Mykhaylo Shumko

(909) · 648 · 5575
msshumko@gmail.com
mshumko.github.io

EDUCATION

Montana State University *August 2014 - April 2020*
Masters in Physics *Awarded in May 2016*
Ph.D. in Physics *Awarded in December 2019*
Dissertation topic: Connecting Microburst Precipitation to Its Scattering Mechanism
mshumko.github.io/files/shumko_dissertation.pdf

University of California, Santa Cruz *September 2010 - June 2014*
B.S. in Astrophysics.
Thesis topic: Dynamic studies of punch thorough protection of silicon strip detectors with laser-based charge injection system.
mshumko.github.io/files/shumko_thesis.pdf

EXPERIENCE

Space Sciences and Engineering Laboratory September 2014 - April 2020
Graduate Research Assistant and Postdoctoral researcher *Bozeman, MT*

- Launched the BARREL high altitude balloon out of McMurdo, Antarctica, December 2019
- Operate the FIREBIRD-II CubeSats and developed the data pipeline to automatically process and upload new data to the internet within 24 hours. Data is located at http://solar.physics.montana.edu/FIREBIRD_II
- Organized and led a Particle Precipitation Workshop at University of New Hampshire, April 17th-18th, 2019
- Use Two Line Elements to generate ephemeris and IRBEM-Lib to generate magnetic ephemeris
- Developed a conjunction toolkit, a software package for calculating magnetic conjunctions between spacecraft. Lists of past conjunctions are used for analysis, and future conjunctions to prioritize FIREBIRD-II CubeSat data downlinks
- Created a detection algorithm to identify transient and spatial features observed by the AeroCube-6 multi-spacecraft CubeSat mission
- Developed a Python wrapper for IRBEM-Lib https://sourceforge.net/p/irbem/code/HEAD/tree/trunk/python/
- Created a database of microbursts observed with the FIREBIRD-II CubeSats, detected using a wavelet filtering and reconstruction
- Advised REU and undergraduate students
- Programmed a Long Range (LoRa) Arduino software-defined radio to transmit data from remote locations with a low power consumption
- Programmed an HCS08 microcontroller in assembly to control a thermoelectric cooler
- Earned a Technician Class ham radio license
- Co-director of the Rocky Mountain Data Science Club https://rmds.tech/

Los Alamos National Laboratory June - July 2018
Summer student *Los Alamos, NM*

- Performed a sensitivity analysis of the Magnetic Electron Ion Spectrometer on the Van Allen Probes
- Developed a forward model to convert a flux energy spectra to count rates observed by the Magnetic Electron Ion Spectrometer and optimized the model parameters using a Markov chain Monte Carlo sampler

The Aerospace Corporation May - August 2017
Graduate Intern *El Segundo, CA*

- Analyzed a microburst observed by the Van Allen Probes and used resonant diffusion theory to conclude that the electron transport is not consistent with particle transport along single-wave characteristics (diffusion curves for monochromatic waves)
- Estimated the magnetic field model footpoint error for a variety of magnetic field models with IRBEM-Lib

Santa Cruz Institute for Particle Physics September 2012 - August 2014
Student Researcher *Santa Cruz, CA*

- Tested Punch-Through Protection resistance and safe operating voltage of Low Resistance silicon strip detectors in silicon sensor Laboratory using DC voltage sweep
- Performed laser injection studies on the ATLAS strip detectors to determine sensor tolerance to large injected charges from beam losses. Used ROOT, a C++ interpreter, to process measured waveforms

Big Bear Solar Observatory Summers of 2011, 2012, and 2013
Programmer & Researcher *Big Bear, CA*

- Analysed the performance of the PCO-EDGE Camera using IDL software to quantify non-linearity in intensity, readout noise and gain with a photon transfer curve, and fixed-pattern noise by image inspection

PUBLICATIONS

- Author, Electron Microburst Size Distribution Derived with AeroCube-6, published in Journal of Geophysical Research, February 2020. (DOI:10.1029/2019JA027651)
- Co-author, The FIREBIRD-II CubeSat Mission: Focused Investigations of Relativistic Electron Burst Intensity, Range, and Dynamics, accepted in Review of Scientific Instruments, February 2019.
- Co-author, Direct Observation of Sub-Relativistic Electron Precipitation Driven by EMIC Waves, publsihed in Geophysical Research Letters, November 2019 (DOI: 10.1029/2019GL084202)
- Author, Evidence of Microbursts Observed Near the Equatorial Plane in the Outer Van Allen Radiation Belt, published in Geophysical Research Letters, July 2018 (DOI: 10.1029/2018GL078451)
- Author, Microburst Scale Size Derived from a Bouncing Packet Microburst Simultaneously Observed with the FIREBIRD-II CubeSats, published in Geophysical Research Letters, July 2018 (DOI: 10.1029/2018GL078925)
- Co-author, Observations directly linking relativistic electron microbursts to whistler mode chorus: Van Allen Probes and FIREBIRD II, published in Geophysical Research Letters, November 2017 (DOI: 10.1002/2017GL075001)
- Co-Author, Low-Resistance Strip Sensors for Beam-Loss Event Protection, published in November 2014. (DOI: 10.1016/j.nima.2014.05.089)

AWARDS

· NASA Postdoctorial Program Fellowship, 2020
· NASA Earth and Space Sciences Fellowship, 2018, 2019
· Vela Fellowship, 2018
· The Best Inner Magnetosphere Poster, GEM Workshop, 2016
· Montana Space Grant Consortium Fellowship, 2015 - 2016
· NASA EPSCoR Travel Grant, 2015

CONFERENCES, MEETINGS, AND WORKSHOPS

· Poster presenter, AGU Fall Meeting, Dec 2019
· Invited focus group talk and poster presenter, GEM workshop, June 2019
· Poster presenter, AGU Fall Meeting, Dec 2018
· Executive Secretary, NASA Review Panel, 2014, 2018
· Gave a student tutorial, focus group speaker, and poster presenter, GEM workshop, June 2018
· Speaker, AGU Fall Meeting, Dec 2017
· Speaker, Relativity and Astrophysics Seminar, MSU, Sept 2017
· Invited speaker, Space Sciences Lab, UC Berkeley, Aug 2017
· Gave a student tutorial, focus group speaker, and poster presenter, GEM workshop, June 2017
· Poster presenter, AGU Fall Meeting, Dec 2016
· Student, CISM Space Weather Summer School, July 2016
· Poster presenter, GEM Workshop, June 2016
· Speaker, MSGC Research Symposium, April 2016
· Speaker, Van Allen Probe ECT Teem Meeting, September 2015
· Poster presenter, CEDAR Workshop, June 2015

TEACHING EXPERIENCE

· Teaching Assistant, Physics 220, Intro to Physics I (w/ calculus), Spring 2016
· Instructor, Physics 201, Physics by Inquiry, Fall 2015
· Teaching Assistant, Physics 207, Intro to Physics II, Spring 2015, Summer 2015
· Teaching Assistant, Physics 205, Intro to Physics I, Fall 2014

TECHNICAL STRENGTHS

Computer Languages	Python, C and Assembly
Protocols	git, SSH and Samba Share
Tools	LaTeX, Visual Studio Code, Inkscape, Windows Subsystem for Linux
Languages	English and Russian

OTHER EMPLOYMENT EXPERIENCE

· Student Manager, UC Santa Cruz Cowell/Stevenson Dining Hall. September 2010 - May 2014
· Bike Mechanic, UC Santa Cruz Bike Maintenance Clinic. April 2012 - June 2014