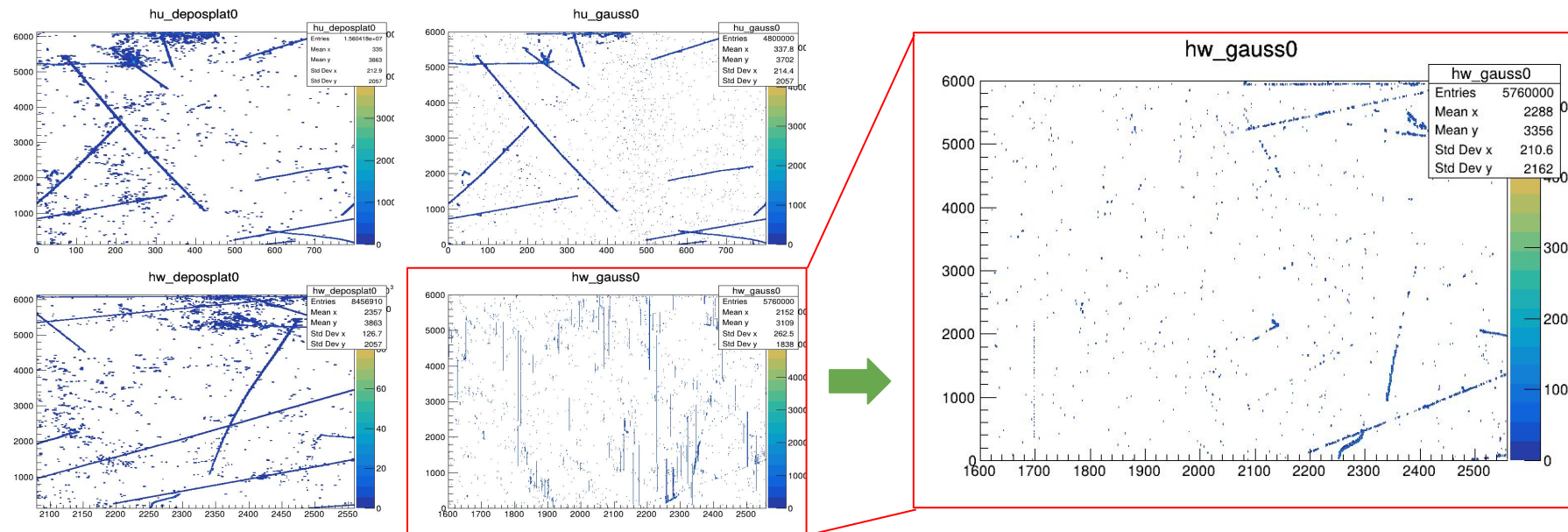




Status report on **DNNROI sigproc**

Hokyeong Nam
Chung-Ang University

Cosmic ray simulation (Lar + WCT)



- With the previous dunereco, gauss failed to reconstruct the track on the w plane
→ fixed a bit with using the updated configuration files
- The wire channel 1600 - 2080 (first half of w plane) is not reconstructed, truth info. is missing this part
 - Traditional SP: No tracks
 - DNN SP: Fake tracks influenced by MP2 & MP3 ROI

DNN SP evaluation w/ single track simulation (WCT standalone)

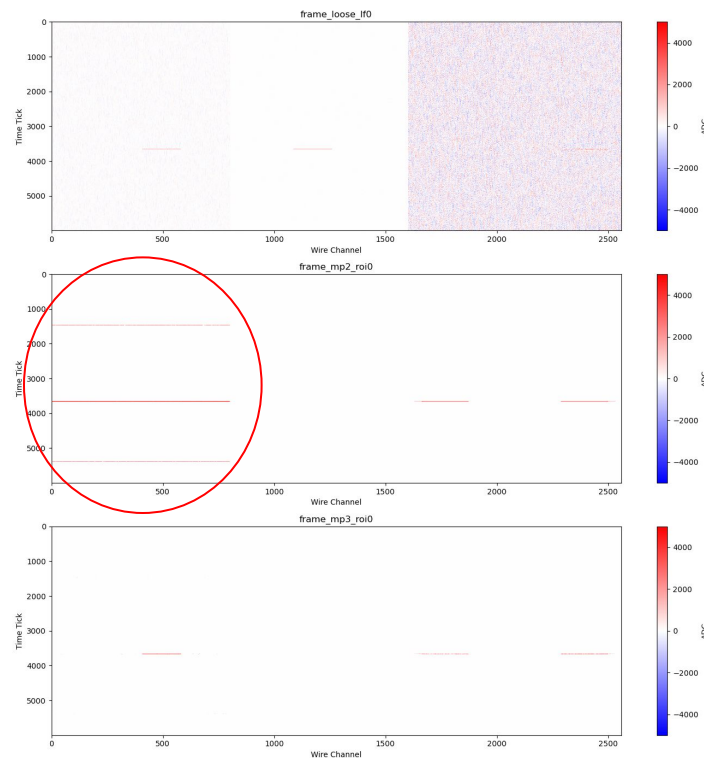
What is changed?:

Previous: wire-cell-cfg provided by Xuyang in Jan.

