

Geometry Updates

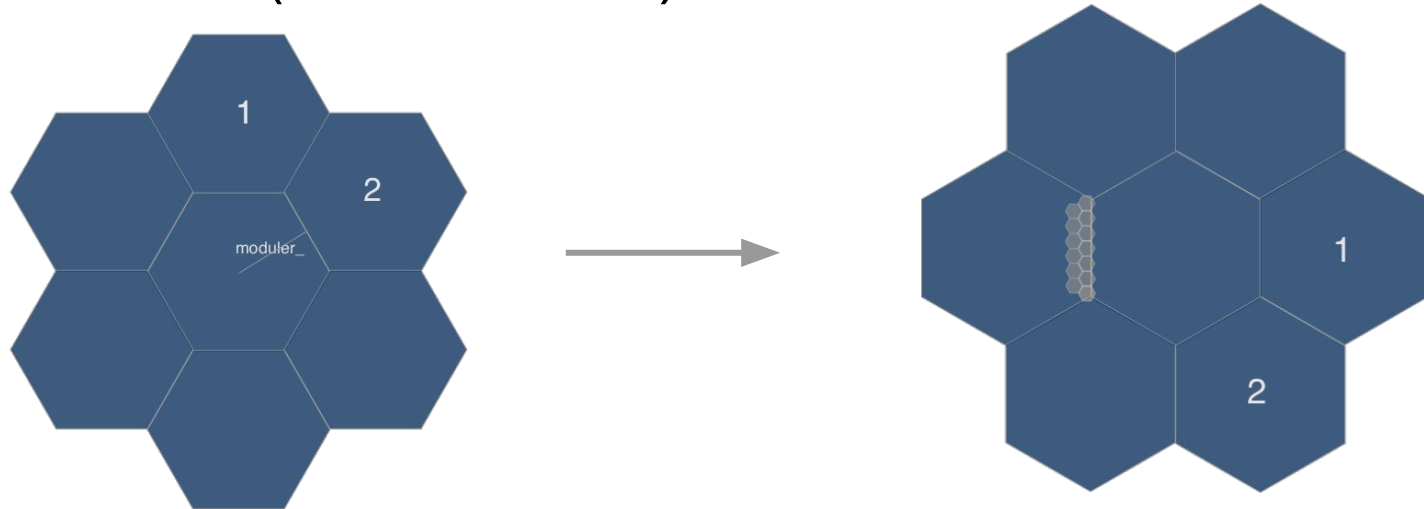
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Outline

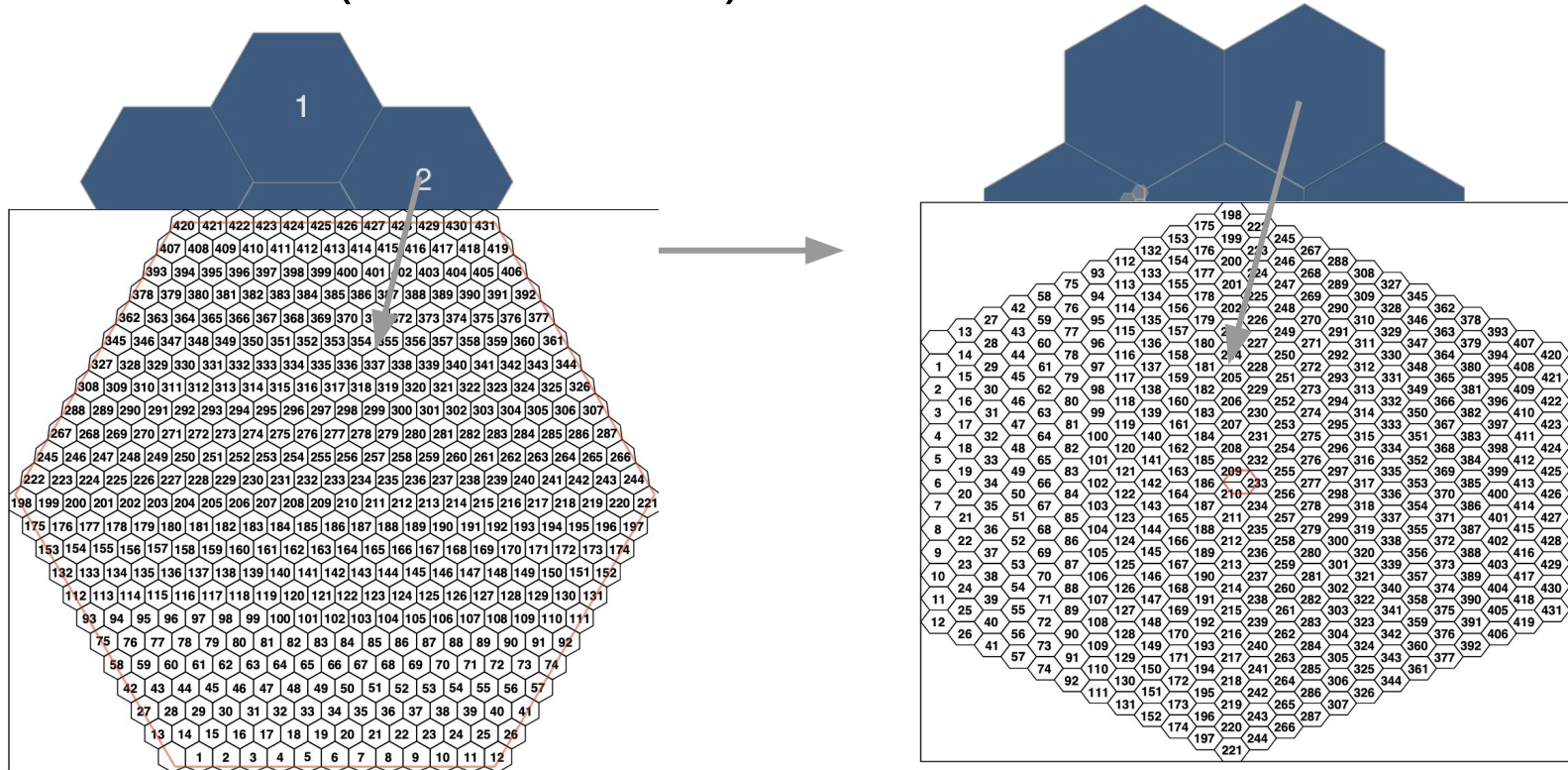
- V13 rotation
 - Implemented and included in v3.0.0 ldmx-sw
 - Plots for v3.0.0 v12 (unrotated) and v13 (rotated) samples:
https://github.com/Hongyin-bug/LDMX-ECal-Geometries/tree/main/v13-rotation/plots_validation
 - Plots before going through a trigger skim have little variance between v12 and v13
- Layer shift
 - Implemented in branch “iss904-rotate-shift” (built layer-shifted ldmx-sw successfully).
 - Currently based on v3.0.0 v13 rotated, but can also add offsets for v12 unrotated.
 - Currently: produce a small sample (check for anomalies).

