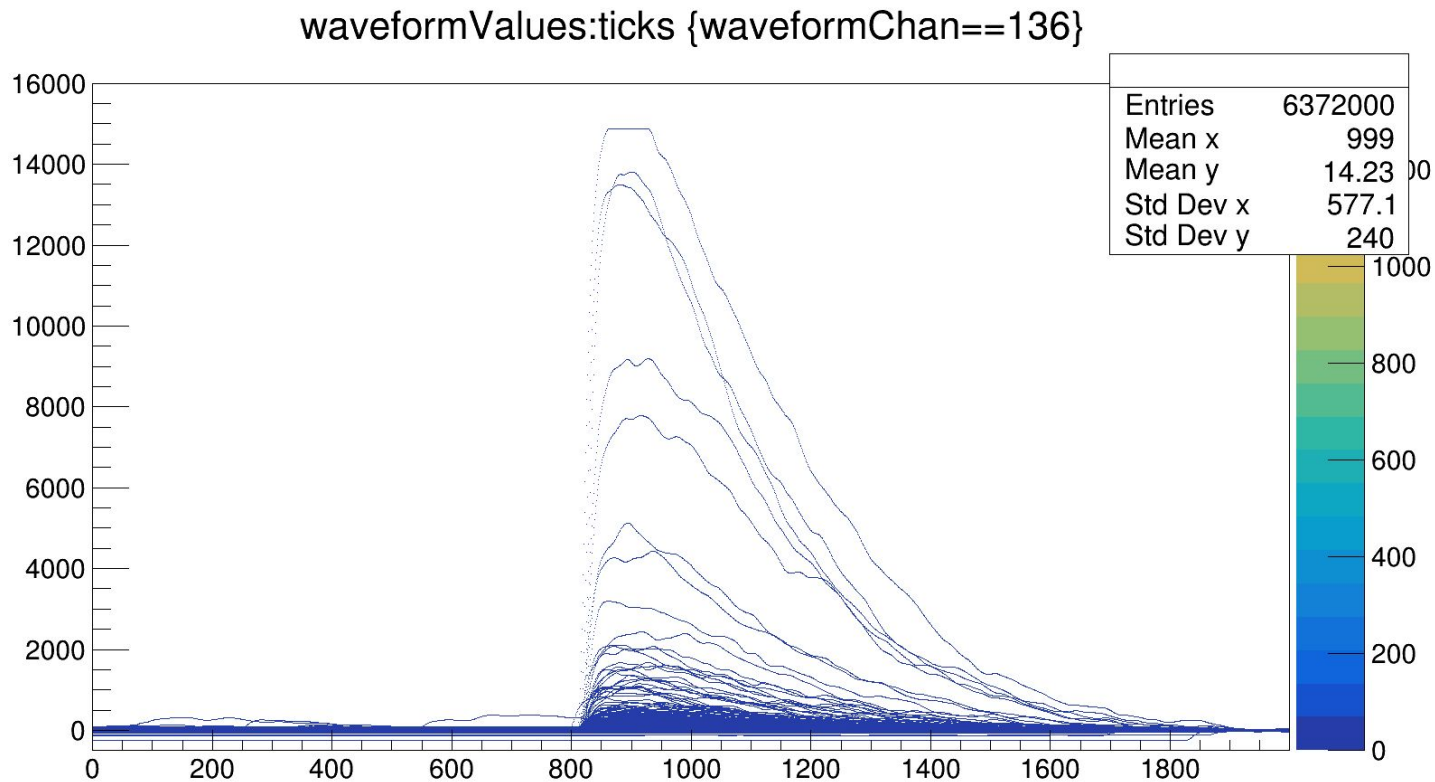


# Xenon Doping: ARAPUCA Analysis

Kyle Spurgeon

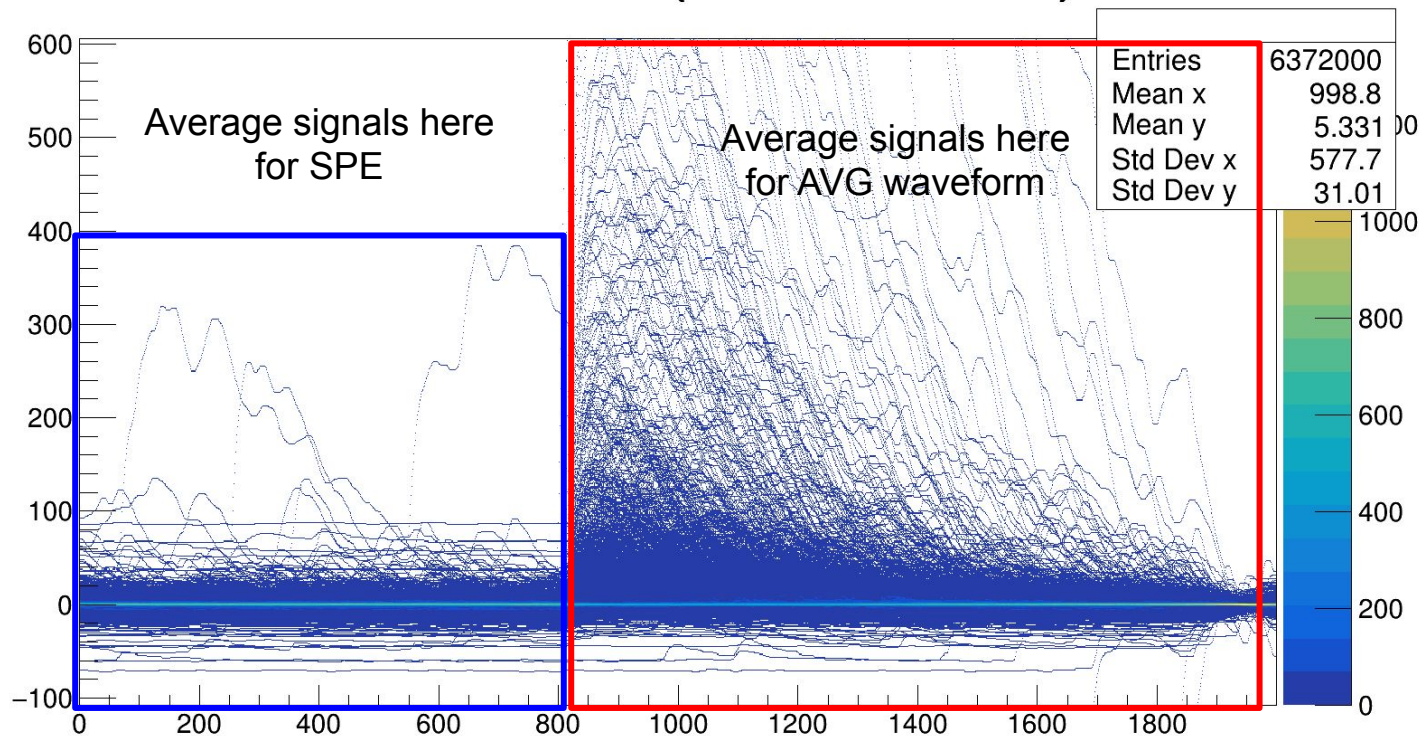
By now you know the drill

# Collect waveforms



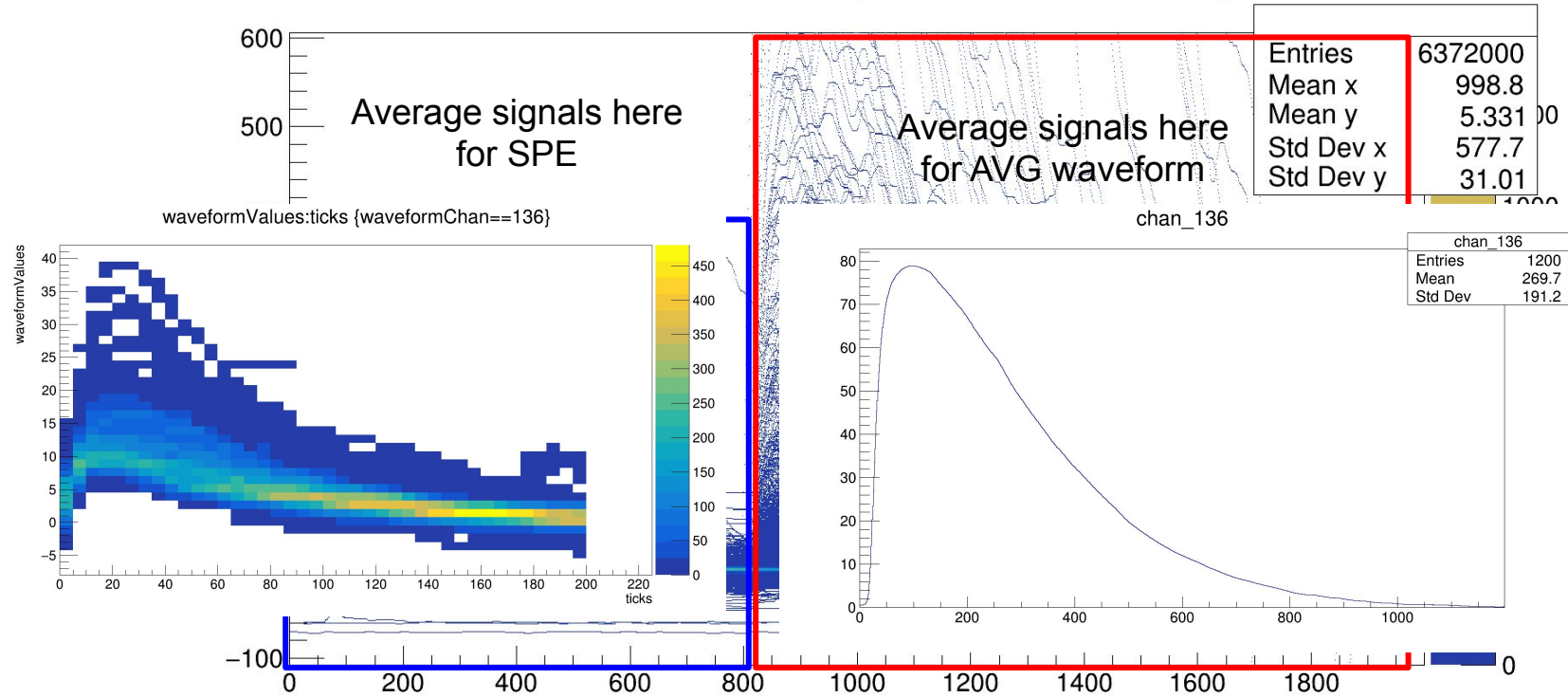
