## Update on

# *Tuning MC and DATA for VETO*

F. Oliva on behalf of the PADME Lecce group

PADME internal Meeting 3rd April 2020

# OUTLINE

- *Find best esteem for digi time window MC to emulate the Veto FEE*

- *Comparison DATA MC*

*Develop Thr for Amplitude*

**Veto.cfg**

*AmplitudeLow 10mV*
*AmplitudeHigh 20mV*

**Try with Low Thr**

*AmplitudeLow/High 2mV*

**Low Thrs for Reco Chosen**

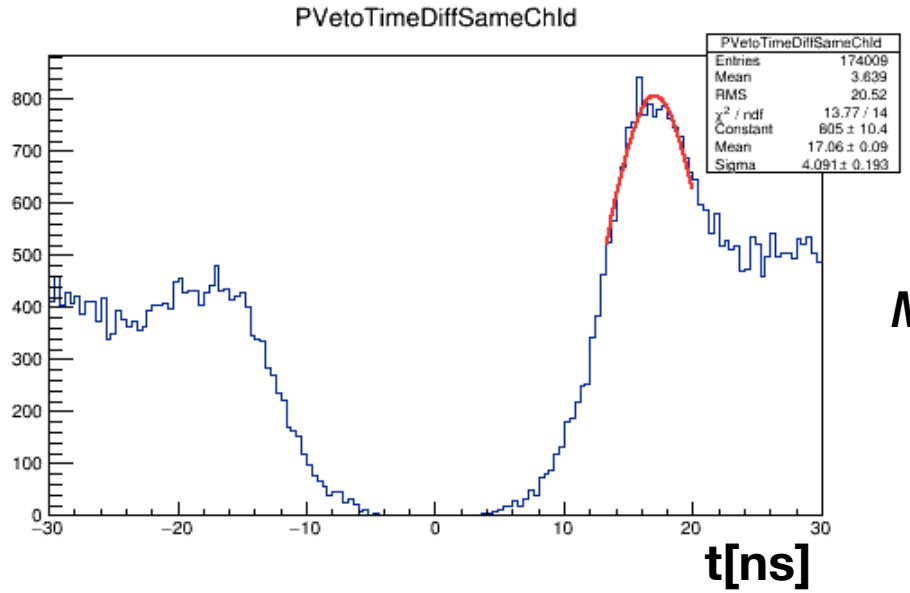
***MC Cluster Hit/Seed Thr 0.1 MeV***
***DATA Cluster Hit/Seed Thr 2.5 mV***

*Best solution for the future is to convert pulse height in energy released for DATA and set common thresholds*

*1000 events*
***MC** 23000 POT 250 ns bunch length, BeW, VC on*
***DATA** reference run run_0000000_20190724_152634*

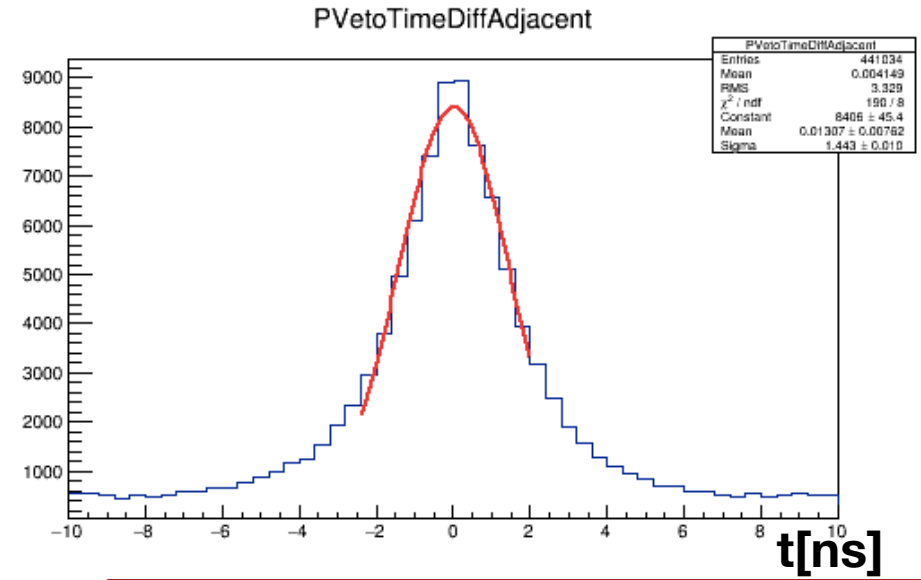
## *Difference between two hits of the same ChId, DATA*