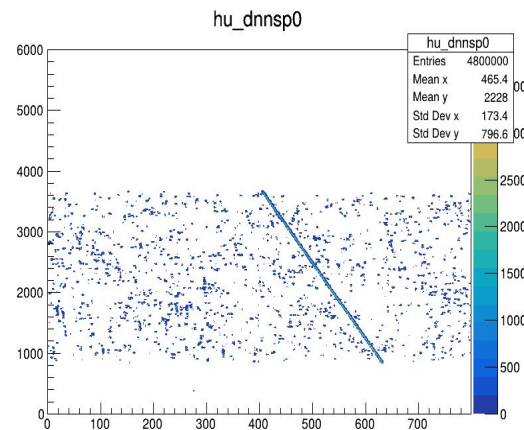
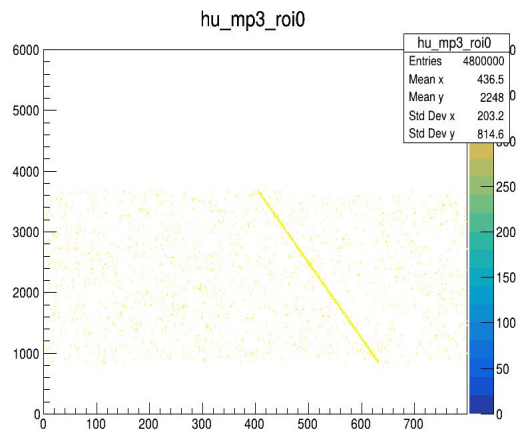
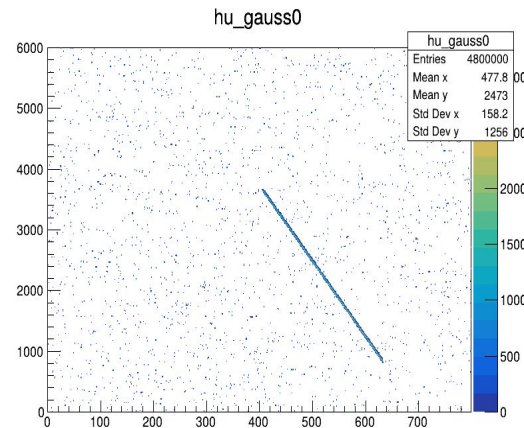
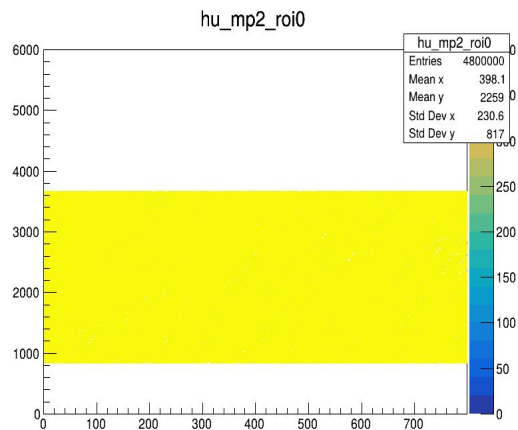
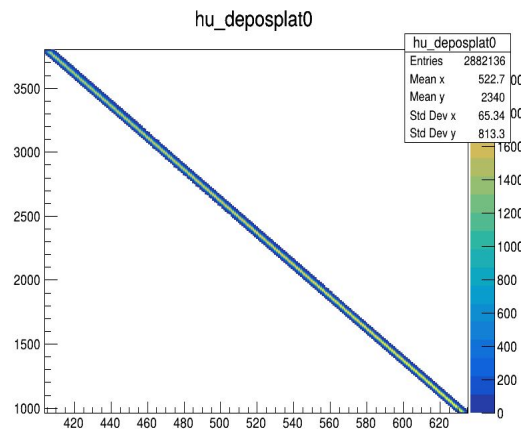


