**Geant 4 – Notes:**

**Installation of geant 4 use the presentation:**

~/Research/g-2/work/simulations/InstallazioneGeant4.pdf

Basic notes in hard disk: GEANT4\_TRENTO

**Simple running of standard example:**

1. Copy entire downloaded Geant4 folder to any location of your choice (serves as backup too) – I did in desktop.
2. Building a standard example (I started with B1) - In a preferred location (~/Research/g-2/work/simulations) copy examples folder and then make a build directory:

* cp –r ~/Desktop/Geant4 /geant4.10.05.p01/examples .
* mkdir B1-build
* cd B1-build
* cmake -DGeant4\_DIR=~/Desktop/Geant4/geant4.10.05.p01- install/lib/Geant4-10.5.1/ ../examples/basic/B1/
* make
* ./exampleB1

**To change code:**

1. Define detector specifics(say): change code in src:

* open ../examples/basic/B1/src/B1DetectorConstruction.cc

Make changes in detector – build your own etc....

* make #make in the build folder
* ./exampleB1

Note: Several changes can be made in a macro say run1.mac file and then no need to compile the code. Just run the macro using:

* control/execute run1.mac

After running you get a root file B1.root with useful histogram

**Working on B4c (using a particle gun!!)**

To run w/o visualization faster:

* ./exampleB4c –m run1.mac

Some important points:

Detector code in: ...../examples/basic/B4/B4c/src/B4cDetectorConstruction.cc

Start with defining world (in vaccume) – G4Box, a Logial volume and place it. Repeat the same with Calorimeter. To add a crystal structure:

// Calorimeter

//

auto calorimeterS

= new G4Box("CalorimeterB", // its name

calorSizeXY/2, calorSizeXY/2, calorThickness/2); // its size

auto calorLV

= new G4LogicalVolume(calorimeterS, gapMaterial, // its material

"CalorimeterL"); // its name

G4int k =0;

for(G4int j=0; j<6;j++) {

for(G4int i=0; i<9;i++) {

new G4PVPlacement( 0, G4ThreeVector(calorSizeXY\*i,calorSizeXY\*j, 0), calorLV, "Calorimeter", worldLV, false,

k, // copy number - unique to each crystal

fCheckOverlaps); // checking overlaps

k++;

}

}

Must add a sensitive detector here using the following:

auto caloSD = new B4cCalorimeterSD("CaloSD");

G4SDManager::GetSDMpointer()->AddNewDetector(caloSD);

SetSensitiveDetector("CalorimeterL",caloSD,true);

Important to get energy deposit by crystal id (copy number). Done in code B4cCalorimeterSD.cc using:

G4TouchableHistory\* touchable = (G4TouchableHistory\*)(preStepPoint->GetTouchable());

G4int cryID = touchable->GetVolume()->GetCopyNo();

**Position of particle gun in code B4PrimaryGenerationAction.cc**

fParticleGun

->SetParticlePosition(G4ThreeVector(112.5-12, 72.5, -100));//units are in mm

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**File setting seed and making root trees:** ../examples/basic/B4/B4c/src/B4RunAction.cc

**Some important macros (my own):**

1. plotEnergy.C in path for B4c-build and backup in ../work/simulations
2. plotNtuples etc. not useful...

**Writing my own module:**

I took example B1 and changed its name and then will change its contents. Step wise of what I did:

1. Copy folder B1 to my\_B1
2. Change every name in include and src folder from B1 to my\_B1