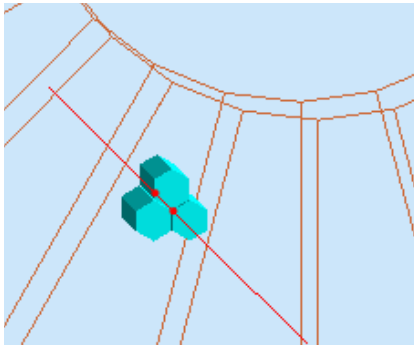
Beam test module simulation



1. 100 MeV/c, e+ and π+

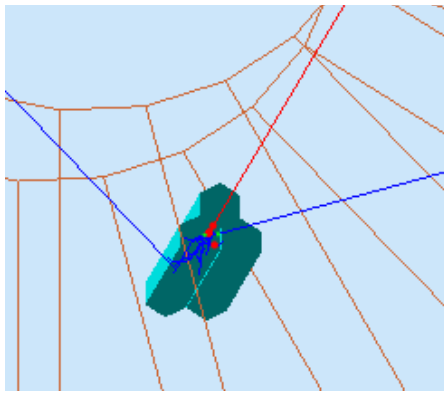
2. 200 MeV/c, e+ and π+

No field, straight hit the center module.

Beam size: 3cm radius

1) 1 module: Y= - 120.984cm, X= - 39.116cm;

2) 3 modules: Y= - 117.575-1cm, X= - 44.704+1cm;



3) 7 modules: Y= - 120.984cm, X= - 39.116cm;

Each above setup has 2 configurations:

a) Full ECAL without 2cm Al support structure

b) Full ECAL with 2cm Al support structure

Modified configurations:

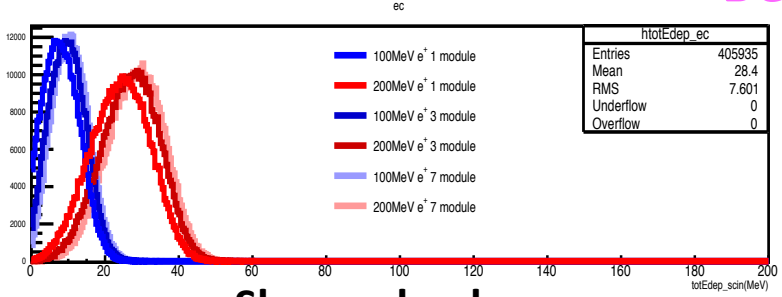
1) Add 6mm Al at front of the shower

2) Replace 0.12mm Mylar to 0.07mm TIO_2 painting.

