

# Zain Kamal

[zain.eris.kamal@rutgers.edu](mailto:zain.eris.kamal@rutgers.edu) | 201-682-5990 | [github.com/Humboldt-Penguin](https://github.com/Humboldt-Penguin)

## EDUCATION

### Rutgers University

New Brunswick, NJ

B.S. Physics with Honors; B.A. Computer Science (GPA: 3.4/4.0)

September 2021 — May 2025

- Graduate-level coursework — Computational Physics | Remote Sensing

## RESEARCH

### Martian Geophysics (Various Remote Sensing)

December 2021 — Present

Rutgers Dept. Earth & Planetary Sciences — Professor Lujendra Ojha

- Secured over **\$30,000** in research funding, including grant proposals for NASA's Mars Data Analysis Program to study geophysical evolution of Martian crust from magnetic source depth analysis of magnetometer data.
- Published an open-source Python package called "redplanet", the first library enabling large-scale data science workflows on Martian geophysical datasets, **cited in three ongoing publications**.
- First author on **four conference papers**, including an oral presentation at the American Geophysical Union.

### Offshore Wind Farms (Satellite Radar)

May 2023 — May 2024

NJ Economic Development Authority — Professor Ruo-Qian Wang

Fellowship studying offshore wind farms with Synthetic-Aperture Radar (SAR) data from Sentinel-1 satellites.

- Formulated and implemented a new geophysical model function (GMF) to isolate and quantify mesoscale wakes across multiple wind farms, enabling the analysis of **~1,000x** more satellite images than previous studies.
- Developed a scalable extract-transform-load (ETL) data pipeline in Python to analyze ~20 terabytes of SAR data using the Google Earth Engine API, enabling rapid on-the-fly statistical modelling of wakes over space/time.

### High Energy Physics (Machine Learning)

May 2022 — September 2022

Paul Scherrer Institute — Professor Ronald Gilman

Summer intern for the MUon Scattering Experiment (MUSE) at the PSI  $\pi$ M1 Beam Line.

- Implemented **generative machine learning** models (Normalizing Flows and GANs) in **PyTorch** to create a calorimeter simulation framework **four orders of magnitude faster** than standard software.
- Developed C++ algorithms to clean/filter data and composite energy readings for beamline sensors.

## WORK EXPERIENCE

### SYSTEM ADMINISTRATOR / PRESIDENT

September 2022 — Present

Rutgers Cluster Computing Committee

- Secured a **\$20,000 grant** to build a **Linux HPC cluster** supporting computational research in physics & astronomy.
- Currently supporting **50 users** spanning five research groups and three campuses.
- Offering one-on-one code reviews with faculty on implementing high-performance computing techniques to optimize their data analysis/simulations.

### PART-TIME LECTURER (Various Courses)

January 2022 — Present

Rutgers Dept. Physics & Astronomy

- Served as sole instructor/grader for physics labs (circuits, E&M, optics, relativity), ranking **top 5%** in the department based on student performance/evaluations and promoted to graduate teaching appointment as an undergraduate.
- Independently designed and taught a first-year course on computational skills in the sciences with **30+ students**.

## TECHNICAL SKILLS

### Programming Languages

Python | Java | C/C++ (ROOT) | Bash | MATLAB | SQL | R

### Data Science/ML

PyTorch | scikit-learn | NumPy | Pandas | SciPy | Polars | Dask

### Remote Sensing

SAR | Multispectral/Hyperspectral Imagery | Gamma-Ray Spectroscopy

### Tools/Technologies

Git | Docker | Cloud (AWS/Azure) | Distributed Computing | Arduino