Geant4 studies for the supporting structure of the CGEM setup

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with insights and help from I. Garzia

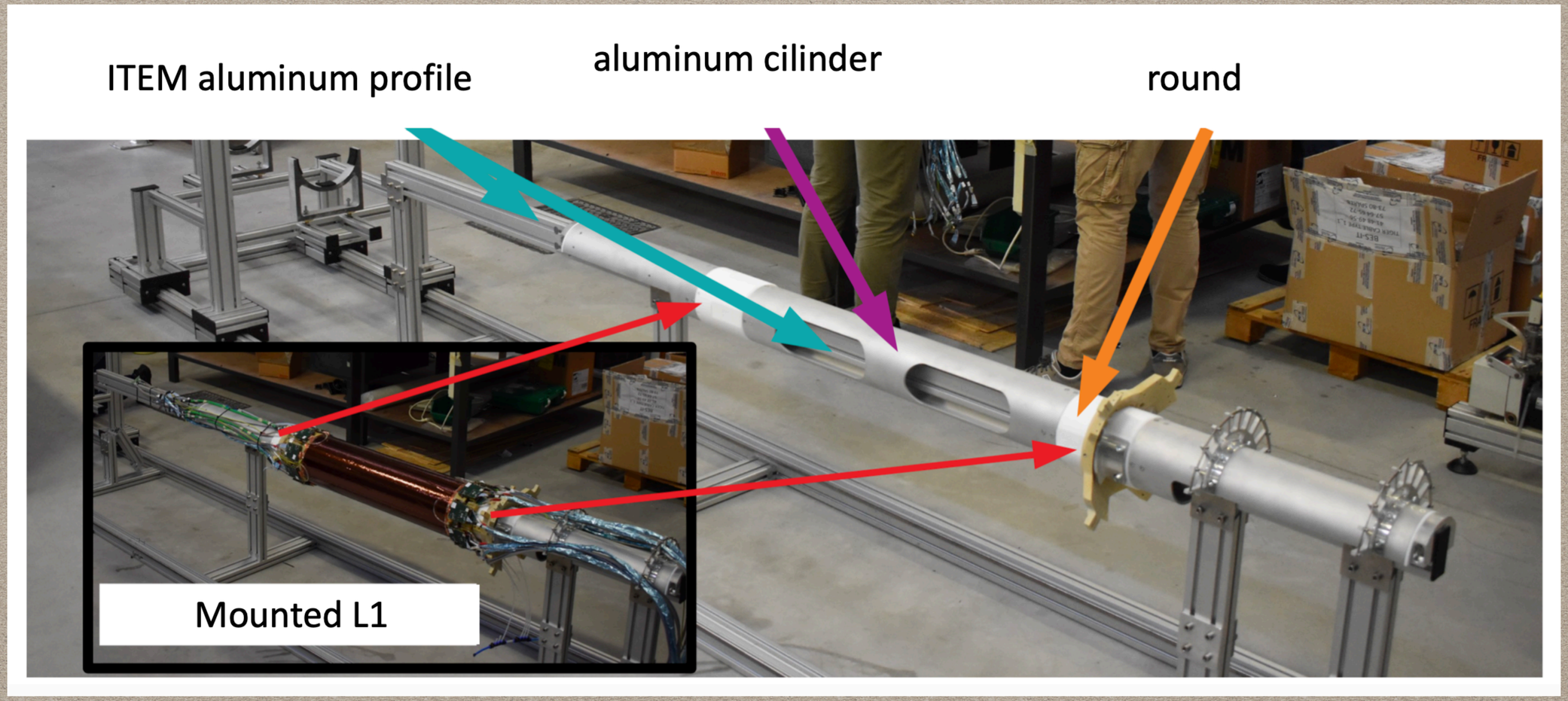
CGEM SW Weekly Meeting
30th March 2020

WHY?

- *The advent of the pandemic didn't allow the removal of the supporting structure*
- *The structure could affect/deflect the cosmic rays crossing it*
- *Possible changes in efficiency, reconstruction etc.*
- *Discussions ongoing for some time (cfr Stefano's slides)*

WHAT?

