Alessandro Ambler

Physics | Data Science | Signal Processing

alessandro.ambler@mail.mcgill.ca | +1 (514) 967-6050 | https://alessandroambler.github.io/

Profile Summary

PhD physicist with 8+ years of experience in large-scale data analysis, real-time signal processing, and machine learning. Proven ability to design algorithms, model complex systems, and deliver scalable solutions in international collaborative environments. Expert in C++ and Python with a strong background in statistical modeling and ML.

Technical Skills

- **Programming:** C++ (expert), Python (excellent), MATLAB (proficient)
- **Tools:** Git, ROOT, TensorFlow, Keras, Bash, LaTeX
- **Data Science:** Large datasets, statistical modeling, signal processing, ML, CNNs
- **Languages:** English (native), French (native), Italian (proficient)

Experience

Research Assistant – ATLAS Experiment at CERN's Large Hadron Collider — CERN / McGill, 2016–2024

- Led statistical analysis of multi-terabyte physics datasets; delivered first observation of a rare process.
- Designed data-driven estimates of important background processes
- Designed and deployed filtering and ML algorithms (including CNNs) for signal extraction in noisy data.
- Developed accurate electronics simulation software supporting state-of-the-art detector upgrades.
- Contributed to CI/CD pipelines ensuring stability of daily software releases.
- Coordinated international teams to resolve detector performance issues in real time.

Teaching Assistant – Physics Department — McGill, 2016–2022

- Gave tutorials, labs, and lectures on electromagnetism, electronics, and data analysis.
- Designed lab exercises and guided students through technical problem-solving.

Research Intern – PICO Dark Matter Experiment at SNOLAB — SNOLAB / UdeM, 2015

- Operated and calibrated nuclear and dark matter detectors and managed accelerator beamline for data collection.

Education

Ph.D. Physics – ATLAS (CERN), Supervisor : Professor Brigitte Vachon — McGill University, 2018–2024

- Thesis: First observation of the simultaneous production of a W boson and two photons.

M.Sc. Physics – ATLAS (CERN), Supervisor : Professor Brigitte Vachon — McGill University, 2016–2018

- Thesis: Optimization of filtering algorithms for calorimeter signal reconstruction,

B.Sc. Physics – PICO (SNOLAB) Supervisor : Professor Viktor Zacek — Université de Montréal 2012–2015

- Thesis: Measuring and analyzing a nuclear reaction used to calibrate a dark matter detector.

Selected Achievements

- **Breakthrough Prize** in Fundamental Physics, awarded to the ATLAS collaboration. — International, 2025
- **Yablonovitch Research Prize**, best research accomplishment in experimental physics. — McGill, 2024
- **NSERC** Postgraduate Scholarship-Doctoral, three years. — Canadian Government, 2019–2021

Selected Publications

- ATLAS Collaboration, *Observation of Wγγ triboson production in proton-proton collisions at √s=13 TeV with the ATLAS detector*, Physics Letters B 848 (2024) 138400
- ATLAS Collaboration, *ATLAS Liquid Argon Calorimeter Phase-II Upgrade: Technical Design Report*, CERN, Geneva, Technical Report, Sep. 2017.
- **Inspire page** : https://inspirehep.net/authors/1607106

Volunteering and Interests

- Volunteer at the McGill particle physics masterclass, CERN Open Days, McGill open house, UdeM physics cafe
- Interests include guitar, luthery, piano, developing audio effects, drawing, and painting