

WG 5.2.1 Meeting Simulation - Phase-I

October 13th 2022

Marco Leite (USP)

WG 5.2.1 Simulation Phase-I

Minutes from Oct. 13th. 2022 meeting



Attendance : G. Saito, G. Giacominni, M. Gauzelli, M. Morales, M. Leite

Hide

Introduction (M. Leite)

- Minutes from previous meeting for comments
- Described the open issues, the severity and the effort needed to work on each one
- We changed the time to 10:30

TCAD Simulation (R. Buhler , R. Giacominni)

- Still working on Taylor's example file
- R. Giacomini and R. Buhler will work tomorrow on the code to understanding the pending issues
- In case the code still does not run, they will make some assumptions (and will discuss them)

Geant 4 Simulation (M. Morales)

- Simulation is running !
- M. Morales presented the first results and we discussed the next steps and possible tests at local facilities
- M. Morales will persist data in a convenient ROOT tree structure
- We need also the metadata (Primary particle conditions, physics model etc.)

Action Items :

- TCAD Simulation :
 - Priority is to run without errors the example file
 - Will aim for next meeting, discuss offline if needed
- Geant4 Simulation :
 - Data persistence as ROOT file
 - Upload code to Gitlab

M. Leite, 13/10/2022

WG 5.2.1 Simulation Phase-I - Gitlab Issues

Project issues in Gitlab as of Today (20/10/2022)

Geant4 4 19

Validate advanced GDML Geometry construction
Effort Medium Feature New
Priority Medium
Oct 27 4
Needs attention
usp9/UFSD/simulati... #2

Save data in ROOT TTree format
Effort Medium Feature New
Priority Medium
Oct 6 5 On track
usp9/UFSD/simula... #7

Edit README.md
Effort Low Priority High
Oct 3 7
usp9/UFSD/simulati... #8

Push current version to gitlab
Effort Low Priority High
Today 3
usp9/UFSD/simulation/... #9

TCAD 3 23

Explore the AC-LGAD first example in Sentaurus (UCSC)
Effort Medium Feature New
Priority High
Oct 6 9
Needs attention
usp9/UFSD/simula... #2

Generate electrical field for the AC-LGAD structures from Taylor's example
Effort Medium
Priority Blocking
Oct 6 7
usp9/UFSD/simula... #4

Contact Taylor to understand error in his example
Effort Low Priority Blocking
Oct 4 7
Needs attention
usp9/UFSD/si... #2

KDetSim 0 0

OPEN

USP > Simulation > Issues

Open 7 Closed 5 All 12

Search or filter results... Created date

Push current version to gitlab
usp9/UFSD/simulation/geant4-simulations#9 - created 2 weeks ago by Marco Leite Oct 20, 2022 3
Effort Low Geant4 Priority High updated 1 week ago

Edit README.md
usp9/UFSD/simulation/geant4-simulations#8 - created 2 weeks ago by Marco Leite Oct 3, 2022 7
Effort Low Geant4 Priority High updated 2 weeks ago

Generate electrical field for the AC-LGAD structures from Taylor's example
usp9/UFSD/simulation/tcad-simulations#4 - created 2 weeks ago by Marco Leite Oct 6, 2022 7
Effort Medium Priority Blocking TCAD updated 2 weeks ago