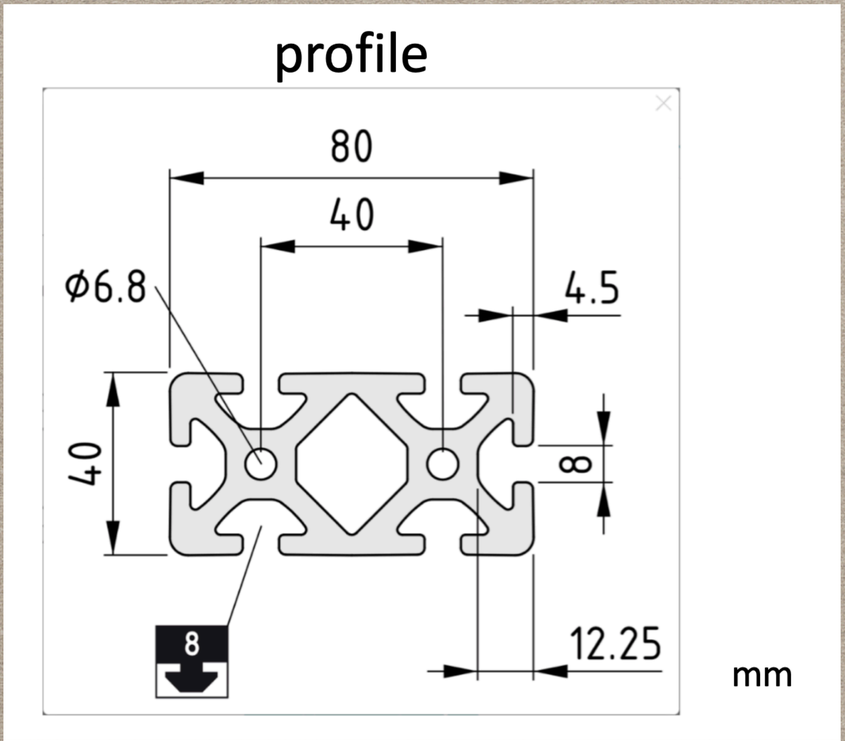
THE STRUCTURE 1



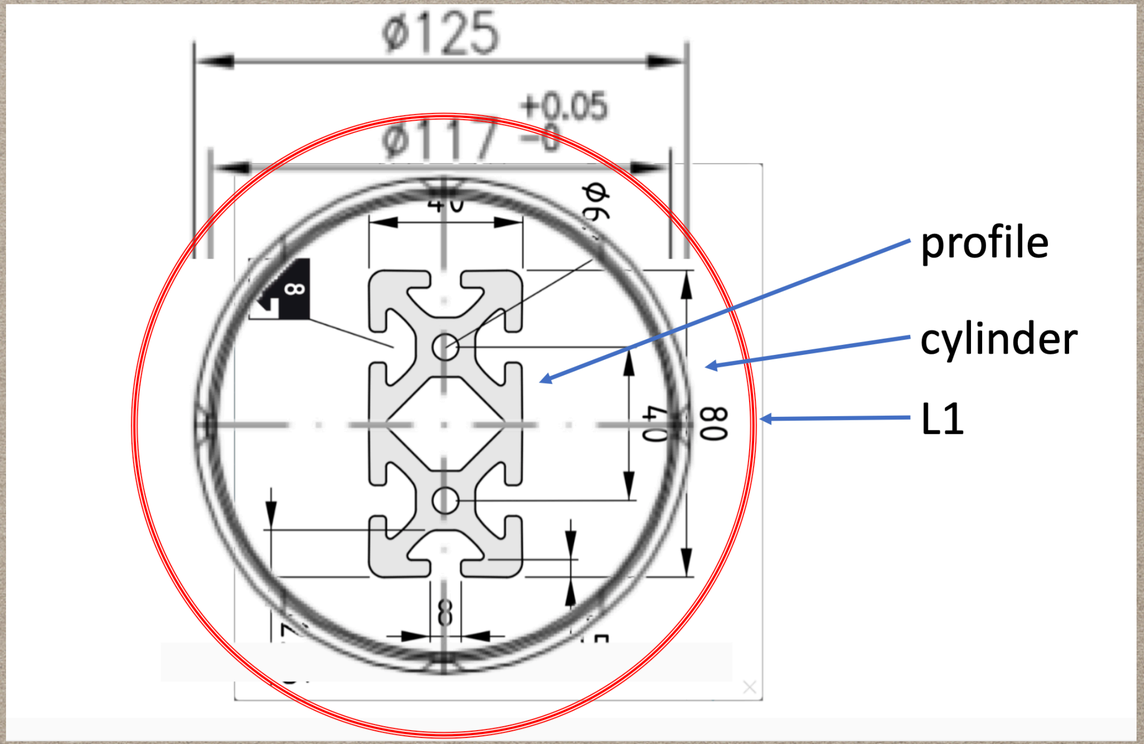
WHAT?

