Potential issue with the wire-cell

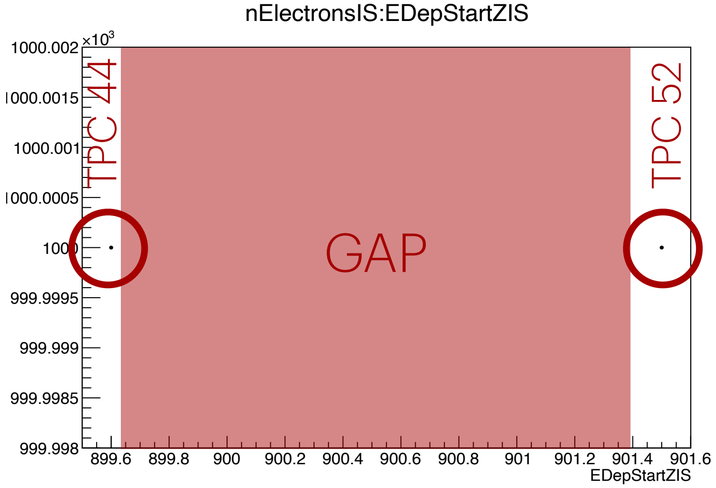
Daria Borodulina, Anselmo Meregaglia, LP2i Bordeaux

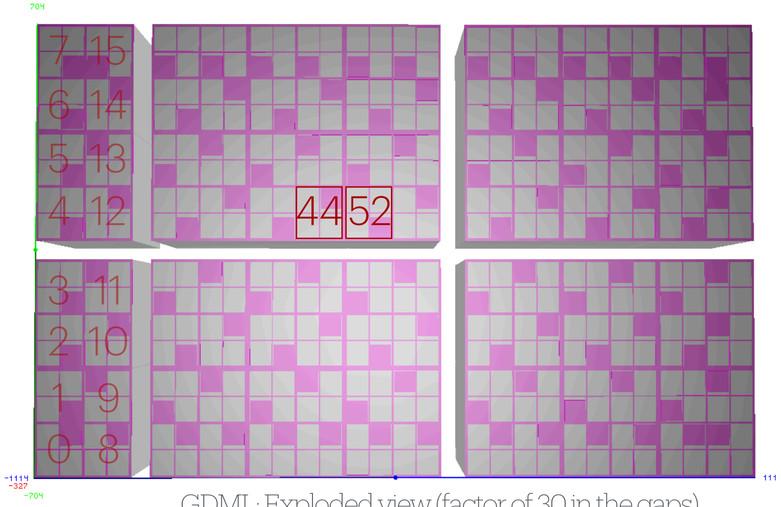
Introduction

- I'm working with the new geometry for DUNE FD-VD with realistic dimensions of the gaps between CRPs: dunevd10kt_3view_30deg_v7_refactored_1x8x14.gdml
- Wire-cell geometry was created by Haiwang: dunevd10kt_3view_30deg_v7_refactored_1x8x14.json.bz2

The same issue is present for "old" standard geometry
(dunevd10kt_3view_30deg_v6_refactored_1x8x6.gdml)

- We were looking at single deposited energies near the edge of the gap:





GDML: Exploded view (factor of 30 in the gaps)