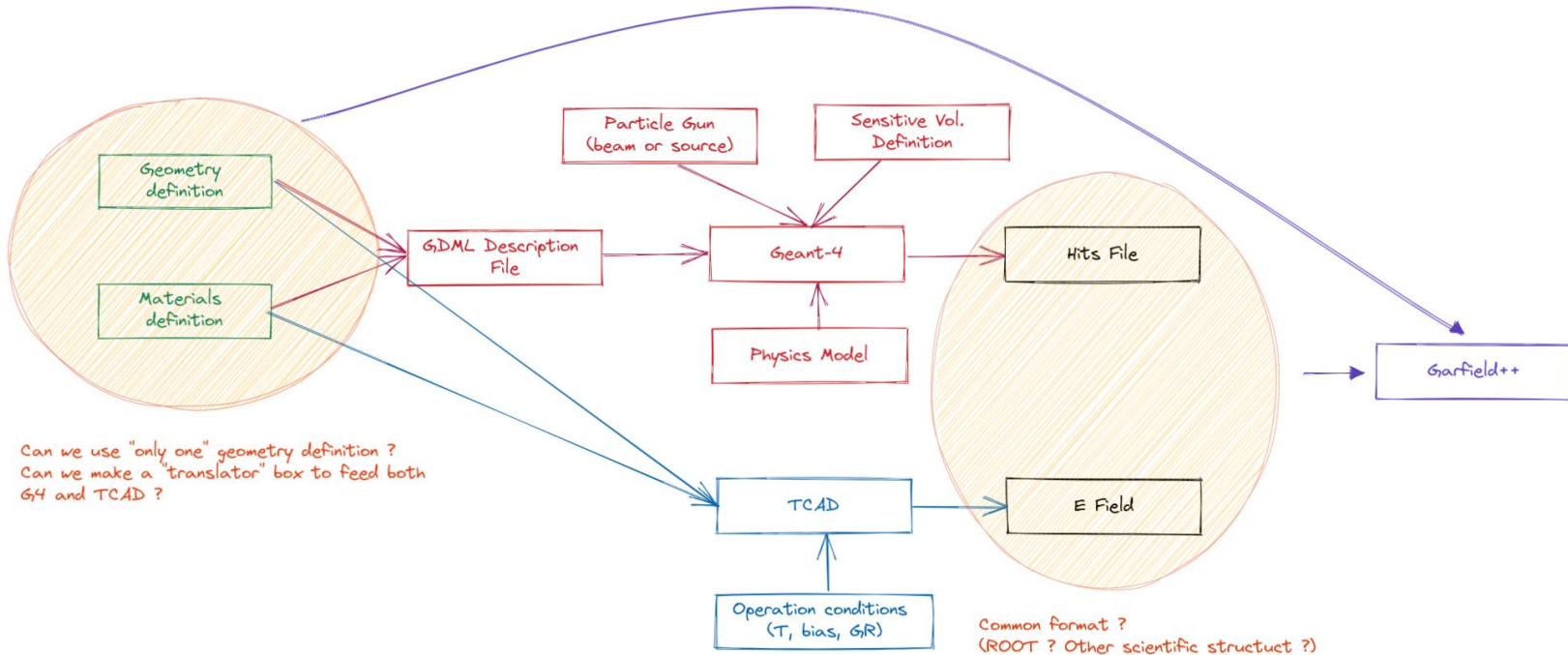
Contact Taylor to understand error in his example
usp9/UFSD/simulation/tcad-simulations#2 - created 2 weeks ago by Marco Leite Oct 4, 2022 7
Needs attention Effort Low Priority Blocking TCAD updated 5 days ago

Save data in ROOT TTree format
usp9/UFSD/simulation/geant4-simulations#7 - created 2 weeks ago by Marco Leite Oct 6, 2022 5
On track Effort Medium Feature New Geant4 Priority Medium updated 2 weeks ago

Validate advanced GDML Geometry construction
usp9/UFSD/simulation/geant4-simulations#2 - created 3 weeks ago by Marco Leite Oct 27, 2022 4
Needs attention Effort Medium Feature New Geant4 Priority Medium updated 1 week ago

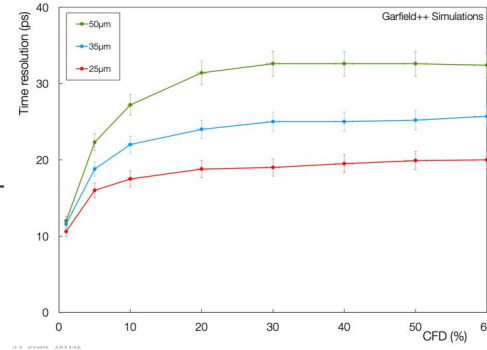
Explore the AC-LGAD first example in Sentaurus (UCSC) and development
usp9/UFSD/simulation/tcad-simulations#1 - created 1 month ago by Marco Leite TCAD Initial configuration Oct 6, 2022 9
Needs attention Effort Medium Feature New Priority High TCAD updated 2 weeks ago

