



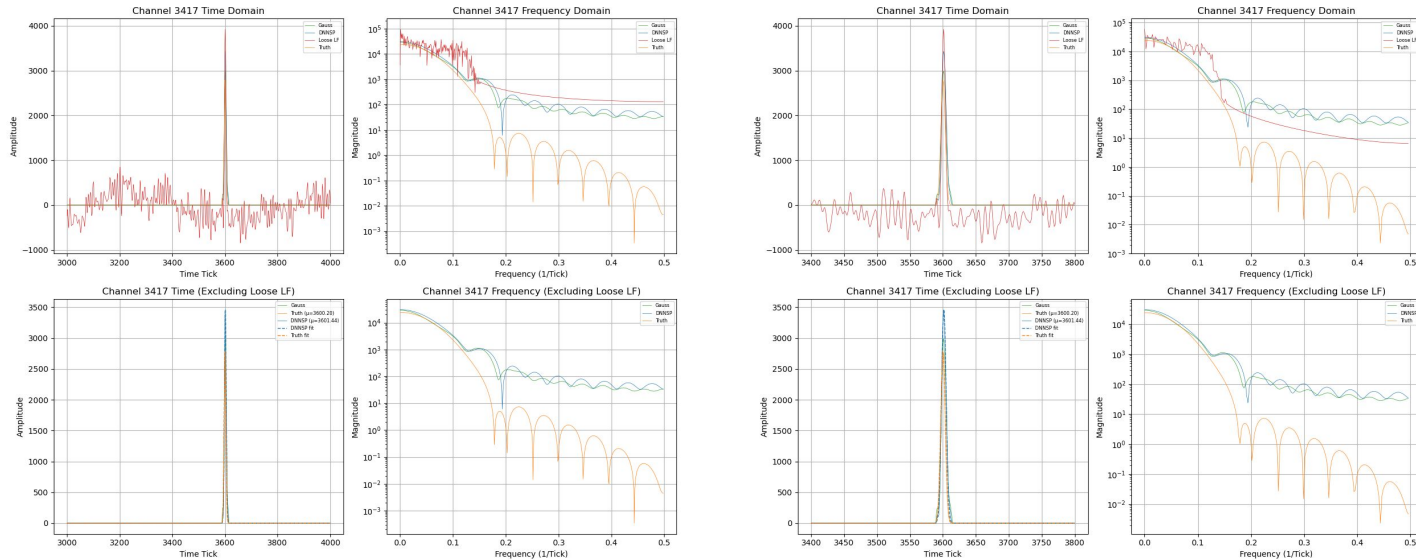
Status report on **DNNROI sigproc**

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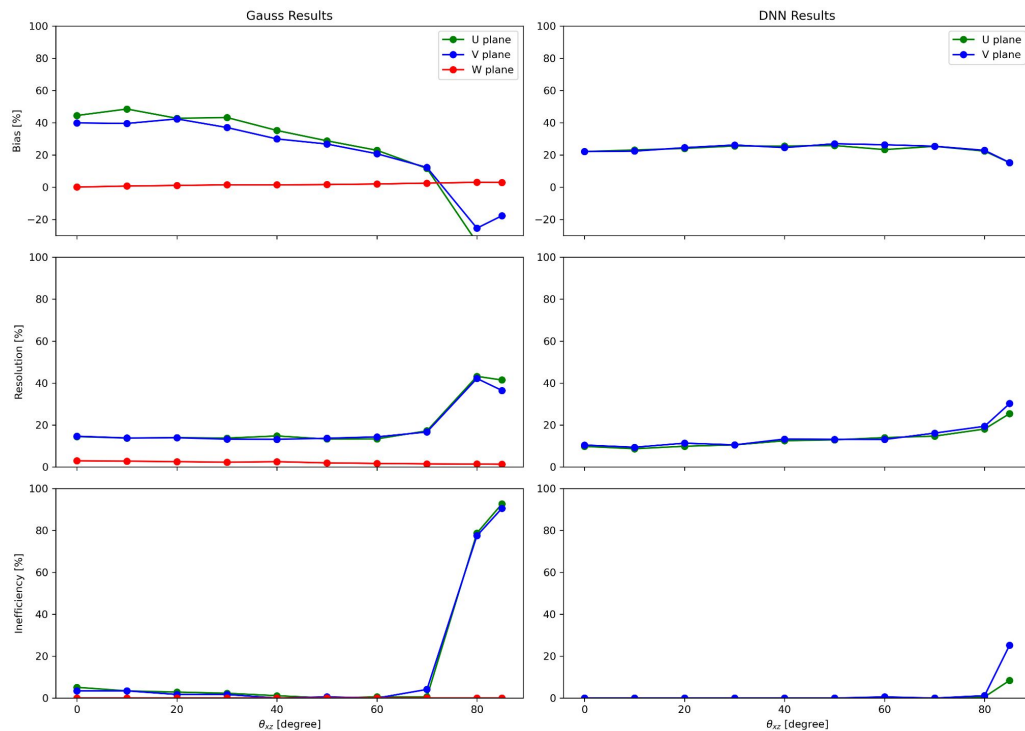
Time offset in truth

```
time_offsets: [-62.5*wc.us, -62.5*wc.us, -62.5*wc.us]
```

