



Update of MC Simulation for HIT2022 data taking

G.B. S.M., INFN-Milano

July 2022

Extension of Calorimeter

Thanks to E. Lopez Torres we have now the possibility of producing the geometry for the CALO configuration with 7 modules in alternative to the 5 module configuration (prepared by L. Scavarda) presented at the last Collab. Meeting.

The updated files have been uploaded in the newgeom branch of SHOE

libs/src/TACAprGeo.cxx

libs/src/TACAprGeo.hxx

Reconstruction/level0/macro/BuildCaGeoFile.C)

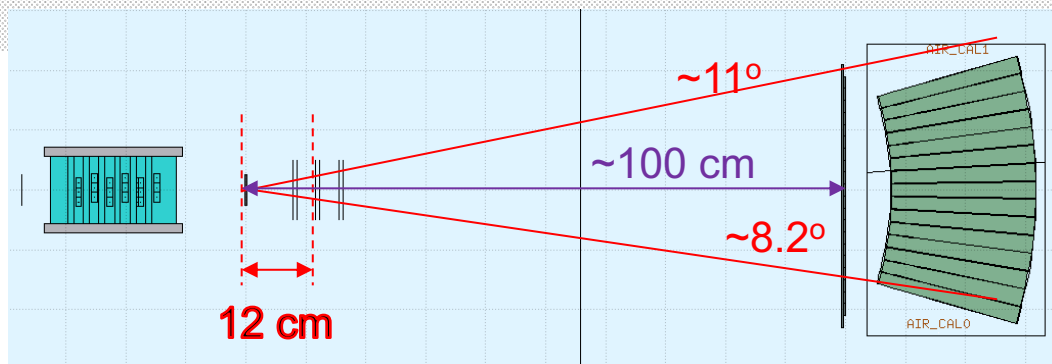
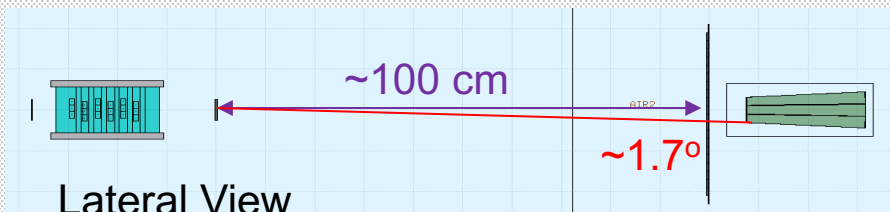
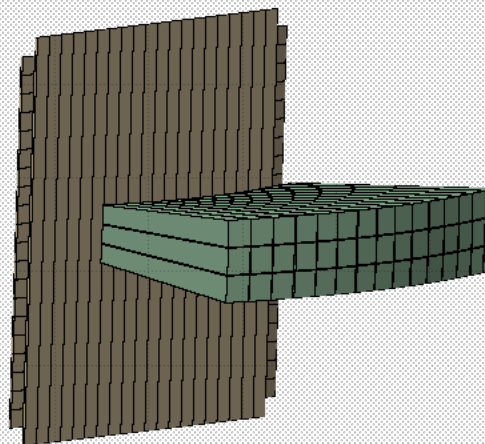
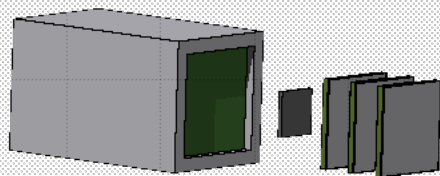


it produces *TACAdetector.geo* to be placed in *geomaps/HIT2022_MC*

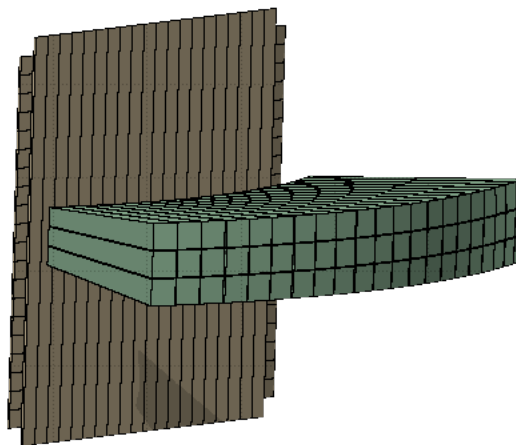
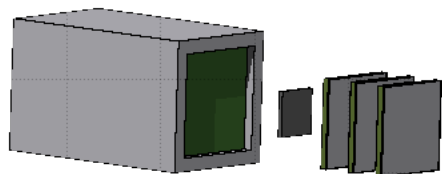
5 Module Setup version