WG 5.2.1 Simulation Phase-I - Charge Transport



WG 5.2.1 Simulation Phase-I - Charge Transport

- Evaluate Garfield++
 - <https://gitlab.cern.ch/garfield/garfieldpp>
 - The example (from tutorial) planar.py
 - Need to map geometry from GDML/TCAD to G++



GARFIELD++
SIMULATION

S. Strazzi 2022

- Change HEED to Geant4 (seems trivial)
- Needs Geant4 information from file

- Change field from analytical calculation to TCAD
- Get E field (2D and 3D) from TCAD

4.2.2. Synopsis TCAD

Electric fields calculated using the device simulation program Synopsis Sentaurus [46] can be imported with the classes ComponentTcad2d and ComponentTcad3d (derived from the base class ComponentTcadBase).

The function to import the field map is

```
bool Initialize(const std::string& gridfilename,  
              const std::string& datafilename);
```

gridfilename name of the mesh file, the extension is typically .grd

datafilename name of the file containing the nodal solution; the filename typically ends with _des.dat

Both files have to be exported in DF-ISE format, files in the default TDR format cannot be read. To convert a TDR file to _ .dat and .grd files, the Sentaurus tool tdx can be used

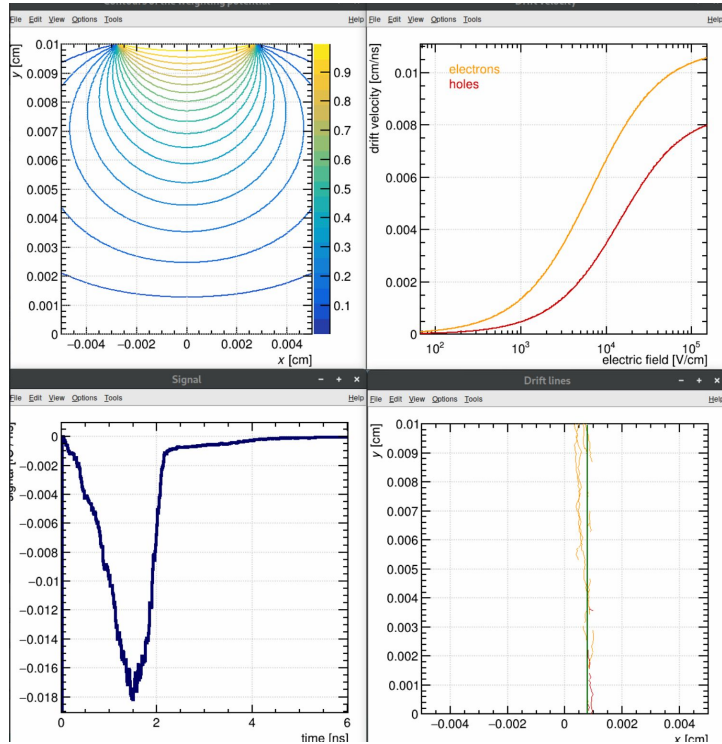
```
tdx -dd fieldToConvert.tdr
```

```
# Retrieve the clusters along the track.  
while track.GetCluster(xc, yc, zc, tc, ne, ec, extra):  
    # Loop over the electrons in the cluster.  
    for j in range(ne.value):  
        xe = ctypes.c_double(0.)  
        ye = ctypes.c_double(0.)  
        ze = ctypes.c_double(0.)  
        te = ctypes.c_double(0.)  
        ee = ctypes.c_double(0.)  
        dx = ctypes.c_double(0.)  
        dy = ctypes.c_double(0.)  
        dz = ctypes.c_double(0.)  
        track.GetElectron(j, xe, ye, ze, te, ee, dx, dy, dz)
```

[Garfield++ Documentation](#)

WG 5.2.1 Simulation Phase-I - Charge Transport

- Running planar.py “stock” example (alpha, 1MeV, 50V)



- Running planar.py “stock” example (alpha, 1MeV, 200V)