- Add one line regarding time_offsets to funcs.jsonnet can resolve the problem



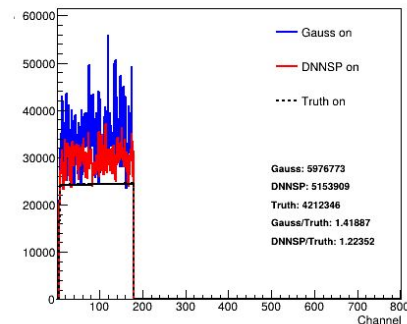
DNN ROI evaluation with fixed time offset



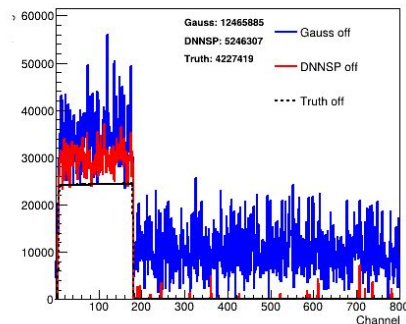
- Shift in Bias is still remaining

DNN ROI evaluation with fixed time offset

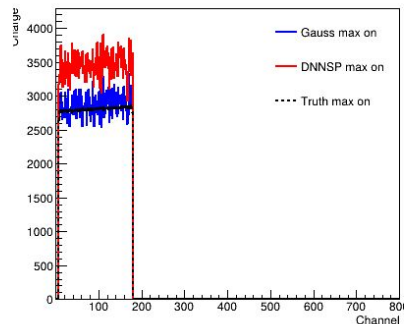
Total Charge (Full-range, Threshold On)



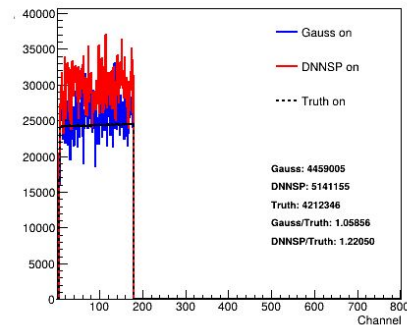
Total Charge (Full-range, Threshold Off)



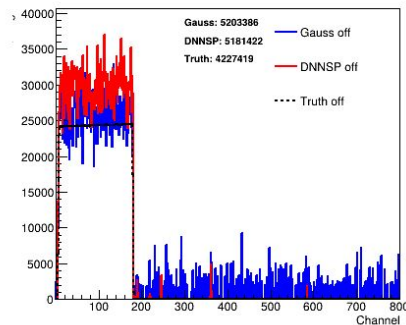
Max Charge (Full-range, Threshold Off)



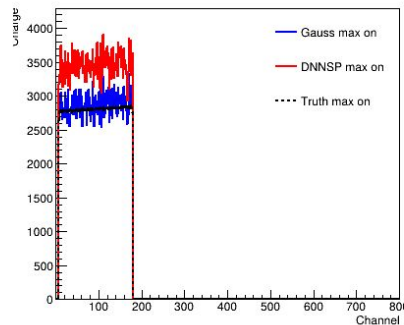
Total Charge (Selected-range, Threshold On)



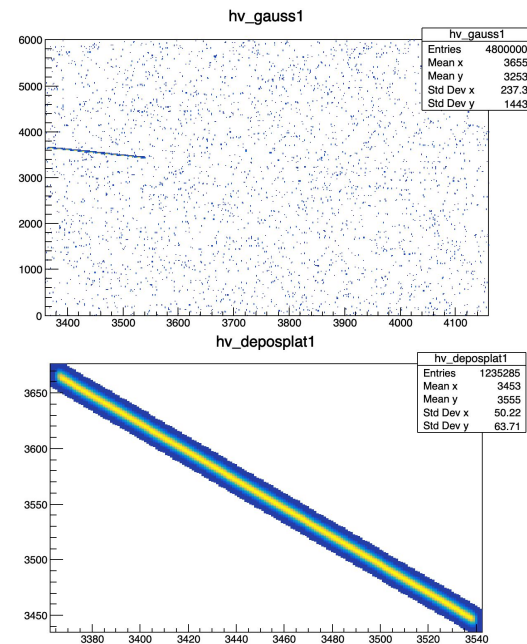
Total Charge (Selected-range, Threshold Off)



