Status report on

DNNROI sigproc

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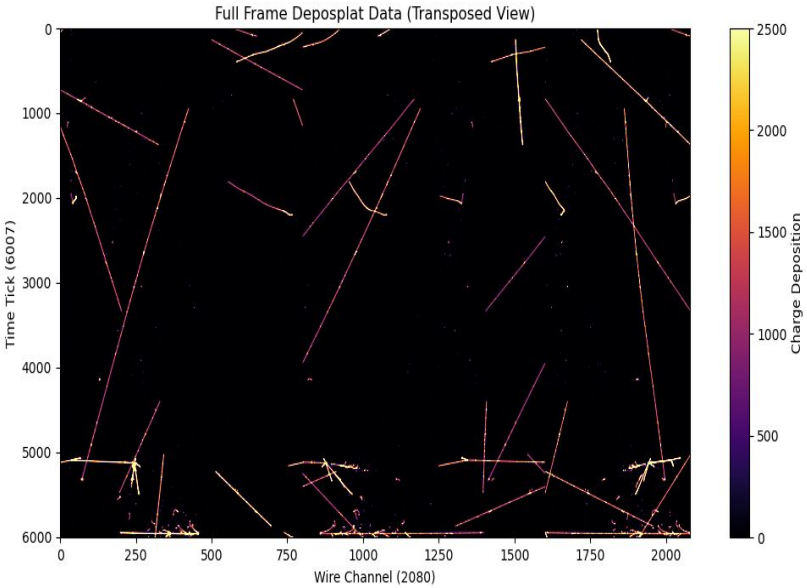
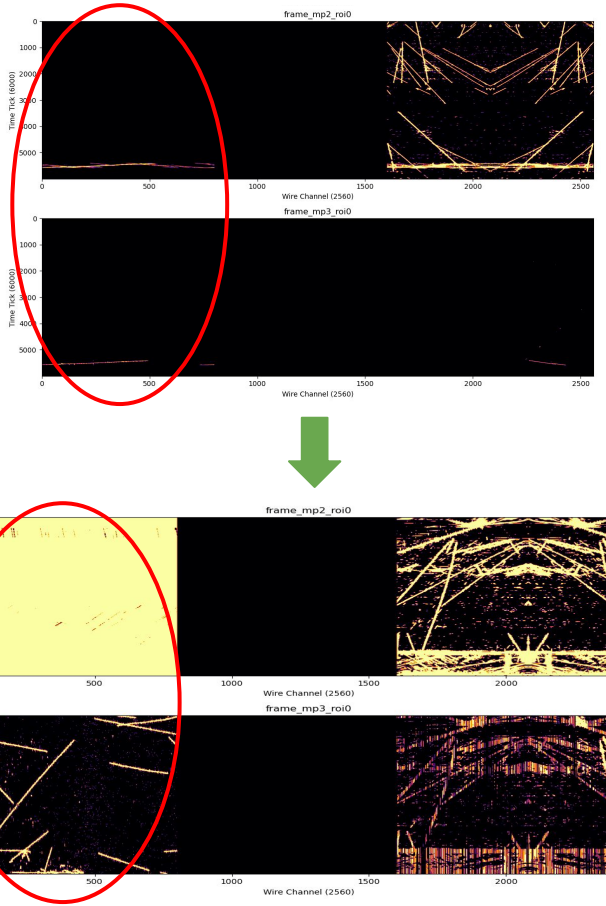
Outline