THE STRUCTURE 2

The ITEM



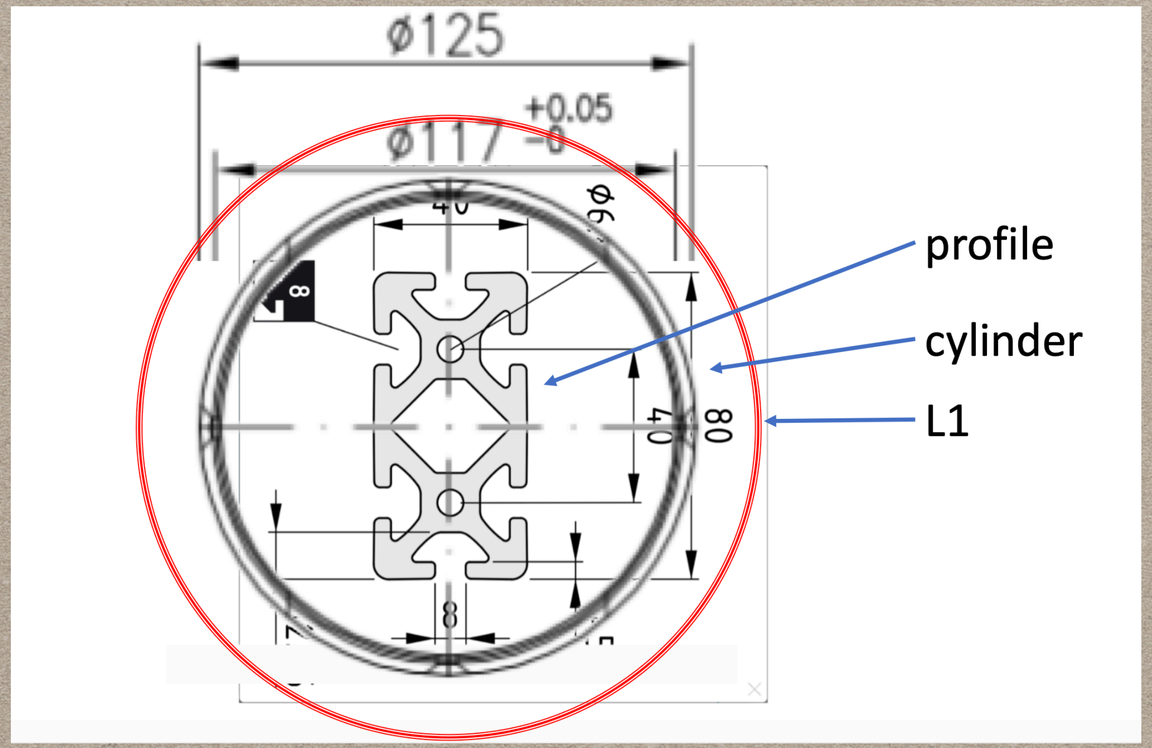
The whole setup



WHAT?