# Collect waveforms

waveformValues:ticks {waveformChan==136}



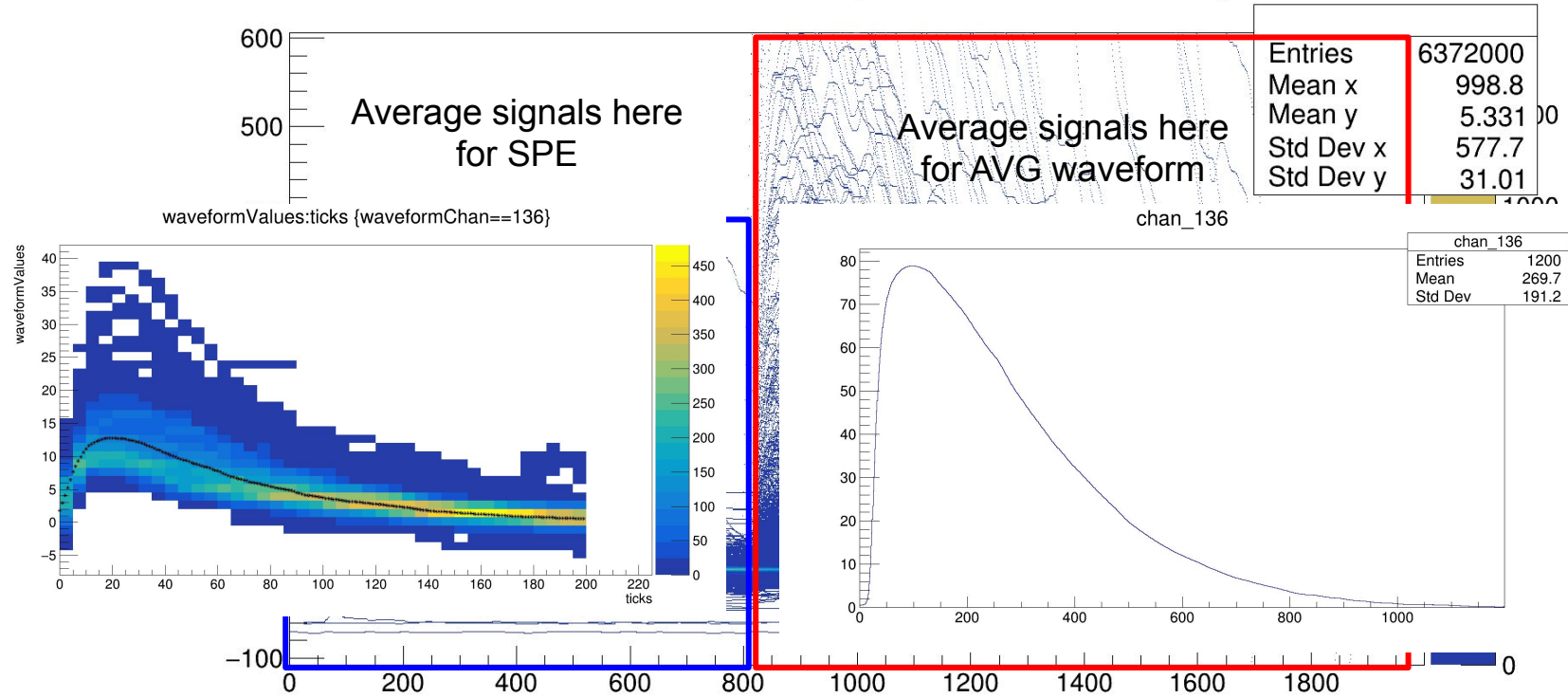
# Collect waveforms

waveformValues:ticks {waveformChan==136}



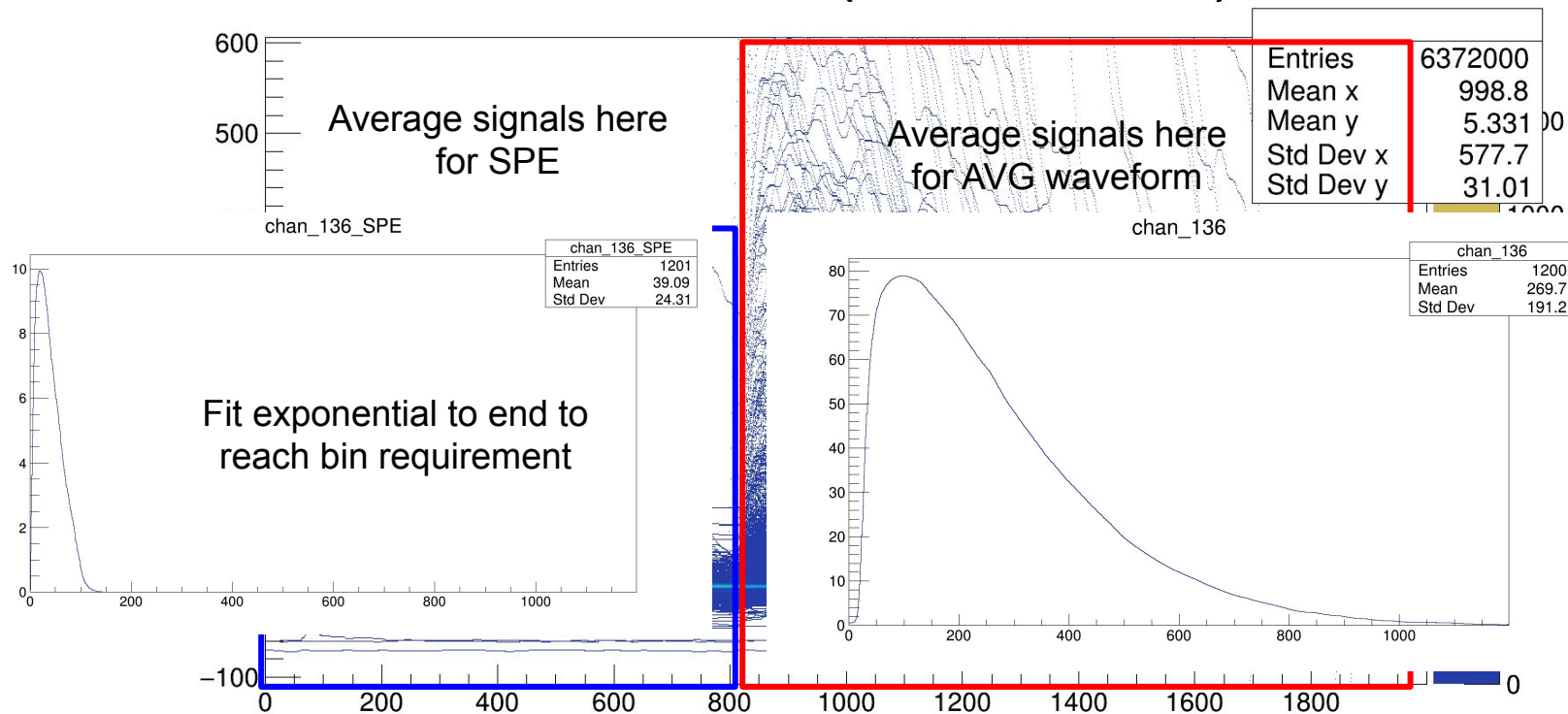
