Alexander R. Lozinski

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- Postdoctoral scholar & lecturer at University of California, Los Angeles
- Expert in machine learning, physics-based modeling and data science
- UK citizen with permanent resident status (Green Card)

Education

Ph.D. Radiation Belt 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**

Space weather researcher, focused on predicting changes to Earth's radiation belts and developing techniques to improve real-time space weather awareness:

- Developed the TRIPS Python library for particle tracing and magnetic field analysis;
- developed **artificial neural network**-based models in Pytorch for forecasting time series of radiation belt phase space density;
- **data assimilation** of spacecraft measurements into 3D physical model predictions, domain of influence & representer analysis, reanalysis in the temporal domain;
- **numerical modeling** of radiation belt particle dynamics over multiple scales, from solving the equation of motion for an individual particle to evolving a distribution.

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

Developed a real-time physics-based numerical model of Earth's proton radiation belt driven by spacecraft measurements for the UK Met Office. This work included modeling physical processes as empirical terms in a **3D Focker-Planck equation**, developing an implicit solver and processing real-time measurements to specify an outer boundary condition.

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**

My classes compliment online lectures by focusing on guided problem solving. I designed the final project component of the course, held office hours, and wrote/graded the assignments. One challenge for 2024 was encouraging students to make use of AI tools whilst preventing over-dependence; I organized meetings with members of faculty to discuss this issue.

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* (May 20th 2025) and *33rd Single Event Effects Symposium & Military and Aerospace Programmable Logic Devices Combined Workshop* (SEEMAPLD, May 14th 2024)

References

Prof. Jacob Bortnik, AOS Department Chair, UCLA jbortnik@gmail.com
Prof. Richard Horne, Science Leader, British Antarctic Survey rh@bas.ac.uk
Dr. Adam Kellerman, Associate Researcher, UCLA akellerman@atmos.ucla.edu