THE STRUCTURE… SOME NUMBERS

The whole setup

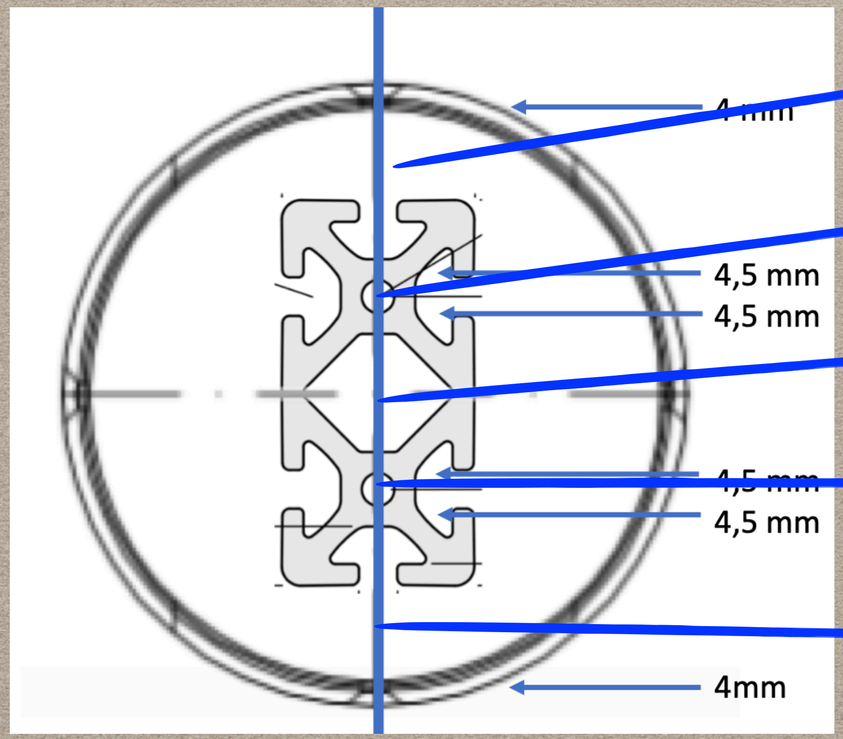


Al cylinder:	**4.00 mm**
1st Air gap:	**30.75 mm**
1st Al ITEM section:	**4.50 mm**
2nd Air gap:	**6.80 mm**
2nd Al ITEM section:	**4.50 mm**
3rd Air gap:	**24.20 mm**
3rd Al ITEM section:	**4.50 mm**
4th Air gap:	**6.80 mm**
4th Al ITEM section:	**4.50 mm**
5th Air gap:	**30.75 mm**
Al cylinder:	**4.00 mm**

WHAT?

THE STRUCTURE… SOME NUMBERS

The whole setup



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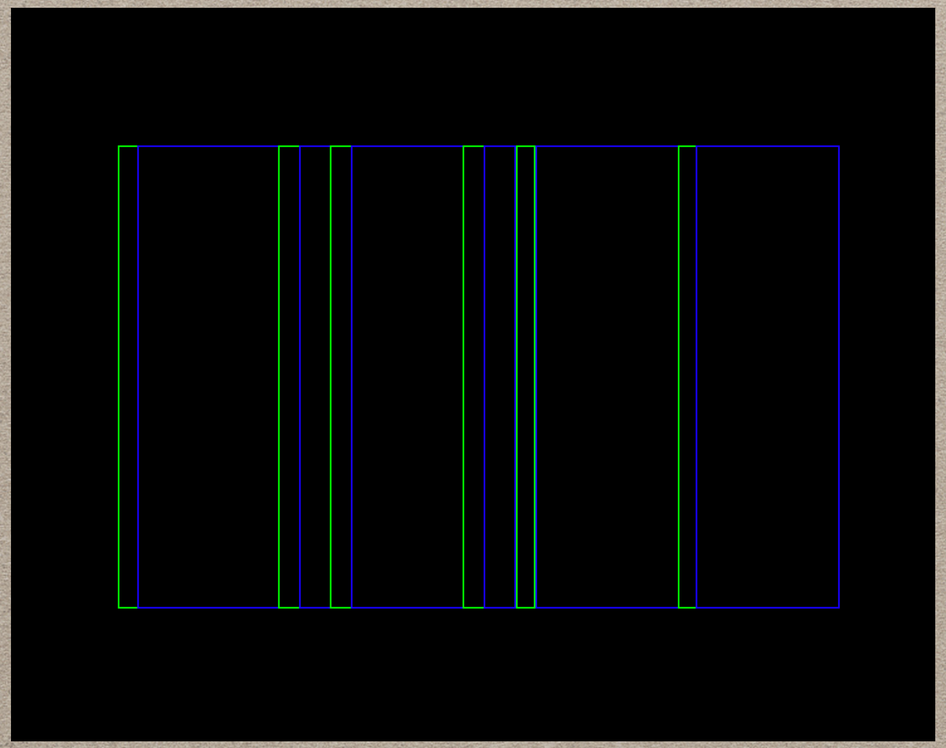
WHAT?