# Collect waveforms

waveformValues:ticks {waveformChan==136}

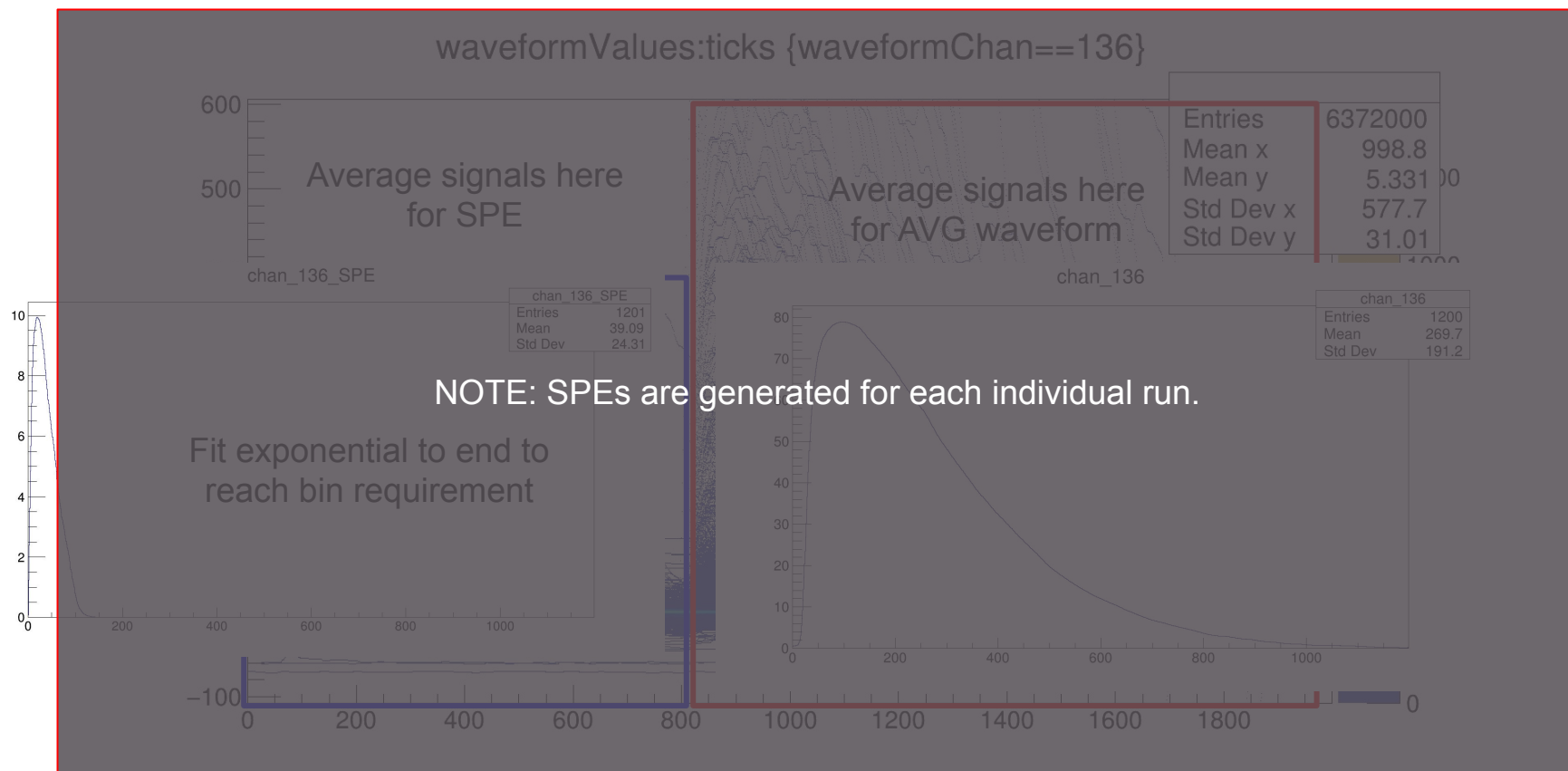


# Collect waveforms

waveformValues:ticks {waveformChan==136}



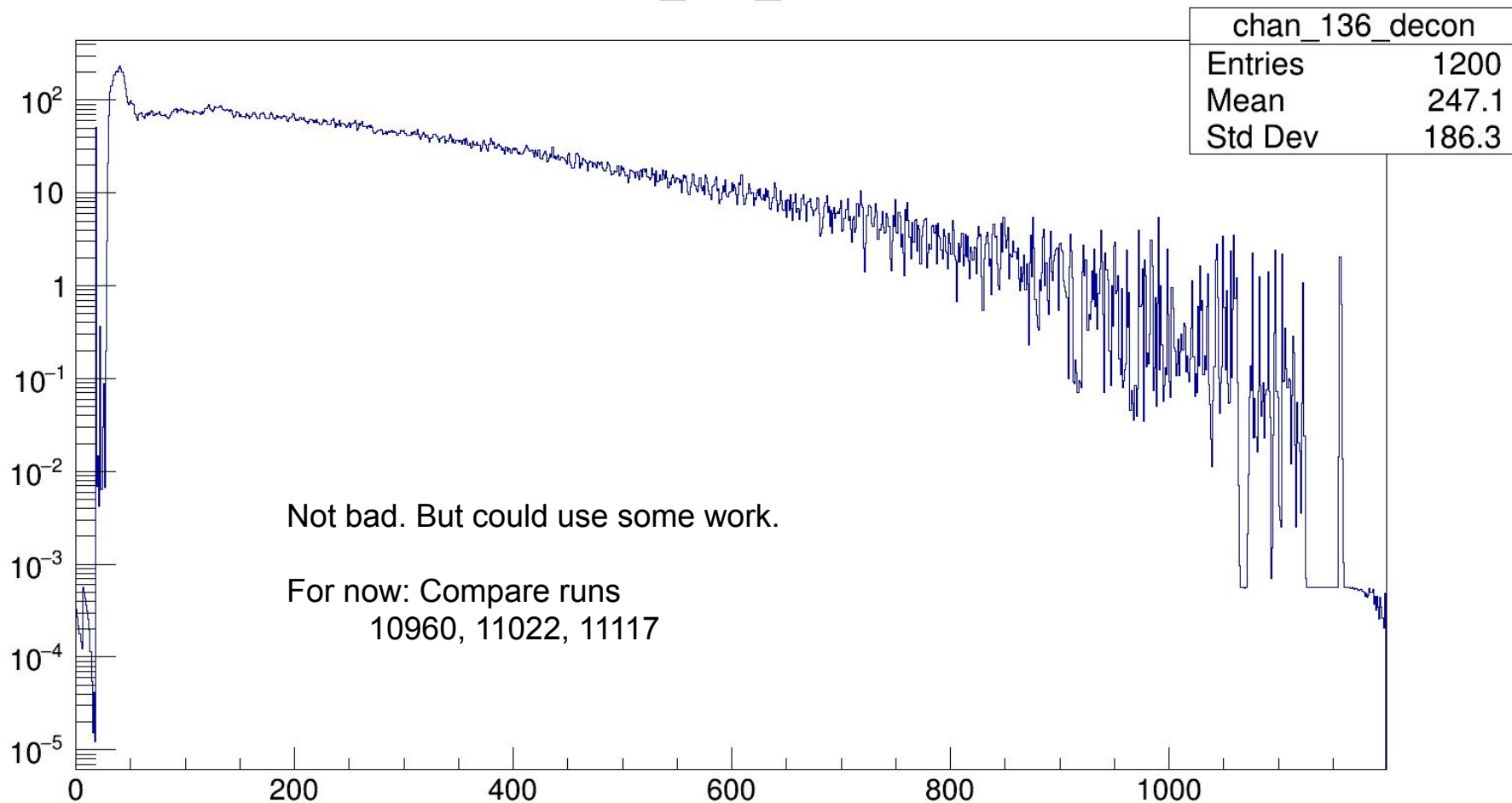
