Z prime Analysis at 8Tev

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Supervised by

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The aim of My visit in Bari

1- Learning more about CMSSW
2- working on Z prime analysis project.

My previous Experience

I came to the university of Bari in (July 1) with
- a little Experience in C++ and Root
- I didn't have any Idea about CMSSW
- I didn't have any background about Z prime

I spent the first 10 days on

1- reading the framework tutorial on the CMSSW Twiki page

2- understanding the concept of reconstruction of Z prime using high pt muons

3- reading CMS analysis note(AN2012_422_V11_1) about

[Search for High-Mass Resonances Decaying to Muon Pairs in pp Collisions]

In the next 10 days

I tried to study and test the analysis of Z prime using the code written by Sherif Elgammal in BUE

1- Making the same cuts as mentioned in the AN2012 paper

2- Plotting the same histograms and compare the results.

All of these tasks were supplemented by extra reading on elementary particle text book.*

Under the Supervision of prof :Nicola in Bari

I started the study of Z prime using sherif's code

using CMSSW_5_3_9

with START53_V7A global tag

We used a monteCarlo samples

 for Z prime

PSIToMuMu_M-1000_TuneZ2star_8TeV-pythia6_70E7A93D-E80D-E211-A1DF-00266CFFBED8.root

And Drell-Yan

Summer12/DYToMuMu_M_20_TuneZ2star_8TeV_pythia6/AODSIM/PU_S7_START52_V9-v1/0000/0005A7CE-33A0-E111-BCAD-00261894393B.root

This samples was recommended by the AN2012_422_V11_1 and agreed with the whole group so that we can fairly compare our results

The applied cuts for High Pt Muons

I started my analysis with these small cuts recommended by Sherif

[1] Muon must be reco as global muon

[2] Mu_pt(cocktail) > 45.0 GeV

[3] delta pt(recoMu)/pt(recoMu) < 0.3

[4] |dxy| < 0.2

[5] |dz| < 0.2

[6] Normalized chi2 < 10

[7] Nb of track layers > 5 (8)

[8] Nb of pixel hits > 0

[9] Nb of muon hits > 0

[10] Nb of track muon segments > 1

[11] trackIso/pt(recoMu) < 0.10

I preferred to construct my own analysis macros in the same way like sherif's one , So that:

    1- I can learn more how to build a macros, making histograms and applying cuts

    2- to compare my results with him directly

    3- to restore everything easily if some errors occurs during coding

The good thing with Sherif 's code is that
it can easily calculate the acceptance and the efficiency of the event so it was
*Very easy to calculate the number of reconstructed events using the formula*

*Nb= CrossSection * Acceptance * efficiency * Integrated Luminosity*

With a luminosity 20 fb-1 The results was like this

Z prime	Drell -Yan
*Acceptance *Efficiency=0.653674* *Efficiency=0.52* *The total number of entries before cut 6260* *The total number of entries after cut 4092* *The number of expected events 645*	*Acceptance *Efficiency=0.0148981* *Efficiency=0.663395* *The total number of entries before cut 10404* *The total number of entries after cut 4050* *The number of expected events 155*

