Research Letters*, 41:266–272, January 2014. doi: 10.1002/2013GL058786.

[12] D. M. Malaspina, R. E. Ergun, A. Sturner, J. R. Wygant, J. W. Bonnell, A. Breneman, and K. Kersten. Chorus waves and spacecraft potential fluctuations: Evidence for wave-enhanced photoelectron escape. *Geophysical Research Letters*, 41:236–243, January 2014. doi: 10.1002/2013GL058769.

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M. Hesse, H. Lai, C. Russell, R. Strangeway, R. B. Torbert, A. F.-Vinas, J. Burch, S. Lee, C. Pollock, J. Dorelli, W. Paterson, N. Ahmadi, K. Goodrich, B. Lavraud, O. Le Contel, Y. V. Khotyaintsev, P.-A. Lindqvist, S. Boardsen, H. Wei, A. Le, and L. Avanov. Electron Bulk Acceleration and Thermalization at Earth's Quasiperpendicular Bow Shock. *Physical Review Letters*, 120(22):225101, June 2018. doi: 10.1103/PhysRevLett.120.225101.

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Magnetospheric Multiscale mission: A case study. *Journal of Geophysical Research: Space Physics*, 122:5487–5501, December 2017. doi: 10.1002/2017JA024062.

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