

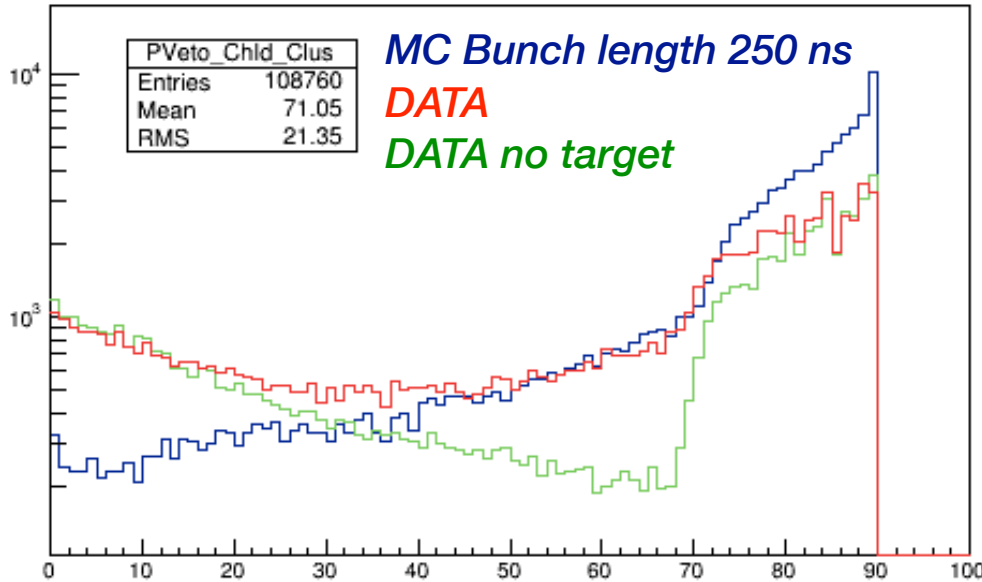


*Update on*

# Tuning MC and DATA for Veto

F. Oliva on behalf of the PADME Lecce group

PVeto\_Chld\_Clus



MC digi time window chosen 17 ns to emulate the time integration of the Veto front-end response

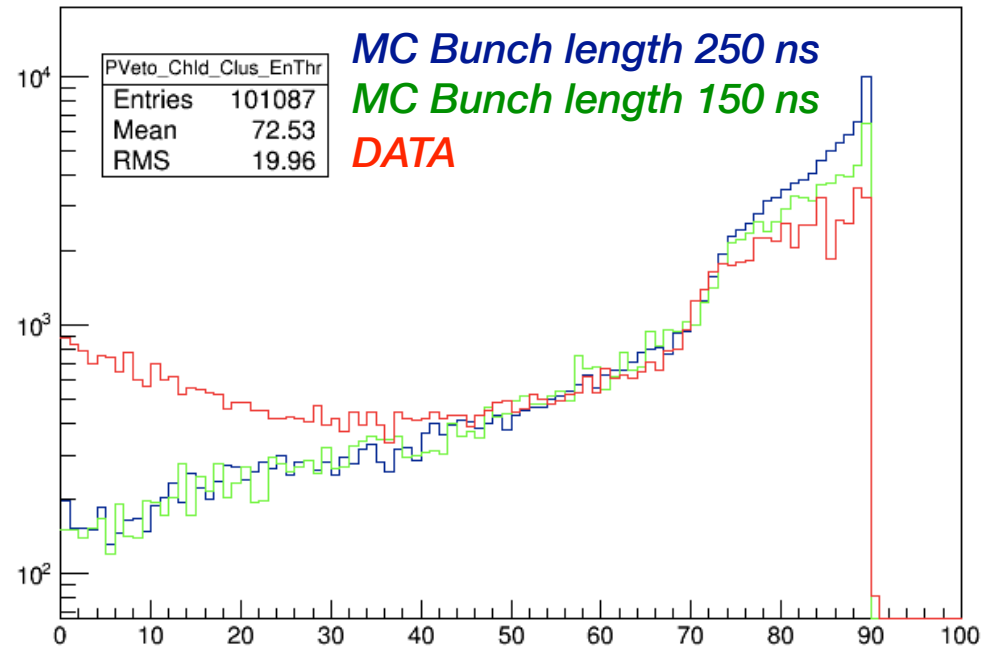
At low and high Chlds the rate with and without the target is the same for DATA

For **Chld >80** Pile up effect probably due to beam tails, Bremsstrahlung not visible

$\Delta t$  clusters = 2 ns

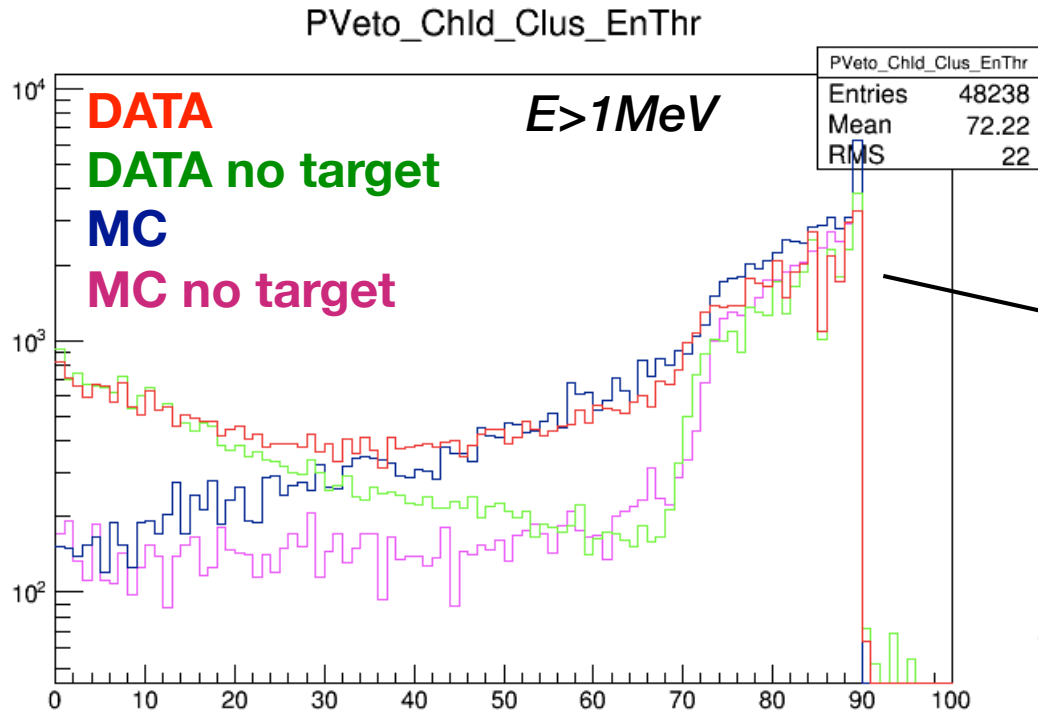
Agreement at high fingers is better for MC with bunch length at 150 ns

PVeto\_Chld\_Clus\_EnThr



# Comparison DATA MC with and without target

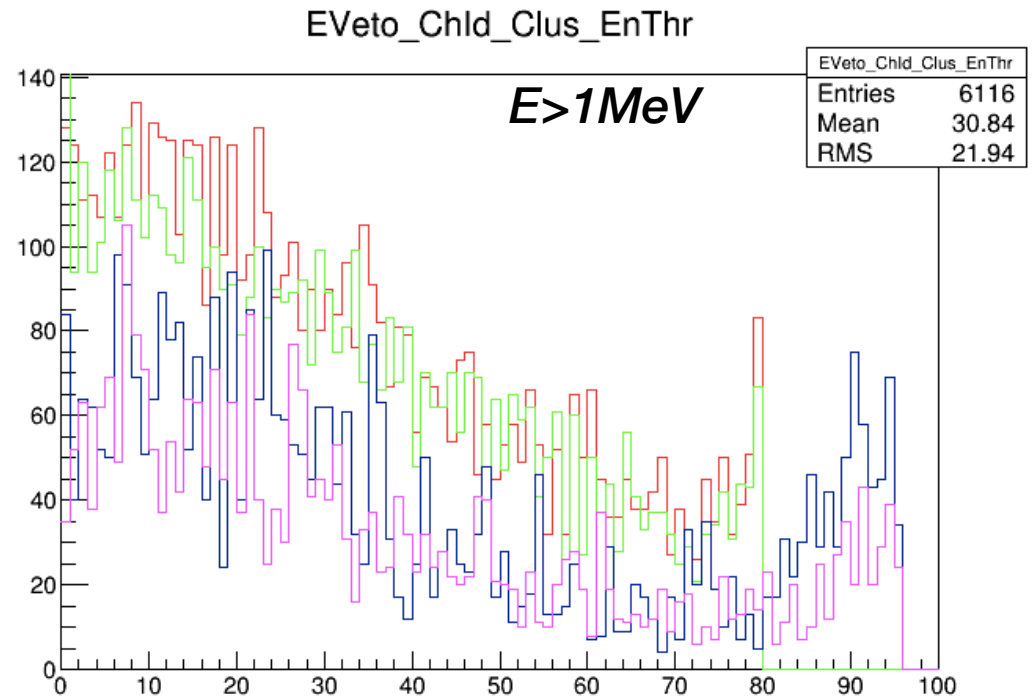
$\Delta t$  clusters = 4 ns      1000events



→  
Sigma of the gaussian fit of the difference between two hits of two adjacent Chld for DATA ~ 1.4 ns

A bit improvement at high Chlds but from ~Chld 80 not able to see Bremsstrahlung events in DATA

