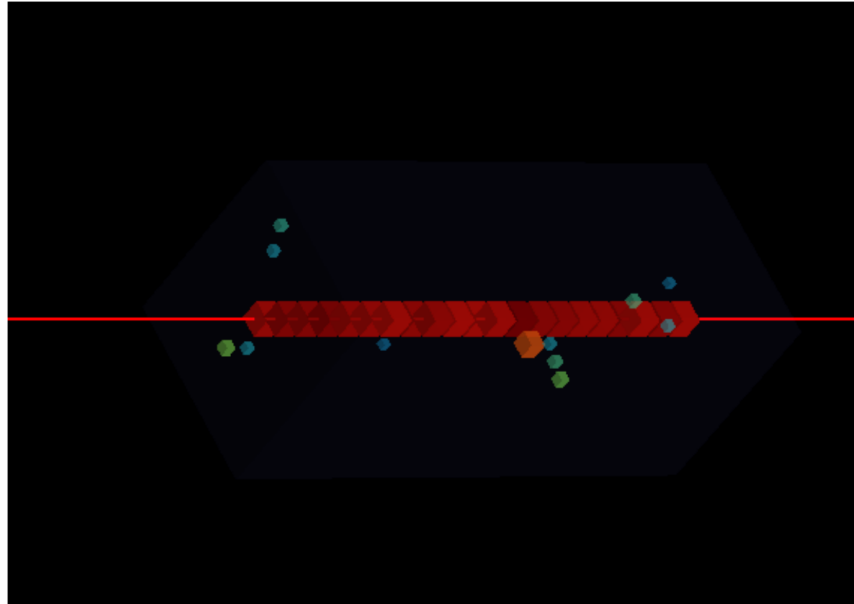


# MIP calibration with muons

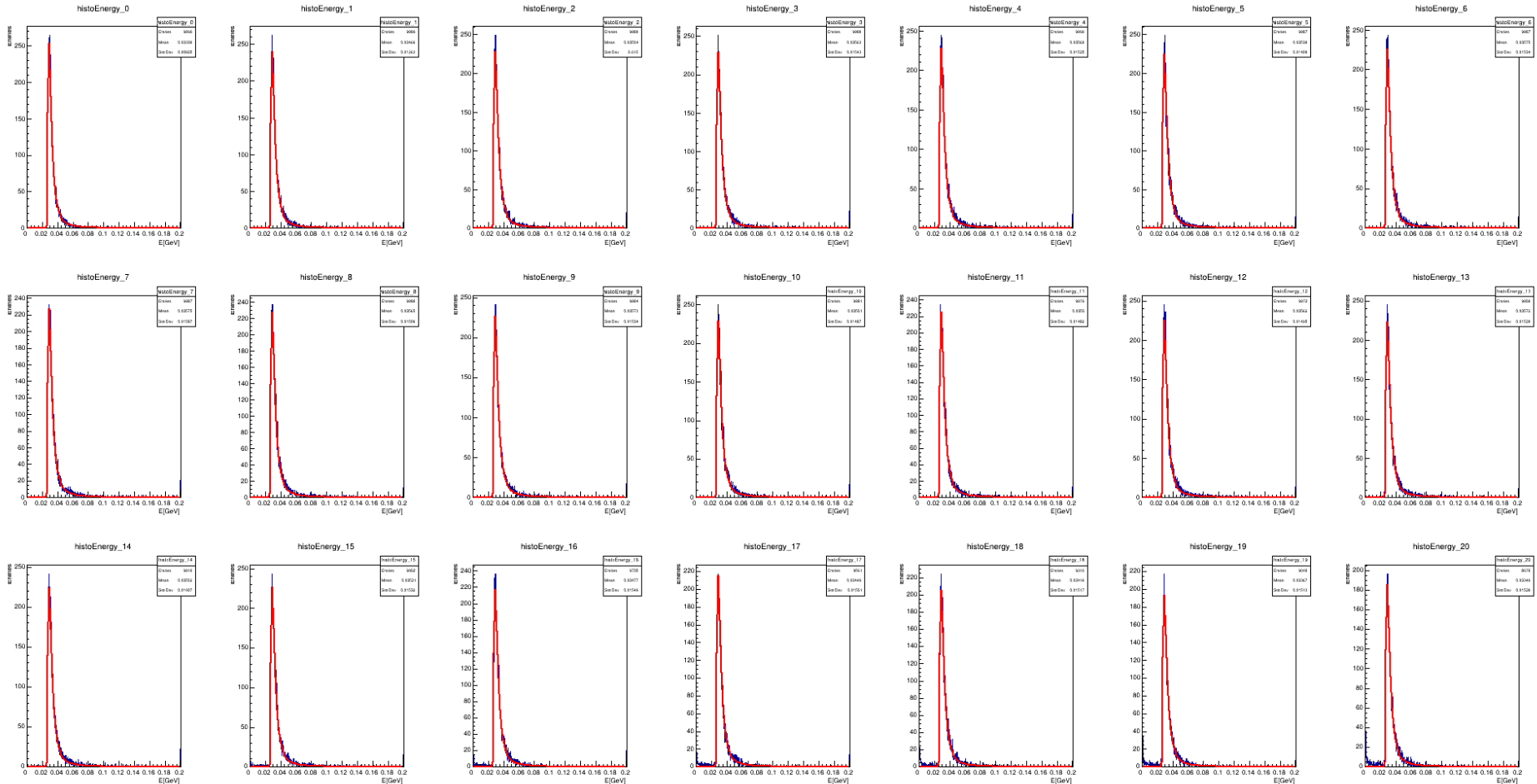
5 GeV muons straight line in the center of the central line of crystals with no angular distribution



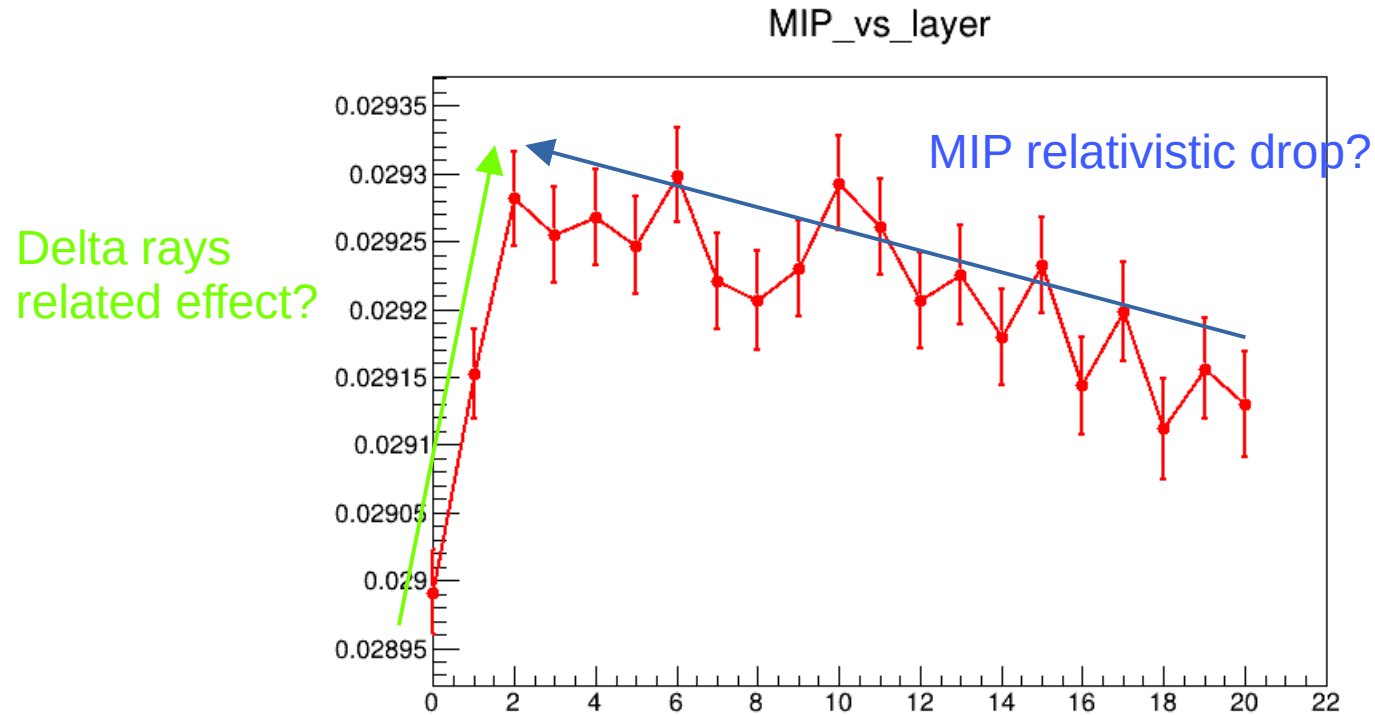
# Attention

- Simulation with LYSO density  $7.25 \text{ g/cm}^3$
- Real density at beam test is  $7.1 \text{ g/cm}^3$

