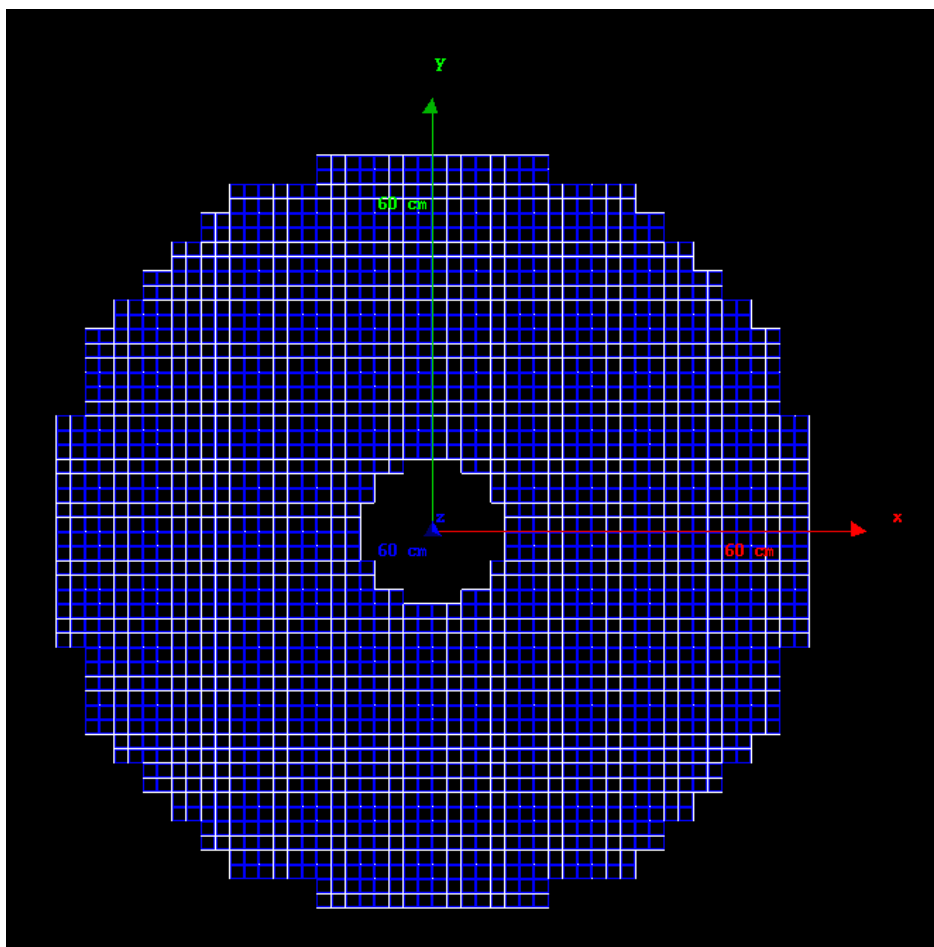




Electron End Cap EMCalorimeter progress

Carlos Munoz Camacho Wang, Pu-Kai 13/07/2021

EEMC configuration

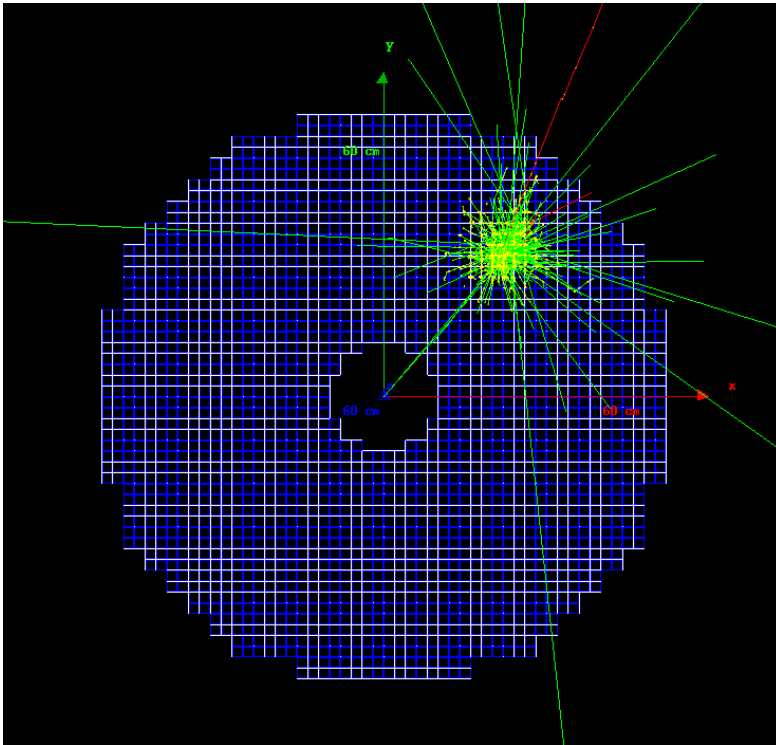


	Inner
Scin material	lead tungsten
Dimension[cm]	1.8 x 1.8 x 20
pe per GeV	15000
tower shell[cm]	0.1
Inner R[cm]	10
Outer R[cm]	53
eta range	-3.64 ~ -1.99
z range[cm]	-190 ~ -210