At this time positioning is still provisional

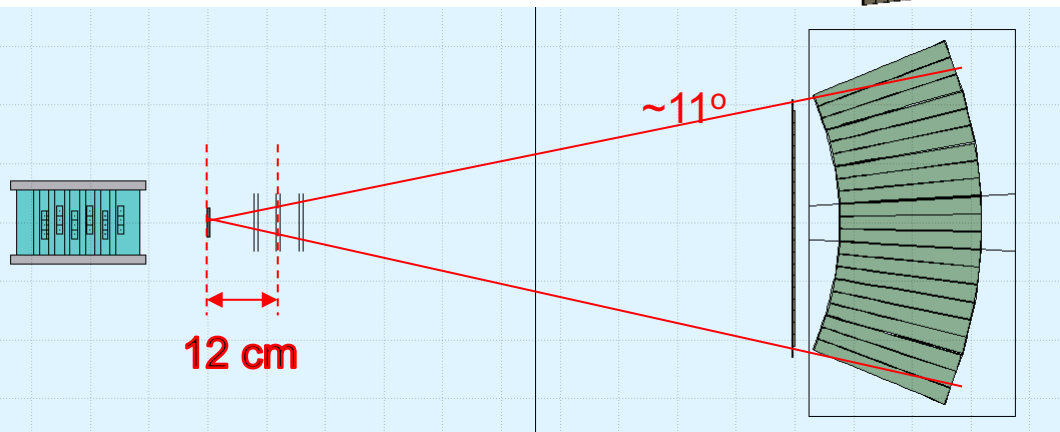
45 crystals
159 Regions



7 Module Setup version



63 crystals
180 Regions



With 7 modules in this view the CALO covers the whole angular acceptance of TW

Lateral view remains unchanged

Preliminary Simulation now available for quick tests

With both configurations, $5 \cdot 10^6$ events (untriggered) 200 MeV/u on C target 5 mm
in Tier3:

[/gpfs_data/local/foot/Simulation/HIT2022_MC/5Mod/4He_C_200_5mod_shoereg.root](#)

[/gpfs_data/local/foot/Simulation/HIT2022_MC/7Mod/4He_C_200_7mod_shoereg.root](#)

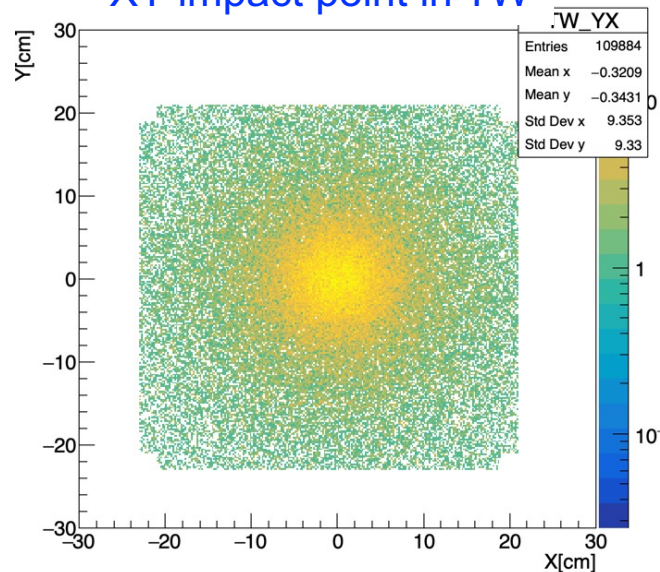
Notice: in both **5Mod** and **7Mod** directories you can find also the specific **FOOT.reg** and **TACAdetector.geo** files to be inserted in **geomaps/HIT2022_MC**