My first Histogram

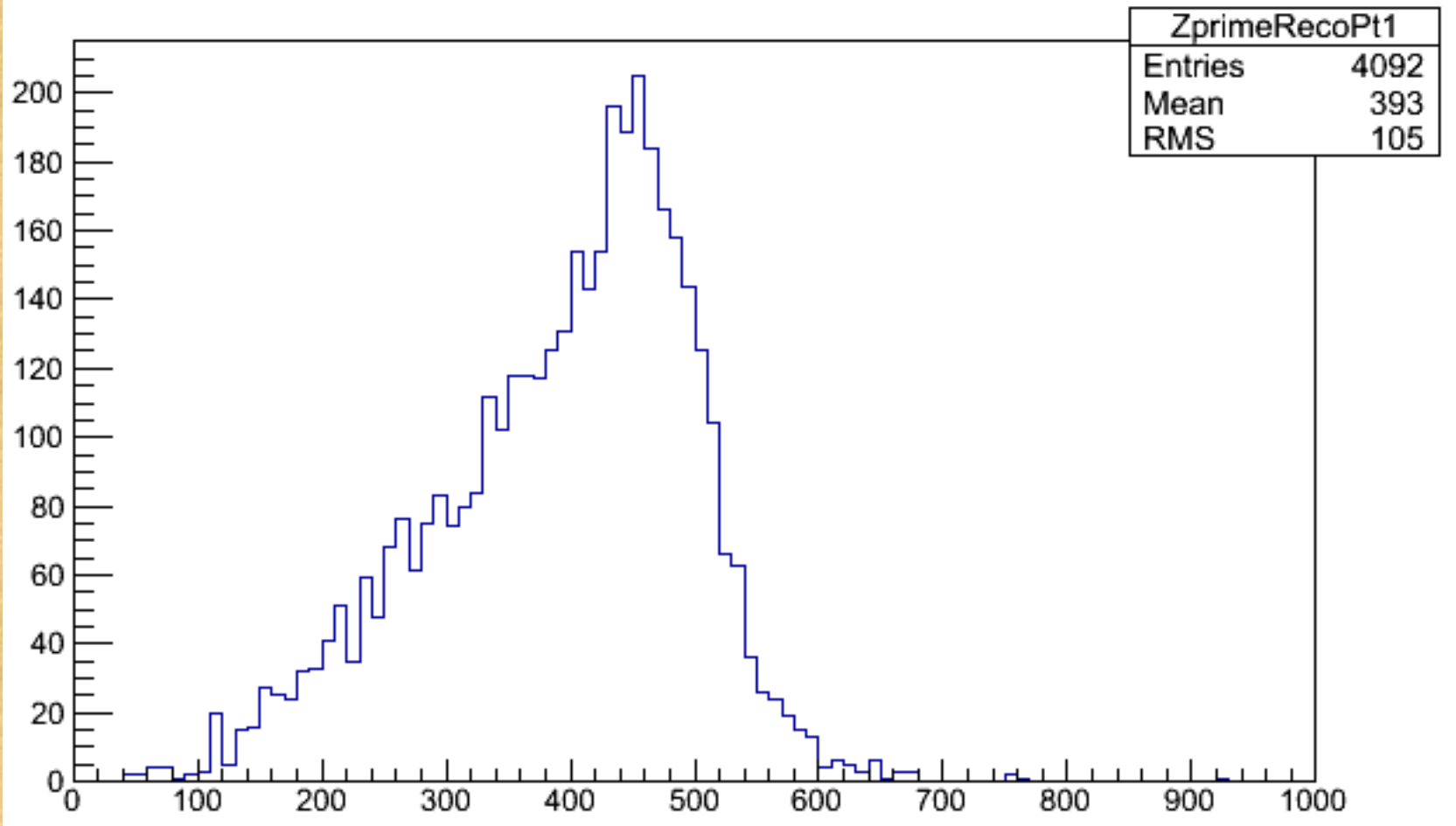*a combination between two histograms for the invariant mass of z