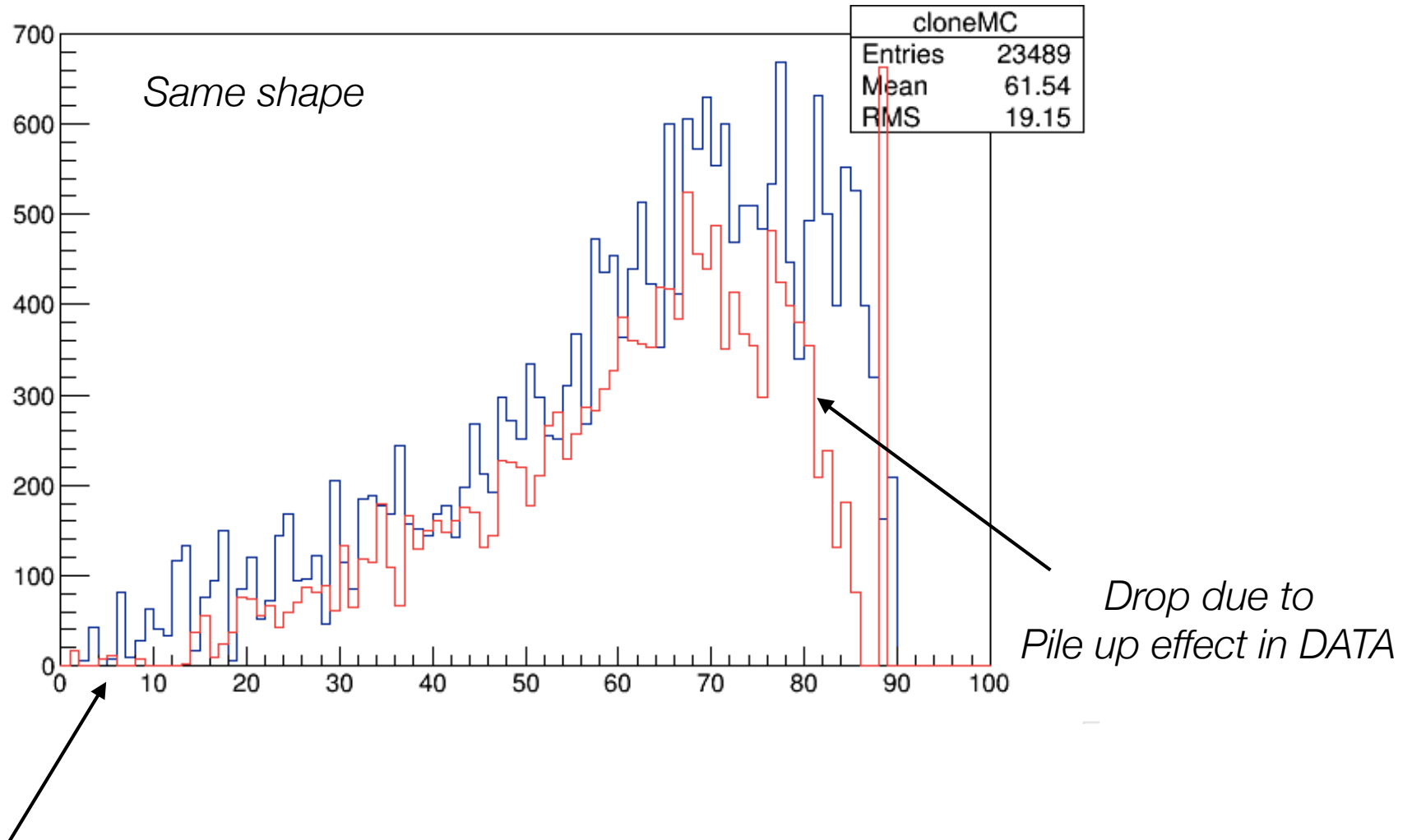
Still don't understand mismatch at low fingers for PVeto and higher rate in DATA EVeto occupancy



*Difference between DATA with/without target*  
*Difference between MC with/without target*

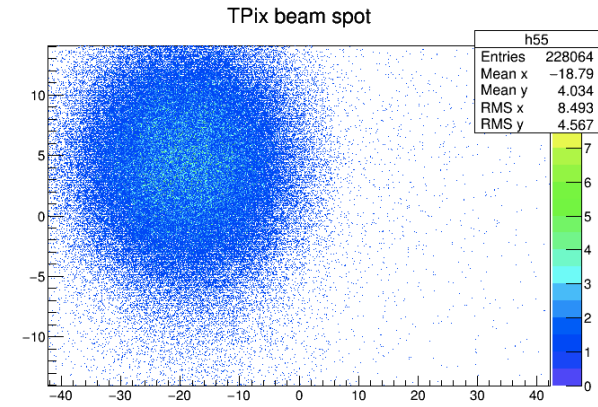
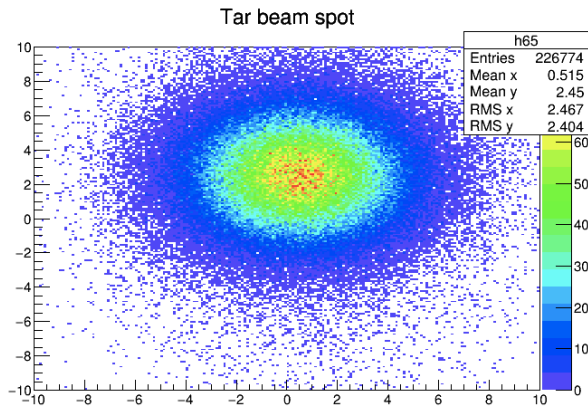
Trial

1000events

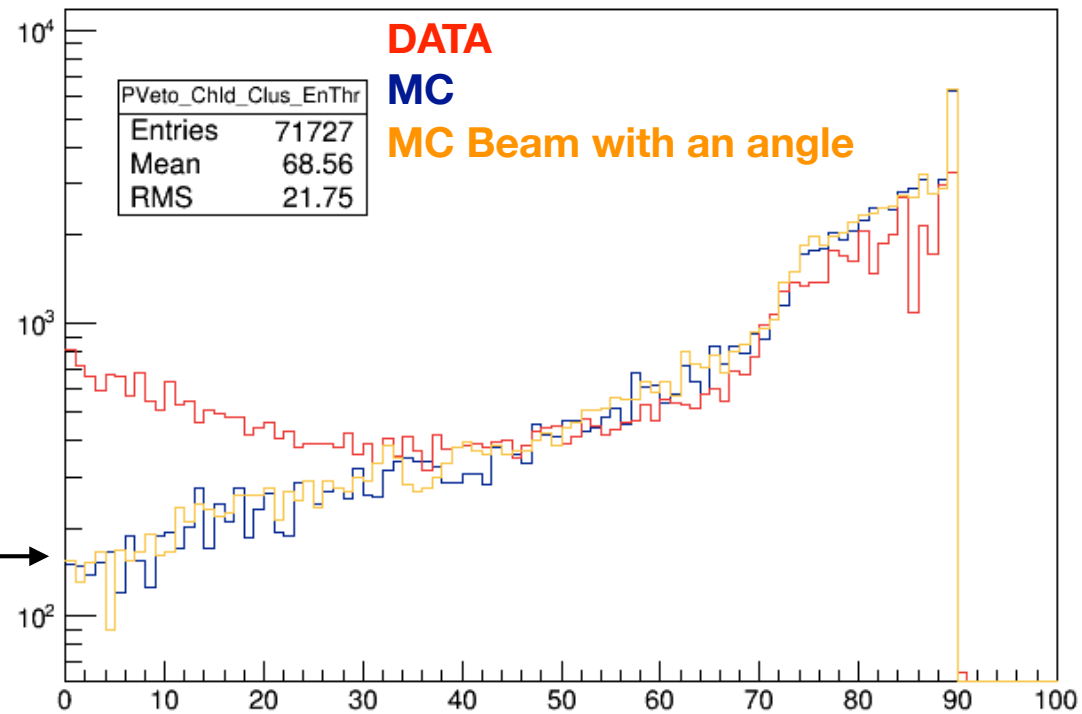


*Bremsstrahlung is visible at low ChlDs in MC*

# MC Beam with an angle to emulate the position of the beam in DATA



PVeto\_Chld\_Clus\_EnThr



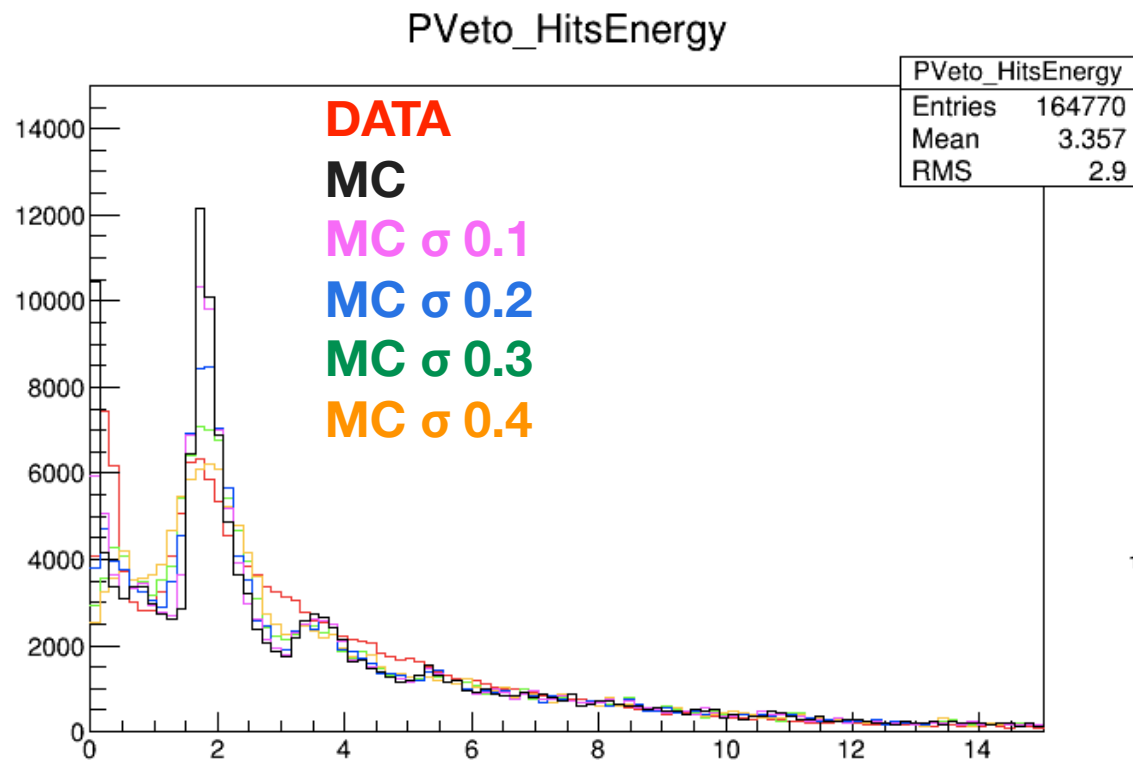
Don't solve the problem of the rate at low fingers



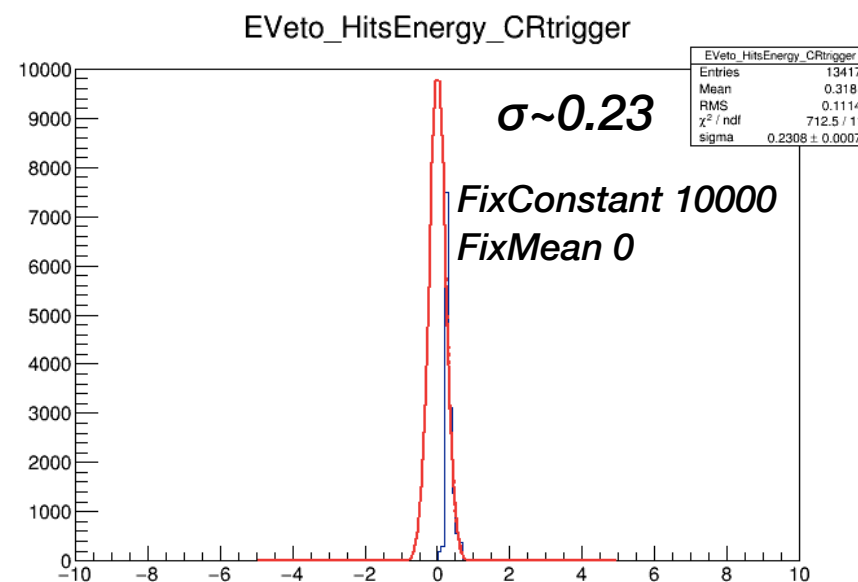
## Emulate electronic noise

Adding a gaussian smearing to hit energy for MC, emulating electronic noise in DATA

