# 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. Moralles, 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. Moralles)**

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

**Action Items  :**

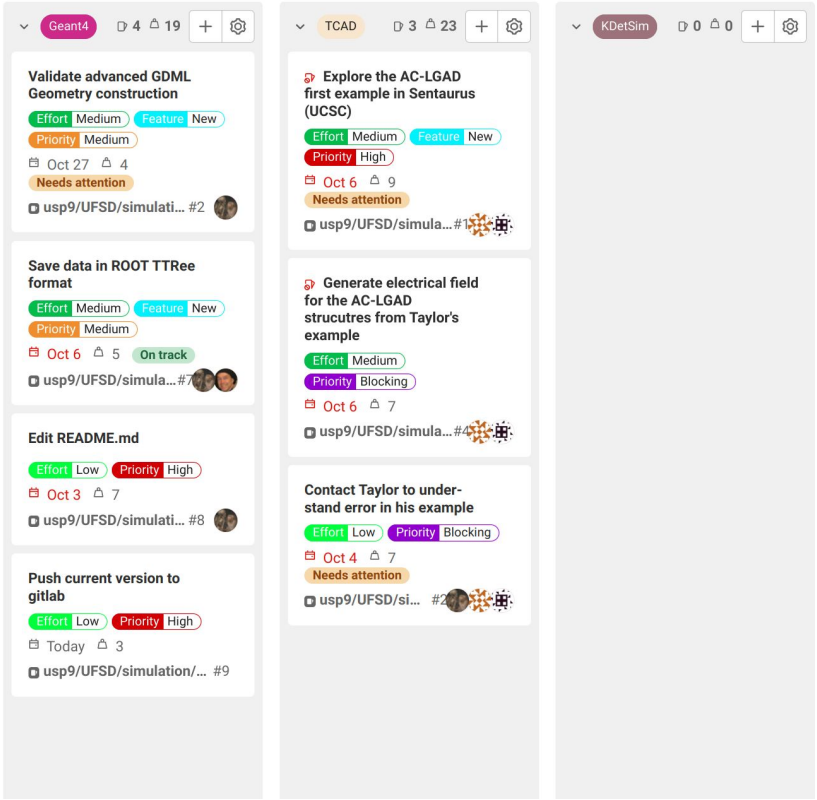
- TCAD SImulation :
  - Priority is to run without errors the example file
  - Will aim for next meeting, discuss offline if needed
- Geant4 Simulation :
  - Data persistence as ROOT file
  - Upload code to Gitlab