***Develop Thrs for Reco Peak Search***




***Mean ~17.06 ns*** → ***17 ns time digi window chosen for MC***

## *Difference between two hits of two adjacent ChId, DATA*

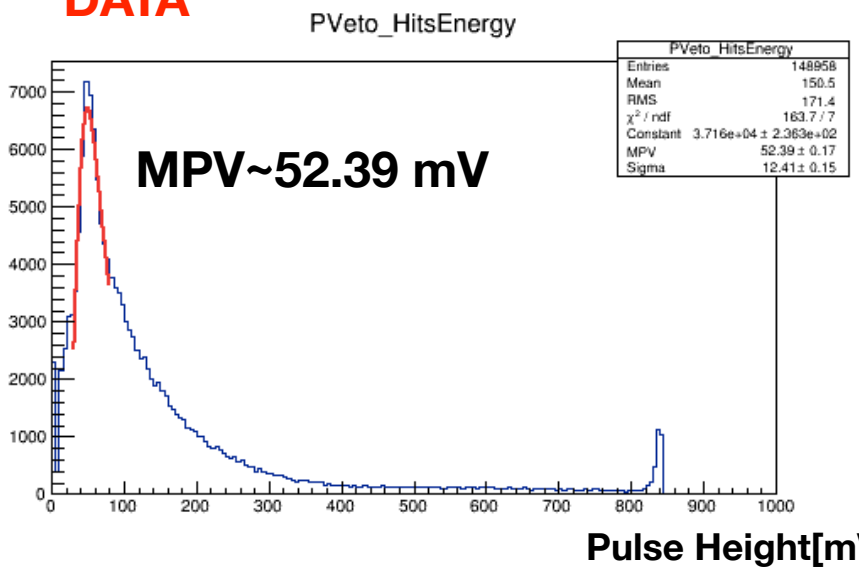



***sigma~1.4ns***

***Delta Cluster Time Chosen 2 ns***

# *Esteem of the conversion factor pulse height-energy*

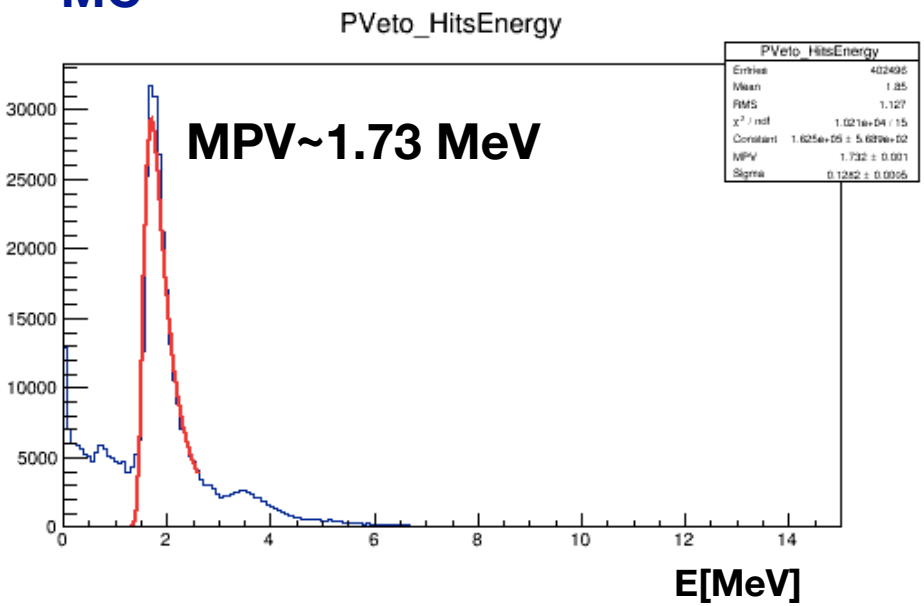
**DATA**




The energy associated to the hit for DATA corresponds to the pulse height of the signal. For the comparison with the MC a conversion factor is needed.

***DATA Energy [MeV]=Pulse Height [mV]/CF[mV/MeV]***

**MC**




**CF=Conversion Factor**

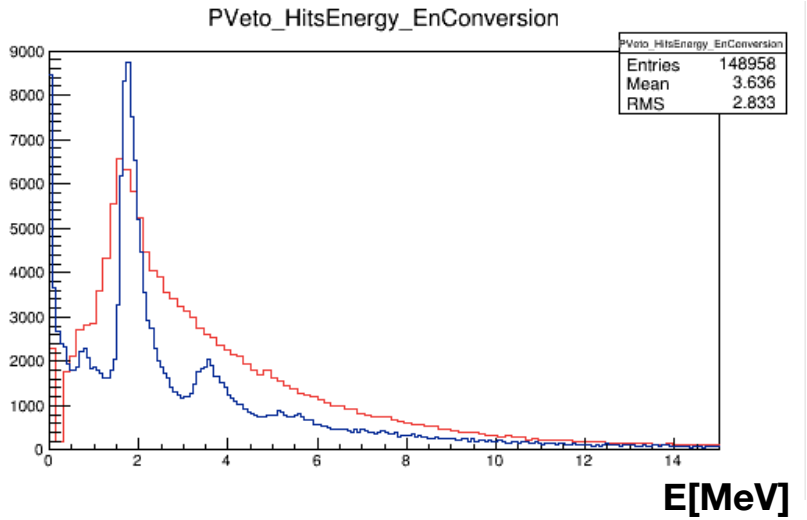
*CF~30.3 mV/MeV*

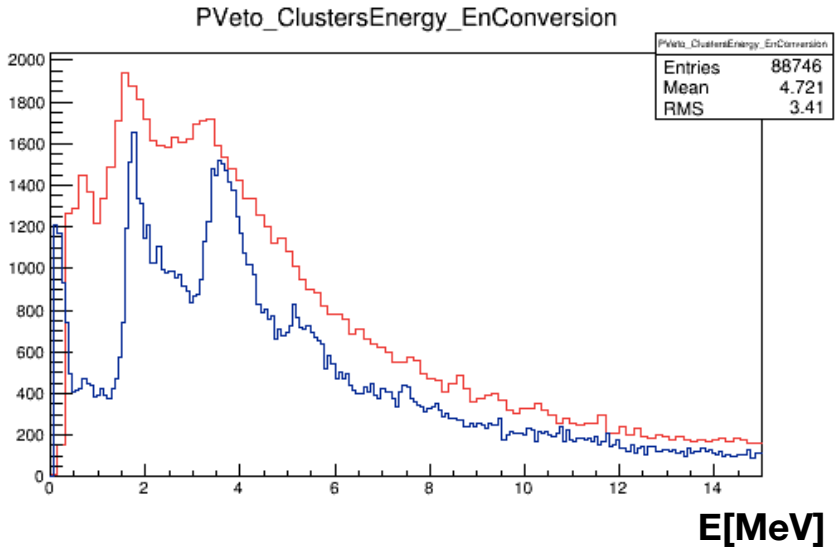
*DATA, thr Hit/Seed 2.5 mV  delta cluster time 2ns*

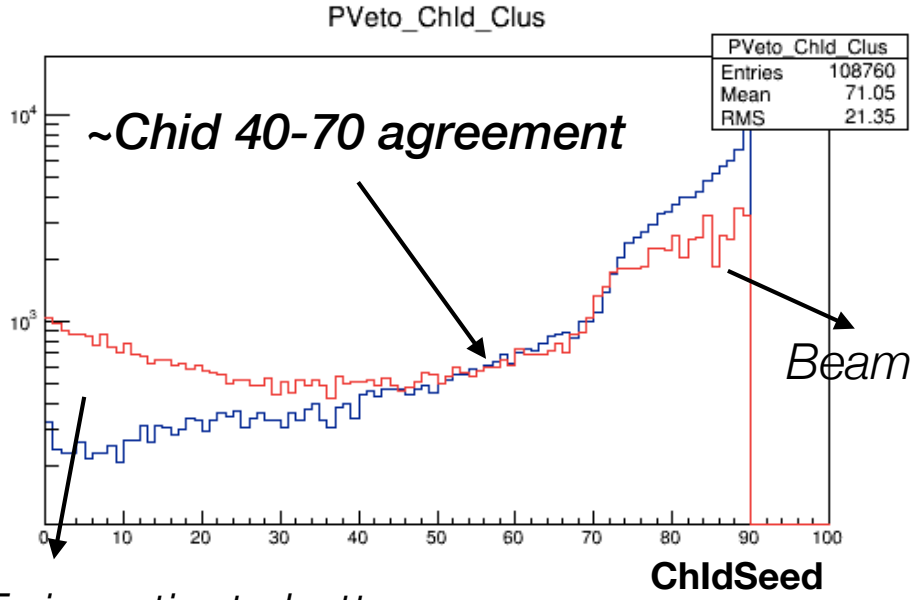
*MC digi 17 ns, thr Hit/Seed 0.1 MeV, delta cluster time 2ns*

