

Filobateer Ghaly

PhD Student

📍 Alberta, Canada

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Education

Ph.D. in Particle Physics



2024 (current)



University of Calgary

M.Sc. in Space Physics



2022 - 2023



University of Calgary

B.Sc. in Physics



2017 - 2021



University of Calgary



Languages

Arabic

C2*



English

C2*



Publications



MSc Thesis

- Ghaly, F. (Sept. 2024). "Quantifying Ionospheric Electron Density Enhancements and their Impact on High Frequency Radio Wave Propagation". en. URL: <https://hdl.handle.net/1880/119764>.



Articles

- Ghaly, F., E. Spanswick, R. Gillies, T. Cameron, S. Skone, R. a. D. Fiori, et al. (2024). "Use of Terrestrial High Frequency Signals in Riometer Data to Explore the Size of D-Region Electron Density Enhancements". en. In: *Journal of Geophysical Research: Space Physics* 129.5. eprint: <https://onlinelibrary.wiley.com/doi/pdf/10.1029/2023JA032375>, e2023JA032375. ISSN: 2169-9402. DOI: 10.1029/2023JA032375. URL: <https://onlinelibrary.wiley.com/doi/abs/10.1029/2023JA032375>.



Reports

- Ghaly, F. and E. Spanswick (Mar. 2022). *Identification and Investigation of High Frequency Radio Wave Transmissions During Quiet and Disturbed Periods*. Tech. rep. Natural Resources Canada.



Conferences

- Ghaly, F., E. Spanswick, T. Cameron, et al. (Dec. 2023). "A Riometer Proxy for HF Terrestrial Link Status". *American Geophysical Union (AGU) 2023 Fall Meeting*. San Francisco, California.
- Ghaly, F., E. Spanswick, R. Gillies, T. Cameron, S. Skone, R. A. D. Fiori, and A. Weatherwax (Feb. 2023). "Using Multi-frequency Riometers for Monitoring HF Signal Propagation And Modelling D-region Absorption". *Division of Atmospheric and Space Physics Conferences (DASP)*. Canadian Space Agency (CSA). John H. Chapman Space Centre, Longueuil, Quebec.
- Ghaly, F., E. Spanswick, R. Gillies, T. Cameron, S. Skone, R. A. D. Fiori, A. Weatherwax, et al. (Dec. 2022). "Use of Terrestrial HF Signals in Riometer Data to Investigate the Size of the Absorbing Region". *American Geophysical Union (AGU) 2022 Fall Meeting*. Chicago, Illinois.
- Ghaly, F., E. Spanswick, and R. Gillies (Feb. 2021). "Investigating Riometer Capacity for Terrestrial HF Signal Monitoring". *Division of Atmospheric and Space Physics Conferences (DASP)*. Online via Zoom.


Skills







Programming: • Python • Java • JavaScript • C++ • MATLAB • GNU Radio Companion • PostgreSQL • SQLite • Django • CSS • HTML

Hardware: • Software Defined Radios (SDR) • Antennae • Microcontrollers



Modelling: • AutoCAD Inventor • COMSOL Multiphysics

Experience

Teaching Assistant (TA): Department of Physics and Astronomy  University of Calgary

Lab TA	PHYS 211: Mechanics	 Fall, 2024
Lead TA	PHYS 355: Electromagnetic Theory	 Winter, 2024
Lab TA	PHYS 397: Applied Physics Laboratory	 Fall, 2023
Lab TA	PHYS 229: Modern Physics	 Winter, 2021
Lead TA	PHYS 259: Electricity and Magnetism	 Summer, 2020
Lab TA	PHYS 259: Electricity and Magnetism	 Winter, 2020

Learning Assistant (LA): Department of Computer Science  University of Calgary

Tutorial LA	DATA 202: Thinking with Data	 Winter, 2021
Tutorial LA	CPSC 501: Advanced Programming Techniques	 Fall, 2020

Research Assistant: Auroral Imaging Group  May, 2021 - January, 2023
 Calgary, AB, Canada

Research on High Frequency Radiowave Propagation:

- Developed a new technique for modeling radio-wave absorption associated with geomagnetic activity (e.g., solar storms) using a prototype instrumentation. The technique was published in: *Journal of Geophysical Research: Space Physics*—Ghaly et al., 2024
- Coordinated with Natural Resources Canada (NRCan) to incorporate their network of radio transmitters into my analysis, thereby developing a space weather forecasting/alerting system for modeling where and when radio communications are disrupted.
- Developed code that extends my methodology to a network of multiple radio transmitters and receivers, and allows for simulating the impact of geomagnetic events before they occur.

Technical Experience, Data Generation, and Software Development:

- Spearheaded the realization of a prototype, Software-Defined Radio (SDR) to make it usable for research.
- Wrote software for data acquisition in Python and Java and tested the instrument's ability to function as a receiver.
- Developed an online data browser for the prototype instruments deployed to generate curated, raw (K0-level) data for the public. Back-processed and published K0 data for 2022 and 2023.
- Wrote instrument-side code to generate curated K0 data on-site for all instruments deployed—now being published in real-time.
- Developed an instrument baselining Graphical User Interface (GUI).
- Developed a methodology for real-time, automatic baselining to generate K2 (operational) data.
- Designed a web application with a Postgre database that browses through different specification parameters for flagging space weather events.