Noise Filtering in SBND

Ewerton Belchior

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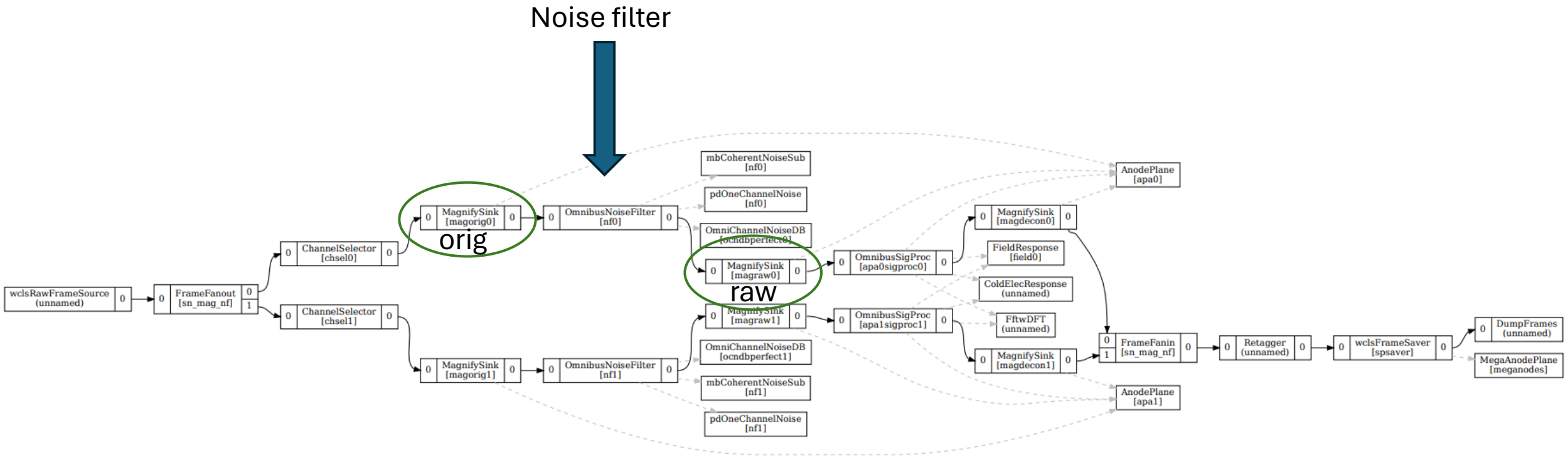
Initial workflow for noise filtering (NF) + signal processing (SP)



- **First time looking at noise filtering in wirecell using SBND real data!**
- **Modified ChannelSelector again, now to handle input without summaries (real data)**
- **(need to update few hardcoded parameters in NF modules, make them configurable)**

SBND parameters for Noise Filtering (same as in PDHD)

(Most of these parameters are for coherent noise removal)

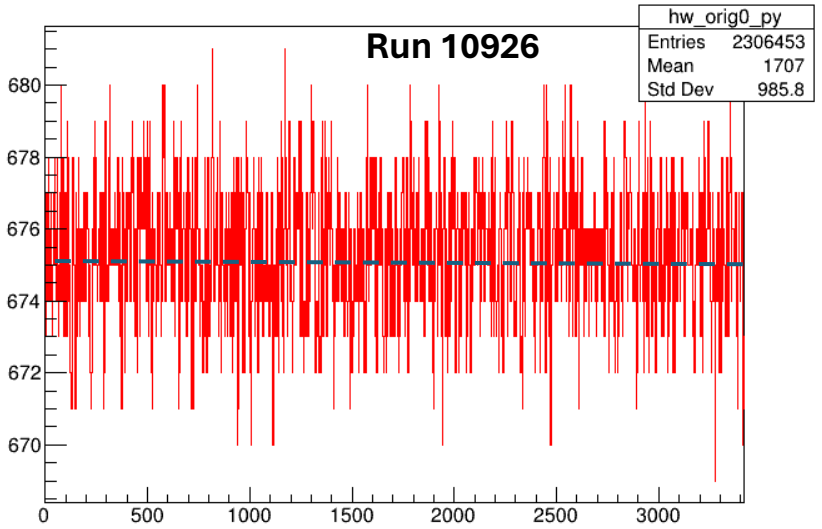
	all channels		induction 1		induction2		collection	
	PDHD	SBND	PDHD	SBND	PDHD	SBND	PDHD	SBND
nominal_baseline (adc count)	2048.0	2001.0	-	same	-	same	400.0	650.0
gain_correction (unitless)	1.0	same	-	same	-	same	-	same
response_offset (ticks?)	0.0	same	120	same	124	same	-	same
pad_window_front (ticks?)	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							