prime and Drell-yan samples*
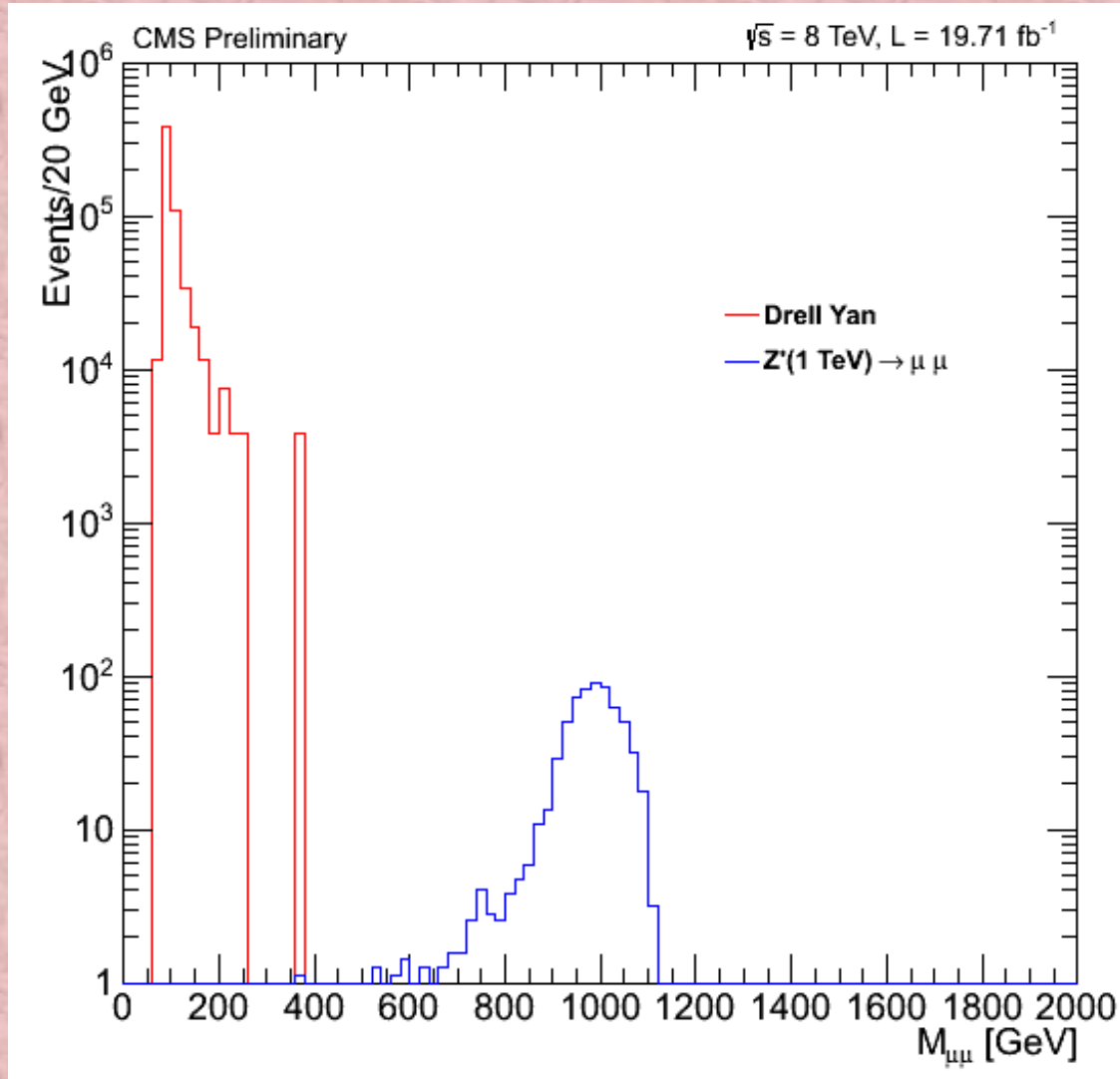
I have attended two online meetings
During this month since I came to Bari
