

Electronic Work Record – Laura Cairns

Project Notes – Term 1, Week 4

26/10/20

Monitoring meeting

27/10/20

Switched to working in X2Go as opposed to Putty.

Brief research about cross sections:

- <https://www.desy.de/~bheine/homepage/pisa/pisa-2.pdf>
- <https://cds.cern.ch/record/941318/files/p361.pdf>
- <https://inspirehep.net/files/bcdcde3baf75ff38ff94d259f29c50c1>
- http://www.hep.ucl.ac.uk/~mw/Post_Grads/2011-12/triggerDAQ-UCL-2011.pdf
- <https://0-journals-aps-org.pugwash.lib.warwick.ac.uk/prl/pdf/10.1103/PhysRevLett.50.1738>

Improved python code to calculate Z invariant mass using ROOT. Original file in T1_W2, ZMassAttempt_ROOT.py. New, more efficient file: ZMass_Final.py

Investigating ROOT directory of simulation data.

/storage/epp2/phshgg/DVTuples__v23/13TeV_2016_28r1_Down_Z_Sim09h.root

Simulated Z/DecayTree has 338926 entries.

Stack histograms in root with THStack <https://root.cern.ch/doc/master/classTHStack.html>

mum_ETA & mum_PHI do not exist in simulated data – what is mum_born and mum_dressed?

Histogram Styling

Histogram styling options in ROOT, Chapter 5: <https://root.cern.ch/root/html/doc/guides/users-guide/Histograms.html#drawing-histograms>

Includes details of how label axes, change the stat block, change the type of plot etc. Chapter 5.

5.8.5 Stat block

5.8.6 Line, fill, text attributes

5.8.7 Tick marks

5.8.8 LABEL AXES

To label axes: “Histogram title;X Axis;Y Axis”

<https://root.cern.ch/doc/master/classTH1.html#operations-on-histograms>

Use “hist.Draw(‘E’) to give as error bars.

Python Code for Plotting Both Simulation and Measurement Data

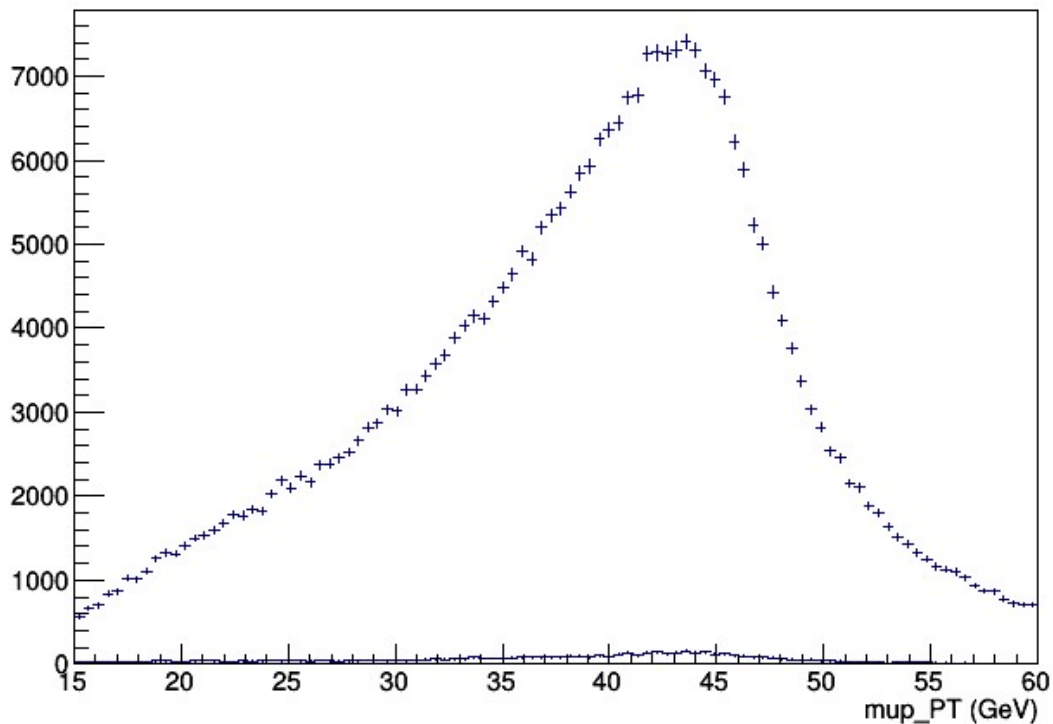
Succeeded in creating plot with two histograms, for Simulation and Measurement (mnt_PT_test3.py, renamed measurement_plot_setup)

- Set up labels and title before histograms, name determined by input property. Input units for axis.
- Possibly extend this label to read in the specific data branch

- Currently reading branch straight into histogram, no “entry” and “fill” method, as this takes an age for the simulated data (338926 entries), even for just read in and fill operations, no calculation.