**Gaussian with Mean 0 and sigma set from time to time**

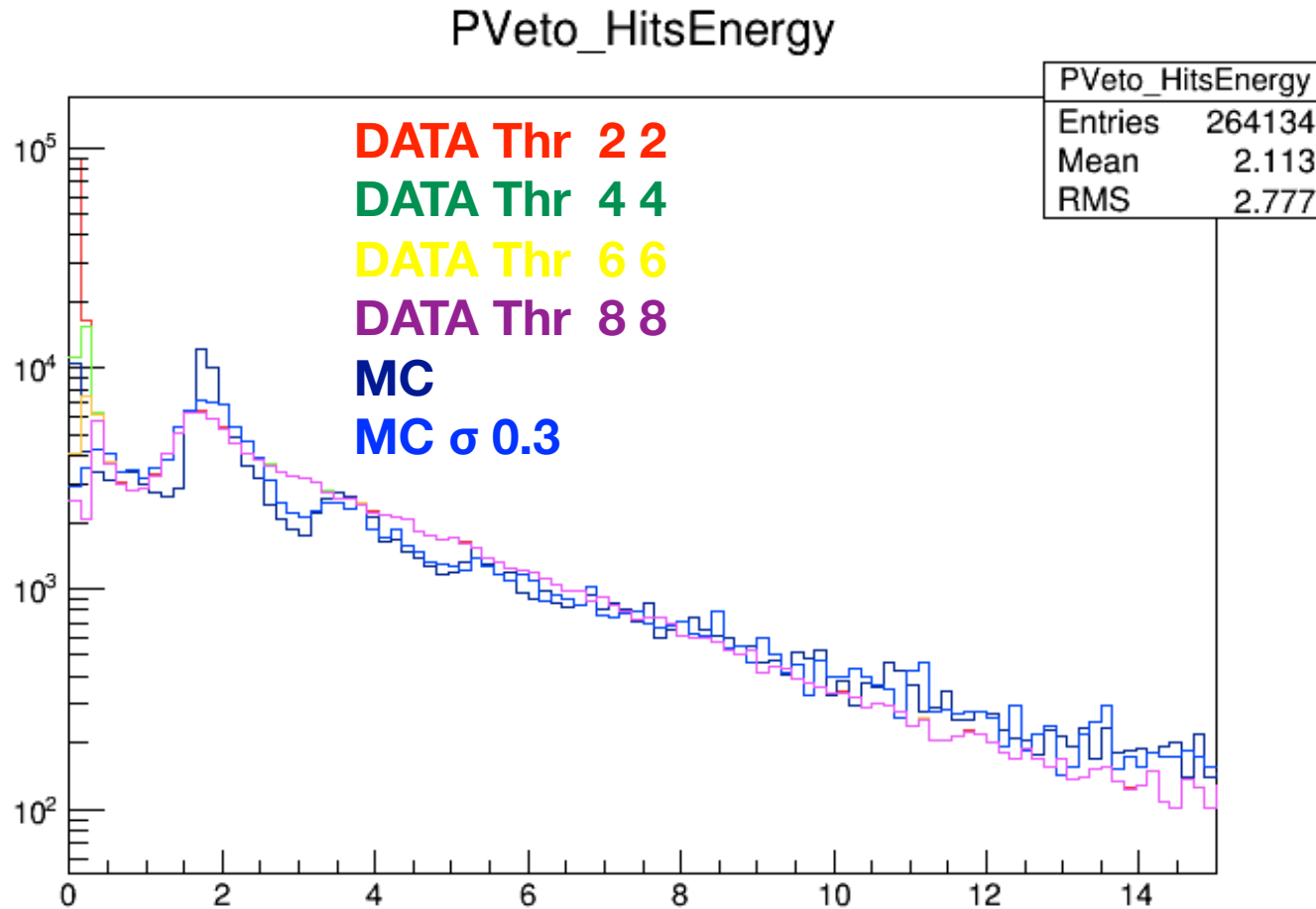


**First trial to obtain Noise value**



## Choice of the peak search threshold

The reco for DATA was performed with very low thresholds but it's too much time consuming.  
The choice was done considering MC and DATA PVeto hits spectra



***Thr chosen: 6mV/ 6 mV***

## Comparison DATA MC at high statistics

**DATA** Reference Run July 2019

**Thr for Peak Search**

**AmplitudeThrLow 6 mV**

**AmplitudeThrHigh 6 mV**

**MC** 23kPOT, 100kevents

- No Correction
- Correction Hit Energy with Noise 0.3 MeV
- Correction Hit Energy with Noise 0.4 MeV

### Comparison MC DATA at high statistics

**Reco for both MC and DATA**

**Clusterization**

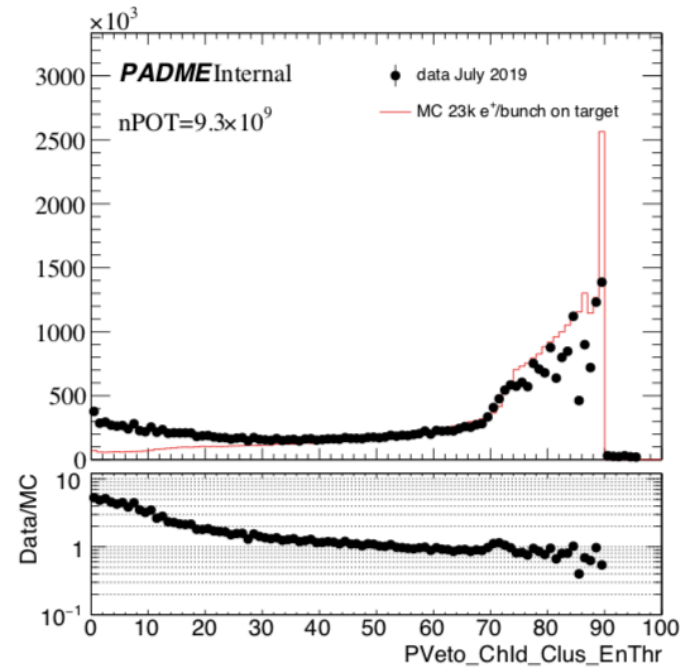
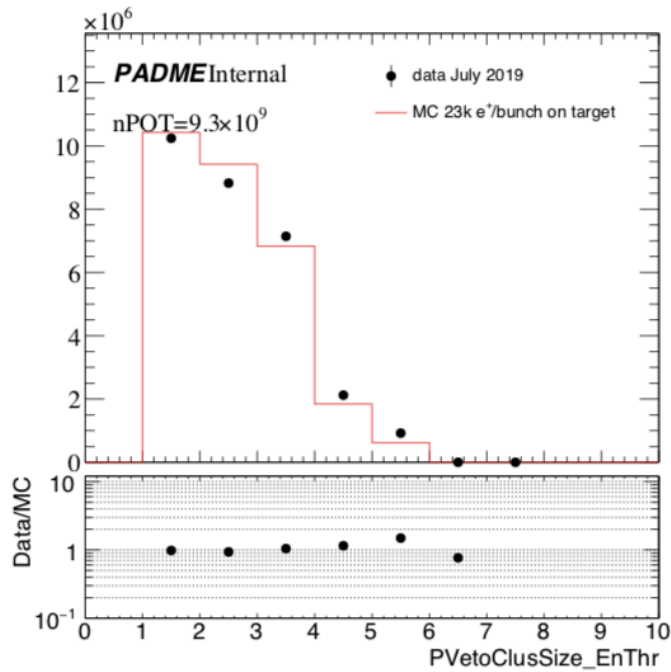
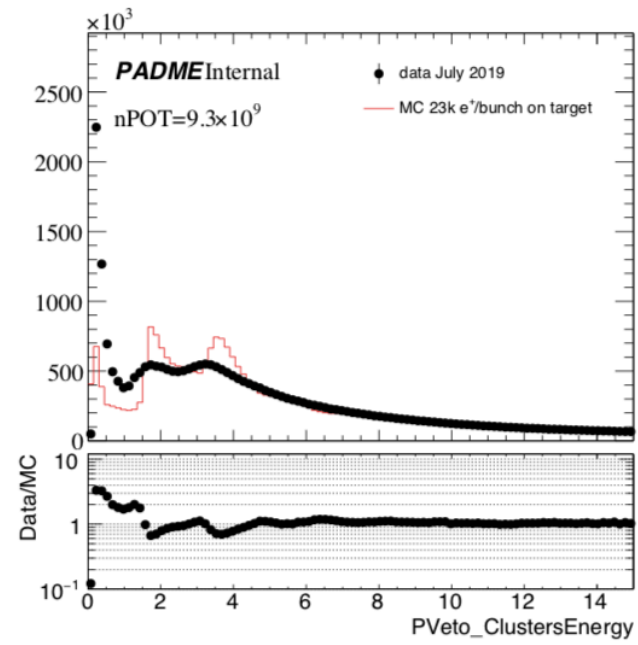
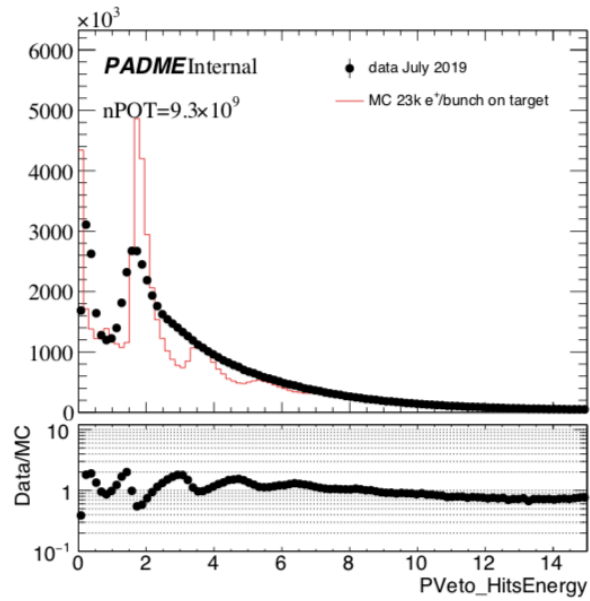
**$\Delta t$  for cluster 4ns**