- Cosmic Ray Simulation
- DNN SP evaluation
  - WCT standalone simulation

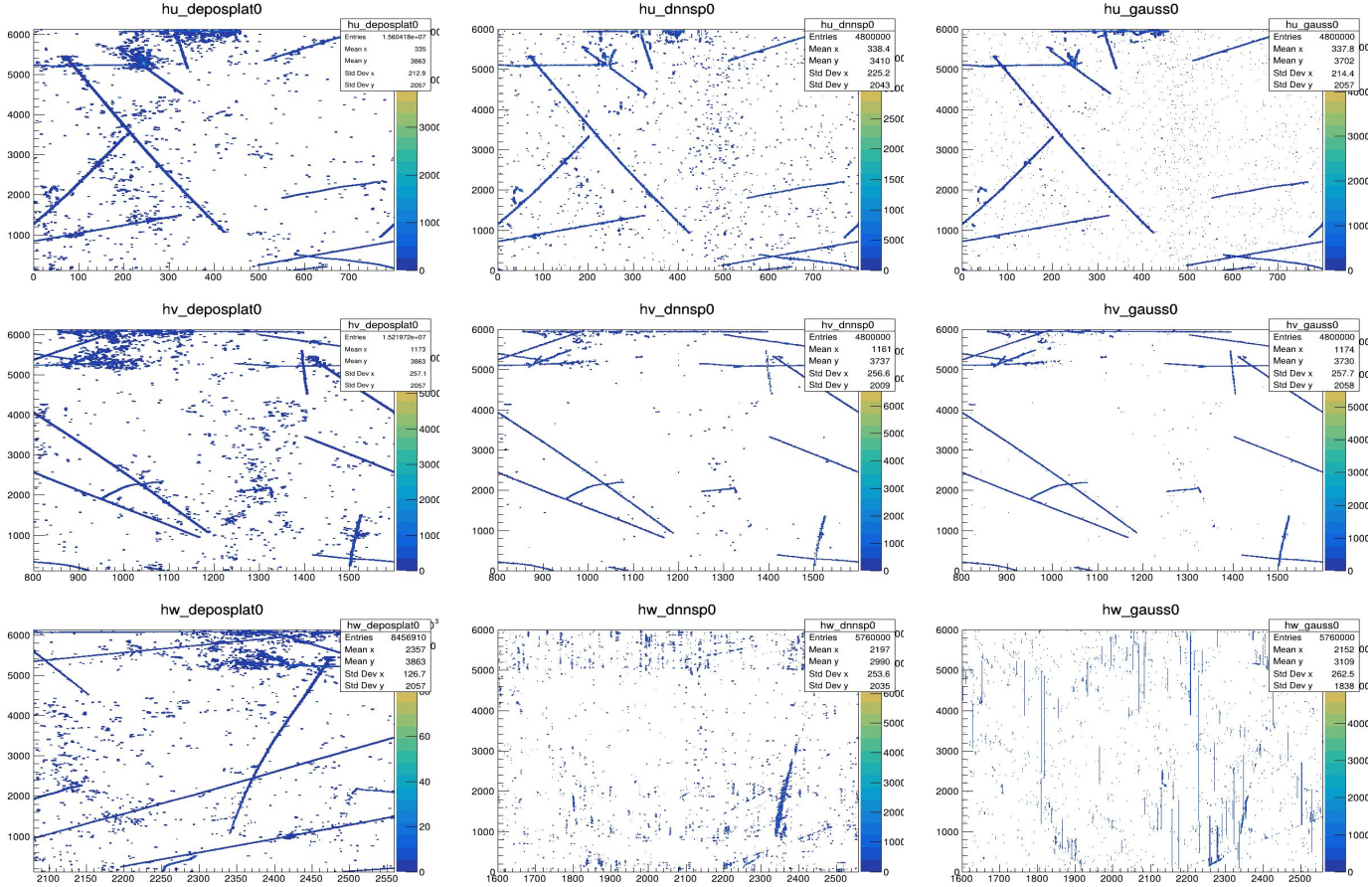
Cosmic ray Simulation (LAr + WCT)





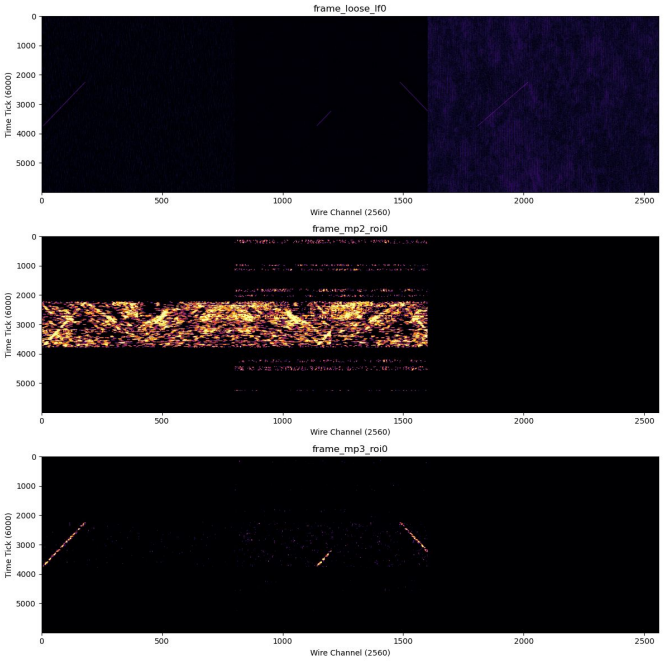
- With Xuyang's filed response for APA1 (APA0 in code)
- Wire Channel: U 800 + V 800 + W 480
- MP3 ROI is solved
- MP2 ROI need to be further corrected → Problem in Field response amplitude