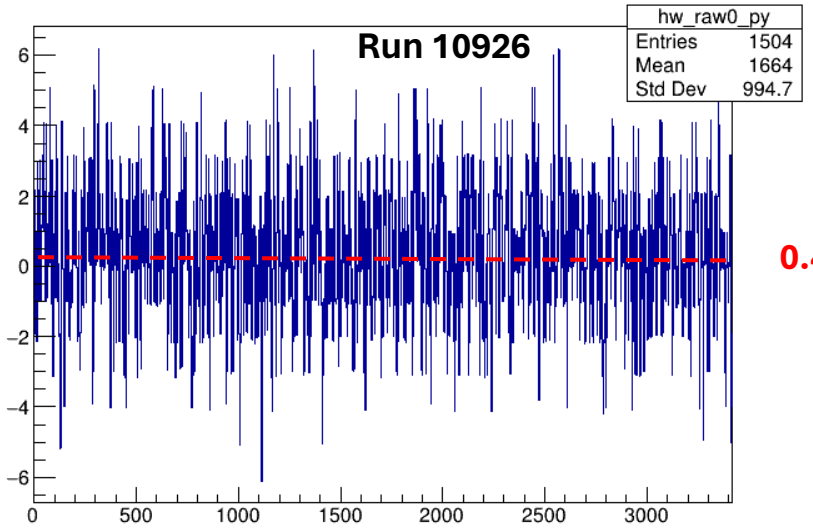
Nominal baselines will be updated!