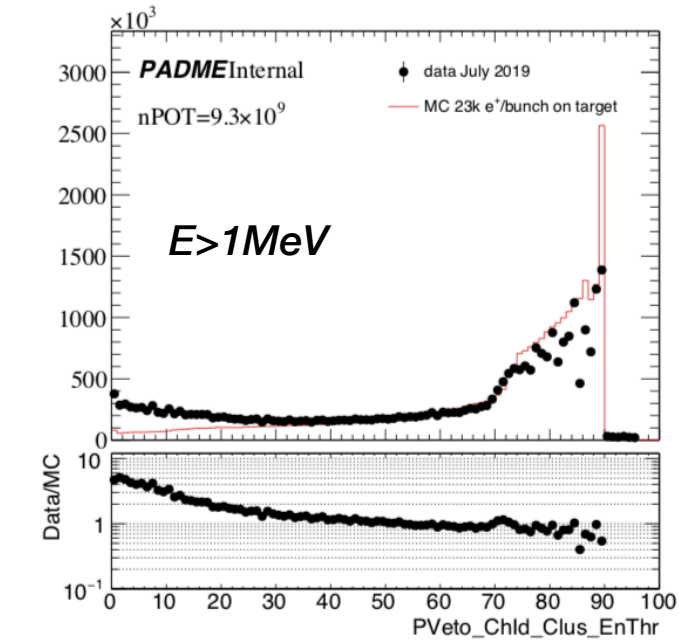
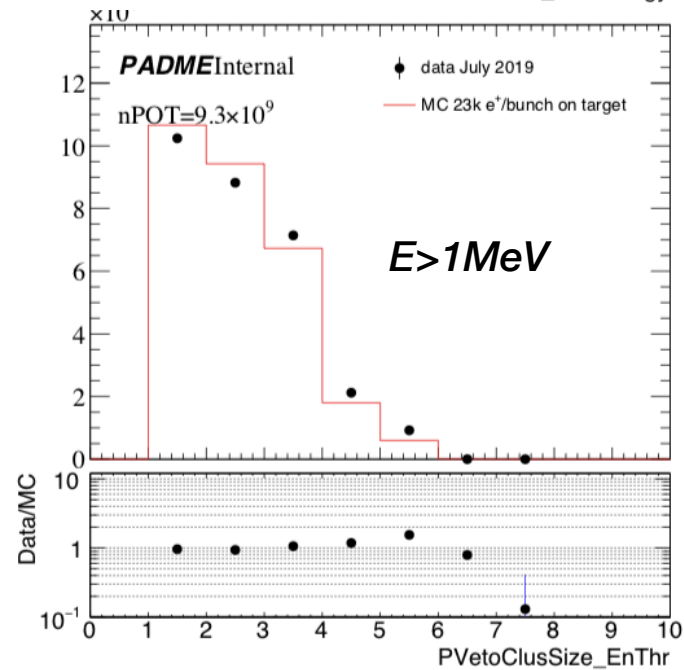
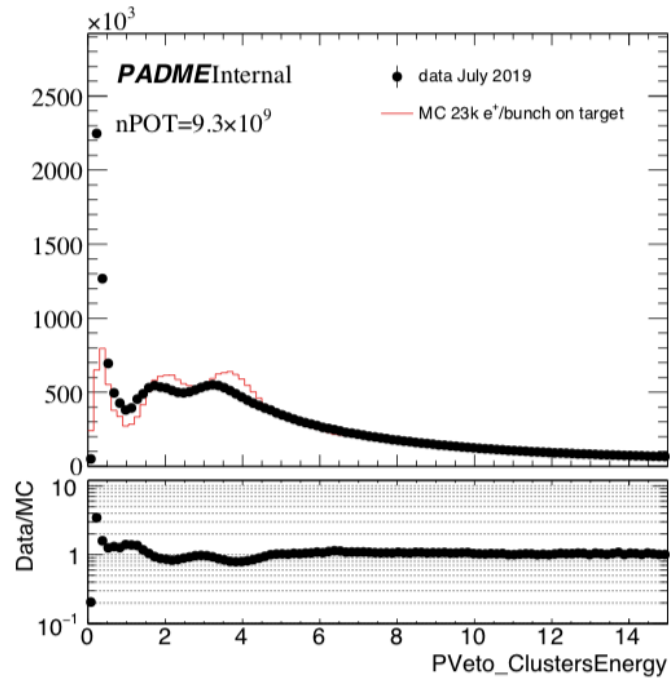
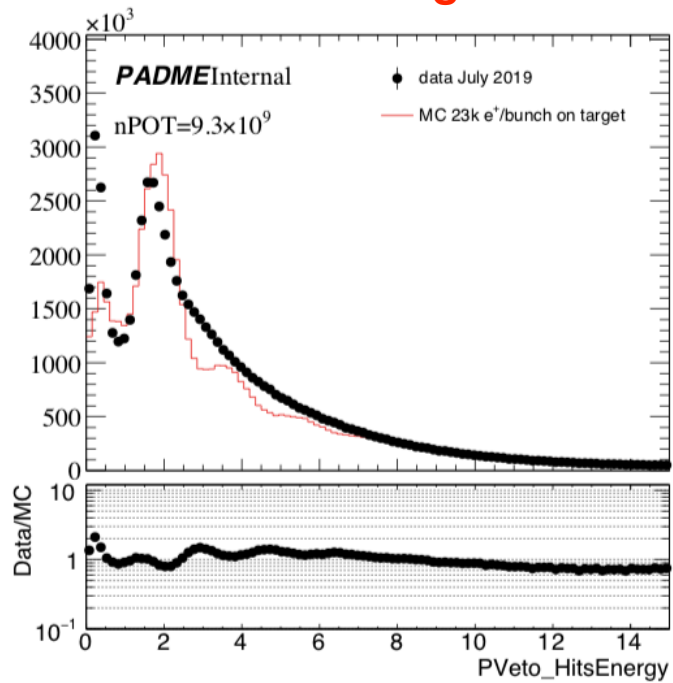
**Thr Hit/Seed 0.1/0.1 MeV**

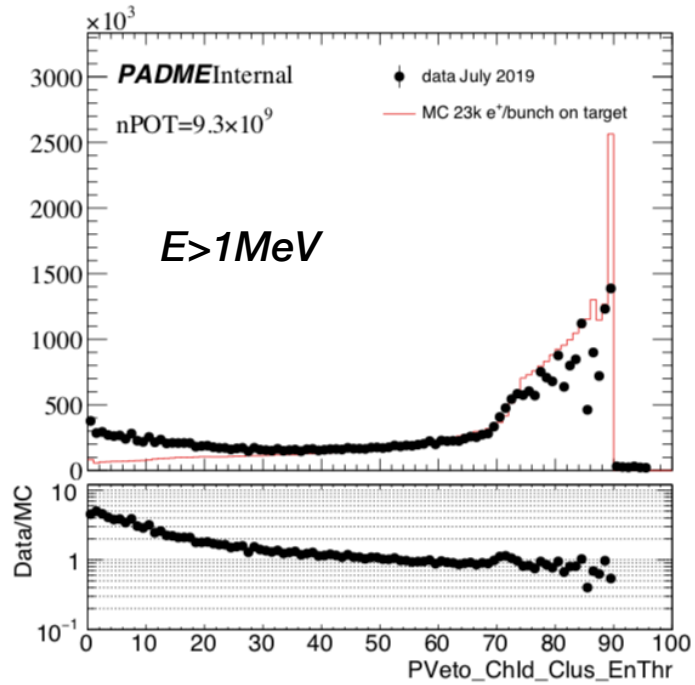
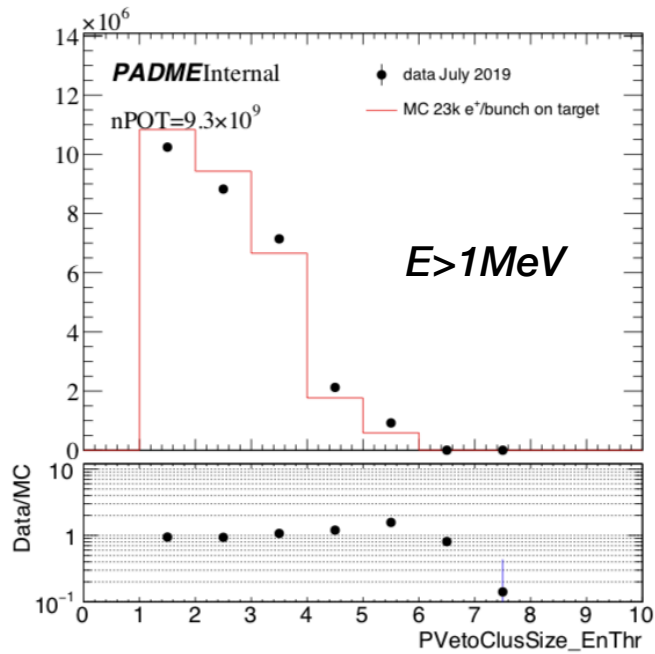
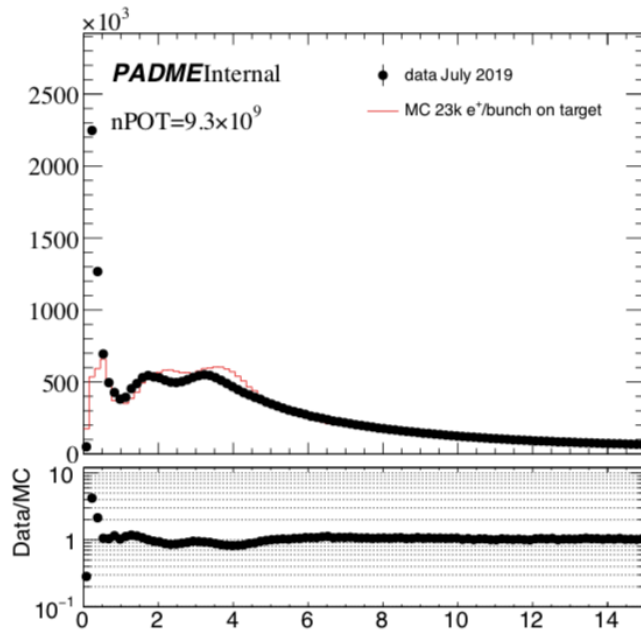
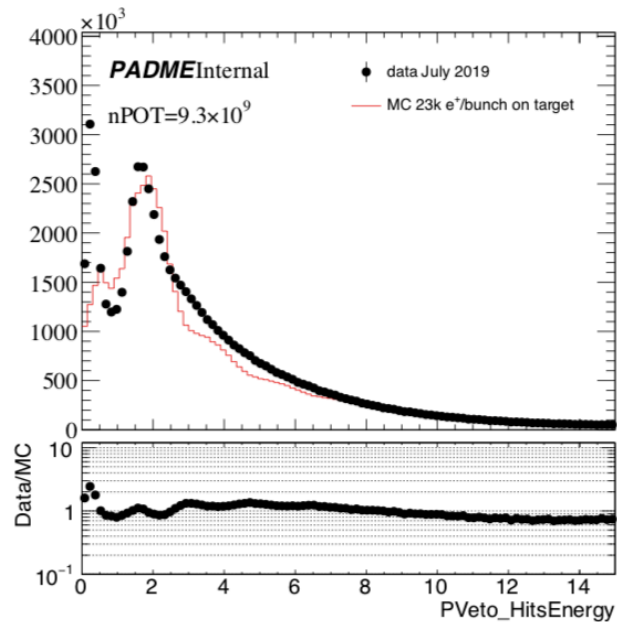
|               |          |
|---------------|----------|
| POT DATA      | 9.3e+09  |
| POT MC        | 1.99e+09 |
| POT MC scaled | 2.25e+09 |