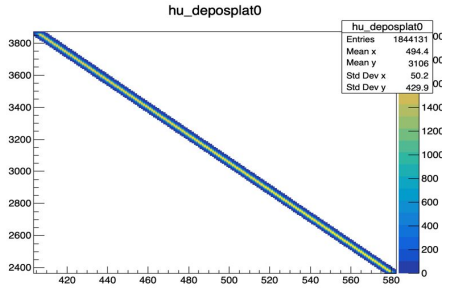
Cosmic ray Simulation (LAr + WCT)

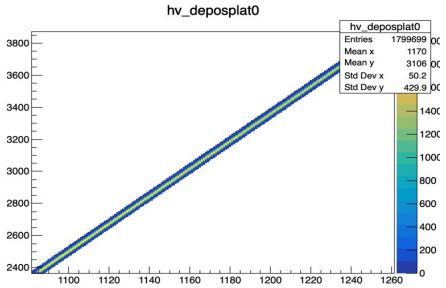


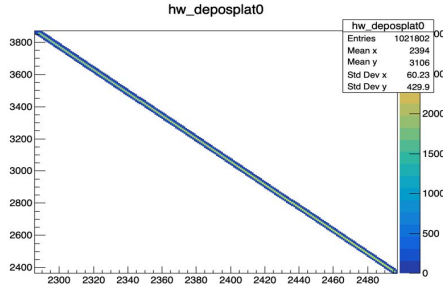
- Truth v.s. DNN SP vs Gauss comparison
  - U (induction)
  - V (collection)
  - W plane

DNN SP evaluation - WCT standalone sim. data



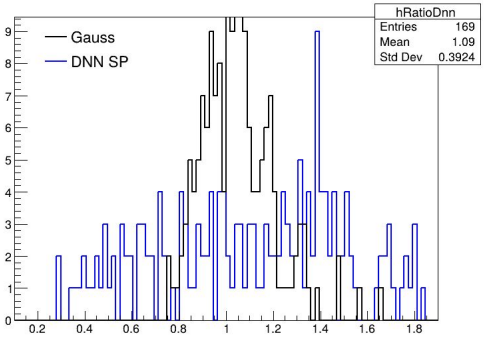




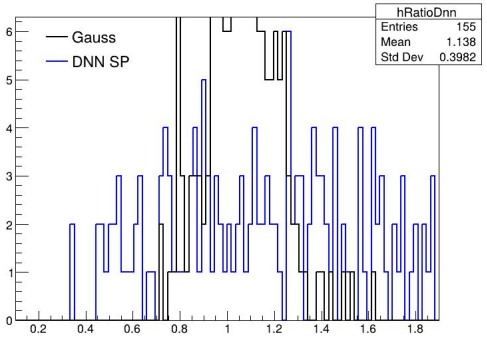


- Weight file: unet-cosmic390-newwc-depofluxsplat-pdhd.ts (from Jay)
- ThetaXZ= 50
- Unexpected MP2 ROI like the cosmic ray simulation

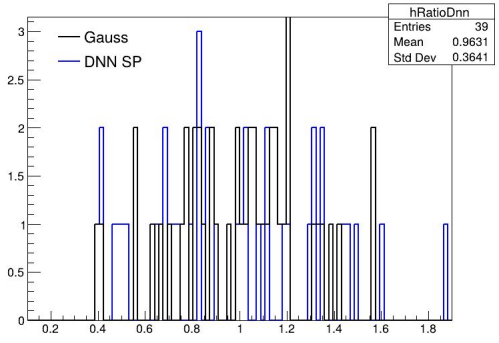
DNN SP evaluation - WCT standalone sim. data




```
=== Bias
Gau bias (%): 4.82189
Dnn bias (%): 9.04731
=== Resolution
Gau RMS (%): 14.3564
Dnn RMS (%): 35.9839
=== Inefficiency
ntru: 175, bad ndnn: 6, bad ngau: 0
```



