

Quick Update: CRP5 Coldbox Pulser Runs, Waveform Fitting

Karla Téllez Girón Flores

04/18/2024



@BrookhavenLab

The Setup

- **The Dataset:** NP02 Second Coldbox pulser calibration runs for CRP5.
- **Runs:** 21040, 21050, 21070 (April 28, 2023).
- 14 mV/fC gain and 2 μ s nominal shaping time.
- Each run at a different DAC setting (30, 40, 60)

The Method (so far):

- A peak finding algorithm finds the positive and negative peaks for each channel in data.
- Finds noisy channels and skips them (for now).
- **Not averaging waveforms (for now).**
- **NEW:** Fitting waveforms using a two-step process.
 - Pre-fitting using old electronics response function (F_0).
 - Fit using newest electronics response function (F_1).

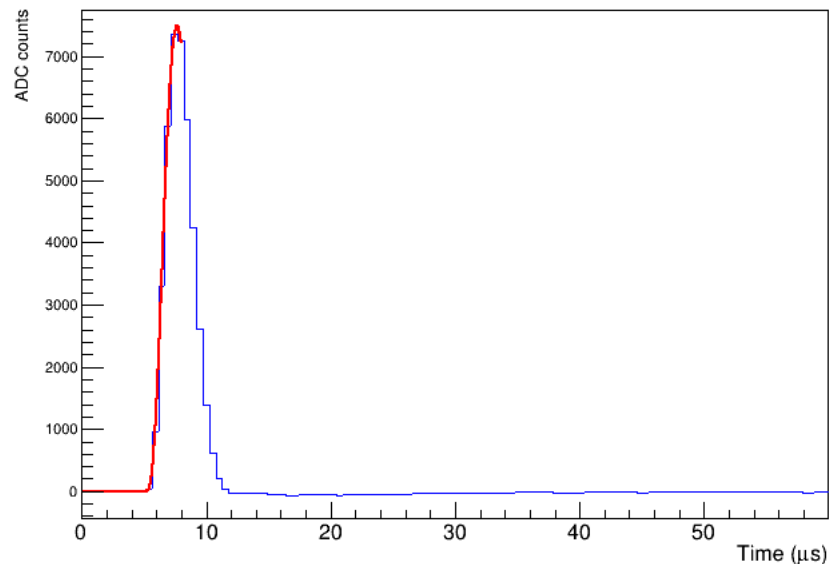
Fit is looking great!

Run 21040

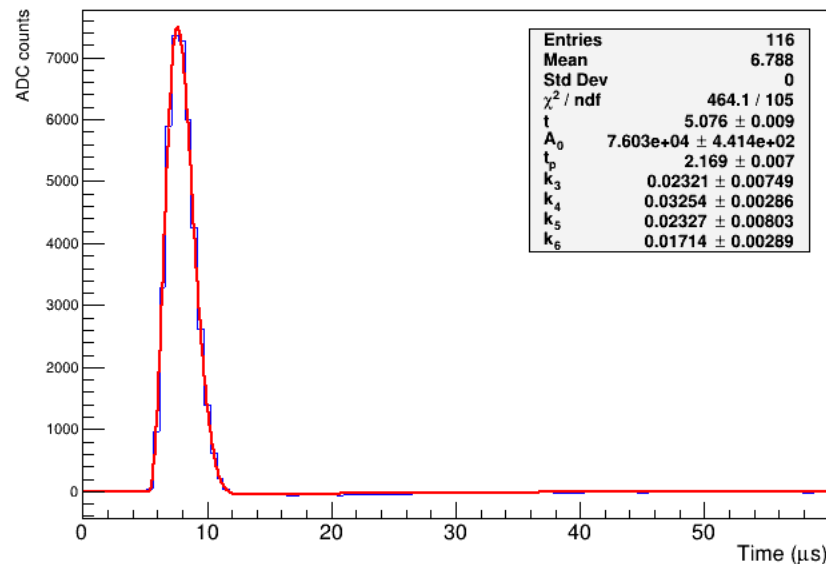
# Channels where fit did not work BEFORE	500
# Channels where fit did not work AFTER	189

- **BEFORE:** One step fit with F_1 only.
- **AFTER:** Two-step fit.

