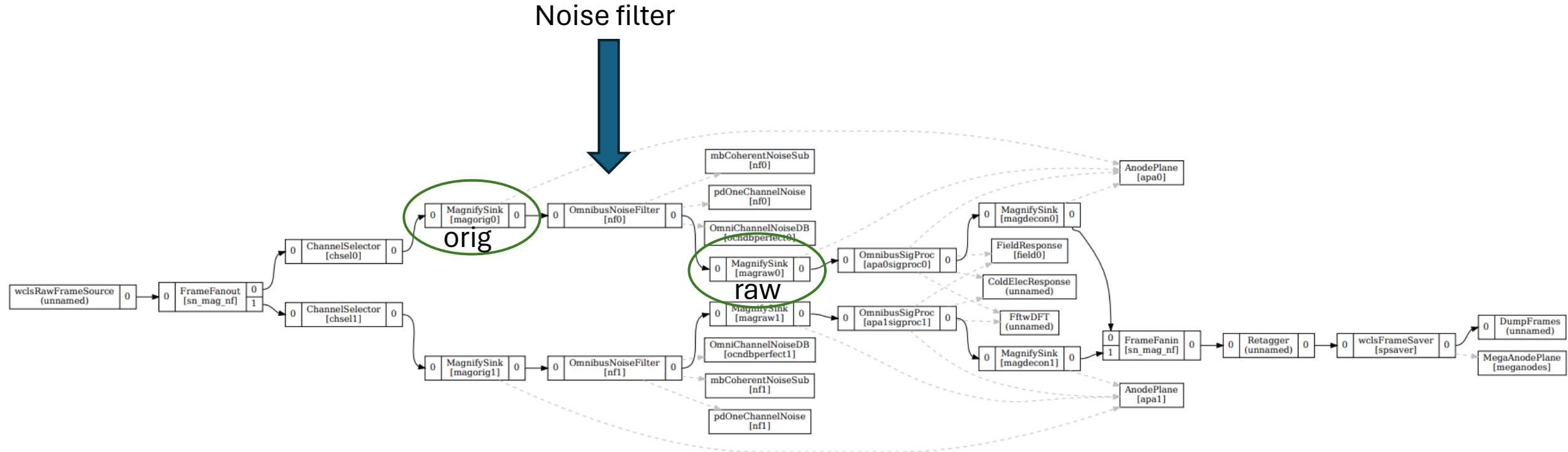


# Wire-Cell noise filtering in SBND

Ewerton Belchior

May 30, 2024

# Initial workflow for noise filtering (NF) + signal processing (SP)



- First time looking at noise filtering in wirecell using SBND real data!)
- Framework setup ready!