N towers	2112

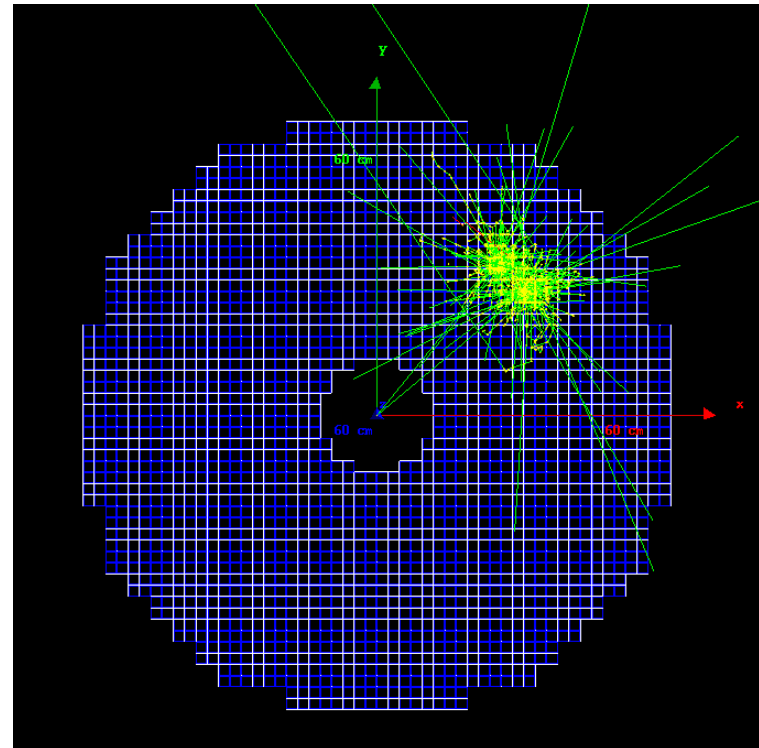
Close events separation

- $\pi^0 \rightarrow \gamma + \gamma$ (Br: 0.988)
- run pure photons pairs to study the separation ability

```
/particle/select pi0  
/particle/property/decay/dump 1  
G4DecayTable: pi0  
0: BR: 0.988 [Phase Space] : gamma gamma  
1: BR: 0.012 [Dalitz Decay] : gamma e- e+
```