First Waveform, Channel 7

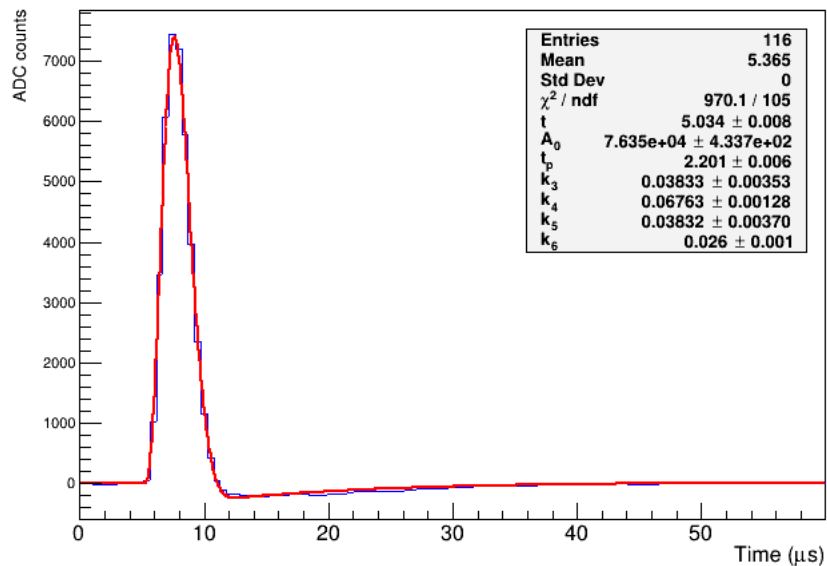


First Waveform, Channel 7

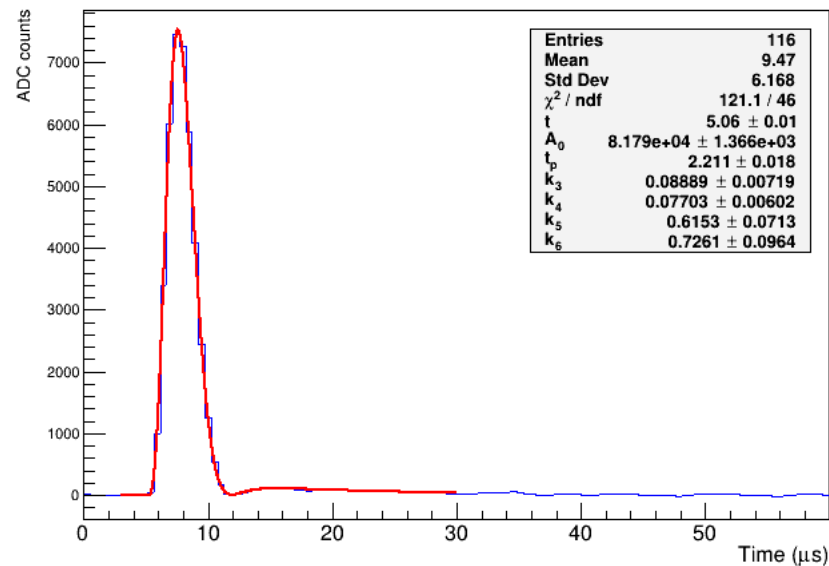


Some examples (Run 21040)