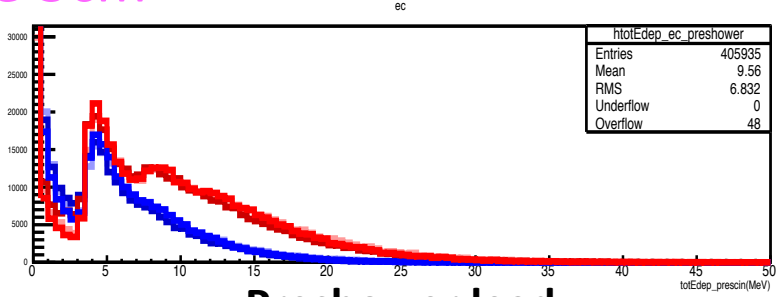
100 and 200 MeV/c, e+, no Al

Beam size 3cm

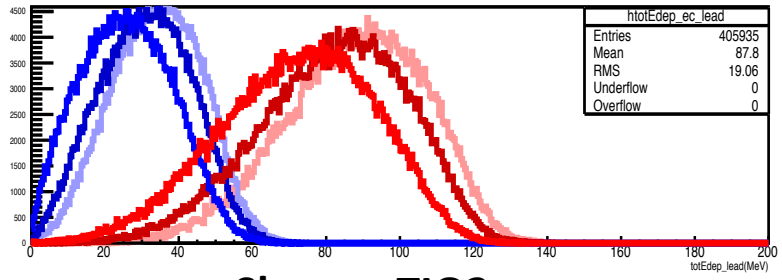
Shower scintillator



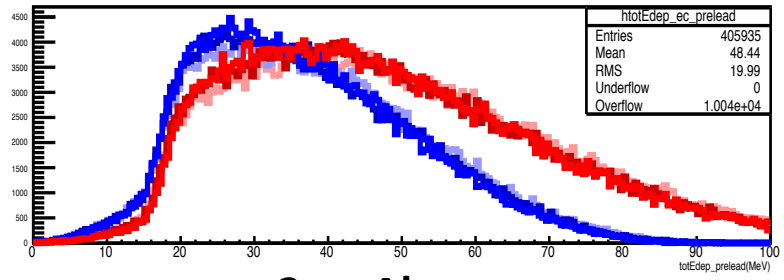
Preshower scintillator



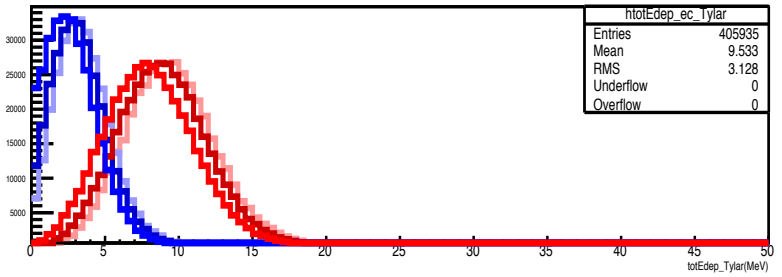
Shower lead



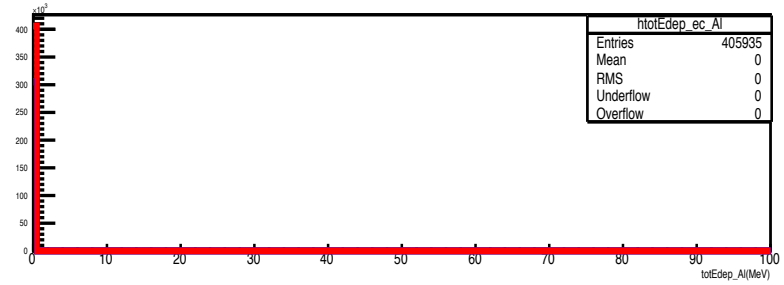
Preshower lead



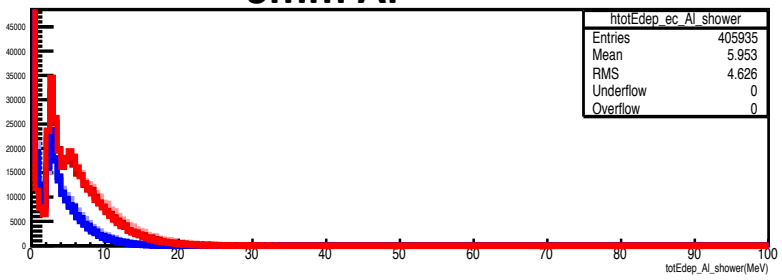
Shower TIO2



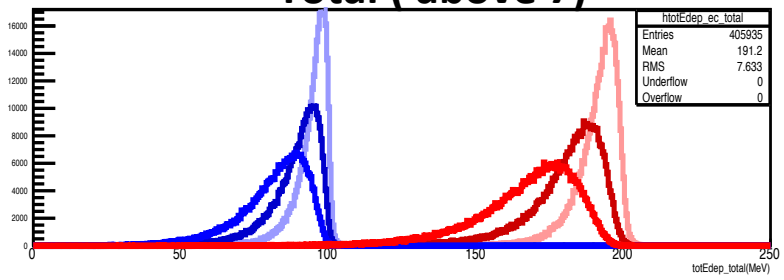
2cm Al



6mm Al



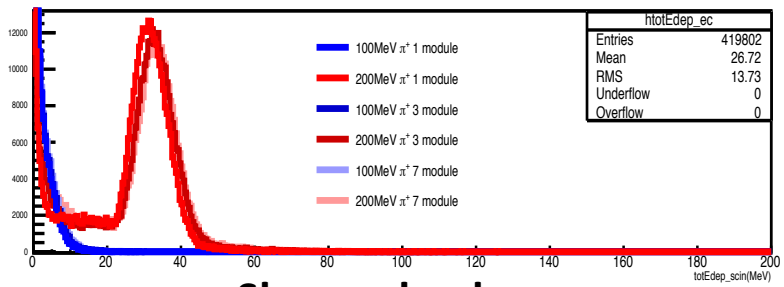
Total (above 7)



