



ADRIAN GILDARDO GUTIERREZ VAZQUEZ

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Highly accomplished physicist with over 7 years of research experience and a solid background in computer science. Key scientist research member of the MUonE project at CERN in charge of the electromagnetic calorimeter data analysis. Expertise in machine/deep learning, linear algebra, and differential equations. Strong problem-solving skills, leadership, and autodidact.

Education

University of Virginia, Charlottesville, Virginia

Ph.D., Particle Physics

2022-Present

Advisor: Dr. Dinko Pocanic

Areas of Study: Particle Physics

University of Virginia, Charlottesville, Virginia

Master of Science, High Energy Physics

2019-2022

Advisor: Dr. Robert Hirosky

Thesis Topic: Simulation for Potential Magnetic Monopoles in a 14 TeV Proton-Proton Collisions at the CMS Electromagnetic Calorimeter.

University of Oregon, Eugene, Oregon

Bachelor of science, Mathematics

Bachelor of science, Physics, Departmental Honor

2016-2019

Advisor: Dr. Stephanie Majewski

Thesis Topic: Edge Detection and Deep Learning Algorithm Performance Studies for the ATLAS Trigger System.

Mount Hood Community College, Gresham, Oregon

Associate in Science

2013-2015

Awards and scholarships

Society of Physics Students Outstanding Presentation Award at the APS April Meeting.

January 2019

Presentation Title: Edge Detection and Deep Learning Algorithm Performance Studies for the ATLAS Trigger System.

Scholarship for Oregon Scientist II

January 2016-2018

Duke University REU

Summer 2018

Research experience

1 - *Graduate research group under the supervision of Dr. Dinko Pocanic*

**Department of Particle Physics at the University of Virginia in
collaboration with the MUonE group**

2022- Present

Member of the MUonE experiment

- Production of muon and electrons through the GEANT4 toolkit particle simulator known as FairMUonE for the MUonE collaboration group.
- Creation of an algorithm for reconstruction of software gains, electromagnetic pulse reconstruction, tracker and calorimeter reconstruction data match for the tagging of electrons and muons.
- Extensive use of Phyton, C++, and ROOT for development and testing of muon data on the MUonE research project.

2 - *Graduate research group under the supervision of Dr. Robert Hirosky*

**Department of High Energy Physics at the University of Virginia in
collaboration with the CMS group**

2019- 2022

Member of the CMS experiment during the Phase-II upgrade of the electromagnetic calorimeter.

- Production of magnetic monopoles and photons through the GEANT4 toolkit particle simulator for the CMS detector at the Large Hadron Collider.
- Studies of magnetic monopoles trajectories inside the CMS detector via the solution of Maxwell Electromagnetic tensor for the existence of a magnetic monopole moving in a constant magnetic field.
- Worked on pulse shape digital reconstruction of simulated monopoles (signal) and photons (background) for the creation of an in-time live trigger by taking advantages of the Phase-II electromagnetic calorimeter upgrades in the CMS detector.
- Extensive use of Phyton, C++, ROOT and machine learning for development and testing of monopole simulations.

3 - *Undergraduate research group under the supervision Dr. Stephanie Majewski*

**Department of High Energy Physics at the University of Oregon in
collaboration with the ATLAS group**

2017 - 2019

Member of the ATLAS experiment during the second data taking period, Run II, of the Large Hadron Collider.

- Development of Sobel filtering algorithm for particle detection and background rejection in the ATLAS hadronic calorimeter.
- Topoclustering algorithm validations for ATLAS trigger system.
- Deep learning algorithm performance studies through the application of TensorFlow for ATLAS Trigger System.

4 - *Summer Internship under the supervision of Dr. Anaya Arce.*

Department of High Energy Physics at Duke University in collaboration with the ATLAS group

Summer 2018

- Development of deep learning techniques using, XGBoost, TMVA, and Scikit-Learn for the study of supersymmetry signatures in the ATLAS detector.

5 - *Advance Projects Laboratory under the supervision of Dr. Bryan Boggs*

Department of Optics at the University of Oregon

2018

- Complete recreation of a non-linear optical process, known as spontaneous parametric down-conversion, that converts one photon into a pair of entangled photons.

6 - *Undergraduate research group under the supervision of Dr. Ben McMorran*

Department of Optics at the University of Oregon

2016 - 2017

- Measurements on the change on the angle of refraction of an IXF.50ti Mounted Mirror by temperature variation.

Teaching experience

University of Virginia, Charlottesville, Virginia

Teacher Assistant

2019-2021

Provide academical support to students in Mathematics and Physics.

Mount Hood Community College, Gresham, Oregon

Tutor

2013-2015

Provide academical support to students in areas such as Mathematics, Chemistry and Physics.

Selected presentation

Fermi National Accelerator Laboratory

CMS DAS School

2020

Oral presentation on the search for Top + Anti-top Resonances in the Lepton+Jet final State

University of Oregon

Undergraduate Symposium

2019

Oral presentation on Deep Learning algorithms on the ATLAS trigger system.

University of Oregon

ATLAS group meeting update on "Sobel filtering efficiency"

2018

One-hour power point presentation with faculty and graduate students

University of Oregon

Undergraduate Symposium

2017

Poster presentation on the implementation of my Sobel filtering Algorithm

University of Oregon

ATLAS group summer presentation

2017

One-hour poster presentation on my summer project which involved Sobel filtering and trigger system algorithm

Technical proficiencies.

Specialized Software:

- LaTeX
- Mathematica
- MATLAB
- TensorFlow
- Scikit-Learn
- TMVA

Programing Languages:

- Python
- ROOT
- C++

Languages

Spanish - Native Language

English - Speak fluently and read/write with high proficiency