I tried to compare my results with the other
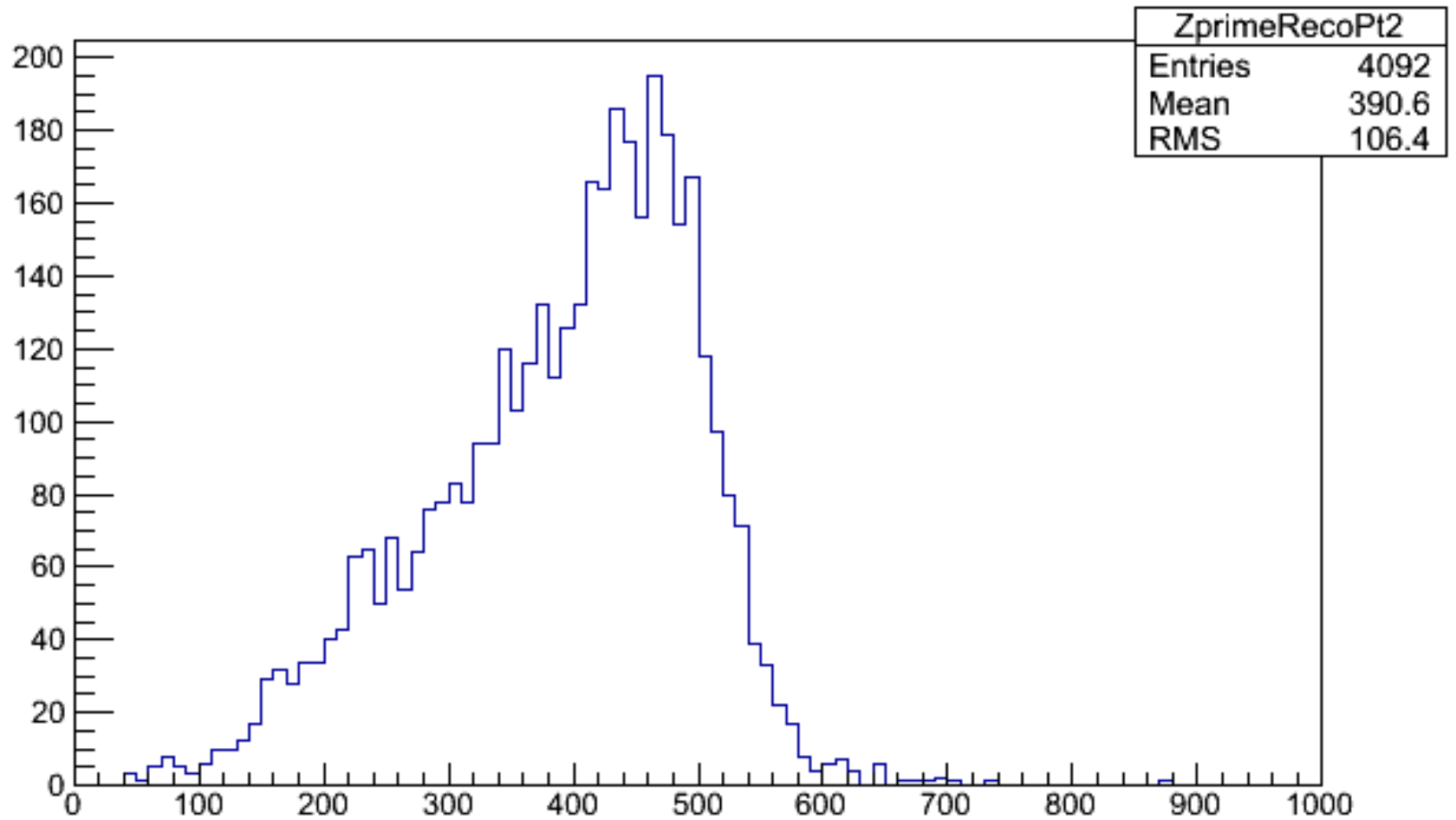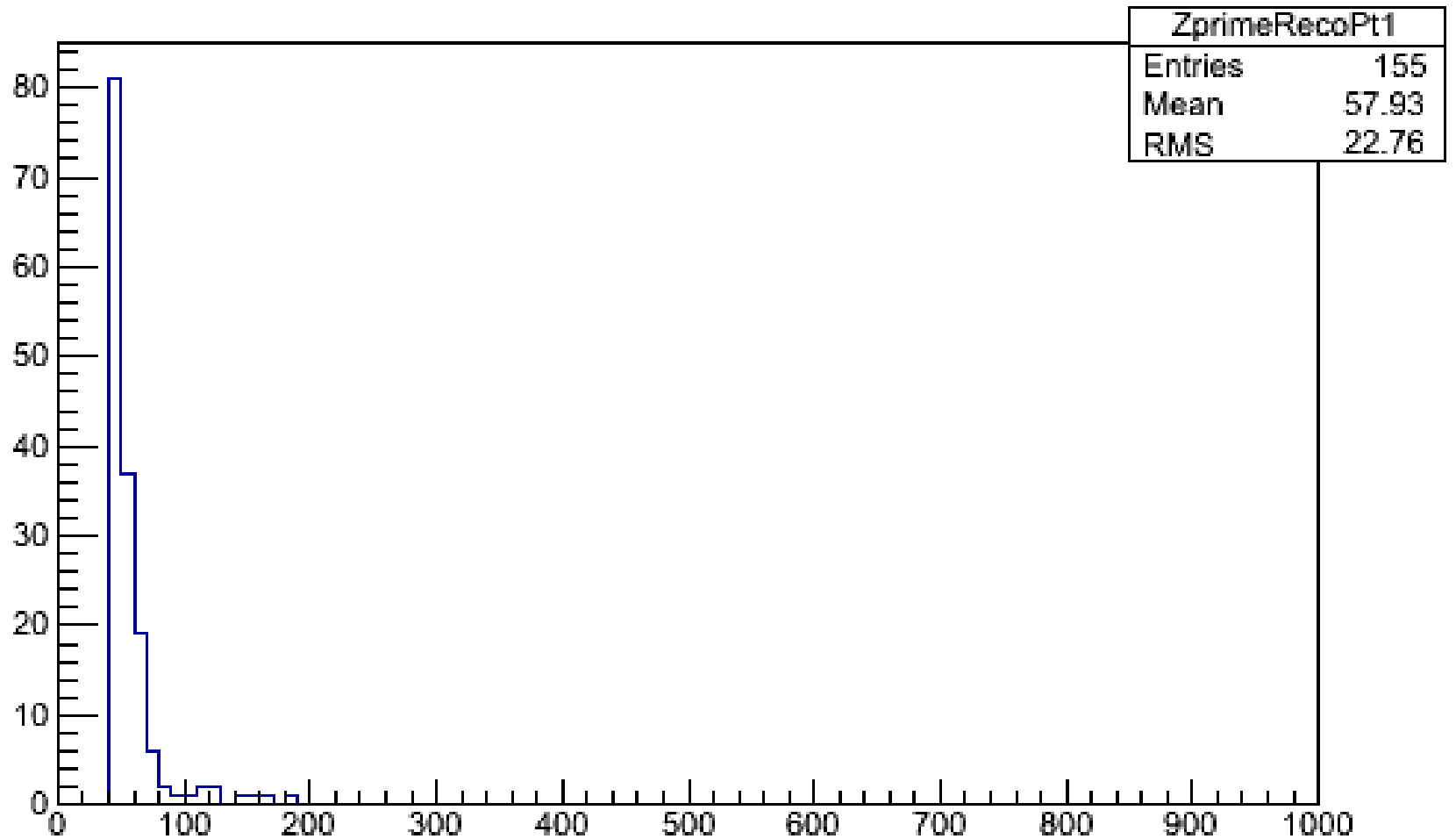 