Now: pdhd directories in the latest dunereco

- Weight file from Jay:
unet-cosmic390-newwc-depofluxsplat-pdhd.ts
- $\text{ThetaXZ} = 0, 10, 20, 30, 40, 50, 60, 70, 80, 90$
- $\text{elecGain} = 14$
- The MP2 ROI problem is more clearly seen the horizontal track ($\text{ThetaXZ} = 0$) file



DNN SP evaluation w/ single track simulation (WCT standalone)



- U plane, thetaXZ= 60

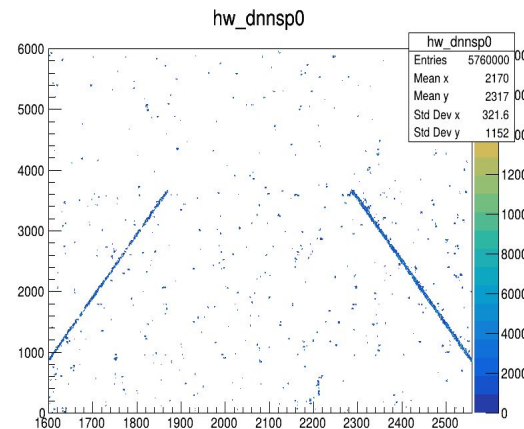
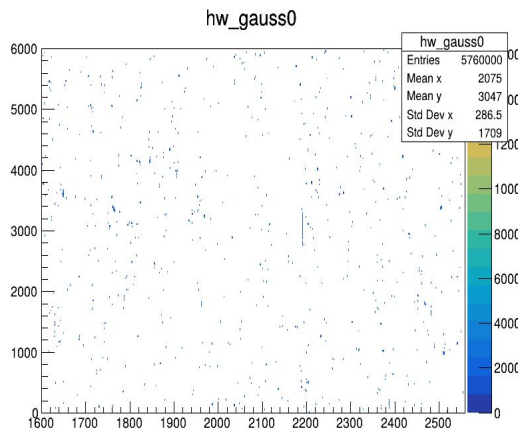
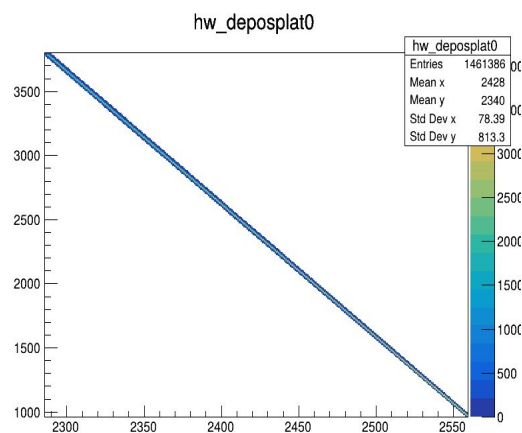
DNN SP evaluation w/ single track simulation (WCT standalone)

Plane	Eval	Type	ThetaXZ in Degree									
			0 (%)	10 (%)	20 (%)	30 (%)	40 (%)	50 (%)	60 (%)	70 (%)	80 (%)	85 (%)
U	Bias	Gau.	36.36	33.68	33.62	31.85	24.69	21.71	16.51	9.42	0.96	-10.26
		DNN	25.75	24.39	33.72	42.89	43.59	48.81	45.00	35.38	30.70	23.58
	Resol	Gau.	14.88	13.96	14.70	13.74	13.22	13.26	12.33	14.62	19.94	33.64
		DNN	9.00	9.37	12.49	14.14	13.86	12.26	12.30	15.01	18.00	24.43
	Ineffi	Gau.	2/227	2/227	2/227	2/227	1/228	1/228	0/228	1/170	2/174	16/95
		DNN	0/227	0/227	3/227	2/227	16/228	24/228	5/228	2/170	0/174	4/95

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

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

DNN SP evaluation w/ single track simulation (WCT standalone)



- W plane, $\theta_{XZ} = 60$

DNN SP evaluation w/ single track simulation (WCT standalone)

Plane	Eval	Type	ThetaXZ in Degree									
			0 (%)	10 (%)	20 (%)	30 (%)	40 (%)	50 (%)	60 (%)	70 (%)	80 (%)	85 (%)
W	Bias	Gau.	59.37	42.70	49.11	48.47	45.16	28.04	16.11	6.92	-19.36	-29.27
		DNN	9.35	24.12	8.47	15.51	12.39	24.71	29.25	7.44	27.77	6.20
	Resol	Gau.	10.88	26.58	23.07	27.75	26.26	31.86	31.63	36.73	55.06	69.98
		DNN	38.72	33.15	50.56	42.93	39.60	38.11	37.53	41.60	31.12	45.05
	Ineffi	Gau.	263/272	253/272	256/272	249/272	242/272	224/272	192/272	115/202	86/206	65/112
		DNN	225/272	212/272	243/272	223/272	239/272	236/272	234/272	166/202	146/206	83/112

