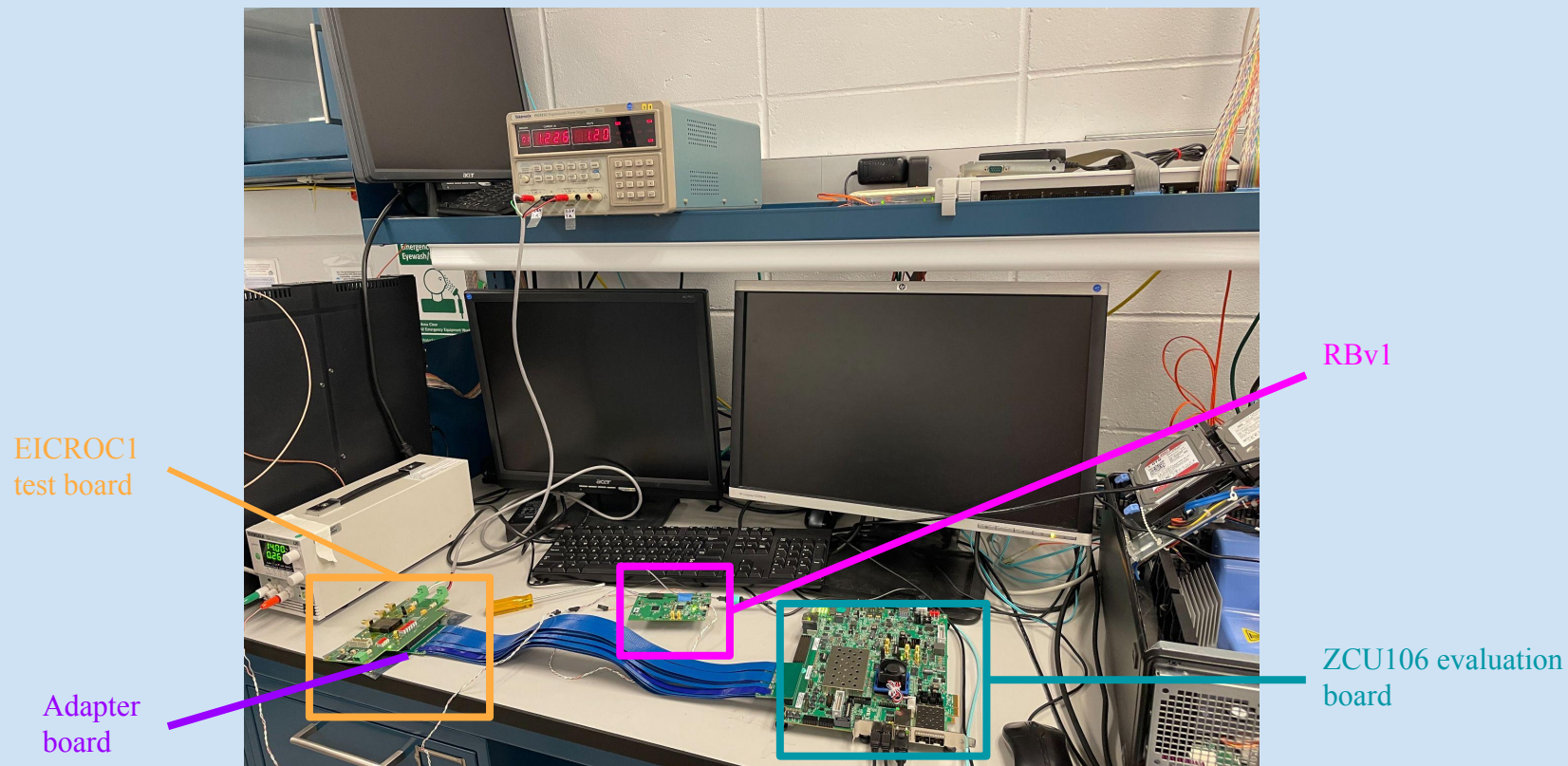


EICROC1 Noise Characterization at BNL - 07/23/26

Rachel Kovach-Fuentes
Rice University

Setup at BNL



Pipeline

zcu106.C: program which talks to ASIC,
performs desired reads/writes to register

ana_zcu.C: program records “reply” from