THE STRUCTURE… GEANT4

Geant4 setup



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THE PLAN

*Perform a **scan in energy with μ^-** particle gun **[0.5 GeV, 5 GeV]** with a step of 0.5 GeV*

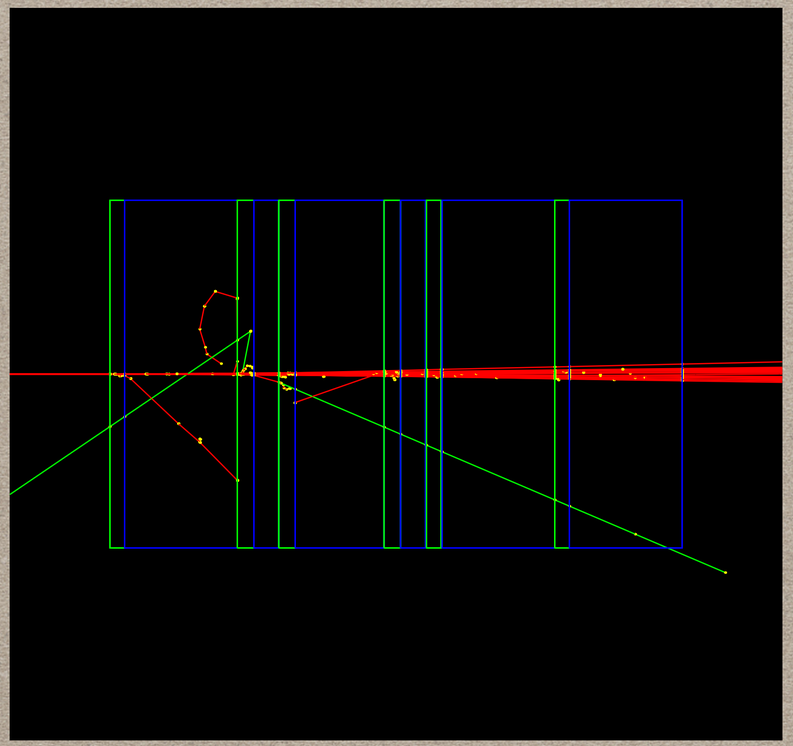
*Main **aim** is to **analyse the deflection** of the μ*

