

# Alessandro Ambler

Physics | Data Science | Signal Processing

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## Profile Summary

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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 collaborative international environments. Expert in C++ and Python with a strong background in statistical modeling and ML.

## Technical Skills

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

## Experience

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**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/calibrated nuclear detection systems and managed accelerator beamline for data collection.

## Education

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**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

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- **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** Canadian Government, 2019–2021

## Selected Publications

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- ATLAS Collaboration, *Observation of W $\gamma\gamma$  triboson production in proton-proton collisions at  $\sqrt{s}=13$  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

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- 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