people in the Italian group
They commented
and
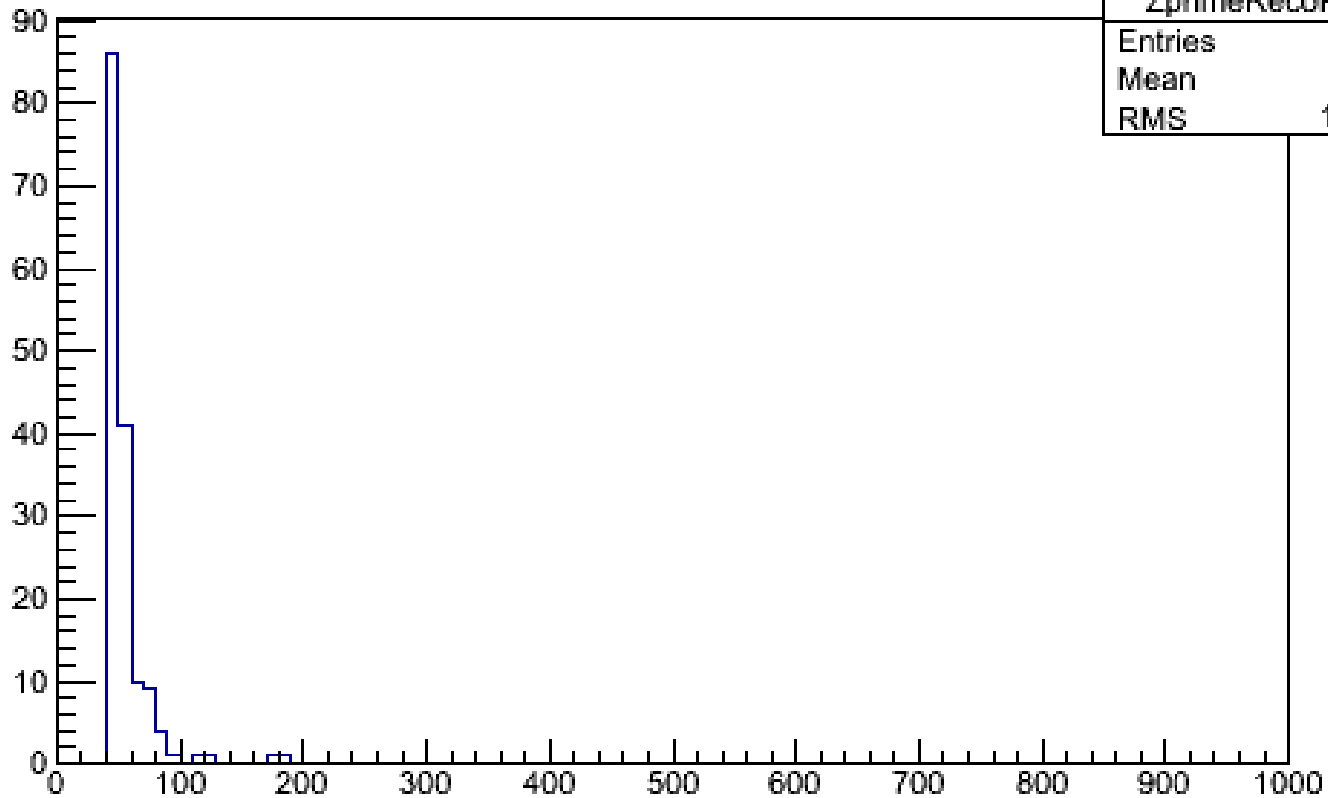# I continued working