v13 Rotation (General Idea)



The “flower shape” of modules

v13 Rotation (General Idea)

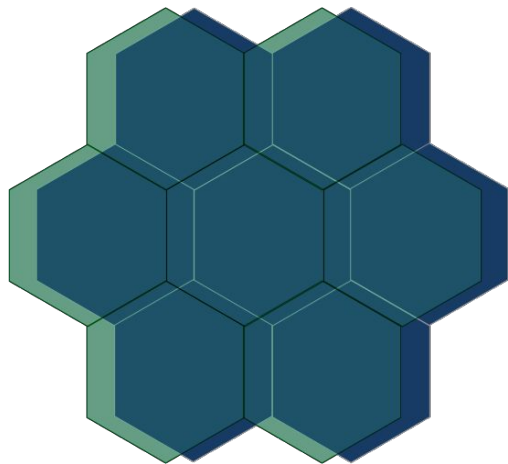


The honeycomb maps for each module

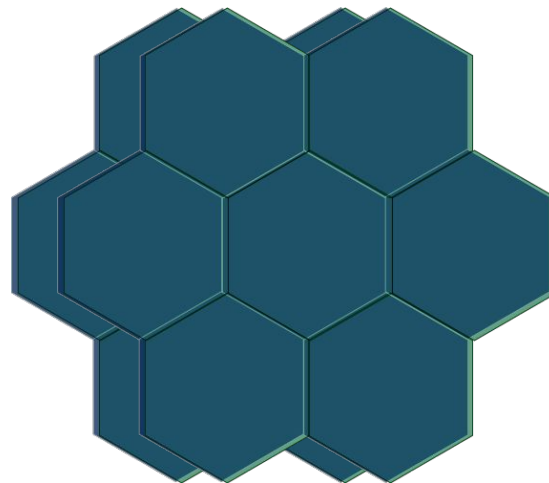
v13 Rotation (Files changed)

- **EcalHexReadout.py, HcalGeometry.py**
 - Cell size is now $85 \times 2 / 35 \sim 4.857\text{mm}$ (v13) instead of $85 \times 2 / 35.3 \sim 4.816\text{mm}$ (v12) (to keep the *triple point* of a module at the center)
 - A boolean variable “cornersSideUp” defined (true if rotated, false if not).
- **EcalHexReadout.h, EcalHexReadout.cxx**
 - Contains both v12 and v13 (differentiated by “if, else” statements using “cornersSideUp”)
 - Changes for v13:
 - Rotated honeycomb map
 - Center locations of each module changed
- **ecal.gdml, constants.gdml**
 - Changes for v13:
 - Materials for each module- rotated 90 degrees
 - Center locations of each module changed

Layer shift/offsets (General Idea: two types)



Shift within each Bilayer



Shift every other Bilayer

Layer shift/offsets (Files changed)

- **Note:** the module and cell-module position maps of the old versions do not have x-y positions as a function of layer ID, so structural changes are made to include layershift.
- **ldmx-sw:** iss904-rotate-shift (parameters layer shift x and layer shift y)
 - **EcalHexReadout.py, HcalGeometry.py**
 - **EcalHexReadout.h, EcalHexReadout.cxx**
 - Includes structural changes for the **module** and **cell-module position maps**
 - **ecal.gdml, constants.gdml**
- Files changed to be consistent with the structural changes:
 - Simcore: **EcalSD.cxx**
 - Ecal: **EcalTriggerGeometry.h, EcalTriggerGeometry.cxx, EcalVetoProcessor.h,**