# Collect waveforms

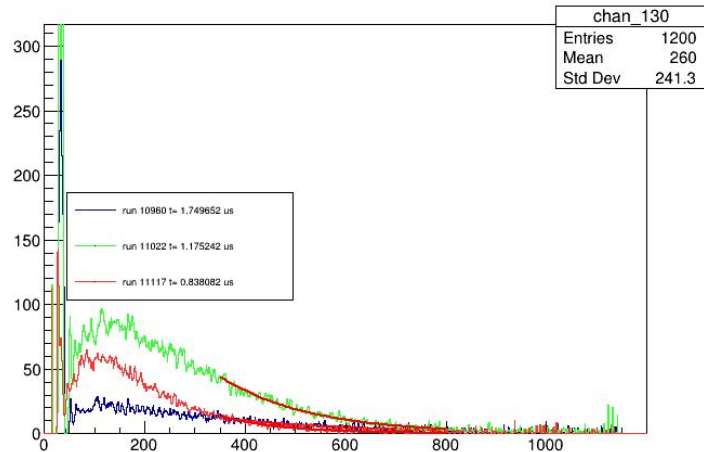
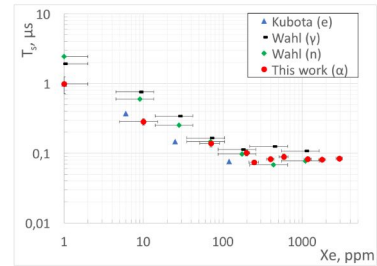
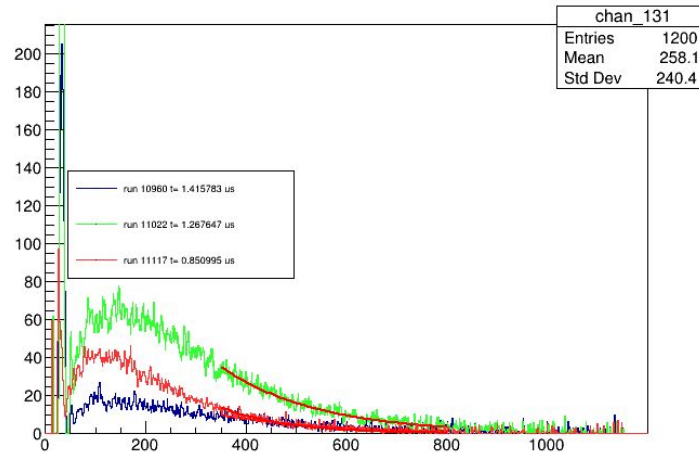
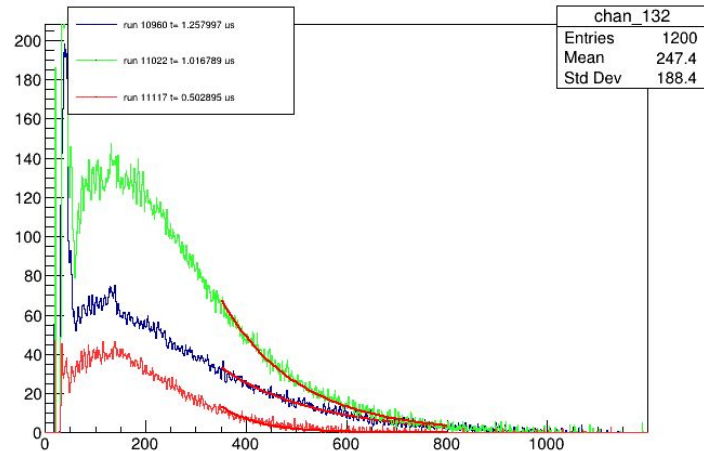
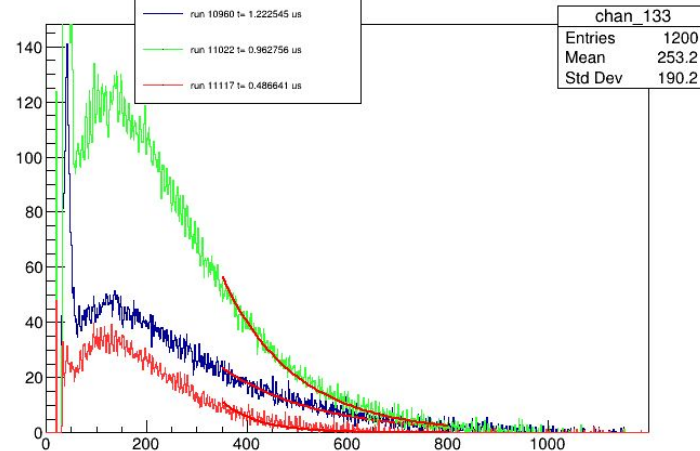


