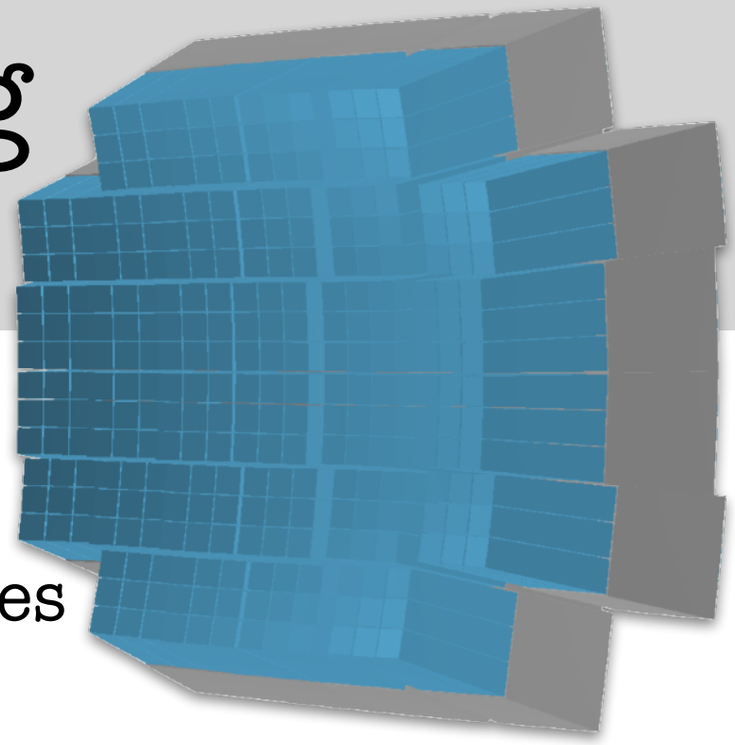
12/09/2019

Status of Calorimeter

Software Meeting



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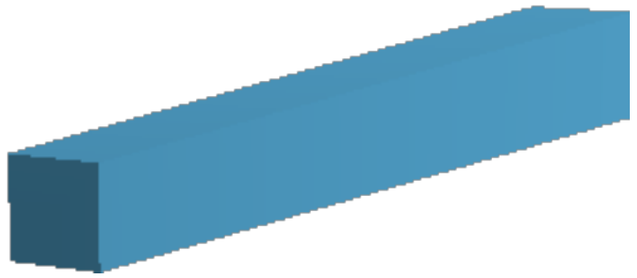
Calo **ROOT** Geometry