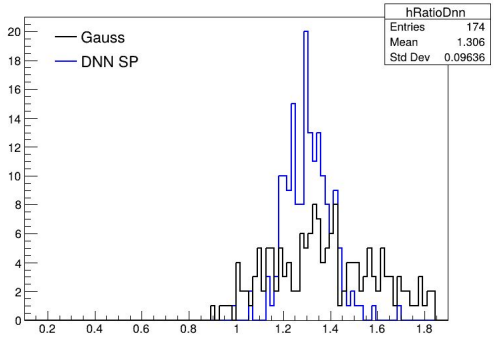

```
=== Bias
Gau bias (%): 6.31162
Dnn bias (%): 13.7574
=== Resolution
Gau RMS (%): 14.6071
Dnn RMS (%): 35
=== Inefficiency
ntru: 175, bad ndnn: 20, bad ngau: 0
```



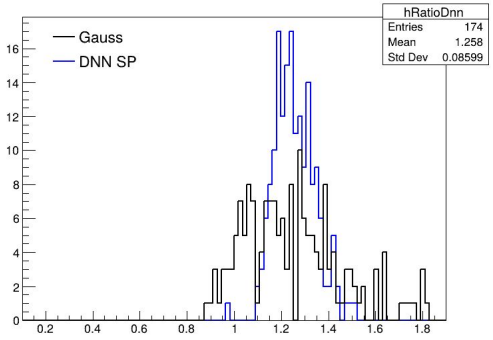

```
=== Bias
Gau bias (%): 0.924765
Dnn bias (%): -3.69016
=== Resolution
Gau RMS (%): 26.6327
Dnn RMS (%): 37.8053
=== Inefficiency
ntru: 50, bad ndnn: 11, bad ngau: 2
```

- Weight file: unet-cosmic390-newwc-depofluxsplat-pdhd.ts (from Jay)
- U plane thetaXZ= 0, 50, 80

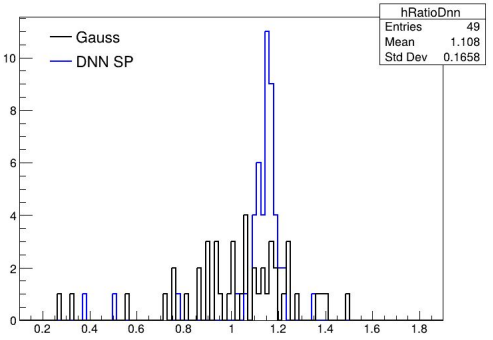
DNN SP evaluation - WCT standalone sim. data




```
=== Bias
Gau bias (%): 37.5684
Dnn bias (%): 30.6385
=== Resolution
Gau RMS (%): 16.028
Dnn RMS (%): 7.3759
=== Inefficiency
ntru: 174, bad ndnn: 0, bad ngau: 9
```



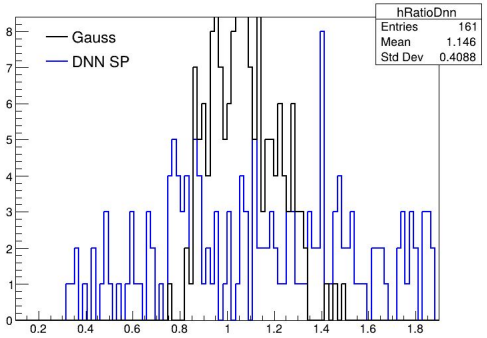

```
=== Bias
Gau bias (%): 24.9592
Dnn bias (%): 25.7941
=== Resolution
Gau RMS (%): 16.8125
Dnn RMS (%): 6.8361
=== Inefficiency
ntru: 174, bad ndnn: 0, bad ngau: 3
```



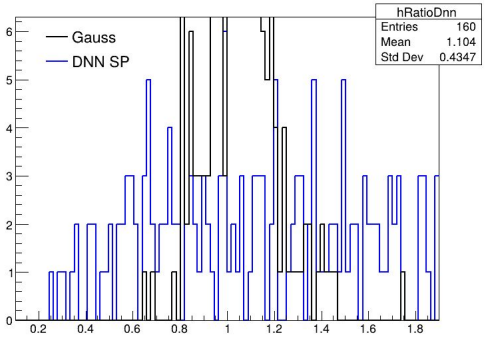

```
=== Bias
Gau bias (%): 2.74479
Dnn bias (%): 10.7889
=== Resolution
Gau RMS (%): 23.8702
Dnn RMS (%): 14.9679
=== Inefficiency
ntru: 51, bad ndnn: 2, bad ngau: 6
```

- Weight file: unet-cosmic390-newwc-depofluxsplat-pdhd.ts (from Jay)
- V plane thetaXZ= 0, 50, 80

