

AF4 Dataset Geometry

Example of Voxelization

Layer 0 with 36 voxels:

Bin Start Alpha:

```
[0.0, 1.57, 3.14, 4.71, 0.0, 1.57, 3.14, 4.71, 0.0, 1.57, 3.14, 4.71,  
0.0, 1.57, 3.14, 4.71, 0.0, 1.57, 3.14, 4.71, 0.0, 1.57, 3.14, 4.71,  
0.0, 1.57, 3.14, 4.71, 0.0, 1.57, 3.14, 4.71, 0.0, 1.57, 3.14, 4.71]
```

Bin Size Alpha:

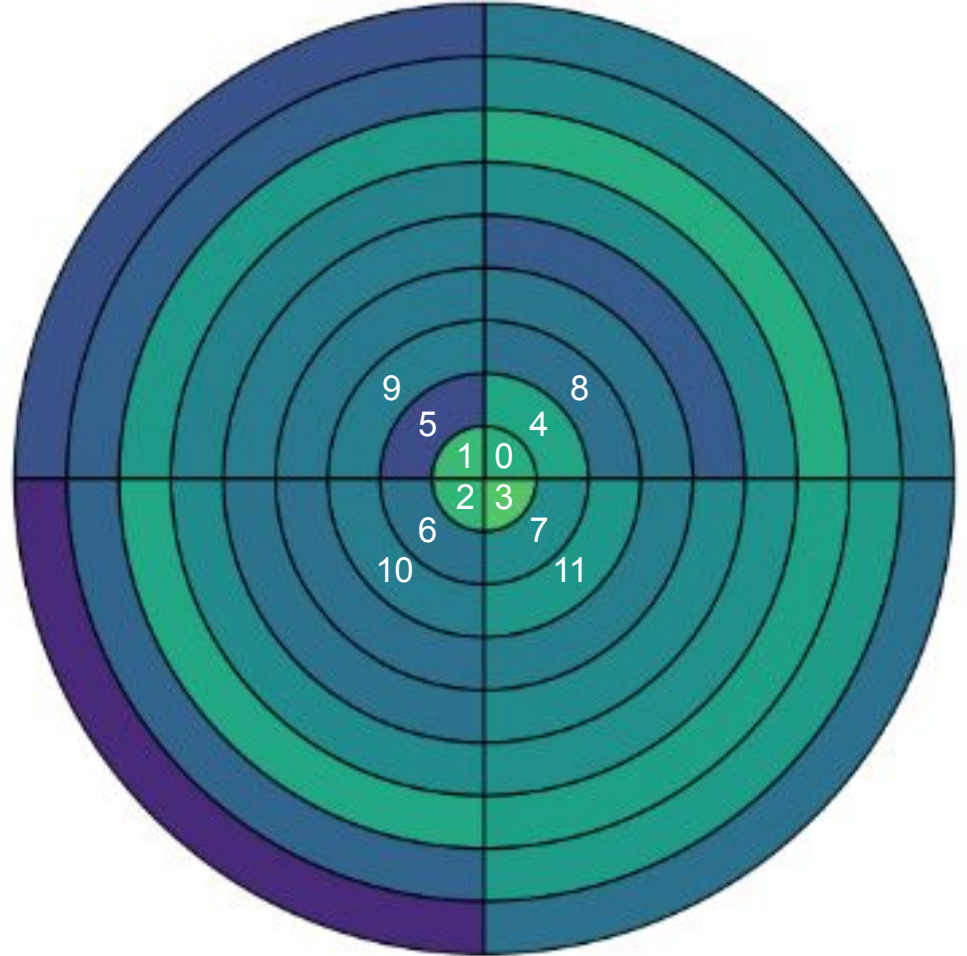
```
[1.57, 1.57, 1.57, 1.57, 1.57, 1.57, 1.57, 1.57, 1.57, 1.57, 1.57,  
1.57, 1.57, 1.57, 1.57, 1.57, 1.57, 1.57, 1.57, 1.57, 1.57, 1.57,  
1.57, 1.57, 1.57, 1.57, 1.57, 1.57, 1.57, 1.57, 1.57, 1.57, 1.57,  
1.57, 1.57, 1.57]
```