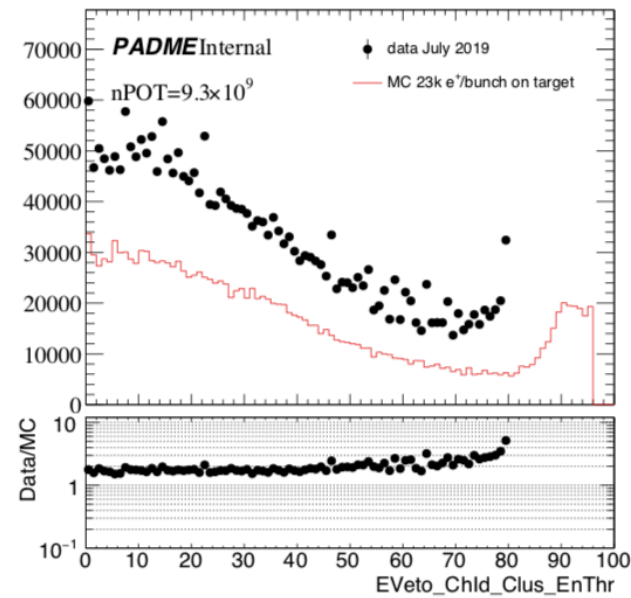
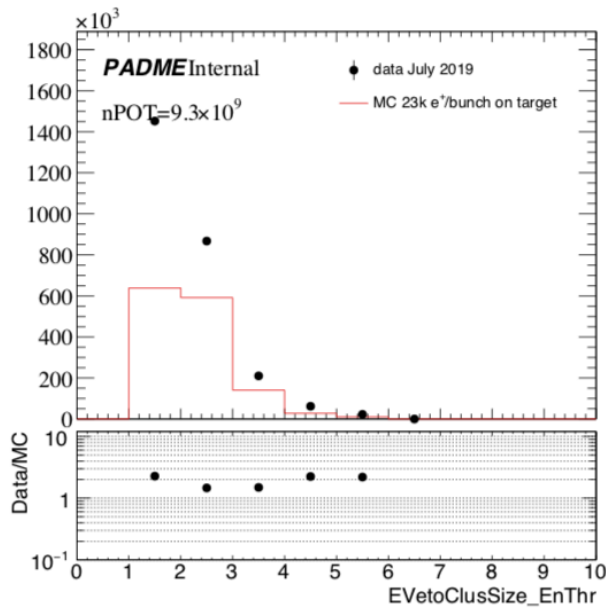
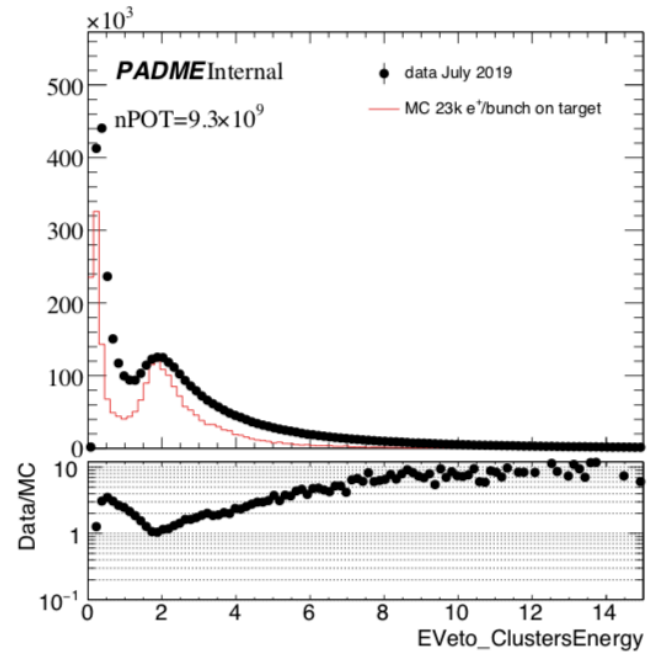
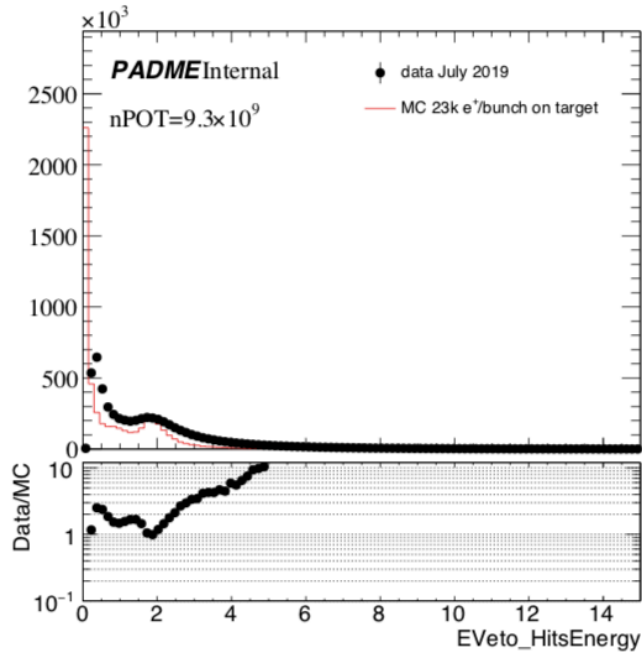


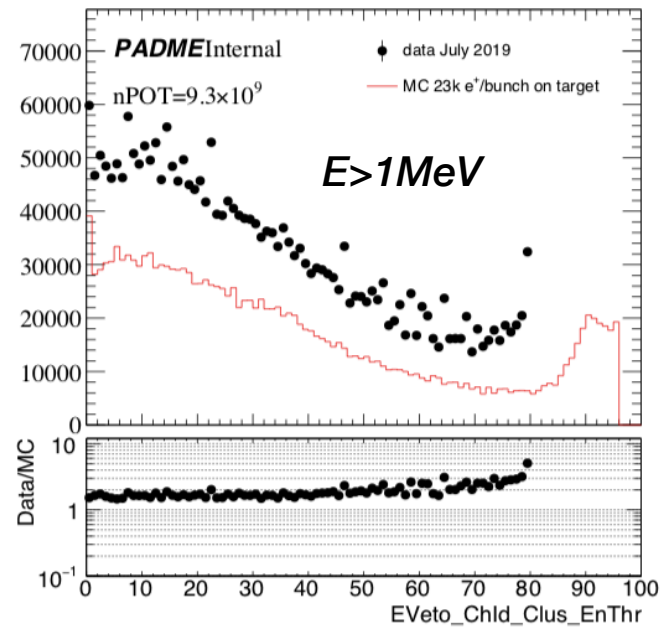
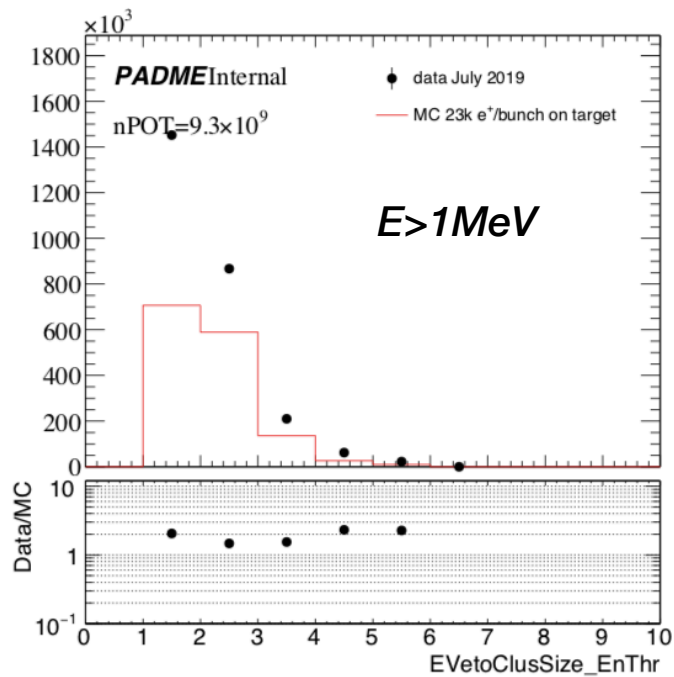
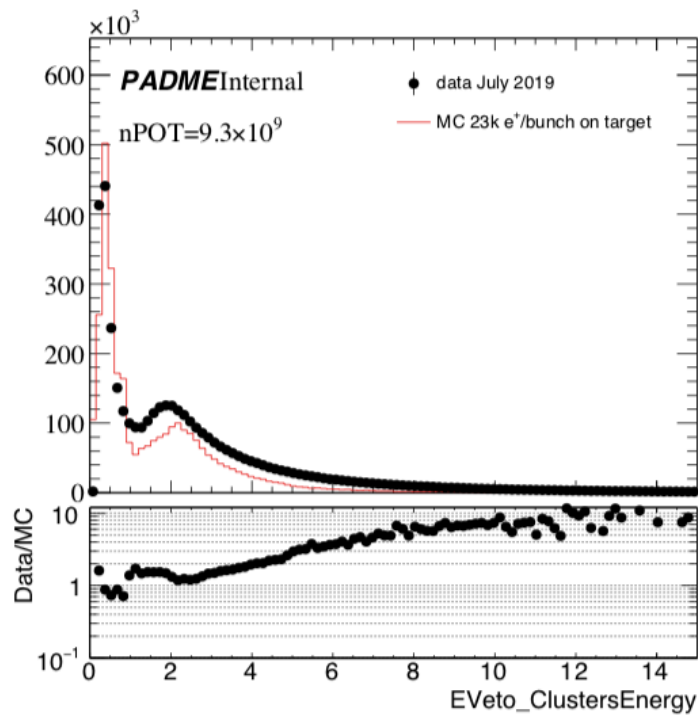
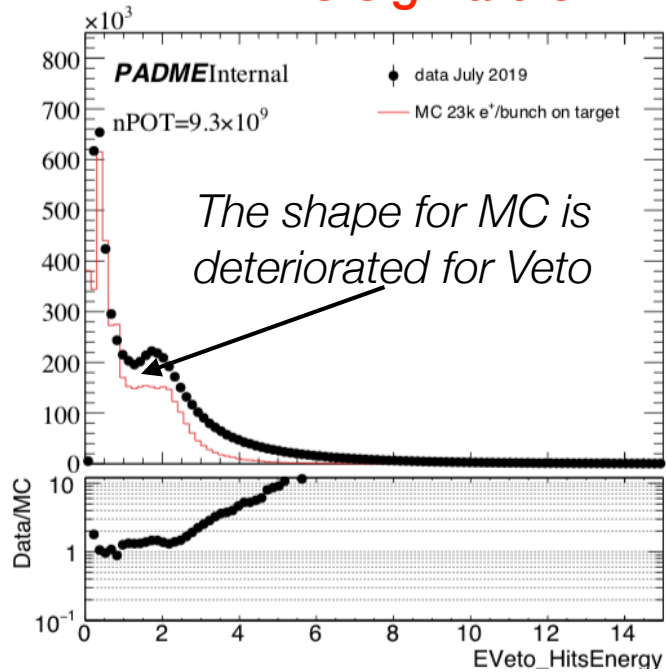
# PVeto DATA MC