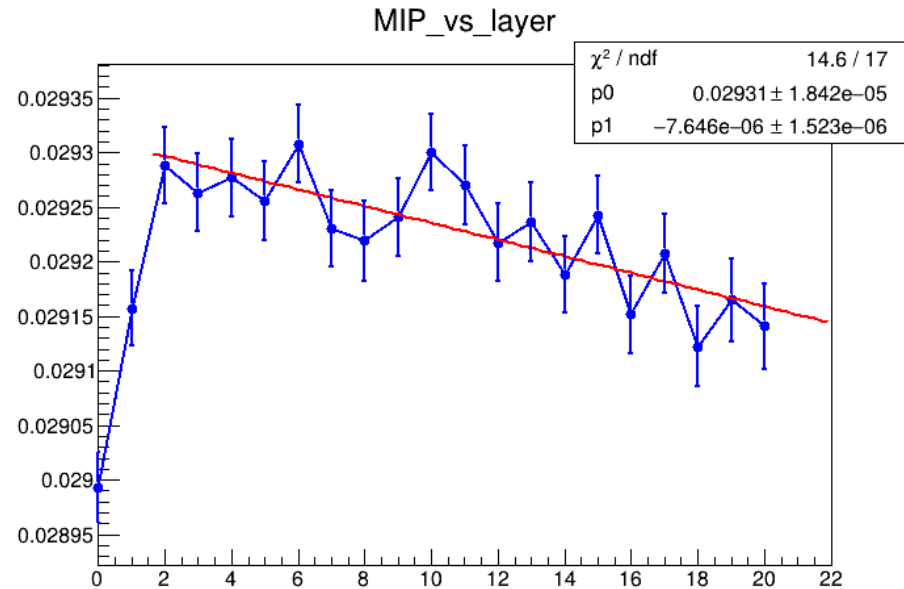
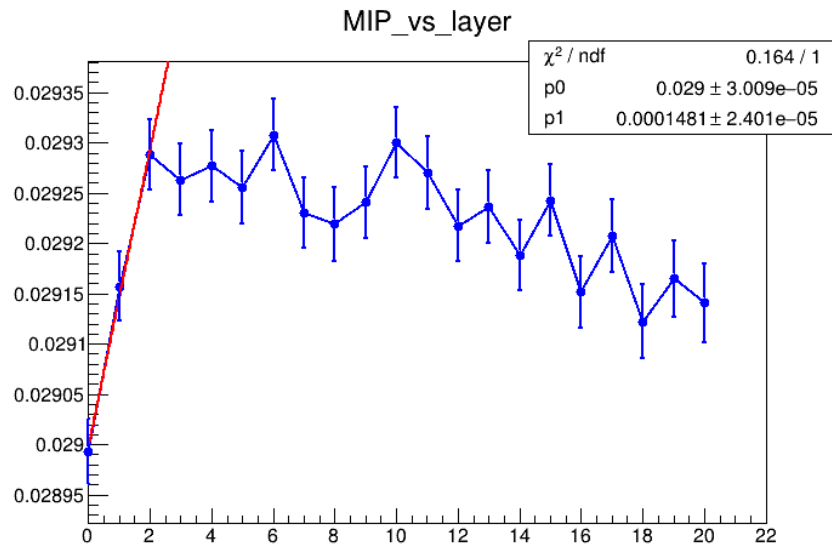
- Build energy releases histogram for every crystal and fit with a Landau distribution



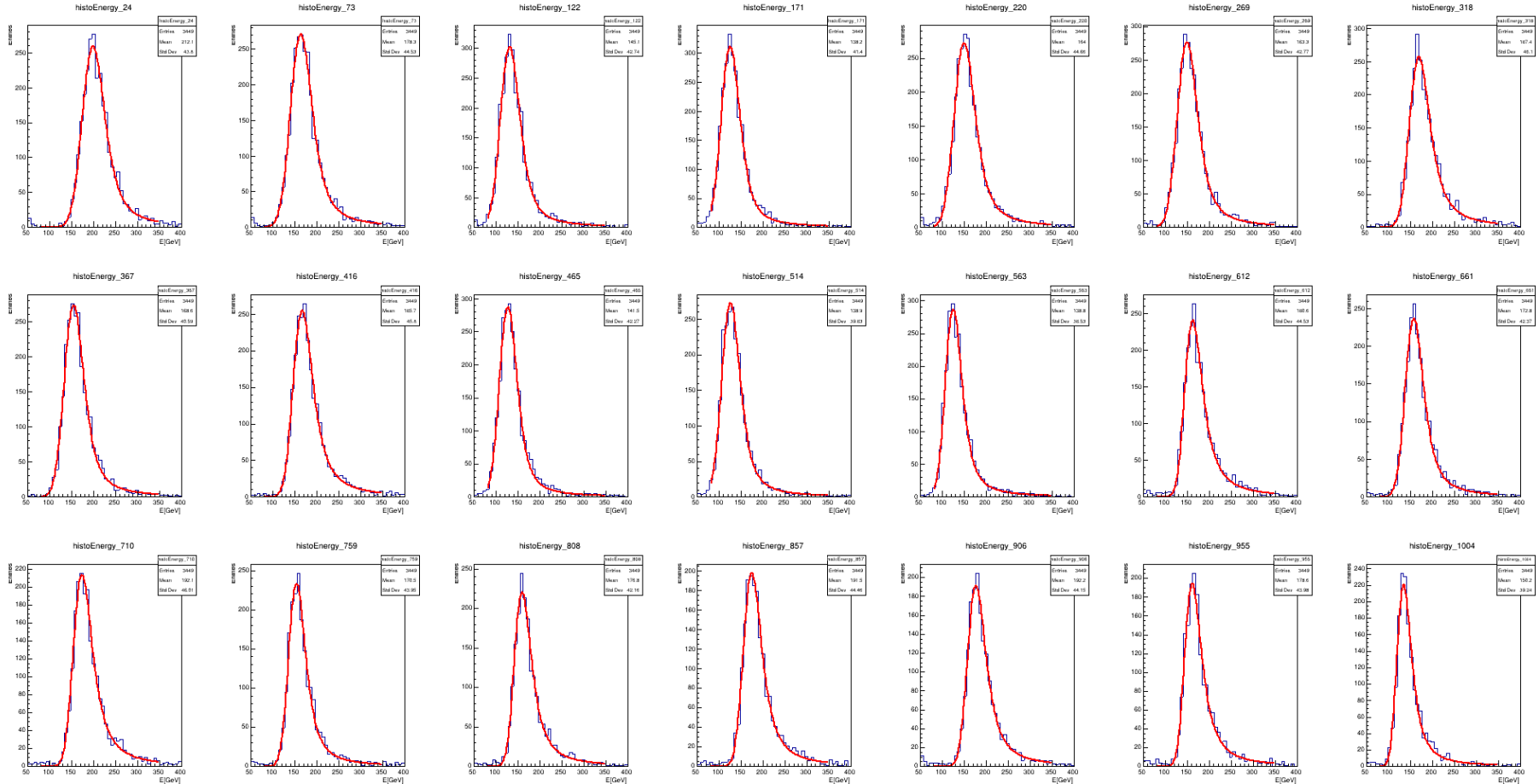
- Landau MPV in function of the Layer



- Linear fit for the two part of the curve, use this linear fit to regularize the MIP energy release
- Assume that this shape is equal for every line of crystals (should be in the MC)



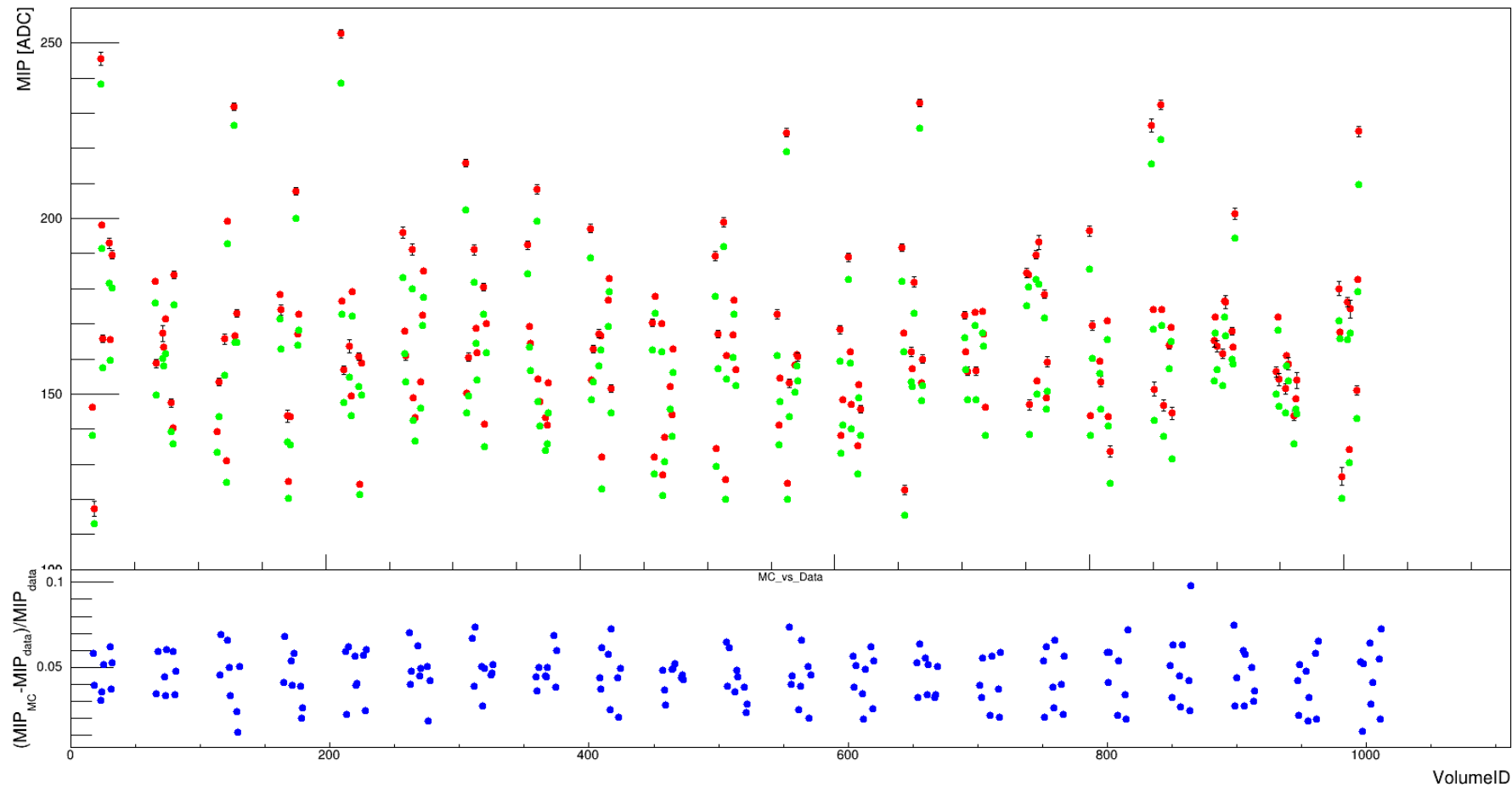
- Use the values from the fitted straight line to digitize and calibrate the MC hits, than perform Languas fit on these new energy releases