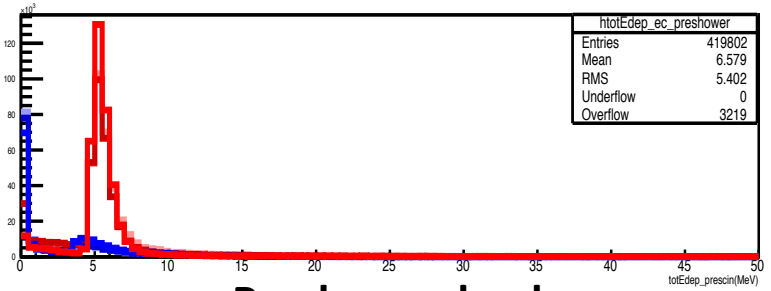
100 and 200 MeV/c, π+, no Al

Beam size 3cm

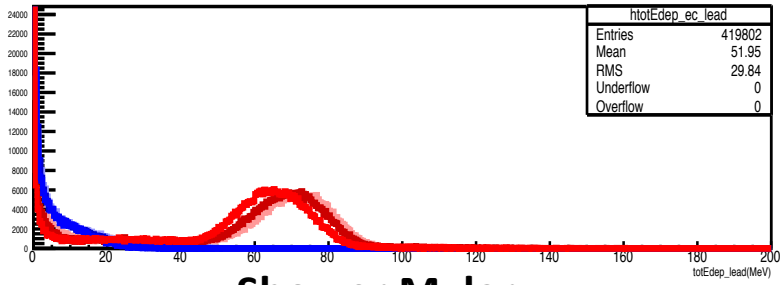
Shower scintillator



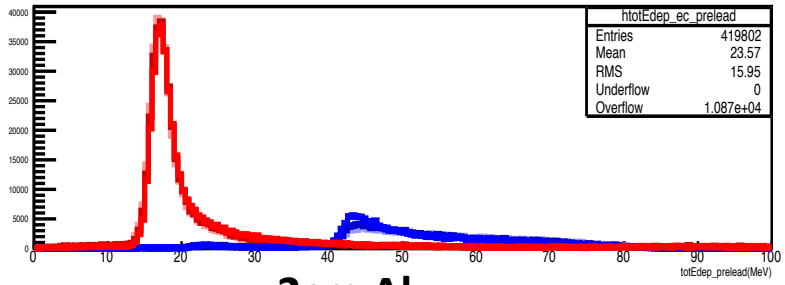
Preshower scintillator



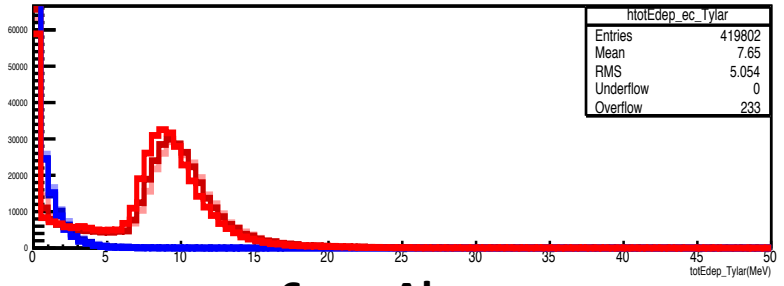
Shower lead



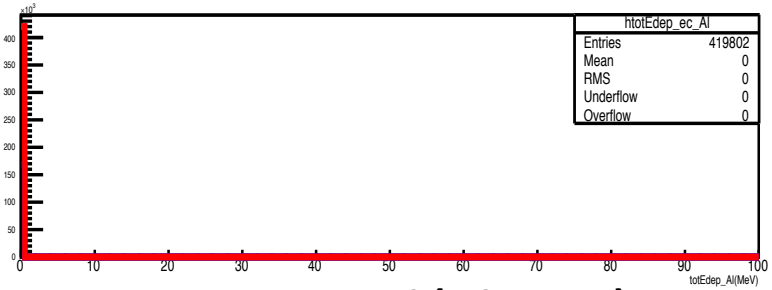
Preshower lead



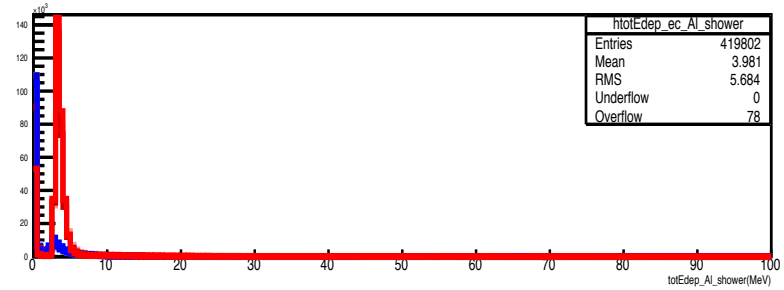
Shower Mylar



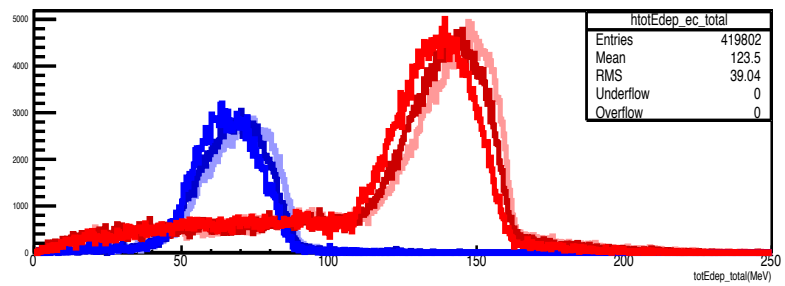
2cm Al



6mm Al



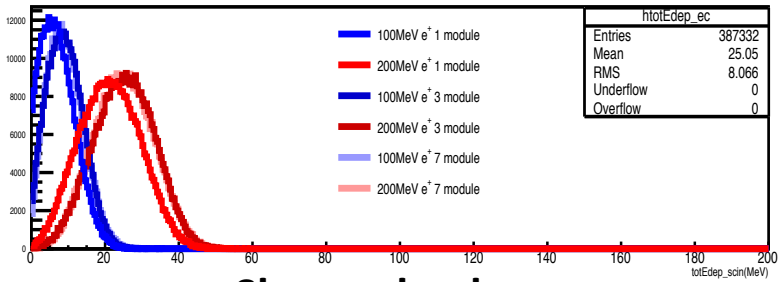
Total (above 7)



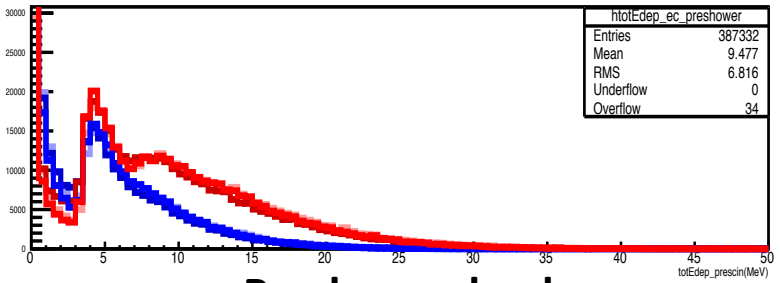
100 and 200 MeV/c, e+, ECAL

Beam size 3cm

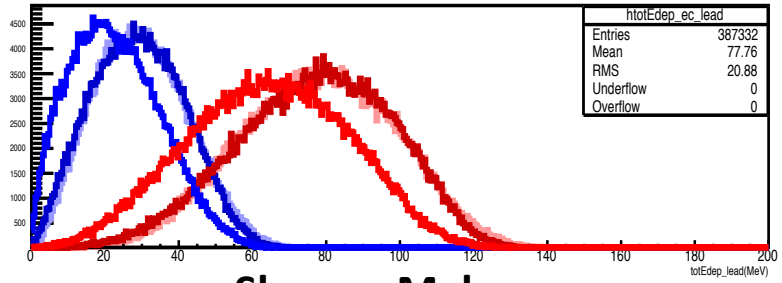
Shower scintillator



Preshower scintillator



Shower lead



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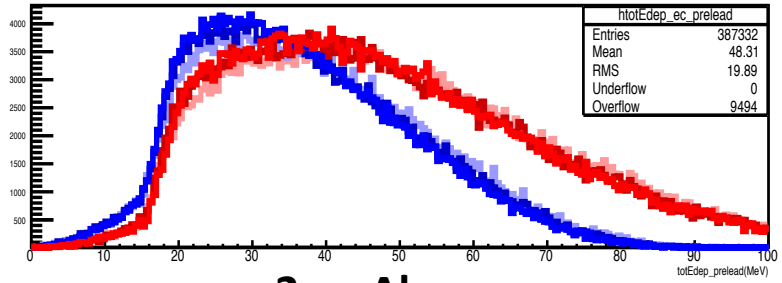
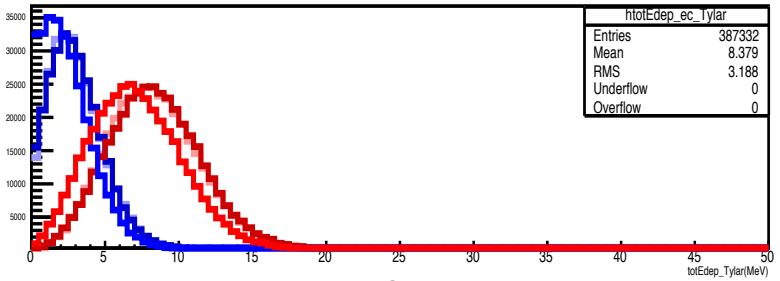
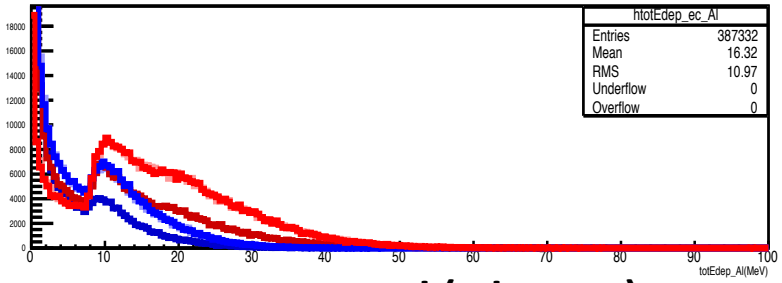