- Gaussian Bias is getting lower as the ThetaXZ increases
- More samples in high ThetaXZ are needed to check if DNN SP performs better than Traditional SP
- For W plane, the fake tracks should be removed to have better performance

Comparison to the MicroBooNE Signal Processing

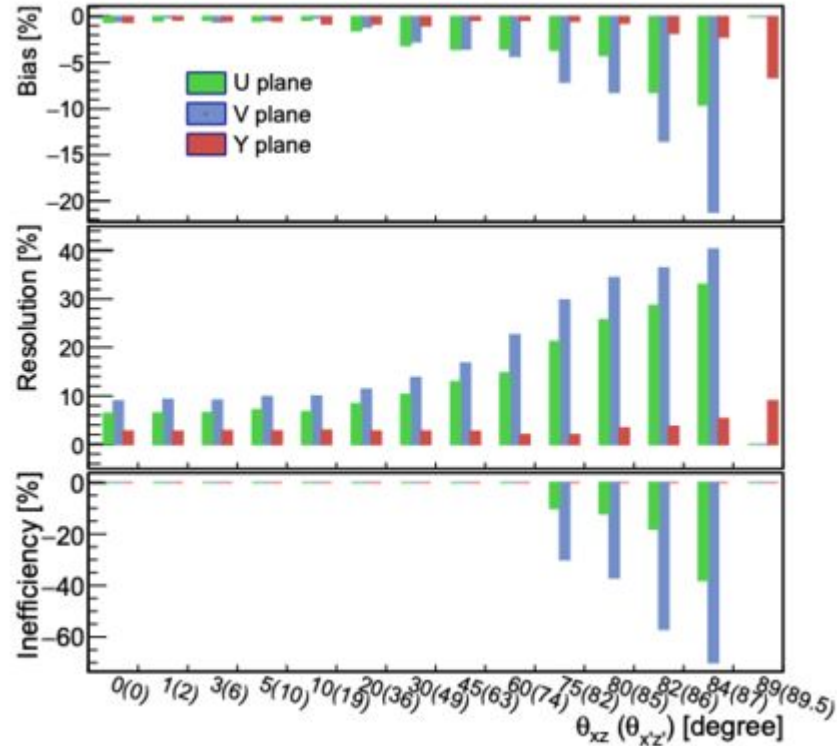
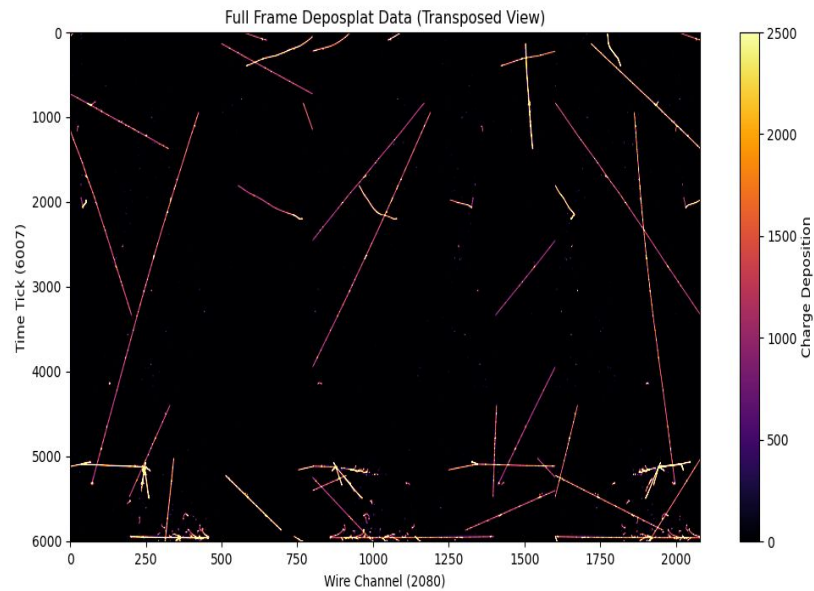


Fig. 30 <https://arxiv.org/pdf/1802.08709>

Back Up

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