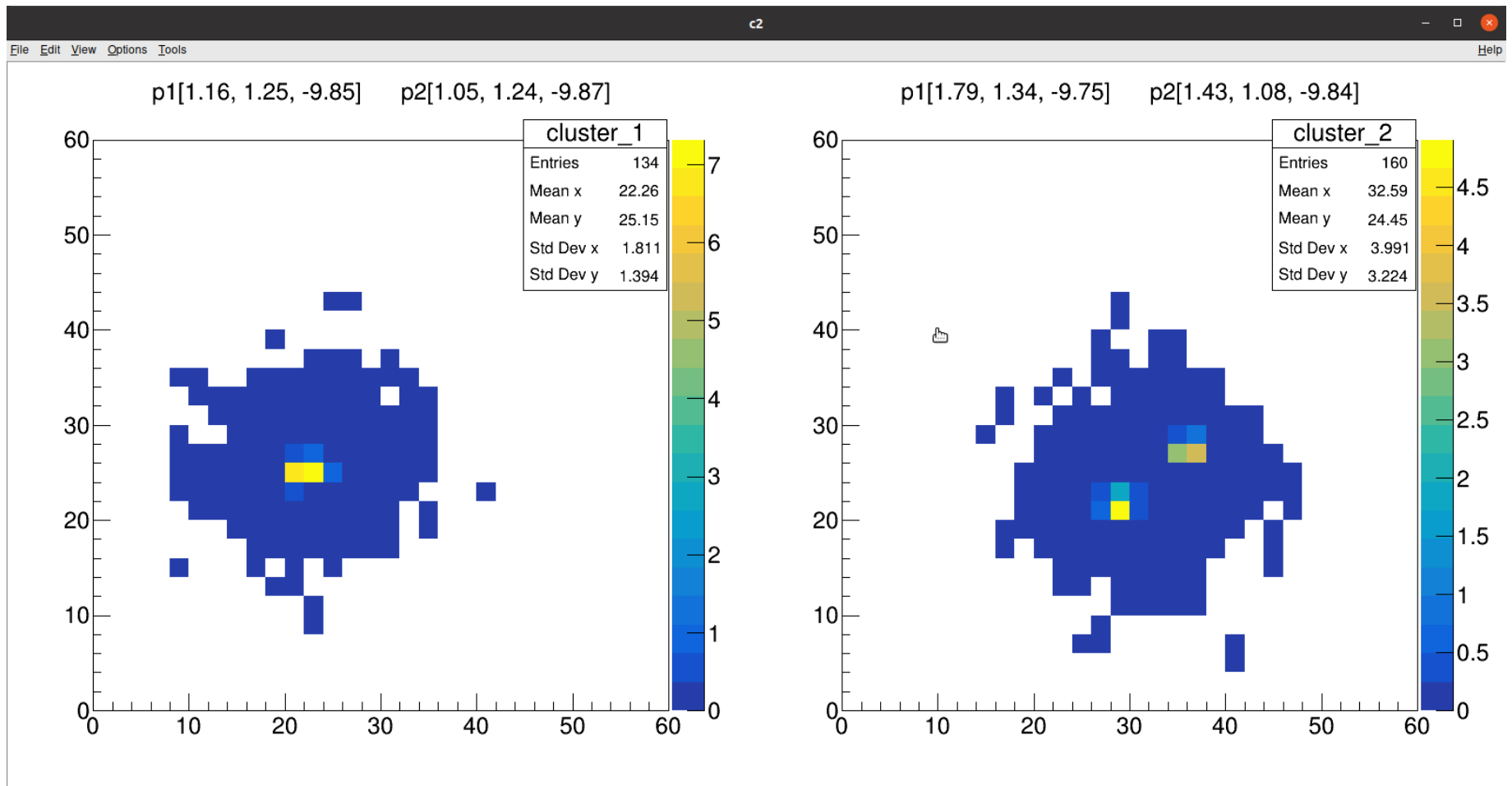


very close



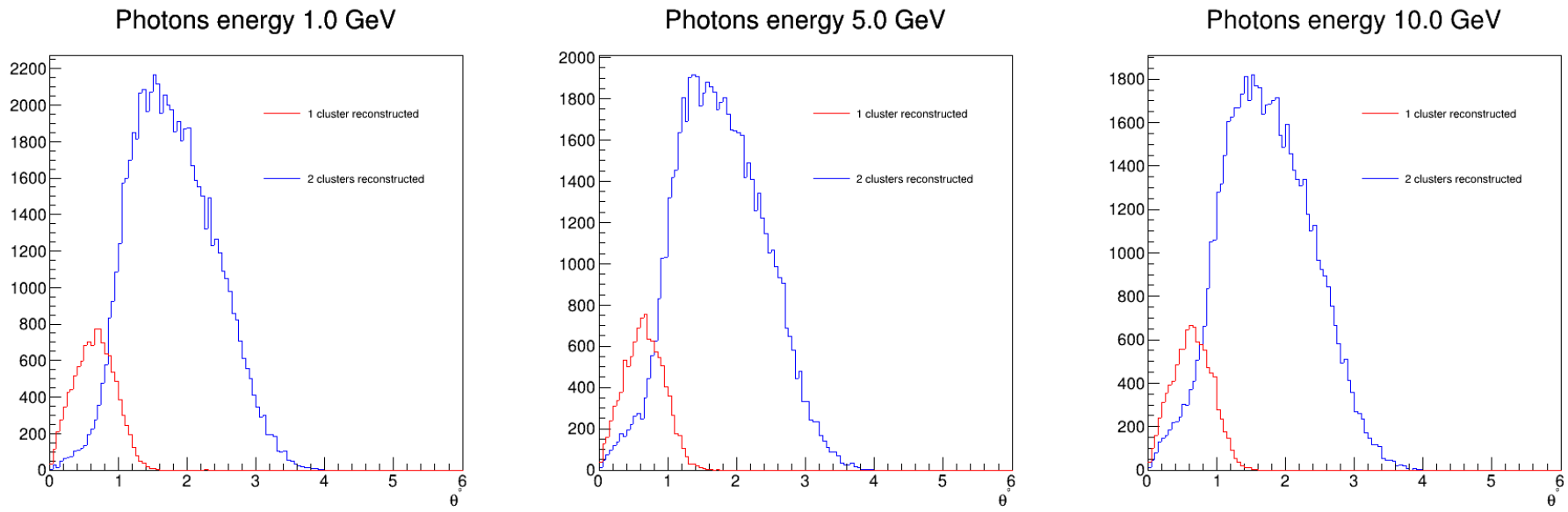
separated