ASIC in human-readable format

output_converter.py and eicroc1_plotter.cxx:
process output and plots the result

v_ref_scan.sh and v_ref_scan.py automate
v_ref scanning per pixel

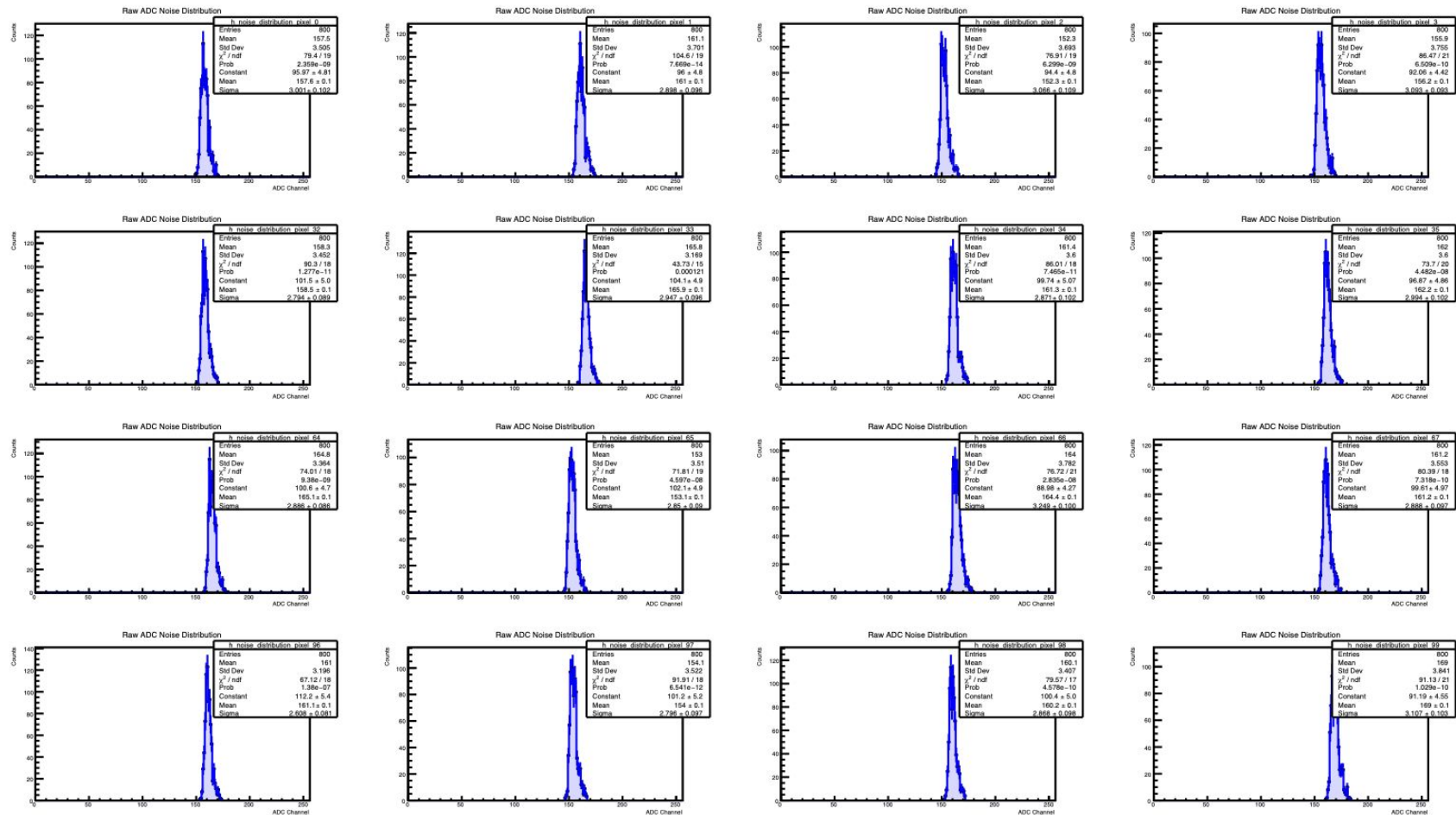
I am documenting all code for future use in
[EICROC_BNL_Rice](#) repository