Single + grouped NF for single event at w-plane

Baseline subtracted

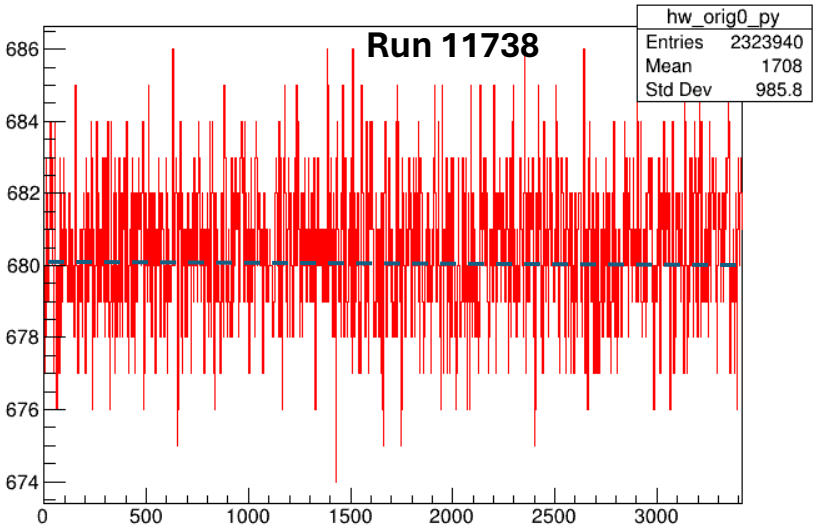
675.2

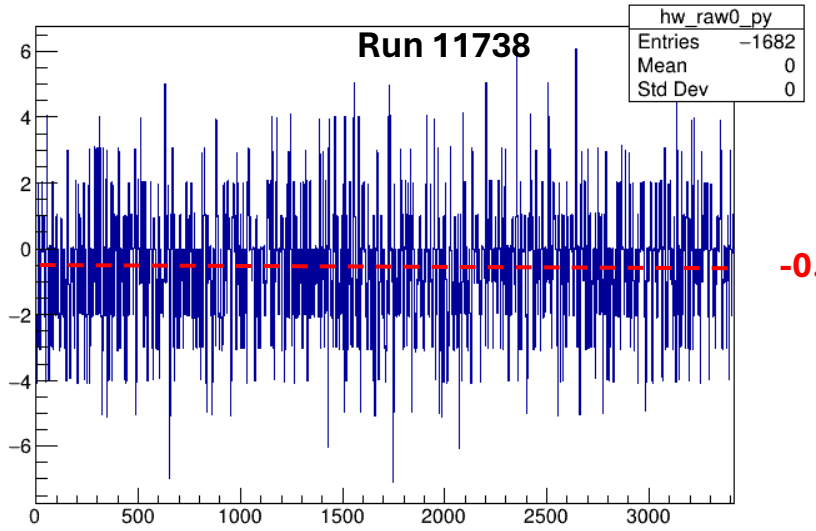




0.44

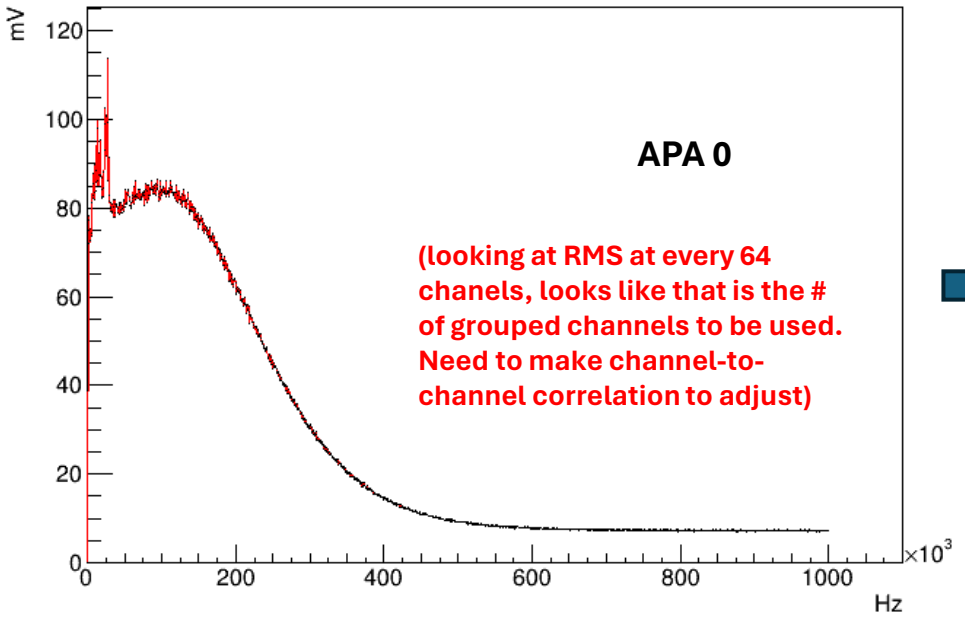
680.3