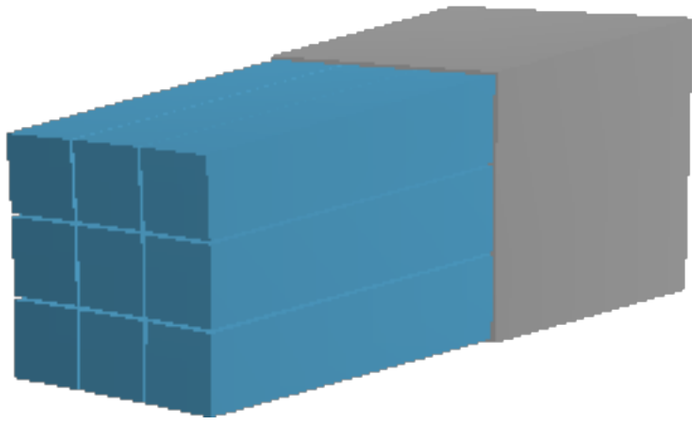
- $FOOTLEVELO/geomaps/TACAdetector.map

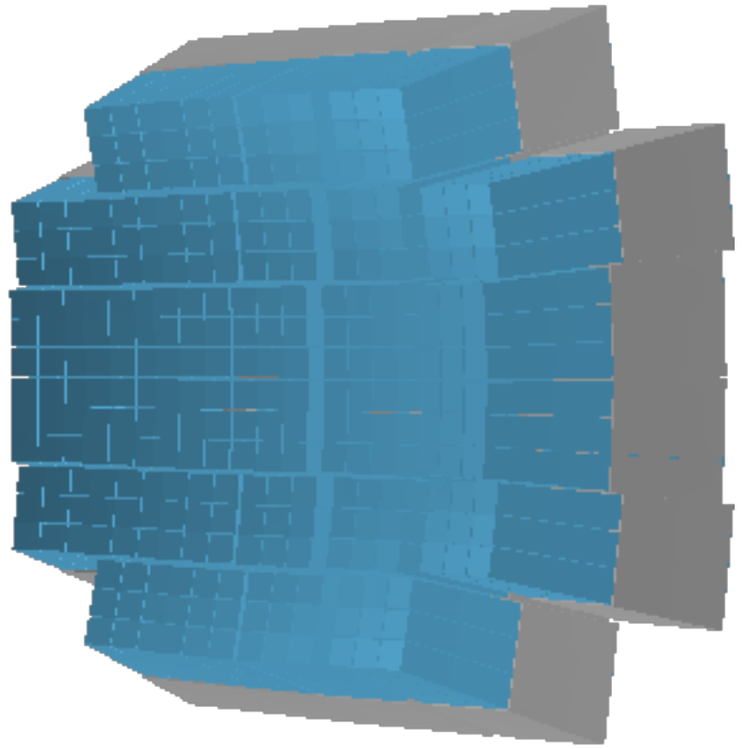
```
Material:       "BGO"
Density:        7.13

// -+-+-+-+--+-+-+-+-+--+-+-+-+-+--+-+-+-+-+--+-+-+-+-+--+-+-+-+-+--+-+-+-+-+-
// Parameter of the Calorimeter (cm)
// -+-+-+-+--+-+-+-+-+--+-+-+-+-+--+-+-+-+-+--+-+-+-+-+--+-+-+-+-+--+-+-+-+-+-
Width:          44.0      Height:       44.0      Thick:      24.0

// -+-+-+-+--+-+-+-+-+--+-+-+-+-+--+-+-+-+-+--+-+-+-+-+--+-+-+-+-+--+-+-+-+-+-
// Parameter of the Crystals (cm)
// -+-+-+-+--+-+-+-+-+--+-+-+-+-+--+-+-+-+-+--+-+-+-+-+--+-+-+-+-+--+-+-+-+-+-
Width:          2.0       Height:       2.0       Thick:      24.0

// -+-+-+-+--+-+-+-+-+--+-+-+-+-+--+-+-+-+-+--+-+-+-+-+--+-+-+-+-+--+-+-+-+-+-
// Parameter of Geometry and TestBeam
// type of geometry (FULL_DET, ONE_CRY, ONE_MOD)
// Setup TestBeam (2_SCN, ...)
// -+-+-+-+--+-+-+-+-+--+-+-+-+-+--+-+-+-+-+--+-+-+-+-+--+-+-+-+-+--+-+-+-+-+-
TypeGeo:        "ONE_MOD"
SetupTB:        "NO"
```

TypeGeo: ONE_CRY
ONE_MOD
FULL_DET

- TACAparGeo::BuildCalorimeter( ) [in ROOT]







Calo **FLUKA** Geometry

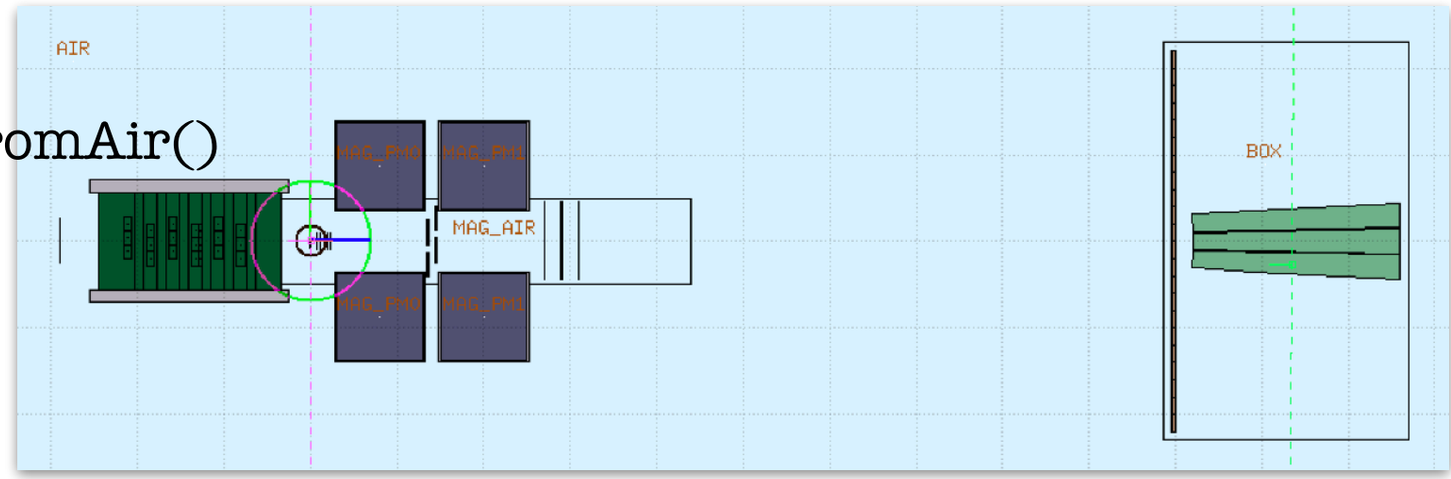
TACAparGeo::PrintBodies()