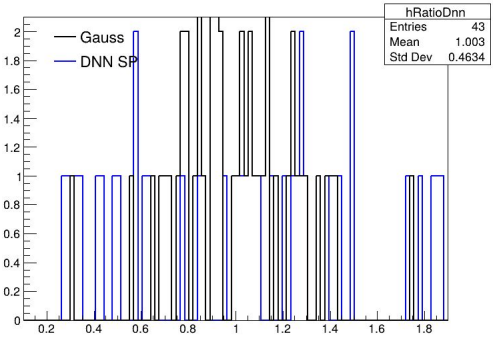
DNN SP evaluation - WCT standalone sim. data




```
=== Bias
Gau bias (%): 7.20238
Dnn bias (%): 14.5972
=== Resolution
Gau RMS (%): 12.7179
Dnn RMS (%): 35.6763
=== Inefficiency
ntru: 175, bad ndnn: 14, bad ngau: 0
```



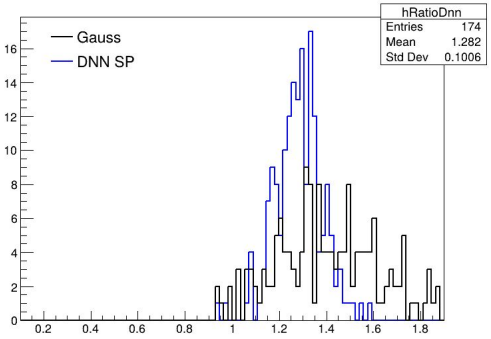

```
=== Bias
Gau bias (%): 5.94946
Dnn bias (%): 10.3973
=== Resolution
Gau RMS (%): 14.6935
Dnn RMS (%): 39.372
=== Inefficiency
ntru: 175, bad ndnn: 15, bad ngau: 0
```



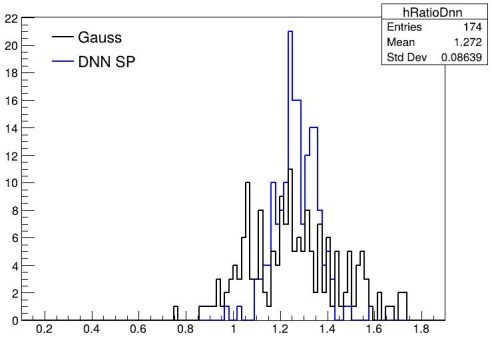

```
=== Bias
Gau bias (%): 0.165591
Dnn bias (%): 0.323613
=== Resolution
Gau RMS (%): 25.4581
Dnn RMS (%): 46.1881
=== Inefficiency
ntru: 50, bad ndnn: 7, bad ngau: 1
```

- Weight file: CP20.ts (from my UNet training)
- U plane thetaXZ= 0, 50, 80

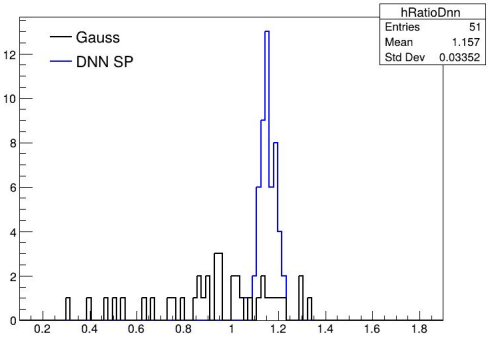
DNN SP evaluation - WCT standalone sim. data




```
=== Bias
Gau bias (%): 39.9299
Dnn bias (%): 28.2498
=== Resolution
Gau RMS (%): 15.5408
Dnn RMS (%): 7.84336
=== Inefficiency
ntru: 174, bad ndnn: 0, bad ngau: 16
```




```
=== Bias
Gau bias (%): 25.7777
Dnn bias (%): 27.188
=== Resolution
Gau RMS (%): 15.5824
Dnn RMS (%): 6.79238
=== Inefficiency
ntru: 174, bad ndnn: 0, bad ngau: 2
```

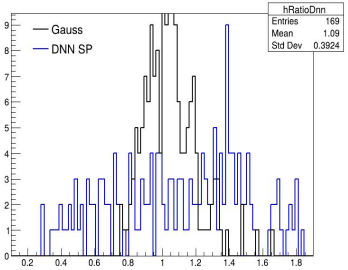


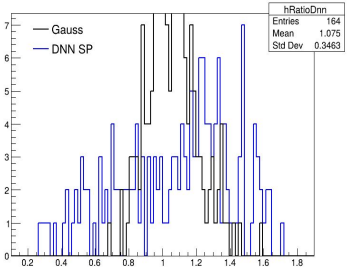

```
=== Bias
Gau bias (%): -7.0844
Dnn bias (%): 15.7141
=== Resolution
Gau RMS (%): 26.8461
Dnn RMS (%): 2.89712
=== Inefficiency
ntru: 51, bad ndnn: 0, bad ngau: 12
```