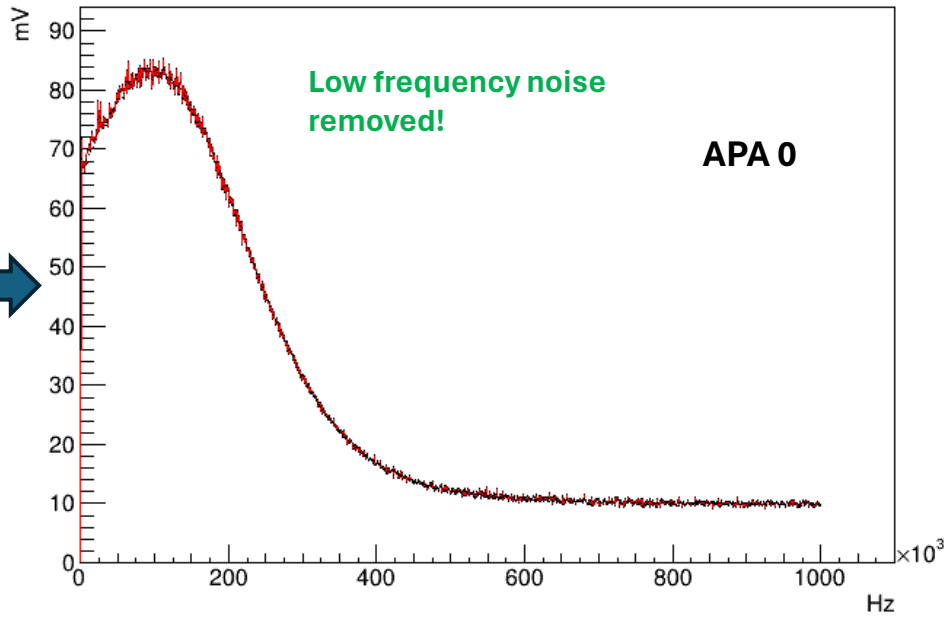


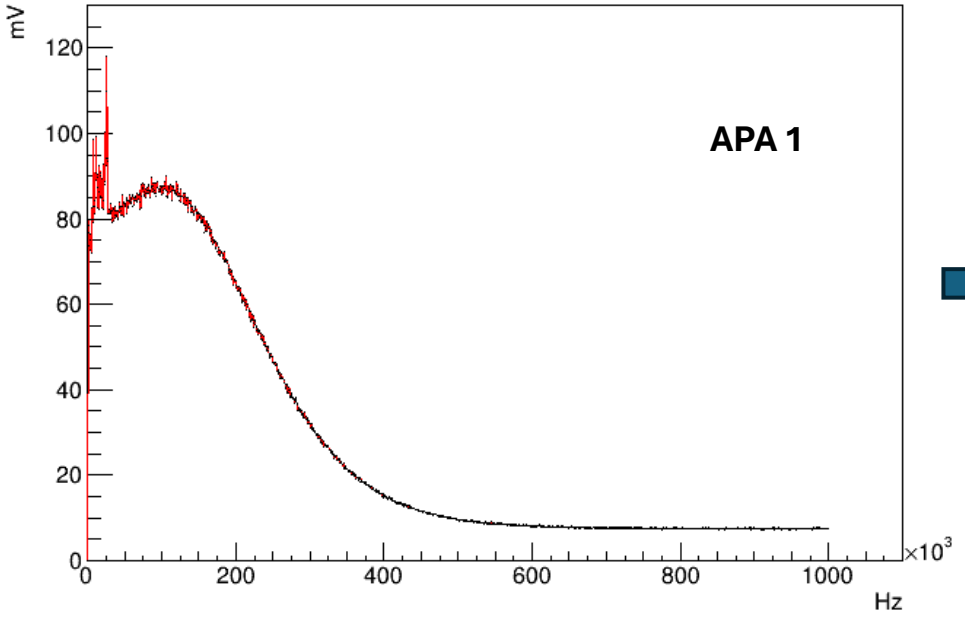


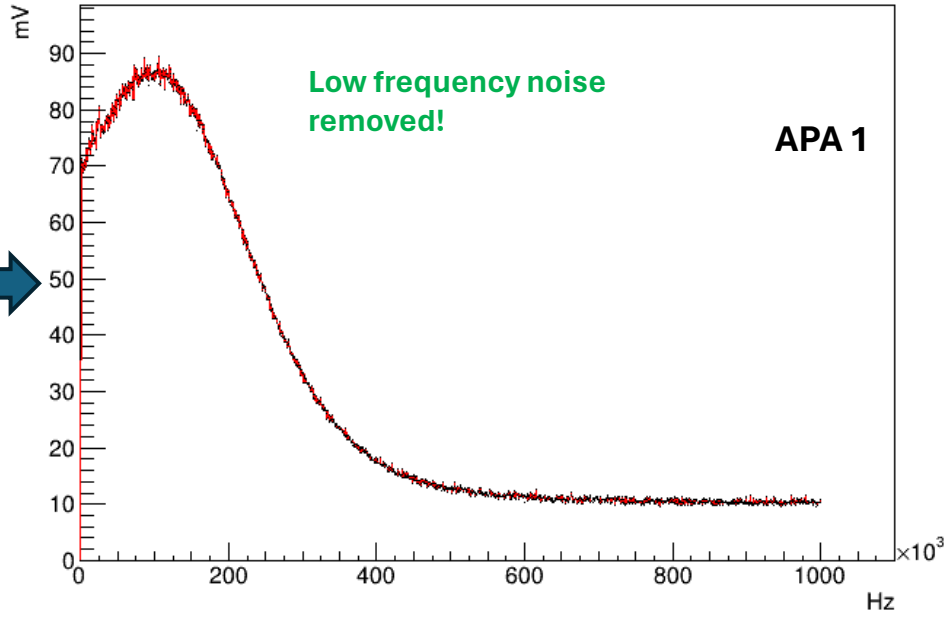
-0.49

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

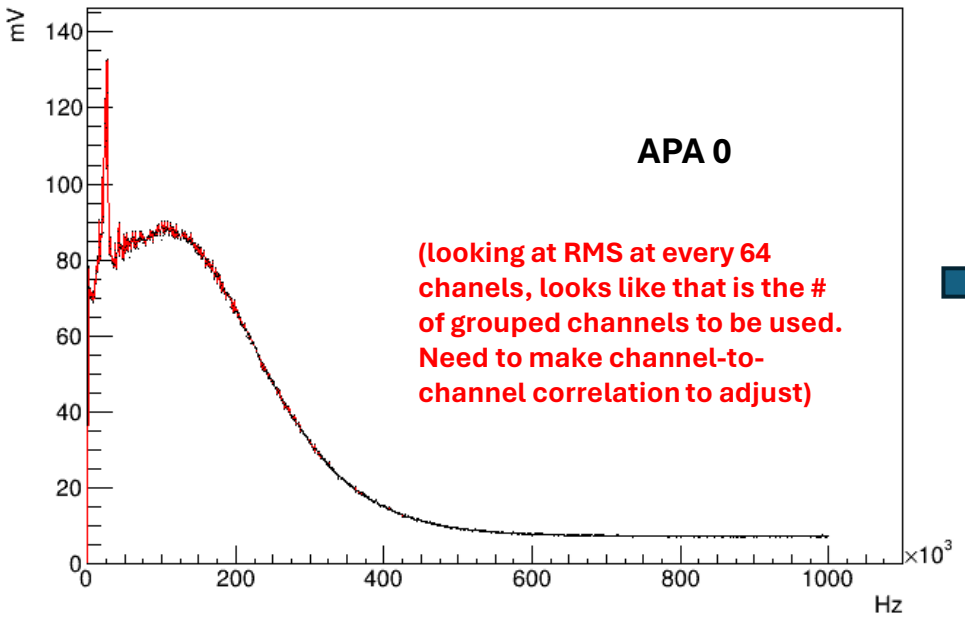