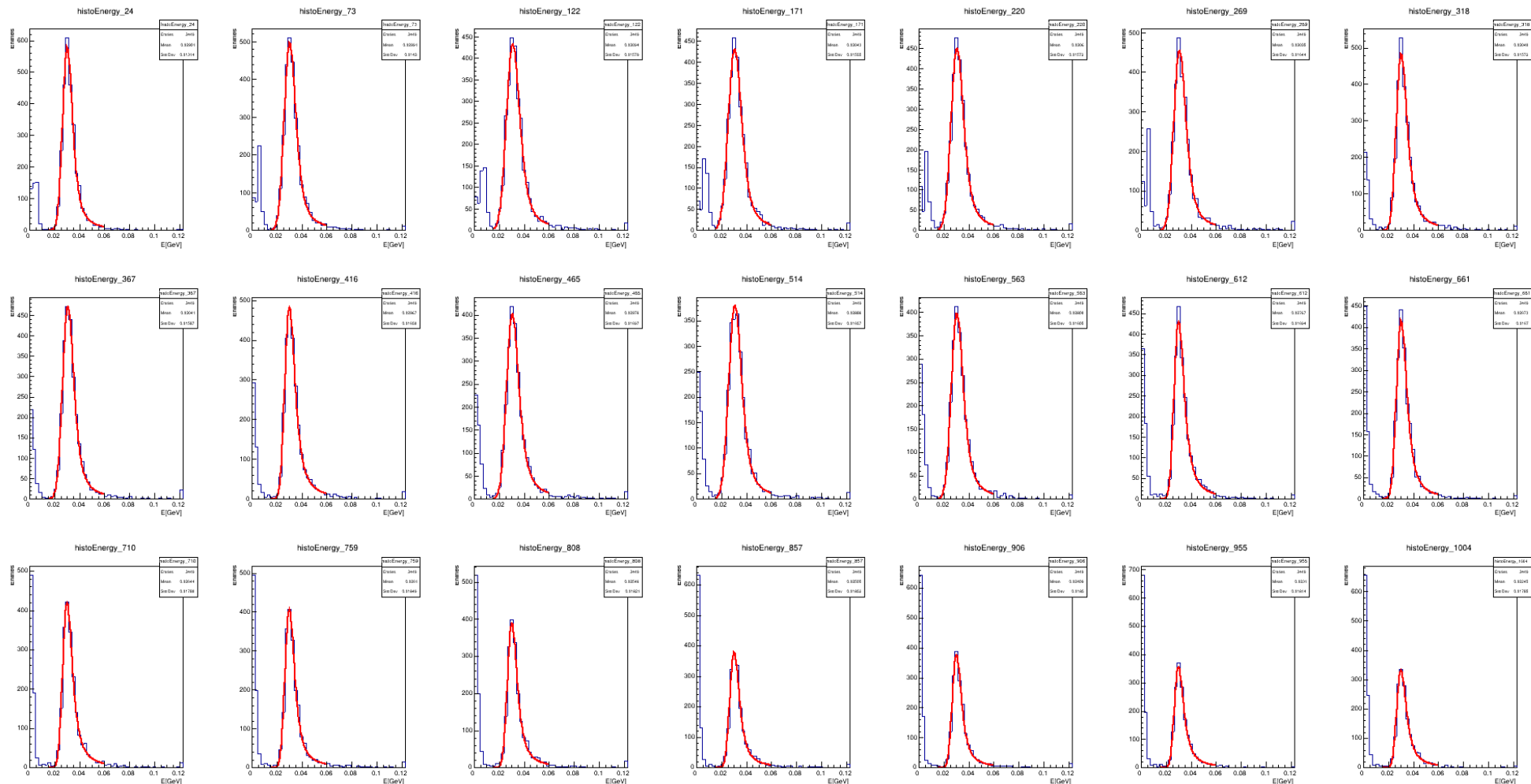
MC

Data

MIPmax\_vs\_layer

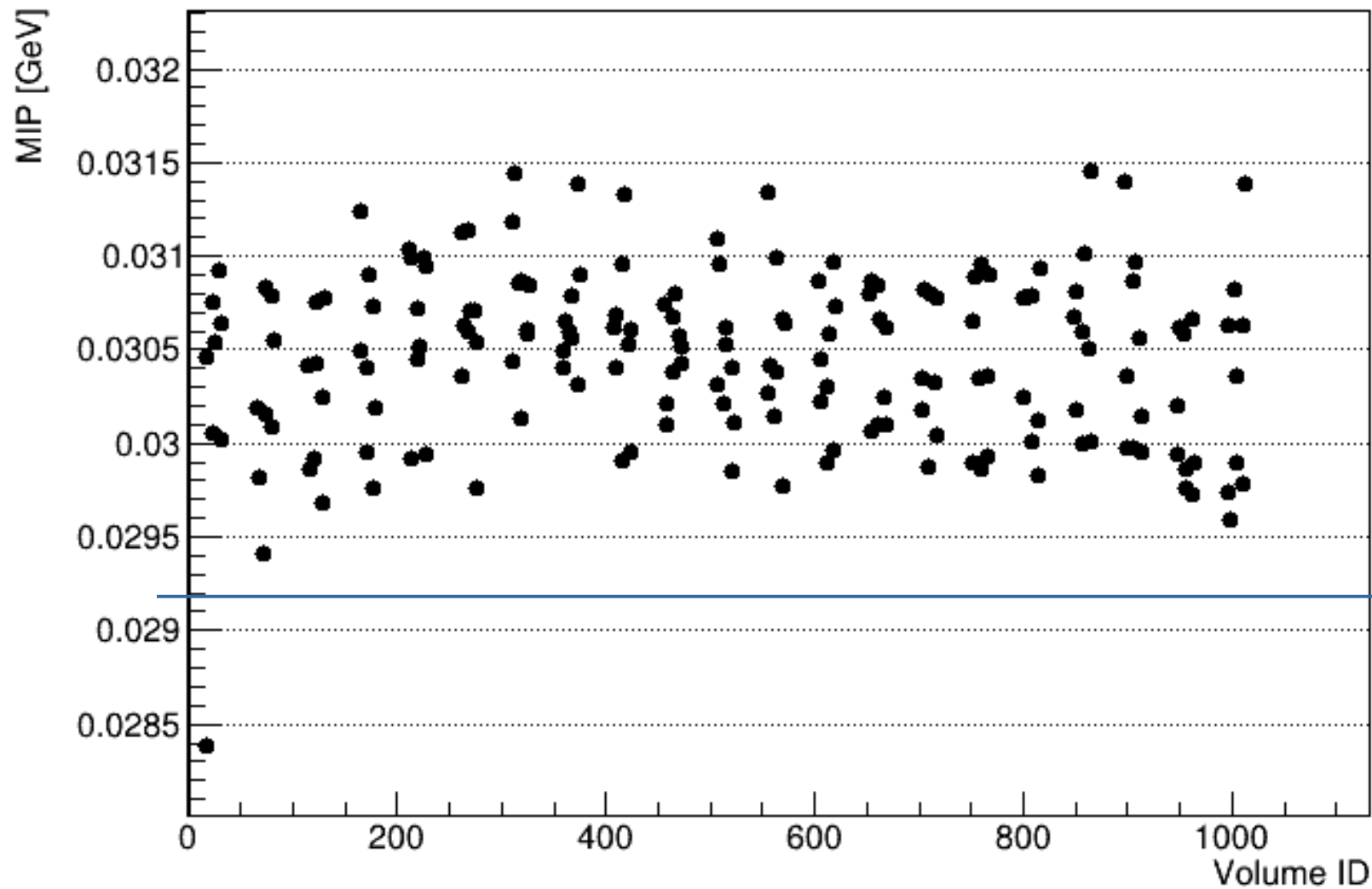


# • Calibrate digitized data and fit LanGaus





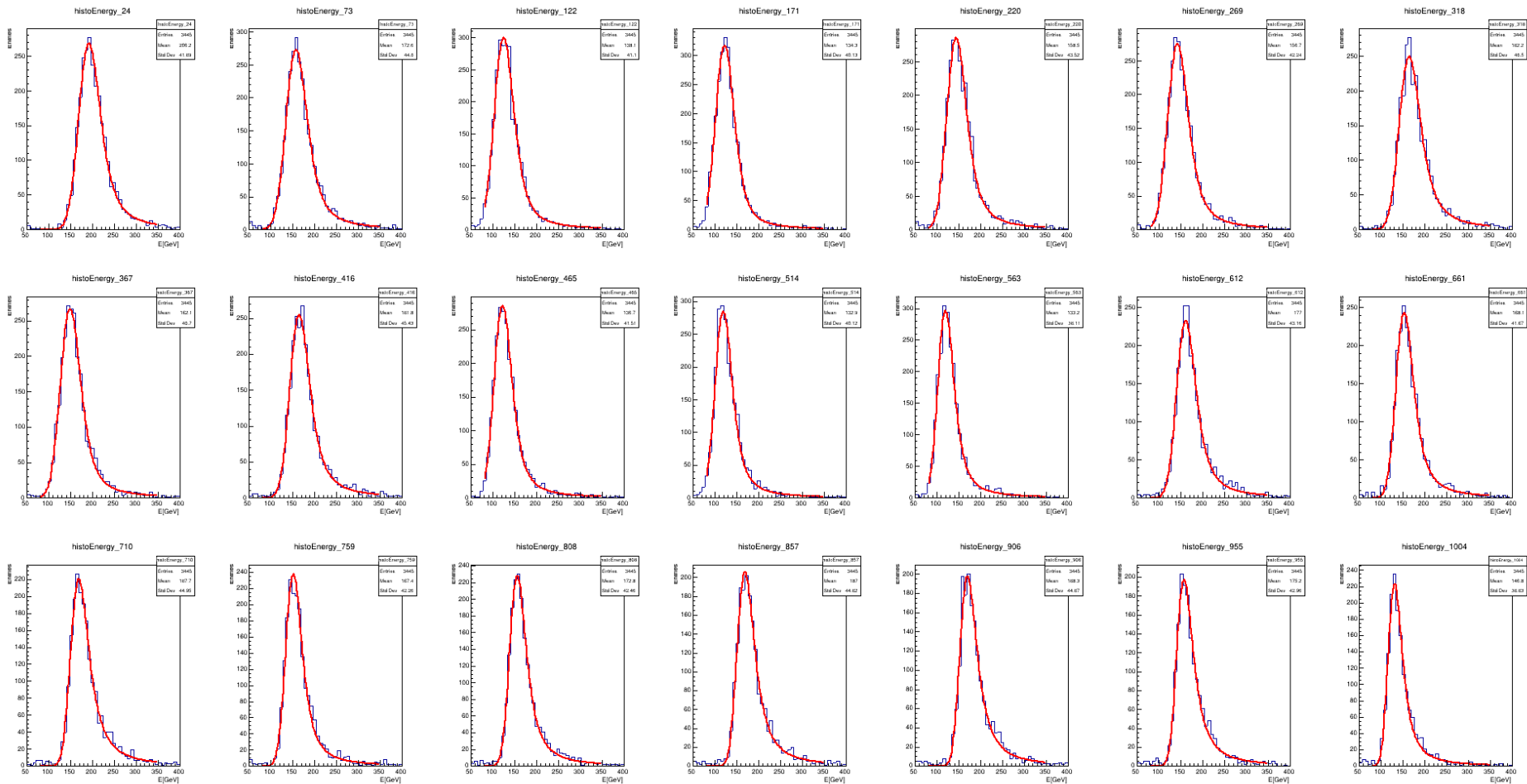