# SBND parameters for Noise Filtering (same as in PDHD)

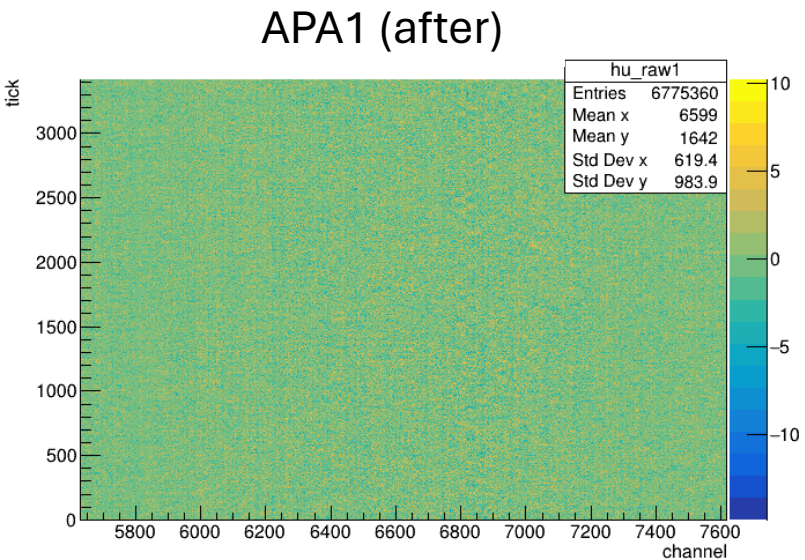
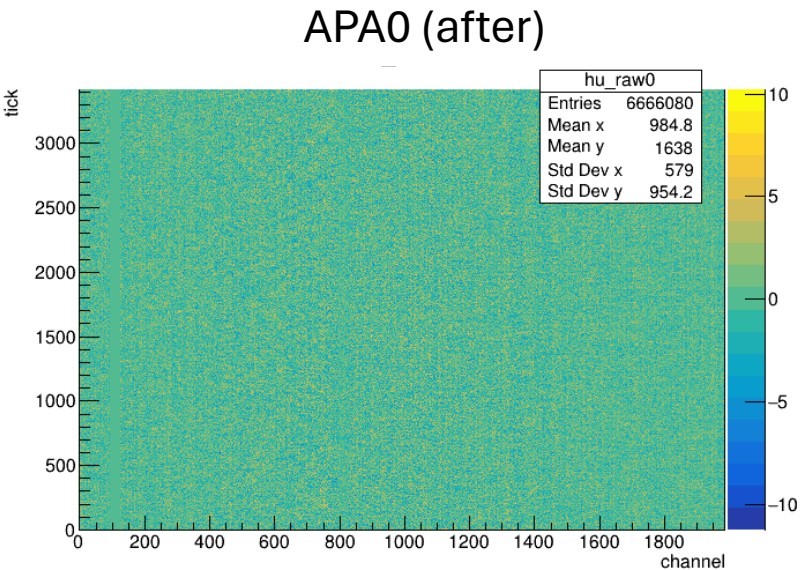
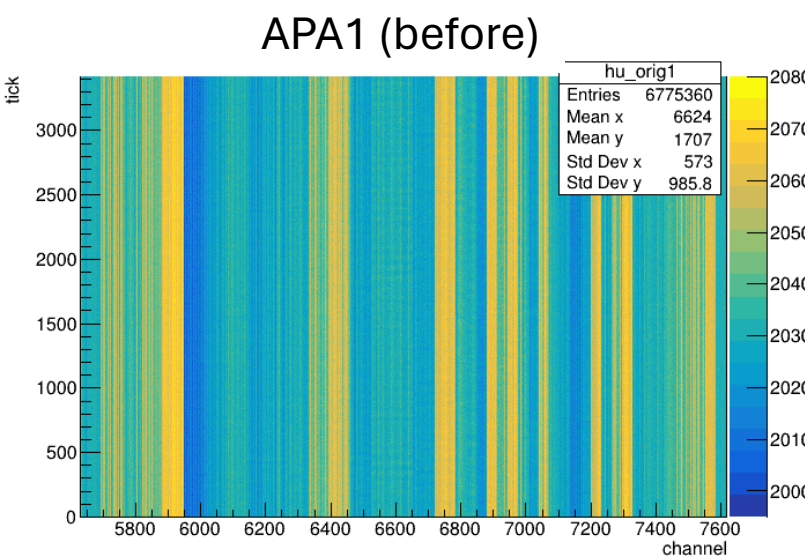
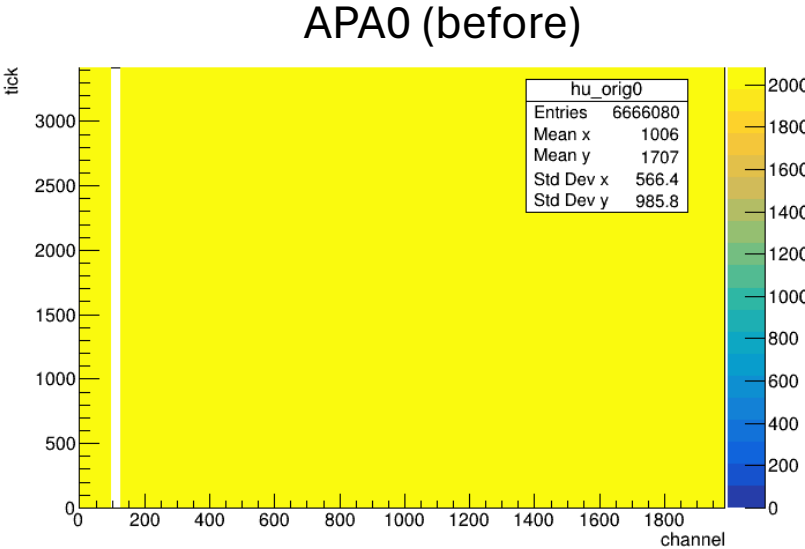
(Most of these parameters are for coherent noise removal)