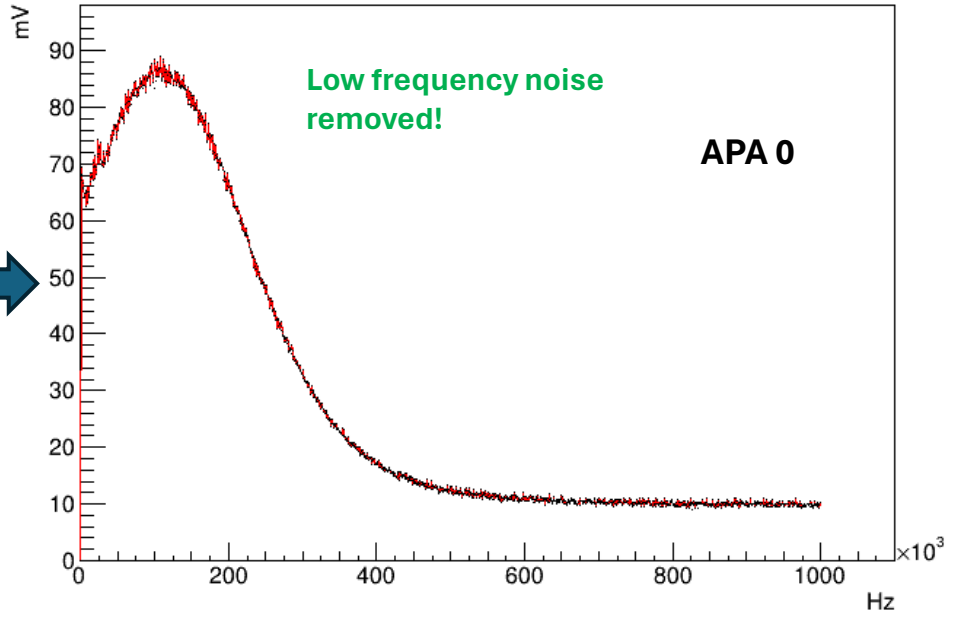


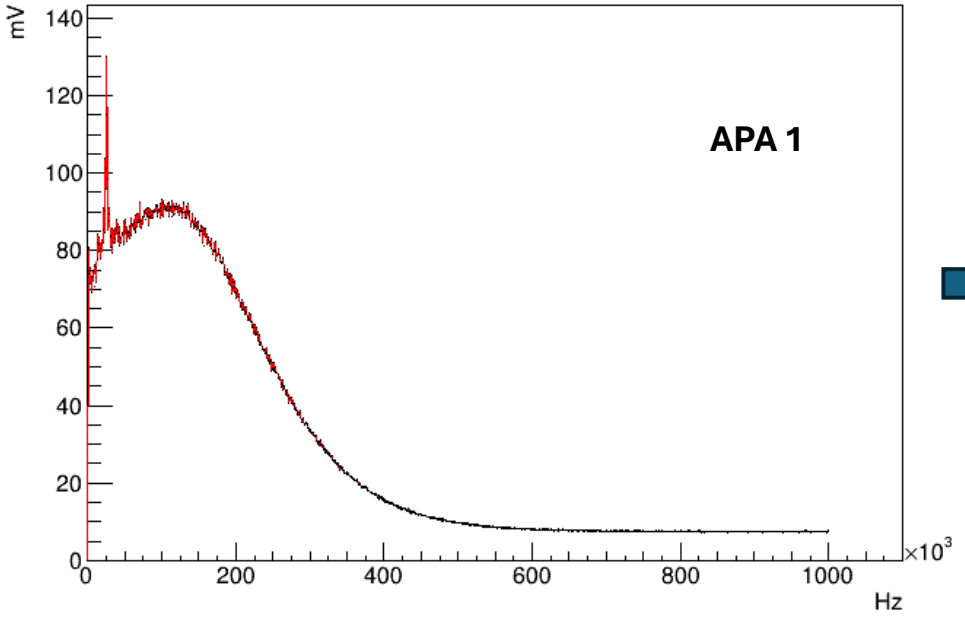


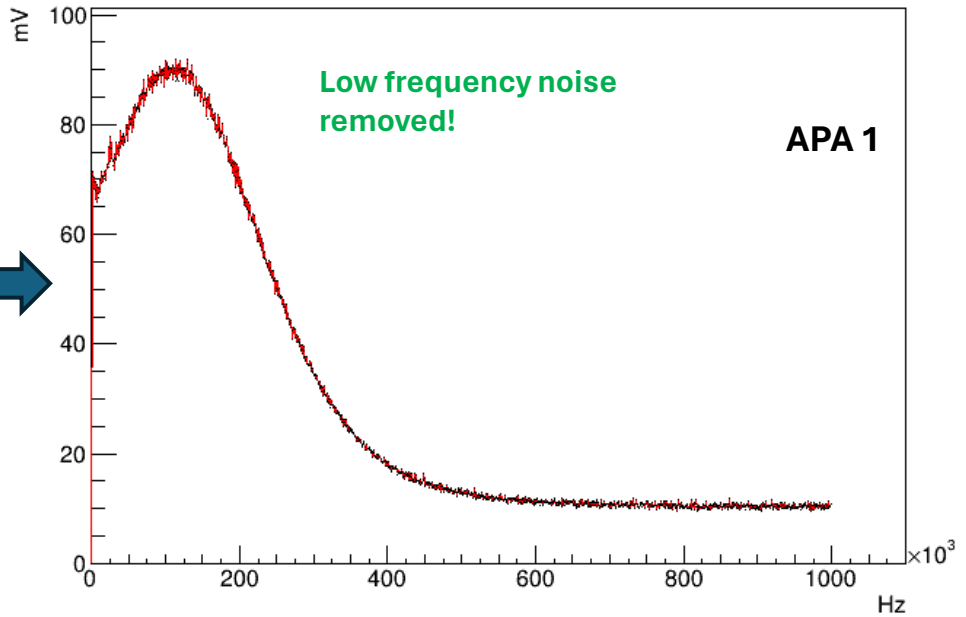


Single + grouped NF for single event at w-plane (run 11738)