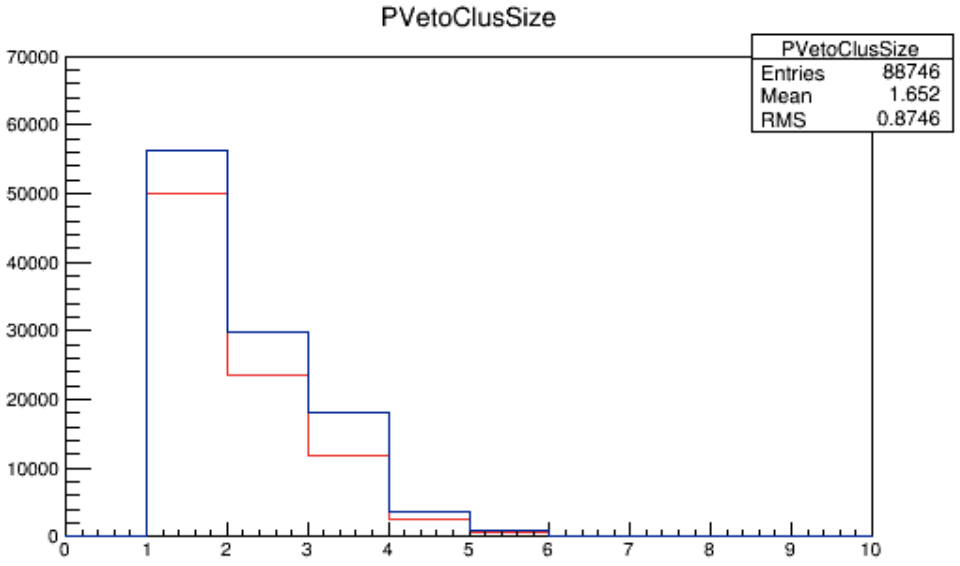
**1000 events**

***Develop Thrs for Reco Peak Search***

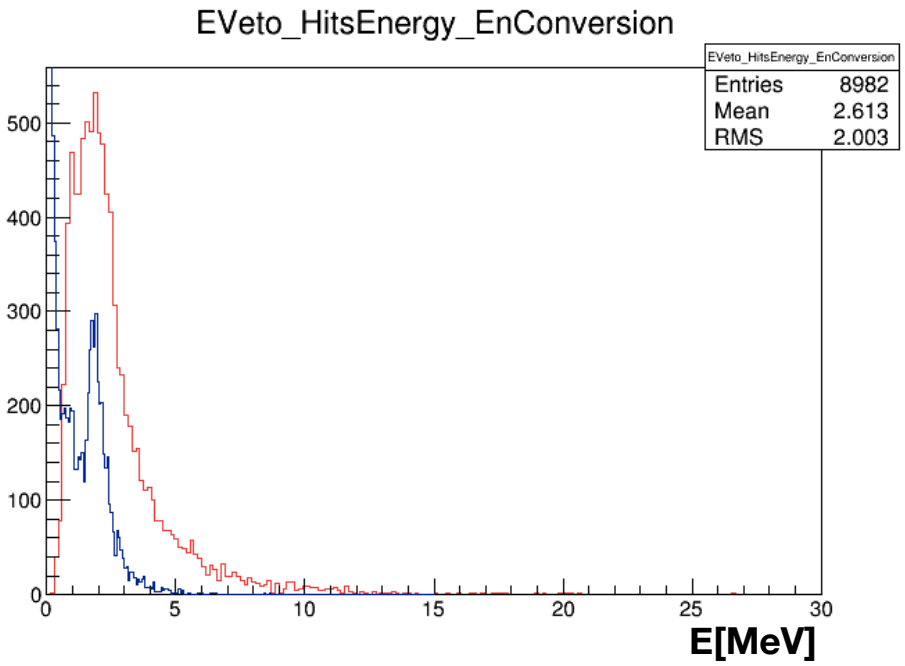


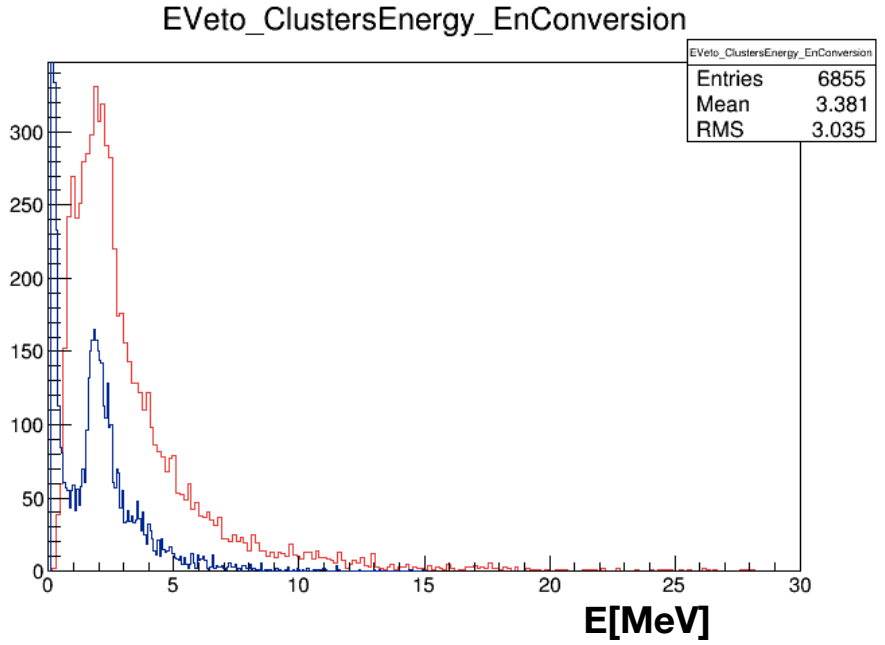



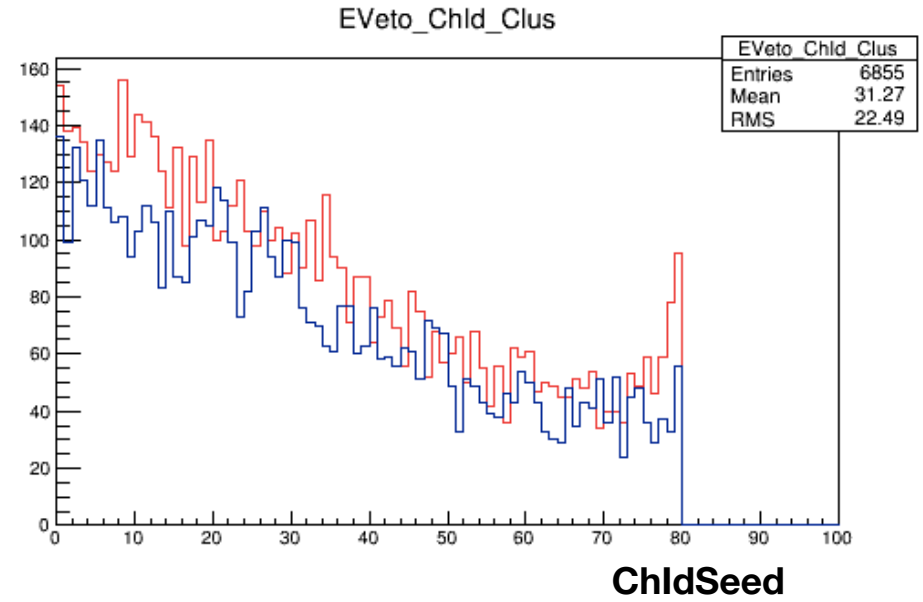



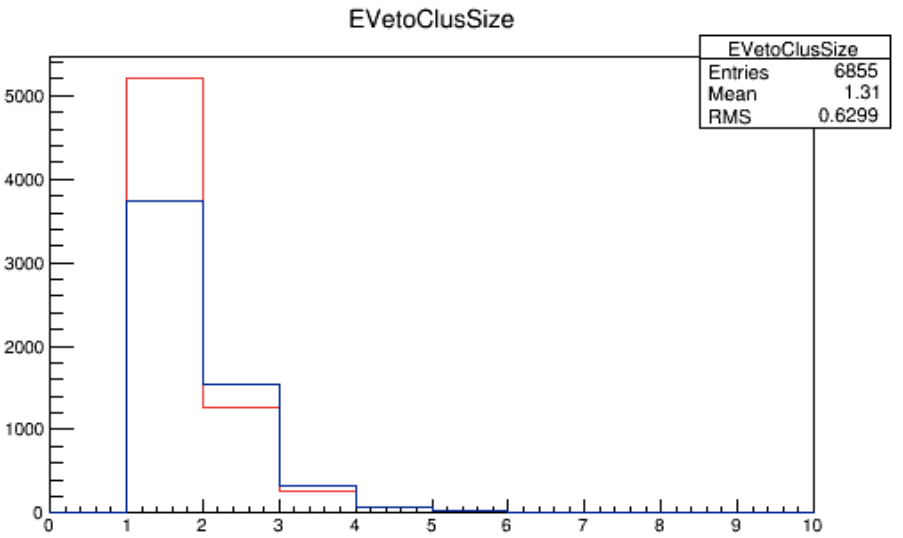