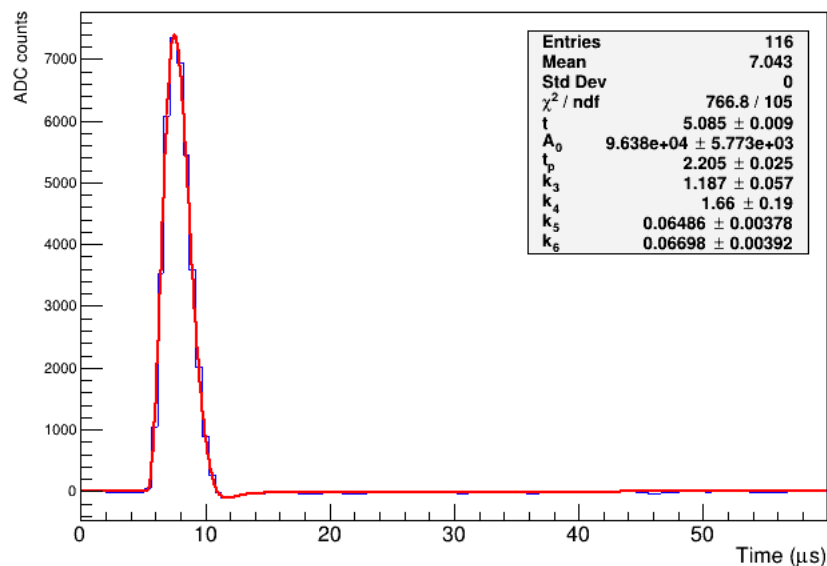
First Waveform, Channel 976



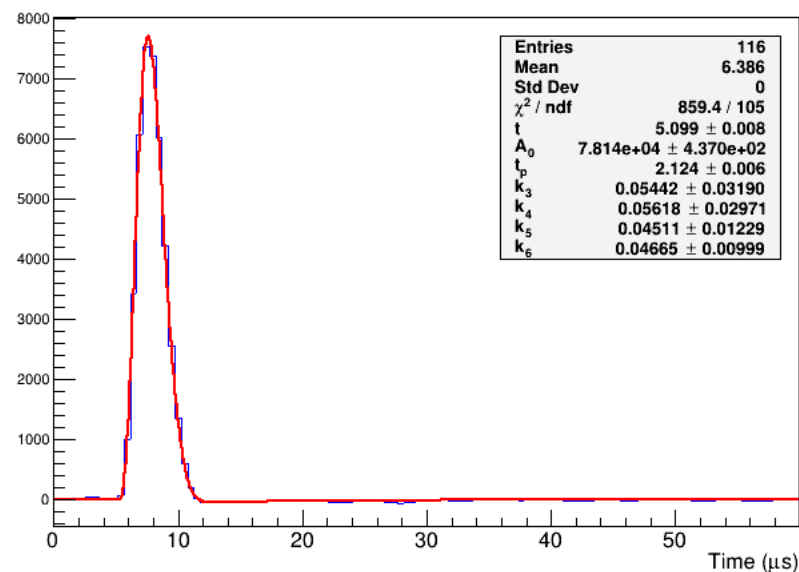
First Waveform, Channel 3043



First Waveform, Channel 2068



First Waveform, Channel 2349

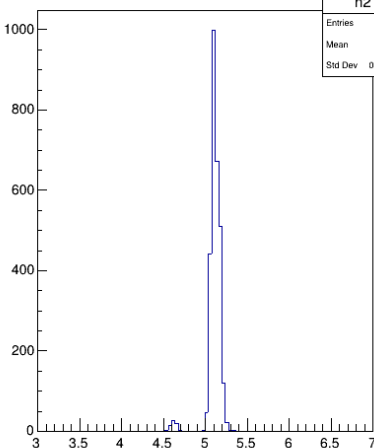


Fit Parameters (Run 21040)