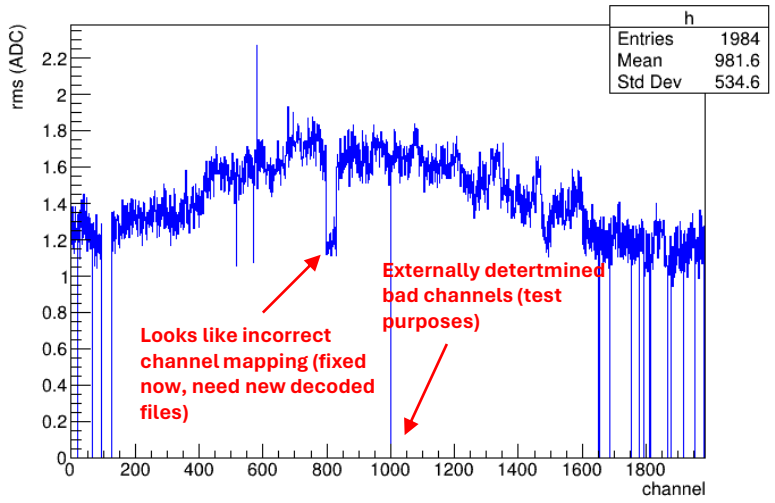




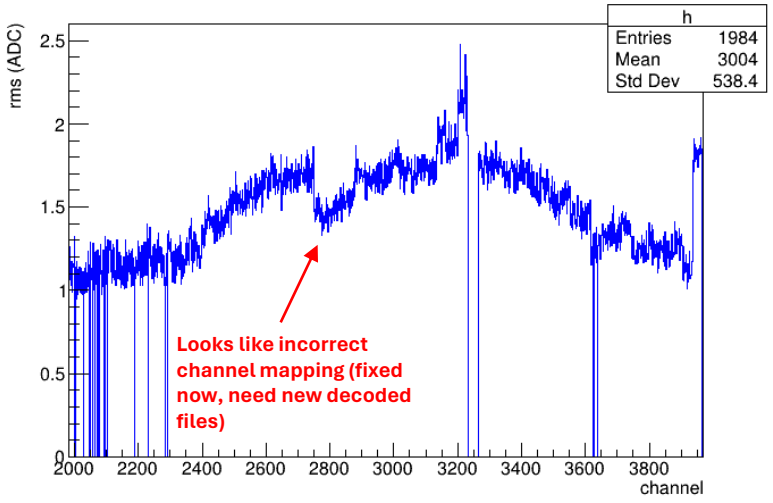
NF noise RMS for single event (run 10926)

Overall, noise rms after filtering looks reasonable!