*To investigate better*

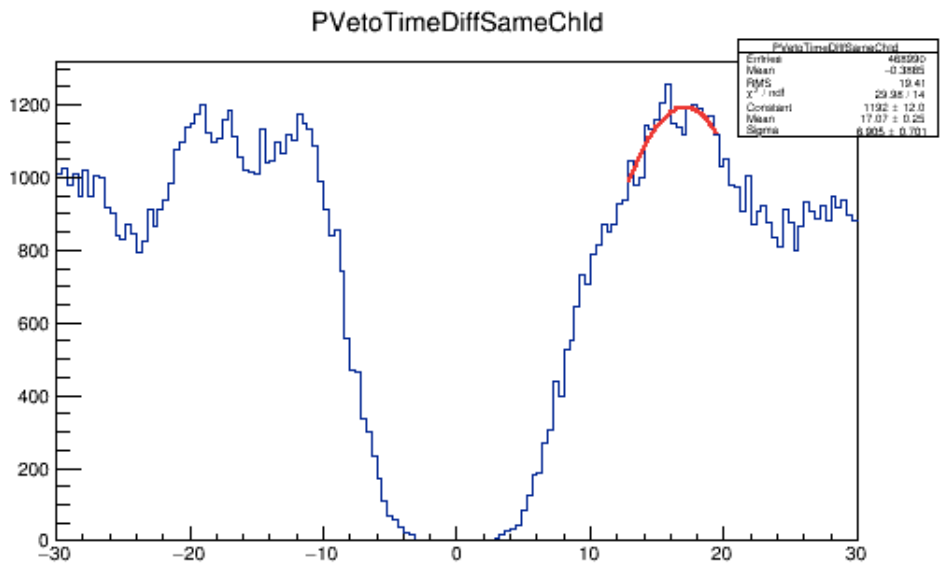

EVeto_HitsEnergy_EnConversion
EVeto_HitsEnergy_EnConversion
Entries 8982
Mean 2.613
RMS 2.003
E[MeV]


EVeto_ClustersEnergy_EnConversion
EVeto_ClustersEnergy_EnConversion
Entries 6855
Mean 3.381
RMS 3.035
E[MeV]