Counts

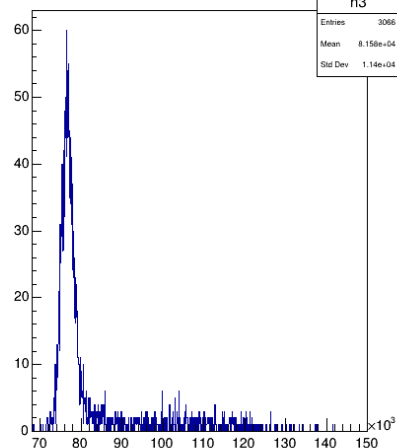
Time Offset

h2	
Entries	3066
Mean	5.111
Std Dev	0.08593



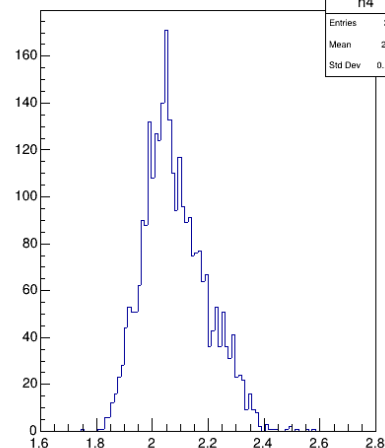
Amplitude

h3	
Entries	3066
Mean	8.158×10^4
Std Dev	1.14×10^4



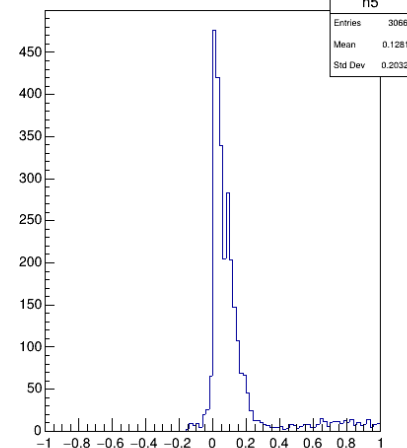
Shaping Time

h4	
Entries	3066
Mean	2.082
Std Dev	0.1133



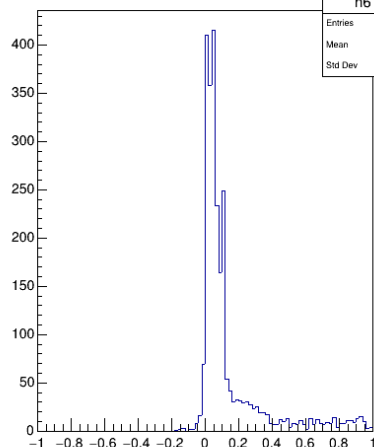
k3

h5	
Entries	3066
Mean	0.1281
Std Dev	0.2032



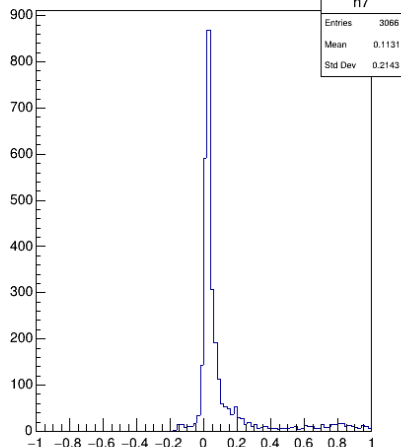
k4

h6	
Entries	3066
Mean	0.1403
Std Dev	0.2119



