About me

**Mildred Alexandra Arias Yanez
Born in Venezuela**
Táchira, Venezuela. Google Maps

**University of the Andes
Science Faculty
Mérida, Venezuela**

PARTICIPATION IN THE WORKSHOP ON PHYSICS, SCIENCE AND THEIR BIG DATA
Oct-2018

PARTICIPATION INTERNATIONAL MASTERCLASSES HANDS ON PARTICLE PHYSICS
Oct-2016

PARTICIPATION IN CEVALE2VE COURSE 2019
Course: Introduction to Particle Physics

My GitHub

My Email

Computational reproduction, optimisation and discussion of the ATLAS Experiment analysis on the production of ZZ in proton-proton collisions at $\sqrt{s}$ = 13 TeV using Open Data

Br. Mildred Alexandra Arias Yanez

Supervisor: Dr. Arturo Sánchez Pineda

Academic Tutor: Dr. Nelson Pantoja

University of the Andes, Mérida - Venezuela/ CELAVE2VE
October 22, 2020

Objectives

General Objective

Generate a computational reproduction, optimization and discussion of the analysis of the ATLAS experiment on the production of ZZ in proton-proton collisions at $\sqrt{s}$ = 13 TeV using open data.

Specific objectives

Analyze the computational reproduction using Jupyter Notebook with ROOT C ++ kernel for the production of ZZ in the decay channel ZZ → 4l at $\sqrt{s}$ = 13 TeV.

Discuss the results obtained from the computational reproduction using Jupyter Notebook with ROOT C ++ kernel for the production of ZZ in the decay channel ZZ → 4l at $\sqrt{s}$ = 13 TeV.

Optimize the results obtained from the computational reproduction for the production of ZZ in the decay channel ZZ → 4l at $\sqrt{s}$ = 13 TeV.

Data collected by the ATLAS detector during 2016.

Datasets 150GB

Data

$\sqrt{s}$ = 13 TeV
L_{int} = 10 fb^{-1}

MC Simulations

SM BSM

13 Tev ATLAS Open Data

ATLAS Open Data 13 TeV Documentation

Analysis Framework

C++ Based framework

Analysis[5]

Plotting [5]

Virtual Machine

Tools for Data Analysis

GitHub/ROOT

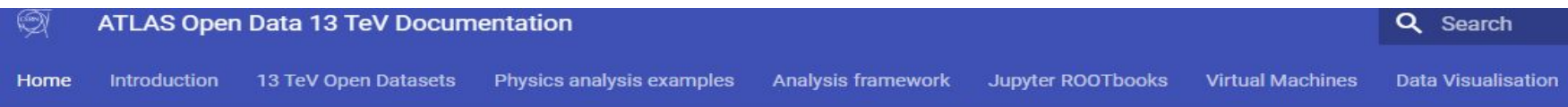**Jupyter Notebook**

Online Documentation about the analysis:
The main ATLAS-approved document

Four-lepton final state:
The case of SM ZZ Diboson Production

➜ ZZ → 4 leptons (eeee,ee$\mu\mu$,$\mu\mu\mu\mu$) channel

➜ Event selection:

◆ p_T > 20 GeV, 4 leptons, opposite charge – same flavour pair.