The idea is to update newgeom branch definitively when we shall have confirmation of the setup actually available

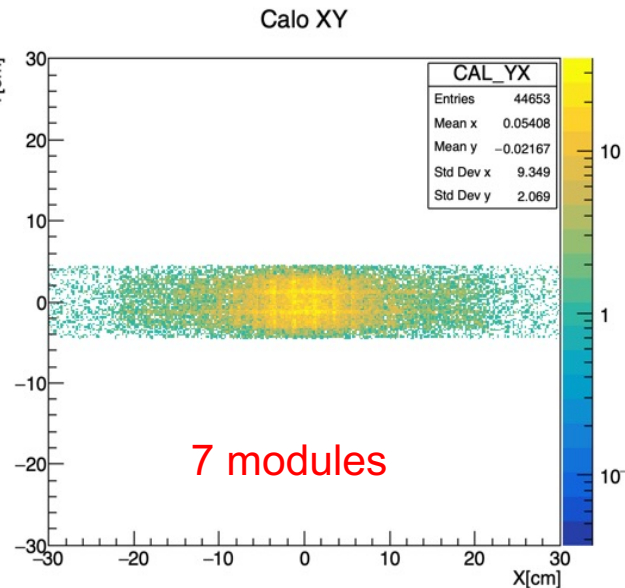
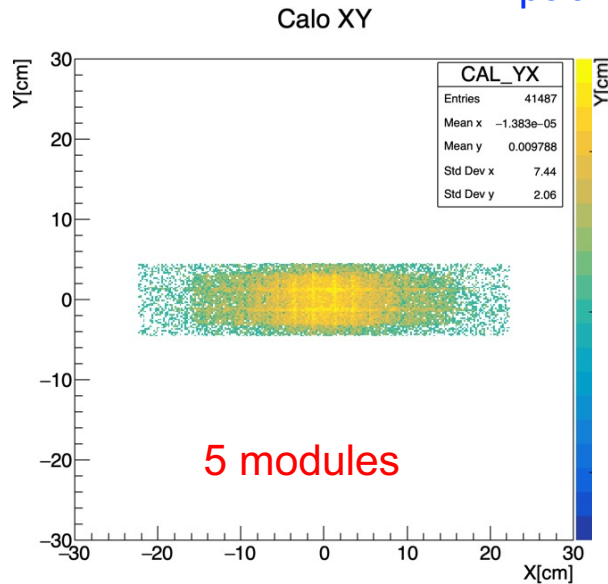
Acceptance of the Calorimeter

Only tracks produced in target

XY impact point in TW



XY impact point in CAL



~8 % increase in the number of tracks hitting the calorimeter

Some statistics: (7 Modules, 5 10^6 primaries, 200 MeV/u, 5 mm C)

No. of interactions in Air: 25918
No. of interactions in STC: 4023
No. of interactions in BMN: 3770
No. of interactions in TGT: 114125
No. of interactions in MSD: 15934
No. of interactions in TWL: 85309
No. of interactions in CAL: 1715060

*in practice no variation with respect to the 5 modules config:
dominated by straight through primaries*

No. of primaries interacting before target is 22442

Selection cuts: $E_cut = 0.10$ $\Theta_cut = 11.00$

Target Material = C; $A_target = 1.201070e+01$ $\rho_target = 1.830000e+00$ thickness = $5.000000e-01$
 $N_prim = 4.979231e+06$ $N_{tg} = 4.587792e-05$

$N(Z1)$ with cuts = 64997.00 $\sigma(Z1)$ with cuts = **284.63 +/- 1.12 mb**

$N(Z2)$ with cuts = 20994.00 $\sigma(Z2)$ with cuts = **91.93 +/- 0.63 mb**

No. of events with $Z=2$ in TW: 9886

in which the no. of $Z=2$ events with 1 hit per bar is: 9825

in which the no. of $Z=2$ events with >1 hit per bar in only 1 layer is: 60

in which the no. of $Z=2$ events with >1 hit per bar in both layers is: 1