	all channels		induction 1		induction2		collection	
	PDHD	SBND	PDHD	SBND	PDHD	SBND	PDHD	SBND
nominal_baseline (adc count)	2048.0	2001.0	-	same	-	same	400.0	650.0
gain_correction (unitless)	1.0	same	-	same	-	same	-	same
response_offset (ticks?)	0.0	same	120	same	124	same	-	same
pad_window_front (ticks?)	10	same	20	same	-	same	-	same
pad_window_back (ticks?)	10	same	-	same	-	same	-	same
decon_limit	0.02	same	0.02	same	0.01	same	0.05	same
decon_limit1	0.09	same	0.07	same	0.08	same	0.08	same
adc_limit	15	same	-	same	-	same	-	same
roi_min_max_ratio	0.8	same	3.0	same	1.5	same	-	same
min_rms_cut (units?)	1.0	same	-	same	-	same	-	same
max_rms_cut (units?)	30.0	same	-	same	-	same	-	same
rcrc (ms)	1.1	same	-	same	-	same	-	same
rc_layers	1	same	-	same	-	same	-	same
reconfig	none	same	-	same	-	same	-	same
freqmasks	none	same	yes	none	yes	none	-	none
response*	none	same	yes	same	yes	same	-	same
harmonic_freqs	none	same	none	same	none	same	none	same
*Total field response (handmade_resp):	chndb-resp.jsonnet							

Nominal  
baselines will  
be updated!

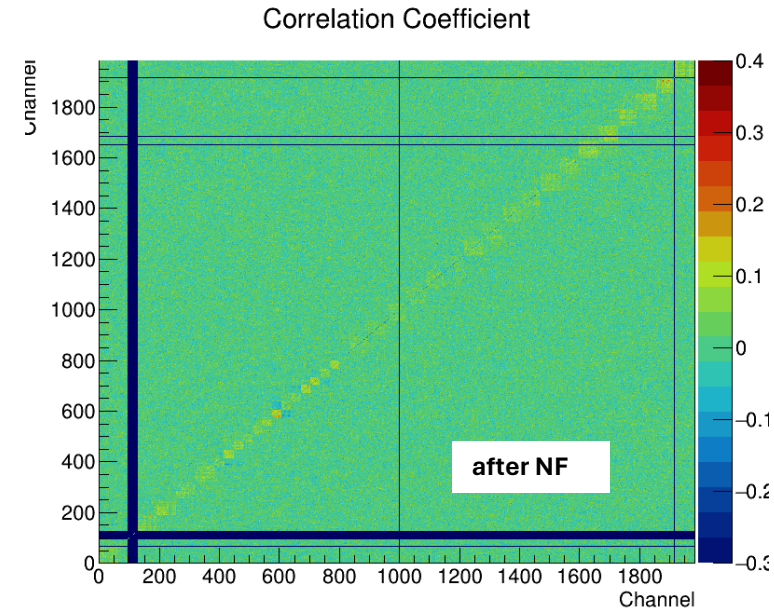
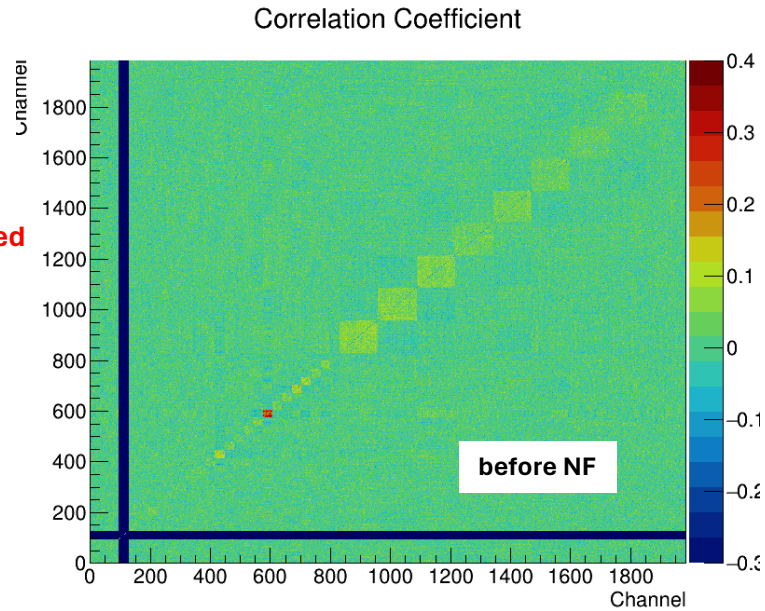
# Single + grouped NF for single event at u-plane (run 10926)