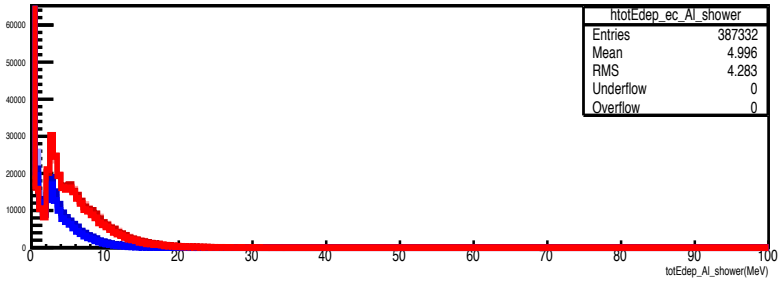
Shower Mylar



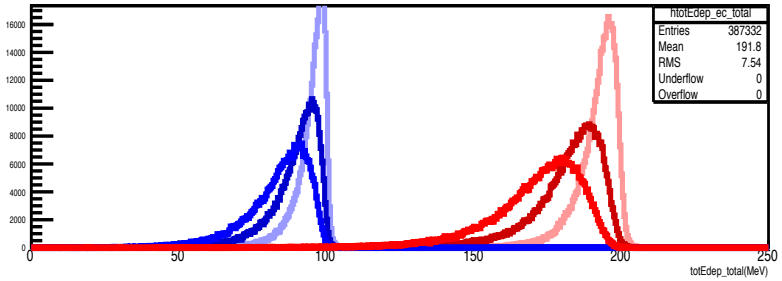
2cm Al



6mm Al



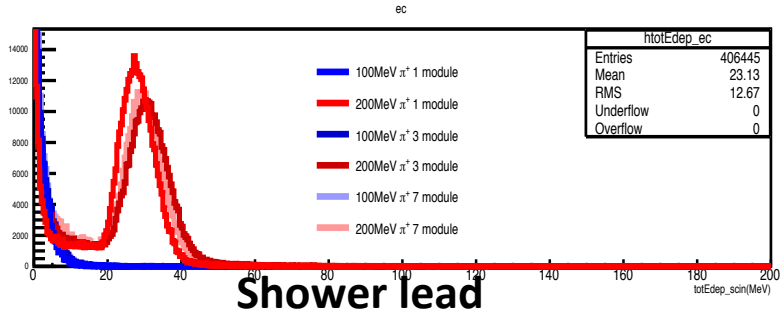
Total (above 7)