Bin Start Radius:

```
[0.0, 0.0, 0.0, 0.0, 10.0, 10.0, 10.0, 10.0, 20.0, 20.0, 20.0, 20.0,  
40.0, 40.0, 40.0, 40.0, 60.0, 60.0, 60.0, 60.0, 80.0, 80.0, 80.0,  
80.0, 100.0, 100.0, 100.0, 100.0, 100.0, 300.0, 300.0, 300.0, 300.0,  
500.0, 500.0, 500.0, 500.0]
```

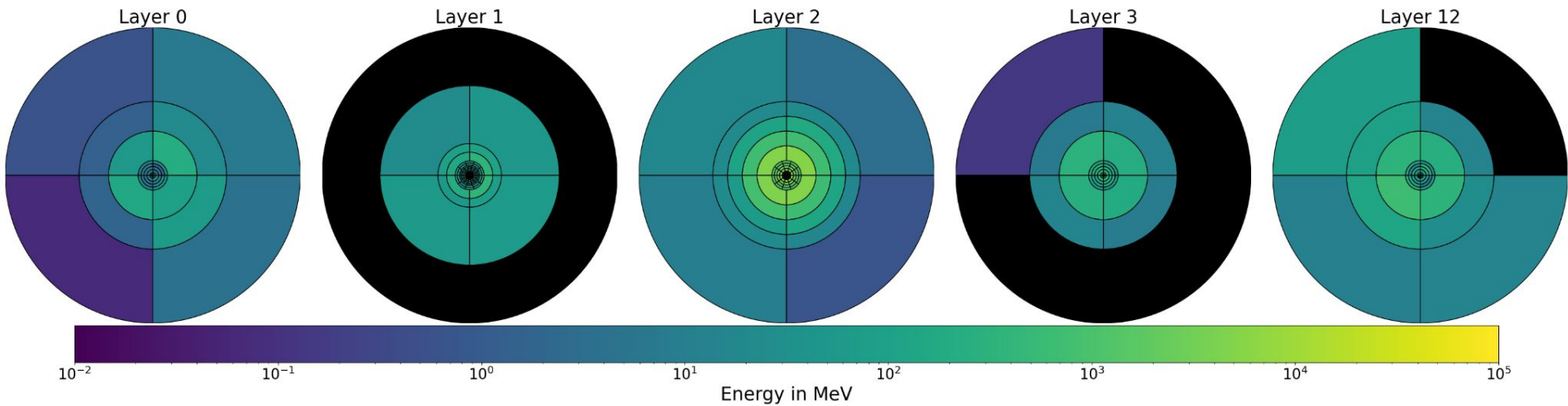
Bin Size Radius:

```
[10.0, 10.0, 10.0, 10.0, 10.0, 10.0, 10.0, 10.0, 20.0, 20.0, 20.0,  
20.0, 20.0, 20.0, 20.0, 20.0, 20.0, 20.0, 20.0, 20.0, 20.0, 20.0,  
20.0, 20.0, 200.0, 200.0, 200.0, 200.0, 200.0, 200.0, 200.0, 200.0,  
200.0, 500.0, 500.0, 500.0, 500.0]
```



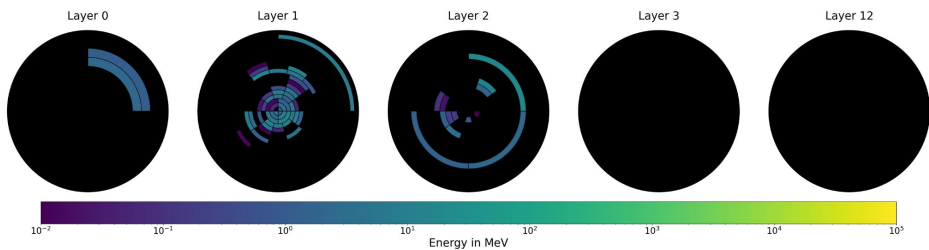
True r plots doesn't look good...