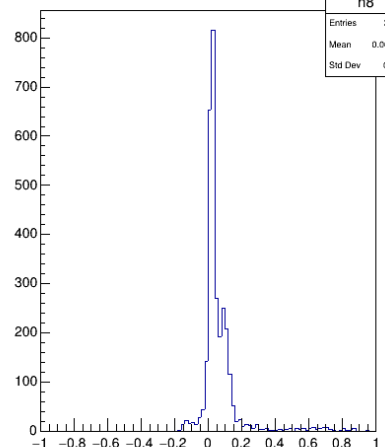
k5

h7	
Entries	3066
Mean	0.1131
Std Dev	0.2143



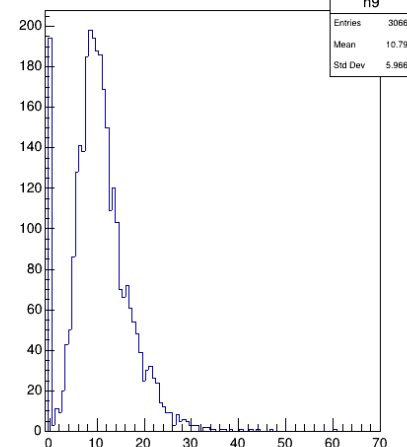
k6

h8	
Entries	3066
Mean	0.06439
Std Dev	0.121



Chi2

h9	
Entries	3066
Mean	10.79
Std Dev	5.968

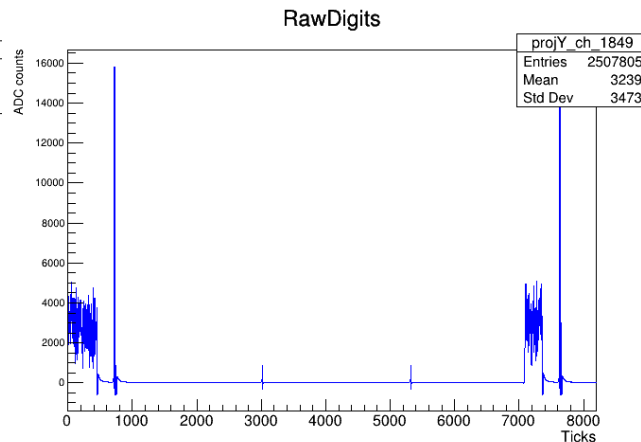
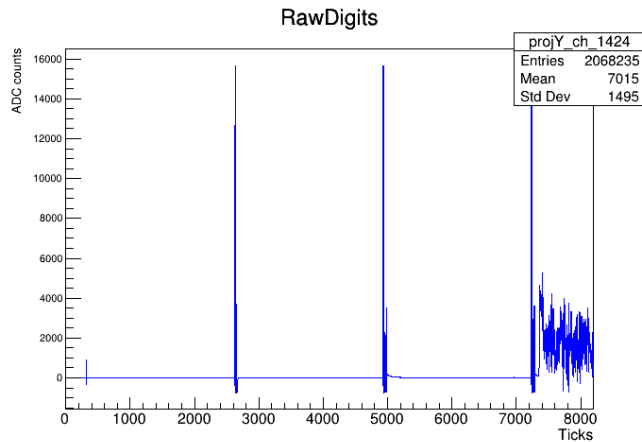
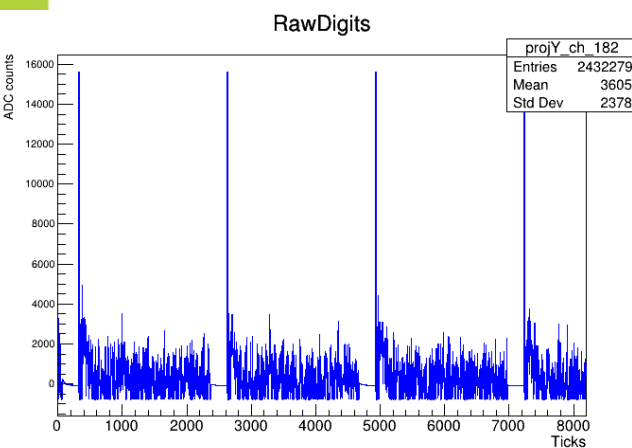


Parameter Value

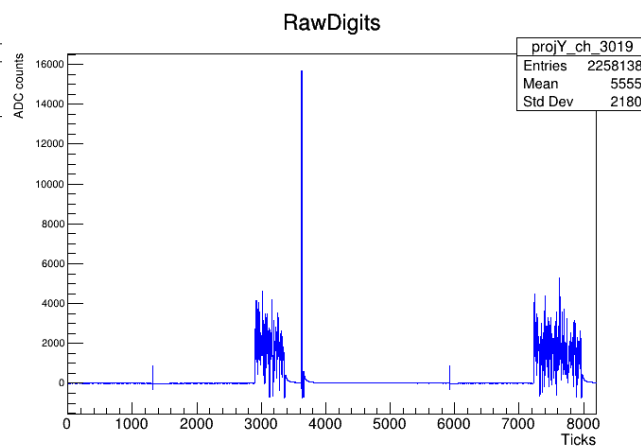
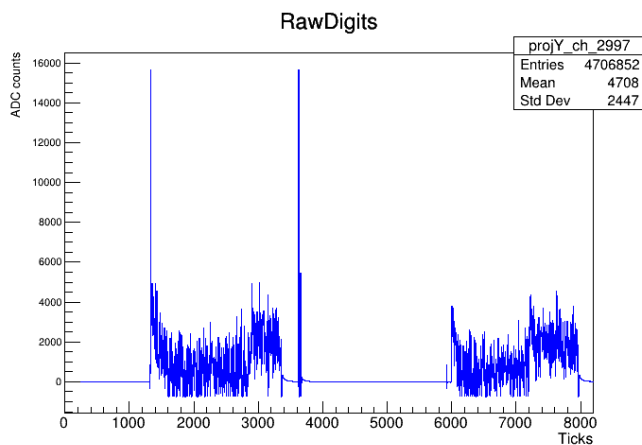
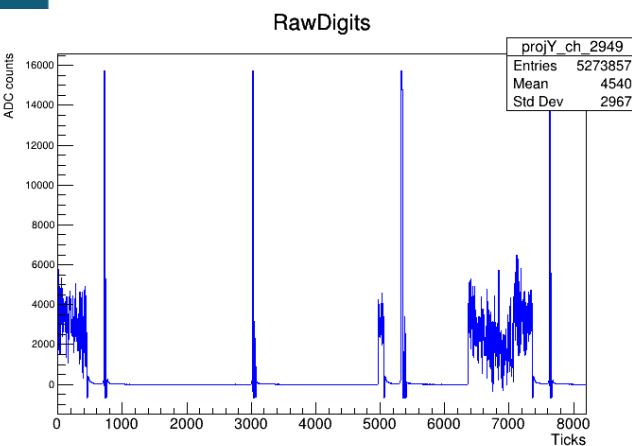
Some channels are consistently noisy...

