Dr. Zach Ulibarri

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Education

Ph.D. in Physics, University of Colorado, 2022
B.S. in Physics, *Summa Cum Laude*, Northern Arizona University, 2013
B.S.E. in Electrical Engineering, *Summa Cum Laude*, Northern Arizona University, 2013

Research Experience

July 2022 – Present: Cornell University. *Postdoctoral Associate, Aerospace Engineering*
- Developed an electrospray ionization source to gently ionize biomolecules for time-of-flight mass spectrometry

2015 – June 2022: University of Colorado at Boulder. *Graduate Research Assistant*
- Designed and performed time-of-flight mass spectroscopy studies of hypervelocity plasma plumes from dust impacts into a cryogenic target
- Determined the "speed limit" of spacecraft for hypervelocity organic studies
- Operated the Colorado Dust Accelerator for a number of space instruments
- Graduate student affiliate of the SUDA instrument on the Europa Clipper
- Operated a 20-ton overhead crane (OSHA/ASME/CMAA certification)

2014 – 2016: University of Colorado at Boulder. *Graduate Research Assistant*
- Set up the Colorado Solar Wind Experiment, a high current, large aperture ion source to simulate solar wind interaction. Characterized with *Langmuir probes* (which I built) and *retarding potential* plasma diagnostics instrumentation

2013: University of Colorado at Boulder. *Research Experience for Undergrads Student*
- Assembled and tested a dust position sensor for the Colorado Dust Accelerator

2012: Cornell University. *Research Experience for Undergrads Student*
- Built and characterized a laser oscillator for the Energy Recovery Linac Project

2012: Northern Arizona University. *Undergrad engineering design project team leader*
- Led a team of five other undergrad engineers on a project to design a $30,000 renewable energy system for Moencopi Day School on the Navajo Nation

Experience and Skills

- ***Technical:*** Ultra-High Vacuums, Mass Spectrometry, Hypervelocity Plasma Plumes, Vacuum Cryogenic Hardware Design, Machining, High-Pressure Gases
- ***Software:*** SolidWorks, LabVIEW, Eagle PCB Design, PCB Artist, GIT, Adobe Illustrator/Photoshop/Premiere/Lightroom. Ran IT/networking and data acquisition pipeline for the Colorado Dust Accelerator.
- ***Programming:*** Python, LabVIEW, HTML, C, VHDL
- ***Project Management:*** Lead organizer of LunGradCon 2017-2021 (team of 5), Founder/lead organizer of Public Works 2022-2023 (team of 4), Managed undergrad and grad student projects at both Cornell and Boulder
- ***Communication:*** 22 conference presentations (11 oral, 11 posters) across USA, Europe, and Asia. *2x NASA Exploration Science Forum poster awards*.
- ***Other:*** Rode a bicycle solo across North America. Solo travelled to India's border with Tibet and to Cambodia's Angkor Wat. Hobbyist woodworker.

Selected Awards and Honors

- NASA Exploration Science Forum Poster Award, Second Place (2018)
- NASA Exploration Science Forum Poster Award, Third Place (2017)
- Lowell Prize – Given to a single outstanding student from the College of Forestry, Engineering, and Natural Sciences at NAU (2014)
- Adel Scholar Award– Given to a single outstanding NAU physics student (2013)

Publications

- Z. Ulibarri, M. Voss, T. Munsat, S. Kempf, M. Horányi, and Z. Sternovsky. "Detection of the amino acid histidine and its breakup products in hypervelocity impact ice spectra." *Icarus* (2023): 115319.
- Z. Ulibarri, O. Jia-Richards, and E. Petro. "Ultra-Long Baseline Time-of-Flight Mass Spectrometry with the Advanced Mass Spectrometry in Gravity-Free Architectures (AMIGAS) Mission Concept." Accepted for publication in *IEEE Aerospace Conference 2023*.
- S. Cogan, Z. Ulibarri, E. Petro, and A. Hofmann. "Electrospray Mass Spectrometry for In-Orbit Biomolecule Analysis." Accepted for publication in *IEEE Aerospace Conference 2023*.
- M. Voss, Z. Ulibarri, T. Munsat. "Novel airbrushing technique for creation of ice surfaces with homogenous distributions of complex organics." In preparation for *Review of Scientific Instruments*.
- E. Ayari, J. Hillier, M. Horányi, R. Mikula, T. Munsat, J. Schmitt, Z. Sternovsky, M. Trieloff, N. Turner, Z. Ulibarri, and A. Westphal. "Composition Measurement Capabilities of the Hyperdust Instrument from Laboratory Accelerator Experiments with Particles of Crystalline Olivine." In preparation for *Review of Scientific Instruments*.
- W. Goode, T. Munsat, D. James, and Z. Ulibarri. "Trajectory measurements for individual dust particles on the Colorado dust accelerator." *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment* 908: 269-276 (2018)
- Z. Ulibarri, J. Han, M. Horányi, T. Munsat, X. Wang, G. Whittall-Scherfee, and L. Yeo. "A large ion beam device for laboratory solar wind studies." *Review of Scientific Instruments* 88(11): 115112 (2017)
- A. Nelson, R. Dee, M. Gudipati, M. Horányi, D. James, S. Kempf, T. Munsat, Z. Sternovsky, and Z. Ulibarri. "New experimental capability to investigate the hypervelocity micrometeoroid bombardment of cryogenic surfaces." *Review of Scientific Instruments* 87(2): 024502 (2016)

Selected Invited Colloquia

NASA Jet Propulsion Laboratory Planetary Science Seminar – March 2022.
Measurement of the Amino Acid Histidine and its Breakup Products in Hypervelocity Dust-Ice Impact Mass Spectra.