Michael D. DeLuca

Curriculum Vitae

Department of Astrophysical Sciences
Princeton University
171 Broadmead, Princeton, NJ 08540
mddeluca@princeton.edu

Research Interests: Instrument development for space physics and planetary science, remote and *in situ* sensing of the space environment, interplanetary and interstellar dust, meteors

Education

2020	Ph.D., Aerospace Engineering Sciences, University of Colorado Boulder Focus Area: Remote Sensing, Earth and Space Sciences Thesis: Experiments on Micrometeoroid Ablation in Planetary Atmospheres Advisor: Prof. Zoltan Sternovsky
2018	M.S., Aerospace Engineering Sciences, University of Colorado Boulder
2015	B.S., Physics and Astronomy, Applied Mathematics, University of Pittsburgh Graduated *summa cum laude*. Program honors in physics/astronomy Minor in History

Research Experience

2020 - present	**Postdoctoral Research Associate, Department of Astrophysical Sciences, Princeton University** Work on the development of the SWAPI instrument for the IMAP mission
2015 - 2020	**Graduate Research Assistant/NSF Graduate Research Fellow, Laboratory for Atmospheric and Space Physics, CU Boulder** Conducted PhD research on dust impacts and meteors at the IMPACT institute at LASP. Supported by NSF fellowship starting in 2017. Used dust accelerator and gas target experimental facility to create simulated meteors in lab to constrain detectability of meteors with remote sensing. Also participated in the IDEX instrument project, which will fly on IMAP to study interstellar dust
2016	**Summer Intern, NASA Goddard Space Flight Center** Analyzed meteor radar data with Dr. Diego Janches to compare meteor detections made with both radar and optics
2013 - 2015	**Student Researcher, Prof. Wood-Vasey's Group, University of Pittsburgh** Imaged Type Ia supernova host galaxies and developed pipeline to process data
2014	**Summer REU Student in Solar Physics, Montana State University** Worked with Dr. Andrés Muñoz-Jaramillo to produce a dataset of bipolar magnetic regions for studying the solar cycle
2012 - 2013	**Student Researcher, Prof. Choyke's Group, University of Pittsburgh** Did experimental work on the spectroscopy of silicon carbide

Fellowships, Awards, and Honors

2017 - 2020	NSF Graduate Research Fellowship
2016	John Mather Nobel Scholarship, award for interns at NASA Goddard
2015	Dean's Outstanding Merit Fellowship, CU Boulder College of Engineering
2015	Culver Award, University of Pittsburgh Mathematics Department
2014	Inducted into Sigma Pi Sigma Physics Honor Society

Peer-Reviewed Publications

2019 **DeLuca, M.,** & Sternovsky, Z. (2019). High-speed drag measurements of aluminum particles in free molecular flow. *Journal of Geophysical Research: Space Physics*, *124*(5), 3743–3751. https://doi.org/10.1029/2019JA026583

Michell, R. G., **DeLuca, M.,** Janches, D., Chen, R., & Samara, M. (2019). Simultaneous optical and dual-frequency radar observations of small mass meteors at Arecibo. *Planetary and Space Science*, *166*, 1–8. https://doi.org/10.1016/j.pss.2018.07.015

2018 **DeLuca, M.,** Munsat, T., Thomas, E., & Sternovsky, Z. (2018). The ionization efficiency of aluminum and iron at meteoric velocities. *Planetary and Space Science*, *156*, 111–116. https://doi.org/10.1016/j.pss.2017.11.003

2017 Thomas, E., Simolka, J., **DeLuca, M.,** Horányi, M., Janches, D., Marshall, R.A., Munsat, T., Plane, J.M.C., & Sternovsky, Z. (2017). Experimental setup for the laboratory investigation of micrometeoroid ablation using a dust accelerator. *Review of Scientific Instruments*, *88*(3), 034501. https://doi.org/10.1063/1.4977832

Conference Presentations (Oral)

2019 **DeLuca, M.,** Sternovsky, Z., Horányi, M., Munsat, T., Carillo-Sánchez, J.D., Plane, J.M.C., & Janches, D. (2019). Differential ablation of organic-coated micrometeoroids observed in the laboratory. Oral presentation at EPSC-DPS Joint Meeting, Geneva, Switzerland, September 2019.

2018 **DeLuca, M.,** & Sternovsky, Z. (2018). Laboratory observations of meteoroid differential ablation. Oral presentation at COSPAR Scientific Assembly, Pasadena, CA, July 2018.

(Invited) DeLuca, M., Sternovsky, Z., & Munsat, T. (2018). Experimental observations of meteor ablation. Invited oral presentation at IEEE International Conference on Plasma Science, Denver, CO, June 2018.

DeLuca, M., & Sternovsky, Z. (2018). Coupled drag and heating in micrometeoroid ablation. Oral presentation at Dusty Visions Workshop, Madrid, Spain, May 2018.

2017 **DeLuca, M.,** Thomas, E., Munsat, T., Marshall, R., & Sternovsky, Z. (2017). Light and charge measurements of simulated aluminum micrometeoroids. Oral presentation at Dust, Atmosphere, and Plasma Environment of the Moon and Small Bodies Workshop, Boulder, CO, January 2017.

Conference Presentations (Poster)

2018 **DeLuca, M.,** Sternovsky, Z., & Munsat, T. (2018). Ablation of micrometeoroids simulated in the laboratory. Poster presentation at AGU Fall Meeting, Washington, DC, December 2018.

DeLuca, M., Sternovsky, Z., Munsat, T., & Ulibarri, Z. (2018). Development of a reflectron time-of-flight mass spectrometer and icy dust accelerator to study icy impacts. Poster presentation at Europa Deep Dive 2: Composition Workshop, Houston, TX, October 2018.

2017 **DeLuca, M.,** Munsat, T., & Sternovsky, Z. (2017). Measurements of the drag coefficient of simulated micrometeoroids. Poster presentation at AGU Fall Meeting, New Orleans, LA, December 2017.

DeLuca, M., Thomas, E., Munsat, T., Marshall, R., & Sternovsky, Z. (2017). Laboratory simulations of aluminum micrometeoroids. Poster presentation at Lunar and Planetary Science Conference, The Woodlands, TX, March 2017.

2016 **DeLuca, M.,** Thomas, E., & Sternovsky, Z. (2016). Fitting the chemical ablation model to laboratory experiments in micrometeoroid ablation. Poster presentation at Meteoroids 2016, Noordwijk, Netherlands, June 2016.

2014 **DeLuca, M.,** Muñoz-Jaramillo, A., & Longcope, D. (2014). Automatic vs. human detection of bipolar magnetic regions: Using the best of both worlds. Poster presentation at Living With a Star Science Meeting, Portland, OR, November 2014.

Teaching and Mentoring

2017 - 2020 Peer mentor to 3 incoming graduate students, CU Boulder

2019 Research mentor to summer REU student at LASP. Supervised student's work on dust impact tests

2018 2 lectures in ASEN 6050: Spacecraft Instrumentation, on dust instruments and electrostatic analyzers, 10/31/18 and 11/2/18, CU Boulder

2018 Guest lecture in ASEN 5210: Remote Sensing Seminar, "Experiments to Support Remote Sensing of Meteors," 9/7/18, CU Boulder

Professional Development

2019 Completed NASA Planetary Science Summer Seminar at JPL