Ronald (Zach) Sumners

ronald.sumners@mail.mcgill.ca

Education

McGill University, Montreal, Quebec — 2024 - 2026
M. Sc. Physics

University of Calgary, Calgary, Alberta — 2019 - 2024
B. Sc. Honours Astrophysics, First Class Honours

Research Experience

Research Assistant — June 2024 - Present
McGill University, Department of Physics

- Investigate multiwavelength Sagittarius A* variability using the Chandra, XMM-Newton, James Webb, NuSTAR, and Submillimeter Array telescopes.
- Developed Python pipeline to detect sources, calibrate positional coordinates, filter events, and create light curves of Chandra X-ray observations.
- Worked with partners to manage the results of each telescope and visualize data together.

Research Assistant — September 2023 – December 2023
University of Calgary, Department of Physics and Astronomy

- Used the James Webb Space Telescope (JWST) data reduction pipeline to create custom background spectra for creating science-ready data cubes.
- Quantitatively compared different versions of JWST observations to investigate upstream data reduction completed by the data providers.
- Collaboratively formulated physically and statistically accurate data cleaning methods.

Rothney Astrophysical Observatory Summer Student — May 2023 – September 2023
University of Calgary, Department of Physics and Astronomy

- Operated, and maintained three large optical research-grade telescopes. Analyzed their data.
- Developed machine learning algorithm to automate cloud-condition-categorized sky quality meter data organization using an all sky camera.
- Developed Python pipeline for automated detection of variable stars in general star fields.
- Hosted diverse range of astrophysics outreach including short lectures, activities, and tours.

Research Assistant — September 2021 – April 2023 (Intermittent)
University of Calgary, Department of Physics and Astronomy

- Developed Python simulation modeling material flow in molten salt nuclear reactor pipes.
- Categorized, scaled, and visualized 1 million+ simulation datapoints.
- Comparative analysis of 5 supervised and 2 unsupervised scikit-learn machine learning models to learn fluid parameters of simulated observations.

Research Assistant — May 2022 – August 2022
University of Calgary, Department of Physics and Astronomy

- Prepared 36 Hubble Space Telescope images for analysis by cutting, masking, point source deconvolution, and background characterization.
- Two-dimensional parametric and non-parametric model fitting of source light curves.
- Developed Python scripts for quantitative comparison of fitting techniques, and model residuals.

Research Interests

Machine learning, computational physics, data-driven analysis, black holes, extragalactic physics.

Publications

Conference Proceedings

Z. Sumners, J. Donev, A. Gurevich, L. Wu, and B. Chevallier, "Exploring the Viability of Using Machine Learning and Ultrasonic Cross-correlation for the Analysis of Molten Salt Nuclear Reactor Flow Conditions," presented at 42nd Annu. Canadian Nuclear Society Conf., Saint John, NB, Canada, Jun. 3-7, 2023.

Z. Sumners, J. Donev, A. Gurevich, "Using Cross-Correlation Methods to Analyze Molten Salt Nuclear Reactor Fluid Flow," presented at 41st Annu. Canadian Nuclear Society Conf., Virtual, Jun. 5-8, 2022.

Z. Sumners, L. A. Vargas-Suarez, J. Donev, J. Griffiths, "Nuclear and Climate Education Through Web-Based 3D Environments," presented at 40th Annu. Canadian Nuclear Society Conf., Virtual, Jun. 6-9, 2021.

L. A. Vargas-Suarez, Z. Sumners, J. Donev, "Nuclear Energy from Different Perspectives," presented at 40th Annu. Canadian Nuclear Society Conf., Virtual, Jun. 6-9, 2021.

Z. Sumners, L. A. Vargas-Suarez, J. Donev, "Nuclear Education with Interactive 3D Web Environments," presented at 2021 American Nuclear Society Student Conf., Virtual, Apr. 8-10, 2021.

L. A. Vargas-Suarez, Z. Sumners, J. Donev, "Conjoined Periodic Table of the Elements and Chart of the Nuclides," presented at 2021 American Nuclear Society Student Conf., Virtual, Apr. 8-10, 2021.

Research Grants

NSERC CGS-M ($27500) (Awarded but declined)	2024
NSERC Undergraduate Student Research Award ($6000) (Awarded but declined)	2022
University of Calgary Program for Undergraduate Research Experience ($7500)	2022

Academic Conferences

Attended, Artificial Light Pollution at Night Conference	2023
Poster, Canadian Nuclear Society CANDU Conference	2023
Attended, Canadian Nuclear Association Conference	2023
Poster and Paper, Canadian Nuclear Society Conference	2021 - 2023
Poster, Undergraduate Research in Science Conference of Alberta	2022
Poster and Paper, American Nuclear Society Student Conference	2021
Poster, EGU International Climate Conference	2021

Professional Development Activities

Astromatic, Université de Montréal, Montreal, Canada 2022

- Machine learning lecture series/hackathon.

CaNoRock-22, Andoya Space Center, Andenes, Norway 2022

- Sounding rocket development and analysis program.

Research Awards

Best Presentation in Physics and Computer Science Session,
Undergraduate Research in Science Conference of Alberta 2022

Best Paper in Education, Training, and Workforce Development Session,
American Nuclear Society Conference 2021

Teaching Experience

- Experimental Methods Fall 2024
- Introduction to Nuclear Energy Winter 2023,Winter 2024
- Introductory Thermodynamics Fall 2020, Fall 2021

Extracurricular Involvement

Rothney Astrophysical Observatory

- Volunteer Coordinator 2021 - Present
- Volunteer 2019 - Present

Nuclear Energy Students Committee

- Founding member 2023

Physics and Astronomy Students Association

- Vice President – Events 2022
- Webmaster 2022
- 2nd Year Representative 2021