

# IDEA Drift Chamber geometry in DD4hep

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Current full simulation code (Geant4): [\[repo\]](#) (to be moved into FCC git?)

- Admixture of geometry description and reconstruction interface
- Thanks to Lorenzo & Valentin we have a gdml file with the full geometry
- In principle much easier to adapt to DD4hep syntax
- However >3.6M lines of code...
- A better strategy is to use both information from gdml and cc files

## Preliminary exploration

This is what most of the gdml code looks like:

```
</physvol>
<physvol copynumber="1" name="spacerDwnSpokeVols9R1_R0x56334f012b60">
  <volumeref ref="spacerDwnSpokeVols9R1_R0x56334f012870"/>
  <rotation name="spacerDwnSpokeVols9R1_R0x56334f012b60_rot" unit="deg" x="0" y="0" z="-1"/>
</physvol>
<physvol copynumber="2" name="spacerDwnSpokeVols9R1_R0x56334f012bf0">
  <volumeref ref="spacerDwnSpokeVols9R1_R0x56334f012870"/>
  <rotation name="spacerDwnSpokeVols9R1_R0x56334f012bf0_rot" unit="deg" x="0" y="0" z="-2"/>
</physvol>
<physvol copynumber="3" name="spacerDwnSpokeVols9R1_R0x56334f012d00">
  <volumeref ref="spacerDwnSpokeVols9R1_R0x56334f012870"/>
  <rotation name="spacerDwnSpokeVols9R1_R0x56334f012d00_rot" unit="deg" x="0" y="0" z="-3"/>
</physvol>
<physvol copynumber="4" name="spacerDwnSpokeVols9R1_R0x56334f012db0">
```

- It is useful to have an xml-like structure to define simple volumes in the detector xml file (DD4hep compact)
- The actual assembly of the various volumes is done in a C++ code
- Each volume is easily duplicated and placed into the world in DD4hep via C++ loops
- There are some strange patterns in the gdml which I suspect can be dramatically simplified by looking at the cc code
- For instance 360 copies of the same volume with 1 degree rotation along z sounds a lot like a simple tube



# First good news

The list of materials used in the simulation is already usable!

- Same syntax as Geant4
- For now I am using a local branch of the LHCb Detector repository
- Plan to move it to FCC repo as soon as some progress is made

```
GNU nano 2.3.1 File: materials.xml
<materials>
<!--
  (c) Copyright 2020 CERN for the benefit of the LHCb Collaboration

  This software is distributed under the terms of the GNU General Public
  Licence version 3 (GPL Version 3), copied verbatim in the file "COPYING".

  In applying this licence, CERN does not waive the privileges and immunities
  granted to it by virtue of its status as an Intergovernmental Organization
  or submit itself to any jurisdiction.
-->

<materials>
  <isotope N="1" Z="1" name="H10x5633439b04f0">
    <atom unit="g/mole" value="1.00782503081372"/>
  </isotope>
  <isotope N="2" Z="1" name="H20x5633439b0590">
    <atom unit="g/mole" value="2.01410199966617"/>
  </isotope>
  <element name="H0x5633439b0600">
    <fraction n="0.999885" ref="H10x5633439b04f0"/>
    <fraction n="0.000115" ref="H20x5633439b0590"/>
  </element>
</materials>
```