# Detector description in SAMPO

IX SPD collaboration meeting

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#### SPD detector description in GeoModel

## GeoModel

- GeoModel package (https://geomodel.web.cern.ch/home/) is used to create a new SPD geometry description to SAMPO.
- GeoModel meets all requirements for SPD geometry description.
- GeoModel is used by the FASER and ATLAS experiments at CERN;
- A toolkit provides easy and transparent mechanism of converting GeoModel geometry description to Geant4 geometry description for full simulation. Currently such type of mechanism is developing for comfortable ability using of GeoModel geometry description in reconstruction.
- It doesn't contain magnetic field' description tools;

#### Current status

- The description of the detector is a C++ project.
- It contains several classes:
  - SPDMaterialBuilder a class in which materials are defined;
  - SPDMaterialList a singleton class is responsible for accessing materials;
  - The geometry of each subsystems is described in separate classes.
- Currently, 4 subsystems have been described in full and 1 partially.

#### Current status



#### Micromegas-based Central Tracker



Straw Tracker



#### Electromagnetic calorimeter



#### Range System (in progress)

#### The mechanism of interaction with GeoModel



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#### SAMPO and GeoModel

## Status of integration

- The detector description represented as special type of input data. Data stored in sqlite db file and should accessible by processing job's.
- GeoModelSvc provides access to the db file and builds the GeoModel geometry;
- G4GeoModelTool builds the Geant4 geometry from GeoModel geometry;
- G4DetectorConstructionSvc declares sensitive volumes;
- G4SampoMagneticFieldTool provides access to the magnetic field map and outputs the value of the magnetic field at a given coordinates.

### Sensitive detector for simulation



#### Usage of detector description in reconstruction

- One of the requirements for SPD geometry description is the possibility of using the same geometry description in simulation and reconstruction.
- In the simulation case we can use Geant4 navigation tools.
- In the reconstruction case we don't have ready-to-use tools. The GeoModel developers are working on this.

Current navigation system:

- creating of unique identifier for each detector element;
- providing access to data via identifier.

#### Usage of detector description in reconstruction. Virtual geometry.

- Virtual geometry is mainly used for Tracking geometry;
- Tools to describe and handle 2D surfaces as a part of a Virtual geometry;
- Virtual geometry nodes are placed in the regular geometry tree and can be saved in SQLite file;
- Four surfaces (GeoRectSurface, GeoTrapezoidSurface, GeoDiamondSurface, GeoAnnulusSurface) already have been created;
- An importer tool is being developed by the ACTS developers to directly use ACTS geometries in GeoModel.

### Next steps

- Range system inner structure description;
- Usage detector description in reconstruction;
- BBC inner structure description.

## Thank you for your attention!