25ns
timestep

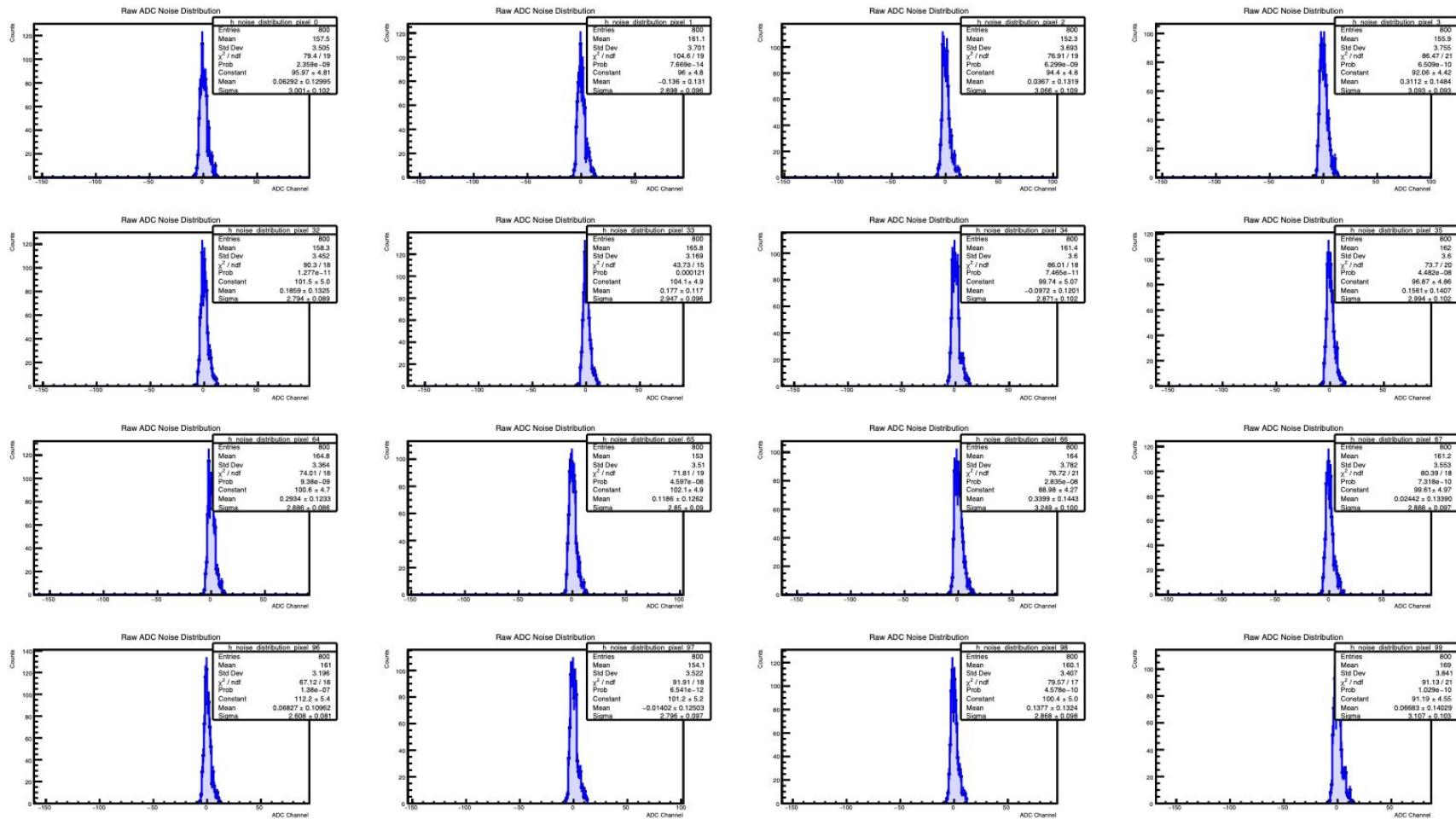
```
I2C read 0x4000 = 0xE3
I2C read 0x4001 = 0x80
I2C read 0x4002 = 0x3C
I2C read 0x4003 = 0x00
I2C read 0x4004 = 0x01
I2C read 0x4005 = 0x20
I2C read 0x4006 = 0xA0
I2C read 0x4007 = 0x40
```