- TACAparGeo::SPrintCrystalBody

```
// There is no truncate piramid in FLUKA, so we need to define
// 6 half planes
Double_t * local = new Double_t [3];
local[0] = local[1] = local[2] = 0;
Double_t * normal = new Double_t [3];
Double_t * point = new Double_t [3];

TGeoNode *node = crt->node;
TGeoHMatrix matCurrent(crt->mat);
```

```
local[2] =  -zdim;
matCurrent.LocalToMasterVect(local, normal); // normal to front face
matCurrent.LocalToMaster(local, point); // point on front face
TString outstr = TString::Format("PLA P%03d_1  %.8f %.8f %.8f %.8f %.8f %.8f\n", id, normal[0] ,normal[1]
                                 ,point[0], point[1], point[2]);
```

- TACAparGeo::PrintRegions()
- TACAparGeo::PrintParameters()
- TACAparGeo::PrintAssignMaterial()
- TACAparGeo::PrintSubtractBodiesFromAir()



Problem & Solution

Example w/ 3x3 Module:

foot.geo

```
* ********************************************************************************
*                                REGIONS                                         *
* ********************************************************************************
BLACK         5 blk -air
* ***Air
AIR1          5 air +airpla
AIR2          5 air -airpla  -(+P000_1 +P000_2 +P000_3 +P000_4 +P000_5 +P000_6)
  -(+P001_1 +P001_2 +P001_3 +P001_4 +P001_5 +P001_6)
  -(+P002_1 +P002_2 +P002_3 +P002_4 +P002_5 +P002_6)
  -(+P003_1 +P003_2 +P003_3 +P003_4 +P003_5 +P003_6)
  -(+P004_1 +P004_2 +P004_3 +P004_4 +P004_5 +P004_6)
  -(+P005_1 +P005_2 +P005_3 +P005_4 +P005_5 +P005_6)
  -(+P006_1 +P006_2 +P006_3 +P006_4 +P006_5 +P006_6)
  -(+P007_1 +P007_2 +P007   +P007_4 +P007_5 +P007_6)
  -(+P008_1 +P008_2 +P008   +P008_4 +P008_5 +P008_6)
```

Too many parenthesis!

Possible solution: find a way to write the air w/o parenthesis

Very long foot.geo

```
* ********************************************************************************
*                                REGIONS                                         *
* ********************************************************************************
BLACK         5 blk -air
* ***Air
AIR1          5 air +airpla
AIR2          5 | +air -airpla -P0_FRN +P0_LEF +P0_RIG +P0_TOP +P0_DOW
                | +air -airpla -P0_BCK +P0_LEF +P0_RIG +P0_TOP +P0_DOW
                | +air -airpla -P1_FRN +P1_RIG +P1_LEF +P0_TOP +P0_DOW
                | +air -airpla -P1_BCK +P1_RIG +P1_LEF +P0_TOP +P0_DOW
                | +air -airpla -P2_FRN +P2_RIG +P2_LEF +P0_TOP +P0_DOW
                | +air -airpla -P2_BCK +P2_RIG +P2_LEF +P0_TOP +P0_DOW
                | +air -airpla -P3_FRN +P1_RIG +P1_LEF +P1_TOP +P1_DOW
                | +air -airpla -P3_BCK +P1_RIG +P1_LEF +P1_TOP +P1_DOW
                | +air -airpla -P4_FRN +P0_RIG +P0_LEF +P1_TOP +P1_DOW
                | +air -airpla -P4_BCK +P0_RIG +P0_LEF +P1_TOP +P1_DOW
                | +air -airpla -P5_FRN +P2_RIG +P2_LEF +P1_TOP +P1_DOW
                | +air -airpla -P5_BCK +P2_RIG +P2_LEF +P1_TOP +P1_DOW
                | +air -airpla -P6_FRN +P0_RIG +P0_LEF +P2_TOP +P2_DOW
                | +air -airpla -P6_BCK +P0_RIG +P0_LEF +P2_TOP +P2_DOW
                | +air -airpla -P7_FRN +P1_RIG +P1_LEF +P2_TOP +P2_DOW
                | +air -airpla -P7_BCK +P1_RIG +P1_LEF +P2_TOP +P2_DOW
                | +air -airpla -P8_FRN +P2_RIG +P2_LEF +P2_TOP +P2_DOW
```

Strategy & Next Steps

Next Steps:

- Fix the problem of FLUKA simulation w/ a 3x3 module
  if is not complicated and too long:
  build the full calorimeter as in slide 4
  else:
  use LATTICE to replicate the first module

Code needs to be changed!

- Implement Calibration
- Implement Digitization

TACAparGeo ➤ push on branch: **makecalogeometry**