# MIPmax\_vs\_layer



Starting MIP  
Value form  
Landau on not  
digitized MC

# Iteration 1

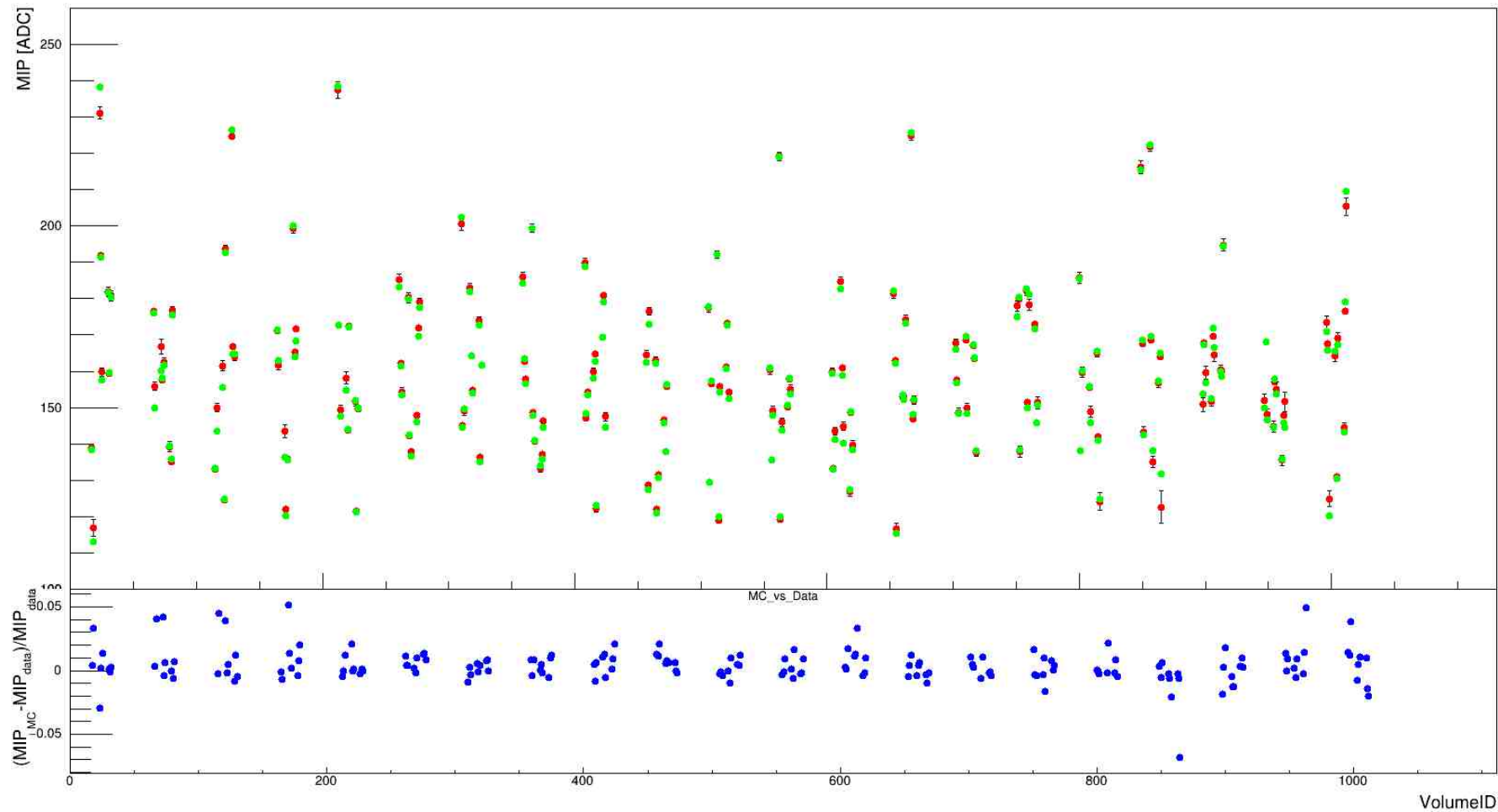
- Use the new MIP GeV value to digitize and claibrate simulate muons