For such an analysis I repurposed the B4a example (the calo one) of Geant4

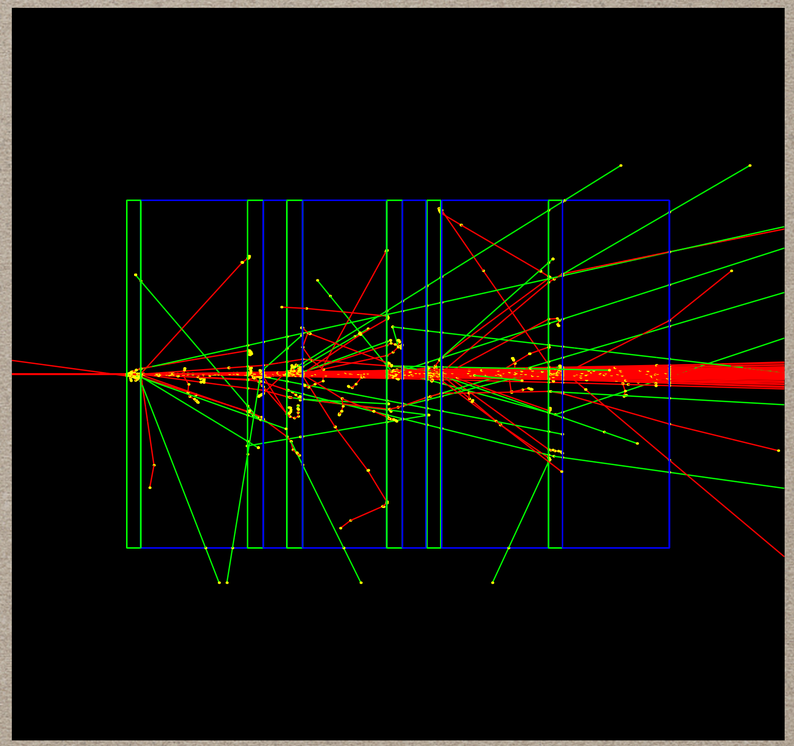
PRELIMINARY RESULTS

0.5 GeV

20 Events



100 Events

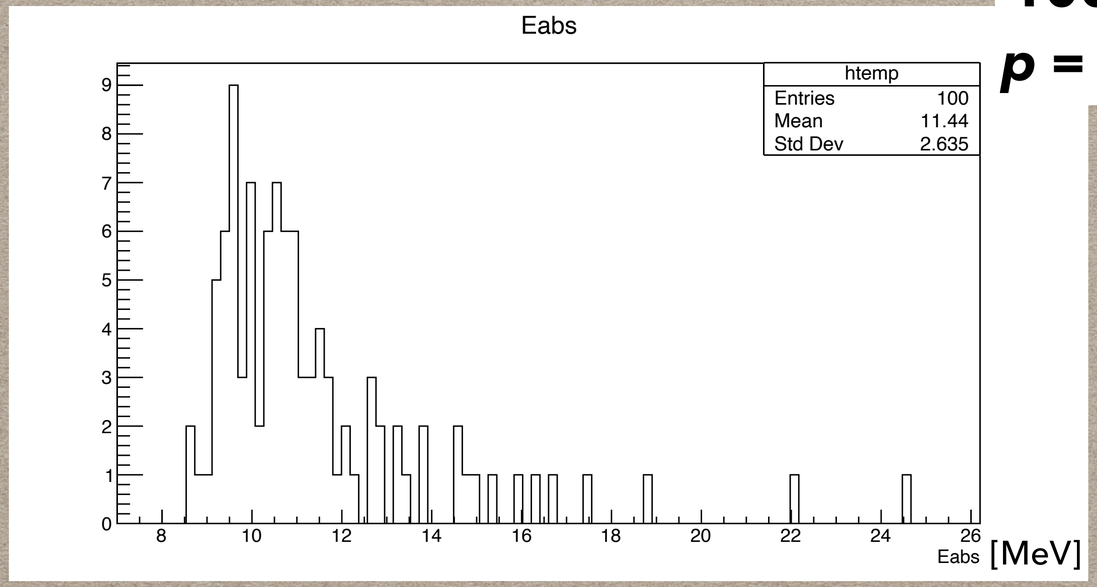


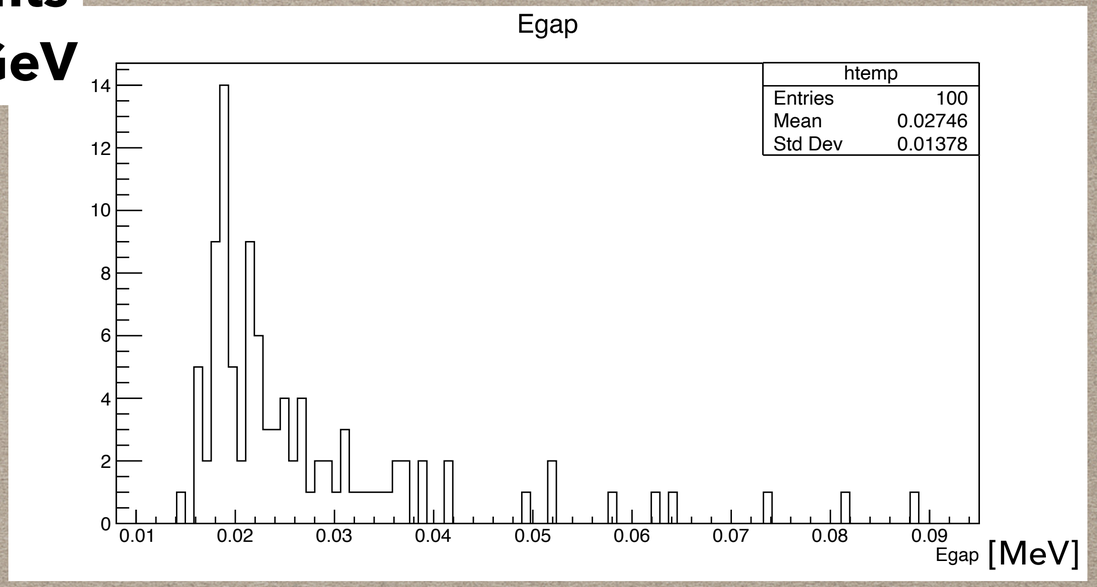
Geant4 studies for the supporting structure- M. Scodeggio

PRELIMINARY RESULTS

I still have to fully modify the example,
namely the variables that are measured
The energy deposit for layer type is measured