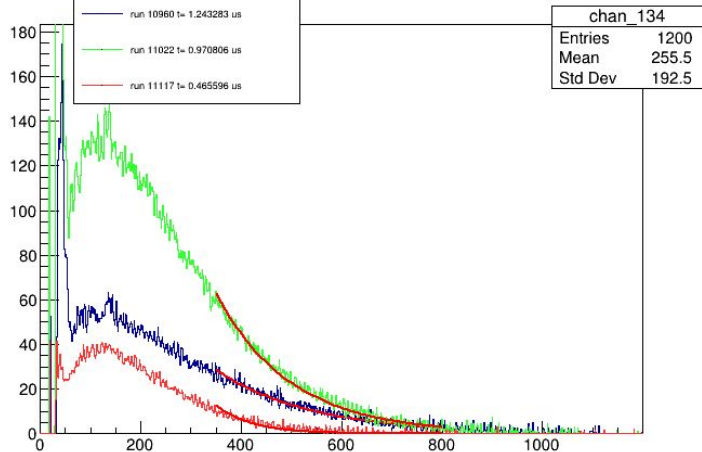
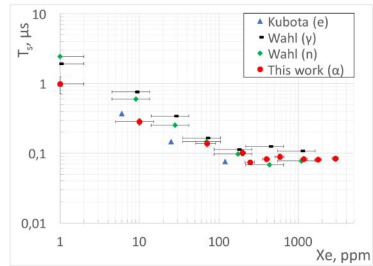
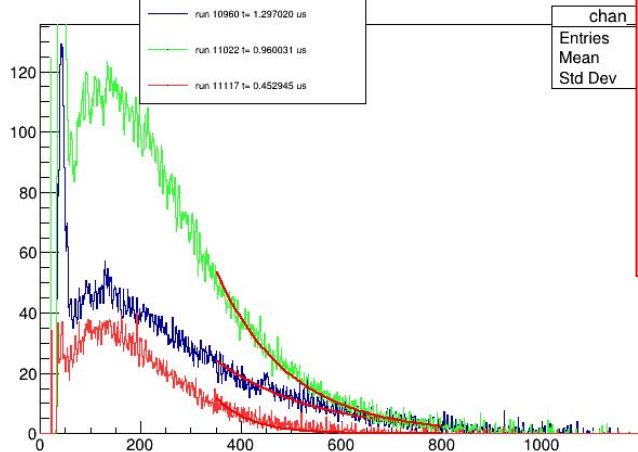


# DECONVOLUTION

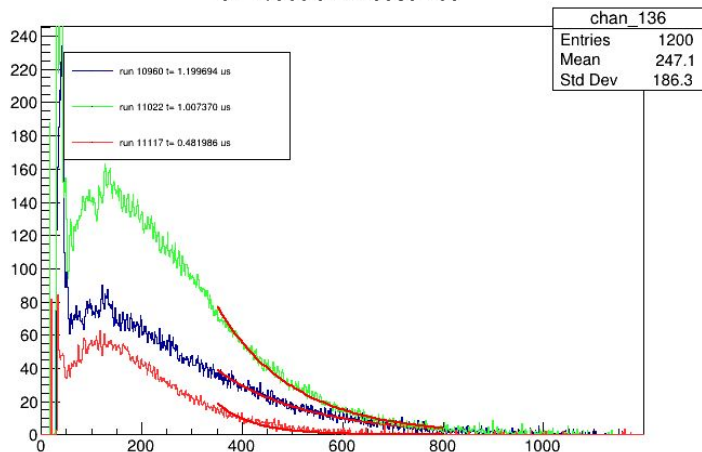
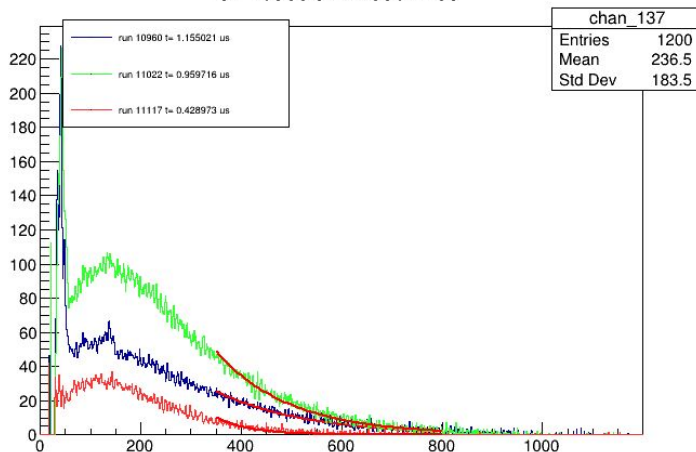
# chan\_136\_decon

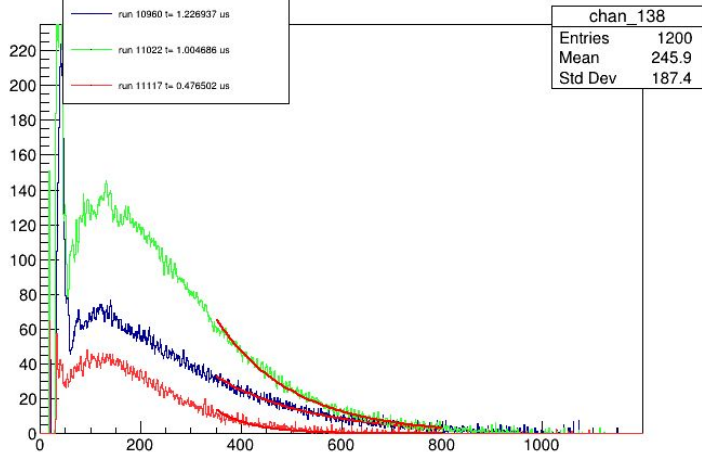
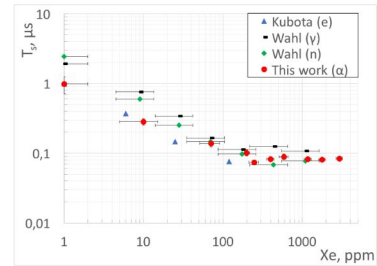
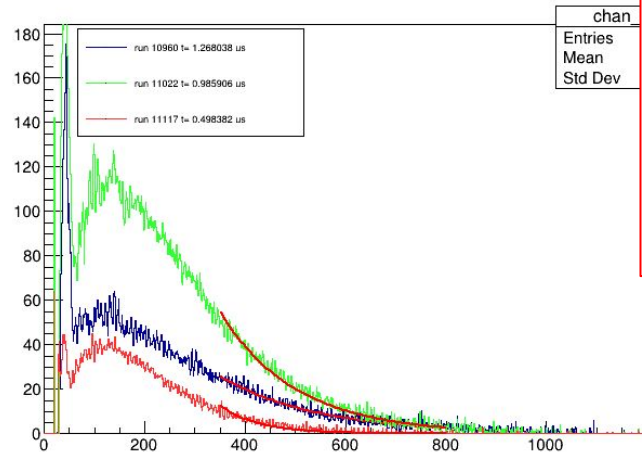


run 10960  $t = 1.749652$  usrun 10960  $t = 1.415783$  usSlow time component evolution  
from Akimov et al (2019)run 10960  $t = 1.257997$  usrun 10960  $t = 1.222545$  us