Close events separation



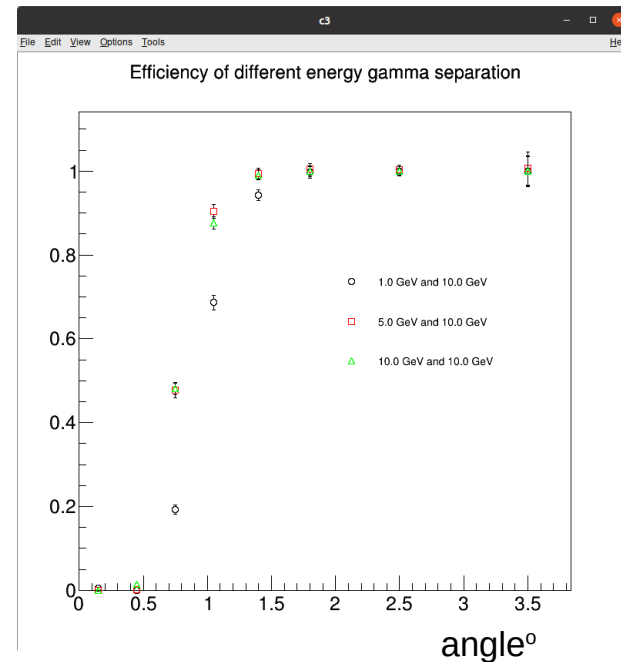
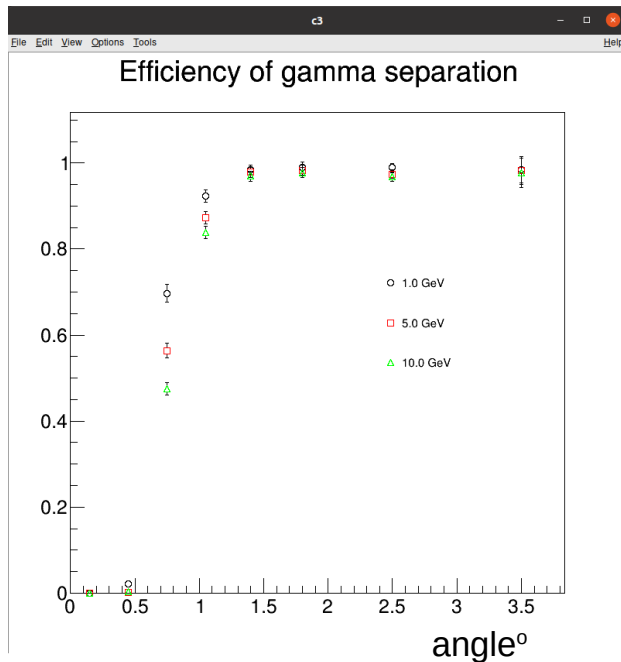
Close events separation