EVeto_Chld_Clus
EVeto_Chld_Clus
Entries 6855
Mean 31.27
RMS 22.49
ChldSeed


EVetoClusSize
EVetoClusSize
Entries 6855
Mean 1.31
RMS 0.6299

## *Difference between two hits of the same ChId, DATA*

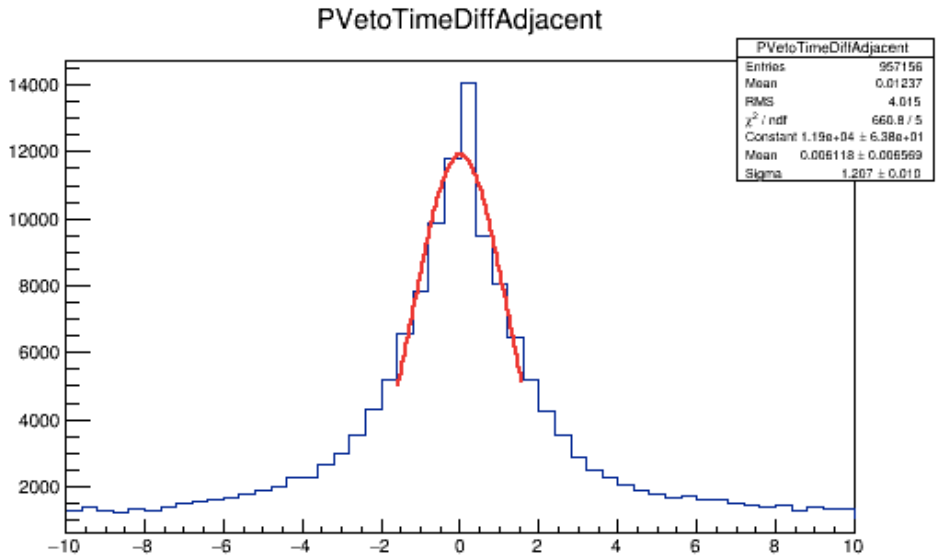



**Check for**

***DATA Amp Thr Low/High 2 mV for Peak Search***

***Mean~17.07 ns***

## *Difference between two hits of two adjacent ChId, DATA*




**~Same as higher thresholds**

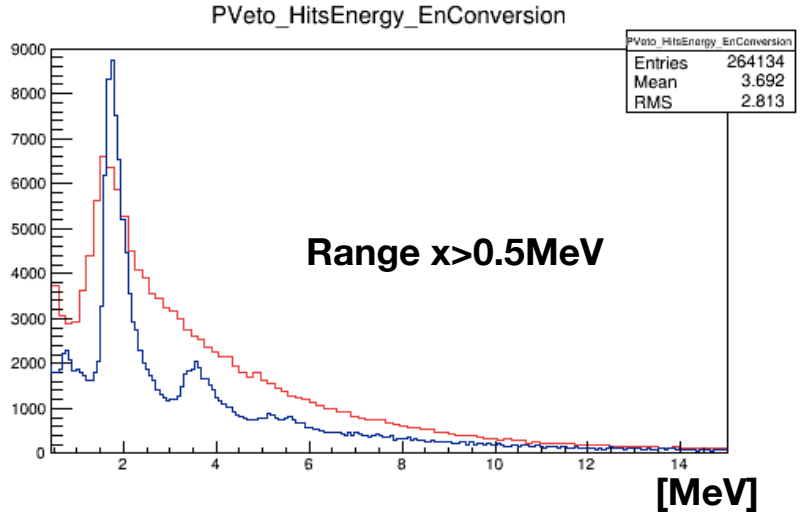
***sigma~1.2ns***

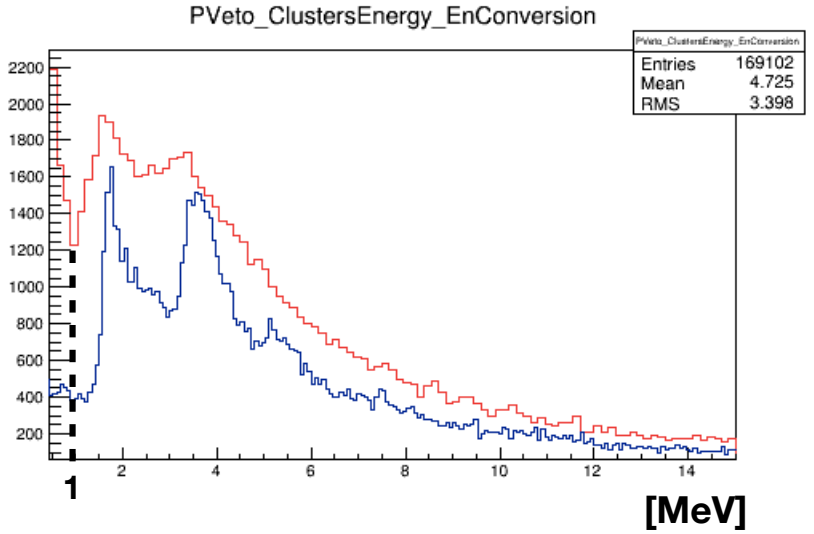
*DATA, thr Hit/Seed 2.5 mV  delta cluster time 2ns*

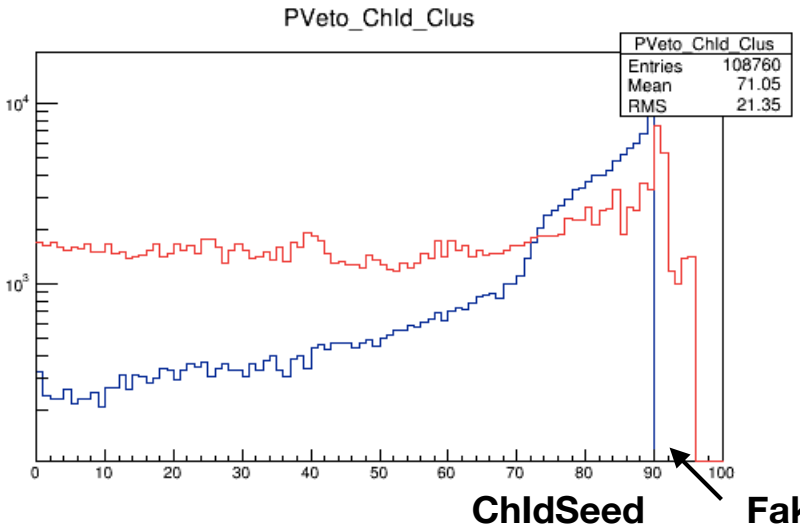
*MC digi 17 ns, thr Hit/Seed 0.1 MeV, delta cluster time 2ns*