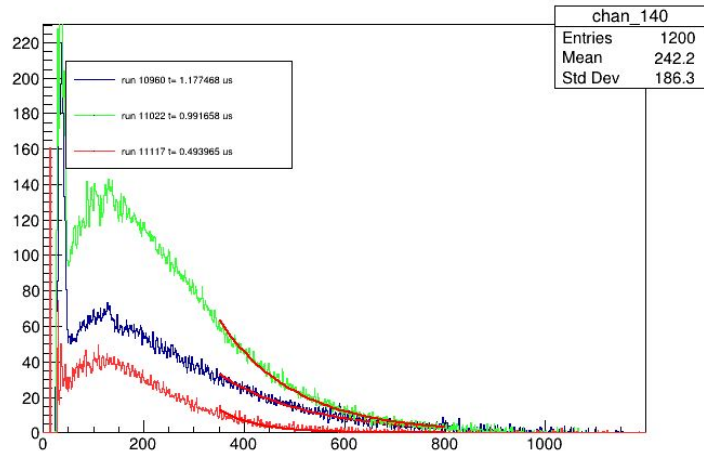
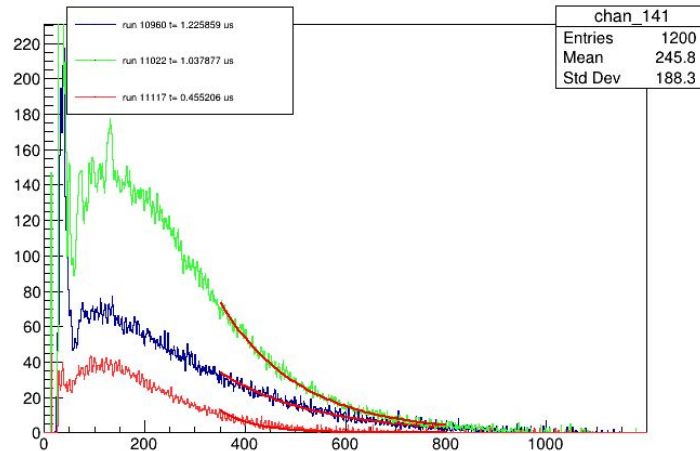
run\_10960  $t = 1.243283$  usrun\_10960  $t = 1.297020$  us

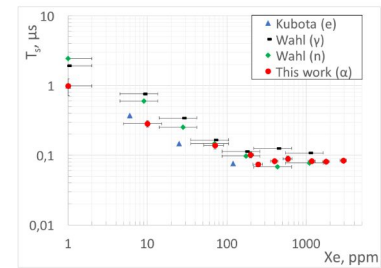
Slow time component evolution  
from Akimov et al (2019)

run\_10960  $t = 1.199694$  usrun\_10960  $t = 1.155021$  us

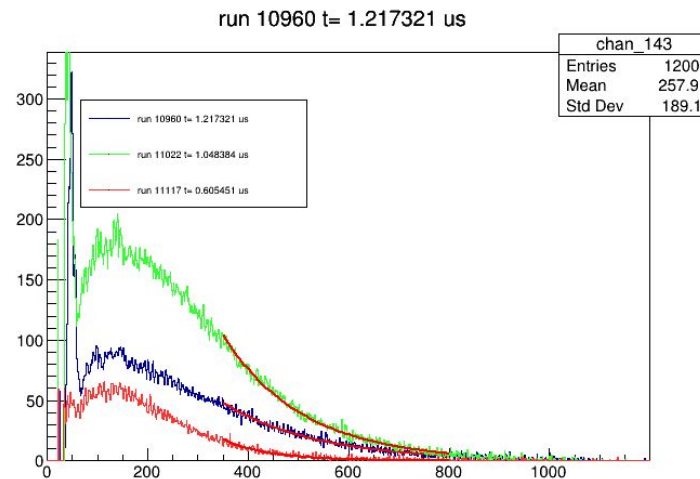
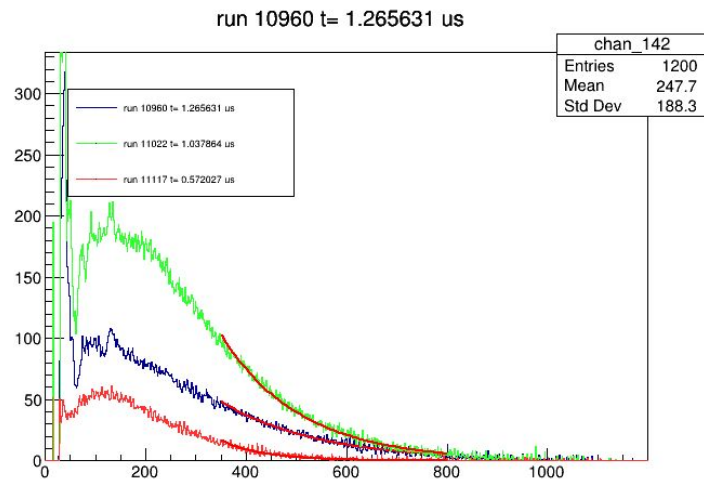
run\_10960  $t = 1.226937$  usrun\_10960  $t = 1.268038$  us

Slow time component evolution  
from Akimov et al (2019)

run\_10960  $t = 1.177468$  usrun\_10960  $t = 1.225859$  us



Slow time component evolution  
from Akimov et al (2019)



# ARAPUCA Average slow decay time

Fit all 12 ARAPUCA  
channels

Average that decay time

Have errors -> trying to  
convert properly

Fits are in tick space



# Summary

ARAPUCA channels (and all ProtoDUNE-SP) PDS channels have been analyzed

Slow component decreasing steadily over 4 runs - good sign

Have MANY runs analyzed, but an analyzing them chronologically

Many runs from 1st doping done, 2nd/3rd comong

Calibration still needs done - Have ADC in all avg waveforms to serve as comparison for now?

Will try area normalization for now?

Need to make more cuts on waveforms that go into average waveforms

Xenon!

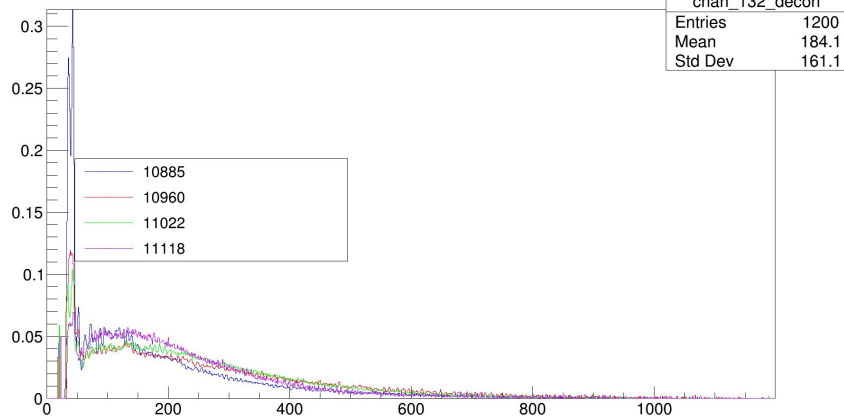




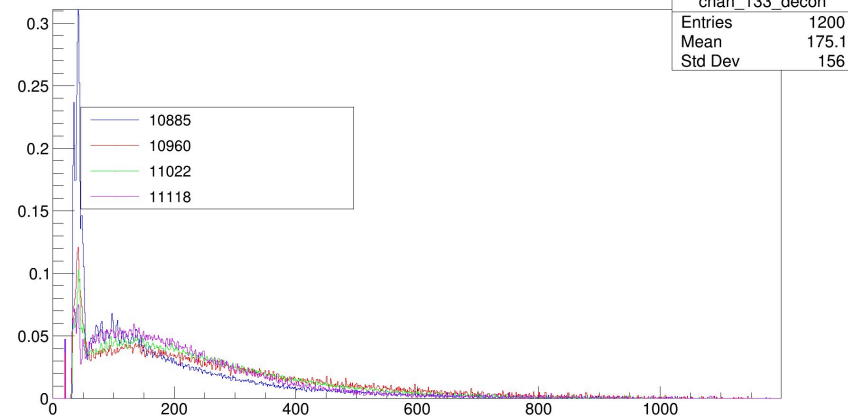
# Backups

I'll put all of the waveforms and SPEs here soon.