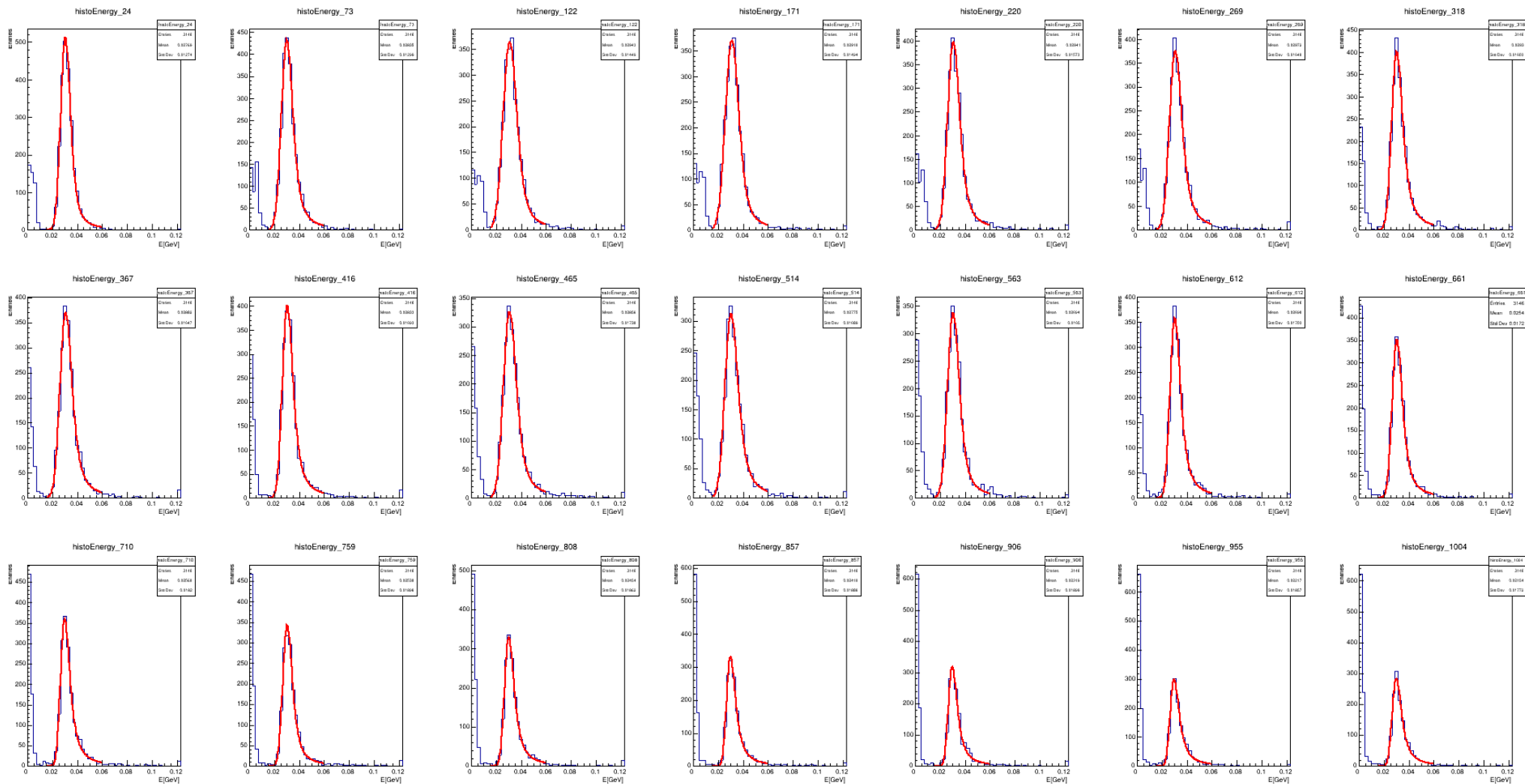
MC

MIPmax\_vs\_layer

Data



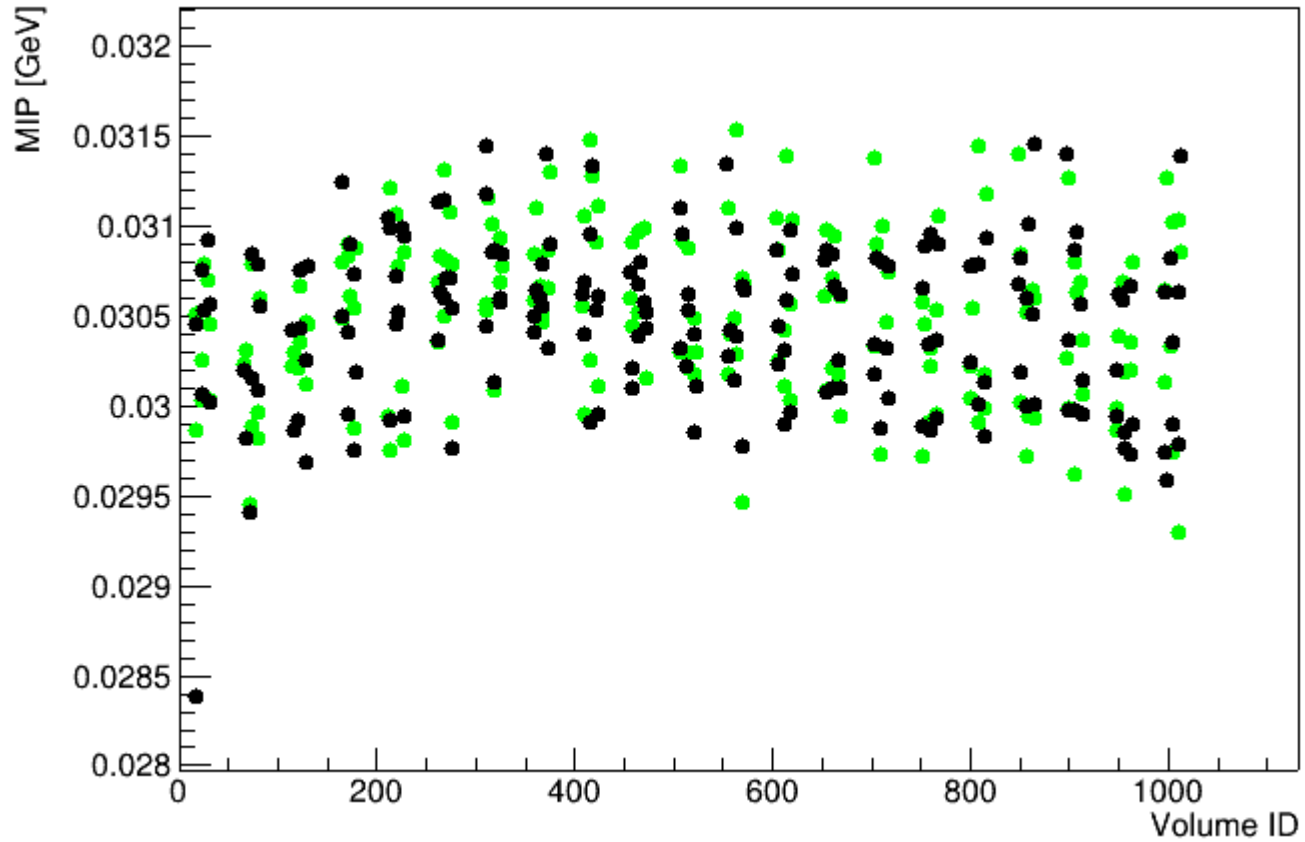
# • Calibrate digitized data and fit LanGaus



Iteration 1

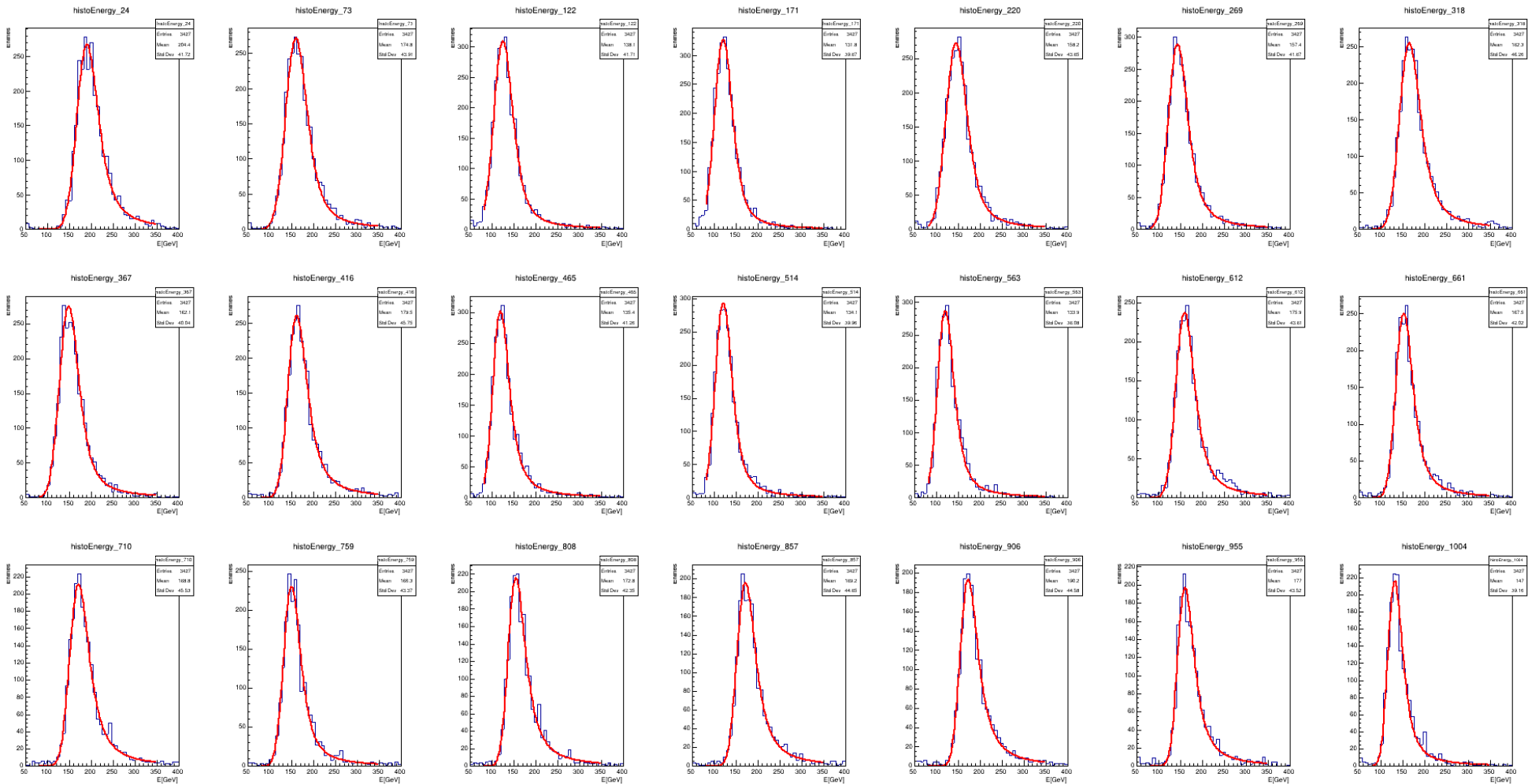
Iteration 0

MIPmax\_vs\_layer



# Iteration 2

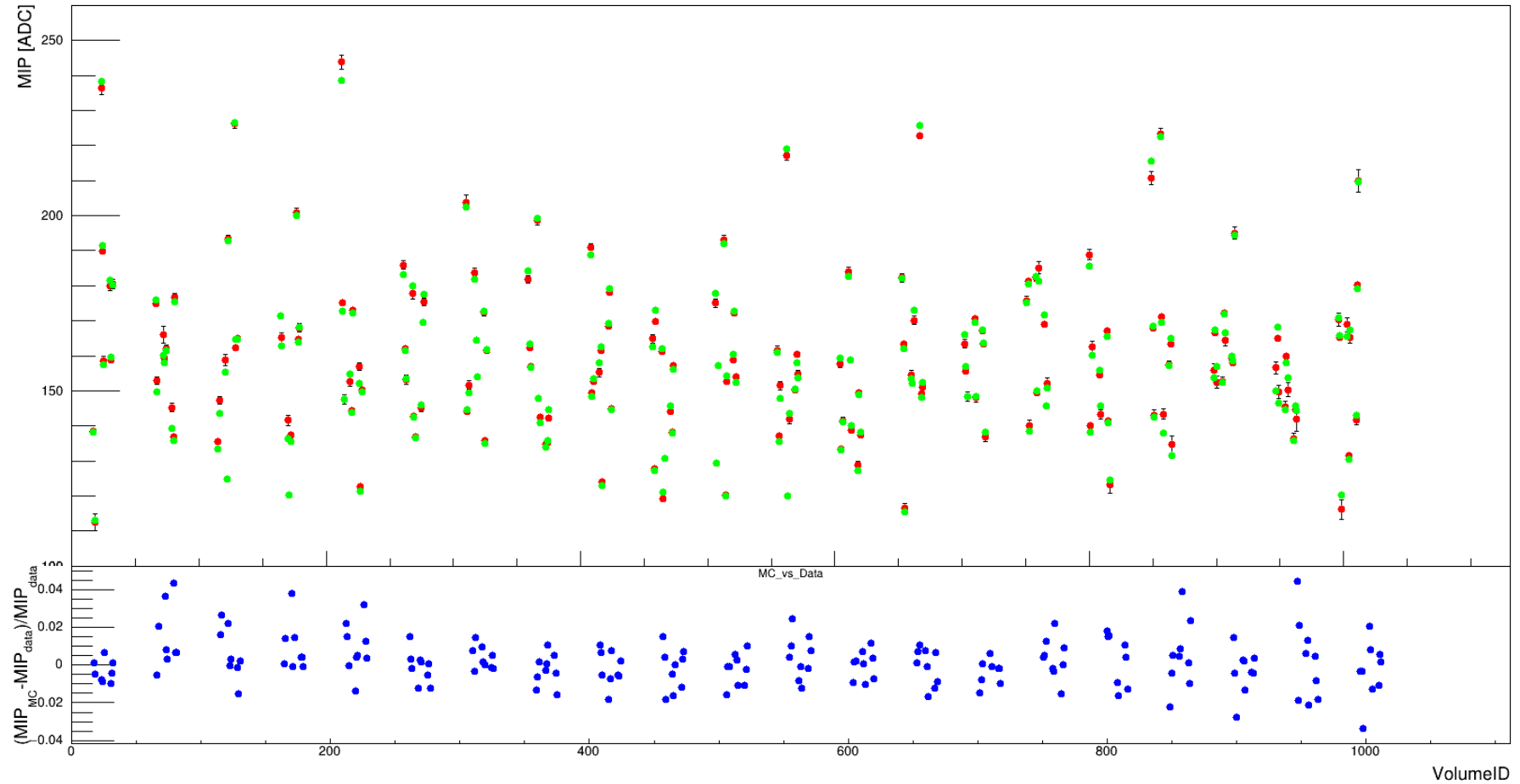
- Use the new MIP GeV value to digitize and claibrate simulate muons