Calorimeter Layer Energy Diagram when $E = 1048.58$ GeV

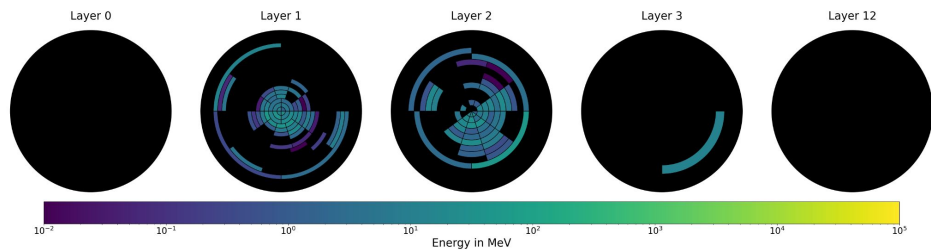


Visualization:

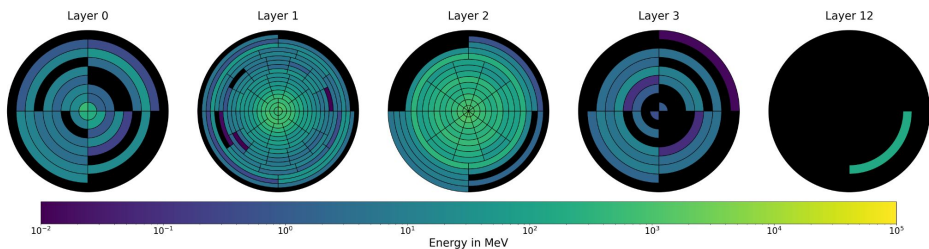
Calorimeter Layer Energy Diagram when $E = 0.26$ GeV



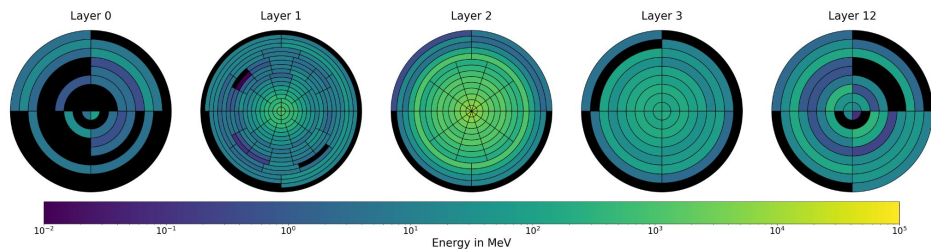
Calorimeter Layer Energy Diagram when $E = 1.02$ GeV



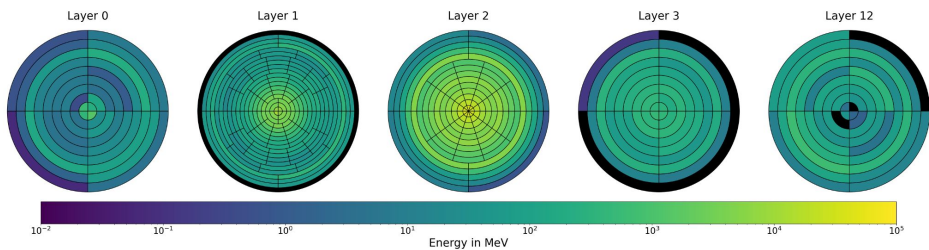
Calorimeter Layer Energy Diagram when $E = 65.54$ GeV



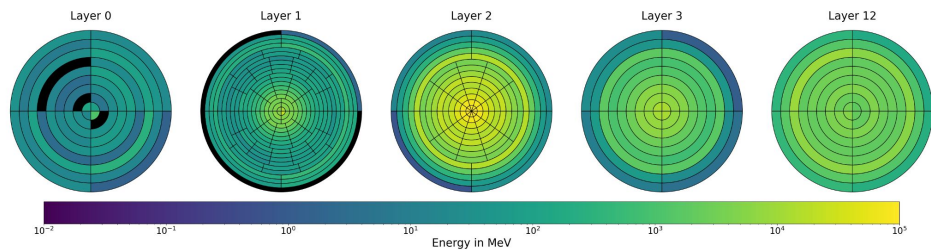
Calorimeter Layer Energy Diagram when $E = 262.14$ GeV



