Session 8 : Exercise

Code for download: session8_start.tar.gz

Exercise 8a:

- Rotate Tube volume so that the tube symmetry axis is parallel with the 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 the magnetic field, charged particles do not reach the second arm of the detector. Rotate the second arm by 30 degree and check that charged particles are again detected in the second arm.
  Hint: The functions `rotateX(G4double)`, `rotateY(G4double)` *and* `rotateZ(G4double)` *are available also for* `G4ThreeVector` *type.*
- Make changes for multi-threading 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`

Exercise 8b:

- Re-implement 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.

Exercise 8c:

- Inspect the implementation of a command using `G4GenericMessenger` in the `EDEventAction` class, execute the command to inactivate verbose mode and run a new event
- Make randomizing of the particle direction optional, and then implement a command to select the randomize option using `G4GenericMessenger` in an analogous way as the command in `EDEventAction`
  - Add a new data member `fRandomize` of a `G4bool` type
  - Add a `G4GenericMessenger` object in `EDPrimaryGeneratorAction` and call its `DeclareProperty` method to create `setRandomize` command

Solution: session8_solution.tar.gz