100 Events
***p* = 0.5 GeV**

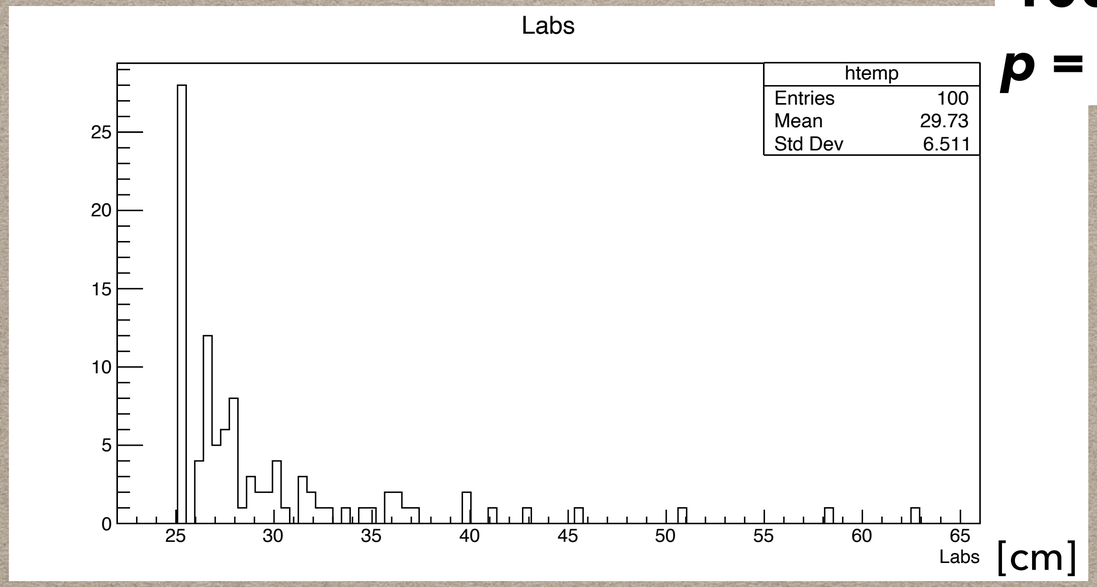


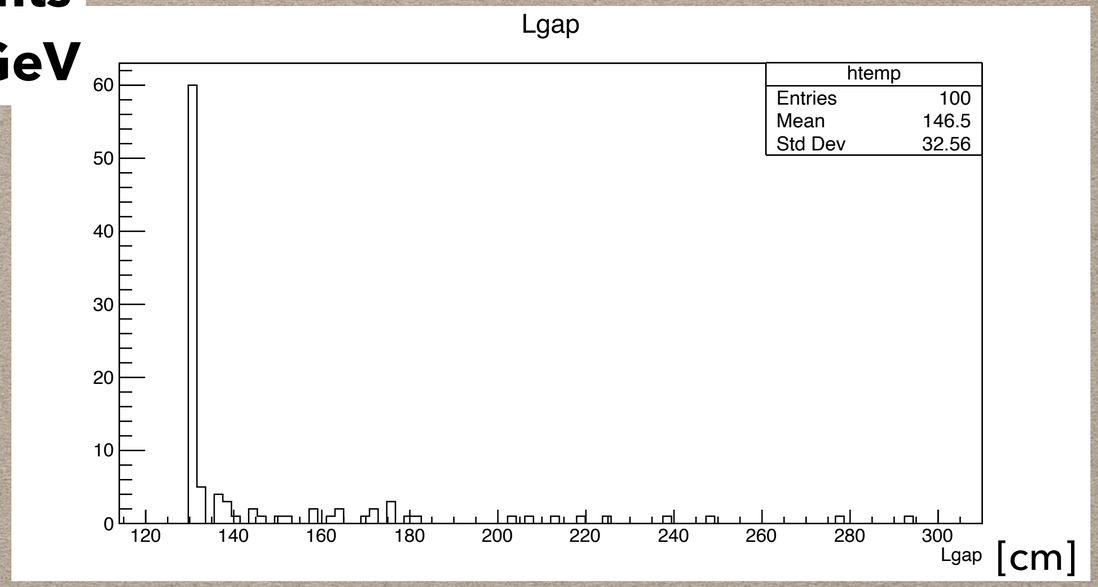


PRELIMINARY RESULTS

I still have to fully modify the example,
namely the variables that are measured
The total length for each layer type is measured

100 Events
***p* = 0.5 GeV**





Total length of absorber 2.6 cm

Total length of gap 98.26 (+30.75) cm

PRELIMINARY CONCLUSIONS

- Both from the event display and the track length, it is evident that a non null deflection is present due to the setup
- The event display shows as well what it seems a non negligible secondary production

WHAT'S NEXT

- Have an estimation of the angle of deflection for the different energies
- Investigate the secondary production further
- Ameliorate/modify the setup (?)
- More ideas are welcome