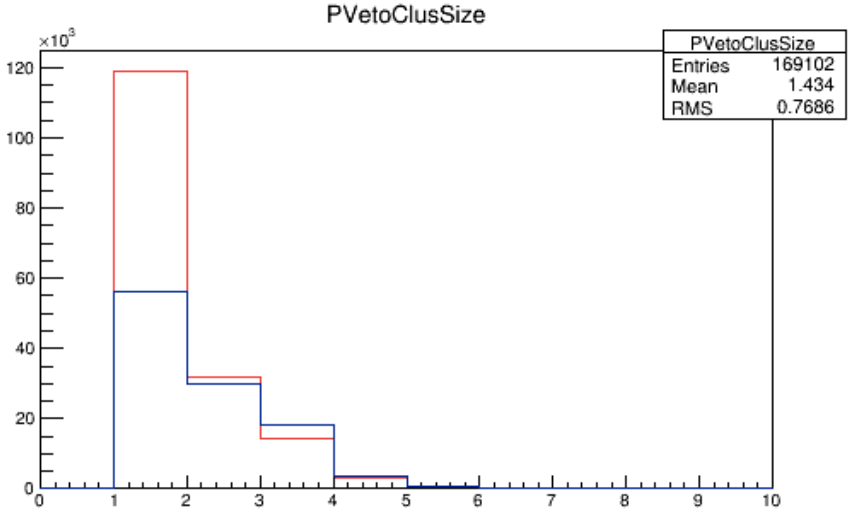
**1000 events**

*Amp Thr Low/High 2mV for Peak Search*

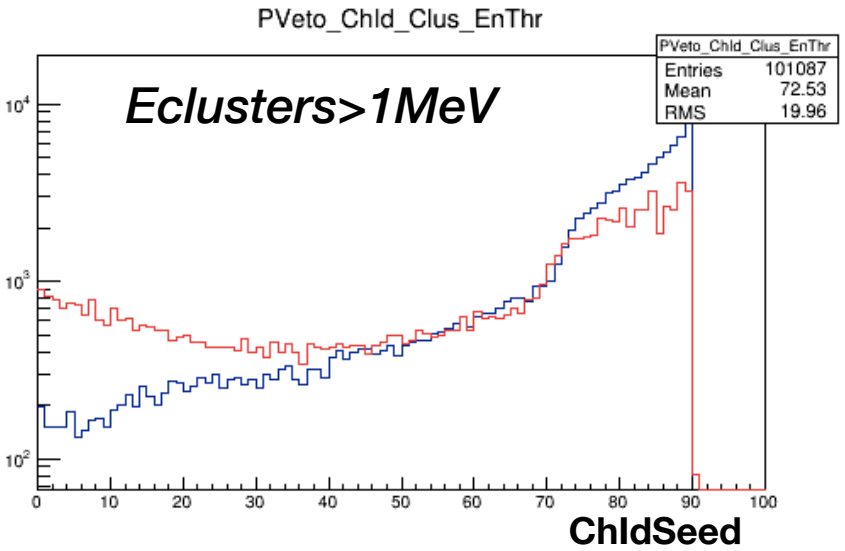


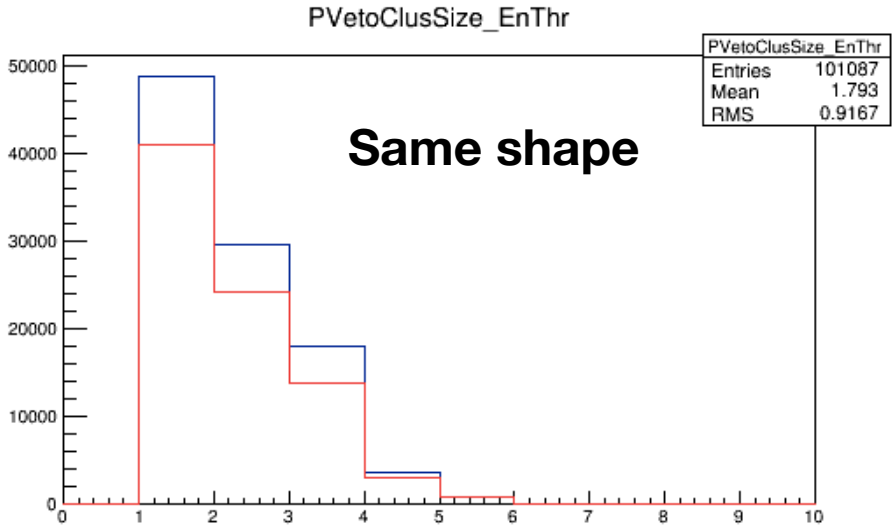



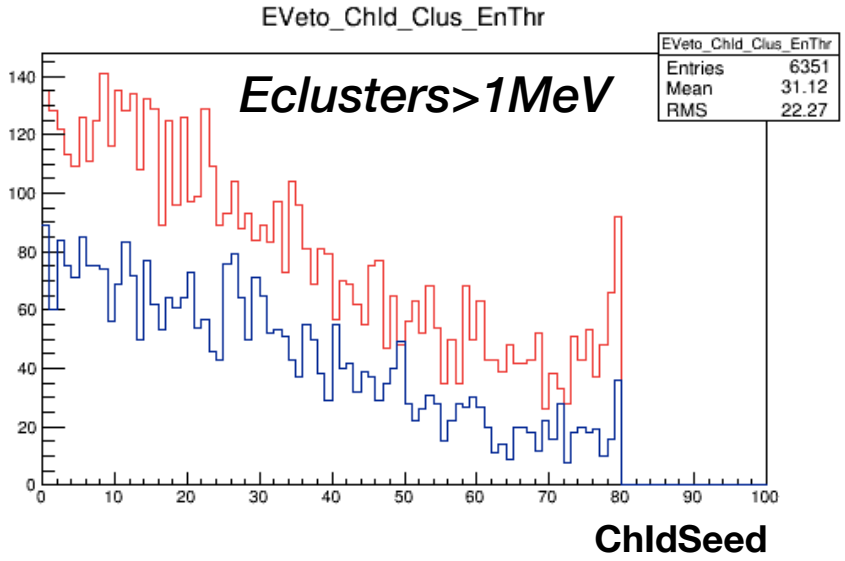



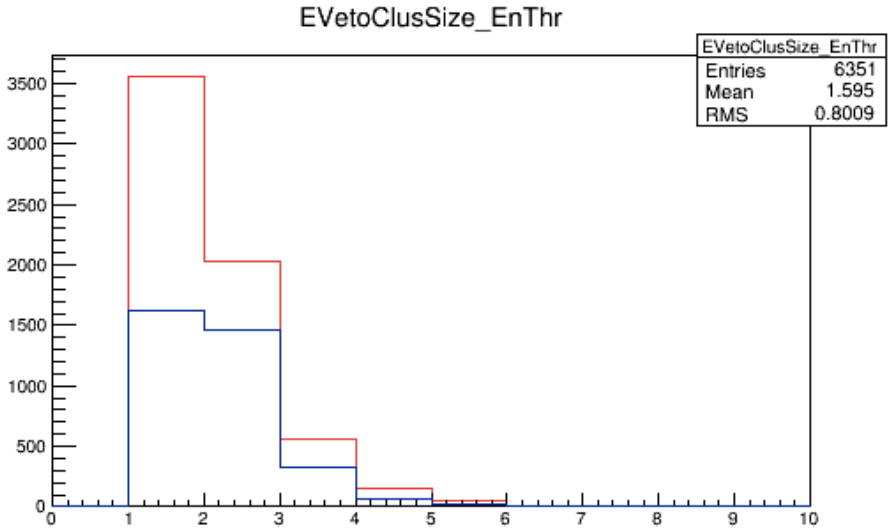




*Energy Thr has to be set* **E>1MeV**



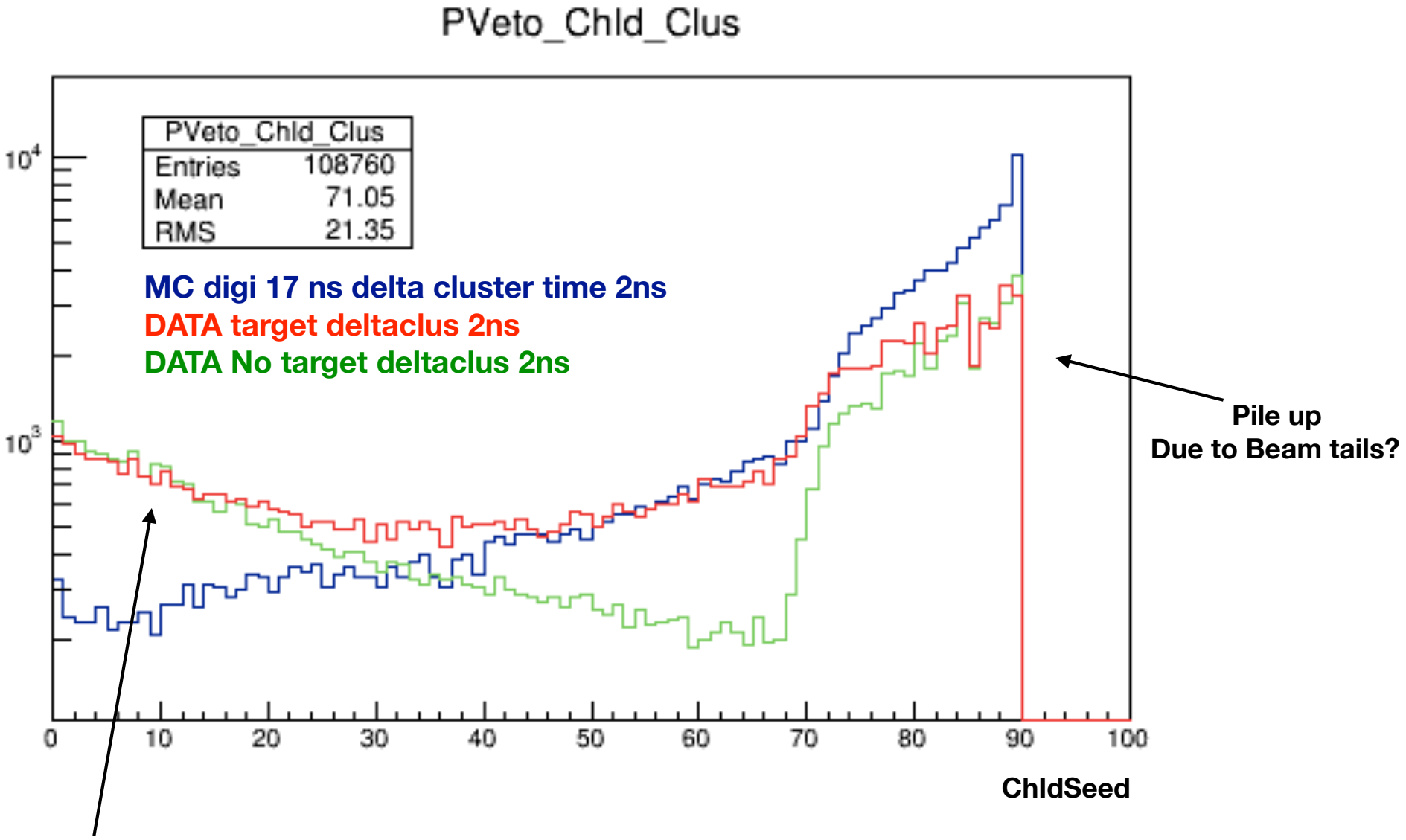



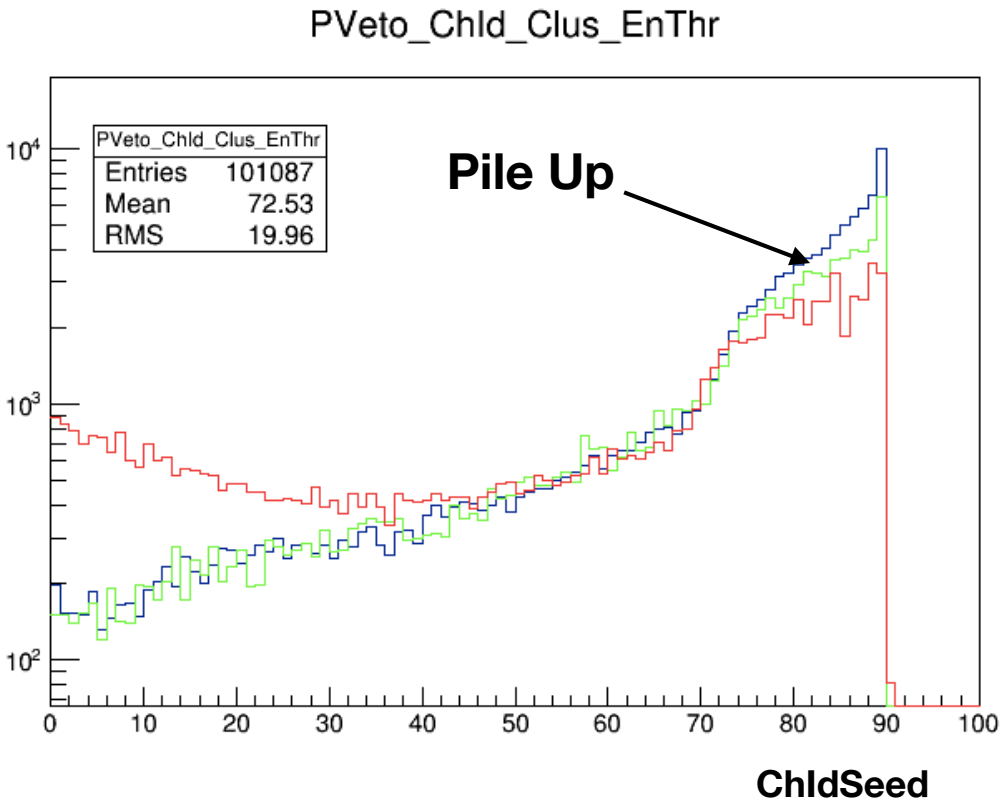