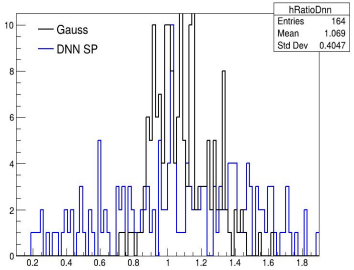
- Weight file: CP20.ts (from my UNet training)
- V plane thetaXZ= 0, 50, 80

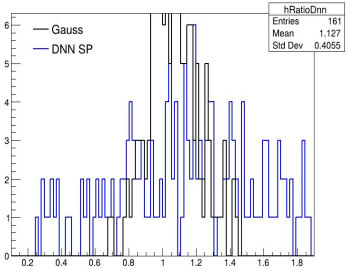
Back Up

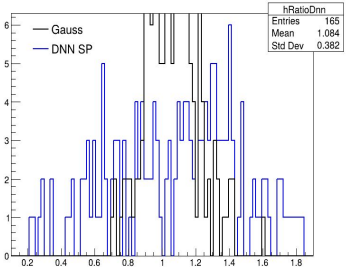
DNN SP evaluation - WCT standalone sim. data

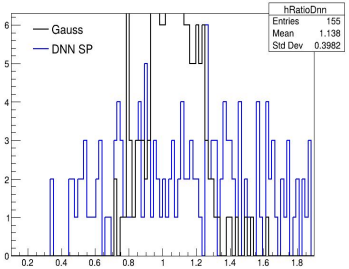


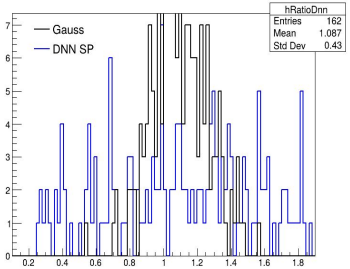


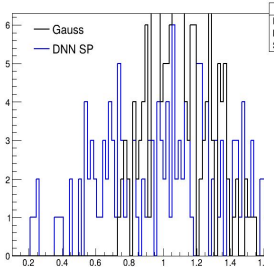


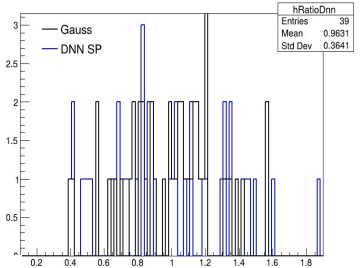












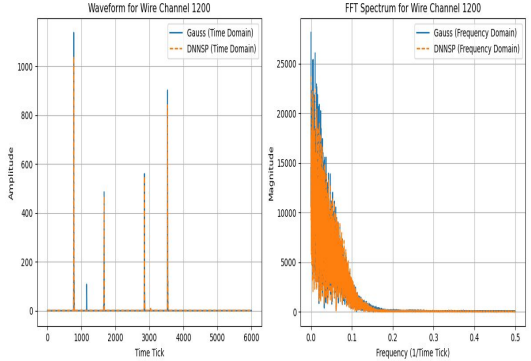
$$\text{Bias}_{\text{method}} = 100 \times (\text{Mean}(Charge_{\text{method}}/Charge_{\text{truth}}) - 1.0)$$

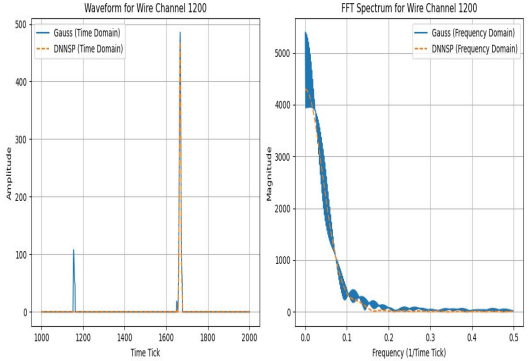
$$\text{hRatioGau} = \frac{\text{Charge}_{\text{Gaussian}}}{\text{Charge}_{\text{Truth}}}$$