◆ On-shell Z mass selection

66 GeV < M_Z < 116 GeV

➜ Small BR but very clean signal

Figura 1: ATLAS Open Data 13 TeV Documentation [1].
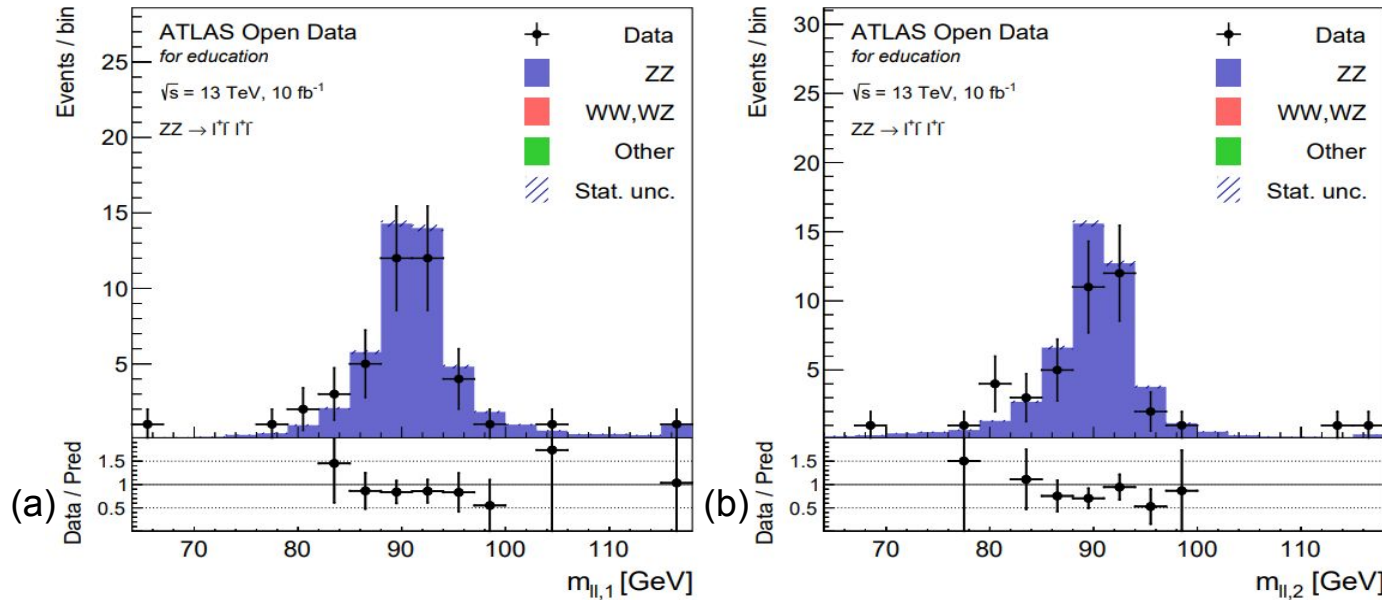
Preliminary Result:
The case of SM ZZ Diboson Production

Figura 2: Comparison between data and MC prediction for the distribution in the ZZ → l⁺ l⁻ l′⁺ l′⁻ selection. Distributions of the invariant masses of the (a) first and (b) second reconstructed Z-boson candidates m_{ll}. The points represent experimental data. The filled histograms show the prediction from different MC simulations. The contributions are stacked. The statistical uncertainty is represented by the error bars on the data points and the hatched area on the MC prediction. The lower panels show the ratio of the data points to the stacked histogram [2].

References

[1]   ATLAS. "The ATLAS Open Data 13 TeV Documentation". Website:
      http://opendata.atlas.cern/release/2020/documentation/index.html. [Accessed 12
      October 2020].

[2]   CERN. "Review of the 13 TeV ATLAS Open Data release". Adelaide,   Australia,
      4 - 8 Nov 2019. Website: https://cds.cern.ch/record/2707171. [Accessed 12
      October 2020].

[3]   CERN. "About ROOT". Website: https://root.cern/about/. [Accessed 12 October
      2020].

[4]   ATLAS ."ZZDiBosonAnalysis". Website:
      https://github.com/mildredarias/ZZDiBosonAnalysis. . [Accessed 12 October 2020].

References

[5]   ATLAS. "C++ framework for the 13 TeV ATLAS Open Data analysis". Website: https://github.com/atlas-outreach-data-tools/atlas-outreach-cpp-framework-13tev. [Accessed 12 October 2020].

[6]   ATLAS. "13 TeV ATLAS Open Data virtual machine". Website: http://opendata.atlas.cern/release/2020/documentation/vm/index.html.[Accessed 12 October 2020].

THANKS