Standard detsim

```
Info in <TGeoManager::Import>: Reading geometry from file: /sps/lbno/daria/tool/localProducts_larsoft_v10_06_00_e26_prof/dunecore/v10_04_05d00/gdml/dunevd10kt_3view_30deg_v7_refactored_1x8x14.gdml
Info in <TGeoManager::TGeoManager>: Geometry GDMLImport, Geometry imported from GDML created
Error: Unsupported GDML Tag Used :gdml_simple_extension. Please Check Geometry/Schema.
Error: Unsupported GDML Tag Used :extension. Please Check Geometry/Schema.
Error: Unsupported GDML Tag Used :color. Please Check Geometry/Schema.
Error: Unsupported GDML Tag Used :color. Please Check Geometry/Schema.
Error: Unsupported GDML Tag Used :color. Please Check Geometry/Schema.
Error: Unsupported GDML Tag Used :color. Please Check Geometry/Schema.
Error: Unsupported GDML Tag Used :color. Please Check Geometry/Schema.
Info in <TGeoManager::SetTopVolume>: Top volume is volWorld. Master volume is volWorld
Info in <TGeoNavigator::BuildCache>: --- Maximum geometry depth set to 100
Info in <TGeoManager::CheckGeometry>: Fixing runtime shapes...
Info in <TGeoManager::CheckGeometry>: ...Nothing to fix
Info in <TGeoManager::CloseGeometry>: Counting nodes...
Info in <TGeoManager::Voxelize>: Voxelizing...
Info in <TGeoManager::CloseGeometry>: Building cache...
Info in <TGeoManager::CountLevels>: max level = 6, max placements = 292
Info in <TGeoManager::CloseGeometry>: 98052 nodes/ 594 volume UID's in Geometry imported from GDML
Info in <TGeoManager::CloseGeometry>: ----------------modeler ready----------------
registering to  primaryGeneratorActionsMap_
registering to   eventActionsMap_
registering to   trackingActionsMap_
registering to  steppingActionsMap_
Warning in <TFile::Append>: Replacing existing TH1: FieldResponse_U (Potential memory leak).
Warning in <TFile::Append>: Replacing existing TH1: FieldResponse_V (Potential memory leak).
Warning in <TFile::Append>: Replacing existing TH1: FieldResponse_Y (Potential memory leak).
[11:42:27.726] I [  wct   ] loading compressed json file: /sps/lbno/daria/tool/localProducts_larsoft_v10_06_00_e26_prof/dunereco/v10_07_00d00/wire-cell-cfg/dunevd10kt_3view_30deg_v7_refactored_1x8x14.json.bz2
[11:42:54.271] I [  wct   ] loading compressed json file: /sps/lbno/daria/tool/localProducts_larsoft_v10_06_00_e26_prof/dunereco/v10_07_00d00/wire-cell-cfg/dunevd-resp-isoc3views-18d92.json.bz2
[11:42:56.840] I [  wct   ] loading compressed json file: /sps/lbno/daria/tool/localProducts_larsoft_v10_06_00_e26_prof/dunereco/v10_07_00d00/wire-cell-cfg/dunevd10kt-1x6x6-3view30deg-noise-spectra-v1.json.bz2
```

Correct geometry

Correct wire-cell configuration

One energy deposition near the left and right border of the gap

Energy depositions at z = 898.6; 901.5:
first point on the right edge of HTPC 44, second one on the left edge of HTPC 52

```
tree->Scan("HADC:HWire:HTPC", "HPlane == 2")
************************************************************
*    Row   * Instance *      HADC *     HWire *       HTPC *
************************************************************
*        0 *       15 * 145.45500 *         0 *         44 *
*        0 *       16 * 27.444999 *         2 *         44 *
*        0 *       17 * 63.354999 *       290 *         44 *
*        0 *       18 * 82.955001 *       290 *         44 *
*        0 *       19 * 5218.2099 *       291 *         44 *
*        0 *       20 * 1065.2999 *       291 *         44 *
*        0 *       34 * 5214.5102 *         0 *         52 *
*        0 *       35 * 1037.7700 *         0 *         52 *
*        0 *       36 * 149.36500 *         1 *         52 *
*        0 *       37 * 88.245002 *         1 *         52 *
*        0 *       38 * 30.184999 *       289 *         52 *
*        0 *       39 * 147.69999 *       291 *         52 *
************************************************************
```

HADC = Hit->HitSummedADC()

????

High HADC at the end of CRU 44: last wires

High HADC at the beginning of CRU 52: first wires

????

It feels like wire 0 is the next one on the right from wire 291 (in the same HTPC!)

One energy deposition inside the CRP

At z = 890 (gap between 899.7 and 901.4)

As expected!

```
[Root > tree->Scan("HADC:HWire:HTPC", "HPlane == 2")
************************************************************
*    Row   * Instance *      HADC *     HWire *      HTPC *
************************************************************
*        0 *       12 * 42.455001 *       271 *        44 *
*        0 *       13 * 3587.2949 *       272 *        44 *
*        0 *       14 * 4254.2597 *       273 *        44 *
*        0 *       15 * 61.004997 *       274 *        44 *
************************************************************
```

Correct HTPC

HWire between 271 and 274:

(150 cm (CRU) - 292 wires)