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Exercises

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Introduction

- Copy the example **N03** in your local area
- Try to build it and run it.

For each exercise, do the following:

- Read carefully the text
- Try to solve it, by modifying some files of the example N03 in your area
- Look at the solution.

Exercise on: Geometry

- Add a *G4Box* of dimensions:
1 mm x CalorSizeYZ x CalorSizeYZ

- Material: scintillator, *Sci*

Caveat: you need to define a private member variable to store the local variable *Sci*.

- Place the box *1 cm* in front (i.e. before) of the calorimeter along the *x-axis*

Hint: the position along the x-axis of the calorimeter starts at $x = -\text{CalorThickness}/2.0$ and the center of the box should be *1 cm* before it (i.e at lower x).

(continuation)

- The solution is in the directory:
geometry/
- Copy the header files *.hh* in your local directory *include/* and the source files *.cc* in your local directory *src/*

Exercise on: B field

- A global uniform magnetic field is applied along the *z-axis*. Change it in such a way that the field is applied along the *x-axis*.
- Hint: look at the constructor *G4ThreeVector(x,y,z)* in the method *ExN03DetectorConstruction::SetMagField*
- Solution is in the directory: *bfield/*

Exercise on: Physics

- In the directory: *physics_example/* you find how to use the Physics List *LHEP*.
Copy the files in your local directory.
- Change it in such a way to use the Physics List *QGSP* instead of *LHEP*.

Hint: look at the main program *exampleN03.cc*

- Solution is in the directory: *physics/*

Exercise on: Sensitivity

- In the directory: *sensitivity_example/* you find how to make the added scintillator box a *sensitive volume*. Each deposit of energy in this volume produces a *hit* which stores that deposited energy.
Copy the files in your local directory.
- Add to the hit the information of the *(x,y,z)* *position* of the energy deposit.
Hint: use *G4Step::GetPreStepPoint()* and *G4StepPoint::GetPosition()*
- Solution in the directory: *sensitivity/*

Exercise on: Analysis

- In the directory: *analysis_example/* you find a very simple analysis: at the end of each event, the sum of the energy deposits (stored in the hits) in the scintillator box is printed.
Copy the files in your local directory.

- Print also the *average distance* of these hits from the origin *(0,0,0)*.

Hint: use `MyTrackerHit::GetPos()` and `G4ThreeVector::mag()`

- Solution in the directory: *analysis/*