1	event	column	row	timebin	adc	tdc	hit
2	0,0,0,0	161	0,0				
3	0,0,0,1	162	0,0				
4	0,0,0,2	162	0,0				
5	0,0,0,3	161	0,0				
6	0,0,0,4	160	0,0				
7	0,0,0,5	159	0,0				
8	0,0,0,6	158	0,0				
9	0,0,0,7	158	0,0				
10	0,0,1,0	161	0,0				
11	0,0,1,1	162	0,0				

Spread of raw ADC values for 16 pixels of interest, 100 events

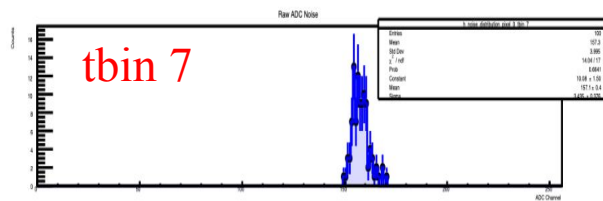
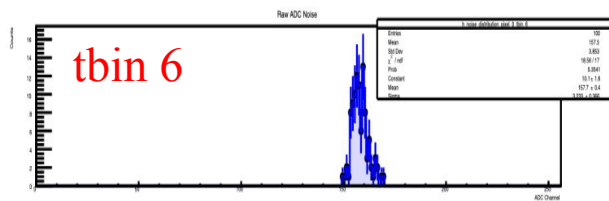
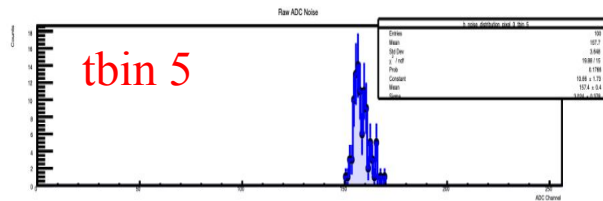
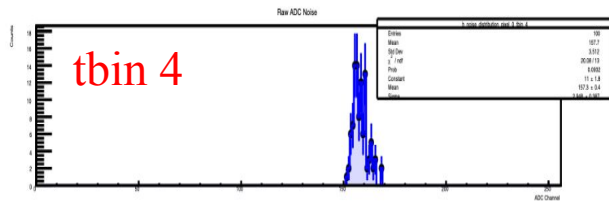
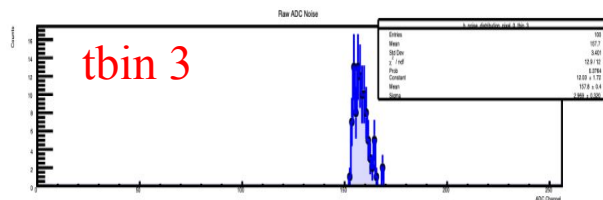
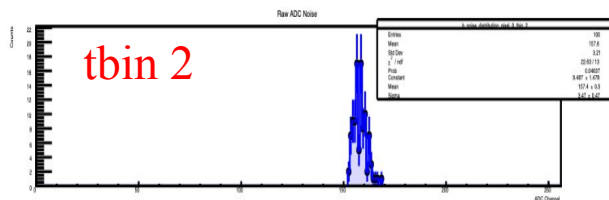
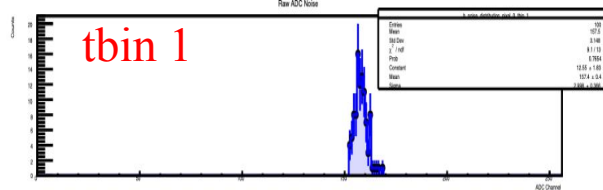
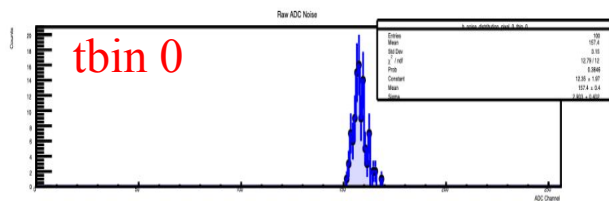