Noisy Channels		
Run 21040	Run 21050	Run 21070
183	183	183
1425	1425	1425
1850	1850	1850
2950	2950	2950
2998	2998	2998
3020	3020	3020

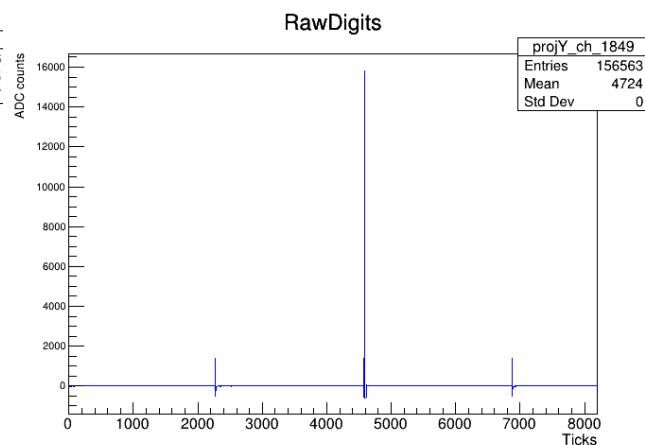
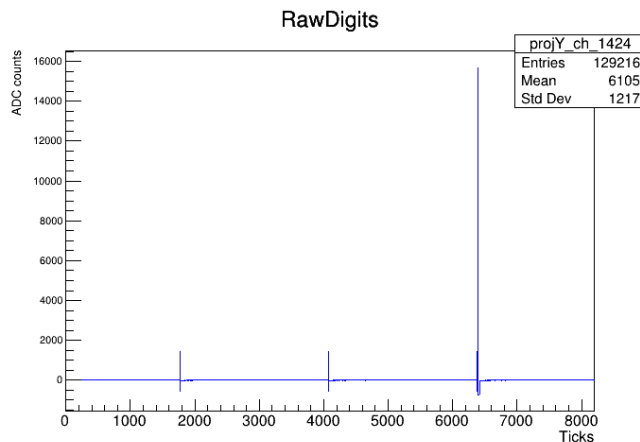
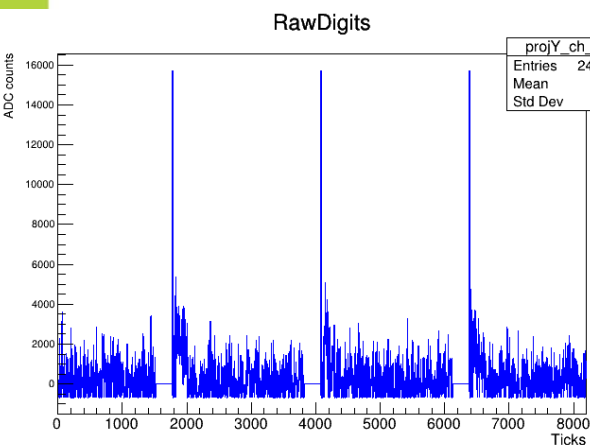
Some channels are consistently noisy...