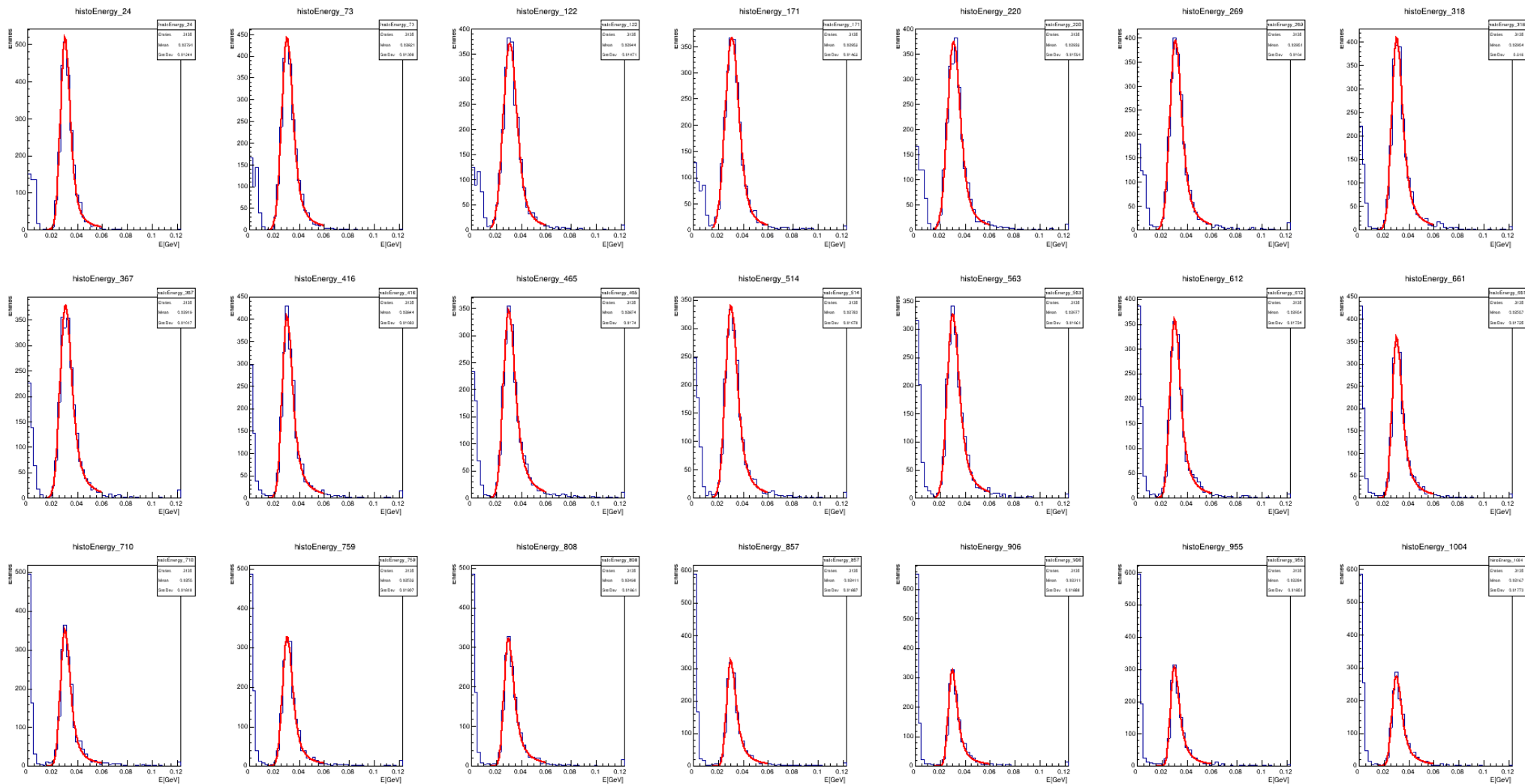
MC

Data

MIPmax\_vs\_layer



# • Calibrate digitized data and fit LanGaus

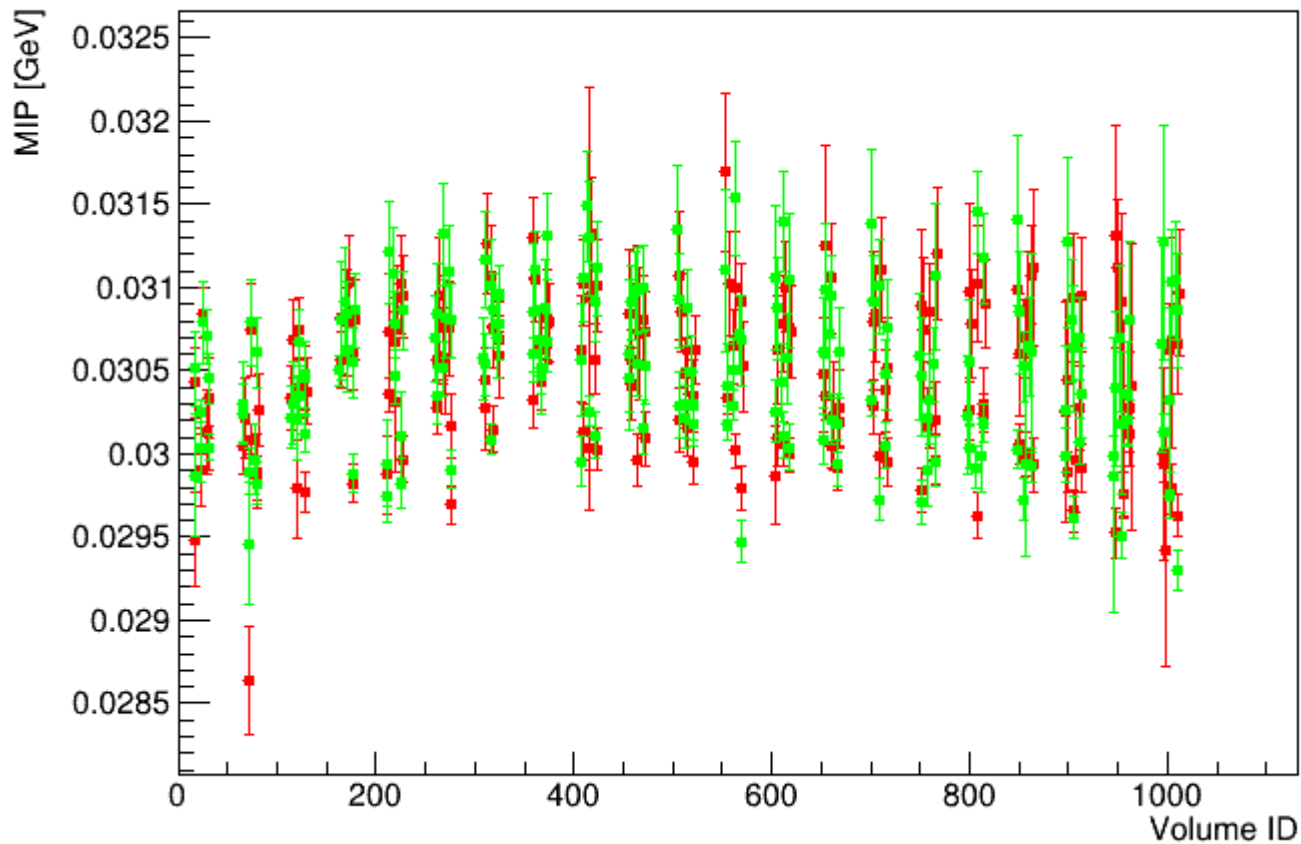




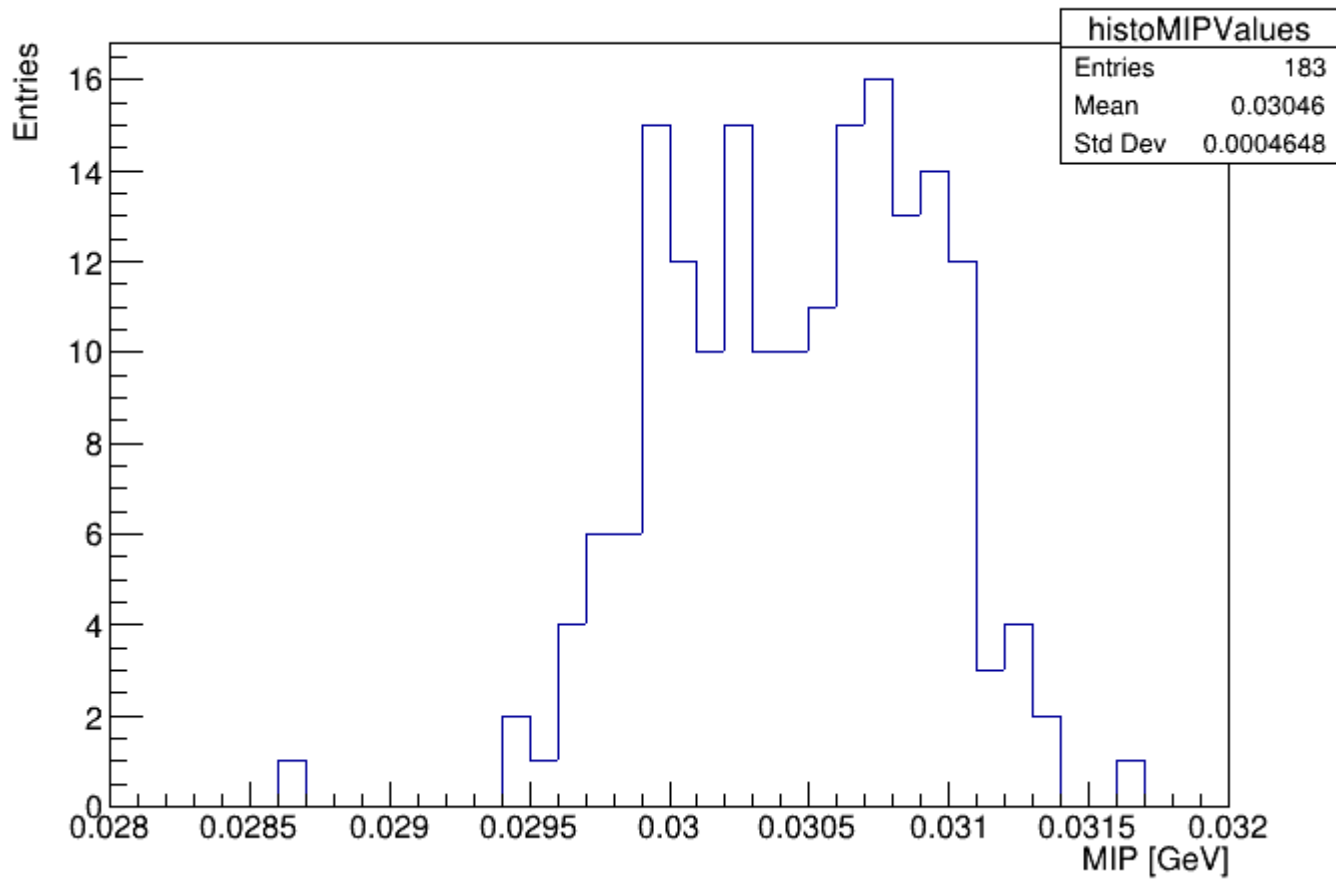
Iteration 1