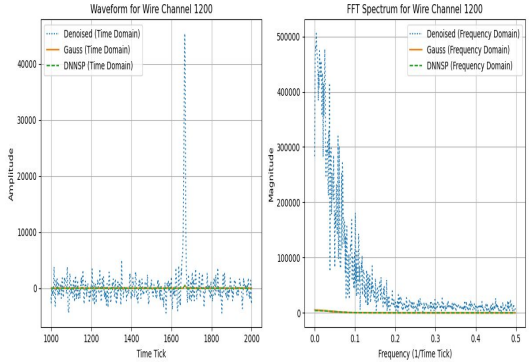
$$\text{Resolution} = 100 \times \frac{\text{RMS}(Charge_{method}/Charge_{truth})}{\text{Mean}(Charge_{method}/Charge_{truth})}$$

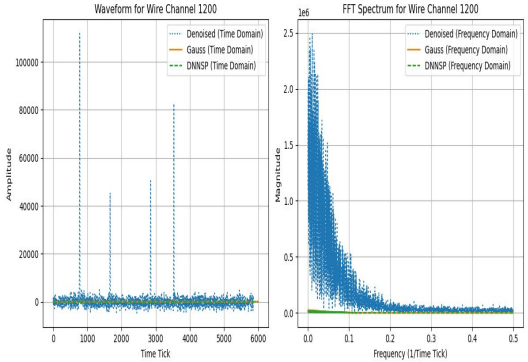
$$\text{hRatioDnn} = \frac{\text{Charge}_{\text{DNN}}}{\text{Charge}_{\text{Truth}}}$$

PDHD data - waveform (NF, Gauss, and dnnsp) APA0



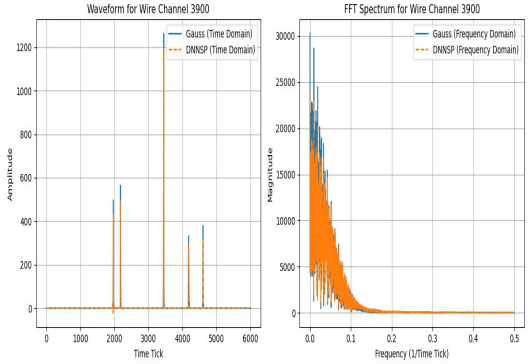


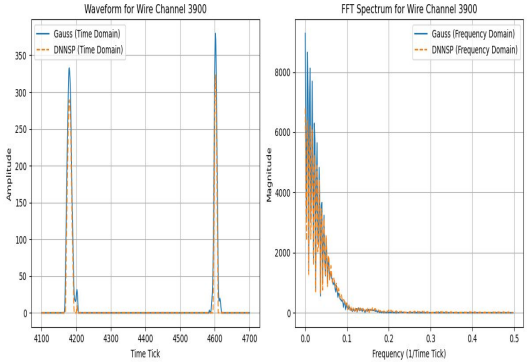


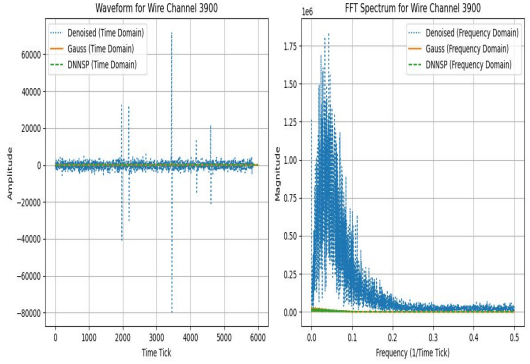


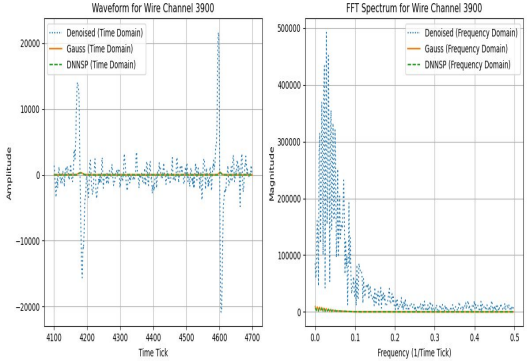
- Can I use after NF info. for evaluation?
- Amplitude should be fixed