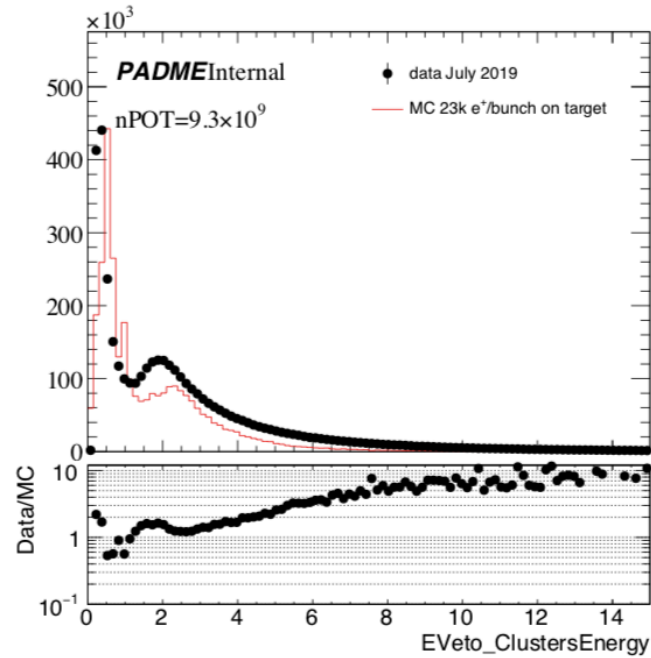
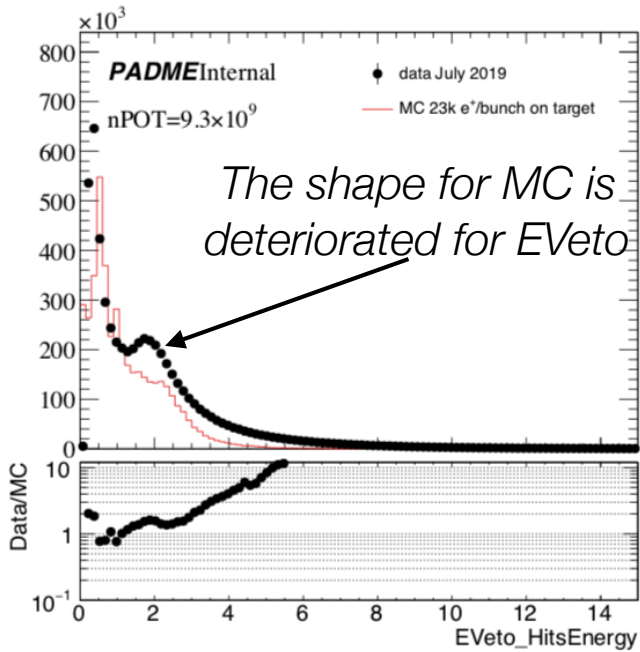




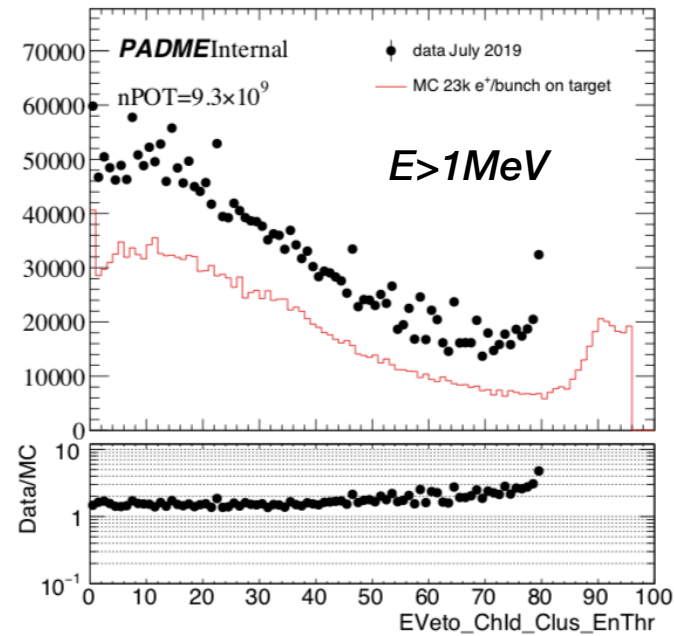
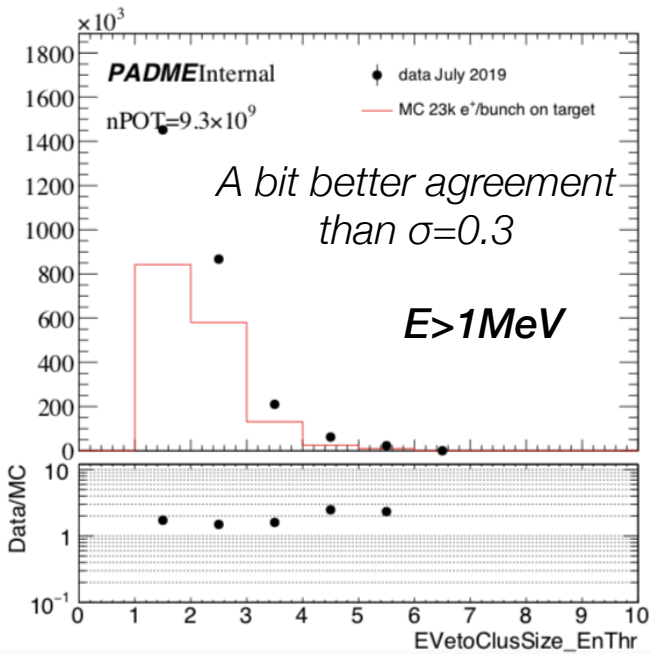




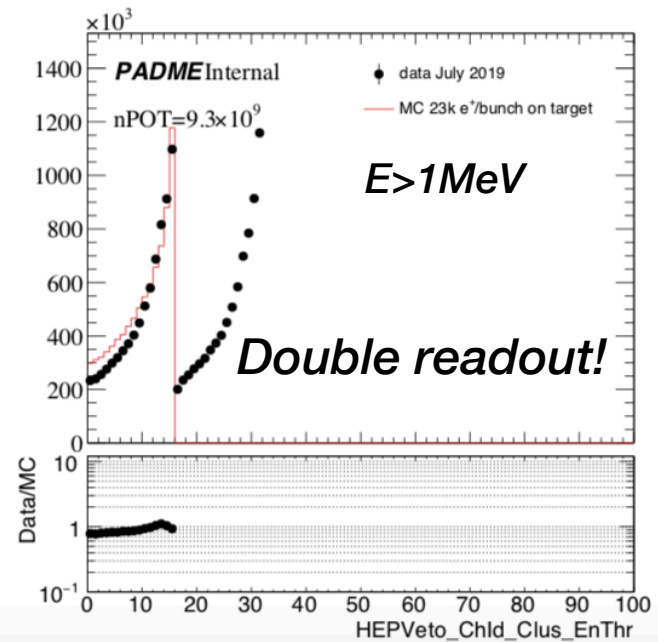
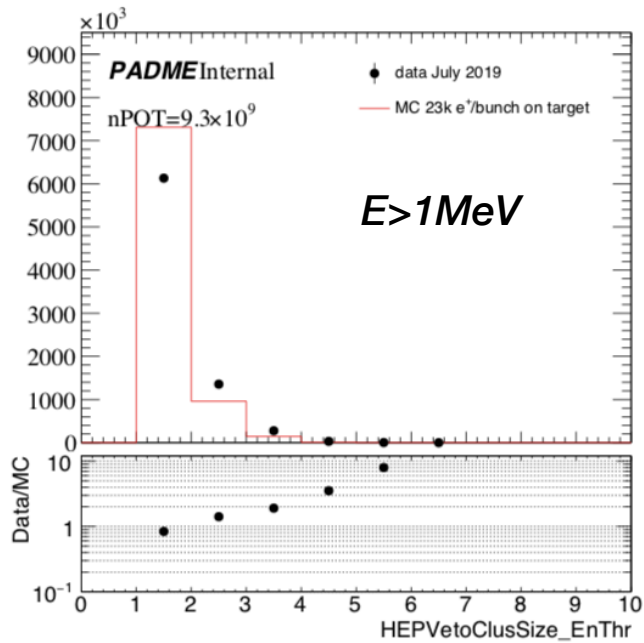
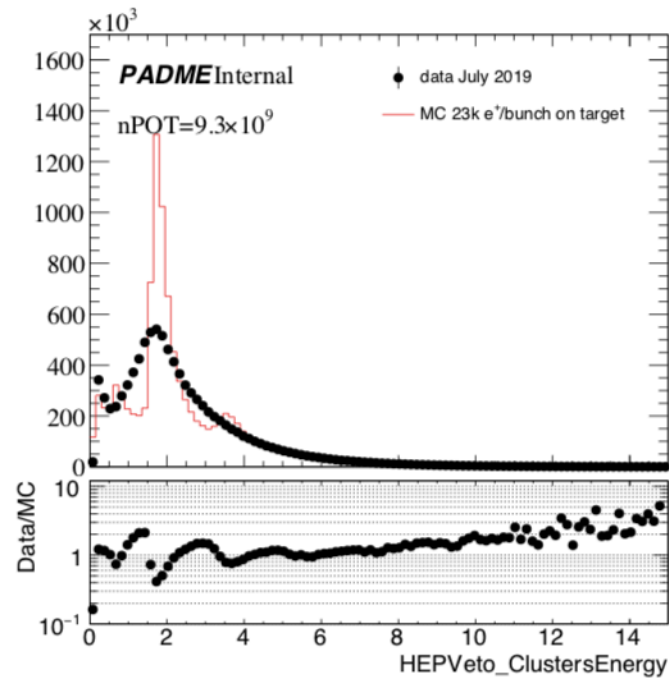
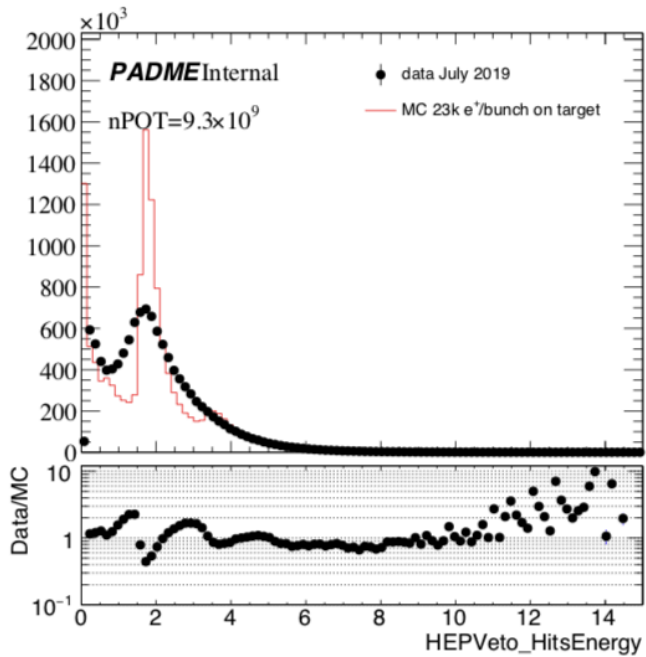


