Alexander Lozinski

+1 (424) 371-3566 3220 S Green St., Chicago, 60608 atmosalex.github.io

- Postdoctoral Scholar & Lecturer at UCLA
- Expertise in machine learning, physics-based modeling and data science
- UK citizen with permanent resident status/green card

Education

Ph.D. Physics, British Antarctic Survey & University of Cambridge 2021

Modelling the Exposure of Satellites in Medium Earth Orbit to Proton Belt Radiation

Advisors: Prof. Richard Horne & Dr. Giulio Del Zanna

MSc Physics, Imperial College London, *Pass with Distinction* 2015

Project thesis: *Modelling Magnetopause Reconnection at Saturn*

BSc Geophysics, Imperial College London, *First-Class Honours* 2014

Experience

Postdoctoral Scholar & Lecturer, Atmospheric & Oceanic Sciences, UCLA 12/2022 - now

Researching methods to model Earth's radiation belts for real-time space weather awareness

Completed projects include:

- developed an artificial neural network-based model in **Pytorch** to forecast radiation belt phase space density and benchmark various architectures;
- developed a **Python library** to combine and inter-calibrate spacecraft measurements, currently used to train ML models and investigate instrument error;
- developed a **Python library** to simulate energetic particle transport in terms of a particle's adiabatic invariants (*see video demonstration*);
- various spacecraft **radiation effect calculations**, including monte carlo shielding simulations, solar cell nonionizing dose and internal charging of dielectrics;
- **data assimilation** of measurements into 3D physical model predictions

Radiation Belt Scientist, British Antarctic Survey, UK 6/2021 - 11/2022

Delivered a **real-time physics-based numerical model** of Earth's proton radiation belt for a UK Met Office contract, deployed via a Docker container. This involved developing an implicit solver for a **3D Fokker-Planck equation** and processing **real-time measurements**.

Ground Systems Engineer, Avanti Comms., UK 9/2015 - 01/2017 (prior to PhD)

Teaching

Instructor for Introduction to Machine Learning for the Physical Sciences Fall 2023 - 2025

This course teaches seven of the most popular ML algorithms using scikit-learn and Google Colab. My classes compliment online lectures and focus on guided problem solving. I designed the final project component of the course, hold office hours, and write/grade assignments. One challenge has been encouraging students to make use of AI tools whilst preventing over-dependence; I organized a faculty meeting to discuss this.

Other Skills

Experience coding in **Python** and **Fortran**; technology for collaborative project management (**Jira**), development (**Git**), and deployment (**Docker**); ML libraries (**Pytorch**, **scikit-learn**); data science (**pandas**); **API** authorization flow (i.e. wrote an app to find the price of an item on Ebay)

Publications

Lozinski et al. (2025), *Modeling the Internal Redistribution of Earth's Proton Radiation Belt by Interplanetary Shocks*, JGR: Space Physics, 130(6)

Lozinski et al. (2024), *Modeling Field Line Curvature Scattering Loss of 1–10 MeV Protons During Geomagnetic Storms*, JGR: Space Physics, 129(4)

Clilverd et al. (2024), *Improved Energy Resolution Measurements of Electron Precipitation Observed During an IPDP-Type EMIC Event*, JGR: Space Physics, 129(7)

Lozinski et al. (2021), *Modeling Inner Proton Belt Variability at Energies 1 to 10 MeV Using BAS-PRO*, JGR: Space Physics, 126(12)

Lozinski et al. (2021), *Optimization of radial diffusion coefficients for the proton radiation belt during the CRRES era*, JGR: Space Physics, 126(3)

Lozinski et al. (2019), *Solar cell degradation due to proton belt enhancements during electric orbit raising to GEO*, Space Weather, 17(7), 1059-1072

numerous conference talks, including *IRENE Space Radiation Modelling and Data Analysis Workshop* (5/20/2025) and *33rd Single Event Effects Symposium…* (SEEMAPLD, 5/14/2024)

References

Prof. Jacob Bortnik, AOS Department Chair, UCLA jbortnik@gmail.com

Prof. Richard Horne, Science Leader, British Antarctic Survey rh@bas.ac.uk