- 3 different E photons pair: [1,1], [5, 5], [10, 10] GeV
- 3 different mixed E photons pair: [1,10], [5, 10], [10, 10] GeV
- Separation efficiency:
 $\#(2 \text{ clusters events}) / \# \text{total events}$



Close events separation

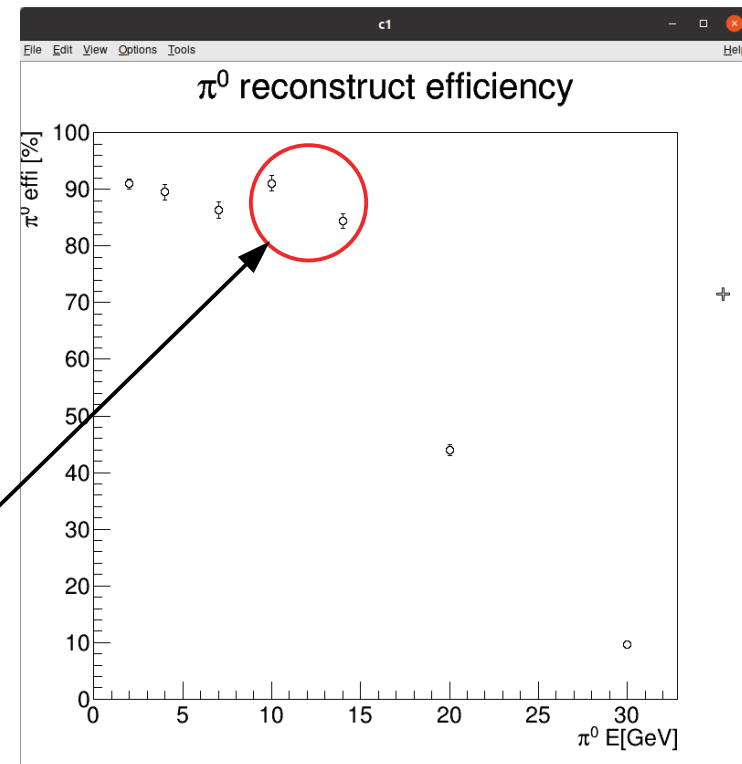
- Regardless energy, the separation efficiency reach 100% after 1.2° ($\sim 4\text{cm}$)
- lower energy has better separation than higher energy in small angle case, since the smaller size of cluster.
- Mixed Energy case reach $\sim 100\%$ efficiency after 1.2° ($\sim 4\text{cm}$)
- Huge energy difference(1 and 10 GeV case) has worse separation in small angle case.