Same plot but mean has been artificially shifted to 0

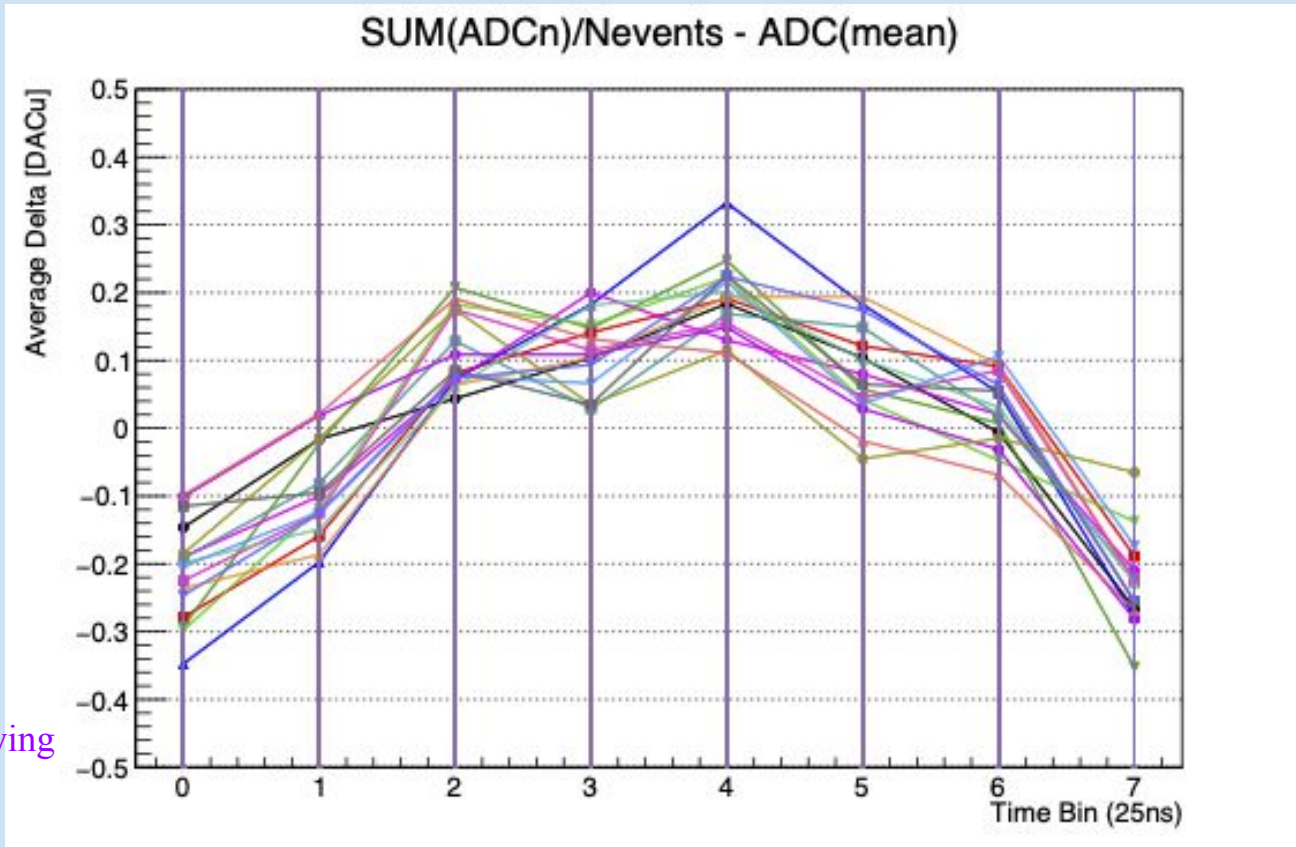


Split by timebin for 1 pixel (pixel 0), raw values

Distributions shift slightly over time

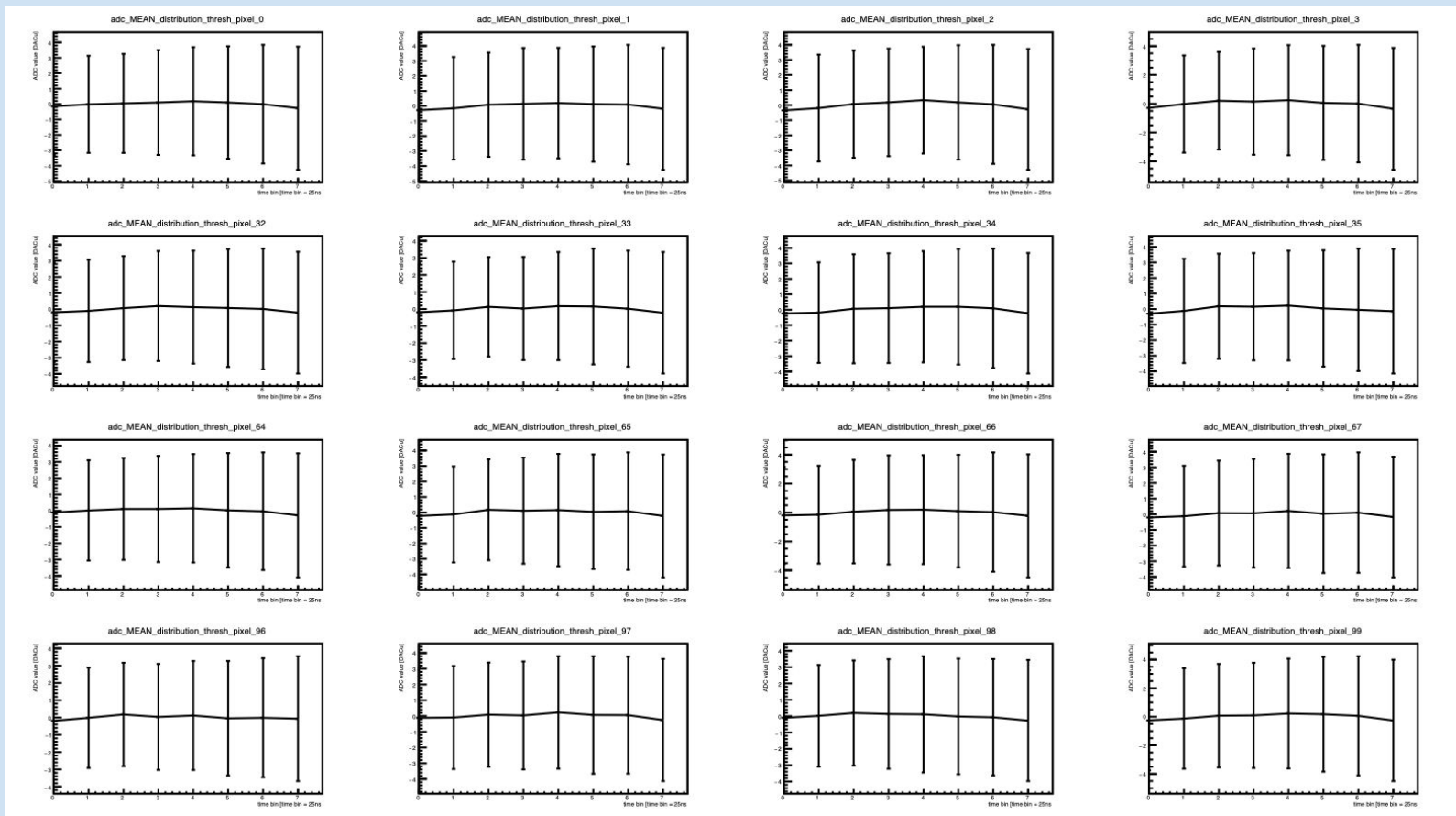


Baseline behavior of 16 pixels of interest, mean shifted to 0



There is an underlying parabolic structure across all channels

Same data, displayed separately with RMS shown



Tuning V_{ref_corr} to shift ADC mean downwards

This picture presents the different slow control parameters that allow to enable a certain signal on the probes of the test PCB.