# Chan 132

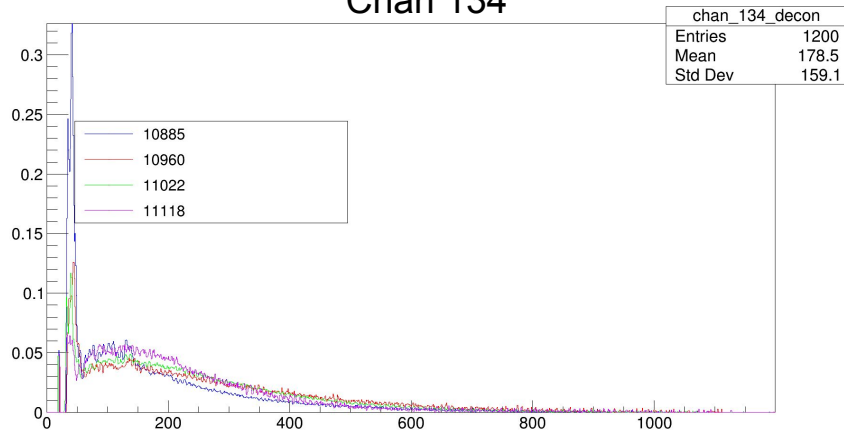


# Chan 133

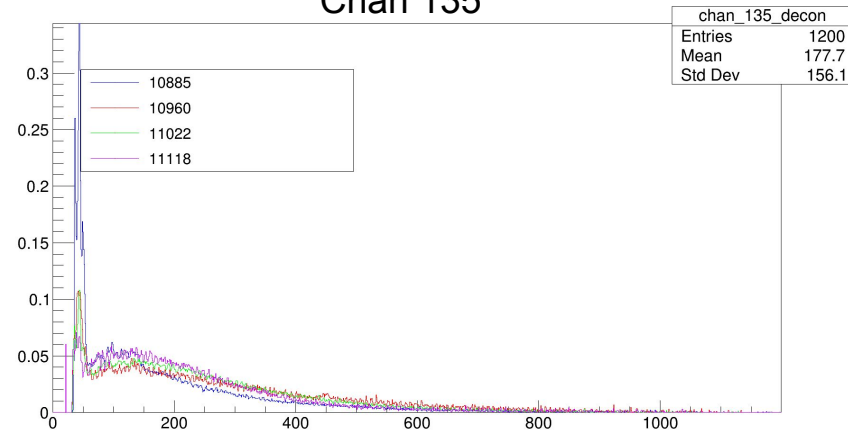


Area-normalized

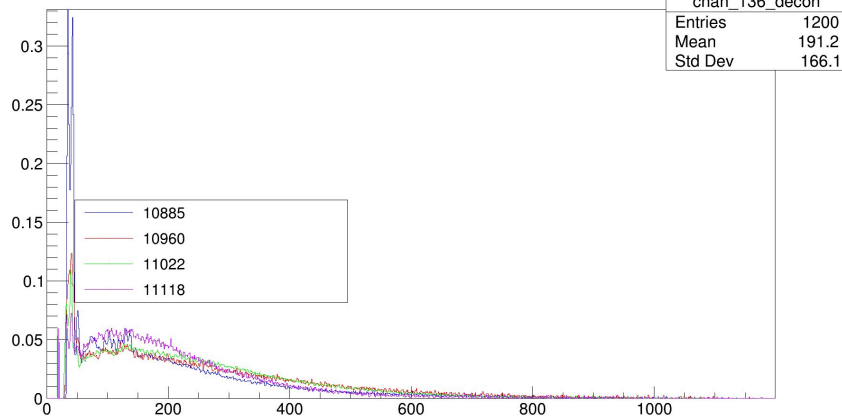
# Chan 134



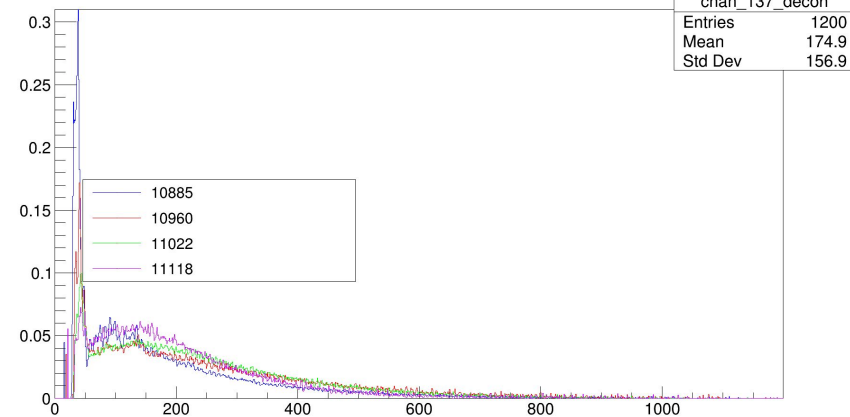
# Chan 135



# Chan 136

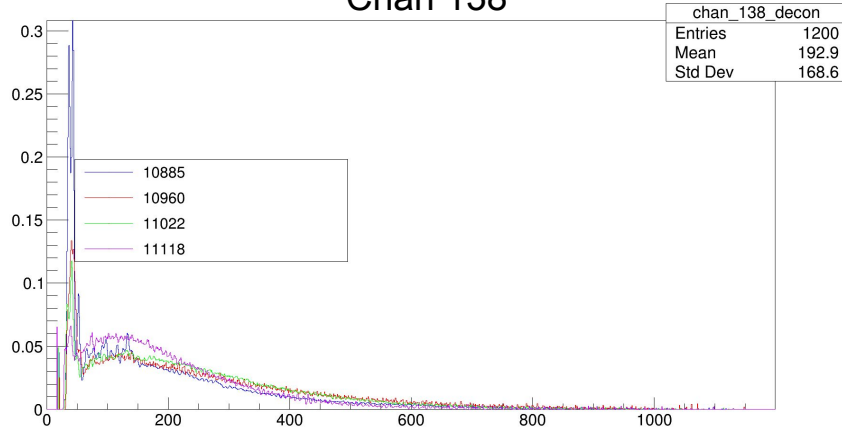


# Chan 137

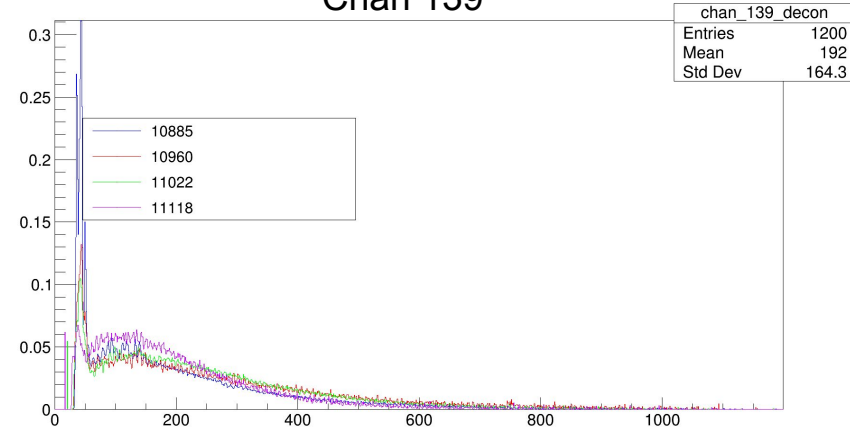


Area-normalized

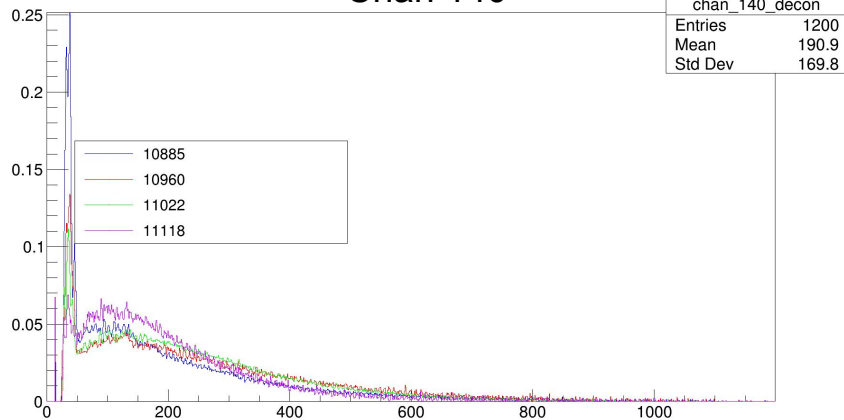
# Chan 138



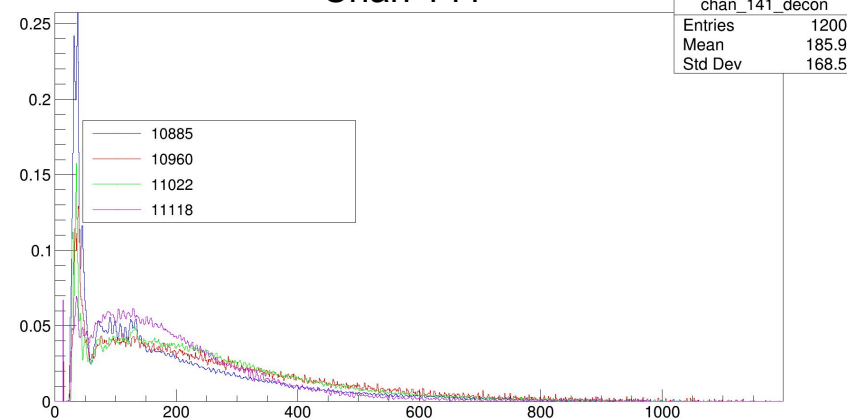