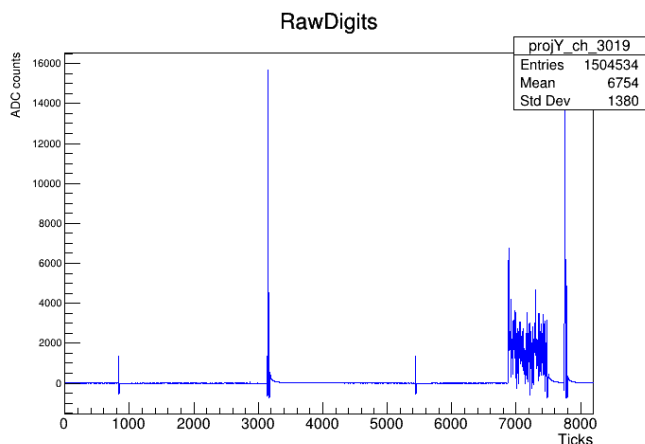
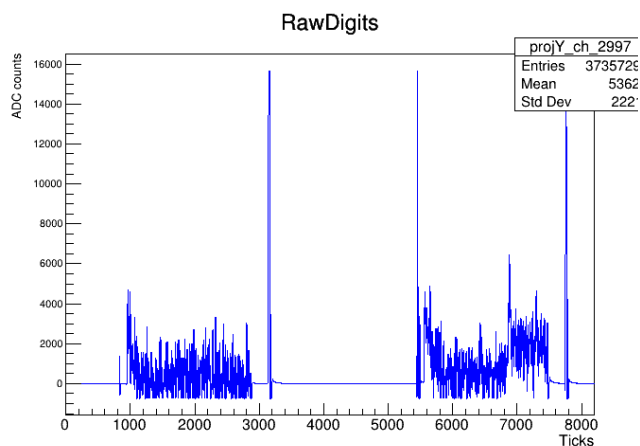
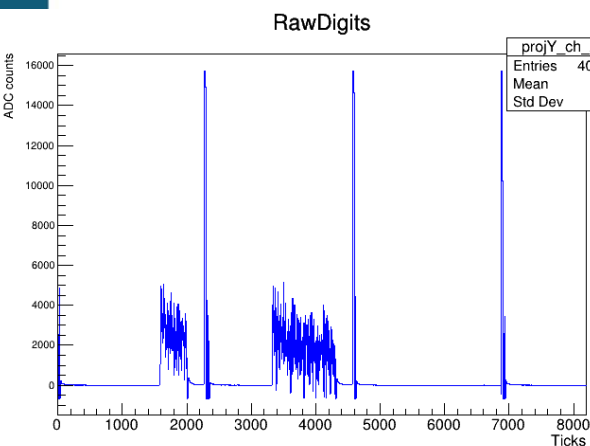
Run 21040



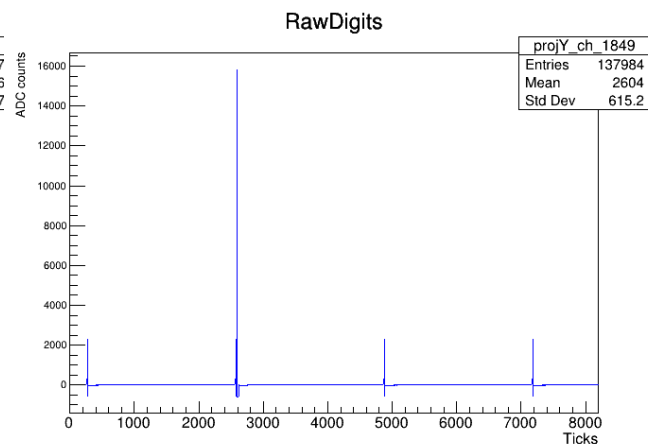
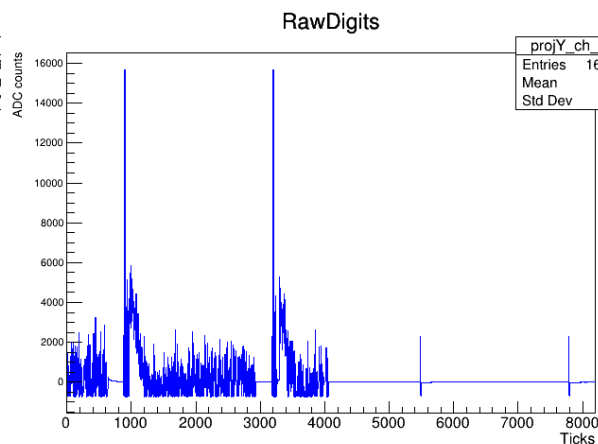
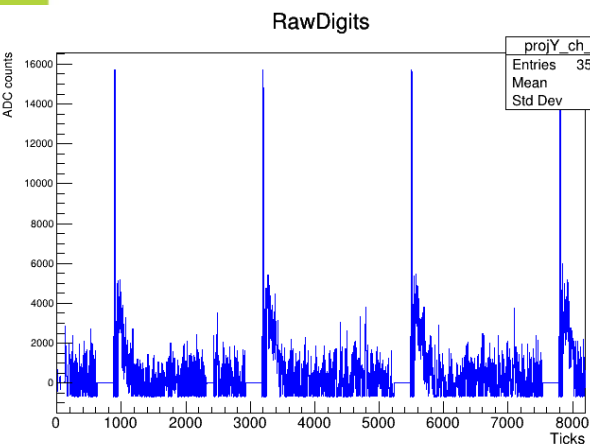
Some channels are consistently noisy...