M. Leite, 13/10/2022

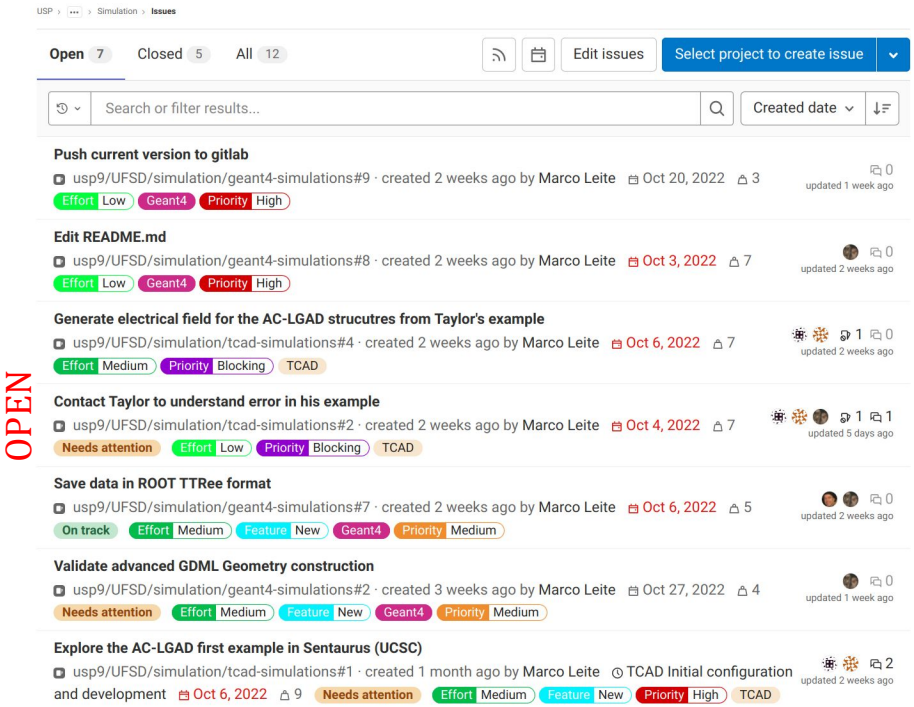
13/10/2022, 17:48 Marco Lisboa Leite

# WG 5.2.1 Simulation Phase-I - Gitlab Issues

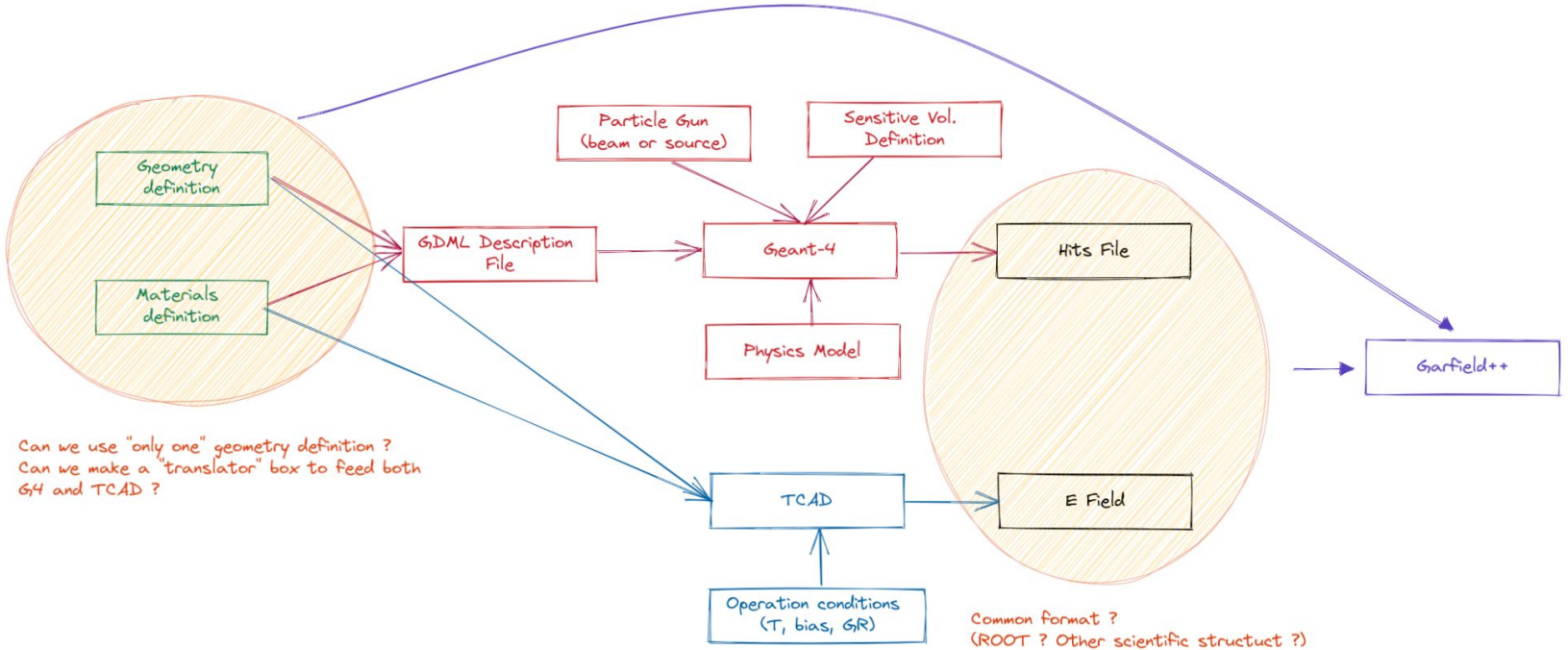
Project issues in Gitlab as of Today (20/10/2022)




OPEN

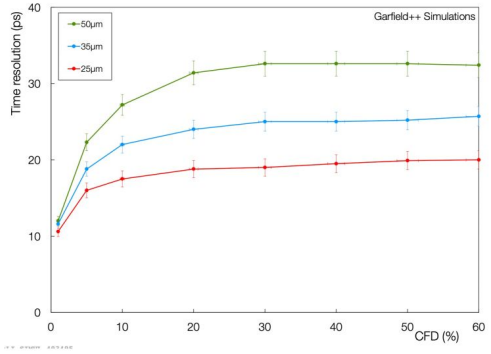


# WG 5.2.1 Simulation Phase-I - Charge Transport



# 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++



*S. Strazzi 2022*

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

```
# 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)
```