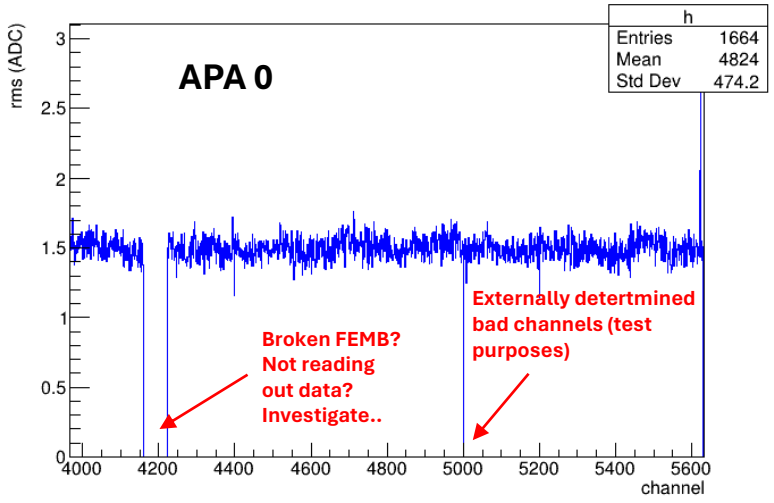
Induction 1



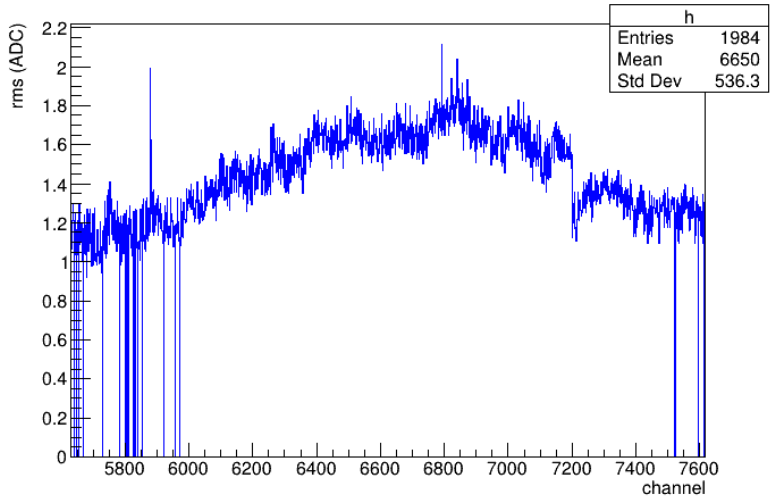
Induction 2



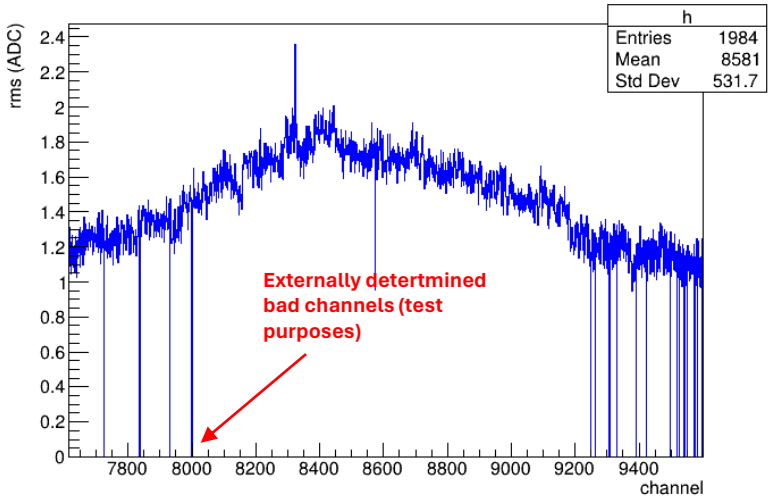
Collection



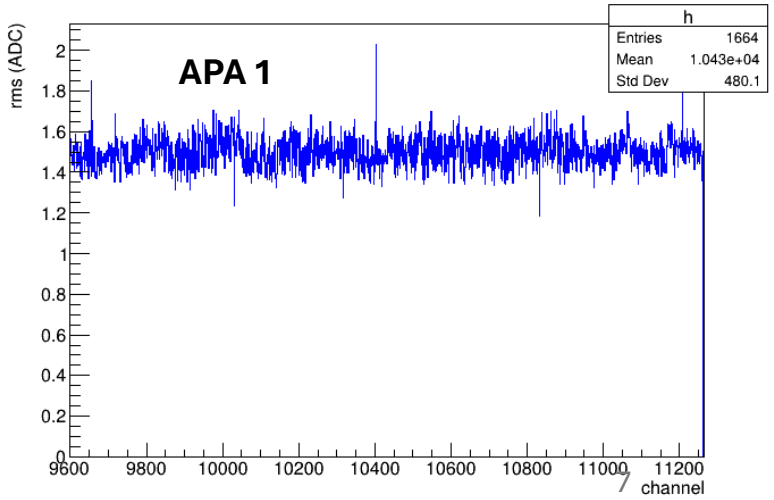
Induction 1



Induction 2



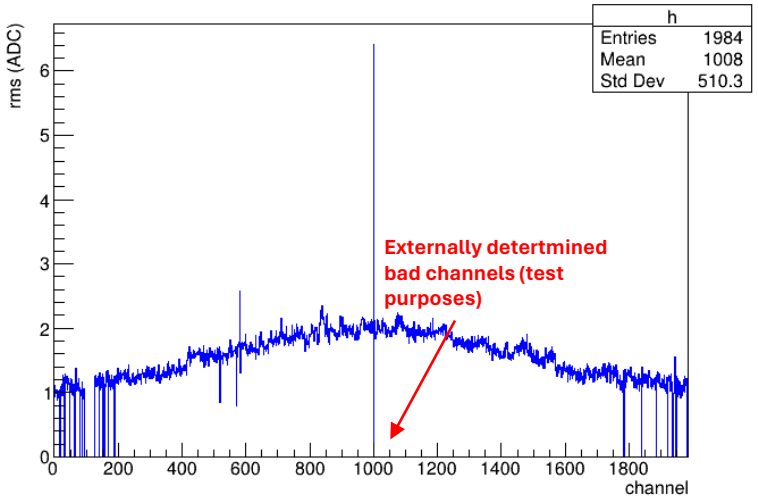
Collection



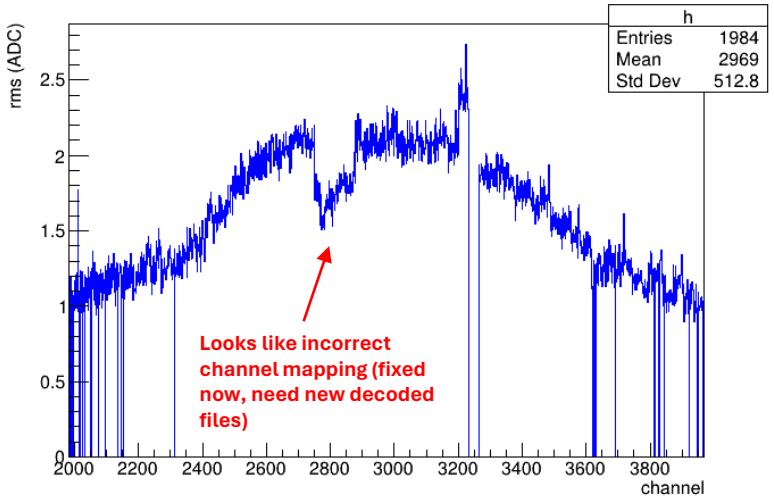
NF noise RMS for single event (run 11738)

Overall, noise rms after filtering looks reasonable!