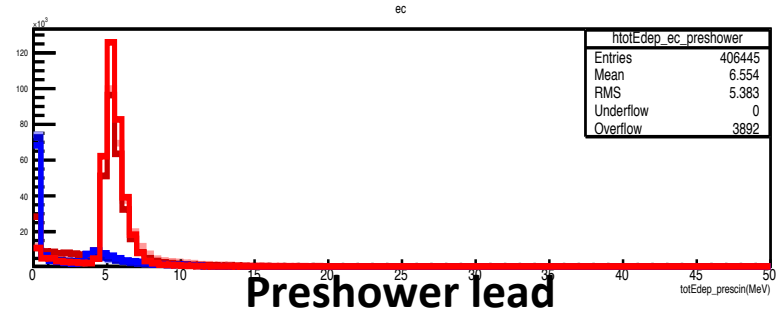
100 and 200 MeV/c, π+, ECAL

Beam size 3cm

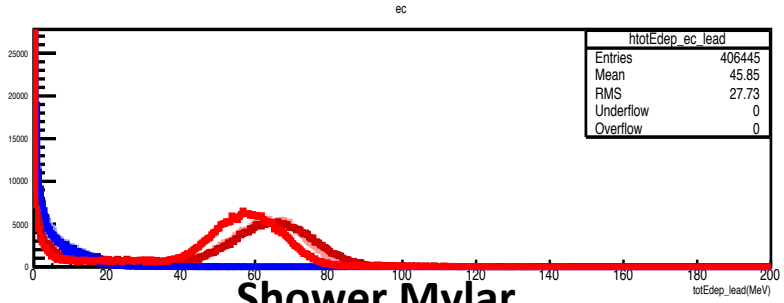
Shower scintillator



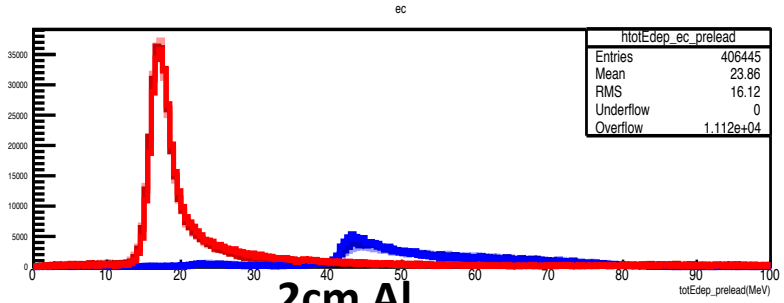
Preshower scintillator



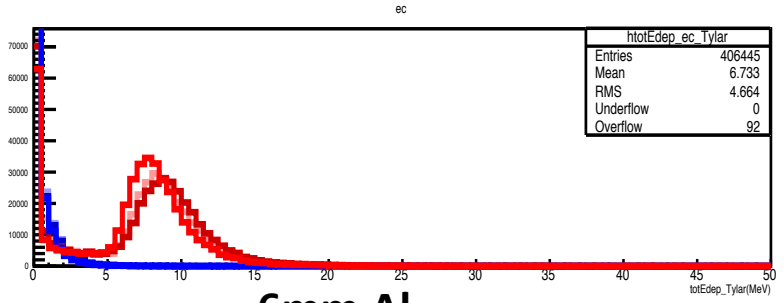
Shower lead



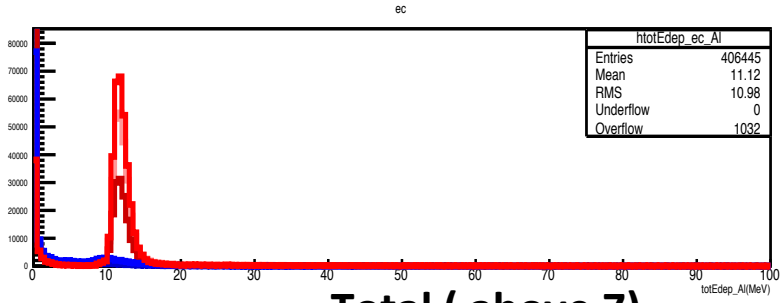
Preshower lead



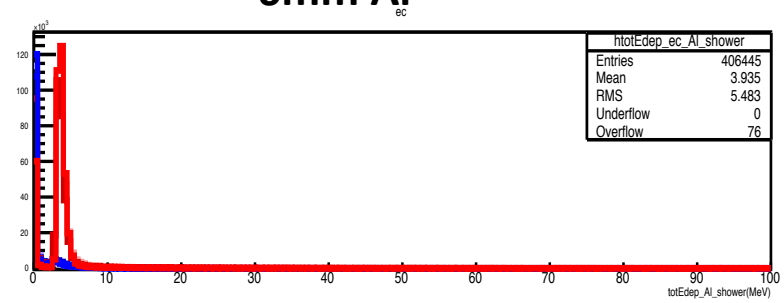
Shower Mylar



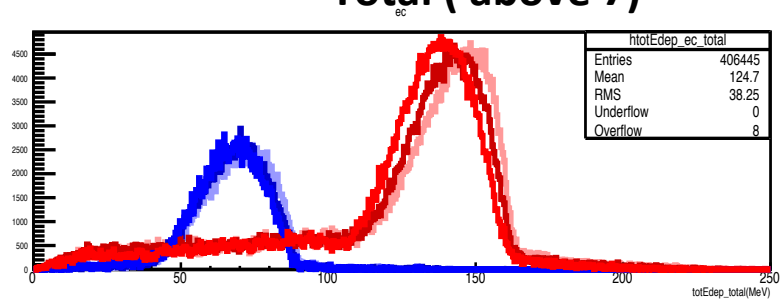
2cm Al



6mm Al

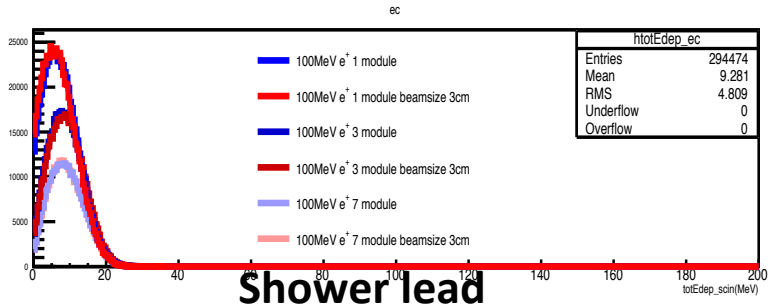


Total (above 7)