PDHD data - waveform (NF, Gauss, and dnnsp) APA1

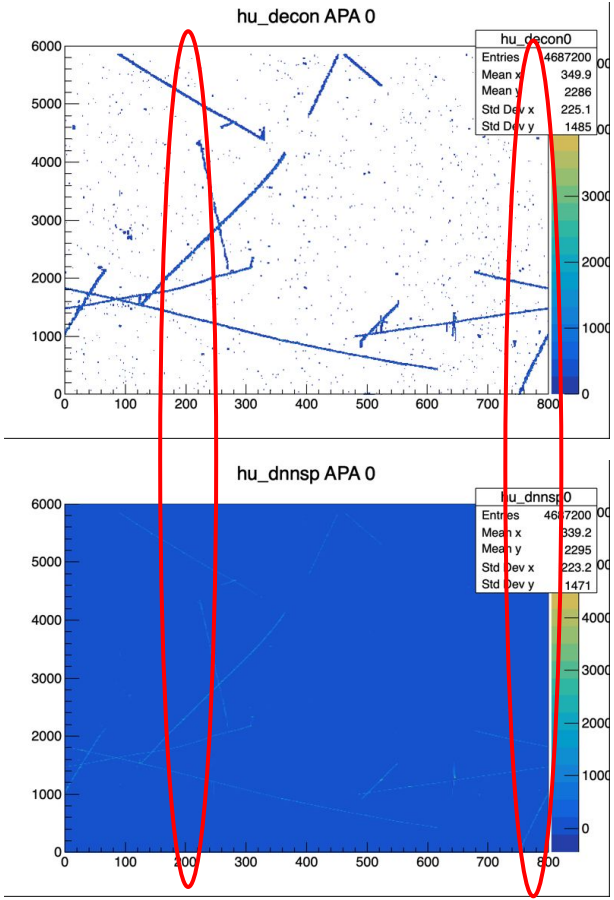


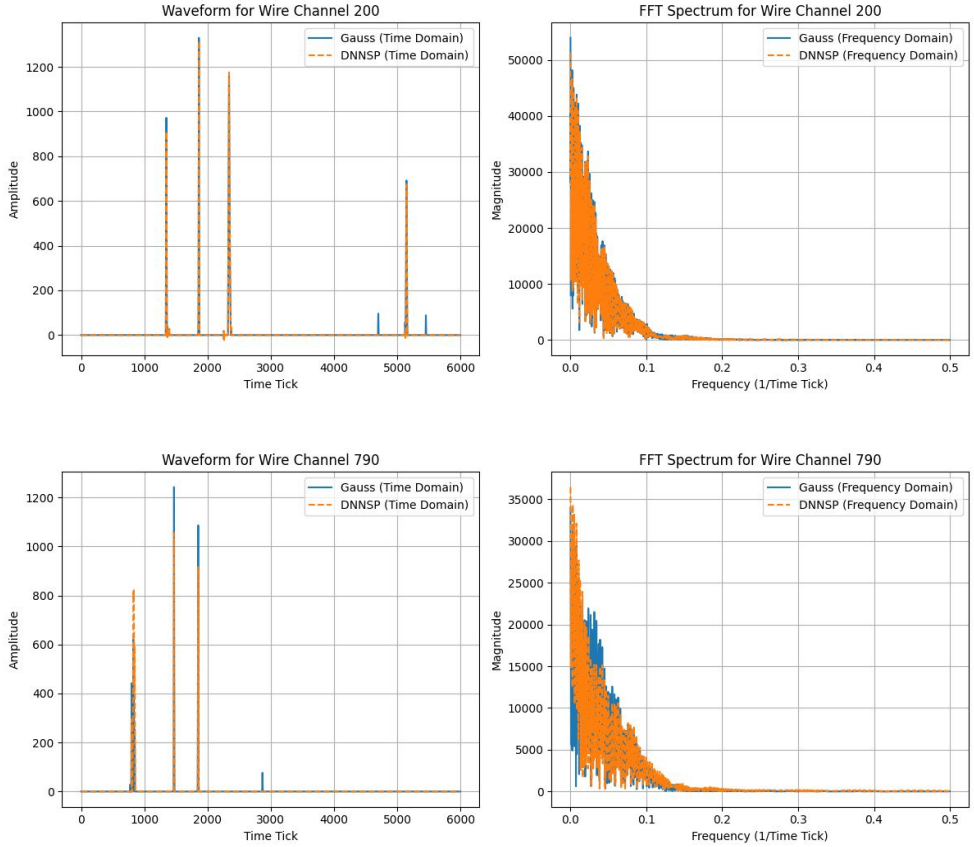






DNNROI SP - PDHD data





- APA0 - u plane
- 1d wave form in time domain v.s. frequency domain