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

#### 4.2.2. Synopsys TCAD

Electric fields calculated using the device simulation program Synopsys 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 Initialise(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 typically ends with `_des.dat`

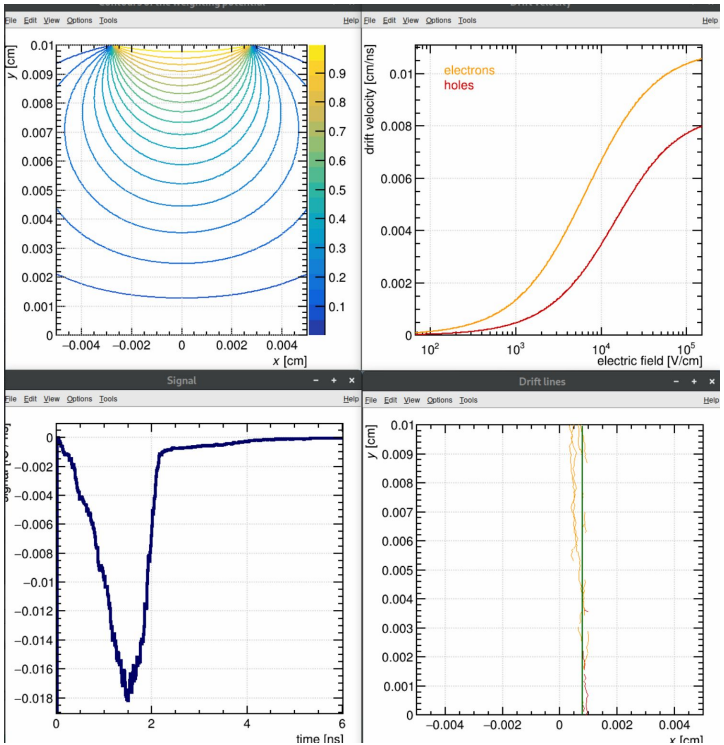
Both files have to be exported in DF-ISE format, files in the default TDR format cannot be read. To convert a TDR file to `_.dat` and `.grd` files, the Sentaurus tool `tdx` can be used

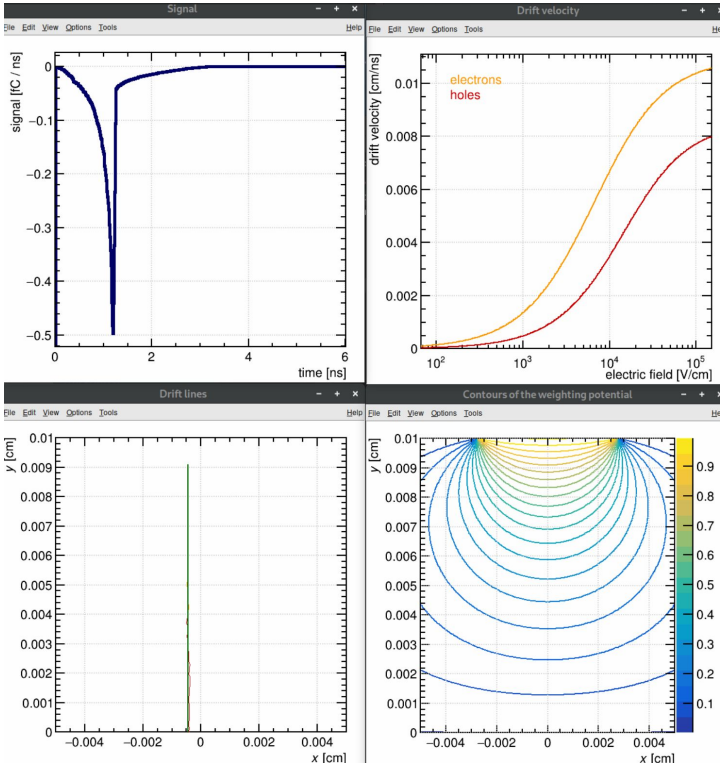
```
tdx -dd fieldToConvert.tdr
```

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)