

## Hands-On Session 8

Code without Solution: [hands-on-8.tar.gz](https://github.com/Geant4/Geant4/releases/download/v4.10.6/hands-on-8.tar.gz)

Code with Solution: [hands-on-8-solution.tar.gz](https://github.com/Geant4/Geant4/releases/download/v4.10.6/hands-on-8-solution.tar.gz)

### Exercise 8

#### Part A

- Rotate Tube volume so that the tube symmetry axis is parallel with y-axis of the world reference frame.
- Complete the `EDMagneticField` class to define a magnetic field with  $B=1.0$  tesla in the y-direction and which is limited to the Tube volume.

– Hint: Set magnetic field with use of

```
void G4LogicalVolume::SetFieldManager(G4FieldManager *pFieldMgr, G4bool forceToAllDaughters);
```

- After including a magnetic field, charged particles do not reach the second arm of the detector. Rotate the second arm by 30 degree and check that particles are again detected in the second arm.
- Add changes necessary for multithreading and activate `G4MTRunManager` in `main()`
  - Hint: Use `G4AutoDelete` to get magnetic field safely deleted in MT mode:

```
// Register the field and its manager for deleting
G4AutoDelete::Register(fMagneticField);
G4AutoDelete::Register(fFieldMgr);
```

- When the magnetic field is implemented you can activate its visualization with the UI command:

```
/vis/scene/add/magneticField
```

#### Part B

- Reimplement calorimeter layers with use of `G4PVReplica` and add an additional level of 3 divisions in y axis.
  - Note: After adding the divisions in y axis (cells), the sensitive detector `EDEmCalorimeterSD` has to be associated with the new replica logical volume (cellLV). Also the code used to get the calorimeter layer number has to be adapted for this change in geometry.