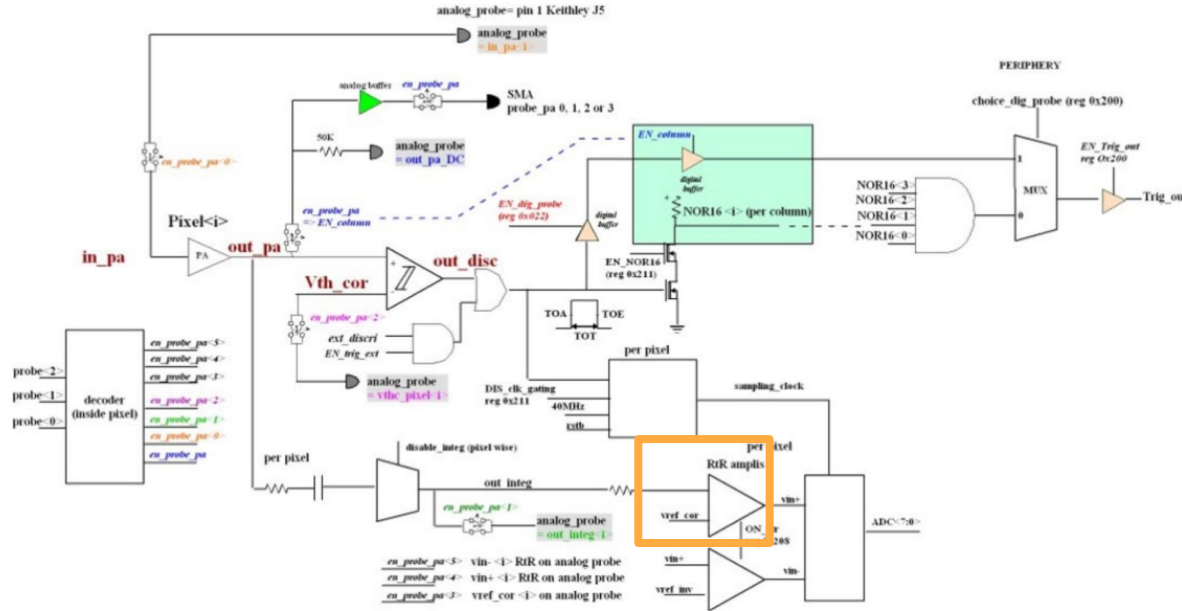
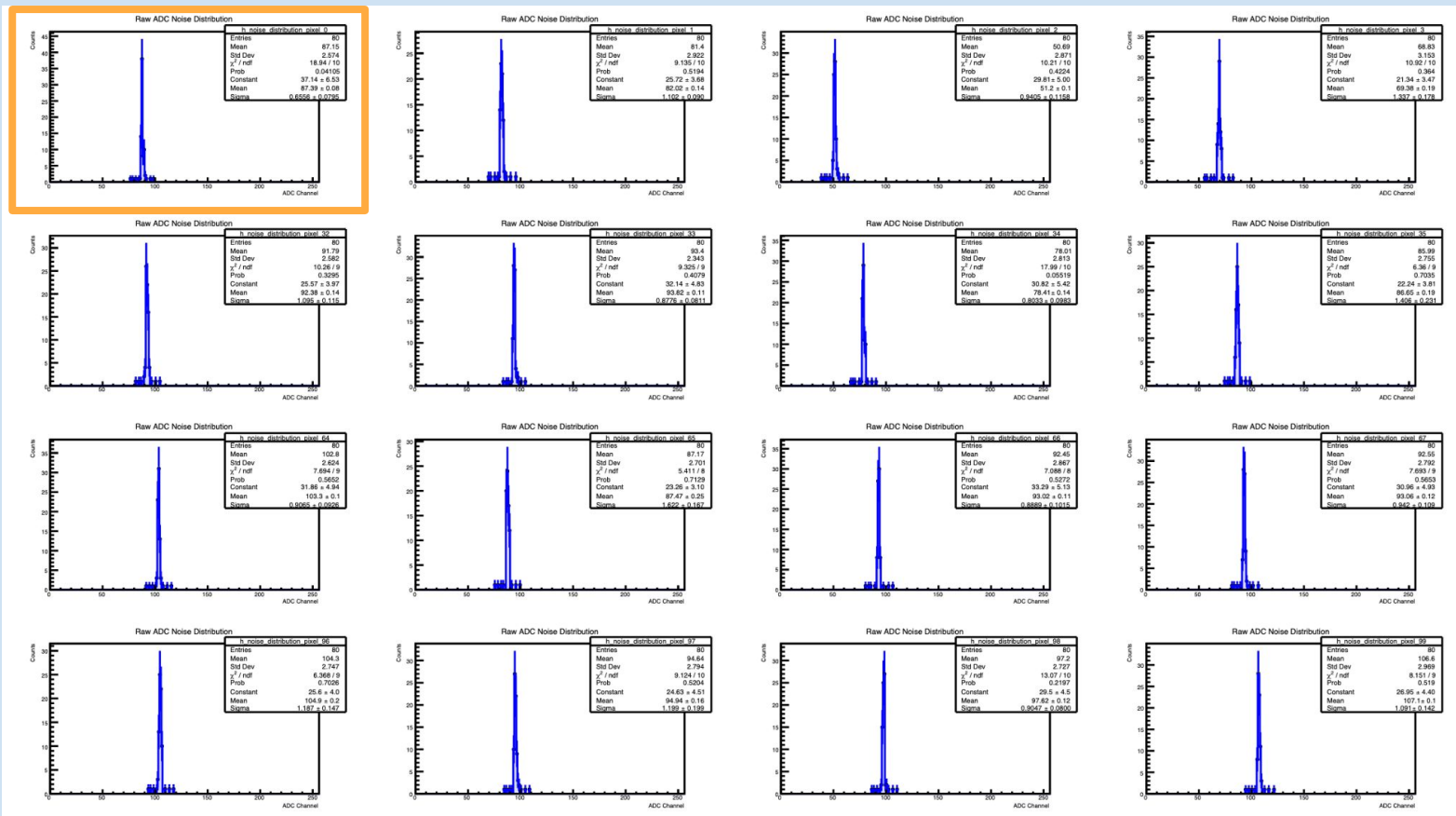