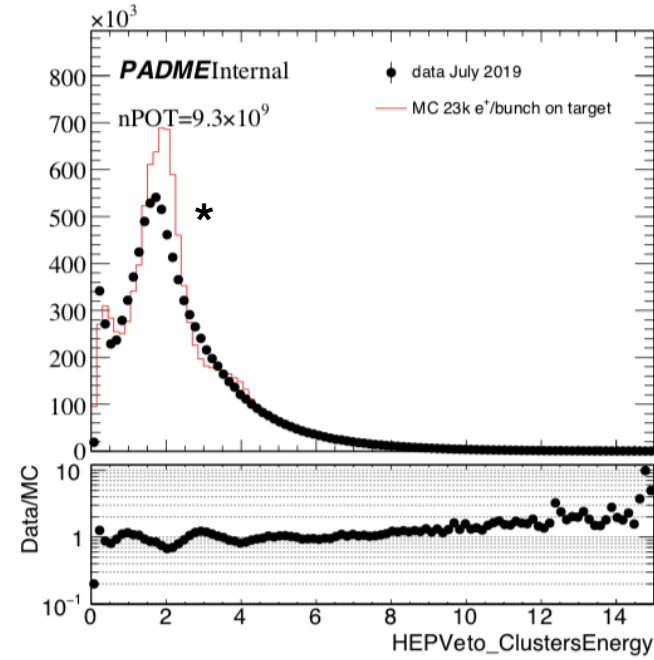
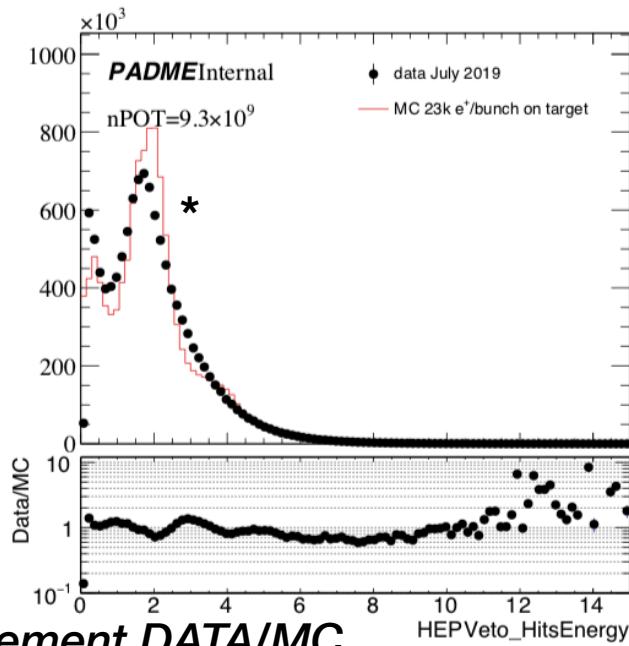


useful to emulate Noise for Eveto?

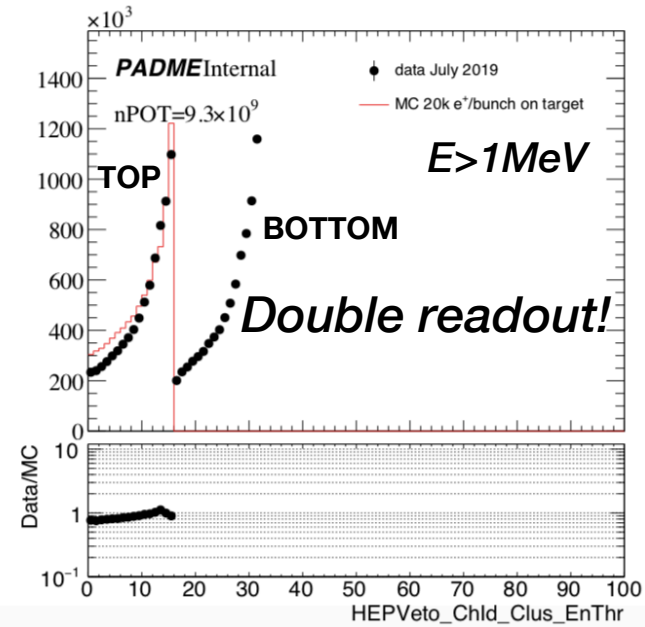
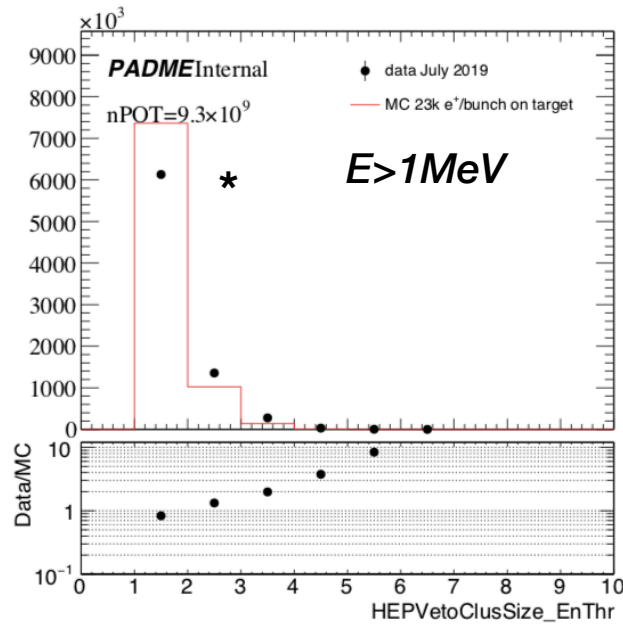




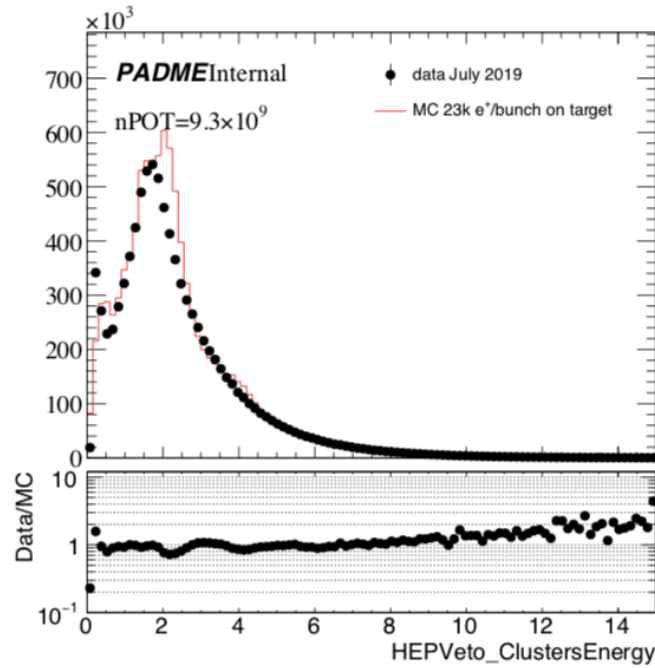
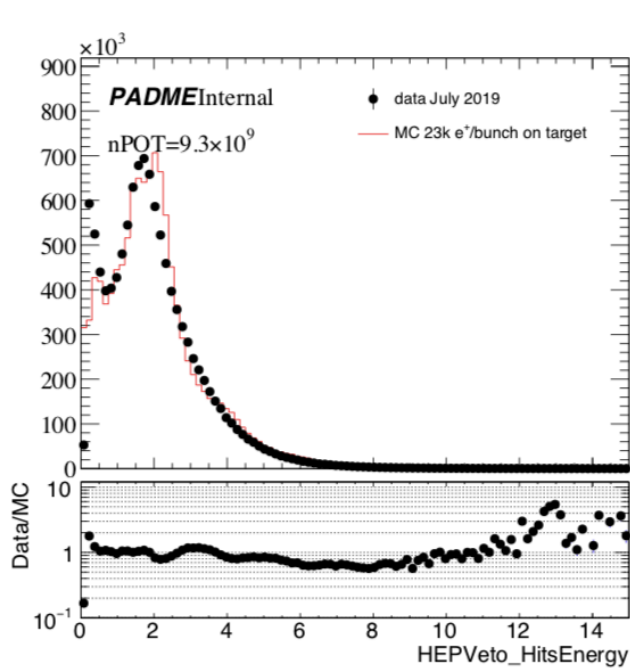




