

GeoModel

A Detector Description Toolkit for HEP

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Requirements for SPD geometry description

- flexibility and ability for description of complicated geometry
- geometry version
- possibility to easier using the geometry description in simulation(Geant4) and reconstruction

A Detector Description Toolkits

- GeoModel (<https://gitlab.cern.ch/GeoModelDev/GeoModel>)

GeoModel has been used by the ATLAS experiment since 2004.

A toolkit meets all requirements for SPD geometry description.

It doesn't contain magnetic field' description tools.

Documentation is available at <https://geomodel.web.cern.ch/home/>

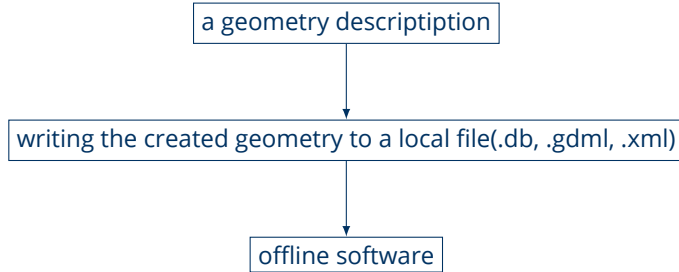
- DD4HEP (<https://gitlab.cern.ch/CLICdp/DetectorSoftware/DD4hep>)

Geometry and material description in GeoModel

- an element: `GeoElement* hydrogen = new GeoElement("Hydrogen","H",1.0,1.008*gr/mole);`
- a material: `GeoMaterial *water = new GeoMaterial("H2O", waterdensity);`
- a shape: `GeoBox* box = new GeoBox(length, width, depth);`
- a logical volume: `GeoLogVol *Log = new GeoLogVol("LogVol", box, water);`
- a physical volume: `GeoPhysVol* LogPhys = new GeoPhysVol(Log);`

The creation scheme of volumes looks like in Geant4.

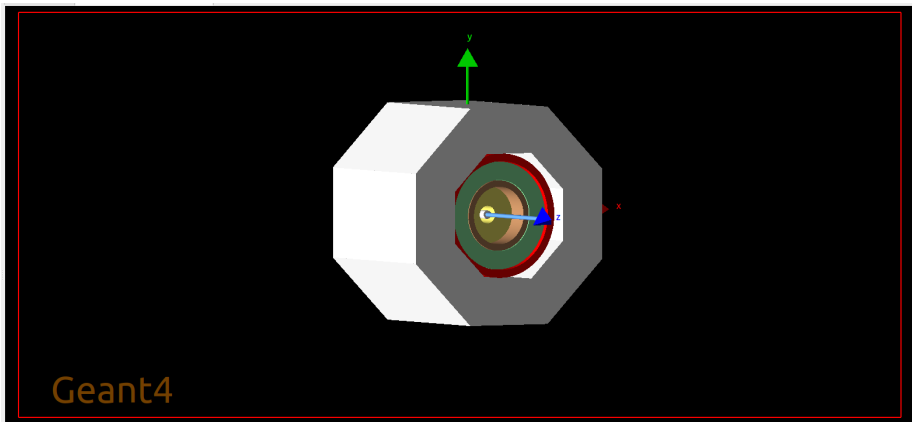
The scheme of interaction with GeoModel



Converting GeoModel data to a Geant4 geometry

```
static const std::string path = "/path to db file/spd.db";  
GMDBManager* db = new GMDBManager(path);  
GeoModelIO::ReadGeoModel readInGeo = GeoModelIO::ReadGeoModel(db);  
GeoPhysVol* world = readInGeo.buildGeoModel();  
ExtParameterisedVolumeBuilder* builder = new ExtParameterisedVolumeBuilder("SPD");  
G4LogicalVolume* g4World = builder->Build(world);  
G4VPhysicalVolume* physWorld = new G4PVPlacement(0, G4ThreeVector(), g4World, "World", 0,  
false, 0, true);
```

First step to the full SPD geometry description



Next steps

- access and navigation amount geometry objects in reconstruction
- association with sensitive volumes of Geant4
- straw tracker description