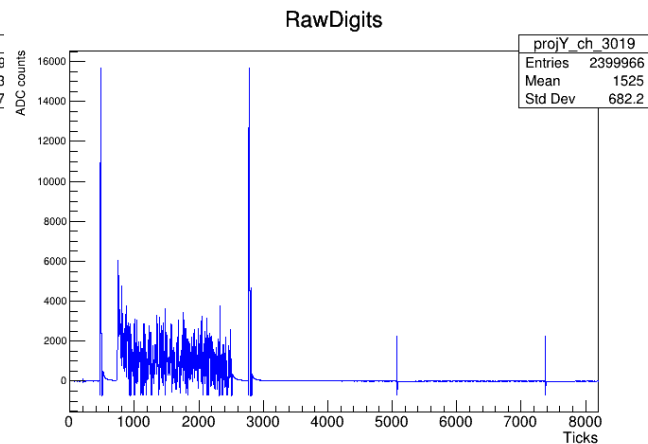
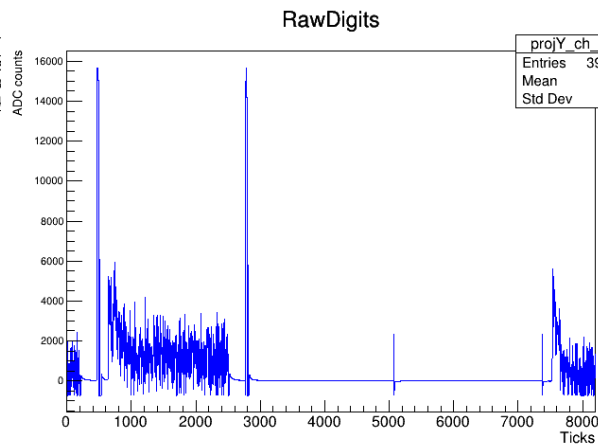
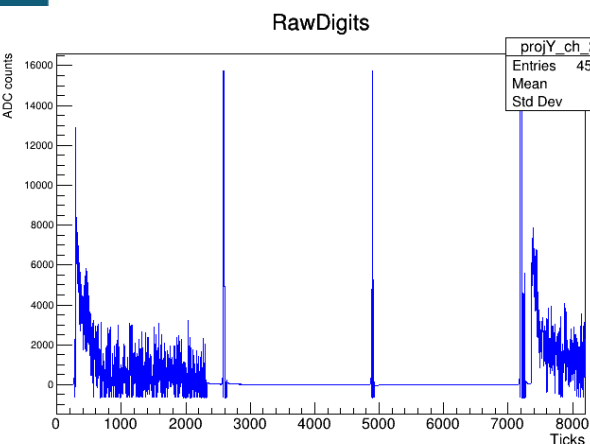
Run 21050



Some channels are consistently noisy...



Run 21070



Next Steps

- Investigate Noisy Channels.
- Keep working on improving the fittings.
 - Collaborating with Lynn to come up with the most efficient fitting tool.