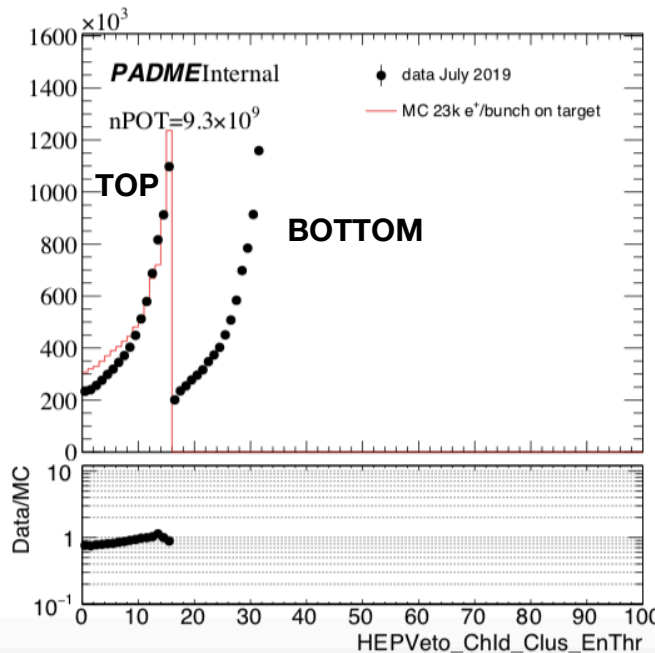
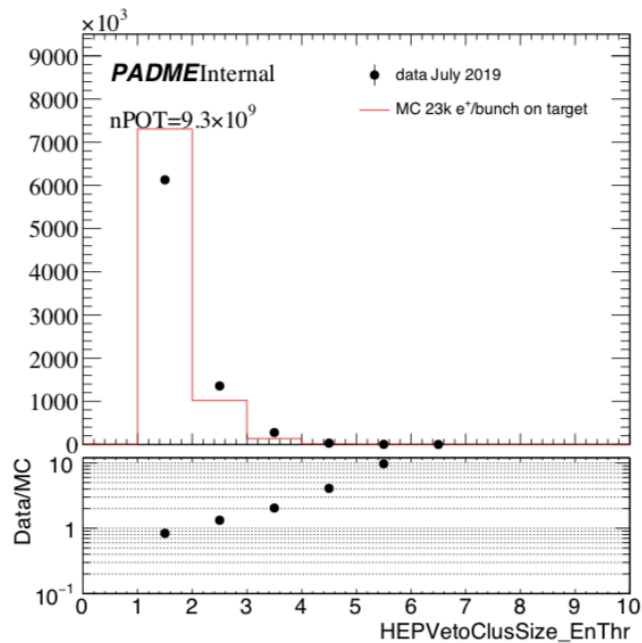
Good agreement DATA/MC







Good agreement DATA/MC

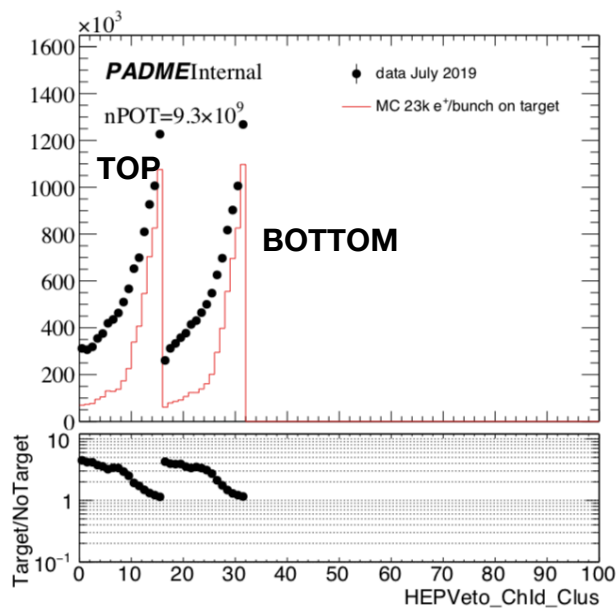
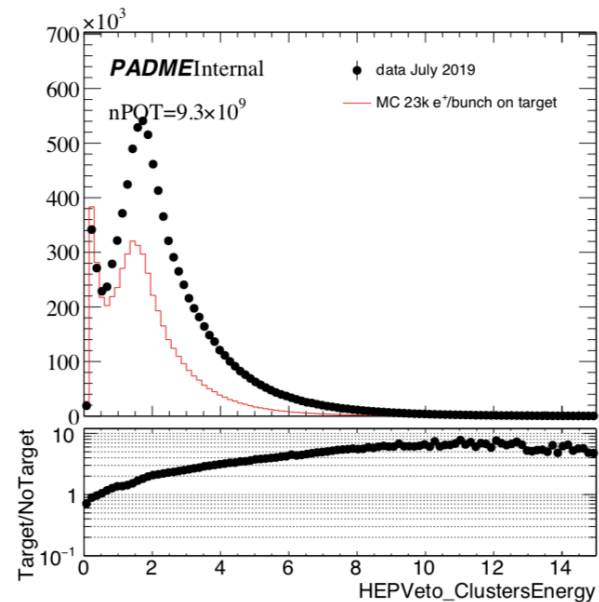
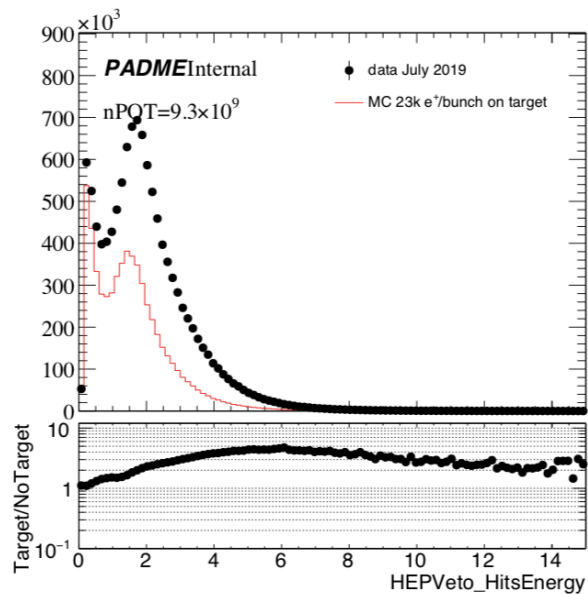


Pile up doesn't affect HEP veto fingers

Is HEP Veto useful to see Bremsstrahlung, recovering last PVeto fingers?

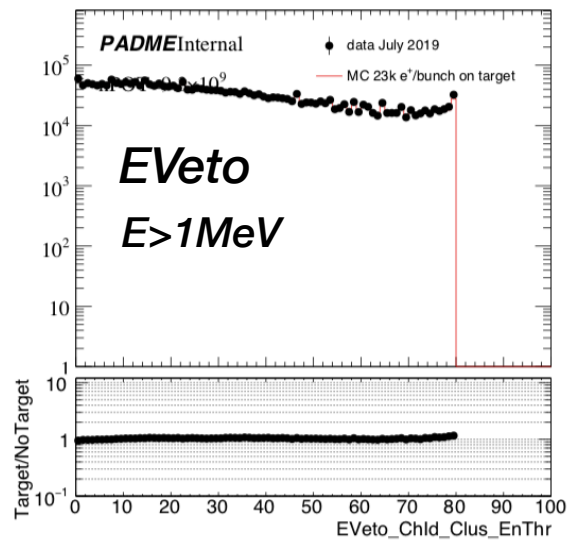
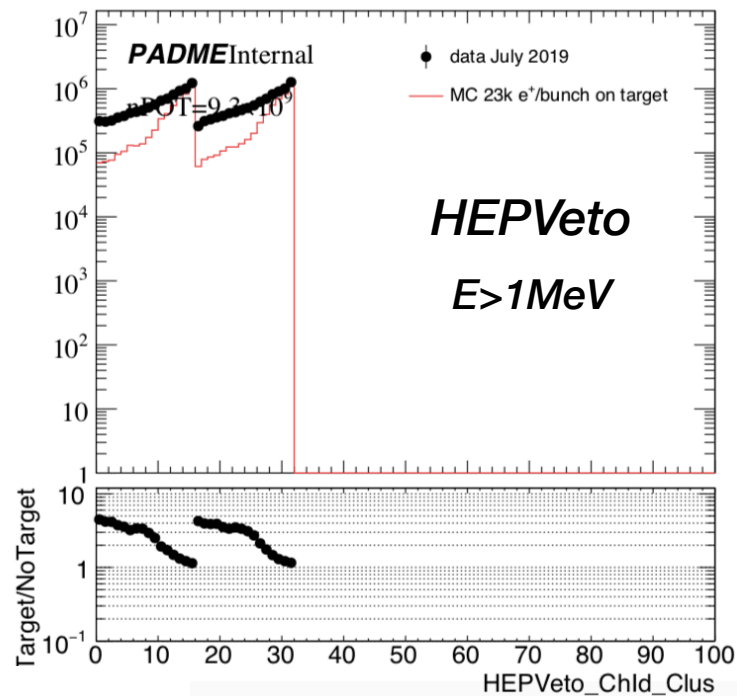
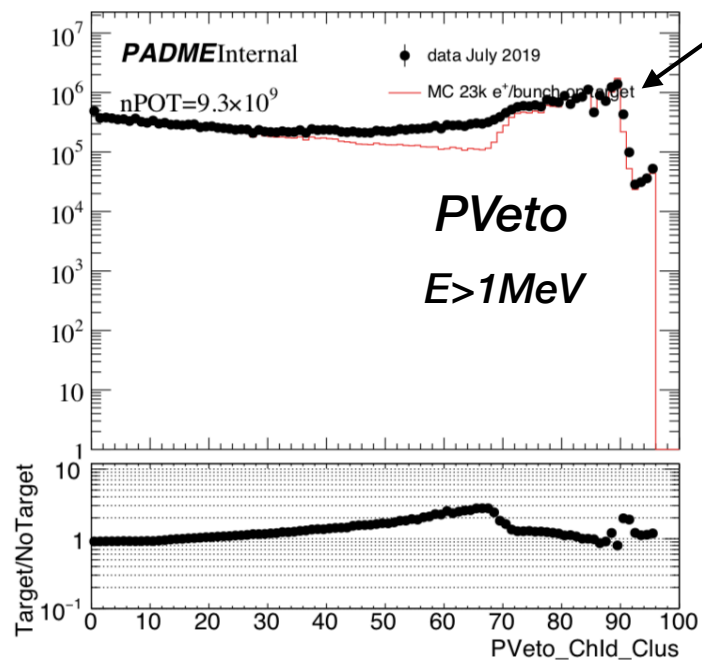
Check without target done

# HEP Veto



*Not the same rate  
 Target/NoTarget as PVeto!  
 HEP fingers could recover the  
 Bremsstrahlung at high PVeto  
 fingers*

Same rate at high fingers



## Conclusions

*Emulating electronic noise improve the agreement between MC/DATA hits and clusters spectra and a bit the cluster size*

*Run with and without target still show the same rate at low and high fingers where the rate of Bremsstrahlung is not visible*

*The **high PVeto Chlds** flooded with pile up due probably to beam tail could be recovered thanks to HEP Veto which cover the same positron energy region but is not affected by pile up*

*The mismatch between MC and DATA at **low Chlds** is still a case of study, probably due to a beam halo or something of the chamber not simulate in MC?*