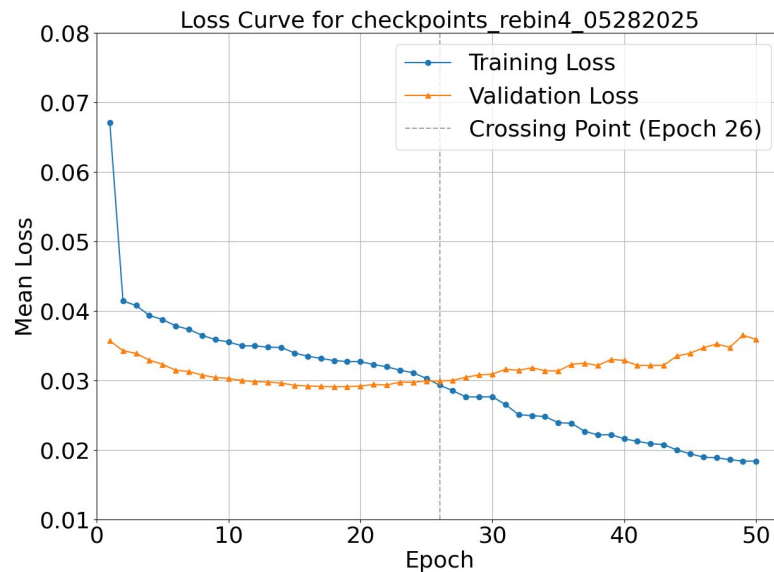
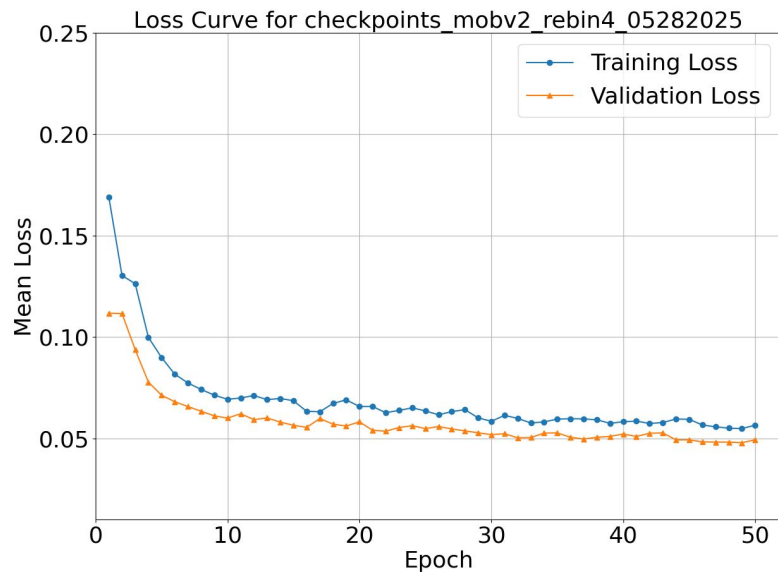
Max Charge (Selected-range, Threshold On)



- Total charge shows the Bias is due to the noise



DNN Training with modified rebinning



- Rebin in time tick 10 $\rightarrow$ 4
- Loss: Binary Cross-Entropy
- Epoch = 50, Learning Rate = 0.1, Momentum = 0.9, train vs val split = 90:10
- Errors in cropped y-axis, the fixed training is on running

WCT w/ GPU on the WC cluster

- Torch version: 2.8.0a0
- CUDA: 12.5
- binutils:2.40 (for GFNI/VNNI support)
- GCC: v12_1_0 (for compatibility with recent version of PyTorch)