Both Simulation and Measurement plotted for mup_PT -> **Measurement_mup_PT.pdf**

Measurement vs Simulation for mup_PT



Considering switching to C++ due to difficulty of translating ROOT commands from C to python.
e.g. SetLineColour

mum_ETA does not exist in simulated data. What is mum_born_PT and mum_dressed_PT?

To Do/Questions

- Auto Latex method
- What properties do I need to plot in order to find the cross section?
- What exactly does plotting both achieve? Especially since the scales are so different on a histogram as the simulation has more than 50x more entries, so the measurement data can barely be seen?
- Do I plot them on the same y axis to show comparison, or with different y axes to show the measurement data in more detail?
- What is mum_born and mum_dressed?

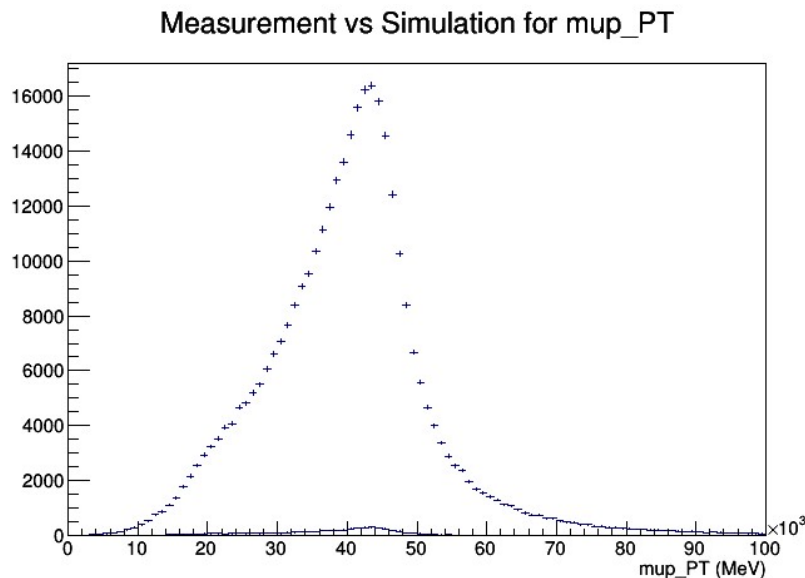
29/10/20

measurement_plot_setup_label.py:

Attempted to make automatic with mup_PT label -> input 'mum_PT' and its units, and the program automatically outputs the mup_PT plot, with GeV or MeV

Issue encountered with histogram range in this auto-method -> does not automatically set the correct histogram range. Tested with mup_ETA and no histogram was given in the range 15 to 60 used for mup_PT at GeV.

Unit label and calculation automation works, but need to specify new histogram range. mum_PT at MeV used range 0 to 100000.



Testing C code with translation

Translated code from python into C++.

Tested chain path input in mnt_setup_test 1 and 2, now deleted as outdated.

mnt_setup_mup_PT_GeV.cpp is working direct translation with mup_PT data.

mnt_setup_function1.cpp is non-working translation with "read_chain" function, although this function is later unused.

mnt_setup_fnc.cpp is working C++ code using struct for path_data and function make_histogram to make each TH1F histogram for the measurement & simulation paths and add to THStack.

mnt_setup_function3.cpp is this same code before tidying unnecessary code.

Makefile saved which makes mnt_setup_fnc.exe.

Decision to continue working in C++.

Workbook Notes

PAGE	DATE	TOPIC
22	26/10/20	Monitoring Interview
23 - 24	27/10/20	Plotting THStack in Python, notes

Attached Files (GitHub)

DATE	FILE
27/10/20	ZMass_final.py
	measurement_plot_setup_label.py
29/10/20	mnt_setup_fnc.cpp
	Makefile

[Link to Issues #5](#)