Calorimeter Layer Energy Diagram when $E = 1048.58$ GeV

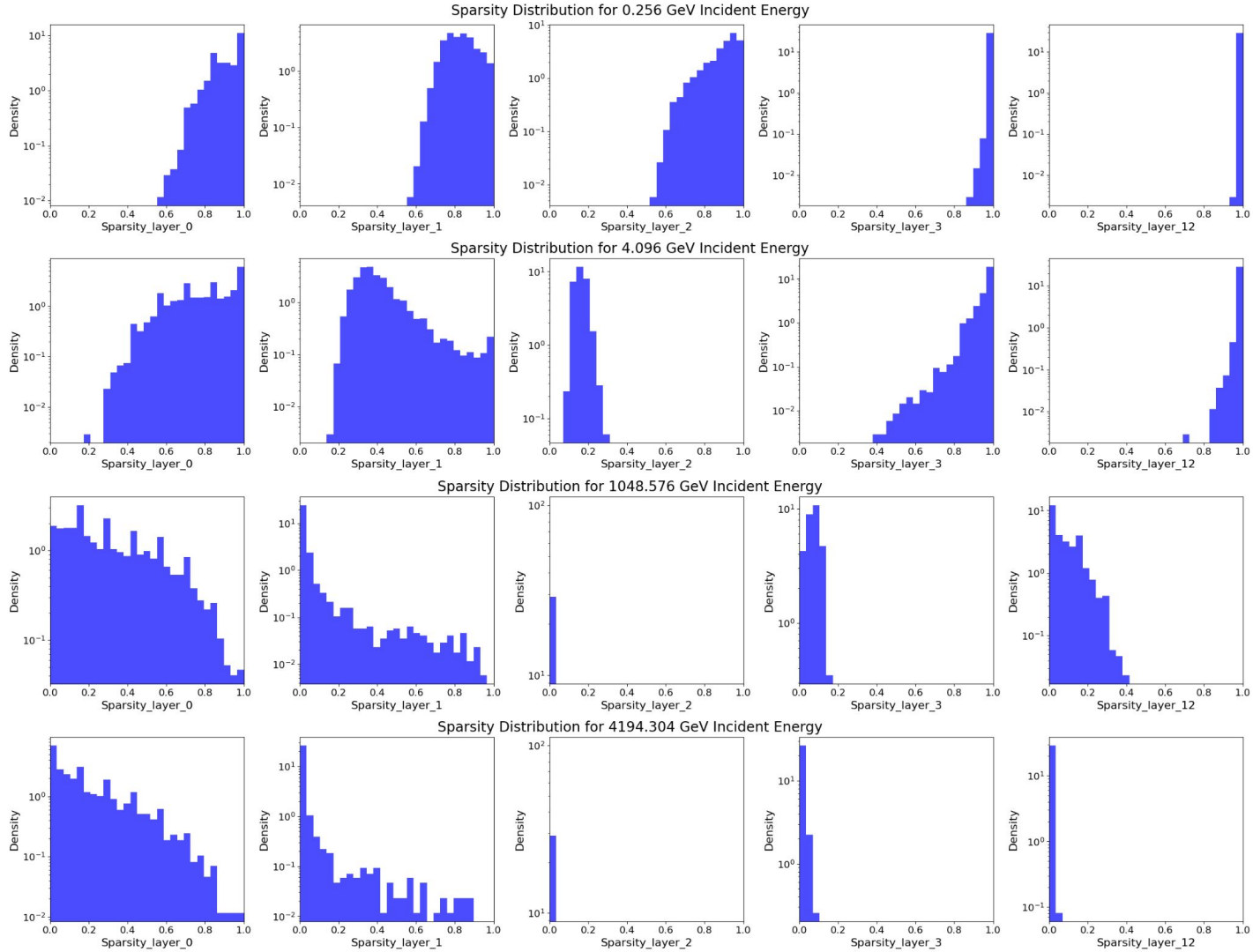


Calorimeter Layer Energy Diagram when $E = 4194.30$ GeV



We have much less layer-wise voxels, which may lead to unsmooth hist in sparsity.

energy_layer_0:[127271, 36]
energy_layer_1:[127271, 164]
energy_layer_2:[127271, 110]
energy_layer_3:[127271, 36]
energy_layer_12:[127271, 36]



External Link

Detailed Description

<https://cds.cern.ch/record/2630434/files/ATL-SOFT-PUB-2018-002.pdf>
<https://arxiv.org/pdf/2109.02551>

Some Codes

https://gitlab.cern.ch/zhangruiPhysics/FastCaloChallenge/-/blob/master/training/HighLevelFeatures.py?ref_type=heads#L79-112

My Plots (dataset)

https://github.com/QaloSim/CaloQVAE/blob/haojia_ML2/notebooks/new_dataset.ipynb

My Plots (Visualization)

https://github.com/QaloSim/CaloQVAE/blob/haojia_ML2/notebooks/geometry_info.ipynb