First high pt muon for Z prime

ZprimeRecoPt1

Entries	4092
Mean	393
RMS	105

Second high pt muon for Z prime

First high pt muon for Drell Yan

Second high pt muon for Drell Yan

ZprimeRecoPt2	
Entries	155
Mean	55.3
RMS	18.71

Mass resolution

Next Step
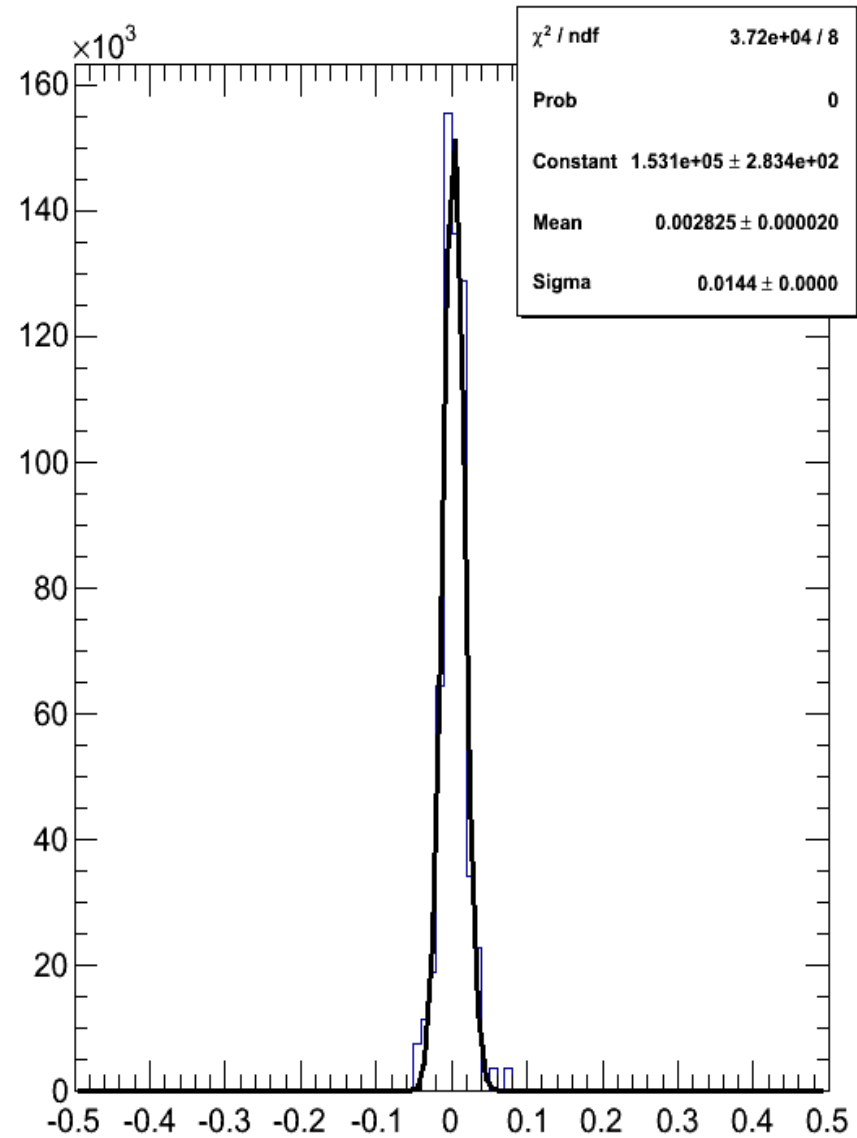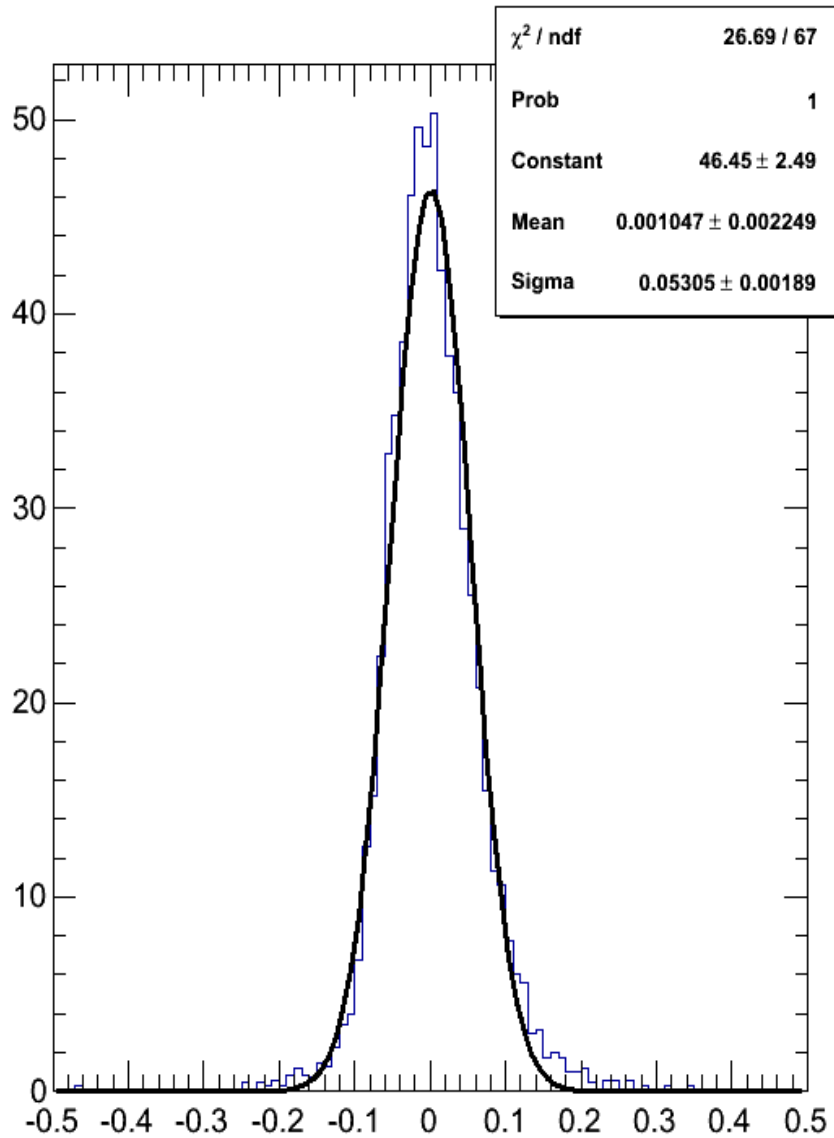
1. Update my code with more cuts
2. Understand the updates made by sherif during this time
3. Learn and read more about CMSSW ,MonteCarlo Techniques and root
4. After returning back to Egypt I will continue in this project with sherif In the BUE and organise a regular online meetings with Nicola in Bari

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THANK YOU