Iteration 2

MIPmax\_vs\_layer

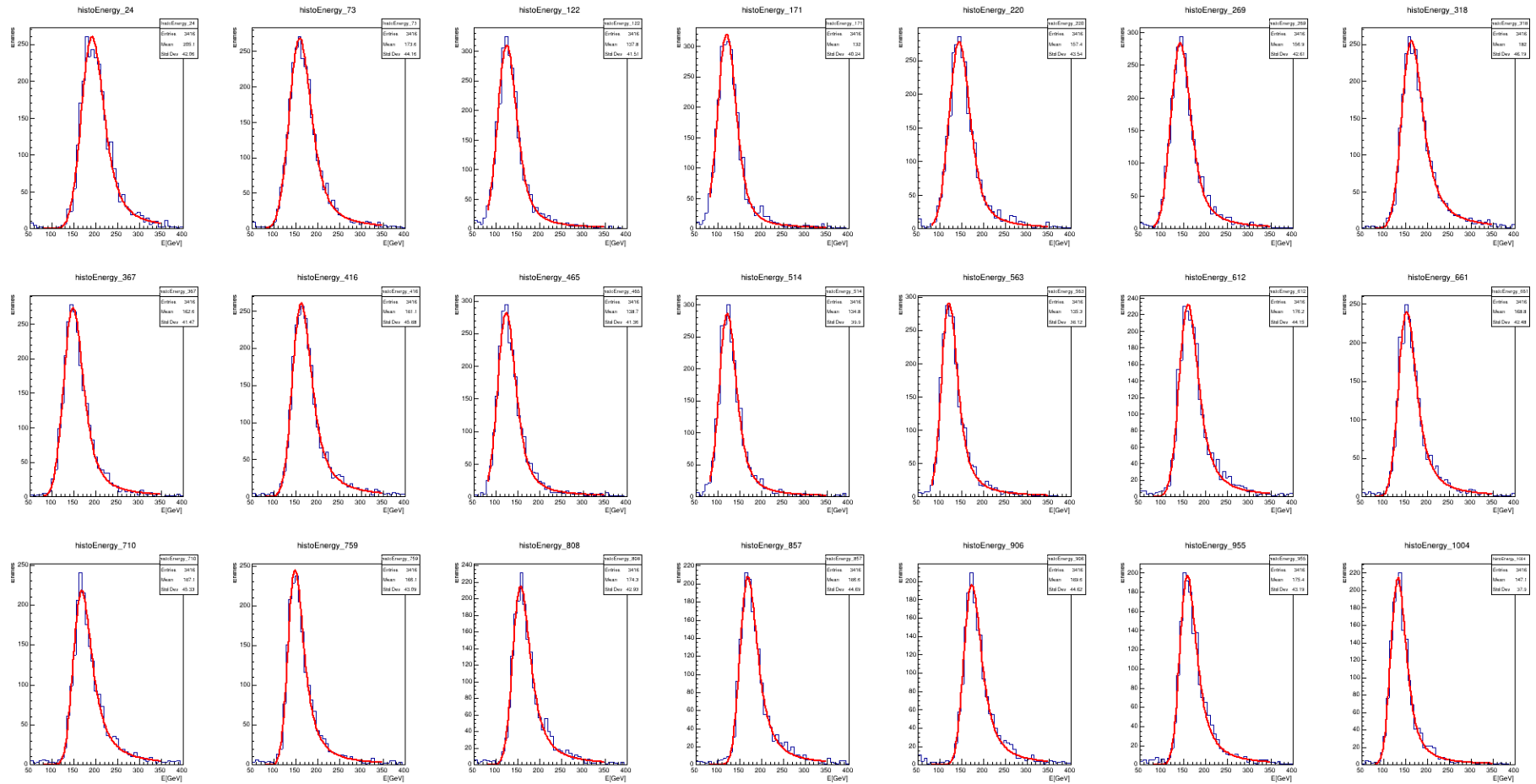


histoMIPValues



# Iteration 3

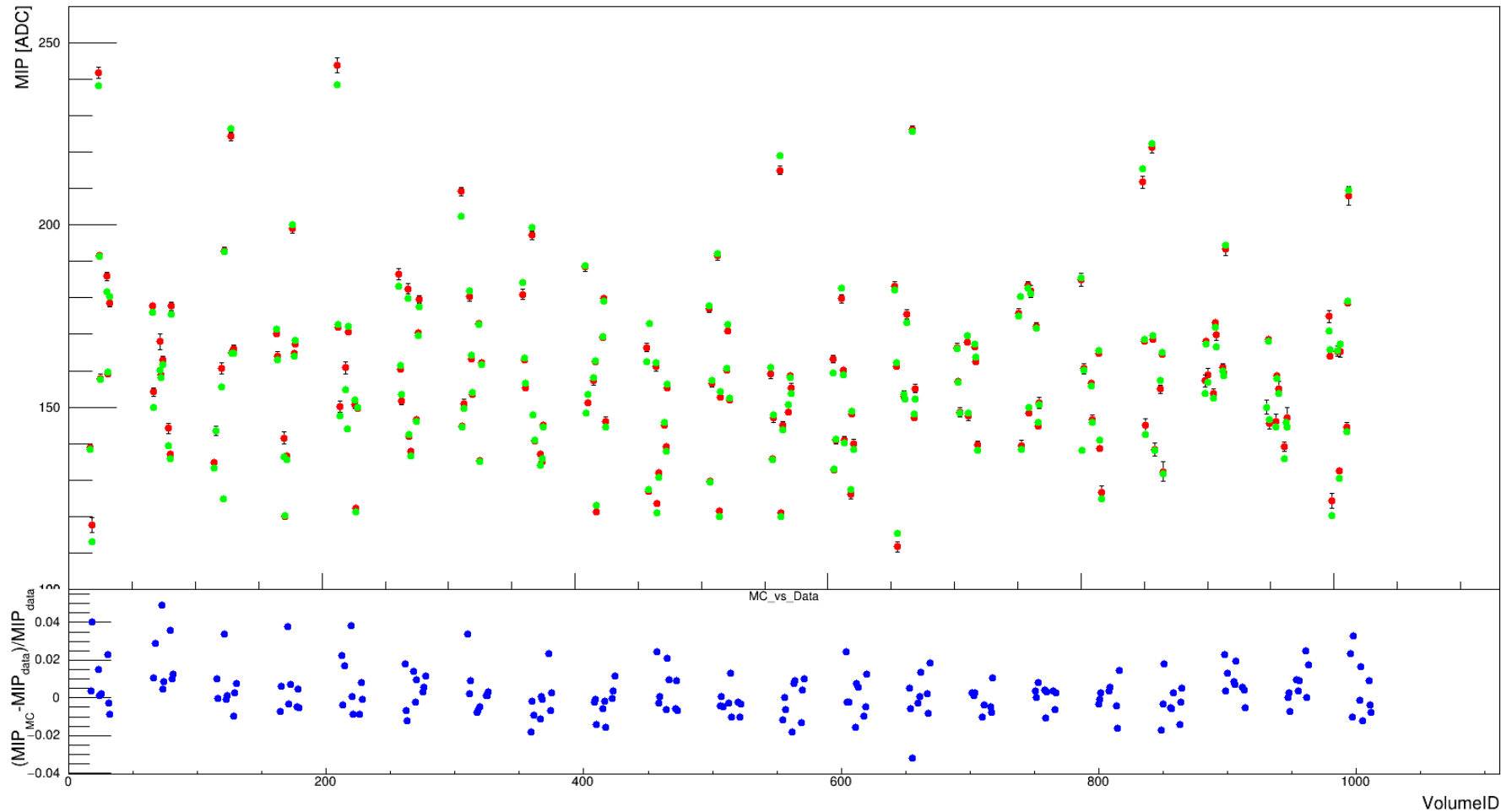
- Use the new MIP GeV value to digitize and calibrate simulated muons