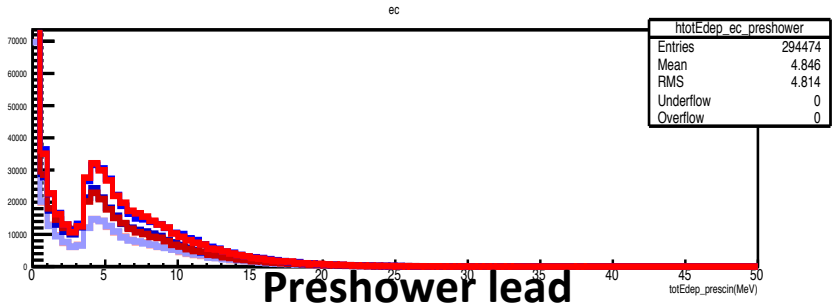


100 MeV/c, e+, beam size comparison

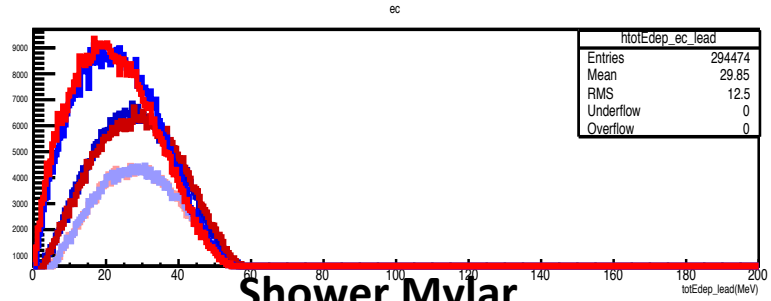
Shower scintillator



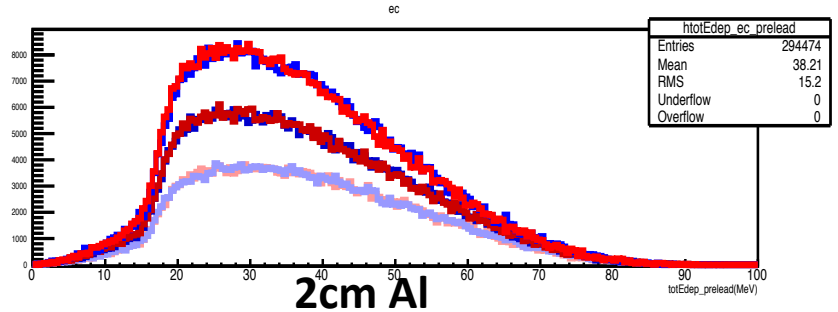
Preshower scintillator



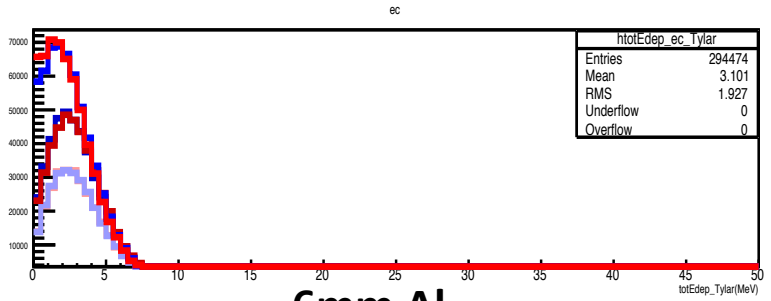
Shower lead



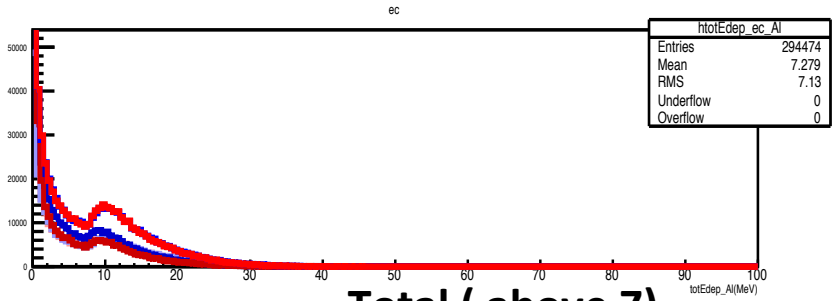
Preshower lead



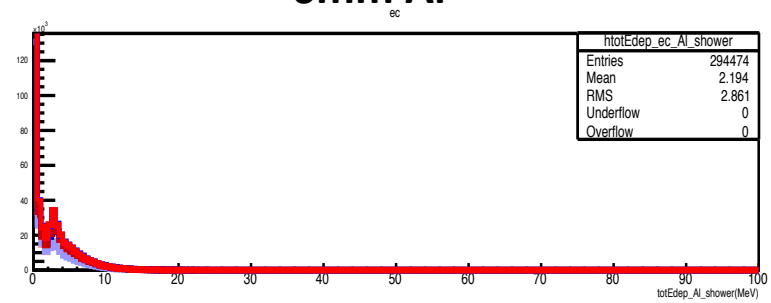
Shower Mylar



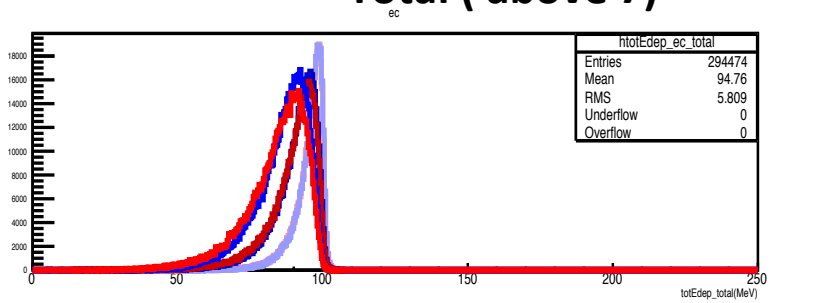
2cm Al



6mm Al

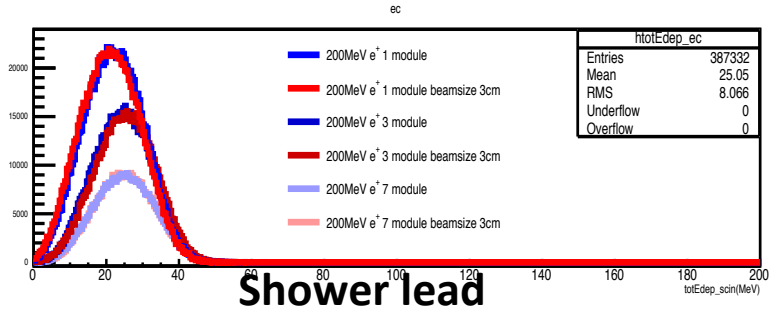


Total (above 7)