***To understand better the mismatch***

## *Develop Thrs for Reco Peak Search*



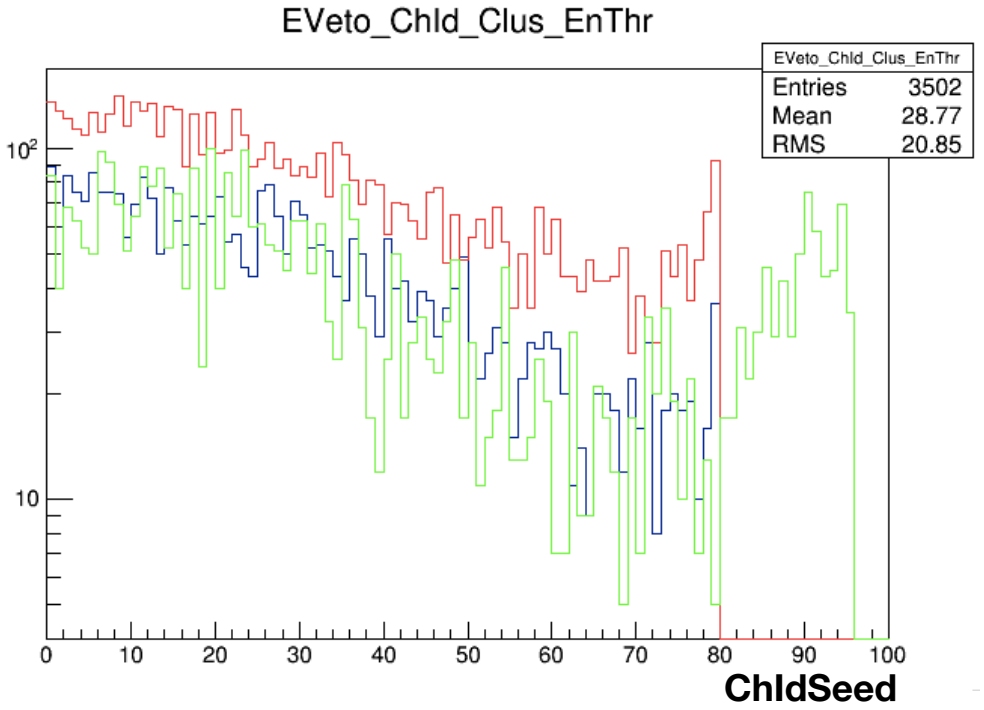
# *Comparison MC with the DATA bunch length (150 ns)*




**DATA**

**MC def Bunch length 250ns**

**MC Bunch length 150ns**



# *First Conclusions*

*The MC Digi Time Window is set at 17 ns, emulating the time integration of the Veto front-end response*

*After parameters tuning, July data showed an energy spectrum, a cluster size and an occupancy semi-qualitative similar to MC (in particular from ch 40 and 70)*