Noise-only event



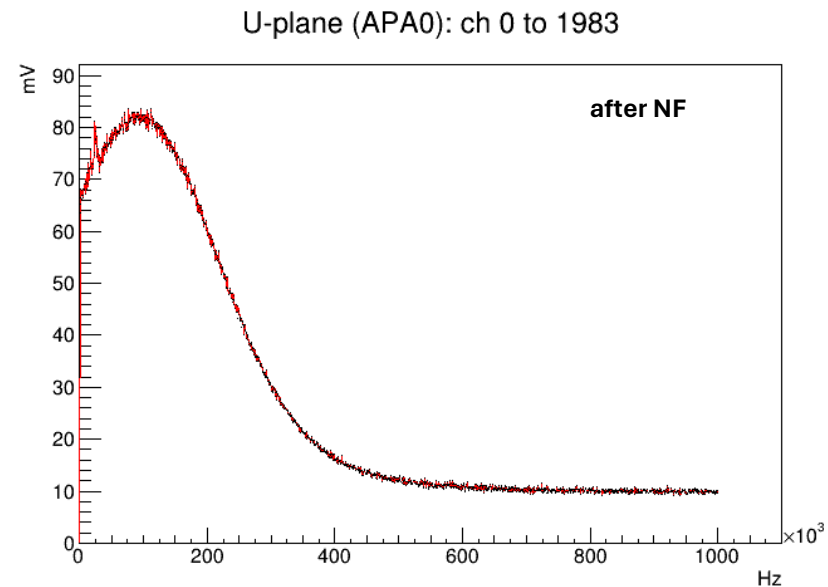
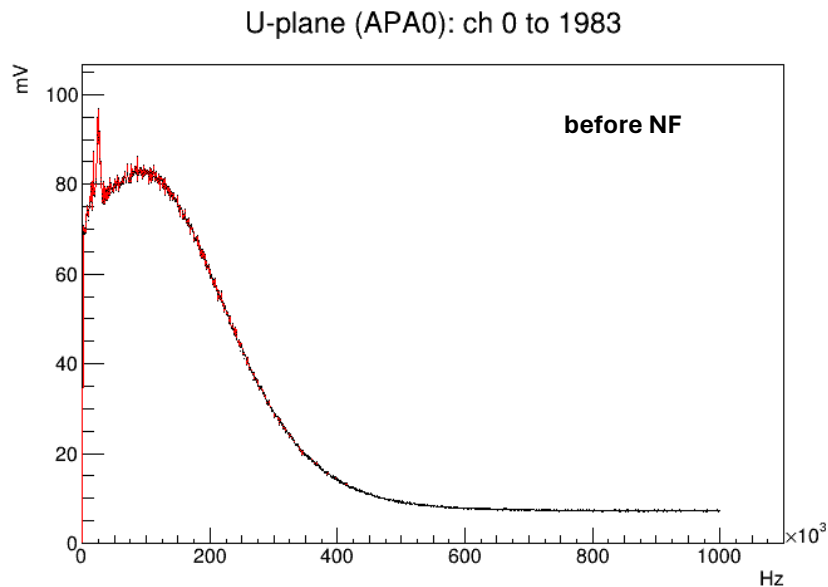
# Single + grouped NF for single event at u-plane (run 10926)

(used 64 channels as grouped channels)



Some bad channels removed in signal processing step

Looks like there are still noise grouped in every 32 channels (residual coherent noise)