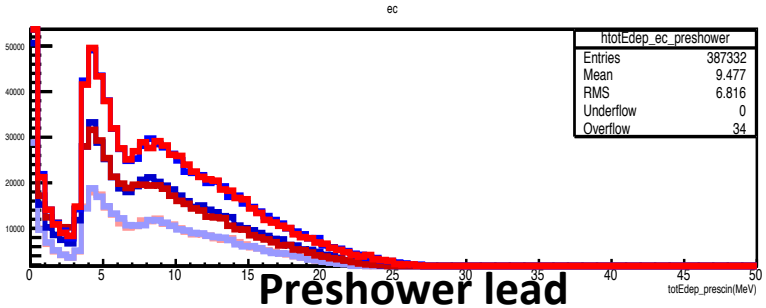


200 MeV/c, e+, beam size comparison

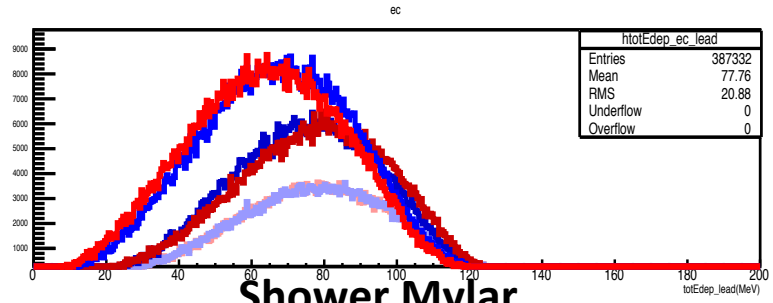
Shower scintillator



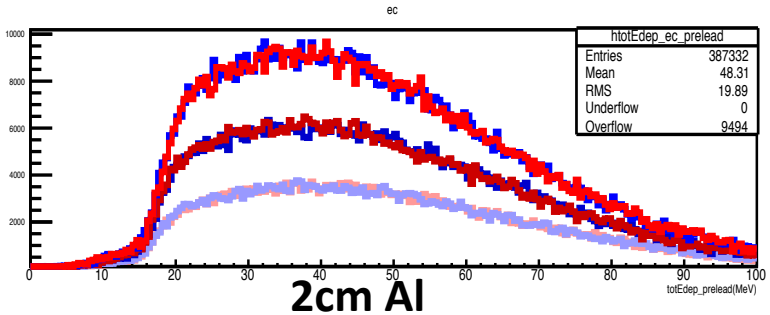
Preshower scintillator



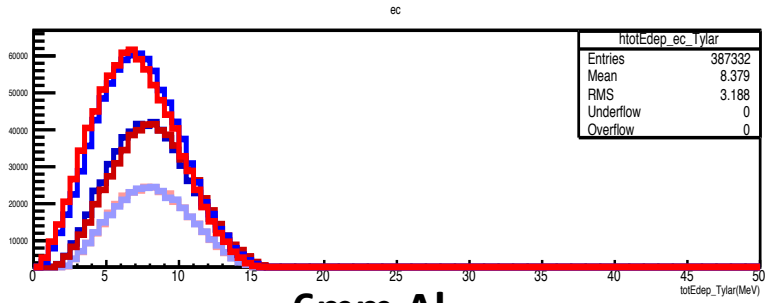
Shower lead



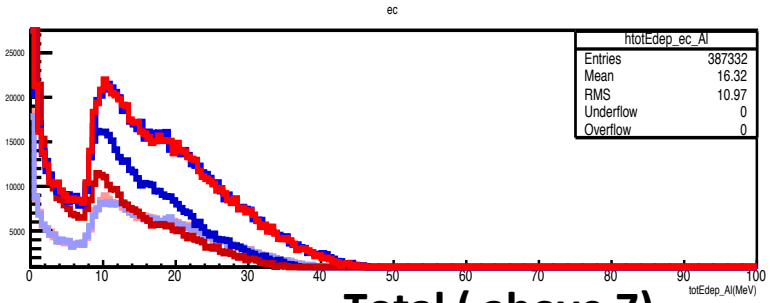
Preshower lead



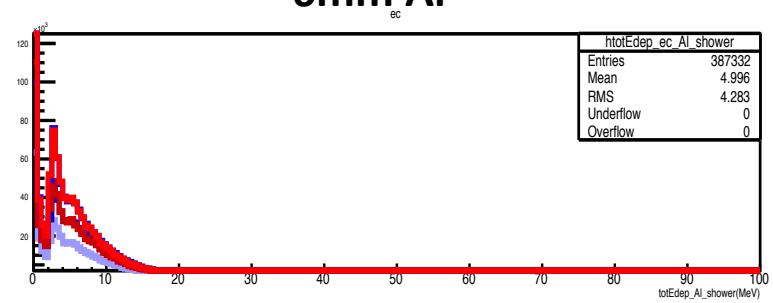
Shower Mylar



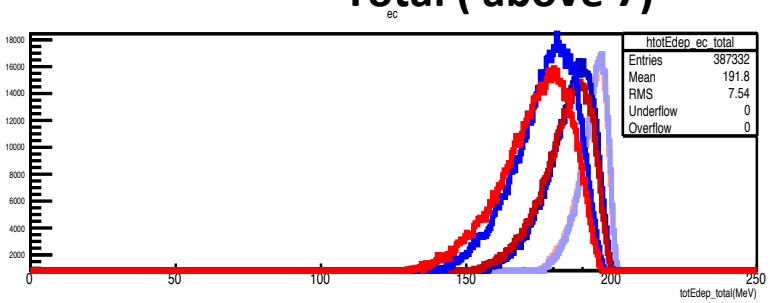
2cm Al



6mm Al



Total (above 7)



Summary and Next steps

- For the new ECAL configuration, the difference between beam size 3cm-radius and 0cm-radius on 1 module, 3 modules, and 7 modules setups is negligible, even though the difference for 200 MeV beam is larger than that for 100 MeV beam.

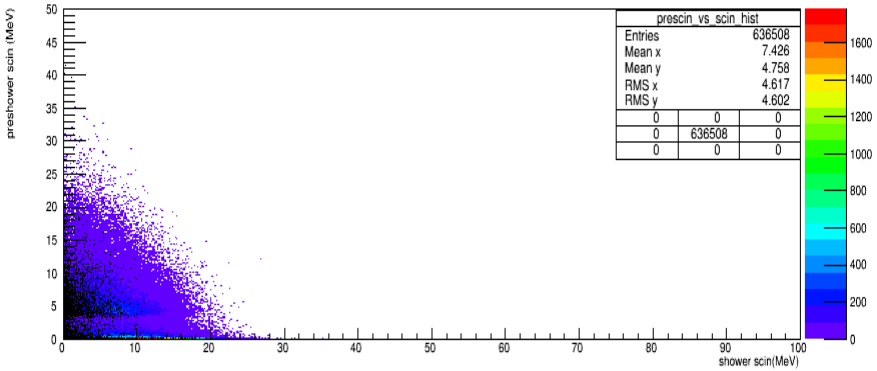
- From the above simulation results, the shower scintillator deposit energy distributions for 3modules and 7 modules are very similar. So for the beam test with 100MeV (positron) and 200 MeV (positron, π^+) beam (3cm beam radius), the 3-module setup is OK.