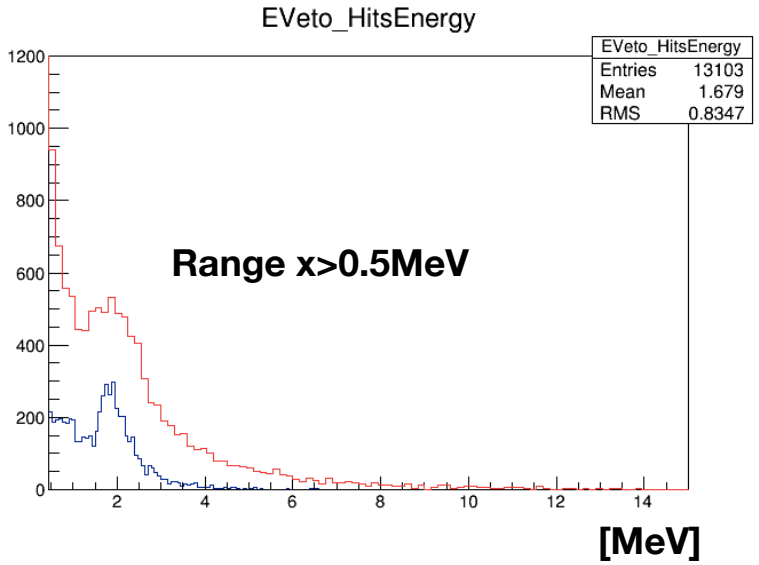
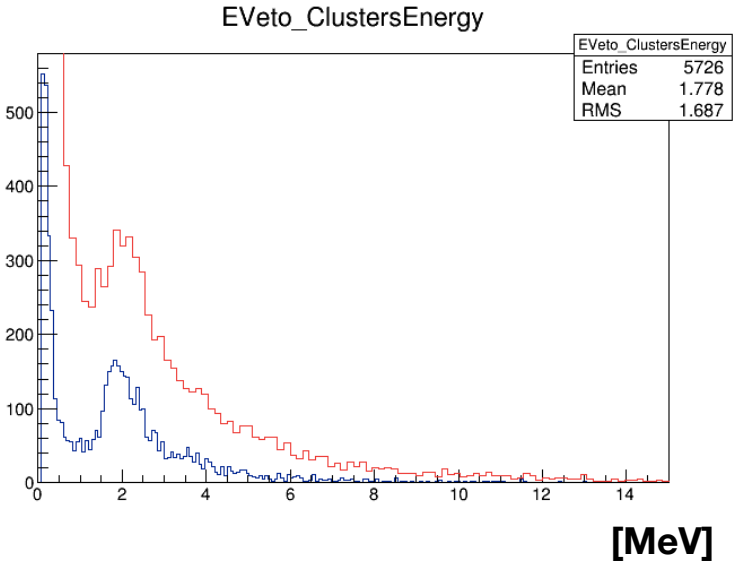
**Mismatch at low fingers (OccupancyDATA>OccupancyMC)** *To investigate better*

**and high fingers (OccupancyDATA<OccupancyMC)** *Beam tails?*

***To do:***

*study on thresholds for hit and seed*

***Tuning between MC and DATA is still underway.***

# *Backup slides*

# *Amp Thr Low/High 2mV for Peak Search*