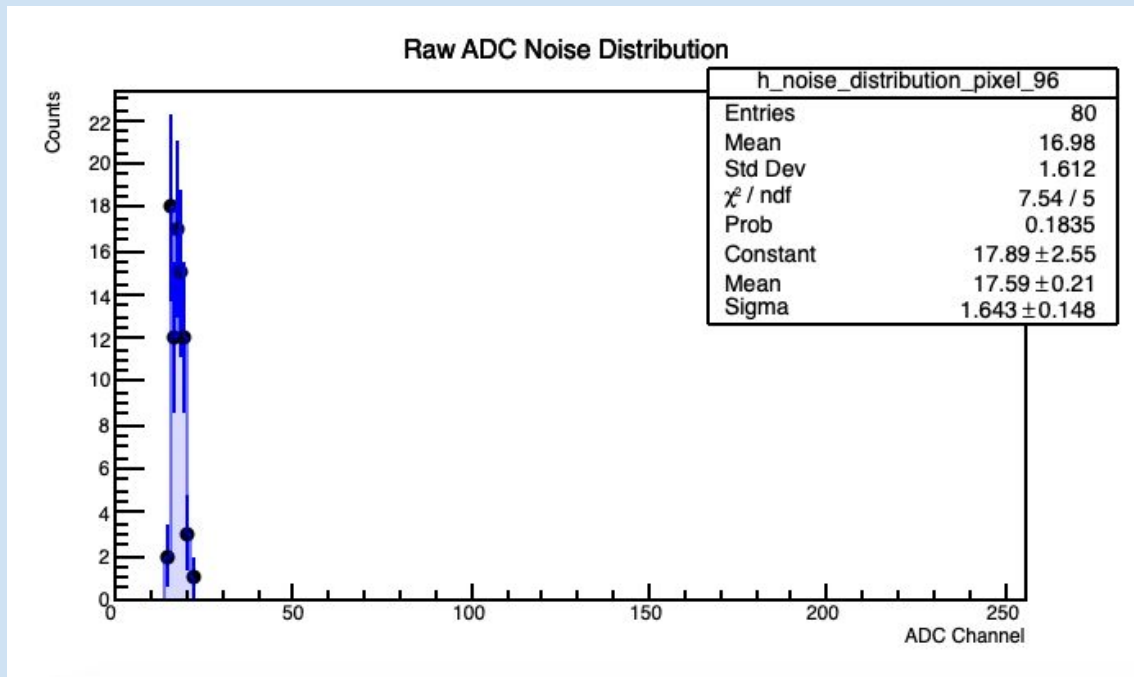
Figure B.1: EICROC0 pixel probe configuration presentation

When v_{ref} is ~ 60 , we see the expected shift of the center of the distribution, but tails also appear on both sides



Example of finding optimized v_ref for pixel 96

After scanning at various vref values over 10 events, vref = 120 (0x78) shifts the peak into the 10-20 range desired



Process will be automated for all pixels

Next: take data with charge injections for selected pixels