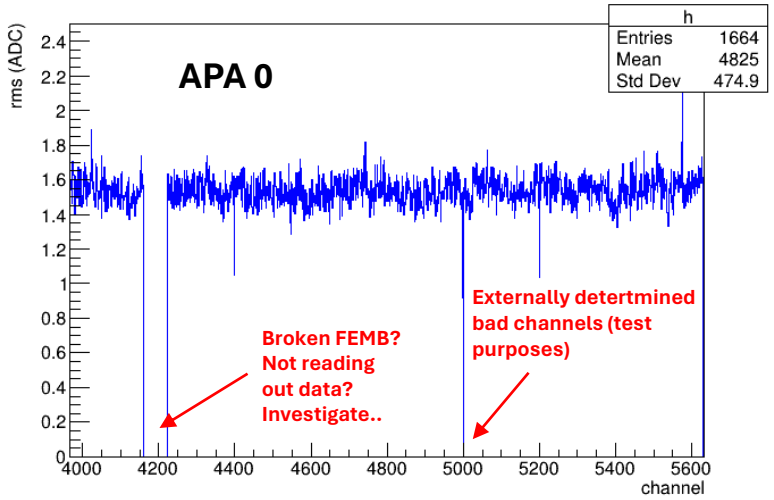
Induction 1



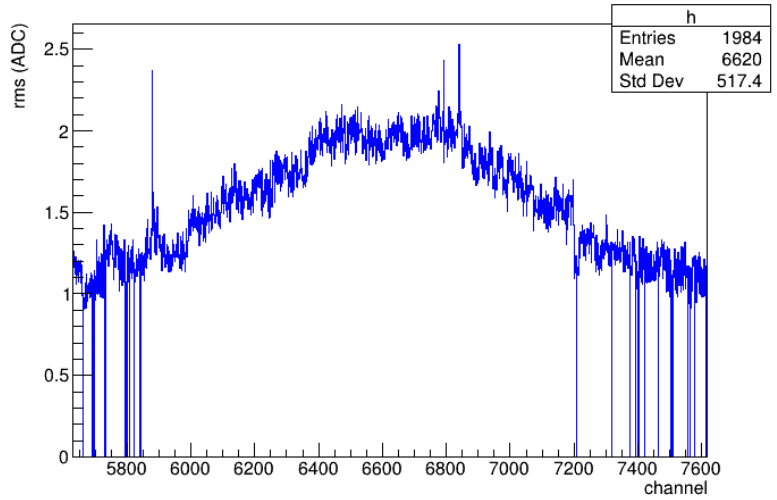
Induction 2



Collection



Induction 1



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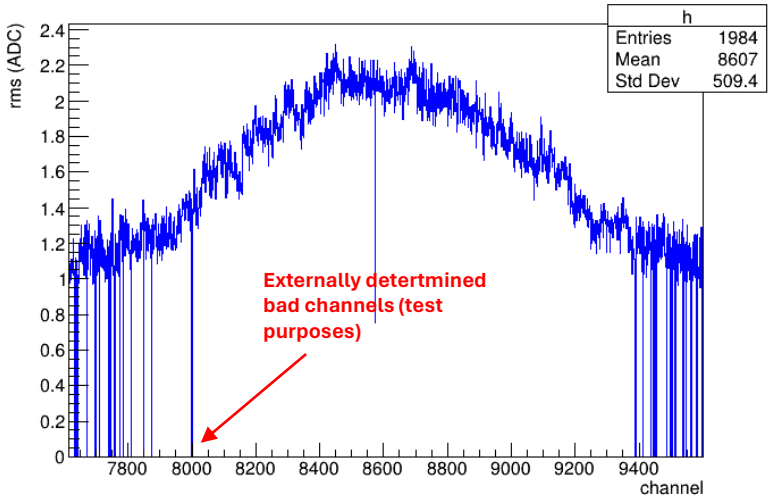
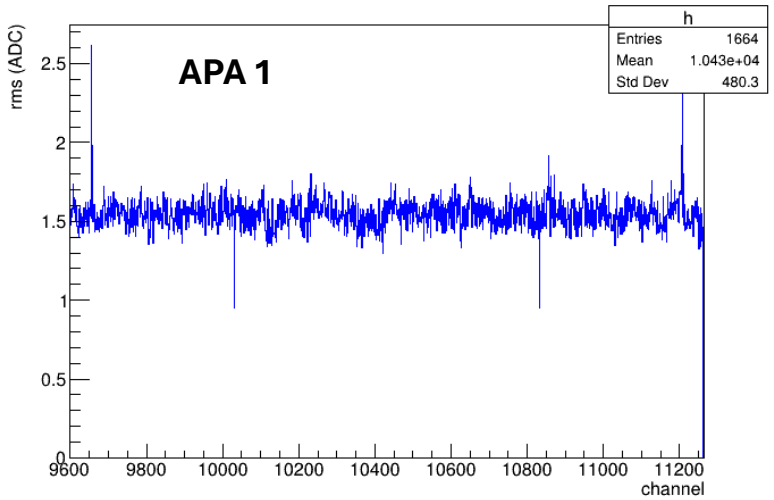


Collection



Summary

- Current set of parameters seem ok for removing excess noise in SBND
- Overall, frequency spectra and noise rms after filtering look reasonable
- Look at channel-to-channel correlations for grouped NF
- Use new decoded files with correct channels mapping
- Look at different runs and tune parameters according to observations

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