# Chan 139



# Chan 140

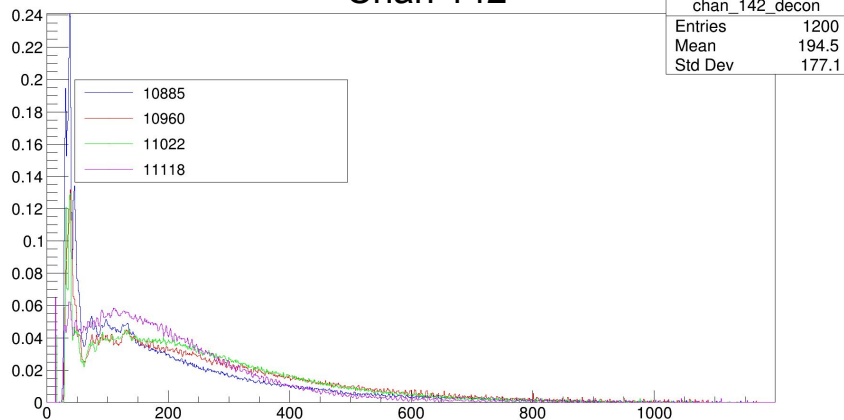


# Chan 141

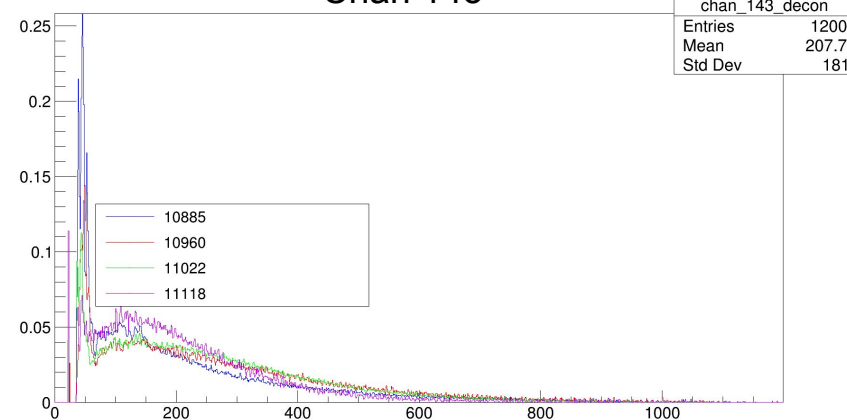


Area-normalized

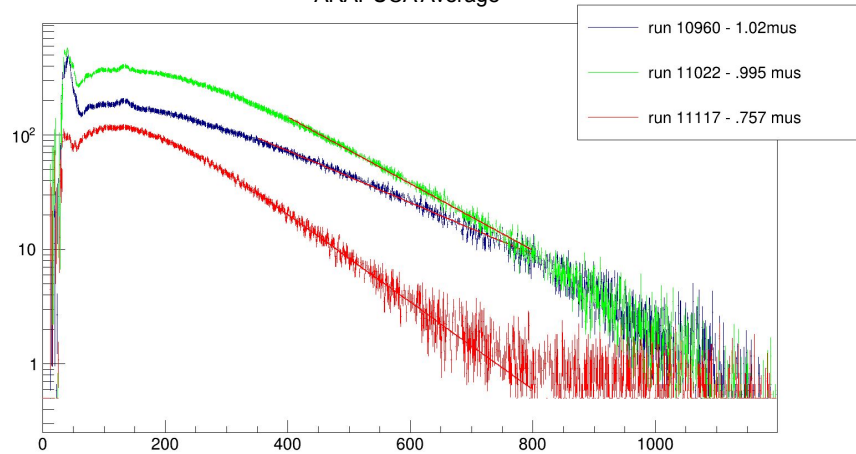
# Chan 142



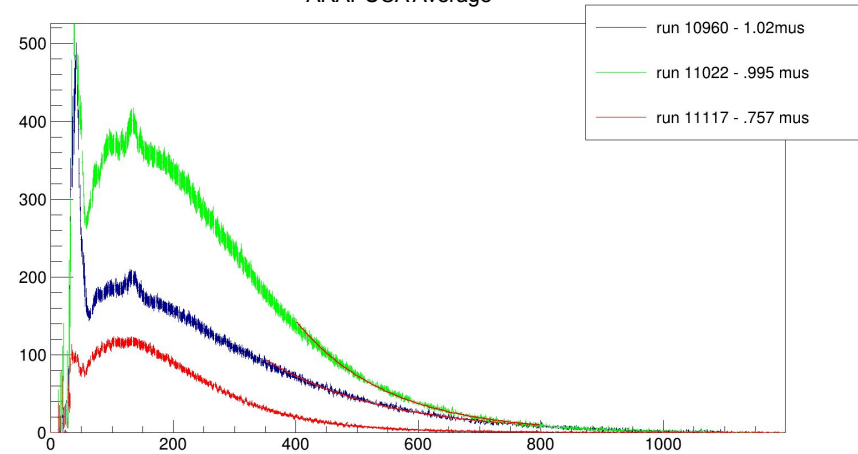
# Chan 143



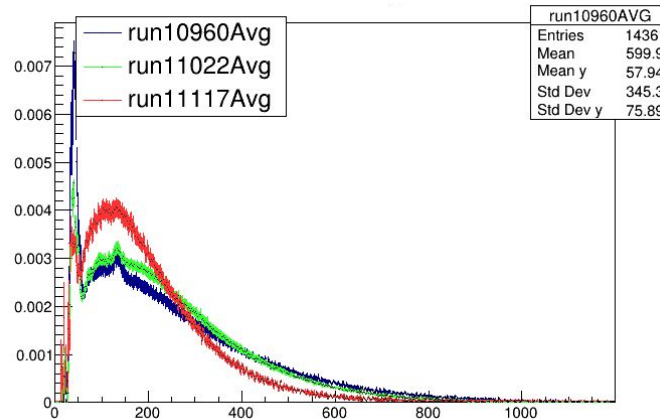
ARAPUCA Average



ARAPUCA Average



ARAPUCA Average -Area Normalized



Average of the 12  
ARAPUCA channels.  
Misinterpreted a  
request from Bryan and  
made this. Might be  
interesting?

ARAPUCA Average -Area Normalized