Any comments and suggestions ?

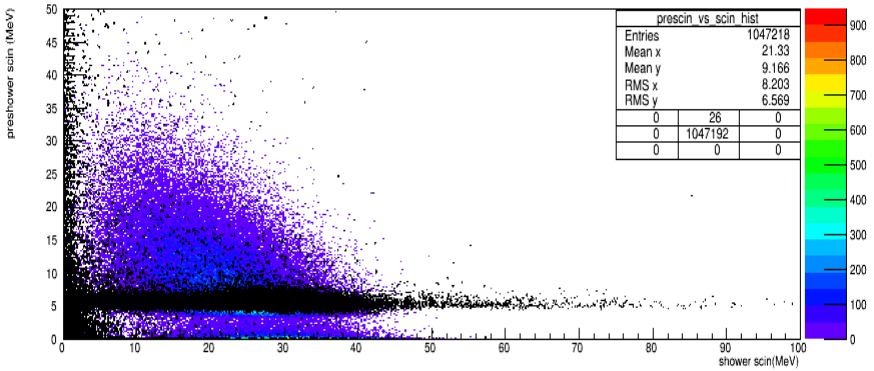
Backup

ECAL with beam size 3cm

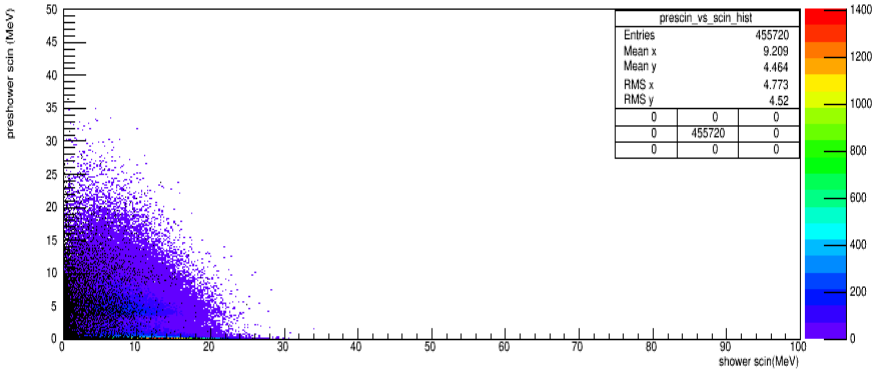
1 module 100MeV



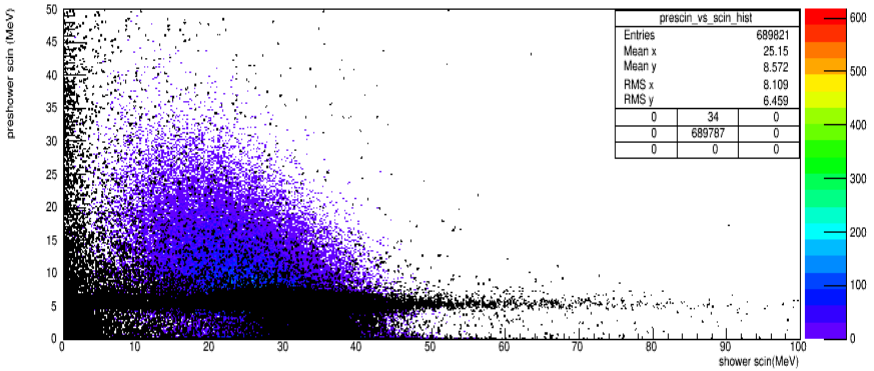
1 module 200MeV



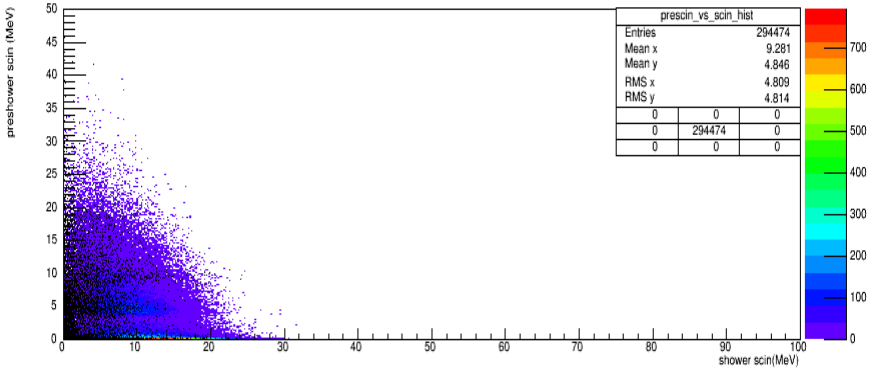
3 module 100MeV



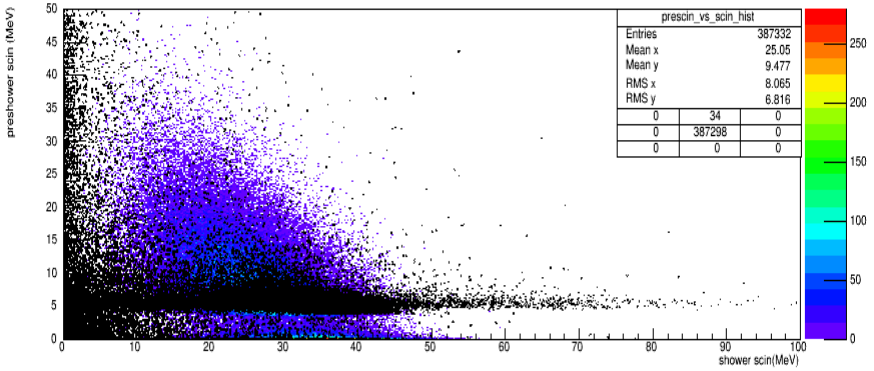
3 module 200MeV



7 module 100MeV



7 module 200MeV



ECAL (without 2cm Al) with beam size 3cm