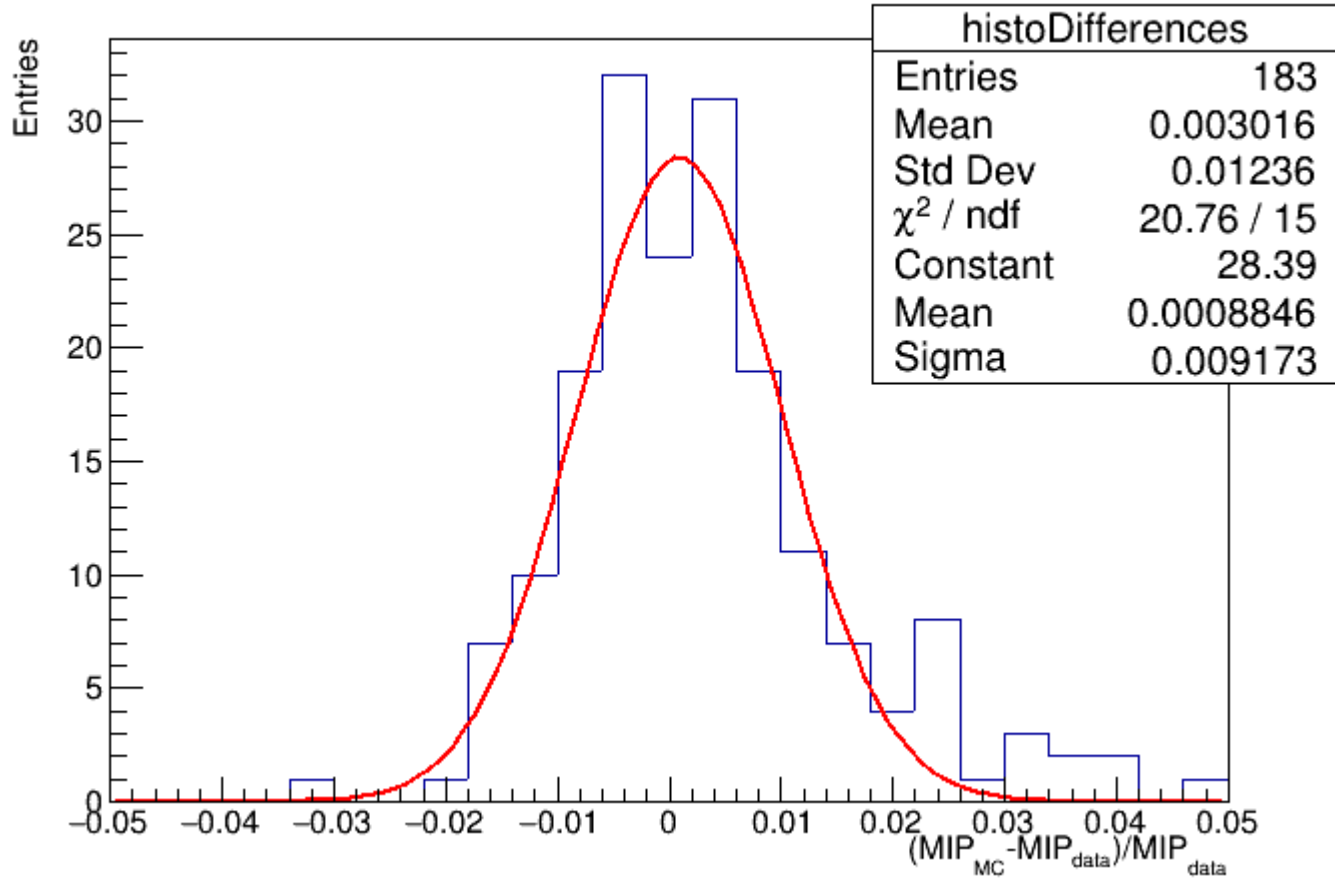
Iteration 1

MIPmax\_vs\_layer

Iteration 2



histoDifferences



Differences are distributed like a Gaussian distribution

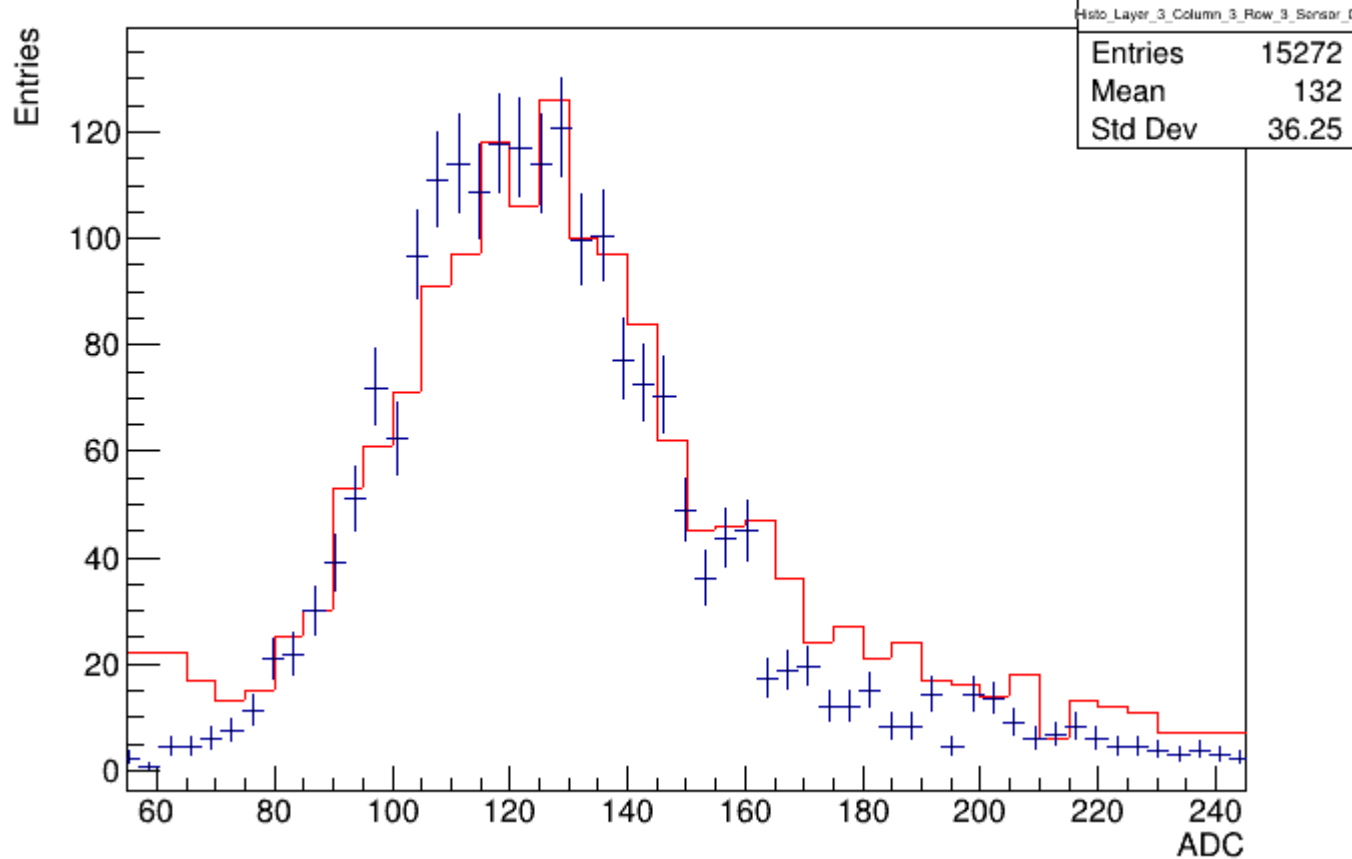
# Nota bene

- Per selezionare le MIP in simulazione, per ogni fila di cristalli ho considerato solo gli eventi in cui nei primi 6 cristalli almeno 3 hanno un segnale maggiore di 1.5 sigma di rumore
- Nei dati non è stata fatta questa selezione, il picco degli eventi senza rilascio è molto più grande che nelle simulazioni
- Simulation with subdetectors of SPS electrons (not PS muons)

Data

Simulation

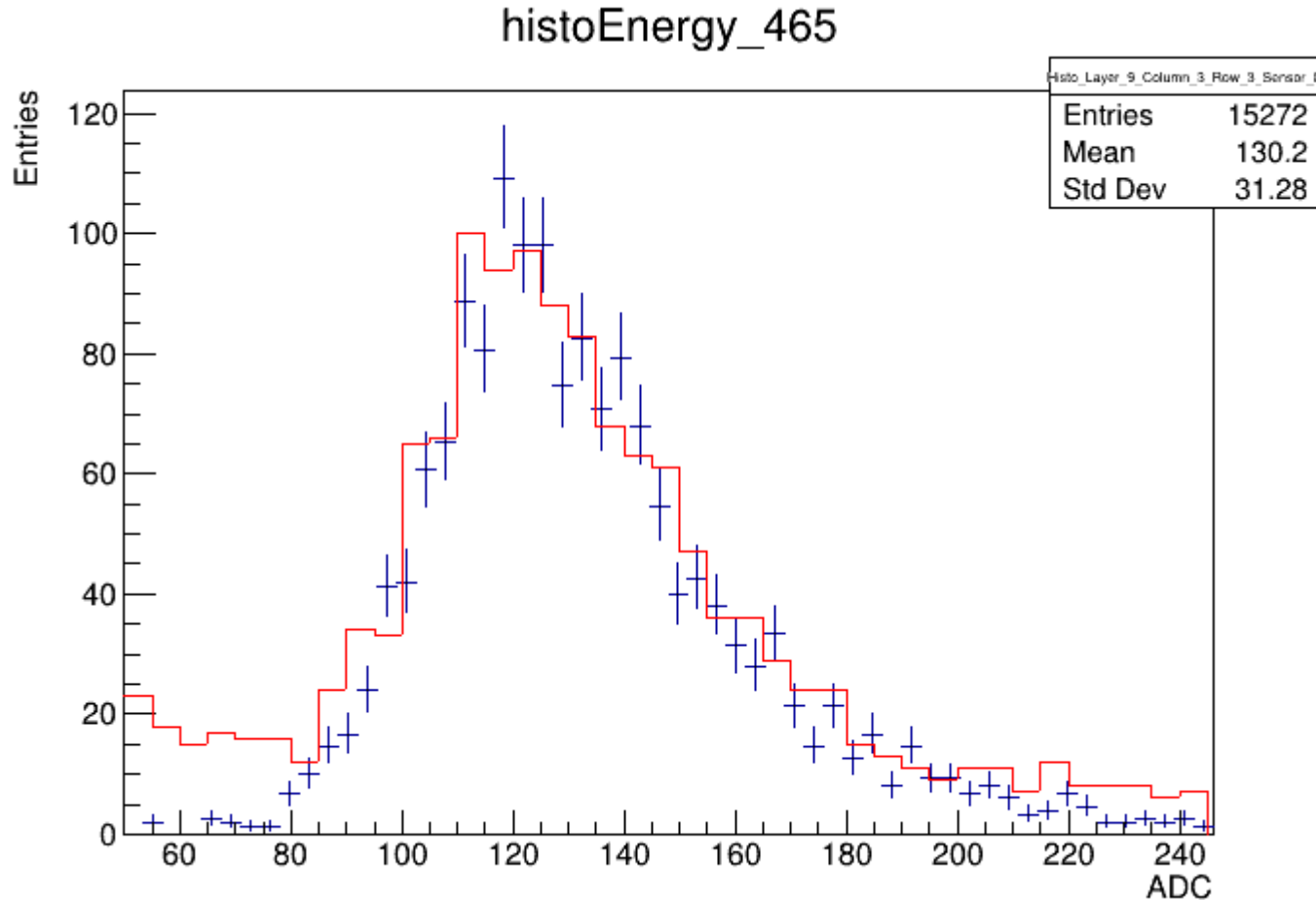
Histo\_Layer\_3\_Column\_3\_Row\_3\_Sensor\_0



The difference between the 2 peaks is of 0.35%

Data

Simulation



The difference between the 2 peaks is of 2.1%

Fare questi grafici anche in GeV e sistematicamente