/nfs/data/1/hnam/demo/pytorch/torch/bin

/nfs/data/1/hnam/demo/pytorch/torch/include

/nfs/data/1/hnam/demo/wire-cell-toolkit/install/bin

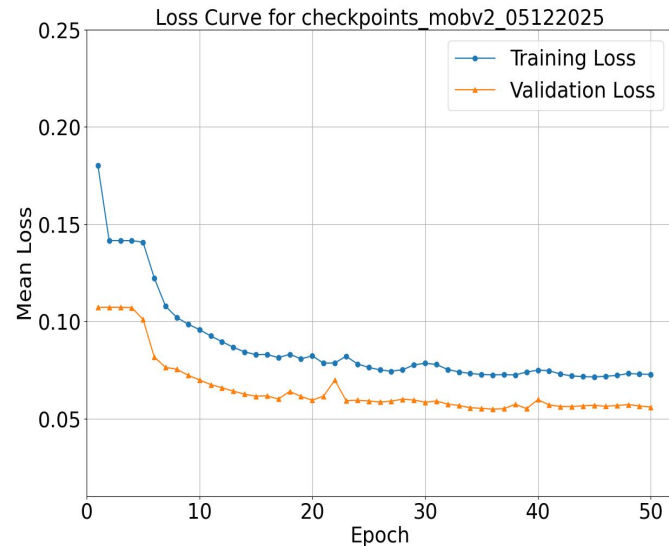
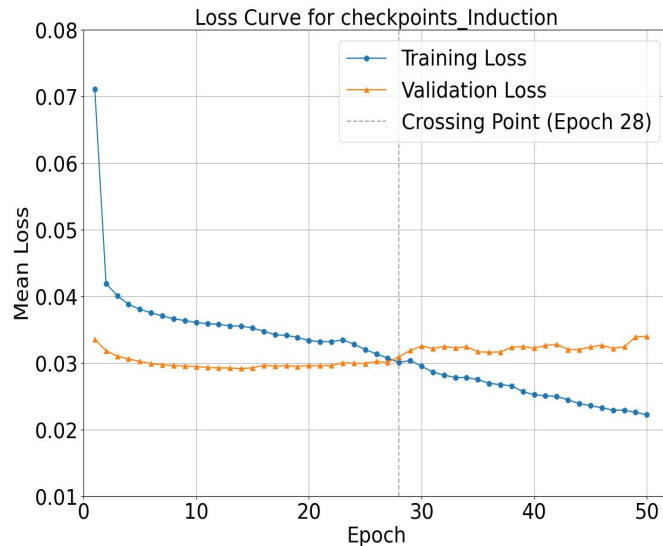
Memory and Time consumption on the WC cluster

Server	WCT	Resource	DNN ROI	Mem (MB)	Time (s)	Mem Ratio	Time Ratio
WC cluster	dunesw	None	None	1891.54	40.41	1.00	1.00
WC cluster	dunesw	CPU	UNet	7419.03	91.45	3.92	2.26
WC cluster	dunesw	CPU	MobileNetV2	4593.25	54.51	2.43	1.35
WC cluster	Built	None	None	1890.80	40.97	0.99	1.01
WC cluster	Built	CPU	UNet	5208.58	53.64	2.75	1.33
WC cluster	Built	CPU	MobileNetV2	4853.49	45.41	2.56	1.12
WC cluster	Built	GPU	UNet	5105.16	46.18	2.70	1.14
WC cluster	Built	GPU	MobileNetV2	5110.95	45.33	2.70	1.12

- Model file used: unet-cosmic390-newwc-depofluxsplat-pdhd.ts
- Signal Processing only & All measurements are averaged over 5 PD-HD data files
 - run026763_0008, run026763_0000, run026763_0001, run026763_0002, run028588_0019
- Using the custom-built WCT reduced the CPU inference time from 91.45 s to 53.64 s: ~41% improvement

Back Up

WCT - New DNN approach



- Haiwang's UNet → MobileNetV2
 - Train loss: $\sim 0.03 \rightarrow \sim 0.072$ (Epoch 50)
- The performance in WCT signal processing chain should be checked

Memory and Time consumption

PD-HD Run		VmPeak (MB)	RSS Peak (MB)	Elapsed Time (s)
26763 - 0008	MobNetV2	8839.19	6563.59	133.83
	UNet	11395.80	9128.28	184.71
27673 - 0000	MobNetV2	6329.87	4056.22	84.13
	UNet	9213.96	6945.05	137.48
27673 - 0001	MobNetV2	6321.81	4163.92	111.77
	UNet	9285.25	7014.49	165.44
27673 - 0002	MobNetV2	6512.53	4270.59	82.91
	UNet	9396.65	7127.31	125.62
28588 - 0019	MobNetV2	6093.46	3825.43	73.86
	UNet	9060.37	6783.75	163.30

- Signal Processing only
- MobileNetV2 vs UNet

Metric	MobNetV2 (avg.)	UNet (avg.)	Ratio (DNN SP/SP)
RSS Peak	7,399.78 MB	4575.95 MB	1.62x
Elapsed	155.31 s	97.3 s	1.60x

- For DNN SP, ○ the FHICL file only save the dnn related waveform in the output file