pi0 separation

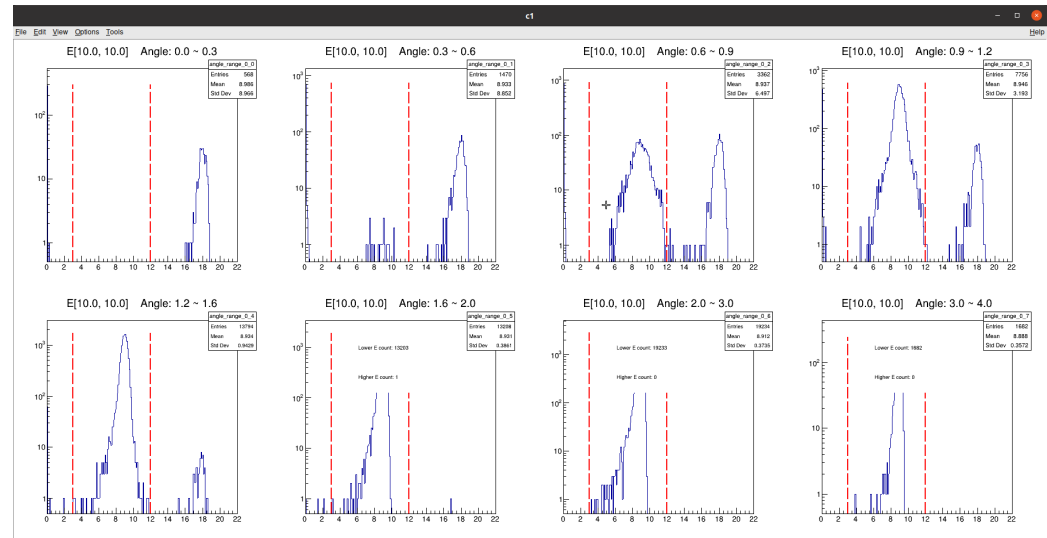
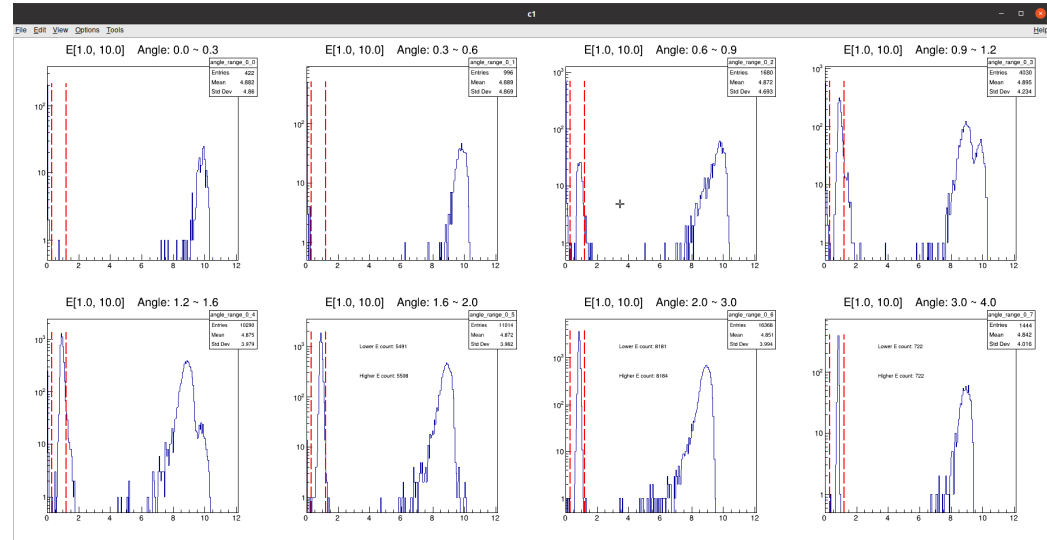
- Angle between 2 photons related to the pi0 E: $1/\gamma$
- 2 ~ 30 GeV given energy pi0
- Apply 2 Cuts:
Geometry: $15 < R < 48$ cm (only for the largest E clusters in single event...)
R is the distance between cluster and Endcap-center
Energy: Total reconstructed E $>$ (Mean - 3 * sigma)
- pi0 efficiency:
#(2 clusters events) / #events pass the cuts
- The min angle of two photons decay in 10 and 14 GeV are: 0.77° and 0.55°
- Instead geant4 pi0 gun, we will input the pi0 simulation by ourselves

Still Working on.....



Backup

- Mix energy cases.



Backup

- Energy cut