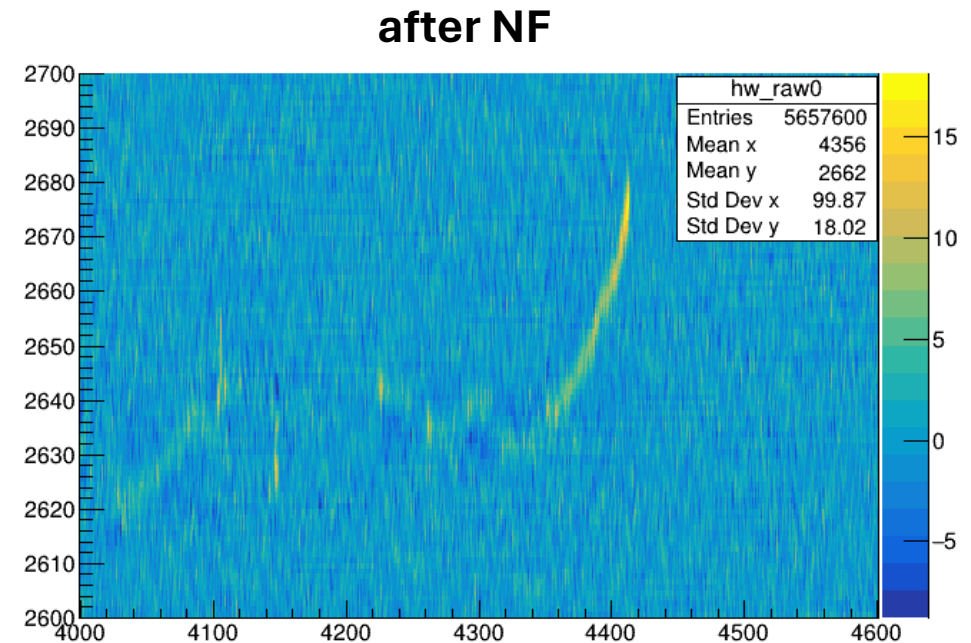
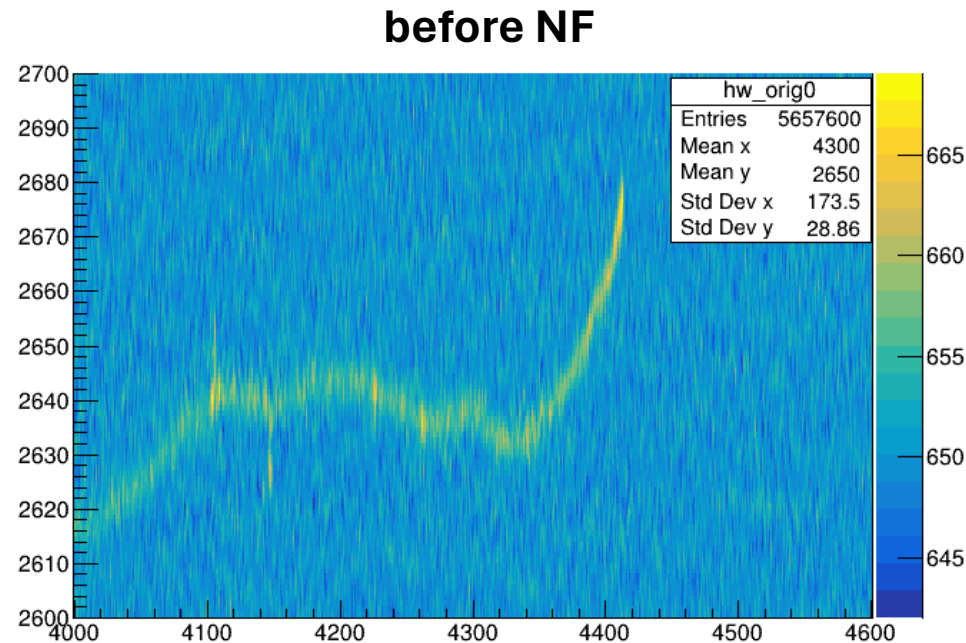


Single spikes can be removed using **freqmasks** parameter!

(residual coherent noise shows up as low freq excess noise “bump”)

# Visually checking the effect of coherent noise filtering

To “mimic” a coherent noise signal, a 500 MeV isochronous MC muon track was used as input, where we have many charge depositions at the same time. The input signal was scaled down by a certain factor to make the signal amplitude smaller.



After coherent noise filtering, the track shows some gaps in same-time charge depositions, as expected.

# Backup

# Initial workflow for noise filtering (NF) + signal processing (SP)

